PUBLIC SERVICES AND PROCUREMENT CANADA
ENVIRONMENTAL SERVICES – WESTERN REGION

Confirmatory Sampling Program for the Resolute Bay Airport Landfill, Resolute Bay, Nunavut

PSPC Project R.112072.001

Final Report

March 2022

DOJV Project No. P2021-09

Executive Summary

Dillon Consulting Ltd. and Outcome Consultants Inc in joint venture (DOJV) were contracted by Public Services and Procurement Canada (PSPC) Environmental Services on behalf of Transport Canada (TC) as site custodian, to initiate the Confirmatory Sampling Program (CSP) for the Resolute Bay Airport Landfill site in accordance with the December 2020 *Post-Closure Monitoring Plan* (DOJV 2020) for the Resolute Bay Airport Landfills in Resolute Bay, Nunavut and in accordance with the Nunavut Water Board (NWB) Amended Renewal Water License (WL) 1BR-RBL1929.

The Resolute Bay Airport is five kilometres northwest of the Inuit hamlet of Resolute, adjacent to Resolute Bay on Cornwallis Island, Nunavut. The site consists of three Areas of Environmental Concern (AECs): two historical landfills and a former vehicle storage area (also referenced as metal storage area). The AECs were remediated in two field seasons during 2018 and 2019. For reporting purposes, the AECs are referenced as the Inactive Solid Waste Landfill (AEC 1), Historical Landfill (AEC 2), and the Former Vehicle and Waste Metal Storage Area (AEC 3).

The post-closure CSP was implemented to evaluate the sustained effectiveness of the Site remediation. Due to the COVID 19 pandemic in 2020, the first year of post remediation monitoring of the site was not completed, and therefore postponed to 2021 with NWB approval.

Outcome conducted the field activities for year 1 of the CSP for the Resolute Bay Airport Landfill site from August 24 – 29, 2021. The program included installation of three thermistors at AEC 1, monitoring and sampling of groundwater (11 monitoring wells) and surface water (4 seep locations) and visual inspections of all three AECs. Groundwater and surface water samples were analysed for dissolved petroleum hydrocarbons (PHCs) Fraction 1 (F1) to F4, benzene, toluene, ethylbenzene and xylenes, oil and grease) total metals, routine water parameter, nutrients, polycyclic aromatic hydrocarbons (PAHs) and phenols to meet licence monitoring requirements.

Based on visual inspections, the landfills are functioning as designed with all three AEC's overall performance considered acceptable. Isolated stress fractures (cracking possibly due to sloughing) were noted at AEC 2 paralleling the western edge of the landfill (approximately 75 - 100 m^2). Isolated slope failure was noted along the north edge of the remedial area near Excavation 1 at AEC 3 (approximately 150 m^2). However, this may be natural sloughing occurring due to the proximity to the local valley and stream. Subsequent inspections can assess any changes to the above noted observations.

Eleven monitoring wells (RBL-1 to 3 (AEC 1), RBL-5 to 7 (AEC 2), RBL-10 to 12, RBL-14 and 15 (AEC 3)) were monitored as part of the CSP with only six wells (RBL-1 to 3, RBL-7, 10 and 14) having sufficient groundwater to be sampled. The other five wells had limited water volume/poor recharge or were dry and as such no samples were collected. A summary of the groundwater results follows:

- At AEC 1, monitoring well RBL-3 (hydraulically downgradient) (and duplicate GW DUP 1) had PHC F2 concentrations which exceeded the Ontario Ministry of the Environment, Conservation and Parks

(MECP) Table 3 site condition standard (SCS) used. As well, concentrations of Total Suspended Solids (TSS) exceeded the Nunavut Water Board's (NWB) Water Licence (WL) maximum allowable effluent concentration at RBL-1 (hydraulically upgradient) and sample set RBL-3/GW DUP 1.

- At AEC 2, monitoring well RBL-7 (hydraulically downgradient) had concentrations of cadmium, lead that exceeded MECP standard and TSS that exceeded the NWB WL maximum allowable effluent concentration.
- At AEC 3, monitoring well RBL-14 (hydraulically upgradient) had TSS concentrations exceeding the WL maximum allowable effluent concentration. All other chemical parameters sampled in the monitoring wells had concentrations below detection limits or below the applied standards or guidelines.

TSS concentrations were noted in monitoring wells where residual sediments may have increased turbidity and may not necessarily reflect in-situ water conditions. As well, TSS concentrations were noted in groundwater that was both upgradient and downgradient and therefore concentrations may reflect background conditions.

Four surface water locations (RBL-4 (AEC1), RBL-8 (AEC 2), RBL-13 and 16 (AEC 3)) were sampled as part of the CSP, however, surface water locations at AEC 3 were completed south of the road (hydraulically cross gradient). No surface water was noted near the former excavations on the north side of the road and due to the sighting of a polar bear in the area no field activities were completed in the valley/stream to the north. A summary of the surface water results follows:

- At AEC 1, surface sample RBL-4 (hydraulically downgradient) had concentrations of hexavalent chromium and ammonia that exceeded the applied Canadian Council of Ministers of the Environment (CCME) guidelines.
- At AEC 2, surface samples RBL-8 (and duplicate Field DUP 2) (hydraulically downgradient) had concentrations of ammonia that exceeded the CCME guideline.
- At AEC 3, surface water location RBL-13 had concentrations of aluminum, iron and ammonia that exceeded the CCME guideline. As well, at AEC 3, surface water location RBL-16 exceeded CCME guidelines for ammonia. All other chemical parameters sampled at surface water locations had concentrations below detection limits and/or below the applied guidelines.

Based on the results of the field and laboratory QA/QC program, the data quality was considered reliable for its intended use.

A longer time series of groundwater and surface water results is required to compare upgradient vs downgradient locations and to evaluate trends at each sampling location. Groundwater and surface water actions levels as described in the *Post-Closure Monitoring Plan* (DOJV 2020) will be assessed following subsequent data collection. Time trends will be assessed with using a moving average approach with actionable criteria backed by a Mann-Kendall analysis.

Outcome recommends a change to the current NWB Licence requirement from sampling of groundwater and surface water twice a year (spring freshet and mid summer) to sampling once per year in mid-summer. The short field season for northern work means that both events would be very close together and provide marginal benefit when compared to the logistical costs.

Table of Contents

Executive Summary i
Table of Contents iv
1.0 **Introduction** 1
1.1 Objectives of the CSP 1
1.2 Scope of Work 1
2.0 **Background Information** 2
2.1 Site Description 2
2.2 Summary of Previous Programs 3
3.0 **Regulatory Guidelines** 6
3.1 Guideline Overview 6
3.2 Groundwater 6
3.3 Surface Water 7
4.0 **Site Investigation Methodology** 9
4.1 Schedule and Personnel 9
4.2 Health and Safety Plan 9
4.3 Visual Inspections 9
4.3.1 Landfill Integrity 9
4.3.2 Wildlife Survey 9
4.4 Thermal Monitoring Installations 10
4.5 Groundwater Monitoring and Sampling 12
4.6 Surface Water Sampling 13
4.7 Quality Assurance and Quality Control 14
4.7.1 Field Methods 14
4.7.2 Laboratory Methods 14
4.7.3 Data Validation 15
4.8 Laboratory Analytical Program 15
5.0 **Summary of AEC 1 Conditions** 17
5.1 Area Summary 17
5.2 Photographic Record 17
5.3 Visual Inspection Evaluation and Stability Assessment 17

5.3.1 Vegetation 20
5.3.2 Seepage / Ponded Water 20
5.3.3 Summary 20
5.4 Thermal Monitoring Installations and Baseline Data 20
5.5 Analytical Results – Groundwater Samples 21
5.6 Analytical Results – Surface Water Samples 22

6.0 **Summary of AEC 2 Conditions** **23**

6.1 Area Summary 23
6.2 Photographic Record 23
6.3 Visual Inspection Evaluation and Stability Assessment 23
6.3.1 Settlement 26
6.3.2 Vegetation 27
6.3.3 Seepage / Ponded Water 27
6.3.4 Summary 27
6.4 Analytical Results – Groundwater Samples 27
6.5 Analytical Results – Surface Water Samples 27

7.0 **Summary of AEC 3 Conditions** **29**

7.1 Area Summary 29
7.2 Photographic Record 29
7.3 Visual Inspection Evaluation and Stability Assessment 29
7.3.1 Settlement 32
7.3.2 Seepage / Ponded Water 32
7.3.3 Summary 32
7.4 Analytical Results – Groundwater Samples 33
7.5 Analytical Results – Surface Water Samples 33

8.0 **QA/QC Discussion** **34**

8.1 Hold Times 34
8.2 Field Duplicates 34
8.3 Field Blank 35
8.4 Laboratory QA/QC 35
8.5 Summary 36

9.0 **Conclusions and Recommendations** **37**
10.0 **Closure** **39**
11.0 **References** **40**

Tables

Table 1: Maximum Allowable Effluent Discharge Limits as per Part D, Condition 11 of Water Licence 7
Table 2: AEC 1 Thermistor Locations 10
Table 3: Monitoring Well Locations 12
Table 4: Surface Water/Seep Locations 13
Table 5: Data Quality Targets 15
Table 6: Groundwater and Surface Water Analyses 16
Table 7: Preliminary Visual Inspection Report AEC 1 17
Table 8: Preliminary Visual Inspection Report AEC 1 - Definitions 19
Table 9: Preliminary Visual Inspection Report AEC 2 23
Table 10: Preliminary Visual Inspection Report AEC 2 - Definitions 25
Table 11: AEC 2 Settlement Observation Details 26
Table 12: Preliminary Visual Inspection Report AEC 3 29
Table 13: Preliminary Visual Inspection Report AEC 3 - Definitions 31
Table 14: AEC 3 Settlement Observation Details 32

Appendices

A Figures
B NWB Guideline Approval and Copy of Guidelines Used
C Analytical Results Tables
D Field Notes
E Laboratory Certificates of Analyses, Chain of Custody Forms and Lab Letter of Approval for Outcome's QA/QC
F Site Photo Logs
G Thermistor Installation/Photo Logs and Baseline Temperature Results

1.0 Introduction

Dillon Consulting Ltd. and Outcome Consultants Inc in joint venture (DOJV) were contracted by Public Services and Procurement Canada (PSPC) Environmental Services on behalf of Transport Canada (TC) as site custodian, to initiate the Confirmatory Sampling Program (CSP) for the Resolute Bay Airport Landfill site in accordance with the December 2020 *Post-Closure Monitoring Plan* (DOJV 2020) for the Resolute Bay Airport Landfills in Resolute Bay, Nunavut and in accordance with the Nunavut Water Board (NWB) Amended Renewal Water License (WL) 1BR-RBL1929.

In fiscal year 2020-21 Dillon-Outcome completed a Post-Closure Monitoring Plan (PCMP), an Operation and Maintenance Manual, Cost Estimate and Project Closure Report for the three waste landfill sites at the Resolute Bay Airport. The three landfill sites are referred to as (AEC 1) Inactive Solid Waste Landfill, (AEC 2) Historical Landfill, and (AEC 3) Former Vehicle and Waste Metal Storage Area (AEC 3). The PCMP contained the specific monitoring requirements with descriptions of methodology and action levels based on observed impacts that may lead to further action or ultimately the cessation of confirmatory sampling. Due to COVID 19 pandemic, the first year of monitoring could not be completed in 2020 and deferred to the subsequent year with NWB approval. Year 1 of the CSP is considered to be fiscal year 2021-22.

1.1 Objectives of the CSP

The goal of the confirmatory sampling program is to ensure that present and future risks to human health and the environment from the post remediation site conditions are negligible and that monitoring, at some point in the future, could be terminated with confidence, based on findings of no risk and no deterioration of the site's environmental conditions.

The post-closure CSP was implemented to evaluate the sustained effectiveness of the Site remediation.

1.2 Scope of Work

Resolute Bay CSP includes the following tasks for 2021:

- Mobilization and demobilization;
- General Site reconnaissance and natural environment monitoring;
- Visual integrity monitoring and inspection of landfill cover and other remediated areas;
- Groundwater monitoring and sampling of monitoring wells at landfills AEC-1, AEC-2 and AEC 3;
- Surface water/seep monitoring and sampling at discharge points;
- Supervision of Contractor and Installation of three thermistors at AEC-1 landfill;
- Initiating thermal monitoring with the newly installed thermistors; and
- Packing and preparation of all water samples and sending them to the designated environmental lab.

2.0 Background Information

2.1 Site Description

The Resolute Bay Airport is legally described as Lot 1001, Quad 58 F/11, Plan 77590 (Public Works and Government Services Canada, 1994). The total area of the site is 2,025 hectares. The Airport is five kilometres northwest of the Inuit hamlet of Resolute, adjacent to Resolute Bay on Cornwallis Island, Nunavut. Cornwallis Island is in the Qikiqtaaluk Region of Nunavut. The Resolute Bay Airport property contains an airstrip, terminal building, hangars, warehouses, fuel storage, and other airport infrastructure. Drinking water for the Hamlet of Resolute Bay is supplied from Strip Lake, a naturally-occurring freshwater lake on the site immediately to the east of the main runway.

Three Areas of Environmental Concern (AECs) were previously identified based on activities, historical and present, associated with the airport and local community.

- AEC 1 is a solid waste landfill developed in the 1960s and 1970s that has not been in official use since 1995. It is located on airport property approximately 2 km north of the north end of the airstrip.
- AEC 2 is a historic landfill that operated between 1947 and 1996. The landfill was used by the military, Transport Canada (TC), and other airport tenants. It is 0.5 km immediately west of the airstrip and in close proximity to restricted access airport activities.
- AEC 3, the historical vehicle storage area, is a metal storage area previously used for vehicle and airport metal waste storage. It is northwest of the Resolute Airport airstrip and 2.75 km north-west of AEC 1. It is an inactive area that resides on the northern perimeter of the Airport property boundary.

The site location is shown in Figure 1 (Appendix A).

The Resolute airport is legally described as Lot 1001, Quad 58 F/11, Plan 77590 (Public Works and Government Services Canada, 1994). The total area of the site is 2,025 hectares. The work areas described in this report do not map directly onto the property – as noted above, AEC 3 is on the northern perimeter of the airport property.

There are no buildings in the work areas. Adjacent land use consists of a municipal sewage lagoon consisting of four separate containment cells, located southeast of AEC 1 and a fenced waste storage area located north of AEC 1 which are both operated by the hamlet and not addressed in this project. The sewage lagoon is known to be operating beyond the design capacity, as chronic overflow issues are known to occur. The open flat areas near AEC 1 have been reported by local contractors to be used by the hamlet to stockpile snow from snow removal activities at the airport. The open flat areas on the east side of AEC 2 have occasionally been used seasonally for large vehicle and or equipment/material storage by the airport authorities.

The work areas are characterized by flat to gently sloping terrain, although AEC 1 and AEC 2 are on slopes, with elevations that range from 35 to 66 m above sea level (asl). AEC 3 is on the top of the south slope of the McMaster River Valley at an elevation of approximately 30 to 35 m asl SENES and Franz (2013). Where present, plant cover is sparse, irregular, and discontinuous.

The loose, unconsolidated sediments at the site and the depth to permafrost mean that drainage in all areas is controlled by the topography. AEC 1 and AEC 3 slope downwards to the west and are located 1 km and 675 m from the bay respectively.

The AEC 1 landfill design was based on a barrier cover design. The constructed barrier was heavily compacted and saturated during construction. The barrier was constructed in mind with the ambient environment to turn to permafrost, which builds an impermeable landfill cap. Further, the drainage swales were constructed to enhance surface water drainage around the landfill to redirect surface water and reducing the potential for landfill leachate production. Swales were implemented at the base of the landfill toes to divert surface water overland flow around the landfill and to existing water bodies.

The AEC 2 landfill design is based on an earthen barrier cover design. The remedial design included a graded cut/fill approach with aggregates used to as a general cover, fill in voids or low spots on the top to promote surficial flow and the construction of drainage swales to promote proper drainage. During the remedial work, surface debris was removed from AEC 2 and brought to AEC 1 if non-hazardous and shipped off-site if deemed to be hazardous. AEC 2 is drained by a complex sequence of interconnected ponds and drainage channels that ultimately discharge towards the south into Resolute Bay. Three small ponded areas west of the landfill capture runoff and drainage from the landfill. These ponds drain approximately 1 km into Meretta/Marida Lake and then to Resolute Lake, and finally Resolute Bay. A patchy, discontinuous wetland has developed at the toe of the Historic Landfill (AEC 2) along its southern extent.

The remedial work at AEC 3 included the removal of physical hazards (by debris removal and/or capping), consolidation of waste and debris, and the containment and control of contaminants in the surface water pathways prior to leaving the site and ultimately, discharging to receiving water bodies. Specifically non-hazardous wastes were consolidated from AEC 3 and moved to AEC 1 and approximately 125 m^3 of PHC and metals contaminated soil was excavated and disposed of at a licenced disposal facility. All excavation and disturbed areas were backfilled and the excavations were re-graded with approved borrow material.

2.2 Summary of Previous Programs

The following reports established existing site conditions prior to remediation. These reports identified the presence of contaminants of concern at the site, identified areas of potential and actual environmental contamination, and made assessments of risk to human health and ecological receptors.

- Arcadis, 2015. Remediation Program for AECs at Resolute Bay Airport. Prepared for Public Works Government Services Canada Environmental Services – Western Region on behalf of Transport Canada. Dated December 3, 2015.
- Franz Environmental Inc., 2013. Data Gap and Geotechnical Assessment Resolute Bay Airport Landfill, Nunavut. Prepared for Public Works and Government Services Canada Environmental Services – Western Region on behalf of Transport Canada. Dated December 10, 2013.
- Franz Environmental Inc., 2010. Phase II/III Environmental Site Assessment Final Report, Resolute Bay Airport Landfill Sites, Resolute Bay, Nunavut. Prepared for Public Works and Government Services Canada on behalf of Transport Canada. Dated March 2010.
- Franz Environmental Inc., 2010. Phase I and Preliminary Phase II Environmental Site Assessment Upper Air Monitoring Station, Resolute Bay, Nunavut. Prepared for Public Works and Government Services Canada & Environment Canada on behalf of Transport Canada. Dated February 5, 2010.

The Resolute Bay airport was originally constructed by the Royal Canadian Air Force and has been in operation since 1949 (PSPC, 2021). Transport Canada (TC), on behalf of the Government of Canada, took ownership of the property in 1964 and continued operations until July 1, 1995. From July 1, 1995 to April 1, 1999 the Government of Northwest Territories had ownership and operations continued under the Arctic Airport Division of the Department of Transportation. The Government of Nunavut has owned the property since April 1, 1999.

Environmental audits and environmental site assessments have occurred at the Site since 1993. investigations between 1993 and 2005 were undertaken by TC. Since 2009 TC has engaged PSPC to assist with delineation of contaminants of concern, the development of remediation action plans for the site, and development of remediation specifications to tender for remediation contractor services.

Geotechnical and stability issues were identified with respect to the semi-buried waste and the current geometry of both landfills. Chemicals of concern (COCs) exceeding soil, sediment and water guidelines were identified at the storage area and both landfills. The COCs were as follows:

Site Location	COCs	Impacted media
Former Metal Storage Area (AEC 3)	Metals, petroleum hydrocarbons (PHCs), Polycyclic aromatic hydrocarbons (PAHs)	Soil, metal waste material
Solid waste landfill (AEC 1)	Metals, PHCs, PAHs, benzene, toluene	Soil, sediments, surface water
Historical landfill (AEC2)	Metals, PHCs, PAHs, benzene, toluene, ethylbenzene	Soil, groundwater, surface water

A Phase II/III ESA was completed by Franz Environmental Inc. (Franz 2010b) in March of 2010 and provided a conceptual remedial action plan (RAP). An informal RAP was later produced by Franz during

the 2011-2012 fiscal year. The accepted design included the segregation of hazardous materials, removal, consolidation and off-site disposal of hazardous waste from the AECs. As well, the design included moving nonhazardous waste from the metal storage area (AEC3) and AEC2, into AEC1 (the solid waste landfill) and applying an aggregate capping solution without an impermeable geomembrane. The landfill toe at AEC 1 was re-designed to be more geotechnically stable. A data gap assessment was completed on the AECs by Franz in 2013-2014. The data gap assessment identified an adjacent municipal sewage lagoon which was a concern for overflowing effluent, a past contributor to leachate production at AEC 1. The sewage lagoon is owned by the Government of Nunavut and as such is not included in the project scope. On July 11, 2014, the Nunavut Water Board (NWB) re-issued a water licence for the project based on the activities outlined in the conceptual RAP. The water licence, 1BR-RBL1419, was initially granted for a period of five years. A renewal application was submitted by Transport Canada on January 31, 2019, and later approved for a period of ten years on May 13, 2019 as NWB Amended Renewal Water Licence No. 1BR-RBL1929.

During the 2014-2015 government fiscal year PSPC purchased and mobilized 26 marine shipping containers, 10 Liquid hazardous waste containers and 5 solid hazardous waste containers to site in anticipation of remedial activities.

DOJV was retained by PSPC during FY 2017-2018 to review and modify the existing remediation designs and to support the tendering process such that the remediation work could be contracted and completed by the end of the FY 2019-2020.

The remedial work contract was awarded to Kudlik Construction Ltd under contract EW699-182827/A, in June 2018. Site remediation was completed over a two Government of Canada fiscal-year (FY) period, FY 2018-2019 and FY 2019-2020. Field activities for FY 2018-2019 began August 14 and ended September 17, 2018. Remedial work which occurred in 2018 included consolidating and packaging hazardous materials, shipping hazardous waste to a licensed waste disposal facility, consolidating non-hazardous waste to the AEC 1 landfill, grading the AEC 1 slope, and preparing borrow sources. All remaining remediation work was completed in the summer of 2019 and included shipping hazardous material offsite, consolidating steel from AEC 2 to AEC 1, stabilizing landfill slopes, aggregate cover development and placement, constructing drainage swales, removing contaminated soil from AEC 3, capping AEC 1 and AEC 2 with gravel, and installing wells for groundwater monitoring.

Transport Canada informed the NWB that On-site monitoring for 2020 was cancelled due to COVID-19 restrictions, and this approach was approved by NWB.

3.0 Regulatory Guidelines

3.1 Guideline Overview

The CSP compares environmental quality data with Environmental Quality Guidelines (EQGs) in accordance with Canadian Council of Ministers of the Environment (CCME) where applicable. The following federal guidelines have been considered:

- Canadian Environmental Quality Guidelines. Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (Freshwater Pathway) (CCME, 2007, with updates).

These guidelines contain numerical limits intended to maintain, improve or protect environmental quality and human health at contaminated sites. The limits come from models and are adjustable based on certain site characteristics, including land use, soil grain size, and whether groundwater is used as a source of drinking water. The guidelines are derived using toxicological data and aesthetic considerations.

For the site, DOJV will use the following characteristics:

- Land use: industrial (non-operational area, open, unrestricted Airport property)
- Soil grain size: coarse (as per field observations of gravel, sand and cobbles observed during thermistor installs)
- Groundwater: not used as a source of drinking water at the airport (drinking water source for Resolute Bay obtained from Char Lake over 2 km from AEC 2 area)
- Aquatic life: freshwater (due to surrounding surface water bodies, marine pathway excluded as ocean bay located > 675 m+ from landfills)

Where federal guidelines are absent or not applicable to site conditions, provincial guidelines from Ontario were used.

3.2 Groundwater

Federal groundwater EQG have been published by the CCME and under the Federal Contaminated Sites Action Plan (FCSAP); however, they have not been used for assessing the groundwater at the site. Exposure to contaminated groundwater have been deemed not applicable to the site (i.e., groundwater exposure pathway non-operable) for the following reasons:

- Due to the shallow active layer (i.e., soils above the permafrost layer), groundwater is typically intermixed with surface water- creating a zero-contaminant transport distance;
- There is an active groundwater discharge within 10 m of surface water (at AEC 1), further intermixing the two; and

- Overland flow is the primary mode of water transport in the area, as groundwater flow is relatively stagnant.

Groundwater wells installed as per the Water License were, however, used as an additional system for detecting pathways of exceedances in the EQGs.

In the absence of groundwater criteria in the water licence, as directed by NWB, groundwater results were compared to the Ontario Ministry of the Environment, Conservation and Parks (MECP), 2011 Site Condition Standards (under Ontario Regulation 153/04). Per Ontario Regulation 153/04 (Section 35 (3)), properties are considered non-potable when the property, and all other properties located within 250 m of the boundaries of the property, are supplied by a municipal drinking water system. As there are no potable water wells within 250 m of the site boundary, the site is considered non-potable. As such, the Table 3 Full Depth Generic Site Condition Standards (SCS) in a Non-Potable Groundwater Condition (Table 3 SCS) were considered applicable to the site. The Table 3 SCS for groundwater are not dependent on land use.

A copy of the NWB approval of the guideline used and copies of the CCME and MECP guidelines, current at the time of this report are provided in Appendix B.

3.3 Surface Water

The NWB Water Licence No. 1BR-RBL1929 does not specify guidelines for groundwater or surface water but does provide maximum allowable concentrations for effluent discharges for select parameters. Any seepage from the landfills that is noted during confirmatory sampling, would be tested and compared against the water quality criteria included in the Water Licence:

Table 1: Maximum Allowable Effluent Discharge Limits as per Part D, Condition 11 of Water Licence

Parameter	Maximum Allowable Concentration (mg/L)
pH	6 to 9 (pH units)
Total Suspended Solids (TSS)	50
Oil and Grease	15 and no visible sheen
Total Lead	0.001
Benzene	0.37
Toluene	0.002
Ethylbenzene	0.090

Note: Effluent limits are similar to CWQG for the Protection of Aquatic Life (Freshwater)

Although, no effluent discharges related to the landfill were noted during the site activities, the maximum allowable concentrations provided in the water licence were used as a reference for comparison of water quality.

Applicable federal guidelines used to evaluate surface water results:

- Canadian Environmental Quality Guidelines. Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (Freshwater Pathway) (CCME, 2007, with updates).

As such, the hierarchy for evaluation guidelines for surface water results was:

1. Effluent guidelines as provided in the Water Licence for select parameters noted above.
2. In the absence of effluent guidelines, CCME Water Quality Guidelines for the Protection of Freshwater Aquatic Life were selected. The landfills are located more than 675 m from the ocean as such the CWQG for Protection of Marine Life were not included for comparison.

4.0 Site Investigation Methodology

Monitoring activities described in this report are based on the 2008 Abandoned Military Site Remediation Protocol (AMSRP) Volume 1 – Main report, developed by Indian and Northern Affairs Canada. This guidance document provides environmental protocols for lower northern arctic contaminated sites which were applied for best practices purposes to the confirmatory sampling of the Resolute Bay Landfill sites.

4.1 Schedule and Personnel

The on-site work was carried out between August 24 – 29, 2021.

The field team consisted of:

- Field Lead: Steve Livingstone, M.Sc., P.Geo.
- Joadamee Iqaluk, Environmental Assistant and Wildlife Monitor (from Resolute Bay)

The contractor for the thermistor installation was ATCO from Resolute Bay.

4.2 Health and Safety Plan

DOJV prepared a site-specific health and safety plan (SSHASP) to address and mitigate site specific hazards. The SSHASP was submitted to PSPC on August 16, 2021 prior to the initiation of field activities.

4.3 Visual Inspections

At each AEC, visual inspections were conducted for the following:

4.3.1 Landfill Integrity

The physical integrity was visually inspected, including evidence of settlement, erosion, frost action, vegetation, and ponding/seepage etc. of the remediated area and surrounding areas. The inspection included photographs, notes and completing a checklist as per the format outlined in the *Post-Closure Monitoring Plan* (DOJV 2020).

The assessment documents the current condition of each AEC for each of the above-noted conditions and serves as an on-going basis of comparison to the previous observations and/ or baseline conditions.

4.3.2 Wildlife Survey

Observations of animal usage of the site (i.e., direct observation/sightings, tracks, scat, fur/feathers, carcass remain) and discussions with the local environmental assistant knowledgeable with the site

regarding site usage (i.e., fishing, hunting, gathering) were conducted. Mr. Joadamee Iqaluk, a local resident of Resolute Bay, assisted Outcome with field activities and acted as a wildlife monitor for the program. He also provided information regarding human and wildlife usage at the site.

4.4 Thermal Monitoring Installations

Three thermistors were installed at AEC 1 landfill cap at the following coordinates (in Table 2) and as shown on Figure 2. Thermal monitoring is intended to verify certain engineering design parameters and assumptions related to permafrost aggradation (i.e. growth) in the new landfill cap upon which the landfill cover design was based on for the Resolute Bay Landfill project. It is predicted that steady state permafrost aggradation will be reached after year 5 based on the maximum landfill vertical cover depth. After this timeframe the theoretical frost penetration front is expected to reach either the existing permafrost or the capped landfill waste. The depth of the active layer is expected to be no deeper than the thickness of the cap, thus waste will be, and remain frozen.

Table 2: AEC 1 Thermistor Locations

Well ID	Northing	Easting	Depth	Description
THRMS-01	8295590	440985	3 meters below ground (mbg)	Planned for on slope of new cap of the Solid Waste Landfill. However, was re-positioned to the top of the crest due to health and safety concerns over the install on the slope. New position will still function for intended purpose of measuring permafrost growth along the slope
THRMS-02	8295607	441055	3 mbg	Within new cap of the Solid Waste Landfill
THRMS-03	8295577	441014	3 mbg	Within new cap of the Solid Waste Landfill

Following a review of the SSHASP and scope of work with the contractor (ATCO) the excavation work commenced on August 25, 2021. Excavations at all three thermistor locations were completed to approximately 2.5 mbg that day. Final excavations were completed, and the thermistors were installed on August 26 and 27, 2021 using two excavators sourced and operated by ATCO. A Komatsu PC200LC track mounted excavator with a rock hammer and a claw tooth attachment and a smaller Kubota U35 mini excavator were brought to the site. The Kubota was used for the majority of the excavation work and the larger excavator was used to excavate soils at deeper depths when required due to permafrost conditions.

Permafrost was encountered at approximately 1.5 to 1.7 mbg. Weather conditions throughout the excavation work were sunny to cloudy, -1 to 3°C. Thermistors test pits were completed in order of Thermistor 1, 3 then 2. All Thermistors were installed to a depth of 3.05 m beneath the landfill cap into the underlying landfill waste materials to ensure there is useable data for the remainder of the Monitoring Plan, while also allowing for this data to be correlated to Environment and Climate Canada

data as required. The thermistors strings were purchased from Lakewood Systems Ltd, and use a R-X 10 Channel Nema Ultra-Logger Data Storage Unit with lithium batteries.

Following the test pit excavation to the target depth of 3.05 m, thermistor stings were installed inside PVC casing pipe, in the open excavations and backfilled to grade in the reverse order of excavation. The thermistor strings and PVC casing pipe were finished at surface with aluminum stick-up protective housings for the data loggers. The protective housings were locked via a lock bar and keyed-alike padlocks. The thermistor installations were completed with a consistent level of effort as follows:

- Test pits were excavated to the target depth of 3.05 m below grade by the excavators.
- Soil stratigraphy and the presence of waste materials were logged and photos taken before backfilling the test pits with excavated soil during the installation of the Thermistor casings.
- A 3.05 m x 10 cm/4" O.D. PVC Casing pipe with a watertight end cap was placed at the bottom of the final depth of the test pit to provide a temporary protective casing during the backfilling of the 5.08 cm/2" O.D. PVC thermistor casing;
- The test pit was then backfilled and the 10 cm protective casing was pulled out approximately 1.5 m below grade; leaving the 5.08 cm thermistor casing in place in natural soil pack at depth.
- The thermistor cable with 10 temperature sensor nodes was then placed within the 5.08 cm thermistor casing and filter sand was placed within the casing to finish the thermistor placement.
- Approximately 15 cm of bentonite seal was then placed at 1.5 m below grade and a 20 cm Weather proof aluminum housing was placed over the 5.08 casing to sit approximately 1.2 m above grade.
- The weather proof housing was then backfilled with filter sand/gravel backfill and a final 5 cm of bentonite seal was placed at grade to avoid any water infiltration.
- The disturbed excavation area at each thermistor area was reclaimed back to the original surface condition and packed down with a portable soil tamper.
- Pre-programmed Data loggers were installed and attached to the thermistor cable at each thermistor on August 29, 2021 and checked for temperature sensor signals. Following confirmation, the casings were locked and wrapped in a red flagging tape as a visual aid.

Significant metallic waste materials including crushed drums and wire were encountered in the upper 1.7 mbg at Thermistor 1. This material was not suitable for backfilling and approximately 12 crushed drums were separated and disposed of at the local recycling facility next to the AEC 1 as recommended by ATCO.

The Thermistor strings are comprised of 10 temperature sensor nodes spaced every 0.25 m starting at 0.5 mbgs to the bottom, and are connected to a programed data logger that remains at the thermistor location in the aluminum protective housing. Data loggers were programmed to take hourly readings for the duration of the monitoring program. An initial temperature baseline reading was downloaded to

verify the thermistors were functioning. Copies of the Thermistor Installation/Photo Logs and baseline temperature readings are provided in Appendix G.

4.5 Groundwater Monitoring and Sampling

Eleven monitoring wells (installed in 2019) were monitored as part of the CSP:

Table 3: Monitoring Well Locations

Well ID	Northing	Easting	Elevation (metres above sea level)	AEC	Description
RBL-1	8295630	441147	66.2	AEC 1	Monitoring Well installed up-gradient of the Solid Waste Landfill
RBL-2	8295551	440943	52.2	AEC 1	Monitoring Well installed down-gradient of the Solid Waste Landfill
RBL-3	8295608	440901	51.5	AEC 1	Monitoring Well installed down-gradient of the Solid Waste Landfill
RBL-5	8292509	441662	53.1	AEC 2	Monitoring Well installed up-gradient of the Historic Landfill
RBL-6	8292566	441420	42.7	AEC 2	Monitoring Well installed down-gradient of the Historic Landfill
RBL-7	8292634	441384	43.2	AEC 2	Monitoring Well installed down-gradient of the Historic Landfill
RBL-10	8296242	440493	43.8	AEC 3	Monitoring Well installed up-gradient of the Former Vehicle and Waste Metal Storage Area (Site 1)
RBL-11	8296265	440383	41.6	AEC 3	Monitoring Well installed down-gradient of the Former Vehicle and Waste Metal Storage Area (Site 1)
RBL-12	8296335	440450	42.6	AEC 3	Monitoring Well installed down-gradient of the Former Vehicle and Waste Metal Storage Area (Site 1)
RBL-14	8296449	440682	55.4	AEC 3	Monitoring Well installed up-gradient of the Former Vehicle and Waste Metal Storage Area (Site 2)
RBL-15	8296468	440635	52.7	AEC 3	Monitoring Well installed down-gradient of the Former Vehicle and Waste Metal Storage Area (Site 2)

Note: The X,Y,Z coordinates are represented under UTM Zone 15N and have been confirmed by survey method.

At each monitoring well location groundwater levels were measured with a water level tape. Monitoring wells RBL-5 and RBL-6 had limited water volume and poor recharge and as such no samples were collected. Monitoring wells RBL-11, RBL-12 and RBL-15 were dry.

All other monitoring wells were sampled with dedicated LDPE tubing and purged under low flow protocols using a peristaltic pump. During purging, ground water quality parameters including pH, EC, temperature, and turbidity were monitored using a water quality meter (Horiba U-52); however, given the low water volumes and limited well depths, it was not possible to wait for parameter stabilization before sampling. All pumped water was captured in sampling containers; no purge water was dumped on-site. The initial water was captured in general chemistry bottles. No visible sheen was noted in any of the monitored wells. Groundwater samples which were able to be collected were analyzed for the water license parameters listed in Section 4.8 below.

Monitoring well locations are illustrated on Figures 2, 3 and 4 of Appendix A**.** Groundwater monitoring data is presented in Table 1 of Appendix C and field monitoring and sampling forms are provided in Appendix D.

4.6 Surface Water Sampling

Four surface water locations were sampled as part of the CSP:

Table 4: Surface Water/Seep Locations

Location	Description	Notes
RBL-4	Discharge from the Solid Waste Landfill	
RBL-8	Discharge from the Historic Landfill	
RBL-13	Discharge from Former Vehicle and Waste Metal Storage Area (Site 1)	Previous surface water samples have been collected northwest of the former remediation areas (Site 1 and 2 in the McMaster River Valley), however, during the 2021 CSP no surface water was present on the north side of the road. As such, RBL-13 and RBL-16 samples were collected on the south side of the road west of monitoring well RBL-10. Drainage was noted along the southern side of the road
RBL-16	Discharge from the Former Vehicle and Waste Metal Storage Area (Site 2)	

In general, surface water sampling was conducted at pre-determined sampling locations down-gradient of drainage and surface water system. These locations were selected to correspond with previous

surface water sampling conducted on site in order to maintain consistency and have comparable concentrations with exception as noted above.

Surface water/seep samples were collected using dedicated LDPE or silicone tubing attached to a peristaltic pump. This method can volatilize some parameters resulting in an under-measurement but field staff made an effort to collect low-volume volatile samples directly from the flowing/standing water. Field parameters including pH, temperature, conductivity and turbidity were measured using a water quality meter (a Horiba U-52) with a flow-through cell and recorded in the field logs. Surface water samples were analyzed for the water license parameters as listed in Section 4.8 below.

Surface water sampling locations are illustrated on Figures 2, 3 and 4 of Appendix A**.** The surface water field sampling forms are provided in Appendix D.

4.7 Quality Assurance and Quality Control

4.7.1 Field Methods

Field methods used to ensure the quality of the results were:

- Field staff used fresh disposable nitrile gloves for the collection of each water sample. Any non-dedicated sampling equipment was decontaminated with Alconox and rinsed with distilled water between uses.
- Equipment was rented from a 3rd party supplier and calibrated prior to fieldwork.
- All samples were collected into sterile lab-prepared containers and stored and transported in supplied coolers on ice.
- Samples selected for analysis were analyzed by Bureau Veritas, which is accredited by the Canadian Association of Laboratory Accreditation (CALA).
- One blind field duplicate for groundwater and one blind field duplicate for surface water were collected by Outcome and analyzed by Bureau Veritas. The analytical results were compared to those of the parent sample using the method of relative percent difference (RPD) to evaluate precision.
- One field blank was prepared by filling sample containers with distilled water in the field and analyzed by Bureau Veritas.

4.7.2 Laboratory Methods

Laboratory quality control consisted of the following methods:

- Laboratory duplicates were analyzed by the lab based on their quality control program.
- Laboratory blanks, i.e., generic samples of a matrix prepared with known zero concentrations of analytes of concern, were analyzed by the project lab based on its quality program.
- Matrix spikes were also included in the lab quality program. A Matrix spike is a sample of an analyte of concern with a known concentration in the matrix.

Reportable detection limits for the program are dependent on the capabilities of the lab. Generally, detection limits for all analytes are below relevant standards; however, it is possible that matrix interference, high concentrations of other analytes or limited sample volumes will result in increased detection limits.

4.7.3 Data Validation

Field and laboratory quality will be compared to industry standards as shown in Table 5 below. Evaluation methods are derived from the Site Characterization Guidance Manual (CCME, 2016).

Table 5: Data Quality Targets

Quality Control Measure	Evaluation and Mitigation
Field duplicate	Relative percent difference between the primary and duplicate sample should be less than 40 percent for water. Where samples exceed the acceptable value, each analyte-matrix combination should be assessed across the program.
Field/Trip blank	Concentrations of all analytes should be non-detect. Where this is not the case, an evaluation of sampling methodology, site conditions and shipping methods should be conducted.
Laboratory duplicate	Per laboratory quality program, but generally less than 20 percent for water. If laboratory duplicates exceed acceptable range, discuss reasons for the exceedance with the laboratory and assess each analyte across the program.
Laboratory blank	Per laboratory quality program. If laboratory blanks contain detectable concentrations, discuss reasons for the detection with the laboratory and assess each exceeding analyte across the program.
Matrix spike	Per laboratory quality program. If laboratory spikes are outside the acceptable range, discuss reasons for the issue with the laboratory and assess each analyte across the program.

4.8 Laboratory Analytical Program

Laboratory analyses were performed on groundwater and surface water samples for the parameters listed in the Water License as follows:

Table 6: Groundwater and Surface Water Analyses

Group	Parameters
General chemistry	pH, conductivity, total suspended solids, ammonia nitrogen, nitrate-nitrite, oil and grease, total phenols, sulfate, total hardness, alkalinity, sodium, potassium, magnesium, calcium, chloride, phosphorus
Metals	aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, zinc
Fuel-related compounds	Petroleum hydrocarbons, polycyclic aromatic hydrocarbons, benzene, toluene, ethylbenzene and xylenes, visual oil & grease

5.0 Summary of AEC 1 Conditions

5.1 Area Summary

The monitoring of AEC 1 landfill included visual observations to assess its physical integrity, including evidence for erosion, ponding, frost action, settlement and lateral movement. Groundwater samples were collected from the wells located upgradient and downgradient from AEC 1 and a surface water sample was collected downgradient of AEC 1.

A plan view of AEC 1 is shown on Figure 2 in Appendix A.

5.2 Photographic Record

The photographic record of AEC 1 was completed as per the work plan. Prints of the photographs and a figure showing photo locations are provided in Appendix F, where photograph captions provide the landfill viewpoint number where applicable.

5.3 Visual Inspection Evaluation and Stability Assessment

The visual inspection of AEC 1 and surrounding area was conducted on August 29, 2021 by the field lead and Environmental Assistant. The visual monitoring checklist was completed using the format provided in the Post Closure Monitoring Plan (DOJV 2020) and is presented as Table 7 of this report. Field notes relating to the visual inspection are included in Appendix D. Table 7 and Table 8 below present the preliminary visual inspection results and definitions (severity/extent) respectively for the 2021 monitoring of the AEC 1.

Table 7: Preliminary Visual Inspection Report AEC 1

Feature	Presence (Y/N)	Severity Rating	Extent
Settlement	N	Not Observed	None
Erosion	N	Not Observed	None
Frost Action	N	Not Observed	None
Animal Borrows	N	Not Observed	None

Feature	Presence (Y/N)	Severity Rating	Extent
Vegetation	Y	Acceptable	Isolated, near toe of landfill only. No vegetation on landfill cap.
Staining	N	Not Observed	None
Vegetation Stress	N	Not Observed	None, vegetation downgradient from the toe of landfill
Seepage / Ponded Water	Y	Acceptable	Occasional and pooling proximal to the toe landfill in small features and along swale near sewage ponds. Refer to Photo 12 in Appendix F.
Exposed Debris	N	Not Observed	None
Grades/Topography	Y	Acceptable	As per landfill design
Distance to downgradient surface water bodies	Y	Occasional	Surface water mapped as previously reported. No new surface water bodies
Distance to freshwater/marine habitat and habitat usage	Y	Acceptable	Set back from marine discharge
Terrestrial Habitat	N	Acceptable	Canadian Geese and scat observed near surface water ponds approximately 200 m south of monitoring well RBL-2
Land use	Y	Acceptable	Industrial (non-operational, open, unrestricted Airport property)
Debris	N	Acceptable	None observed on-site
Landfill cover	Y	Acceptable	As per landfill design
Snow, Sun Exposure, Surface Temperature, Wind	Y	Acceptable	No significant weather-related conditions

Feature	Presence (Y/N)	Severity Rating	Extent
Surface Drainage	Y	Acceptable	As per landfill design, Drainage within swale systems, drainage acting as designed
Sewage Overflow	N	Acceptable	As per landfill design, no sewage overflow was observed.
Potential Percolation into Landfill Cap	Y	Acceptable	As per landfill design, no pooling of water on landfill cap
Runoff Diversion	Y	Acceptable	Swales/channels functioning as per landfill design
Monitoring Well Condition	Y	Good condition – Acceptable. Minor repairs to RBL-3 (sand and bentonite added to base to solidify casing)	
Overall Landfill Performance	**Acceptable**		

Table 8: Preliminary Visual Inspection Report AEC 1 - Definitions

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement.

Performance/Severity Rating	Description
	• Liner exposed. • Slope failure.
Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

5.3.1 Vegetation

One area of vegetation growth (approximately 30 m x 15 m) was observed proximal to the toe of the landfill and along the southern edge of the landfill, off-site and downgradient from the sewage ponds, consistent with previous observations. Refer to Photo 12 in Appendix F.

5.3.2 Seepage / Ponded Water

Areas of ponded water were observed 5 m-10 m from west toe of the landfill; they did not contain any evidence of staining or product seepage from the landfill. Conditions at the site were generally wet due to recent rainfall, and many areas of saturated soil were observed around the AEC 1 at the ground surface.

5.3.3 Summary

Based on the observations, the performance of the AEC 1 landfill was rated as Acceptable.

5.4 Thermal Monitoring Installations and Baseline Data

Copies of the Thermistor Test Pit/Installation Logs and Photo Logs are provided in Appendix G.

As indicated on the test pits logs, the site stratigraphy consisted of, in descending order, the following materials:

- Recent fill - gravel and sand matrix, dry from surface to approximately 1.3 mbg

- Debris Containing Soil Fill - landfill wastes, some domestic debris from 1.3 to approx. 2.4 mbg. Fill matrix was characterized as sands, and silts. Permafrost was encountered at approximately 1.5 to 1.7 mbg in this unit.
- Soil Fill - less debris/waste with domestic type debris noted.

All test pits were excavated to the target depth of 3.05 m below grade by the excavators. Significant metallic waste materials including crushed drums and wire were encountered in the upper 1.7 mbg at Thermistor 1. This material was not suitable for backfilling and approximately 12 crushed drums were separated and disposed of at the local recycling facility next to the AEC 1 as recommended by ATCO.

As described in Section 4.4, the thermistors cables were purchased from Lakewood Systems Ltd, and use a R-X 10 Channel Nema Ultra-Logger Data Storage Unit. The Thermistor strings are comprised of 10 temperature sensor nodes spaced every 0.25 m starting at 0.5 mbg to the bottom, connected to a programed data logger that remains at the thermistor location in a protected case. Data loggers were programmed on August 29, 2021 to take hourly readings for the duration of the monitoring program. The Lakewood System Ltd Prolog 4 Datalogger Software system was used to check that the thermistors were working and to activate the temperature sensor monitoring.

An initial temperature baseline reading was downloaded on Aug 29 to verify the thermistors were functioning. Copies of the baseline temperature readings are also provided in Appendix G.

5.5 Analytical Results – Groundwater Samples

Three groundwater samples (RBL-1, RBL-2 and RBL-3) and one blind field duplicate (GW DUP 1) were collected at AEC 1 for parameters as specified in the NWB Water Licence (WL) and submitted to Bureau Veritas in Calgary, Alberta. Concentrations of benzene, toluene, ethylbenzene, xylene (BTEX) and Petroleum Hydrocarbons (PHC) fractions F1 through F4 were non-detect except for PHC F2 concentrations in samples RBL-3 (hydraulically downgradient) (370 ug/L) and its duplicate GW DUP 1 (170 ug/L) which exceeded the MECP Table 3 SCS guideline (150 ug/L). Concentrations of Total Suspended Solids (TSS) exceeded the NWB WL effluent maximum allowable concentration (50 mg/L) in samples RBL-1 (hydraulically upgradient) (1,200 mg/L) and sample set RBL-3 (250 mg/L) and GW DUP 1 (160 mg/L). Polycyclic Aromatic Hydrocarbons (PAH) concentrations were non-detect for all parameters except for 1-, 2-Methylnapthene (range from 2.8 to 7.2 µg/L) and Naphthalene (range 1.0 to 1.6 µg/L) within sample sets RBL-3 and GW DUP 1, however, values were generally three orders of magnitude below the applied guidelines (1,800 µg/L, 1,800 µg/L, 1,400 µg/L respectively). Select total metals, nutrients, routine water parameters, phenols and/or oil and grease were detected but values ranged from the same order to three orders of magnitude below guideline.

AEC 1 monitoring well locations and results are illustrated on Figure 2. The analytical results compared to the selected guidelines are presented in Table 2a in Appendix C. Laboratory Certificates of Analysis reports are included in Appendix E.

5.6 Analytical Results – Surface Water Samples

One surface water sample (RBL-4 – hydraulically downgradient) was collected at AEC 1. All BTEX PHCs, PAH parameters, Oil and Grease and Phenols were non-detect and therefore below guidelines. Select total metals, routine water and/or nutrient parameters were generally detected but were below guidelines (ranging from same order to two orders of magnitude below) except for hexavalent chromium (1.3 ug/L) and ammonia (0.33 mg/L) concentrations that exceeded the CCME guidelines of 1 ug/L and 0.0231 mg/L respectively.

AEC 1 surface water locations and results are illustrated on Figure 2. The analytical results and selected guidelines are presented in Table 2b in Appendix C. Laboratory Certificates of Analysis reports are included in Appendix E.

6.0 Summary of AEC 2 Conditions

6.1 Area Summary

The monitoring of AEC 2 landfill included visual observations to assess its physical integrity, including evidence for erosion, ponding, frost action, settlement and lateral movement. Groundwater and surface water samples were collected downgradient from AEC 2.

A plan view of AEC 2 and the site physical attributes is shown on Figure 3 in Appendix A.

6.2 Photographic Record

The photographic record of the AEC 2 was completed as per the work plan. Prints of the photographs and a figure showing photo locations are provided in Appendix F, where photograph captions provide the landfill viewpoint number where applicable.

6.3 Visual Inspection Evaluation and Stability Assessment

The visual inspection of the AEC 2 and surrounding area was conducted on August 29, 2021 by the field lead and Environmental Assistant. The visual monitoring checklist was completed using the format provided in the Post Closure Monitoring Plan (DOJV 2020) and is presented as Table 9 of this report. Field notes relating to the visual inspection are included in Appendix D. Table 9 and Table 10 below present the preliminary visual inspection results and definitions (severity/extent) respectively for the 2021 monitoring of the AEC 2.

Table 9: Preliminary Visual Inspection Report AEC 2

Feature	Presence (Y/N)	Severity Rating	Extent
Settlement	Y	Acceptable	Isolated stress fracture approx. 15 -20 m in length along western edge of landfill, minor cracking observed. Refer to Photos 23 and 24 (AEC 2) in Appendix F.
Erosion	N	Not Observed	None
Frost Action	N	Not Observed	None
Animal Borrows	N	Not Observed	None

Feature	Presence (Y/N)	Severity Rating	Extent
Vegetation	Y	Acceptable	Isolated, near toe of landfill only. No vegetation on landfill cap.
Staining	N	Not Observed	None
Vegetation Stress	N	Not Observed	None, vegetation downgradient from the toe of landfill
Seepage / Ponded Water	Y	Acceptable	Occasional and pooling at toe landfill in small features consistent with previous observations.
Exposed Debris	N	Acceptable	Isolated domestic debris (very minor) on cap of landfill. Not considered as dumping, possibly windblown debris from community use from surrounding area.
Grades/Topography	Y	Acceptable	As per landfill design
Distance to downgradient surface water bodies	Y	Occasional	No surface water at toe of landfill. Small pond as previously mapped. No new surface water bodies
Distance to freshwater/marine habitat and habitat usage	Y	Acceptable	Set back from marine discharge
Terrestrial Habitat	Y	Acceptable	Arctic fox observed at toe of landfill along access road. Canadian Geese and scat observed near surface water ponds
Land use	Y	Acceptable	Industrial (non-operational, open, unrestricted Airport property)
Debris	N	Acceptable	None observed
Landfill cover	Y	Acceptable	As per landfill design

Feature	Presence (Y/N)	Severity Rating	Extent
Snow, Sun Exposure, Surface Temperature, Wind	Y	Acceptable	No significant weather-related conditions
Surface Drainage	Y	Acceptable	As per landfill design, Drainage within swale systems, drainage acting as designed
Sewage Overflow	Y	Acceptable	As per landfill design, no pooling of water on landfill cap
Surface Water Drainage, Runoff Diversion and Potential Percolation into Landfill Cap	Y	Acceptable.	Swales and drainage system operating as designed
Permafrost Degradation	N	Acceptable	None observed
Monitoring Well Condition	Y	Acceptable. Minor repairs to RBL-6 (sand and bentonite added at base to solidify well casing)	
Overall Landfill Performance	**Acceptable**		

Table 10: Preliminary Visual Inspection Report AEC 2 - Definitions

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.

Performance/Severity Rating	Description
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

6.3.1 Settlement

One area of settlement was observed along the central western edge of the landfill. This settlement was observed to be approximately 15 - 20 m in length and was characterized by surface cracks along a slight rise or escarpment. This feature was considered small in nature and does not impact the integrity of the landfill.

Table 11: AEC 2 Settlement Observation Details

Checklist Item	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments	Photo Reference
Settlement	A (Figure 3)	Central Western portion of Landfill	15 - 20 m length, 1.5 m width		0.1 to 0.2	<1%	Small settlement cracks		#23 and #24

6.3.2 Vegetation

One area of vegetation growth was observed proximal to the toe of the landfill off-site (near access road and on southside of the road) and downgradient consistent with previous observations. The area was not mapped as the vegetation growth is believed to be natural and is not associated with landfill performance.

6.3.3 Seepage / Ponded Water

Areas of ponded water were observed 10 - 20 m from the west toe of the landfill; they did not contain any evidence of staining or product seepage from the landfill. Conditions at the site were generally wet due to recent rainfall, and many areas of saturated soil were observed around the AEC 2 at the ground surface.

6.3.4 Summary

Based on the observations, the performance of the AEC 2 landfill was rated as Acceptable.

6.4 Analytical Results – Groundwater Samples

Only one groundwater sample (RBL-7 – hydraulically downgradient) was collected from the three groundwater monitoring wells at AEC 2. Monitoring wells RBL-5 and RBL-6 had limited water volume, poor recharge and no sample was obtained. Concentrations of toluene, ethylbenzene and xylene were detected but values were on average three orders of magnitude below guidelines. Benzene and all other PHCs were non-detectable. All PAH parameters, Oil and Grease and Phenols were non-detectable. Select total metals, nutrients and/or routine water parameters were detected but ranged from the same to two orders of magnitude below guideline values with the exception of Cadmium (2.77 ug/L), Lead (186 ug/L) and TSS (1,300 mg/L) which exceeded the applied guidelines of 2.7 ug/L, 25 ug/L and 50 mg/L respectively.

AEC 2 monitoring well locations and results are illustrated on Figure 3. The analytical table results and selected guidelines are presented in Table 2a in Appendix C. Laboratory Certificates of Analysis reports are included in Appendix E.

6.5 Analytical Results – Surface Water Samples

One surface water sample (RBL-8 -hydraulically downgradient) and one blind field duplicate (Field DUP 2) were collected at AEC 2. All BTEX PHCs, PAH parameters, Oil and Grease and Phenols were non-detect and therefore below guidelines. Select total metals, routine water and nutrient parameters were detected but were below guidelines except for ammonia concentrations which ranged from 0.15 to 0.76 mg/L in Field DUP 2 and RBL-8 respectively.

AEC 2 surface water locations and results are illustrated on Figure 3. The analytical table results and selected guidelines are presented in Table 2b in Appendix C. Laboratory Certificates of Analysis reports are included in Appendix E.

7.0 Summary of AEC 3 Conditions

7.1 Area Summary

The monitoring of AEC 3 landfill included visual observations to assess its physical integrity, including evidence for erosion, ponding, frost action, settlement and lateral movement. Groundwater water samples could only be collected up-gradient of AEC 3; the monitoring wells within AEC 3 were dry. There was no ponded surface water within the remedial area of AEC 3 but ponded water was observed approximately 20 - 30 m south of the access road and was sampled for background chemistry as it appeared to be local water flooding that area.

A plan view of AEC 3 and the site physical attributes is shown on Figure 4 in Appendix A.

7.2 Photographic Record

The photographic record of the AEC 3 was completed as per the work plan. Prints of the photographs and a figure showing photo locations are provided in Appendix F, where photograph captions provide the landfill viewpoint number where applicable.

7.3 Visual Inspection Evaluation and Stability Assessment

The visual inspection of the AEC 3 and surrounding area was conducted on August 29, 2021 by the field lead and Environmental Assistant. The visual monitoring checklist was completed using the format provided in the Post Closure Monitoring Plan (DOJV 2020) and is presented as Table 12 of this report. Field notes relating to the visual inspection are included in Appendix D. Table 12 and Table 13 below present the preliminary visual inspection results and definitions (severity/extent) respectively for the 2021 monitoring of the AEC 3.

Table 12: Preliminary Visual Inspection Report AEC 3

Feature	Presence (Y/N)	Severity Rating	Extent
Settlement	Y	Acceptable	Isolated, settlement and slope failure approximately 15 m in length along northern edge of remedial area, with evidence of a minor shallow earth slide. This may have been natural due to proximity to the local valley and stream. Refer to Photo 4 for AEC 3 in Appendix F.
Erosion	N	Not Observed	None

Feature	Presence (Y/N)	Severity Rating	Extent
Frost Action	N	Not Observed	None
Animal Borrows	N	Not Observed	None
Vegetation	N	Not Observed	None
Staining	N	Not Observed	None
Vegetation Stress	N	Not Observed	None
Seepage / Ponded Water	Y	Acceptable	No water pooling in remedial area. Occasional and pooling south of the remedial area, consistent with previous observations.
Exposed Debris	N	Not Observed	None.
Grades/Topography	Y	Acceptable	As per landfill design
Distance to downgradient surface water bodies	Y	Occasional	No surface water noted downgradient.
Distance to freshwater/marine habitat and habitat usage	Y	Acceptable	No flow to valley stream to the North
Terrestrial Habitat	Y	Acceptable	Polar bear observed to the northwest of the AEC. Presence of the bear limited taking of observations in valley/stream to north.
Land use	Y	Acceptable	Wildlands
Debris	N	Acceptable	None observed
Permafrost Degradation	N	Acceptable	None observed
Landfill cover	Y	Acceptable	As per landfill design

Feature	Presence (Y/N)	Severity Rating	Extent
Snow, Sun Exposure, Surface Temperature, Wind	Y	Acceptable	No significant weather-related conditions
Surface Water Drainage and Potential Percolation into Remedial Excavations	Y	Acceptable	As per landfill design, no pooling of water on remedial areas or north side of access road.
Runoff Diversion	Y	Acceptable	No runoff from remedial area.
Monitoring Well Condition	Y	Good condition – Acceptable. Minor repairs to RBL-10 (sand and bentonite added to base to solidify well casing)	
Overall Landfill Performance	**Acceptable**		

Table 13: Preliminary Visual Inspection Report AEC 3 - Definitions

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The remedial area is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on backfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting backfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed.

Performance/Severity Rating	Description
	• Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

7.3.1 Settlement

One area of settlement, slope failure was observed along the central western edge of the remedial area. This settlement was observed to be approximately 15 m in length and was characterized by a settlement and soil slide along the valley escarpment adjacent to the lower stream. This feature was considered small in nature and does not impact the integrity of the remedial work. As this feature may not be related to the remedial work and backfilling, future monitoring can assess any changes.

Table 14: AEC 3 Settlement Observation Details

Checklist Item	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments	Photo Reference
Settlement	A (Figure 4)	Northwest portion of Remedial area	15 m length, 5 m width		0.2	<1%	Slope failure and settlement	May be natural settlement along valley crest	#4

7.3.2 Seepage / Ponded Water

There is no ponded water within the remedial area. Water was observed approximately 20 - 30 m south of the access road. This water was sampled for background chemistry as it appeared local water flooding in that area. Conditions at the off site to the south were generally wet due to recent rainfall, and many areas of saturated soil were observed around the AEC 3.

7.3.3 Summary

Based on the observations, the performance of the AEC 3 was rated as Acceptable.

7.4 Analytical Results – Groundwater Samples

Only two of the five monitoring wells at AEC 3 could be sampled. Two groundwater samples (RBL-10 and RBL-14 - hydraulically upgradient) were collected. Monitoring wells RBL-11, RBL-12 and RBL-15 were dry. Concentrations of BTEX PHC, Oil and Grease and PAH parameters were non-detect. Select total metals, nutrients and/or routine water parameters were detected but ranged from the same to two orders of magnitude below guideline values with the exception of TSS (560 mg/L) at RBL-14 which exceeded the applied guideline of 50 mg/L.

AEC 3 monitoring well locations and results are illustrated on Figure 4. The analytical results and selected guidelines are presented in Table 2a in Appendix C. Laboratory analytical reports are included in Appendix E.

7.5 Analytical Results – Surface Water Samples

Two surface water samples (RBL-13 and RBL-16) were collected at hydraulically cross gradient locations at AEC 3. All BTEX PHCs, PAH parameters, Oil and Grease and Phenols were non-detect and therefore below guidelines. Select total metals, routine water and nutrient parameters ranged from below the detection limits to detected concentrations that were the same to two orders of magnitude below guideline values with the exception of aluminum (399 ug/L and 147 ug/L), iron (507 ug/L – RBL-13 only) and ammonia (0.53 mg/L and 0.85 mg/L) at RBL-13 and RBL-16, respectively, which exceeded the applied guideline values of 100ug/L, 300 ug/L, and 0.0231 mg/L, respectively.

AEC 3 surface water locations and results are illustrated on Figure 4. The analytical table results and selected guidelines are presented in Table 2b in Appendix C. Laboratory Certificates of Analysis reports are included in Appendix E.

8.0 QA/QC Discussion

A QA/QC program was conducted to assess data reliability. A discussion of the quality assurance and quality control methods are detailed below.

8.1 Hold Times

Samples submitted to the laboratory for BTEX PHC, PAH, NO2, NO2 + NO3, Alkalinity, CO3, HCO3, TSS were analyzed past the recommended hold times described in the CCME 2016 Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment, Volume 4 Analytical Methods (CCME, 2016a). This was due to the length of time in transit, primarily the truck transit leg from Yellowknife to Calgary. All water samples were shipped out of Resolute Bay on Aug 28th and received at the lab on Sept 13th, which is 16 days. The lab indicated that exceedance of hold times can increase the uncertainty of test results but does not necessarily imply that results are compromised.

8.2 Field Duplicates

The reliability of data relates to the certainty that sample results are representative of conditions over a certain scale at the sample location and are not influenced by a small particle of highly impacted material. This is assessed through collection and analysis of field duplicate samples.

Field duplicates were collected for groundwater and surface water at a ratio of approximately 1 per 10 samples. One field duplicate for groundwater and one field duplicate for surface water were prepared.

For each sample pair of original and its field duplicate, the relative percent differences (RPD) was calculated using the following formula:

$$RPD = [|X_1 - X_2| / X_3] \times 100\%$$

Where:

- RPD = relative percent difference
- X_1 = original groundwater or surface water sample concentration
- X_2 = duplicate groundwater or surface water concentration
- X_3 = average concentration = $(X_1 + X_2)/2$

Where one or both concentrations of a parameter are non-detect, or very low, i.e., less than five times the reportable detection limit (RDL), the RPD for that parameter pair is not calculated. This is because the variability of results at concentrations close to the detection level can be high. The generally accepted industry standard for acceptable RPD's analyses is less than or equal to 40% for field

duplicated water samples described by the CCME Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment, Volume 1 Guidance Manual (CCME, 2016b).

For groundwater sample RBL-3 and GW DUP 1, the calculated RPDs ranged from 1% to 46% and were within the accepted industry standard for RPD % except for TSS (44%) and Naphthalene (46%). For surface water samples RBL-8 and Field DUP 2, the calculated RPDs ranged from 0% to 134% and were within the accepted industry standard for RPD % except for Ammonia (134%). These results are likely due to non-homogenous sampling but do not compromise the validity of the results.

The RPD results are presented in Table 2a for groundwater and Table 2b for surface water in Appendix C.

8.3 Field Blank

A field blank sample was prepared in the field by Outcome personnel using distilled water purchased in Iqaluit. The field blank sample was submitted for analysis of NWB WL Licence parameters. Laboratory analytical results indicated the reported concentrations of the tested parameters were non-detect for organic compounds and inorganic compounds except for Aluminum, pH, Electrical Conductivity and Ammonia. The pH value was 4.36 and well outside of applied guidelines (6.0 – 9.0). Groundwater and surface water samples were consistent across the program and the field blank low pH is likely a result of the distilled water used. As such, the field blank results indicate that sample handling and sampling equipment did not influence the analytical results in the program.

The field blank results are presented in Table 2a in Appendix C.

8.4 Laboratory QA/QC

Precision of lab results is assessed by reviewing the laboratory's internal QA/QC results which accompany the certificate of laboratory results. All water analyses were done by Bureau Veritas Laboratories. Their QA/QC section contains the results of internal checks such as analysis of lab blanks, spikes and duplicates.

In general, the laboratory QA/QC results were considered acceptable with the exception of the following:

- TSS and Chromium (VI) detection limits were raised based on the sample volume used for analysis and due to the sample matrix requiring dilution respectively.
- The method blank recovery for Naphthalene was below the control limit
- The matrix spike recovery for Total Silicon (below) and Total Zirconium (above) were outside of the control limit
- The spiked blank recovery for Total Mercury and Total Silicon were below the control limit

Bureau Veritas indicated that the overall quality control for this analysis met acceptability criteria. The results are presented as part of laboratory certificates of analysis and a separate letter from Bureau Veritas approving Outcome's QA/QC program can be found in Appendix E.

8.5 Summary

Based on the results of the assessment above, the data quality for the program was considered reliable for its intended use.

9.0 Conclusions and Recommendations

Outcome conducted the field activities for year 1 of the confirmatory sampling program for the Resolute Bay Airport Landfill site from August 24 – 29, 2021. The three landfill sites are referred to as (AEC 1) Inactive Solid Waste Landfill, (AEC 2) Historical Landfill, and (AEC 3) Former Vehicle and Waste Metal Storage Area (AEC 3). The program included installation of three thermistors at AEC 1 and commencing thermal monitoring, monitoring and sampling of groundwater (11 wells) and surface water (4 locations) and visual inspections of all three AEC's.

Based on visual inspections, the landfills are functioning as designed with all three AEC's overall performance considered acceptable. Isolated stress fractures (cracking) were noted at AEC 2 along the western edge of the landfill and isolated slope failure was noted along the north edge of the remedial area near Excavation 1 at AEC 3. However, this may be natural due to the proximity to the local valley and stream. Future monitoring can assess any changes to the above noted observations.

Eleven wells RBL-1 to 3 (AEC 1), RBL-5 to 7 (AEC 2), RBL-10 to 12, RBL-14 and 15 (AEC 3)) were monitored as part of the CSP with only six wells (RBL-1 to 3, RBL-7, 10 and 14) being sampled. Five wells had limited water volume/poor recharge or were dry and as such no samples were collected. At AEC 1, hydraulically downgradient monitoring well RBL-3 (and duplicate GW DUP 1) had PHC F2 concentrations which exceeded the MECP Table 3 SCS guideline used. As well, concentrations of Total Suspended Solids (TSS) exceeded the NWB WL effluent maximum allowable concentration at the hydraulically upgradient RBL-1 and sample set RBL-3/GW DUP 1. At AEC 2, monitoring well RBL-7 (hydraulically downgradient) had concentrations of cadmium, lead and TSS that exceeded MCEP guidelines and effluent allowances respectively. At AEC 3, monitoring well RBL-14 (hydraulically upgradient) had TSS concentrations exceeding effluent allowance. All other chemical parameters sampled in monitoring wells had concentrations below detection limits or below the applied guidelines. TSS concentrations were related to higher turbidity within monitoring wells due to residual sediments and does not reflect in-situ water conditions. As well, TSS were noted in monitoring wells both upgradient and downgradient and therefore concentrations may reflect background conditions.

Four surface water locations (RBL-4 (AEC1), RBL-8 (AEC 2), RBL-13 and 16 (AEC 3)) were sampled as part of the CSP, however, surface water locations at AEC 3 were completed south of the road (hydraulically cross gradient). No surface water was noted near the former excavations on the north side of the road and due to the sighting of a polar in the area no field activities were completed in the valley/stream to the north. At AEC 1, surface sample RBL-4 (hydraulically downgradient) had concentrations of hexavalent chromium and ammonia that exceeded the applied CCME guidelines. At AEC 2, surface samples RBL-8 (and duplicate Field DUP 2) (hydraulically downgradient) had concentrations of ammonia that exceeded the CCME guideline. At AEC 3, surface water location RBL-13 had concentrations of aluminum, iron and ammonia that exceeded the CCME guideline. As well, at AEC 3, surface water

location RBL-16 exceeded CCME guidelines for ammonia. All other chemical parameters sampled at surface water locations had concentrations below detection limits and/or below the applied guidelines.

Based on the results of the field and laboratory QA/QC program, the data quality was considered reliable for its intended use.

A longer record over time of groundwater and surface water results are required to compare upgradient vs downgradient locations and to evaluate trends at each sampling location. Groundwater and surface water actions levels as described in the *Post-Closure Monitoring Plan* (DOJV 2020) will be assessed following subsequent data collection. Time trends will be assessed with using a moving average approach with actionable criteria backed by a Mann-Kendall analysis.

Outcome recommends a change to the NWB Licence requirement from sampling of groundwater and surface water currently twice a year (spring freshet and mid summer) to sampling once per year in mid-summer. The short field season for northern work means that both events would be very close together and provide marginal benefit when compared to the logistical costs.

10.0 Closure

This report was prepared exclusively for the purposes, project, and site location outlined in the report. The report is based on information provided to, or obtained by Dillon-Outcome as indicated in the report, and applies solely to site conditions and the regulatory frameworks existing at the time of the on-site work and interpretation.

This report was prepared by Dillon-Outcome for the sole benefit of our client. The material in it reflects Dillon-Outcome's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon- Outcome accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this information is satisfactory for your requirements.

Sincerely,

DILLON-OUTCOME JOINT VENTURE

Keelan Veitch, B.Sc.
Intermediate Professional

Steve Livingstone, M.Sc., P.Geo
Senior Professional

Don Plenderleith, P.Eng (NU, NT, ON, QC)
Senior Professional Engineer

11.0 References

ARCADIS (2015). Remediation Program for AECs at Resolute Bay Airport.

CCME (2007). Canadian Water Quality Guidelines for the Protection of Aquatic Life. Retrieved from Canadian Council of Ministers of the Environment: http://ceqg-rcqe.ccme.ca/download/en/220?redir=1579714589

CCME (2016). Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment. Volume 1 Guidance Manual and Volume 4 Analytical Methods.

Dillon Consulting Ltd. and Outcome Consultants Inc in joint venture (DOJV). (2020). Post-Closure Monitoring Plan for the Resolute Bay Airport Landfill, Resolute Bay, Nunavut.

Columbia Environmental Consulting Ltd. and Franz Environmental Inc (2010a). Phase I and Preliminary Phase II Environmental Site Assessment Upper Air Monitoring Station, Resolute Bay, Nunavut.

Franz Environmental Inc (2010b). Phase II/III Environmental Site Assessment Final Report, Resolute Bay Airport Landfill Sites, Resolute Bay, Nunavut. March 2010

Indian and Northern Affairs Canada (2008). Abandoned Military Site Remediation Protocol Volume 1.

Ministry of the Environment Conservation and Parks (2011). Soil, Groundwater, and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act

Nunavut Water Board (May 13, 2019). Water Licence Renewal. Licence 1BR RBL1929.

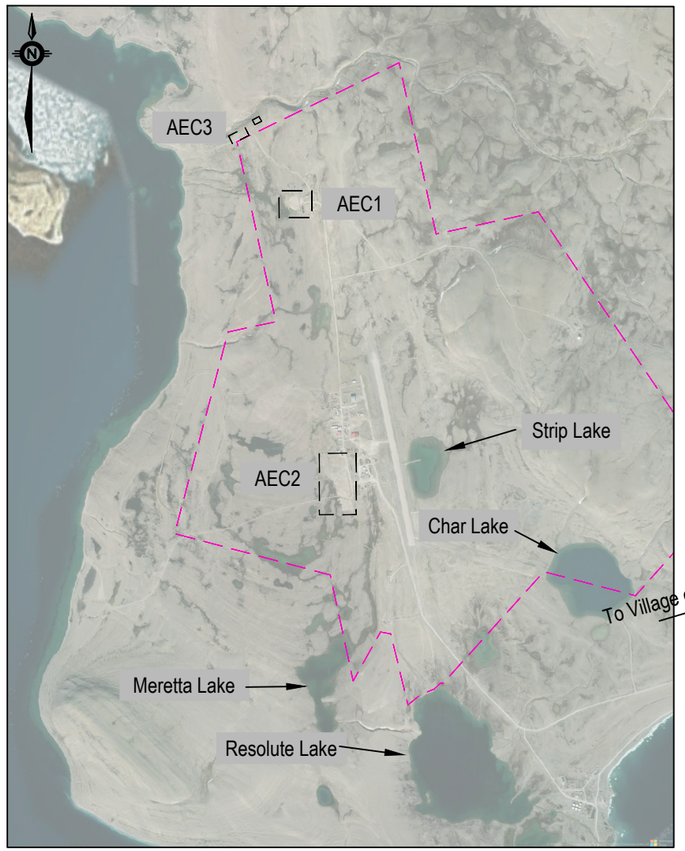
Public Services and Procurement Canada (April 26, 2021). Terms of Reference for Environmental Program, Resolute Bay Airport Landfill Remediation, Resolute Bay, Nunavut. Canada.

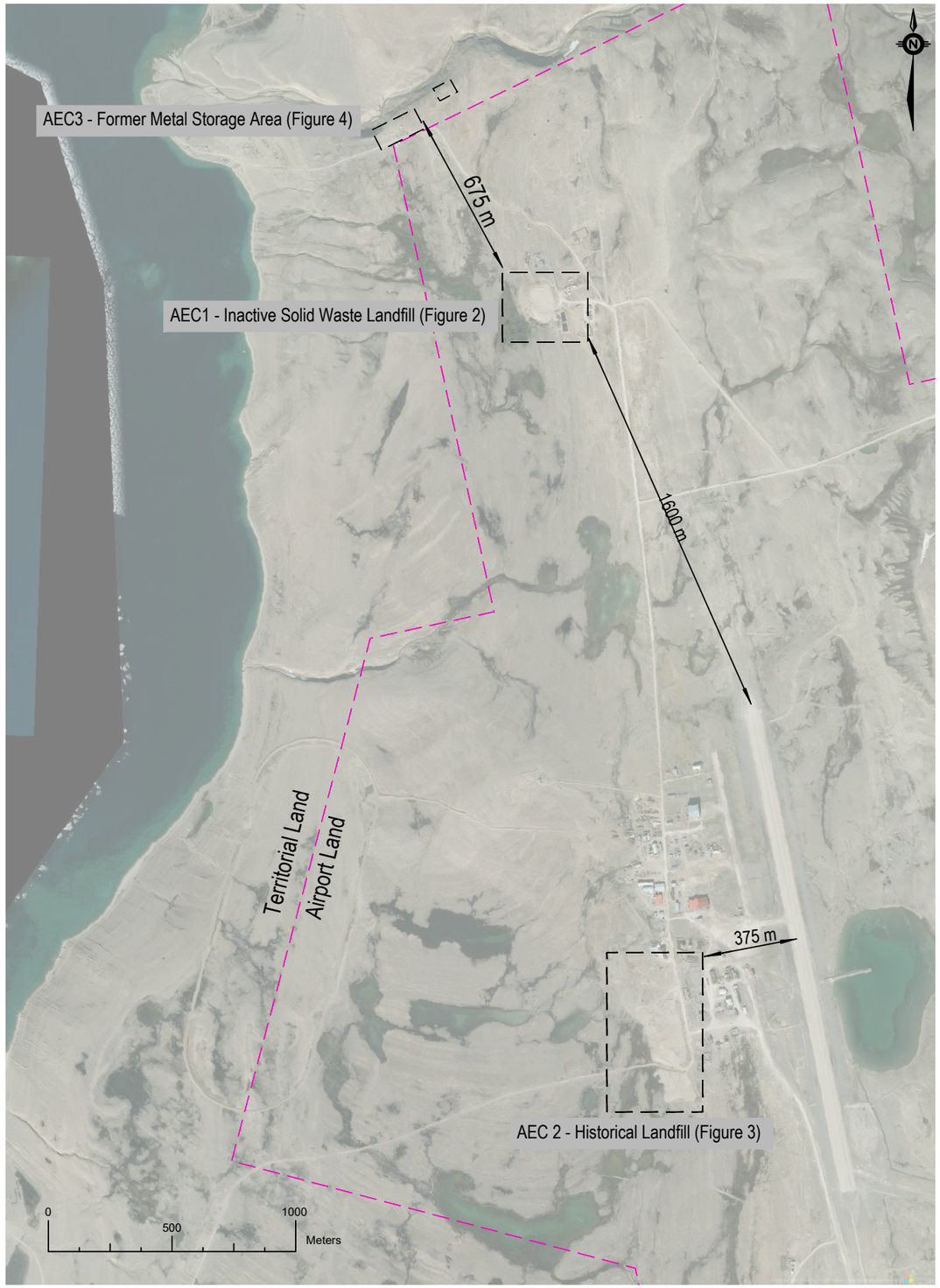
Public Works and Government Services Canada (1994). Real Estate Survey: Airport Boundary at Resolute Bay, Northwest Territories. CLSR 77590.

SENES Consultants Ltd. and Franz Environmental Inc. (2013). Data Gap and Geotechnical Assessment Resolute Bay Airport Landfill, Nunavut.

Appendix A

Figures





Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Drawing Source:
1. Adapted from Preliminary Design prepared by Arcadis Canada Inc. on behalf of Public Works & Government Services Canada (March 2016)

LEGEND:
- Airport Property Line
- Area of Environmental Concern (AEC)

DILLON CONSULTING | outcome CONSULTANTS

PROFESSIONAL SEALS

DO NOT SCALE DRAWINGS

04		
03		
02		
01		
revision		date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail No. / No. du detail
B drawing no. – where detail required / dessin no. – ou detail exige
C drawing no. – where detailed / dessin no. – ou detaille

project title / titre du projet
RESOLUTE BAY NUNAVUT
PWGSC for TRANSPORT CANADA
RESOLUTE BAY LANDFILLS:
CONFIRMATORY SAMPLING PROGRAM

drawing title / titre du dessin
SITE LOCATION

drawn by / dessine par	
designed by / conc par	
approved by / approuve par	M. BILLOWITS
bid / offre	N. ROBINSON (project manager / administrateur de projets)
project date / date du projet	FEBRUARY 2022
project no. / no. du projet	R.112072.001
drawing no. / dessine no.	Figure 1

AEC 1 – SOLID WASTE LANDFILL

Parameter	Guideline [3]	Value
Chromium (VI)	1 ug/L	1.3 ug/L
Ammonia	0.0231 mg/L	0.33 mg/L

Parameter	Guideline [1,2]	Value
PHC F2	150 ug/L	370 ug/L
TSS	50 mg/L	250 mg/L

Parameter	Guideline [1,2]	Value
TSS	50 mg/L	1,200 mg/L

RBL-4
RBL-3
RBL-2
RBL-1
THRMS-01
THRMS-02
THRMS-03
LANDFILL AREA
ACCESS ROAD
SEWAGE INLET
SEWAGE OUTFLOW
MUNICIPAL SEWAGE LAGOONS
ROAD TO FENCED-IN AREA
58.5
59
59.5
60
60.5
57.5
56.5
56
55.5
55
54.5
54
53.5
53
52.5
52
51.5
61
61.5
62
62.5
63
63.5
64
64.5
65
65.5
0
20
40
Meters

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Drawing Source:
1. Adapted from Preliminary Design prepared by Arcadis Canada Inc. on behalf of Public Works & Government Services Canada (March 2016)

Environmental Criteria:
1. Ontario Ministry of the Environment 2011 Soil, Groundwater, and Sediment Standards for use under Part X.V.1 of the Environmental Protection Act (MECP, 2011). Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Condition
2. Maximum Allowable Effluent Discharge Concentration as per Water Licence No. 1BR-RBL1929
3. CCME Water Quality for the Protection of Aquatic Life, Freshwater Pathway (Marine Pathway excluded)

LEGEND

- Major Topographic Contour
- Minor Topographic Contour
- 64.5 — Topographic Contour Elevation (approx. metres above sea level)
- Suspected Ground/Surface Water Flow Direction
- Monitoring Well Installed in 2019
- Surface Water Sample
- Thermistor
- Sample Meets Applicable Criteria
- Sample Exceeds Applicable Criteria (See Notes Above)

DILLON CONSULTING | outcome CONSULTANTS

PROFESSIONAL SEALS

DO NOT SCALE DRAWINGS

04		
03		
02		
01		
revision		date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail No. / No. du detail
B drawing no. – where detail required / dessin no. – ou detail exige
C drawing no. – where detailed / dessin no. – ou detaille

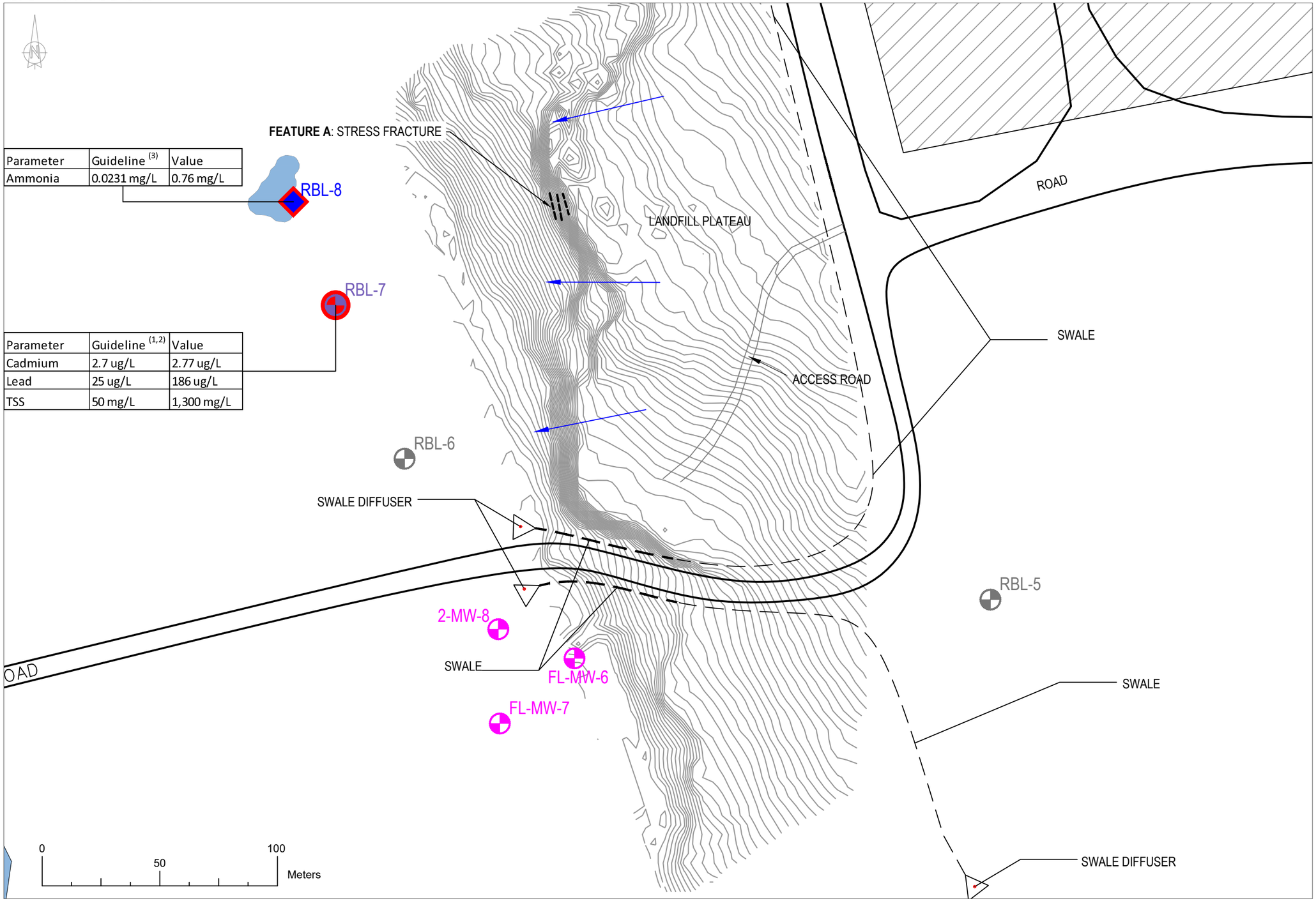
project title / titre du projet: RESOLUTE BAY NUNAVUT — PWGSC for TRANSPORT CANADA

RESOLUTE BAY LANDFILLS: CONFIRMATORY SAMPLING PROGRAM

drawing title / titre du dessin: AEC1: INACTIVE SOLID WASTE LANDFILL MONITORING WELL, SURFACE WATER AND THERMISTOR LOCATIONS

drawn by / dessine par:
designed by / conc par:
approved by / approuve par: M. BILLOWITS
bid / offre: N. ROBINSON — project manager / administrateur de projets
project date / date du projet: FEBRUARY 2022
project no. / no. du projet: R.112072.001
drawing no. / dessine no.: Figure 2

AEC 2 – HISTORICAL LANDFILL



Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Drawing Source:
1. Adapted from Preliminary Design prepared by Arcadis Canada Inc. on behalf of Public Works & Government Services Canada (March 2016)

Environmental Criteria:
1. Ontario Ministry of the Environment 2011 Soil, Groundwater, and Sediment Standards for use under Part X.V.1 of the Environmental Protection Act (MECP, 2011). Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Condition
2. Maximum Allowable Effulent Discharge Concentration as per Water Licence No. 1BR-RBL1929
3. CCME Water Quality for the Protection of Aquatic Life, Freshwater Pathway (Marine Pathway excluded)

LEGEND

- Topographic Contour
- Suspected Ground/Surface Water Flow Direction
- Monitoring Well Installed in 2019
- Existing Monitoring Well (Not Sampled)
- Monitoring Well Installed in 2019 (Not Sampled)
- Surface Water Sample
- Sample Meets Applicable Criteria
- Sample Exceeds Applicable Criteria (See Notes Above)

DILLON CONSULTING | outcome CONSULTANTS

PROFESSIONAL SEALS

DO NOT SCALE DRAWINGS

04		
03		
02		
01		
revision		date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

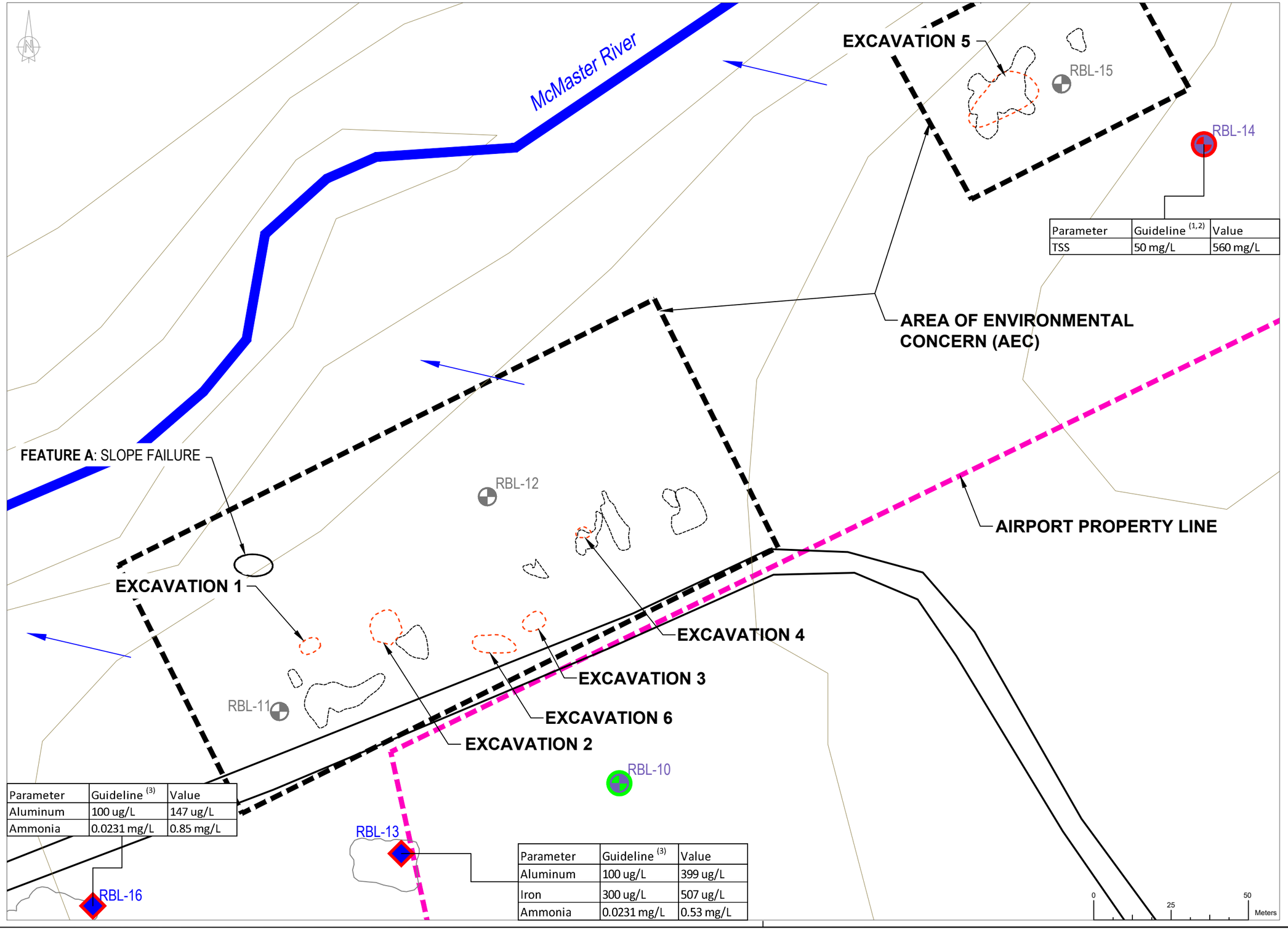
A Detail No. / No. du detail
B drawing no. – where detail required / dessin no. – ou detail exige
C drawing no. – where detailed / dessin no. – ou detaille

project title / titre du projet: RESOLUTE BAY NUNAVUT
PWGSC for TRANSPORT CANADA
RESOLUTE BAY LANDFILLS: CONFIRMATORY SAMPLING PROGRAM

drawing title / titre du dessin: AEC2: HISTORICAL LANDFILL MONTORING WELL AND SURFACE WATER LOCATIONS

drawn by / dessine par:
designed by / conc par:
approved by / approuve par: M. BILLOWITS
bid / offre: N. ROBINSON — project manager / administrateur de projets
project date / date du projet: FEBRUARY 2022
project no. / no. du projet: R.112072.001
drawing no. / dessine no.: Figure 3

AEC 3 – VEHICLE STORAGE AREA



Parameter	Guideline (1,2)	Value
TSS	50 mg/L	560 mg/L

Parameter	Guideline (3)	Value
Aluminum	100 ug/L	147 ug/L
Ammonia	0.0231 mg/L	0.85 mg/L

Parameter	Guideline (3)	Value
Aluminum	100 ug/L	399 ug/L
Iron	300 ug/L	507 ug/L
Ammonia	0.0231 mg/L	0.53 mg/L

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Drawing Source:
1. Adapted from Preliminary Design prepared by Arcadis Canada Inc. on behalf of Public Works & Government Services Canada (March 2016)

Environmental Criteria:
1. Ontario Ministry of the Environment 2011 Soil, Groundwater, and Sediment Standards for use under Part X.V.1 of the Environmental Protection Act (MECP, 2011). Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Condition
2. Maximum Allowable Effluent Discharge Concentration as per Water Licence No. 1BR-RBL1929
3. CCME Water Quality for the Protection of Aquatic Life, Freshwater Pathway (Marine Pathway excluded)

LEGEND

- Major Topographic Contour
- Minor Topographic Contour
- Excavation Limits
- Former Waste Debris Piles
- Suspected Ground/Surface Water Flow Direction
- Monitoring Well Installed in 2019
- Monitoring Well Installed in 2019 (Not Sampled)
- Surface Water Sample
- Sample Meets Applicable Criteria
- Sample Exceeds Applicable Criteria (See Notes Above)

DILLON CONSULTING | outcome CONSULTANTS

PROFESSIONAL SEALS

DO NOT SCALE DRAWINGS

04		
03		
02		
01		
revision		date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail No. / No. du detail
B drawing no. – where detail required / dessin no. – ou detail exige
C drawing no. – where detailed / dessin no. – ou detaille

project title / titre du projet
RESOLUTE BAY NUNAVUT
PWGSC for TRANSPORT CANADA

RESOLUTE BAY LANDFILLS:
CONFIRMATORY SAMPLING PROGRAM

drawing title / titre du dessin
AEC3: FORMER VEHICLE AND WASTE METAL STORAGE AREA, MONITORING WELL AND SURFACE WATER SAMPLING LOCATIONS

drawn by / dessine par

designed by / conc par

approved by / approuve par M. BILLOWITS

bid / offre N. ROBINSON project manager / administrateur de projets

project date / date du projet FEBRUARY 2022

project no. / no. du projet R.112072.001

drawing no. / dessine no. Figure 4

Appendix B

NWB Guideline Approval and Copy of Guidelines Used

FW: Question on guidelines/standards for analysis comparison for Licence 1BR-RBL1929 - dplenderleith@outcomeinc.ca - Personal - Microsoft Edge

https://mail.google.com/mail/u/0/?ui=2&view=btop&ver=ciekafjt8cfz&msg=%23msg-f%3A1718425439190163310&attid=0.1

From: Assol Kubeisinova <assol.kubeisinova@nwb-oen.ca>
Sent: Monday, November 29, 2021 6:06 PM
To: Campbell, Reid <Reid.Campbell@tc.gc.ca>
Cc: Richard Dwyer <richard.dwyer@nwb-oen.ca>
Subject: Fwd: Question on guidelines/standards for analysis comparison for Licence 1BR-RBL1929

Hello Reid,

The NWB recommends the use of the *CCME Water QUality Guidelines for the Protection of Aquatic Life* (*Freshwater*).

For groundwater parameters, the recommendation would be the same as for 1BR-FTA1828.

Best regards,
Assol

Assol Kubeisinova - ᐊᓴᖏᑦ ᑯᐱᐃᓯᓄᕐ - she\her\elle
Technical Advisor- Conseiller technique
ᐱᓗᐊᖅᓯᖓᓕᓂᖅᓯᒪᔪᑦ ᐃᑲᖅᑎᑦ- Piluaqnaqtuliginiqmun Ikayuqti

NUNAVUT WATER BOARD - OFFICE DES EAUX DU NUNAVUT
ᓄᓇᕗᑦ ᐃᒪᓕᕆᔨᑦ ᑲᑎᒪᔨᖏᑦ - NUNAVUT IMALIRIYIN KATIMAYINGI
www.nwb-oen.ca

P.O. Box 119, Gjoa Haven, NU, X0B 1J0
C.P. 119, Gjoa Haven (Nunavut), X0B 1J0
ᑎᑎᕋᐊᕐᕿᐊ 119, ᐅᔾᔨᖓᒃ, ᓄᓇᕗᑦ X0B 1J0
Titigaqaqvia 119, Uqhuqhuq, NU, X0B 1J0

Tel / Téléphone / ᓯᕗᓕᒃᑕᒃ / Hivayauta: (867) 360-6338 | Fax / Télécopieur / ᓴᒃᖢᑦᑯᑦ / Fax-kut: (867) 360-6369
Toll Free / Sans / ᐊᑭᖅᑲᓪᓚᑦᑐᖅ / Akiittuq: 1-855-521-3745

WARNING - This communication, including any attachments contains confidential information intended only for the addressee(s) noted above. Any unauthorized distribution, copying, or disclosure is strictly prohibited. If you have received this by mistake, please notify the sender immediately and delete this message without printing or copying it. Thank you.

AVIS DE CONFIDENTIALITÉ - Ce message, et toute(s) pièce(s) jointe(s) est confidentiel et est à l'usage exclusif du(es) destinataire(s) ci-dessus. Toute autre personne est par la présente avisée qu'il lui est strictement interdit de le diffuser, le distribuer ou le reproduire. Si le destinataire ne peut être joint ou vous est inconnu, veuillez informer l'expéditeur par courrier électronique immédiatement et détruire ce message et toute copie de celui-ci. Merci pour votre collaboration.

Merci de penser à l'environnement avant d'imprimer ce courriel / Thank you for thinking of the environment before printing this email

Download of CCME Water Quality Guidelines
for the Protection of Aquatic Life
as of March 11, 2022
for Water License listed Parameters

Chemical Name	Chemical Groups	CASRN	Water Quality Guidelines for the Protection of Aquatic Life					
			Freshwater			Marine		
			Concentration (µg/L) Short Term	Concentration (µg/L) Long Term	Date	Concentration (µg/L) Short Term	Concentration (µg/L) Long Term	Date
Acenaphthene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	83-32-9	*No data*	5.8	1999	*No data*	Insufficient data	1999
Acenaphthylene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	208-96-8	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Acridine	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	260-94-6	*No data*	4.4	1999	*No data*	Insufficient data	1999
Aluminium	Inorganic, Metals	7429-90-5	*No data*	Variable	1987	*No data*	*No data*	*No data*
Anthracene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	120-12-7	*No data*	0.012	1999	*No data*	Insufficient data	1999
Antimony	Inorganic, Metals	7440-36-0	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Aroclor 1254	Organic, Polyaromatic compounds, Polychlorinated biphenyls	11097-69-1	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Arsenic	Inorganic, Metals	7440-38-2	*No data*	5	1997	*No data*	12.5	1997
Barium	Inorganic, Metals	7440-39-3	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Benz(a)anthracene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	56-55-3	*No data*	0.018	1999	*No data*	Insufficient data	1999
Benzo(a)pyrene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	50-32-8	*No data*	0.015	1999	*No data*	Insufficient data	1999
Benzo(k)fluoranthene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	207-08-9	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Beryllium	Inorganic, Metals	7440-41-7	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Boron	Inorganic, Metals	7440-42-8	29,000µg/L	1,500µg/L	2009	NRG	NRG	2009
Cadmium	Inorganic, Metals	7440-43-9	Equation	Equation	2014	NRG	0.12	2014
Calcium	Inorganic, Metals	7440-70-2	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Chloride	Inorganic	16887-00-6	640,000 µg/L or 640 mg/L	120,000 µg/L or 120 mg/L	2011	NRG	NRG	2011
Chromium (total)	Inorganic, Metals	7440-47-3	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Chromium, hexavalent (Cr(VI))	Inorganic, Metals	7440-47-3	*No data*	1	1997	*No data*	1.5	1997
Chromium, trivalent (Cr(III))	Inorganic, Metals	7440-47-3	*No data*	8.9	1997	*No data*	56	1997
Chrysene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	218-01-9	*No data*	Insufficient data	1999	*No data*	Insufficient data	1999
Cobalt	Inorganic, Metals	7440-48-4	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Conductivity	Physical	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Copper	Inorganic, Metals	7440-50-8	*No data*	Equation	1987	*No data*	*No data*	*No data*
Dibenz(a,h)anthracene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	53-70-3	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*

Chemical Name	Chemical Groups	CASRN	Water Quality Guidelines for the Protection of Aquatic Life					
			Freshwater			Marine		
			Concentration (µg/L) Short Term	Concentration (µg/L) Long Term	Date	Concentration (µg/L) Short Term	Concentration (µg/L) Long Term	Date
Fluoranthene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	206-44-0	*No data*	0.04	1999	*No data*	Insufficient data	1999
Fluorene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	86-73-7	*No data*	3	1999	*No data*	Insufficient data	1999
Indeno(1,2,3-c,d)pyrene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	193-39-5	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Iron	Inorganic, Metals	7439-89-6	*No data*	300	1987	*No data*	*No data*	*No data*
Lead	Inorganic, Metals	7439-92-1	*No data*	Equation	1987	*No data*	*No data*	*No data*
Lithium	Inorganic, Metals	7439-93-2	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Manganese	Inorganic, Metals	7439-96-5	Equation	Variable	2019	*No data*	*No data*	*No data*
Mercury	Inorganic, Metals	7439-97-6	*No data*	0.026	2003	*No data*	0.016	2003
2-Methylnaphthalene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	91-57-6	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Molybdenum	Inorganic, Metals	7439-98-7	*No data*	73	1999	*No data*	*No data*	*No data*
Naphthalene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	91-20-3	*No data*	1.1	1999	*No data*	1.4	1999
Nickel	Inorganic, Metals	7440-02-0	*No data*	Equation	1987	*No data*	*No data*	*No data*
Nitrate + Nitrite	Inorganic, Inorganic nitrogen compounds	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
pH	Inorganic, Acidity, alkalinity and ph	*No data*	*No data*	6.5 to 9.0	1987	*No data*	7.0 to 8.7 & Narrative	1996
Phenanthrene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	1985-01-08	*No data*	0.4	1999	*No data*	Insufficient data	1999
Phenols (mono- & dihydric)	Organic, Aromatic hydroxy compounds	108-95-2	*No data*	4	1999	*No data*	*No data*	*No data*
Polychlorinated biphenyls	Organic, Polyaromatic compounds, Polychlorinated biphenyls	1336-36-3	*No data*	~~0.001~~	1987	*No data*	~~0.01~~	1991
Polychlorinated dibenzo-p-dioxins/dibenzo furans	Organic, Polyaromatic compounds, Polychlorinated dioxins and furans	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Pyrene	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	129-00-0	*No data*	0.025	1999	*No data*	Insufficient data	1999
Quinoline	Organic, Polyaromatic compounds, Polycyclic aromatic hydrocarbons	91-22-5	*No data*	3.4	1999	*No data*	Insufficient data	1999
Selenium	Inorganic, Metals	7782-49-2	*No data*	1	1987	*No data*	*No data*	*No data*
Silver	Inorganic, Metals	7440-22-4	NRG	0.25	2015	7.5	NRG	2015
Sulphate	Inorganic, Inorganic sulphur compounds	18785-72-3	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Suspended sediments	Physical, Turbidity, clarity and suspended solids, Total particulate matter	*No data*	*No data*	Narrative	1999	*No data*	Narrative	1999
Thallium	Inorganic, Metals	7440-28-0	*No data*	0.8	1999	*No data*	*No data*	*No data*
Tin	Inorganic, Metals	7440-31-5	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*

Chemical Name	Chemical Groups	CASRN	Water Quality Guidelines for the Protection of Aquatic Life					
			Freshwater			Marine		
			Concentration (µg/L) Short Term	Concentration (µg/L) Long Term	Date	Concentration (µg/L) Short Term	Concentration (µg/L) Long Term	Date
Total dissolved solids (salinity)	Physical, Turbidity, clarity and suspended solids	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Uranium	Inorganic, Metals	7440-61-1	33	15	2011	NRG	NRG	2011
Vanadium	Inorganic, Metals	7440-62-2	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*
Zinc	Inorganic, Metals	7440-66-6	Equation	Equation	2018	Not assessed	Not assessed	2018

Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*

Ministry of the Environment
April 15, 2011

PIBS # 7382e01

TABLE OF CONTENTS

TABLE OF CONTENTS ..... **ii**

INTRODUCTION ..... **iii**

HOW TO READ THESE TABLES iii

Tables 1 to 5 iii

Notes on Table 1 iv

Notes on Table 6, 7, 8, &9 iv

Table 1: Full Depth Background Site Condition Standards **1**

Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition **4**

Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition **7**

Table 4: Stratified Site Condition Standards in a Potable Ground Water Condition **10**

Table 5: Stratified Site Condition Standards in a Non-Potable Ground Water Condition **13**

Table 6 Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition **16**

Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition **19**

Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Groundwater Condition **22**

Table 9: Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition **25**

INTRODUCTION

This document, consisting of Tables 1 to 9, sets out the prescribed contaminants and the applicable site condition standards for those contaminants for the purposes of Part XV.1 of the *Environmental Protection Act*. The Tables can be summarized as follows:

Table 1:	Full Depth Background Site Condition Standards
Table 2:	Full Depth Generic Site Condition Standards in a Potable Ground Water Condition.
Table 3:	Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.
Table 4:	Stratified Site Condition Standards in a Potable Ground Water Condition.
Table 5:	Stratified Site Condition Standards in a Non-Potable Ground Water Condition.
Table 6:	Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition
Table 7:	Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition
Table 8	Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Groundwater Condition
Table 9	Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition

HOW TO READ THESE TABLES

Tables 1 to 9 set out prescribed contaminants by listing contaminants in the column of rows that has the heading row entitled “Contaminant”. Tables 1 to 9 set out prescribed standards for these contaminants by indicating in the appropriate locations the maximum concentrations of the contaminants in soil, ground water and sediment, which are expressed in a number that is to be read as µg/g dry weight for soil and sediment, and as µg/L for ground water, unless otherwise indicated in the table. Within Tables 2 – 7 separate values for each of the two soil texture groups are listed. The value for coarse soils is the one that is not bracketed, whereas the value for medium and fine textured soils is given within brackets. Where there are no bracketed values, the value applies to both soil groups.

The standard for a property that is applicable for a type of property use in a particular medium, can be found in the row named for the contaminant and in the column that has the heading row that indicates the applicable medium and the type of property use for which the record of site condition is filed.

A contaminant that is listed and for which the abbreviation “N/V” appears in the cell, instead of a number representing a maximum concentration, is a contaminant for which a standard is not prescribed. The abbreviation “N/V” means “no value”.

A contaminant that is listed and for which the abbreviation “N/A” appears in the cell, instead of a number representing a maximum concentration, is a contaminant for which a standard is not prescribed because no standard is required. The abbreviation “N/A” means “not applicable”.

Notes on Table 1

Table 1 sets out the “Full Depth Background Site Condition Standards”. The soil standards in Table 1 are background values derived from the Ontario Typical Range values for

the land uses indicated and are considered representative of upper limits of typical province-wide background concentrations in soils that are not contaminated by point sources.

The groundwater standards in Table 1 were derived from the Provincial Groundwater Monitoring Information System (PGMIS) from 20002 to 2007 and from groundwater well surveillance data (DWSP) from 1997 -2002. For parameters where sufficient data was not available values have been derived from the most recent effects-based water criteria including Provincial Water Quality Objectives and the Ontario Drinking Water Quality Standards as upper limits and Method Detection Limit as a lower limit. These values are considered to be generally achievable in site situations typical of background while providing a level of human health and ecosystem protection consistent with background conditions and protective of sensitive ecosystems.

The sediment standards in Table 1 are the same standards (adverse effects-based) developed for the Table 8 and 9 for properties within 30 m of a water body. These values are within the range of measured background sediment where data is available in the 1993 Sediment Guidelines and are considered to provide a level of human health and ecosystem protection consistent with background and protective of sensitive ecosystems.

Notes on Table 6, 7, 8, and 9

Tables 6 and 7 are to be used in situations where there is less than 2 m of overburden above bedrock. They can also be used in situations where the QP is not satisfied that Tables 2 and 3 are suitable due to shallow depth to groundwater. Tables 6 and 7 were derived on the same basis as Tables 2 and 3 except that the calculation for dilution occurring in the aquifer is removed, and biodegradation between the groundwater and the basement is assumed to not be occurring.

Tables 8 and 9 are to be used where all or part of a property lies within 30 m of a surface water body. These standards were derived with the objective of protecting surface water bodies from movement of soil directly into surface water to become sediment, and assuming that there is no dilution in the groundwater for the aquatic protection pathway.

Additional notes

1) For all tables, the methyl naphthalene soil standard is applicable to both 1-methyl naphthalene and 2 –methyl naphthalene, with the provision that if both are detected the sum of the two concentrations cannot exceed the standard.

2) There are two boron parameters in the tables, one for a hot water extract (HWS) that is designed for protection of plants and soil invertebrates, and one for a total (mixed strong acid digest). The HWS boron can be used by itself for all surface soils, as plants are the most sensitive receptor for boron. For subsurface soils the total boron standard can be used by itself, since plant protection for soils below the root zone is not a significant concern.

3) Conditions can exist at a site for which the assumptions used to develop the generic criteria may not be valid. The QP must ascertain that the site conditions are appropriate for use of the generic standards such that he/she can be comfortable with signing the certifications on the RSC. To assist the QP in recognizing the types of conditions that may be important in this respect the following examples are given:

   a) if the contaminated zone has a volume larger than 340m3 or a source length or width greater than 13 metres then all pathways which employ source depletion or groundwater

transport (Soil to Nose, S-GW1, S-IA, S-GW3, GW2 and GW3 components of the standards) may be affected.

b) if a high permeability zone is present in the vadose zone which provides a direct preferential pathway to the building then the soil properties assumed in the generic J&E modelling to determine the S-IA and GW2 components of the standard may change.

c) if the annual average of the capillary fringe of the water table is < 0.8 metres from the outer edge of the gravel crush of the building foundation, then the 10 x biodegradation factor assumed in the GW2 pathway may be non-conservative.

d) if the average Organic Carbon content (foc) of soil above the water table is < 0.002 then more contaminant may be in the water and gas phases than assumed in the generic standards.

f) if there is a continuous source of the contaminant then the pathways which assume a depleting source (i.e., S-IA, S-GW1, and Soil to Nose) might be non-conservative.

g) if there is a surface water body that could be affected by the property from contaminant migration via groundwater, and the surface water has total hardness less than 70 mg/L (as $CaCO_3$) and/or has pH less than 6.7, the aquatic protection values for some metals and pentachlorophenol may be non-conservative. In such cases, the QP may need to consider whether a site-specific estimate of hardness and pH resulting from mixing of groundwater and surface water is needed to estimate an appropriate aquatic protection value for this site.

The existence of any of the above conditions does not necessarily indicate that the generic criteria are not valid for a given site. There are many interrelated parameters and factors that were used in the development of the generic standards, and in many cases one factor, such as any of those above, can be outweighed by differences in other factors in a manner that, overall, there is sufficient natural protection provided by the site. In addition, it must also be considered that the component that drives the standard may not be affected by the particular limiting condition described above (e.g. a terrestrial ecological driver, but there are high permeable zones in the vadose zone). The QP should consider these types of factors in assessing the appropriateness of the use of the generic standards.

TABLE 1: Full Depth Background Site Condition Standards

Table 1	Soil (other than sediment) µg/g		Ground Water (µg/L)	Sediment (µg/g)
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All Types of Property Uses	All Types of Property Uses
Acenaphthene	0.05	0.072	4.1	NV
Acenaphthylene	0.093	0.093	1	NV
Acetone	0.5	0.5	2700	NV
Aldrin	0.05	0.05	0.01	0.002
Anthracene	0.05	0.16	0.1	0.22
Antimony	1	1.3	1.5	NV
Arsenic	11	18	13	6
Barium	210	220	610	NV
Benzene	0.02	0.02	0.5	NV
Benz[a]anthracene	0.095	0.36	0.2	0.32
Benzo[a]pyrene	0.05	0.3	0.01	0.37
Benzo[b]fluoranthene	0.3	0.47	0.1	NV
Benzo[ghi]perylene	0.2	0.68	0.2	0.17
Benzo[k]fluoranthene	0.05	0.48	0.1	0.24
Beryllium	2.5	2.5	0.5	NV
Biphenyl 1,1'-	0.05	0.05	0.5	NV
Bis(2-chloroethyl)ether	0.5	0.5	5	NV
Bis(2-chloroisopropyl)ether	0.5	0.5	120	NV
Bis(2-ethylhexyl)phthalate	5	5	10	NV
Boron (Hot Water Soluble)*	NA	NA	NA	NA
Boron (total)	36	36	1700	NV
Bromodichloromethane	0.05	0.05	2	NV
Bromoform	0.05	0.05	5	NV
Bromomethane	0.05	0.05	0.89	NV
Cadmium	1	1.2	0.5	0.6
Carbon Tetrachloride	0.05	0.05	0.2	NV
Chlordane	0.05	0.05	0.06	0.007
Chloroaniline p-	0.5	0.5	10	NV
Chlorobenzene	0.05	0.05	0.5	NV
Chloroform	0.05	0.05	2	NV
Chlorophenol, 2-	0.1	0.1	8.9	NV
Chromium Total	67	70	11	26
Chromium VI	0.66	0.66	25	NV
Chrysene	0.18	2.8	0.1	0.34
Cobalt	19	21	3.8	50
Copper	62	92	5	16
Cyanide (CN-)	0.051	0.051	5	0.1
Dibenz[a h]anthracene	0.1	0.1	0.2	0.06
Dibromochloromethane	0.05	0.05	2	NV
Dichlorobenzene, 1,2-	0.05	0.05	0.5	NV
Dichlorobenzene, 1,3-	0.05	0.05	0.5	NV
Dichlorobenzene, 1,4-	0.05	0.05	0.5	NV
Dichlorobenzidine, 3,3'-	1	1	0.5	NV
Dichlorodifluoromethane	0.05	0.05	590	NV
DDD	0.05	0.05	1.8	0.008
DDE	0.05	0.05	10	0.005
DDT	0.078	1.4	0.05	0.007
Dichloroethane, 1,1-	0.05	0.05	0.5	NV
Dichloroethane, 1,2-	0.05	0.05	0.5	NV
Dichloroethylene, 1,1-	0.05	0.05	0.5	NV
Dichloroethylene, 1,2-cis-	0.05	0.05	1.6	NV
Dichloroethylene, 1,2-trans-	0.05	0.05	1.6	NV
Dichlorophenol, 2,4-	0.1	0.1	20	NV
Dichloropropane, 1,2-	0.05	0.05	0.5	NV
Dichloropropene,1,3-	0.05	0.05	0.5	NV
Dieldrin	0.05	0.05	0.05	0.002

Table 1	Soil (other than sediment) µg/g		Ground Water (µg/L)	Sediment (µg/g)
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All Types of Property Uses	All Types of Property Uses
Diethyl Phthalate	0.5	0.5	30	NV
Dimethylphthalate	0.5	0.5	30	NV
Dimethylphenol, 2,4-	0.2	0.2	10	NV
Dinitrophenol, 2,4-	2	2	10	NV
Dinitrotoluene, 2,4 & 2,6-	0.5	0.5	5	NV
Dioxane, 1,4	0.2	0.2	50	NV
Dioxin/Furan (TEQ)	0.000007	0.000007	0.000015	NV
Endosulfan	0.04	0.04	0.05	NV
Endrin	0.04	0.04	0.05	0.003
Ethylbenzene	0.05	0.05	0.5	NV
Ethylene dibromide	0.05	0.05	0.2	NV
Fluoranthene	0.24	0.56	0.4	0.75
Fluorene	0.05	0.12	120	0.19
Heptachlor	0.05	0.05	0.01	NV
Heptachlor Epoxide	0.05	0.05	0.01	0.005
Hexachlorobenzene	0.01	0.01	0.01	0.02
Hexachlorobutadiene	0.01	0.01	0.01	NV
Hexachlorocyclohexane Gamma-	0.01	0.01	0.01	NV
Hexachloroethane	0.01	0.01	0.01	NV
Hexane (n)	0.05	0.05	5	NV
Indeno[1 2 3-cd]pyrene	0.11	0.23	0.2	0.2
Lead	45	120	1.9	31
Mercury	0.16	0.27	0.1	0.2
Methoxychlor	0.05	0.05	0.05	NV
Methyl Ethyl Ketone	0.5	0.5	400	NV
Methyl Isobutyl Ketone	0.5	0.5	640	NV
Methyl Mercury **	NV	NV	0.12	NV
Methyl tert-Butyl Ether (MTBE)	0.05	0.05	15	NV
Methylene Chloride	0.05	0.05	5	NV
Methlynaphthalene, 2-(1-) ***	0.05	0.59	2	NV
Molybdenum	2	2	23	NV
Naphthalene	0.05	0.09	7	NV
Nickel	37	82	14	16
Pentachlorophenol	0.1	0.1	0.5	NV
Petroleum Hydrocarbons F1****	17	25	420	NV
Petroleum Hydrocarbons F2	10	10	150	NV
Petroleum Hydrocarbons F3	240	240	500	NV
Petroleum Hydrocarbons F4	120	120	500	NV
Phenanthrene	0.19	0.69	0.1	0.56
Phenol	0.5	0.5	5	NV
Polychlorinated Biphenyls	0.3	0.3	0.2	0.07
Pyrene	0.19	1	0.2	0.49
Selenium	1.2	1.5	5	NV
Silver	0.5	0.5	0.3	0.5
Styrene	0.05	0.05	0.5	NV
Tetrachloroethane, 1,1,1,2-	0.05	0.05	1.1	NV
Tetrachloroethane, 1,1,2,2-	0.05	0.05	0.5	NV
Tetrachloroethylene	0.05	0.05	0.5	NV
Thallium	1	1	0.5	NV
Toluene	0.2	0.2	0.8	NV
Trichlorobenzene, 1,2,4-	0.05	0.05	0.5	NV
Trichloroethane, 1,1,1-	0.05	0.05	0.5	NV
Trichloroethane, 1,1,2-	0.05	0.05	0.5	NV
Trichloroethylene	0.05	0.05	0.5	NV
Trichlorofluoromethane	0.05	0.25	150	NV
Trichlorophenol, 2,4,5-	0.1	0.1	0.2	NV
Trichlorophenol, 2,4,6-	0.1	0.1	0.2	NV
Uranium	1.9	2.5	8.9	NV
Vanadium	86	86	3.9	NV
Vinyl Chloride	0.02	0.02	0.5	NV

Table 1	Soil (other than sediment) µg/g		Ground Water (µg/L)	Sediment (µg/g)
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All Types of Property Uses	All Types of Property Uses
Xylene Mixture	0.05	0.05	72	NV
Zinc	290	290	160	120
Electrical Conductivity (mS/cm)	0.47	0.57	NA	NA
Chloride	NA	NA	790000	NV
Sodium Adsorption Ratio	1	2.4	NA	NA
Sodium	NA	NA	490000	NV

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

TABLE 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition

Table 2	Soil Standards (other than sediment) µg/g			Potable Ground Water µg/L
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Acenaphthene	(29) 7.9	(29) 7.9	(29) 21	4.1
Acenaphthylene	(0.17) 0.15	(0.17) 0.15	(0.17) 0.15	1
Acetone	(28) 16	(28) 16	(28) 16	2700
Aldrin	0.05	0.05	(0.11) 0.088	0.35
Anthracene	(0.74) 0.67	(0.74) 0.67	(0.74) 0.67	2.4
Antimony	7.5	7.5	(50) 40	6
Arsenic	11	18	18	25
Barium	390	390	670	1000
Benzene	(0.17) 0.21	(0.17) 0.21	(0.4) 0.32	5
Benz[a]anthracene	(0.63) 0.5	(0.63) 0.5	0.96	1
Benzo[a]pyrene	0.078	0.3	0.3	0.01
Benzo[b]fluoranthene	0.78	0.78	0.96	0.1
Benzo[ghi]perylene	(7.8) 6.6	(7.8) 6.6	9.6	0.2
Benzo[k]fluoranthene	0.78	0.78	0.96	0.1
Beryllium	(5) 4	(5) 4	(10) 8	4
Biphenyl 1,1'-	(1.1) 0.31	(1.1) 0.31	(210) 52	0.5
Bis(2-chloroethyl)ether	0.5	0.5	0.5	5
Bis(2-chloroisopropyl)ether	(1.8) 0.67	(1.8) 0.67	(13) 11	120
Bis(2-ethylhexyl)phthalate	5	5	(35) 28	10
Boron (Hot Water Soluble)*	1.5	1.5	2	NA
Boron (total)	120	120	120	5000
Bromodichloromethane	(1.9) 1.5	(1.9) 1.5	(1.9) 1.5	16
Bromoform	(0.26) 0.27	(0.26) 0.27	(1.7) 0.61	25
Bromomethane	0.05	0.05	0.05	0.89
Cadmium	1	1.2	1.9	2.7
Carbon Tetrachloride	(0.12) 0.05	(0.12) 0.05	(0.71) 0.21	(5) 0.79
Chlordane	0.05	0.05	0.05	7
Chloroaniline p-	(0.53) 0.5	(0.53) 0.5	(0.53) 0.5	10
Chlorobenzene	(2.7) 2.4	(2.7) 2.4	(2.7) 2.4	30
Chloroform	(0.18) 0.05	(0.18) 0.05	(0.18) 0.47	(22) 2.4
Chlorophenol, 2-	(2) 1.6	(2) 1.6	(3.9) 3.1	8.9
Chromium Total	160	160	160	50
Chromium VI	(10) 8	(10) 8	(10) 8	25
Chrysene	(7.8) 7	(7.8) 7	9.6	0.1
Cobalt	22	22	(100) 80	3.8
Copper	(180) 140	(180) 140	(300) 230	87
Cyanide (CN-)	0.051	0.051	0.051	66
Dibenz[a h]anthracene	0.1	0.1	0.1	0.2
Dibromochloromethane	(2.9) 2.3	(2.9) 2.3	(2.9) 2.3	25
Dichlorobenzene, 1,2-	(1.7) 1.2	(1.7) 1.2	(1.7) 1.2	3
Dichlorobenzene, 1,3-	(6) 4.8	(6) 4.8	(12) 9.6	59
Dichlorobenzene, 1,4-	(0.097) 0.083	(0.097) 0.083	(0.57) 0.2	1
Dichlorobenzidine, 3,3'-	1	1	1	0.5
Dichlorodifluoromethane	(25) 16	(25) 16	(25) 16	590
DDD	3.3	3.3	4.6	10
DDE	(0.33) 0.26	(0.33) 0.26	(0.65) 0.52	10
DDT	0.078	1.4	1.4	2.8
Dichloroethane, 1,1-	(0.6) 0.47	(0.6) 0.47	(0.6) 0.47	5
Dichloroethane, 1,2-	0.05	0.05	0.05	(5) 1.6
Dichloroethylene, 1,1-	0.05	0.05	(0.48) 0.064	(14) 1.6
Dichloroethylene, 1,2-cis-	(2.5) 1.9	(2.5) 1.9	(2.5) 1.9	(17) 1.6
Dichloroethylene, 1,2-trans-	(0.75) 0.084	(0.75) 0.084	(2.5) 1.3	(17) 1.6
Dichlorophenol, 2,4-	(0.27) 0.19	(0.27) 0.19	(0.27) 0.19	20
Dichloropropane, 1,2-	(0.085) 0.05	(0.085) 0.05	(0.68) 0.16	5
Dichloropropene,1,3-	(0.081) 0.05	(0.081) 0.05	(0.081) 0.059	0.5
Dieldrin	0.05	0.05	(0.11) 0.088	0.35

Table 2	Soil Standards (other than sediment) µg/g			Potable Ground Water µg/L
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Diethyl Phthalate	0.5	0.5	0.5	38
Dimethylphthalate	0.5	0.5	0.5	38
Dimethylphenol, 2,4-	(53) 38	(53) 38	(53) 38	59
Dinitrophenol, 2,4-	(2.9) 2	(2.9) 2	(2.9) 2	10
Dinitrotoluene, 2,4 & 2,6-	0.5	0.5	0.5	5
Dioxane, 1,4	0.2	1.8	1.8	50
Dioxin/Furan (TEQ)	0.000013	0.000013	0.000099	0.000015
Endosulfan	0.04	0.04	(0.38) 0.3	1.5
Endrin	0.04	0.04	0.04	0.48
Ethylbenzene	(1.6) 1.1	(1.6) 1.1	(1.6) 1.1	2.4
Ethylene dibromide	0.05	0.05	0.05	0.2
Fluoranthene	0.69	0.69	9.6	0.41
Fluorene	(69) 62	(69) 62	(69) 62	120
Heptachlor	0.15	0.15	0.19	1.5
Heptachlor Epoxide	0.05	0.05	0.05	0.048
Hexachlorobenzene	0.52	0.52	0.66	1
Hexachlorobutadiene	(0.014) 0.012	(0.014) 0.012	(0.095) 0.031	(0.6) 0.44
Hexachlorocyclohexane Gamma-	(0.063) 0.056	(0.063) 0.056	(0.063) 0.056	1.2
Hexachloroethane	(0.071) 0.089	(0.071) 0.089	(0.43) 0.21	2.1
Hexane (n)	(34) 2.8	(34) 2.8	(88) 46	(520) 51
Indeno[1 2 3-cd]pyrene	(0.48) 0.38	(0.48) 0.38	(0.95) 0.76	0.2
Lead	45	120	120	10
Mercury	(1.8) 0.25	(1.8) 0.27	(20) 3.9	(1) 0.29
Methoxychlor	0.13	0.13	1.6	6.5
Methyl Ethyl Ketone	(44) 16	(44) 16	(88) 70	1800
Methyl Isobutyl Ketone	(4.3) 1.7	(4.3) 1.7	(210) 31	640
Methyl Mercury **	(0.0094) 0.0084	(0.0094) 0.0084	(0.0094) 0.0084	0.15
Methyl tert-Butyl Ether (MTBE)	(1.4) 0.75	(1.4) 0.75	(2.3) 1.6	15
Methylene Chloride	(0.96) 0.1	(0.96) 0.1	(2) 1.6	50
Methlynaphthalene, 2-(1-) ***	(3.4) 0.99	(3.4) 0.99	(42) 30	3.2
Molybdenum	6.9	6.9	40	70
Naphthalene	(0.75) 0.6	(0.75) 0.6	(28) 9.6	11
Nickel	(130) 100	(130) 100	(340) 270	100
Pentachlorophenol	0.1	0.1	(3.3) 2.9	30
Petroleum Hydrocarbons F1****	(65) 55	(65) 55	(65) 55	750
Petroleum Hydrocarbons F2	(150) 98	(150) 98	(250) 230	150
Petroleum Hydrocarbons F3	(1300) 300	(1300) 300	(2500) 1700	500
Petroleum Hydrocarbons F4	(5600) 2800	(5600) 2800	(6600) 3300	500
Phenanthrene	(7.8) 6.2	(7.8) 6.2	(16) 12	1
Phenol	9.4	9.4	9.4	890
Polychlorinated Biphenyls	0.35	0.35	1.1	3
Pyrene	78	78	96	4.1
Selenium	2.4	2.4	5.5	10
Silver	(25) 20	(25) 20	(50) 40	1.5
Styrene	(2.2) 0.7	(2.2) 0.7	(43) 34	5.4
Tetrachloroethane, 1,1,1,2-	(0.05) 0.058	(0.05) 0.058	(0.11) 0.087	1.1
Tetrachloroethane, 1,1,2,2-	0.05	0.05	(0.094) 0.05	1
Tetrachloroethylene	(2.3) 0.28	(2.3) 0.28	(2.5) 1.9	(17) 1.6
Thallium	1	1	3.3	2
Toluene	(6) 2.3	(6) 2.3	(9) 6.4	24
Trichlorobenzene, 1,2,4-	(1.4) 0.36	(1.4) 0.36	(16) 3.2	70
Trichloroethane, 1,1,1-	(3.4) 0.38	(3.4) 0.38	(12) 6.1	200
Trichloroethane, 1,1,2-	0.05	0.05	(0.11) 0.05	(5) 4.7
Trichloroethylene	(0.52) 0.061	(0.52) 0.061	(0.61) 0.55	(5) 1.6
Trichlorofluoromethane	(5.8) 4	(5.8) 4	(5.8) 4	150
Trichlorophenol, 2,4,5-	(5.5) 4.4	(5.5) 4.4	(10) 9.1	8.9
Trichlorophenol, 2,4,6-	(2.9) 2.1	(2.9) 2.1	(2.9) 2.1	2
Uranium	23	23	33	20
Vanadium	86	86	86	6.2
Vinyl Chloride	(0.022) 0.02	(0.022) 0.02	(0.25) 0.032	(1.7) 0.5

Table 2	Soil Standards (other than sediment) µg/g			Potable Ground Water µg/L
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Xylene Mixture	(25) 3.1	(25) 3.1	(30) 26	300
Zinc	340	340	340	1100
Electrical Conductivity (mS/cm)	0.7	0.7	1.4	NA
Chloride	NA	NA	NA	790000
Sodium Adsorption Ratio	5	5	12	NA
Sodium	NA	NA	NA	490000

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

TABLE 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

Table 3	Soil Standards (other than sediment) µg/g		Non- Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Acenaphthene	(58) 7.9	96	(1700) 600
Acenaphthylene	(0.17) 0.15	(0.17) 0.15	1.8
Acetone	(28) 16	(28) 16	130000
Aldrin	0.05	(0.11) 0.088	8.5
Anthracene	(0.74) 0.67	(0.74) 0.67	2.4
Antimony	7.5	(50) 40	20000
Arsenic	18	18	1900
Barium	390	670	29000
Benzene	(0.17) 0.21	(0.4) 0.32	(430) 44
Benz[a]anthracene	(0.63) 0.5	0.96	4.7
Benzo[a]pyrene	0.3	0.3	0.81
Benzo[b]fluoranthene	0.78	0.96	0.75
Benzo[ghi]perylene	(7.8) 6.6	9.6	0.2
Benzo[k]fluoranthene	0.78	0.96	0.4
Beryllium	(5) 4	(10) 8	67
Biphenyl 1,1'-	(1.1) 0.31	(210) 52	(2200) 1000
Bis(2-chloroethyl)ether	0.5	0.5	300000
Bis(2-chloroisopropyl)ether	(1.8) 0.67	(14) 11	20000
Bis(2-ethylhexyl)phthalate	5	(35) 28	140
Boron (Hot Water Soluble)*	1.5	2	NA
Boron (total)	120	120	45000
Bromodichloromethane	13	18	85000
Bromoform	(0.26) 0.27	(1.7) 0.61	(770) 380
Bromomethane	0.05	0.05	(56) 5.6
Cadmium	1.2	1.9	2.7
Carbon Tetrachloride	(0.12) 0.05	(1.5) 0.21	(8.4) 0.79
Chlordane	0.05	0.05	28
Chloroaniline p-	(0.53) 0.5	(0.53) 0.5	400
Chlorobenzene	(2.7) 2.4	(2.7) 2.4	630
Chloroform	(0.18) 0.05	(0.18) 0.47	(22) 2.4
Chlorophenol, 2-	(2) 1.6	(3.9) 3.1	3300
Chromium Total	160	160	810
Chromium VI	(10) 8	(10) 8	140
Chrysene	(7.8) 7	9.6	1
Cobalt	22	(100) 80	66
Copper	(180) 140	(300) 230	87
Cyanide (CN-)	0.051	0.051	66
Dibenz[a h]anthracene	0.1	0.1	0.52
Dibromochloromethane	9.4	13	82000
Dichlorobenzene, 1,2-	(4.3) 3.4	(8.5) 6.8	(9600) 4600
Dichlorobenzene, 1,3-	(6) 4.8	(12) 9.6	9600
Dichlorobenzene, 1,4-	(0.097) 0.083	(0.84) 0.2	(67) 8
Dichlorobenzidine, 3,3'-	1	1	640
Dichlorodifluoromethane	(25) 16	(25) 16	4400
DDD	3.3	4.6	45
DDE	(0.33) 0.26	(0.65) 0.52	20
DDT	1.4	1.4	2.8
Dichloroethane, 1,1-	(11) 3.5	(21) 17	(3100) 320
Dichloroethane, 1,2-	0.05	0.05	(12) 1.6
Dichloroethylene, 1,1-	0.05	(0.48) 0.064	(17) 1.6
Dichloroethylene, 1,2-cis-	(30) 3.4	(37) 55	(17) 1.6
Dichloroethylene, 1,2-trans-	(0.75) 0.084	(9.3) 1.3	(17) 1.6
Dichlorophenol, 2,4-	(2.1) 1.7	(4.2) 3.4	4600
Dichloropropane, 1,2-	(0.085) 0.05	(0.68) 0.16	(140) 16
Dichloropropene,1,3-	(0.083) 0.05	(0.21) 0.18	(45) 5.2
Dieldrin	0.05	(0.11) 0.088	0.75

Table 3	Soil Standards (other than sediment) µg/g		Non- Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Diethyl Phthalate	0.5	0.5	38
Dimethylphthalate	0.5	0.5	38
Dimethylphenol, 2,4-	(420) 390	(440) 390	39000
Dinitrophenol, 2,4-	38	(66) 59	11000
Dinitrotoluene, 2,4 & 2,6-	0.92	1.2	2900
Dioxane, 1,4	1.8	1.8	(7300000)1900000
Dioxin/Furan (TEQ)	0.000013	0.000099	(0.023) 0.014
Endosulfan	0.04	(0.38) 0.3	1.5
Endrin	0.04	0.04	0.48
Ethylbenzene	(15) 2	(19) 9.5	2300
Ethylene dibromide	0.05	0.05	(0.83) 0.25
Fluoranthene	0.69	9.6	130
Fluorene	(69) 62	(69) 62	400
Heptachlor	0.15	0.19	2.5
Heptachlor Epoxide	0.05	0.05	0.048
Hexachlorobenzene	0.52	0.66	3.1
Hexachlorobutadiene	(0.014) 0.012	(0.095) 0.031	(4.5) 0.44
Hexachlorocyclohexane Gamma-	(0.063) 0.056	(0.063) 0.056	1.2
Hexachloroethane	(0.071) 0.089	(0.43) 0.21	(200) 94
Hexane (n)	(34) 2.8	(88) 46	(520) 51
Indeno[1 2 3-cd]pyrene	(0.48) 0.38	(0.95) 0.76	0.2
Lead	120	120	25
Mercury	(1.8) 0.27	(20) 3.9	(2.8) 0.29
Methoxychlor	0.13	1.6	6.5
Methyl Ethyl Ketone	(44) 16	(88) 70	(1500000) 470000
Methyl Isobutyl Ketone	(4.3) 1.7	(210) 31	(580000) 140000
Methyl Mercury **	(0.0094) 0.0084	(0.0094) 0.0084	0.15
Methyl tert-Butyl Ether (MTBE)	(1.4) 0.75	(3.2) 11	(1400) 190
Methylene Chloride	(0.96) 0.1	(2) 1.6	(5500) 610
Methlynaphthalene, 2-(1-) ***	(3.4) 0.99	(85) 76	1800
Molybdenum	6.9	40	9200
Naphthalene	(0.75) 0.6	(28) 9.6	(6400) 1400
Nickel	(130) 100	(340) 270	490
Pentachlorophenol	0.1	(3.3) 2.9	62
Petroleum Hydrocarbons F1****	(65) 55	(65) 55	750
Petroleum Hydrocarbons F2	(150) 98	(250) 230	150
Petroleum Hydrocarbons F3	(1300) 300	(2500) 1700	500
Petroleum Hydrocarbons F4	(5600) 2800	(6600) 3300	500
Phenanthrene	(7.8) 6.2	(16) 12	580
Phenol	9.4	9.4	12000
Polychlorinated Biphenyls	0.35	1.1	(15) 7.8
Pyrene	78	96	68
Selenium	2.4	5.5	63
Silver	(25) 20	(50) 40	1.5
Styrene	(2.2) 0.7	(43) 34	(9100) 1300
Tetrachloroethane, 1,1,1,2-	(0.05) 0.058	(0.11) 0.087	(28) 3.3
Tetrachloroethane, 1,1,2,2-	0.05	(0.094) 0.05	(15) 3.2
Tetrachloroethylene	(2.3) 0.28	(21) 4.5	(17) 1.6
Thallium	1	3.3	510
Toluene	(6) 2.3	(78) 68	18000
Trichlorobenzene, 1,2,4-	(1.4) 0.36	(16) 3.2	(850) 180
Trichloroethane, 1,1,1-	(3.4) 0.38	(12) 6.1	(6700) 640
Trichloroethane, 1,1,2-	0.05	(0.11) 0.05	(30) 4.7
Trichloroethylene	(0.52) 0.061	(0.61) 0.91	(17) 1.6
Trichlorofluoromethane	(5.8) 4	(5.8) 4	2500
Trichlorophenol, 2,4,5-	(5.5) 4.4	10	1600
Trichlorophenol, 2,4,6-	(4.2) 3.8	(4.2) 3.8	230
Uranium	23	33	420
Vanadium	86	86	250
Vinyl Chloride	(0.022) 0.02	(0.25) 0.032	(1.7) 0.5

Table 3	Soil Standards (other than sediment) µg/g		Non- Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Xylene Mixture	(25) 3.1	(30) 26	4200
Zinc	340	340	1100
Electrical Conductivity (mS/cm)	0.7	1.4	#N/A
Chloride	NA	NA	2300000
Sodium Adsorption Ratio	5	12	NA
Sodium	NA	NA	2300000

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

TABLE 4: Stratified Site Condition Standards in a Potable Ground Water Condition

Table 4	Soil Standards (other than sediment) µg/g				Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use		Industrial/ Commercial/Community Property Use		All Types of Property Use
	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	
Acenaphthene	(29) 7.9	(29) 7.9	(29) 21	(29) 21	4.1
Acenaphthylene	(0.17) 0.15	(0.17) 0.15	(0.17) 0.15	(0.17) 0.15	1
Acetone	(28) 16	(28) 16	(28) 16	(28) 16	2700
Aldrin	0.05	4.7	(0.11) 0.088	6.3	0.35
Anthracene	(0.74) 0.67	(0.74) 0.67	(0.74) 0.67	(0.74) 0.67	2.4
Antimony	7.5	63	(50) 40	63	6
Arsenic	18	18	18	47	25
Barium	390	(8600) 7700	670	(8600) 7700	1000
Benzene	(0.17) 0.21	(0.17) 0.21	(0.4) 0.32	(1.3) 0.92	5
Benz[a]anthracene	(0.63) 0.5	0.96	0.96	36	1
Benzo[a]pyrene	0.3	0.3	0.3	3.6	0.01
Benzo[b]fluoranthene	0.78	0.96	0.96	36	0.1
Benzo[ghi]perylene	(7.8) 6.6	9.6	9.6	360	0.2
Benzo[k]fluoranthene	0.78	0.96	0.96	36	0.1
Beryllium	(5) 4	60	(10) 8	60	4
Biphenyl 1,1'-	(1.1) 0.31	(83) 11	(210) 52	(210) 52	0.5
Bis(2-chloroethyl)ether	0.5	0.5	0.5	0.5	5
Bis(2-chloroisopropyl)ether	(1.8) 0.67	(13) 11	(13) 11	(13) 11	120
Bis(2-ethylhexyl)phthalate	5	(1200) 830	(35) 28	(1200) 830	10
Boron (Hot Water Soluble)*	1.5	NA	2	NA	NA
Boron (total)	NA	(7900) 5000	NA	(7900) 5000	5000
Bromodichloromethane	(1.9) 1.5	(1.9) 1.5	(1.9) 1.5	(1.9) 1.5	16
Bromoform	(0.26) 0.27	(0.26) 0.27	(1.7) 0.61	(2.7) 2	25
Bromomethane	0.05	0.05	0.05	0.05	0.89
Cadmium	1.2	7.9	1.9	7.9	2.7
Carbon Tetrachloride	(0.12) 0.05	(0.12) 0.05	(0.71) 0.21	(0.71) 0.43	(5) 0.79
Chlordane	0.05	0.8	0.05	30	7
Chloroaniline p-	(0.53) 0.5	(0.53) 0.5	(0.53) 0.5	(0.53) 0.5	10
Chlorobenzene	(2.7) 2.4	(2.7) 2.4	(2.7) 2.4	(2.7) 2.4	30
Chloroform	(0.18) 0.05	(0.18) 0.05	(0.18) 0.47	(0.19) 0.85	(22) 2.4
Chlorophenol, 2-	(2) 1.6	(5.1) 3.7	(3.9) 3.1	(5.1) 3.7	8.9
Chromium Total	160	(18000) 11000	160	(18000) 11000	50
Chromium VI	(10) 8	40	(10) 8	40	25
Chrysene	(7.8) 7	9.6	9.6	(28) 20	0.1
Cobalt	22	250	(100) 80	2500	3.8
Copper	(180) 140	5600	(300) 230	5600	87
Cyanide (CN-)	0.051	0.051	0.051	0.051	66
Dibenz[a h]anthracene	0.1	0.1	0.1	3.6	0.2
Dibromochloromethane	(2.9) 2.3	(2.9) 2.3	(2.9) 2.3	(2.9) 2.3	25
Dichlorobenzene, 1,2-	(1.7) 1.2	(1.7) 1.2	(1.7) 1.2	(1.7) 1.2	3
Dichlorobenzene, 1,3-	(6) 4.8	(34) 24	(12) 9.6	(34) 24	59
Dichlorobenzene, 1,4-	(0.097) 0.083	(0.097) 0.083	(0.57) 0.2	(0.57) 0.39	1
Dichlorobenzidine, 3,3'-	1	1	1	1	0.5
Dichlorodifluoromethane	(25) 16	(25) 16	(25) 16	(25) 16	590
DDD	3.3	4.6	4.6	110	10
DDE	(0.33) 0.26	3.2	(0.65) 0.52	110	10
DDT	1.4	3.2	1.4	110	2.8
Dichloroethane, 1,1-	(0.6) 0.47	(0.6) 0.47	(0.6) 0.47	(0.6) 0.47	5
Dichloroethane, 1,2-	0.05	0.05	0.05	(0.05) 0.055	(5) 1.6
Dichloroethylene, 1,1-	0.05	0.05	(0.48) 0.064	(0.53) 0.12	(14) 1.6
Dichloroethylene, 1,2-cis-	(2.5) 1.9	(2.5) 1.9	(2.5) 1.9	(2.5) 1.9	(17) 1.6
Dichloroethylene, 1,2-trans-	(0.75) 0.084	(0.75) 0.084	(2.5) 1.3	(2.5) 1.9	(17) 1.6
Dichlorophenol, 2,4-	(0.27) 0.19	(0.27) 0.19	(0.27) 0.19	(0.27) 0.19	20
Dichloropropane, 1,2-	(0.085) 0.05	(0.085) 0.05	(0.68) 0.16	(0.74) 0.33	5
Dichloropropene,1,3-	(0.081) 0.05	(0.081) 0.05	(0.081) 0.059	(0.081) 0.059	0.5
Dieldrin	0.05	(0.12) 0.11	(0.11) 0.088	(0.12) 0.11	0.35

Table 4	Soil Standards (other than sediment) µg/g				Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use		Industrial/ Commercial/Community Property Use		All Types of Property Use
	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	
Diethyl Phthalate	0.5	0.5	0.5	0.5	38
Dimethylphthalate	0.5	0.5	0.5	0.5	38
Dimethylphenol, 2,4-	(53) 38	(53) 38	(53) 38	(53) 38	59
Dinitrophenol, 2,4-	(2.9) 2	(2.9) 2	(2.9) 2	(2.9) 2	10
Dinitrotoluene, 2,4 & 2,6-	0.5	0.5	0.5	0.5	5
Dioxane, 1,4	1.8	(7.7) 7.5	1.8	(7.7) 7.5	50
Dioxin/Furan (TEQ)	0.000013	0.00051	0.000099	(0.0026) 0.0018	0.000015
Endosulfan	0.04	(0.51) 0.46	(0.38) 0.3	(0.51) 0.46	1.5
Endrin	0.04	(0.079) 0.071	0.04	(0.079) 0.071	0.48
Ethylbenzene	(1.6) 1.1	(1.6) 1.1	(1.6) 1.1	(1.6) 1.1	2.4
Ethylene dibromide	0.05	0.05	0.05	0.05	0.2
Fluoranthene	0.69	9.6	9.6	(34) 24	0.41
Fluorene	(69) 62	(69) 62	(69) 62	(69) 62	120
Heptachlor	0.15	0.19	0.19	(2) 1.8	1.5
Heptachlor Epoxide	0.05	0.05	0.05	0.05	0.048
Hexachlorobenzene	0.52	0.66	0.66	(4) 2.9	1
Hexachlorobutadiene	(0.014) 0.012	(0.014) 0.012	(0.095) 0.031	(0.11) 0.06	(0.6) 0.44
Hexachlorocyclohexane Gamma-	(0.063) 0.056	(0.063) 0.056	(0.063) 0.056	(0.063) 0.056	1.2
Hexachloroethane	(0.071) 0.089	(0.071) 0.089	(0.43) 0.21	(0.69) 0.49	2.1
Hexane (n)	(34) 2.8	(34) 2.8	(88) 46	(88) 54	(520) 51
Indeno[1 2 3-cd]pyrene	(0.48) 0.38	0.96	(0.95) 0.76	36	0.2
Lead	120	1000	120	1000	10
Mercury	(1.8) 0.27	(1.8) 0.27	(20) 3.9	(30) 13	(1) 0.29
Methoxychlor	0.13	1.6	1.6	1.6	6.5
Methyl Ethyl Ketone	(44) 16	(180) 16	(88) 70	(310) 150	1800
Methyl Isobutyl Ketone	(4.3) 1.7	(66) 6.6	(210) 31	(210) 64	640
Methyl Mercury **	(0.0094) 0.0084	(0.0094) 0.0084	(0.0094) 0.0084	(0.0094) 0.0084	0.15
Methyl tert-Butyl Ether (MTBE)	(1.4) 0.75	(1.4) 0.75	(2.3) 1.6	(2.3) 1.6	15
Methylene Chloride	(0.96) 0.1	(0.96) 0.1	(2) 1.6	(5.7) 3	50
Methlynaphthalene, 2-(1-) ***	(3.4) 0.99	(42) 30	(42) 30	(42) 30	3.2
Molybdenum	6.9	1200	40	1200	70
Naphthalene	(0.75) 0.6	(4.6) 0.65	(28) 9.6	(130) 93	11
Nickel	(130) 100	510	(340) 270	510	100
Pentachlorophenol	0.1	(3.3) 2.9	(3.3) 2.9	(3.3) 2.9	30
Petroleum Hydrocarbons F1****	(65) 55	(65) 55	(65) 55	(65) 55	750
Petroleum Hydrocarbons F2	(150) 98	(150) 98	(250) 230	(250) 230	150
Petroleum Hydrocarbons F3	(1300) 300	(7200) 5800	(2500) 1700	(7200) 5800	500
Petroleum Hydrocarbons F4	(5600) 2800	(8000) 6900	(6600) 3300	(8000) 6900	500
Phenanthrene	(7.8) 6.2	(24) 17	(16) 12	(24) 17	1
Phenol	9.4	(53) 46	9.4	(53) 46	890
Polychlorinated Biphenyls	0.35	2.7	1.1	4.1	3
Pyrene	78	96	96	(330) 240	4.1
Selenium	2.4	1200	5.5	1200	10
Silver	(25) 20	490	(50) 40	490	1.5
Styrene	(2.2) 0.7	(19) 16	(43) 34	(66) 47	5.4
Tetrachloroethane, 1,1,1,2-	(0.05) 0.058	(0.05) 0.058	(0.11) 0.087	(0.14) 0.15	1.1
Tetrachloroethane, 1,1,2,2-	0.05	0.05	(0.094) 0.05	(0.11) 0.05	1
Tetrachloroethylene	(2.3) 0.28	(2.3) 0.28	(2.5) 1.9	(2.5) 1.9	(17) 1.6
Thallium	1	3.3	3.3	33	2
Toluene	(6) 2.3	(9) 6.2	(9) 6.4	(9) 6.4	24
Trichlorobenzene, 1,2,4-	(1.4) 0.36	(1.4) 0.36	(16) 3.2	(22) 10	70
Trichloroethane, 1,1,1-	(3.4) 0.38	(3.4) 0.38	(12) 6.1	(12) 9.8	200
Trichloroethane, 1,1,2-	0.05	0.05	(0.11) 0.05	(0.13) 0.068	(5) 4.7
Trichloroethylene	(0.52) 0.061	(0.52) 0.061	(0.61) 0.55	(0.69) 0.55	(5) 1.6
Trichlorofluoromethane	(5.8) 4	(5.8) 4	(5.8) 4	(5.8) 4	150
Trichlorophenol, 2,4,5-	(5.5) 4.4	(13) 9.1	(10) 9.1	(13) 9.1	8.9
Trichlorophenol, 2,4,6-	(2.9) 2.1	(2.9) 2.1	(2.9) 2.1	(2.9) 2.1	2
Uranium	23	300	33	300	20
Vanadium	86	160	86	160	6.2
Vinyl Chloride	(0.022) 0.02	(0.022) 0.02	(0.25) 0.032	(0.25) 0.057	(1.7) 0.5

Table 4	Soil Standards (other than sediment) µg/g				Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use		Industrial/ Commercial/Community Property Use		All Types of Property Use
	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	
Xylene Mixture	(25) 3.1	(25) 3.1	(30) 26	(30) 26	300
Zinc	340	(24000) 15000	340	(24000) 15000	1100
Electrical Conductivity (mS/cm)	0.7	NA	1.4	NA	N/A
Chloride	NA	NV	NA	NV	790000
Sodium Adsorption Ratio	5	NA	12	NA	N/A
Sodium	NA	NV	NA	NV	490000

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

TABLE 5: Stratified Site Condition Standards in a Non-Potable Ground Water Condition

Table 5	Soil Standards (other than sediment) µg/g				Non-Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use		Industrial/ Commercial/Community Property Use		All Types of Property Use
	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	
Acenaphthene	(58) 7.9	(58) 7.9	96	(620) 330	(1700) 600
Acenaphthylene	(0.17) 0.15	(0.17) 0.15	(0.17) 0.15	(0.17) 0.15	1.8
Acetone	(28) 16	(28) 16	(28) 16	(28) 16	130000
Aldrin	0.05	4.7	(0.11) 0.088	6.3	8.5
Anthracene	(0.74) 0.67	(0.74) 0.67	(0.74) 0.67	(0.74) 0.67	2.4
Antimony	7.5	63	(50) 40	63	20000
Arsenic	18	18	18	47	1900
Barium	390	(8600) 7700	670	(8600) 7700	29000
Benzene	(0.17) 0.21	(0.17) 0.21	(0.4) 0.32	(4.4) 6.1	(430) 44
Benz[a]anthracene	(0.63) 0.5	0.96	0.96	36	4.7
Benzo[a]pyrene	0.3	0.3	0.3	3.6	0.81
Benzo[b]fluoranthene	0.78	0.96	0.96	36	0.75
Benzo[ghi]perylene	(7.8) 6.6	9.6	9.6	360	0.2
Benzo[k]fluoranthene	0.78	0.96	0.96	36	0.4
Beryllium	(5) 4	60	(10) 8	60	67
Biphenyl 1,1'-	(1.1) 0.31	(83) 11	(210) 52	(210) 52	(2200) 1000
Bis(2-chloroethyl)ether	0.5	0.5	0.5	16	300000
Bis(2-chloroisopropyl)ether	(1.8) 0.67	(14) 11	(14) 11	(14) 11	20000
Bis(2-ethylhexyl)phthalate	5	(8300) 7100	(35) 28	(8300) 7100	140
Boron (Hot Water Soluble)*	1.5	NA	2	NA	NA
Boron (total)	NA	(7900) 5000	NA	(7900) 5000	45000
Bromodichloromethane	13	18	18	(63) 50	85000
Bromoform	(0.26) 0.27	(0.26) 0.27	(1.7) 0.61	(2.7) 2	(770) 380
Bromomethane	0.05	0.05	0.05	0.05	(56) 5.6
Cadmium	1.2	7.9	1.9	7.9	2.7
Carbon Tetrachloride	(0.12) 0.05	(0.12) 0.05	(1.5) 0.21	(1.7) 0.43	(8.4) 0.79
Chlordane	0.05	0.8	0.05	30	28
Chloroaniline p-	(0.53) 0.5	(0.53) 0.5	(0.53) 0.5	(0.53) 0.5	400
Chlorobenzene	(2.7) 2.4	(2.7) 2.4	(2.7) 2.4	(2.7) 2.4	630
Chloroform	(0.18) 0.05	(0.18) 0.05	(0.18) 0.47	(0.19) 0.85	(22) 2.4
Chlorophenol, 2-	(2) 1.6	(23) 21	(3.9) 3.1	(23) 21	3300
Chromium Total	160	(18000) 11000	160	(18000) 11000	810
Chromium VI	(10) 8	40	(10) 8	40	140
Chrysene	(7.8) 7	9.6	9.6	360	1
Cobalt	22	250	(100) 80	2500	66
Copper	(180) 140	5600	(300) 230	5600	87
Cyanide (CN-)	0.051	0.051	0.051	0.051	66
Dibenz[a h]anthracene	0.1	0.1	0.1	3.6	0.52
Dibromochloromethane	9.4	13	13	(61) 48	82000
Dichlorobenzene, 1,2-	(4.3) 3.4	(52) 35	(8.5) 6.8	(68) 60	(9600) 4600
Dichlorobenzene, 1,3-	(6) 4.8	(67) 59	(12) 9.6	(67) 59	9600
Dichlorobenzene, 1,4-	(0.097) 0.083	(0.097) 0.083	(0.84) 0.2	(0.97) 0.39	(67) 8
Dichlorobenzidine, 3,3'-	1	1	1	25	640
Dichlorodifluoromethane	(25) 16	(25) 16	(25) 16	(25) 16	4400
DDD	3.3	4.6	4.6	110	45
DDE	(0.33) 0.26	3.2	(0.65) 0.52	110	20
DDT	1.4	3.2	1.4	110	2.8
Dichloroethane, 1,1-	(11) 3.5	(31) 3.5	(21) 17	(45) 120	(3100) 320
Dichloroethane, 1,2-	0.05	0.05	0.05	(0.05) 0.055	(12) 1.6
Dichloroethylene, 1,1-	0.05	0.05	(0.48) 0.064	(0.53) 0.12	(17) 1.6
Dichloroethylene, 1,2-cis-	(30) 3.4	(30) 3.4	(37) 55	(43) 110	(17) 1.6
Dichloroethylene, 1,2-trans-	(0.75) 0.084	(0.75) 0.084	(9.3) 1.3	(11) 2.9	(17) 1.6
Dichlorophenol, 2,4-	(2.1) 1.7	(52) 46	(4.2) 3.4	(52) 46	4600
Dichloropropane, 1,2-	(0.085) 0.05	(0.085) 0.05	(0.68) 0.16	(0.75) 0.33	(140) 16
Dichloropropene,1,3-	(0.083) 0.05	(0.083) 0.05	(0.21) 0.18	(0.24) 0.34	(45) 5.2
Dieldrin	0.05	(0.12) 0.11	(0.11) 0.088	(0.12) 0.11	0.75

Table 5	Soil Standards (other than sediment) µg/g				Non-Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use		Industrial/ Commercial/Community Property Use		All Types of Property Use
	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	
Diethyl Phthalate	0.5	0.5	0.5	0.5	38
Dimethylphthalate	0.5	0.5	0.5	0.5	38
Dimethylphenol, 2,4-	(420) 390	(440) 390	(440) 390	(440) 390	39000
Dinitrophenol, 2,4-	38	(66) 59	(66) 59	(66) 59	11000
Dinitrotoluene, 2,4 & 2,6-	0.92	1.2	1.2	(17) 15	2900
Dioxane, 1,4	1.8	100	1.8	(1500) 810	7300000) 1900000
Dioxin/Furan (TEQ)	0.000013	0.00051	0.000099	0.0044	(0.023) 0.014
Endosulfan	0.04	(0.51) 0.46	(0.38) 0.3	(0.51) 0.46	1.5
Endrin	0.04	(0.079) 0.071	0.04	(0.079) 0.071	0.48
Ethylbenzene	(15) 2	(16) 2	(19) 9.5	(19) 17	2300
Ethylene dibromide	0.05	0.05	0.05	0.05	(0.83) 0.25
Fluoranthene	0.69	9.6	9.6	360	130
Fluorene	(69) 62	(69) 62	(69) 62	(69) 62	400
Heptachlor	0.15	0.19	0.19	(2) 1.8	2.5
Heptachlor Epoxide	0.05	0.05	0.05	0.05	0.048
Hexachlorobenzene	0.52	0.66	0.66	(15) 14	3.1
Hexachlorobutadiene	(0.014) 0.012	(0.014) 0.012	(0.095) 0.031	(0.11) 0.06	(4.5) 0.44
Hexachlorocyclohexane Gamma-	(0.063) 0.056	(0.063) 0.056	(0.063) 0.056	(0.063) 0.056	1.2
Hexachloroethane	(0.071) 0.089	(0.071) 0.089	(0.43) 0.21	1.7	(200) 94
Hexane (n)	(34) 2.8	(34) 2.8	(88) 46	(88) 54	(520) 51
Indeno[1 2 3-cd]pyrene	(0.48) 0.38	0.96	(0.95) 0.76	36	0.2
Lead	120	1000	120	1000	25
Mercury	(1.8) 0.27	(1.8) 0.27	(20) 3.9	(30) 13	(2.8) 0.29
Methoxychlor	0.13	1.6	1.6	1.6	6.5
Methyl Ethyl Ketone	(44) 16	(180) 16	(88) 70	(380) 150	(1500000) 470000
Methyl Isobutyl Ketone	(4.3) 1.7	(66) 6.6	(210) 31	(210) 64	(580000) 140000
Methyl Mercury **	(0.0094) 0.0084	(0.0094) 0.0084	(0.0094) 0.0084	(0.0094) 0.0084	0.15
Methyl tert-Butyl Ether (MTBE)	(1.4) 0.75	(1.4) 0.75	(3.2) 11	(3.4) 14	(1400) 190
Methylene Chloride	(0.96) 0.1	(0.96) 0.1	(2) 1.6	(9.8) 3	(5500) 610
Methlynaphthalene, 2-(1-) ***	(3.4) 0.99	(85) 34	(85) 76	(85) 76	1800
Molybdenum	6.9	1200	40	1200	9200
Naphthalene	(0.75) 0.6	(4.6) 0.65	(28) 9.6	(220) 200	(6400) 1400
Nickel	(130) 100	510	(340) 270	510	490
Pentachlorophenol	0.1	(3.3) 2.9	(3.3) 2.9	(3.3) 2.9	62
Petroleum Hydrocarbons F1****	(65) 55	(65) 55	(65) 55	(65) 55	750
Petroleum Hydrocarbons F2	(150) 98	(150) 98	(250) 230	(250) 230	150
Petroleum Hydrocarbons F3	(1300) 300	(7200) 5800	(2500) 1700	(7200) 5800	500
Petroleum Hydrocarbons F4	(5600) 2800	(8000) 6900	(6600) 3300	(8000) 6900	500
Phenanthrene	(7.8) 6.2	(300) 270	(16) 12	(300) 270	580
Phenol	9.4	(53) 46	9.4	(53) 46	12000
Polychlorinated Biphenyls	0.35	2.7	1.1	4.1	(15) 7.8
Pyrene	78	96	96	(2900) 2600	68
Selenium	2.4	1200	5.5	1200	63
Silver	(25) 20	490	(50) 40	490	1.5
Styrene	(2.2) 0.7	(19) 16	(43) 34	(75) 66	(9100) 1300
Tetrachloroethane, 1,1,1,2-	(0.05) 0.058	(0.05) 0.058	(0.11) 0.087	(0.14) 0.24	(28) 3.3
Tetrachloroethane, 1,1,2,2-	0.05	0.05	(0.094) 0.05	(0.11) 0.05	(15) 3.2
Tetrachloroethylene	(2.3) 0.28	(2.3) 0.28	(21) 4.5	(21) 9.5	(17) 1.6
Thallium	1	3.3	3.3	33	510
Toluene	(6) 2.3	(50) 6.2	(78) 68	(78) 68	18000
Trichlorobenzene, 1,2,4-	(1.4) 0.36	(1.4) 0.36	(16) 3.2	(22) 10	(850) 180
Trichloroethane, 1,1,1-	(3.4) 0.38	(3.4) 0.38	(12) 6.1	(12) 9.8	(6700) 640
Trichloroethane, 1,1,2-	0.05	0.05	(0.11) 0.05	(0.13) 0.068	(30) 4.7
Trichloroethylene	(0.52) 0.061	(0.52) 0.061	(0.61) 0.91	(0.69) 1.8	(17) 1.6
Trichlorofluoromethane	(5.8) 4	(5.8) 4	(5.8) 4	(5.8) 4	2500
Trichlorophenol, 2,4,5-	(5.5) 4.4	(30) 27	10	(30) 27	1600
Trichlorophenol, 2,4,6-	(4.2) 3.8	(4.2) 3.8	(4.2) 3.8	(4.2) 3.8	230
Uranium	23	300	33	300	420
Vanadium	86	160	86	160	250
Vinyl Chloride	(0.022) 0.02	(0.022) 0.02	(0.25) 0.032	(0.28) 0.057	(1.7) 0.5

Table 5	Soil Standards (other than sediment) µg/g				Non-Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use		Industrial/ Commercial/Community Property Use		All Types of Property Use
	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	
Xylene Mixture	(25) 3.1	(25) 3.1	(30) 26	(30) 26	4200
Zinc	340	(24000) 15000	340	(24000) 15000	1100
Electrical Conductivity (mS/cm)	0.7	NA	1.4	NA	#N/A
Chloride	NA	NV	NA	NV	2300000
Sodium Adsorption Ratio	5	NA	12	NA	NA
Sodium	NA	NV	NA	NV	2300000

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

TABLE 6: Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition

Table 6	Soil Standards (other than sediment) µg/g			Potable Ground Water µg/L
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Acenaphthene	(29) 7.9	(29) 7.9	(29) 21	4.1
Acenaphthylene	(0.17) 0.15	(0.17) 0.15	(0.17) 0.15	1
Acetone	(28) 16	(28) 16	(28) 16	2700
Aldrin	0.05	0.05	(0.11) 0.088	0.35
Anthracene	(0.74) 0.67	(0.74) 0.67	(0.74) 0.67	1
Antimony	7.5	7.5	(50) 40	6
Arsenic	11	18	18	25
Barium	390	390	670	1000
Benzene	(0.17) 0.21	(0.17) 0.21	(0.4) 0.32	0.5
Benz[a]anthracene	(0.63) 0.5	(0.63) 0.5	0.96	1
Benzo[a]pyrene	0.078	0.3	0.3	0.01
Benzo[b]fluoranthene	0.78	0.78	0.96	0.1
Benzo[ghi]perylene	(7.8) 6.6	(7.8) 6.6	9.6	0.2
Benzo[k]fluoranthene	0.78	0.78	0.96	0.1
Beryllium	(5) 4	(5) 4	(10) 8	4
Biphenyl 1,1'-	(1.1) 0.31	(1.1) 0.31	(210) 52	0.5
Bis(2-chloroethyl)ether	0.5	0.5	0.5	5
Bis(2-chloroisopropyl)ether	(1.8) 0.67	(1.8) 0.67	(13) 11	120
Bis(2-ethylhexyl)phthalate	5	5	(35) 28	10
Boron (Hot Water Soluble)*	1.5	1.5	2	NA
Boron (total)	120	120	120	5000
Bromodichloromethane	(1.9) 1.5	(1.9) 1.5	(1.9) 1.5	16
Bromoform	(0.26) 0.27	(0.26) 0.27	(1.7) 0.61	5
Bromomethane	0.05	0.05	0.05	0.89
Cadmium	1	1.2	1.9	2.1
Carbon Tetrachloride	(0.12) 0.05	(0.12) 0.05	(0.71) 0.21	0.2
Chlordane	0.05	0.05	0.05	0.06
Chloroaniline p-	(0.53) 0.5	(0.53) 0.5	(0.53) 0.5	10
Chlorobenzene	(2.7) 2.4	(2.7) 2.4	(2.7) 2.4	30
Chloroform	(0.18) 0.05	(0.18) 0.05	(0.18) 0.47	2
Chlorophenol, 2-	(2) 1.6	(2) 1.6	(3.9) 3.1	8.9
Chromium Total	160	160	160	50
Chromium VI	(10) 8	(10) 8	(10) 8	25
Chrysene	(7.8) 7	(7.8) 7	9.6	0.1
Cobalt	22	22	(100) 80	3.8
Copper	(180) 140	(180) 140	(300) 230	69
Cyanide (CN-)	0.051	0.051	0.051	52
Dibenz[a h]anthracene	0.1	0.1	0.1	0.2
Dibromochloromethane	(2.9) 2.3	(2.9) 2.3	(2.9) 2.3	25
Dichlorobenzene, 1,2-	(1.7) 1.2	(1.7) 1.2	(1.7) 1.2	3
Dichlorobenzene, 1,3-	(6) 4.8	(6) 4.8	(12) 9.6	59
Dichlorobenzene, 1,4-	(0.097) 0.083	(0.097) 0.083	(0.57) 0.2	0.5
Dichlorobenzidine, 3,3'-	1	1	1	0.5
Dichlorodifluoromethane	(25) 16	(25) 16	(25) 16	590
DDD	3.3	3.3	4.6	1.8
DDE	(0.33) 0.26	(0.33) 0.26	(0.65) 0.52	10
DDT	0.078	1.4	1.4	0.05
Dichloroethane, 1,1-	(0.6) 0.47	(0.6) 0.47	(0.6) 0.47	5
Dichloroethane, 1,2-	0.05	0.05	0.05	0.5
Dichloroethylene, 1,1-	0.05	0.05	(0.48) 0.064	0.5
Dichloroethylene, 1,2-cis-	(2.5) 1.9	(2.5) 1.9	(2.5) 1.9	1.6
Dichloroethylene, 1,2-trans-	(0.75) 0.084	(0.75) 0.084	(2.5) 1.3	1.6
Dichlorophenol, 2,4-	(0.27) 0.19	(0.27) 0.19	(0.27) 0.19	20
Dichloropropane, 1,2-	(0.085) 0.05	(0.085) 0.05	(0.68) 0.16	0.58
Dichloropropene,1,3-	(0.081) 0.05	(0.081) 0.05	(0.081) 0.059	0.5
Dieldrin	0.05	0.05	(0.11) 0.088	0.35

Table 6	Soil Standards (other than sediment) µg/g			Potable Ground Water µg/L
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Diethyl Phthalate	0.5	0.5	0.5	30
Dimethylphthalate	0.5	0.5	0.5	30
Dimethylphenol, 2,4-	(53) 38	(53) 38	(53) 38	59
Dinitrophenol, 2,4-	(2.9) 2	(2.9) 2	(2.9) 2	10
Dinitrotoluene, 2,4 & 2,6-	0.5	0.5	0.5	5
Dioxane, 1,4	0.2	1.8	1.8	50
Dioxin/Furan (TEQ)	0.000013	0.000013	0.000099	0.000015
Endosulfan	0.04	0.04	(0.38) 0.3	0.56
Endrin	0.04	0.04	0.04	0.36
Ethylbenzene	(1.6) 1.1	(1.6) 1.1	(1.6) 1.1	2.4
Ethylene dibromide	0.05	0.05	0.05	0.2
Fluoranthene	0.69	0.69	9.6	0.41
Fluorene	(69) 62	(69) 62	(69) 62	120
Heptachlor	0.15	0.15	0.19	0.038
Heptachlor Epoxide	0.05	0.05	0.05	0.038
Hexachlorobenzene	0.52	0.52	0.66	1
Hexachlorobutadiene	(0.014) 0.012	(0.014) 0.012	(0.095) 0.031	0.012
Hexachlorocyclohexane Gamma-	(0.063) 0.056	(0.063) 0.056	(0.063) 0.056	0.95
Hexachloroethane	(0.071) 0.089	(0.071) 0.089	(0.43) 0.21	0.17
Hexane (n)	(34) 2.8	(34) 2.8	(88) 46	5
Indeno[1 2 3-cd]pyrene	(0.48) 0.38	(0.48) 0.38	(0.95) 0.76	0.2
Lead	45	120	120	10
Mercury	(1.8) 0.25	(1.8) 0.27	(20) 3.9	0.1
Methoxychlor	0.13	0.13	1.6	0.3
Methyl Ethyl Ketone	(44) 16	(44) 16	(88) 70	1800
Methyl Isobutyl Ketone	(4.3) 1.7	(4.3) 1.7	(210) 31	640
Methyl Mercury **	(0.0094) 0.0084	(0.0094) 0.0084	(0.0094) 0.0084	0.12
Methyl tert-Butyl Ether (MTBE)	(1.4) 0.75	(1.4) 0.75	(2.3) 1.6	15
Methylene Chloride	(0.96) 0.1	(0.96) 0.1	(2) 1.6	26
Methlynaphthalene, 2-(1-) ***	(3.4) 0.99	(3.4) 0.99	(42) 30	3.2
Molybdenum	6.9	6.9	40	70
Naphthalene	(0.75) 0.6	(0.75) 0.6	(28) 9.6	7
Nickel	(130) 100	(130) 100	(340) 270	100
Pentachlorophenol	0.1	0.1	(3.3) 2.9	30
Petroleum Hydrocarbons F1****	(65) 55	(65) 55	(65) 55	420
Petroleum Hydrocarbons F2	(150) 98	(150) 98	(250) 230	150
Petroleum Hydrocarbons F3	(1300) 300	(1300) 300	(2500) 1700	500
Petroleum Hydrocarbons F4	(5600) 2800	(5600) 2800	(6600) 3300	500
Phenanthrene	(7.8) 6.2	(7.8) 6.2	(16) 12	1
Phenol	9.4	9.4	9.4	890
Polychlorinated Biphenyls	0.35	0.35	1.1	0.2
Pyrene	78	78	96	4.1
Selenium	2.4	2.4	5.5	10
Silver	(25) 20	(25) 20	(50) 40	1.2
Styrene	(2.2) 0.7	(2.2) 0.7	(43) 34	5.4
Tetrachloroethane, 1,1,1,2-	(0.05) 0.058	(0.05) 0.058	(0.11) 0.087	1.1
Tetrachloroethane, 1,1,2,2-	0.05	0.05	(0.094) 0.05	0.5
Tetrachloroethylene	(2.3) 0.28	(2.3) 0.28	(2.5) 1.9	0.5
Thallium	1	1	3.3	2
Toluene	(6) 2.3	(6) 2.3	(9) 6.4	24
Trichlorobenzene, 1,2,4-	(1.4) 0.36	(1.4) 0.36	(16) 3.2	3
Trichloroethane, 1,1,1-	(3.4) 0.38	(3.4) 0.38	(12) 6.1	23
Trichloroethane, 1,1,2-	0.05	0.05	(0.11) 0.05	0.5
Trichloroethylene	(0.52) 0.061	(0.52) 0.061	(0.61) 0.55	0.5
Trichlorofluoromethane	(5.8) 4	(5.8) 4	(5.8) 4	150
Trichlorophenol, 2,4,5-	(5.5) 4.4	(5.5) 4.4	(10) 9.1	8.9
Trichlorophenol, 2,4,6-	(2.9) 2.1	(2.9) 2.1	(2.9) 2.1	2
Uranium	23	23	33	20
Vanadium	86	86	86	6.2
Vinyl Chloride	(0.022) 0.02	(0.022) 0.02	(0.25) 0.032	0.5

Table 6	Soil Standards (other than sediment) µg/g			Potable Ground Water µg/L
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Xylene Mixture	(25) 3.1	(25) 3.1	(30) 26	72
Zinc	340	340	340	890
Electrical Conductivity (mS/cm)	0.7	0.7	1.4	NA
Chloride	NA	NA	NA	790000
Sodium Adsorption Ratio	5	5	12	NA
Sodium	NA	NA	NA	490000

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

TABLE 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition

Table 7	Soil Standards (other than sediment) µg/g		Non- Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Acenaphthene	(58) 7.9	96	17
Acenaphthylene	(0.17) 0.15	(0.17) 0.15	1
Acetone	(28) 16	(28) 16	100000
Aldrin	0.05	(0.11) 0.088	3
Anthracene	(0.74) 0.67	(0.74) 0.67	1
Antimony	7.5	(50) 40	16000
Arsenic	18	18	1500
Barium	390	670	23000
Benzene	(0.17) 0.21	(0.4) 0.32	0.5
Benz[a]anthracene	(0.63) 0.5	0.96	1.8
Benzo[a]pyrene	0.3	0.3	0.81
Benzo[b]fluoranthene	0.78	0.96	0.75
Benzo[ghi]perylene	(7.8) 6.6	9.6	0.2
Benzo[k]fluoranthene	0.78	0.96	0.4
Beryllium	(5) 4	(10) 8	53
Biphenyl 1,1'-	(1.1) 0.31	(210) 52	(1700) 1000
Bis(2-chloroethyl)ether	0.5	0.5	240000
Bis(2-chloroisopropyl)ether	(1.8) 0.67	(14) 11	20000
Bis(2-ethylhexyl)phthalate	5	(35) 28	30
Boron (Hot Water Soluble)*	1.5	2	NA
Boron (total)	120	120	36000
Bromodichloromethane	13	18	67000
Bromoform	(0.26) 0.27	(1.7) 0.61	5
Bromomethane	0.05	0.05	0.89
Cadmium	1.2	1.9	2.1
Carbon Tetrachloride	(0.12) 0.05	(1.5) 0.21	0.2
Chlordane	0.05	0.05	0.06
Chloroaniline p-	(0.53) 0.5	(0.53) 0.5	320
Chlorobenzene	(2.7) 2.4	(2.7) 2.4	140
Chloroform	(0.18) 0.05	(0.18) 0.47	2
Chlorophenol, 2-	(2) 1.6	(3.9) 3.1	2600
Chromium Total	160	160	640
Chromium VI	(10) 8	(10) 8	110
Chrysene	(7.8) 7	9.6	0.7
Cobalt	22	(100) 80	52
Copper	(180) 140	(300) 230	69
Cyanide (CN-)	0.051	0.051	52
Dibenz[a h]anthracene	0.1	0.1	0.4
Dibromochloromethane	9.4	13	65000
Dichlorobenzene, 1,2-	(4.3) 3.4	(8.5) 6.8	150
Dichlorobenzene, 1,3-	(6) 4.8	(12) 9.6	7600
Dichlorobenzene, 1,4-	(0.097) 0.083	(0.84) 0.2	0.5
Dichlorobenzidine, 3,3'-	1	1	500
Dichlorodifluoromethane	(25) 16	(25) 16	3500
DDD	3.3	4.6	1.8
DDE	(0.33) 0.26	(0.65) 0.52	17
DDT	1.4	1.4	0.05
Dichloroethane, 1,1-	(11) 3.5	(21) 17	11
Dichloroethane, 1,2-	0.05	0.05	0.5
Dichloroethylene, 1,1-	0.05	(0.48) 0.064	0.5
Dichloroethylene, 1,2-cis-	(30) 3.4	(37) 55	1.6
Dichloroethylene, 1,2-trans-	(0.75) 0.084	(9.3) 1.3	1.6
Dichlorophenol, 2,4-	(2.1) 1.7	(4.2) 3.4	3700
Dichloropropane, 1,2-	(0.085) 0.05	(0.68) 0.16	0.58
Dichloropropene,1,3-	(0.083) 0.05	(0.21) 0.18	0.5
Dieldrin	0.05	(0.11) 0.088	0.56

Table 7	Soil Standards (other than sediment) µg/g		Non- Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Diethyl Phthalate	0.5	0.5	30
Dimethylphthalate	0.5	0.5	30
Dimethylphenol, 2,4-	(420) 390	(440) 390	31000
Dinitrophenol, 2,4-	38	(66) 59	9000
Dinitrotoluene, 2,4 & 2,6-	0.92	1.2	2300
Dioxane, 1,4	1.8	1.8	190000
Dioxin/Furan (TEQ)	0.000013	0.000099	0.0001
Endosulfan	0.04	(0.38) 0.3	0.56
Endrin	0.04	0.04	0.36
Ethylbenzene	(15) 2	(19) 9.5	54
Ethylene dibromide	0.05	0.05	0.2
Fluoranthene	0.69	9.6	44
Fluorene	(69) 62	(69) 62	290
Heptachlor	0.15	0.19	0.038
Heptachlor Epoxide	0.05	0.05	0.038
Hexachlorobenzene	0.52	0.66	3.1
Hexachlorobutadiene	(0.014) 0.012	(0.095) 0.031	0.012
Hexachlorocyclohexane Gamma-	(0.063) 0.056	(0.063) 0.056	0.95
Hexachloroethane	(0.071) 0.089	(0.43) 0.21	0.17
Hexane (n)	(34) 2.8	(88) 46	5
Indeno[1 2 3-cd]pyrene	(0.48) 0.38	(0.95) 0.76	0.2
Lead	120	120	20
Mercury	(1.8) 0.27	(20) 3.9	0.1
Methoxychlor	0.13	1.6	0.3
Methyl Ethyl Ketone	(44) 16	(88) 70	21000
Methyl Isobutyl Ketone	(4.3) 1.7	(210) 31	5200
Methyl Mercury **	(0.0094) 0.0084	(0.0094) 0.0084	0.12
Methyl tert-Butyl Ether (MTBE)	(1.4) 0.75	(3.2) 11	15
Methylene Chloride	(0.96) 0.1	(2) 1.6	26
Methlynaphthalene, 2-(1-) ***	(3.4) 0.99	(85) 76	1500
Molybdenum	6.9	40	7300
Naphthalene	(0.75) 0.6	(28) 9.6	7
Nickel	(130) 100	(340) 270	390
Pentachlorophenol	0.1	(3.3) 2.9	50
Petroleum Hydrocarbons F1****	(65) 55	(65) 55	420
Petroleum Hydrocarbons F2	(150) 98	(250) 230	150
Petroleum Hydrocarbons F3	(1300) 300	(2500) 1700	500
Petroleum Hydrocarbons F4	(5600) 2800	(6600) 3300	500
Phenanthrene	(7.8) 6.2	(16) 12	380
Phenol	9.4	9.4	9600
Polychlorinated Biphenyls	0.35	1.1	0.2
Pyrene	78	96	5.7
Selenium	2.4	5.5	50
Silver	(25) 20	(50) 40	1.2
Styrene	(2.2) 0.7	(43) 34	43
Tetrachloroethane, 1,1,1,2-	(0.05) 0.058	(0.11) 0.087	1.1
Tetrachloroethane, 1,1,2,2-	0.05	(0.094) 0.05	0.5
Tetrachloroethylene	(2.3) 0.28	(21) 4.5	0.5
Thallium	1	3.3	400
Toluene	(6) 2.3	(78) 68	320
Trichlorobenzene, 1,2,4-	(1.4) 0.36	(16) 3.2	3
Trichloroethane, 1,1,1-	(3.4) 0.38	(12) 6.1	23
Trichloroethane, 1,1,2-	0.05	(0.11) 0.05	0.5
Trichloroethylene	(0.52) 0.061	(0.61) 0.91	0.5
Trichlorofluoromethane	(5.8) 4	(5.8) 4	2000
Trichlorophenol, 2,4,5-	(5.5) 4.4	10	1300
Trichlorophenol, 2,4,6-	(4.2) 3.8	(4.2) 3.8	180
Uranium	23	33	330
Vanadium	86	86	200
Vinyl Chloride	(0.022) 0.02	(0.25) 0.032	0.5

Table 7	Soil Standards (other than sediment) µg/g		Non- Potable Ground Water µg/L
Contaminant	Residential/ Parkland/Institutional Property Use	Industrial/ Commercial/Community Property Use	All Types of Property Use
Xylene Mixture	(25) 3.1	(30) 26	72
Zinc	340	340	890
Electrical Conductivity (mS/cm)	0.7	1.4	NA
Chloride	NA	NA	1800000
Sodium Adsorption Ratio	5	12	NA
Sodium	NA	NA	1800000

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

TABLE 8 - Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition

Table 8	Soil (other than sediment) µg/g		Ground Water (µg/L)	Sediment µg/g
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All types of Property Use	All Types of Property Use
Acenaphthene	0.05	0.072	4.1	NV
Acenaphthylene	0.093	0.093	1	NV
Acetone	0.5	0.5	2700	NV
Aldrin	0.05	0.05	0.35	0.002
Anthracene	0.22	0.22	1	0.22
Antimony	1	1.3	6	NV
Arsenic	11	18	25	6
Barium	210	220	1000	NV
Benzene	0.02	0.02	5	NV
Benz[a]anthracene	0.32	0.36	1	0.32
Benzo[a]pyrene	0.078	0.3	0.01	0.37
Benzo[b]fluoranthene	0.3	0.47	0.1	NV
Benzo[ghi]perylene	0.2	0.68	0.2	0.17
Benzo[k]fluoranthene	0.24	0.48	0.1	0.24
Beryllium	2.5	2.5	4	NV
Biphenyl 1,1'-	0.05	0.05	0.5	NV
Bis(2-chloroethyl)ether	0.5	0.5	5	NV
Bis(2-chloroisopropyl)ether	0.5	0.5	120	NV
Bis(2-ethylhexyl)phthalate	5	5	10	NV
Boron (Hot Water Soluble)*	1.5	1.5	NA	NA
Boron (total)	36	36	5000	NV
Bromodichloromethane	0.05	0.05	16	NV
Bromoform	0.05	0.05	25	NV
Bromomethane	0.05	0.05	0.89	NV
Cadmium	1	1.2	2.1	0.6
Carbon Tetrachloride	0.05	0.05	0.79	NV
Chlordane	0.05	0.05	0.06	0.007
Chloroaniline p-	0.5	0.5	10	NV
Chlorobenzene	0.05	0.05	30	NV
Chloroform	0.05	0.05	2.4	NV
Chlorophenol, 2-	0.1	0.1	8.9	NV
Chromium Total	67	70	50	26
Chromium VI	0.66	0.66	25	NV
Chrysene	0.34	2.8	0.1	0.34
Cobalt	22	22	3.8	50
Copper	62	92	69	16
Cyanide (CN-)	0.051	0.051	52	0.1
Dibenz[a h]anthracene	0.1	0.1	0.2	0.06
Dibromochloromethane	0.05	0.05	25	NV
Dichlorobenzene, 1,2-	0.05	0.05	3	NV
Dichlorobenzene, 1,3-	0.05	0.05	59	NV
Dichlorobenzene, 1,4-	0.05	0.05	1	NV
Dichlorobenzidine, 3,3'-	1	1	0.5	NV
Dichlorodifluoromethane	0.05	0.05	590	NV
DDD	0.05	0.05	1.8	0.008
DDE	0.05	0.05	10	0.005
DDT	0.078	1.4	0.05	0.007
Dichloroethane, 1,1-	0.05	0.05	5	NV
Dichloroethane, 1,2-	0.05	0.05	1.6	NV
Dichloroethylene, 1,1-	0.05	0.05	1.6	NV
Dichloroethylene, 1,2-cis-	0.05	0.05	1.6	NV
Dichloroethylene, 1,2-trans-	0.05	0.05	1.6	NV
Dichlorophenol, 2,4-	0.1	0.1	20	NV
Dichloropropane, 1,2-	0.05	0.05	5	NV
Dichloropropene,1,3-	0.05	0.05	0.5	NV
Dieldrin	0.05	0.05	0.35	0.002

Table 8	Soil (other than sediment) µg/g		Ground Water (µg/L)	Sediment µg/g
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All types of Property Use	All Types of Property Use
Diethyl Phthalate	0.5	0.5	30	NV
Dimethylphthalate	0.5	0.5	30	NV
Dimethylphenol, 2,4-	0.2	0.2	59	NV
Dinitrophenol, 2,4-	2	2	10	NV
Dinitrotoluene, 2,4 & 2,6-	0.5	0.5	5	NV
Dioxane, 1,4	0.2	0.2	50	NV
Dioxin/Furan (TEQ)	0.000007	0.000007	0.000015	NV
Endosulfan	0.04	0.04	0.56	NV
Endrin	0.04	0.04	0.36	0.003
Ethylbenzene	0.05	0.05	2.4	NV
Ethylene dibromide	0.05	0.05	0.2	NV
Fluoranthene	0.69	0.69	0.41	0.75
Fluorene	0.19	0.19	120	0.19
Heptachlor	0.05	0.05	0.038	NV
Heptachlor Epoxide	0.05	0.05	0.038	0.005
Hexachlorobenzene	0.02	0.02	1	0.02
Hexachlorobutadiene	0.01	0.01	0.44	NV
Hexachlorocyclohexane Gamma-	0.01	0.01	0.95	NV
Hexachloroethane	0.01	0.01	2.1	NV
Hexane (n)	0.05	0.05	51	NV
Indeno[1 2 3-cd]pyrene	0.2	0.23	0.2	0.2
Lead	45	120	10	31
Mercury	0.2	0.27	0.29	0.2
Methoxychlor	0.05	0.05	0.3	NV
Methyl Ethyl Ketone	0.5	0.5	1800	NV
Methyl Isobutyl Ketone	0.5	0.5	640	NV
Methyl Mercury **	NV	NV	0.12	NV
Methyl tert-Butyl Ether (MTBE)	0.05	0.05	15	NV
Methylene Chloride	0.05	0.05	50	NV
Methlynaphthalene, 2-(1-) ***	0.05	0.59	3.2	NV
Molybdenum	2	2	70	NV
Naphthalene	0.05	0.09	11	NV
Nickel	37	82	100	16
Pentachlorophenol	0.1	0.1	30	NV
Petroleum Hydrocarbons F1****	17	25	420	NV
Petroleum Hydrocarbons F2	10	10	150	NV
Petroleum Hydrocarbons F3	240	240	500	NV
Petroleum Hydrocarbons F4	120	120	500	NV
Phenanthrene	0.56	0.69	1	0.56
Phenol	0.5	0.5	890	NV
Polychlorinated Biphenyls	0.3	0.3	0.2	0.07
Pyrene	0.49	1	4.1	0.49
Selenium	1.2	1.5	10	NV
Silver	0.5	0.5	1.2	0.5
Styrene	0.05	0.05	5.4	NV
Tetrachloroethane, 1,1,1,2-	0.05	0.05	1.1	NV
Tetrachloroethane, 1,1,2,2-	0.05	0.05	1	NV
Tetrachloroethylene	0.05	0.05	1.6	NV
Thallium	1	1	2	NV
Toluene	0.2	0.2	22	NV
Trichlorobenzene, 1,2,4-	0.05	0.05	70	NV
Trichloroethane, 1,1,1-	0.05	0.05	200	NV
Trichloroethane, 1,1,2-	0.05	0.05	4.7	NV
Trichloroethylene	0.05	0.05	1.6	NV
Trichlorofluoromethane	0.05	0.25	150	NV
Trichlorophenol, 2,4,5-	0.1	0.1	8.9	NV
Trichlorophenol, 2,4,6-	0.1	0.1	2	NV
Uranium	1.9	2.5	20	NV
Vanadium	86	86	6.2	NV
Vinyl Chloride	0.02	0.02	0.5	NV

Table 8	Soil (other than sediment) µg/g		Ground Water (µg/L)	Sediment µg/g
Contaminant	Agricultural or Other Property Use	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All types of Property Use	All Types of Property Use
Xylene Mixture	0.05	0.05	300	NV
Zinc	290	290	890	120
Electrical Conductivity (mS/cm)	0.7	0.7	NA	NA
Chloride	NA	NA	790000	NV
Sodium Adsorption Ratio	5	5	NA	NA
Sodium	NA	NA	490000	NV

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

TABLE 9 - Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Ground Water Condition

Table 9	Soil (other than sediment) µg/g	Ground Water (µg/L)	Sediment µg/g
Contaminant	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All Types of Property Use	All Types of Property Use
Acenaphthene	0.072	600	NV
Acenaphthylene	0.093	1.4	NV
Acetone	0.5	100000	NV
Aldrin	0.05	3	0.002
Anthracene	0.22	1	0.22
Antimony	1.3	16000	NV
Arsenic	18	1500	6
Barium	220	23000	NV
Benzene	0.02	44	NV
Benz[a]anthracene	0.36	1.8	0.32
Benzo[a]pyrene	0.3	0.81	0.37
Benzo[b]fluoranthene	0.47	0.75	NV
Benzo[ghi]perylene	0.68	0.2	0.17
Benzo[k]fluoranthene	0.48	0.4	0.24
Beryllium	2.5	53	NV
Biphenyl 1,1'-	0.05	1700	NV
Bis(2-chloroethyl)ether	0.5	240000	NV
Bis(2-chloroisopropyl)ether	0.5	20000	NV
Bis(2-ethylhexyl)phthalate	5	30	NV
Boron (Hot Water Soluble)*	1.5	NA	NA
Boron (total)	36	36000	NV
Bromodichloromethane	0.05	67000	NV
Bromoform	0.05	380	NV
Bromomethane	0.05	5.6	NV
Cadmium	1.2	2.1	0.6
Carbon Tetrachloride	0.05	0.79	NV
Chlordane	0.05	0.06	0.007
Chloroaniline p-	0.5	320	NV
Chlorobenzene	0.05	500	NV
Chloroform	0.05	2.4	NV
Chlorophenol, 2-	0.1	2600	NV
Chromium Total	70	640	26
Chromium VI	0.66	110	NV
Chrysene	2.8	0.7	0.34
Cobalt	22	52	50
Copper	92	69	16
Cyanide (CN-)	0.051	52	0.1
Dibenz[a h]anthracene	0.1	0.4	0.06
Dibromochloromethane	0.05	65000	NV
Dichlorobenzene, 1,2-	0.05	4600	NV
Dichlorobenzene, 1,3-	0.05	7600	NV
Dichlorobenzene, 1,4-	0.05	8	NV
Dichlorobenzidine, 3,3'-	1	500	NV
Dichlorodifluoromethane	0.05	3500	NV
DDD	0.05	1.8	0.008
DDE	0.05	17	0.005
DDT	1.4	0.05	0.007
Dichloroethane, 1,1-	0.05	320	NV
Dichloroethane, 1,2-	0.05	1.6	NV
Dichloroethylene, 1,1-	0.05	1.6	NV
Dichloroethylene, 1,2-cis-	0.05	1.6	NV
Dichloroethylene, 1,2-trans-	0.05	1.6	NV
Dichlorophenol, 2,4-	0.1	3700	NV
Dichloropropane, 1,2-	0.05	16	NV
Dichloropropene,1,3-	0.05	5.2	NV
Dieldrin	0.05	0.56	0.002

Table 9	Soil (other than sediment) µg/g	Ground Water (µg/L)	Sediment µg/g
Contaminant	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All Types of Property Use	All Types of Property Use
Diethyl Phthalate	0.5	30	NV
Dimethylphthalate	0.5	30	NV
Dimethylphenol, 2,4-	0.2	31000	NV
Dinitrophenol, 2,4-	2	9000	NV
Dinitrotoluene, 2,4 & 2,6-	0.5	2300	NV
Dioxane, 1,4	0.2	1900000	NV
Dioxin/Furan (TEQ)	0.000007	0.0001	NV
Endosulfan	0.04	0.56	NV
Endrin	0.04	0.36	0.003
Ethylbenzene	0.05	1800	NV
Ethylene dibromide	0.05	0.25	NV
Fluoranthene	0.69	73	0.75
Fluorene	0.19	290	0.19
Heptachlor	0.05	0.038	NV
Heptachlor Epoxide	0.05	0.038	0.005
Hexachlorobenzene	0.02	3.1	0.02
Hexachlorobutadiene	0.01	0.44	NV
Hexachlorocyclohexane Gamma-	0.01	0.95	NV
Hexachloroethane	0.01	94	NV
Hexane (n)	0.05	51	NV
Indeno[1 2 3-cd]pyrene	0.23	0.2	0.2
Lead	120	20	31
Mercury	0.27	0.29	0.2
Methoxychlor	0.05	0.3	NV
Methyl Ethyl Ketone	0.5	470000	NV
Methyl Isobutyl Ketone	0.5	140000	NV
Methyl Mercury **	NV	0.12	NV
Methyl tert-Butyl Ether (MTBE)	0.05	190	NV
Methylene Chloride	0.05	610	NV
Methlynaphthalene, 2-(1-) ***	0.59	1500	NV
Molybdenum	2	7300	NV
Naphthalene	0.09	1400	NV
Nickel	82	390	16
Pentachlorophenol	0.1	50	NV
Petroleum Hydrocarbons F1****	25	420	NV
Petroleum Hydrocarbons F2	10	150	NV
Petroleum Hydrocarbons F3	240	500	NV
Petroleum Hydrocarbons F4	120	500	NV
Phenanthrene	0.69	380	0.56
Phenol	0.5	9600	NV
Polychlorinated Biphenyls	0.3	0.2	0.07
Pyrene	1	5.7	0.49
Selenium	1.5	50	NV
Silver	0.5	1.2	0.5
Styrene	0.05	1300	NV
Tetrachloroethane, 1,1,1,2-	0.05	3.3	NV
Tetrachloroethane, 1,1,2,2-	0.05	3.2	NV
Tetrachloroethylene	0.05	1.6	NV
Thallium	1	400	NV
Toluene	0.2	14000	NV
Trichlorobenzene, 1,2,4-	0.05	180	NV
Trichloroethane, 1,1,1-	0.05	640	NV
Trichloroethane, 1,1,2-	0.05	4.7	NV
Trichloroethylene	0.05	1.6	NV
Trichlorofluoromethane	0.25	2000	NV
Trichlorophenol, 2,4,5-	0.1	1300	NV
Trichlorophenol, 2,4,6-	0.1	180	NV
Uranium	2.5	330	NV
Vanadium	86	200	NV
Vinyl Chloride	0.02	0.5	NV

Table 9	Soil (other than sediment) µg/g	Ground Water (µg/L)	Sediment µg/g
Contaminant	Residential/ Parkland/Institutional/ Industrial/Commercial/ Community Property Use	All Types of Property Use	All Types of Property Use
Xylene Mixture	0.05	3300	NV
Zinc	290	890	120
Electrical Conductivity (mS/cm)	0.7	NA	NA
Chloride	NA	1800000	NV
Sodium Adsorption Ratio	5	NA	NA
Sodium	NA	1800000	NV

Notes

( ) Standard in bracket applies to medium and fine textured soils

N/V= No value derived. N/A = Not applicable

* The boron standards are for hot water soluble extract for all surface soils. For subsurface soils the standards are for total boron (mixed strong acid digest), since plant protection for soils below the root zone is not a significant concern.

**Analysis for methyl mercury only applies when mercury (total) standard is exceeded

*** The methyl naphthalene standards are appliable to both 1-methyl naphthallene and 2- methyl naphthalene , with the provision that if both are detected the sum of the two must not exceed the standard.

**** F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

Appendix C

Analytical Results Tables

Table 1 Groundwater Monitoring
Resolute Landfill CSP: Resolute, Nunavut

Location (AEC)	Date Sampled	3TM Easting	3TM Northing	Groundwater Depth (mbTOP)	Total Well Depth (mbTOP)	pH Range	Conductivity (uS/cm) Range	Turbidity (NTU) Range	Temperature (^{o}C) Range	Notes
Monitoring Wells										
RBL-1 (AEC 1)	25-Aug-21	441147	8295630	0.93	1.53	7.91 - 8.64	0.420 - 0.490	170 - 300	1.9 - 4.03	Good condition. Lock added
RBL-2 (AEC 1)	25-Aug-21	440943	8295551	1.28	1.33	7.61 - 8.03	1.11 - 2.0	210 - 312	1.35 - 2.41	Good condition. Lock added
RBL-3 (AEC 1)	25-Aug-21	440901	8295608	0.89	1.55	8.07 - 8.84	0.490 - 0.540	245 - 310	2.10 - 2.20	Sand and benonite added at base to solidify well casing. Lock added
RBL-5 (AEC 2)	27-Aug-21	441662	8292509	1.27	1.35					Poor recharge, no sample collected. Lock added
RBL-6 (AEC 2)	24-Aug-21	441420	8292566	1.30	NA					Well leaning over. Casing fixed with new sand/benonite base. Poor recharge, no sample collected.
RBL-7 (AEC 2)	24-Aug-21	441384	8292634	0.85	1.25	7.73 - 8.29	0.290 - 0.295	175 - 210	1.57 - 3.36	Good condition. Lock added
RBL-10 (AEC 3)	26-Aug-21	440493	8296242	1.01	1.40	7.76 - 8.01	0.405 - 0.449	195 - 325	2.50 - 3.05	Sand and benonite added at base to solidify well casing. Lock added
RBL-11 (AEC 3)	26-Aug-21	440383	8296265	NA	NA					Good condition. Lock added. Dry, no sample collected.
RBL-12 (AEC 3)	26-Aug-21	440450	8296335	NA	NA					Good condition. Lock added. Dry, no sample collected.
RBL-14 (AEC 3)	26-Aug-21	440682	8296449	0.98	1.60	7.75 - 8.01	0.315 - 0.425	210 - 305	2.82 - 3.01	Good condition. Lock added
RBL-15 (AEC 3)	25-Aug-21	440635	8296468	NA	NA					Good condition. Lock added. Dry, no sample collected.
Surface Water										
RBL-4 (AEC 1)	25-Aug-21	NA	NA	n/a	n/a	7.55 - 7.75	0.813 - 0.820	106 - 121	4.05 - 4.20	None
RBL-8 (AEC 2)	27-Aug-21	NA	NA	n/a	n/a	7.76 - 7.80	0.775 - 0.790	110 - 125	3.01 - 4.05	None
RBL-13 (AEC 3)	26-Aug-21	NA	NA	n/a	n/a	7.72 - 7.92	0.58 - 0.665	120 - 145	4.25 - 4.50	None. Located on south side of road
RBL-16 (AEC 3)	25-Aug-21	NA	NA	n/a	n/a	7.78 - 7..95	0.405 - 0.650	110 - 130	4.05 - 4.95	None. Located on south side of road

Notes:
All monitoring wells were installed in 2019
All coordinates are expressed in 3TM, Zone 15N, NAD83 datum.
^{o}C - degree celsius
mbTOP - metres below top of pipe.
n/a - not applicable
NA - not available
NTU - nephelometric turbidity unit
uS/cm - microsiemens per centimeter

Table 2a Groundwater Sampling

Resolute Landfill CSP: Resolute, Nunavut

BTEX PHC, Oil and Grease, Total Metals, Routine parameters, PAH and Phenol Analysis

				Resolute Bay LTM - Groundwater								
				AEC 1 - Inactive Solid Waste LF					AEC 2 - Historical LF	AEC 3 - Former Vehicle and Metal Storage Area		
						Duplicates						
Sample ID	Guideline	Reportable Detection	Units	RBL-1	RBL-2	RBL-3	GW DUP 1	RPD (%)	RBL-7	RBL-10	RBL-14	FIELD BLANK
Laboratory ID	(1)	ug/L		AFW841	AFW842	AFW843	AFW910		AFW845	AFW848	AFW850	AFW911
Sampling Date				27-Aug-2021	27-Aug-2021	27-Aug-2021	27-Aug-2021		27-Aug-2021	27-Aug-2021	27-Aug-2021	27-Aug-2021
PARAMETERS												
BTEX												
Benzene	**44 ug/L** / 370 ug/L	0.2	ug/L	<0.40	<0.40	<0.40	<0.40	-	<0.40	<0.40	<0.40	<0.40
Toluene	**18,000 ug/L** / 2 ug/L	0.2	ug/L	<0.40	<0.40	<0.40	<0.40	-	1.6	<0.40	<0.40	<0.40
Ethylbenzene	**2,300 ug/L** / 90 ug/L	0.2	ug/L	<0.40	<0.40	<0.40	<0.40	-	0.77	<0.40	<0.40	<0.40
m-Xylene & p-Xylene	NV	0.2	ug/L	<0.80	<0.80	<0.80	<0.80	-	3.2	<0.80	<0.80	<0.80
o-Xylene	NV	0.4	ug/L	<0.40	<0.40	<0.40	<0.40	-	1.6 (1)	<0.40	<0.40	<0.40
Total Xylenes	**4,200 ug/L**	0.89	ug/L	<0.89	<0.89	<0.89	<0.89	-	4.8	<0.89	<0.89	<0.89
Petroleum Hydrocarbons	**(1)**											
F1 (C6-C10)	**750 ug/L**	25	ug/L	<100	<100	<100	<100	-	<100	<100	<100	<100
F1 (C6-C10) - BTEX	**750 ug/L**	25	ug/L	<100	<100	<100	<100	-	<100	<100	<100	<100
F2 (C10-C16)	**150 ug/L**	100	ug/L	<100	<100	**370**	**170**	-	<100	<100	<100	<100
F3 (C16-C34)	**500 ug/L**	200	ug/L	<100	<100	<100	<100	-	<100	<100	<100	<100
F4 (C34-C50)	**500 ug/L**	200	ug/L	<200	<200	<200	<200	-	<200	<200	<200	<200
Reached Baseline at C50												
Extractable Hydrocarbons	**(1)**											
Oil And Grease	NV / 15mg/L (15,000 ug/L)	500	ug/L	<500	<500	<500	<500	-	<500	<1300	<500	<500
Total Metals	**(1)**											
Aluminium	NV	3	ug/L	1,730	7.3	19.3	14.4	-	31,400	271	3,110	4.4
Antimony	**20,000 ug/L**	0.5	ug/L	<0.50	2.09	<0.50	<0.50	-	<5.0	<0.50	<0.50	<0.50
Arsenic	**1,900 ug/L**	0.1	ug/L	0.58	0.67	0.48	0.37	-	11.8	0.62	1.62	<0.10
Barium	**29,000 ug/L**	1	ug/L	42.7	62.2	83.1	77.2	7	454	72.1	32.3	<1.0
Beryllium	**67 ug/L**	0.1	ug/L	0.11	<0.10	<0.10	<0.10	-	2.4	<0.10	0.19	<0.10
Boron (Total)	**45,000 ug/L**	50	ug/L	<50	157	80	76	-	<500	203	<50	<50
Cadmium	**2.7 ug/L**	0.01	ug/L	0.094	0.145	<0.010	<0.010	-	**2.77**	0.034	0.11	<0.010
Chromium	**810 ug/L**	1	ug/L	3.9	<1.0	<1.0	<1.0	-	64	<1.0	6	<1.0
Chromium (VI)	**140 ug/L**	0.99	ug/L	<0.99	<0.99	<0.99	<0.99	-	<0.99	<0.99	<5 (2)	<0.99
Cobalt	**66 ug/L**	0.2	ug/L	1.03	0.32	0.2	<0.20	-	19.8	0.21	1.84	<0.20
Copper	**87 ug/L**	0.2	ug/L	2.71	2.71	0.74	0.66	-	61.4	1.15	4.43	<0.50
Iron	NV	5	ug/L	1,970	25	376	271	32	46,200	310	4,040	<10
Lead	**25 ug/L** / 1ug/L	0.2	ug/L	3.17	0.34	0.34	0.21	-	**186**	0.49	7.82	<0.20
Manganese	NV	1	ug/L	61.3	77	56.2	42.3	28	1,500	13.7	127	<1.0
Mercury	**0.29 ug/L**	0.0019	ug/L	0.0033	0.003	0.0084	0.005	-	0.0065	0.0023	0.0041	<0.0019
Molybdenum	**9,200 ug/L**	1	ug/L	<1.0	2.6	<1.0	<1.0	-	<10	<1.0	<1.0	<1.0
Nickel	**490 ug/L**	0.1	ug/L	3.1	2.2	1.2	1.1	9	51	1.7	5.3	<1.0
Phosphorus	NV	3	ug/L	30	190	370	320	14	86	15	110	<3
Selenium	**63 ug/L**	0.02	ug/L	0.24	0.22	0.14	0.17	19	2.7	0.85	1.36	<0.10
Silver	**1.5 ug/L**	0.01	ug/L	<0.020	<0.020	<0.020	<0.020	-	0.48	<0.020	0.024	<0.020
Sulfur	NV	3000	ug/L	4200	88100	4200	<3,000	-	<3,000	67,700	<3,000	<3,000
Thallium	**510 ug/L**	5	ug/L	0.051	0.011	<0.010	<0.010	-	0.77	<0.010	0.027	<0.010
Titanium	NV	0.1	ug/L	60.8	<5.0	<5.0	<5.0	-	696	12.6	83.7	<5.0
Uranium	**420 ug/L**	5	ug/L	0.26	0.36	0.18	0.18	-	4.8	2.02	0.47	<0.10
Vanadium	**250 ug/L**	5	ug/L	<5.0	<5.0	<5.0	<5.0	-	80	<5.0	7.7	<5.0
Zinc	**1,100 ug/L**	5	ug/L	12.7	43.5	<5.0	<5.0	-	421	<5.0	19	<5.0
Routine Water	**(1)**											
pH	NV / 6.0 - 9.0	N/A	pH	8.21	7.99	7.63	7.7	1	8.13	7.92	8.13	**4.36**
Electrical Conductivity	NV	2,000	uS/cm	500	1100	470	450	-	620	3000	340	8.2
Total Suspended Solids	NV / 50 mg/L	400	mg/L	**1200 (1)**	10	**250 (1)**	**160 (1)**	**44**	**1300 (1)**	20	**560 (1)**	<0.40
Hardness	NV	500	mg/L	287	425	191	182	5	6,010	938	279	<0.50
Total Alkalinity	NV	1,000	mg/L	140	220	190	180	5	190	390	160	<1.0
Bicarbonate	NV	1,000	mg/L	170	270	230	220	4	230	480	200	<1.0
Carbonate	NV	1,000	mg/L	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0
Hydroxide	NV	1,000	mg/L	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0
Calcium	NV	500	mg/L	72	138	52	49	6	1,380	217	73	<0.050
Magnesium	NV	500	mg/L	26	20	15	14	3	626	96	23	<0.050
Potassium	NV	500	mg/L	2	17	5	4	12	10	10	2	<0.050
Sodium	**2,300 mg/L**	500	mg/L	44	54	22	22	4	43	269	9	<0.050
Chloride	**2,300 mg/L**	1,000	mg/L	68	63	32	32	0	56	630	11	<1.0
Sulphate (SO4)	NV	1,000	mg/L	12	240	11	9	16	45	190	3	<1.0
Ionic Balance	NV											
Nutrients	**(1)**											
Ammonia	NV	15	mg/L	0.33	1.3	2.4	2.3	4	0.16	1.2	0.49	0.5
Nitrate - N	NV	100	mg/L	2.1	1.2	<0.010	<0.010	-	0.47	1.6	0.25	<0.010
Nitrite - N	NV	100	mg/L	<0.010	0.028	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010
Nitrate and Nitrite - N	NV	100	mg/L	2.1	1.2	<0.010	<0.010	-	0.47	1.6	0.25	<0.010
Polycyclic Aromatic Hydrocarbons	**(1)**											
Calculated Paramters												
Benzo(a)pyrene (TPE)	NV	0.010		<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010
Specific Parameters												
Acenaphthene	**600 ug/L**	0.1	ug/L	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	**1.8 ug/L**	0.1	ug/L	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10
Acridine	NV	0.04	ug/L	<0.040	<0.040	<0.040	<0.040	-	<0.040	<0.040	<0.040	<0.040
Anthracene	**2.4 ug/L**	0.01	ug/L	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010
Benzo(a)anthracene	**4.7 ug/L**	0.0085	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085	<0.0085	<0.0085
Benzo(a)pyrene	**0.81 ug/L**	0.0085	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085	<0.0085	<0.0085
Benzo(b/j)fluoranthene	**0.75 ug/L**	0.0085	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085	<0.0085	<0.0085
Benzo(k)fluoranthene	**0.4 ug/L**	0.0085	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085	<0.0085	<0.0085
Benzo(g,h,i)perylene	**0.2 ug/L**	0.05	ug/L	<0.050	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050	<0.050
Benzo(c)phenanthrene	NV	0.0075	ug/L	<0.0075	<0.0075	<0.0075	<0.0075	-	<0.0075	<0.0075	<0.0075	<0.0075
Benzo(e)pyrene	NV	0.05	ug/L	<0.050	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050	<0.050
Chrysene	**1 ug/L**	0.0085	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085	<0.0085	<0.0085
Dibenzo(a,h)anthracene	**0.52 ug/L**	0.0075	ug/L	<0.0075	<0.0075	<0.0075	<0.0075	-	<0.0075	<0.0075	<0.0075	<0.0075
Fluoranthene	**130 ug/L**	0.1	ug/L	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010
Fluorene	**400 ug/L**	0.05	ug/L	<0.050	<0.050	0.071	<0.050	-	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-c,d)pyrene	**0.2 ug/L**	0.0085	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085	<0.0085	<0.0085
1-Methylnaphthalene	**1,800 ug/L**	0.1	ug/L	<0.10	<0.10	4.1	2.8	38	<0.10	<0.10	<0.10	<0.10
2-Methylnaphthalene	**1,800 ug/L**	0.1	ug/L	<0.10	<0.10	7.2	4.9	38	<0.10	<0.10	<0.10	<0.10
Naphthalene	**1,400 ug/L**	0.1	ug/L	<0.10	<0.10	1.6	1.0	**46**	<0.10	<0.10	<0.10	<0.10
Phenanthrene	**580 ug/L**	0.05	ug/L	<0.050	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050	<0.050
Perylene	NV	0.05	ug/L	<0.050	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050	<0.050
Pyrene	**68 ug/L**	0.02	ug/L	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020	<0.020
Quinoline	NV	0.2	ug/L	<0.20	<0.20	<0.20	<0.20	-	<0.20	<0.20	<0.20	<0.20
Misc. Organics	**(1)**											
Phenols	**12,000 ug/L**	1.5	ug/L	<1.5	3.5	19	24	23	<1.5	3.6	<1.5	<1.5

RDL exceeds guideline value

Guideline Exceedance

Guideline 1 Ontario Ministry of the Environment 2011 Soil, Groundwater, and Sediment Standards for use under Part X.V.1 of the Environmental Protection Act (MECP, 2011). Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Condition

Maximum Allowable Effulent Discharge Concentration as per Water Licence No. 1BR-RBL1929

COMPARATIVE GUIDELINE USED IS SHOWN IN BOLD IN TABLE

Notes:

RDL - Reportable detection limit

RPD - Relative percent difference calculated as (abs(C1-C2)/average(C1+C2))*100

"-" Indicates RPD not calculated. RPD cannot be calculated if one or more of the analytical results are less than detection limits or within 5 times the detection limits.

BOLD - RPD value greater than 40%

Resolute Landfill CSP: Resolute, Nunavut

BTEX PHC, Oil and Grease, Total Metals, Routine parameters, PAH and Phenol Analysis

				Resolute Bay LTM - Surface Water					
				AEC 1 - Inactive Solid Waste LF	AEC 2 - Historical LF			AEC 3 - Former Vehicle and Metal Storage Area	
					Duplicates				
Sample ID	Guideline	Reportable	Units	RBL-4	RBL-8	FIELD DUP 2	RPD (%)	RBL-13	RBL-16
Laboratory ID	(1)	Detection		AFW844	AFW846	AFW847		AFW849	AFW909
Sampling Date		ug/L		27-Aug-2021	27-Aug-2021	27-Aug-2021		27-Aug-2021	27-Aug-2021
PARAMETERS									
BTEX									
Benzene	0.37mg/L (370 ug/L)	0.2	ug/L	<0.40	<0.40	<0.40	-	<0.40	<0.40
Toluene	0.002 mg/L (2 ug/L)	0.2	ug/L	<0.40	<0.40	<0.40	-	<0.40	<0.40
Ethylbenzene	0.090 mg/L (90 ug/L)	0.2	ug/L	<0.40	<0.40	<0.40	-	<0.40	<0.40
m-Xylene & p-Xylene	NV	0.2	ug/L	<0.80	<0.80	<0.80	-	<0.80	<0.80
o-Xylene	NV	0.4	ug/L	<0.40	<0.40	<0.40	-	<0.40	<0.40
Total Xylenes	**3.9 mg/L (3900 ug/L)**	0.89	ug/L	<0.89	<0.89	<0.89	-	<0.89	<0.89
Petroleum Hydrocarbons	**(2)**								
F1 (C6-C10)	NV	25	ug/L	<100	<100	<100	-	<100	<100
F1 (C6-C10) - BTEX	NV	25	ug/L	<100	<100	<100	-	<100	<100
F2 (C10-C16)	NV	100	ug/L	<100	<100	<100	-	<100	<100
F3 (C16-C34)	NV	200	ug/L	<100	<100	<100	-	<100	<100
F4 (C34-C50)	NV	200	ug/L	<200	<200	<200	-	<200	<200
Reached Baseline at C50									
Extractable Hydrocarbons	**(2)**								
Oil And Grease	15mg/L (15,000 ug/L)	500	ug/L	<500	<500	500	-	<500	<500
Total Metals	**(2)**								
Aluminium	**0.1 mg/L (100 ug/L)**	3	ug/L	13.1	7	6.1	-	**399**	**147**
Antimony	NV	0.5	ug/L	<0.50	<0.50	<0.50	-	<0.50	<0.50
Arsenic	**0.005 mg/L (5 ug/L)**	0.1	ug/L	0.26	0.21	0.23	9	0.27	0.18
Barium	NV	1	ug/L	72.9	121	121	0	17.2	15.5
Beryllium	NV	0.1	ug/L	<0.10	<0.10	<0.10	-	<0.10	<0.10
Boron (Total)	**1.5 mg/L (1500 ug/L)**	50	ug/L	56	74	69	-	115	131
Cadmium	**0.00033 mg/L (0.33 ug/L)**	0.01	ug/L	0.033	0.013	0.014	-	0.018	0.016
Chromium	NV	1	ug/L	1.5	<1.0	<1.0	-	1	<1.0
Chromium (VI)	**0.001 mg/L (1 ug/L)**	0.99	ug/L	**1.3**	<0.99	<0.99	-	<0.99	<0.99
Cobalt	NV	0.2	ug/L	<0.20	<0.20	<0.20	-	0.23	<0.20
Copper	**0.004 mg/L (4 ug/L)**	0.2	ug/L	1.72	0.7	0.59	-	0.86	1.87
Iron	**0.3 mg/L (300 ug/L)**	5	ug/L	49	26	27	4	**507**	177
Lead	0.007mg/L (7 ug/L) / 0.001 mg/L (1 ug/L)	0.2	ug/L	0.49	<0.20	<0.20	-	0.51	0.51
Manganese	**0.520 mg/L (520 ug/L)**	1	ug/L	2.3	1.8	2.1	-	12.3	5.3
Mercury	**0.000026 mg/L (0.026 ug/L)**	0.0019	ug/L	0.0022	<0.0019	0.0023	-	<0.0019	<0.0019
Molybdenum	**0.073 mg/L (73 ug/L)**	1	ug/L	1	<1.0	<1.0	-	<1.0	<1.0
Nickel	**0.150 mg/L (150 ug/L)**	0.1	ug/L	<1.0	<1.0	<1.0	-	<1.0	<1.0
Phosphorus	NV	3	ug/L	90	3	3.4	-	18	4.2
Selenium	**0.001 mg/L (1 ug/L)**	0.02	ug/L	0.27	0.21	0.25	17	0.1	<0.10
Silver	**0.00025 mg/L (0.25 ug/L)**	0.01	ug/L	<0.020	<0.020	<0.020	-	<0.020	<0.020
Sulfur	NV	3000	ug/L	5,500	7,700	9,200	-	16,200	20,700
Thallium	**0.0008 mg/L (0.8 ug/L)**	5	ug/L	<0.010	<0.010	<0.010	-	<0.010	<0.010
Titanium	NV	0.1	ug/L	<5.0	<5.0	<5.0	-	11.9	<5.0
Uranium	**0.015 mg/L (15ug/L)**	5	ug/L	0.31	0.34	0.34	-	0.55	0.63
Vanadium	NV	5	ug/L	<5.0	<5.0	<5.0	-	<5.0	<5.0
Zinc	**0.01 mg/L (10 ug/L)**	5	ug/L	7.6	<5.0	<5.0	-	<5.0	<5.0
Routine Water	**(2)**								
pH	6.5 - 9.0 / 6.0 - 9.0	N/A	pH	8.11	8.10	8.06	0	8.15	8.22
Electrical Conductivity	NV	2,000	uS/cm	380	690	680	-	680	750
Total Suspended Solids	50 mg/L	400	mg/L	9	0.61	<0.40	-	46	18
Hardness	NV	500	mg/L	144	285	286	0	253	220
Total Alkalinity	NV	1,000	mg/L	120	250	250	0	130	140
Bicarbonate	NV	1,000	mg/L	150	300	300	0	160	180
Carbonate	NV	1,000	mg/L	<1.0	<1.0	<1.0	-	<1.0	<1.0
Hydroxide	NV	1,000	mg/L	<1.0	<1.0	<1.0	-	<1.0	<1.0
Calcium	NV	500	mg/L	36	80	80	1	64	55
Magnesium	NV	500	mg/L	13	21	21	0	23	20
Potassium	NV	500	mg/L	2	2	2	-	3	4
Sodium	NV	500	mg/L	22	37	37	1	64	75
Chloride	**120 mg/L**	1,000	mg/L	33	62	63	2	100	120
Sulphate (SO4)	NV	1,000	mg/L	16	24	24	0	52	60
Ionic Balance	NV								
Nutrients	**(2)**								
Ammonia	**0.0231 mg/L**	15	mg/L	**0.33**	**0.76**	**0.15**	**134**	**0.53**	**0.85**
Nitrate - N	**13 mg/L**	100	mg/L	1.2	0.038	0.034	-	0.071	0.014
Nitrite - N	**0.197 mg/L**	100	mg/L	0.019	<0.010	<0.010	-	<0.010	<0.010
Nitrate and Nitrite - N	NV	100	mg/L	1.3	0.038	0.034	-	0.071	0.014
Polycyclic Aromatic Hydrocarbons	**(2)**								
Calculated Paramters									
Benzo(a)pyrene (TPE)	NV	0.010	ug/L	<0.010	<0.010	<0.010	-	<0.010	<0.010
Specific Parameters									
Acenaphthene	**0.0058 mg/L (5.8 ug/L)**	0.1	ug/L	<0.10	<0.10	<0.10	-	<0.10	<0.10
Acenaphthylene	NV	0.1	ug/L	<0.10	<0.10	<0.10	-	<0.10	<0.10
Acridine	**0.0044 mg/L (4.4 ug/L)**	0.04	ug/L	<0.10	<0.10	<0.10	-	<0.10	<0.10
Anthracene	**0.000012 mg/L (0.012 ug/L)**	0.01	ug/L	<0.040	<0.040	<0.040	-	<0.040	<0.040
Benzo(a)anthracene	**0.000018 mg/L (0.018 ug/L)**	0.0085	ug/L	<0.010	<0.010	<0.010	-	<0.010	<0.010
Benzo(a)pyrene	**0.000015 mg/L (0.015 ug/L)**	0.0085	ug/L	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085
Benzo(b/j)fluoranthene	NV	0.0085	ug/L	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085
Benzo(k)fluoranthene	NV	0.0085	ug/L	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085
Benzo(g,h,i)perylene	NV	0.05	ug/L	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085
Benzo(c)phenanthrene	NV	0.0075	ug/L	<0.050	<0.050	<0.050	-	<0.050	<0.050
Benzo(e)pyrene	NV	0.05	ug/L	<0.0075	<0.0075	<0.0075	-	<0.0075	<0.0075
Chrysene	NV	0.0085	ug/L	<0.050	<0.050	<0.050	-	<0.050	<0.050
Dibenzo(a,h)anthracene	NV	0.0075	ug/L	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085
Fluoranthene	**0.00004 mg/L (0.04 ug/L)**	0.1	ug/L	<0.0075	<0.0075	<0.0075	-	<0.0075	<0.0075
Fluorene	**0.003 mg/L (3 ug/L)**	0.05	ug/L	<0.010	<0.010	<0.010	-	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	NV	0.0085	ug/L	<0.050	<0.050	<0.050	-	<0.050	<0.050
1-Methylnaphthalene	NV	0.1	ug/L	<0.0085	<0.0085	<0.0085	-	<0.0085	<0.0085
2-Methylnaphthalene	NV	0.1	ug/L	<0.10	<0.10	<0.10	-	<0.10	<0.10
Naphthalene	**0.0011 mg/L (1.1 ug/L)**	0.1	ug/L	<0.10	<0.10	<0.10	-	<0.10	<0.10
Phenanthrene	**0.0004 mg/L (0.4 ug/L)**	0.05	ug/L	<0.10	<0.10	<0.10	-	<0.10	<0.10
Perylene	NV	0.05	ug/L	<0.050	<0.050	<0.050	-	<0.050	<0.050
Pyrene	**0.000025 mg/L (0.025 ug/L)**	0.02	ug/L	<0.050	<0.050	<0.050	-	<0.050	<0.050
Quinoline	**0.0034 mg/L (3.4 ug/L)**	0.2	ug/L	<0.020	<0.020	<0.020	-	<0.020	<0.020
Misc. Organics	**(2)**								
Phenols	**0.004 mg/L (4 ug/L)**	1.5	ug/L	<0.20	<0.20	<0.20	-	<0.20	<0.20

RDL exceeds guideline value

Guideline Exceedance

Guideline 1 CCME Water Quality for the Protection of Aquatic Life, Freshwater Pathway (Marine Pathway excluded)

Maximum Allowable Effulent Discharge Concentration as per Water Licence No. 1BR-RBL1929

COMPARATIVE GUIDELINE USED IS SHOWN IN BOLD IN TABLE

Notes:

RDL - Reportable detection limit

RPD - Relative percent difference calculated as (abs(C1-C2)/average(C1+C2))*100

"-" Indicates RPD not calculated. RPD cannot be calculated if one or more of the analytical results are less than detection limits or within 5 times the detection limits.

BOLD - RPD value greater than 40%

Appendix D

Field Notes

AEC 1 Aug 29, 2021
SJL

TABLE 1: GENERAL AEC 1 VISUAL INSPECTION MATRIX

Observation Parameter	Operational Feature	Maintenance Feature	Observations from Previous Report	Current Observations
Settlement	✓		Acceptable	None noted
Erosion	✓		Acceptable	None noted
Frost Action	✓		Acceptable	None noted
Animal Burrows		✓	↳ no wildlife observed	
Vegetation	✓		Acceptable	No Veg on AEC Veg - isolated @ Toe
Staining		✓	Acceptable	None noted
Vegetation Stress	✓		Acceptable	None noted
Seepage Points	✓		Acceptable / isolated	pools @ toe @ landfill along south swale near sewage lagoon
Exposed Debris		✓	Acceptable	- none noted
Condition of Monitoring Instruments		✓	OK	- minor repairs to house @ RBL-3
Grades/ Topography	✓		Acceptable	- As per design
Distance to downgradient surface water bodies	✓		Occasional	- SLW mapped as previously reported - no new SLW bodies
Distance to freshwater/marine habitat and habitat usage	✓		Acceptable	- Set back from Marine discharge
Terrestrial Habitat		✓	Acceptable	None observed
Land Uses		✓	Acceptable	None observed Industrial Use / Sewage lagoons
Debris		✓	Acceptable	↳ no debris on AEC

TABLE 1: SITE SPECIFIC AEC 1 RISKS VISUAL INSPECTION MATRIX

Observation Parameter	Operational Feature	Maintenance Feature	Observations from Previous Report	Current Observations
Ensuring landfill cover thickness	✓		Acceptable	cover is adequate as per design
Snow cover, including measured depth	✓		Acceptable	No snow
Sun exposure	✓		Acceptable.	
Surface temperature	✓		Acceptable	
Wind effects	✓		Acceptable	
Surface Drainage	✓		Acceptable	Drainage as per design within swale system, noted on south side along active swale → operating as designed
Sewage Lagoon Overflow		✓	Acceptable / Isolated	
potential percolation into landfill cap	✓		Acceptable	
Ensuring a sufficiently high degree of saturation of the barrier layer below the active zone	✓		Acceptable	→ no evidence of percolation dry soils
Runoff Diversion	✓		Acceptable	swales / channels running landfill as designed

TABLE 2: SEVERITY RATINGS OF AEC 1 OPERATIONAL FEATURES

Severity Rating	Description
Not observed	No issues identified
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations may be observed, such as isolated areas of erosion or settlement, drainage system is performing well.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in number or size of features of note, such as differential settlement, erosion or cracking; drainage systems are showing increased sedimentation reducing surface flow. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion, or differential settlement; scarp development, collapsed or slumped surface water drainage systems. The potential for failure is assessed as imminent.
Unacceptable	The stability of the landfill is compromised to the extent that waste materials are exposed in areas of erosion, or differential settlement, cap is not functional and/or slope failure, surface water is not draining as designed with overflows or breakouts.

Historical Landfill (AEC 2)

AEC #2 Aug 24 2021
SJL

TABLE 4: GENERAL AEC 2 VISUAL INSPECTION MATRIX

Observation Parameter	Operational Feature	Maintenance Feature	Observations from Previous Report	Current Observations
Settlement	✓	(See map) See photos	Acceptable / isolated	isolated feature - 30-40' strong fracture along western edge, cracking observed
Erosion	✓		Acceptable	
Frost Action	✓		Acceptable	Non observed
Animal Burrows		✓	Acceptable	Non observed
Vegetation	✓		Acceptable	Non observed
Staining		✓	Acceptable	Non observed
Vegetation Stress	✓		" "	" "
Seepage Points	✓		" "	" " No seepage @ Toe
Exposed Debris		✓	Acceptable Isolated	trace domestic debris
Condition of Monitoring Instruments		✓	Acceptable	casing fix @ RBL-6
Grades/ Topography	✓		Acceptable	As designed
Distance to downgradient surface water bodies	✓		No surface water @ Toe ponded water	small pond as previously mapped
Distance to freshwater/marine habitat and habitat usage	✓		Acceptable	Distal from Marine habitat
Terrestrial Habitat		✓	Acceptable	Arctic fox noted
Land Uses		✓	Acceptable	Industrial
Debris		✓	Acceptable	None observed

TABLE 5: AEC 2 SITE SPECIFIC RISKS VISUAL INSPECTION MATRIX

Observation Parameter	Operational Feature	Maintenance Feature	Observations from Previous Report	Current Observations
Permafrost Degradation	✓		Acceptable	Non observed
Snow cover duration	✓		Acceptable	Non observed
Sun exposure	✓		"	
Surface temperature	✓		"	
Wind	✓		"	
Surface water drainage and potential percolation into landfill cap	✓		Acceptable	Swales and drainage system operating as designed
Runoff Diversion	✓		"	" "
Permafrost Degradation	✓		"	None observed
Snow cover duration	✓		"	"

TABLE 6: SEVERITY RATINGS OF AEC 2 OPERATIONAL FEATURES

Severity Rating	Description
Not observed	No issues identified
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations may be observed, such as isolated areas of erosion or settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in number or size of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion, or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	The stability of the landfill is compromised to the extent that waste materials are exposed in areas of erosion, or differential settlement, cap is not functional and/or slope failure.

AEC 3
Aug 29, 2021
SB

Vehicle Storage Area (AEC 3)

* Note: check to ensure that this was within the former remedial area and not Natural slope erosion

TABLE 8: GENERAL AEC 3 VISUAL INSPECTION MATRIX

Observation Parameter	Operational Feature	Maintenance Feature	Observations from Previous Report	Current Observations
Settlement	✓		Acceptable, isolated	· minor settlement of excavated areas
Erosion	✓	Note	*Marginal / isolated	- erosion face along isolated area north face
Frost Action	✓		Acceptable	to 40' slope failure along bank of valley slope
Animal Burrows		✓	Acceptable	None noted
Vegetation	✓		"	No veg
Staining		✓	"	No staining
Vegetation Stress	✓		"	"
Seepage Points	✓		"	No seeps
Exposed Debris		✓	"	No observed
Condition of Monitoring Instruments		✓	"	Minor resetting of RBL-10 casing
Grades/ Topography	✓		"	As per design
Distance to downgradient surface water bodies	✓		"	distal from slw bodies
Distance to freshwater/marine habitat and habitat usage	✓		"	no flow to valley stream - Nad
Terrestrial Habitat		✓	"	Polar bear sightings in valley
Land Uses		✓	"	Wildlands
Debris		✓	"	Non observed

AEC #3

TABLE 5: AEC 3 SITE SPECIFIC RISKS VISUAL INSPECTION MATRIX

Observation Parameter	Operational Feature	Maintenance Feature	Observations from Previous Report	Current Observations
Permafrost Degradation	✓		Acceptable	None observed
Snow cover duration	✓		Acceptable	None observed
Sun exposure	✓		Acceptable	
Surface temperature	✓		"	
Wind	✓		"	
Surface water drainage and potential percolation into landfill cap	✓		None noted	
Runoff Diversion	✓		No run off from remedial area & no standing water on North side of Access Rd	
Permafrost Degradation	✓		NA	
Snow cover duration	✓		NA	

TABLE 9: SEVERITY RATINGS OF AEC 3 OPERATIONAL FEATURES

Severity Rating	Description
Not observed	No issues identified
Acceptable	Noted features are of little consequence. Performing as designed. Minor deviations may be observed, such as isolated areas of erosion or settlement.
Marginal	Physical/environmental surface grading performance appears to be deteriorating with time. Observations may include an increase in number or size of features of note, such as differential settlement, erosion or cracking.
Significant	Significant or potentially significant changes affecting site regrading such as significant differential settlement or water erosion features. Regrading is not consistent with remedial design.
Unacceptable	Significant settlement or erosion.

KEY

Feature	Severity Rating	Extent
Settlement		
Erosion		
Lateral Movement		
Frost Action		
Sloughing		
Cracking		
Animal Burrows		
Vegetation Establishment		
Staining		
Vegetation Stress		
Seepage/Ponded Water		
Debris and/or Liner exposure		
Other		
Overall Landfill Performance		

Performance/ Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacts less than 50% of the surface area of the landfill
Extensive	Impacts greater than 50% of the surface area of the landfill

RIBL-1

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RIBL | Landfill Name: AEC 1

Date: Aug 25 | Time: 1:05

Weather: cloudy 3°C

Monitoring Well ID: RIBL-1 | UTM Coordinates: N E

Sample #: Groundwater | Duplicate #: /

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB [See COC]

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): S Livingstone / Jackamee Igalik

Ponded Water, Snow Depth, etc.: Groundwater

Well Condition/Repair Requirements: None required

Lock Make/Model/Condition/Replaced: Lock added

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): 1.53 | Diameter (cm): 2 Inch / 5cm (Pipe Diameter)

Depth to Top of Screen (mbgs): | Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☑ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): 0.93

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): 1.53 (Measure Refusal After Sampling)

Thickness of Water Column (m): 0.63 m | Water Volume (L): (Calculated)

Free Product Thickness (mm): / | Sludge/Silt: ☑ Y ☐ N

cleared up during purging

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Horiba | Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☑ Y ☐ N | Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
1 min	8.64	0.490	300	4.03
5 min	8.05	0.440	190	1.96
10 min	7.95	0.420	175	1.90
15 min	7.91	0.430	170	1.95
Final Time: Final Values:				

Clear? ☑ Y ☐ N | Colour: slightly brown

PHC Sheen? ☐ Y ☒ N | PHC Odour? ☐ Y ☒ N

Free Product/PHC Globules? ☐ Y ☒ N | Other Odour? No odours

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☑ Y ☐ N | Decon Required? ☐ Y ☑ N

Type of Decontamination Fluid(s): | # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: | Direction:

Scale Indicated? ☐ Y ☐ N | Line of Sight:

RBL-2

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL | Landfill Name: AEC 1

Date: Aug 25 | Time: 1:40

Weather: Cloudy 3°C

Monitoring Well ID: RBL-2 | UTM Coordinates: N E

Sample #: | Duplicate #: /

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB [See COC]

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): S Livingstone / J Igaluk

Ponded Water, Snow Depth, etc.: Groundwater

Well Condition/Repair Requirements: None

Lock Make/Model/Condition/Replaced: Lock added

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): 1.33 | Diameter (cm): 5 (Pipe Diameter)

Depth to Top of Screen (mbgs): | Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☑ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): 1.28

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): 1.33 (Measure Refusal After Sampling)

Thickness of Water Column (m): | Water Volume (L): (Calculated)

Free Product Thickness (mm): / | Sludge/Silt: ☑ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Horiba | Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☑ Y ☐ N | Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
1 min	8.03	2.10	312	2.41
5 min	7.70	1.20	210	1.45
15 min	7.61	1.11	241	1.35
Final Time: Final Values:				

Clear? ☑ Y ☐ N | Colour: slight brown

PHC Sheen? ☐ Y ☑ N | PHC Odour? ☐ Y ☑ N

Free Product/PHC Globules? ☐ Y ☑ N | Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☑ Y ☐ N | Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): | # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: | Direction:

Scale Indicated? ☐ Y ☐ N | Line of Sight:

RBL-3

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 1

Date: Aug 25 Time: 2:55

Weather: cloudy 2°C

Monitoring Well ID: RBL-3 UTM Coordinates: N E

Sample #: Duplicate #: Yes GW Dup 1

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB [See COC]

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ____ ☐ None

Name(s) of Sampler(s): S Livingstue I J Igaluk

Ponded Water, Snow Depth, etc.: Groundwater

Well Condition/Repair Requirements: None required

Lock Make/Model/Condition/Replaced: Lock added

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): 1.545 Diameter (cm): 2"/5cm (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☑ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): 0.89

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): 1.545 (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): / Sludge/Silt: ☑ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Horiba Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☑ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
1 min	8.84	0.540	310	2.20
10 min	8.10	0.490	245	2.10
15 min	8.07	0.496	251	2.12
Final Time: Final Values:				

Clear? ☑ Y ☐ N Colour: slight grey

PHC Sheen? ☐ Y ☑ N PHC Odour? ☐ Y ☑ N

Free Product/PHC Globules? ☐ Y ☑ N Other Odour? /

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☑ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

RBL-4

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 1

Date: Aug 25 Time: 3:45

Weather: Cloudy / Sunny 1°C

Surface water Monitoring Well ID: UTM Coordinates: N E

Sample #: RBL-4 Duplicate #:

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB See COC

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): S Livingstone / J Igaluk

Ponded Water, Snow Depth, etc.: Surface Water Sample

Well Condition/Repair Requirements: /

Lock Make/Model/Condition/Replaced: / surface water

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): / Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m):

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Hanna Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☑ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
1 min	7.65	0.814	106	4.15
10 min	7.75	0.820	120	4.05
15 min	7.55	0.813	121	4.20
Final Time: Final Values:				

Clear? ☑ Y ☐ N Colour: clear

PHC Sheen? ☐ Y ☑ N PHC Odour? ☐ Y ☑ N

Free Product/PHC Globules? ☐ Y ☐ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☑ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

RBL-5

[No sample]

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 2

Date: Aug 24 / 26 / 27 Time: 2:00

Weather: 2°C Sunny

Monitoring Well ID: RBL-5 UTM Coordinates: N E

Sample #: Duplicate #:

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): Slivingston / J Igglak

Ponded Water, Snow Depth, etc.:

Well Condition/Repair Requirements:

Lock Make/Model/Condition/Replaced: New lock added

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): 1.27m / 1.35m

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique:

Water Quality Parameter Equipment: Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
Aug 24 poor recovery				
Aug 26 poor recharge				
Aug 27 3rd attempt	· Poor water quality			
	· No recharge and sampling aborted			
Final Time: Final Values:				

Clear? ☐ Y ☐ N Colour:

PHC Sheen? ☐ Y ☐ N PHC Odour? ☐ Y ☐ N

Free Product/PHC Globules? ☐ Y ☐ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☐ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

RBL-6
[NO Sample]

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 2

Date: ~~Aug~~ Aug 24 Time: 3:10

Weather:

Monitoring Well ID: RBL-6 UTM Coordinates: N E

Sample #: Duplicate #:

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): Slivingstue / J Iyaluk

Ponded Water, Snow Depth, etc.: Groundwater

Well Condition/Repair Requirements: Well was leaning over, casing was

Lock Make/Model/Condition/Replaced: fixed with new sand/bentonite base.

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): 1.30

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): (Measure Refusal After Sampling)

Thickness of Water Column (m): / Water Volume (L): (Calculated)

Free Product Thickness (mm): / Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Horiba. Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
Aug 24 - poor - 0.5L				
26 - poor - 0.3L				
27 - poor - 0.1L → very turbid				
	· No sample collected			
	· Sampling Aborted.			
Final Time: Final Values:				

Clear? ☐ Y ☐ N Colour:

PHC Sheen? ☐ Y ☐ N PHC Odour? ☐ Y ☐ N

Free Product/PHC Globules? ☐ Y ☐ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☐ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

RBL-7

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 2

Date: Aug 24 Time: 4:40

Weather: Cloudy 2°C

Monitoring Well ID: RBL-7 UTM Coordinates: / N E

Sample #: Duplicate #: N/A

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB See [COC]

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): S Livingstone / J Igaluk.

Ponded Water, Snow Depth, etc.: Groundwater Sample.

Well Condition/Repair Requirements: /

Lock Make/Model/Condition/Replaced: Lock added.

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): 0.85

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): 1.25 (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): / Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Horiba Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
5 Min	8.29	0.293	210	3.36
10 min	7.75	0.295	175	1.82
20 Min	7.73	0.298	180	1.57
Final Time: Final Values:				

Clear? ☑ Y ☐ N Colour: slight grey

PHC Sheen? ☐ Y ☑ N PHC Odour? ☐ Y ☑ N

Free Product/PHC Globules? ☐ Y ☑ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☑ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

TBL-8

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: TBL Landfill Name: AEC 2

Date: Aug 27 Time: 10:10

Weather: 2°C Sunny

Surface Water Monitoring Well ID: TBL-8 UTM Coordinates: N E

Sample #: Duplicate #: yes Field Dup 2

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB [See COC]

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ____ ☐ None

Name(s) of Sampler(s): S livingstone / J Igaluk.

Ponded Water, Snow Depth, etc.: Surface Water Sample.

Well Condition/Repair Requirements: /

Lock Make/Model/Condition/Replaced: /

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): / Diameter (cm): ____ (Pipe Diameter)

Depth to Top of Screen (mbgs): / Screen Length (m): ____

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other ____

Well Stickup (Ground to Top of Pipe) (m): ____

Depth to Water (From Top of Pipe) (m): Surface water.

Calculated Static Water Level (mbgs): /

Well Refusal Depth (m): ____ (Measure Refusal After Sampling)

Thickness of Water Column (m): / Water Volume (L): ____ (Calculated)

Free Product Thickness (mm): ____ Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Horiba Calibration Details: ____

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): ____ (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
1 min	7.80	0.776	110	4.05
10 min	7.76	0.790	125	3.95
20 min	7.79	0.775	111	3.01
Final Time: Final Values:				

Clear? ☑ Y ☐ N Colour: ____

PHC Sheen? ☐ Y ☒ N PHC Odour? ☐ Y ☒ N

Free Product/PHC Globules? ☐ Y ☒ N Other Odour? ____

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☐ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): ____ # Washes/Rinses: ____

Photographic Records

Photo Numbers/IDs: ____

Close Up/Wide Angle/Panoramic: ____ Direction: ____

Scale Indicated? ☐ Y ☐ N Line of Sight: ____

RBL-10

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 3

Date: Aug 26 Time: 1:45

Weather: Cloudy 2°C

Monitoring Well ID: RBL-10 UTM Coordinates: / N E

Sample #: Duplicate #: No

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ____ ☐ None

Name(s) of Sampler(s): Slivingstone / J Igaluk.

Ponded Water, Snow Depth, etc.: Groundwater Sample.

Well Condition/Repair Requirements: / No

Lock Make/Model/Condition/Replaced: Lock added

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): 1.40 Diameter (cm): ____ (Pipe Diameter)

Depth to Top of Screen (mbgs): ____ Screen Length (m): ____

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other ____

Well Stickup (Ground to Top of Pipe) (m): ____

Depth to Water (From Top of Pipe) (m): 1.01

Calculated Static Water Level (mbgs): ____

Well Refusal Depth (m): 1.40 (Measure Refusal After Sampling)

Thickness of Water Column (m): ____ Water Volume (L): ____ (Calculated)

Free Product Thickness (mm): / Sludge/Silt: ☑ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Hydrolab Calibration Details: ____

Maintained Purge Rate at ≤ 100 mL/min: ☑ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): ____ (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
5min	8.01	0.449	325	3.05
10min	7.76	0.405	210	2.75
15min	7.80	0.435	195	2.50
Final Time: Final Values:				

Clear? ☑ Y ☐ N Colour: slight grey

PHC Sheen? ☐ Y ☑ N PHC Odour? ☐ Y ☑ N

Free Product/PHC Globules? ☐ Y ☑ N Other Odour? ____

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☑ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): ____ # Washes/Rinses: ____

Photographic Records

Photo Numbers/IDs: ____

Close Up/Wide Angle/Panoramic: ____ Direction: ____

Scale Indicated? ☐ Y ☐ N Line of Sight: ____

RBL – 11

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 11

Date: Aug 27th Time: 11:45

Weather: Sunny 10°C

Monitoring Well ID: RBL – 11 UTM Coordinates: N E

Sample #: Duplicate #:

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): Slivingstu / J Igaluk

Ponded Water, Snow Depth, etc.: Groundwater

Well Condition/Repair Requirements: None required

Lock Make/Model/Condition/Replaced: Lock added

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): dry Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): No sample

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique:

Water Quality Parameter Equipment: Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
DRY- No sampling.				
Final Time: Final Values:				

Clear? ☐ Y ☐ N Colour:

PHC Sheen? ☐ Y ☐ N PHC Odour? ☐ Y ☐ N

Free Product/PHC Globules? ☐ Y ☐ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☐ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

RBL - 12

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 3

Date: Aug 26 Time: 1:15

Weather: Cloudy 2°C

Monitoring Well ID: RBL-12 UTM Coordinates: N E

Sample #: Duplicate #:

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): Slivingstone / J Igaluk

Ponded Water, Snow Depth, etc.: Groundwater -

Well Condition/Repair Requirements: None required

Lock Make/Model/Condition/Replaced: Lock added

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): Dry Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): No Sample.

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique:

Water Quality Parameter Equipment: Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
Dry - No Sampling.				
Final Time: Final Values:				

Clear? ☐ Y ☐ N Colour:

PHC Sheen? ☐ Y ☐ N PHC Odour? ☐ Y ☐ N

Free Product/PHC Globules? ☐ Y ☐ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☐ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

RBL-13

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL | Landfill Name: AEC 3

Date: Aug 27th | Time: 2:25

Weather: Cloudy 3°C

Monitoring Well ID: RBL-13 | UTM Coordinates: N E

Sample #: | Duplicate #: NO

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB [See COC]

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): Sliving Stone / J Igdluk

Ponded Water, Snow Depth, etc.: Surface Water Sample.

Well Condition/Repair Requirements: /

Lock Make/Model/Condition/Replaced: /

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): | Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): / | Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): Surface Water

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): (Measure Refusal After Sampling)

Thickness of Water Column (m): | Water Volume (L): (Calculated)

Free Product Thickness (mm): | Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique:

Water Quality Parameter Equipment: | Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N | Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
5 min	7.92	0.665	145	4.25
10 min	7.72	0.595	120	4.50
15 min	7.80	0.580	132	4.31
Final Time: Final Values:				

Clear? ☑ Y ☐ N | Colour:

PHC Sheen? ☐ Y ☑ N | PHC Odour? ☐ Y ☑ N

Free Product/PHC Globules? ☐ Y ☑ N | Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☑ Y ☐ N | Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): | # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: | Direction:

Scale Indicated? ☐ Y ☐ N | Line of Sight:

RBL-14

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 3

Date: Aug 26 Time: 3:25

Weather: Cloudy 2°C

Monitoring Well ID: RBL-14 UTM Coordinates: N E

Sample #: Duplicate #: NO

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB [See COC]

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): S Livingstone / J Igaluk

Ponded Water, Snow Depth, etc.: Groundwater

Well Condition/Repair Requirements: None required

Lock Make/Model/Condition/Replaced: Well lock added.

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): ~~0.97~~ 1.6m Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☑ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): 0.975

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): 1.60m (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): / Sludge/Silt: ☑ Y ☐ N Minor

Purging Information Summary

Purging/Sampling Equipment/Technique: Low flow

Water Quality Parameter Equipment: Horiba. Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☑ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
5min	8.01	0.425	305	3.01
10 min	7.82	0.315	210	2.95
15 min	7.75	0.320	225	2.82
Final Time: Final Values:				

Clear? ☑ Y ☐ N Colour: sl-swt grey

PHC Sheen? ☐ Y ☑ N PHC Odour? ☐ Y ☑ N

Free Product/PHC Globules? ☐ Y ☑ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☐ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

RBL-15

Site Name: RBL Landfill Name: AEC 3

Date: Aug 26 Time: 3:05

Weather: cloudy 2°C

Monitoring Well ID: RBL-15 UTM Coordinates: N E

Sample #: Duplicate #:

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None

Name(s) of Sampler(s): Slivingstone / J Igaluk.

Ponded Water, Snow Depth, etc.: groundwater

Well Condition/Repair Requirements: None required

Lock Make/Model/Condition/Replaced: Lock added.

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): DRY Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): No sample

Calculated Static Water Level (mbgs): Dry

Well Refusal Depth (m): (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique:

Water Quality Parameter Equipment: Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
Dry- No sampling				
Final Time: Final Values:				

Clear? ☐ Y ☐ N Colour:

PHC Sheen? ☐ Y ☐ N PHC Odour? ☐ Y ☐ N

Free Product/PHC Globules? ☐ Y ☐ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☐ Y ☐ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

RBL-16

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: RBL Landfill Name: AEC 3

Date: Aug 24 Time: 4:05

Weather: Cloudy 3C

Surface Water

Monitoring Well ID: RBL-16 UTM Coordinates: N E

Sample #: Duplicate #:

Bottles Filled (by Parameter Type): ☐ PHC F1 ☐ Metals ☐ PHC F2-F4 ☐ PCB

Preservatives Used for PHC Fraction(s): ☐ Methanol ☐ Sodium Bisulfate ☐ Other: ☐ None See COC

Name(s) of Sampler(s): Slivingstone / J Igaluk

Ponded Water, Snow Depth, etc.: Surface Water Sample.

Well Condition/Repair Requirements: dry

Lock Make/Model/Condition/Replaced:

Pre-Measured Data (From Well Log)

Depth of Well (mbgs): Diameter (cm): (Pipe Diameter)

Depth to Top of Screen (mbgs): Screen Length (m):

Field Measurements

Measurement Method: ☐ Interface Probe ☐ Water Level Tape ☐ Other

Well Stickup (Ground to Top of Pipe) (m):

Depth to Water (From Top of Pipe) (m): Surface Water

Calculated Static Water Level (mbgs):

Well Refusal Depth (m): (Measure Refusal After Sampling)

Thickness of Water Column (m): Water Volume (L): (Calculated)

Free Product Thickness (mm): Sludge/Silt: ☐ Y ☐ N

Purging Information Summary

Purging/Sampling Equipment/Technique:

Water Quality Parameter Equipment: Calibration Details:

Maintained Purge Rate at ≤ 100 mL/min: ☐ Y ☐ N Purge Rate: ☐ < Recharge Rate ☐ > Recharge Rate

Total Volume Purged (L): (Total Volume Over Multiple Events, if Applicable)

Time (Note Dates if Multiple Days Required)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Temperature (°C)
5min	7.95	0.650	130	4.95
10 min	7.78	0.405	110	4.05
15 min	7.82	0.410	120	4.10
Final Time: Final Values:				

Clear? ☑ Y ☐ N Colour:

PHC Sheen? ☐ Y ☑ N PHC Odour? ☐ Y ☑ N

Free Product/PHC Globules? ☐ Y ☑ N Other Odour?

Decontamination of Sampling Equipment

All Equipment Dedicated/Single Use? ☐ Y ☑ N Decon Required? ☐ Y ☐ N

Type of Decontamination Fluid(s): # Washes/Rinses:

Photographic Records

Photo Numbers/IDs:

Close Up/Wide Angle/Panoramic: Direction:

Scale Indicated? ☐ Y ☐ N Line of Sight:

Appendix E

Laboratory Certificates of Analyses, Chain of Custody Forms and Lab Letter of Approval for Outcome's QA/QC program

Your Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Your C.O.C. #: 836752-01-01, 836752-02-01

Attention: Don Plenderleith

OUTCOME CONSULTANTS INC.
151 HOLLAND AVENUE
SUITE 200
OTTAWA, ON
CANADA K1Y 0Y2

Report Date: 2021/09/28
Report #: R3077606
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C168232
Received: 2021/09/13, 14:00

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2021/09/16	AB SOP-00005	SM 23 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH	12	N/A	2021/09/18	AB SOP-00005	SM 23 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	13	N/A	2021/09/22	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	13	N/A	2021/09/23		Auto Calc
Chloride/Sulphate by Auto Colourimetry	12	N/A	2021/09/24	AB SOP-00020	SM23-4500-Cl/SO4-E m
Chloride/Sulphate by Auto Colourimetry	1	N/A	2021/09/27	AB SOP-00020	SM23-4500-Cl/SO4-E m
Total Hexavalent Chromium	2	N/A	2021/09/20	AB SOP-00063	SM 23 3500-Cr B m
Total Hexavalent Chromium	1	N/A	2021/09/21	AB SOP-00063	SM 23 3500-Cr B m
Total Hexavalent Chromium	10	N/A	2021/09/24	AB SOP-00063	SM 23 3500-Cr B m
Conductivity @25C	1	N/A	2021/09/16	AB SOP-00005	SM 23 2510 B m
Conductivity @25C	11	N/A	2021/09/18	AB SOP-00005	SM 23 2510 B m
Conductivity @25C	1	N/A	2021/09/27	AB SOP-00005	SM 23 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	13	2021/09/19	2021/09/20	AB SOP-00037	CCME PHC-CWS m
Hardness Total (calculated as CaCO3) (3)	11	N/A	2021/09/25	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3) (3)	2	N/A	2021/09/27	BBY WI-00033	Auto Calc
Mercury (Total) by CV	13	2021/09/24	2021/09/24	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	11	2021/09/16	2021/09/25		Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2021/09/16	2021/09/27		Auto Calc
Elements by CRC ICPMS (total)	11	2021/09/24	2021/09/24	CAL SOP-00265	EPA 6020 m
Elements by CRC ICPMS (total)	2	2021/09/24	2021/09/25	CAL SOP-00265	EPA 6020 m
Ammonia-N (Total)	1	N/A	2021/09/17	AB SOP-00007	SM 23 4500 NH3 A G m
Ammonia-N (Total)	3	N/A	2021/09/23	AB SOP-00007	SM 23 4500 NH3 A G m
Ammonia-N (Total)	6	N/A	2021/09/24	AB SOP-00007	SM 23 4500 NH3 A G m
Ammonia-N (Total)	2	N/A	2021/09/27	AB SOP-00007	SM 23 4500 NH3 A G m
Ammonia-N (Total)	1	N/A	2021/09/28	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite	13	N/A	2021/09/17		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water	13	N/A	2021/09/16	AB SOP-00091	SM 23 4500 NO3m
Nitrate (as N)	13	2021/09/15	2021/09/17		Auto Calc
Benzo[a]pyrene Equivalency (4)	13	N/A	2021/09/20		Auto Calc
PAH in Water by GC/MS	1	2021/09/19	2021/09/19	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m

Your Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Your C.O.C. #: 836752-01-01, 836752-02-01

Attention: Don Plenderleith
OUTCOME CONSULTANTS INC.
151 HOLLAND AVENUE
SUITE 200
OTTAWA, ON
CANADA K1Y 0Y2

Report Date: 2021/09/28
Report #: R3077606
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C168232
Received: 2021/09/13, 14:00

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
PAH in Water by GC/MS	12	2021/09/19	2021/09/20	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
pH @25°C (5)	1	N/A	2021/09/16	AB SOP-00005	SM 23 4500-H+B m
pH @25°C (5)	12	N/A	2021/09/18	AB SOP-00005	SM 23 4500-H+B m
Phenols (4-AAP)	13	N/A	2021/09/22	AB SOP-00088	EPA 9066 R0 m
Total Phosphorus	8	2021/09/19	2021/09/21	AB SOP-00024	SM 23 4500-P A,B,F m
Total Phosphorus	5	2021/09/22	2021/09/22	AB SOP-00024	SM 23 4500-P A,B,F m
Total Suspended Solids (NFR, low)	13	N/A	2021/09/17	AB SOP-00061	SM 23 2540 D m
Total Oil and Grease (1)	13	2021/09/23	2021/09/23	CAM SOP-00326	EPA 1664B m

Remarks:

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

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

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Campobello, 6740 Campobello Road , Mississauga, ON, L5N 2L8
(2) Silica gel clean up employed.

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Your Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Your C.O.C. #: 836752-01-01, 836752-02-01

Attention: Don Plenderleith
OUTCOME CONSULTANTS INC.
151 HOLLAND AVENUE
SUITE 200
OTTAWA, ON
CANADA K1Y 0Y2

Report Date: 2021/09/28
Report #: R3077606
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C168232
Received: 2021/09/13, 14:00

(3) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(4) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas
28 Sep 2021 16:23:25

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bureauveritas.com
Phone# (403) 291-3077

==========

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

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

AT1 BTEX AND F1-F4 IN WATER (WATER)

BV Labs ID		AFW841	AFW842	AFW843	AFW844	AFW845	AFW846		
Sampling Date		2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-01-01	836752-01-01	836752-01-01	836752-01-01	836752-01-01	836752-01-01		
	UNITS	RBL-1	RBL-2	RBL-3	RBL-4	RBL-7	RBL-8	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.37	<0.10	<0.10	<0.10	0.10	A355359
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355359
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	A355359
Volatiles									
Benzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	A354601
Toluene	ug/L	<0.40	<0.40	<0.40	<0.40	1.6	<0.40	0.40	A354601
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	<0.40	0.77	<0.40	0.40	A354601
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	<0.80	3.2	<0.80	0.80	A354601
o-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	1.6 (1)	<0.40	0.40	A354601
Xylenes (Total)	ug/L	<0.89	<0.89	<0.89	<0.89	4.8	<0.89	0.89	A353607
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	<100	<100	<100	100	A353607
F1 (C6-C10)	ug/L	<100	<100	<100	<100	<100	<100	100	A354601
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	108	109	108	109	109	109		A354601
4-Bromofluorobenzene (sur.)	%	97	96	97	96	96	96		A354601
D4-1,2-Dichloroethane (sur.)	%	101	102	101	101	101	102		A354601
O-TERPHENYL (sur.)	%	108	109	110	106	111	109		A355359

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

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

AT1 BTEX AND F1-F4 IN WATER (WATER)

BV Labs ID		AFW847	AFW848	AFW849	AFW850	AFW909	AFW910		
Sampling Date		2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-01-01	836752-01-01	836752-01-01	836752-01-01	836752-02-01	836752-02-01		
	UNITS	FIELD DUP 2	RBL-10	RBL-13	RBL-14	RBL-16	GW DUP 1	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.17	0.10	A355359
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355359
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	A355359
Volatiles									
Benzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	A354601
Toluene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	A354601
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	A354601
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	0.80	A354601
o-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	A354601
Xylenes (Total)	ug/L	<0.89	<0.89	<0.89	<0.89	<0.89	<0.89	0.89	A353607
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	<100	<100	<100	100	A353607
F1 (C6-C10)	ug/L	<100	<100	<100	<100	<100	<100	100	A354601
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	109	109	110	110	111	111		A354601
4-Bromofluorobenzene (sur.)	%	96	96	95	95	95	95		A354601
D4-1,2-Dichloroethane (sur.)	%	102	101	103	104	103	102		A354601
O-TERPHENYL (sur.)	%	107	109	107	108	108	113		A355359

RDL = Reportable Detection Limit

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

AT1 BTEX AND F1-F4 IN WATER (WATER)

BV Labs ID		AFW911		
Sampling Date		2021/08/27		
COC Number		836752-02-01		
	UNITS	FIELD BLANK	RDL	QC Batch
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	A355359
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	0.10	A355359
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	A355359
Volatiles				
Benzene	ug/L	<0.40	0.40	A354601
Toluene	ug/L	<0.40	0.40	A354601
Ethylbenzene	ug/L	<0.40	0.40	A354601
m & p-Xylene	ug/L	<0.80	0.80	A354601
o-Xylene	ug/L	<0.40	0.40	A354601
Xylenes (Total)	ug/L	<0.89	0.89	A353607
F1 (C6-C10) - BTEX	ug/L	<100	100	A353607
F1 (C6-C10)	ug/L	<100	100	A354601
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	110		A354601
4-Bromofluorobenzene (sur.)	%	96		A354601
D4-1,2-Dichloroethane (sur.)	%	103		A354601
O-TERPHENYL (sur.)	%	109		A355359
RDL = Reportable Detection Limit				

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		AFW841			AFW842			AFW843		
Sampling Date		2021/08/27			2021/08/27			2021/08/27		
COC Number		836752-01-01			836752-01-01			836752-01-01		
	UNITS	RBL-1	RDL	QC Batch	RBL-2	RDL	QC Batch	RBL-3	RDL	QC Batch
Calculated Parameters										
Total Hardness (CaCO3)	mg/L	287	0.50	A354728	425	0.50	A354728	191	0.50	A354728
Dissolved Nitrate (N)	mg/L	2.1	0.050	A353566	1.2	0.050	A353566	<0.010	0.010	A353566
Dissolved Nitrate (NO3)	mg/L	9.2	0.22	A353543	5.3	0.22	A353543	<0.044	0.044	A353543
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	A353543	0.091	0.033	A353543	<0.033	0.033	A353543
Misc. Inorganics										
Conductivity	uS/cm	500	2.0	A357185	1100	2.0	A357185	470	2.0	A357185
pH	pH	8.21	N/A	A357184	7.99	N/A	A357184	7.63	N/A	A357184
Total Suspended Solids	mg/L	1200 (1)	2.0	A355981	9.5	0.40	A355981	250 (1)	1.2	A355981
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Alkalinity (Total as CaCO3)	mg/L	140	1.0	A357182	220	1.0	A357182	190	1.0	A357182
Bicarbonate (HCO3)	mg/L	170	1.0	A357182	270	1.0	A357182	230	1.0	A357182
Carbonate (CO3)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Hydroxide (OH)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Dissolved Chloride (Cl)	mg/L	68	1.0	A364301	63	1.0	A364301	32	1.0	A364301
Dissolved Sulphate (SO4)	mg/L	12	1.0	A364301	240	5.0	A364301	11	1.0	A364301
Metals										
Total Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	A363337	<0.00099	0.00099	A363348	<0.00099	0.00099	A358453
Nutrients										
Total Ammonia (N)	mg/L	0.33	0.015	A356251	1.3	0.015	A363115	2.4	0.075	A364690
Total Phosphorus (P)	mg/L	0.030	0.0030	A357924	0.19	0.0030	A361265	0.37	0.030	A357924
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A354886	0.028	0.010	A354886	<0.010	0.010	A354886
Dissolved Nitrate plus Nitrite (N)	mg/L	2.1	0.050	A354886	1.2	0.050	A354886	<0.010	0.010	A354886
Misc. Organics										
Phenols	mg/L	<0.0015	0.0015	A360147	0.0035	0.0015	A360147	0.019	0.0015	A360147
Extractable Hydrocarbons										
Total Oil and grease	mg/L	<0.50	0.50	A364373	<0.50	0.50	A364373	<0.50	0.50	A364373

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limit raised based on sample volume used for analysis.

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		AFW844			AFW845			AFW846		
Sampling Date		2021/08/27			2021/08/27			2021/08/27		
COC Number		836752-01-01			836752-01-01			836752-01-01		
	UNITS	RBL-4	RDL	QC Batch	RBL-7	RDL	QC Batch	RBL-8	RDL	QC Batch
Calculated Parameters										
Total Hardness (CaCO3)	mg/L	144	0.50	A354728	6010	0.50	A354728	285	0.50	A354728
Dissolved Nitrate (N)	mg/L	1.2	0.050	A353566	0.47	0.010	A353566	0.038	0.010	A353566
Dissolved Nitrate (NO3)	mg/L	5.5	0.22	A353543	2.1	0.044	A353543	0.17	0.044	A353543
Dissolved Nitrite (NO2)	mg/L	0.064	0.033	A353543	<0.033	0.033	A353543	<0.033	0.033	A353543
Misc. Inorganics										
Conductivity	uS/cm	380	2.0	A357185	620	2.0	A357185	690	2.0	A357185
pH	pH	8.11	N/A	A357184	8.13	N/A	A357184	8.10	N/A	A357184
Total Suspended Solids	mg/L	9.2	0.40	A355981	1300 (1)	2.0	A355981	0.61	0.40	A355981
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Alkalinity (Total as CaCO3)	mg/L	120	1.0	A357182	190	1.0	A357182	250	1.0	A357182
Bicarbonate (HCO3)	mg/L	150	1.0	A357182	230	1.0	A357182	300	1.0	A357182
Carbonate (CO3)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Hydroxide (OH)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Dissolved Chloride (Cl)	mg/L	33	1.0	A364301	56	1.0	A364301	62	1.0	A364300
Dissolved Sulphate (SO4)	mg/L	16	1.0	A364301	45	1.0	A364301	24	1.0	A364300
Metals										
Total Hex. Chromium (Cr 6+)	mg/L	0.0013	0.00099	A358453	<0.00099	0.00099	A363337	<0.00099	0.00099	A363348
Nutrients										
Total Ammonia (N)	mg/L	0.33	0.015	A364690	0.16	0.015	A363115	0.76	0.015	A366948
Total Phosphorus (P)	mg/L	0.090	0.0030	A357924	0.086	0.0030	A357924	0.0030	0.0030	A357924
Dissolved Nitrite (N)	mg/L	0.019	0.010	A354886	<0.010	0.010	A354886	<0.010	0.010	A354888
Dissolved Nitrate plus Nitrite (N)	mg/L	1.3	0.050	A354886	0.47	0.010	A354886	0.038	0.010	A354888
Misc. Organics										
Phenols	mg/L	<0.0015	0.0015	A360145	<0.0015	0.0015	A360147	0.0017	0.0015	A360145
Extractable Hydrocarbons										
Total Oil and grease	mg/L	<0.50	0.50	A364373	<0.50	0.50	A364373	<0.50	0.50	A364373

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limit raised based on sample volume used for analysis.

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		AFW847			AFW848			AFW849		
Sampling Date		2021/08/27			2021/08/27			2021/08/27		
COC Number		836752-01-01			836752-01-01			836752-01-01		
	UNITS	FIELD DUP 2	RDL	QC Batch	RBL-10	RDL	QC Batch	RBL-13	RDL	QC Batch
Calculated Parameters										
Total Hardness (CaCO3)	mg/L	286	0.50	A354728	938	0.50	A354728	253	0.50	A354728
Dissolved Nitrate (N)	mg/L	0.034	0.010	A353566	1.6	0.050	A353566	0.071	0.010	A353566
Dissolved Nitrate (NO3)	mg/L	0.15	0.044	A353612	7.0	0.22	A353612	0.31	0.044	A353612
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	A353612	<0.033	0.033	A353612	<0.033	0.033	A353612
Misc. Inorganics										
Conductivity	uS/cm	680	2.0	A357185	3000	2.0	A357185	680	2.0	A354917
pH	pH	8.06	N/A	A357184	7.92	N/A	A357184	8.15	N/A	A354916
Total Suspended Solids	mg/L	<0.40	0.40	A355981	20	0.40	A355981	46	0.40	A355981
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A354912
Alkalinity (Total as CaCO3)	mg/L	250	1.0	A357182	390	1.0	A357182	130	1.0	A354912
Bicarbonate (HCO3)	mg/L	300	1.0	A357182	480	1.0	A357182	160	1.0	A354912
Carbonate (CO3)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A354912
Hydroxide (OH)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A354912
Dissolved Chloride (Cl)	mg/L	63	1.0	A365459	630	5.0	A364601	100	1.0	A364301
Dissolved Sulphate (SO4)	mg/L	24	1.0	A365459	190	2.0	A364601	52	1.0	A364301
Metals										
Total Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	A363337	<0.00099	0.00099	A363348	<0.00099	0.00099	A363337
Nutrients										
Total Ammonia (N)	mg/L	0.15	0.015	A366948	1.2	0.015	A364690	0.53	0.015	A364690
Total Phosphorus (P)	mg/L	0.0034	0.0030	A357924	0.015	0.0030	A361265	0.018	0.0030	A357924
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A354886	<0.010	0.010	A354886	<0.010	0.010	A354886
Dissolved Nitrate plus Nitrite (N)	mg/L	0.034	0.010	A354886	1.6	0.050	A354886	0.071	0.010	A354886
Misc. Organics										
Phenols	mg/L	<0.0015	0.0015	A360147	0.0036	0.0015	A360145	<0.0015	0.0015	A360147
Extractable Hydrocarbons										
Total Oil and grease	mg/L	0.50	0.50	A364373	<1.3	1.3	A364373	<0.50	0.50	A364373

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		AFW850			AFW909			AFW910		
Sampling Date		2021/08/27			2021/08/27			2021/08/27		
COC Number		836752-01-01			836752-02-01			836752-02-01		
	UNITS	RBL-14	RDL	QC Batch	RBL-16	RDL	QC Batch	GW DUP 1	RDL	QC Batch
Calculated Parameters										
Total Hardness (CaCO3)	mg/L	279	0.50	A354728	220	0.50	A354728	182	0.50	A354728
Dissolved Nitrate (N)	mg/L	0.25	0.010	A353566	0.014	0.010	A353566	<0.010	0.010	A353566
Dissolved Nitrate (NO3)	mg/L	1.1	0.044	A353612	0.064	0.044	A353612	<0.044	0.044	A353612
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	A353612	<0.033	0.033	A353612	<0.033	0.033	A353612
Misc. Inorganics										
Conductivity	uS/cm	340	2.0	A357185	750	2.0	A357185	450	2.0	A357185
pH	pH	8.13	N/A	A357184	8.22	N/A	A357184	7.70	N/A	A357184
Total Suspended Solids	mg/L	560 (1)	2.0	A355981	18	0.40	A355981	160 (1)	1.0	A355981
Anions										
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Alkalinity (Total as CaCO3)	mg/L	160	1.0	A357182	140	1.0	A357182	180	1.0	A357182
Bicarbonate (HCO3)	mg/L	200	1.0	A357182	180	1.0	A357182	220	1.0	A357182
Carbonate (CO3)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Hydroxide (OH)	mg/L	<1.0	1.0	A357182	<1.0	1.0	A357182	<1.0	1.0	A357182
Dissolved Chloride (Cl)	mg/L	11	1.0	A364301	120	1.0	A364287	32	1.0	A364301
Dissolved Sulphate (SO4)	mg/L	3.4	1.0	A364301	60	1.0	A364287	9.4	1.0	A364301
Metals										
Total Hex. Chromium (Cr 6+)	mg/L	<0.0050 (2)	0.0050	A358453	<0.00099	0.00099	A363337	<0.00099	0.00099	A363348
Nutrients										
Total Ammonia (N)	mg/L	0.49	0.015	A364690	0.85	0.015	A363115	2.3	0.075	A364690
Total Phosphorus (P)	mg/L	0.11	0.0030	A361265	0.0042	0.0030	A361265	0.32	0.0060	A357924
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A354886	<0.010	0.010	A354888	<0.010	0.010	A354886
Dissolved Nitrate plus Nitrite (N)	mg/L	0.25	0.010	A354886	0.014	0.010	A354888	<0.010	0.010	A354886
Misc. Organics										
Phenols	mg/L	<0.0015	0.0015	A360147	<0.0015	0.0015	A360147	0.024	0.0015	A360147
Extractable Hydrocarbons										
Total Oil and grease	mg/L	<0.50	0.50	A364373	<0.50	0.50	A364373	<0.50	0.50	A364373

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limit raised based on sample volume used for analysis.
(2) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		AFW911		
Sampling Date		2021/08/27		
COC Number		836752-02-01		
	UNITS	FIELD BLANK	RDL	QC Batch
Calculated Parameters				
Total Hardness (CaCO3)	mg/L	<0.50	0.50	A354728
Dissolved Nitrate (N)	mg/L	<0.010	0.010	A353566
Dissolved Nitrate (NO3)	mg/L	<0.044	0.044	A353612
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	A353612
Misc. Inorganics				
Conductivity	uS/cm	8.2	2.0	A366569
pH	pH	4.36	N/A	A357184
Total Suspended Solids	mg/L	<0.40	0.40	A355981
Anions				
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A357182
Alkalinity (Total as CaCO3)	mg/L	<1.0	1.0	A357182
Bicarbonate (HCO3)	mg/L	<1.0	1.0	A357182
Carbonate (CO3)	mg/L	<1.0	1.0	A357182
Hydroxide (OH)	mg/L	<1.0	1.0	A357182
Dissolved Chloride (Cl)	mg/L	<1.0	1.0	A364301
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	A364301
Metals				
Total Hex. Chromium (Cr 6+)	mg/L	<0.00099	0.00099	A363348
Nutrients				
Total Ammonia (N)	mg/L	0.50	0.015	A366948
Total Phosphorus (P)	mg/L	<0.0030	0.0030	A361265
Dissolved Nitrite (N)	mg/L	<0.010	0.010	A354886
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	0.010	A354886
Misc. Organics				
Phenols	mg/L	<0.0015	0.0015	A360147
Extractable Hydrocarbons				
Total Oil and grease	mg/L	<0.50	0.50	A364373

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		AFW841	AFW842	AFW843	AFW844	AFW845		
Sampling Date		2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-01-01	836752-01-01	836752-01-01	836752-01-01	836752-01-01		
	UNITS	RBL-1	RBL-2	RBL-3	RBL-4	RBL-7	RDL	QC Batch
Polycyclic Aromatics								
B[a]P TPE Total Potency Equivalents	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	A353549
Acenaphthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355353
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355353
Acridine	ug/L	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	A355353
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	A355353
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	<0.0075	<0.0075	0.0075	A355353
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	<0.0075	<0.0075	0.0075	A355353
Fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	A355353
Fluorene	ug/L	<0.050	<0.050	0.071	<0.050	<0.050	0.050	A355353
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
1-Methylnaphthalene	ug/L	<0.10	<0.10	4.1	<0.10	<0.10	0.10	A355353
2-Methylnaphthalene	ug/L	<0.10	<0.10	7.2	<0.10	<0.10	0.10	A355353
Naphthalene	ug/L	<0.10	<0.10	1.6	<0.10	<0.10	0.10	A355353
Phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Perylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Pyrene	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	A355353
Quinoline	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	A355353
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	90	101	105	94	96		A355353
D8-ACENAPHTHYLENE (sur.)	%	83	83	88	89	89		A355353
D8-NAPHTHALENE (sur.)	%	63	51	58	66	65		A355353
TERPHENYL-D14 (sur.)	%	105	109	114	111	111		A355353
RDL = Reportable Detection Limit								

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		AFW846	AFW847	AFW848	AFW849	AFW850		
Sampling Date		2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-01-01	836752-01-01	836752-01-01	836752-01-01	836752-01-01		
	UNITS	RBL-8	FIELD DUP 2	RBL-10	RBL-13	RBL-14	RDL	QC Batch
Polycyclic Aromatics								
B[a]P TPE Total Potency Equivalents	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	A353549
Acenaphthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355353
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355353
Acridine	ug/L	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	A355353
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	A355353
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	<0.0075	<0.0075	0.0075	A355353
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	<0.0075	<0.0075	0.0075	A355353
Fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	A355353
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	0.0085	A355353
1-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355353
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355353
Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	A355353
Phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Perylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	A355353
Pyrene	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	A355353
Quinoline	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	A355353
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	101	108	99	97	94		A355353
D8-ACENAPHTHYLENE (sur.)	%	86	99	99	88	91		A355353
D8-NAPHTHALENE (sur.)	%	60	83	86	67	73		A355353
TERPHENYL-D14 (sur.)	%	109	116	115	111	112		A355353

RDL = Reportable Detection Limit

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		AFW909	AFW910	AFW911		
Sampling Date		2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-02-01	836752-02-01	836752-02-01		
	UNITS	RBL-16	GW DUP 1	FIELD BLANK	RDL	QC Batch
Polycyclic Aromatics						
B[a]P TPE Total Potency Equivalents	ug/L	<0.010	<0.010	<0.010	0.010	A353549
Acenaphthene	ug/L	<0.10	<0.10	<0.10	0.10	A355353
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	0.10	A355353
Acridine	ug/L	<0.040	<0.040	<0.040	0.040	A355353
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	A355353
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	A355353
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	A355353
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	A355353
Benzo(e)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	A355353
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	A355353
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	0.0075	A355353
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	A355353
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	A355353
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	0.0085	A355353
1-Methylnaphthalene	ug/L	<0.10	2.8	<0.10	0.10	A355353
2-Methylnaphthalene	ug/L	<0.10	4.9	<0.10	0.10	A355353
Naphthalene	ug/L	<0.10	1.0	<0.10	0.10	A355353
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	A355353
Perylene	ug/L	<0.050	<0.050	<0.050	0.050	A355353
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	A355353
Quinoline	ug/L	<0.20	<0.20	<0.20	0.20	A355353
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	95	98	96		A355353
D8-ACENAPHTHYLENE (sur.)	%	89	93	89		A355353
D8-NAPHTHALENE (sur.)	%	69	72	68		A355353
TERPHENYL-D14 (sur.)	%	111	115	113		A355353
RDL = Reportable Detection Limit						

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

MERCURY BY COLD VAPOR (WATER)

BV Labs ID		AFW841	AFW842	AFW843	AFW844	AFW845	AFW846		
Sampling Date		2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-01-01	836752-01-01	836752-01-01	836752-01-01	836752-01-01	836752-01-01		
	UNITS	RBL-1	RBL-2	RBL-3	RBL-4	RBL-7	RBL-8	RDL	QC Batch
Elements									
Total Mercury (Hg)	ug/L	0.0033	0.0030	0.0084	0.0022	0.0065	<0.0019	0.0019	A364584
RDL = Reportable Detection Limit									

BV Labs ID		AFW847	AFW848	AFW849	AFW850	AFW909	AFW910		
Sampling Date		2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-01-01	836752-01-01	836752-01-01	836752-01-01	836752-02-01	836752-02-01		
	UNITS	FIELD DUP 2	RBL-10	RBL-13	RBL-14	RBL-16	GW DUP 1	RDL	QC Batch
Elements									
Total Mercury (Hg)	ug/L	0.0023	0.0023	<0.0019	0.0041	<0.0019	0.0050	0.0019	A364584
RDL = Reportable Detection Limit									

BV Labs ID		AFW911		
Sampling Date		2021/08/27		
COC Number		836752-02-01		
	UNITS	FIELD BLANK	RDL	QC Batch
Elements				
Total Mercury (Hg)	ug/L	<0.0019	0.0019	A364584
RDL = Reportable Detection Limit				

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		AFW841	AFW842	AFW843	AFW844		AFW845		
Sampling Date		2021/08/27	2021/08/27	2021/08/27	2021/08/27		2021/08/27		
COC Number		836752-01-01	836752-01-01	836752-01-01	836752-01-01		836752-01-01		
	UNITS	RBL-1	RBL-2	RBL-3	RBL-4	RDL	RBL-7	RDL	QC Batch
Total Metals by ICPMS									
Total Aluminum (Al)	ug/L	1730	7.3	19.3	13.1	3.0	31400	30	A364255
Total Antimony (Sb)	ug/L	<0.50	2.09	<0.50	<0.50	0.50	<5.0	5.0	A364255
Total Arsenic (As)	ug/L	0.58	0.67	0.48	0.26	0.10	11.8	1.0	A364255
Total Barium (Ba)	ug/L	42.7	62.2	83.1	72.9	1.0	454	10	A364255
Total Beryllium (Be)	ug/L	0.11	<0.10	<0.10	<0.10	0.10	2.4	1.0	A364255
Total Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	<10	10	A364255
Total Boron (B)	ug/L	<50	157	80	56	50	<500	500	A364255
Total Cadmium (Cd)	ug/L	0.094	0.145	<0.010	0.033	0.010	2.77	0.10	A364255
Total Chromium (Cr)	ug/L	3.9	<1.0	<1.0	1.5	1.0	64	10	A364255
Total Cobalt (Co)	ug/L	1.03	0.32	0.20	<0.20	0.20	19.8	2.0	A364255
Total Copper (Cu)	ug/L	2.71	2.71	0.74	1.72	0.50	61.4	5.0	A364255
Total Iron (Fe)	ug/L	1970	25	376	49	10	46200	100	A364255
Total Lead (Pb)	ug/L	3.17	0.34	0.34	0.49	0.20	186	2.0	A364255
Total Lithium (Li)	ug/L	2.8	8.6	2.2	<2.0	2.0	52	20	A364255
Total Manganese (Mn)	ug/L	61.3	77.0	56.2	2.3	1.0	1500	10	A364255
Total Mercury (Hg)	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	<0.50	0.50	A364255
Total Molybdenum (Mo)	ug/L	<1.0	2.6	<1.0	1.0	1.0	<10	10	A364255
Total Nickel (Ni)	ug/L	3.1	2.2	1.2	<1.0	1.0	51	10	A364255
Total Selenium (Se)	ug/L	0.24	0.22	0.14	0.27	0.10	2.7	1.0	A364255
Total Silicon (Si)	ug/L	3350	1760	834	634	100	43400	1000	A364255
Total Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	0.48	0.20	A364255
Total Strontium (Sr)	ug/L	119	643	176	113	1.0	1130	10	A364255
Total Thallium (Tl)	ug/L	0.051	0.011	<0.010	<0.010	0.010	0.77	0.10	A364255
Total Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	<50	50	A364255
Total Titanium (Ti)	ug/L	60.8	<5.0	<5.0	<5.0	5.0	696	50	A364255
Total Uranium (U)	ug/L	0.26	0.36	0.18	0.31	0.10	4.8	1.0	A364255
Total Vanadium (V)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	80	50	A364255
Total Zinc (Zn)	ug/L	12.7	43.5	<5.0	7.6	5.0	421	50	A364255
Total Zirconium (Zr)	ug/L	0.73	0.10	<0.10	<0.10	0.10	5.1	1.0	A364255
Total Calcium (Ca)	mg/L	72.4	138	52.3	35.7	0.050	1380	0.50	A354524
Total Magnesium (Mg)	mg/L	25.7	19.8	14.6	13.4	0.050	626	0.50	A354524

RDL = Reportable Detection Limit

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		AFW841	AFW842	AFW843	AFW844		AFW845		
Sampling Date		2021/08/27	2021/08/27	2021/08/27	2021/08/27		2021/08/27		
COC Number		836752-01-01	836752-01-01	836752-01-01	836752-01-01		836752-01-01		
	UNITS	RBL-1	RBL-2	RBL-3	RBL-4	RDL	RBL-7	RDL	QC Batch
Total Potassium (K)	mg/L	2.07	16.8	4.85	2.17	0.050	9.54	0.50	A354524
Total Sodium (Na)	mg/L	43.8	54.4	22.4	22.0	0.050	42.9	0.50	A354524
Total Sulphur (S)	mg/L	4.2	88.1	4.2	5.5	3.0	<30	30	A354524
RDL = Reportable Detection Limit									

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		AFW846	AFW847		AFW848		AFW849	AFW850		
Sampling Date		2021/08/27	2021/08/27		2021/08/27		2021/08/27	2021/08/27		
COC Number		836752-01-01	836752-01-01		836752-01-01		836752-01-01	836752-01-01		
	UNITS	RBL-8	FIELD DUP 2	RDL	RBL-10	RDL	RBL-13	RBL-14	RDL	QC Batch
Total Metals by ICPMS										
Total Aluminum (Al)	ug/L	7.0	6.1	3.0	271	3.0	399	3110	3.0	A364255
Total Antimony (Sb)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	A364255
Total Arsenic (As)	ug/L	0.21	0.23	0.10	0.62	0.10	0.27	1.62	0.10	A364255
Total Barium (Ba)	ug/L	121	121	1.0	72.1	1.0	17.2	32.3	1.0	A364255
Total Beryllium (Be)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	<0.10	0.19	0.10	A364255
Total Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	<1.0	<1.0	1.0	A364255
Total Boron (B)	ug/L	74	69	50	203	50	115	<50	50	A364255
Total Cadmium (Cd)	ug/L	0.013	0.014	0.010	0.034	0.010	0.018	0.110	0.010	A364255
Total Chromium (Cr)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	1.0	6.0	1.0	A364255
Total Cobalt (Co)	ug/L	<0.20	<0.20	0.20	0.21	0.20	0.23	1.84	0.20	A364255
Total Copper (Cu)	ug/L	0.70	0.59	0.50	1.15	0.50	0.86	4.43	0.50	A364255
Total Iron (Fe)	ug/L	26	27	10	310	10	507	4040	10	A364255
Total Lead (Pb)	ug/L	<0.20	<0.20	0.20	0.49	0.20	0.51	7.82	0.20	A364255
Total Lithium (Li)	ug/L	2.8	2.8	2.0	17.8	2.0	4.0	4.7	2.0	A364255
Total Manganese (Mn)	ug/L	1.8	2.1	1.0	13.7	1.0	12.3	127	1.0	A364255
Total Mercury (Hg)	ug/L	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	A364255
Total Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	<1.0	<1.0	1.0	A364255
Total Nickel (Ni)	ug/L	<1.0	<1.0	1.0	1.7	1.0	<1.0	5.3	1.0	A364255
Total Selenium (Se)	ug/L	0.21	0.25	0.10	0.85	0.10	0.10	1.36	0.10	A364255
Total Silicon (Si)	ug/L	1130	1140	100	2070	100	1010	5270	100	A364255
Total Silver (Ag)	ug/L	<0.020	<0.020	0.020	<0.020	0.020	<0.020	0.024	0.020	A364255
Total Strontium (Sr)	ug/L	333	334	1.0	1170	1.0	184	151	1.0	A364255
Total Thallium (Tl)	ug/L	<0.010	<0.010	0.010	<0.010	0.010	<0.010	0.027	0.010	A364255
Total Tin (Sn)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	<5.0	<5.0	5.0	A364255
Total Titanium (Ti)	ug/L	<5.0	<5.0	5.0	12.6	5.0	11.9	83.7	5.0	A364255
Total Uranium (U)	ug/L	0.34	0.34	0.10	2.02	0.10	0.55	0.47	0.10	A364255
Total Vanadium (V)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	<5.0	7.7	5.0	A364255
Total Zinc (Zn)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	<5.0	19.0	5.0	A364255
Total Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	0.55	0.10	0.23	0.53	0.10	A364255
Total Calcium (Ca)	mg/L	79.7	80.2	0.050	217	0.25	64.0	73.4	0.050	A354524
Total Magnesium (Mg)	mg/L	20.8	20.8	0.050	96.4	0.050	22.8	23.3	0.050	A354524

RDL = Reportable Detection Limit

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		AFW846	AFW847		AFW848		AFW849	AFW850		
Sampling Date		2021/08/27	2021/08/27		2021/08/27		2021/08/27	2021/08/27		
COC Number		836752-01-01	836752-01-01		836752-01-01		836752-01-01	836752-01-01		
	UNITS	RBL-8	FIELD DUP 2	RDL	RBL-10	RDL	RBL-13	RBL-14	RDL	QC Batch
Total Potassium (K)	mg/L	2.15	2.15	0.050	10.0	0.050	3.27	1.88	0.050	A354524
Total Sodium (Na)	mg/L	36.7	36.9	0.050	269	0.25	64.4	8.53	0.050	A354524
Total Sulphur (S)	mg/L	7.7	9.2	3.0	67.7	3.0	16.2	<3.0	3.0	A354524
RDL = Reportable Detection Limit										

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		AFW909	AFW910	AFW911		
Sampling Date		2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-02-01	836752-02-01	836752-02-01		
	UNITS	RBL-16	GW DUP 1	FIELD BLANK	RDL	QC Batch
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	147	14.4	4.4	3.0	A364255
Total Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	A364255
Total Arsenic (As)	ug/L	0.18	0.37	<0.10	0.10	A364255
Total Barium (Ba)	ug/L	15.5	77.2	<1.0	1.0	A364255
Total Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	A364255
Total Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	A364255
Total Boron (B)	ug/L	131	76	<50	50	A364255
Total Cadmium (Cd)	ug/L	0.016	<0.010	<0.010	0.010	A364255
Total Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	A364255
Total Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	A364255
Total Copper (Cu)	ug/L	1.87	0.66	<0.50	0.50	A364255
Total Iron (Fe)	ug/L	177	271	<10	10	A364255
Total Lead (Pb)	ug/L	0.51	0.21	<0.20	0.20	A364255
Total Lithium (Li)	ug/L	4.3	2.2	<2.0	2.0	A364255
Total Manganese (Mn)	ug/L	5.3	42.3	<1.0	1.0	A364255
Total Mercury (Hg)	ug/L	<0.050	<0.050	<0.050	0.050	A364255
Total Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	A364255
Total Nickel (Ni)	ug/L	<1.0	1.1	<1.0	1.0	A364255
Total Selenium (Se)	ug/L	<0.10	0.17	<0.10	0.10	A364255
Total Silicon (Si)	ug/L	486	732	<100	100	A364255
Total Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	A364255
Total Strontium (Sr)	ug/L	180	164	<1.0	1.0	A364255
Total Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	A364255
Total Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	A364255
Total Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	A364255
Total Uranium (U)	ug/L	0.63	0.18	<0.10	0.10	A364255
Total Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	A364255
Total Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	A364255
Total Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	A364255
Total Calcium (Ca)	mg/L	55.1	49.4	<0.050	0.050	A354524
Total Magnesium (Mg)	mg/L	20.1	14.2	<0.050	0.050	A354524
RDL = Reportable Detection Limit						

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		AFW909	AFW910	AFW911		
Sampling Date		2021/08/27	2021/08/27	2021/08/27		
COC Number		836752-02-01	836752-02-01	836752-02-01		
	UNITS	RBL-16	GW DUP 1	FIELD BLANK	RDL	QC Batch
Total Potassium (K)	mg/L	3.78	4.29	<0.050	0.050	A354524
Total Sodium (Na)	mg/L	74.5	21.6	<0.050	0.050	A354524
Total Sulphur (S)	mg/L	20.7	<3.0	<3.0	3.0	A354524
RDL = Reportable Detection Limit						

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

GENERAL COMMENTS

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

Package 1	16.3°C
Package 2	15.0°C
Package 3	15.0°C
Package 4	14.7°C

Sample AFW841 [RBL-1] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW842 [RBL-2] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW843 [RBL-3] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW844 [RBL-4] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW845 [RBL-7] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW846 [RBL-8] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID. Sample was analyzed past method specified hold time for Ammonia-N (Total).

Sample AFW847 [FIELD DUP 2] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID. Sample was analyzed past method specified hold time for Ammonia-N (Total).

Sample AFW848 [RBL-10] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID. O&G Analysis: Due to limited amount of sample available for analysis, a smaller than usual portion of the sample was used. Detection limits were adjusted accordingly.

Sample AFW849 [RBL-13] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW850 [RBL-14] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW909 [RBL-16] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW910 [GW DUP 1] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID.

Sample AFW911 [FIELD BLANK] : Sample was analyzed past method specified hold time for CCME Hydrocarbons (F2-F4 in water). Sample was analyzed past method specified hold time for PAH in Water by GC/MS. Sample was analyzed past method specified hold time for NO2 (N); NO2 (N) + NO3 (N) in Water. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Total Suspended Solids (NFR, low). Sample was analyzed past method specified hold time for Alkalinity @25C (pp, total), CO3,HCO3,OH. Sample was analyzed past method specified hold time for BTEX/F1 in Water by HS GC/MS/FID. Sample was analyzed past method specified hold time for Conductivity @25C. Sample was analyzed past method specified hold time for Chloride/Sulphate by Auto Colourimetry. Sample was analyzed past method specified hold time for Ammonia-N (Total).

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample AFW845 [RBL-7] Elements by CRC ICPMS (total): Detection limits raised due to sample matrix.

Results relate only to the items tested.

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A354601	DO1	Matrix Spike	1,4-Difluorobenzene (sur.)	2021/09/22		102	%	50 - 140
			4-Bromofluorobenzene (sur.)	2021/09/22		96	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2021/09/22		107	%	50 - 140
			Benzene	2021/09/22		96	%	50 - 140
			Toluene	2021/09/22		90	%	50 - 140
			Ethylbenzene	2021/09/22		93	%	50 - 140
			m & p-Xylene	2021/09/22		92	%	50 - 140
			o-Xylene	2021/09/22		91	%	50 - 140
			F1 (C6-C10)	2021/09/22		62	%	60 - 140
A354601	DO1	Spiked Blank	1,4-Difluorobenzene (sur.)	2021/09/22		102	%	50 - 140
			4-Bromofluorobenzene (sur.)	2021/09/22		97	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2021/09/22		106	%	50 - 140
			Benzene	2021/09/22		98	%	60 - 130
			Toluene	2021/09/22		92	%	60 - 130
			Ethylbenzene	2021/09/22		94	%	60 - 130
			m & p-Xylene	2021/09/22		95	%	60 - 130
			o-Xylene	2021/09/22		94	%	60 - 130
			F1 (C6-C10)	2021/09/22		104	%	60 - 140
A354601	DO1	Method Blank	1,4-Difluorobenzene (sur.)	2021/09/22		107	%	50 - 140
			4-Bromofluorobenzene (sur.)	2021/09/22		98	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2021/09/22		100	%	50 - 140
			Benzene	2021/09/22	<0.40		ug/L	
			Toluene	2021/09/22	<0.40		ug/L	
			Ethylbenzene	2021/09/22	<0.40		ug/L	
			m & p-Xylene	2021/09/22	<0.80		ug/L	
			o-Xylene	2021/09/22	<0.40		ug/L	
			F1 (C6-C10)	2021/09/22	<100		ug/L	
A354601	DO1	RPD	Benzene	2021/09/22	NC		%	30
			Toluene	2021/09/22	NC		%	30
			Ethylbenzene	2021/09/22	NC		%	30
			m & p-Xylene	2021/09/22	NC		%	30
			o-Xylene	2021/09/22	NC		%	30
			F1 (C6-C10)	2021/09/22	NC		%	30
A354886	SKM	Matrix Spike [AFW850-02]	Dissolved Nitrite (N)	2021/09/16		102	%	80 - 120
			Dissolved Nitrate plus Nitrite (N)	2021/09/16		111	%	80 - 120
A354886	SKM	Spiked Blank	Dissolved Nitrite (N)	2021/09/16		103	%	80 - 120
			Dissolved Nitrate plus Nitrite (N)	2021/09/16		102	%	80 - 120
A354886	SKM	Method Blank	Dissolved Nitrite (N)	2021/09/16	<0.010		mg/L	
			Dissolved Nitrate plus Nitrite (N)	2021/09/16	<0.010		mg/L	
A354886	SKM	RPD [AFW850-02]	Dissolved Nitrite (N)	2021/09/16	NC		%	20
			Dissolved Nitrate plus Nitrite (N)	2021/09/16	2.4		%	20
A354888	SKM	Matrix Spike [AFW909-02]	Dissolved Nitrite (N)	2021/09/16		101	%	80 - 120
			Dissolved Nitrate plus Nitrite (N)	2021/09/16		112	%	80 - 120
A354888	SKM	Spiked Blank	Dissolved Nitrite (N)	2021/09/16		103	%	80 - 120
			Dissolved Nitrate plus Nitrite (N)	2021/09/16		104	%	80 - 120
A354888	SKM	Method Blank	Dissolved Nitrite (N)	2021/09/17	<0.010		mg/L	
			Dissolved Nitrate plus Nitrite (N)	2021/09/17	<0.010		mg/L	
A354888	SKM	RPD [AFW909-02]	Dissolved Nitrite (N)	2021/09/16	NC		%	20
			Dissolved Nitrate plus Nitrite (N)	2021/09/16	1.9		%	20
A354912	IK0	Spiked Blank	Alkalinity (Total as CaCO3)	2021/09/16		97	%	80 - 120
A354912	IK0	Method Blank	Alkalinity (PP as CaCO3)	2021/09/16	<1.0		mg/L	

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Alkalinity (Total as CaCO3)	2021/09/16	<1.0		mg/L	
			Bicarbonate (HCO3)	2021/09/16	<1.0		mg/L	
			Carbonate (CO3)	2021/09/16	<1.0		mg/L	
			Hydroxide (OH)	2021/09/16	<1.0		mg/L	
A354912	IK0	RPD [AFW849-02]	Alkalinity (PP as CaCO3)	2021/09/16	NC		%	20
			Alkalinity (Total as CaCO3)	2021/09/16	1.9		%	20
			Bicarbonate (HCO3)	2021/09/16	1.9		%	20
			Carbonate (CO3)	2021/09/16	NC		%	20
			Hydroxide (OH)	2021/09/16	NC		%	20
A354916	IK0	Spiked Blank	pH	2021/09/16		99	%	97 - 103
A354916	IK0	RPD [AFW849-02]	pH	2021/09/16	1.1		%	N/A
A354917	IK0	Spiked Blank	Conductivity	2021/09/16		102	%	90 - 110
A354917	IK0	Method Blank	Conductivity	2021/09/16	<2.0		uS/cm	
A354917	IK0	RPD [AFW849-02]	Conductivity	2021/09/16	0.15		%	10
A355353	JC7	Matrix Spike [AFW841-05]	D10-ANTHRACENE (sur.)	2021/09/19		97	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2021/09/19		88	%	50 - 130
			D8-NAPHTHALENE (sur.)	2021/09/19		71	%	50 - 130
			TERPHENYL-D14 (sur.)	2021/09/19		106	%	50 - 130
			Acenaphthene	2021/09/19		86	%	50 - 130
			Acenaphthylene	2021/09/19		91	%	50 - 130
			Acridine	2021/09/19		86	%	50 - 130
			Anthracene	2021/09/19		83	%	50 - 130
			Benzo(a)anthracene	2021/09/19		97	%	50 - 130
			Benzo(b&j)fluoranthene	2021/09/19		93	%	50 - 130
			Benzo(k)fluoranthene	2021/09/19		97	%	50 - 130
			Benzo(g,h,i)perylene	2021/09/19		98	%	50 - 130
			Benzo(c)phenanthrene	2021/09/19		91	%	50 - 130
			Benzo(a)pyrene	2021/09/19		98	%	50 - 130
			Benzo(e)pyrene	2021/09/19		90	%	50 - 130
			Chrysene	2021/09/19		96	%	50 - 130
			Dibenz(a,h)anthracene	2021/09/19		94	%	50 - 130
			Fluoranthene	2021/09/19		100	%	50 - 130
			Fluorene	2021/09/19		90	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2021/09/19		100	%	50 - 130
			1-Methylnaphthalene	2021/09/19		64	%	50 - 130
			2-Methylnaphthalene	2021/09/19		77	%	50 - 130
			Naphthalene	2021/09/19		80	%	50 - 130
			Phenanthrene	2021/09/19		92	%	50 - 130
			Perylene	2021/09/19		94	%	50 - 130
			Pyrene	2021/09/19		96	%	50 - 130
			Quinoline	2021/09/19		104	%	50 - 130
A355353	JC7	Spiked Blank	D10-ANTHRACENE (sur.)	2021/09/19		101	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2021/09/19		89	%	50 - 130
			D8-NAPHTHALENE (sur.)	2021/09/19		66	%	50 - 130
			TERPHENYL-D14 (sur.)	2021/09/19		111	%	50 - 130
			Acenaphthene	2021/09/19		89	%	50 - 130
			Acenaphthylene	2021/09/19		95	%	50 - 130
			Acridine	2021/09/19		92	%	50 - 130
			Anthracene	2021/09/19		87	%	50 - 130
			Benzo(a)anthracene	2021/09/19		104	%	50 - 130
			Benzo(b&j)fluoranthene	2021/09/19		99	%	50 - 130
			Benzo(k)fluoranthene	2021/09/19		103	%	50 - 130

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(g,h,i)perylene	2021/09/19		104	%	50 - 130
			Benzo(c)phenanthrene	2021/09/19		95	%	50 - 130
			Benzo(a)pyrene	2021/09/19		105	%	50 - 130
			Benzo(e)pyrene	2021/09/19		94	%	50 - 130
			Chrysene	2021/09/19		101	%	50 - 130
			Dibenz(a,h)anthracene	2021/09/19		99	%	50 - 130
			Fluoranthene	2021/09/19		106	%	50 - 130
			Fluorene	2021/09/19		94	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2021/09/19		110	%	50 - 130
			1-Methylnaphthalene	2021/09/19		63	%	50 - 130
			2-Methylnaphthalene	2021/09/19		74	%	50 - 130
			Naphthalene	2021/09/19		79	%	50 - 130
			Phenanthrene	2021/09/19		98	%	50 - 130
			Perylene	2021/09/19		100	%	50 - 130
			Pyrene	2021/09/19		103	%	50 - 130
			Quinoline	2021/09/19		103	%	50 - 130
A355353	JC7	Method Blank	D10-ANTHRACENE (sur.)	2021/09/19		95	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2021/09/19		73	%	50 - 130
			D8-NAPHTHALENE (sur.)	2021/09/19		46 (1)	%	50 - 130
			TERPHENYL-D14 (sur.)	2021/09/19		113	%	50 - 130
			Acenaphthene	2021/09/19	<0.10		ug/L	
			Acenaphthylene	2021/09/19	<0.10		ug/L	
			Acridine	2021/09/19	<0.040		ug/L	
			Anthracene	2021/09/19	<0.010		ug/L	
			Benzo(a)anthracene	2021/09/19	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2021/09/19	<0.0085		ug/L	
			Benzo(k)fluoranthene	2021/09/19	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2021/09/19	<0.0085		ug/L	
			Benzo(c)phenanthrene	2021/09/19	<0.050		ug/L	
			Benzo(a)pyrene	2021/09/19	<0.0075		ug/L	
			Benzo(e)pyrene	2021/09/19	<0.050		ug/L	
			Chrysene	2021/09/19	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2021/09/19	<0.0075		ug/L	
			Fluoranthene	2021/09/19	<0.010		ug/L	
			Fluorene	2021/09/19	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2021/09/19	<0.0085		ug/L	
			1-Methylnaphthalene	2021/09/19	<0.10		ug/L	
			2-Methylnaphthalene	2021/09/19	<0.10		ug/L	
			Naphthalene	2021/09/19	<0.10		ug/L	
			Phenanthrene	2021/09/19	<0.050		ug/L	
			Perylene	2021/09/19	<0.050		ug/L	
			Pyrene	2021/09/19	<0.020		ug/L	
			Quinoline	2021/09/19	<0.20		ug/L	
A355353	JC7	RPD	Acenaphthene	2021/09/20	NC		%	30
			Acenaphthylene	2021/09/20	NC		%	30
			Acridine	2021/09/20	NC		%	30
			Anthracene	2021/09/20	NC		%	30
			Benzo(a)anthracene	2021/09/20	NC		%	30
			Benzo(b&j)fluoranthene	2021/09/20	NC		%	30
			Benzo(k)fluoranthene	2021/09/20	NC		%	30
			Benzo(g,h,i)perylene	2021/09/20	NC		%	30
			Benzo(c)phenanthrene	2021/09/20	NC		%	30
			Benzo(a)pyrene	2021/09/20	NC		%	30

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(e)pyrene	2021/09/20	NC		%	30
			Chrysene	2021/09/20	NC		%	30
			Dibenz(a,h)anthracene	2021/09/20	NC		%	30
			Fluoranthene	2021/09/20	NC		%	30
			Fluorene	2021/09/20	NC		%	30
			Indeno(1,2,3-cd)pyrene	2021/09/20	NC		%	30
			1-Methylnaphthalene	2021/09/20	NC		%	30
			2-Methylnaphthalene	2021/09/20	NC		%	30
			Naphthalene	2021/09/20	NC		%	30
			Phenanthrene	2021/09/20	NC		%	30
			Perylene	2021/09/20	NC		%	30
			Pyrene	2021/09/20	NC		%	30
			Quinoline	2021/09/20	NC		%	30
A355359	SEH	Matrix Spike [AFW842-05]	O-TERPHENYL (sur.)	2021/09/20		107	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2021/09/20		105	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2021/09/20		106	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2021/09/20		107	%	60 - 140
A355359	SEH	Spiked Blank	O-TERPHENYL (sur.)	2021/09/20		109	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2021/09/20		106	%	60 - 140
			F3 (C16-C34 Hydrocarbons)	2021/09/20		107	%	60 - 140
			F4 (C34-C50 Hydrocarbons)	2021/09/20		110	%	60 - 140
A355359	SEH	Method Blank	O-TERPHENYL (sur.)	2021/09/20		110	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2021/09/20	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2021/09/20	<0.10		mg/L	
			F4 (C34-C50 Hydrocarbons)	2021/09/20	<0.20		mg/L	
A355359	SEH	RPD	F2 (C10-C16 Hydrocarbons)	2021/09/20	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2021/09/20	NC		%	30
A355981	AP1	Matrix Spike	Total Suspended Solids	2021/09/17		102	%	80 - 120
A355981	AP1	Spiked Blank	Total Suspended Solids	2021/09/17		92	%	80 - 120
A355981	AP1	Method Blank	Total Suspended Solids	2021/09/17	<0.40		mg/L	
A355981	AP1	RPD	Total Suspended Solids	2021/09/17	1.1		%	20
A356251	JFH	Matrix Spike	Total Ammonia (N)	2021/09/17		100	%	80 - 120
A356251	JFH	Spiked Blank	Total Ammonia (N)	2021/09/17		103	%	80 - 120
A356251	JFH	Method Blank	Total Ammonia (N)	2021/09/17	<0.015		mg/L	
A356251	JFH	RPD	Total Ammonia (N)	2021/09/17	1.6		%	20
A357182	IK0	Spiked Blank	Alkalinity (Total as CaCO3)	2021/09/18		99	%	80 - 120
A357182	IK0	Method Blank	Alkalinity (PP as CaCO3)	2021/09/18	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2021/09/18	<1.0		mg/L	
			Bicarbonate (HCO3)	2021/09/18	<1.0		mg/L	
			Carbonate (CO3)	2021/09/18	<1.0		mg/L	
			Hydroxide (OH)	2021/09/18	<1.0		mg/L	
A357182	IK0	RPD [AFW846-02]	Alkalinity (PP as CaCO3)	2021/09/18	NC		%	20
			Alkalinity (Total as CaCO3)	2021/09/18	0.62		%	20
			Bicarbonate (HCO3)	2021/09/18	0.62		%	20
			Carbonate (CO3)	2021/09/18	NC		%	20
			Hydroxide (OH)	2021/09/18	NC		%	20
A357184	IK0	Spiked Blank	pH	2021/09/18		100	%	97 - 103
A357184	IK0	RPD [AFW846-02]	pH	2021/09/18	0.15		%	N/A
A357185	IK0	Spiked Blank	Conductivity	2021/09/18		102	%	90 - 110
A357185	IK0	Method Blank	Conductivity	2021/09/18	<2.0		uS/cm	
A357185	IK0	RPD [AFW846-02]	Conductivity	2021/09/18	0		%	10
A357924	STI	Matrix Spike	Total Phosphorus (P)	2021/09/21		101	%	80 - 120

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A357924	STI	QC Standard	Total Phosphorus (P)	2021/09/21		91	%	80 - 120
A357924	STI	Spiked Blank	Total Phosphorus (P)	2021/09/21		97	%	80 - 120
A357924	STI	Method Blank	Total Phosphorus (P)	2021/09/21	<0.0030		mg/L	
A357924	STI	RPD	Total Phosphorus (P)	2021/09/21	10		%	20
A358453	KWE	Matrix Spike	Total Hex. Chromium (Cr 6+)	2021/09/20		88	%	80 - 120
A358453	KWE	Spiked Blank	Total Hex. Chromium (Cr 6+)	2021/09/20		101	%	80 - 120
A358453	KWE	Method Blank	Total Hex. Chromium (Cr 6+)	2021/09/20	<0.00099		mg/L	
A358453	KWE	RPD	Total Hex. Chromium (Cr 6+)	2021/09/20	NC		%	20
A360145	TMU	Matrix Spike	Phenols	2021/09/22		98	%	80 - 120
A360145	TMU	Spiked Blank	Phenols	2021/09/22		98	%	80 - 120
A360145	TMU	Method Blank	Phenols	2021/09/22	<0.0015		mg/L	
A360145	TMU	RPD	Phenols	2021/09/22	NC		%	20
A360147	TMU	Matrix Spike [AFW849-03]	Phenols	2021/09/22		96	%	80 - 120
A360147	TMU	Spiked Blank	Phenols	2021/09/22		101	%	80 - 120
A360147	TMU	Method Blank	Phenols	2021/09/22	<0.0015		mg/L	
A360147	TMU	RPD [AFW849-03]	Phenols	2021/09/22	NC		%	20
A361265	STI	Matrix Spike	Total Phosphorus (P)	2021/09/22		102	%	80 - 120
A361265	STI	QC Standard	Total Phosphorus (P)	2021/09/22		89	%	80 - 120
A361265	STI	Spiked Blank	Total Phosphorus (P)	2021/09/22		89	%	80 - 120
A361265	STI	Method Blank	Total Phosphorus (P)	2021/09/22	<0.0030		mg/L	
A361265	STI	RPD	Total Phosphorus (P)	2021/09/22	6.5		%	20
A363115	SKM	Matrix Spike	Total Ammonia (N)	2021/09/23		100	%	80 - 120
A363115	SKM	Spiked Blank	Total Ammonia (N)	2021/09/23		102	%	80 - 120
A363115	SKM	Method Blank	Total Ammonia (N)	2021/09/23	<0.015		mg/L	
A363115	SKM	RPD	Total Ammonia (N)	2021/09/23	NC		%	20
A363337	KWE	Matrix Spike	Total Hex. Chromium (Cr 6+)	2021/09/24		97	%	80 - 120
A363337	KWE	Spiked Blank	Total Hex. Chromium (Cr 6+)	2021/09/24		106	%	80 - 120
A363337	KWE	Method Blank	Total Hex. Chromium (Cr 6+)	2021/09/24	<0.00099		mg/L	
A363337	KWE	RPD	Total Hex. Chromium (Cr 6+)	2021/09/24	NC		%	20
A363348	KWE	Matrix Spike [AFW846-02]	Total Hex. Chromium (Cr 6+)	2021/09/24		81	%	80 - 120
A363348	KWE	Spiked Blank	Total Hex. Chromium (Cr 6+)	2021/09/24		95	%	80 - 120
A363348	KWE	Method Blank	Total Hex. Chromium (Cr 6+)	2021/09/24	<0.00099		mg/L	
A363348	KWE	RPD [AFW846-02]	Total Hex. Chromium (Cr 6+)	2021/09/24	NC		%	20
A364255	ANE	Matrix Spike [AFW848-02]	Total Aluminum (Al)	2021/09/24		115	%	80 - 120
			Total Antimony (Sb)	2021/09/24		116	%	80 - 120
			Total Arsenic (As)	2021/09/24		102	%	80 - 120
			Total Barium (Ba)	2021/09/24		NC	%	80 - 120
			Total Beryllium (Be)	2021/09/24		95	%	80 - 120
			Total Bismuth (Bi)	2021/09/24		98	%	80 - 120
			Total Boron (B)	2021/09/24		107	%	80 - 120
			Total Cadmium (Cd)	2021/09/24		91	%	80 - 120
			Total Chromium (Cr)	2021/09/24		103	%	80 - 120
			Total Cobalt (Co)	2021/09/24		97	%	80 - 120
			Total Copper (Cu)	2021/09/24		91	%	80 - 120
			Total Iron (Fe)	2021/09/24		106	%	80 - 120
			Total Lead (Pb)	2021/09/24		103	%	80 - 120
			Total Lithium (Li)	2021/09/24		106	%	80 - 120
			Total Manganese (Mn)	2021/09/24		104	%	80 - 120
			Total Mercury (Hg)	2021/09/24		81	%	80 - 120
			Total Molybdenum (Mo)	2021/09/24		118	%	80 - 120

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2021/09/24		93	%	80 - 120
			Total Selenium (Se)	2021/09/24		93	%	80 - 120
			Total Silicon (Si)	2021/09/24		78 (1)	%	80 - 120
			Total Silver (Ag)	2021/09/24		97	%	80 - 120
			Total Strontium (Sr)	2021/09/24		NC	%	80 - 120
			Total Thallium (Tl)	2021/09/24		101	%	80 - 120
			Total Tin (Sn)	2021/09/24		102	%	80 - 120
			Total Titanium (Ti)	2021/09/24		103	%	80 - 120
			Total Uranium (U)	2021/09/24		111	%	80 - 120
			Total Vanadium (V)	2021/09/24		107	%	80 - 120
			Total Zinc (Zn)	2021/09/24		83	%	80 - 120
			Total Zirconium (Zr)	2021/09/24		132 (1)	%	80 - 120
A364255	ANE	Spiked Blank	Total Aluminum (Al)	2021/09/24		108	%	80 - 120
			Total Antimony (Sb)	2021/09/24		118	%	80 - 120
			Total Arsenic (As)	2021/09/24		104	%	80 - 120
			Total Barium (Ba)	2021/09/24		101	%	80 - 120
			Total Beryllium (Be)	2021/09/24		106	%	80 - 120
			Total Bismuth (Bi)	2021/09/24		106	%	80 - 120
			Total Boron (B)	2021/09/24		109	%	80 - 120
			Total Cadmium (Cd)	2021/09/24		103	%	80 - 120
			Total Chromium (Cr)	2021/09/24		104	%	80 - 120
			Total Cobalt (Co)	2021/09/24		105	%	80 - 120
			Total Copper (Cu)	2021/09/24		104	%	80 - 120
			Total Iron (Fe)	2021/09/24		107	%	80 - 120
			Total Lead (Pb)	2021/09/24		105	%	80 - 120
			Total Lithium (Li)	2021/09/24		102	%	80 - 120
			Total Manganese (Mn)	2021/09/24		108	%	80 - 120
			Total Mercury (Hg)	2021/09/24		79 (1)	%	80 - 120
			Total Molybdenum (Mo)	2021/09/24		103	%	80 - 120
			Total Nickel (Ni)	2021/09/24		105	%	80 - 120
			Total Selenium (Se)	2021/09/24		102	%	80 - 120
			Total Silicon (Si)	2021/09/24		76 (1)	%	80 - 120
			Total Silver (Ag)	2021/09/24		103	%	80 - 120
			Total Strontium (Sr)	2021/09/24		109	%	80 - 120
			Total Thallium (Tl)	2021/09/24		102	%	80 - 120
			Total Tin (Sn)	2021/09/24		101	%	80 - 120
			Total Titanium (Ti)	2021/09/24		109	%	80 - 120
			Total Uranium (U)	2021/09/24		107	%	80 - 120
			Total Vanadium (V)	2021/09/24		105	%	80 - 120
			Total Zinc (Zn)	2021/09/24		110	%	80 - 120
			Total Zirconium (Zr)	2021/09/24		106	%	80 - 120
A364255	ANE	Method Blank	Total Aluminum (Al)	2021/09/24	<3.0		ug/L	
			Total Antimony (Sb)	2021/09/24	<0.50		ug/L	
			Total Arsenic (As)	2021/09/24	<0.10		ug/L	
			Total Barium (Ba)	2021/09/24	<1.0		ug/L	
			Total Beryllium (Be)	2021/09/24	<0.10		ug/L	
			Total Bismuth (Bi)	2021/09/24	<1.0		ug/L	
			Total Boron (B)	2021/09/24	<50		ug/L	
			Total Cadmium (Cd)	2021/09/24	<0.010		ug/L	
			Total Chromium (Cr)	2021/09/24	<1.0		ug/L	
			Total Cobalt (Co)	2021/09/24	<0.20		ug/L	
			Total Copper (Cu)	2021/09/24	<0.50		ug/L	
			Total Iron (Fe)	2021/09/24	<10		ug/L	

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Lead (Pb)	2021/09/24	<0.20		ug/L	
			Total Lithium (Li)	2021/09/24	<2.0		ug/L	
			Total Manganese (Mn)	2021/09/24	<1.0		ug/L	
			Total Mercury (Hg)	2021/09/24	<0.050		ug/L	
			Total Molybdenum (Mo)	2021/09/24	<1.0		ug/L	
			Total Nickel (Ni)	2021/09/24	<1.0		ug/L	
			Total Selenium (Se)	2021/09/24	<0.10		ug/L	
			Total Silicon (Si)	2021/09/24	<100		ug/L	
			Total Silver (Ag)	2021/09/24	<0.020		ug/L	
			Total Strontium (Sr)	2021/09/24	<1.0		ug/L	
			Total Thallium (Tl)	2021/09/24	<0.010		ug/L	
			Total Tin (Sn)	2021/09/24	<5.0		ug/L	
			Total Titanium (Ti)	2021/09/24	<5.0		ug/L	
			Total Uranium (U)	2021/09/24	<0.10		ug/L	
			Total Vanadium (V)	2021/09/24	<5.0		ug/L	
			Total Zinc (Zn)	2021/09/24	<5.0		ug/L	
			Total Zirconium (Zr)	2021/09/24	<0.10		ug/L	
A364255	ANE	RPD [AFW909-02]	Total Aluminum (Al)	2021/09/24	1.9		%	20
			Total Antimony (Sb)	2021/09/24	NC		%	20
			Total Arsenic (As)	2021/09/24	NC		%	20
			Total Barium (Ba)	2021/09/24	0.66		%	20
			Total Beryllium (Be)	2021/09/24	NC		%	20
			Total Bismuth (Bi)	2021/09/24	NC		%	20
			Total Boron (B)	2021/09/24	3.0		%	20
			Total Cadmium (Cd)	2021/09/24	8.6		%	20
			Total Chromium (Cr)	2021/09/24	NC		%	20
			Total Cobalt (Co)	2021/09/24	NC		%	20
			Total Copper (Cu)	2021/09/24	17		%	20
			Total Iron (Fe)	2021/09/24	0.65		%	20
			Total Lead (Pb)	2021/09/24	2.5		%	20
			Total Lithium (Li)	2021/09/24	0.086		%	20
			Total Manganese (Mn)	2021/09/24	0.50		%	20
			Total Mercury (Hg)	2021/09/24	NC		%	20
			Total Molybdenum (Mo)	2021/09/24	NC		%	20
			Total Nickel (Ni)	2021/09/24	NC		%	20
			Total Selenium (Se)	2021/09/24	NC		%	20
			Total Silicon (Si)	2021/09/24	4.7		%	20
			Total Silver (Ag)	2021/09/24	NC		%	20
			Total Strontium (Sr)	2021/09/24	0.82		%	20
			Total Thallium (Tl)	2021/09/24	NC		%	20
			Total Tin (Sn)	2021/09/24	NC		%	20
			Total Titanium (Ti)	2021/09/24	NC		%	20
			Total Uranium (U)	2021/09/24	1.7		%	20
			Total Vanadium (V)	2021/09/24	NC		%	20
			Total Zinc (Zn)	2021/09/24	NC		%	20
			Total Zirconium (Zr)	2021/09/24	NC		%	20
A364287	BFE	Matrix Spike	Dissolved Chloride (Cl)	2021/09/24		NC	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		NC	%	80 - 120
A364287	BFE	Spiked Blank	Dissolved Chloride (Cl)	2021/09/24		106	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		101	%	80 - 120
A364287	BFE	Method Blank	Dissolved Chloride (Cl)	2021/09/24	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2021/09/24	<1.0		mg/L	
A364287	BFE	RPD	Dissolved Chloride (Cl)	2021/09/24	0.60		%	20

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Sulphate (SO4)	2021/09/24	0.45		%	20
A364300	BFE	Matrix Spike [AFW846-02]	Dissolved Chloride (Cl)	2021/09/24		NC	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		NC	%	80 - 120
A364300	BFE	Spiked Blank	Dissolved Chloride (Cl)	2021/09/24		107	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		99	%	80 - 120
A364300	BFE	Method Blank	Dissolved Chloride (Cl)	2021/09/24	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2021/09/24	<1.0		mg/L	
A364300	BFE	RPD [AFW846-02]	Dissolved Chloride (Cl)	2021/09/24	1.7		%	20
			Dissolved Sulphate (SO4)	2021/09/24	0.26		%	20
A364301	BFE	Matrix Spike	Dissolved Chloride (Cl)	2021/09/24		102	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		NC	%	80 - 120
A364301	BFE	Spiked Blank	Dissolved Chloride (Cl)	2021/09/24		105	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		100	%	80 - 120
A364301	BFE	Method Blank	Dissolved Chloride (Cl)	2021/09/24	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2021/09/24	<1.0		mg/L	
A364301	BFE	RPD	Dissolved Chloride (Cl)	2021/09/24	0.46		%	20
			Dissolved Sulphate (SO4)	2021/09/24	4.6		%	20
A364373	éJU	Spiked Blank	Total Oil and grease	2021/09/23		98	%	85 - 115
A364373	éJU	RPD	Total Oil and grease	2021/09/23	1.0		%	25
A364373	éJU	Method Blank	Total Oil and grease	2021/09/23	<0.50		mg/L	
A364584	RK3	Matrix Spike	Total Mercury (Hg)	2021/09/24		103	%	80 - 120
A364584	RK3	Spiked Blank	Total Mercury (Hg)	2021/09/24		98	%	80 - 120
A364584	RK3	Method Blank	Total Mercury (Hg)	2021/09/24	<0.0019		ug/L	
A364584	RK3	RPD	Total Mercury (Hg)	2021/09/24	NC		%	20
A364601	BFE	Matrix Spike	Dissolved Chloride (Cl)	2021/09/24		105	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		99	%	80 - 120
A364601	BFE	Spiked Blank	Dissolved Chloride (Cl)	2021/09/24		103	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		99	%	80 - 120
A364601	BFE	Method Blank	Dissolved Chloride (Cl)	2021/09/24	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2021/09/24	<1.0		mg/L	
A364601	BFE	RPD	Dissolved Chloride (Cl)	2021/09/24	2.3		%	20
			Dissolved Sulphate (SO4)	2021/09/24	NC		%	20
A364690	JFH	Matrix Spike [AFW910-08]	Total Ammonia (N)	2021/09/24		NC	%	80 - 120
A364690	JFH	Spiked Blank	Total Ammonia (N)	2021/09/24		102	%	80 - 120
A364690	JFH	Method Blank	Total Ammonia (N)	2021/09/24	<0.015		mg/L	
A364690	JFH	RPD [AFW910-08]	Total Ammonia (N)	2021/09/24	0.72		%	20
A365459	BFE	Matrix Spike	Dissolved Chloride (Cl)	2021/09/24		112	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		103	%	80 - 120
A365459	BFE	Spiked Blank	Dissolved Chloride (Cl)	2021/09/24		108	%	80 - 120
			Dissolved Sulphate (SO4)	2021/09/24		100	%	80 - 120
A365459	BFE	Method Blank	Dissolved Chloride (Cl)	2021/09/25	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2021/09/25	<1.0		mg/L	
A365459	BFE	RPD	Dissolved Chloride (Cl)	2021/09/25	8.3		%	20
			Dissolved Sulphate (SO4)	2021/09/25	0.22		%	20
A366569	IK0	Spiked Blank	Conductivity	2021/09/27		102	%	90 - 110
A366569	IK0	Method Blank	Conductivity	2021/09/27	<2.0		uS/cm	
A366569	IK0	RPD	Conductivity	2021/09/27	0.21		%	10
A366948	JFH	Matrix Spike	Total Ammonia (N)	2021/09/27		93	%	80 - 120
A366948	JFH	Spiked Blank	Total Ammonia (N)	2021/09/27		100	%	80 - 120
A366948	JFH	Method Blank	Total Ammonia (N)	2021/09/27	<0.015		mg/L	

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A366948	JFH	RPD	Total Ammonia (N)	2021/09/27	1.4		%	20

N/A = Not Applicable

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

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

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

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

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

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

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

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

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

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

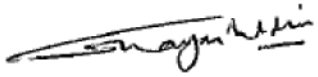
BV Labs Job #: C168232
Report Date: 2021/09/28

OUTCOME CONSULTANTS INC.
Client Project #: RESOLUTE BAG LTM
Site Location: P2021-9
Sampler Initials: SL

VALIDATION SIGNATURE PAGE

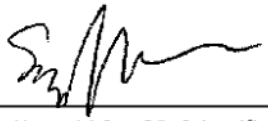
The analytical data and all QC contained in this report were reviewed and validated by:

Brad Newman, Scientific Specialist



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

Maria Magdalena Florescu, Ph.D., P.Chem., QP, Inorganics Manager



Sandy Yuan, M.Sc., QP, Scientific Specialist

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

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

Bureau Veritas Laboratories Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

628

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#34798 Outcome Consultants Inc.	Company Name:		Quotation #:	C12986	BV Labs Job #: C168232	Bottle Order #: 836752
Attention:	Don Plenderleith	Attention:	Don Plenderleith	P.O. #:			
Address:	151 Holland Avenue Suite 200 Ottawa ON K14 0Y2	Address:		Project:	Resolute Bay LTM D2021-9	COC #: C#836752-01-01	Project Manager: Katherine Szozda
Tel:	(613) 729-2402 Fax:	Tel:	Fax:	Project Name:			
Email:	dplenderleith@outcomeinc.ca	Email:	dplenderleith@outcomeinc.ca	Site #:			
				Sampled By:	S Livingstone		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☑ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO ☐ Reg 406 Table ___
- ☐ Other ___

Special Instructions
All samples not filtered
• preservative present

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / CrVI	Resolute Bay LF Analysis C12986								# of Bottles	Comments
1		RBL-1	Aug 27	pm	GW	✓	✓								13	Groundwater
2		RBL-2	Aug 27	pm	GW	✓	✓								13	" "
3		RBL-3	Aug 27	pm	GW	✓	✓								13	" "
4		RBL-4	Aug 27	pm	SW	✓	✓								13	Surface Water
5		RBL-7	Aug 27	pm	GW	✓	✓								13	Groundwater
6		ABL-8	Aug 27	pm	SW	✓	✓								13	Surface water
7		Field Dup 2	Aug 27	pm	SW	✓	✓								13	" "
8		ABL-10	Aug 27	pm	GW	✓	✓								13	Groundwater
9		RBL-13	Aug 27	pm	SW	✓	✓								13	Surface water
10		RBL-14	Aug 27	pm	GW	✓	✓								13	Groundwater

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only			
			Kristy Taylor Kristy11 Avila	21/09/13	14:00		Time Sensitive	Temperature (°C) on Recei see ACTR	Custody Seal Present / Intact	Yes / No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

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

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

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

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvlabs.com

Page of

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#34798 Outcome Consultants Inc.	Company Name:		Quotation #:	C12986	BV Labs Job #: C168232	Bottle Order #: 836752
Attention:	Don Plenderleith	Attention:	Don Plenderleith	P.O. #:			
Address:	151 Holland Avenue Suite 200 Ottawa ON K14 0Y2	Address:		Project:	Resolute Bay GTM PZ021-9	COC #: C#836752-02-01	Project Manager: Katherine Szozda
Tel:	(613) 729-2402 Fax:	Tel:	Fax:	Project Name:			
Email:	dplenderleith@outcomeinc.ca	Email:	dplenderleith@outcomeinc.ca	Site #:			
				Sampled By:	S Living Stone		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☑ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ____
- ☐ PWQO ☐ Reg 406 Table ____
- ☐ Other ____

Special Instructions: All samples not field filtered

Include Criteria on Certificate of Analysis (Y/N)? ____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / CrVI	Resolute Bay LF Analysis C12980	# of Bottles	Comments
1		RBL-16	Aug 27	pm	SW	✓	✓	13	Surface water
2		GW Dup1	Aug 27	pm	GW	✓	✓	13	Groundwater
3		Field Blank	Aug 27	pm	water	✓	✓	13	Distilled water
4									
5									
6									
7									
8									
9									
10									

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
			[illegible] Kristyll Avila	2021/09/13	14:00	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	See ACTR	Present		
		Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

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

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

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

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Outcome Consultants Inc.
151 Holland Avenue Suite 200
Ottawa, ON K1Y 0Y2

2022/03/10

Attn: Don Plenderleith, Environmental Division Manager

Re: Resolute Bay Airport Landfill Confirmatory Sampling Program

Dear Mr. Penderleith

As requested, Bureau Veritas Laboratories has reviewed the Resolute Bay Airport Landfill Confirmatory Sampling Program. In our opinion, the Program meets the CCME requirements for field QC including a field blank and field duplicate. It is recommended for future programs that a laboratory provided trip blank also be included.

I trust this is sufficient for your needs. If anything further is required, please do not hesitate to contact me directly

Sincerely,

Barry Loescher, PhD PChem QP
Quality Systems Specialist
Barry.loescher@bureauveritas.com

Appendix F

Site Photo Logs

Photo Log – AEC 1

	Photo 1 **Date** Aug 29, 2021 **Description** AEC 1 overview from Access Road **Viewing Direction** Facing West

	Photo 2 **Date** Aug 29, 2021 **Description** General condition of Landfill Plateau. **Viewing Direction** Facing West. Thermistor 2 in background.

	Photo 3 **Date** Aug 29, 2021 **Description** General view of crest of landfill and rock amour. Thermistor 1 in background. **Viewing Direction** Facing West

Photo 4

Date
August 29, 2021

Description
General condition of Landfill Plateau

Viewing Direction
Facing East towards access Road. Thermistor 2 in background.

Photo 5

Date
August 29, 2021

Description
General condition of rock amour to the toe of the Landfill slope

Viewing Direction
Facing Northwest

Photo 6

Date
August 29, 2021

Description
Rock amour and taper at the Landfill toe

Viewing Direction
Facing South

	Photo 7 **Date** August 29, 2021 **Description** General condition of the rock armour from the toe of Landfill to crest **Viewing Direction** Facing East

	Photo 8 **Date** August 29, 2021 **Description** Rock amour and taper at the Landfill toe **Viewing Direction** Facing North

	Photo 9 **Date** August 29, 2021 **Description** General view of the Landfill plateau with transition to slope. Thermistor 3 in background. **Viewing Direction** Facing North

	Photo 10 **Date** August 29, 2021 **Description** General view of the swale constructed along the south portion of the Landfill proximal to the municipal sewage lagoons **Viewing Direction** Facing northwest

	Photo 11 **Date** August 29, 2021 **Description** View of southern limits of the Landfill near municipal sewage lagoons **Viewing Direction** West

Photo 12

Date
August 29, 2021

Description
View of swale at the toe of the discharge (sewage lagoon), looking towards crest, sewage lagoons on the right in background

Viewing Direction
East

Photo 13

Date
August 29, 2021

Description
View of sewage lagoons with Landfill in background. No evidence of overflow to the landfill.

Viewing Direction
Facing Northwest

Photo 14

Date
August 29, 2021

Description
View of northern limits of Landfill adjacent to Metal Waste depot

Viewing Direction
Northeast

Photo 15

Date
August 29, 2021

Description
Northern limits of the Landfill with swale to toe of the landfill

Viewing Direction
West

Photo 16

Date
August 29, 2021

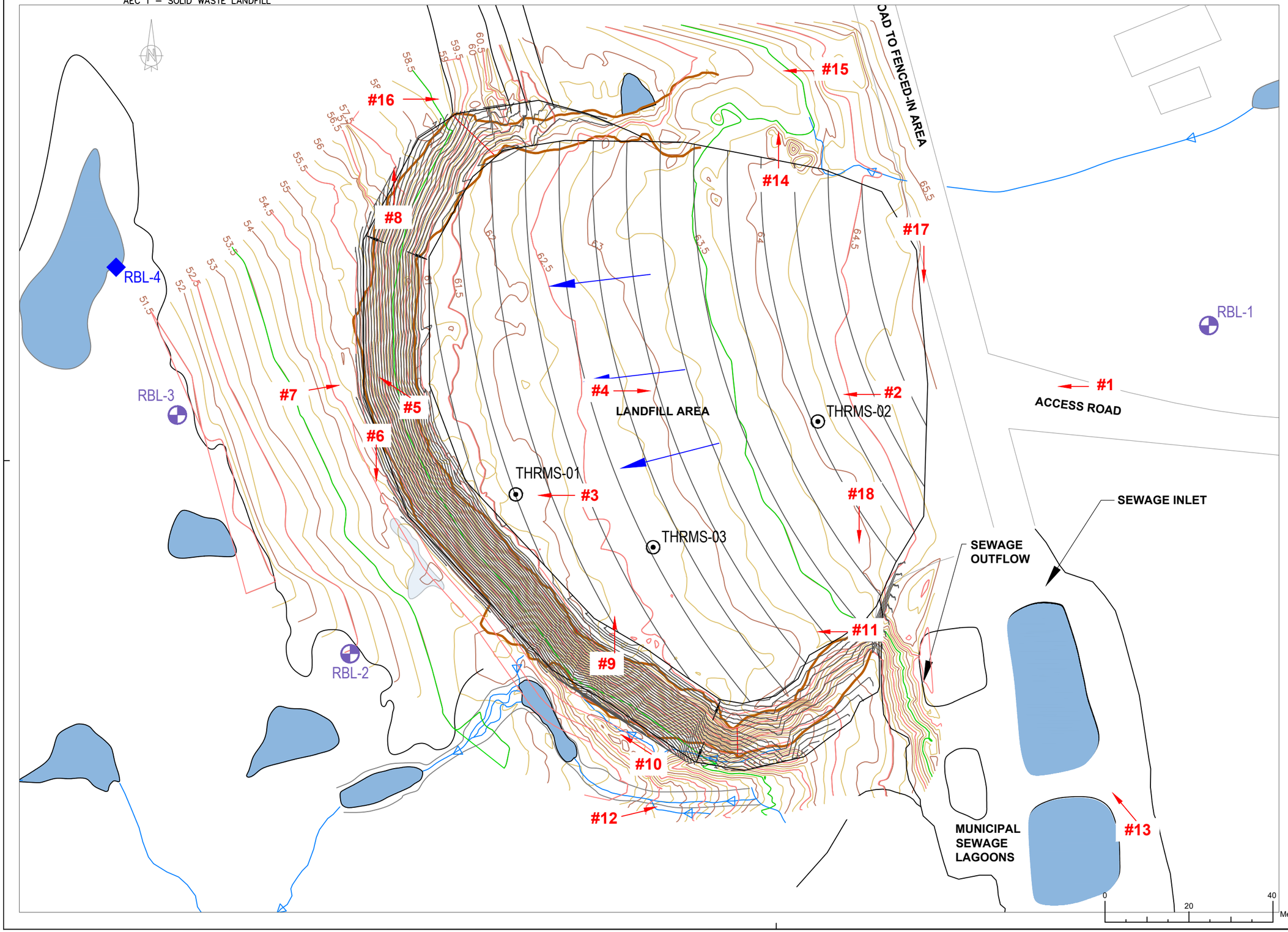
Description
Northern swale reaching eastern limits of Landfill

Viewing Direction
East

	Photo 17 **Date** August 29, 2021 **Description** View of eastern Landfill limit near Access Road. **Viewing Direction** Facing South

	Photo 18 **Date** Aug 29, 2021 **Description** Southern limits of Landfill plateau **Viewing Direction** South

AEC 1 – SOLID WASTE LANDFILL



Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Drawing Source:
1. Adapted from Preliminary Design prepared by Arcadis Canada Inc. on behalf of Public Works & Government Services Canada (March 2016)

LEGEND

- Major Topographic Contour
- Minor Topographic Contour
- 64.5 — Topographic Contour Elevation (approx. metres above sea level)
- Suspected Ground/Surface Water Flow Direction
- Monitoring Well Installed in 2019
- Surface Water Sample
- Thermistor
- #1 — Photo Location

DILLON CONSULTING

outcome CONSULTANTS

PROFESSIONAL SEALS

DO NOT SCALE DRAWINGS

04		
03		
02		
01		
revision		date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail No. / No. du detail
B drawing no. – where detail required / dessin no. – ou detail exige
C drawing no. – where detailed / dessin no. – ou detaille

project title / titre du projet: RESOLUTE BAY NUNAVUT — PWGSC for TRANSPORT CANADA

RESOLUTE BAY LANDFILLS: CONFIRMATORY SAMPLING PROGRAM

drawing title / titre du dessin: AEC1: INACTIVE SOLID WASTE LANDFILL PHOTO LOCATIONS

drawn by / dessine par	
designed by / conc par	
approved by / approuve par	M. BILLOWITS
bid / offre	N. ROBINSON (project manager / administrateur de projets)
project date / date du projet	FEBRUARY 2022
project no. / no. du projet	R.112072.001
drawing no. / dessine no.	Figure F1

Photo Log – AEC 2

	Photo 1 **Date** Aug 29, 2021 **Description** AEC 2 Main Landfill Plateau general view **Viewing Direction** From roadway facing West

	Photo 2 **Date** Aug 29, 2021 **Description** AEC 2 Main Landfill Plateau general view **Viewing Direction** Facing Southwest

	Photo 3 **Date** August 29, 2021 **Description** AEC 2 Landfill Plateau general view **Viewing Direction** Facing Northwest

	Photo 4 **Date** August 29, 2021 **Description** AEC 2 Landfill Plateau general view, northern limit, and diffusion swale. Debris/Equipment in background outside of landfill area. **Viewing Direction** Facing Northwest

	Photo 5 **Date** August 29, 2021 **Description** AEC 2 Landfill Plateau general view, southern limit, and diffusion swale **Viewing Direction** Facing Southwest

	Photo 6 **Date** Aug 29, 2021 **Description** Southern portion of Landfill **Viewing Direction** West

	Photo 7 **Date** August 29, 2021 **Description** View of toe of the Landfill and swale **Viewing Direction** East

	Photo 8 **Date** August 29, 2021 **Description** View of Crest of landfill towards the toe. **Viewing Direction** Facing Northwest

	Photo 9 **Date** August 29, 2021 **Description** Toe of Main Landfill, with slope of the landfill and diffusion swale **Viewing Direction** North

	Photo 10 **Date** August 29, 2021 **Description** Toe of Main Landfill, with slope of the landfill and diffusion swale **Viewing Direction** North

	Photo 11 **Date** August 29, 2021 **Description** Main Landfill and diffusion swale adjacent to east-west access road **Viewing Direction** Facing Northeast

	Photo 12 **Date** August 29, 2021 **Description** Two diffusion swales on opposite side of East-West Road **Viewing Direction** North

	Photo 13 **Date** August 29, 2021 **Description** Toe of Landfill and two diffusion swales on opposite side of East-West road **Viewing Direction** East

	Photo 14 **Date** August 29, 2021 **Description** Close-up of diffusion swale condition **Viewing Direction** East

	Photo 15 **Date** August 29, 2021 **Description** Condition of gravel layer on plateau, Main Landfill area **Viewing Direction** Facing West

	Photo 16 **Date** August 29, 2021 **Description** Condition of rock armour on plateau ridge **Viewing Direction** Facing Southwest

	Photo 17 **Date** August 29, 2021 **Description** Condition of rock armour on plateau ridge to toe **Viewing Direction** Facing South

	Photo 18 **Date** August 29, 2021 **Description** Condition of rock armour on plateau ridge **Viewing Direction** Facing North

	Photo 19 **Date** August 29, 2021 **Description** Condition of rock armour on plateau ridge **Viewing Direction** Facing South

	Photo 20 **Date** August 29, 2021 **Description** Condition of rock armour from toe of Landfill **Viewing Direction** Facing East

	Photo 21 **Date** August 29, 2021 **Description** Condition of rock armour from toe of Landfill **Viewing Direction** Facing Northeast

	Photo 22 **Date** August 29, 2021 **Description** Condition of rock armour, Northern portion of the Landfill **Viewing Direction** Facing North

	Photo 23 **Date** August 29, 2021 **Description** Condition of landfill crest and transition to lower plateau. Centre-northern portion of landfill. Minor cracking and sloughing- approx. 15-20 m in length **Viewing Direction** Facing South

	Photo 24 **Date** August 29, 2021 **Description** Condition of landfill crest and transition to lower plateau. Centre-northern portion of landfill. Minor cracking and sloughing- approx. 15-20 m in length **Viewing Direction** Facing South

	Photo 25 **Date** August 29, 2021 **Description** Northern portion of the landfill **Viewing Direction** Facing North

	Photo 26 **Date** August 29, 2021 **Description** Northern portion of the landfill with eastern diffusion swale **Viewing Direction** Facing North

	Photo 27 **Date** August 29, 2021 **Description** Northern portion of the landfill with eastern diffusion swale **Viewing Direction** Facing Northwest

	Photo 28 **Date** August 29, 2021 **Description** Northern portion of the landfill **Viewing Direction** Facing West

Photo 29

Date
August 29, 2021

Description
Northern portion of the landfill

Viewing Direction
Facing North

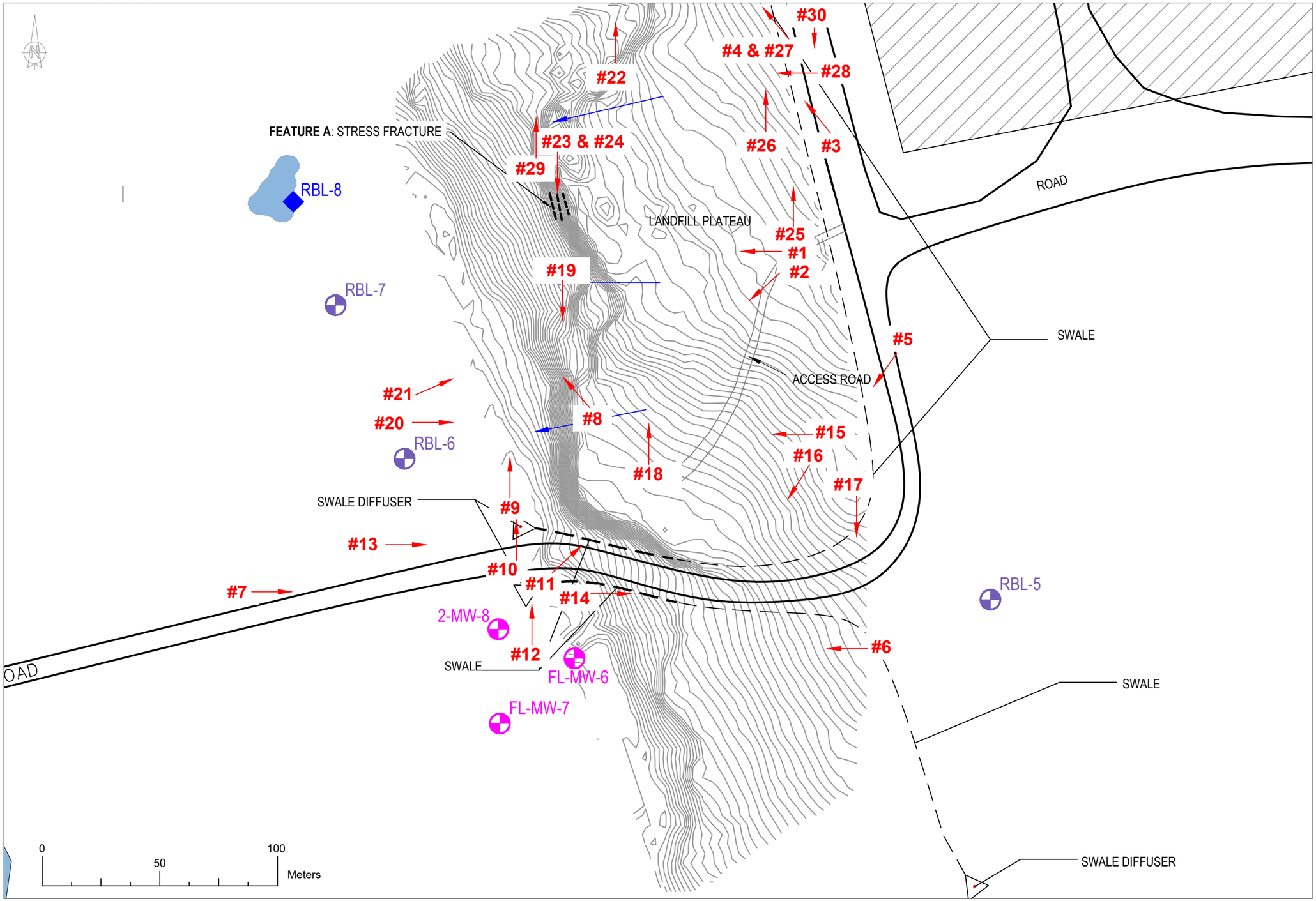
Photo 30

Date
August 29, 2021

Description
Northern portion of the landfill with eastern diffusion swale

Viewing Direction
Facing South along main road

AEC 2 – HISTORICAL LANDFILL



Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Drawing Source:
1. Adapted from Preliminary Design prepared by Arcadis Canada Inc. on behalf of Public Works & Government Services Canada (March 2016)

LEGEND

- Topographic Contour
- Suspected Ground/Surface Water Flow Direction
- Monitoring Well Installed in 2019
- Existing Monitoring Well (Not Sampled)
- Surface Water Sample
- #1 Photo Location

DILLON CONSULTING | outcome CONSULTANTS

PROFESSIONAL SEALS

DO NOT SCALE DRAWINGS

04		
03		
02		
01		
revision		date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail No. / No. du detail
B drawing no. – where detail required / dessin no. – ou detail exige
C drawing no. – where detailed / dessin no. – ou detaille

project title / titre du projet: RESOLUTE BAY NUNAVUT
PWGSC for TRANSPORT CANADA

RESOLUTE BAY LANDFILLS:
CONFIRMATORY SAMPLING PROGRAM

drawing title / titre du dessin: AEC2: HISTORICAL LANDFILL PHOTO LOCATIONS

drawn by / dessine par	
designed by / conc par	
approved by / approuve par	M. BILLOWITS
bid / offre	N. ROBINSON (project manager / administrateur de projets)
project date / date du projet	FEBRUARY 2022
project no. / no. du projet	R.112072.001
drawing no. / dessine no.	Figure F2

Photo Log – AEC 3

	Photo 1 **Date** Aug 29, 2021 **Description** MW RBL-11 with Excavation 1 in background **Viewing Direction** Facing East

	Photo 2 **Date** Aug 29, 2021 **Description** Excavations 1 and 2 in background **Viewing Direction** Facing East

	Photo 3 **Date** Aug 29, 2021 **Description** Excavation 1 and 2 (background). Valley along N. **Viewing Direction** Facing Northeast

	Photo 4 **Date** August 29, 2021 **Description** Excavation 1. Facing West along Valley to North. Slope failure noted, approximately 15 m in length. **Viewing Direction** Facing West

	Photo 5 **Date** August 29, 2021 **Description** MW RBL-11. Excavation 1, 2, 3 and 6 along road. **Viewing Direction** Facing Northeast

	Photo 6 **Date** August 29, 2021 **Description** Excavation 2, with valley in background **Viewing Direction** Facing North

	Photo 7 **Date** August 29, 2021 **Description** Excavations 2, 3 and 6, roadway along south **Viewing Direction** Facing West

	Photo 8 **Date** August 29, 2021 **Description** Excavations 3 and 6. View of MW RBL-10 in background **Viewing Direction** Facing South

	Photo 9 **Date** August 29, 2021 **Description** Excavation 4, MW RBL-12 in background to right **Viewing Direction** Facing West

	Photo 10 **Date** August 29, 2021 **Description** Excavation 4. **Viewing Direction** Facing south

	Photo 11 **Date** August 29, 2021 **Description** Excavations 3 and 6 **Viewing Direction** Northeast

	Photo 12 **Date** August 29, 2021 **Description** Excavations 3 and 6 with 2 in background **Viewing Direction** Northwest

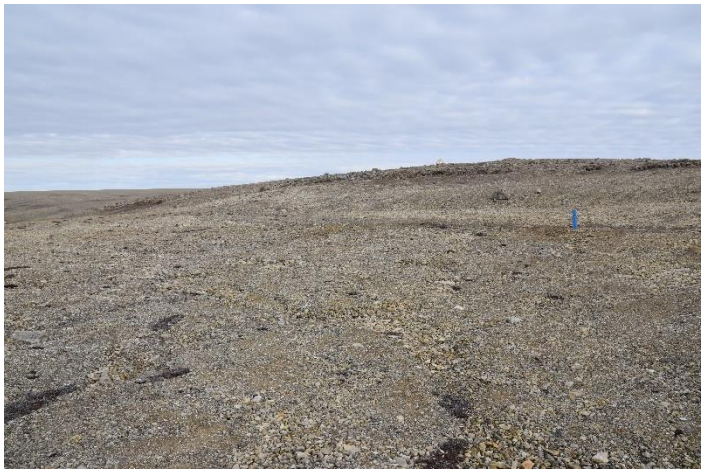
	**Photo 13** **Date** August 29, 2021 **Description** Excavation 5, MW RBL-15 in background. **Viewing Direction** Facing Northeast

	Photo 14 **Date** August 29, 2021 **Description** Excavation 5 View North from MW RBL-14 **Viewing Direction** Northwest

	Photo 15 **Date** August 29, 2021 **Description** Excavation 5 MW RBL-15 in background. **Viewing Direction** Northwest

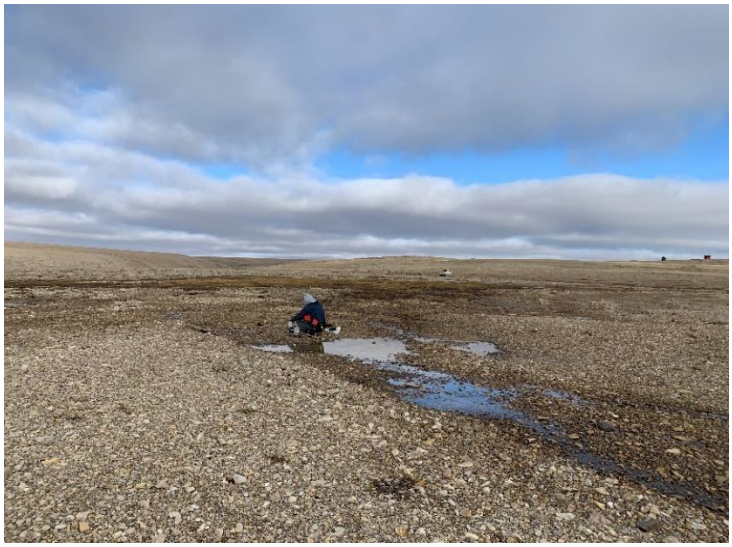
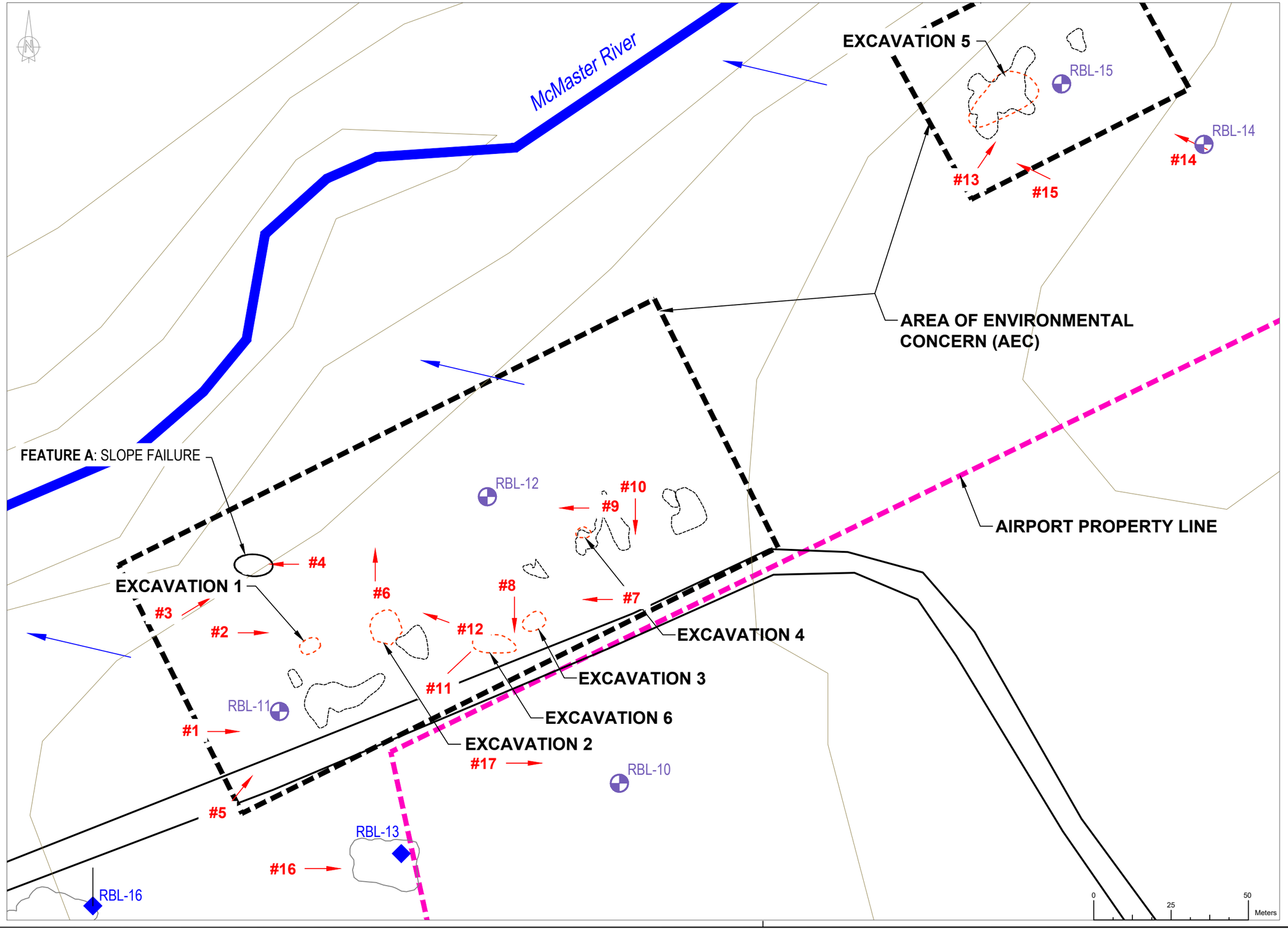
	**Photo 16** **Date** August 29, 2021 **Description** Surface water sampling (RBL- 13 with MW RBL-10 in background near truck) **Viewing Direction** East

	Photo 17 **Date** August 29, 2021 **Description** Land survey with MW RBL-10 in background **Viewing Direction** Facing East

AEC 3 – VEHICLE STORAGE AREA



Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Drawing Source:
1. Adapted from Preliminary Design prepared by Arcadis Canada Inc. on behalf of Public Works & Government Services Canada (March 2016)

LEGEND

- Major Topographic Contour
- Minor Topographic Contour
- Excavation Limits
- Former Waste Debris Piles
- Suspected Ground/Surface Water Flow Direction
- Monitoring Well Installed in 2019
- Surface Water Sample
- #1 Photo Location

DILLON CONSULTING | outcome CONSULTANTS

PROFESSIONAL SEALS

DO NOT SCALE DRAWINGS

04		
03		
02		
01		
revision		date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail No. / No. du detail
B drawing no. – where detail required / dessin no. – ou detail exige
C drawing no. – where detailed / dessin no. – ou detaille

project title / titre du projet
RESOLUTE BAY NUNAVUT
PWGSC for TRANSPORT CANADA
RESOLUTE BAY LANDFILLS: CONFIRMATORY SAMPLING PROGRAM

drawing title / titre du dessin
AEC3: FORMER VEHICLE AND WASTE METAL STORAGE AREA, PHOTO LOCATIONS

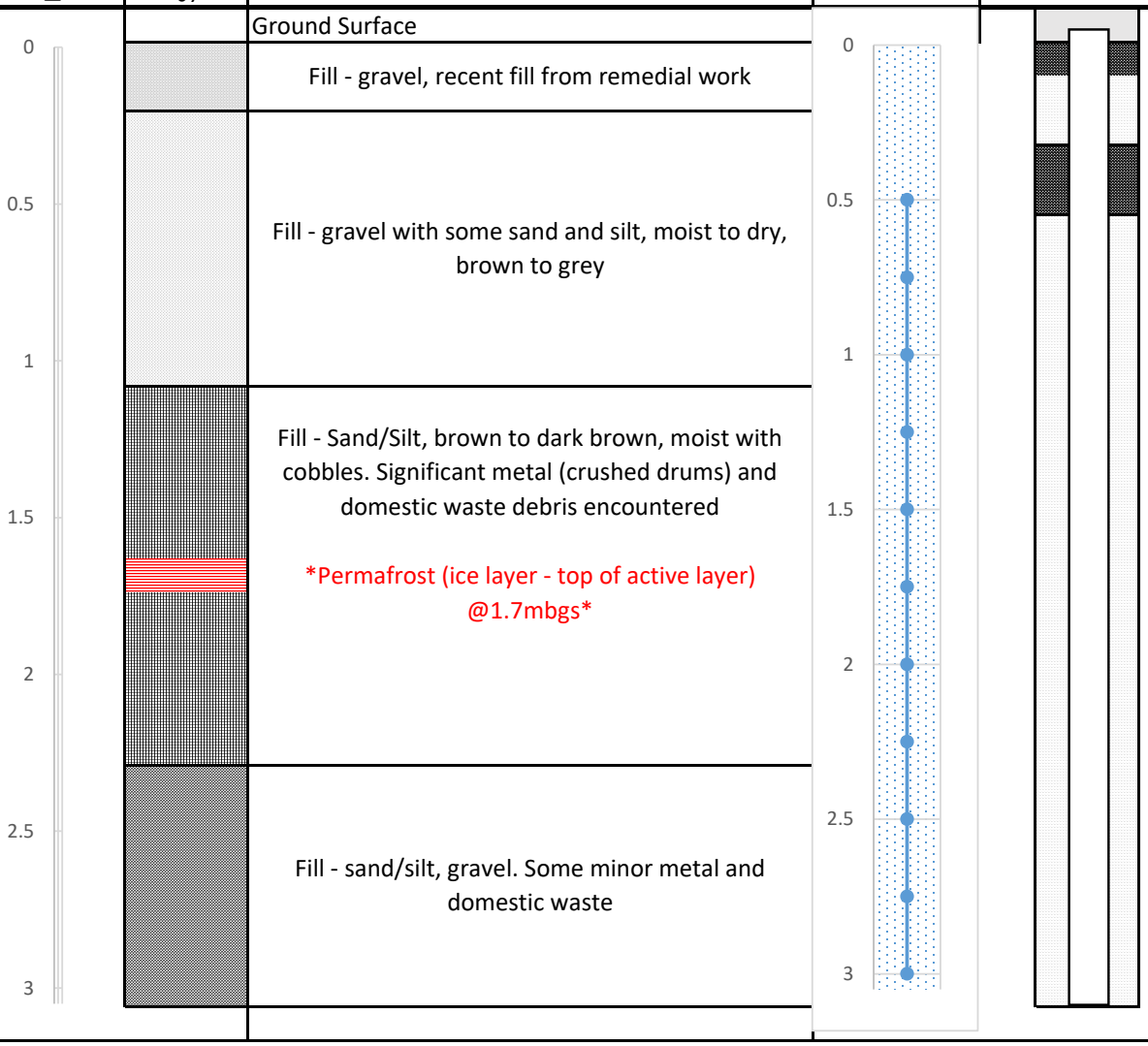
drawn by / dessine par	
designed by / conc par	
approved by / approuve par	M. BILLOWITS
bid / offre	N. ROBINSON (project manager / administrateur de projets)
project date / date du projet	FEBRUARY 2022
project no. / no. du projet	R.112072.001
drawing no. / dessine no.	Figure F3

Appendix G

Thermistor Installation/Photo Logs and Baseline Temperature Results

Project No:	P2021-09		THRMS-01
Project:	Resolute Bay Landfill CSP		
Client:	PSPC	Logged by:	S. Livingstone
Location:	AEC 1	Engineer:	

SUBSURFACE PROFILE			WELL INSTALL DETAILS	
Depth (m)	Symbol	Description	Thermistor String (nodes) within 2 " PVC	Well Cross Section
0		Ground Surface		
		Fill - gravel, recent fill from remedial work		
0.5		Fill - gravel with some sand and silt, moist to dry, brown to grey		
1				
1.5		Fill - Sand/Silt, brown to dark brown, moist with cobbles. Significant metal (crushed drums) and domestic waste debris encountered *Permafrost (ice layer - top of active layer) @1.7mbgs*		
2				
2.5		Fill - sand/silt, gravel. Some minor metal and domestic waste		
3				

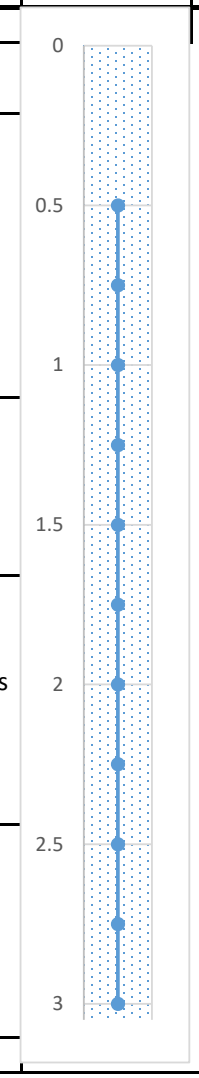


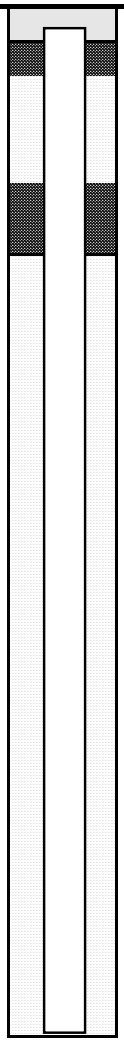
Sample Type	n/a
Excavation Method	Excavator
Date:	26-Aug-21
UTM N:	8295590
UTM E:	440985

Checked by:

Project No:	P2021-09		THRMS-02
Project:	Resolute Bay Landfill CSP		
Client:	PSPC	Logged by:	S. Livingstone
Location:	AEC 1	Engineer:	

SUBSURFACE PROFILE			WELL INSTALL DETAILS	
Depth (m)	Symbol	Description	Thermistor String (nodes) within 2 " PVC	Well Cross Section
0		Ground Surface		
		Fill - recent gravel, brown, dry		
0.5		Fill - gravel, coarse grained, brown, moist		
1				
		Fill - Sand/Silt, brown to grey, moist . Metal and domestic waste encountered *Permafrost (ice layer - top of active layer) @1.3mbgs*		
1.5				
2		Minor to trace domestic/construction waste debris (metal wires, rubber)		
2.5		Fill - sand/silt, gravel, grey. No waste observed		
3				



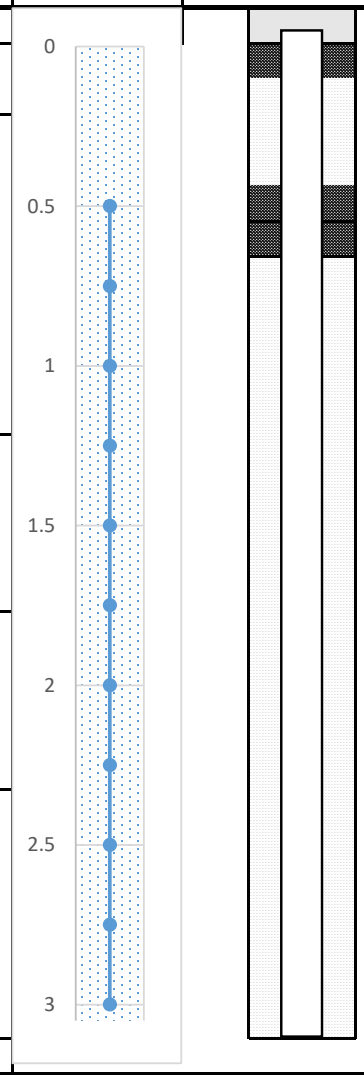


Sample Type	n/a
Excavation Method	Excavator
Date:	27-Aug-21
UTM N:	8295607
UTM E:	441055

Checked by:

Project No:	P2021-09		THRMS-03
Project:	Resolute Bay Landfill CSP		
Client:	PSPC	Logged by:	S. Livingstone
Location:	AEC 1	Engineer:	

SUBSURFACE PROFILE			WELL INSTALL DETAILS	
Depth (m)	Symbol	Description	Thermistor String (nodes) within 2 " PVC	Well Cross Section
0		Ground Surface		
		Fill - gravel, recent fill from remedial work		
0.5		Fill - gravel with some sand and silt, moist to dry, brown to light grey		
1				
1.5		Fill - Sand/Silt, brown to grey. Debris and domestic waste encountered *Permafrost (ice layer - top of active layer) @1.4 mbgs*		
2		Minor waste encountered (wood, wire, rubber tubing)		
2.5		Fill - sand/silt, gravel. Some minor to trace metal and domestic waste		
3				



Sample Type	n/a
Excavation Method	Excavator
Date:	26-Aug-21
UTM N:	8295577
UTM E:	441014

Checked by:

Photo Log – Thermistor 1

Photo 1

Date
Aug 26, 2021

Description
Thermistor 1 – start of excavation

Viewing Direction
Facing South

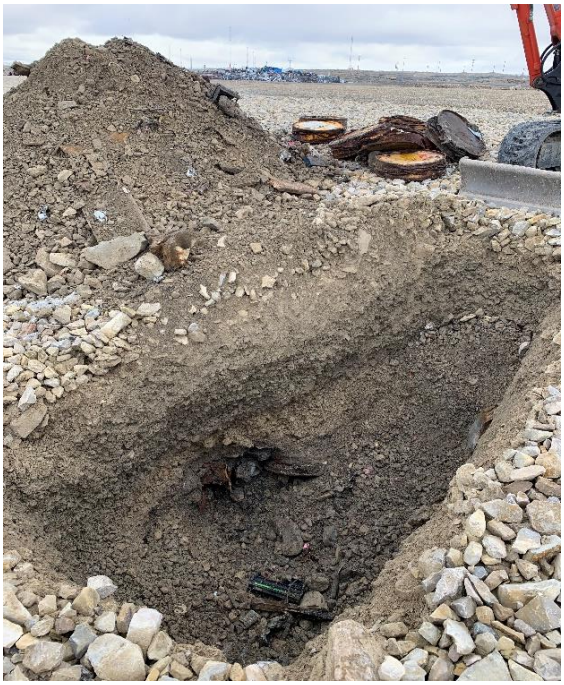


Photo 2

Date
Aug 26, 2021

Description
Excavation depth of 1.5 mbg. Domestic and metal waste including numerous crushed and empty drums at 1.3 mbg.

Viewing Direction
Facing East

Photo 3

Date
August 26, 2021

Description
Final depth of Thermistor 1. Permafrost encountered at 1.7 mbg and waste was encountered to depth of 3.05 mbg. Gravel fill at depth.

Viewing Direction
Facing West

Photo 4

Date
August 26, 2021

Description
Thermistor installation- 4" O.D. – 3.05 m grey pipe was used as casing with 2" O.D. PVC thermistor casing installed

Viewing Direction
Facing West

Photo 5

Date
August 26, 2021

Description
Backfilling Test pit with Casing for protection

Viewing Direction
Facing West

Photo 6

Date
August 26, 2021

Description
Backfilling Test pit with Casing for protection

Viewing Direction
Facing Northwest

Photo 7

Date
August 26, 2021

Description
Grey casing removed, exposing 2” OD Thermistor casing

Viewing Direction
Facing West

Photo 8

Date
August 26, 2021

Description
Installation of Thermistor cable (blue) downhole in 2” OD PVC casing. Protective steel casing mounted and installed

Viewing Direction
Facing North

Photo 9

Date
August 28, 2021

Description
Final casing installation and backfilling

Viewing Direction
Facing Northwest

Photo 10

Date
August 29, 2021

Description
Data logger installed to Thermistor cables, tested and locked

Viewing Direction
n/a

Photo 11

Date
August 29, 2021

Description
Final installation view

Viewing Direction
Facing Northwest

Photo Log – Thermistor 2

Photo 1

Date
Aug 27, 2021

Description
Thermistor 2 – start of excavation

Viewing Direction
Facing north

Photo 2

Date
Aug 27, 2021

Description

Typical soil stratigraphy in upper 1.5 m. Very little waste materials

Viewing Direction
Facing East

Photo 3

Date
August 27, 2021

Description
Excavation to final depth 3 mbg showing soil stratigraphy and minor domestic waste at depth.

Viewing Direction
Facing West

Photo 4

Date
August 27, 2021

Description
View of 3 m long 2” O.D. thermistor casing prior to backfill.

Viewing Direction
Facing West

Photo 5

Date
August 27, 2021

Description
Removal of Temp 4” O.D. – 3.05 m grey pipe protective casing installed for thermistor casing installation

Backfilling excavation final completion of the 2” O.D. PVC thermistor casing installation

Viewing Direction
Facing North

Photo 6

Date
August 27, 2021

Description
Final completion of the 2” O.D. PVC thermistor casing. Installation of the thermistor string (blue cable). Sand was placed within the PVC thermistor casing to house the thermistor string

Viewing Direction
Facing Southeast

Photo 7

Date
August 27, 2021

Description
Final completion of the 2” O.D. PVC thermistor casing installation with sand and bentonite seal. Protective steel casing mounted and installed

Viewing Direction
Facing Northwest

Photo 8

Date
August 27, 2021

Description
Final casing installation

Viewing Direction
Facing Northeast

Photo 9

Date
August 29, 2021

Description
Data logger installed to Thermistor cables, tested and locked

Viewing Direction
n/a

Photo Log – Thermistor 3

Photo 1

Date
Aug 26, 2021

Description
Thermistor 3 – start of excavation

Viewing Direction
Facing South

Photo 2

Date
Aug 26, 2021

Description
Excavation to final depth 3 mbg showing soil stratigraphy and minor shallow fill. Temp 4" O.D. – 3.05 m grey pipe protective casing installed for thermistor casing installation

Viewing Direction
Facing North

Photo 3

Date
August 26, 2021

Description
View of 3 m long 2” O.D. thermistor casing prior to backfill.

Viewing Direction
Facing East

Photo 4

Date
August 27, 2021

Description
Thermistor installation - 4” O.D. – 3.05 m grey pipe was used as casing with 2” O.D. PVC thermistor casing installed

Viewing Direction
Facing East

Photo 5

Date
August 26, 2021

Description
Backfilling excavation with protective casing prior to removal and final completion of the 2” O.D. PVC thermistor casing installation

Viewing Direction
Facing Northwest

Photo 6

Date
August 26, 2021

Description
Protective casing was removed and final completion of the 2” O.D. PVC thermistor casing installation with sand and bentonite seal

Viewing Direction
Facing West

Photo 7

Date
August 26, 2021

Description
Final completion of the 2” O.D. PVC thermistor casing installation with sand and bentonite seal. Installation of the thermistor string (blue cable). Sand was placed within the PVC thermistor casing to house the thermistor string

Viewing Direction
Facing Northwest

Photo 8

Date
August 26, 2021

Description
Installation of Thermistor string (blue cable) downhole in 2” OD PVC casing. Protective steel casing mounted and installed

Viewing Direction
Facing West

Photo 9

Date
August 26, 2021

Description
Final casing installation and backfilling. Thermistor 1 in the background

Viewing Direction
Facing Northwest

Photo 10

Date
August 29, 2021

Description
Data logger installed to Thermistor cables, tested and locked

Viewing Direction
n/a

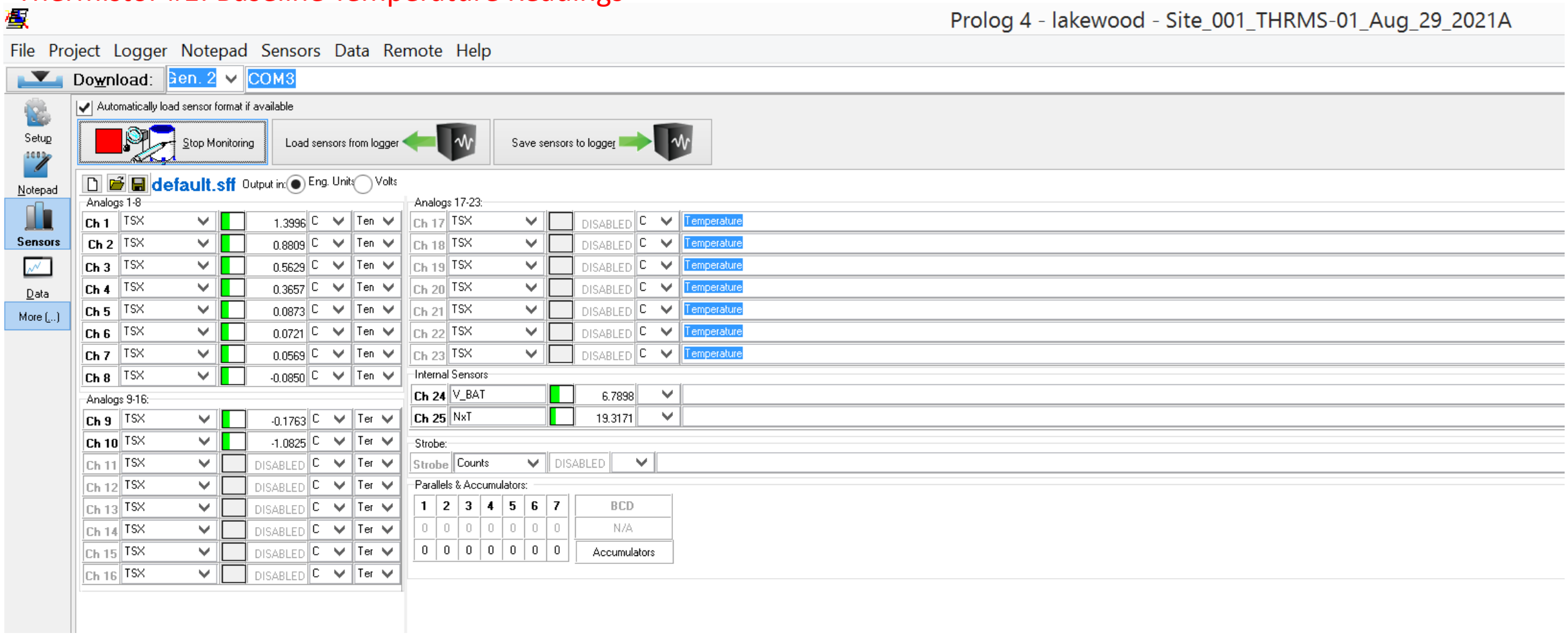
Photo 11

Date
August 29, 2021

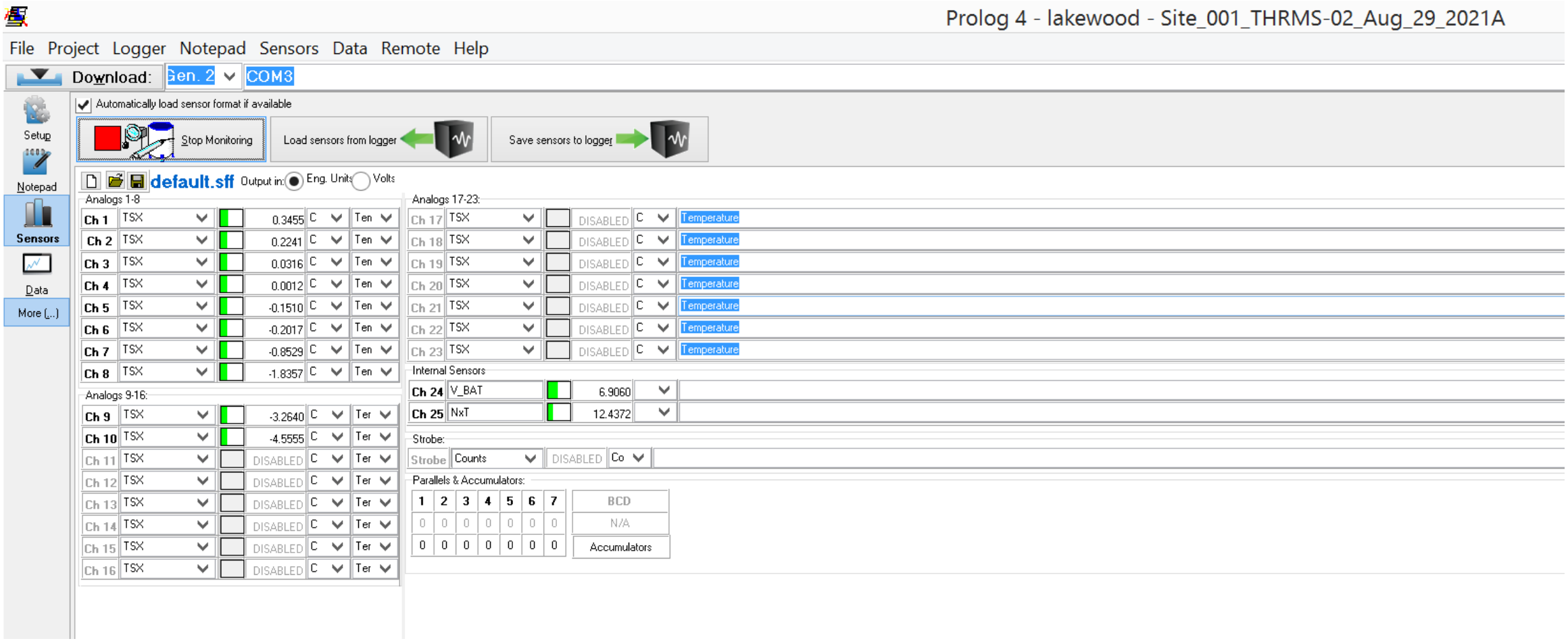
Description
Finished installation of Thermistor 3

Viewing Direction
Facing Northwest

Thermistor #1: Baseline Temperature Readings



Thermistor #2: Baseline Temperature Readings



Thermistor #3: Baseline Temperature Readings