APPLICATION FOR AMENDMENT OF APPROVAL NO.: 10348-03-00, AS AMENDED

LATERAL EXPANSION OF THE RYLEY HAZARDOUS WASTE LANDFILL AND TRANSFER FACILITY

PREPARED BY

TETRA TECH

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ISSUED FOR USE
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LIMITATIONS OF REPORT

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1.0 INTRODUCTION

Clean Harbors Canada, Inc. (Clean Harbors) owns and operates the Ryley Hazardous Waste Storage Facility and Landfill located in Ryley, Alberta (AB) (the Ryley Facility). The Ryley Facility, under the initial ownership and operation of Newalta Environmental Services Ltd. (Newalta) from 1989 until 1991, was constructed to the existing Alberta Environment (AENV) specifications required for a Class 1 landfill, designed to accept hazardous materials from off-site sources. Laidlaw Environmental Services Ltd. (Laidlaw) purchased the Ryley Facility from Newalta in 1991 and, in 1992, completed construction and opened for operation. Following extensive consultation and completion of an Environmental Impact Assessment (EIA) (AXYS Environmental Consulting Ltd. 1995), Laidlaw received approval to amend the license to operate and expand the Ryley Facility as a Class 1 landfill. The Ryley Facility was purchased from Laidlaw by Safety Kleen in 1998. In 2002, Clean Harbors acquired Safety Kleen and continues to operate the Ryley Facility under Alberta *Environmental Protection and Enhancement Act* [EPEA] Approval No. 10348-03-00 (the Current Approval), as amended (Appendix B).

This report comprises an application for amendment of the current Approval for lateral expansion of the Ryley Facility (presently confined to SE-09-050-17 W4M) to include NE-09-050-17 W4M (the Project), and to construct and operate a new landfill cell (i.e., Cell 5) and associated infrastructure (e.g., access roads, waste receiving and stabilization area). Primary amendments to the Current Approval include development of a centrally located waste receiving and stabilization area outside of a Class I Landfill Cell, and construction of new Class I Landfill Cells below the native ground surface. Secondary amendments to the Landfill Operations Plan are provided to accommodate the proposed change in operation of the waste receiving and stabilization area, access roads and other general administration.

This application has been prepared in general accordance with the *Guide to Content for Industrial Approval Applications*– Part 3 Amendments (the Guide) (Government of Alberta 2014) (Table 1).

Table 1: Cross-Reference of Applicable Sections of the Guide and the Application

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2.0 APPLICANT IDENTIFICATION

2.1 Applicant and Authorized Agent

The Applicant is:

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2.2 Statement of Confirmation

I certify that I am familiar with the information contained in this application and enclosures, and that to the best of my knowledge and belief, such information is true, complete and accurate.

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2.3 Facility Address

The address for the Ryley Facility is:

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3.0 FACILITY IDENTIFICATION

3.1 Description of Main Activities

The Ryley Facility operates as a landfill and waste transfer facility that handles hazardous waste and, therefore is designated under Schedule 1, Division 1 of the *Activities Designation Regulation* of the Environmental Protection and Enhancement Act. Similarly, the proposed lateral expansion includes the development of additional hazardous waste landfill cells and associated infrastructure. There are no proposed amendments to the general design or operation of the Ryley Facility associated with this lateral expansion. Consequently, the proposed lateral expansion of the Ryley Facility is similarly defined under Schedule 1, Division 1 of the *Activities Designation Regulation*.

3.2 Facility Location

The Ryley Facility is located in SE 9-50-17 W4M, within the municipal boundaries of the Village of Ryley, AB at 53°18’1.43” N, 112°25’21.07” W (Figure 1).

The proposed lateral expansion includes all land within NE 9-50-17 W4M at 53°18’16.46” N, 112°25’25.24” W (Figure 2) (the Project Footprint).

3.3 Receptors, Setbacks and Site Suitability

The Project Footprint includes all lands within which landfill and waste handling/storage activities may occur (Figure 2), to be developed as required outside of the setback distances prescribed under Section 2.1(a) of the *Standards for Landfills in Alberta* (Government of Alberta 2010) and Section 13 of the *Subdivision and Development Regulation* of the Municipal Development Act (Figure 3).

A *Detailed Technical Investigation Program Report* was completed for the Project which concluded that the Project Footprint is suitable for landfill development in accordance with the *Standards for Landfills in Alberta* (Government of Alberta 2010) (Appendix C).

3.3.1 Slope Stability

Terrain within the Project Footprint is level to gently undulating; there is no evidence that the Project Footprint is located on lands subject to slope failure.

3.3.2 Waterbodies

Numerous ephemeral, temporary and seasonally inundated waterbodies (i.e., wetlands and drainages) of natural origin are located within and adjacent to the Project Footprint; there are no permanent waterbodies of natural origin (i.e., lake, river or creek) encountered by or within 300 m of the Project Footprint (Section 5.1.1 and 5.1.2).

Although several dugouts are encountered by, or located within 300 m of the Project Footprint, there are no man-made surface features that permanently contain surface water (i.e., irrigation canals or drainage ditches) located within 300 m of the Project Footprint.

None of the natural areas or man-made surface features encountered by or located within 300 m of the Project Footprint are considered to permanently contain water.

3.3.3 Residences

The Ryley Facility, including the Project are located within the municipal boundary of the Village of Ryley. Rural residences in closest proximity to the Project have the following legal locations and distances to the Project Footprint (Figure 2):

- 07-16-050-17 W4M: 450 m north; and
- 13-10-050-17 W4M: 450 m east.

3.3.4 Other Receptors

The Beaver Municipal Solutions Landfill is located adjacent to the east of the Ryley Facility in NW 10-50-17 W4M; setback of the Project Footprint from the Beaver Municipal Solutions Landfill is not required.

3.4 Facility Capacity

Under the current Approval (10348-03-00) and associated amendments, the Ryley Facility functions as a hazardous waste transfer facility and secure landfill with an approved storage capacity of approximately 2,494,855 m^3. The currently approved landfill cells are referred to as Cells 1, 2, 3A, 3B, 3C. 3D, 3E and 4.

According to current annual rates of landfill capacity depletion, Clean Harbors anticipates that the existing Ryley Facility will achieve its anticipated total landfill capacity by 2023. To meet the projected market demand for landfill disposal of hazardous material for the continued operation of the oil and gas, chemical and heavy manufacturing sectors, Clean Harbors is seeking approval to expand the landfill capacity of the Ryley Facility to occupy the area located immediately north of the current site boundary.

Although Clean Harbors is applying to AEP for an overall authorization to receive and store hazardous waste throughout NE 09-050-17W4M (i.e., lateral expansion), the present application specifically proposes the construction of:

- a new Class I Landfill Cell (i.e., Cell 5);
- associated staging areas, scale and access roads;
- waste receiving and stabilization area; and
- surface water management infrastructure.

The proposed construction of Cell 5 will increase the landfill capacity by approximately 508,670 m^3, producing a cumulative planned storage capacity of the Ryley Facility of approximately 3,003,525 m^3. Up to 6 additional landfill cells are conceived within the remaining areas of NE 9-50-17 W4M, however their specific footprint, capacity and design have not yet been determined and will be addressed in future applications for amendment to the Current Approval as required (Section 4.6).

4.0 PROJECT BACKGROUND

4.1 Regional Initiatives or Plans

The Ryley Facility and Project Footprint are located within the North Saskatchewan Planning Region designated pursuant to the *Alberta Land Stewardship Act*. A Regional Plan has not yet been developed for the North Saskatchewan Planning Region (Government of Alberta 2016).

Since the Project is located within the municipal boundary for the Village of Ryley, development within the Project Footprint is subject to the Ryley *Municipal Development Plan*. Clean Harbors will obtain all necessary municipal permits prior to commencing construction within the Project Footprint.

4.2 Results or Decisions that Modify Environmental Requirements

Since the Ryley Facility does not operate as a component of the resource development sector, hearings in support for authorization from the Alberta Energy Regulator (AER), the Alberta Utilities Commission (AUC), or the Natural Resources Conservation Board (NRCB) are not required.

At the time of its initial review and authorization, the Ryley Facility was not subject to the *Canadian Environmental Assessment Act* and, therefore, was not subject to any associated hearings or other authorizations.

Under municipal authority, a public hearing was held on May 31, 2012 to address applications by the Facility for changes to the Beaver County Land Use Bylaw and Municipal Development Plan as well as to the Beaver County and Village of Ryley Intermunicipal Development Plan. Written and verbal submissions were made regarding the Ryley Facility, upon which Clean Harbors requested that Beaver County and the Village of Ryley delay review of the applications until they could address issues raised at the Hearing related to dust, odour, real estate values, community support (financial) and communication with the stakeholders of the area.

Following the public hearing, meetings were held with neighboring residents, citizen groups (i.e., the Ryley Public Advisory Committee), as well as Beaver County and Village of Ryley administrators, to address and resolve concerns that were previously identified. Senior management for the Ryley Facility were present at many of these meetings including a Public Meeting held October 10, 2012 at which the proposed development of the existing site and the expansion to the NE 9-50-17 W4M was available for review and questions regarding these proposals and the company's intentions were answered. An Open House was held by Clean Harbors on September 11, 2013 at which interested attendees were taken on tours of the Ryley Facility and landfill.

As a result of these meetings and others with AEP, several actions were implemented to address the concerns:

- Clean Harbors increased its level of community support and funding through the creation of an annual Community Enhancement Donation and the implementation of a quarterly hosting fee payment based on the tonnage landfilled during each calendar quarter.
- Clean Harbors and the Village of Ryley created a Liaison Committee composed of two Village Council members, four Village residents, and a Clean Harbors representative. The Liaison Committee meets on a quarterly basis to address landfill and business updates/information. The last meeting during which the proposed lateral expansion was addressed was held on June 13, 2017.
- Negotiations have been undertaken to resolve concerns regarding property values on a case by case basis, and may continue as required.
- Clean Harbors embarked on an aggressive landfill capping program to reduce concerns over fugitive emissions of dust and odour as well as improving the appearance of the Ryley Facility.

- The Ryley Facility implemented a Fugitive Dust and Odour Best Management Plan (BMP) that defined the procedures that were in place to manage these issues. The Fugitive Dust and Odour BMP included the use of cover material, the positioning and use of units for the dispersion of odour reducing chemicals and the application of water to reduce dust emissions.

In October of 2013, Beaver County approved the changes to the Land Use Bylaw and the Municipal Development Plan as requested by Clean Harbors in 2012 and in conjunction with the Village of Ryley, Council approved the change to the Intermunicipal Development Plan.

Subsequent Open Houses were held by Clean Harbors on June 9, 2014, June 17, 2015, June 15, 2016 and June 15, 2017, during which time story boards depicting the lateral expansion to NE 09-050-17 W4M were provided and staff were available to answer questions. Attending stakeholders did not voice any significant concerns at the time of the Open Houses.

4.3 Environmental Impact Assessment

4.3.1 Alberta Environment and Parks

Pursuant to Schedule 1 of the EPEA *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, the development of a “landfill that accepts hazardous waste from an off-site source” is considered an activity for which an EIA must be conducted prior to receiving approval from AEP.

Clean Harbors submitted a Project Summary Table for review and consideration as to the requirement for preparation of an EIA; following completion of its review, AEP determined that an EIA would not be required for lateral expansion of the Ryley Facility (Appendix D).

4.3.2 Canadian Environmental Assessment Agency

Increase of landfill capacity associated with the Project Footprint will result in an increase of more than 50% of the currently operating capacity of the Ryley Facility. Consequently, the Project is considered to be a Designated Project subject to Section 31 of the federal *Regulations Designating Physical Activities*. Clean Harbors submitted a Project Description for review and consideration as to the requirement for preparation of an EIA; following completion of its review, the Canadian Environmental Assessment Agency determined that an Environmental Impact Statement would not be required for lateral expansion of the Ryley Facility (Appendix E).

4.4 Other Regulatory Authorizations

There are no other authorizations, issued by the Alberta Energy Regulator, the Alberta Utilities Commission or the Natural Resources Conservation Board, which must be obtained for the development of Cell 5 or associated infrastructure.

Clean Harbors has obtained “Clearance” subject to the Alberta *Historical Resources Act* (Appendix F).

Numerous waterbodies are located within the Project Footprint. Given the nature of construction activities within the Project Footprint, the Project is likely to impact waterbodies that overlap with landfill cells or other Project infrastructure. Clean Harbors will obtain authorization pursuant to the Alberta *Water Act* as proposed impacts to waterbodies are determined on a case-by-case basis. Presently, construction of Cell 5 and associated Project infrastructure is anticipated to require an Approval under the Alberta *Water Act* for removal of wetlands and diversion of flow paths that would otherwise flow into the Project Footprint.

The Project Footprint is located on privately held lands under title to Clean Harbors. Furthermore, there are no waterbodies within the Project Footprint that are considered to be naturally occurring and permanent; however

numerous temporary and seasonal waterbodies (i.e., wetlands) occur. Consequently, there are no dispositions or other authorizations subject to the Alberta *Public Lands Act* necessary for construction or operation of the Project. Furthermore, as the Project Footprint is not located on Crown Land, clearing of trees within the Project Footprint is not subject to the Alberta *Forests Act*.

Emissions of greenhouse gases associated with the operation of the Ryley Facility are considered to be negligible, primarily associated with the operation of diesel-powered machinery. As the associated output of greenhouse gas emissions are significantly less than 100,000 tonnes of CO_2 equivalent, the Ryley Facility is not considered to be a Specified Gas Emitter and is therefore not subject to the Alberta *Climate Change and Emissions Management Act*.

Clean Harbors will construct and operate the Project in such a manner as to minimize the risk of mortality to wildlife. Consequently, authorizations pursuant to the Alberta *Wildlife Act*, the federal *Species at Risk Act* and the federal *Migratory Birds Convention Act* are not anticipated.

Since the Ryley Facility is located within the Village of Ryley, a development permit must be obtained pursuant to the Village of Ryley *Land Use Bylaw* (No. 2010-889). This permit will be obtained subsequent to this Approval, but prior to any construction activity within the Project Footprint.

4.5 Financial Security

The additional financial security necessary for closure and post-closure requirements for the addition of Cell 5 and the expanded site boundary is $1,784,424.37. Cumulatively, total financial security necessary for closure and post-closure requirements of the Ryley Facility, including Cell 5 and additional infrastructure (e.g., stormponds), is currently estimated to be $13,315,304.55 (Appendix G).

Pending approval of the current application, and confirmation of status capping status of other currently active landfill cells, Clean Harbors will update the associated financial security, to be verified in writing to AEP prior to commencement of construction of Cell 5.

4.6 Project Timelines, Milestones, and Consultation

Pending determination of final capacity under a full-build scenario, and depending on rates of airspace depletion over the cumulative operation of the Ryley Facility, landfill activities within the Project Footprint are anticipated to occur over a period of at least 40 years.

Timelines and milestones for construction, operation and closure of the components of the Ryley Facility are provided in Table 2.

Table 2: Timelines and Milestones for Components of the Ryley Facility

Landfill Cell	Duration of Construction (Anticipated)	Duration of Operation (Anticipated)	Date of Interim Closure (Anticipated)
Cell 5 (Proposed)	2022	2023 – 2028	2029
Cell 6 (Conceptual)	2026	2027 - 2032	2033
Cell 7 (Conceptual)	2030	2031 - 2036	2037
Cell 8 (Conceptual)	2034	2035 - 2040	2041
Cell 9 (Conceptual)	2038	2039 - 2044	2045
Cell 10 (Conceptual)	2042	2043 - 2048	2049
Cell 11 (Conceptual)	2046	2047 - 2052	2053
Cell 12 (Conceptual)	2050	2051 - 2056	2057

4.7 Consultation

Clean Harbors conducts quarterly public consultation with the Ryley Community Liaison Committee, as well as annual mail-outs to the local community, providing a formal environment for the discussion of operations, revenue and future development, as well as community concerns and investment. Although individual complaints or concerns are not resolved through the Liaison Committee, as these are addressed on a case by case basis through the complaint telephone line, systemic or fundamental problems are acknowledged with potential for discussion of their respective status and/or procedure for resolution. To date, Clean Harbors' participation in the Liaison Committee has been instrumental for the maintenance of a positive relationship with the Village of Ryley.

In addition to its participation in the Liaison Committee, Clean Harbors' hosts an annual Open House, typically scheduled in June or July of every year. The most recent open house was held at the Ryley Facility on June 15, 2017. This meeting was attended by 34 registered guests and some who did not sign the registry. Clean Harbors personnel and the consultant were available to answer questions regarding the facility operations, monitoring activities and the proposed lateral expansion. Attendees were invited to tour the site with the General Manager who described the facility operations and answered any questions raised by the attendees during the tour. Information boards were displayed at the gathering area describing the facility's operation, environmental monitoring activities, regulatory process and Cell 5 expansion. The north quarter expansion was shown on the information boards and discussed by the General Manager and the consultant with the attendees, as it has been at previous open houses.

Finally, Clean Harbors maintains a public complaints telephone line for immediate reporting of issues identified by local stakeholders. Upon notification of a complaint, Clean Harbors' initiates an investigation as to the source of the issue, and potential measures for its resolution or mitigation. Clean Harbors' reports all issues and their applicable resolution/mitigation as required under the Current Approval.

A Disclosure Plan providing specific details on the history of consultation regarding the proposed lateral expansion, and plans for future public consultation is provided in Appendix H.

5.0 SETTING AND ENVIRONMENTAL CONDITIONS

5.1 Pre-Disturbance Setting and Condition

The following subsections include information related to the pre-disturbance setting and potential environmental effects as they may apply to the general development of the Project Footprint and specifically, the construction and operation of Cell 5 and associated infrastructure.

5.1.1 Hydrological Conditions

Drainage

The Ryley Facility and Project Footprint are located in the Beaverhill Lake basin. Under existing (i.e., pre-disturbance) conditions, run-off within the Project Footprint would flow north (Figure 4).

Generally, the Project Footprint is level and poorly drained; surface run-off would likely occur only during very wet periods when there is sufficient water to fill the isolated closed depressions to an overflow level. Analysis of LiDAR elevation data acquired in August 2009 indicates that when water levels achieve spill-over elevations at depressions in the Project Footprint, surface water would generally flow northward (Figure 5). An abandoned railway bed bisects the Project Footprint, restricting the northward flow of surface water to a culvert crossing near the eastern boundary of the expansion area.

On the south side of the abandoned railway bed, a large closed depression occupying an area of approximately 13 hectares (ha) at an elevation of 687.0 m[1,2]. Water would need to fill to an elevation higher than this for surface water outflow to occur.

Local run-off from the north side of the railway embankment flows to two outlets: (1) at the west side of the property where a north-flowing drainage exists on the adjacent property, and (2) at the north east corner of the property where a north-south culvert is installed under Township Road 50-2. Based on the bottom elevations of the associated ditches, surface outflow at the NE outlet should initiate at a water level of about 685.0 m; water levels would spill over Township Road 50-2 at an elevation of approximately 685.7 m.

Surface Water Chemistry

Clean Harbors annually samples all dugouts and water wells located within a 1.6 km radius of the Ryley Facility and considered to be in use as part of its Approval conditions. Target dugouts and wells were identified during the baseline sampling program completed during the fall of 1996 and have been subsequently reviewed annually. To date, there are no contaminant levels in the data that indicate off-site release from the site to dugouts through groundwater or surface water within the 1.6 km radius study area and that the Ryley Facility is not adversely impacting dugouts within that radius (Appendix I).

Clean Harbors is committed to continue monitoring surface water quality parameters and addressing any detected exceedances in accordance with the conditions of the current and future Approval. Based on the increased spatial footprint associated with the Project, additional dugouts located in NW 15 and NE/NW 16-50-17 W4M will be located within the sampling radius of 1.6 km from the Project Footprint. Subsequent to this Approval Amendment, Clean Harbors will engage with the associated landowners and, pending landowner approval, shall include the additional sampling locations in the dugout sampling program for the year prior to commencement of landfill and waste handling activities in the Project Footprint.

5.1.2 Geological and Hydrogeological Conditions

Regional Hydrogeology

The Ryley area has two types of aquifers: bedrock and surficial deposits (Hydrogeological Consultants Ltd., 1999).

[1] Water balance information for the site was determined by review of (1) climate, runoff, and water balance mapping presented in the Hydrologic Atlas of Canada (1978), (2) Environment Canada precipitation data for Edmonton International Airport, (3) computed shallow lake evaporation data published by Alberta Environment for various stations including Edmonton International Airport and Lacombe, and Water Survey of Canada streamflow records.

Climate and computed evaporation data for the Edmonton International Airport (EIA) was used to characterize site conditions. Mean annual precipitation at the EIA is expected to be up to 10% greater than at Ryley, and evapotranspiration is expected to be slightly lower than at Ryley. Design rainfall events were based on Environment Canada Intensity Frequency Duration relationships for Edmonton Municipal Airport, which has a relatively long period of record for short-interval rainfall data and yields rainfall intensities which are conservatively high compared to other climate stations in the Edmonton-Ryley vicinity.

Key water balance parameters are summarized below.

- Annual precipitation, based on EIA records for 1961 to 2011, has ranged from 267 mm to 651 mm. Mean annual precipitation over this period was 455 mm.
- Alberta Environment Computed Shallow Lake Evaporation, based on EIA climate records for 1961 to 2009, has ranged from 604 mm to 759 mm. Mean annual shallow lake evaporation over this period was 672 mm
- Net annual evaporation (computed evaporation minus precipitation) for 1961 to 2009 has ranged from -43 m to 451 mm. Mean annual net evaporation over this period was 218 mm.

[2] All elevations are referenced to CGVD28 (Canadian Geodetic Vertical Datum of 1928).

Upper bedrock aquifers occur as sandstones and coal seams of the Belly River Group, Bearpaw Formation and Lower Horseshoe Canyon Formation. Individual wells completed within the Horseshoe Canyon Formation may be capable of yields in the range of 10 to 100 m^3/day. The apparent yields for wells completed in the Bearpaw Formation are less than 10 m^3/day. The Oldman Aquifer, part of the upper Belly River Group, has apparent yields of less than 10 m^3/day. Other members of the Belly River Group also have yields less than 10 m^3/day.

Surficial deposits include glacial till, glaciolacustrine, and minor glaciofluvial sediments. Water is sporadically produced from surficial deposits in Beaver County, however, these deposits are limited in areal extent.

Table 3 provides the stratigraphic units from ground surface to depth in the vicinity of the Ryley Facility.

Table 3: Stratigraphic Units in the Ryley Area

Stratigraphic Unit		Material/Lithology
Surficial Deposits		Glacial till, glaciolacustrine, and glaciofluvial sediments
Horseshoe Canyon Formation		Fluvial clayey sandstone, siltstone, and shale
Bearpaw Formation		Marine shale, siltstone, and minor sandstone
Belly River Group	Old Man River Formation	Sandstone, siltstone, shale, and coal deposits
	Continental Foremost Formation	Shale with minor amounts of sandstone
	Marine Foremost Formation	Sandstone and shale

Regional groundwater flow in the vicinity of Ryley is generally towards the northwest in the direction of Beaverhill Lake (Stein (1982)). There are no known major aquifers immediately beneath the Village of Ryley or the Ryley Facility and groundwater availability in the majority of wells reported as less than 10 m^3/day in the upper 90 m of bedrock (Horseshoe Canyon, Bearpaw Formation, and upper Belly River Group).

The groundwater chemistry within surface deposits was summarized by Hydrogeological Consultants Ltd. (1999) as being primarily two types: calcium-magnesium-bicarbonate type and sodium-sulphate type. Total dissolved solids (TDS) concentrations are primarily less than 1,500 mg/L but in areas where the groundwater has greater sodium and sulphate concentrations, the TDS concentrations are also greater. Dissolved iron is typically less than 1 mg/L and chloride is typically less than 250 mg/L in the surficial deposits.

Upper bedrock groundwater chemistry are primarily of two types: sodium-bicarbonate type and sodium-sulphate. TDS concentrations range from less than 500 mg/L to greater than 2,000 mg/L. Chloride concentrations are greater than 250 mg/L for approximately half of the County within the upper bedrock aquifers. Hydrocarbons and groundwater with TDS concentrations around 5,000 mg/L may be present in some permeable zones in the Belly River group.

Table 4 below summarizes the TDS and chloride concentrations of the Horseshoe Canyon, Bearpaw, and Belly River Group Formations as described by Hydrogeological Consultants Ltd. (1999).

Table 4: Upper Bedrock Groundwater Chemistry in Beaver County

Formation	Groundwater Types	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Comments
Horseshoe Canyon	Sodium-bicarbonate Sodium-sulfate Sodium-chloride	Less than 1,000 to greater than 2,000	Less than 100 to greater than 250	
Bearpaw		Mainly Less than 2,000	Mainly Less than 250	Chloride concentrations less than 250 mg/L in townships 049, 050, ranges 18 and 19, W4M
Old Man River		500 to 3,000	East of range 12, W4M is mainly less than 250 West of range 12, W4M is mainly greater than 250	Ryley Facility located west of Range 12 W4M
Continental Foremost	Insufficient data	1,000 to 3,000	Less than 100	
Marine Foremost		Less than 1,500	Less than 100	

Aquifers encountered in the vicinity of the Village of Ryley are not regionally prolific and are not considered exceptional aquifers[3] for water supply (i.e., >0.7 L/sec). Water supply wells in the vicinity of the Ryley Facility are primarily wells completed in the deeper bedrock, as shown in the water well database search. These wells are not considered to be producing water from exceptional aquifers.

Local Hydrogeology

Clean Harbors commissioned a comprehensive investigation of geological and hydrogeological conditions within the Project Footprint (Appendix C) in 2016. The following discussion provides a brief summary of the findings of that investigation.

Surficial soils within the Project Footprint have a discontinuous water table. Flow direction is generally north to northwest in the southern portion of the Project Footprint, however a southwestern gradient is observed in the northeast portion of the Project Footprint. The average groundwater elevation was 685.5 m.

Groundwater in the upper bedrock unit generally flows north to northeast. This unit is comprised of interbedded bedrock types, evident from apparently inconsistent water levels in the central and northeast portion of the Project Footprint indicative of mounding and depressional areas. The average groundwater elevation was 685.0 m.

Groundwater in the middle bedrock (i.e., clay shale) generally flows north with an average elevation (excluding the two deeper occurrences) of 683.7 m.

Groundwater in the lower bedrock unit indicates a relatively uniform northwest gradient across the Project Footprint with an average elevation of 678.9 m.

Vertical hydraulic gradients across the major units are generally downward, with the exception of two locations where upward hydraulic gradients were noted between the deep and middle bedrock units. Calculated vertical gradients within the Project Footprint were:

[3] For the purposes of this discussion, "Exceptional Aquifer" means a hydrostratigraphic unit with a transmissivity of greater than 2.5×10^{-3} m^2/sec yielding water with a total dissolved solids (TDS) concentration not exceeding 4000 mg/L. This is consistent with the definition used in the Standards for Landfills in Alberta

- 1.8 m/m downward between surficial soils and upper bedrock unit;
- From 0.4 m/m and 0.5 m/m downward between upper bedrock and middle bedrock units; and
- 0.2 m/m upward between middle and lower bedrock units.

A discontinuous water bearing zone is present in the clay till, and is associated with a more complicated water bearing zone in the upper bedrock due to the highly interlayered nature of this unit, and more consistent water bearing zones in the middle and deeper bedrock. Further, groundwater movement is not laterally persistent nor predictable over the larger areas. This is due to the variable nature of hydraulic conductivity values, the interbedding and the discontinuous nature of the sedimentary layers.

There is no evidence of direct connection between these groundwater bodies. The shallow and intermediate systems have a downward vertical gradient, however the deeper system (lower bedrock) exhibits variable upward and downward gradients. The hydraulic conductivity values are generally less than 10^{-8} m/s with occasional layers of greater hydraulic conductivity; vertical hydraulic conductivity values in both the upper and middle bedrock range between 9×10^{-10} m/s and 4×10^{-11} m/s. The shallowest zone is recharged by local infiltration, which may recharge the upper bedrock directly due to the relatively thin till presence.

The presence of relatively shallow groundwater beneath the Project Footprint (less than 5 m depth in eight of the wells monitored in June 2016) indicates that groundwater management may be required during construction. Additional details regarding considerations for design of landfill cells, monitoring and management of groundwater are included in Appendix C.

Groundwater Chemistry

Groundwater monitoring has been conducted regularly since the Ryley Facility was constructed. Currently the groundwater monitoring program is conducted on an annual basis typically in the spring (May/June) of each year. The groundwater chemistry results from the latest annual groundwater monitoring report (Appendix J) indicate that:

- The natural groundwater type is sodium sulphate and natural mineralization accounts for high concentrations of sodium, sulphate, and TDS concentrations in groundwater at the facility.
- Dissolved metal and routine parameters are within historical ranges, there are no notable changes to overall chemical quality of the groundwater.
- PAHs detected at MW26B in 2015 were not detected in 2016. Other wells sampled for PAHs had no detections.
- There are no indications of groundwater impacts from the Ryley Facility, based on the parameters measured as part of the current Approval.

Clean Harbors is committed to continue monitoring groundwater water quality parameters and addressing any detected exceedances in accordance with the conditions of the current Approval. Based on the increased spatial footprint associated with the Project, Clean Harbors will expand its monitoring program to include those monitoring wells that have been advanced within the Project Footprint for the year prior to commencement of landfill and waste handling activities in the Project Footprint.

5.1.3 Ambient Air Quality

Construction of landfill cells and associated infrastructure will result in emissions from the operation of heavy machinery and release of dust from soil handling. These emissions are anticipated to be low in magnitude and isolated to the construction phase of the Project

The proposed development of the site will comprise the operation of cells in a similar manner to that which has occurred previously: It is not anticipated that more cells will be "open" at any given time. Also, the nature of the wastes to be landfilled are unlikely to change from present conditions. We can conclude, therefore, that no additional emissions will be generated as the site develops.

Air quality monitoring is currently conducted at three locations in the area, including the administration building at the Ryley Facility (PM_{10}) and at the Ryley school (PM_{10}) and the Ryley Lift Station (PM_{10}, VOCs and total non-methane hydrocarbon [TNMHC]). Given that construction and operating conditions are not anticipated to change from that which occurs under the current operation of the Ryley Facility, additional air quality monitoring stations are not warranted at this time. However, Clean Harbors is committed to continue monitoring the air quality under the approved program and to address detected exceedances in accordance with the conditions of the current and future Approval.

5.1.1 Soils, Terrain, and Land Use

The undisturbed upland soils around the Ryley Facility are composed predominantly of Black Solodized Solonetz (Camrose soil series [CMO]) developed in fine loamy textured till. These soils are naturally saline and sodic (Howitt, R.W. et al. 1988). Published soil series data (Pedocan Land Evaluation Ltd., 1993.) relating to salinity is provided in Table 5.

Table 5: Published Soils Data for Camrose Soil Series

Horizon	Depth (m)	pH	Electrical Conductivity (dS/m)	Sodium Absorption Ratio
Ap (Topsoil)	0.0-0.18	5.4-6.5	0.4-6.8	2.6-9.3
Bnt/Bntgj	0.18-0.36	7.0-7.5	0.5-6.9	6.3-40.4
Csk/Cskgj	0.36-1.8	7.8-8.2	0.8-12.9	7.3-35.1

To ensure adequate characterization of site-specific conditions prior to construction, Clean Harbors will conduct baseline soil sampling and characterization as part of the pre-construction soil management and handling plan. This will be completed concurrently with the development of landfill cells and associated infrastructure within the Project Footprint. Furthermore, Clean Harbors is committed to continue monitoring soil parameters and addressing any detected exceedances in accordance with the conditions of the current Approval, with additional soil monitoring locations to be included for the Project Footprint during the next soil monitoring event.

5.1.2 Biological Resources

5.1.2.1 Vegetation

Vegetation within the Project Footprint consists predominantly of cultivated lands, seeded pasture, ephemeral waterbodies and wetlands as well as a remnant stand of deciduous woodland (Figure 6). A reconnaissance survey was completed for the Project Footprint on June 14 and 15, 2016. Seeded pasture was typically characterized by introduced forage species including Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*) and clover species (*Trifolium* spp.) (Photo 1). Ephemeral waterbodies were only detected in cultivated areas, and were predominantly characterized by areas of increased bare soil relative to the surrounding fallow field areas (Photo 2).

Wetlands consisted of temporary and seasonal freshwater marshes. Where not entirely affected by cultivation practices, temporary freshwater marshes were characterized by tufted hairgrass (*Deschampsia caespitosa*), wire rush (*Juncus balticus*) and sedges (*Carex* spp.) (Photo 3). Similarly, where seasonal freshwater marshes have not

been previously affected by cultivation practices, characteristic vegetation is typically dominated by sedges, slough grass (*Beckmannia syzigachne*) and water smartweed (*Polygonum amphibium*) (Photo 4). Remnant deciduous woodland was dominated by aspen (*Populus tremuloides*), prickly rose (*Rosa acicularis*) and Kentucky bluegrass (Photo 5).

No Vegetation Elements (i.e., vascular plant species and ecological communities) of Conservation Concern[4] have been reported within 5 km of the existing Ryley Facility or the Project Footprint (AEP 2015a). Remaining habitat areas within the Project Footprint (i.e., ephemeral waterbodies, wetlands and deciduous woodland) have potential to support VECC. An early season rare plant survey was completed within the remnant area of deciduous woodland at the time of the reconnaissance survey. A total of 46 species were detected during the early season rare plant survey. There were no VECC detected at the time of the survey (Table 6).

[4] Vegetation Elements of Conservation Concern are considered to be:

- Species listed as 'Threatened' or 'Endangered' under the Alberta *Wildlife Act*;
- Species listed as 'Special Concern,' 'Threatened' or 'Endangered' under the Alberta Endangered Species Conservation Committee (Government of Alberta 2015a);
- Species listed as 'Special Concern,' 'Threatened' or 'Endangered' under Schedule 1 of the federal *Species at Risk Act*;
- Species listed as 'Special Concern,' 'Threatened' or 'Endangered' according to the Committee on the Status of Endangered Wildlife (Government of Canada 2016);
- Vascular plant species and ecological communities listed as 'Tracked' or 'Watched' on the Alberta Conservation Information Management System List of Tracked and Watched Elements (Allen 2014, Government of Alberta 2015b).

Table 6: Vegetation Species Detected During the Reconnaissance and Early Season Rare Plant Survey

Common Name	Scientific Name	Common Name	Scientific Name
TREES AND SHRUBS		**FORBS AND SUBSHRUBS CONT'D**	
aspen	*Populus tremuloides*	Canada anemone	*Anemone canadensis*
Cotoneaster sp.	*Cotoneaster sp.*	clover species	*Trifolium spp.*
narrow-leaved meadowsweet	*Spiraea alba*	common dandelion	*Taraxacum officinale*
northern gooseberry	*Ribes oxyacanthoides*	common fireweed	*Chamerion angustifolium*
prickly rose	*Rosa acicularis*	common pepper-grass	*Lepidium densiflorum*
red-osier dogwood	*Cornus stolonifera*	common yarrow	*Achillea millefolium*
saskatoon	*Amelanchier alnifolia*	cream-colored vetchling	*Lathyrus ochroleucus*
snowberry	*Symphoricarpos albus*	dewberry	*Rubus pubescens*
western mountain-ash	*Sorbus scopulina*	greenish-flowered wintergreen	*Pyrola chlorantha*
wild red raspberry	*Rubus idaeus*	heart-leaved Alexanders	*Zizia aptera*
GRASSES, SEDGES AND RUSHES		lamb's-quarters	*Chenopodium album*
common tall manna grass	*Glyceria grandis*	large-flowered stickseed	*Hackelia floribunda*
hairy chess	*Bromus commutatus*	long-stalked chickweed	*Stellaria longipes*
Kentucky bluegrass	*Poa pratensis*	northern bedstraw	*Galium boreale*
purple oat grass	*Schizachne purpurascens*	northern fairy candelabra	*Androsace septentrionalis*
sedges	*Carex spp.*	slender blue beardtongue	*Penstemon procerus*
slough grass	*Beckmannia syzigachne*	sneezewort yarrow	*Achillea ptarmica*
smooth brome	*Bromus inermis*	star-flowered Solomon's-seal	*Maianthemum stellatum*
tufted hairgrass	*Deschampsia caespitosa*	sweet coltsfoot	*Petasites frigidus var. frigidus*
wire rush	*Juncus balticus*	veiny meadow rue	*Thalictrum venulosum*
wood bluegrass	*Poa nemoralis*	water smartweed	*Polygonum amphibium*
FORBS AND SUBSHRUBS		wild strawberry	*Fragaria virginiana*
alpine hedysarum	*Hedysarum alpinum*	wild vetch	*Vicia americana*
arrow-leaved coltsfoot	*Petasites frigidus var. sagittatus*	yellow avens	*Geum aleppicum*

5.1.2.2 Wildlife

The Project Footprint contains areas of intact vegetation (i.e., wetlands, seeded pasture and remnant woodlands) that are likely to provide habitat for wildlife such as amphibians, migratory birds, ungulates, small rodents, rabbits and small canines.

Clean Harbors staff have anecdotally noted the presence of Coyote (*Canis latrans*), Fox (*Vulpes vulpes*) and Deer (*Odocoileus* sp.) within the Project Footprint. Small mammals of the rodent family (Muridae), as well as white-tailed jackrabbit (*Lepus townsendii*), are likely to be abundant within the Project Footprint. The range of three species of bats overlaps with the Project Footprint, including: little brown bat (*Myotis lucifigus*), big brown bat (*Eptesicus fuscus*), and hoary bat (*Lasiurus cinereus*). There are no habitat features (i.e., structures, caves, cliffs, overhangs or large diameter trees) within the Project Footprint that are likely to provide roost or den sites for bat species.

Numerous wildlife species of management concern (SOMC) are considered to have potential habitat in the surrounding areas, or may temporarily pass through the Project Footprint[5]. Previously identified occurrences encountered within a 5 km buffer of the existing facilities identified within the AEP Fish and Wildlife Management Information System (Government of Alberta 2015b) include:

- Barn Swallow (*Hirundo rustica*);
- Green-winged Teal (*Anas crecca*);
- Least Flycatcher (*Empidonax minimus*);
- Northern Pintail (*Anas acuta*);
- Sora (*Porzana carolina*); and
- Swainson's Hawk (*Buteo swainsoni*).

A reconnaissance wildlife survey was conducted within the Project Footprint on June 29, 2016. Of the 36 species detected within the Project Footprint, five are considered to be Species of Management Concern (Table 7). In addition to the four nests that were detected in areas of remnant woodland, ground nesting species were also considered to be likely to be encountered within areas of improved pasture and wetlands (Table 7).

[5] Wildlife SOMC include the following:

- Species listed as 'Threatened' or 'Endangered' under the Alberta *Wildlife Act*;
- Species listed as 'Special Concern,' 'Threatened' or 'Endangered' under the Alberta Endangered Species Conservation Committee (Government of Alberta 2015a);
- Species listed as 'Special Concern,' 'Threatened' or 'Endangered' under Schedule 1 of the federal *Species at Risk Act*;
- Species listed as 'Special Concern,' 'Threatened' or 'Endangered' according to the Committee on the Status of Endangered Wildlife (Government of Canada 2016);
- Species listed as 'Sensitive,' 'May Be At Risk' or 'At Risk' according to the General Status of Alberta Wild Species (GSAWS; Government of Alberta 2010b); or
- Species with provincial and/or federal restricted activity dates or setback distances (Government of Alberta 2011; Environment Canada 2011).

Table 7: Wildlife Species Detected Within the Project Footprint

Common Name	Scientific Name	Number Detected	SOMC	Status	Detected Feature
AMPHIBIANS					
Western Chorus Frog	*Pseudacris triseriata*	100			
BIRDS					
American Crow	*Corvus brachyrhynchos*	1			
American Goldfinch	*Spinus tristis*	1			
American Green-winged Teal	*Anas crecca*	4	Yes	Sensitive	
American Robin	*Turdus migratorius*	6			
American Wigeon	*Anas americana*	1			
Baltimore Oriole	*Icterus galbula*	1	Yes	Sensitive	
Black-billed Magpie	*Pica hudsonia*	2			
Brewer's Blackbird	*Euphagus cyanocephalus*	10			
Brown-headed Cowbird	*Molothrus ater*	10			
Clay-colored Sparrow	*Spizella pallida*	3			
Common Raven	*Corvus corax*	1			
Eastern Kingbird	*Tyrannus tyrannus*	6			
European Starling	*Sturnus vulgaris*	100			
Greater Yellowlegs	*Tringa melanoleuca*	4			
Horned Lark	*Eremophila alpestris*	1			
House Sparrow	*Passer domesticus*	1			
House Wren	*Troglodytes aedon*	3			
Killdeer	*Charadrius vociferus*	6			
Least Flycatcher	*Empidonax minimus*	1	Yes	Sensitive	
Lesser Yellowlegs	*Tringa flavipes*	4			
Mallard	*Anas platyrhynchos*	2			
Northern Pintail	*Anas acuta*	1	Yes	Sensitive	
Northern Shoveler	*Anas clypeata*	10			
Red-tailed Hawk	*Buteo jamaicensis*	2			Nest: 12U 405424 E 5906893 N
Red-winged Blackbird	*Agelaius phoeniceus*	5			
Savannah Sparrow	*Passerculus sandwichensis*	15			
Snow Goose	*Chen caerulescens*	1			
Song Sparrow	*Melospiza melodia*	1			
Sora	*Porzana carolina*	1	Yes	Sensitive	
Swainson's Hawk	*Buteo swainsoni*	-			Nest: 12U 405164 E 5907074 N
Tree Swallow	*Tachycineta bicolor*	2			Nest: 12U 405213 E 5907114 N
Vesper Sparrow	*Pooecetes gramineus*	4			
Western Meadowlark	*Sturnella neglecta*	1			
Wilson's Snipe	*Gallinago delicata*	2			
Yellow Warbler	*Setophaga petechia*	4			
MAMMALS					
Richardson's Ground Squirrel	*Spermophilus richardsonii*	3			

5.1.2.3 Fish

The AEP Fisheries and Wildlife Management Information System database (Government of Alberta 2016b) identified one fish species as being present within 5 km from the Project Footprint: Fathead Minnow (*Pimephales promelas*); however, fish and fish habitat are not directly impacted by the Project Footprint.

5.1.2.4 Summary

Given the absence of habitat features, the potential for vegetation elements or wildlife species of conservation concern to occur within the Ryley Facility is considered to be low. Although incidental encounters of wildlife species may occur from time to time, Clean Harbors monitors the Ryley Facility for wildlife activity and ensures that the surrounding chain-link fence is intact and in good repair. Although weeds and invasive species may establish within the Ryley Facility, Clean Harbors conducts regulatory vegetation management within all vegetated areas and closed landfill cells.

Although fish (i.e., fathead minnow) may potentially be encountered in deeper pools of the unnamed, ephemeral drainage downstream of the Ryley Facility (i.e., Bible Creek), potential effects are considered to be negligible as water quality testing is conducted prior to discharge of on-site run-off collected in stormwater retention ponds.

Preconstruction surveys will be conducted in the new expanded area to confirm the presence of any sensitive biological resources that may require additional mitigation or consideration prior to the commencement of clearing and site preparation (e.g., soil salvage and grading activities). Clearing and site preparation will be conducted outside of the migratory bird breeding season (i.e., April 15 to August 31, annually). In the event that vegetation clearing is delayed until the migratory bird breeding season, Clean Harbors will ensure that a survey for active nests will be conducted.

5.2 Regional Initiatives or Plans

There are no changes to the terms, conditions or commitments for the environment as they relate to any regional initiatives or plans identified in Section 4.1 since the current Approval was renewed.

There are no anticipated changes to the Ryley Facility's obligations, potential obligations or opportunities due to the proposed lateral expansion as identified by the regional initiatives or plans identified in Section 4.1.

5.3 Site Suitability

Based on the information summarized in the preceding subsections (Sections 5.1 and 5.2), Clean Harbors has determined that:

- The Project Footprint is not located over any buried valleys; within 100 m of land subject to slope failure; or within 300 m of man-made surface water features or ravines, coulees or gullies.
- The Project Footprint has been previously developed for agricultural activities and does not contain habitat features considered to be of significant value to wildlife (i.e., old growth forests, native prairie, wetlands of semi-permanent to permanent inundation);
- Numerous wetlands are located within the Project Footprint, however none are characterized by a permanency (i.e., semi-permanent to permanent inundation) that could preclude development of the proposed Lateral Expansion;
- The Project Footprint provides habitat for some wildlife species of management concern, however their occupancy occurs only seasonally, and for which none of the detected species have habitat features (e.g.,

nest, den, burrow, roost) with an annual restricted activity period that could preclude development of the proposed Lateral Expansion.

Consequently, pending acquisition of subsequent approvals for impacts to wetlands, the Project Footprint is located at a site considered to be suitable for the development of a Class I Landfill.

6.0 PROPOSED CHANGES TO DESIGN AND OPERATION

6.1 Facility Processes

There are no proposed changes to existing processes implemented at the Ryley Facility or that shall be applied within the Project Footprint.

Frequently, Clean Harbors receives potentially pyrophoric wastes (e.g., molecular sieve and catalytic wastes) that risk heat generation or ignition when exposed to water/moisture when landfilled. Presently, the standard operating procedure for such wastes consists of spreading a layer of the subject waste on an inert portion of the landfill surface, monitoring for reactivity and temperature rise followed by redistribution and cover within the landfill cell upon elimination of reactivity and restoration of surface temperature (Section 4.3 of the existing Landfill Operations Plan).

To reduce the risk of fire within a landfill cell, Clean Harbors proposes that “water quenching” of pyrophoric wastes be conducted within the Waste Receiving and Stabilization Area, prior to transfer to a landfill cell. Specifically, upon transfer of waste from the delivery truck to a steel waste stabilization bin, water shall be added to designated pyrophoric wastes to the point that all remaining reactive materials have been stabilized and no longer pose a risk for generation of heat or ignition within the landfill. Quenching shall only be conducted where potential off-gases from such reactions are confirmed in Clean Harbors’ on-site laboratory to be non-regulated and not harmful to the environment or human health. Saw dust shall then be added to the “quenched” waste as required such that the waste no longer contains free liquids. Upon stabilization, the waste would then be transferred to the appropriate landfill cell.

Pending regulatory approval, the Landfill Operations Plan will be updated to include this process of water quenching of pyrophoric wastes.

6.2 Substances

There are no proposed changes to substances that are received or generated by the Ryley Facility or that shall be received or generated within the Project Footprint.

6.3 Alternatives

In the Province of Alberta, processing of hazardous waste has grown progressively during the period for which the Ryley Facility has been in operation. Generally, the bulk of hazardous waste designated for landfill disposal has predominantly originated from the oil and gas sector (ESRD Unknown Date).

Waste designated for landfill disposal at the Ryley Facility predominantly originates from waste disposal brokers (understood to be associated with municipal, commercial, and light industrial development) accounting for more than one-third of the solid waste intake (35%). Other activities from which the Ryley Facility receives hazardous waste include: oil sands development (20%), petroleum upgrading (15%), chemical processing (15%), general construction (10%), and other activities (5%).

Recent forecasts for oil development in Alberta suggest that Conventional production in Western Canada is currently 1.3 million barrels per day (b/d) and is expected to decline to 1.1 million b/d by 2018 and then remain

relatively stable. Oil sands production is forecast to increase by 1.3 million b/d from 2.4 million b/d in 2015 to reach 3.7 million b/d in 2030. In 2015, oil sands mining projects produced over 1.0 million b/d while over 1.3 million b/d came from in situ projects. Looking ahead to 2030, mining production is forecast to reach 1.5 million b/d and in situ production is forecast to reach 2.1 million b/d (Canadian Association of Petroleum Producers 2016). Consequently, development of conventional oil and oil sands resources in Alberta suggest a growth of 46% and 189%, respectively, for the period from 2012 to 2030. Further, the Alberta Government is forecasting growth in the Industrial Manufacturing and Refining, Petrochemicals, and Biochemicals sectors through 2030.

In addition to growth of industrial sectors that contribute to hazardous waste in Alberta, Statistics Canada says Alberta is on track to grow from 4.2 million residents to between 5.6 million and 6.8 million by 2038, a rate of between 1.6 and 2.8 percent. The predicted increase in population is expected to vary positively with growth in commercial and industrial activity and, therefore, an increase in the amount of hazardous waste produced in Alberta may also be expected.

Although efficiencies in reduction of hazardous wastes may be realized on a per capita basis, Clean Harbors anticipates that an improved rate of diversion will not offset the cumulative volume of hazardous waste designated for landfill disposal. Production of hazardous waste designated for landfill disposal is anticipated to grow continuously with the rate of development associated with the forecasted growth in sectors that contribute substantial proportions to the hazardous waste processed at the Ryley Facility. Consequently, projected volumes of hazardous waste diverted for landfill disposal at the Ryley Facility are anticipated to increase for the foreseeable future.

According to current annual rates of landfill capacity depletion, Clean Harbors anticipates that the Ryley Facility will achieve its anticipated total landfill capacity by 2023. To meet the projected market demand for landfill disposal of hazardous material for the continued growth of the oil and gas, chemical and heavy manufacturing sectors, Clean Harbors proposes to expand the landfill capacity of the Ryley Facility to occupy the area located immediately north of the lands on which it currently operates.

6.4 Minimization

The capacity of the site considered under this application far exceeds the ten-year approval period. Clean Harbors will develop the Project Footprint progressively over time to meet market demand for landfill airspace. In this way, it will minimize the development of the overall property to that which is required for a single cell development (including the associated infrastructure), up to three years.

The sequence of development proposed by Clean Harbors foresees development from the south-west corner of the Project Footprint northwards, keeping a maximum distance between the cells and the public roads adjacent to the east and north of the facility.

6.5 Materials Handling and Storage

The proposed lateral expansion of the Ryley Facility will require development of new landfill cells, including the currently proposed Cell 5, a central waste receiving and stabilization area, associated access roads and stormwater management infrastructure, as well as the ability to store containers with hazardous waste in the currently approved storage and laydown area, to be constructed in the southeast corner of the Project Footprint (Figure 7).

The proposed Landfill Cell 5 will be constructed for the storage of hazardous waste (i.e., Class 1) in a similar manner as that previously approved for Cells 3E and 4 (Figures 8A-8E), including:

- A Primary perimeter berm;

- Intermediate perimeter berms (contiguous with future Landfill cell boundaries);
- Composite cell liner; and
- Leachate collection system.

Although no change in the conceptual design specifications are anticipated from that which is specified under the Current Approval (Appendix B), Clean Harbors is proposing to construct Cell 5 and future landfill cells in NE 9-50-17 W4M below the native ground surface, at a base elevation of approximately 681 m asl (Figure 8B). Given the results of the site suitability investigation (Section 5.1.2); establishing a base elevation for waste at 681 m asl which meets the minimum groundwater protection criteria required by the *Standard for Landfills*.

A central waste receiving and stabilization area is proposed to be developed outside the boundary of a Class I Landfill Cell. Given the requirement to prevent release of hazardous waste, including potential contact run-off, the waste receiving and stabilization pits shall be constructed with an engineered containment consisting of welded steel waste bins encased in concrete (Figure 9). Vehicle contact with waste will be minimized by elevating the waste receiving and stabilization area above waste receiving and transfer vehicles. Precipitation falling on the waste receiving and stabilization area will be directed to the proposed Pond 4; vehicles (e.g., haul trucks) and equipment (e.g., excavators) that have potential to contact waste will not be operated on highway vehicle roads. Consistent with the current operational requirements, Clean Harbors will either stabilize any received waste containing free liquids (including precipitation directed from the waste receiving and stabilization area) by addition of sawdust, or shall dispose of collected liquids via deep-well disposal at an approved facility, prior to disposal in a landfill cell.

Upon construction of the central waste receiving and stabilization area, the currently permitted off-loading and stabilization area in Landfill Cell 3D will be decommissioned and removed.

There are no proposed changes to the monitoring plans to evaluate the performance of the collection and storage elements.

6.6 Wastewater and Run-off Treatment and Control

Clean Harbors will operate and maintain leachate collection and surface water run-off diversion systems to prevent any release of water with quality parameters in exceedance of approval thresholds. With the exception of leachate and surface water diversion, there are no other wastewater streams integrated in the design of the proposed lateral expansion.

6.6.1 Leachate Collection Systems

All landfill cells to be developed in the Project Footprint will include a leachate collection system with primary and secondary collection pipes nested within the same trench of the cell liner, as well as an independent sump pit, pump and pumping station (Figure 8). Collected leachate is disposed of by deep well injection. Although Clean Harbors presently uses the Seller's Oilfield Disposal Facility (Alberta Energy Regulator Approval No.: WM 077A) located near Calmar, Alberta in 12-28-49-26 W4M (53°15'36.21"N, 113°45'12.86"W), other equivalent wells may be used.

6.6.2 Run-Off Diversion Systems

Surface water run-off from developed portions of the Project Footprint will be collected in stormwater retention ponds that are sized in accordance with applicable requirements from the Guidelines (Government of Alberta 2014). Specifically, stormwater ponds will be sized to provide live storage volumes sufficient to contain the run-off from more than two consecutive 1:25-year, 24-hour storm events; this is double the largest event suggested in the Guidelines (Government of Alberta 2014). Additional "dead storage" will be provided at the bottom of the live storage range to accommodate sediment deposits which will need to be periodically removed to maintain the live storage

capacity. A nominal freeboard of 0.3 m is proposed between the pond design high water level and active surfaces including but not limited to roads and laydown areas.

Rainfall Intensity-Duration-Frequency (IDF) curves are available online from Environment and Climate Change Canada (EC; EC 2016). Figure 10 shows stations with IDF information in the Ryley vicinity, together with the EC 25-year, 24 hour rain amounts. Ignoring the low result for Camrose, which was based on a relatively short period of record, the surrounding stations suggest a 25-year 24-hour rain amount in the range of 80 mm to 100 mm. Subsequent pond volume sizing calculations are based on total rain event amount of 200 mm, which provides a conservative limit for establishing designed storage capacity. Rain event IDF curves for Edmonton City Centre A, shown in Figure 11, are used for hydrologic calculations requiring other durations.

A total of three stormwater ponds are planned for the initial phase of expansion in the Project Footprint, including:

- Pond 3 – Collecting run-off from the Laydown Area;
- Pond 4 – Collecting run-off (potential contact water) from the Waste Receiving and Stabilization Area; and
- Pond 5 – Collecting run-off from closed landfill cell caps and roads

All of these ponds are located in the south portion of the Project Footprint that is internally draining and lacks a surface water outlet under existing conditions.

Volumes were determined assuming storm run-off coefficients of 0.4 for undeveloped areas, 0.6 for capped landfill areas, 0.8 for roads and pads (including ditching), and 1.0 for pond surface areas. Basin areas and pond volumes for the initial phase of expansion are summarized in Table 8. Note that area sizing calculations have assumed a buildout condition when the landfill cell(s) are fully capped, resulting in pond volumes that exceed that which would be required during the period of open landfill activities (i.e., precipitation falling within the open landfill cell area will be deferred leachate collection systems that will be managed separately from surface water run-off [Section 6.6.1]).

Table 8: Stormwater Pond Basin Areas and Design Storage Volumes for 200 mm Rainfall

Project Component	Collection Area (m^2) and Storm Run-off Coefficient			Design Live Volume (m^3)	Preliminary Pond Top Dimensions[1]		Achieved Volume (m^3)
	Pond (C=1.0)	Road/Pad (C=0.8)	Landfill Cap (C=0.6)		Length (m)	Width (m)	
Pond 3 (Laydown Area)	3,600	27,500	0	5,120	139	42	8,972
Pond 4 (Waste Receiving and Stabilization Area)	1,800	12,700	0	2,392	50	54	3,923
Pond 5 (Non-contact Areas)	6,750	16,960	51,900	10,292	121	54	10,473

[1] Assumes 2 m live storage depth below 0.3 m freeboard with 3:1 side slopes.

Preliminary design for stormwater ponds have assumed a top elevation of 688.0 m which corresponds to the minimum design elevation for roads and other development areas. Designs incorporate a freeboard amount of 0.3 m, resulting in a high water level of 687.7 m. Pond volumes are achieved with an assumed 2.0 m depth of live

storage (with an additional 0.3 for accumulation of sediments), such that the ponds are assumed to have a normal water level at or below elevation 685.7 m. The final pond design(s) will incorporate additional depth for storage of accumulated sediment and to provide an evaporation surface to assist in water quantity management.

The stormwater retention ponds will be operated on a batch basis, emptied as soon as practicable after spring melt and storm events so as to restore the available storage capacity prior to a subsequent event. As per the terms of the Current Approval, Clean Harbors may discharge surface water from existing stormwater ponds to the receiving environment subject to confirmation that the water quality meets the applicable discharge criteria. Stormwater that does not meet the water quality criteria will be disposed at an approved facility or treated on site to meet discharge criteria. Where contact water from proposed stormwater ponds meets the approved criteria for discharge to the surrounding environment, Clean Harbors proposes to discharge water in accordance with Section 4.3.4 Paragraphs (b) and (c) of the Current Approval (Appendix B).

6.6.3 Run-On Diversion Systems

For the period of development associated with Cell 5 and associated Project infrastructure in the south half of the Project Footprint, local run-on water from adjacent undeveloped areas could pool against the outside edges of Project infrastructure including pond berms and access roads. Where such ponding of this run-on water persists in areas south of the abandoned railway bed, ponded run-on water will be pumped to the northeast, past the basin divide, adjacent to the abandoned railway bed and Secondary Highway 854, where it will remain for evaporation. Drainage within the Project Footprint north of the abandoned railway bed will continue as per existing conditions during the period of construction and operation of Cell 5.

The volume of run-on water to be produced during the operation of Cell 5 is expected to be sufficiently small as to not result in impacts to off-site downstream properties where a defined drainage course does not exist.

Where exposed soils exist during the construction of Cell 5 and associated Project infrastructure, silt fencing will be installed to prevent sedimentation of adjacent lands and waterbodies. Exposed soils of run-on diversion berms will be vegetated as soon as practicable following construction.

6.7 Ambient Monitoring

There are no proposed changes to the location or protocols for ambient monitoring as identified in current Approval for the Ryley Facility.

6.8 Air Treatment and Control

There are no proposed changes to the nature or types of substances that will be directly or indirectly released to the air in a typical operating day at the Ryley Facility.

There are no proposed changes to the process technology, control systems and management practices that are used to minimize substance release to the environment.

There are no reciprocating or turbine engines, fired heaters, treaters and boilers, incinerators, flare stacks or flare pits associated with the proposed lateral expansion, nor are there any proposed changes to heaters presently used in the administration buildings at the Ryley Facility.

There are no anticipated changes in fugitive emissions, area or point sources of emissions associated with the proposed lateral expansion of the Ryley Facility.

There are no proposed changes to the existing monitoring program for air quality associated with the Ryley Facility.

6.9 Assessment of Proposed Construction Considerations

Construction activities are likely to result in direct impacts to wetlands and other waterbodies, disturbance of soils, introduction or spread of weeds, invasive species and crop disease (i.e., clubroot) and, depending on the season of construction, may potentially cause sensory disruption and/or mortality of wildlife. Environmental Protection Measures that will be applied during construction within the Project Footprint shall include:

- Minimize the area of development to that required by the current cell;
- Obtain an Approval under the Alberta *Water Act* for all permanent impacts to wetlands and waterbodies;
- Implement erosion and sediment control measures (e.g., avoidance of handling, application of water or tackifiers, utilization of geotextiles) where exposed soils may come into contact with adjacent waterbodies outside the Project Footprint;
- Avoid refuelling, cleaning, or other vehicle/equipment maintenance within 100 m of waterbodies;
- Conduct pre-disturbance assessments and baseline soil monitoring to determine site-specific soil handling and vegetation management measures and other associated environmental protection measures including, but not limited to:
  - Undertake topsoil/subsoil stripping/salvage and isolation;
  - Implement erosion and sediment control measures (e.g., avoidance of handling, application of water or tackifiers, utilization of geotextiles);
  - Identify areas requiring decompaction of subsoils; and
  - Time amendments to avoid high risk for erosion (i.e., windy or wet weather), compaction, and rutting conditions.
- Restrict construction equipment to designated work spaces;
- Manage activities to prevent the introduction of clubroot in accordance with the Alberta *Agricultural Pests Act* and the Alberta Clubroot Management Plan (Alberta Agriculture and Rural Development and Alberta Clubroot Management Committee 2015);
- Conduct regular monitoring to ensure site-specific environmental protection measures are in place and functioning effectively;
- Revegetate workspace and other areas outside of active landfill cells and associated infrastructure;
- Restrict vegetation clearing and soil disturbance in areas of intact vegetation to the extent required to allow safe construction and operation of the Project;
- Ensure interim reclamation includes revegetation following restoration of post-closure contours and replacement of salvaged topsoil.
- Schedule clearing and construction activities during the winter months, where feasible. If clearing and construction is required during the breeding months (i.e., April 15 – August 31, annually), schedule wildlife surveys to locate sensitive areas to avoid;

- Conduct preconstruction surveys to confirm activity of previously detected wildlife features (e.g., raptor nests [including unoccupied stick nests], leks) during appropriate survey periods;
- Ensure vehicle and equipment idling is minimized;
- Use low-sulfur diesel fuels where feasible;
- Minimize vehicle speeds on access roads;
- Minimize grader and scraper speeds during site preparation;
- Water access roads and soils regularly, or apply a single-application tackifier, at active construction sites, particularly during dry periods; and
- Minimize disturbances to storage piles.

6.10 Proposed Changes to Operations

Following consultation between Clean Harbors and AEP (i.e., Mr. Weiguo Wu and Mr. Gene Leskiw) on June 14, 2017, Clean Harbors proposes a site-specific groundwater monitoring program to be implemented for the lateral expansion areas in NE 9-50-17 W4M (Appendix K). The groundwater monitoring program to be implemented for the Ryley Facility in SE 9-50-17 W4M will continue as currently approved.

There are no proposed changes or additions to existing monitoring programs, management systems, emergency preparation or contingency plans for the Ryley Facility. With the exception of the proposed site-specific groundwater monitoring program, Clean Harbors proposes that existing monitoring programs, management systems, emergency preparation or contingency plans for the Ryley Facility would be extended to operations conducted in NE 9-50-17 W4M. Pending regulatory approval, the Section 4.3 of the Landfill Operations Plan will be updated to include the process of water quenching of pyrophoric wastes (Section 6.1).

In accordance with its consultation with Alberta Transportation, pending regulatory approval, Clean Harbors will amend the location of its entrance to the Ryley Facility, to be aligned across from the existing entrance to the Beaver Municipal Solutions Landfill, approximately 30 m north of the current entrance. Upon commissioning of the new entrance, the existing entrance to the Ryley Facility will be decommissioned. Combined with its proposed staging road located within NE 9-50-17 W4M, Clean Harbors will reduce the impact of commercial vehicles entering the Ryley Facility on local traffic patterns. This change will reduce potential traffic hazards

7.0 RECLAMATION

Interim reclamation of landfill cells will be conducted sequentially as their approved capacity is achieved in accordance with the *Standards for Landfills in Alberta* (Government of Alberta 2010a). The following discussion provides a conceptual reclamation plan for future development in NE 9-50-17 W4M; a detailed reclamation plan will be prepared in accordance with Sections 22.1 to 22.15 of the *Standard for Landfills in Alberta* (Government of Alberta 2010a) and any other applicable designated reclamation standards in place, prior to commencement of decommissioning and closure of the Ryley Facility.

7.1 Identify and Describe the End Land-use

Given the nature of the landfilled material, landfill cells within the Project Footprint cannot be reclaimed for future development or agricultural use following closure; this remains compatible with the currently zoned land-use for the Ryley Facility (i.e., industrial).

Consequently, Clean Harbors' primary goal of its conceptual reclamation plan is to ensure safe and secure containment of closed landfill cells for the long term while minimizing aesthetic impact on the landscape. The decommissioning and reclamation of the site will follow the steps identified as follows based on current guidelines and regulatory practices. This process may be altered based on industry best practices and/or amended regulatory guidance applicable at the time of closure.

Although it may be assumed that revegetated areas may be attractive for local wildlife (e.g., songbirds and mammals), the integrity of the landfill liners and other remaining infrastructure necessitates that wildlife interaction within the fenced area is minimized. The fence will use industry standard chain-link fencing to a height of up to 2.5 m above grade, topped with three overhanging strands of barbed wire to prevent unauthorized access to the fenced area.

7.2 Reclamation of Landform, Drainage and Watercourses

Reclaimed landfill cells will permanently alter the landform within the Project Footprint (Figure 12), however all other associated project infrastructure (e.g., access roads, laydown area, waste receiving and stabilization area) will be removed, subject lands will be remediated as required and subsequently reclaimed to a level or gently sloped terrain facilitating passive drainage of surface water where feasible.

Reclamation of the landfill cells will be conducted in a phased approach, which will include:

- A cell cap consisting of 0.6 meters of compacted clay, synthetic liner cap will be welded to the primary liner around the perimeter of the cell;
- A geotextile cover will be laid over the synthetic liner cap;
- At least 0.20 m of topsoil will be placed over the geotextile;
- Topsoil will be revegetated on the landfill cells to establish a self-sustaining, erosion controlling vegetative cover as appropriate;
- Run-on diversion channels will be maintained around the perimeter of the landfill cells;
- Run-off diversion infrastructure (i.e., channels, retention ponds, culverts) will be filled in and decommissioned;
- Landfill cells, leachate collection infrastructure and groundwater monitoring wells will be left intact with associated routes of access/egress improved as warranted to ensure effective maintenance and monitoring throughout the post-closure period;
- Fences will be left in place to prevent unauthorized access to this infrastructure; and
- An erosion and sediment control plan will be developed prior to the commencement of general closure activities, prepared in consideration of any future infrastructure and methods for remediation.

Figure 13 shows the conceptual views of the Project Footprint following closure and reclamation.

The following activities will be undertaken following closure of the landfill cells and will continue throughout the post-closure period for the landfill, as defined in the Standards:

- Groundwater monitoring will continue in conjunction with monitoring of subsidence, erosion or damage to reclaimed cells;

- Monitoring wells and leachate collection system will be inspected, maintained and collected leachate will be analyzed;
- Groundwater monitoring wells will be maintained and monitored for at least 25 years subsequent to the landfill closure and will continue until the end of post-closure conditions are met as per the *Standards For Landfills in Alberta* (Section 6.3);
- Monitoring will involve annual sampling of the groundwater monitoring wells surrounding the competed landfill cells as well as a sample from the secondary leachate collection system if any liquid is present;
- All cell caps and fences will be inspected annually for subsidence, erosion or damage; and
- Maintenance of vegetation will include reseeding, weed management or mowing as required.

8.0 SUMMARY

Given the discussion provided within this application, Clean Harbors proposes the following amendments to the Current Approval:

Current Text	Proposed Amendment
Section 1.1: Definitions	
(bb) "facility" means all buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, roadways, railways, pipelines and other installations, the Class I and Class II industrial landfill and the HWRSP Facility, and includes the land, located on the SE 1/4 of Section 9, Township 50, Range 17, West of the 4th Meridian, that is being or has been used or held for or in connection with the Ryley Industrial Waste Management Facility;	(bb) "facility" means all buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, roadways, railways, pipelines and other installations, the Class I and Class II industrial landfill and the HWRSP Facility, and includes the land, located on the SE and NE 1/4 of Section 9, Township 50, Range 17, West of the 4th Meridian, that is being or has been used or held for or in connection with the Ryley Industrial Waste Management Facility;
(lll) "new landfill cells" means Cell 3D as described in application No. 005-10348, Cell 3E as described in application No. 012-10348, and Cell 4 as described in the application;	(lll) "new landfill cells" means Cell 3D as described in application No. 005-10348, Cell 3E as described in application No. 012-10348, and Cells 4 and 5 as described in the application;
(mmm) "new surface water detention pond" means the surface water detention pond as described in application No. 012-10348;	(mmm) "new surface water detention pond" means the surface water detention ponds as described in application No. 012-10348 and No. 015-10348.
Section 3.1: Landfill	
3.1.1 The approval holder shall not commence construction of Cell 4 unless and until updated financial security of the facility has been provided to include Cell 4 lateral expansion.	3.1.1 The approval holder shall not commence construction of Cell 4 or 5 unless and until updated financial security of the facility has been provided to include Cell 4 or 5 lateral expansion.
Section 4.1: General	
4.1.1 The approval holder shall maintain the geographical boundaries of the landfill to that located within SE 1/4 of Section 9, Township 50, Range 17, West of the 4th Meridian, as described in the application.	4.1.1 The approval holder shall maintain the geographical boundaries of the landfill to that located within SE and NE 1/4 of Section 9, Township 50, Range 17, West of the 4th Meridian, as described in the application.
4.1.5 The approval holder shall: (a) operate; and (b) maintain the integrity of the following waste management facilities at the facility: (i) the HWRSP Facility; (ii) the Class I and Class II industrial landfill, including: (A) Class I landfill cells, (B) Class II landfill cell(s), and (C) waste stabilization area within a Class I landfill cell; and (iii) waste storage area(s); as described in the application.	4.1.5 The approval holder shall: (a) operate; and (b) maintain the integrity of the following waste management facilities at the facility: (i) the HWRSP Facility; (ii) the Class I and Class II industrial landfill, including: (A) Class I landfill cells, (B) Class II landfill cell(s), and (C) waste stabilization area ~~within a Class I landfill cell~~; and (iii) waste storage area(s); as described in the application.

9.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Clean Harbors Canada, Inc. and Tetra Tech EBA Inc.

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PROFESSIONAL ENGINEER ALBERTA
JONATHAN PAUL RUFFELL
2017 09 05

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Principal Consultant – Solid Waste Management
Tetra Tech Canada Inc.
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PERMIT TO PRACTICE
TETRA TECH CANADA INC.
Signature _____
Date Sep 5, 2017
PERMIT NUMBER: P13774
The Association of Professional Engineers and Geoscientists of Alberta

Bryan Hensel, B.Sc., P.Biol., R.P.Bio.
Vegetation Ecologist, Environmental Planner
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/bh

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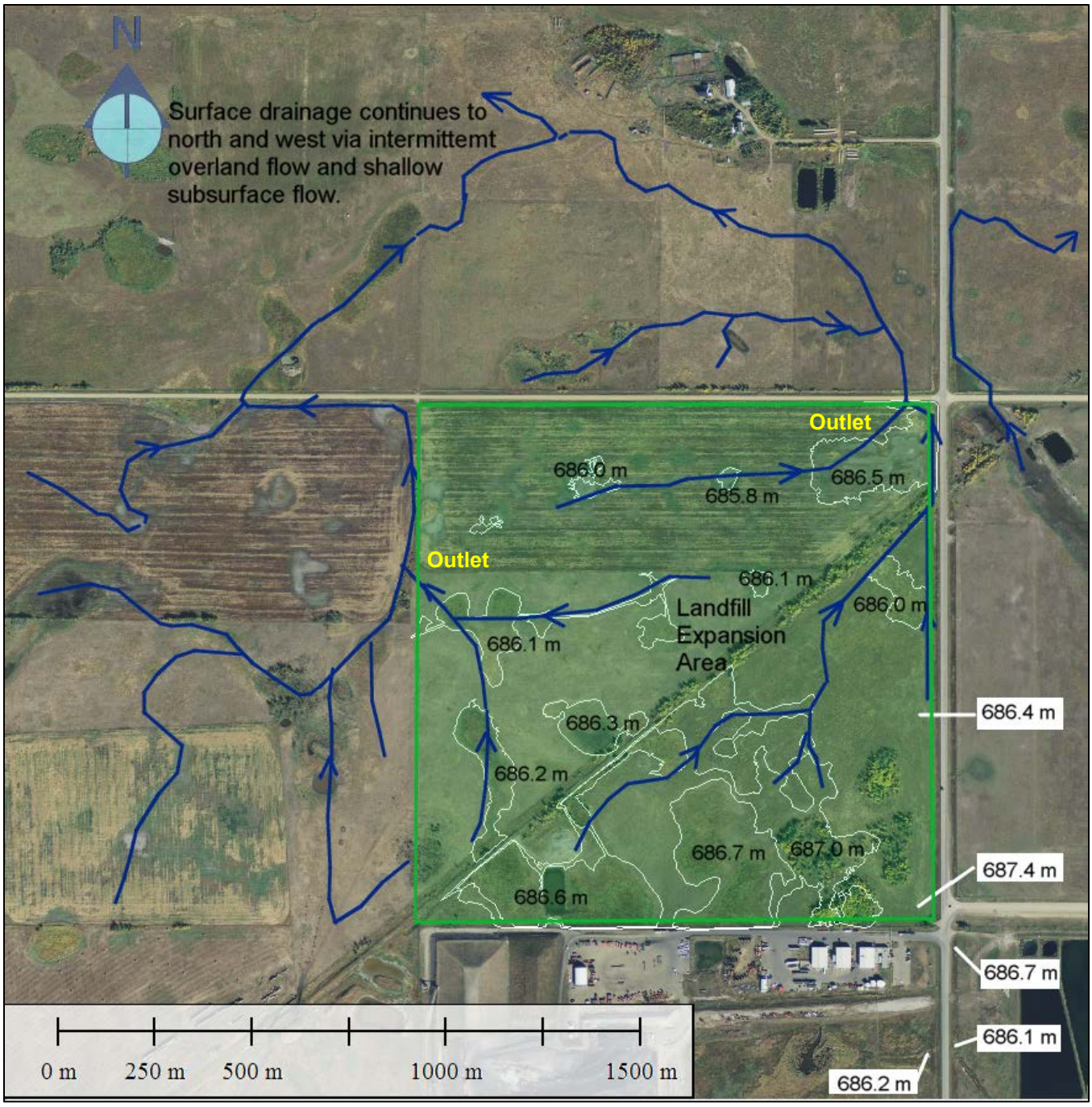
FIGURES



CLIENT

CleanHarbors

TETRA TECH

Ryley Facility Lateral Expansion

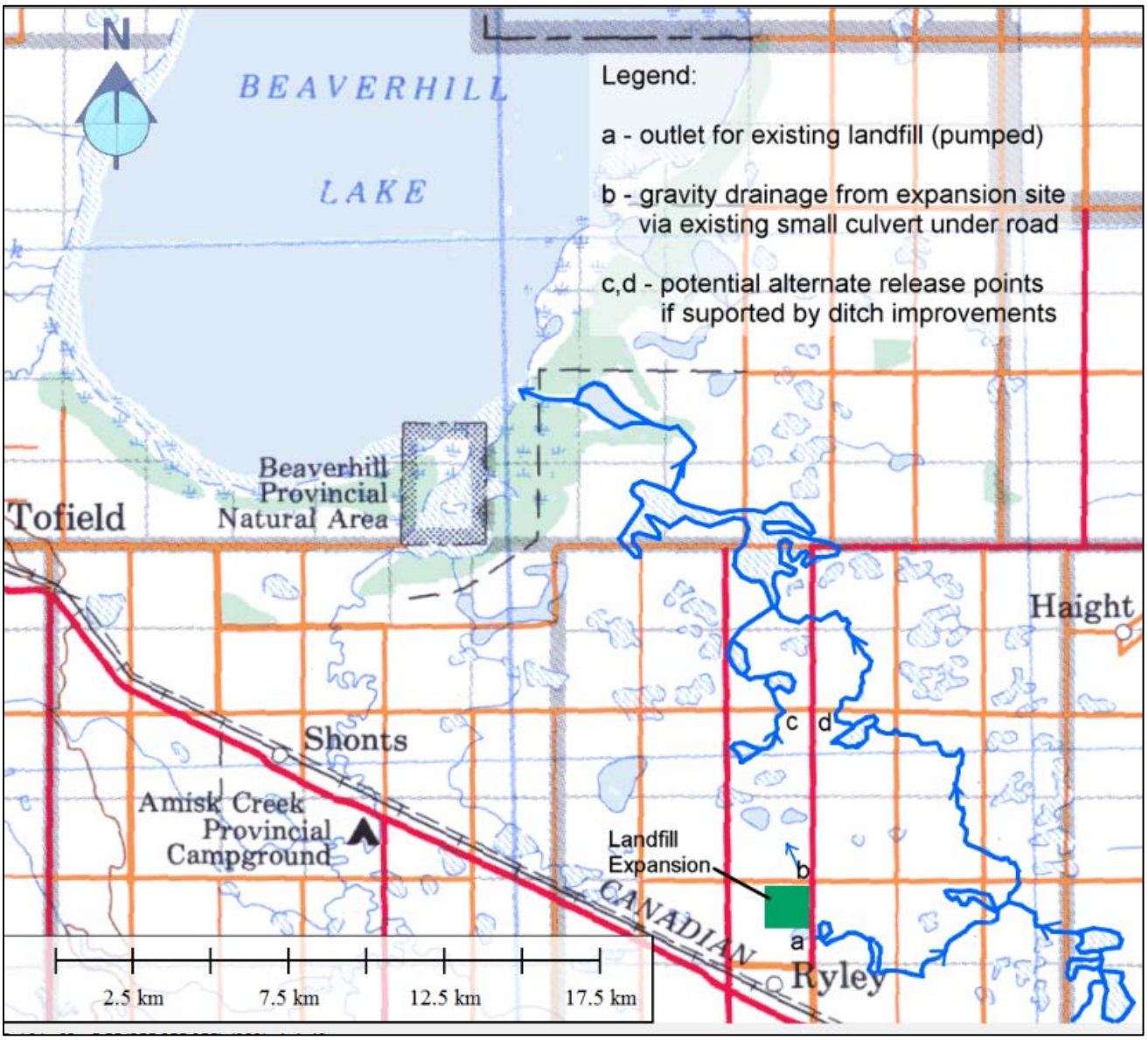
Local Hydrology

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	SS	BR	BH	1

OFFICE	DATE
EBA-SWM.SWOP	August 27, 2017

Figure 5

STATUS
ISSUED FOR USE



CLIENT

CleanHarbors

TETRA TECH

Ryley Facility Lateral Expansion

Regional Hydrology

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	SS	BR	BH	1

OFFICE	DATE
EBA-SWM.SWOP	August 27, 2017

Figure 4

STATUS
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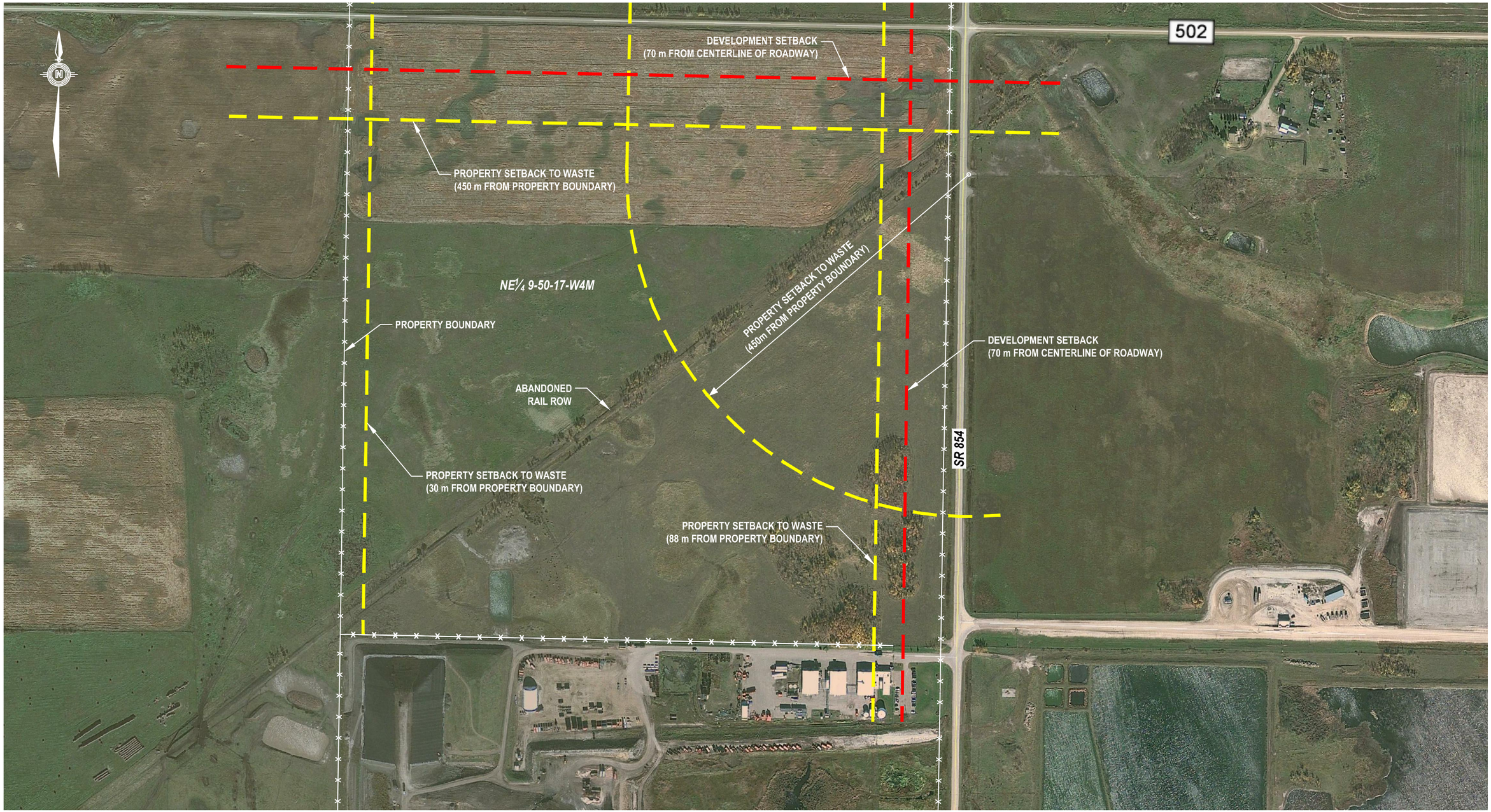

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Scale: 1:5,000 @ 11"x17"

CLIENT

Clean Harbors

TETRA TECH

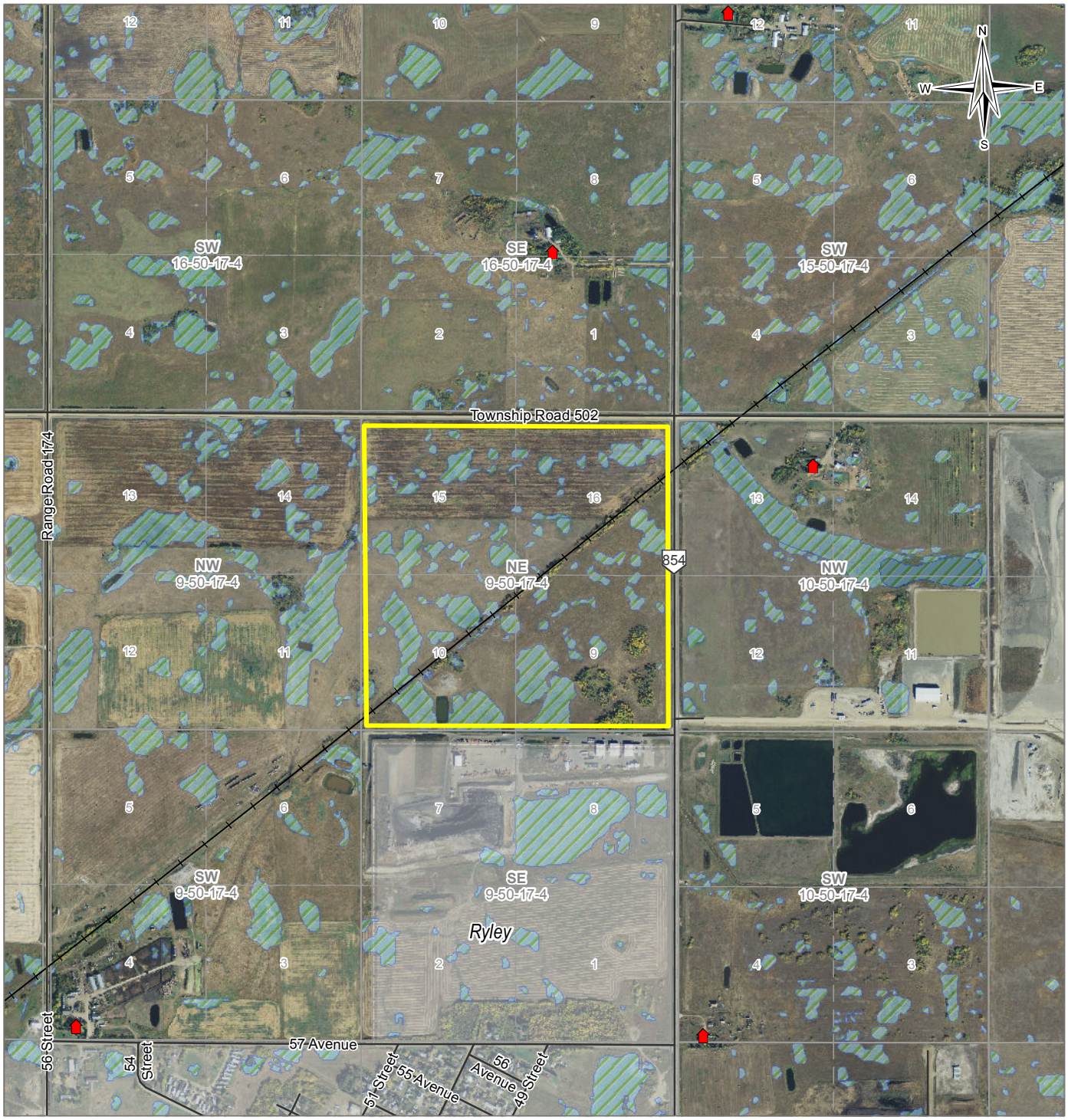
RYLEY FACILITY LATERAL EXPANSION

SETBACK DISTANCES AND PROPOSED LANDFILL AREA

PROJECT NO.	DWN	CKD	REV
ENVSWM03011-05	DBD	KA	0

OFFICE	DATE
EDM	February 2017

Figure 3



LEGEND

- Rural Residence
- Road
- Abandoned Railway Bed (Approx. Centreline)
- Potential Wetland
- Project Footprint
- Town Boundary

NOTES
Base data source: ESRI, CanVec (50,000) & ESRD
Imagery: Valtus Imagery Services (July 29 - Oct. 6, 2012)

STATUS
ISSUED FOR USE

RYLEY FACILITY LATERAL EXPANSION

Project Footprint

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:15,000
200 100 0 200
Metres

FILE NO. Figure4.mxd

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-01	BB	MS	BH	1

OFFICE	DATE
Tt EBA-CAL	August 27, 2017

CleanHarbors

PREPARED BY:
TETRA TECH

Figure 2

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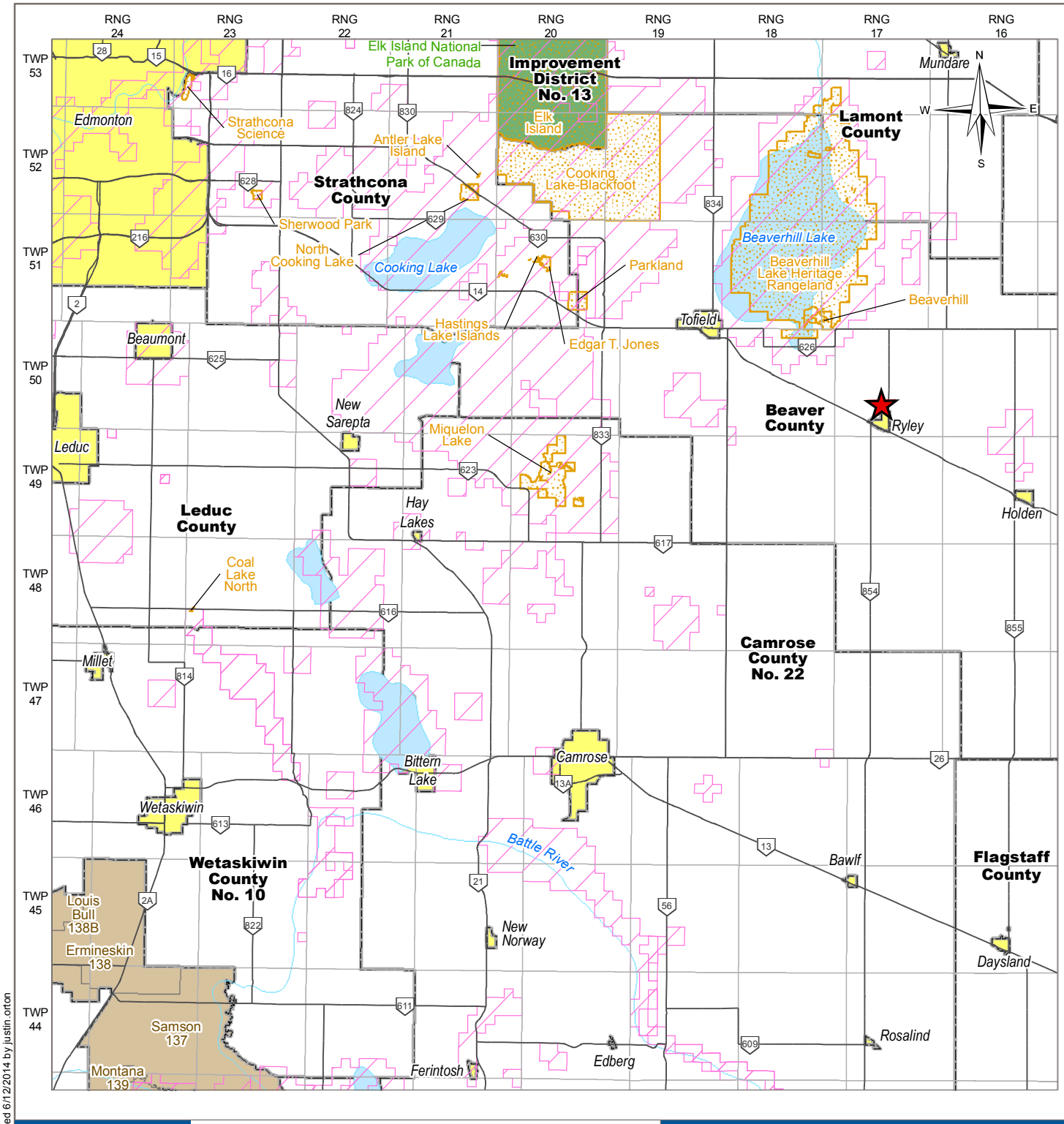

LEGEND

- Site Location
- Primary / Secondary Highway
- Environmentally Significant Area
- Protected Area
- National Parks
- Indian Reserve
- Urban Area
- Municipal Area
- Watercourse
- Waterbody

NOTES
Base data source: ESRI, CanVec (50,000), AltaLIS, ESRD & Government of Alberta (Tourism, Parks and Recreation)

STATUS
ISSUED FOR USE

RYLEY FACILITY LATERAL EXPANSION

Project Location

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:500,000
10 5 0 10
Kilometers

FILE NO.				
Figure3.mxd				
PROJECT NO.	**DWN**	**CKD**	**APVD**	**REV**
ENVSWM03011-01	BB	MS	BH	1
OFFICE	**DATE**			
Tt EBA-CAL	June 9, 2014			

CleanHarbors

PREPARED BY:
TETRA TECH

Figure 1

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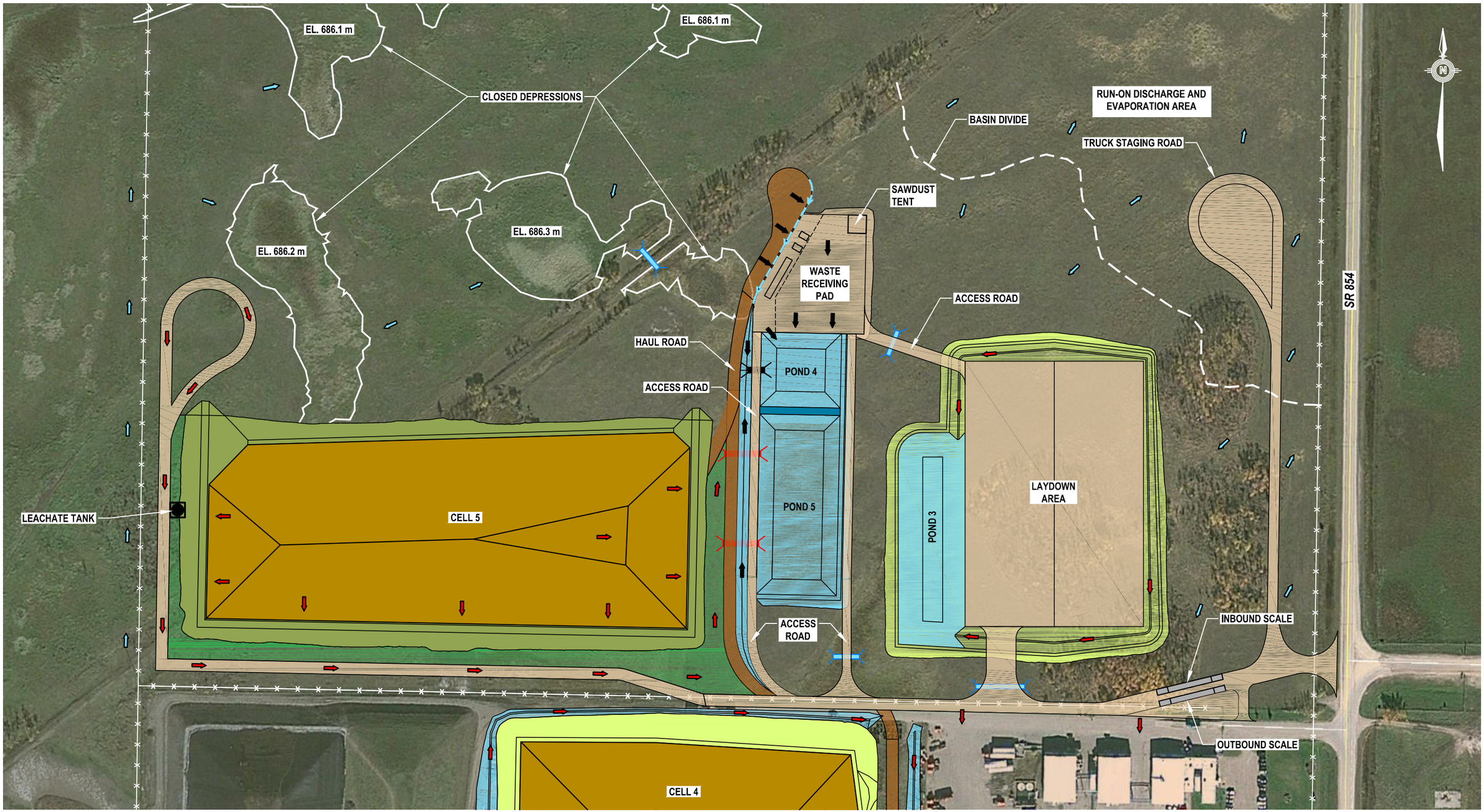


LEGEND:

- CONTACT WATER FLOW DIRECTION
- NON CONTACT WATER FLOW DIRECTION
- SURFACE WATER FLOW DIRECTION
- CONTACT WATER DIVERSION CULVERT
- NON CONTACT WATER DIVERSION CULVERT
- SURFACE WATER DIVERSION CULVERT

0 100m

Scale: 1:2,500 @ 11"x17"

CLIENT

Clean Harbors

TETRA TECH

RYLEY FACILITY LATERAL EXPANSION

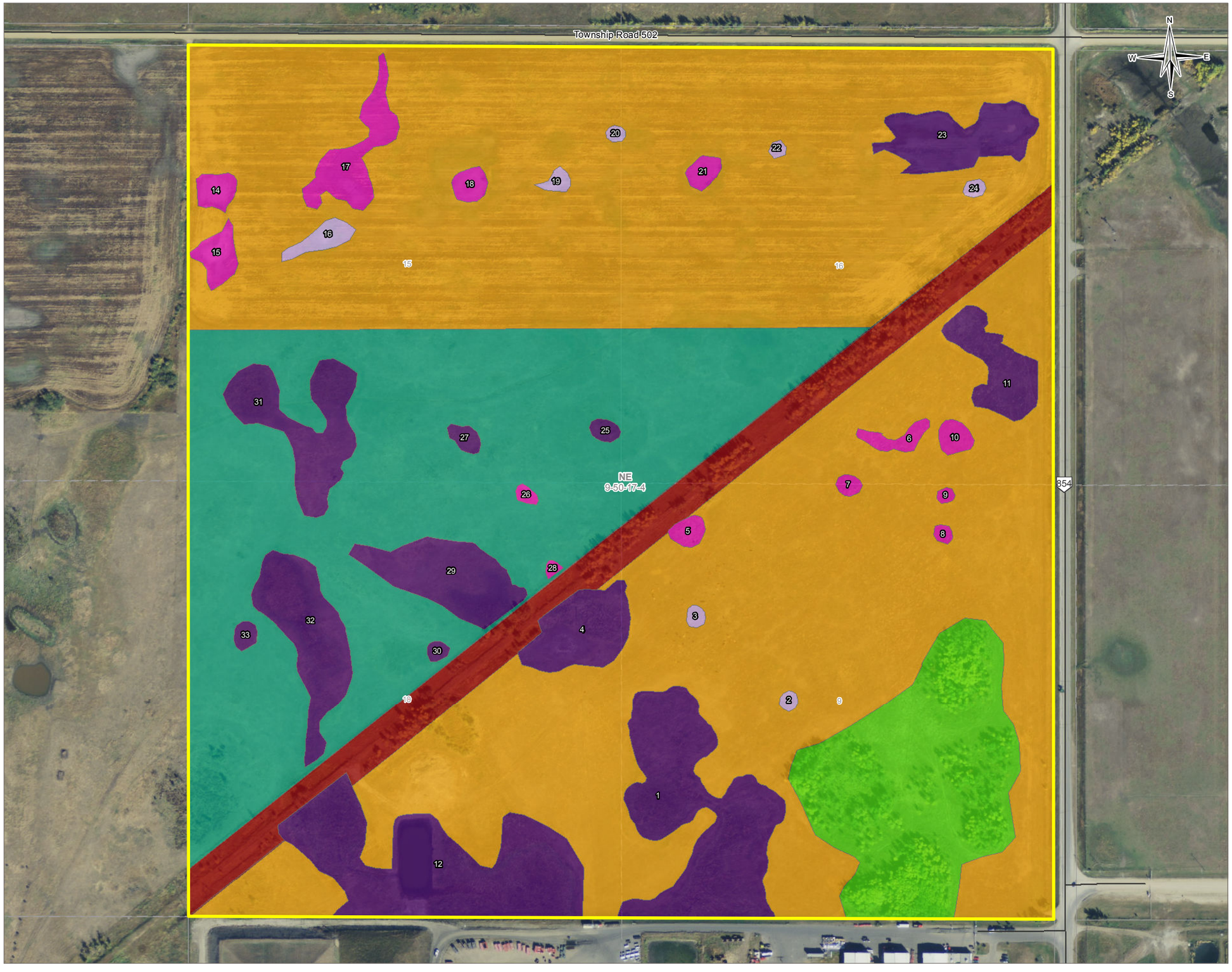
Proposed Layout and Stormwater Management

PROJECT NO.	DWN	CKD	REV
ENVSWM03011-05	DBD	KA	0

OFFICE: EDM

DATE: June 2017

Figure 7



LEGEND

- Project Area

Landover

- Cultivated
- Improved Pasture
- Woodland
- Ephemeral Waterbody
- Temporary Wetland
- Seasonal Wetland
- Abandoned Railway

STATUS
ISSUED FOR USE

NOTES
Image source: Valtus Imagery Service (July - Oct. 2012)

RYLEY FACILITY LATERAL EXPANSION

Biological Resources

PROJECTION	DATUM	CLIENT
UTM 12	NAD83	CleanHarbors

Scale: 1:3,500

50 25 0 50

Meters

TETRA TECH

FILE NO.				
ENVSWM03011_05_010_FIG1.mxd				
OFFICE	**DWN**	**CKD**	**APVD**	**REV**
Tt-CAL	MS	RG	BH	0
DATE	**PROJECT NO.**			
December 12, 2016	ENVSWM03011-05.010			

Figure 6

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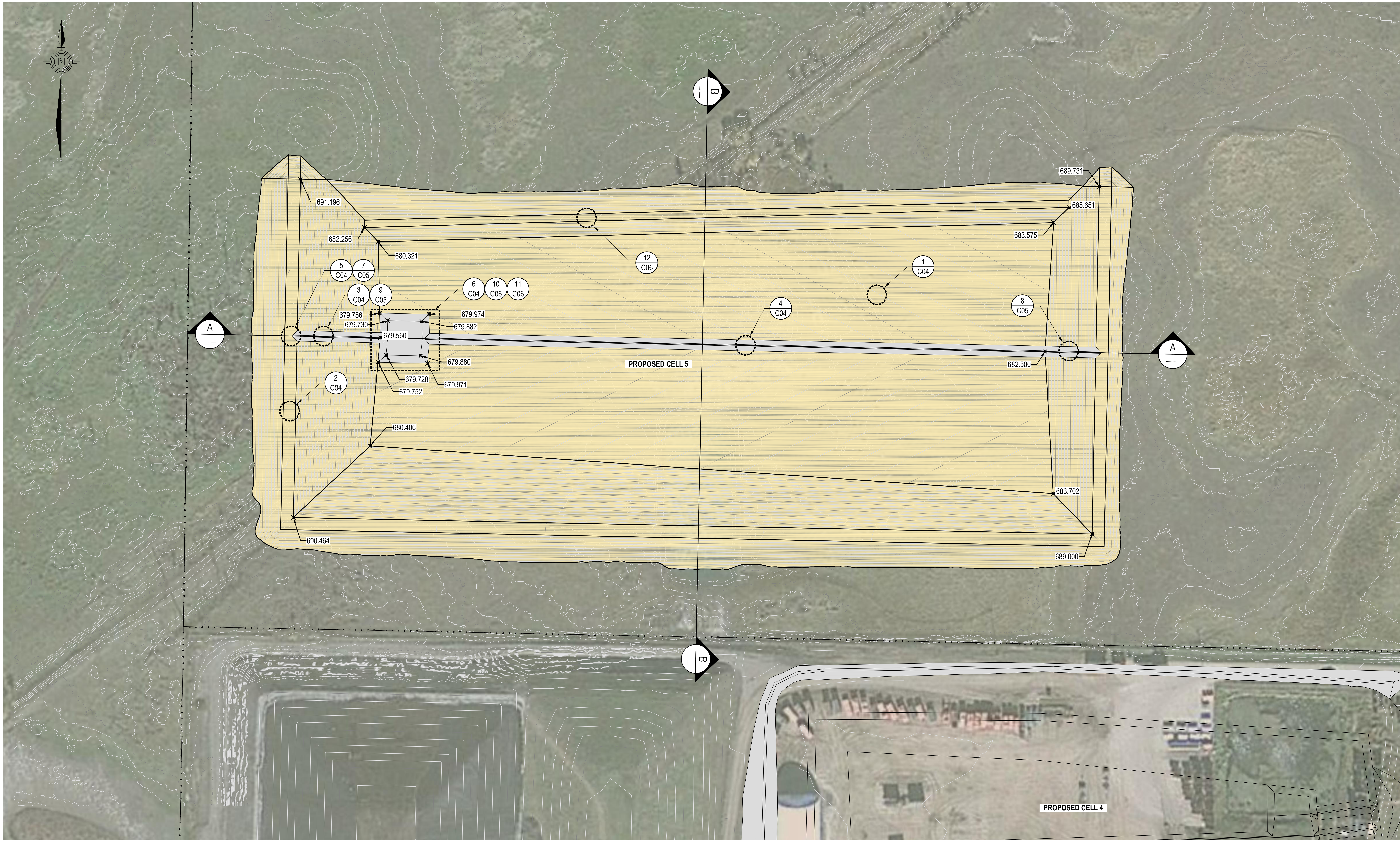

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Scale: 1: 750 (metres)

STATUS ISSUED FOR USE

NUM	DATE	DWN	CKD	APR	DESCRIPTION

REVISIONS

NUM	DATE	APR	DESCRIPTION
A	AUG. 30/17	KA	ISSUED FOR USE

DRAWING STATUS

PERMIT TO PRACTICE
TETRA TECH CANADA INC.
Signature [signature]
Date August 30 2017
PERMIT NUMBER: P13774
The Association of Professional Engineers and Geoscientists of Alberta

PERMIT

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA
KEN ANDERSON
Aug. 30, 2017

PROFESSIONAL SEAL

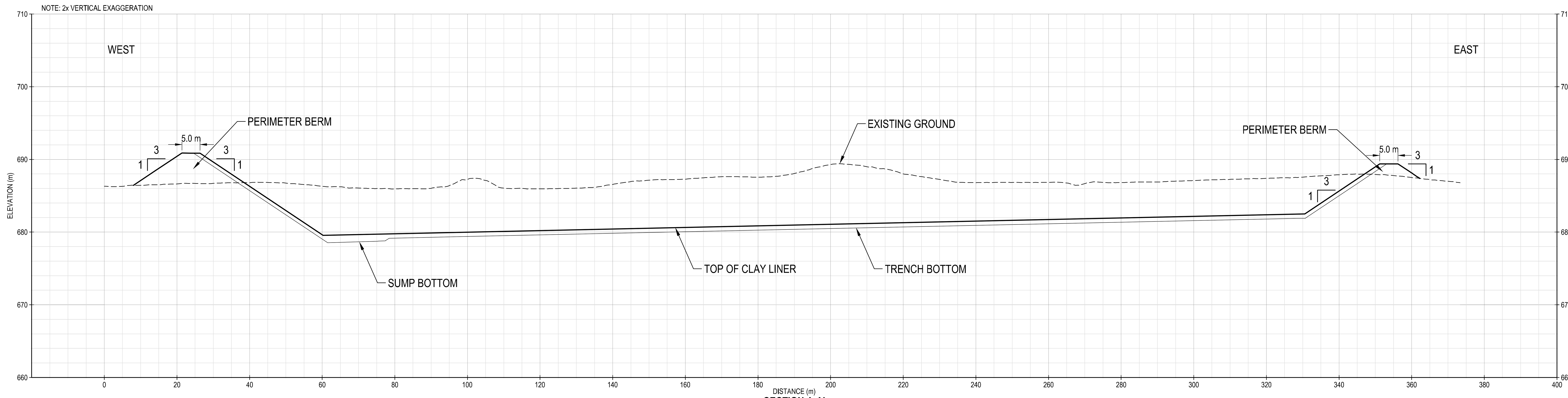
CLIENT
CleanHarbors

TETRA TECH

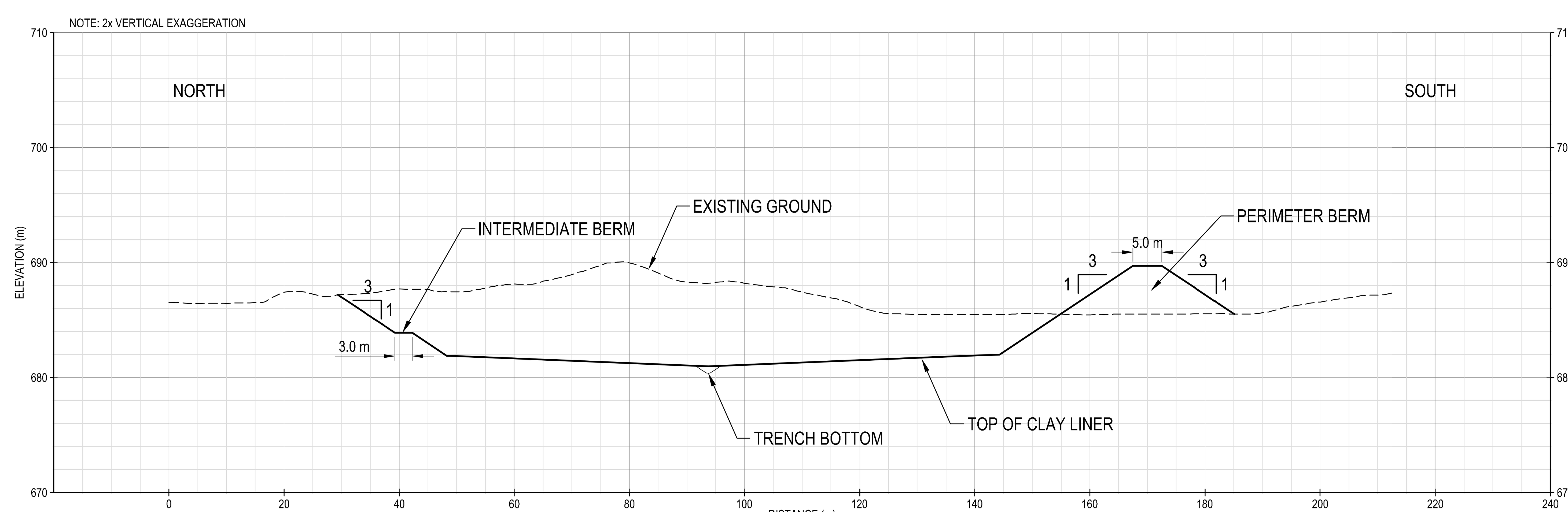
RYLEY FACILITY LATERAL EXPANSION

CELL 5 - DESIGN
DETAILED SITE PLAN

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
ENVSWM03011-05	EDM	KA	KA	0	Figure 8A
DATE:	SHEET No.	DWN	APP	STATUS	
December 2016	2 of 6	DBD	KA	A	



SECTION A-A'



SECTION B-B'

Scale: 1: 600 (metres)

NUM	DATE	DWN	CKD	APR	DESCRIPTION

REVISIONS

NUM	DATE	APR	DESCRIPTION
A	AUG. 30/17	KA	ISSUED FOR USE

DRAWING STATUS

PERMIT TO PRACTICE
TETRA TECH CANADA INC.
Signature
Date August 30 2017
PERMIT NUMBER: P13774
The Association of Professional Engineers and Geoscientists of Alberta

PERMIT

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA
KEN ANDERSON
Aug. 30, 2017

PROFESSIONAL SEAL

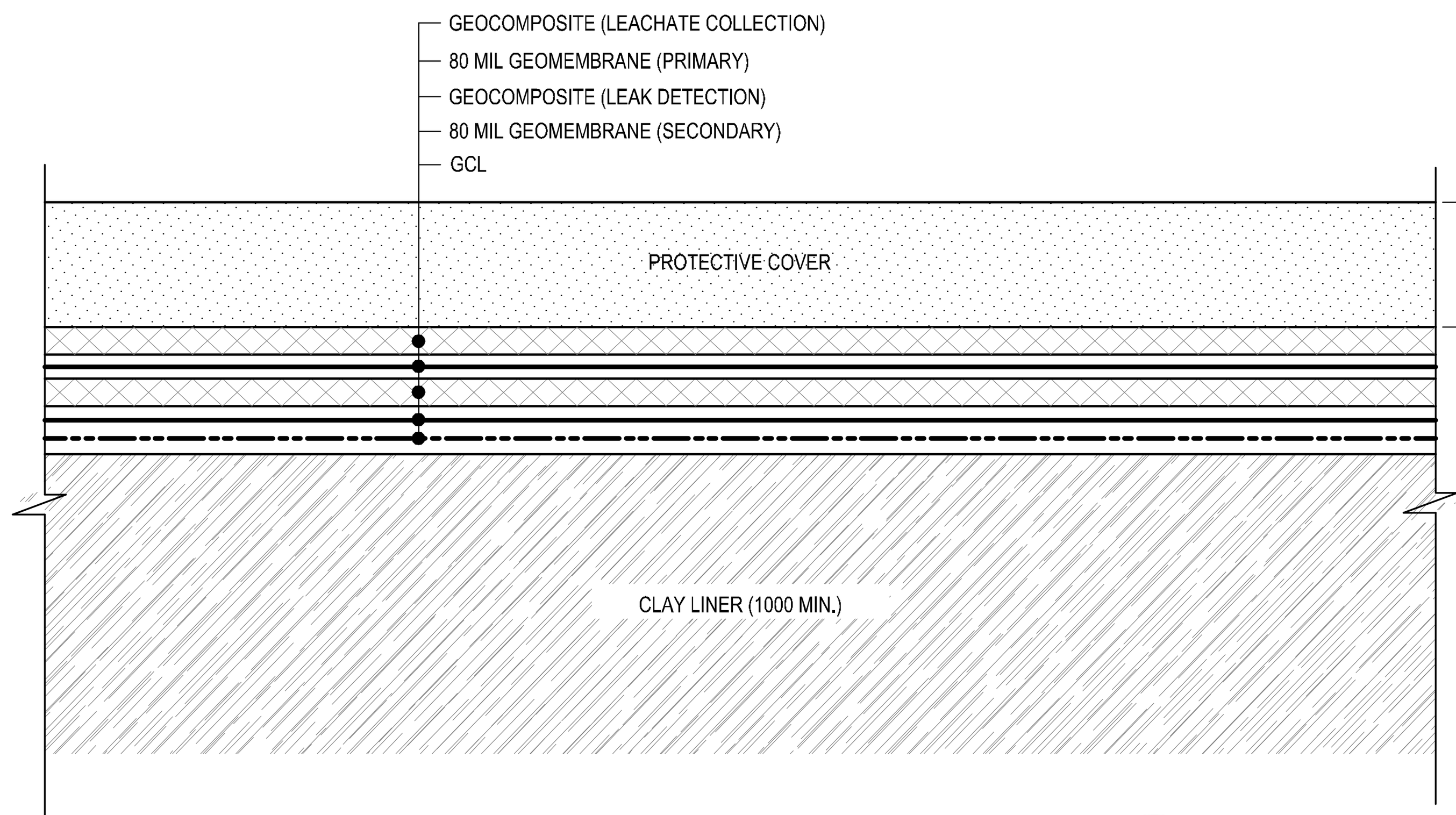
CLIENT
CleanHarbors

TETRA TECH

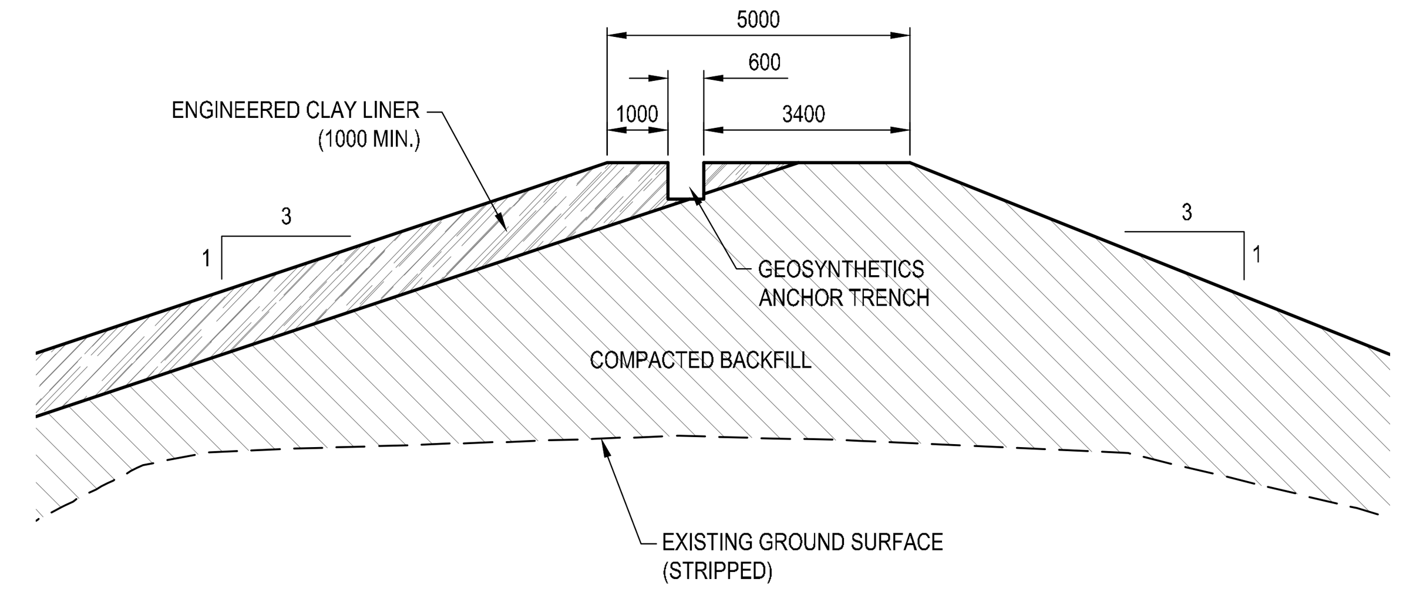
RYLEY FACILITY LATERAL EXPANSION

CELL 5 - DESIGN CROSS-SECTIONS

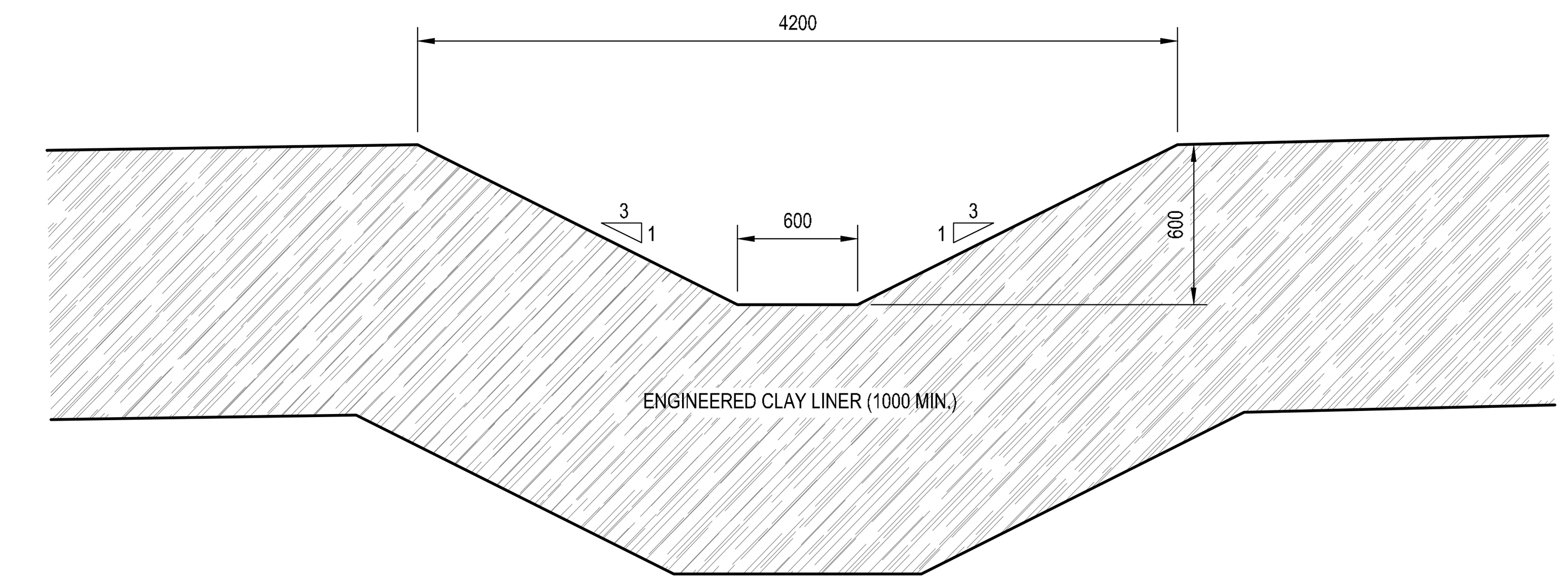
PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
ENVSWM03011-05	EDM	KA	KA	0	Figure 8B
DATE: December 2016	SHEET No. 3 of 6	DWN DBD	APP KA	STATUS A	



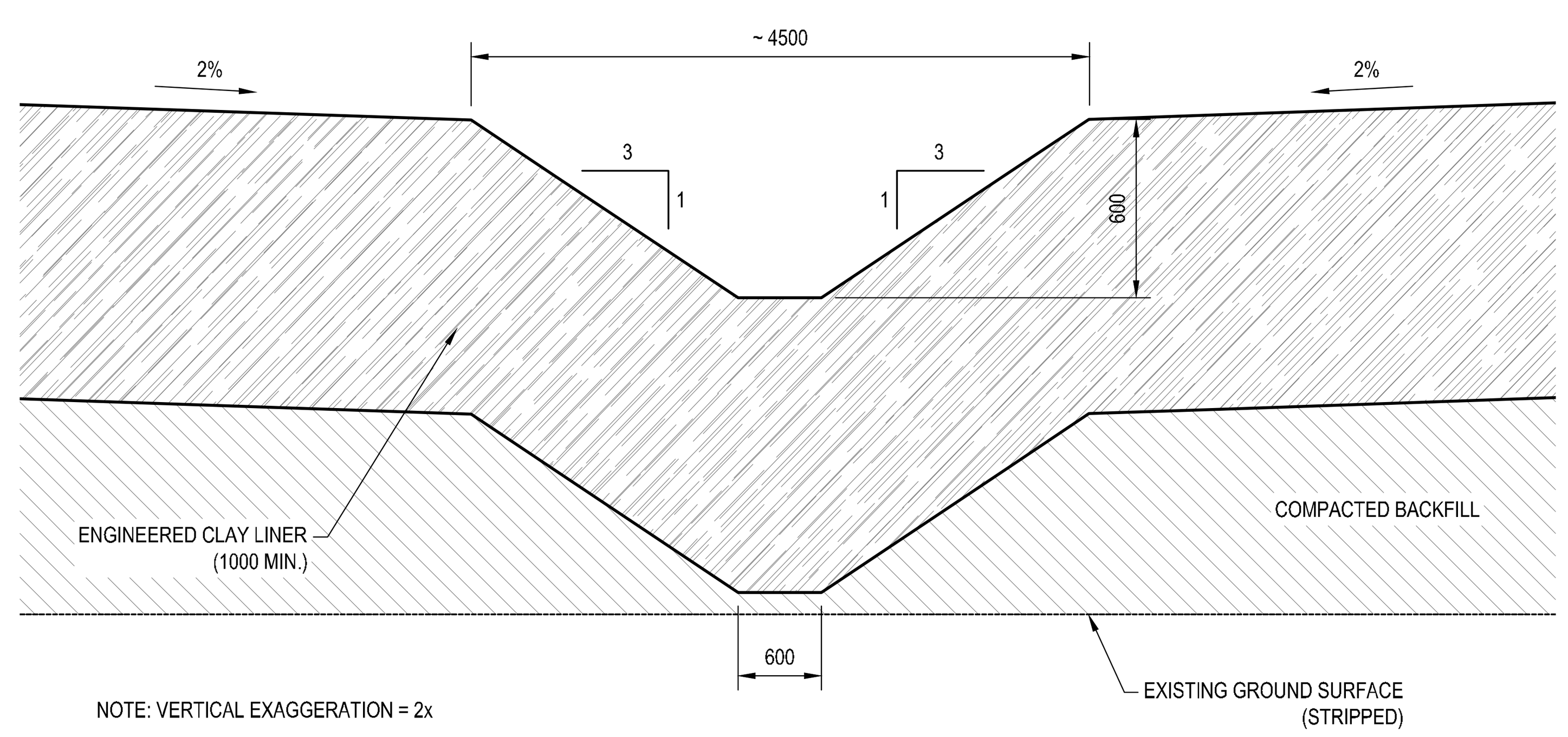
DETAIL 1 / C02
GENERAL AREA -LINER SYSTEM
N.T.S.



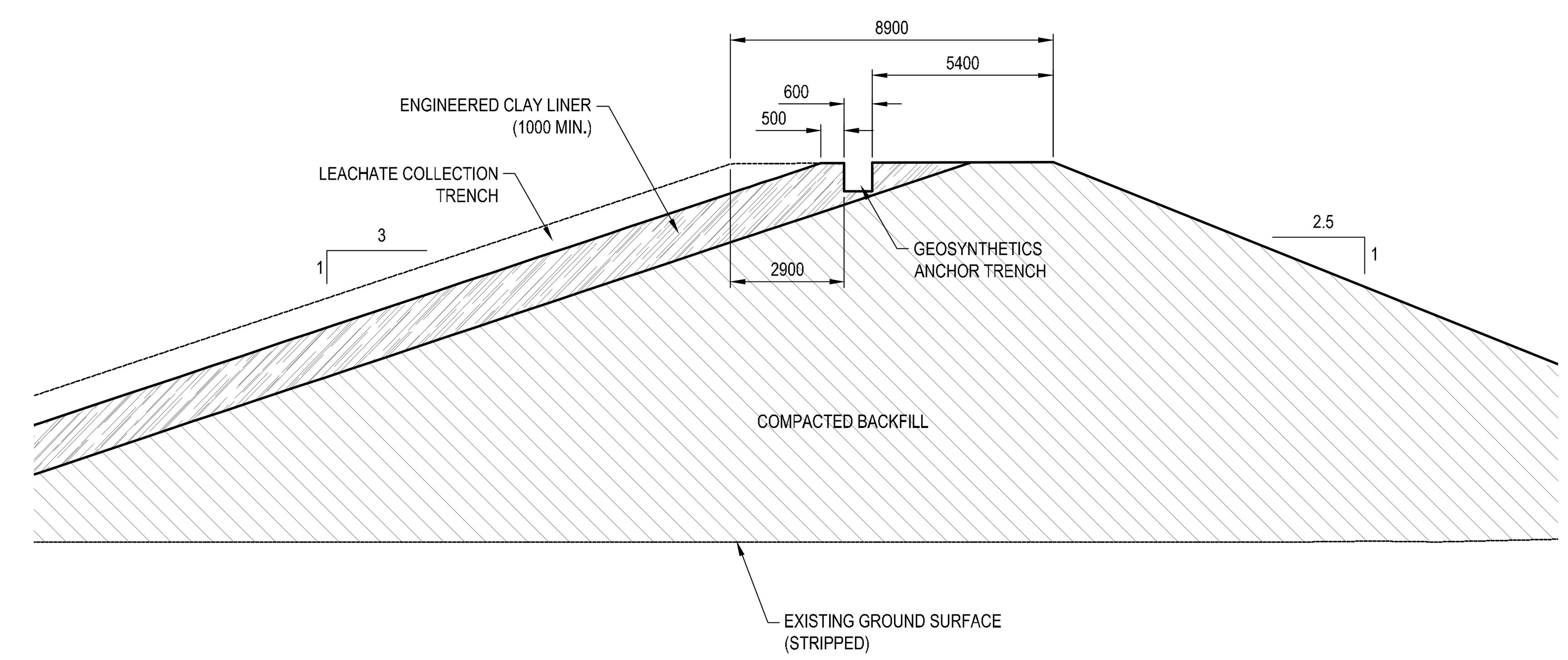
DETAIL 2 / C02
ANCHOR TRENCH - GENERAL AREA
N.T.S.



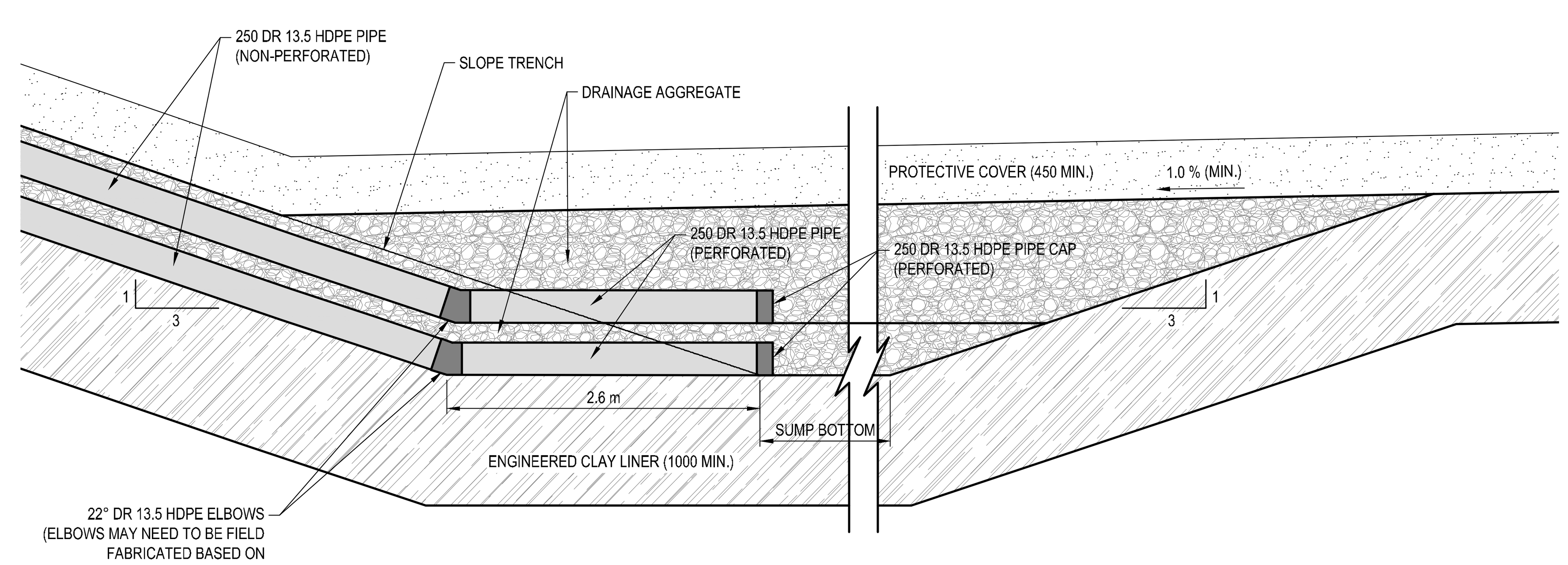
DETAIL 3 / C02
WEST SLOPE LEACHATE COLLECTION TRENCH
N.T.S.



DETAIL 4 / C02
CELL FLOOR LEACHATE COLLECTION TRENCH
1:50



DETAIL 5 / C02
ANCHOR TRENCH - LEACHATE EXTRACTION PIPE LOCATION
N.T.S.



DETAIL 6 / C02
LEACHATE COLLECTION SUMP
250 mm Ø PIPING
N.T.S.

0 50
Scale: 1: 1000 (metres)

STATUS ISSUED FOR USE

NUM	DATE	DWN	CKD	APR	DESCRIPTION

REVISIONS

NUM	DATE	APR	DESCRIPTION
A	AUG. 30/17	KA	ISSUED FOR USE

DRAWING STATUS

PERMIT TO PRACTICE
TETRA TECH CANADA INC.
Signature [signature]
Date August 30, 2017
PERMIT NUMBER: P13774
The Association of Professional Engineers and Geoscientists of Alberta

PERMIT

PROFESSIONAL LICENSEE (ENGINEERING) KEN ANDERSON ALBERTA
Aug. 30, 2017

PROFESSIONAL SEAL

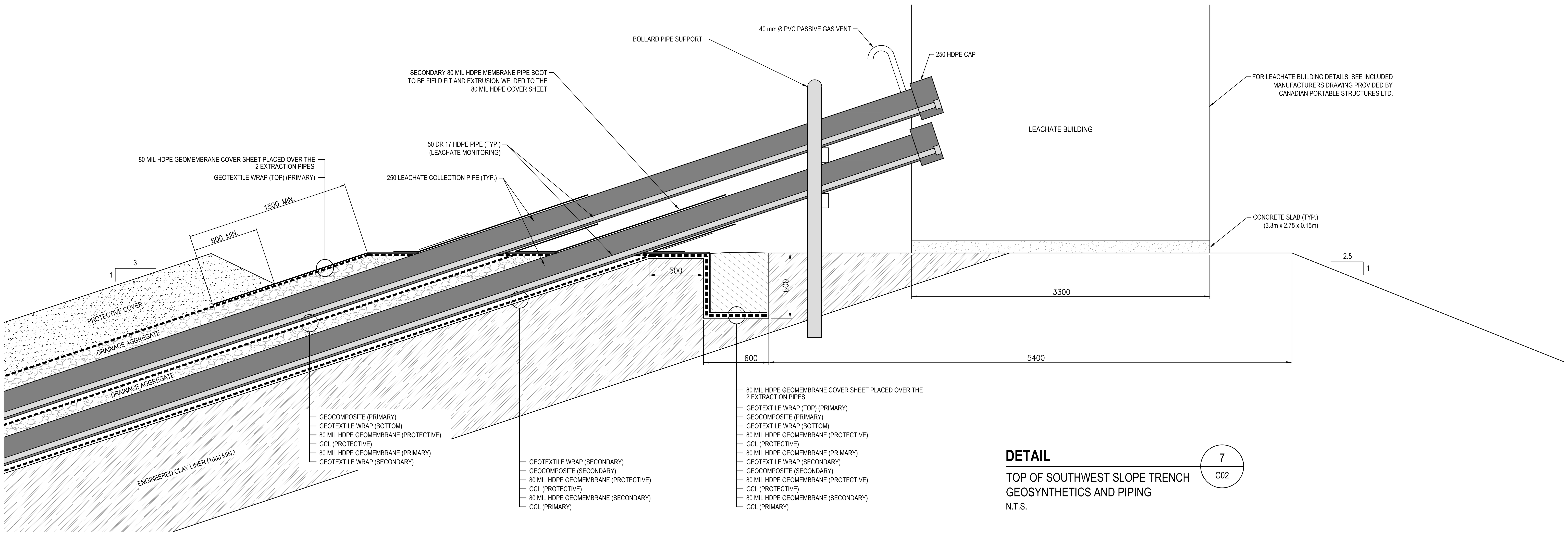
CLIENT
CleanHarbors
TETRA TECH

RYLEY FACILITY LATERAL EXPANSION

CELL 5 - DESIGN
DETAILS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
ENVSWM03011-05	EDM	KA	KA	0	Figure 8C
DATE:	SHEET No.	DWN	APP	STATUS	
December 2016	4 of 6	DBD	KA	A	

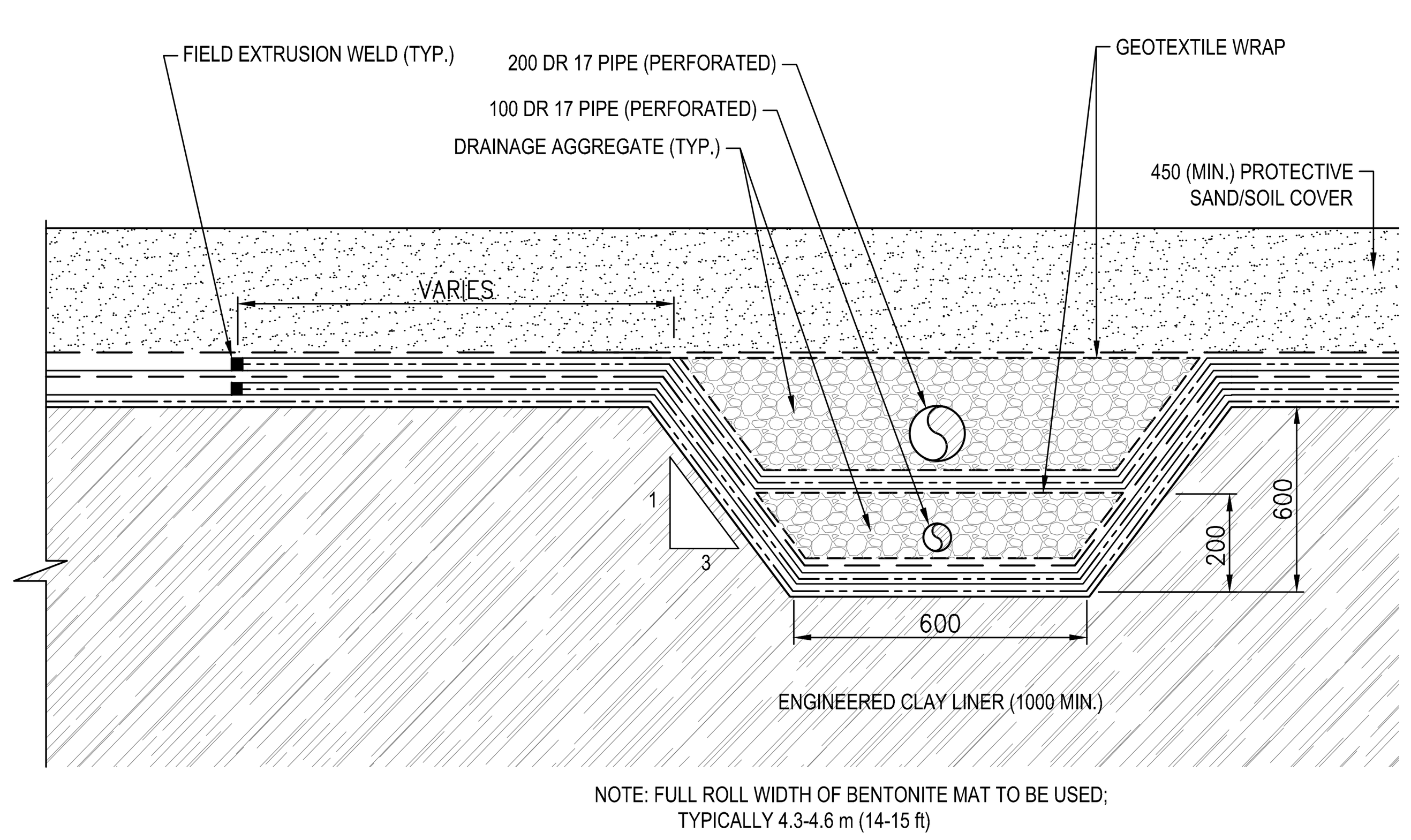
Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Clean Harbors Ryley\PROJECTS\NORTH QUARTER DEVELOPMENT\ENVSWM03011-05_Preliminary Design_Cell 5\Production Drawings\Issued for Review\ENVSWM03011-05-C04_R0_IFR.DWG [C04] December 13, 2016 - 1:15:44 pm (BY: DAS, DEBASHIS)



DETAIL 7 / C02

TOP OF SOUTHWEST SLOPE TRENCH GEOSYNTHETICS AND PIPING

N.T.S.

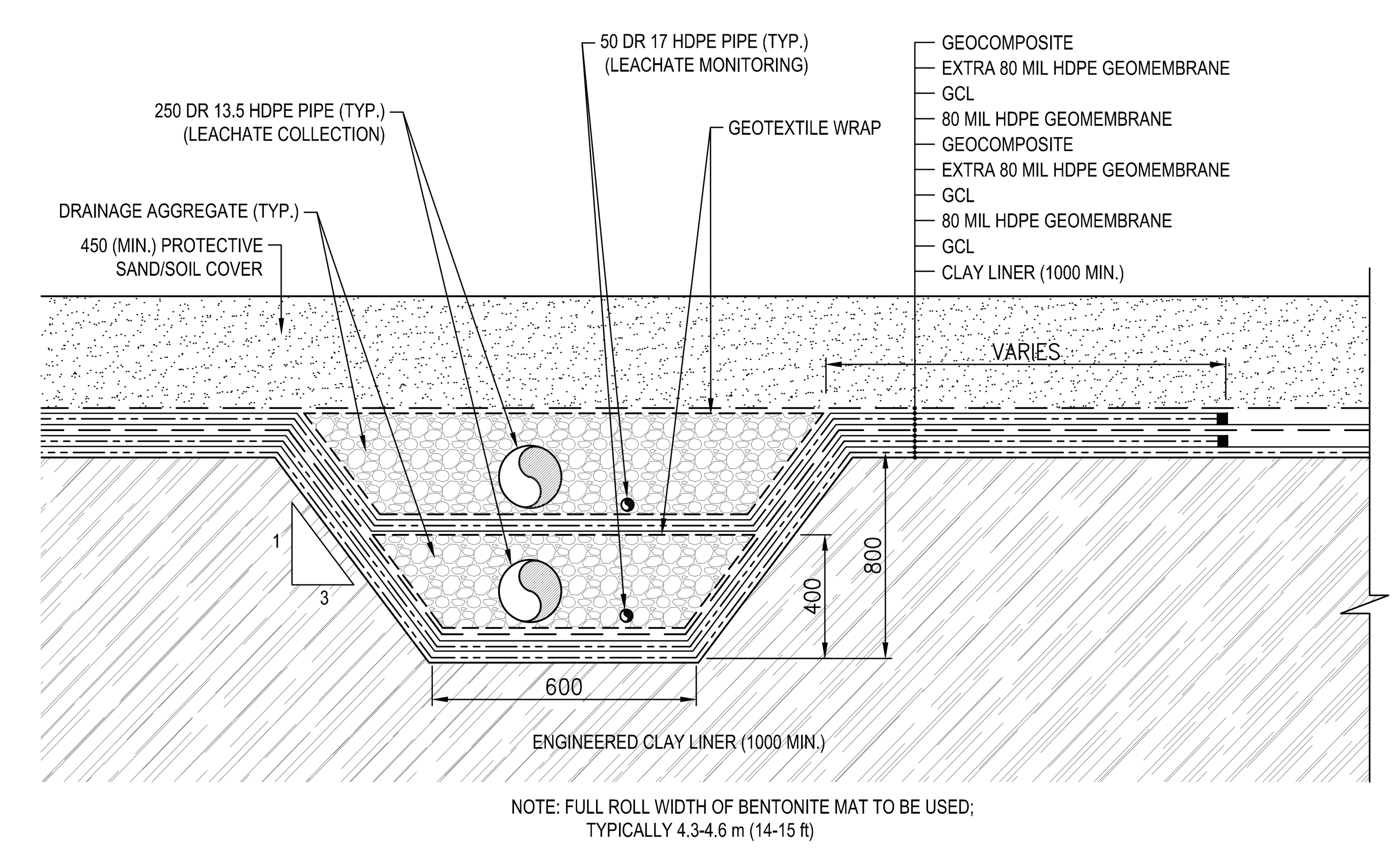


NOTE: FULL ROLL WIDTH OF BENTONITE MAT TO BE USED; TYPICALLY 4.3-4.6 m (14-15 ft)

DETAIL 8 / C02

EAST LEACHATE COLLECTION PIPE CLEAN-OUT TRENCH GEOSYNTHETICS AND PIPING

N.T.S.



NOTE: FULL ROLL WIDTH OF BENTONITE MAT TO BE USED; TYPICALLY 4.3-4.6 m (14-15 ft)

DETAIL 9 / C02

WEST LEACHATE COLLECTION PIPE CLEAN-OUT TRENCH GEOSYNTHETICS AND PIPING

N.T.S.

NOTES
DIMENSIONS SHOWN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

STATUS
ISSUED FOR USE

REVISIONS

NUM	DATE	DWN	CKD	APR	DESCRIPTION

DRAWING STATUS

NUM	DATE	APR	DESCRIPTION
A	AUG. 30/17	KA	ISSUED FOR USE

PERMIT TO PRACTICE
TETRA TECH CANADA INC.
Signature
Date August 30 2017
PERMIT NUMBER: P13774
The Association of Professional Engineers and Geoscientists of Alberta

PERMIT

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA
KEN ANDERSON
Aug. 30, 2017

PROFESSIONAL SEAL

CLIENT
CleanHarbors

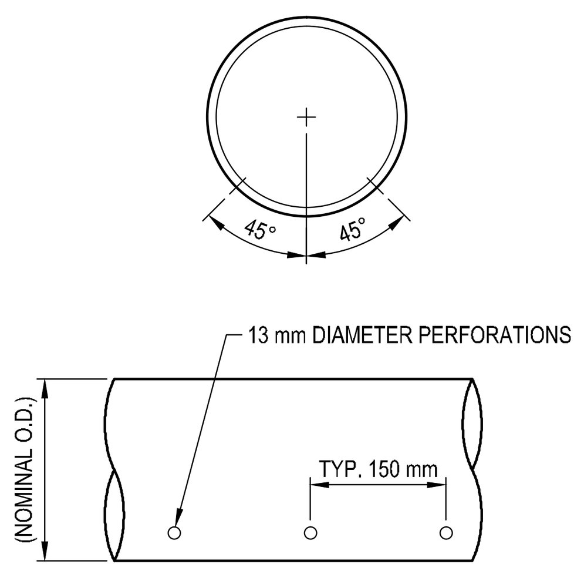
TETRA TECH

RYLEY FACILITY LATERAL EXPANSION

CELL 5 - DESIGN DETAILS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
ENVSWM03011-05	EDM	KA	KA	0	Figure 8D
DATE:	SHEET No.	DWN	APP	STATUS	
December 2016	5 of 6	DBD	KA	A	

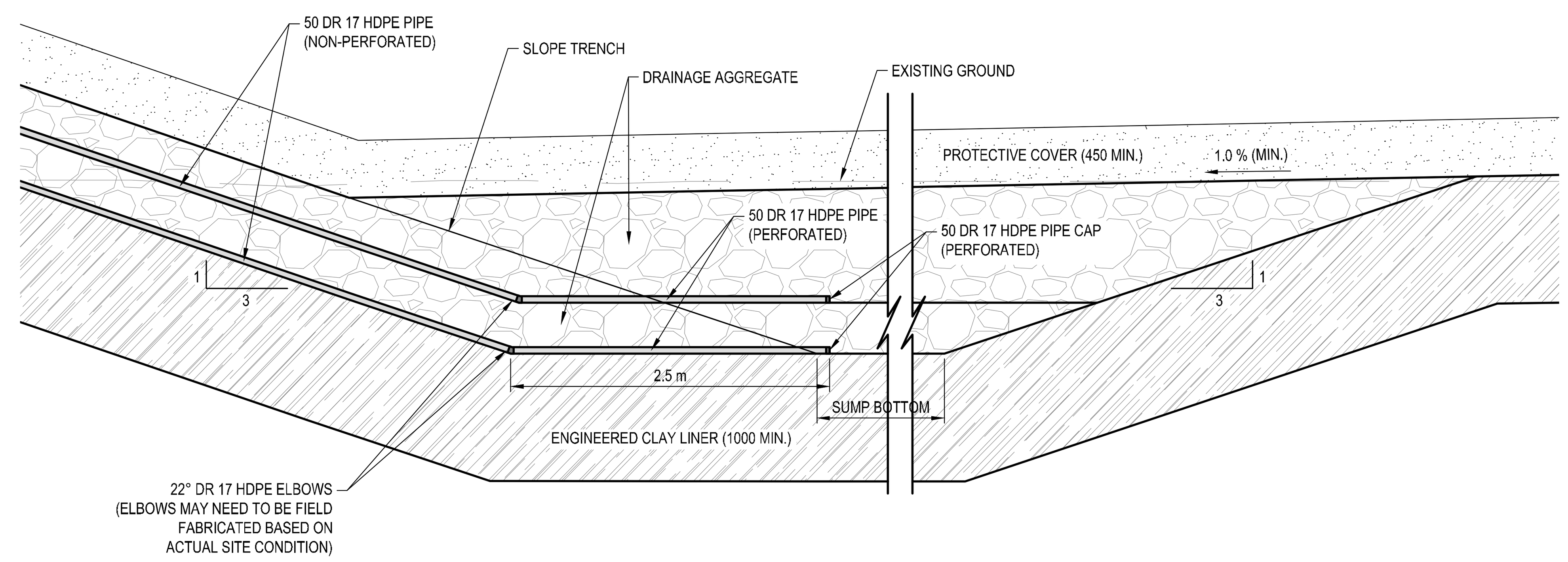
Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Clean Harbors Ryley\PROJECTS\NORTH QUARTER DEVE



PERFORATION DETAILS

DR17 200mm / 100mm DIAMETER PIPE PERFORATIONS

N.T.S.

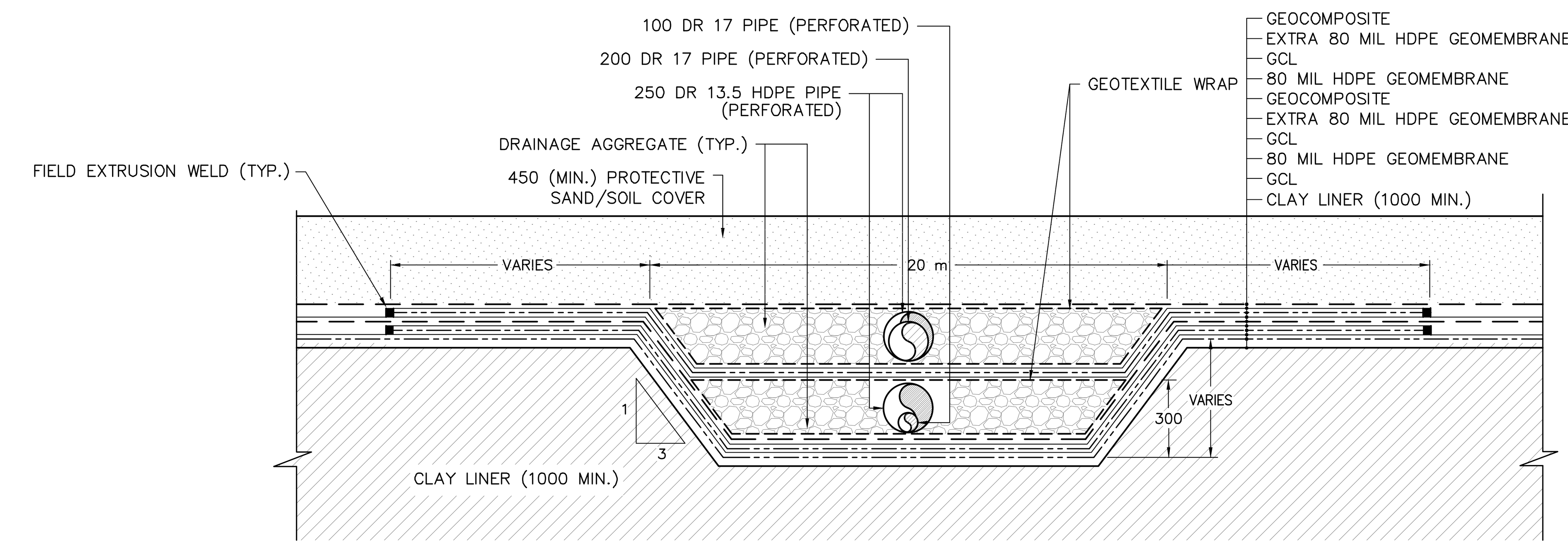


DETAIL

LEACHATE MONITORING PIPE - 50mmØ PIPING

10 / C02

N.T.S.



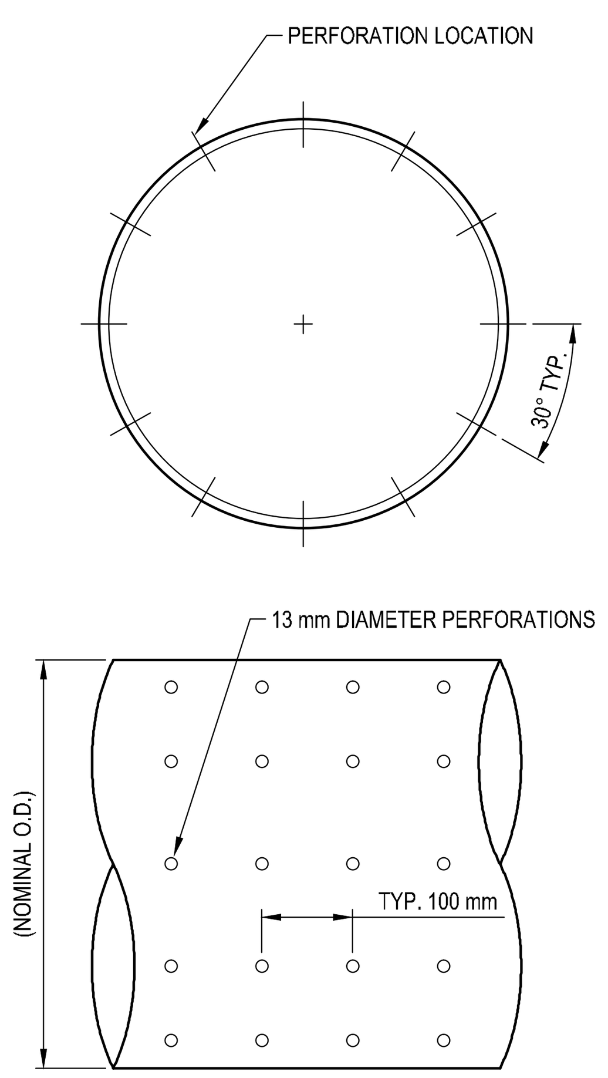
NOTE: FULL ROLL WIDTH OF BENTONITE MAT TO BE USED;
TYPICALLY 4.3–4.6 m (14–15 ft)

SECTION - LEACHATE SUMP

GEOSYNTHETICS AND PIPING DETAIL

11 / C02

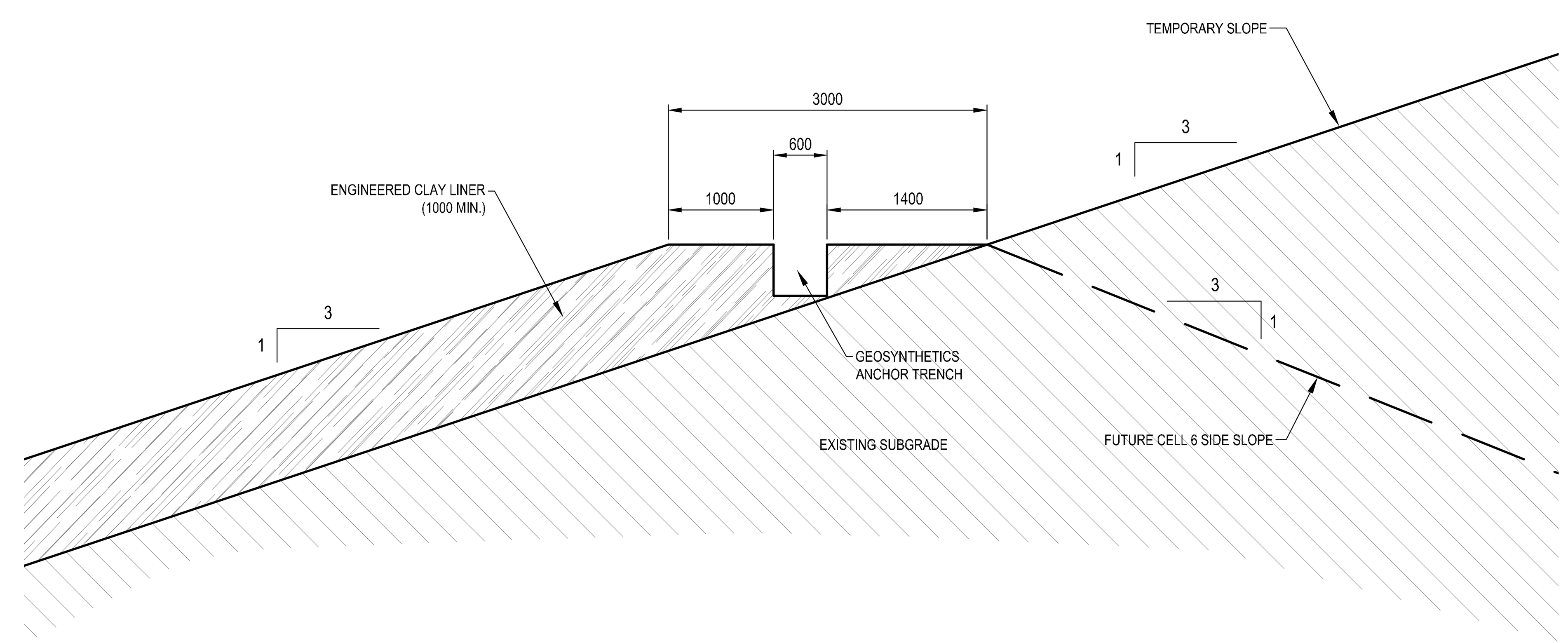
N.T.S.



PERFORATION DETAILS

DR13.5 250mm DIAMETER PIPE PERFORATIONS

N.T.S.



DETAIL

NORTH INTERMEDIATE BERM AND ANCHOR TRENCH

12 / C02

N.T.S.

NOTES
DIMENSIONS SHOWN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

STATUS
ISSUED FOR USE

NUM	DATE	DWN	CKD	APR	DESCRIPTION

REVISIONS

NUM	DATE	APR	DESCRIPTION
A	AUG. 30/17	KA	ISSUED FOR USE

DRAWING STATUS

PERMIT TO PRACTICE
TETRA TECH CANADA INC.
Signature
Date August 30 2017
PERMIT NUMBER: P13774
The Association of Professional Engineers and Geoscientists of Alberta

PERMIT

PROFESSIONAL SEAL
Aug. 30, 2017

CLIENT

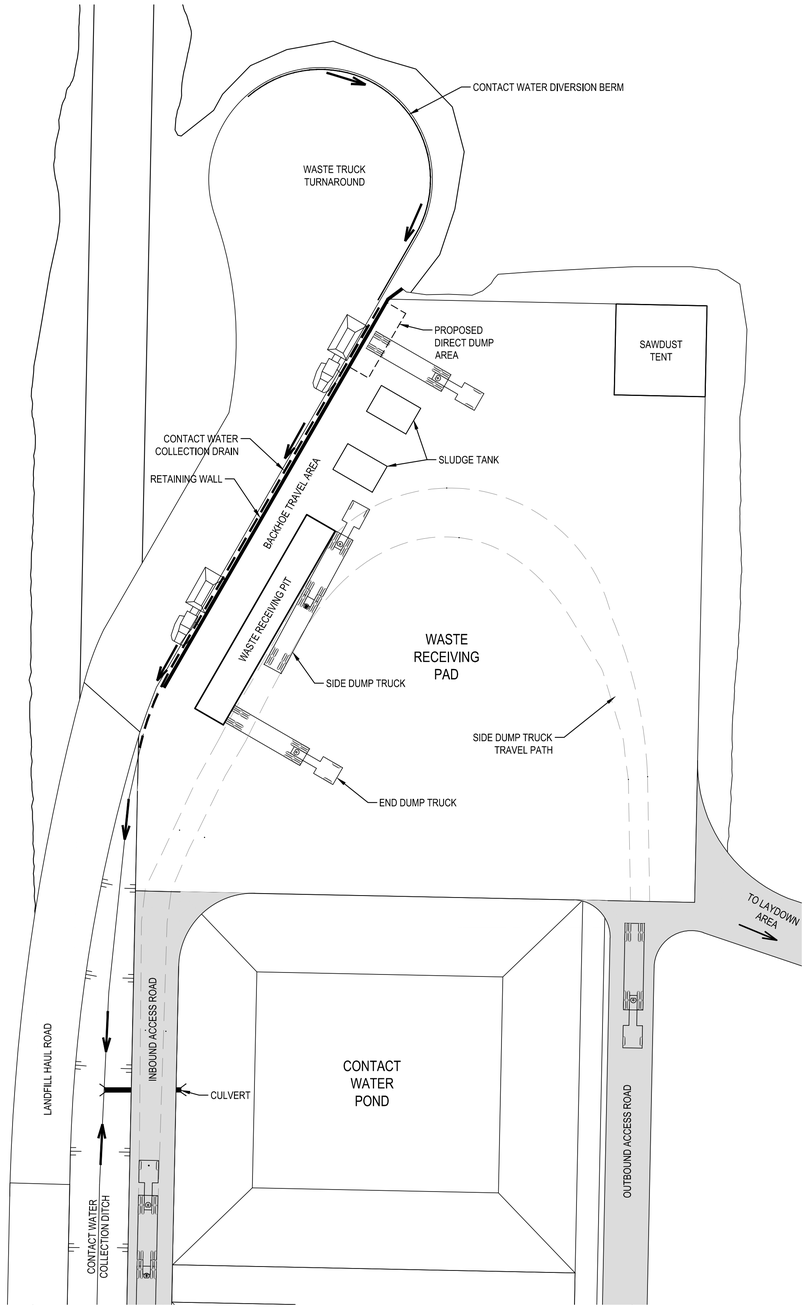
Clean Harbors

TETRA TECH

RYLEY FACILITY LATERAL EXPANSION

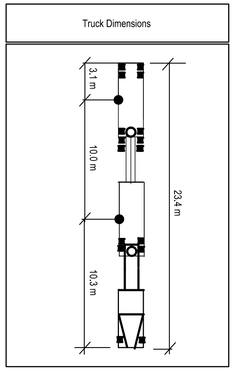
CELL 5 - DESIGN DETAILS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
ENVSWM03011-05	EDM	KA	KA	0	Figure 8E
DATE	SHEET No.	DWN	APP	STATUS	
December 2016	6 of 6	DBD	KA	A	



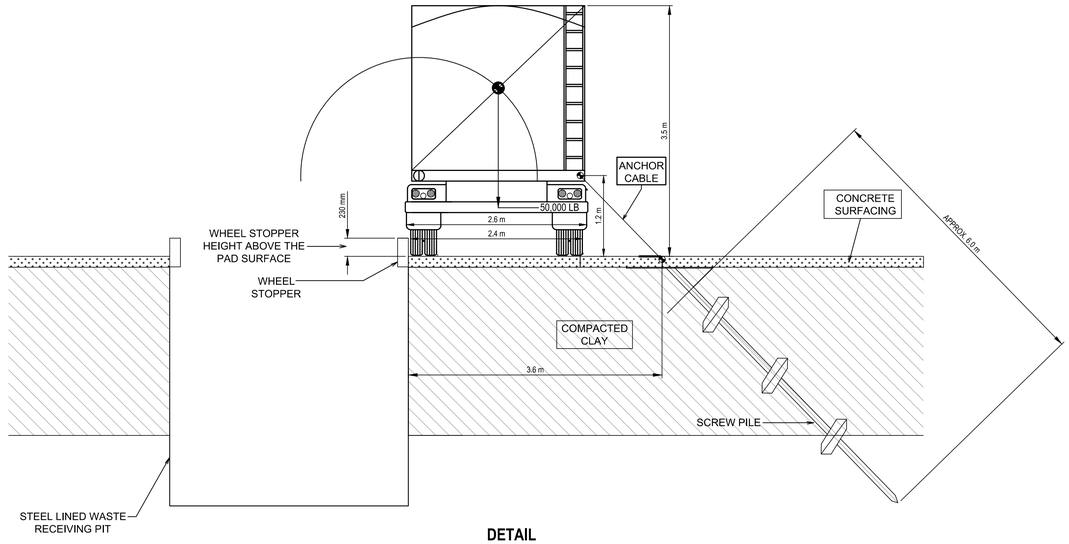
PLAN

WASTE RECEIVING PAD
N.T.S.



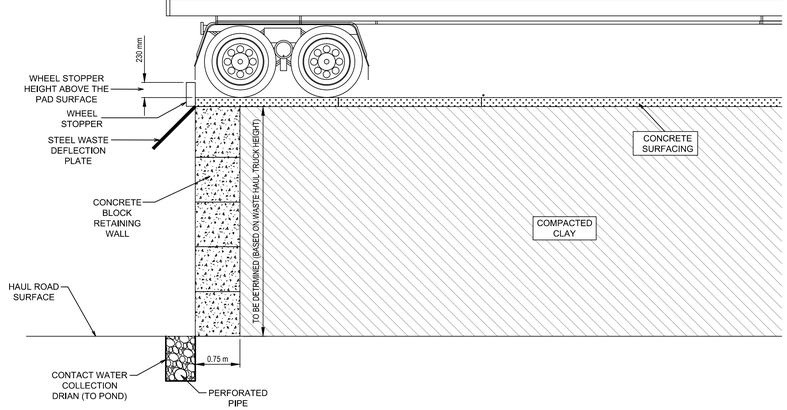
PLAN

SIDE DUMP TRUCK
N.T.S.



DETAIL

WASTE RECEIVING PIT
N.T.S.



DETAIL

DIRECT DUMP RETAINING WALL AREA
N.T.S.

NOTES:

1) DIMENSIONS SHOWN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

2) THE FINAL CONFIGURATION OF KEY OPERATIONAL ELEMENTS TO BE DETERMINED THROUGH THE DESIGN PROCESS PRIOR TO CONSTRUCTION

STATUS
ISSUED FOR REVIEW

NUM	DATE	DWN	CKD	APR	DESCRIPTION

REVISIONS

NUM	DATE	APR	DESCRIPTION
A	July 05/2017	KA	ISSUED FOR REVIEW

DRAWING STATUS

PERMIT

PROFESSIONAL SEAL

CLIENT

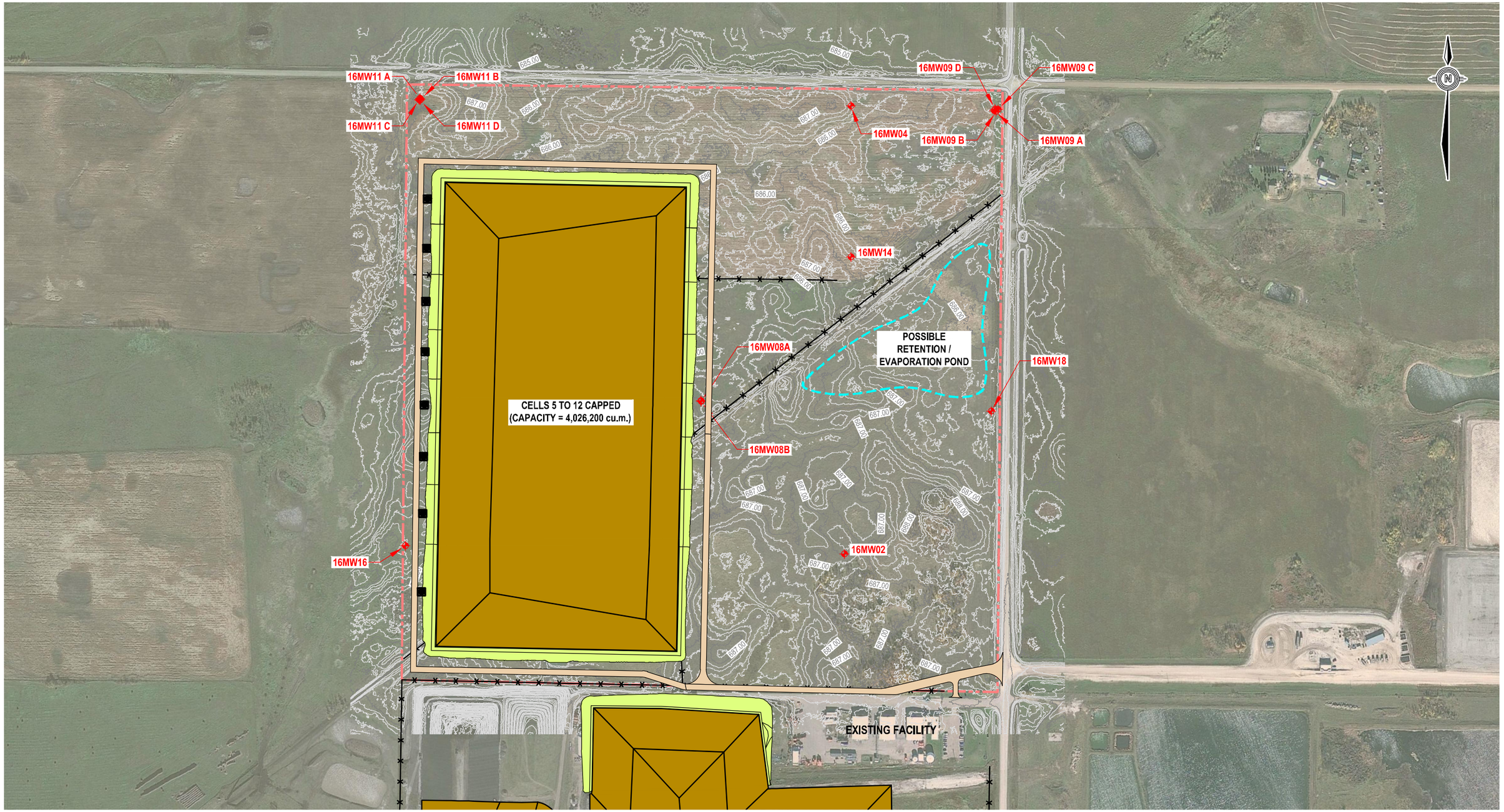
CleanHarbors

TETRA TECH

RYLEY FACILITY LATERAL EXPANSION

Schematic Design of Waste Receiving and Stabilization Area

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
ENVSWM03011-05	EDM	KA	KA	0	Figure 9
DATE:	SHEET No.	DWN	APP	STATUS	
July 2017	1 of 1	DBD	KA	A	



LEGEND

- MONITORING WELL LOCATION
- APPROXIMATE LEACHATE COLLECTION TANK
- PROPOSED EXPANSION SITE BOUNDARY
- FENCE

NOTES:

1) CONTOUR DATA IS BASED ON 2009 LIDAR SURVEY
2) BOREHOLE AND MONITORING WELL LOCATIONS ARE BASED ON SURVEY DATA RECEIVED ON JULY 8TH, 2016

0 250m

Scale: 1:5,000 @ 11"x17"

CLIENT

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TETRA TECH

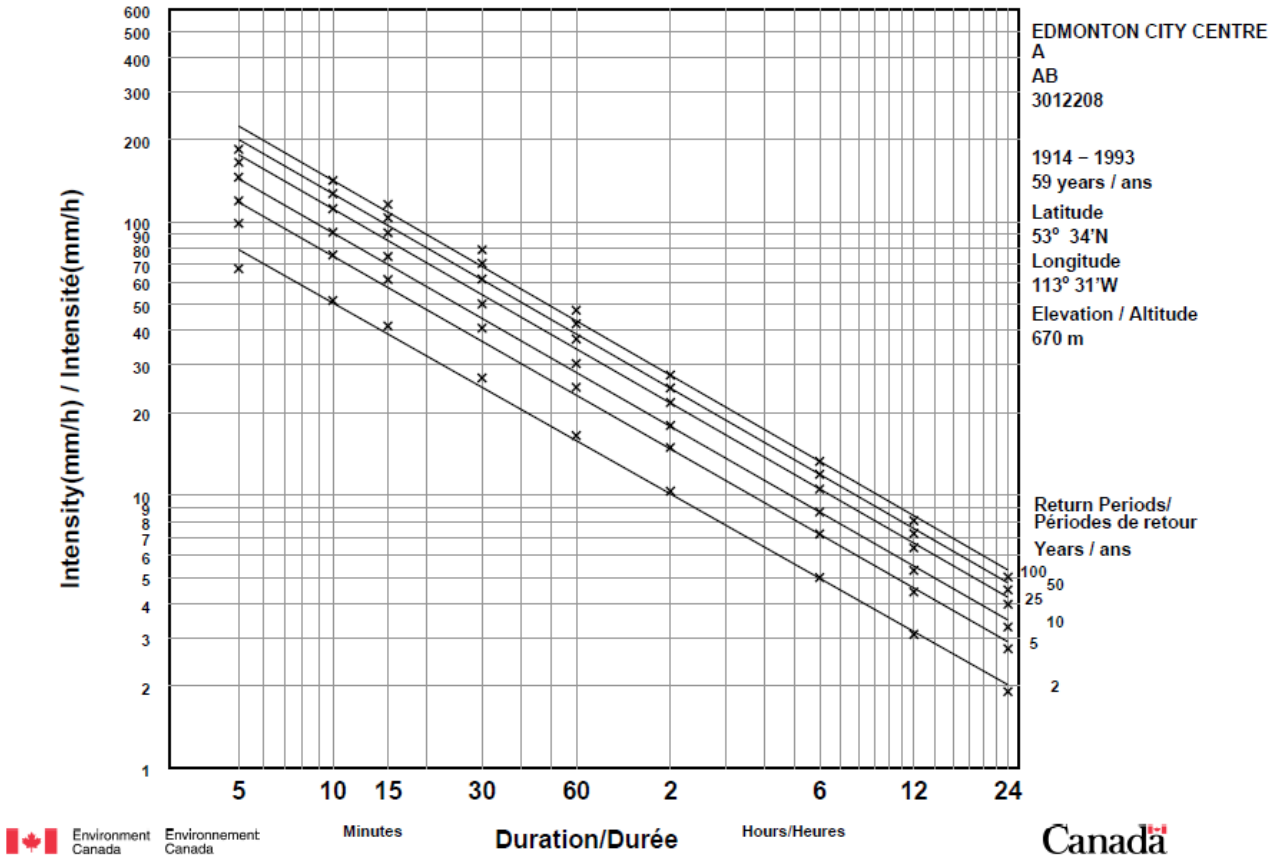
RYLEY FACILITY LATERAL EXPANSION

CONCEPTUAL CLOSURE - PLAN VIEW

PROJECT NO.	DWN	CKD	REV
ENVSWM03011-05	DBD	LQ	0

OFFICE	DATE
EDM	February 2017

Figure 12



LEGEND

NOTES
Environment and Climate Change Canada 2016

STATUS
ISSUED FOR USE

CLIENT
CleanHarbors

TETRA TECH

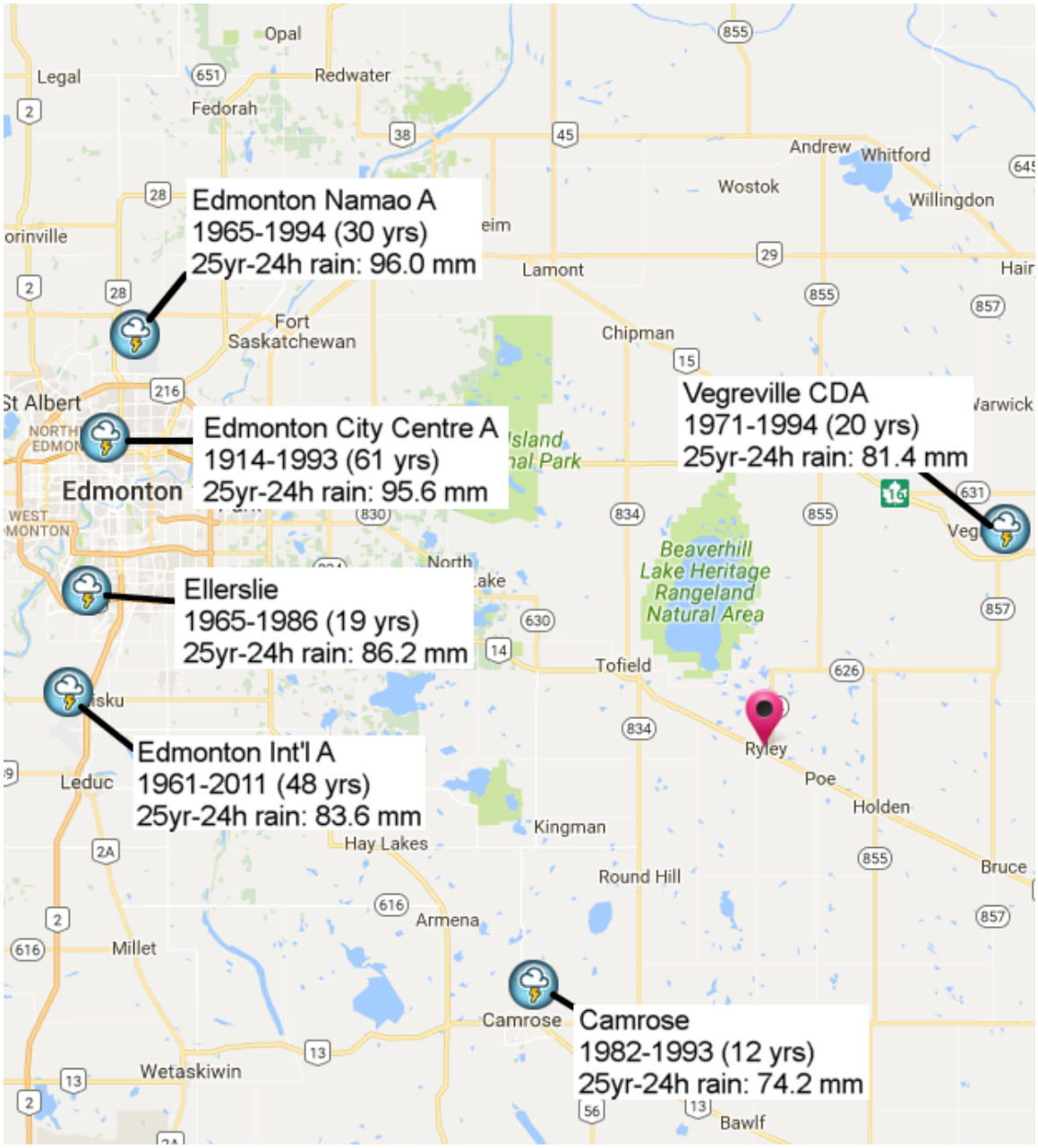
RYLEY FACILITY LATERAL EXPANSION

Rainfall Intensity Duration Frequency Curves for Edmonton City Centre A

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	SS	BR	BH	BH

OFFICE	DATE
EBA-EDM	August 27, 2017

Figure 11



LEGEND

NOTES
Environment and Climate Change Canada 2016

STATUS
ISSUED FOR USE

CLIENT
CleanHarbors

TETRA TECH

Ryley Facility Lateral Expansion

Rainfall Intensity-Duration-Frequency Stations

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	SS	BR	BH	1

OFFICE	DATE
EBA-SWM.SWOP	August 27, 2017

Figure 10

WEST VIEW
N.T.S.

SOUTHWEST VIEW
N.T.S.

CLIENT
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TETRA TECH

RYLEY FACILITY LATERAL EXPANSION

CONCEPTUAL CLOSURE - LANDSCAPE VIEW

PROJECT NO.	DWN	CKD	REV
ENVSWM03011-05	DBD	KA	0

OFFICE	DATE
EDM	February 2017

Figure 13

PHOTOGRAPHS

Photo 1 View south toward seeded pasture (foreground) and a seasonal freshwater marsh wetland in the southwest corner of the Project Footprint

Photo 2 Close-up of bare soil and weedy vegetation attributed to ephemeral waterbody located in cultivated area of the Project Footprint

Photo 3 View northeast of temporary freshwater marsh wetland vegetation located within seeded pasture areas of the Project Footprint

Photo 4 View east of seasonal freshwater marsh wetland vegetation located in seeded pasture area in the southeast corner of the Project Footprint

Photo 5 Close-up view of dominant vegetation in remnant deciduous woodland located in the southeast corner of the Project Footprint

Photo 1: View south toward seeded pasture (foreground) and a seasonal freshwater marsh wetland in the southwest corner of the Project Footprint (June 15, 2016).

Photo 2: Close-up of bare soil and weedy vegetation attributed to ephemeral waterbody located in cultivated area of the Project Footprint (June 15, 2016).

Photo 3: View northeast of temporary freshwater marsh wetland vegetation located within seeded pasture areas of the Project Footprint (June 15, 2016).

Photo 4: View east of seasonal freshwater marsh wetland vegetation located in seeded pasture area in the southeast corner of the Project Footprint (June 14, 2016).

Photo 5: Close-up view of dominant vegetation in remnant deciduous woodland located in the southeast corner of the Project Footprint (June 14, 2016).

APPENDIX A

TETRA TECH'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.1 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of TETRA TECH’s client. TETRA TECH does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than TETRA TECH’s Client unless otherwise authorized in writing by TETRA TECH. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the report, if required, may be obtained upon request.

1.2 ALTERNATE REPORT FORMAT

Where TETRA TECH submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed TETRA TECH’s instruments of professional service); only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by TETRA TECH shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of TETRA TECH’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except TETRA TECH. The Client warrants that TETRA TECH’s instruments of professional service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

1.3 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

1.4 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of the report, TETRA TECH may rely on information provided by persons other than the Client. While TETRA TECH endeavours to verify the accuracy of such information when instructed to do so by the Client, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX B

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT APPROVAL (APPROVAL NO. 10348-03-00)

Alberta Environment and Parks

APPROVAL

PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
R.S.A. 2000, c.E-12, as amended.

APPROVAL NO. 10348-03-00

APPLICATION NO. 013-10348 and 014-10348

EFFECTIVE DATE: March 31, 2017

EXPIRY DATE: March 31, 2027

APPROVAL HOLDER: Clean Harbors Canada, Inc.

ACTIVITY: **CONSTRUCTION, OPERATION AND RECLAMATION OF THE**

Ryley Industrial Waste Management Facility, consisting of a Class I and Class II Industrial Landfill and a Hazardous Waste/Recyclable Storage and Processing Facility,

IS SUBJECT TO THE ATTACHED TERMS AND CONDITIONS.

Designated Director under the Act .....
Mohammad Habib, P. Eng.

Date Signed March 31, 2017

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 1: DEFINITIONS

SECTION 1.1: DEFINITIONS

1.1.1 All definitions from the Act and the regulations apply except where expressly defined in this approval.

1.1.2 In all PARTS of this approval:

(a) "Act" means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c.E-12, as amended;

(b) "action leakage rate" means the leakage rate that would occur through the primary liner, based on two holes per hectare, each with a diameter of 2 mm and that is calculated to be 790L/ha/day;

(c) "active landfill area" means the portion of the landfill that has received or is receiving waste for disposal, where final cover has not been placed, and includes areas that are being used for interim management of waste prior to disposition;

(d) "active landfill life" means the period of landfill life during which waste is received for disposal at the landfill, beginning with the initial receipt of waste and ending with the start of final landfill closure activities;

(e) "AER" means Alberta Energy Regulator;

(f) "affected lands" means lands which have received substances released from the facility;

(g) "air effluent stream" means any substance in a gaseous medium released by or from a facility;

(h) "APEGA" means the Association of Professional Engineers and Geoscientists of Alberta;

(i) "application" means the written submissions from the approval holder to the Director in respect of application No. 013-10348 and No. 014-10348 and any subsequent applications where amendments are issued for this approval;

(j) "application No. 005-10348" means the written submissions from the approval holder to the Director in respect of renewal application No. 005-10348;

(k) "application No. 008-10348" means the written submissions from the approval holder to the Director in respect of amendment application No. 008-10348;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(l) "application No. 012-10348" means the written submissions from the approval holder to the Director in respect of amendment application No. 012-10348;

(m) “as-built plans” means survey plans, signed and stamped by a professional registered with APEGA, that document variances from design or construction plans that were either approved or authorized according to the terms and conditions of this approval;

(n) “BTEX” means benzene, toluene, ethylbenzene and xylene;

(o) “COD” means Chemical Oxygen Demand;

(p) “composite liner” means a liner that meets the specifications in 3.1.2(b) of this approval;

(q) "container" means any portable device in which a substance is kept, including but not limited to the following:

(i) drums, barrels and pails which have a capacity greater than 18 litres but less than 210 litres,

(ii) 320 litre overpack drums, and

(iii) 1000 litre tote tanks or sacks;

(r) “cover” means soil or other approved material that is used to cover compacted wastes in a landfill cell;

(s) “day”, when referring to sampling, means any sampling period of 24 consecutive hours;

(t) "decommissioning" means the dismantling and decontamination of the facility undertaken subsequent to the termination or abandonment of any activity or any part of any activity regulated under the Act, excluding the landfill cells and those infrastructure components and facilities that are required for the landfill post-closure;

(u) "decontamination" means the treatment or removal of substances from the facility and affected lands;

(v) "Director" means an employee of the Government of Alberta designated as a Director under the Act;

(w) “dismantling” means the removal of buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling

TERMS AND CONDITIONS ATTACHED TO APPROVAL

facilities, railways, roadways, pipelines and any other installations that are being or have been used or held for or in connection with the facility;

(x) "DOC" means Dissolved Organic Carbon;

(y) "domestic wastewater" means wastewater that is the composite of liquid and water-carried wastes associated with the use of water for drinking, cooking, cleaning, washing, hygiene, sanitation or other domestic purposes, together with any infiltration and inflow wastewater, that is released into a wastewater collection system;

(z) "domestic wastewater system" means the parts of the facility that collect, store, or treat domestic wastewater from the facility;

(aa) "existing landfill cells" means Cell 1, Cell 2, Cell 3A, Cell 3B, and Cell 3C as described in application No. 005-10348;

(bb) "facility" means all buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, roadways, railways, pipelines and other installations, the Class I and Class II industrial landfill and the HWRSP Facility, and includes the land, located on the SE 1/4 of Section 9, Township 50, Range 17, West of the 4th Meridian, that is being or has been used or held for or in connection with the Ryley Industrial Waste Management Facility;

(cc) "facility developed area" means the areas of the facility used for the storage, treatment, processing, transport, or handling of raw material, intermediate product, by-product, finished product, process chemicals, or waste material, and includes the active landfill area;

(dd) "final cover" means a designed system, natural or man-made, that is placed on the surface of a landfill or landfill cell that has reached its maximum designated waste elevation to control transmission of moisture and landfill gas, and conforms to the end use plan;

(ee) "final landfill closure" means the period of time when waste is no longer placed in the defined portion of a landfill and activities are undertaken to complete the final cover system and decommission components and facilities that are no longer required, and includes the construction of any additional components or monitoring systems that are necessary for post-closure;

(ff) "free liquids" means the liquids as determined by the US EPA SW-846 Test Method 9095B: Paint Filter Liquids Test, as specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, US EPA Publication No. SW-846, as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(gg) "fugitive emissions" means emissions of substances to the atmosphere other than ozone depleting substances, originating from a facility source other than a flue, vent, or stack but does not include sources which may occur due to breaks or ruptures in process equipment;

(hh) "GCL" means geosynthetic clay liner that is made of a thin layer of bentonite either bonded to a geomembrane or fixed between two sheets of geotextile;

(ii) "geomembrane" means a sheet of manufactured synthetic material designed to control migration of liquid and gas;

(jj) "grab sample" means an individual sample collected in less than 30 minutes and which is representative of the substance sampled;

(kk) "groundwater" means groundwater as defined in the *Water Act,* R.S.A. 2000, c.W-3, as amended;

(ll) "groundwater monitoring well" means a well drilled at a site to measure groundwater levels and collect groundwater samples for the purpose of physical, chemical, or biological analysis to determine the concentration of groundwater constituents;

(mm) "HDPE" means High Density Polyethylene;

(nn) "HWRSP Facility" means the Hazardous Waste/Recyclable Storage and Processing Facility as described in the application for storage, processing and transfer of hazardous wastes and hazardous recyclables and which includes the Maintenance Shop, and is an integral part of the facility;

(oo) "hydraulic conductivity" means the ease with which water can be transported through a material

(pp) "hydrocarbon" means a chemical compound that consists entirely of hydrogen and carbon;

(qq) "ISO/IEC 17025" means the international standard, developed and published by International Organization for Standardization (ISO), specifying management and technical requirements for laboratories;

(rr) "incompatible waste" means waste materials which could cause dangerous reactions from direct contact with one another;

(ss) "industrial wastewater" means the composite of liquid wastes and water-carried wastes, any portion of which results from any industrial process carried on at the HWRSP Facility;

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(tt) "landfill" means the Class I and Class II industrial landfill as described in the application and which includes the waste stabilization area, and is an integral part of the facility;

(uu) "landfill cell" means a designed area of a landfill comprised of an excavation or earthen structure in which waste is enclosed;

(vv) "landfill cell closure" means the construction of a final cover for landfill cell including placement of previously conserved top soil and upper subsoil and re-vegetation as required for the intended future use of the landfill;

(ww) "landfill gas" means a mixture of gases generated by the microbial decomposition of and chemical reactions between wastes in a landfill;

(xx) "lateral expansion" means an expansion of landfill cell boundaries beyond the approved area;

(yy) "leachate" means a liquid that has been in contact with waste in the landfill cell and has undergone chemical or physical changes;

(zz) "leachate collection system" means a system that gathers leachate so that it may be removed from a landfill, and includes a permeable drainage material, a network of perforated pipes and sumps or manholes from where leachate can be removed;

(aaa) "leak detection liquid" means any liquid collected within the leak detection system;

(bbb) "leak detection system" means a system that gathers liquid between a primary liner and a secondary liner system, and consists of a permeable drainage material, a network of perforated pipes and sumps or manholes from where the liquid can be removed;

(ccc) "liner" means a continuous layer of synthetic material or compacted natural clay placed beneath and at the sides of a landfill cell that is compatible with the waste and restricts the migration of leachate, or landfill gas, or both;

(ddd) "local environmental authority" means the Department of Environment and Parks, in the Province of Alberta, or the agency that has the equivalent responsibilities for any jurisdiction outside the Province;

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(eee) "major ions" means the following:

Calcium	Carbonate
Magnesium	Bicarbonate
Sodium	Chloride
Potassium	Sulfate

(fff) "maximum acceptable leachate head" means the maximum depth of leachate above the lowest part of the primary liner, not including the sumps or leachate collection pipe trenches, and is:

(i) 1.0 m in each of the existing landfill cells, and

(ii) 0.3 m in each of the new landfill cells

during active landfill life, landfill cell closure, final landfill closure, and post-closure;

(ggg) "maximum designated waste elevation" means the maximum elevation of waste in metres above sea level that can be disposed of at the landfill prior to construction of final cover, and is 714 metres;

(hhh) "metals" means the following:

Aluminum, dissolved	Chromium, dissolved (hexavalent)	Nickel, dissolved
Antimony, dissolved	Cobalt, dissolved	Selenium, dissolved
Arsenic, dissolved	Copper, dissolved	Silver, dissolved
Barium, dissolved	Lead, dissolved	Thallium, dissolved
Boron, dissolved	Manganese, dissolved	Tin, dissolved
Cadmium, dissolved	Mercury, total	Uranium, dissolved
Chromium, total	Molybdenum, dissolved	Zinc, dissolved

(iii) "monitoring system" means all equipment used for sampling, conditioning, analyzing or recording data in respect of any parameter listed or referred to in this approval, including equipment used for continuous monitoring;

(jjj) "month" means calendar month;

(kkk) "municipal solid waste" means solid waste resulting from or incidental to municipal, community, commercial, institutional and recreation activities, and includes garbage, rubbish, ashes, street cleanings, abandoned automobiles and all other solid wastes except hazardous waste, industrial solid waste, oilfield waste and biomedical wastes;

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(lll) "new landfill cells" means Cell 3D as described in application No. 005-10348, Cell 3E as described in application No. 012-10348, and Cell 4 as described in the application;

(mmm) "new surface water detention pond" means the surface water detention pond as described in application No. 012-10348;

(nnn) "NORM" means Naturally Occurring Radioactive Materials;

(ooo) "NORM waste" means any waste material with concentrations of NORM above the limits specified in Tables 5.1, 5.2, or 5.3 of the *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM)*, Health Canada, 2011, as amended;

(ppp) "nutrients" means the following:

Ammonia nitrogen	Nitrite nitrogen
Total Kjeldahl nitrogen	Total phosphorus
Nitrate nitrogen	Dissolved phosphorus

(qqq) "old surface water detention pond" means the surface water detention pond as described in application No. 005-10348;

(rrr) "Petroleum Hydrocarbons Fractions F1 and F2" means the specific hydrocarbon fraction measured by the analytical methods described in the *Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method,* published by the Canadian Council of Ministers of the Environment, 2001, as amended;

(sss) "points of compliance" means the location or locations of the groundwater monitoring wells where measurements of groundwater quality are taken to assess landfill and waste treatment performance;

(ttt) "post-closure" means the period of time after completion of the final landfill closure;

(uuu) "ppm" means concentration in parts per million;

(vvv) "primary liner" means the uppermost geomembrane liner;

(www) "QA/QC" means quality assurance and quality control;

(xxx) "quarter year" means a time period of three consecutive months designated as January, February and March; or April, May and June; or July, August and September; or October, November and December;

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(yyy) "regulations" means the regulations enacted pursuant to the Act, as amended;

(zzz) "representative grab" means a sample consisting of equal volume portions of water collected from at least four sites between 0.20 to 0.30 metres below the water surface within a pond;

(aaaa) "runoff" means any rainwater or melt water that drains as surface flow from the facility developed areas, excluding leachate;

(bbbb) "runoff control system" means the parts of the facility that collect, store or treat runoff from the facility, and includes but is not limited to runoff collection ditches, surface water detention pond(s) and tank farm bermed area;

(cccc) "run-on" means any rainwater or melt water that drains as surface flow toward the active landfill area;

(dddd) "run-on control system" means the parts of the facility that divert run-on away from the active landfill area;

(eeee) "scrubber exhaust stack" means the exhaust stack through which the air effluent streams that are:

(i) collected from the exhaust vents of the Drum Processing Building or Staging Building or both, and

(ii) treated with the caustic scrubber and activated carbon filter

are released to the atmosphere as described in the application;

(ffff) "secondary liner" means the lowermost geomembrane liner;

(gggg) "soil" means mineral or organic earthen materials that can, have, or are being altered by weathering, biological processes, or human activity;

(hhhh) "SOP" means Standard Operating Procedures;

(iiii) "storm event" means a 1 in 25 year, 24 hour duration rainfall event at Ryley, Alberta;

(jjjj) "tank" means a stationary device, designed to contain an accumulation of a substance, which is constructed primarily of non-earthen materials that provide structural support including wood, concrete, steel, and plastic;

(kkkk) "TDGR" means the *Transportation of Dangerous Goods Regulations* (SOR/2001-286) made under the *Transportation of Dangerous Goods Act*, 1992 (Canada), as amended;

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(llll) "TDS" means Total Dissolved Solids;

(mmmm) "topsoil" means the uppermost layer of soil and consists of:

(i) the A-horizons and all organic horizons as defined in *The Canadian System of Soil Classification* (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended, and

(ii) the soil ordinarily moved during tillage;

(nnnn) "TSS" means Total Suspended Solids;

(oooo) "upper subsoil" means the layer of soil directly below the topsoil layer that consists of the B-horizons as defined in *The Canadian System of Soil Classification,* (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended;

(pppp) "volume estimate" means a technical evaluation based on the sources contributing to the release including but not limited to pump capabilities, water meters, and batch release volumes;

(qqqq) "waste stabilization area" means the portion of the landfill that is used for waste stabilization or solidification or both, as described in application no. 008-10348;

(rrrr) "waste storage area" means the areas designated for storage of containers for waste or hazardous recyclable or both, or for storage of tanks for waste or hazardous recyclable or both, or for storage of both, as described in application No. 005-10348;

(ssss) "week" means any consecutive 7-day period;

(tttt) "working face" means that portion of the active landfill area where waste is currently being deposited, spread and compacted; and

(uuuu) "year" means calendar year.

PART 2: GENERAL

SECTION 2.1: REPORTING

2.1.1 The approval holder shall immediately report to the Director by telephone any contravention of the terms and conditions of this approval at 1-780-422-4505.

2.1.2 The approval holder shall submit a written report to the Director within 7 days of the reporting pursuant to 2.1.1.

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2.1.3 The approval holder shall immediately notify the Director in writing if any of the following events occurs:

(a) the approval holder is served with a petition into bankruptcy;

(b) the approval holder files an assignment in bankruptcy or Notice of Intent to make a proposal;

(c) a receiver or receiver-manager is appointed;

(d) an application for protection from creditors is filed for the benefit of the approval holder under any creditor protection legislation; or

(e) any of the assets which are the subject matter of this approval are seized for any reason.

2.1.4 If the approval holder monitors for any substances or parameters which are the subject of operational limits as set out in this approval more frequently than is required and uses procedures authorized in this approval, then the approval holder shall provide the results of such monitoring as an addendum to the reports required by this approval.

2.1.5 The approval holder shall submit all monthly reports required by this approval to be compiled or submitted to the Director on or before the end of the month following the month in which the information was collected, unless otherwise specified in this approval.

2.1.6 The approval holder shall submit all annual reports required by this approval to be compiled or submitted to the Director on or before March 31 of the year following the year in which the information was collected, unless otherwise specified in this approval.

SECTION 2.2: RECORD KEEPING

2.2.1 The approval holder shall:

(a) record; and

(b) retain

all the following information in respect of any sampling conducted or analyses performed in accordance with this approval for a minimum of ten years, unless otherwise authorized in writing by the Director:

(i) the place, date and time of sampling,

(ii) sample type,

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(iii) the dates the analyses were performed,

(iv) the analytical techniques, methods or procedures used in the analyses,

(v) the names of the persons who collected and analysed each sample, and

(vi) the results of the analyses.

2.2.2 The approval holder shall keep and maintain an Operating Record of the landfill as per 4.6.34(a) until the end of the landfill post-closure.

2.2.3 The Operating Record referred to in 2.2.2 shall include, at a minimum, all of the following information:

(a) the information required in section 7.3(c) of the *Standards for Landfills in Alberta*, as amended;

(b) the name and contact information of all persons who discover any contravention;

(c) the names and contact information of all persons who take any remedial actions arising from the contravention of the Act, the regulations, or this approval; and

(d) a description of the remedial measures taken in respect of a contravention of the Act, the regulations, or this approval.

2.2.4 The approval holder shall submit a copy of the most recent Operating Record to the Director upon written request from the Director within the timeline specified in writing by the Director.

SECTION 2.3: ANALYTICAL REQUIREMENTS

2.3.1 With respect to any sample required to be taken pursuant to this approval, the approval holder shall ensure that:

(a) collection;

(b) preservation;

(c) storage;

(d) handling; and

(e) analysis

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shall be conducted in accordance with the following unless otherwise authorized in writing by the Director:

(i) for air:

(A) the *Alberta Stack Sampling Code*, Alberta Environment, 1995, as amended,

(B) the *Methods Manual for Chemical Analysis of Atmospheric Pollutants*, Alberta Environment, 1993, as amended, and

(C) the *Air Monitoring Directive*, Alberta Environment, 1989, as amended;

(ii) for industrial wastewater, industrial runoff, groundwater and domestic wastewater:

(A) the *Standard Methods for the Examination of Water and Wastewater*, published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation, 1998, as amended;

(iii) for whole effluent toxicity tests:

(A) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout*, Environment Canada, Environmental Protection Series 1/RM/13, December 2000, as amended,

(B) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia Magna*, Environment Canada, Environmental Protection Series 1/RM/14, December 2000, as amended,

(C) the *Biological Test Method: Growth Inhibition Test Using the Freshwater Alga Selenastrum capricornutum*, Environment Canada, Environmental Protection Series, November 1992, as amended,

(D) the *Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia*, Environment Canada, Environmental Protection Series 1/RM/21, February 1992, as amended,

(E) the *Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows*, Environment Canada,

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Environmental Protection Series 1/RM/22, February 1992, as amended, and

(F) the *Biological Test Method: Toxicity Test Using Luminescent Bacteria (Photobacterium phosphoreum)*, Environment Canada, Environmental Protection Series, 1/RM/24, November 1992, as amended;

(iv) for soil:

(A) the *Soil Monitoring Directive,* Alberta Environment, May 2009, as amended, and

(B) the *Soil Quality Criteria Relative to Disturbance and Reclamation*, Alberta Agriculture, March 1987, as amended; and

(v) for waste:

(A) the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, USEPA, SW-846, September 1986, as amended,

(B) the *Methods Manual for Chemical Analysis of Water and Wastes*, Alberta Environmental Centre, Vegreville, Alberta, 1996, AECV96-M1, as amended,

(C) the *Toxicity Characteristic Leaching Procedure (TCLP)* USEPA Regulation 40 CFR261, Appendix II, Method No. 1311, as amended, or

(D) the *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, American Water Works Association, and the Water Environment Federation, 2010, as amended.

2.3.2 The approval holder shall analyse all samples that are required to be obtained by this approval in a laboratory accredited pursuant to ISO/IEC 17025, as amended, for the specific parameter(s) to be analysed, unless otherwise authorized in writing by the Director.

2.3.3 The term sample used in 2.3.2 does not include samples directed to continuous monitoring equipment, unless specifically required in writing by the Director.

2.3.4 The approval holder shall comply with the terms and conditions of any written authorization issued by the Director under 2.3.2.

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SECTION 2.4: OTHER

2.4.1 The terms and conditions of this approval are severable. If any term or condition of this approval or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of this approval shall not be affected thereby.

2.4.2 Any conflict between the *Standards for Landfills in Alberta*, as amended, and the terms and conditions of this approval shall be resolved in favour of this approval.

2.4.3 *Environmental Protection and Enhancement Act* Approval No. 10348-02-00, as amended, is cancelled.

2.4.4 All tanks shall conform to the *Guidelines for Secondary Containment for Above Ground Storage Tanks,* Alberta Environmental Protection, 1997, as amended, unless otherwise authorized in writing by the Director.

2.4.5 All above ground storage tanks containing liquid hydrocarbons or organic compounds shall conform to the *Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks*, Canadian Council of Ministers of the Environment, PN 1180, 1995, as amended.

PART 3: CONSTRUCTION

SECTION 3.1: LANDFILL

3.1.1 The approval holder shall not commence construction of Cell 4 unless and until updated financial security of the facility has been provided to include Cell 4 lateral expansion.

3.1.2 The approval holder shall construct each new Class I industrial landfill cell in such a way that each new Class I landfill cell shall consist of the following components, at a minimum, unless otherwise authorized in writing by the Director:

(a) a minimum of 0.45 metre thick cover of clean sand or soil placed over top of the uppermost drainage layer;

(b) a composite liner that consists of, at a minimum:

(i) a GCL liner placed in direct contact with an underlying 80 mil HDPE geomembrane liner as a primary liner;

(ii) a GCL liner placed in direct contact with an underlying 80 mil HDPE geomembrane liner as a secondary liner; and

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(iii) a GCL liner placed in direct contact with an underlying clay liner that has:

(A) a minimum thickness of 1.0 metre at all points, measured perpendicular to the slope, and

(B) been compacted to achieve an in-place hydraulic conductivity of 1×10^{-9} m/s or less;

(c) a leachate collection system that:

(i) is placed over the primary liner;

(ii) is capable of maintaining the maximum acceptable leachate head; and

(iii) consists of:

(A) a geo-composite drainage layer with a transmissivity of at least 1×10^{-4} m^2/s placed over top of the primary liner,

(B) a network of perforated leachate collection pipes, and

(C) a leachate collection sump placed over the primary liner;

(d) a leak detection system that:

(i) is installed over the secondary liner;

(ii) is capable of detecting the leakage through the primary liner; and

(iii) consists of:

(A) a geo-composite drainage layer with a transmissivity of at least 1×10^{-4} m^2/s placed over top of the secondary liner,

(B) a network of perforated leak detection liquid collection pipes, and

(C) a leak detection liquid collection sump placed over the secondary liner;

(e) a final cover:

(i) that meets the requirements in section 6.1(c) of the *Standards for Landfills in Alberta*, as amended; or

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(ii) as specified in the Landfill Cell Closure Plan submitted by the approval holder and authorized in writing by the Director pursuant to 7.1.1 and 7.1.4;

(f) a run-on control system capable of preventing flow onto the active landfill area from at least the peak discharge from a 1 in 25 year, 24 hour duration storm event at the facility; and

(g) a runoff control system capable of collecting and controlling at least the runoff volume resulting from a 1 in 25 year, 24 hour duration storm event at the facility.

3.1.3 The composite liner for the landfill shall be constructed on a foundation or base such that there shall be no failure of the liners due to settlement, compression, or uplift.

3.1.4 The approval holder shall submit to the Director the following plans and specifications for the proposed construction of each of the items listed in 3.1.2, signed and stamped by a professional registered with APEGA at least three (3) months prior to construction:

(a) a Detailed Construction Plan and Specifications prepared as per 3.1.2;

(b) a Construction Quality Assurance Plan; and

(c) a Construction Quality Control Plan.

3.1.5 If the Detailed Construction Plan and Specifications in 3.1.4 is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within the timeline specified in writing by the Director.

3.1.6 The approval holder shall implement the Detailed Construction Plan and Specifications in 3.1.4 as authorized in writing by the Director.

3.1.7 During construction of any of the items listed in 3.1.2, the approval holder shall not deviate from the Detailed Construction Plan and Specifications as authorized in writing by the Director in 3.1.6, unless the following conditions are met:

(a) the deviation results in a minor adjustment to the Detailed Construction Plan and Specifications in order to suit field conditions encountered; and

(b) the deviation will result in an equivalent or better design performance of the landfill.

3.1.8 The approval holder shall submit to the Director a summary report of the Construction Quality Assurance and Construction Quality Control results signed and stamped by a professional registered with APEGA.

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3.1.9 The summary report in 3.1.8 shall contain the following information, at a minimum:

(a) confirmation that the landfill has been constructed according to:

(i) the Construction Quality Assurance Plan,

(ii) the Construction Quality Control Plan, and

(iii) the Detailed Construction Plan and Specifications as authorized in writing by the Director in 3.1.6, subject to the deviations as per 3.1.7;

(b) description of any minor deviations as per 3.1.7;

(c) confirmation by the professional registered with APEGA, that deviations as per 3.1.7 will result in an equivalent or better design performance of the landfill;

(d) "as-built" plans;

(e) photo-documentation of important stages of construction including any repair work or remediation activities to establish or maintain liner integrity; and

(f) any other information as required in writing by the Director.

3.1.10 The approval holder shall notify the Director in writing at least fourteen (14) days prior to commencing operations of any new landfill cell.

3.1.11 The approval holder shall construct the off-loading area (tipping area) as described in the application, unless otherwise authorized in writing by the Director.

3.1.12 The approval holder shall manage landfill progression in such a manner as to minimize off-site visual impacts of the landfill, as described in the Landfill Cell Closure Plan submitted by the approval holder and authorized in writing by the Director pursuant to 7.1.1 and 7.1.4.

SECTION 3.2: WASTE STABILIZATION AREA

3.2.1 The approval holder shall construct the waste stabilization area in accordance with the following:

(a) application No. 008-10348; and

(b) within a Class I landfill cell;

unless otherwise authorized in writing by the Director.

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SECTION 3.3: SOIL CONSERVATION

3.3.1 The approval holder shall:

(a) salvage; and

(b) conserve

all topsoil for land reclamation of the landfill.

3.3.2 The approval holder shall:

(a) salvage; and

(b) conserve

all upper subsoil for land reclamation of the landfill.

3.3.3 The approval holder shall:

(a) conserve; and

(b) stockpile

all topsoil separately from the upper subsoil.

3.3.4 The approval holder shall place all:

(a) topsoil stockpiles; and

(b) upper subsoil stockpiles

at the landfill.

3.3.5 The approval holder shall stockpile all topsoil as follows:

(a) on stable foundations; and

(b) on undisturbed topsoil.

3.3.6 The approval holder shall stockpile all upper subsoil as follows:

(a) on stable foundations; and

(b) on areas where the topsoil has been removed.

3.3.7 The approval holder shall take all steps necessary to prevent any erosion (e.g., wind or water), including but not limited to, all of the following:

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(a) revegetating the stockpiles; and

(b) any other steps authorized in writing by the Director.

3.3.8 The approval holder shall immediately suspend conservation of:

(a) topsoil; and

(b) upper subsoil

when:

(i) wet or frozen conditions will result in mixing, loss, degradation or compaction of topsoil or upper subsoil, or

(ii) high wind velocities, any other field conditions or facility operations will result in mixing, loss, or degradation of topsoil or upper subsoil.

3.3.9 The approval holder shall recommence conservation of:

(a) topsoil; and

(b) upper subsoil

only when conditions in 3.3.8 no longer exist.

PART 4: OPERATIONS, LIMITS, MONITORING AND REPORTING

SECTION 4.1: GENERAL

4.1.1 The approval holder shall maintain the geographical boundaries of the landfill to that located within SE 1/4 of Section 9, Township 50, Range 17, West of the 4th Meridian, as described in the application.

4.1.2 The approval holder shall limit the waste elevation of the landfill to no more than the maximum designated waste elevation.

4.1.3 The approval holder shall restrict access to the facility to only personnel authorized by the approval holder.

4.1.4 The approval holder shall maintain a publicly available 24 hour "HOTLINE" number for a prompt response during an emergency.

4.1.5 The approval holder shall:

(a) operate; and

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(b) maintain the integrity of

the following waste management facilities at the facility:

(i) the HWRSP Facility;

(ii) the Class I and Class II industrial landfill, including:

(A) Class I landfill cells,

(B) Class II landfill cell(s), and

(C) waste stabilization area within a Class I landfill cell; and

(iii) waste storage area(s);

as described in the application.

4.1.6 In addition to 4.1.5, the approval holder shall:

(a) operate; and

(b) maintain the integrity of

the following infrastructure components at the facility:

(i) the composite liner;

(ii) the leachate collection system,

(iii) the leak detection system,

(iv) the run-on control system,

(v) the runoff control system,

(vi) the groundwater monitoring wells,

(vii) the weigh scale, and

(viii) the site access control;

as described in the application.

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FACILITY AUDIT

4.1.7 The approval holder shall cause the facility to be audited by an independent third-party environmental consultant or organization to assess compliance with the terms and conditions of this approval:

(a) at least once every three years; and

(b) commencing on or before October 1, 2018 for the first audit.

4.1.8 The approval holder shall submit the audit report required in 4.1.7 in the Annual Landfill Operations Report as required in 4.6.58(c).

4.1.9 The requirements in 4.1.7 and 4.1.8 shall not relieve the approval holder of any duty under the Act, or its associated regulations, or this approval.

SECTION 4.2: AIR

OPERATIONS

4.2.1 The approval holder shall not release any air effluent streams to the atmosphere except as authorized by this approval.

4.2.2 The approval holder shall only release air effluent streams to the atmosphere from the following sources:

(a) the scrubber exhaust stack;

(b) the Drum Processing Building natural gas fired air make up unit exhaust vent;

(c) the Staging Building natural gas fired air make up unit exhaust vent;

(d) the Administration Building natural gas fired furnaces exhaust vents;

(e) the Laboratory fume hood and natural gas fired air make up unit exhaust vents;

(f) the Maintenance Shop equipment and natural gas fired Radiant Heater exhaust vents;

(g) the Leachate Collection Tanks natural gas fired heaters exhaust vents;

(h) the leachate transfer lines passive gas vents; and

(i) any other source authorized in writing by the Director.

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4.2.3 The approval holder shall not operate any process equipment unless and until the pollution abatement equipment associated with the corresponding process equipment is:

(a) operational; and

(b) operating.

4.2.4 The approval holder shall treat all air effluent streams from the exhaust vents of the Drum Processing or Staging or both Buildings with a caustic scrubber and an activated carbon filter before directing the air effluent streams to the scrubber exhaust stack for release to the atmosphere while:

(a) hazardous waste or hazardous recyclables or both are being processed;

(b) hazardous waste or hazardous recyclables or both are being transferred; or

(c) containers of hazardous waste or hazardous recyclables or both are open

in the Drum Processing or Staging or both Buildings.

4.2.5 The approval holder shall control fugitive emissions and any source not specified in 4.2.2 in accordance with 4.2.6 of this approval unless otherwise authorized in writing by the Director.

4.2.6 With respect to fugitive emissions and any source not specified in 4.2.2, the approval holder shall not release a substance or cause to be released a substance that causes or may cause any of the following:

(a) impairment, degradation or alteration of the quality of natural resources;

(b) material discomfort, harm or adverse effect to the well being or health of a person; or

(c) harm to property or to vegetative or animal life.

4.2.7 The approval holder shall not burn any debris by means of an open fire unless authorized in writing by the Director.

4.2.8 If the approval holder receives complaints of offensive odours, or fugitive dust, or both, beyond the facility boundaries, the approval holder shall:

(a) conduct the following to reduce the release of those odours, or fugitive dust, or both by:

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(i) placing restrictions on types, or volumes, or both, of the wastes being handled or processed or deposited that are causing those odours, or fugitive dust, or both,

(ii) increasing the frequency of cover placement, or modifying waste handling activities, or performing both, at the landfill,

(iii) modifying waste handling activities at the HWRSP Facility, or

(iv) performing any combination of the above; and

(b) activate the Odour and Fugitive Dust Response Program as specified in the Landfill Operations Plan 4.6.34(j).

LIMITS

4.2.9 The approval holder shall maintain the pH of the scrubbing liquid of the caustic scrubber referred to in 4.2.4 at 8.0 or higher.

4.2.10 The approval holder shall replace activated carbon in the activated carbon filter referred to in 4.2.4 immediately when the concentration of total petroleum hydrocarbons in the air effluent streams released from the scrubber exhaust stack to the atmosphere exceeds 25 ppm.

MONITORING AND REPORTING

4.2.11 The approval holder shall monitor, daily at a minimum, the pH of the scrubbing liquid of the caustic scrubber referred to in 4.2.4.

4.2.12 The approval holder shall monitor, weekly at a minimum, the air effluent streams released from the scrubber exhaust stack, using a portable total petroleum hydrocarbon analyzer while:

(a) hazardous waste or hazardous recyclables or both are being processed;

(b) hazardous waste or hazardous recyclables or both are being transferred; or

(c) containers of hazardous waste or hazardous recyclables or both are open

in the Drum Processing or Staging or both Buildings.

4.2.13 The portable total petroleum hydrocarbon analyzer referred to in 4.2.12 shall:

(a) have a detection limit of 1 ppm or lower for total petroleum hydrocarbons;

(b) be located in a straight section of the scrubber exhaust stack, a minimum of one (1) metre downstream from the last flow disturbance; and

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(c) be calibrated regularly in accordance with the analyzer manufacturer's specifications.

4.2.14 The approval holder shall continue to implement the Ambient Air Monitoring Program as authorized in writing by the Director on June 24, 2009, unless and until otherwise authorized in writing by the Director pursuant to 4.2.18.

4.2.15 The approval holder shall submit to the Director the results of the Ambient Air Monitoring Program in 4.2.14 with the following reports:

(a) a Monthly Ambient Air Monitoring Report; and

(b) an Annual Ambient Air Monitoring Report

in accordance with the written authorization by the Director on June 24, 2009, unless and until otherwise authorized in writing by the Director pursuant to 4.2.18.

4.2.16 The approval holder shall submit:

(a) a revised Ambient Air Monitoring Program;

(b) revised reporting requirements, or

(c) both of the above

to the Director upon written request from the Director within the timeline specified in writing by the Director.

4.2.17 If the revised:

(a) Ambient Air Monitoring Program;

(b) reporting requirements; or

(c) both of the above

submitted pursuant to 4.2.16 is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within the timeline specified in writing by the Director.

4.2.18 The approval holder shall implement the revised:

(a) Ambient Air Monitoring Program;

(b) reporting requirements; or

(c) both of the above

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submitted pursuant to 4.2.16 as authorized in writing by the Director within the timeline specified in writing by the Director.

SECTION 4.3: RUNOFF AND INDUSTRIAL WASTEWATER

OPERATIONS

4.3.1 The approval holder shall not release any substances from the facility to the surrounding watershed except as authorized by this approval.

4.3.2 The approval holder shall operate and maintain the integrity of:

(a) the run-on control system to prevent flow onto the active landfill area from at least the peak discharge from a 1 in 25 year, 24 hour duration storm event at the facility; and

(b) the runoff control system for the facility to collect and control at least the runoff volume resulting from a 1 in 25 year, 24 hour duration storm event at the facility.

4.3.3 All runoff from the facility developed area shall be directed to the runoff control system as described in:

(a) application No. 012-10348, prior to decommissioning and reclamation of the old surface water detention pond; and

(b) the application, after decommissioning and reclamation of the old surface water detention pond;

unless otherwise authorized in writing by the Director.

4.3.4 Prior to decommissioning and reclamation of the old surface water detention pond and subject to 4.3.7, the approval holder shall only make or permit a release from the old surface water detention pond:

(a) at the release point as designated in application No. 012-10348, which is:

(i) located in the south east corner of the old surface water detention pond, and

(ii) referred to as sampling location A1 in 4.3.11;

(b) through a pump and a release hose over the south berm into the drainage control ditch, east of the landfill access road, to the new surface water detention pond, under normal operating conditions; and

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(c) through a pump and a release hose over the south berm directly to the culvert under Highway 854, during periods of high runoff exceeding the holding capacity of the old surface water detention pond;

unless otherwise authorized in writing by the Director.

4.3.5 Subject to 4.3.7, the approval holder shall only make or permit a release from the new surface water detention pond:

(a) at the release point as designated in application No. 012-10348, which is:

(i) located in the north east corner of the new surface water detention pond, and

(ii) referred to as sampling location B1 in 4.3.11; and

(b) through a pump and a release hose over the east berm into the culvert under Highway 854;

unless otherwise authorized in writing by the Director.

4.3.6 The approval holder shall only dispose of industrial wastewaters, or specified runoff in TABLE 4.3-A, or both, by one or more of the following methods:

(a) to facilities holding a current Act authorization to accept such waste;

(b) to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) to a disposal well approved by AER;

(d) as per 4.6.51; or

(e) as otherwise authorized in writing by the Director.

TABLE 4.3-A: SPECIFIED RUNOFF

SOURCES
Runoff that exceeds any of the limits for the parameters listed in TABLE 4.3-B.
Runoff for which the results of the parameters listed in TABLE 4.3-B are unavailable at the time that the runoff must be disposed of.
Runoff from within the tank farm bermed area.

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LIMITS

4.3.7 Releases of runoff from:

(a) the old surface water detention pond;

(b) the new surface water detention pond; or

(c) both ponds

to the surrounding watershed shall comply with the limits specified in TABLE 4.3-B.

4.3.8 Releases of runoff from within the tank farm bermed area to the old or new or both surface water detention ponds shall comply with the limits specified in TABLE 4.3-C.

TABLE 4.3-B: RUNOFF LIMITS FOR SURFACE WATER DETENTION POND

PARAMETER	LIMITS Maximum unless otherwise indicated
pH	6.0 – 9.5 pH units
COD	50 mg/L
TDS	2500 mg/L
TSS	25 mg/L
Ammonia (expressed as Nitrogen)	5 mg/L
Chloride	250 mg/L
Sodium	200 mg/L
Sulphate	500 mg/L
Oil or other substances	Not present in amounts sufficient to create a visible film or sheen
96-Hour Multiple Concentration Acute Lethality Test Using Rainbow Trout (*Oncorhynchus mykiss*)	50% or greater survival

TABLE 4.3-C: RUNOFF LIMITS FOR TANK FARM BERMED AREA

PARAMETER	LIMITS Maximum unless otherwise indicated
pH	6.0 – 9.5 pH units
COD	50 mg/L
TSS	25 mg/L
Ammonia (expressed as Nitrogen)	5 mg/L
Oil or other substances	Not present in amounts sufficient to create a visible film or sheen

TERMS AND CONDITIONS ATTACHED TO APPROVAL

MONITORING AND REPORTING

4.3.9 The approval holder shall monitor the runoff control system as required in TABLE 4.3-D, subject to 4.3.12.

4.3.10 The approval holder shall report to the Director the results of the runoff control system monitoring as required in TABLE 4.3-D, subject to 4.3.12.

4.3.11 For the purpose of TABLE 4.3-D:

(a) sampling location A1 is defined as the old surface water detention pond release point;

(b) sampling location A2 is defined as the old surface water detention pond;

(c) sampling location B1 is defined as the new surface water detention pond release point;

(d) sampling location B2 is defined as the new surface water detention pond; and

(e) sampling location C is defined as the tank farm bermed area.

4.3.12 The monitoring and reporting requirements in 4.3.9 and 4.3.10 for the old surface water detention pond (sampling locations A1 and A2) shall not apply after decommissioning and reclamation of the old surface water detention pond.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.3-D: RUNOFF CONTROL SYSTEM MONITORING AND REPORTING

MONITORING				REPORTING	
Parameter	**Frequency**	**Sample Type**	**Sampling Location**	**Monthly**	**Annually**
Surface Water Detention Pond(s)				Monthly Runoff and Industrial Wastewater Report, for each month when release occurs	Annual Runoff and Industrial Wastewater Report
Flow (m^3/day)	Daily during release	Estimate	A1, B1		
pH	Once per batch release, prior to release	Representative Grab	A2, B2		
COD					
TDS					
TSS					
Ammonia (expressed as nitrogen)					
Chloride					
Sodium					
Sulphate					
Oil or other substances	Daily during release	Visual			
96-hour multiple concentration acute lethality test using rainbow trout (*oncorhynchus mykiss*)	Each month when release occurs, prior to release, for the first batch release of the month	Representative Grab			
48-hour static acute lethality test using *daphnia magna*					
Tank Farm Bermed Area					
Volume (m^3)	Total batch volume released	Estimate	C		
pH	Once per batch release, prior to release to the surface water detention pond(s)	Representative Grab			
COD					
TSS					
Ammonia (expressed as nitrogen)					
Oil or other substances		Visual			

4.3.13 The monitoring and reporting required in TABLE 4.3-D for the acute lethality tests shall comply with:

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(a) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout*, Environment Canada, Environmental Protection Series 1/RM/13, December2000, as amended; and

(b) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia Magna*, Environment Canada, Environmental Protection Series 1/RM/14, December 2000, as amended.

4.3.14 The approval holder shall:

(a) treat any acute lethality test that deviates from the corresponding test method referred to in 4.3.13 as invalid; and

(b) repeat the test as soon as logistically possible.

4.3.15 In the event that less than 50% of the rainbow trout survived in the 100% concentration sample, the approval holder shall:

(a) implement a program immediately to identify the source of the toxicity; and

(b) submit to the Director within 90 days after the test result is available, a proposed program to reduce the toxicity of the runoff.

4.3.16 The approval holder shall submit the Monthly Runoff and Industrial Wastewater Report in TABLE 4.3-D to the Director.

4.3.17 The Monthly Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:

(a) a monthly assessment of the monitoring results relative to the limits in TABLE 4.3-B;

(b) a monthly assessment of the monitoring results relative to the limits in TABLE 4.3-C;

(c) a monthly assessment of the performance of the:

(i) runoff control system,

(ii) pollution abatement equipment, and

(iii) monitoring equipment;

(d) a monthly summary of management and disposal of the:

(i) industrial wastewaters, and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ii) specified runoff

as per 4.3.6;

(e) a monthly summary of management and disposal of runoff in general;

(f) a monthly summary of runoff contraventions reported pursuant to 2.1.1; and

(g) any other information as required in writing by the Director.

4.3.18 The approval holder shall submit the Annual Runoff and Industrial Wastewater Report in TABLE 4.3-D to the Director.

4.3.19 The Annual Runoff and Industrial Wastewater Report shall include, at a minimum, all of the following information:

(a) an annual summary assessment of the monitoring results relative to the limits in TABLE 4.3-B;

(b) an annual summary assessment of the monitoring results relative to the limits in TABLE 4.3-C;

(c) an annual summary assessment of the performance of the:

(i) runoff control system,

(ii) pollution abatement equipment, and

(iii) monitoring equipment;

(d) an annual summary of management and disposal of the:

(i) industrial wastewaters, and

(ii) specified runoff

as per 4.3.6;

(e) an annual summary and evaluation of management and disposal of runoff in general;

(f) an annual summary of the results pursuant to 4.3.21;

(g) an annual summary of runoff contraventions reported pursuant to 2.1.1; and

(h) any other information as required in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.3.20 The approval holder shall:

(a) collect a representative grab sample from the old surface water detention pond at least once per year, prior to decommissioning and reclamation of the pond;

(b) collect a representative grab sample from the new surface water detention pond at least once per year; and

(c) analyze the sample(s) for all of the parameters specified in TABLE 4.3-E.

4.3.21 The approval holder shall submit the results of the analyses in 4.3.20 to the Director in the Annual Runoff and Industrial Wastewater Report.

TABLE 4.3-E: ANNUAL MONITORING OF SURFACE WATER DETENTION POND

PARAMETERS			
pH	TDS; TSS	Fluoride, dissolved	Phenols
Electrical conductivity	Metals	Cyanide (weak acid dissociable)	Total chlorinated phenols
COD	Major ions	BTEX	Polychlorinated biphenyls, total
DOC	Nutrients	Petroleum Hydrocarbons Fractions F1 and F2	Total organic halogens

SECTION 4.4: LEACHATE COLLECTION AND LEAK DETECTION

OPERATIONS

4.4.1 The approval holder shall only dispose of leachate removed from the leachate collection system by one or more of the following methods:

(a) to facilities holding a current Act authorization to accept such waste;

(b) to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) to a disposal well approved by AER; or

(d) as per 4.6.51.

4.4.2 The approval holder shall only dispose of liquid removed from the leak detection system by one or more of the following methods:

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(a) to facilities holding a current Act authorization to accept such waste;

(b) to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) to a disposal well approved by AER; or

(d) as per 4.6.51.

LIMITS

4.4.3 Subject to 4.4.4, the approval holder shall not exceed the maximum acceptable leachate head in any landfill cell.

4.4.4 Subsequent to a storm event, the leachate head in any landfill cell shall not exceed the maximum acceptable leachate head for more than fourteen (14) days, unless otherwise authorized in writing by the Director.

4.4.5 The volume of liquid in the leak detection system, as monitored in TABLE 4.6-D, shall not exceed the action leakage rate in any landfill cell.

MONITORING AND REPORTING

4.4.6 The approval holder shall monitor the leachate collection and leak detection systems as required in TABLE 4.6-D and for all parameters specified in TABLE 4.4-A, subject to 4.4.8 and 4.4.9.

4.4.7 The approval holder shall report to the Director the results of the leachate collection and leak detection systems monitoring as required in TABLE 4.6-D, including the results of the analyses for all parameters specified in TABLE 4.4-A, subject to 4.4.8 and 4.4.9.

TABLE 4.4-A: LEACHATE AND LEAK DETECTION LIQUID MONITORING

PARAMETERS		
pH (field and laboratory)	TDS	Nutrients
Electrical conductivity (field and laboratory)	TSS	BTEX
COD	Metals	Phenols
DOC	Major Ions	Petroleum Hydrocarbons Fractions F1 and F2

4.4.8 The requirements in 4.4.6 and 4.4.7 for monitoring and reporting the parameters in TABLE 4.4-A for leachate shall not apply if insufficient leachate is available for conducting the analyses.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.4.9 The requirements in 4.4.6 and 4.4.7 for monitoring and reporting the parameters in TABLE 4.4-A for leak detection liquid shall not apply if insufficient leak detection liquid is available for conducting the analyses.

4.4.10 If the volume of liquid removed from the leak detection system exceeds the action leakage rate, in addition to reporting pursuant to 2.1.1, the approval holder shall submit a Response Action Plan to the Director within 30 days of the exceedance.

SECTION 4.5: DUGOUTS AND WATER WELLS IN SURROUNDING AREA

MONITORING AND REPORTING

4.5.1 The approval holder shall:

(a) collect a representative sample from:

(i) each of the dugouts, and

(ii) each of the water wells

within an approximate 1.6 kilometre radius around the facility; and

(b) analyze the sample for the parameters listed in TABLE 4.5-A;

unless the approval holder is not granted access by the landowner.

4.5.2 The monitoring required in 4.5.1 shall be conducted once each year in October unless otherwise authorized in writing by the Director.

4.5.3 The approval holder shall record the analytical results of the sampling information required in 4.5.1 in an Annual Dugout and Water Well Sampling Program Report.

4.5.4 The approval holder shall submit the Annual Dugout and Water Well Sampling Program Report to the Director pursuant to 4.6.58(i).

TABLE 4.5-A: DUGOUT AND WATER WELL MONITORING

PARAMETERS		
pH (field and laboratory)	TDS	Nutrients
Electrical conductivity (field and laboratory)	TSS	BTEX
COD	Metals	Phenols
DOC	Major Ions	Petroleum Hydrocarbons Fractions F1 and F2

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 4.6: HWRSP FACILITY AND LANDFILL

GENERAL

4.6.1 The approval holder shall not:

(a) receive;

(b) process;

(c) dispose of; or

(d) perform any combination of the above for

any of the following wastes, individually or in any combination, at the places specified below respectively:

(i) explosives (Class 1 TDGR wastes), at the facility;

(ii) radioactive wastes (Class 7 TDGR wastes), at the facility;

(iii) radioactive wastes regulated under the *Nuclear Safety and Control Act* (Canada), at the facility;

(iv) biomedical waste, at the facility;

(v) waste containing free liquids, at the landfill, excluding the waste stabilization area;

(vi) material containing ozone depleting substances, at the landfill;

(vii) municipal solid waste, at the facility; and

(viii) NORM waste, at the facility.

4.6.2 Incompatible wastes and incompatible hazardous recyclables shall be prevented from mixing.

4.6.3 The approval holder shall dispose of wastes generated at the facility only:

(a) to facilities holding a current Act authorization;

(b) to facilities approved by a local environmental authority outside of Alberta; or

(c) as otherwise authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

HWRSP FACILITY

OPERATIONS PLAN

4.6.4 The approval holder shall:

(a) develop;

(b) keep up-to-date; and

(c) implement

an HWRSP Facility Operations Plan.

4.6.5 The approval holder shall:

(a) review the HWRSP Facility Operations Plan annually, at a minimum; and

(b) update the HWRSP Facility Operations Plan if any of the following circumstances apply:

(i) there are facility expansions or changes in site operations or equipment,

(ii) there is an applicable change to an applicable regulation, or

(iii) an update is required in writing by the Director.

4.6.6 The approval holder shall retain a copy of the most recent HWRSP Facility Operations Plan at the facility.

4.6.7 The approval holder shall submit a copy of the most recent HWRSP Facility Operations Plan to the Director upon written request from the Director within the timeline specified in writing by the Director.

4.6.8 If the HWRSP Facility Operations Plan submitted pursuant to 4.6.7 is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

4.6.9 The approval hold shall implement the latest HWRSP Facility Operations Plan, unless otherwise authorized in writing by the Director.

OPERATIONS

4.6.10 The approval holder shall only transfer wastes and hazardous recyclables at designated transfer areas designed to contain spills and leaks.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.6.11 The approval holder shall use the following when transferring substances to, from, and between containers, tanks, and trucks:

(a) couplings equipped with seals that are compatible with the substance transferred;

(b) the necessary precautions to prevent spills when the couplings are disconnected;

(c) emergency shut-off valves;

(d) established transfer areas and associated curbing, paving and catchment areas;

(e) drip trays to capture potential losses under coupling devices and other connections; and

(f) manual inspections of the transfer area for leaks and spills during and after waste transfer.

4.6.12 All wastes and all hazardous recyclables that are unloaded shall be immediately transferred to the waste storage area.

4.6.13 All containers and unrinsed empty containers shall be stored in the waste storage area.

4.6.14 The approval holder shall:

(a) provide and maintain an adequate aisle space between containers in the waste storage area to allow:

(i) inspection, and

(ii) unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of the waste storage area; and

(b) arrange inspection aisles in the waste storage area such that the identification label on each container is readable.

4.6.15 All tanks within the tank farm area shall be equipped, at a minimum, with all of the following:

(a) sensors for detecting the level in each tank;

(b) high level alarms that activate when a tank overfill is imminent;

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(c) automatic shut-off devices or sufficient free board space above the high level sensor to allow operators time to prevent overfill from occurring; and

(d) earthen dikes or equivalent secondary containment structures capable of containing 110% of the volume of the largest tank within the bermed area plus 10% of the aggregate capacity of all other tanks in the bermed area.

4.6.16 All tanks containing hazardous waste and all tanks containing hazardous recyclables in each building shall be equipped, at a minimum, with all of the following:

(a) sensors or gauges for detecting the level in each tank;

(b) a written operating procedure to prevent tank overfill; and

(c) secondary containment structures capable of containing 110% of the volume of the largest tank within the building plus 10% of the aggregate capacity of all other tanks containing hazardous waste and hazardous recyclables in the same building.

4.6.17 Hazardous waste and hazardous recyclables stored in containers and tanks shall be stored in accordance with the *Hazardous Waste Storage Guidelines*, June 1988, Alberta Environment, as amended.

4.6.18 The approval holder shall only carry out the following activities, individually or in any combination, at the HWRSP Facility in relation to hazardous waste or hazardous recyclables or both:

(a) commingling of hazardous waste or hazardous recyclables to make maximum use of available container or tank capacity, only if the resultant mixture has the same TDGR hazard classification as any one of the individual components;

(b) phase separation by gravity settling, only without the addition of any chemicals designed to accelerate settling;

(c) dispersion of solids into liquids by natural or mechanical means, only if the resultant mixture has the same TDGR hazard classification as the original waste;

(d) physical segregation of hazardous from non-hazardous articles or components from the same container, only if no process equipment is used;

(e) washing of drums or other objects, only for the purpose of removing hazardous residue;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(f) crushing or shredding of used filters, rags, absorbent materials, or empty containers, only for the purpose of volume reduction or liquid recovery, unless otherwise authorized in writing by the Director; or

(g) treatment of hazardous waste, only as authorized in writing by the Director.

4.6.19 Notwithstanding 4.6.18(g), the approval holder shall not incinerate waste at the facility.

LIMITS

4.6.20 The approval holder shall not store a total of more than 752,500 litres of hazardous waste or hazardous recyclables or both at the HWRSP Facility at any time.

4.6.21 In addition to the storage limits in 4.6.20, the approval holder shall not exceed the waste storage limits as specified in TABLE 4.6-A.

TABLE 4.6-A: STORAGE LIMITS FOR HAZARDOUS WASTE OR HAZARDOUS RECYCLABLES OR BOTH AT HWRSP FACILITY

Waste/Recyclable Type	Material	Maximum Quantity
Containers: Hazardous waste or hazardous recyclables or both	TDGR Classification 2, 3, 4, 5, 6, 8 or 9 waste type only	512,500 litres (consisting of 2,500 drum equivalents, each 205 litre capacity)
Bulk Tanks: Hazardous waste or hazardous recyclables or both	Waste flammable liquids, used oil, or wastewaters; or TDGR Classification 3, 5, 6, 8 or 9 waste type only	240,000 litres (consisting of a total of 135 m^3 in the tank farm area, and a total of 105 m^3 inside the buildings)

4.6.22 Containers other than 205 litre drums shall be prorated to 205 litre drum equivalents based on their nominal volumes, e.g., 10 X 20 litre pails = 1 X 205 litre drum.

4.6.23 The limits referred to in 4.6.20 and 4.6.21 shall be calculated based on the:

(a) total nominal volumes of all containers, treating all partially filled containers as if they were full; and

(b) total filled capacities of all tanks.

MONITORING AND REPORTING

4.6.24 The approval holder shall:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) identify;

(b) characterize; and

(c) classify

all waste streams and all hazardous recyclables, generated or received at the HWRSP Facility, not including runoff, industrial wastewater streams and air effluent streams in accordance with the:

(i) *Industrial Waste Identification and Management Options*, Alberta Environment, May 1996, as amended, and

(ii) *Alberta User Guide for Waste Managers*, Alberta Environment, August 1996, as amended.

4.6.25 The approval holder shall measure or, when not feasible to measure, estimate, the quantity of each waste and hazardous recyclable identified in 4.6.24 each year.

4.6.26 The approval holder shall keep a daily:

(a) total; and

(b) inventory

of all materials being stored at the HWRSP Facility.

4.6.27 The daily total and inventory records in 4.6.26 shall be available at the facility at all times for inspection by the Director or an inspector.

4.6.28 The approval holder shall submit a Monthly Waste Management Report to the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.6-B: MONTHLY WASTE INVENTORY REPORT (BY WASTE CLASS)

COMPANY NAME: _____ APPROVAL NO.: _____

REPORT PERIOD: MONTH _____ YEAR _____

CLASS	UNIT (Kg or L)	OPENING BALANCE	+ RECEIVED IN PROVINCE	+ RECEIVED OUT OF PROVINCE	- SHIPPED *		- ON-SITE DISPOSAL	+ or - ADJUSTMENT **	CLOSING BALANCE	APPROVAL LIMIT
					RECYCLING / PRODUCT	OFF-SITE DISPOSAL				
2										
3										
4										
5										
6.1										
8										
9.1										
9.2										
9.3										
PCB										
NR										
TOTAL										XXXXX
							No. of Containers On site			XXXXX
							Total Litres in Bulk Tanks			XXXXX

Name of Company Official: _____ Title: _____ Signature: _____

Report Date: _____

* Provide a list of the recycling and disposal locations.

** Identity the amount and reason for each adjustment.
Adjustments include consolidation/reclassification, losses to processing, spills, volume miscalculations, or any other circumstances, which would affect the mass balance of the monthly inventory report.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.6.29 The approval holder shall compile all of the information indicated in TABLE 4.6-B in the Monthly Waste Management Report which shall contain, at minimum, all of the following information:

(a) an opening waste and hazardous recyclables inventory balance in kilograms or litres by waste class or material type;

(b) the amount and type of waste and hazardous recyclables received:

(i) within the province, and

(ii) from outside the province;

(c) the amount and type of waste and hazardous recyclables:

(i) shipped for recycling or product,

(ii) shipped off-site for disposal, and

(iii) disposed on-site;

(d) any adjustments, including but not limited to, consolidation, reclassification, losses to processing, spills, volume miscalculations, or any other circumstances, which would affect the mass balance of the monthly inventory report;

(e) closing balance in kilograms or litres;

(f) a summary of contraventions reported pursuant to 2.1.1 related to waste and hazardous recyclables; and

(g) any other information as required in writing by the Director.

4.6.30 The approval holder shall compile all the information required by 4.6.24 and 4.6.25 in an Annual Waste Management Summary Report:

(a) as specified in TABLE 4.6-C; and

(b) in accordance with the:

(i) *Industrial Waste Identification and Management Options*, Alberta Environment, May 1996, as amended, and

(ii) *Alberta User Guide for Waste Managers*, Alberta Environment, August 1996, as amended.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.6-C: ANNUAL WASTE MANAGEMENT SUMMARY

Waste or Hazardous Recyclable Name	Uniform Waste Code				Quantity (kg or L)		Stored	Recycled		Disposed	
	WC	PIN	Class	Mgmt	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
TOTAL											

4.6.31 The approval holder shall submit the Annual Waste Management Summary Report to the Director.

LANDFILL

OPERATIONS PLAN

4.6.32 The approval holder shall:

(a) develop;

(b) keep up-to-date; and

(c) implement

a Landfill Operations Plan that does not contravene with the requirements of this approval.

4.6.33 The approval holder shall:

(a) review the Landfill Operations Plan annually, at a minimum; and

(b) update the Landfill Operations Plan if any of the following circumstances apply:

(i) there are facility expansions or changes in site operations or equipment,

(ii) there is an applicable change to the *Standards for Landfills in Alberta,* as amended,

(iii) an update is required in writing by the Director, or

(iv) there is an update to an applicable regulation.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.6.34 The Landfill Operations Plan shall include, at a minimum, all of the following:

(a) SOP for keeping and maintaining an Operating Record;

(b) SOP for waste control, run-on and runoff controls, and nuisance controls;

(c) SOP for the waste stabilization area operations;

(d) SOP for the acceptance, handling and disposal of wastes, including;

(i) waste characterization and classification at source,

(ii) waste manifesting and tracking,

(iii) QA/QC waste acceptance procedures, and

(iv) waste sampling;

(e) SOP for detecting, preventing and disposal of unauthorized wastes;

(f) SOP for placing waste in a landfill cell including;

(i) working face width,

(ii) lift depth,

(iii) compaction, and

(iv) waste placement location using a grid system;

(g) SOP for managing contaminated sulphur and sulphur containing wastes;

(h) SOP for managing asbestos wastes;

(i) SOP for placing leachate, leak detection liquid, or other authorized wastes and liquids over the surface of the active landfill area for the purpose of evaporation or dust suppression;

(j) an Odour and Fugitive Dust Response Program;

(k) a Fugitive Dust and Odour Best Management Plan;

(l) a runoff and industrial wastewater monitoring and management program;

(m) a leachate monitoring and management program;

(n) a leak detection liquid monitoring and management program;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(o) a groundwater monitoring program;

(p) a Remediation Plan to deal with groundwater quality deterioration;

(q) a soil monitoring program;

(r) a soil management program;

(s) a landfill cell cover system;

(t) a monitoring and maintenance program for the scale house and heavy operational equipment;

(u) a health and safety program;

(v) an emergency response program, including SOP for handling fires, substance releases to the environment, and health concerns; and

(w) an up-to-date plan of the landfill layout with survey records showing the location of all infrastructure components of the landfill including final cover elevations and contours.

4.6.35 The approval holder shall retain a copy of the most recent Landfill Operations Plan at the facility.

4.6.36 The approval holder shall submit to the Director the most recent Landfill Operations Plan when requested in writing by the Director within the timeline specified in writing by the Director.

4.6.37 The approval holder shall correct all deficiencies in the Landfill Operations Plan submitted pursuant to 4.6.36, as outlined in writing by the Director, within the timeline specified in writing by the Director.

4.6.38 The approval holder shall implement the latest Landfill Operations Plan, unless otherwise authorized in writing by the Director.

OPERATIONS

4.6.39 The approval holder shall classify all materials entering the landfill in accordance with the:

(a) *Waste Control Regulation (AR 192/96)*;

(b) *Industrial Waste Identification and Management Options*, Alberta Environment, May 1996, as amended; and

(c) *Alberta User Guide for Waste Managers*, May 1995, as amended.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.6.40 The approval holder shall obtain a detailed representative physical and chemical analysis of a waste prior to disposal of the waste into the landfill at the following times, at a minimum:

(a) the first time a waste is received from a new generator;

(b) the first time a delivery is received from a different process associated with a known waste generator;

(c) the first time a waste is received from a different location associated with a known waste generator; and

(d) when the nature or composition of the waste that was previously characterized by the generator changes.

4.6.41 The approval holder shall not dispose of hazardous waste in any Class II landfill cell.

4.6.42 The approval holder shall:

(a) only carry out waste stabilization or solidification or both within the waste stabilization area; and

(b) not transfer waste from the waste stabilization area to the Class I landfill cell before the waste stabilization or solidification or both have completed.

4.6.43 The approval holder shall only dispose of any liquid collected within the waste stabilization area by one or more of the following methods:

(a) to facilities holding a current Act authorization to accept such waste;

(b) to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) to a disposal well approved by AER; or

(d) as otherwise authorized in writing by the Director.

4.6.44 The approval holder shall conduct:

(a) annually, in-house visual inspections for corrosion; and

(b) biennially, ultrasonic testing to monitor thickness

of the steel plate liner of the stabilization pits in the waste stabilization area, unless otherwise authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.6.45 The approval holder shall dispose of asbestos wastes in accordance with *"Guidelines for the Disposal of Asbestos Waste"*, Environmental Protection Services, Alberta Environment, 1989, as amended.

4.6.46 The approval holder shall dispose of sulphur waste in accordance with *"Guidelines for Landfill Disposal of Sulphur Wastes and Remediation of Sulphur Containing Soils"*, Alberta Environment, 2011, as amended.

4.6.47 The approval holder shall only dispose of wastes that the landfill is not authorized to dispose of:

(a) to facilities holding a current Act authorization;

(b) to facilities approved by a local environmental authority outside of Alberta; or

(c) as otherwise authorized in writing by the Director.

4.6.48 If an unauthorized waste is received at the landfill, the approval holder shall remove the waste from the landfill within seven (7) days of the receipt, unless otherwise authorized in writing by the Director.

4.6.49 The approval holder shall restrict the working face of each landfill cell to the smallest practical area.

4.6.50 For any waste disposed of at the landfill that is subject to wind dispersal, the approval holder shall:

(a) wet the waste to prevent dispersal of particulate matter; or

(b) immediately apply cover on top of the waste to minimize entrainment of particulate matter.

4.6.51 Notwithstanding 4.6.1(v), the approval holder may place any of the following wastes over the surface of the active landfill area for the purpose of dust suppression:

(a) specified runoff;

(b) leachate;

(c) leak detection liquid;

(d) sump waste of car wash bays or similar operations;

(e) waste from hydrovac excavation operations; or

(f) any other waste authorized by t*he Alberta User Guide for Waste Managers*, May 1995, as amended;

provided that placement of such wastes will not cause offensive odours.

4.6.52 The approval holder shall inspect the landfill, at a minimum:

(a) weekly; and

(b) immediately after each storm event to:

(i) detect evidence of deterioration of any infrastructure components, including the composite liner,

(ii) detect any malfunction or improper operation of the run-on and runoff control systems, leachate collection system, or leak detection system, and

(iii) take corrective measures to repair any damage to infrastructure components, including the composite liner.

4.6.53 The approval holder shall:

(a) keep a record of inspections conducted pursuant to 4.6.52;

(b) have the record of inspections available for review upon written request from the Director; and

(c) immediately report any deficiencies detected by the inspection in 4.6.52 to the Director in writing along with any corrective measures taken or proposed.

4.6.54 The approval holder shall not stockpile waste exceeding the maximum designated waste elevation of the landfill for a period of more than two (2) weeks, unless otherwise authorized in writing by the Director.

4.6.55 The approval holder shall take all practical measures to prevent off-site tracking of waste from vehicles and equipment leaving the facility.

MONITORING AND REPORTING

4.6.56 The approval holder shall monitor the landfill operations as required in TABLE 4.6-D.

4.6.57 The approval holder shall report to the Director the results of the landfill operations monitoring as required in TABLE 4.6-D.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.6-D: LANDFILL OPERATIONS MONITORING AND REPORTING REQUIREMENTS

MONITORING AND REPORTING				
Parameter	**Frequency**	**Sample Type**	**Sampling Location**	**Reporting**
Quantity and type of waste received	Continuously, When operating	Measured or estimated	At entrance to landfill	Annual Landfill Operations Report
Quantity and type of material removed	Continuously, when operating	Measured or estimated	At entrance to landfill	
General location of waste deposited	Continuously, when operating	As per survey, or using grid system	At active landfill area, or survey coordinates	
Leachate head	at least: - once every three working days; - after storm event; and - immediately prior to leachate removal	Calculated	At primary leachate collection system sumps for existing landfill Cell 1	
		Measured	At primary leachate collection system sumps for all other landfill cells	
Leachate analysis, as per TABLE 4.4-A	At least once every quarter year, unless insufficient sample volume is available	Grab sample	At each primary leachate collection system sump	
Volume of leachate removed from the leachate collection system	As removed	Measured or calculated	At leachate collection system sumps	
Leak detection liquid analysis, as per TABLE 4.4-A	At least once every quarter year, unless insufficient sample volume is available	Grab sample	At each leak detection system sump	
Volume of leak detection liquid removed from the leak detection system	At least once every working day, as removed	Measured or calculated	At leak detection system sumps	
Final cover	When final cover is applied	Final cover by survey cores or test pits or both	On each completed landfill cell	

4.6.58 The Annual Landfill Operations Report required in TABLE 4.6-D shall include, at a minimum, all of the following:

(a) the name and contact information of the person responsible for the facility;

(b) a summary of all information collected as required in TABLE 4.6-D;

(c) a summary of the results of any audit conducted in accordance with 4.1.7;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(d) a summary of the operations of the waste stabilization area;

(e) a summary of the performance of the run-on and runoff control systems, including a comparison to the limits in TABLES 4.3-B and 4.3-C;

(f) a summary of the performance of the leachate collection system, including a comparison to the maximum acceptable leachate head;

(g) a summary of the performance of the leak detection system, including a comparison to the action leakage rate limit;

(h) the Response Action Plan for the leak detection system pursuant to 4.4.10;

(i) the Annual Dugout and Water Well Sampling Program Report pursuant to 4.5.4;

(j) a summary of all revisions to the Landfill Operations Plan pursuant to 4.6.33(b);

(k) any groundwater remedial action taken pursuant to 4.6.34(p);

(l) a summary of records of landfill inspections pursuant to 4.6.53;

(m) a summary of:

  (i) operational issues encountered,

  (ii) emergencies occurred, and

  (iii) measures or actions taken;

(n) a summary of records of:

  (i) public complaints, and

  (ii) the approval holder's responses;

(o) an up-to-date financial security estimate pursuant to 5.1.2;

(p) an updated site development plan showing the status of the landfill progression at the end of the operating year, including but not limited to:

  (i) contour mapping,

  (ii) the location of active and inactive disposal areas,

  (iii) areas where a final cover has been placed, and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(iv) the location of new landfill cell(s) constructed;

(q) the Annual Landfill Cell Closure Report pursuant to 7.1.7;

(r) a summary of contraventions reported pursuant to 2.1.1 related to landfill operations; and

(s) any other information as required in writing by the Director.

4.6.59 The approval holder shall submit the Annual Landfill Operations Report to the Director.

SECTION 4.7: DOMESTIC WASTEWATER

OPERATIONS

4.7.1 The approval holder shall not release any substances from the domestic wastewater system to the surrounding watershed except as authorized by this approval.

4.7.2 The approval holder shall direct all domestic wastewater to the domestic wastewater system.

4.7.3 The approval holder shall only dispose of substances from the domestic wastewater system:

(a) to facilities holding a current Act authorization;

(b) to facilities approved by a local environmental authority outside of Alberta; or

(c) as otherwise authorized in writing by the Director.

SECTION 4.8: WATERWORKS

Not used at this time.

SECTION 4.9: GROUNDWATER

MONITORING

4.9.1 The approval holder shall continue to implement the existing Groundwater Monitoring Program as authorized in writing by the Director, unless and until otherwise authorized in writing by the Director pursuant to 4.9.4.

4.9.2 The approval holder shall submit a revised Groundwater Monitoring Program to the Director on or before September 30, 2017, unless otherwise authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.3 If the revised Groundwater Monitoring Program submitted pursuant to 4.9.2 is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within the timeline specified in writing by the Director.

4.9.4 The approval holder shall implement the revised Groundwater Monitoring Program submitted pursuant to 4.9.2 as authorized in writing by the Director within the timeline specified in writing by the Director.

4.9.5 The approval holder shall:

(a) collect a representative groundwater sample from each of the groundwater monitor wells specified in the Groundwater Monitoring Program, including the groundwater monitoring wells designated as points of compliance; and

(b) analyze each sample for the parameters listed in TABLE 4.9-A.

TABLE 4.9-A: GROUNDWATER MONITORING PROGRAM

PARAMETERS	
pH	Metals
Electrical conductivity	Major ions
COD	Nutrients
DOC	BTEX
TDS	Petroleum Hydrocarbons Fractions F1 and F2

4.9.6 The monitoring required in 4.9.5 shall be conducted at the following frequencies, unless otherwise authorized in writing by the Director:

(a) a minimum of once per year during each of the active landfill life, landfill cell closure, final landfill closure, and post-closure periods; and

(b) a minimum of four times per year following detection of leachate constituents in groundwater at levels above those specified in 4.9.7, and until the levels specified in 4.9.7 have been met.

4.9.7 The groundwater quality in the monitoring wells, designated as points of compliance in the Groundwater Monitoring Program, shall not exceed the higher of:

(a) the objectives established in the water quality objectives in the *Canadian Environmental Quality Guidelines (CEQG)* for drinking water published by the Canadian Council of Ministers of the Environment (CCME), as amended; or

(b) background groundwater chemistry as determined through a statistical analysis, as a derived alternate groundwater performance standard.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.8 The approval holder shall implement the Remediation Plan as specified in the Landfill Operations Plan, when groundwater quality exceeds the groundwater performance criteria in 4.9.7.

4.9.9 The samples extracted from the groundwater monitor wells shall be collected using scientifically acceptable purging, sampling and preservation procedures so that a representative groundwater sample is obtained.

4.9.10 The approval holder shall:

(a) protect from damage; and

(b) keep locked except when being sampled

all groundwater monitoring wells unless otherwise authorized in writing by the Director.

4.9.11 If a representative groundwater sample cannot be collected because the groundwater monitoring well is damaged or is no longer capable of producing a representative groundwater sample, the approval holder shall:

(a) clean, repair or replace the groundwater monitoring well; and

(b) collect and analyse a representative groundwater sample prior to the next scheduled sampling event;

unless otherwise authorized in writing by the Director.

4.9.12 In addition to the sampling information recorded in 2.2.1, the approval holder shall record the following sampling information for all groundwater samples collected:

(a) a description of purging and sampling procedures;

(b) the static elevations above sea level, and depth below ground surface of fluid phases in the groundwater monitoring well prior to purging;

(c) the temperature of each sample at the time of sampling;

(d) the pH of each sample at the time of sampling; and

(e) the specific conductance of each sample at the time of sampling.

4.9.13 The approval holder shall carry out remediation of the groundwater in accordance with the following:

(a) *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*, Alberta Environment, February 2009, as amended; and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(b) *Alberta Tier 2 Soil and Groundwater Remediation Guidelines*, Alberta Environment, February 2009, as amended.

REPORTING

4.9.14 The approval holder shall compile an Annual Groundwater Monitoring Program Report which shall include, at a minimum, all of the following information:

(a) a completed *Record of Site Condition Form*, Alberta Environment, 2009, as amended;

(b) a legal land description of the facility and a map illustrating the facility boundaries;

(c) a topographic map of the facility;

(d) a description of the industrial activity and processes;

(e) a map showing the location of all surface and groundwater users, and a listing describing surface water and water well use details, within at least a 1.6 kilometre radius of the facility;

(f) a general hydrogeological characterization of the region within a five kilometre radius of the facility;

(g) a detailed hydrogeological characterization of the facility, including an interpretation of groundwater flow patterns;

(h) cross-sections showing depth to water table, patterns of groundwater movement and hydraulic gradients at the facility;

(i) borehole logs and completion details for groundwater monitoring wells;

(j) a map showing locations of all known buried channels within at least five kilometre of the facility;

(k) a map of surface drainage within the facility and surrounding area to include nearby water bodies;

(l) a map of groundwater monitoring well locations and a table summarizing the existing groundwater monitoring program for the facility;

(m) a summary of any changes to the groundwater monitoring program made since the last groundwater monitoring report;

(n) analytical data recorded as required in 4.9.5 and 4.9.11(b);

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(o) a summary of fluid elevations recorded as required in 4.9.12(b) and an interpretation of changes in fluid elevations;

(p) an interpretation of QA/QC program results;

(q) an interpretation of all the data in this report, including the following:

  (i) diagrams indicating the location and extent of any contamination,

  (ii) a description of probable sources of contamination, and

  (iii) a site map showing the location and type of current and historical potential sources of groundwater contamination;

(r) a summary and interpretation of the data collected since the groundwater monitoring program began including:

  (i) control charts which indicate trends in concentrations of parameters, and

  (ii) the migration of contaminants;

(s) a description of the following:

  (i) contaminated groundwater remediation techniques employed,

  (ii) source elimination measures employed,

  (iii) risk assessment studies undertaken, and

  (iv) risk management studies undertaken;

(t) a proposed sampling schedule for the following year(s);

(u) a description of any contaminant remediation, risk assessment or risk management action conducted at the facility; and

(v) recommendations for:

  (i) changes to the groundwater monitoring program to make it more effective, and

  (ii) remediation, risk assessment or risk management of contamination identified.

4.9.15 The approval holder shall submit the Annual Groundwater Monitoring Program Report to the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.16 If the Annual Groundwater Monitoring Program Report is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director, within the timeline specified in writing by the Director.

SECTION 4.10: SOIL

4.10.1 In addition to any other requirements specified in this approval, the approval holder shall conduct all of the following activities related to soil monitoring and soil management required by this approval in accordance with the *Soil Monitoring Directive,* Alberta Environment, 2009, as amended:

(a) designing and developing proposals for the Soil Monitoring Program;

(b) designing and developing proposals for the Soil Management Program;

(c) all other actions, including sampling, analysing, and reporting, associated with the Soil Monitoring Program; and

(d) all other actions, including sampling, analysing and reporting, associated with the Soil Management Program.

MONITORING AND REPORTING

4.10.2 The approval holder shall submit the Soil Monitoring Program proposal to the Director according to the following schedule:

(a) for the first soil monitoring event on or before January 31, 2019; and

(b) for the second soil monitoring event on or before January 31, 2024;

unless otherwise authorized in writing by the Director.

4.10.3 If any Soil Monitoring Program proposal is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

4.10.4 Subject to 4.10.3, the approval holder shall implement the Soil Monitoring Program as authorized in writing by the Director.

4.10.5 If an authorization or a deficiency letter is not issued within 120 days of the applicable date required by 4.10.2, the approval holder shall implement the Soil Monitoring Program:

(a) in accordance with the program as set out in the proposal submitted by the approval holder; and

(b) within 270 days after the applicable date required by 4.10.2.

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4.10.6 The approval holder shall submit to the Director each Soil Monitoring Program Report obtained from the soil monitoring referred to in 4.10.4 and 4.10.5 according to the following schedule:

(a) for the first Soil Monitoring Program Report on or before January 31, 2020; and

(b) for the second Soil Monitoring Program Report on or before January 31, 2025;

unless otherwise authorized in writing by the Director.

4.10.7 If any Soil Monitoring Program Report is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

SOIL MANAGEMENT PROGRAM

4.10.8 If the Soil Monitoring Program, or any other soil monitoring, reveals that there are substances present in the soil at concentrations greater than any of the applicable concentrations set out in the standards in the *Soil Monitoring Directive*, Alberta Environment, 2009, as amended, the approval holder shall develop a Soil Management Program Proposal.

4.10.9 If a Soil Management Program Proposal is required pursuant to 4.10.8, the approval holder shall submit a Soil Management Program Proposal to the Director according to the following schedule:

(a) for Soil Management Program Proposal that is triggered by the findings from the first soil monitoring event on or before the date in 4.10.6(a);

(b) for Soil Management Program Proposal that is triggered by the findings from a second soil monitoring event on or before the date in 4.10.6(b); or

(c) for any other soil monitoring event not specified in this approval within six months of completion of the soil monitoring event.

4.10.10 If any Soil Management Program Proposal is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

4.10.11 The approval holder shall implement the Soil Management Program as authorized in writing by the Director.

4.10.12 If the approval holder is required to implement a Soil Management Program pursuant to 4.10.11, the approval holder shall submit a written Soil Management Program

TERMS AND CONDITIONS ATTACHED TO APPROVAL

Report to the Director on or before March 31 of each year following the year in which the information was collected.

4.10.13 If any Soil Management Program Report is found deficient by the Director, the approval holder shall correct all deficiencies identified by the Director by the date specified in writing by the Director.

PART 5: FINANCIAL SECURITY REQUIREMENTS

5.1.1 The approval holder shall annually review and revise the cost estimate for reclamation of the facility including decommissioning and land reclamation.

5.1.2 The annual revised cost estimate for the facility shall be submitted to the Director by March 31 of each year.

5.1.3 The approval holder shall review and revise the cost estimate for reclamation of the facility when one or more of the following occurs:

(a) the cost estimate of future conservation and reclamation of the facility changes;

(b) the extent of the operation of the facility is increased or reduced;

(c) the facility or any portion of it is conserved and reclaimed;

(d) the conservation and reclamation plan required by this approval is changed; or

(e) the activities conducted at the facility for which security is required is increased or decreased.

5.1.4 The approval holder shall submit the revised cost estimate arising from 5.1.3 to the Director within 30 days after the occurrence of any of the circumstances described in 5.1.3.

5.1.5 The approval holder shall provide additional financial security as required in writing by the Director.

5.1.6 The approval holder shall renew the financial security for the facility at least 30 days prior to the date it expires.

5.1.7 The approval holder shall maintain the financial security for the facility until returned in accordance with the Act or the regulations.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 6: DECOMMISSIONING AND LAND RECLAMATION OF HWRSP FACILITY

SECTION 6.1: GENERAL

6.1.1 The approval holder shall apply for an amendment to this approval to reclaim the HWRSP Facility by submitting to the Director:

(a) a Decommissioning Plan; and

(b) a Land Reclamation Plan.

6.1.2 The approval holder shall submit the:

(a) Decommissioning Plan; and

(b) Land Reclamation Plan

referred to in 6.1.1 within six (6) months of the HWRSP Facility ceasing operation, except for repairs and maintenance, unless otherwise authorized in writing by the Director.

SECTION 6.2: DECOMMISSIONING

6.2.1 The Decommissioning Plan referred to in 6.1.1 shall include, at a minimum, all of the following:

(a) a plan for dismantling the HWRSP Facility;

(b) a comprehensive study to determine the nature, degree and extent of contamination at the HWRSP Facility and affected lands;

(c) a plan to manage all wastes at the HWRSP Facility;

(d) evaluation of remediation technologies proposed to be used at the HWRSP Facility and affected lands;

(e) a plan for decontamination of the HWRSP Facility and affected lands in accordance with the following:

(i) for soil or groundwater, *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*, Alberta Environment, February 2009, as amended,

(ii) for soil or groundwater, *Alberta Tier 2 Soil and Groundwater Remediation Guidelines*, Alberta Environment, February 2009, as amended,

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(iii) for drinking water, *Canadian Environmental Quality Guidelines*, Canadian Council of Ministers of the Environment, PN 1299, 1999, as amended, and

(iv) for surface water, *Surface Water Quality Guidelines for Use in Alberta*, Alberta Environment, November 1999, as amended;

(f) confirmatory testing to indicate compliance with the remediation objectives;

(g) a plan for maintaining and operating contaminant monitoring systems;

(h) a schedule for activities (a) through (g) above; and

(i) any other information as required in writing by the Director.

6.2.2 If the Decommissioning Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

SECTION 6.3: LAND RECLAMATION

6.3.1 The Land Reclamation Plan referred to in 6.1.1 shall include, at a minimum, all of the following:

(a) the final use of the reclaimed area and how equivalent land capability will be achieved;

(b) removal of infrastructure;

(c) restoration of drainage;

(d) soil replacement;

(e) erosion control;

(f) revegetation and conditioning of the HWRSP Facility including:

(i) species list, seed source and quality, seeding rates and methods,

(ii) fertilization rates and methods, and

(iii) wildlife habitat plans where applicable;

(g) reclamation schedule; and

(h) any other information as required in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

6.3.2 If the Land Reclamation Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

PART 7: FINAL LANDFILL CLOSURE AND POST-CLOSURE

SECTION 7.1: LANDFILL CELL CLOSURE AND MAINTENANCE

7.1.1 The approval holder shall submit a Landfill Cell Closure Plan for individual landfill cell closure to the Director on or before September 30, 2017, unless otherwise authorized in writing by the Director.

7.1.2 The Landfill Cell Closure Plan submitted pursuant to 7.1.1 shall be signed and stamped by a professional registered with APEGA.

7.1.3 If the Landfill Cell Closure Plan submitted pursuant to 7.1.1 is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within the timeline specified in writing by the Director.

7.1.4 The approval holder shall implement the Landfill Cell Closure Plan submitted pursuant to 7.1.1 as authorized in writing by the Director.

7.1.5 The approval holder shall maintain the closed landfill cells to:

(a) protect and maintain the integrity of the final cover and surface water drainage systems;

(b) prevent erosion;

(c) prevent surface water ponding;

(d) remediate areas affected by subsidence and differential settlement; and

(e) prevent leachate break out.

7.1.6 If the approval holder completes landfill cell closure in a year, the approval holder shall prepare an Annual Landfill Cell Closure Report, and include, at a minimum, all of the following information in the Report:

(a) as-built plans and details on the location of landfill cells that have been closed;

(b) certified construction QA/QC procedures employed during cover construction and installation; and

(c) survey reports showing the final cover depths.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

7.1.7 The approval holder shall submit the Annual Landfill Cell Closure Report with the Annual Landfill Operations Report required in 4.6.58.

SECTION 7.2: FINAL LANDFILL CLOSURE AND POST-CLOSURE

7.2.1 The approval holder shall apply for an amendment to this approval for final landfill closure by submitting to the Director:

(a) a Detailed Final Landfill Closure Plan ; and

(b) a Landfill Post-Closure Plan.

7.2.2 The approval holder shall submit the:

(a) Detailed Final Landfill Closure Plan; and

(b) Landfill Post-Closure Plan

referred to in 7.2.1 within six (6) months of the landfill ceasing operations, unless otherwise authorized in writing by the Director.

DETAILED FINAL LANDFILL CLOSURE PLAN

7.2.3 The Detailed Final Landfill Closure Plan shall be developed in accordance with sections 6.1(b) and 6.1(c) of the *Standards for Landfills in Alberta*, as amended.

7.2.4 In addition to 7.2.3, the Detailed Final Landfill Closure Plan shall include, at a minimum, all of the following:

(a) a plan for replacement of soil;

(b) a QA/QC Program; and

(c) any deviations from the most recently submitted closure plan.

7.2.5 The Detailed Final Landfill Closure Plan shall be signed and stamped by a professional registered with APEGA.

7.2.6 If the Detailed Final Landfill Closure Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

7.2.7 The approval holder shall implement the Detailed Final Landfill Closure Plan as authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

LANDFILL POST-CLOSURE PLAN

7.2.8 The Landfill Post-Closure Plan shall be developed in accordance with sections 6.2 and 6.3 of the *Standards for Landfills in Alberta*, as amended.

7.2.9 In addition to 7.2.8, the Landfill Post-Closure Plan shall include, at a minimum, all of the following:

(a) the groundwater monitoring program including performance standards and points of compliance;

(b) the subsurface landfill gas monitoring program and performance standards at points of compliance;

(c) a plan for erosion control;

(d) a plan for maintaining vegetative cover; and

(e) any other information requested in writing by the Director.

7.2.10 The Landfill Post-Closure Plan shall be signed and stamped by a professional registered with APEGA.

7.2.11 If the Landfill Post-Closure Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

7.2.12 The approval holder shall implement the Landfill Post-Closure Plan as authorized in writing by the Director.

PART 8: DECOMMISSIONING AND LAND RECLAMATION OF OLD SURFACE WATER DETENTION POND

8.1.1 The approval holder shall:

(a) decommission; and

(b) reclaim

the old surface water detention pond prior to construction of Cell 4.

8.1.2 The approval holder shall submit a Decommissioning and Land Reclamation Plan for the old surface water detention pond to the Director a minimum of six (6) months prior to decommissioning and land reclamation of the pond.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

8.1.3 If the Decommissioning and Land Reclamation Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

DATED March 31, 2017

DESIGNATED DIRECTOR UNDER THE ACT
Mohammad Habib, P. Eng.

APPENDIX C

DETAILED SITE INVESTIGATION REPORT

Detailed Technical Investigation Program Report
NE ¼ of Section 09-050-17 W4M
Clean Harbors Ryley Facility Proposed Expansion

PRESENTED TO

Clean Harbors Inc.

FEBRUARY 2017
ISSUED FOR USE
FILE: 704-ENVSWM03011-05

Tetra Tech Canada Inc.
Riverbend Atrium One, 115, 200 Rivercrest Drive SE
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EXECUTIVE SUMMARY

Clean Harbors Canada Inc. (Clean Harbors) requested Tetra Tech Canada Inc. (Tetra Tech) to undertake a detailed technical investigation program at a site located at NE ¼ of Section 09-050-17 W4M. The site is proposed for expansion of the Ryley Hazardous Waste Storage Facility (Ryley Facility) operated by Clean Harbors and situated to the immediate south. The Ryley Facility is approximately 1 km north of the Village of Ryley in Beaver County, Alberta.

The investigation was undertaken to demonstrate that the site's attributes meet the requirements of the Standards for Landfills in Alberta (the Standards) (Alberta Environment[1] [AENV] 2010), specifically those of Section 2: Landfill Development and Siting. These attributes include:

- Separation from potential environmental receptors;
- Geological and hydrogeological characterization on regional and local scales;
- Characterization of engineering and hydraulic properties of soils and bedrock;
- Description of the groundwater and surface water regimes;
- Description of site investigations conducted; and
- Interpretation of site investigation data and assessment of potential impacts to the groundwater and surface water regimes resulting from development and use of this site for an expansion of the Class I landfill.

The interpretation and impact assessment requirement of the landfill development and siting criteria are summarized here by making a direct comparison between the criteria and the site conditions. The investigation was also undertaken to align with the requirements for AEP's Guide to Content for Industrial Approval Applications (AEP 2014).

This detailed technical investigation has concluded that on the basis of the work presented herein, this site is suitable for landfill development in accordance with the applicable regulatory requirements in Alberta (AENV 2010). This key points of this suitability are summarized below:

Setbacks

The site has been demonstrated to comply with the setbacks outlined in the Standards:

- *Land subject to slope failure: 100 m.* The site meets this setback requirement.
- *A natural area that permanently contains water such as a lake, river or creek: 300 m, unless otherwise authorized in writing by the Director*. There are no permanent natural features within 300 m; therefore, the site meets this setback requirement.
- *A man-made surface feature that permanently contains water such as an irrigation canal, drainage ditch, but not a road-side ditch or dugout: 300 m, unless otherwise authorized in writing by the Director.* The only man-made surface features with 300 m are dugouts; therefore, the site meets this setback requirement.

[1] Currently Alberta Environment and Parks (AEP)

Geological Conditions

The site has been demonstrated to comply with the following conditions outlined in the Standards:

- *The area cannot be situated within a ravine, coulee, or gully.* The site is not located in such a feature, therefore the site meets this requirement.
- *There must be more than 30 m of geological materials with an equivalent hydraulic conductivity less than 1 x 10^{-8} m/s between the bottom of the liner, or where no liner is required, immediately beneath where waste will be deposited, excluding sumps or leachate pipe trenches, and an exceptional underlying aquifer.* Conservative transmissivity values calculated for materials beneath the site are a minimum of two orders of magnitude less than those defined as an exceptional aquifer in the Standards (2.5 x 10^{-3} m^2/s). Therefore, the site conditions satisfy this geological criteria on the basis that an exceptional aquifer is not present within the depth of interest.
- *The geological materials within 10 m below the bottom of the liner, excluding sumps or leachate pipe trenches, must not include fractured non-porous bedrock or karst features.* No evidence of karst features was encountered, either in the boreholes, or during the background information review of the regional geology to a depth of 250 m, and the bedrock is considered to be porous. Therefore, this geological separation requirement is met.

Hydraulic Properties of Site Materials

The site materials have been demonstrated to comply with the requirements for hydraulic properties, including:

- *There must be a 5 m thick layer of a clayey deposit having an equivalent hydraulic conductivity less than 1 x 10^{-8} m/s immediately beneath the lowest part of the liner, or where no liner is required, immediately beneath where waste will be deposited, excluding sumps or leachate pipe trenches.*
- *The geological materials immediately beneath the clayey deposit required consist of at least 3 m of material providing equivalent or better protection to the requirements above.*

With respect to the first criterion, there is a 5 m thick layer of a clayey deposit having an equivalent hydraulic conductivity less than 1 x 10^{-8} m/s immediately beneath the lowest part of the liner. With respect to the second criterion, the geological materials immediately beneath the clayey deposit required consist of at least 3 m of material providing equivalent or better protection to the first requirement; this criterion is also met with both the upper and middle bedrock providing this protection. The upper bedrock layer, underlying the clay tills at the site has the most variable characteristics of the site materials. This unit is formed primarily of clayey materials (clayey sandstone and clay shale) and due to the high weathering of the materials both the clayey sandstone and clay shale behave for engineering purposes as a clay. The upper bedrock is interbedded, and the hydraulic conductivity of this layer ranges over several orders of magnitude (6 x10^{-10} m/s and 8 x10^{-8} m/s) with a geometric mean hydraulic conductivity value of 5 x 10^{-9} m/s. The geometric mean vertical hydraulic conductivity value (from Shelby Tubes) of the upper bedrock was 3 x 10^{-10} m/s, with a range from 9 x 10^{-10} m/s to 7 x 10^{-11} m/s.

Protection of Groundwater Resources

The landfill cells will be constructed below grade, largely within the upper bedrock unit. The construction depths are expected to be in the 4 m to 6 m range and it is possible that there will be isolated areas of perched groundwater that will require management during construction and/or through engineering design; experience at the adjacent Beaver site where excavation is regularly to these depths, has found that these perched zones drain quickly and often at a rate that evaporates at the surface. Landfill cells represent a potential for environmental impacts due to the potential for leakage of leachate to the underlying groundwater, and potential for runoff of contact water into

surface water collection systems. The potential to impact groundwater will be managed by the natural geology, which has been demonstrated to be suitable in terms of the geologic and hydraulic properties of the site materials. Further, the engineering measures incorporated into the landfill design include a double geomembrane liner system that incorporates a leachate collection and removal system (LCRS) as well as a leak detection and removal system (LDRS). The double geomembrane liner system is installed directly above a geosynthetic clay liner (GCL). These geosynthetic materials are installed above a layer of engineered clay liner material constructed using low hydraulic conductivity native materials. The design includes requirements for ongoing capping of exposed wastes and management of contact water, and therefore the potential to impact surface waters is minimized. Further, surface water runoff is to be collected in ponds and tested prior to controlled discharge to the receiving environment.

Overall the geologic site conditions, continued groundwater monitoring program, and engineering measures in place at the existing Ryley Facility have mitigated and prevented landfill-related compounds from reaching the subsoil and groundwater. We note that Clean Harbours has undertaken a site monitoring program since 1991, and that the groundwater quality sampling has not identified indications of adverse groundwater impacts from the activities of the existing facility. With continued monitoring and maintenance of the current site and of the proposed expansion lands, there will not be impacts to groundwater resources in the area of the Ryley Facility. Clean Harbors is committed to continue monitoring groundwater quality parameters and addressing any detected exceedances in accordance with the conditions of the current and future Approval.

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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Clean Harbors Inc. and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Clean Harbors Inc., or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech Canada Inc.'s Services Agreement. Tetra Tech's General Conditions are provided in Appendix F of this report.

1.0 INTRODUCTION

Clean Harbors Canada Inc. (Clean Harbors) requested Tetra Tech Canada Inc. (Tetra Tech) to undertake a detailed technical investigation program at the NE ¼ of Section 9-50-17 W4M. The site is proposed for expansion of the Ryley Hazardous Waste Storage Facility (Ryley Facility) operated by Clean Harbors and situated to the immediate south. The Ryley Facility is approximately 1 km north of the Village of Ryley in Beaver County Alberta (Figure 1).

The investigation was undertaken to demonstrate that the site's attributes meet the requirements of the Standards for Landfills in Alberta (the Standards) (Alberta Environment[2] [AENV] 2010), specifically those of Section 2: Landfill Development and Siting. These attributes include:

- Separation from potential environmental receptors;
- Geological and hydrogeological characterization on regional and local scales;
- Characterization of engineering and hydraulic properties of soils and bedrock;
- Description of the groundwater and surface water regimes;
- Description of site investigations conducted; and
- Interpretation of site investigation data and assessment of potential impacts to the groundwater and surface water regimes resulting from development and use of this site for expansion of the Class I landfill.

The interpretation and impact assessment requirement of the Landfill Development and Siting criteria are summarized here by making a direct comparison between the criteria and the site conditions.

The investigation was also undertaken to align with the requirements for AEP's Guide to Content for Industrial Approval Applications (AEP 2014).

The following table of concordance lists the key regulatory requirements from the Standards and identifies the section(s) in this report where each requirement is described.

Table 1-1: Concordance Summary

Section in the Standards (AENV 2010)	Description of Relevant Section	Section in Detailed Investigation Program Report
Section 2.1 – Natural Environment Separation		
2.1 (a)	Setbacks for new landfills.	N/A
2.1 (b)	Setbacks for laterally expanding landfills.	3.1 and 6.1
2.1 (c) (i)	Existence of ravine, coulee, or gully within the footprint.	3.1 and 6.1
2.1 (c) (ii)	Nature of geological material 30 m below the base of the landfill.	5.1 and 6.2
2.1 (c) (iii)	Presence of fractured non-porous bedrock.	5.1 and 6.2
2.1 (d) (i),(ii)	Presence of 8 m thickness of suitable materials.	5.1 and 6.3
2.1 (e) (i),(ii)	Existence of material with hydraulic conductivity greater than 1×10^{-6} ms^{-1} within the clayey deposit.	5.1 and 6.3
2.1 (f)	Use of equivalent hydraulic conductivity in achieving 2.1(3).	6.3
2.1 (g) and (h)	Exemptions from 2.1 (c) and (d).	N/A

[2] Currently Alberta Environment and Parks (AEP)

Table 1-1: Concordance Summary

Section in the Standards (AENV 2010)	Description of Relevant Section	Section in Detailed Investigation Program Report
Section 2.2 – Requirements for a Technical Investigation Program		
2.2 (a)	Requirement to complete a technical investigation program.	4.0
2.2 (b)	Requirement for preparation of technical investigation program by APEGA registered professionals.	(various)
2.2 (c)	Requirement for technical investigation program to characterize on local and regional scales.	(various)
2.2 (d) (i)	Description of groundwater and surface water regimes.	5.2 and 3.4
2.2 (d) (ii)	Description of potential contaminant flow paths.	6.4
2.2 (d) (iii)	Potential impacts on groundwater and surface water regimes relative to the existing landfill.	6.4
2.2 (d) (iv)	Characterization of on-site soils.	5.1
2.2 (d) (v)	Site stability assessment.	6.1.2
2.2 (e) to (h)	Spacing, depth and survey requirements for the technical investigation program.	4.0
Section 2.3 – Groundwater Monitoring Wells		
2.3 (a)	Requirements for drilling and wells.	4.0
Section 2.4 – Detailed Technical Investigation Program Report		
2.4 (a)	Requirement for preparation of technical investigation program report by APEGA registered professionals.	8.0
2.4 (b) (i)	Description of topography, surface drainage, geology, and hydrogeology within 800 m.	3.0
2.4 (b) (ii)a.	Site relation to adjacent development and infrastructure.	3.1
2.4 (b) (ii)b.	Site relation to natural and constructed physical features.	3.1
2.4 (b) (ii)c.	Site relation to licensed water wells within 5 km radius.	3.4
2.4 (b) (ii)d.	Site relation to municipal wellhead protection zones.	3.4
2.4 (b) (iii)	Detailed site plan.	Figure 6
2.4 (b) (iv) and (v)	Profile and depths of topsoil and subsoil and borehole records of geological and hydrogeological conditions.	5.1, Appendix A
2.4 (b) (vi)	Site stability.	6.1.2
2.4 (b) (vii)	Cross-sections.	Figure 8a-8f
2.4 (b) (viii)	Hydrological, hydrogeological, and geological conditions on a regional and local scale.	3.0 and 5.0
2.4 (b) (ix),(x)	Site suitability for landfill development and recommendations.	7.1 and 7.2

This report consists of seven sections.

- Section 1.0 provides an overview of the work, regulatory requirements, and structure of the report;
- Section 2.0 introduces the project and identifies the scope of work;
- Section 3.0 describes the site setting and regional geology and hydrogeology;
- Section 4.0 details the site investigation methods;

- Section 5.0 presents the results of the site investigation;
- Section 6.0 presents a site evaluation with respect to the natural environment separation criteria outlined in the Standards; and
- Section 7.0 summarizes the report's findings, providing recommendations and a description of ongoing work.

Further landfill design information will be presented under a separate cover.

Authorization to carry out this investigation was provided by Mr. Michael Parker of Clean Harbors in March 2016.

2.0 PROJECT INFORMATION

2.1 Project Description

The proposed lateral expansion of the Ryley Facility expansion is to be classified as a Class I landfill, which allows the site to accept hazardous waste. The waste landfilled will be consistent with the waste accepted into the existing Ryley Class I Facility with waste which predominantly originates from waste disposal brokers (understood to be associated with municipal, commercial, and light industrial development) accounting for more than one-third of the solid waste intake (35%). Other activities from which the Ryley Facility receives hazardous waste include: oil sands development (20%), petroleum upgrading (15%), chemical processing (15%), general construction (10%), and other activities (5%).

Presently, Clean Harbors proposes to construct:

- A new Class I Landfill Cell (i.e., Cell 5);
- Associated staging areas, scale and access roads;
- A waste handling/tipping pad; and
- Surface water management infrastructure.

The proposed initial construction (Cell 5) will increase the landfill capacity by approximately 508,670 m^3. Up to six additional landfill cells are conceived within the remaining areas of the proposed lateral expansion area; however, their specific footprint, capacity and design have not yet been determined.

2.2 Scope of Work

The investigation involved the following tasks, listed in approximate chronological order:

- Project initiation meeting;
- Review of regional and local geological and hydrogeological information;
- Borehole drilling, soil sampling, and monitoring well installation;
- Geotechnical testing; and
- Groundwater monitoring and hydraulic response testing.

The scope of work for the investigation was outlined in the Tetra Tech proposal Ryley Landfill Expansion Project Expression of Interest, Statement of Qualifications, Quotation dated April 1, 2015 (Tetra Tech 2015). Boreholes drilled for the program were positioned on a grid pattern at intervals of 200 m. Some of the drilling locations were moved from the regular grid initially proposed, due to terrain difficulties, and obstacles (e.g., fence line). Tetra Tech also referenced historical borehole information on site, and at the adjacent, existing Clean Harbors Ryley Facility to supplement and confirm findings. The investigation depth was approximately between 12.0 m below grade (mbg) and 19.8 mbg at 18 locations, and approximately 41.1 mbg at two locations. Further details of the drilling and testing program are described in Section 4.0.

3.0 SITE DESCRIPTION

3.1 Physical Setting

The site is located in central Alberta, 2 km north of Highway 14 (Figure 1 and Figure 2), 90 km southeast of Edmonton. The ATS location is NE ¼ of Section 9-50-17 W4M. The closest settlements are the Village of Ryley (1 km south) and the unincorporated community of Poe (8 km southeast). The Holden Hutterite Colony and the village of Holden are located 14 km and 16 km southeast respectively, and town of Tofield is 20 km northwest of the site.

The site is bounded by Highway 854 (Range Road 173) to the east, Township Road 502 to the north, and the Ryley Facility to the south (Figure 3). The surrounding land use includes farmland to the north, east and west, and the existing Clean Harbors Ryley Facility is located directly south. The Beaver Regional Landfill is located approximately 800 m east of the site. There are several low pressure gas pipelines in the area, all are listed under the ownership of Atco Gas (North). The nearest oil and gas well is 1.0 km north of the site and is abandoned. All other oil and gas wells nearby are listed as abandoned.

The surface area for the proposed landfill expansion site is approximately 65 ha and the proposed expansion site boundary is shown on Figure 4. Topographic relief across the site is minimal, with local low points across the site which have previously been identified as “Potential Wetland(s)”. Figure 4 shows the topography of the site based on Lidar data, and indicates that the local topography varies between 685 m above mean sea level (masl) and 690 masl. The site generally slopes to the north.

The regional topography of the area (Figure 2) is controlled mainly by buried bedrock features. Areas to the west of Beaverhill Lake are noted to have greater relief, where the Horseshoe Canyon Formation is present directly below surface. Where the Bearpaw Formation is present below the surface, the ground surface topography is flat and featureless. A topographic rise is noted further to the east, where the Bearpaw Formation pinches out, and the Sandier Belly River Formation becomes dominant.

The northern third of the site is currently cultivated for livestock feed while the southern two thirds are pasture land with few trees. An abandoned rail track crosses the site diagonally from near the northeast corner to near the southwest corner bounded by fences on either side. There are shrubs and small trees in the southeast corner of the site and along the historical railway track. Pasture areas are covered by grasses. The cultivated area in the northern portion of the site was harrowed and has grown animal feed in the preceding year.

A review of Abacus Datagraphics (Abacus Datagraphics 2011) indicated that there is a low pressure gas pipeline running north-south at the east edge of the site. The line was located in the ditch of Highway 854 during the line locating process for the subsurface investigation and was identified by Atco as abandoned. There is also a telephone line at the eastern boundary of the site within the road right-of-way. A fiber-optic telecommunications line runs along the abandoned rail track immediately north of the fence.

Tetra Tech is not aware of the site having been used previously for any purpose other than farming and grazing.

3.2 Regional Geology

The following sections describe the surficial geology (3.2.1) and bedrock geology (3.2.2). Table 1 summarizes the local and regional geological setting to assist in interpretation of the available regional reporting, and to link to the local site conditions described in the subsequent sections. As a broad overview of geologic suitability, the Alberta Geologic Survey published mapping showing the natural suitability of geologic setting for waste management (Andriashek and Waters 2005) which shows that the site location is classed as 'Suitable: Low Permeability'.

3.2.1 Surficial Geology

Surficial landforms in the area are dominated by the process that occurred during glacial retreat of ice sheets in the late Pleistocene (Quaternary) era. Landforms and material types were mapped by Bayrock and Hughes (1962) and Bayrock (1972). The sediments overlaying the erosional bedrock surface vary between less than 3 m thick to greater than 60 m. However, these deposits are usually less than 15 m thick unless in areas of elevated hummocky terrain or where buried valleys are present (Stein 1982). Two types of till were documented, including hummocky moraine, and ground moraine (Bayrock 1972). The hummocky moraine (till deposit) is the dominating landform to the west of the site. This till deposit is comprised of mixed clay, silt and sand with pebbles and boulders. It is described as containing lenses of sand, gravel and local bedrock. It is generally greater than 12 m thick and is expressed as undulating to gently rolling topography. The ground moraine (till deposit), which includes the immediate site area, is also comprised of clay, silt and sand, with pebbles and boulders. It is also generally less than 12 m thick but the surface topography where this till is placed is level to undulating. Around Beaverhill Lake, northwest of the site, recent alluvial deposits are present including beach deposits (sand and silt) and lake and slough deposits (silt, clay, organic muck and marl).

Surficial features include stagnant ice moraines, which were formed through melting of stagnant ice, and stratified glacial sediments. The presence of "knob and kettle terrain" has been noted by others for the region (McDonald 2009). Beaverhill Lake is understood to be formed through this process.

The Alberta Surficial Geology (Fenton et al 2013) describes the site area as fluted moraine comprising glacially streamlined sediments, predominantly till. In the area northeast of the site glaciolacustrine deposits are present. These sediments were formed in or along the margins of glacial lakes, and comprise either offshore sediment (fine sand, silt and clay) or nearshore sediment (well sorted silty sand, pebbly sand and minor gravel). Stagnant ice moraine deposits have also been mapped in the northeast of the site area, comprising mainly till with local stratified glaciolacustrine or glaciofluvial deposits.

3.2.2 Bedrock Geology

A general description of the regional bedrock geology, emphasizing hydrogeological characteristics for the County of Beaver No. 9 was prepared by Hydrogeological Consultants (HCL 1999). The mapping HCL provided was used to create Figure 5. An earlier hydrogeological report of the area was prepared by Stein (1982). The geological nature of the various formations in the area is well documented as part of the resource exploration of the Western Canadian Sedimentary Basin. Stein's hydrogeological study focused on a region of approximately 4,500 km^2 southeast of Edmonton, while the HCL report covered an area of approximately 3,600 km^2, over the County of Beaver No. 9. The Natural Resources Canada (NRC) online Lexicon of Canadian Geologic Units has also been referenced for descriptions of the individual bedrock units.

The overall dip of the bedrock units in the area of the site is estimated to be west-southwest at a rate of approximately 30 m/km. The geologic units are documented to grade to a thickness of zero towards their erosion

edge in the northeastern-most boundary of the sedimentary wedge (HCL 1999). The erosional bedrock surface, below the surficial material, has a slope trending gradually to the north east (HCL 1999), with a local depressional area north of the site (Figure 5). Surface exposures of the Bearpaw Formation have been documented in areas to the east (Stein 1982).

The bedrock formations in the area are well documented, and are of late Cretaceous age. It is composed of the following formations (HCL 1999):

- Horseshoe Canyon Formation;
- Bearpaw Formation;
- Belly River Group (comprising the Oldman, Continental Foremost and Marine Foremost formations); and
- Lea Park Formation.
- All of these formations are interpreted to be present below the site, with the exception of the Horseshoe Canyon Formation.

The Horseshoe Canyon Formation is the lowest stratigraphic member of the Edmonton Group. In the region of study, it has a thickness of 300 m to 380 m (HCL 1999). The material in this unit was deposited in a deltaic and fluvial system. Sediments include fine grained, bentonitic, feldspathic sandstones; silty, bentonitic shales; minor coal seams; and carbonaceous shale (NRC 2016). The formation is noted to grade to zero thickness along a south east trend, through the town of Tofield, west of the study area (Stein 1982). The transition from the contact between Horseshoe Canyon and the Bearpaw Formation can be gradational, or clearly defined by a light grey weathering sandstone.

The Bearpaw Formation is present across much of Alberta as the bedrock surface. It has been observed to have a thickness of 60 m to 120 m in this region, and up to 350 m in other areas in the south of Alberta and Saskatchewan (NRC 2016). The formation is composed of a large variety of materials, including claystone, coal, shales, silt, siltstone, sand and sandstone. The most notable features of the formation include concretions and thin beds of bentonite. Sandstone present in the formation contains weakly cemented fine to medium sized grains of quartz, feldspar and glauconitic material. The sandstone material is also noted to contain clay and silt material, especially near the bottom of the formation (NRC 2016). The Bearpaw Formation also contains a wide array of clearly documented fossils, primarily molluscs (bivalves, ammonites, nautiloids, etc.). It grades to a zero thickness along a south east trend, just east of the town of Holden (Stein 1982). Stein (1978) describes the Bearpaw as marine shales, silty shales, sandstones and bentonite beds that interfinger with sandstone, shale and coal of the overlying Horseshoe Canyon Formation.

Mapping in the local area by Moell (1985, 2005) separated the Bearpaw Formation into two distinct units, an upper and lower member. Moell indicated that the upper member was a heterogeneous mix of muddy sandstone, mudstone and claystone; the lower member was comprised of uniformly textured claystone-mudstone (and due to the massive, non-fissile nature of this unit, the terminology of claystone-mudstone was preferred to shale). Moell also noted thin carbonaceous and lignitic streaks in both the sand and shale units in the upper member.

The Belly River Formation is located directly below the Bearpaw Formation, and overall is 275 m to 300 m thick in this region (Stein 1982). Various authors describe this unit differently, though generally referencing the same rock types. Stein (1982) described the Belly River Formation as non-marine, grey to greenish grey, thick bedded, feldspathic sandstone, grey, clayey siltstone, grey and green mudstone, and concretionary ironstone beds. He noted that the definition of Bearpaw Formation boundaries is difficult due to the interfingering nature of formation

contacts and similarity of surrounding lithologies. Approximately the upper third of the formation was described (Stein 1982) as the Birch Lake Members, and typically have an increased sandstone content.

HCL (1999) describes the Belly River as a Group, comprising the Oldman, Continental Foremost and Marine Foremost Formations, which include both marine and non-marine members. These formation descriptors are used in the Southern Plains district. The Oldman Formation is between 40 m and 80 m thick in the study region. The upper portion of the formation consists of carbonaceous sandstone and shale, of marine origin, with some coal seams and bentonite beds near the top. Lower portions were generally deposited in a freshwater environment, and consist of light grey sandstone and shale, with minor greenish, brown and reddish shales and siltstones. Sandstone is generally weakly cemented, and is famous for creating “badland” topography where it outcrops. It also contains dinosaur and plant remains (NRC 2016). In porous material in this formation, fluids can be present, and may be either high TDS (total dissolved solids) water or naturally occurring hydrocarbons (HCL 1999).

The Foremost Formation is at the bottom of the Belly River Group. It comprises a top zone of coal seams and carbonaceous shales, ranging from 80 m to 220 m in thickness (NRC 2016). HCL (1999) classifies this as the Continental Foremost Formation. An underlying zone of sandstone, shale, freshwater mollusc beds and carbonaceous shale is present, ranging from 33 m to 76 m in thickness. This material is in turn underlain by the McKay Coal Horizon (approximately 9 m thick), which is in turn underlain by the basal Foremost sandstone (NRC 2016). HCL (1999) classifies these lower zones as the Marine Foremost Formation.

The Lea Park Formation lies below the Belly River Group and ranges between 100 m and 200 m thick (HCL 1999). The formation comprises medium to dark grey shale with minor amounts of silt. Stringers of sand and clay-ironstone concretions are common, as are thin bentonite seams and fossils (NRC 2016).

A system of bedrock valleys has been documented by Andriashek (1987). The main valley system in the region is the Vegreville Valley. The Beaverhill and Holden valleys are tributaries to the main Vegreville Valley, and lie to the west and east of the town of Ryley. They trend north, and meet up with the Vegreville Valley, which runs east then turns north near the town of Vegreville. The buried valleys are documented to be from 10 m to 50 m deep, with sediments up to 80 m thick in some areas (HCL 1999). Figure 5 shows the interpreted bedrock topography and the buried bedrock valleys in the vicinity of the site.

3.3 Hydrogeology

In 1982 Stein conducted a regional hydrogeological study (Stein 1982). Data from various pumping tests across the study region was analyzed. Due to widespread heterogeneity of the bedrock materials, results varied highly within formations. A more recent study was conducted by HCL in 1999 (HCL 1999). Using new data, a more detailed characterization of each of the main aquifers was possible. Variability within the units was also inferred to be high with addition of new data. Both Stein and HCL identify that the regional groundwater flow in the vicinity of the site is to the north and northeast (Figure 6a).

At various points in the available literature, the authors characterize the yield of the geologic units in terms of m^3/day. The Standards for Landfills in Alberta (AENV 2010) only use water yield to identify exceptional aquifers for their siting criteria, presented in terms of transmissivity. As used there, and for ease of reference, a transmissivity of greater than 2.5×10^{-3} m^2s^{-1} defines an exceptional aquifer where 30 m of separation by fine grained, low hydraulic conductivity material is required for placement of a landfill. This transmissivity would relate to a yield of approximately 518 m^3/day for an aquifer with 5 m of available head and 2,570 m^3/day for an aquifer with 25 m of available head (calculated using the Farvolden method and assuming that the yield represents a 20 year sustainable yield).

The Horseshoe Canyon Formation is noted to be highly variable geologically. Higher groundwater yields are obtainable in coal zones, present in the lower half of the bedrock unit. Due to the nature of the depositional environment, layers of fine grained materials interfinger, and are laterally discontinuous. Fractures within the coal, locally caused by glaciation, allow for greater groundwater yield from this formation. The presence of fractures is variable, and further complicated by incision of valleys. As a result, groundwater yield in the formation can vary between 10 and 100 m^3/day (HCL 1999). In areas containing incised valleys, a buried gravel or sand channel can permit higher values, up to 1,000 m^3/day (12 L/s)(Stein 1982). Updated data from HCL (1999) supports these findings.

The Bearpaw Formation contains material that is not ideal for high groundwater yield. Material is highly heterogeneous, and contains higher amounts of clay and silt. The apparent yield for the majority of the area is between 0 m^3/day and 10 m^3/day. Some regions to the south of Ryley, and to the west of Beaverhill Lake, reported as yielding greater than 50 m^3/day (HCL 1999). The report also notes that the higher yield regions may be inaccurately grouped within the formation, due to difficulty constraining the top and bottom contacts of the Bearpaw Formation.

The Belly River Group yield similar results to those found in the Bearpaw Formation. Average water well yields for water wells completed in this sedimentary group is expected to be less than 10 m^3/day. Local areas of higher yield in these formations may be due to increased weathering and subsequent fracturing to the east, or inaccurate stratigraphic control, and incorrect assignment of values (HCL 1999).

Figure 6a shows expected well yield information obtained from Stein (1982); however, it does not identify the formation for that yield. At the location of the site, the expected yield is between 0.1 L/s and 0.4 L/s (7.2 m^3/day and 34.6 m^3/day) according to this mapping. Using data provided by the Government of Alberta, a map was prepared showing well depth, and recommended pumping rate for wells with available information (Figure 6b). Within 5 km of the site, wells with recommended pump rates of between 0.14 L/s and 3.15 L/s (12.1 m^3/day and 272 m^3/day) occurred at installation depths between 105 m and 184 m; the wells with the higher recommended pumping rates were all greater than 105 m deep. Notable higher yield, shallower wells are located approximately 8 km south of the proposed expansion site.

Chemical characteristics of the groundwater are summarized as follows:

Table 3-1: Bedrock Groundwater Chemistry in Beaver County

Formation	Groundwater Types	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Comments
Horseshoe Canyon	Sodium-bicarbonate, Sodium-sulfate or Sodium-chloride	Range from <1,000 to >2,000	On average <100 up to >250	
Bearpaw		<2,000	On average <250	Chloride concentrations >250 mg/L in Townships 049, 050, Ranges 18 and 19, W4M
Oldman		500 to 3,000	East of Range 12, W4M mainly <250 West of Range 12, W4M is mainly >250	Ryley Facility located west of Range 12, W4M
Continental Foremost	Insufficient data	1,000 to 3,000	<100	
Marine Foremost		<1,500	<100	

Source: HCL, 1999

Surficial sediments contain a mixture of till material, with some sand and gravel, particularly on the northern regions of the study area (HCL 1999). A study of the till material on site was completed by Shetsen (1990), and summarized by Laidlaw Environmental Services for their environmental baseline study (Laidlaw 1992). Surficial materials are composed of the following deposits:

- Till, primarily clay and silt, up to gravel sized. Deposited by melting of glaciers as ground moraine, or stagnation moraine.
- Glaciofluvial outwash and deposition of silt, sand and gravel often in association with meltwater channels.
- Glacial Lacustrine silts, sand and clay. Deposited in glacial lakes that developed as the glaciers retreated.

When near surface sand and gravel pockets are saturated, they are capable of producing useable quantities of groundwater. Partially buried sand and gravel lenses exposed or near surface can provide a conduit for infiltration of surface water. These lenses are generally less than 10 m thick; however, they can be up to 15 m thick in some areas. The lenses have been reported to yield 8 m^3/day to 35 m^3/day (Stein 1984). Higher yield wells in the surficial material have been documented in areas to the east of Beaverhill Lake, and to the east of the Town of Viking, with reported yields greater than 100 m^3/day (HCL 1999). There are large areas within the region that do not have the sand and gravel aquifer present, particularly where bedrock is shallow. No surficial sand and gravel lenses have been encountered by the investigation program within the proposed expansion area.

The chemical quality of the groundwater contained in these near surface sediments is consistent across the region, and within the various depths. The table below summarizes chemical quality.

Table 3-2: Surficial Material Groundwater Chemistry in Beaver County

Formation	Groundwater Types	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Comments
Surficial Material	Calcium-Magnesium-Bicarbonate or Sodium-Sulfate	Overall <1,500	Overall <250	Highest TDS in areas, north and south of Tofield, south of Holden and north of Bruce

Source: HCL, 1999

3.4 Local Hydrology and Water Well Use

The proposed expansion area is located within the Bible Creek drainage within the Beaverhill Lake watershed (Laidlaw 1995). The Bible Creek drainage is part of the larger North Saskatchewan River Basin, and the proposed expansion area is located approximately 76 km south of the North Saskatchewan River (Figure 2). A tributary of bible creek runs to the south of the proposed expansion site (Figure 3).

The most notable waterbody feature in the area is Beaverhill Lake (Surface area ~130 km^2), located approximately 10 km to the northwest of the proposed expansion area. No major creeks or rivers are located within the immediate vicinity. Amisk Creek is located approximately 7 km to the west and flows to the north, into Beaverhill Lake. Vermillion River is located approximately 22 km to the east and flows north.

The topography of the area is flat, with some nob and kettle landforms. There are many un-named sloughs and saturated areas surrounding, and within the proposed expansion area (Figure 3). The water is suspected to be stagnant, and dissipates either by evaporation or by infiltration into shallow groundwater systems. Agricultural development has reduced the number of these stagnant water areas in the surrounding farmland. The waterbodies are small, and seasonally intermittent. There are 20 dugouts within the surrounding area that are sampled annually as part of operations of the existing Ryley Facility. Surface water collected from the existing facility, located to the

south, is tested and discharged along run-on diversion channels to the natural channel, draining east, then north to Beaverhill Lake.

The AENV Water Well Information Database Search is provided in Appendix B. The search identified drilling reports for 146 water wells within 5 km of the proposed expansion area. According to the database search, the average depth of the wells is 75 m, with a maximum depth of 1,005.8 m. The water well usage within the area is summarized as follows.

Table 3-3: Water Well Usage in Area

Well Use	Number of Wells	Percentage of Total
Domestic	49	33.6
Domestic and Industrial	3	2.1
Domestic and Stock	38	26
Industrial	5	3.4
Investigation	4	2.7
Monitoring	4	2.7
Municipal	2	1.4
Observation	5	3.4
Other	3	2.1
Stock	14	9.6
Unknown	19	13

Appendix B contains a tabulation of well identification numbers, locations and other information as well as Alberta water well users within a 5 km radius of the proposed expansion area and existing facility. Figure B1 in Appendix B shows the location of these wells within 5 km of the site.

There were no Wellhead Protection Zones identified within the vicinity of the site.

4.0 SITE INVESTIGATION METHODS

Tetra Tech conducted a detailed drilling program between February 23, 2016, and March 19, 2016. Twenty-eight boreholes were advanced to depths of between 12.2 m and 41.2 m at twenty locations (Figure 4) to assess the potential for landfill development in the area (i.e., presence and thickness of clayey deposits). Clayey materials were encountered in all boreholes. Borehole locations were based on an approximate 200 m maximum grid across the study area; existing boreholes and monitoring wells along the northern perimeter of the existing Ryley facility were used as the southern line of the grid area for the expansion site.

Tetra Tech contracted Garritty Baker Drilling Inc. for deep drilling depths and bedrock coring, and Clean Harbors Exploration Services for shallow auger drilling depths. Half of the boreholes advanced, including all deep holes, were cored using water to circulate the cuttings upward and to stabilize the boreholes for the installation of groundwater monitoring wells. Coring was conducted between February 23, 2016, and March 1, 2016. The remaining boreholes were drilled by solid stem auger, conducted between March 15, 2016, and March 19, 2016.

The geotechnical and hydrogeological investigation at the site involved:

- Drilling and geological logging of 27 boreholes at 20 locations;
- Collection of samples from all of the boreholes (disturbed grab samples and relatively undisturbed Shelby tube and core samples);
- Installation of twelve 51 mm diameter polyvinyl chloride (PVC) monitoring wells at selected borehole locations within the site perimeter;
- Installation of three 102 mm diameter PVC monitoring wells at selected borehole locations within the site perimeter; and
- Site walkover, and hydraulic response testing.

Details of borehole locations and monitoring well completions are presented in Table 2.

Historical subsurface investigation information from the existing Clean Harbors Facility and the proposed expansion site have been incorporated into this report. In particular, the historical information has been used to supplement the geological information at the southern edge of the site. Two deep (41.5 mbg) boreholes southwest and southeast of the existing Clean Harbors Facility (15MW35Deep and 15MW36Deep, respectively) were advanced in 2015 as part of the Approval Renewal application process. These boreholes have been incorporated into the cross-sections and site understanding of the proposed expansion site.

4.1 Material Classification and Sampling

Materials were logged according to the Modified Unified Soil Classification System (USCS). During drilling, the consistency of the unconsolidated shallow deposits was assessed in the field by taking pocket penetrometer readings from soil samples recovered from the auger flights. To complement the information collected using the pocket penetrometer, standard penetration tests (SPTs) were conducted at 3 m depth intervals. Results from both the pocket penetrometer tests and SPTs are presented on the individual borehole records in Appendix A.

Disturbed grab samples and bulk samples were recovered from the auger flights at selected depth intervals. The samples were examined visually and classified in the field. Soil stratigraphy was logged, noting the depths of stratigraphic boundaries, water-bearing layers, and other significant features. Bedrock cores were collected in core boxes and logged for type, colour, fractures, and water-bearing zones in the field. Field descriptions were reviewed and edited as appropriate, based on the findings of laboratory tests, as discussed in Section 5.0. An explanation of the terms and symbols used on the borehole records is included in Appendix A.

4.2 Monitoring Well Installation

Twelve 51 mm diameter and three 102 mm diameter PVC monitoring wells were installed at the site. The monitoring wells were constructed using 51 mm or 102 mm diameter threaded PVC pipe with a No. 10/20 slot; all 15 monitoring wells were constructed with a 1 m long screened section. For each 51 mm well, the screen was positioned in the wettest zone in either the bedrock or the glacial sediments. For each 102 mm well, the screen was positioned to allow in situ percolation testing in a material where water was not present. Silica sand was used to fill the annular space around the screen from the bottom of the borehole to approximately 15 cm above the screened section. The remainder of the annulus was filled with bentonite chips and hydrated to isolate the screened interval from the surface. Protective housings were placed on all 51 mm wells to guard against accidental damage and vandalism. Protective housings were not placed on the 102 mm wells but lockable J-Plugs were placed on all of these wells. The ground and casing (‘top of pipe’) elevations of the monitoring wells were surveyed by Challenger Geomatics in

June 2016. Monitoring well construction details and survey information is provided in Table 2. Boreholes without wells were backfilled with bentonite to near the ground surface.

4.3 Groundwater Monitoring and Sampling

Groundwater monitoring was conducted in May 4 and May 11, 2016, and June 2 and June 10, 2016. During each monitoring event, water levels were measured using an electronic water level probe.

Groundwater quality sampling was conducted in June 2016. This sampling will continue in fall 2016 as part of the baseline groundwater sampling program, and will be reported under a separate cover.

4.4 Hydraulic Response Testing

Tetra Tech personnel were present on site to conduct a site walkover and hydraulic conductivity testing from May 4 to May 5, 2016, from May 11 to May 13, 2016, and from September 12 to September 13, 2016. Hydraulic response testing was conducted on wells to obtain estimates of the hydraulic conductivity of the geological materials adjacent to the well screen.

Testing was completed on wells 16MW04, 16MW08A, 16MW09A, 16MW09B, 16MW09D, 16MW11A, 16MW11C, 16MW13, 16MW14, 16MW16 and 16MW18. Wells tested were subjected to a slug/bail test (falling head and/or rising head test), conducted by displacing a measured volume of water within each well and timing the recovery of the water level to equilibrium. Both hand measurements as well as pressure transducer dataloggers were used to record water levels. All data was analyzed using the Hvorslev (1951) or Bouwer and Rice (1976) method. Atmospheric pressure was recorded using a barometric pressure transducer in the area of the monitoring wells, and used to correct the test results. The results of hydraulic response testing are provided in Appendix C and summarized in Section 5.2.

Hydraulic response testing was also conducted in 2015 at 15MW34 and 15MW35 as a component of the Approval Renewal application, and hydraulic response testing was conducted at historical wells on the expansion lands (no longer existing) by C.E. Moell in 1983 (Moell 1983). These historical test results have been incorporated into the analysis in Section 5.2.

4.5 Geotechnical Testing Program

Laboratory tests were conducted at Tetra Tech's geotechnical laboratory to determine the engineering properties of representative samples collected from boreholes distributed across the site. The testing program included:

- Natural moisture content was determined from 65 samples;
- Atterberg limits (PL, LL, and plasticity index [PI]) were established from 22 samples;
- A full grain size analysis by sieve and hydrometer was conducted on 22 samples;
- The moisture-density relationship (Standard Proctor Maximum Dry Density [SPMDD]) and optimum moisture content (OMC) were determined for nine samples;
- Bedrock porosity was determined for six samples; and
- The constant-head hydraulic conductivity (K) was determined for 17 samples (9 remoulded and 8 Shelby tube samples).

The results of the laboratory testing are summarized in Table 3a and Table 3b. Appendix D presents the detailed results from laboratory tests conducted, including Atterberg Limits, grain size analyses, Standard Proctor moisture-density relationship tests, porosity, and hydraulic conductivity tests.

5.0 SITE INVESTIGATION RESULTS

The results of the hydrogeological investigation are presented according to:

- Stratigraphic units (Section 5.1);
- Groundwater conditions (Section 5.2); and
- Suitability of soils for liner construction (Section 5.3).

5.1 Stratigraphic Units

Within the maximum depth (41.5 m) penetrated by the 27 boreholes drilled for this subsurface investigation the soil and bedrock materials consisted of:

- Surficial soils – predominantly clay till;
- Upper bedrock – weathered clayey sandstone and interbedded clay shale;
- Middle bedrock – clay shale; and
- Lower bedrock – interbedded clayey sandstone, clay shale and mudstone.

Section 5.1.1 to Section 5.1.4 describe these materials and their variation from place to place across the site. These units are described in relation to the previous studies in Table 1.

Detailed descriptions of the ground conditions encountered at each borehole location are presented on the borehole records (Appendix A). Borehole locations are shown on Figure 4, and a site plan that shows additional historical boreholes (i.e., prior to 2016) on site and on the adjacent operating facility is provided on Figure 7. Copies of selected historical borehole records on site and to the south are also provided in Appendix A. The historical borehole records have not been revised by Tetra Tech to reflect the nomenclature of the recently drilled boreholes. The available data has been used to generate the series of stratigraphic cross sections shown on Figure 8a through Figure 8f. Hydrogeological information has also been shown on the cross sections, including groundwater elevations, interpreted flow directions and hydraulic conductivity values (further discussed in Section 5.2).

The results of geotechnical testing of the samples of the materials are presented in Appendix D, and summarized in Table 3. Selected samples of bedrock (5) were submitted for analysis of petroleum hydrocarbons based on ambient odours noted during drilling; these results are presented in Table 4 and described further in Section 5.1.5.

5.1.1 Surficial Soils

The surficial soil materials encountered within the boreholes generally comprised clay till. At each location boreholes were advanced to a minimum depth of 15.2 mbg (for nested wells, one or more of the boreholes drilled was advanced to this depth or deeper). Of the boreholes previously advanced at the northern edge of the existing Clean Harbors Ryley Facility, the minimum depth was 5.4 mbg. Boreholes extended through the full thickness of the glacial sediments to the bedrock surface as shown on the cross-sections. The base of surficial soils was generally encountered at depths ranging between 1.5 mbg (16BH05) and 4.6 mbg (16BH01).

Topsoil thicknesses generally ranged from 0.15 m to 0.3 m. Topsoil on the site was primarily brown to black in appearance and contained roots and rootlets. The soil was damp to wet during sampling but at the time of drilling was often frozen so its relative moisture state could not always be recorded. Topsoil was covered with vegetation, primarily grasses, on the southern two thirds of the site while the northern section was harrowed and had been previously cultivated. Subsoil has been identified on the borehole logs as clay or sand and topsoil. This subsoil layer was identified at 12 of the 20 locations drilled in 2016. The median subsoil thickness encountered was 205 mm across the site. A detailed soil assessment is being conducted as part of the expansion application and will be reported under a separate cover.

Unconsolidated sediments beneath the topsoil and subsoil consisted mainly of clay (till). The clay till material generally consisted of silty clay with a variable sand content ranging from some sand to sandy. The consistency of the clay till ranged from stiff to very stiff with occasional soft or hard material in some locations. The plasticity was generally medium, although isolated materials exhibited lower plasticity (with increased sand and gravel content) or higher plasticity (with decreased silt or sand content). The clay till was generally brown in colour and at some locations became grey with depth. The material contained traces of gravel, cobbles, coal, iron oxide, white precipitates, and pink precipitates; fragments of bedrock were reported at greater depths. The clay till deposits ranged between 1.5 m and 4.3 m thick, with the thickest deposits observed in the southwest corner of the site.

Mottled sand and clay was encountered at one borehole (16BH19) at depths between 2.0 mbg and 2.5 mbg underlying the clay till in the transition to the sandstone layer. A silt layer was encountered between 1.8 mbg and 2.1 mbg in one borehole (16MW14). They silt was sandy with some clay, moist, and brown. Sand bodies were uncommon, but some sand and silt deposits were encountered and included:

- Isolated pockets of sand or silt within the surficial materials in 16BH02, 16BH06, and 16MW14 which could not be correlated between boreholes; and
- Trace small sand pockets (smaller than 5 cm) throughout the clay till.

The regional descriptions discussed in Section 3.2.1 indicated that the most probable soil type for the site would be clay till which is supported by the material descriptions recorded.

5.1.2 Upper Bedrock

The surficial soils were underlain by an interlayered bedrock unit, consisting of weathered clayey sandstone and clay shale. The clayey sandstone was readily penetrated by the augers due to its weathering. Thin layers of interbedded clay shale layers were encountered throughout this unit. Overall the unit ranged from damp to wet and was typically blue grey with iron oxide staining common within the uppermost section. The majority of the unit was extremely weak but some thin medium strong brown clay shale layers were encountered in the lower portion. Concretions and shells were observed in samples from several locations across the site, in both clay shale and clayey sandstone layers. Typically these ranged in depth from 4.5 m to 10.5 m. Occasional hydrocarbon odour was noted in cores in the base of this layer (refer to Section 5.1.5), including at 16MW11 and 16BH12 and 16BH19. The upper bedrock deposits ranged between 0.9 m and 10.2 m thick, with the thinnest deposits observed in the north end of the site.

The regional descriptions discussed in Section 3.2.2 indicate that the Bearpaw Formation is composed of large variety of materials, including claystone, coal, shales, silt, siltstone, sand and sandstone. The sandstones in this formation are known to contain clay and silt material as encountered on site, and as indicated in Table 1, the upper bedrock unit corresponds to the upper member of the Bearpaw Formation as described by Moell (2005).

Geotechnical laboratory testing including moisture content, Atterberg Limits, grain size analysis, in situ hydraulic conductivity, remoulded hydraulic conductivity, proctor, and porosity testing. The material tested from this unit

generally behaved as clay in in the laboratory. The material ranged from low plastic to high plastic with the low plastic material containing high sand content and the high plastic material containing high clay content. Porosity values ranged between 20% and 25%. These results are discussed in detail within Section 5.1 (hydraulic conductivity testing) and Section 5.3 (other geotechnical testing) with individual lab reports contained in Appendix D.

5.1.3 Middle Bedrock

Beneath the upper bedrock unit, the bedrock was more uniform with only minor interlayering. This unit comprised clay shale and was found across the site at a thickness ranging between approximately 20 m and 25 m. The thickness of the unit generally increased toward the northeast corner of the site. The top of this unit was encountered at elevations ranging between 675 masl and 681.5 masl. The bottom of this unit was delineated in the four deeper boreholes drilled at depths of between 29.5 m and 32.5 m, corresponding to elevations of between 652.5 m and 656.5 m.

The clay shale was slightly weathered to highly weathered and was extremely weak to weak with occasional small fractures encountered throughout the unit at angles ranging between 50° to 90°. The majority of the fractures were between 75° and 90°, measured to the axis of the core. Occasional hydrocarbon odour was noted in the clay shale, including at 16BH03, 16MW09 and 16MW11 (refer to Section 5.1.5).

The regional descriptions discussed in Section 3.2.2 indicate that the Bearpaw Formation is composed of large variety of materials, including claystone, coal, shales, silt, siltstone, sand and sandstone. Moell (1985) also noted the presence of thin lignitic and carbonaceous streaks in the shale and sandstone. The notable features of the formation include concretions and thin beds of bentonite as well as several types of fossils as were observed in samples collected on site. As indicated in Table 1, the middle bedrock unit corresponds to the lower member of the Bearpaw Formation as described by Moell (2005).

Geotechnical laboratory testing included moisture content, Atterberg Limits, grain size analysis, in situ hydraulic conductivity, and porosity conducted on core samples from this middle bedrock unit. Porosity values ranged between 22% and 26% (Table 3a). The material tested had high plasticity with fines content ranging from 45% to 99%. These results are discussed in detail within Section 5.1 (hydraulic conductivity) and Section 5.3 in regards to their suitability for use as clay liner material.

5.1.4 Lower Bedrock

The layers of bedrock beneath the clay shale (i.e., middle bedrock unit) have been defined as the lower bedrock unit. This unit consists of layers of sandstone, clay shale, and siltstone. The sandstone encountered was primarily slightly weathered, weak, and fine grained with interbedded layers of clay shale throughout. The sandstone was typically grey with blackish brown staining in some fractures accompanied by a hydrocarbon odour (noted at 16MW09 and 16MW11). Portions of the sandstone encountered was medium strong. The clay shale encountered was typically slightly weathered, weak and grey or brown. Moisture content of materials in this unit ranged from damp to moist. Of the four wells screened in this unit, water levels were detected in all four ranging between 5.2 mbg and 14.1 mbg.

The top of this unit was encountered between 652.5 masl and 656.5 masl in the four boreholes drilled past this depth, corresponding to depths of 29.5 mbg to 32.5 mbg. The bottom of this unit was not defined through the recent investigations on site which reached depths of up to 41.1 mbg. The expected thickness of this unit according to the regional descriptions discussed in Section 3.2.2 is more than 275 m.

As indicated in Table 1, the lower bedrock unit corresponds to the Belly River Group as described by Moell (2005) and others. The Belly River Group is typified by light grey sandstone and clay shale which is weakly cemented.

Natural hydrocarbons have been documented in this formation. These regional descriptions correspond with the material encountered on site.

5.1.5 Naturally Occurring Hydrocarbons

During drilling, ambient hydrocarbon odours were noted in the bedrock at several holes. The regional geologic information describes carboniferous shale and sandstone in all formations encountered with this investigation. Samples of this material were collected to characterize the chemical composition, including testing for benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbon fractions. Results of this testing are provided in Table 4 and laboratory certified results are provided in Appendix E.

The locations of ambient hydrocarbon odour noted included:

- Upper bedrock:
  - 16-MW11 at 8 m depth in clayey sandstone.
  - 16-BH12 at 9 m depth in clayey sandstone.
  - 16-MW18 at 6 m depth in clayey sandstone.
- Middle bedrock:
  - 16-BH03 at 8 m depth in clay shale.
  - 16-MW09 at 27.5 m and 29 m depth in clay shale.
  - 16-MW11 at 10 m depth in clay shale.
- Lower bedrock:
  - 15-MW36 at 35 m depth in sandstone (Note: borehole on existing Ryley Facility).
  - 16-MW09 at 39 m depth in clay shale.
  - 16-MW11 at 35 m and 39.5 m depths in clayey sandstone.

The analytical testing did not measure BTEX concentrations greater than the analytical detection limits. Petroleum hydrocarbon fraction concentrations were generally less than 250 mg/kg with the exception of at 15-MW36 where greater concentrations were measured (Table 4). The chromatogram for this sample (Appendix E) resembled an unrefined, heavier end hydrocarbon, such as crude oil.

5.2 Groundwater Conditions

5.2.1 Distribution of Hydraulic Conductivity

The results of hydraulic response testing conducted on monitoring wells are provided in Table C1 in Appendix C which includes recent testing as well as results from testing conducted historically at the site (Moell 1985). The current and historical testing are compiled below to summarize the overall hydraulic conductivity values for the layers beneath the site.

Table 5-1: Summary of Hydraulic Response Testing by Unit

Unit Screened	Number of Tests	Hydraulic Conductivity (m/s)				Comment
		Minimum	Maximum	Average	Geometric Mean	
Surficial Soils	1	2×10^{-9}	2×10^{-9}	-	-	Materials generally dry or intermittent water table
Upper Bedrock	16	6×10^{-10}	8×10^{-8}	-	5×10^{-9}	
Middle Bedrock	17	4×10^{-10}	1×10^{-6}	-	2×10^{-9}	Maximum value at one well by Moell at northeast corner of site, interpreted to be anomalous and indicative of fractured shale at that location (Moell 1983); next highest value is 1×10^{-8}m/s.
Lower Bedrock	2	4×10^{-9}	8×10^{-8}	4×10^{-8}	-	

For the 2016 hydraulic conductivity testing, values obtained using the methods of Hvorslev, and Bouwer and Rice were generally mutually consistent.

Vertical hydraulic conductivity testing was conducted on Shelby tube samples from the different units at the site. The following summarizes the results of this testing by unit:

- Upper bedrock unit – vertical hydraulic conductivity measurements from Shelby tubes ranged between 7×10^{-11} m/s and 9×10^{-10} m/s (geometric mean of 3×10^{-10} m/s); and
- Middle bedrock unit – vertical hydraulic conductivity measurements from Shelby tubes ranged between 4×10^{-11} m/s and 2×10^{-10} m/s (geometric mean of 7×10^{-11} m/s).

Further evaluation of the monitoring well response test (horizontal hydraulic conductivity) and Shelby tube (vertical conductivity) values in terms of the hydraulic properties of site materials required by the Standards is provided in Section 6.4.

5.2.2 Flow Directions and Circulation Patterns

Groundwater monitoring data is provided in Table 2. Groundwater elevations have been calculated based on surveyed well elevations. As described in Section 5.1, the site stratigraphy has been classified into four overall units, within each of which there are one or more distinct soil or bedrock types. The information was grouped according to unit, contoured, and divided to show only information for the expansion area. Elevation contouring was done to provide better resolution on the boundaries of the proposed expansion area. Contouring was undertaken using Golden Software's Surfer V 14. All datasets were kriged, and any values excluded from contouring are indicated on the figures.

Groundwater flow in the different units is described as follows:

- Clay till (Figure 9a): The surficial soils have a discontinuous water table, with several of the monitoring wells being dry through to the bedrock. Flow direction is generally north to northwest in the southern portion of the site; however, a southwestern gradient is observed in the northeast portion of the site. The average depth of wells screened in this group is 4.1 mbg, and the average groundwater elevation was 685.5 masl. Based on the interpreted elevation contours, the groundwater flow gradient ranges from zero to 0.006.
- Upper bedrock unit (Figure 9b): The groundwater in the upper bedrock unit generally flows north to northeast. This unit is comprised of interbedded bedrock types (clayey sandstone and clay shale), and this is evident in apparently inconsistent water levels in the central and northeast portion of the site which suggest mounding

and depressional areas. The average depth of the wells contoured in this grouping is 6.8 mbg and the average groundwater elevation was 685.0 masl. The gradient ranges from 0.001 to 0.015.

- Middle bedrock unit (Figure 9c): The groundwater in the clay shale of the middle bedrock generally flows north. At the north end of the site two wells (16MW11B and 16MW09B) exhibit notably lower groundwater elevations, approximately 8 m lower than the surrounding wells. These wells are screened approximately 5 m to 6 m deeper than the surrounding wells within the same clay shale unit and may suggest a downward hydraulic gradient within the clay shale. However, the screen at 16MW18 on the east side of the site is similarly deeper yet the water level corresponds with the shallower occurrence seen elsewhere. The average groundwater elevation (excluding the two deeper occurrences) was found to be 683.7 masl. The gradient ranges from 0.002 to 0.021.

- Lower bedrock unit (Figure 9d): The groundwater in the lower bedrock unit indicates a relatively uniform northwest gradient across the site towards the lowest elevation in well 16MW11A. The average depth of wells within this unit is 35.21 mbg, with the average elevation 678.9 masl. The gradient ranges from 0.004 to 0.012.

There are four locations with multiple nested wells with which to evaluate vertical hydraulic gradients, including two on the expansion site (16MW09 and 16MW11) and two on the existing facility to the south (15MW34 and 15MW35). In general, vertical hydraulic gradients across the major units are downward, with the exception of at 16MW09 and 15MW35 where upward hydraulic gradients were noted between the deep and middle bedrock units. At the on-site locations, the calculated vertical gradients were:

- Between surficial soils and upper bedrock unit: 1.8 m/m downward (16MW09; 16MW11D was dry);

- Between upper bedrock and middle bedrock units: 0.4 m/m and 0.5 m/m downward (16MW09 and 16MW11, respectively); and

- Between middle and lower bedrock units: 0.2 m/m upward at 16MW09 and 0.2 m/m downward at 16MW11.

The shallowest water bearing zone is recharged by local infiltration, which in areas may recharge the upper bedrock directly due to the relatively thin till presence. This shallowest water bearing zone is discontinuous with areas of perched water table. The groundwater conditions in the upper bedrock are complicated by the highly interlayered nature of this unit and the influence of seasonal recharge effects. Due to the variable nature of hydraulic conductivity values, the inter-bedding and discontinuous nature of the sedimentary layers, shallow groundwater movement is not laterally persistent nor predictable over the larger areas. The shallow and intermediate systems have a downward vertical gradient; however, the deeper system (lower bedrock) exhibits variable upward and downward gradients; we interpret that the regional water table, present in the middle and deep bedrock, recharges the shallower system, but that seasonally perched water tables may result in periodic downward gradients to the deeper system. Additional monitoring of water levels is needed to confirm these conclusions; this monitoring is ongoing concurrent with baseline groundwater quality testing, and with the semi-annual groundwater monitoring program at the adjacent facility.

The presence of relatively shallow groundwater beneath the site (less than 5 m depth in eight of the wells monitored in June 2016) indicates that groundwater management may be required both during construction and will need to be considered as part of the cell design to ensure water levels are reduced below the landfill cell liners.

5.3 Suitability of Soils for Clay Liner Construction

The Standards (AENV 2010) require that a clay or composite liner be incorporated into the landfill construction. This section provides an evaluation of the use of the soils presently onsite to construct a clay liner.

The results of geotechnical testing of site materials are presented in Appendix D, and summarized in Table 3a. It should be noted that shallow geological conditions are innately variable. Glacial deposits, in particular, are seldom spatially uniform. At the time of preparation of this report, information on subsurface stratigraphy was available only from discrete borehole locations. To develop recommendations that support landfill construction from this information, it is necessary to make some assumptions concerning conditions at locations between the boreholes drilled on the site.

We note that the results described below are also incorporated in Section 6.0 (which describes natural environment separation) because the upper bedrock may be considered suitable both for use as clay liner material, and as suitable underlying material of low hydraulic conductivity to satisfy the siting requirements. Recommendations in this regard are presented in Section 7.0.

5.3.1 General

Neither topsoil nor other organic-rich soils that were reported as present on the site are considered suitable for use in compacted clay liners for landfills. These materials should be stripped and stockpiled in accordance with the Soil Conservation Act (Province of Alberta 2010) for use in landscaped areas, or for use in future reclamation activities. The isolated pockets of silt materials and the mottled clay and sand encountered are unsuitable for use in compacted clay liner construction and should be separated during excavation and stockpiled separately from materials suited to use in clay liner construction. Roots encountered during excavation should be removed from any clay materials selected for liner construction.

5.3.2 Criteria for Clay Liner Material

Criteria for establishing the suitability of a soil for use in compacted clay liner construction for landfills were taken from Section 3.5 of the Standards (AENV 2010) and Section 3.4 of the draft Guidelines for Landfills in Alberta (AENV 2007). Based on the Standards, the primary requirement for a clay liner material is that it is capable of achieving, upon remoulding and compaction, a hydraulic conductivity of less than 1×10^{-9} m/s. The draft Guidelines provide guidance for certain index and classification properties applicable to screen soils for use in clay liner construction for landfills (e.g., Atterberg limits and grain size).

For ease of reference this section uses the following terms that we define as:

- PI – Plasticity index;
- LL – Liquid limit;
- P_{200} – Percent passing sieve No. 200 sieve;
- ML – silt of low plasticity;
- MI – silt of medium plasticity;
- MH – silt of high plasticity;
- CL – clay of low plasticity;
- CI – clay of medium plasticity; and
- CH – clay of high plasticity.

The guidance for appropriate index and classification properties applicable to soils intended for use in clay liners is contained on Figure 3.1 of the draft Guidelines, and is summarized thus:

1. “Preferred” clay liner soil:
   - PI greater than or equal to 15;
   - LL between 30 and 50 (inclusive);
   - Clay content greater than or equal to 25%; and
   - P_{200} value greater than or equal to 50%.
2. “Acceptable” low-plasticity clay liner soil:
   - PI between 10 and 15 (inclusive);
   - LL between 20 and 30 (inclusive);
   - Clay content between 15% and 25%; and
   - P_{200} value between 40% and 50% (inclusive).
3. “Acceptable” high-plasticity clay liner soil:
   - PI greater than or equal to 21;
   - LL between 50 and 75 (inclusive);
   - Clay content between 15% and 25%; and
   - P_{200} value between 40% and 50% (inclusive).

The following figure illustrates the Atterberg limits criteria, as per the draft Guidelines (AENV 2007), and presents the laboratory test data obtained from this site. Samples falling outside the ‘acceptable’ and “preferred” areas (classified as CL or CL-ML, with a PI of less than 10) are generally considered unsuitable for clay liner construction and should be stockpiled separately when identified during excavation, unless they can be proven to meet the minimum standard for hydraulic conductivity of 1×10^{-9} ms^{-1}.

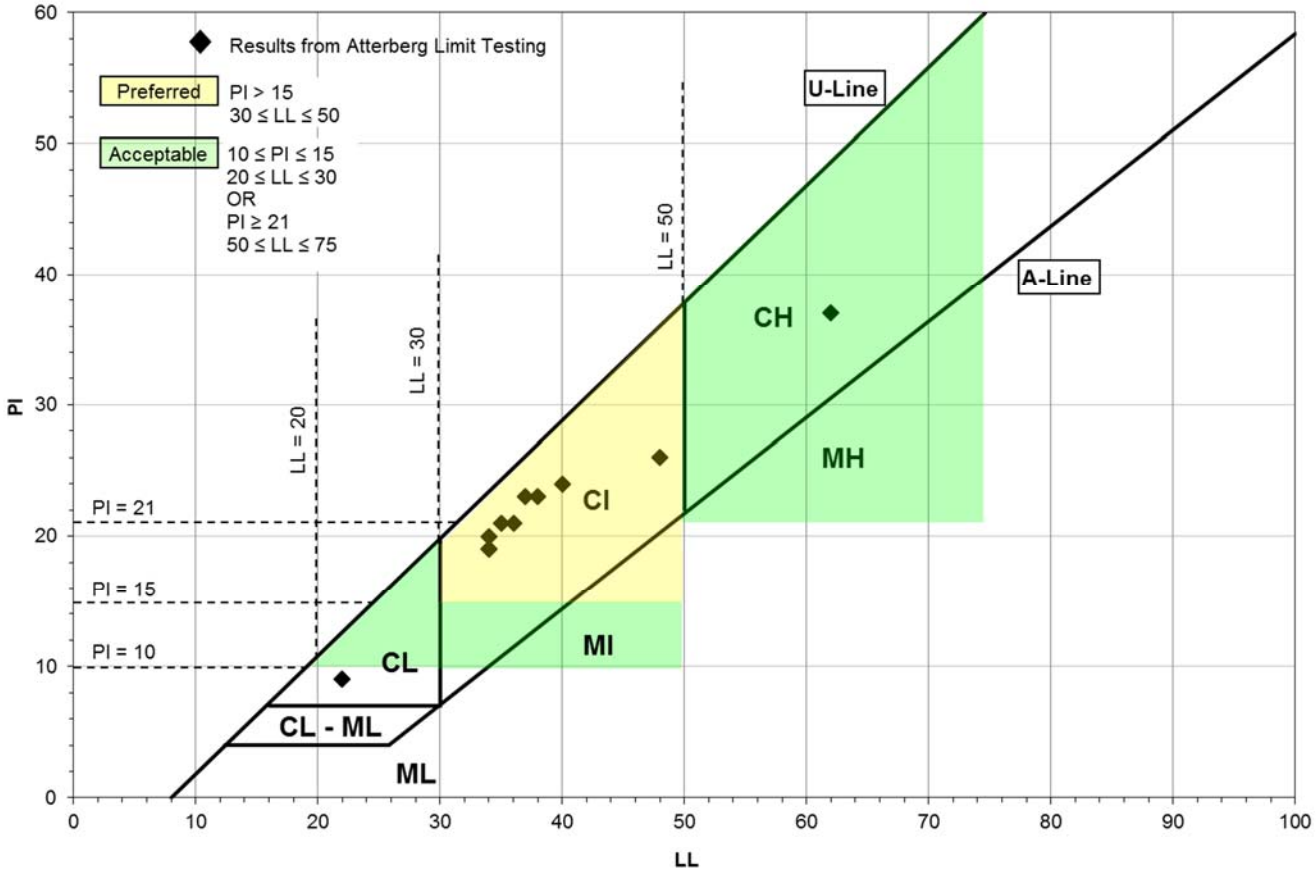

Figure 1: Comparison between the Prescribed Atterberg Limits Criteria (AENV 2007) and Laboratory Test Results from this Project

5.3.3 Evaluation of Clayey Materials

5.3.3.1 Clay Till

Based on the laboratory test data obtained from the clay till collected at this site (summarized in Table 3a), the following was observed:

- The majority of soil samples tested satisfy the requirements for "preferred" liner materials. From the 11 samples tested, 9 were within the "preferred" range; the other sample (16BH03 Bulk1) had a LL value of greater than 50. The samples tested had an average PI value of 23 and an average LL of 40.
  - One sample from 16BH03 was classified as high plastic clay which falls within the "acceptable" range for clay liner construction.
  - One sample from 16BH06 was classified as low plastic clay with a PI lower than 10 which falls outside of the "preferred" and "acceptable" ranges.

- The samples tested exhibited a clay content ranging between 17% and 47% with an average of 29%. The percentage mass that passed the No. 200 sieve ranged between 50% and 86%. Based on the clay and fines content, 6 samples were classified as "preferred" material for clay liner construction. Four samples from 16BH01, 16MW08, 16MW11, and 16MW18 were classified as "acceptable" with a clay content of 23% to 24%.
  - One sample from 16BH06 was not classified as "acceptable" or "preferred" with a clay content of 17%.
- Remoulded hydraulic conductivity testing (Table 3b) on six samples of the clay material ranged between 6 x 10^{-11} m/s and 9 x 10^{-11} m/s, with a geometric mean of 7 x 10^{-11} m/s.

The test data presented above indicate general conformance with the Standards (AENV 2010) and draft Guidelines (AENV 2007). The clay soil samples tested are capable of achieving a hydraulic conductivity of 1 x 10^{-9} m/s or less, when compacted to approximately 98% of standard proctor maximum dry density (SPMDD), and at a moisture content within approximately zero to four percentage points above the optimum moisture content. This conclusion is based on the results of hydraulic conductivity tests conducted on compacted specimens that all yielded hydraulic conductivity results less than 1 x 10^{-9} m/s, with a geometric mean of 7 x 10^{-11} m/s for the six samples tested.

One sample from 16BH06 was not classified as "preferred" or "acceptable" clay liner. This material was identified as very sandy and low plastic. When this material is encountered during excavation it should be stockpiled separately and should not be used as clay liner material.

No Shelby tube samples of this material suitable for testing in situ hydraulic conductivity were collected.

It is concluded that the clay till from the site satisfy the requirements for soils acceptable, and in general, preferred, for construction of compacted clay liners for use in the proposed Clean Harbors Ryley Facility expansion. We note that this material has been used successfully for decades at both the Ryley Facility and at the adjacent Beaver facility. Silt material encountered at the site during excavation should be separated and should not be used as clay liner material.

5.3.3.2 Upper Bedrock

In addition to the clay till soils, the upper bedrock unit is formed primarily of clayey materials (clayey sandstone and clay shale). Testing of the Atterberg limits for the samples of these materials demonstrates that for engineering purposes these geological materials behave like a clay.

Based on the laboratory test data obtained from the upper bedrock samples collected at this site (summarized in Table 3a), the following was observed:

- The majority of clayey sandstone samples tested are within the high plastic clay range. One clayey sandstone sample from 16BH06 with no interbedded clay or clay shale behaved as a low plastic clay when disturbed and remoulded.
- The majority of clay shale samples tested are also within the high plastic clay range. One clay shale sample from 16MW09 was classified as high plastic silt when disturbed and remoulded although the clay content was 31%.
- The six bedrock core samples tested (including upper and middle bedrock layers) exhibited porosities ranging from 19.6% to 26.1% which would be considered porous bedrock. Four clay shale samples from depths of 12 mbg to 13 mbg were tested with an average porosity of 23.9%. Two sandstone samples from depths of 6.1 mbg and 9.1 mbg were tested with an average porosity of 22.1%.
- Remoulded hydraulic conductivity testing (Table 3b) on three samples of the upper bedrock ranged between 6 x 10^{-12} m/s and 4 x 10^{-11} m/s, with a geometric mean of 2 x 10^{-11} m/s.

Similar to the clay till, this material has also been used successfully for decades at both the Ryley Facility and at the adjacent Beaver facility as liner.

6.0 NATURAL ENVIRONMENT SEPARATION

This section provides our evaluation of the site's attributes in reference to Section 2 (landfill development and siting) of the Standards. We note that Clean Harbours has undertaken a site monitoring program since 1991, and that the groundwater quality sampling has not identified indications of adverse groundwater impacts from the activities of the existing facility.

The Standards provide hydrogeological criteria that must be satisfied during landfill site planning, and apply to both new landfills and expansion of existing sites. The following sections describe our evaluation of these criteria, including:

- Setbacks from land subject to slope failure and water features, and adequate surface drainage (Section 6.1);
- Suitable geology, including separation from exceptional underlying aquifers, non-porous bedrock and karst features (Section 6.2);
- Suitable hydraulic properties of site materials (Section 6.3); and
- Protection of on-site and off-site surface water and groundwater resources (Section 6.4).

6.1 Setbacks

6.1.1 Criteria

The Standards specify that the person responsible for a laterally expanding landfill shall comply with several setbacks:

- Land subject to slope failure: 100 m.
- A natural area that permanently contains water such as a lake, river or creek: 300 m, unless otherwise authorized in writing by the Director.
- A man-made surface feature that permanently contains water such as an irrigation canal, drainage ditch, but not a road-side ditch or dugout: 300 m, unless otherwise authorized in writing by the Director.

6.1.2 Suitability of Setbacks

In response to the criteria, the site investigation has determined the site characteristics presented below.

6.1.2.1 Slope Stability

There is no evidence that this site is, or has been, subject to slope failure. There is minimal topographical relief across the site. Bare Earth LiDAR data have been presented (Figure 4), and indicate that the ground is smooth and presents no evidence for historical slope failure scarps.

6.1.2.2 Natural Areas Containing Permanent Watercourses or Man-Made Features

NTS mapping of the area indicates the presence of one creek within 2 km of the site. The creek was identified as an ephemeral draw known as Bible Creek running directly south of the existing Clean Harbors Ryley Facility as indicated on Figure 3. The Alberta Merged Wetland Inventory indicates that several "potential wetlands" may exist on the site. These "potential wetlands" are shown on Figure 3. Site visits revealed that these "potential wetlands" were predominantly low-lying areas which while wet primarily contained vegetation similar to the surrounding areas. A detailed survey of these "potential wetlands" has been conducted, the results of which will be reported under a separate cover.

The NTS base maps indicate that there are several manmade water features within 300 m of the site. Numerous dugouts are shown on Figure 3 to the west, north, and east of the proposed expansion site. There is one dugout located on the site which will would be removed during construction.

The elevation at the site ranges between 685 masl and 688 masl. LiDAR data indicated several potential, subtle surface drainage features. Some of these were observed by the field crews to contain water but the vegetation associated with them was not indicative of regular inundation. Agricultural development has likely reduced the number of these stagnant water areas in surrounding farmland. Due to the relatively flat nature of the site, the surface drainage is poor, and the engineering design will include construction of drainage features to manage stormwater drainage.

In conclusion, there are waterbodies within 300 m of the site including potential wetlands (natural) and several dugouts (man-made). The natural areas do not permanently contain water, and the man-made features are dugouts; therefore, the site meets these setback criteria.

6.2 Geological Conditions

6.2.1 Criteria

The standards specify that the waste footprint of a laterally expanding landfill shall not be situated at a location where there exists one or more of the following conditions:

- The area is situated within a ravine, coulee, or gully.
- There are less than 30 m of geological materials with an equivalent hydraulic conductivity less than 1 x 10^{-8} m/s between the bottom of the liner, or where no liner is required, immediately beneath where waste will be deposited, excluding sumps or leachate pipe trenches, and an exceptional underlying aquifer. An exceptional underlying aquifer is defined by the Standards as '*a hydrostratigraphic unit with a transmissivity of greater than 2.5 x 10^{-3} m^2s^{-1}, yielding water with a total dissolved solids (TDS) concentration not exceeding 4,000 mg/L*'.
- The geological materials within 10 m below the bottom of the liner, excluding sumps or leachate pipe trenches, include fractured non-porous bedrock or karst features.

6.2.2 Suitability of Geological Conditions

In response to the criteria, the site investigation has determined the geologic conditions described below.

6.2.2.1 Location

The site is not located in a ravine, coulee, or gully; this has been demonstrated using the LiDAR data presented on Figure 4, supplemented with site visits.

6.2.2.2 Separation from Underlying Exceptional Aquifer

To assess the material to a minimum depth of 30 m below the base of the landfill and confirm that an exceptional aquifer did not exist at depths shallower than 30 m, the subsurface investigation was conducted to a depth of 41 mbg.

The potential for an exceptional aquifer has been evaluated based on the major unit types. In the following table, the maximum layer thickness and maximum hydraulic conductivity values have been used to estimate the transmissivity of the geological units defined at the site.

Table 6-1: Transmissivity Calculations

Unit	Maximum Layer Thickness (m)	Maximum Hydraulic Conductivity (m/s)	Calculated Transmissivity (m^2/s)
Upper Bedrock	8.3 m (16BH12, clayey sandstone and clay shale)	8×10^{-8} m/s (16MW08A)	7×10^{-7} m^2/s
Middle Bedrock	26.9 m (16MW09, clay shale)	1×10^{-6} m/s (24C, Moell 1993)	3×10^{-5} m^2/s
Lower Bedrock	9.6 m (16MW11, sandstone)	8×10^{-8} m/s (16MW09A)	8×10^{-7} m^2/s

Based on these calculations, the conservative transmissivity values are a minimum of two orders of magnitude less than those defined as an exceptional aquifer in the Standards (2.5×10^{-3} m^2/s). The results presented indicate that an exceptional aquifer is not present within the depth of interest.

6.2.2.3 Separation from Fractured Non-Porous Bedrock and Karst Features

No evidence of karst features was encountered, either in the boreholes, or during the background information review of the regional geology to a depth of 250 m.

The Standards state that 'fractured non-porous bedrock' means fractured bedrock with a primary porosity of less than 5% as measured by a helium porosimeter. Porosity testing on two samples of the upper bedrock (clayey sandstone) yielded porosity between 19.6% and 24.6%; testing on four samples of the middle bedrock (clay shale) identified porosity ranging between 22.4% and 26.1%. Several of the bedrock layers exhibited fracturing, including those within 10 m of the expected landfill base. However, fracturing is understood to be a consequence of weathering that occurred during the last glacial retreat and not a regional tectonic feature nor associated with a noticeable change in hydraulic conductivity. Therefore the bedrock can be considered to be porous, and this separation requirement is met.

6.3 Hydraulic Properties of Site Materials

6.3.1 Criteria

The Standards identify that the waste footprint of a laterally expanding landfill shall only be situated at a location where:

- There is a 5 m thick layer of a clayey deposit having an equivalent hydraulic conductivity less than 1×10^{-8} m/s immediately beneath the lowest part of the liner, or where no liner is required, immediately beneath where waste will be deposited, excluding sumps or leachate pipe trenches; and
- The geological materials immediately beneath the clayey deposit required consist of at least 3 m of material providing equivalent or better protection to the requirements above.

The clayey deposit may include one or more layers of a material with hydraulic conductivity greater than 1 x 10^{-6} m/s provided that:

- The accumulated thickness of the sand layers is less than 0.5 m; and
- Any such layers do not extend beyond the compliance boundary.

The thickness of the clayey deposit required may be attained by reconstruction of compacted earthen materials to an equivalent hydraulic conductivity less than 1 x 10^{-8} m/s.

6.3.2 Suitability of Site Hydraulic Properties

In response to the criteria, the site investigation has determined the site's hydraulic characteristics, as described below.

6.3.2.1 Properties of Underlying Clayey Deposit

One test for hydraulic conductivity was made on the clay till. This test yielded a value for the horizontal hydraulic conductivity of the till of 2 x 10^{-9} m/s. Laboratory testing for the vertical hydraulic conductivity made on six Shelby tube samples yielded a geometric mean vertical hydraulic conductivity value of 7 x 10^{-11} m/s. Based on the likely scenarios for cell development, we anticipate that in most areas of site, the clay till material will be removed and used for cell construction.

The upper bedrock layer underlies the clay tills and has more variable characteristics. This unit is formed primarily of clayey materials (clayey sandstone and clay shale) and as indicated in Section 5.1.2, due to the high weathering of the materials both the clayey sandstone and clay shale behave for engineering purposes as a clay. The upper bedrock is interbedded, and as shown in Section 5.2.1, the hydraulic conductivity of this layer ranges over several orders of magnitude (6 x10^{-10} m/s and 8 x10^{-8} m/s) with a geometric mean hydraulic conductivity value of 5 x 10^{-9} m/s.

A maximum value for the hydraulic conductivity of the upper bedrock was measured by Moell in 1983 at monitoring well 11W, located centrally on the southern perimeter. Well 11W was installed across a 1.5 m thick layer of clayey sandstone at a depth of 4.0 m. At this location the upper bedrock unit is recorded to be 8.9 m thick. While the depth of this layer is such that it would likely be removed during cell construction, an equivalent value for the hydraulic conductivity at this location has been calculated as follows:

- The equivalent hydraulic conductivity is determined by the following equation.

  $K = d/\Sigma(d_i/K_i)$

  Where:

  K = equivalent hydraulic conductivity

  d = thickness of natural geologic material between the bottom of a landfill and the top of an exceptional aquifer

  d_i= thickness of each distinctly different geologic layer within the thickness of d

  K_i = the hydraulic conductivity of geologic layer d_i

  Σ = means the summation of all d_i/K_i values for the distinctly different geologic layers.

- The following information was used as input to the equivalent hydraulic conductivity value calculation:
  - 1.5 m layer of clayey sandstone with a K of 7.5×10^{-8} m/s; and
  - 7.4 m layer (the remaining thickness of the upper bedrock in this location, i.e., 8.9 m minus 1.5 m) with a K of 5×10^{-9} m/s (which is the geometric mean for the upper bedrock, and which includes the maximum value).
- Based on the above, the equivalent hydraulic conductivity of the overall upper bedrock in this location would be 6×10^{-9} m/s.

In addition to the horizontal hydraulic conductivity testing, four Shelby Tube samples were tested for vertical hydraulic conductivity from the upper bedrock. The geometric mean of these vertical hydraulic conductivity measurements was 3×10^{-10} m/s, with a range from 9×10^{-10} m/s to 7×10^{-11} m/s.

The horizontal hydraulic conductivity values for the middle bedrock unit, the clay shale, yielded a geometric mean of 2×10^{-9} m/s. The geometric mean of these vertical hydraulic conductivity measurements was 7×10^{-11} m/s, with a range from 2×10^{-10} m/s to 4×10^{-11} m/s. This unit extends to greater than 30 mbg and is considered to meet the Standards requirements for underlying material within 5 m plus 3 m below the lowest part of the liner.

With respect to the first criterion, there is a 5 m thick layer of a clayey deposit having an equivalent hydraulic conductivity less than 1×10^{-8} m/s immediately beneath the lowest part of the liner. With respect to the second criterion, the geological materials immediately beneath the clayey deposit required consist of at least 3 m of material providing equivalent or better protection to the first requirement; this criterion is also met, with both the upper and middle bedrock providing this protection.

With reference to the Standards criteria, therefore, and based on the data currently available, it is considered that the Ryley Facility meets the primary requirement for an appropriate low-hydraulic conductivity in situ clayey deposits beneath the liners of the landfill cells.

6.4 Protection of Groundwater Resources

The landfill cells will be constructed below grade, largely within the upper bedrock unit. The construction depths are expected to be in the 4 m to 6 m range and it is possible that there will be isolated areas of perched groundwater that will require management during construction and/or through engineering design. Landfill cells represent a potential for environmental impacts due to the potential for leakage of leachate to the underlying groundwater, and potential for runoff of contact water into surface water collection systems. The potential to impact groundwater will be managed by the natural geology, which has been demonstrated to be suitable in terms of the geologic and hydraulic properties of the site materials. Further, the engineering measures incorporated into the landfill design include a double geomembrane liner system that incorporates a leachate collection and removal system (LCRS) as well as a leak detection and removal system (LDRS). The double geomembrane liner system is installed directly above a geosynthetic clay liner (GCL). These geosynthetic materials are installed above a layer of engineered clay liner material constructed using low hydraulic conductivity native materials. The design includes requirements for ongoing capping of exposed wastes and management of contact water; therefore, the potential to impact surface waters is minimized. Further, surface water runoff is to be collected in ponds and tested prior to controlled discharge to the receiving environment.

The Ryley area has two types of aquifers including bedrock and surficial deposits. These aquifers are not prolific in a regional sense and should not be considered exceptional aquifers for water supply. Landowners in the Ryley area primarily haul potable water from a truck fill station located in the Village or purchase bottled water for domestic use. The upper bedrock groundwater types are primarily sodium-bicarbonate and sodium-sulphate. Sodium, sulphate, chloride, and TDS are naturally elevated in the groundwater making it unsuitable for use.

Overall the geologic site conditions, continued groundwater monitoring program, and engineering measures in place at the existing Ryley Facility have mitigated and prevented landfill-related compounds from reaching the subsoil and groundwater. With continued monitoring and maintenance of the current site and of the proposed expansion lands, there will not be impacts to groundwater resources in the area of the Ryley Facility. Clean Harbors is committed to continue monitoring groundwater quality parameters and addressing any detected exceedances in accordance with the conditions of the current and future Approval.

7.0 SUMMARY AND RECOMMENDATIONS

7.1 Summary Statement

On the basis of the work presented herein, this site is suitable for landfill development in accordance with the applicable regulatory requirements in Alberta (AENV 2010).

7.2 Recommendations

7.2.1 Area Suitable for Landfilling

This investigation report considers that the entire quarter section is suitable for landfilling, subject to required setbacks. Due to the variable nature of the underlying stratigraphy, most notably the upper bedrock unit, the depths of development will vary with landfill design. Site layout and development is described under a separate cover.

7.2.2 Landfill Design

Landfill cells at the existing Ryley Facility have all been constructed as double liner, double leachate collection systems built on top of low hydraulic conductivity native clay soil. The current cell construction requirements laid out in Section 3.1.1(b) of Approval 10348-02-03 of the existing site approval are subsequently described:

- The cells have a composite engineered liner system. A 1.0 m to 1.5 m thick layer of engineered compacted clay is overlain with a GCL. The GCL is covered with an 80 mil high density polyethylene (HDPE) liner (secondary liner). A geocomposite leak detection layer is placed above the secondary liner. An 80 mil HDPE liner (primary liner) is installed over top of the geocomposite leak detection layer. A geocomposite leachate collection layer is placed above the primary liner. At least 0.45 m of clean sand/soil is placed over the geocomposite leachate collection layer.
- The cells have a double liner, double leachate collection system to provide maximum protection against soil and groundwater contamination. The cells are sloped to the south or west to aid in the movement of leachate to collection points so the leachate can be measured, removed and disposed of appropriately at an off-site deep injection well.
- When a cell is filled to capacity, the cell is capped with clay or soil cover and synthetic material, to limit infiltration and the generation of leachate. The cap layers are then covered with subsoil and topsoil then seeded with grass.

The previously described engineered liner system consisting of compacted clay, synthetic liners, and leachate collection systems maximize the protection of the soil and groundwater at the Ryley Facility by containing any leachate generated. If landfilling is to occur in any areas of the site where subgrade materials do not meet the hydraulic property requirements, the subgrade materials will need to be compacted to achieve a hydraulic conductivity of 10^{-8} m/s and thereby meet the criteria. Laboratory testing demonstrates that this value for the hydraulic conductivity can be achieved with standard landfill construction practices.

The planned cells will range in depth between approximately 4 m and 6 m. These depths will place the base of the landfill within the upper bedrock unit and as noted in Section 6.4, groundwater management measures may need to be incorporated into the cell designs. Surface water will be managed through a series of storm ponds.

7.2.3 Implications of Site Conditions on Landfill Development

The stratigraphy encountered beneath the site will affect development on an area by area basis. Specifically, the upper bedrock unit will need to be evaluated on an aerial basis as the cells are developed to confirm that the requirements of the Standards are met in terms of the suitability of hydraulic properties. Where materials are suspect or borderline, the landfill cells will need to be deeper, installed into the top of the middle bedrock unit (clay shale).

The landfill design may need to account for, and manage, potential inflow of shallow groundwater in particular considering the potential for deeper cells. Such management measures may include drains. The detailed design of management measures is outside the scope of this document; however, this information is provided in support of design documentation (provided under a separate cover).

7.3 Ongoing Work

This report has described the results of work undertaken thus far towards planning and design of the proposed expansion. Future undertakings will include the following:

- Preparation of a separate report detailing baseline soil and groundwater chemistry data obtained, their interpreted significance, and a proposed method of monitoring the site with respect to baseline conditions. This includes consideration of the sporadic occurrence of natural hydrocarbons within in the local geology.
- Development of a groundwater monitoring plan for this site, including expansion of the existing dugout and water well sampling program based on the proposed northward expansion.
- A soil survey to assist with closure planning.
- Continued monitoring of seasonal groundwater and surface water trends.

8.0 LIMITATION OF REPORT

This report and its contents are intended for the sole use of Clean Harbors Inc. and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Clean Harbors Inc., or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech Canada Inc.'s Services Agreement. Tetra Tech's General Conditions are provided in Appendix F of this report.

9.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

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PERMIT NUMBER: P13774
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REFERENCES

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TABLES

Table 1: Local and Regional Geological Context

	Regional Mapping							Local Mapping											
	Stein 1982 (Hydrogeology of the Edmonton Area)			HCL 1999 (County of Beaver Regional GW Assessment)				C.E. Moell 1983 (drilling program at site)				C.E. Moell 2005 (area summary)				Tetra Tech Expansion Site Investigation			
	Formation / Unit	Description	Thickness	Formation / Unit		Sub-Unit	Thickness	Formation / Unit	Sub-Unit	Thickness	Depth	Formation / Unit	Sub-Unit	Thickness	Depth	Formation / Unit	Sub-Unit	Thickness	Depth
Surficial Geology	(Surficial)	Ground and hummocky moraine tills, comprising sand, silt and clay	<3 m to >60 m	(Surficial)		Sand, gravel, till, clay, silt	<70 m	(Surficial)	Glaciolacustrine clay and silty clay; glacial till	1.2 m to 4 m	-	(Surficial)	Fluvial sand and lacustrine clay; glacial till	0.3 m to 4.5 m	-	Surficial Soils	Clay Till	2.5 m to 5 m	-
Bedrock Geology	Horseshoe Canyon Fm	Interbedded bentonitic and feldspathic sandstone, siltstone, bentonitic shales, coal seams and carbonaceous shale	-	Horseshoe Canyon Fm	Edmonton Group	Shale, sandstone, coal, bentonite, limestone, ironstone	300 m to 380 m	(Not described)	-	-	-	(Not described)	-	-	-	-	(Not described)	-	-
	Bearpaw Fm	"Marine shales, silty shales, sandstone and bentonite beds that interfinger with sandstone, shale and coal of the overlying Horseshoe Canyon Formation".	-	Bearpaw Fm		Shale, sandstone, siltstone	60 m to 120 m	Bearpaw Fm (marine)	Upper Member (Moell subdivided into 7 units, of which A and D are areally persistent) A - Sandstone B - Sandstone (w/clay bands) C - Argillaceous (clayey) sand, grading to sandy shale D - Shale, dark brn to grey brn E - Shale, dark grey w/ sandy interbeds F - Sandstone, grey G - Shale, sandy, dark grey-brn	4.9 m to 9.1 m	-	Bearpaw Fm (marine)	Upper Member Predominantly sandstone; locally overlying strata of shale, sandy shale or interbedded sandstone and shale; locally underlain by shale or interbedded sandstone and shale	-	-	Upper Bedrock	Clay shale; clayey sandstone; silty sandstone	0.9 m to 10.2 m	2.5 m to 10.5 m
	-	-	-	-		-	-	Bearpaw Fm	Middle Shale Member Shale, fine grained, with thin bentonite seams and concretionary beds; slightly fossiliferous	~24 m	top of unit between 7 m to 11.6 mbg	Bearpaw Fm	Lower Member Predominantly shale, occasionally interrupted by thin layers or occurrences of other rock types; massive (Moell indicated more appropriately described as claystone, and less commonly mudstone, rather than shale)		-	Middle Bedrock	Clay shale	20 m to 25 m	Top of unit 5.5 m to 9.5 mbg
	Belly River Group	Non-marine, grey to greenish grey, thick bedded, feldspathic sandstone, grey, clayey siltstone, grey and green mudstone, and concretionary ironstone beds.	275 m to 300 m	Belly River Group	Oldman Fm	Sandstone, siltstone, shale, coal	40 m to 80 m	Belly River Fm	Lower Member Grey and green sandstone, siltstone and shale; local consolidated concretionary and soft bentonite horizons; interpreted non-marine		33 m to >90r	Belly River Fm	Non-marine clastic sediments; cited "thick bedded, feldspathic sandstone, grey, clayey siltstone, grey and green mudstone and concretionary ironstone beds" (green, 1972); high fines content, "muddy sandstone"		Top of unit between 24 m and 33 mbg	Lower Bedrock	Silty sandstone, some clay; clay shale; clayey sandstone	Not measured	Top of unit 31.5 m to >41.1 mbg
					Foremost Fm (continental)	Shale, sandstone, coal	10 m to 220 m												
					Foremost Fm (marine)	Sandstone, shale	<200 m												
				Lea Park Formation		Shale, siltstone	100 m to 200 m									-			

Sources:
Stein, R. 1982. Hydrogeology of the Edmonton Area (Southeast Segment), Alberta. Alberta Research Council. Report 79-6.
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C.E. Moell & Associates Ltd. 1983. Hydrogeology of the Ryley Site, NE 9-50-17 W4M. Prepared for Alberta Environment Earth Sciences Division Soils Branch.
C.E. Moell & Associates Ltd. 2005. Summary Review of Hydrogeologic Conditions and Characteristics. Clean Harbors Canada Inc. Ryley Facility.

Table 2: Well Construction Details and Groundwater Levels

Location	Date Installed	Coordinates		TOC Elevation (masl)	Ground Elevation (masl)	Screen Interval		Screen Interval		Screened Material	Borehole Depth (mbg)	Well Depth (mbg)	Well Diameter (mm)	Stick-Up (m) (Calculated)	Stick-Up (m) [1]	May 2016 Monitoring			June 2016 Monitoring		
		Easting	Northing			Top Elevation (masl)	Bottom Elevation (masl)	Top Depth (mbg)	Bottom Depth (mbg)							Date	Water Depth (mbTOC)	Groundwater Elevation (masl)	Date	Water Depth (mbTOC)	Groundwater Elevation (masl)
Expansion Area Wells																					-
16MW04	3/19/2016	405394	5907530	687.17	686.35	675.77	674.77	10.58	11.58	Clay Shale	15.24	11.58	51	0.82	0.82	5/11/2016	4.34	682.83	6/2/2016	3.98	683.20
16MW08A	3/17/2016	405193	5907134	685.9	686.94	681.84	680.84	5.10	6.1	Sandstone	15.24	6.10	102	-	1.03	5/11/2016	6.54	679.37	6/2/2016	5.23	680.68
16MW08B	3/17/2016	405193	5907134	688.01	686.93	684.99	683.99	1.94	2.94	Clay	3.00	3.00	51	1.08	1.02	5/11/2016	Dry	-	6/10/2016	Dry	-
16MW09A	2/24/2016	405586	5907524	686.20	685.16	649.43	648.43	35.73	36.73	Sandstone	41.15	36.73	51	1.04	0.89	5/11/2016	6.72	679.48	6/10/2016	6.64	679.56
16MW09B	2/24/2016	405589	5907523	686.11	685.17	668.11	667.11	17.06	18.06	Clay Shale	18.06	18.06	51	0.94	0.83	5/11/2016	12.27	673.84	6/10/2016	11.25	674.86
16MW09C	3/19/2016	405591	5907525	686.34	685.24	680.60	679.60	4.64	5.64	Sandstone	6.10	5.64	102	1.10	1.01	5/11/2016	6.22	680.12	6/10/2016	6.14	680.20
16MW09D	3/19/2016	405587	5907526	686.28	685.24	683.80	682.80	1.44	2.44	Clay	2.44	2.44	102	1.04	0.95	5/4/2016	Dry	-	6/10/2016	0.17	686.11
16MW11A	2/26/2016	404816	5907540	686.89	685.96	650.08	649.08	35.88	36.88	Sandstone	41.15	36.88	51	0.93	0.92	5/11/2016	27.37	659.53	6/10/2016	15.04	671.85
16MW11B	2/26/2016	404817	5907539	687.00	685.95	667.90	666.90	18.05	19.05	Clay Shale	19.05	19.05	51	1.05	1.01	5/11/2016	12.26	674.74	6/10/2016	11.17	675.83
16MW11C	3/16/2016	404814	5907539	686.89	685.92	683.57	682.57	2.35	3.35	Sandstone	7.62	3.35	51	0.97	0.90	5/11/2016	2.91	683.98	6/10/2016	2.54	684.35
16MW11D	3/16/2016	404816	5907538	686.84	685.93	684.80	683.80	1.13	2.13	Clay	2.15	2.13	51	0.91	0.85	5/11/2016	Dry	-	6/10/2016	Dry	-
16MW13	2/26/2016	404999	5907333	688.21	687.21	674.49	673.49	12.72	13.72	Clay Shale	19.81	13.72	51	1.00	0.95	5/4/2016	5.96	682.25	6/10/2016	5.19	683.02
16MW14	2/23/2016	405394	5907327	687.28	686.47	683.20	682.20	3.27	4.27	Clay Shale	15.09	4.27	51	0.81	0.77	5/4/2016	3.70	683.57	6/10/2016	3.44	683.84
16MW16	2/25/2016	404796	5906940	688.58	687.57	684.61	683.61	2.96	3.96	Clay	15.24	3.96	51	1.00	0.84	5/11/2016	4.23	684.34	6/10/2016	4.12	684.45
16MW18	2/29/2016	405583	5907120	687.04	686.20	667.39	666.39	18.81	19.81	Clay Shale	19.81	19.81	51	0.83	0.75	5/11/2016	4.00	683.04	6/10/2016	3.58	683.46
Expansion Area Boreholes																					
16BH01	3/15/2016	404994	5906898	-	688.24	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH02	3/15/2016	405385	5906929	-	686.93	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH03	3/16/2016	405588	5907324	-	686.50	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH05	3/19/2016	405196	5907332	-	686.30	-	-	-	-	-	12.19	-	-	-	-		-	-	-	-	-
16BH06	3/17/2016	405003	5907536	-	685.81	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH07	3/17/2016	404809	5907138	-	687.57	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH10	2/23/2016	405199	5907532	-	686.44	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH12	2/27/2016	404803	5907341	-	685.88	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH15	2/27/2016	404998	5907136	-	686.81	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH17	2/28/2016	405391	5907127	-	686.74	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH19	2/29/2016	405581	5906924	-	687.13	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH20	2/28/2016	405192	5906930	-	686.44	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-

Notes:

masl - metres above sea level

TOC - Top of Casing

mbTOC - metres below Top of Casing

mbg - Metres below ground

1 - Field Measurement

NC - Not calculated

Table 3A: Laboratory Test Results - Summary

Borehole Number	Sample Number	Sample Depth (Below Ground Level)		Material Type	Major Unit	Atterberg Limits			Grain Size Analysis (Hydrometer)					Standard Proctor		Hydraulic Conductivity (Remoulded)			Hydraulic Conductivity (Shelby Tube)			Porosity
		Average (ft)	Average (m)			LL	PL	PI	P_{fines} (%)	Clay (%)	Silt (%)	Sand (%)	Gravel (%)	SPMDD (kg/m^3)	Opt. MC (%)	K (m/s)	Dry Dens. (Initial) (kg/m^3)	MC (Initial) (%)	K (m/s)	Dry Dens. (Initial) (kg/m^3)	MC (Initial) (%)	%
16BH01	BULK2	7.5	2.3	Clay	Clay	34	15	19	58	23	35	41	1									
16BH02	BULK1	2.0	0.6	Clay	Clay	36	15	21	63	30	33	37	0									
	ST3	25.0	7.6	Clay Shale	Mid Bedrock														7.30E-11	1362	25.2	
16BH03	B2	4.0	1.2	Clay	Clay																	
	BULK1	7.0	2.1	Clay	Clay	62	25	37	86	47	39	14	0									
16MW04	B6	21.0	6.4	Clay Shale	Mid Bedrock	71	33	38	79	39	40	21	0									
	ST2	25.0	7.6	Clay Shale	Mid Bedrock														4.70E-11	1551	24	
16BH05	BULK1	3.0	0.9	Clay	Clay	37	14	23	60	27	33	39	1	1830	14.5	6.60E-11	1798	15				
	ST1	12.0	3.7	Sandstone	Upper Bedrock														8.50E-11	1757	19.2	
	ST3	31.5	9.6	Clay shale	Mid Bedrock														1.50E-10	1766	17.3	
16BH06	B1	2.0	0.6	Clay	Clay	22	13	9	50	17	33	49	1									
	B3	8.0	2.4	Sandstone	Upper Bedrock	22	13	9	34	15	19	66	0									
	ST2	27.5	8.4	Sandstone	Upper Bedrock														8.80E-10	1393	29.5	
	B14	38.0	11.6	Clay Shale	Mid Bedrock	113	29	84	69	46	23	31	0									
16BH07	BULK1	8.5	2.6	Clay	Clay	48	22	26	67	30	37	27	6	1660	21	7.60E-11	1639	21.1				
	ST3	21.0	6.4	Sandstone	Upper Bedrock														7.40E-10	1639	17.1	
16MW08 A/B	BULK	22.3	6.8	Clayey Sandstone	Upper Bedrock									1630	18	3.78E-11	1609	16.8				
	BULK2	6.0	1.8	Clay	Clay	40	16	24	59	24	35	40	1									
	ST2	27.0	8.2	Sandstone	Upper Bedrock														7.40E-11	1762	19.3	
	ST3	37.5	11.4	Clay shale	Mid Bedrock														4.20E-11	1757	16.4	
16MW09	C3	27.5	8.4	Clay Shale	Mid Bedrock	86	38	48	99	31	68	1	0									
	C4	40.0	12.2	Clay Shale	Mid Bedrock																	24.1
16MW09C/D	BULK1	2.5	0.8	Clay	Clay	34	15	19	63	27	36	37	0	1840	14	9.40E-11	1806	14				
16MW11	BULK1	3.5	1.1	Clay	Clay	35	14	21	58	27	31	41	1									
	BULK2	6.5	2.0	Clay	Clay				60	23	37	39	1	1830	14.5	7.00E-11	1796	14.3				
	C7	40.0	12.2	Clay Shale	Mid Bedrock																	23.0
16MW11 C/D	BULK2	7.0	2.1	Clay	Clay	38	15	23						1840	15	6.80E-11	1813	15.6				
16BH12	C3	20.0	6.1	Sandstone	Upper Bedrock	75	20	55	47	24	23	53	0									
	C5	30.0	9.1	Sandstone	Upper Bedrock																	19.6
16MW13	C2	21.0	6.4	Clay Shale	Upper Bedrock	68	20	48	45	24	21	55	0									
16MW14	C2	19.0	5.8	Clay Shale	Upper Bedrock	78	32	46	97	33	64	3	0									
16BH15	C3	20.0	6.1	Sandstone	Upper Bedrock																	24.6
	BULK	22.5	6.9	Clayey Sandstone	Upper Bedrock									1700	17	5.90E-12	1646	16.6				
	C5	30.0	9.1	Clay Shale	Upper Bedrock	91	40	51	83	20	63	17	0									
16MW16	C3	30.0	9.1	Sandstone	Upper Bedrock	57	21	36	75	24	51	25	0									
	C4-2	35.0	10.7	Sandstone	Upper Bedrock	85	24	61	50	23	27	50	0									
16BH17	C6	42.5	13.0	Clay Shale	Mid Bedrock																	26.1
16MW18	BULK1	3.0	0.9	Clay	Clay	34	14	20	57	23	34	42	0	1910	12.5	5.90E-11	1876	12.7				
16BH19	C5	40.0	12.2	Clay Shale	Mid Bedrock																	22.4
16BH20	Bulk	20.0	6.1	Clayey Sandstone	Upper Bedrock									1520	19	2.30E-11	1506	18.2				

Table 3B: Laboratory Test Results - Summary of Vertical Hydraulic Conductivity Values

Borehole Number	Sample Number	Sample Depth (average meters below ground level)	Material Type	Major Unit	Hydraulic Conductivity (Remoulded)	Hydraulic Conductivity (Shelby Tube)
					(m/s)	(m/s)
16BH05	BULK1	0.9	Clay	Clay	6.6E-11	
16BH07	BULK1	2.6	Clay	Clay	7.6E-11	
16MW09	BULK1	0.8	Clay	Clay	9.4E-11	
16MW11	BULK2	2.0	Clay	Clay	7.0E-11	
16MW11C/D	BULK2	2.1	Clay	Clay	6.8E-11	
16MW18	BULK1	0.9	Clay	Clay	5.9E-11	
Geometric Mean - Clay Soils					**7E-11**	
16BH05	ST1	3.7	Clayey Sandstone	Upper Bedrock		8.5E-11
16BH06	ST2	8.4	Clayey Sandstone	Upper Bedrock		8.8E-10
16BH07	ST3	6.4	Clayey Sandstone	Upper Bedrock		7.4E-10
16MW08	ST2	8.2	Clayey Sandstone	Upper Bedrock		7.4E-11
16MW08	BULK	6.8	Clayey Sandstone	Upper Bedrock	3.8E-11	
16BH15	BULK	6.9	Clayey Sandstone	Upper Bedrock	5.9E-12	
16BH20	BULK	6.1	Clayey Sandstone	Upper Bedrock	2.3E-11	
Geometric Mean - Upper Bedrock					**2E-11**	**3E-10**
16BH02	ST3	7.6	Clay Shale	Mid Bedrock		7.3E-11
16MW04	ST2	7.6	Clay Shale	Mid Bedrock		4.7E-11
16BH05	ST3	9.6	Clay shale	Mid Bedrock		1.5E-10
16MW08	ST3	11.4	Clay shale	Mid Bedrock		4.2E-11
Geometric Mean - Middle Bedrock						**7E-11**

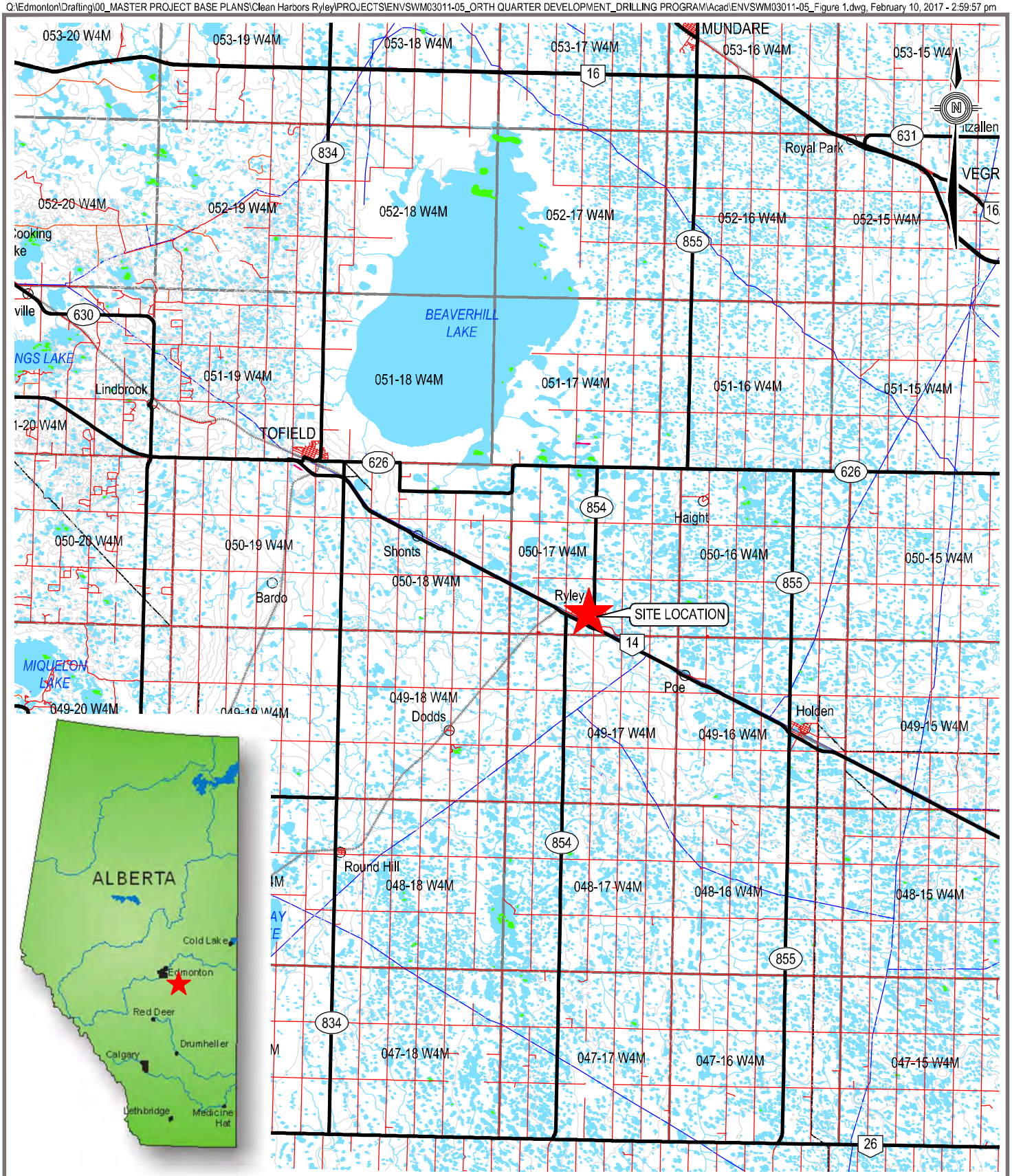
Table 4: Soil Analytical Results

Parameter	Unit	15MW36	16BH03 J1	16BH06 J1	16MW11 J1	16BH19 J1
		21-Jul-2015	16-Mar-2016	17-Mar-2016	26-Feb-2016	29-Feb-2016
		35 m	8 m	5 m	8 m	7 m
		Lower Bedrock	Middle Bedrock	Upper Bedrock	Upper Bedrock	Upper Bedrock
		sandstone	clay shale	clayey sandstone	clayey sandstone	clayey sandstone
Routine						
Moisture	%	14	17	15	18	23
Hydrocarbons						
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
Xylenes (m & p)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040
Xylene (o)	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020
Xylenes Total	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040
F1 (C_6 to C_{10})	mg/kg	390	<12	<12	<12	<12
F1 (C_6-C_{10}) - BTEX	mg/kg	390	<12	<12	<12	<12
F2 (C_{10}-C_{16})	mg/kg	2400	<10	<10	17	33
F3 (C_{16} - C_{34})	mg/kg	6700	52	<50	110	250
F4 (C_{34} - C_{50})	mg/kg	2400	<50	<50	<50	<50
Chromatogram Reached Baseline at C_{50}	N/A	Yes	Yes	Yes	Yes	Yes
Laboratory Work Order Number		B562537	B620851	B620851	B615290	B615800
Laboratory Identification Number		MS4152	OH8200	OH8198	OE8708	OF2324

Notes:

N/A - Not applicable

FIGURES



NOTES

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0 15,000m

CLIENT

CleanHarbors

TETRA TECH

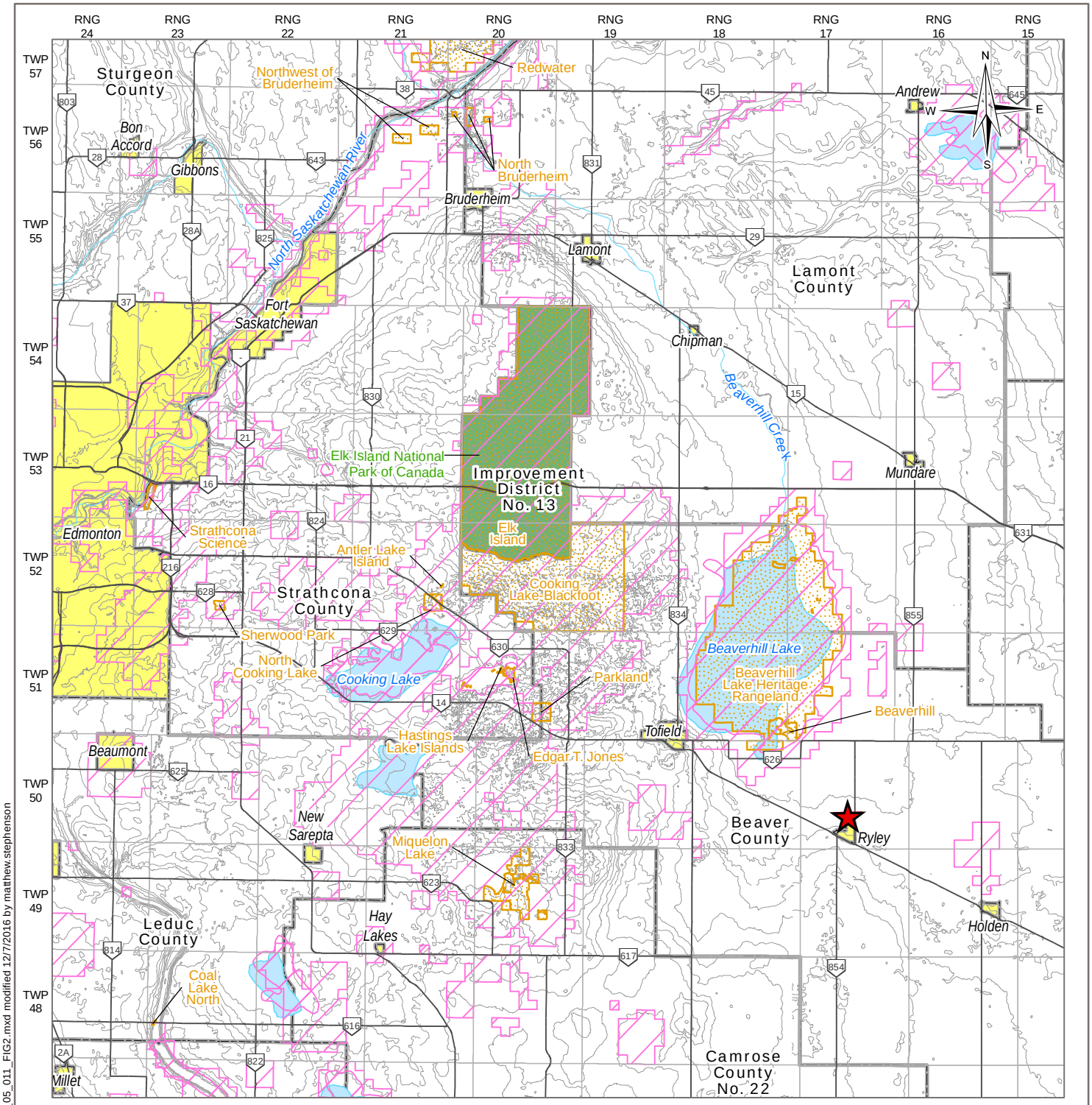
RYLEY FACILITY LATERAL EXPANSION
RYLEY, ALBERTA

SITE LOCATION

PROJECT NO.	DWN	CKD	REV
ENVSWM03011-05	KE/DBD	LQ	0

OFFICE	DATE
EBA-EDM	February 2017

Figure 1



LEGEND

- Site Location
- Primary / Secondary Highway
- Topographic Contour (10m interval, masl)
- Environmentally Significant Area
- Protected Area
- National Parks
- Indian Reserve
- Urban Area
- Municipal Area
- Watercourse
- Waterbody

NOTES

Base data source: ESRI, CanVec (50,000), AltaLIS, ESRD & Government of Alberta (Tourism, Parks and Recreation)

STATUS
ISSUED FOR USE

RYLEY FACILITY LATERAL EXPANSION
RYLEY, ALBERTA

Regional Environmental Setting

PROJECTION	DATUM
UTM Zone 12	NAD83

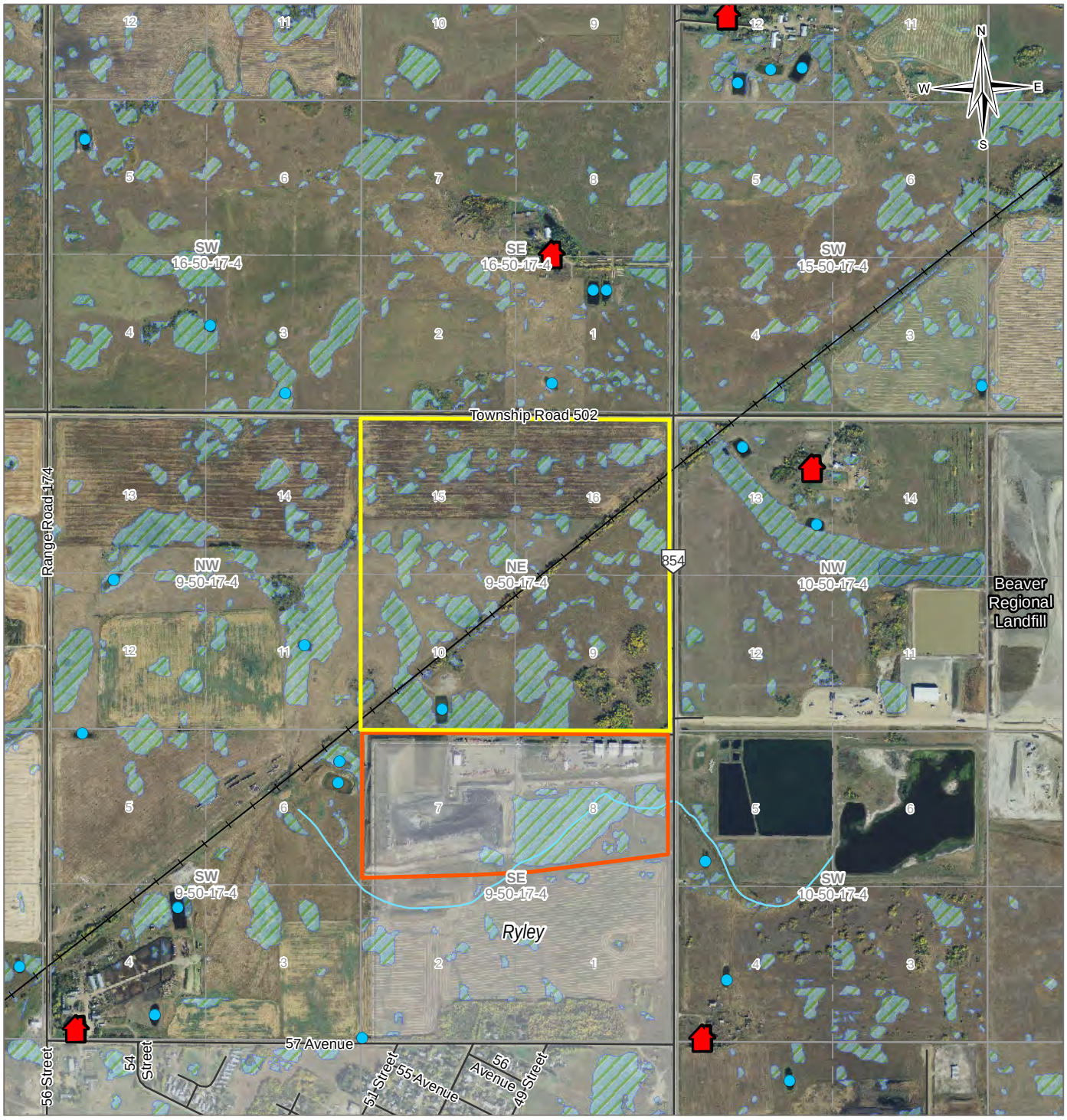
Scale: 1:500,000
10 5 0 10
Kilometers

PREPARED BY: TETRA TECH

FILE NO.				
ENVSWM03011_05_011_FIG2.mxd				
PROJECT NO.	**DWN**	**CKD**	**APVD**	**REV**
ENVSWM03011-05	BB	MS	BH	0
OFFICE	**DATE**			
Tt EBA-CAL	December 7, 2016			

Figure 2

M:\ENVIRONMENTAL\SWM\ENVSWM03011\Maps\05-003\ENVSWM03011_05_011_FIG2.mxd modified 12/7/2016 by matthew.stephenson



LEGEND

- Site Location
- Existing Facility
- Rural Residence
- Dugout
- Road
- Historical Railway Bed (Approximate Centreline)
- Bible Creek (Approximate Centreline)
- Potential Wetland
- Town Boundary

NOTES
Base data source: ESRI, CanVec (50,000) & ESRD
Imagery: Valtus Imagery Services (July 29 - Oct. 6, 2012)

STATUS
ISSUED FOR USE

RYLEY FACILITY LATERAL EXPANSION
RYLEY, ALBERTA

Local Environmental Setting

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:15,000
200 100 0 200
Metres

FILE NO. ENVSWM03011_05_011_FIG3.mxd

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	BB	MS	BH	1

OFFICE	DATE
Tt EBA-CAL	June 27, 2016

CleanHarbors

PREPARED BY:
TETRA TECH

Figure 3

M:\ENVIRONMENTAL\SWM\ENVSWM03011\Maps\05-003\ENVSWM03011_05_011_FIG3.mxd modified 12/7/2016 by matthew.stephenson

LEGEND

- MONITORING WELL LOCATION
- BOREHOLE LOCATION
- PROPOSED EXPANSION SITE BOUNDARY
- FENCE

NOTES:

1) CONTOUR DATA IS BASED ON 2009 LIDAR SURVEY
2) BOREHOLE AND MONITORING WELL LOCATIONS ARE BASED ON SURVEY DATA RECEIVED ON JULY 8TH, 2016

0 250m

Scale: 1:5,000 @ 11"x17"

CLIENT: CleanHarbors

TETRA TECH

RYLEY FACILITY LATERAL EXPANSION
RYLEY, ALBERTA

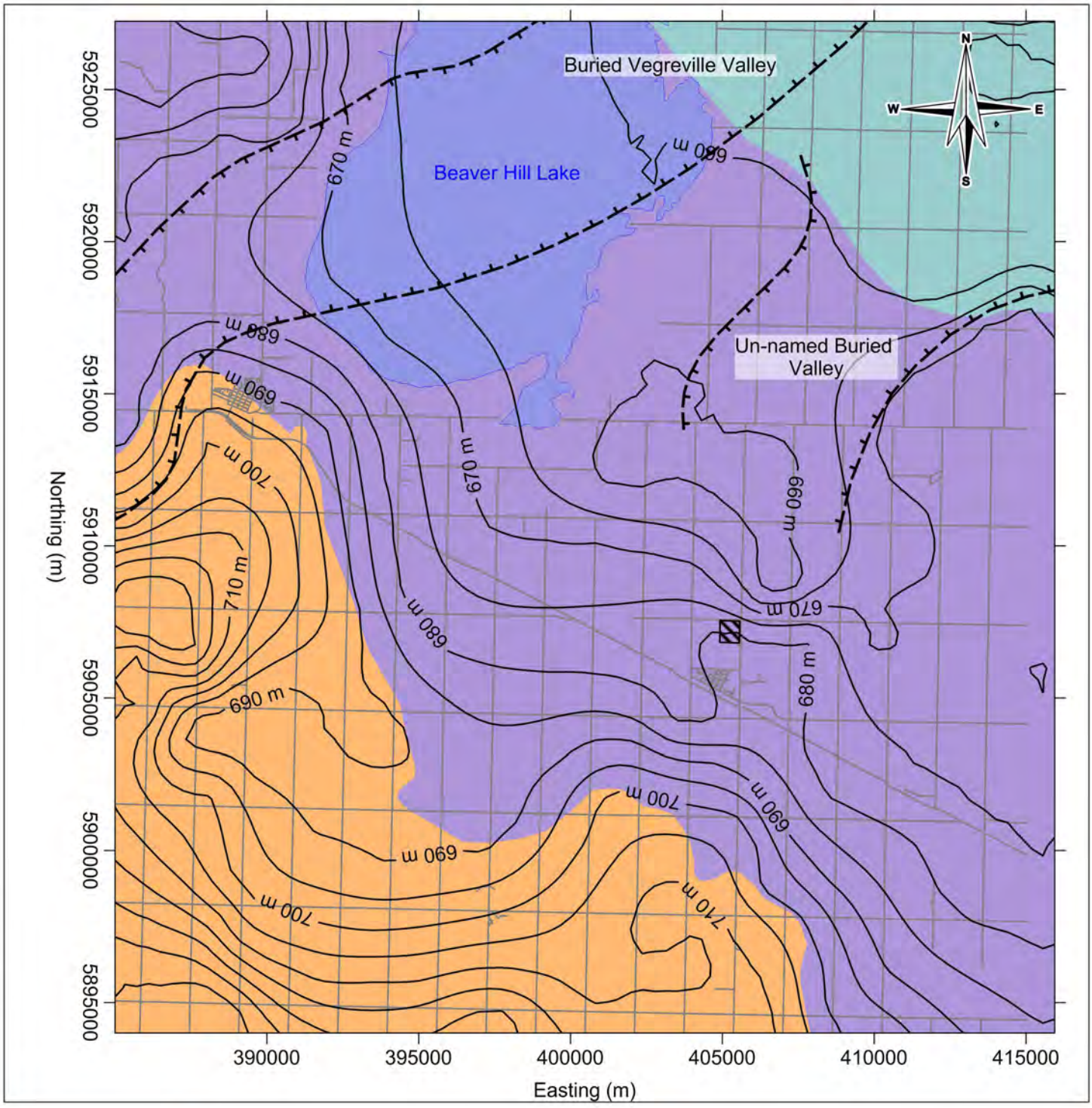
SITE TOPOGRAPHY AND LOCATIONS OF 2016 BOREHOLES AND MONITORING WELLS

PROJECT NO.	DWN	CKD	REV
ENVSWM03011-05	DBD	LQ	0

OFFICE: EDM
DATE: February 2017

Figure 4

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Clean Harbors Ryley\PROJECTS\ENVSWM03011-05_ORTH QUARTER DEVELOPMENT_DRILLING PROGRAM\Acad\ENVSWM03011-05_Figure 4.dwg [FIGURE 4] February 10, 2017 - 2:56:52 pm (BY: DAS, DEBASHIS)



LEGEND

- Buried Valley
- Bedrock Elevation Contour
- Roadway
- Water body
- Site Location

Bedrock Formation

- Lower Horseshoe Canyon
- Bearpaw
- Oldman (Belly River Group)

NOTES

Geological data obtained from:
County of Beaver No.9
Revised Regional Groundwater Assesment
HCL, 1999
NRC, CanVec+ Base Map

STATUS
Issued for Use

Proposed Lateral Expansion
Ryley, Alberta

Regional Geology

PROJECTION	DATUM
UTM Zone 12	NAD83

0 2 4 6
Kilometres

FILE NO.
Figure 5 - RegionalGeology.srf

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	CF	SB	TJD	0

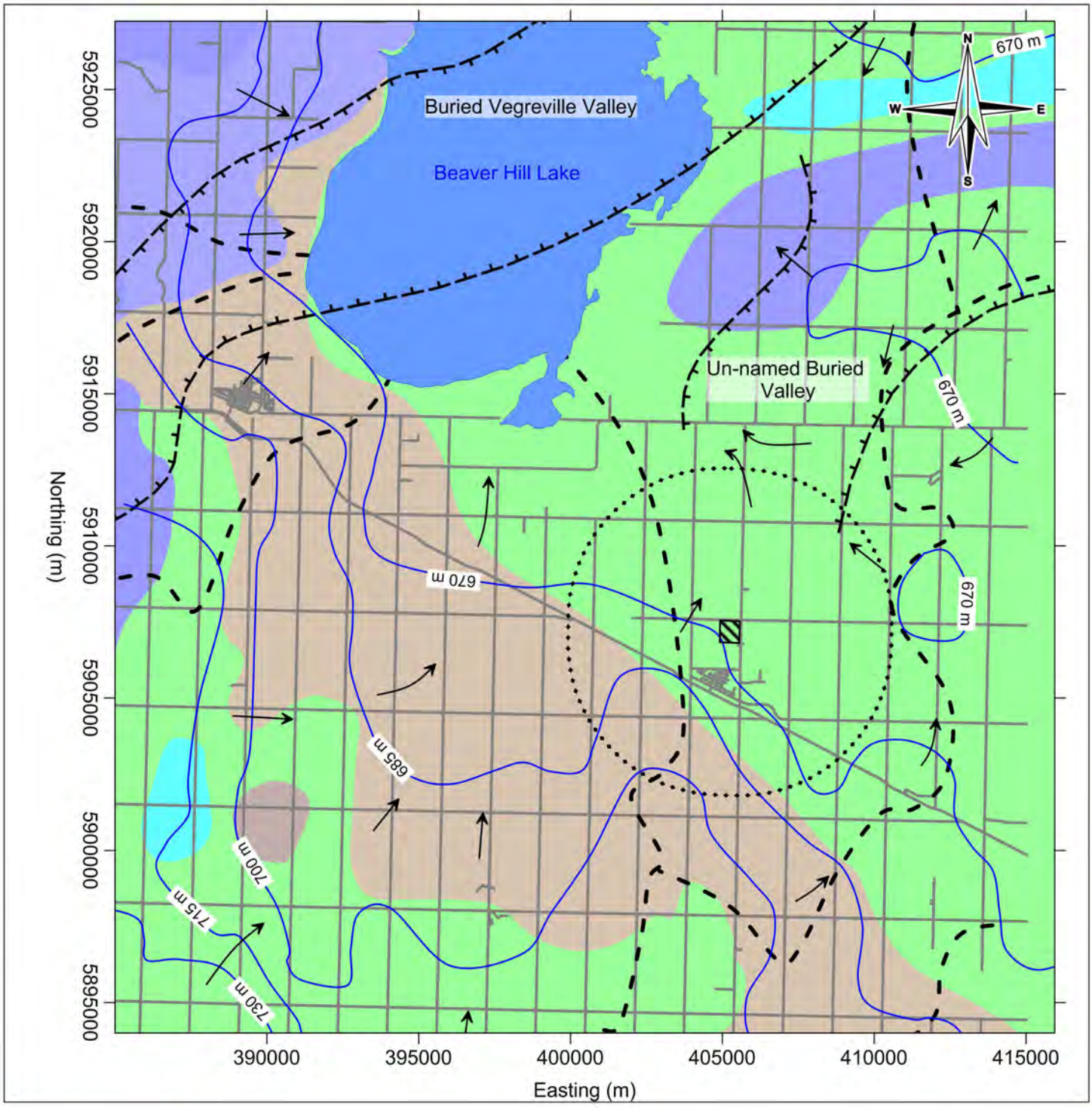
OFFICE	DATE
TtEBA-CAL	February 2017

CLIENT
CleanHarbors

TETRA TECH

Figure 5

filepath: \\tt.local\eba\Projects\CGY\78070\ENVSWM03011-05\Data\Surfer\Figure 5 - RegionalGeology.srf (Date modified 27/06/2016)



LEGEND

- Surface Water Divide
- Buried Valley
- Groundwater Flow Direction
- Groundwater Elevation
- Roadway
- Water body
- Site Location
- 5 km Site Radius

Expected Groundwater Yield (L/sec)

- < 0.1
- 0.1 - 0.4
- 0.4 - 2
- 2 - 8

NOTES

Hydrogeological data obtained from:
Hydrogeology of the Edmonton Area Southeast Segment, Alberta
R.Stein, 1982
NRC, CanVec+ Base Map

STATUS
Issued for Use

Proposed Lateral Expansion
Ryley, Alberta

Regional Hydrogeology
Groundwater Flow

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	Clean Harbors

0 2 4 6
Kilometres

TETRA TECH

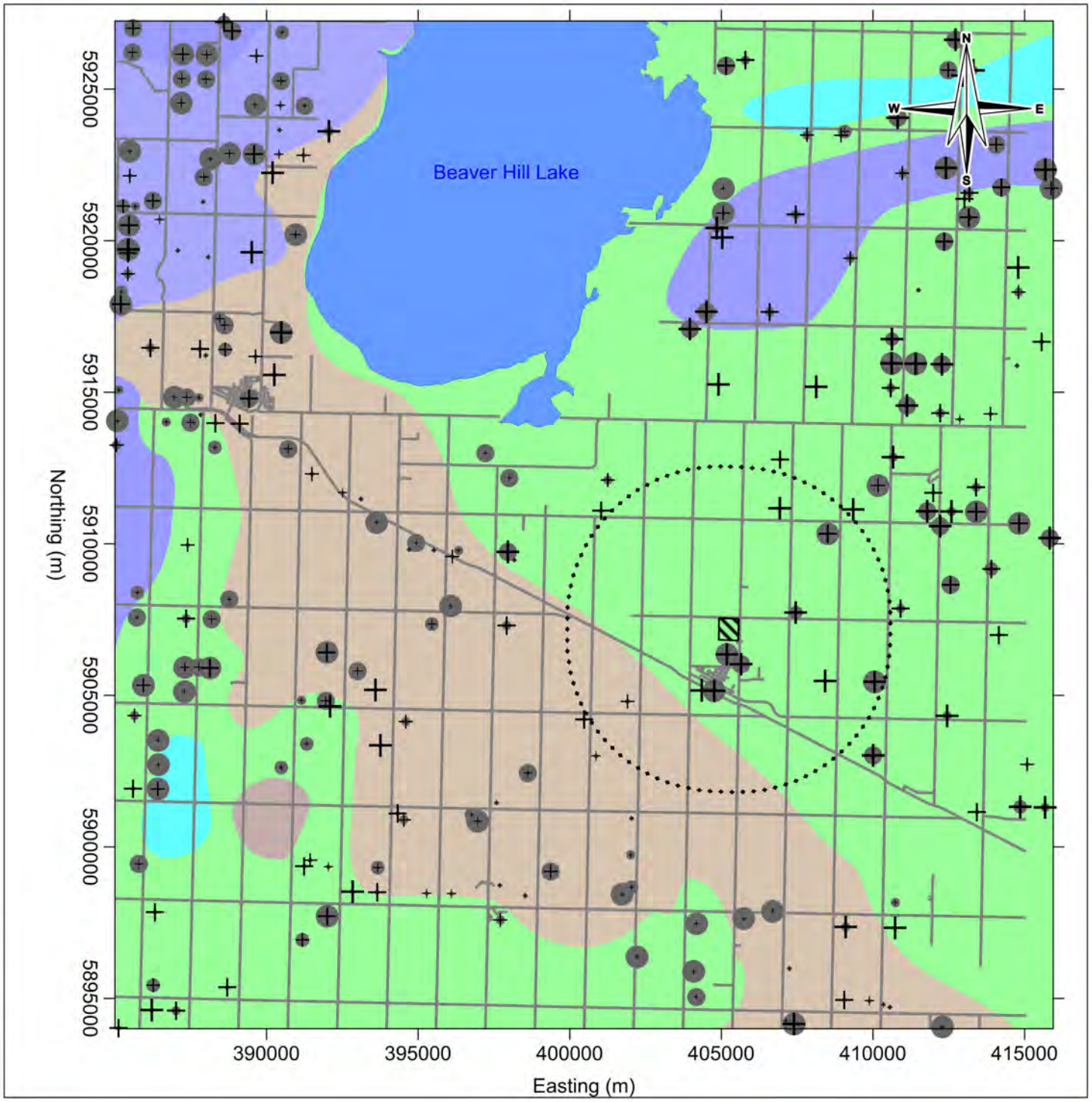
FILE NO.
ENVSWM03011-05_FIG6a.srf

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	CF	SB	TJD	0

OFFICE	DATE
TtEBA-CAL	February 2017

Figure 6a

filepath: \\tt.local\eba\Projects\CGY\78070\ENVSWM03011-05\Data\Surfer\Regional Hydrogeology 6a.srf (Date modified 27/06/2016)



LEGEND

Well Depth (m)
- 184-470
- 141-184
- 105-141
- 75-105
- 19-75
- Roadway
- Water body
- Site Location
- 5 km Site Radius

Recomended Pump Rate (L/sec)
- 0.44 - 3.15
- 0.32 - 0.44
- 0.25 - 0.32
- 0.14 - 0.25
- 0.03 - 0.14

Expected Groundwater Yield (L/sec)
- < 0.1
- 0.1 - 0.4
- 0.4 - 2
- 2 - 8

NOTES
Hydrogeological data obtained from:
Hydrogeology of the Edmonton Area
Southeast Segment, Alberta
R.Stein, 1982
AB Water Well Information Database June 28, 2016
NRC, CanVec+ Base Map

STATUS
Issued for Use

Proposed Lateral Expansion Ryley, Alberta

Regional Hydrogeology Water Wells

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

0 2 4 6
Kilometres

TETRA TECH

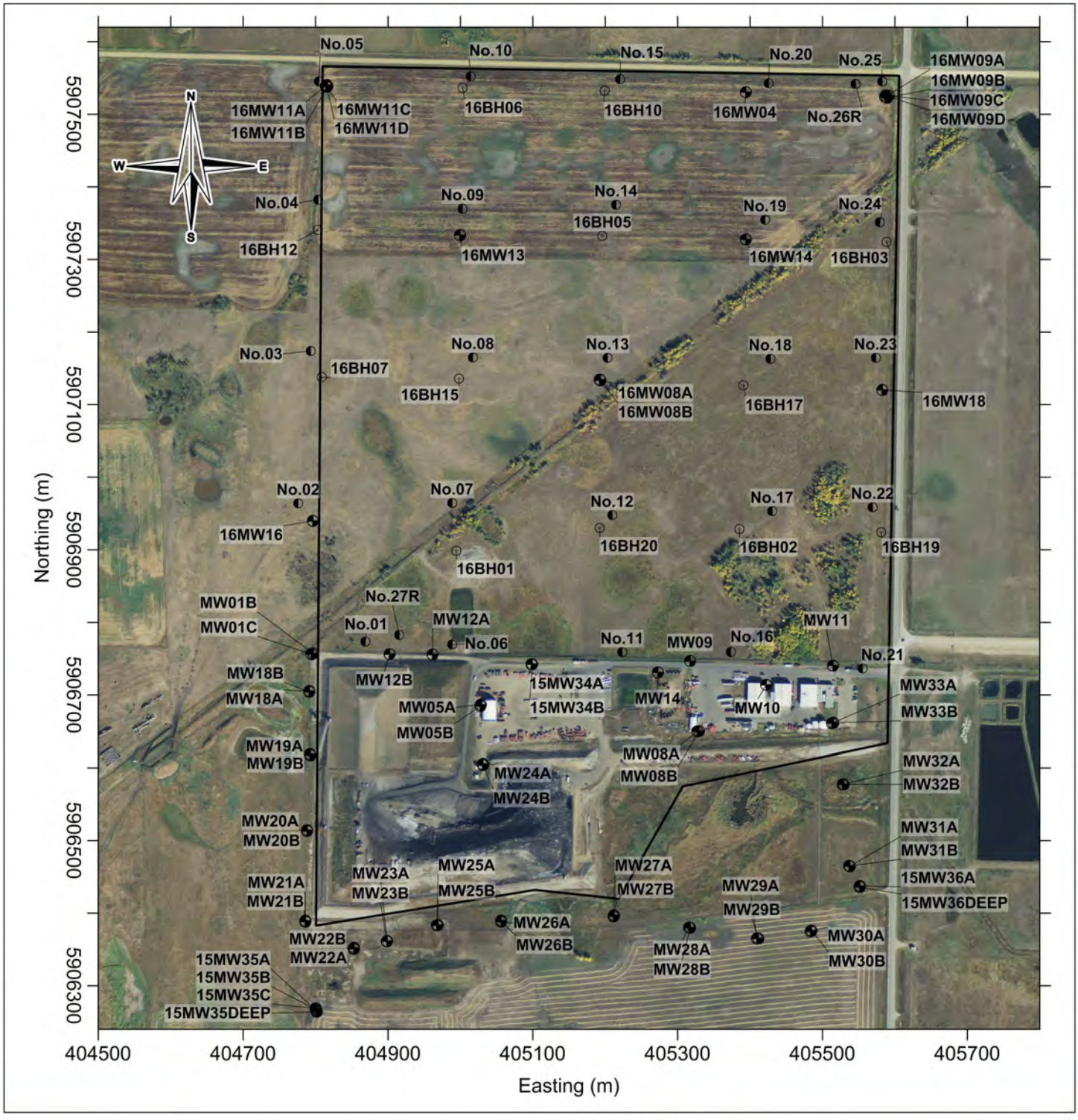
FILE NO. ENVSWM03011-05_FIG06B.srf

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	CF	SB	TJD	0

OFFICE	DATE
TtEBA-CAL	February 2017

Figure 6b

filepath: \\tt.local\eba\Projects\CGY\78070\ENVSWM03011-05\Data\Surfer\Regional Hydrogeolog 6b.srf (Date modified 27/06/2016)



LEGEND

- Borehole
- Monitoring Well
- Borehole/Monitoring Well by Moell (1983)

NOTES
Survey completed
June 2015 and July 2016

STATUS
Issued for Use

Proposed Lateral Expansion
Ryley, Alberta

Test Hole, Borehole and Monitoring Well Locations on Site, and Adjacent to Existing Facility

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

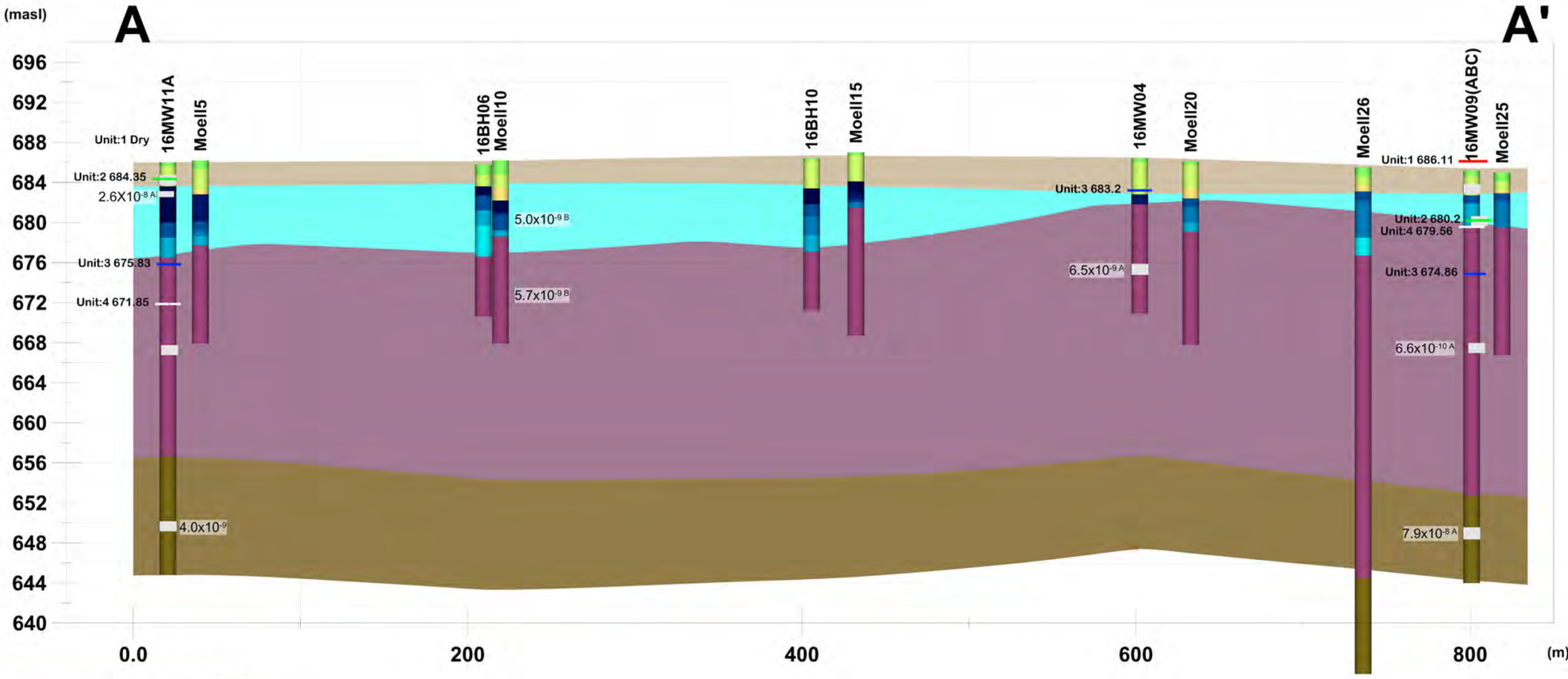
0 50 100 150 200 250 300
Metres

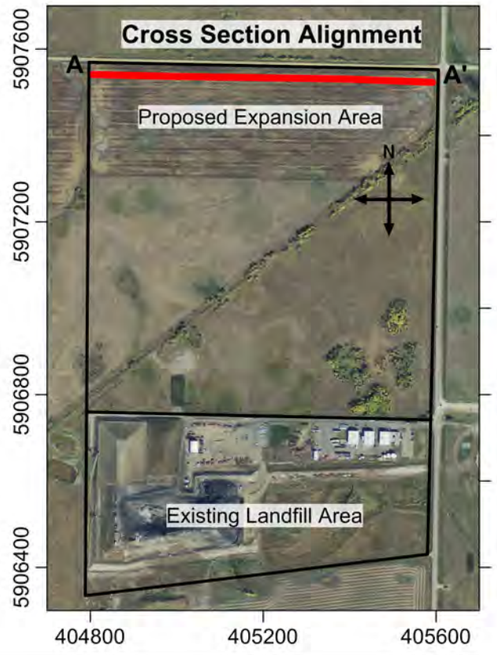
TETRA TECH

FILE NO.				
Figure 7 - SitePlan.srf				
PROJECT NO.	**DWN**	**CKD**	**APVD**	**REV**
ENVSWM03011-05	CF	SB	TJD	0
OFFICE	**DATE**			
TtEBA-CAL	February 2017			

Figure 7

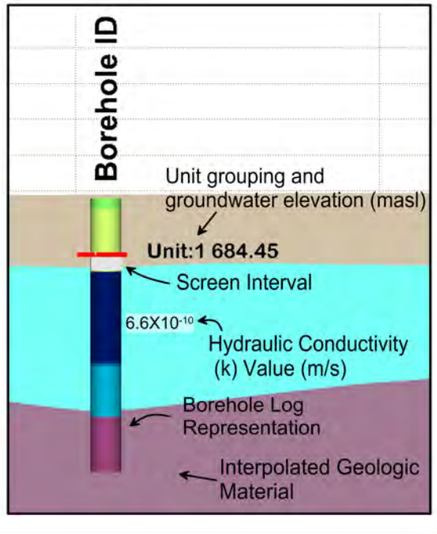
filepath: filepath:W:/Projects/CGY/78070/ENV/SWM03011-05/Data/Surfer/Figure 7 - Site Plan.srf (06/12/2016)





Cross Section Guide

Glacial Drift	Surficial	Topsoil	Silt/Topsoil Material
		Till/Clay	
		Sand	Sand or weathered Sandstone
Bearspaw Formation	Upper Member	Sandstone	Brown-Blue, unconsolidated, medium grained
		Sandstone	Blue-Grey, Unconsolidated, Clay Bands.
		Sand	Argillaceous, V.fine, Dark Green, grades to shale.
		Shale	Dark brown to grey.
		Shale	Dark grey, thin sand interbeds.
		Sandstone	Unconsolidated, Grey, fine.
		Shale	Sandy, dark grey/brown.
	Middle Shale Member	Shale	Fine, bentonite seams.
Belly River Formation	Lower Shale Member	Sandstone	Grey-green, siltstone and shale



The borehole representation are generalized material descriptions obtained through cross-referencing of multiple logs, created by several parties.
To facilitate consistent representation and interpolation between adjacent logs, materials have been grouped acording to detailed description.
For full log descriptions, properties,less common materials and distinctions between primary material types, please refer to the original logs. Geologic material was interpolated using 16 series borehole data only, drilled by Tt EBA in Feb/March, 2016.
A - K value obtained by Tetra Tech EBA, 2016.
B - K Value obtained by Moell and Associates, 1983.
Groundwater levels measured in June, 2016.

Proposed Lateral Expansion
Ryley, Alberta

Cross Section A-A'

PROJECTION: UTM Zone 12			DATUM: NAD83	CLIENT: CleanHarbors	
Vertical Exaggeration: 6X				TETRA TECH	
FILE NO.: Figure08a - CrossSectionA-A'.srf					
PROJECT NO.: ENVSWM03011-05	DWN: CF	CKD: SB	APVD: TJD	REV: 0	Figure 8a
OFFICE: EBA-CALGARY	DATE: December, 2016				

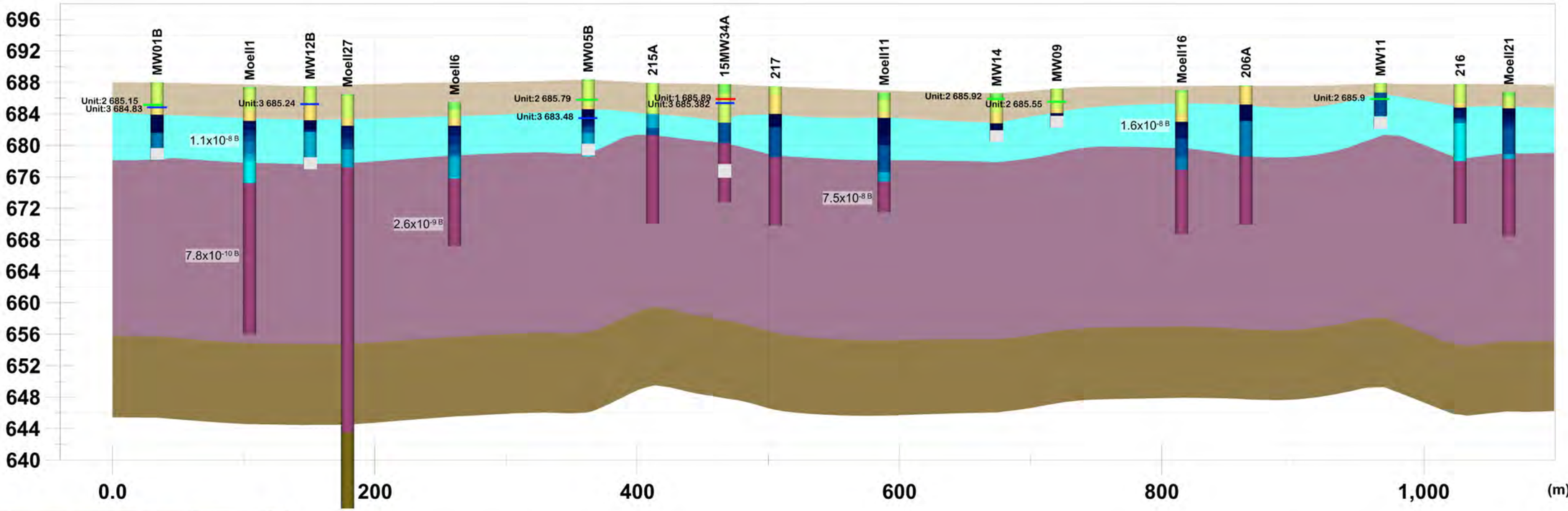
STATUS: Issued for Use

filepath :W:/Projects/CGY/78070/ENV/SWM03011-05/Data/Figure08a - CrossSectionA.srf (06/12/2016)

B

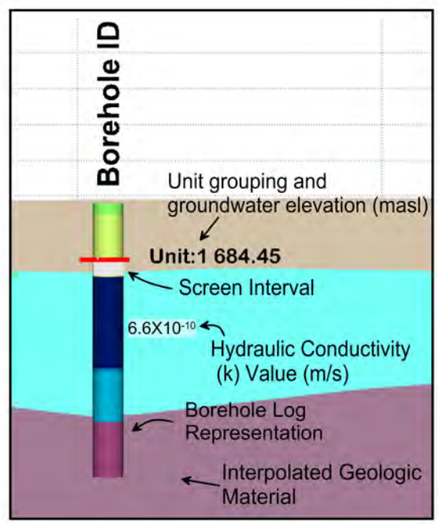
B'

Elevation (masl)



Cross Section Guide

Glacial Drift	Surficial	Topsoil	Silt/Topsoil Material
		Till/Clay	
		Sand	Sand or weathered Sandstone
Bearspaw Formation	Upper Member	Sandstone	Brown-Blue, unconsolidated, medium grained
		Sandstone	Blue-Grey, Unconsolidated, Clay Bands.
		Sand	Argillaceous, V.fine, Dark Green, grades to shale.
		Shale	Dark brown to grey.
		Shale	Dark grey, thin sand interbeds.
		Sandstone	Unconsolidated, Grey, fine.
		Shale	Sandy, dark grey/brown.
	Middle Shale Member	Shale	Fine, bentonite seams.
Belly River Formation	Lower Shale Member	Sandstone	Grey-green, siltstone and shale



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Groundwater levels measured in June, 2016.

Proposed Lateral Expansion
Ryley, Alberta

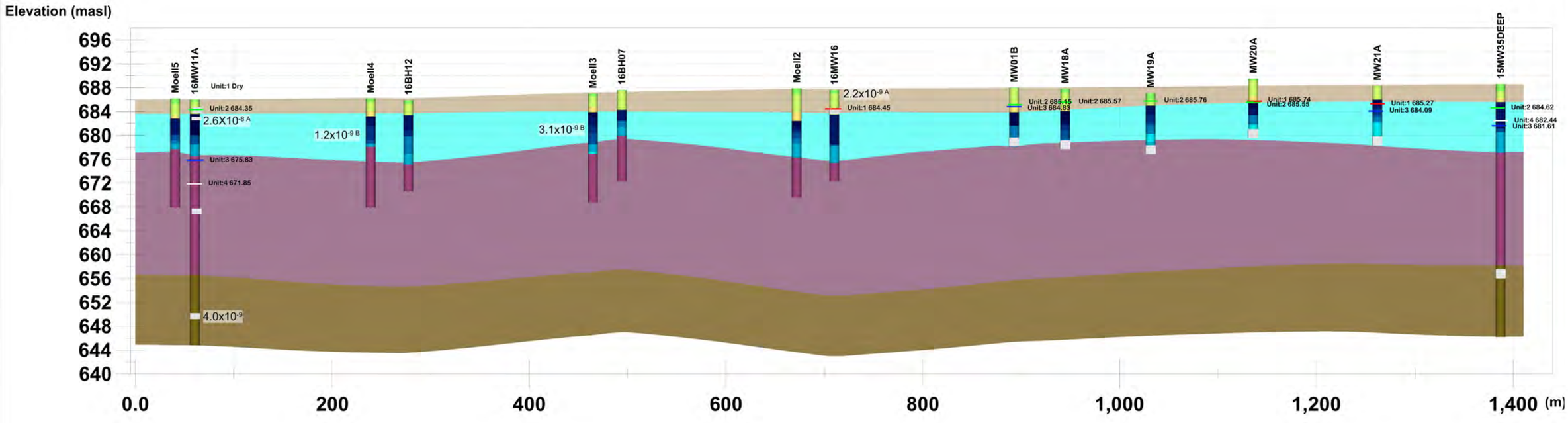
Cross Section B-B'

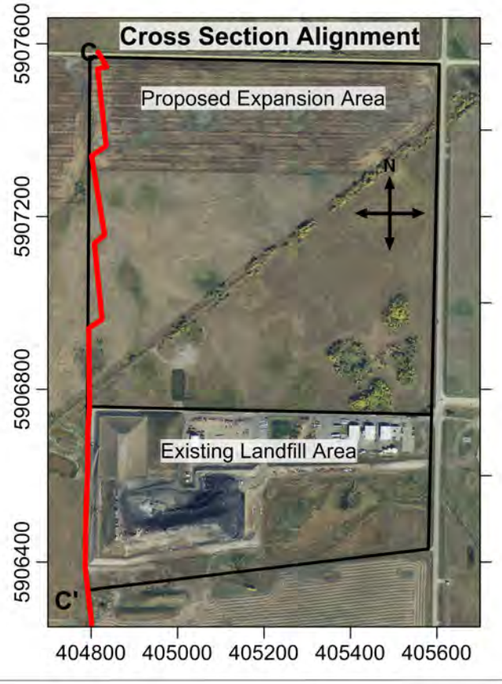
PROJECTION: UTM Zone 12	DATUM: NAD83				CLIENT: CleanHarbors
Vertical Exaggeration: 6X					TETRA TECH
FILE NO.: Figure08b - CrossSectionB-B'.srf					
PROJECT NO.: ENVSWM03011-05	DWN: CF	CKD: SB	APVD: TJD	REV: 0	Figure 8b
OFFICE: EBA-CALGARY	DATE: February 2017				

STATUS
Issued for Use

filepath :W:/Projects/CGY/78070/ENVSWM03011-05/Data/Figure08b - CrossSectionB-B' srf (06/12/2016)

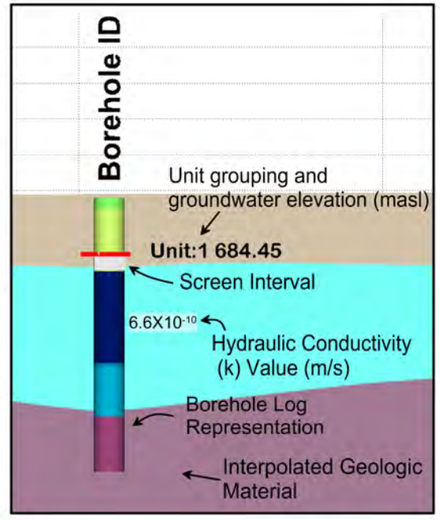
C — C'





Cross Section Guide

Glacial Drift / Surficial	Topsoil	Silt/Topsoil Material	
	Till/Clay		
	Sand	Sand or weathered Sandstone	
Bearspaw Formation / Upper Member	Sandstone	Brown-Blue, unconsolidated, medium grained	
	Sandstone	Blue-Grey, Unconsolidated, Clay Bands.	
	Sand	Argillaceous, V.fine, Dark Green, grades to shale.	
	Shale	Dark brown to grey.	
	Shale	Dark grey, thin sand interbeds.	
	Sandstone	Unconsolidated, Grey, fine.	
	Shale	Sandy, dark grey/brown.	
Bearspaw Formation / Middle Shale Member	Shale	Fine, bentonite seams.	
Belly River Formation / Lower Shale Member	Sandstone	Grey-green, siltstone and shale	



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B - K Value obtained by Moell and Associates, 1983.
Groundwater levels measured in June, 2016.

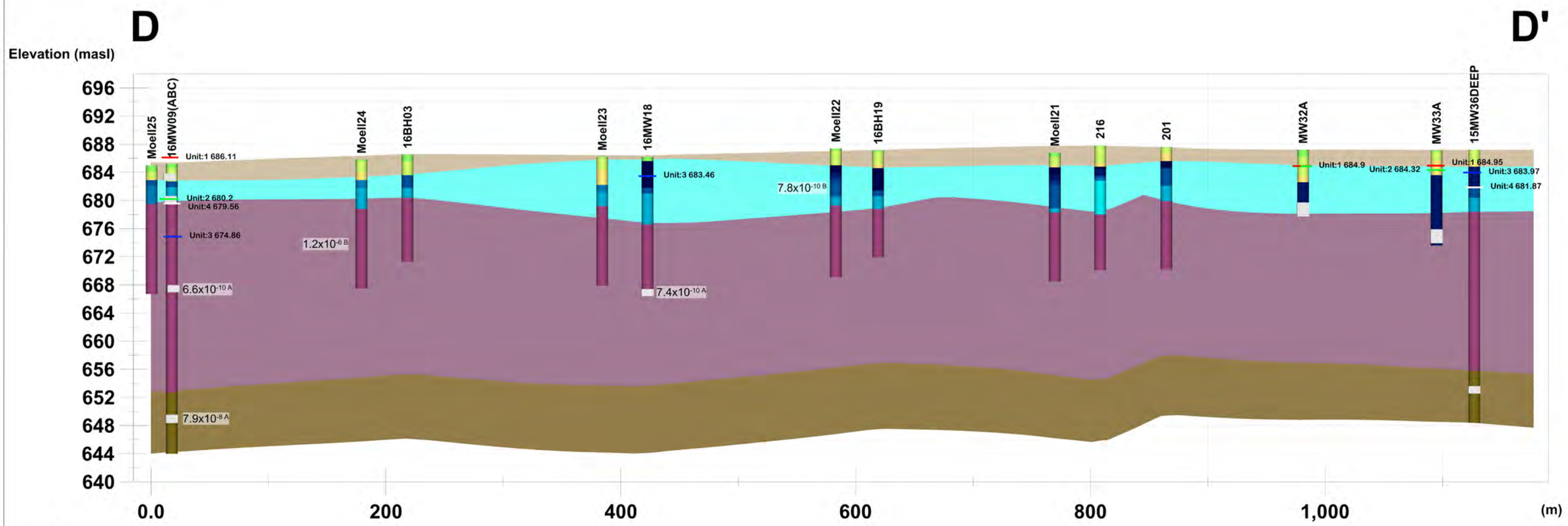
Proposed Lateral Expansion
Ryley, Alberta

Cross Section C-C'

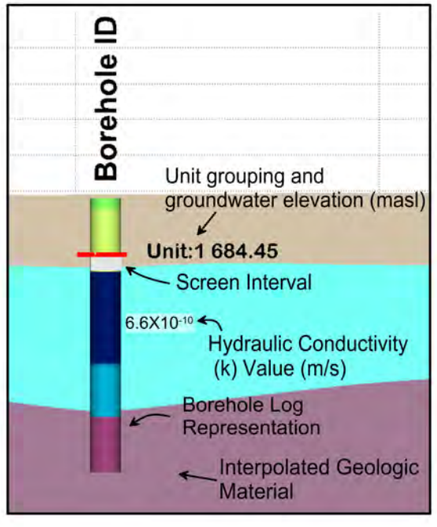
PROJECTION: UTM Zone 12	DATUM: NAD83	CLIENT: CleanHarbors			
Vertical Exaggeration: 6X		TETRA TECH			
FILE NO.: Figure08C - CrossSectionC-C'.srf					
PROJECT NO.: ENVSWM03011-05	DWN: CF	CKD: SB	APVD: TJD	REV: 0	Figure 8c
OFFICE: EBA-CALGARY	DATE: February 2017				

STATUS: Issued for Use

filepath :W:/Projects/CGY/78070/ENV/SWM03011-05/Data/Figure08C - CrossSectionC-C'.srf (06/12/2016)



Glacial Drift	Surficial	Topsoil	Silt/Topsoil Material
		Till/Clay	
		Sand	Sand or weathered Sandstone
Bearspaw Formation	Upper Member	Sandstone	Brown-Blue, unconsolidated, medium grained
		Sandstone	Blue-Grey, Unconsolidated, Clay Bands.
		Sand	Argillaceous, V.fine, Dark Green, grades to shale.
		Shale	Dark brown to grey.
		Shale	Dark grey, thin sand interbeds.
		Sandstone	Unconsolidated, Grey, fine.
		Shale	Sandy, dark grey/brown.
	Middle Shale Member	Shale	Fine, bentonite seams.
Belly River Formation	Lower Shale Member	Sandstone	Grey-green, siltstone and shale



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Groundwater levels measured in June, 2016.

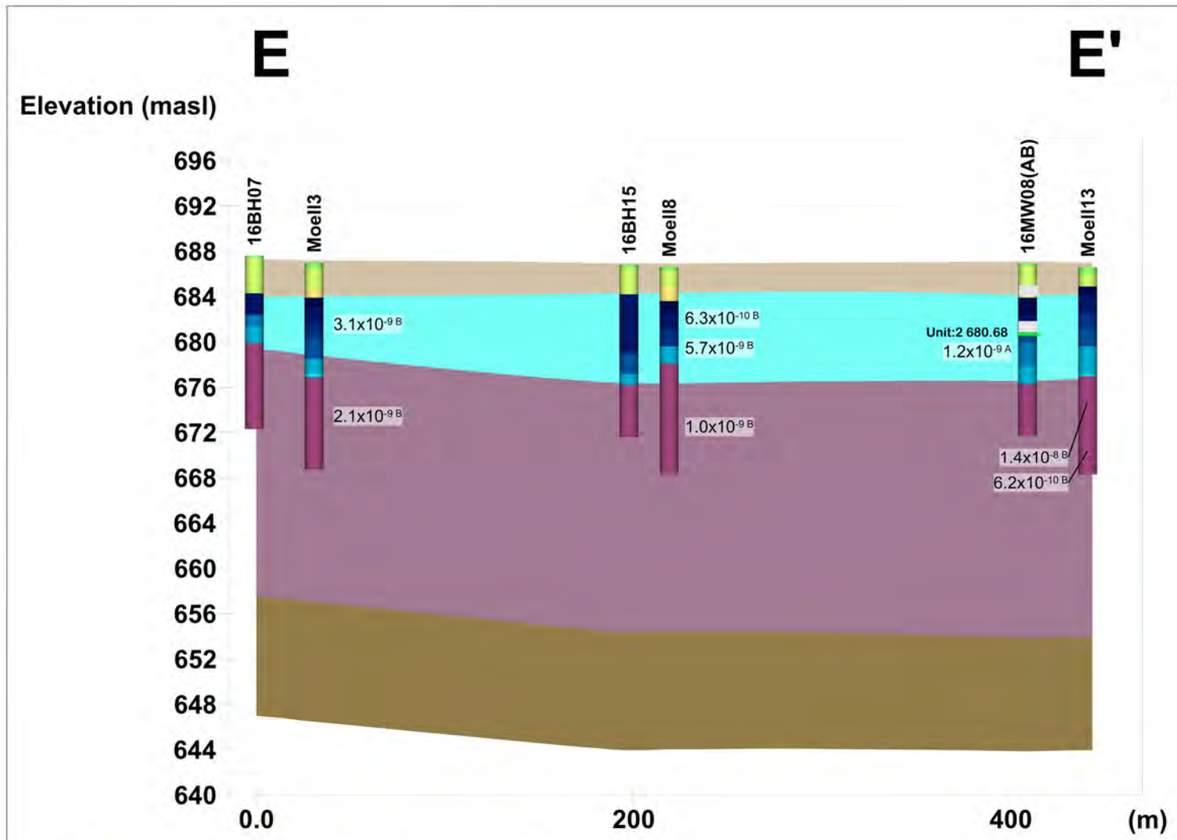
Proposed Lateral Expansion
Ryley, Alberta

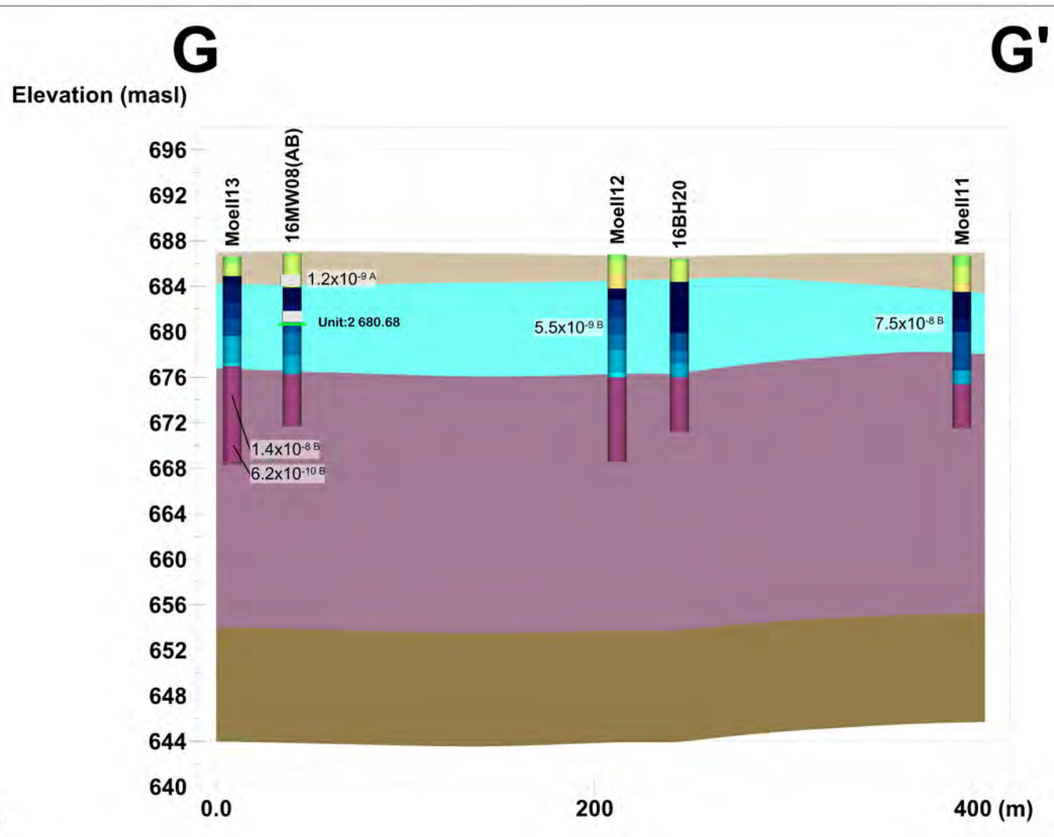
Cross Section D-D'

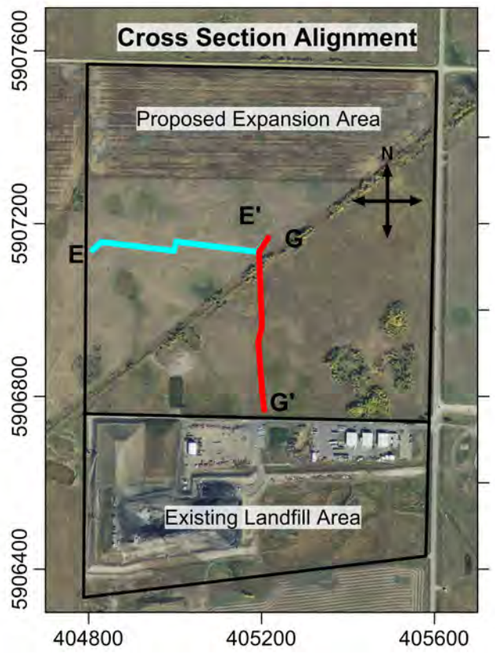
PROJECTION: UTM Zone 12	DATUM: NAD83	CLIENT: CleanHarbors	
Vertical Exaggeration: 6X		TETRA TECH	
FILE NO.: Figure08d- CrossSectionD-D'.srf			
PROJECT NO.: ENVSWM03011-05	DWN: CF / CKD: SB / APVD: TJD / REV: 0		Figure 8d
OFFICE: EBA-CALGARY	DATE: February 2017		

STATUS: Issued for Use

filepath :W:/Projects/CGY/78070/ENVSWM03011-05/Data/Figure08d - CrossSectionD-D'.srf (06/12/2016)

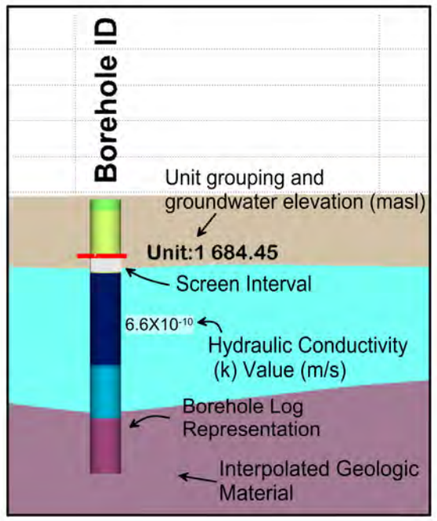






Cross Section Guide

Glacial Drift	Surficial	Topsoil	Silt/Topsoil Material
		Till/Clay	
		Sand	Sand or weathered Sandstone
Bearspaw Formation	Upper Member	Sandstone	Brown-Blue, unconsolidated, medium grained
		Sandstone	Blue-Grey, Unconsolidated, Clay Bands.
		Sand	Argillaceous, V.fine, Dark Green, grades to shale.
		Shale	Dark brown to grey.
		Shale	Dark grey, thin sand interbeds.
		Sandstone	Unconsolidated, Grey, fine.
		Shale	Sandy, dark grey/brown.
	Middle Shale Member	Shale	Fine, bentonite seams.
Belly River Formation	Lower Shale Member	Sandstone	Grey-green, siltstone and shale



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Groundwater levels measured in June, 2016.

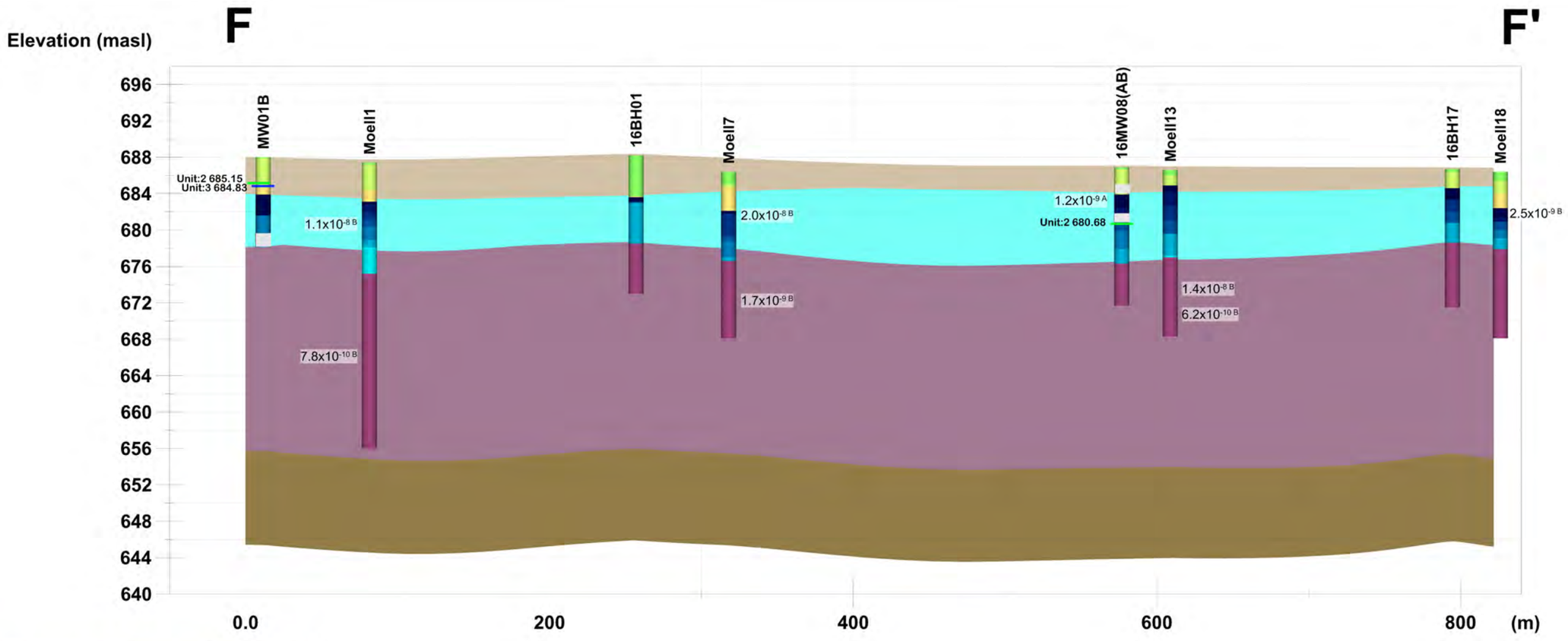
Proposed Lateral Expansion
Ryley, Alberta

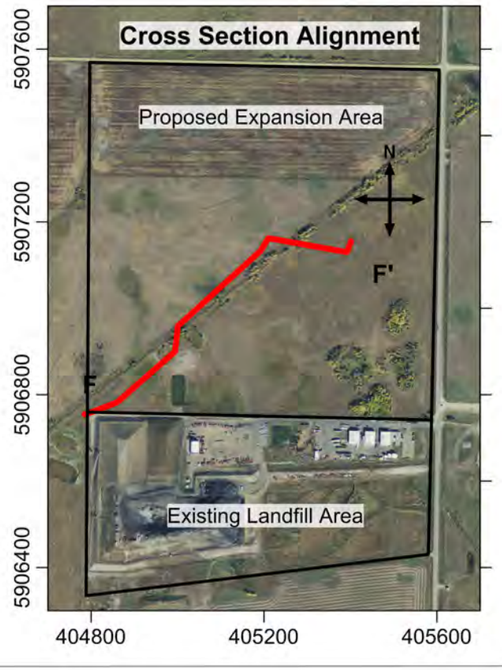
Cross Section E-E' and G-G'

PROJECTION: UTM Zone 12	DATUM: NAD83			CLIENT: CleanHarbors
Vertical Exaggeration: 6X				TETRA TECH
FILE NO.: Figure08e - CrossSectionE-E'&G-G'.srf				
PROJECT NO.: ENVSWM03011-05	DWN: CF	CKD: SB	APVD: TJD	REV: 0
OFFICE: EBA-CALGARY	DATE: February 2017			Figure 8e

STATUS
Issued for Use

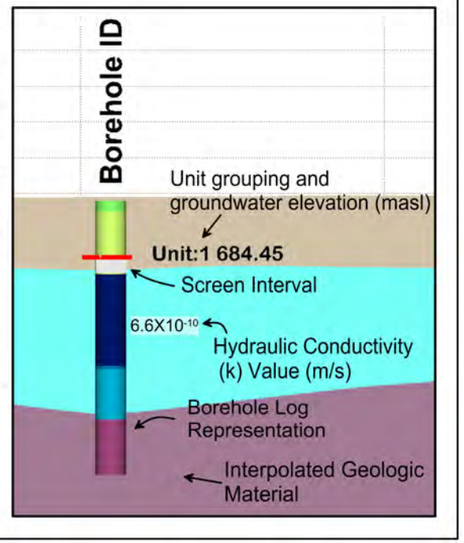
filepath :W:/Projects/CGY/78070/ENVSWM03011-05/Data/Figure 08e - CrossSectionE&G.srf (06/12/2016)





Cross Section Guide

Glacial Drift	Surficial		Topsoil	Silt/Topsoil Material
			Till/Clay	
			Sand	Sand or weathered Sandstone
Bearspaw Formation	Upper Member		Sandstone	Brown-Blue, unconsolidated, medium grained
			Sandstone	Blue-Grey, Unconsolidated, Clay Bands.
			Sand	Argillaceous, V.fine, Dark Green, grades to shale.
			Shale	Dark brown to grey.
			Shale	Dark grey, thin sand interbeds.
			Sandstone	Unconsolidated, Grey, fine.
			Shale	Sandy, dark grey/brown.
	Middle Shale Member		Shale	Fine, bentonite seams.
Belly River Formation	Lower Shale Member		Sandstone	Grey-green, siltstone and shale



The borehole representation are generalized material descriptions obtained through cross-referencing of multiple logs, created by several parties.
To facilitate consistent representation and interpolation between adjacent logs, materials have been grouped acording to detailed description.
For full log descriptions, properties,less common materials and distinctions between primary material types, please refer to the original logs. Geologic material was interpolated using 16 series borehole data only, drilled by Tt EBA in Feb/March, 2016.
A - K value obtained by Tetra Tech EBA, 2016.
B - K Value obtained by Moell and Associates, 1983.
Groundwater levels measured in June, 2016.

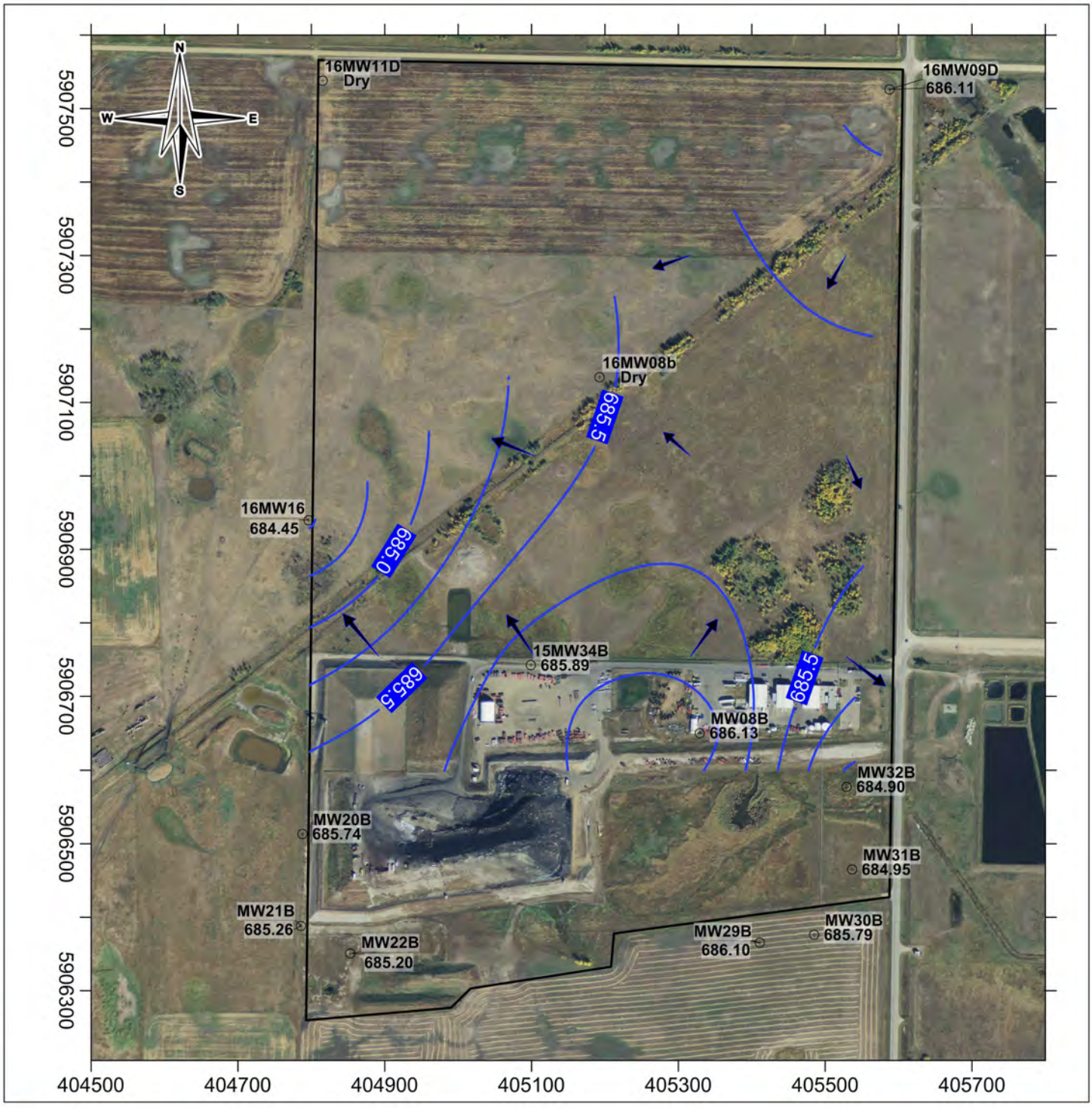
Proposed Lateral Expansion
Ryley, Alberta

Cross Section F-F'

PROJECTION: UTM Zone 12	DATUM: NAD83			CLIENT: CleanHarbors
Vertical Exaggeration: 6X				TETRA TECH
FILE NO.: Figure08f - CrossSectionF-F'.srf				
PROJECT NO.: ENVSWM03011-05	DWN: CF	CKD: SB	APVD: TJD	REV: 0
OFFICE: EBA-CALGARY	DATE: February 2017			Figure 8f

STATUS
Issued for Use

filepath :W:/Projects/CGY/78070/ENV/SWM03011-05/Data/Figure08f - CrossSectionF.srf (06/12/2016)



LEGEND

- Monitoring Well
- 682 — Interpreted Elevation Contour
  Water levels measured 31/05/16-02/06/16
- Inferred Groundwater Flow Direction
- Approximate Site Boundary

Approximate Gradient
0.0000 → 0.0060

NOTES
Survey completed
June 2015 and July 2016

STATUS
Issued for Use

Proposed Lateral Expansion
Ryley, Alberta

Groundwater Elevation Contours
Surficial Material

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

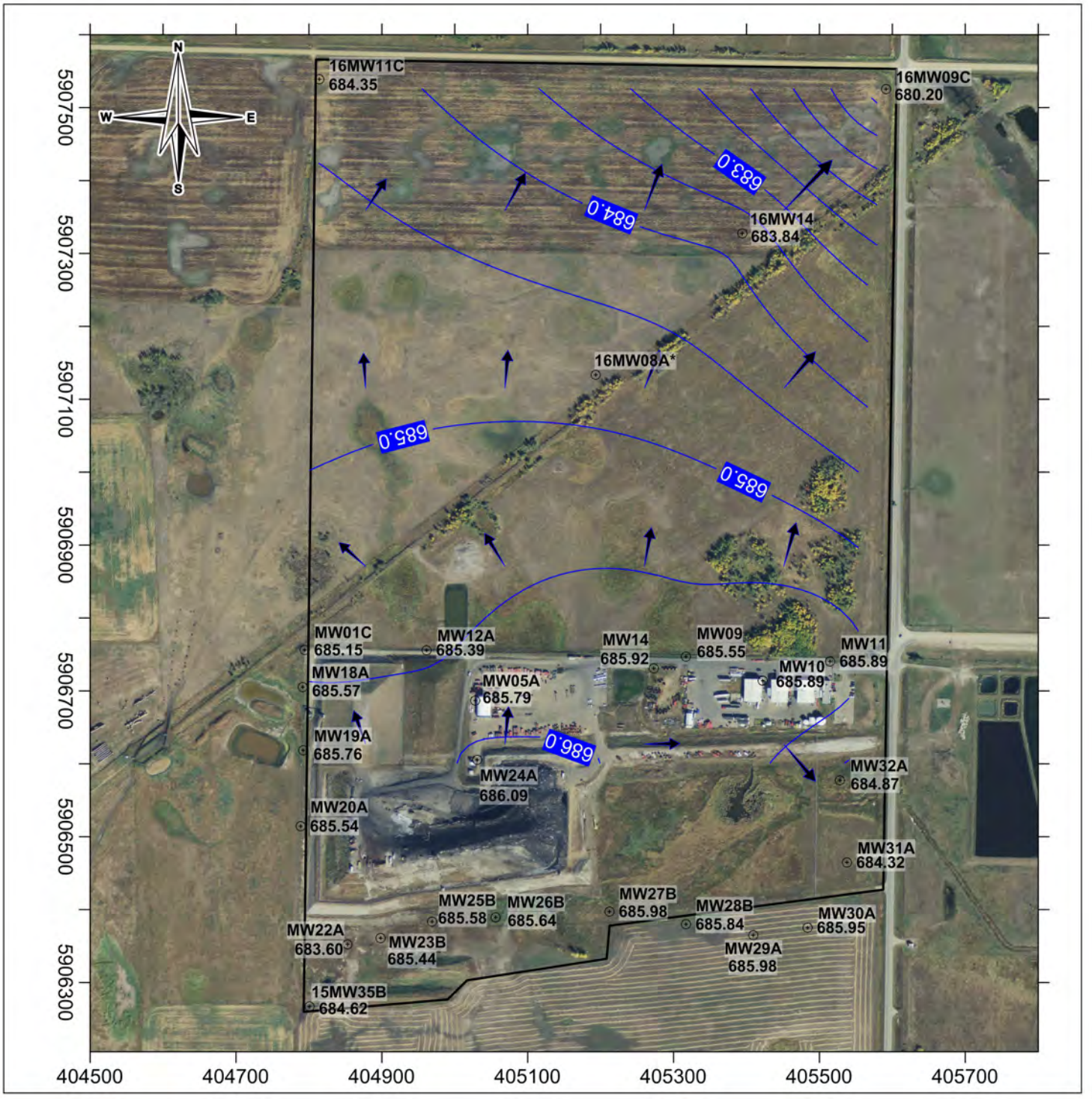
0 50 100 150 200 250 300
Metres

TETRA TECH

FILE NO.				
Figure 09a - SurficialMaterial.srf				
PROJECT NO.	**DWN**	**CKD**	**APVD**	**REV**
ENVSWM03011-05	CF	SB	TJD	0
OFFICE	**DATE**			
TtEBA-CAL	February 2017			

Figure 9a

filepath: filepath:W:/Projects/CGY/78070/ENV/SWM03011-05/Data/Surfer/Figure 9a - SurficialMaterial.srf (06/12/2016)



LEGEND

- Monitoring Well
- 682 — Interpreted Elevation Contour
  Water levels measured 31/05/16-02/06/16
- Inferred Groundwater Flow Direction
- Approximate Site Boundary

* Well not included in contours, refer to text discussion.

Approximate Gradient
0.0001 → 0.0132

NOTES
Survey completed
June 2015 and July 2016

STATUS
Issued for Use

Proposed Lateral Expansion
Ryley, Alberta

Groundwater Elevation Contours
Upper Bedrock Unit

PROJECTION	DATUM
UTM Zone 12	NAD83

0 50 100 150 200 250 300
Metres

FILE NO.
Figure 9b - UpperBedrockUnit.srf

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	CF	SB	TJD	0

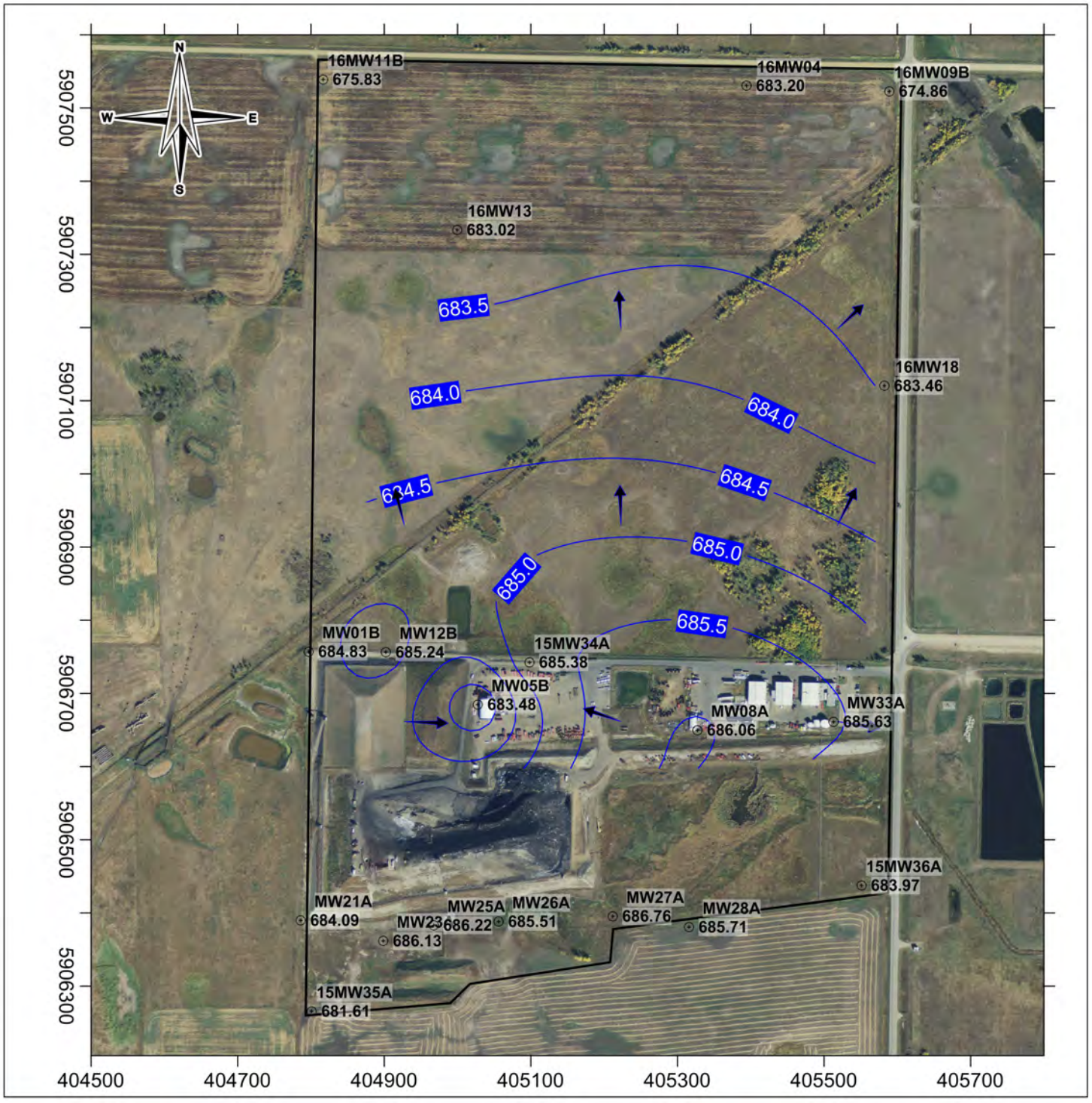
OFFICE	DATE
TtEBA-CAL	February 2017

CLIENT: CleanHarbors

TETRA TECH

Figure 9b

filepath: filepath:W:/Projects/CGY/78070/ENVSWM03011-05/Data/Surfer/Figure 9b - UpperBedrockUnit.srf (06/12/2016)



LEGEND

- Monitoring Well
- 682 — Interpreted Elevation Contour
  Water levels measured 31/05/16-02/06/16
- Inferred Groundwater Flow Direction
- Approximate Site Boundary

* Well not included in contours, refer to text discussion.

Approximate Gradient

0.0002 → 0.0214

NOTES
Survey completed
June 2015 and July 2016

STATUS
Issued for Use

Proposed Lateral Expansion
Ryley, Alberta

Groundwater Elevation Contours
Middle Bedrock Unit

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

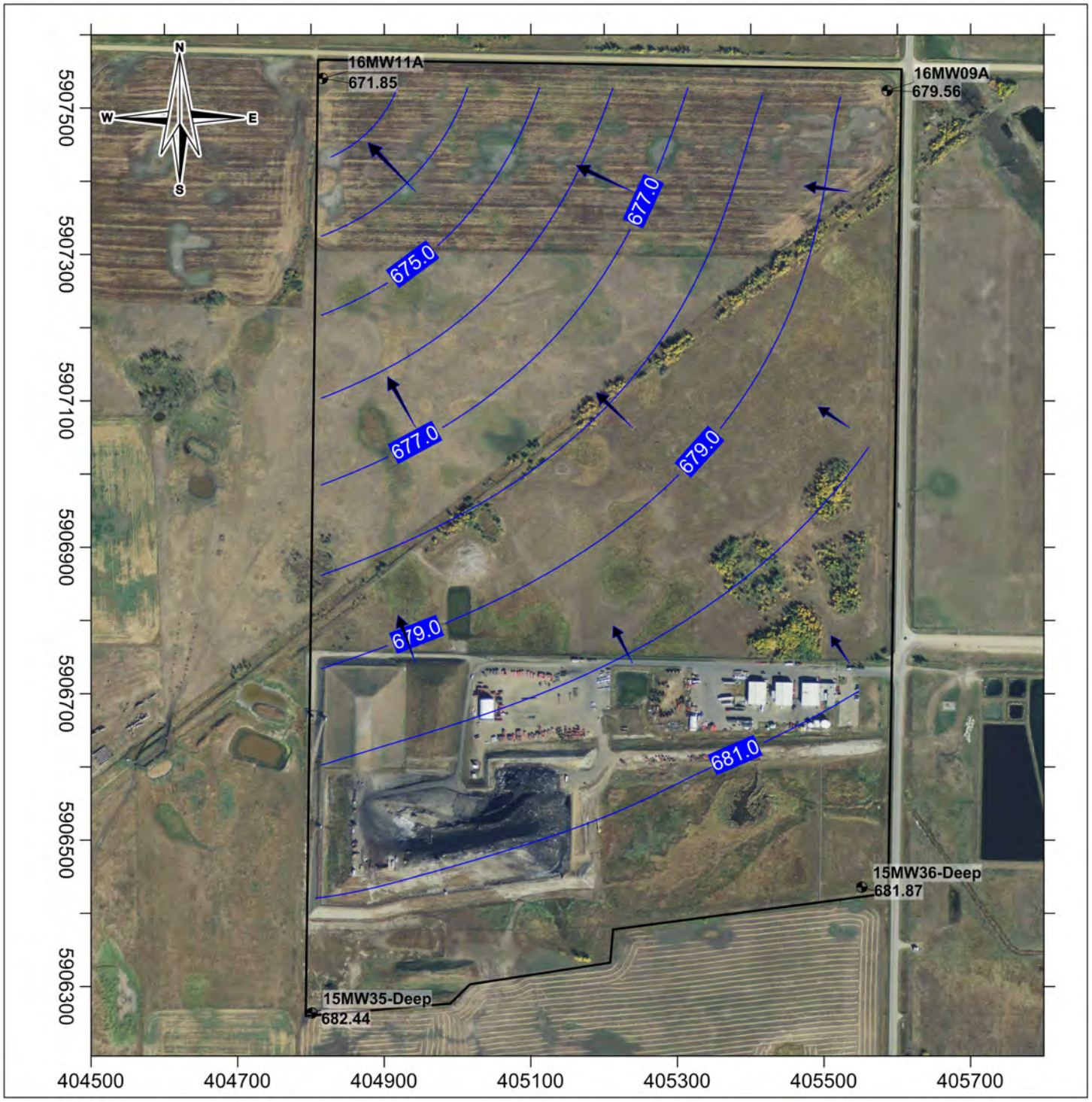
0 50 100 150 200 250 300
Metres

TETRA TECH

FILE NO.				
Figure 9c - MiddleBedrockUnit.srf				
PROJECT NO.	**DWN**	**CKD**	**APVD**	**REV**
ENVSWM03011-05	CF	SB	TJD	0
OFFICE	**DATE**			
TtEBA-CAL	February 2017			

Figure 9c

filepath: filepath:W:/Projects/CGY/78070/ENVSWM03011-05/Data/Surfer/Figure 9c - MiddleBedrockUnit.srf (06/12/2016)



LEGEND

- Monitoring Well
- 682 — Interpreted Elevation Contour
  Water levels measured 31/05/16-02/06/16
- Inferred Groundwater Flow Direction
- Approximate Site Boundary

* Well not included in contours, refer to text discussion.

Approximate Gradient

0.004 → 0.012

NOTES
Survey completed
June 2015 and July 2016

STATUS
Issued for Use

Proposed Lateral Expansion
Ryley, Alberta

GW Elevation Contours
Lower Bedrock Unit

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

0 50 100 150 200 250 300
Metres

TETRA TECH

FILE NO.
Figure 9d - LowerBedrockUnit.srf

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	CF	SB	TJD	0

OFFICE	DATE
TtEBA-CAL	February 2017

Figure 9d

filepath: filepath:W:/Projects/CGY/78070/ENV/SWM03011-05/Data/Surfer/Figure 9d - LowerBedrockUnit.srf (06/12/2016)

APPENDIX A

BOREHOLE RECORDS

Tetra Tech – 2015 and 2016

C.E. Moell – 1983

Borehole No: **15MW34A**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	SPT (N)	Moisture Content (%)
0					
1	Solid stem auger	CLAY (FILL) - some silt, some fine to coarse gravel, trace of fine to medium cobbles, trace of fine boulders, damp, hard, non to low plastic, brown, coal and iron stained inclusions		12	
2		CLAY (TILL) - some silt, trace of gravel, damp, firm, medium plastic, brown, coal and iron stained inclusions		14	
		- some fine grained brown sand, low plastic, grey blue			
3		- silty, soft, medium to high plastic, brown		13	
4		- firm			
		- silty, firm to very stiff, grey			
5				71	
		SANDSTONE - silty, clayey, fine to medium grained, damp to moist, extremely weak, grey			
		- some silt, some clay, moist to wet			
6		- wet, grey blue		98 /225mm	
7		- silty, clayey, moist to wet, grey			
8		CLAY SHALE - trace of fine grained sand, trace of fine gravel, damp, extremely weak, high plastic, grey			
9					
10					
11					
12		- dark greyish brown			
		- some fine grained sand, light grey			
13					
14		- no visible sand, dark grey			
15					
16		END OF BOREHOLE (15.00 metres)			
		slough - 14.25 metres			
		water - 3.91 metres on July 21, 2015			
		Monitoring well installed to 11.80 metres			
		Stickup = 1.05 metres			
17					
18					
19					
20					

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

15MW34A

Depth (ft)

July21/15

>100

Contractor: Clean Harbors	Completion Depth: 15 m
Drilling Rig Type: Auger Rig	Start Date: 2015 July 21
Logged By: TH	Completion Date: 2015 July 21
Reviewed By: SS	Page 1 of 1

TETRA TECH

Borehole No: **15MW34B**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Moisture Content (%)	Pocket Pen. (kPa) / Plastic Limit / Moisture Content / Liquid Limit	Fracture Frequency (#/m) / RQD (%) / Recovery (%)	15WM34B	Depth (ft)
0								0
1	Solid stem auger	CLAY (FILL) - some silt, some fine to coarse gravel, trace of fine to medium cobbles, trace of fine boulders, damp, hard, non to low plastic, brown, coal and iron stained inclusions						2
		CLAY (TILL) - some silt, trace of gravel, damp, firm, medium plastic, brown, coal and iron stained inclusions						
2								4
								6
3		- gleying						8
		- sand pockets - fine grained sand, damp, very slight gleying						10
4		- soft, low to medium plastic						12
		- silty, some fine grained brown sand, medium to high plastic,						14
5		- firm to very stiff, grey						16
		SANDSTONE - silty, clayey, fine to medium grained, damp to moist, grey						
0 hrs		END OF BOREHOLE (5.00 metres)						0 hrs
6		Monitoring well installed to 4.80 metres						18
		Stickup = 1.01 metres						20
7								22
								24
8								26
								28
9								30
								32
10								34
								36
11								38
								40
12								42
								44
13								46
								48
14								50
								52
15								54
								56
16								58
								60
17								62
								64
18								
19								
20								

Contractor: Clean Harbors	Completion Depth: 5 m
Drilling Rig Type: Auger Rig	Start Date: 2015 July 21
Logged By: TH	Completion Date: 2015 July 21
Reviewed By: SS	Page 1 of 1

Borehole No: **15MW35A/B/C**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0	Wet Rotary/HQ Coring	CLAY (TILL) - sandy, plastic, brown			14	
3		CLAY - trace of sand, high plastic, brown				
4		SANDSTONE - weathered, fine grained, blue grey, intermittent clay shale laminations, mechanical fractures		1		
4		- at 4.24 m, 50 mm thick siltstone bed				
5		- at 4.94 m, 50 mm thick siltstone bed				
8		CLAY SHALE - extremely weak, dark brown		2		
8		- at 8.10 m, 50 mm thick coal seam				
9		SANDSTONE - blue green, grey clay shale laminations				
10				3		
11		- at 10.80 m, increasing clay content				
11		CLAY SHALE - moist, strong, dark brown, fracturing at interface		4		
13		- at 13.27 m, 1 mm thick tan siltstone lamination		5		
15		- at 15.10 m, minor slickensides, some fracturing, intermittent seashells				
16		- at 15.40 m, dark grey				
16		- at 16.00 m, 40 mm thick bentonite seam		6		
20				7		

SPT (N) 20 40 60 80

Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80

Fracture Frequency (#/m) 2 4 6 8

RQD (%) 40 60 80 100

Recovery (%) 40 60 80 100

15MW35A 15MW35B 15MW35C

Elevation (m): 625 624 623 622 621 620 619 618 617 616 615 614 613 612 611 610 609 608 607 606 605

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 1 of 3

TETRA TECH

Borehole No: **15MW35A/B/C**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW35A	15MW35B	15MW35C	Elevation (m)
20												605
21		- at 21.20 m, increased fractures										604
22				8								603
23		- at 23.30 m, 100 mm thick tan siltstone bed										602
24												601
25												600
26				9								599
27												598
28		- at 27.50 m, intermittent 45-65° fractures										597
29				10								596
30	Wet Rotary/HQ Coring											595
31		SANDSTONE - fine grained, moist, strong, grey, coal laminations										594
32				11								593
33		- from 32.65 to 32.79 m, very fine grained sand, brown bed, 5 mm thick coal seam - at 33.30 m, intermittent siltstone										592
34		- at 34.06 m, 10 mm thick coal seam										591
35		- at 34.07 m, clay shale bed - at 34.15 m, dark grey clay shale laminations		12								590
36		- at 35.30 m, increasing clay content, dark brown - at 35.40 m, 20 mm thick coal seam MUDSTONE - very fine grained, friable, extremely weak, brown to light brownish grey										589
37												588
38				13								587
39		- light brownish grey, trace of coal fragments										586
40		- at 39.40 m, 10 mm thick clay layer - silty, wet, soft, sticky, high plastic, grey										585

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 2 of 3

Borehole No: **15MW35A/B/C**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW35A	15MW35B	15MW35C	Elevation (m)
40												585
41		SANDSTONE - glauconitic, very fine grained, extremely weak, light grey, coal fragments		14								584
42		CLAY SHALE - strong, dark brown - at 41.00 m, 10 mm thick coal seam MUDSTONE - very fine grained, brittle, grey grey										583
43		END OF BOREHOLE (42.40 metres) Monitoring well A installed to 12.80 metres Monitoring well B installed to 7.01 metres Monitoring well C installed to 3.05 metres										582
44												581
45												580
46												579
47												578
48												577
49												576
50												575
51												574
52												573
53												572
54												571
55												570
56												569
57												568
58												567
59												566
60												565

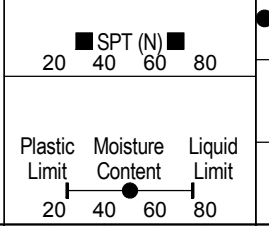
TETRA TECH

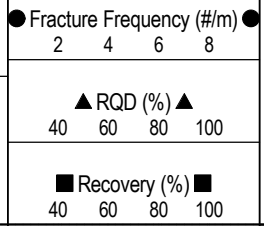
Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 3 of 3

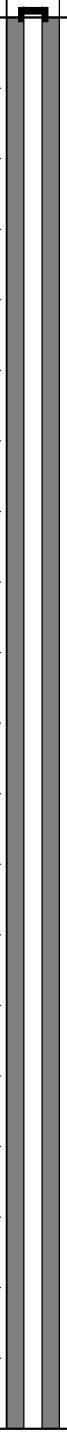
Borehole No: **15MW35Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0						
1	Wet Rotary/HQ Coring	CLAY (TILL) - sandy, plastic, brown			14	
2						
3		CLAY - trace of sand, high plastic, brown				
4		SANDSTONE - weathered, fine grained, blue grey, intermittent clay shale laminations, mechanical fractures		1		
5		- at 4.24 m, 50 mm thick siltstone bed - at 4.94 m, 50 mm thick siltstone bed				
6						
7						
8		CLAY SHALE - strong, dark brown		2		
9		- at 8.10 m, 50 mm thick coal seam SANDSTONE - blue green, grey clay shale laminations				
10				3		
11		- at 10.80 m, increasing clay content				
12		CLAY SHALE - moist, strong, dark brown, fracturing at interface		4		
13						
14		- at 13.27 m, 1 mm thick tan siltstone lamination		5		
15						
16		- at 15.10 m, minor slickensides, some fracturing, intermittent seashells - at 15.40 m, dark grey - at 16.00 m, 40 mm thick bentonite seam		6		
17						
18						
19						
20				7		







Elevation (m)
625
624
623
622
621
620
619
618
617
616
615
614
613
612
611
610
609
608
607
606
605

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 1 of 3

Borehole No: **15MW35Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW35	Elevation (m)
20										605
21		- at 21.20 m, increased fractures								604
22				8						603
23		- at 23.30 m, 100 mm thick tan siltstone bed								602
24										601
25				9						600
26										599
27		- at 27.50 m, intermittent 45-65° fractures								598
28				10						597
29										596
30	Wet Rotary/HQ Coring	SANDSTONE - fine grained, moist, strong, grey, coal laminations								595
31				11						594
32										593
33		- from 32.65 to 32.79 m, very fine grained sand, brown bed, 5 mm thick coal seam - at 33.30 m, intermittent siltstone								592
34		- at 34.06 m, 10 mm thick coal seam								591
35		- at 34.07 m, clay shale bed - at 34.15 m, dark grey clay shale laminations		12						590
36		- at 35.30 m, increasing clay content, dark brown - at 35.40 m, 20 mm thick coal seam MUDSTONE - very fine grained, friable, extremely weak, brown to light brownish grey								589
37										588
38				13						587
39		- light brownish grey, trace of coal fragments								586
40		- at 39.40 m, 10 mm thick clay layer - silty, wet, soft, sticky, high plastic, grey								585

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 2 of 3

Borehole No: **15MW35Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW35	Elevation (m)
40										585
41		SANDSTONE - glauconitic, very fine grained, extremely weak, light grey, coal fragments		14						584
42		CLAY SHALE - strong, dark brown - at 41.00 m, 10 mm thick coal seam MUDSTONE - very fine grained, brittle, grey								583
43		END OF BOREHOLE (42.40 metres) Monitoring well installed to 32.77 metres								582
44										581
45										580
46										579
47										578
48										577
49										576
50										575
51										574
52										573
53										572
54										571
55										570
56										569
57										568
58										567
59										566
60										565

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 3 of 3

Borehole No: **15MW36A/Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0						
1	Wet Rotary/HQ Coring	CLAY (TILL) - some silt, moist, plastic, brown			24	
2		SAND - clayey, moist, brown				
3		SANDSTONE - medium grained, blue grey, clay shale interbeds				
4						
5				1		
6		CLAY SHALE - moist, strong, dark grey, mechanical fractures				
7		SANDSTONE - medium grained, strong, light grey, laminated clay shale throughout, mechanical fractures		2		
8						
9		CLAY SHALE - moist, strong, dark grey, mechanical fractures				
10				3		
11						
12		- at 1.220 mm, 200 mm thick siltstone layer - very fine grained, weak, light brown, mechanical fractures				
13		- at 12.80 m, 20 mm thick seashell layer		4		
14						
15		- at 14.70 m, 10 mm thick bentonite lens				
16				5	19	
17		- at 17.00 m, intermittent shells throughout				
18				6		
19		- at 19.00 m, periodic 45-65° fractures				
20						

SPT (N) ■ 20 40 60 80

Plastic Limit — Moisture Content — Liquid Limit

20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

15MW36 | 15MW36A

Depth (ft) 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 38.8 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 21
Logged By: BS	Completion Date: 2015 July 21
Reviewed By: TH	Page 1 of 3

Borehole No: **15MW36A/Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW36	15MW36A	Depth (ft)
20											66
21		- slight slickensides									68
22											72
23				8							74
24		- at 24.13 m, 10 mm thick coal seam									76
25											78
26				9							82
27											84
28	Wet Rotary/HQ Coring			10							88
29		- from 28.90 to 29.20 m, transition to siltstone - very fine grained, light grey, coal inclusions									90
30		- at 29.20 m, strong, light grey		11							92
31											94
		SANDSTONE - fine to medium grained, strong, grey		12							96
32		- at 32.23 m, clay shale laminations, 20 mm thick clay shale bed									98
33		SILTSTONE - clay shale interbeds									100
		SANDSTONE - fine grained, light grey, coal laminations									102
34		- at 33.40 m, coal laminations at 140 mm intervals									104
		- at 33.80 m, coal laminations at 500 mm intervals									106
35		- at 34.29 m, medium grained interbeds with light brown staining		13							108
		- at 34.76 m, coal inclusion									110
36		- from 35.16 to 35.41 m, intermitted sandstone at 250 mm intervals - medium grained, light brown staining, coal inclusions, hydrocarbon odour									112
		- from 35.76 to 36.06 m, 300 mm thick sandstone layer - medium grained, coal inclusions, hydrocarbon odour									114
37		- at 37.00 m, fine grained, intermittent light staining									116
		CLAY SHALE - strong, dark grey		14							118
38											120
											122
39		END OF BOREHOLE (38.80 metres)									124
		Monitoring well installed to 35.36 metres									126
		Stickup = 0.74 metres									128
40											130

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 38.8 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 21
Logged By: BS	Completion Date: 2015 July 21
Reviewed By: TH	Page 2 of 3

Borehole No: **15MW36A/Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW36	15MW36A	Depth (ft)
40		Monitoring well A installed to 14.33 metres water - 14.99 metres on July 27, 2015 Stickup = 0.84 metres									132
41											134
42											136
43											138
44											140
45											142
46											144
47											146
48											148
49											150
50											152
51											154
52											156
53											158
54											160
55											162
56											164
57											166
58											168
59											170
60											172
											174
											176
											178
											180
											182
											184
											186
											188
											190
											192
											194
											196

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 38.8 m
Drilling Rig Type: Coring Rig	Start Date: 2015 July 21
Logged By: BS	Completion Date: 2015 July 21
Reviewed By: TH	Page 3 of 3

Borehole No: **16BH01**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	Backfill	Depth (ft)
0										0
1	Solid stem auger	TOPSOIL - sod covered, organics, moist, brown to black, frozen to 0.30 metres								2
		CLAY (TILL) - silty, sandy, some gravel, trace cobbles, damp, very stiff, low to medium plastic, brown, iron oxides, white precipitates		Bulk1		8.4				4
2		- moist, firm, medium plastic		S1	15					6
		- moist to wet, trace coal inclusions		Bulk2		15.3				8
3										10
		- trace to some mudstone fragments		Bulk3		20.5				12
4										14
		- mottled with sand - wet, loose, brown, medium sand		B1		18.2				16
5		CLAY SHALE - highly to completely weathered, damp, extremely weak, grey		S2	46					18
				B2		17.4				20
		SANDSTONE - clayey, completely weathered, moist to wet, extremely weak, blue grey		B3						22
6		CLAY SHALE - highly to completely weathered, moist, extremely weak, grey		ST2						24
7		SANDSTONE - clayey, silty, highly to completely weathered, moist to wet, extremely weak, blue grey, fine to medium sand		B4		6.7				26
		- damp, medium strong, grey		B5						28
8		- 150 mm thick clay shale layer - highly weathered, damp, weak, brown		B6	50		>100			30
				S3	/150mm					32
		- 150 mm thick clay shale layer - moderately weathered, damp, medium strong, brown		B7						34
9		- interbedded grey and blue grey sandstone		S4	38		>100			36
		- 150 mm thick clay shale layer - moderately weathered, damp, medium strong, brown		B8	/150mm					38
10		- interbedded sandstone and shale		B9						40
		CLAY SHALE - highly weathered, moist, very weak, grey		S5	50		>100			42
11		- highly to completley weathered, extremely weak, grey with brown and black staining		B10	/150mm					44
				B11						46
12		- moderately weathered, damp to moist, weak, grey		B12						48
13										50
		- highly weathered, brown		B13						52
14				S6	50		>100			54
					/150mm					56
15		- slightly weathered, grey		B14						58
		END OF BOREHOLE (15.24 metres)								60
16		water - 13.40 metres at 0 hrs.								62
		Note: Backfilled at completion.								64
17										
18										
19										
20										

▼ 0 hrs.

Contractor: Clean Harbors	Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 15
Logged By: LQ	Completion Date: 2016 March 15
Reviewed By: CS	Page 1 of 1

TETRA TECH

Borehole No: **16BH02**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	Backfill	Depth (ft)
0										0
0	Solid stem auger	TOPSOIL - organics, roots, damp, brown to black, (150 mm thick)								0
0		SAND AND TOPSOIL - damp, brown to black, fine sand, (300 mm thick)								0
1		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, damp to moist, very stiff, medium plastic, brown, iron oxides, trace sand pockets, coal inclusions, white precipitates		Bulk1		10.5				2
1				B1						4
2		SAND - damp, loose, iron oxides, fine to medium sand								4
2		SANDSTONE - clayey, silty, completely weathered to residual soil, moist, extremely weak, brown, iron oxide inclusions, fine sand		B2		15				6
3		- blue grey		ST1						6
3				B3		18				6
4		CLAY SHALE - highly weathered, damp to moist, extremely weak, grey		B4						8
4		- interbedded shale and sandstone for 600 mm		ST2						8
5		- faintly weathered, damp, medium strong		B5						10
5		- completely weathered, interbedded clay shale and sandstone for 600 mm		B6		15.7				10
6		- faintly weathered		S1	84					10
6				B7						10
7				B8		21.6				12
7		- damp to moist, interbedded thin sandstone layers		ST3						12
8				B9						12
8		- damp		B10						12
9		- moderately weathered, brown		S2	50		>100			14
9				B11	/150mm					14
10				B12						14
10										14
11				B13						14
11										14
12				B14			>100			14
12		- grey, no visible sandstone layers		S3	50					14
12				B15	/150mm					14
13				B16						14
13										14
14				B17						14
14				B18						14
15										14
15		END OF BOREHOLE (15.24 metres)								14
15		slough - 14.30 metres at 0 hrs.								14
16		water - dry at 0 hrs.								14
16		Note: Backfilled at completion.								14
17										14
17										14
18										14
18										14
19										14
19										14
20										14

TETRA TECH

Contractor: Clean Harbors	Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 15
Logged By: LQ	Completion Date: 2016 March 15
Reviewed By: CS	Page 1 of 1

Borehole No: **16BH03**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	Backfill	Depth (ft)
0										0
1	Solid stem auger	TOPSOIL - organic, trace gravel, moist, black, (300 mm thick)								2
		SILT AND TOPSOIL - some clay, trace gravel, moist, brown		B1						
		- sandy, moist, loose, brown, fine to medium sand		B2		24.2				4
2		CLAY (TILL) - silty, some sand, trace gravel, trace cobbles, moist to wet, stiff, high plastic, brown, some iron oxide staining, some sand pockets		S1	18	29.2				6
				Bulk1						
		- sandy, damp to moist, very stiff, low plastic		B3						8
3		CLAY SHALE - highly weathered, damp, extremely weak, grey		ST1						10
				B4		22.3				12
4		- brown		B5						14
		SANDSTONE - clayey, silty, completely weathered, damp, extremely weak, grey, interbedded clay shale - completely weathered, extremely weak, brown, concretionary layers		S2	48					16
5				B6						
				B7						18
6		CLAY SHALE - highly weathered, damp to moist, extremely weak, interbedded layers of grey and brown		ST2						20
				B8		22.4				22
7		- brown		B9						24
		- moderately weathered, damp, very weak, brown, black staining, slight hydrocarbon odour		S3	50/150mm		>100			
8										26
										28
9		- no visible staining		S4						30
				J1						
10				B10						32
				B11						34
		- no discernible hydrocarbon odour		S5						
11				B12						36
				B13						38
12		- grey								40
										42
13										44
14										46
										48
15										50
		END OF BOREHOLE (15.24 metres)								
16		slough - 14.80 metres at 0 hrs.								52
		water - dry at 0 hrs.								54
		Note: Backfilled at completion.								
17										56
										58
18										60
										62
19										64
20										

TETRA TECH

Contractor: Clean Harbors	Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 16
Logged By: JD/LQ	Completion Date: 2016 March 16
Reviewed By: CS	Page 1 of 1

Borehole No: **16MW04**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - organic, silty, sandy, trace gravel, trace cobbles, moist, black, (150 mm thick)				
1	Solid stem auger	CLAY AND TOPSOIL - silty, sandy, trace gravel, trace cobbles, moist, black, (150 mm thick)		Bulk1		16.1
2		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, stiff, low to medium plastic, light brown, trace dark brown streaks, some white precipitates, trace iron pockets, sand pockets		Bulk2		
3		- sand seam - moist, very loose, brown, fine to medium sand		B1		
		- trace sandstone fragments		S1	25	
				B2		
4		SANDSTONE - clayey, moderately weathered, moist, extremely weak, blue grey, fine sand		B3		18.6
		- interbedded brown clay shale				
5		CLAY SHALE - moderately weathered, damp to moist, weak, interbedded brown sandstone		B4		
				ST1		
		- trace interbedded blue grey sandstone		B5		24
6		- some interbedded blue grey sandstone		S2	74	
				B6		23.7
7				B7		
				ST2		
8				B8		
		- medium strong brown shale layer				
9				B9		
		- trace interbedded sandstone				
		- no visible sandstone, dry to damp, brown		S3	50 /150mm	
10				B10		
				B11		
				B12		
11				ST3		
		- wet, extremely weak		B13		
		- dry to damp, weak, grey				
12				S4	50 /150mm	
		- wet, extremely weak		B14		
13				B15		
		- damp, medium strong				
14		- dry to damp, weak				
15						
16		END OF BOREHOLE (15.24 metres)				
		water - 14.94 metres at 0 hrs.				
		- 3.52 metres on May 11, 2016				
		50 mm Monitoring well installed to 11.58 metres				
		Stickup = 0.82 metres				
17						
18						
19						
20						

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

>100

>100

May 11/16 ▼ 0 hrs.

16MW04

Depth (ft) 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

Contractor: Clean Harbors	Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 19
Logged By: JD	Completion Date: 2016 March 19
Reviewed By: CS	Page 1 of 1

TETRA TECH

Borehole No: **16BH05**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) ■ 20 40 60 80 / Pocket Pen. (kPa) ▲ 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) ● 2 4 6 8 / RQD (%) ▲ 40 60 80 100 / Recovery (%) ■ 40 60 80 100	Backfill	Depth (ft)
0										0
0	Solid stem auger	TOPSOIL - silty, sandy, organics, trace to some gravel, trace cobbles, damp, brown, (300 mm thick)								
1		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, damp, very stiff to hard, low to medium plastic, brown, iron oxide staining, trace sand pockets, white precipitates		Bulk1		8.9				2
2		SANDSTONE - clayey, completely weathered to residual soil, moist, extremely weak, brown, fine sand, interbedded clay shale - completely weathered, extremely weak		S1	32					4
				B1						6
				B2						8
3		- moderately weathered, grey								10
		- some clay, blue grey		B3		19.2				12
				ST1						
4		- interbedded clay shale - moderately weathered, weak, grey		B4						14
5				S2	76					16
				B5						
6				B6		18.8				18
		CLAY SHALE - moderately weathered, damp to moist, very weak, brown		ST2						20
7				B7						22
		- interbedded sandstone layers - moderately weathered, damp, extremely weak, blue grey, fine sand		B8		24				24
8				S3	50		>100			26
				B9	/150mm					28
9				B10						30
		- dry to damp, trace interbedded sandstone		B11						
				ST3		17.3				32
10				B12						34
11		- no visible sandstone		S4	50		>100			36
				B13	/150mm					38
12				B14						40
		END OF BOREHOLE (12.19 metres) Note: Backfilled at completion.								42
13										44
14										46
15										48
16										50
										52
										54
17										56
										58
18										60
										62
19										64
20										

TETRA TECH

Contractor: Clean Harbors	Completion Depth: 12.19 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 18
Logged By: JD	Completion Date: 2016 March 18
Reviewed By: CS	Page 1 of 1

Borehole No: **16BH06**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	Backfill	Depth (ft)
0		TOPSOIL - organic, silty, trace sand, moist, black, (300 mm thick)						0
1	Solid stem auger	CLAY (TILL) - silty, sandy, trace gravel, damp, very stiff, low plastic, brown, white precipitates		B1		8.7		2
		- brown, mottled grey, iron oxide inclusions		B2		10.3		4
2				Bulk1				6
		SANDSTONE - completely weathered to residual soil, moist to wet, extremely weak, brown, fine sand		B3		8.7		8
3		- interbedded layers of clay shale - completely weathered, extremely weak, brown		S1	64			10
				B4				12
4		CLAY SHALE - moderately weathered, damp, medium strong, grey						
		- completely weathered, damp to moist, grey, interbedded blue grey sandstone		B5		16.1		14
5		SANDSTONE - clayey, silty, completely weathered, moist, extremely weak, grey, trace interbedded clay shale, fine sand		S2	50 /150mm	>100		16
				J1		20.3		
				ST1				18
6				B6				20
				B7				
		CLAY SHALE - moderately weathered, damp, very weak, grey		B8				22
7		- dry to damp, weak, brown		B9				24
8		SANDSTONE - moist, extremely weak, blue grey, fine to medium sand		B10		29.5		26
				ST2				28
9				B11				30
		CLAY SHALE - moderately weathered, damp, weak, grey, some interbedded sandstone layers		J2	50 /150mm	>100		
				S3				32
10				B12				34
				B13				
11		- brown						36
		- dry to damp, some sand pockets, trace interbedded sandstone		B14		22.1		38
12				B15				40
		- dry, grey						
13				B16				42
				B17				44
14 ▼				S4	50 /150mm	>100		46 ▼
				B18				
15				B19				48
		END OF BOREHOLE (15.24 metres) slough - 15.10 metres at 0 hrs. water - 14.20 metres at 0 hrs. Note: Backfilled at completion.						50
16								52
17								54
18								56
19								58
20								60
								62
								64

SPT (N) ■ 20 40 60 80 ■
Pocket Pen. (kPa) ▲ 100 200 300 400 ▲
Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8
▲ RQD (%) ▲ 40 60 80 100
■ Recovery (%) ■ 40 60 80 100

Contractor: Clean Harbors	Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 16
Logged By: JD/LQ	Completion Date: 2016 March 17
Reviewed By: CS	Page 1 of 1

TETRA TECH

Borehole No: **16BH07**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	Backfill	Depth (ft)
0										0
0	Solid stem auger	TOPSOIL - organics, some gravel, some clay, damp, very loose, brown, (150 mm thick)								
1		CLAY (TILL) - silty, sandy, some gravel, trace cobbles, damp, stiff, low plastic, brown, trace white precipitates		B1						2
				B2						4
2		- very stiff, low to medium plastic, iron oxide inclusions, some white precipitates		S1	34					6
		- trace gravel, moist, very stiff, medium plastic, dark brown, sand pockets, trace white precipitates		B3						8
3		- grey, trace brown laminations, trace sandstone fragments		Bulk1		13.3				10
		SANDSTONE - trace clay, completely weathered to residual soil, moist, extremely weak, brown, some iron oxide inclusions, fine sand		B4						12
4				ST1						
				B5		19.3				14
		- blue grey, no visible iron oxide inclusions		S2	50			>100		
5		- medium strong		B6	/150mm					16
		CLAY SHALE - moderately weathered, damp, extremely weak, grey, trace interbedded sandstone		ST2						18
6				B7						
		SANDSTONE - moderately weathered, damp to moist, extremely weak, grey, trace iron oxide staining, some interbedded clay shale, fine sand		ST3		17.1				20
7				B7						22
				B8		15.4				24
		CLAY SHALE - moderately weathered, damp, extremely weak, brown		S3	50			>100		
8				B9	/150mm					26
				B10		22.7				28
9		- some white precipitates, some interbedded blue grey sandstone		B11						30
										32
10		- trace white precipitates		B12						34
				S4	50			>100		
11				B13	/150mm					36
				B14						38
12		- no visible sandstone, no visible white precipitates								40
				B15						42
13				B16						44
		- damp to moist, brown, trace interbedded sandstone		S5	50			>100		
14				B17	/150mm					46
										48
15				B18						50
		END OF BOREHOLE (15.24 metres) slough - 15.15 metres at 0 hrs, Note: Backfilled at completion.								52
16										54
17										56
18										58
										60
19										62
										64
20										

TETRA TECH

Contractor: Clean Harbors	Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 17
Logged By: JD/LQ	Completion Date: 2016 March 17
Reviewed By: CS	Page 1 of 1

Borehole No: **16MW08A/B**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - organic, silty, some clay, trace gravel, trace cobbles, damp, brown, (150 mm thick)				
1		CLAY - silty, sandy, some gravel, trace cobbles, damp, very stiff, medium plastic, brown, iron oxide inclusions, trace sand pockets, trace white precipitates		Bulk1		
2		- some sand, moist, medium plastic, dark brown		Bulk2		11.8
3		- trace interbedded sand layers - loose, brown, fine sand		B1		
		SANDSTONE - clayey, completely weathered, moist, extremely weak, brown, iron oxide staining, fine sand		S1	43	
				B2		
4		- blue grey		B3		14.9
		- medium strong				
5		- moderately weathered, damp to moist, extremely weak, no visible iron oxide staining		ST1		
				B4		
				B5		16.3
6		- moist to wet, trace interbedded brown clay shale		S2	50 /150mm	
				B6		
7		- damp to moist, medium strong		B7		20.4
		- moist, extremely weak		B8		19.3
8		- some interbedded clay shale		ST2		
				B9		
9		- trace interbedded clay shale		S3	50 /150mm	
		- no visible clay shale, trace interbedded layers of brown sandstone		B10		
10				B11		
		CLAY SHALE - moderately weathered, damp to moist, extremely weak, grey		B12		16.4
11				ST3		
				B13		
12				S4	50 /150mm	
				B14		
13				B15		
14		- dry to damp, medium strong		B16		
				B17		
15						
16		END OF BOREHOLE (15.24 metres) 100 mm MW08A installed to 6.10 metres Stickup = 1.03 metres water - 5.51 metres on May 11, 2016 50 mm MW08B installed to 2.94 metres Stickup = 1.02 metres water - dry on May 11, 2016				
17						
18						
19						
20						

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

>100

May11/16

Solid stem auger

16MW08A

16MW08B

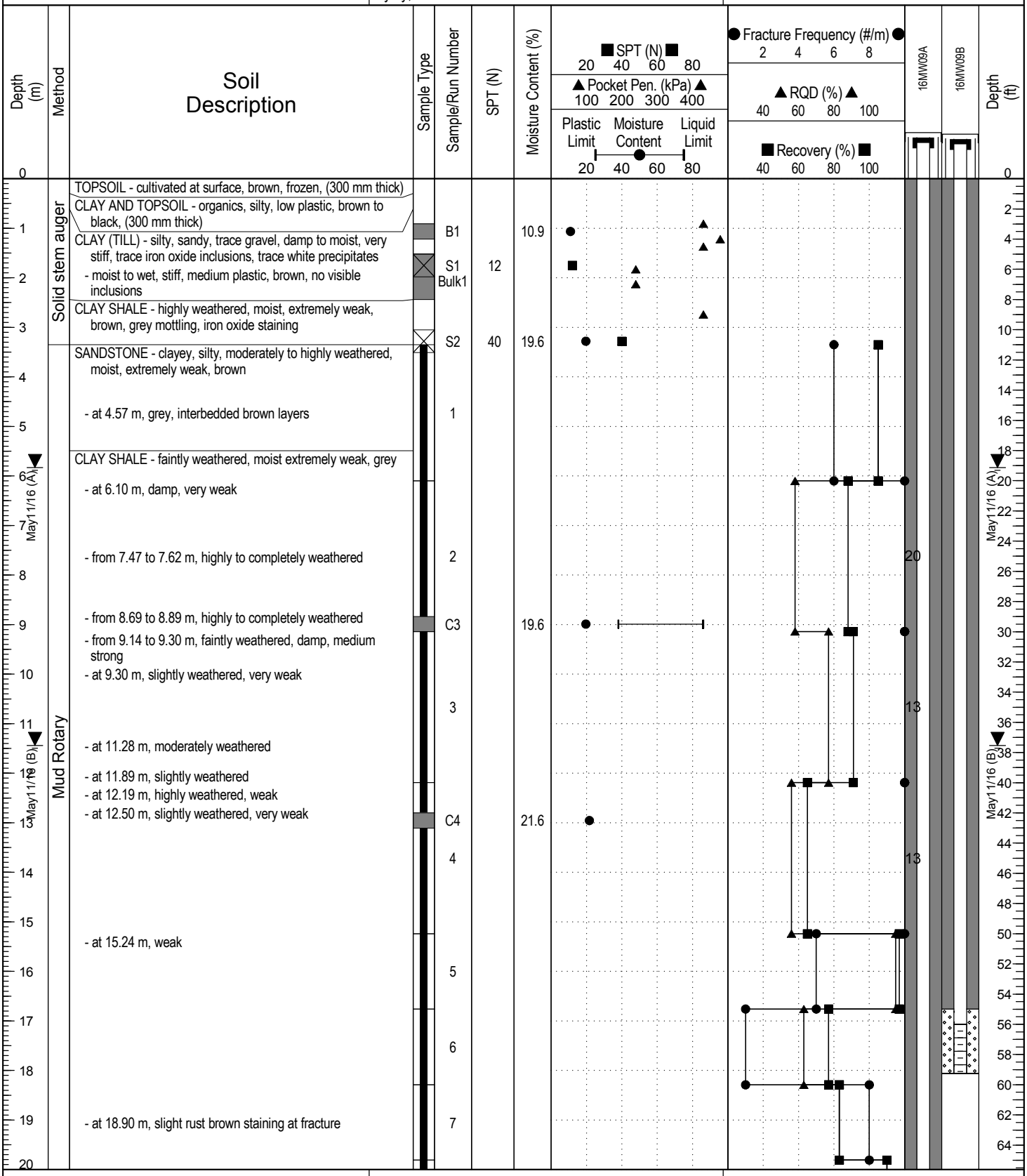
Depth (ft)

Contractor: Clean Harbors		Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig		Start Date: 2016 March 17
Logged By: JD/LQ		Completion Date: 2016 March 17
Reviewed By: CS		Page 1 of 1

TETRA TECH

Borehole No: **16MW09**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	



Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 24
Logged By: LQ	Completion Date: 2016 February 24
Reviewed By: CS	Page 1 of 3

TETRA TECH

Borehole No: **16MW09**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	16MW09A	16MW09B	Depth (ft)
20											66
21				8							68
		- at 21.34 m, faintly weathered									70
22				9							72
23											74
				10							76
24											78
25											80
											82
26				11							84
27		- at 26.67 m, slightly weathered, damp, brown									86
		- from 27.13 to 27.43 m, blue grey staining									88
		- from 27.43 to 27.73 m, possible hydrocarbon staining		J1							90
28		- at 27.58 mn, thin coal layers		J2							92
		- at 27.73 m, light grey		12							94
29		- from 28.65 to 29.34 m, blue grey									96
		- at 29.34 m, grey, brown to black staining, faint hydrocarbon odour									98
30				13							100
											102
31		- at 30.73 m, faintly weathered, brown									104
		- at 31.04 m, grey, no discernible odour		14							106
32											108
		SANDSTONE - silty, some clay, slightly weathered, weak, grey, brown staining around fractures, fine sand									110
33		- at 32.92 m, no visible staining		15							112
		- at 33.53 m, trace iron oxide staining									114
34		CLAY SHALE - slightly weathered, weak, grey									116
		SANDSTONE - silty, some clay, slightly weathered, grey, fine sand		16							118
35		- from 34.44 to 35.19 m, completely weathered									120
		- from 35.66 to 35.76 m, interbedded clay shale - faintly weathered, weak, brown		17							122
36		- from 35.97 to 36.02 m, interbedded clay shale									124
		- at 36.02 m, slightly weathered, weak, grey, fine to medium sand									126
37		- from 36.27 to 36.37 m, interbedded clay shale		18							128
		- from 36.93 to 36.98 m, interbedded clay shale									130
38		- at 37.08 m, completely weathered, extremely weak, brown									
		CLAY SHALE - slightly weathered, weak, grey brown		19							
39		- from 38.50 to 38.55 m, grey									
		- at 39.32 m, gey, faint black staining in fractures									
40											

Mud Rotary

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 24
Logged By: LQ	Completion Date: 2016 February 24
Reviewed By: CS	Page 2 of 3

Borehole No: **16MW09**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	16MW09A	16MW09B	Depth (ft)
40											132
		- at 39.34 m, grey, black and black staining, faint hydrocarbon odour		20							134
41		SANDSTONE - silty, faintly weathered, damp, weak to medium strong, grey, fine sand									136
		CLAY SHALE - faintly weathered, moist, weak, grey									138
42		END OF BOREHOLE (41.15 metres)									140
		50 mm Monitoring well A installed to 36.73 metres									142
43		Stickup = 0.89 metres									144
		water - 5.83 metres on May 11, 2016									146
		Monitoring well B installed to 18.06 metres									148
44		Stickup = 0.83 metres									150
		water - 11.44 metres on May 11, 2016									152
45											154
											156
46											158
											160
47											162
											164
48											166
											168
49											170
											172
50											174
											176
51											178
											180
52											182
											184
53											186
											188
54											190
											192
55											194
											196
56											
57											
58											
59											
60											

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 24
Logged By: LQ	Completion Date: 2016 February 24
Reviewed By: CS	Page 3 of 3

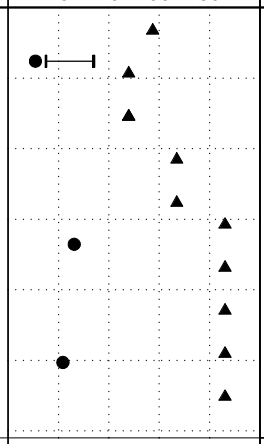
TETRA TECH

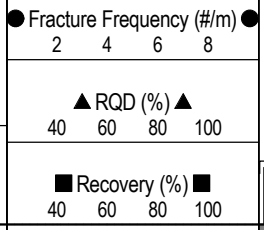
Borehole No: **16MW09C/D**

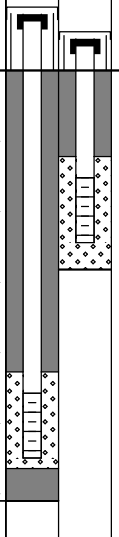
Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	Moisture Content (%)
0					
0 – 1	Solid stem auger	TOPSOIL - cultivated at surface, brown, frozen, (300 mm thick)			
		CLAY AND TOPSOIL - organics, silty, low plastic, brown to black, (300 mm thick)		Bulk1	10.8
1 – 2		CLAY (TILL) - silty, sandy, trace gravel, damp to moist, very stiff, trace iron oxide inclusions, trace white precipitates			
2 – 3		- moist to wet, stiff, medium plastic, brown, no visible inclusions		Bulk2	
3 – 4		CLAY SHALE - highly weathered, moist, extremely weak, brown, grey mottling, iron oxide staining		B1	26.2
4 – 5		SANDSTONE - clayey, silty, moderately to highly weathered, moist, extremely weak, brown		B2	
5 – 6		- at 4.57 m, grey, interbedded brown layers		ST1 B3	21.7
		CLAY SHALE - faintly weathered, moist extremely weak, grey		B4	
6 – 20		END OF BOREHOLE (6.10 metres) water - dry at 0 hrs. 100 mm Monitoring well C installed to 5.64 metres Stickup = 1.01 metres water - 5.21 metres on May 11, 2016 50 mm Monitoring well D installed to 2.44 metres Stickup - 0.95 metres water - dry on May 11, 2016			

May 11/16







Depth (ft): 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

May 11/16

TETRA TECH

Contractor: Clean Harbors	Completion Depth: 6.1 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 19
Logged By: JD	Completion Date: 2016 March 19
Reviewed By: CS	Page 1 of 1

Borehole No: **16BH10**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0						
0	Solid stem auger	TOPSOIL - cultivated at surface, organic, roots, moist, brown to black, frozen, (300 mm thick)				
1		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, trace coal, stiff, medium plastic, brown, trace iron oxides, frozen to 0.60 metres		B1		
2				S1	17	
2		- low to medium plastic				
3		SANDSTONE - silty, some clay, completely weathered to residual soil, moist, extremely weak, fine sand		S2	25	
4		- at 3.35 m, grey				
4		- at 3.96 m, clayey, completely weathered				
5		CLAY SHALE - highly weathered, moist, extremely weak, brown		1		
6		SANDSTONE - clayey, silty, highly to completely weathered, moist, extremely weak, grey				
6		CLAY SHALE - interbedded 25 mm thick grey sandstone layers				
7		- from 6.25 to 6.55 m, moderately weathered, moist, extremely weak, grey				
8		- at 6.55 m, moderately weathered, damp, weak		2		
8		SANDSTONE - moderately to highly weathered, extremely weak, grey, trace coal inclusions, trace iron oxide staining				
9	Mud Rotary					
10		CLAY SHALE - slightly weathered, damp, weak, grey				
10		- at 9.60 m, 25 m thick interbedded damp sandstone layers				
11		- at 10.67 m, grey		3		
12						
13						
14				4		
15						
15		END OF BOREHOLE (15.24 metres)				
16		Note: Backfilled at completion.				
17						
18						
19						
20						

SPT (N) 20 40 60 80

Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80

Fracture Frequency (#/m) 2 4 6 8

RQD (%) 40 60 80 100

Recovery (%) 40 60 80 100

Backfill: 19, 13, 12

Depth (ft)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 23
Logged By: LQ	Completion Date: 2016 February 23
Reviewed By: CS	Page 1 of 1

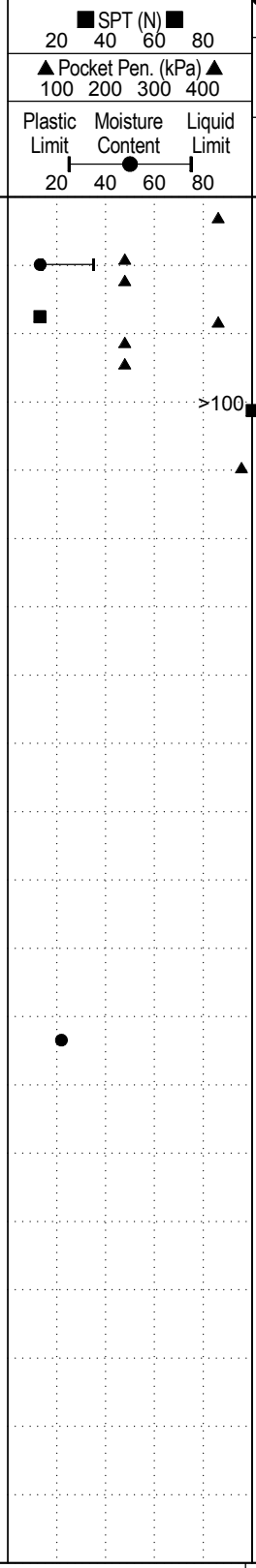
Borehole No: **16MW11**

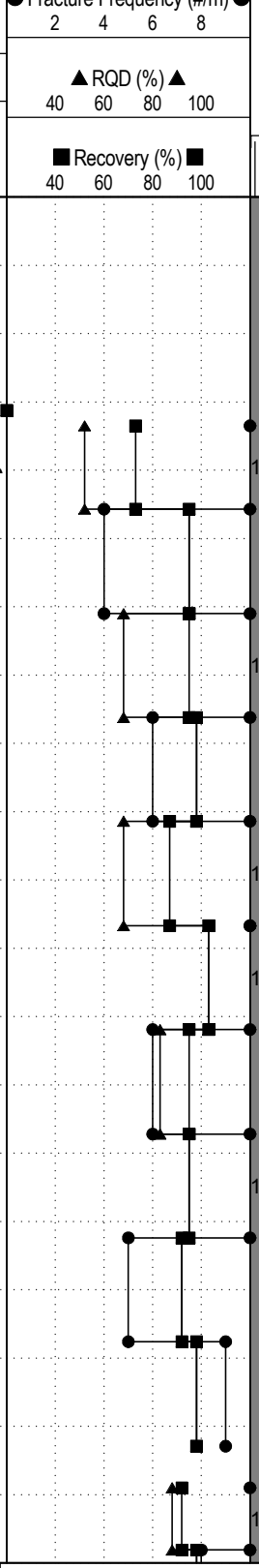
Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0						
	Solid stem auger	TOPSOIL - cultivated at surface, organic, moist, brown to black, trace sand pockets, (200 mm thick)				
1		CLAY AND TOPSOIL - sandy, silty, trace gravel, moist, very stiff, low plastic, brown to black, (260 mm thick)		Bulk1		13.2
2		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, moist to wet, stiff, medium plastic, brown, iron oxide inclusions, coal inclusions, trace sand pockets, frozen to 0.61 metres		S1 Bulk2	13	
3		SANDSTONE - silty, clayey, completely weathered, damp, extremely weak, fine sand		B1 B2 S2	50/150mm	
		- at 2.59 m, moist				
4		- at 3.35 m, moderately weathered, medium strong, grey, brown and iron oxide staining, thin interbedded shale layer		1		
		- at 4.27 m, blue grey				
5		- at 4.72 m, very weak, grey, interbedded 50 mm thick shale - completely weathered, moist, extremely weak		2		
6		- at 4.88 m, interbedded 50 mm thick shale - moderately weathered, medium strong, brown				
		- from 5.03 to 6.10 m, thin shale layers - highly weathered, extremely weak				
7		CLAY SHALE - moderately weathered, moist, very weak, grey		3		
		- at 7.29 m, 25 mm thick sandstone layer - completely weathered, extremely weak, grey, fine sand				
8		- at 7.34 m, 50 mm thick sandstone layer - completely weathered, extremely weak, grey, fine sand		J1 4		
		- at 7.39 m, brown				
9		SANDSTONE - clayey, highly weathered, very weak, grey, black and brown staining, trace shell fragments, faint hydrocarbon odour				
10		CLAY SHALE - moderately weathered, brittle, weak, brown, black and brown staining, hydrocarbon odour		5		
		- from 10.36 to 10.52 m, interbedded sandstone				
11		- at 10.67 m, slightly weathered, weak, brown, grey mottling		J2 6		
		- at 11.58 m, grey				
12				C7		21.9
13		- at 13.11 m, many small fractures at 90°		7		
14		- at 13.72 m, faintly weathered				
15				8		
16				9		
17						
18				10		
19		- at 19.05 m, 25 mm fractured material, 75°		11		
20						

May11/16 (B)

May11/16 (B)





16MW11A

16MW11B

Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 26
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 1 of 3

Borehole No: **16MW11**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
20						
21		- at 20.42 m, 6 mm fractured material, 90°		12		
22		- from 21.79 to 22.10 m, interbedded grey - from 22.30 to 22.35 m, weak sandstone layer		13		
23						
24				14		
25		- at 24.94 m, 6 mm fractured material, 75°		15		
26						
27		- at 26.37 m, 6 mm fractured material, 80° - at 26.75 m, 6 mm fractured material, 90°		16		
28						
29				17		
30	Mud Rotary	SANDSTONE - clayey, silty, faintly weathered, damp, weak, grey - at 29.64 m, 30 mm diameter coal fragment, iron oxide inclusions				
31		CLAY SHALE - faintly weathered, damp, weak, grey, coal inclusions, concretions				
32		SANDSTONE - silty, clayey, slighty weathered, damp to moist, weak, blue grey, fine sand - from 32.00 to 32.15 m, interbedded clay shale layers - from 32.30 to 33.53 m, interbedded clay shale layers, brown		18		
33						
34		- at 33.53 m, grey, fine to medium sand				
35		- at 34.44 m, fracture, black staining - from 34.44 to 34.47 m, interbedded medium strong brown shale		19		
36		- from 35.70 to 34.77 m, interbedded thin shale layers - at 34.77 m, 80° fracture				
37		- from 34.77 to 34.90 m, hydrocarbon staining - from 34.90 to 35.03 m, medium strong, light brown sandstone pieces, coal inclusions				
38		- at 35.05 m, moderately weathered - from 35.05 to 35.20 m, 90° fractures - at 35.38 m, black staining		20		
39		- at 35.74 m, 6 mm interbedded shale - at 36.58 m, very weak				
40		- at 36.73 m, brown - from 36.73 to 36.88 m, brown and grey layers		J3		

SPT (N) ■ 20 40 60 80
▲ Pocket Pen. (kPa) ▲ 100 200 300 400
Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8
▲ RQD (%) ▲ 40 60 80 100
■ Recovery (%) ■ 40 60 80 100

16MW11A 16MW11B

18

May11/16 (A)

Depth (ft)
66
68
70
72
74
76
78
80
82
84
86
88
90
92
94
96
98
100
102
104
106
108
110
112
114
116
118
120
122
124
126
128
130

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 26
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 2 of 3

Borehole No: **16MW11**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	16MW11A	16MW11B	Depth (ft)
40											132
41		- from 37.19 to 37.49 m, interbedded clay shale - highly weathered, weak - at 38.10 m, grey, coal inclusions - at 39.62 m, black stained layers, strong hydrocarbon odour to 40.23 metres - at 40.84 m, brown		21							134
42		END OF BOREHOLE (41.15 metres) Monitoring well A installed to 36.88 metres on February 27, 2016 Stickup = 0.92 metres water - 26.45 metres on May 11, 2016 Monitoring well B installed to 19.05 metres on February 27, 2016 Stickup = 1.01 metres water - 11.25 metres on May 11, 2016									136
43											138
44											140
45											142
46											144
47											146
48											148
49											150
50											152
51											154
52											156
53											158
54											160
55											162
56											164
57											166
58											168
59											170
60											172
											174
											176
											178
											180
											182
											184
											186
											188
											190
											192
											194
											196

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 26
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 3 of 3

Borehole No: **16MW11C/D**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) / Pocket Pen. (kPa) / Plastic Limit – Moisture Content – Liquid Limit	Fracture Frequency (#/m) / RQD (%) / Recovery (%)	16MW11C	16MW11D	Depth (ft)
0							SPT (N) 20 40 60 80 Pocket Pen. (kPa) 100 200 300 400 Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 RQD (%) 40 60 80 100 Recovery (%) 40 60 80 100			0
0	Solid stem auger	TOPSOIL - cultivated at surface, organic, moist, brown to black, trace sand pockets, (200 mm thick)									
1		CLAY AND TOPSOIL - sandy, silty, trace gravel, moist, very stiff, low plastic, brown to black, (260 mm thick)		Bulk1							
2		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, moist to wet, stiff, medium plastic, brown, iron oxide inclusions, coal inclusions, trace sand pockets, frozen to 0.61 metres		S1 Bulk2	18	16.6					
3		SANDSTONE - silty, clayey, completely weathered, damp, extremely weak, fine sand		B1							
		- at 2.59 m, moist		ST1							
4		- at 3.35 m, moderately weathered, medium strong, grey, brown and iron oxide staining, thin interbedded shale layer		B2							
		- at 4.27 m, blue grey		B3							
5		- at 4.72 m, very weak, grey, interbedded 50 mm thick shale - completely weathered, moist, extremely weak		S2 B4	50 /150mm		>400				
		- at 4.88 m, interbedded 50 mm thick shale - moderately weathered, medium strong, brown		B5							
6		- from 5.03 to 6.10 m, thin shale layers - highly weathered, extremely weak		ST2 B6							
7		CLAY SHALE - moderately weathered, moist, very weak, grey		B7							
		- at 7.29 m, 25 mm thick sandstone layer - completely weathered, extremely weak, grey, fine sand									
8		- at 7.34 m, 50 mm thick sandstone layer - completely weathered, extremely weak, grey, fine sand									
		- at 7.39 m, brown									
9		END OF BOREHOLE (7.62 metres)									
		slough - 7.52 metres at 0 hrs.									
10		50 mm Monitoring well C installed to 3.35 metres									
		Stickup = 0.90 metres									
11		water - 2.01 metres on May 11, 2016									
		50 mm Monitoring well D installed to 2.13 metres									
12		Stickup = 0.85 metres									
		water- dry on May 11, 2016									
13											
14											
15											
16											
17											
18											
19											
20											

May11/16 (C)

Contractor: Clean Harbors	Completion Depth: 7.62 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 16
Logged By: JD/LQ	Completion Date: 2016 March 16
Reviewed By: CS	Page 1 of 1

TETRA TECH

Borehole No: **16BH12**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	Backfill	Depth (ft)
0										0
1	Solid stem auger	TOPSOIL - cultivated at surface, organics, roots, wet, brown to black, frozen, (300 mm thick)								2
		SAND AND TOPSOIL - organics, rootlets, moist, brown, frozen, (300 mm thick)		B1						4
				B2						
2		CLAY (TILL) - silty, sandy, some gravel, trace cobbles, wet, low plastic, brown, grey mottling, rust inclusions, coal inclusions, trace white precipitates		S1	13					6
				Bulk1						
3		- trace gravel, moist to wet, low to medium plastic		B3						8
		- some sand, medium plastic, grey								
		- mottled sandstone		S2	49					10
4		SANDSTONE - clayey, silty, completely weathered to residual soil, moist to wet, extremely weak, brown, iron oxide staining		1					11	12
		- at 3.05 m, grey								14
5		- at 3.35 m, completely weathered, moist, blue grey, fine sand								16
		- at 3.66 and 3.81 m, 50 mm thick interbedded shale - moderately weathered, weak, brownish grey		2					14	18
6		- 100 mm thick shale layer - highly weathered, medium strong								20
		- at 4.78 m, interbedded 25 mm thick clay shale - moderately weathered, medium strong, brown		C3		16.5				22
7		- at 5.08 m, interbedded 25 mm thick clay shale - moderately weathered, medium strong, brown		3					92	24
8	Mud Rotary	SANDSTONE AND CLAY SHALE - interbedded, Sandstone - clayey, silty, completely weathered, moist, extremely weak, brown, Clay Shale - completely weathered, extremely weak, grey								26
				4						28
9		SANDSTONE - clayey, silty, moderately weathered, moist, extremely weak, moist, blue grey, coal inclusions		C5		16				30
		- at 6.65 m, interbedded 50 mm thick shale - moderately weathered, medium strong								32
10		CLAY SHALE - moderately weathered, very weak, grey		5						34
		SANDSTONE - faintly weathered, damp, medium strong, brown, medium sand								
11		CLAY SHALE - slightly weathered, damp, very weak, brown								36
		- at 8.41 m, 6 mm thick sandstone layer		6					19	38
12		SANDSTONE - clayey, moderately weathered, damp to moist, very weak, blue grey, black brown staining in fractures, fine sand								40
		- from 9.09 to 9.19 m, shale - faintly weathered, weak, brown								
13		- at 9.14 m, possible hydrocarbon odour		7					21	42
		- at 9.50 m, 12 mm fracture at 85°								44
		- at 9.60 m, interbedded 50 mm clay shale - moist, weak, brown								
14		CLAY SHALE - moderately weathered, moist, very weak, light grey, dark grey bands								46
				8					19	48
15		- at 10.82 m, 12 m fracture filled with completely weathered shale at 90°								
		- at 11.07 m, 25 mm facture filled with completely weathered shale at 90°								50
16		- at 11.12 m, grey								52
		- at 11.46 m, 50 mm facture filled with highly to completely weathered shale								54
17		- at 11.89 m, 25 mm facture filled with highly to completely weathered shale								56
		- at 12.50 m, interbedded shale layers - highly weathered medium strong, brown								58
18		- at 12.50 m, 6 mm fracture filled with highly to completely weathered shale at 85°								60
		- at 12.95 m, 6mm fracture filled with highly weathered shale								62
19		- from 14.48 to 14.63 m, shale layer - medium strong, light brown								64
20										

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 27
Logged By: LQ	Completion Date: 2016 February 27
Reviewed By: CS	Page 1 of 2

Borehole No: **16BH12**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	Backfill	Depth (ft)
20		END OF BOREHOLE (15.24 metres) Note: Backfilled at completion.								66
21										68
22										72
23										74
24										76
25										78
26										80
27										82
28										84
29										86
30										88
31										90
32										92
33										94
34										96
35										98
36										100
37										102
38										104
39										106
40										108
										110
										112
										114
										116
										118
										120
										122
										124
										126
										128
										130

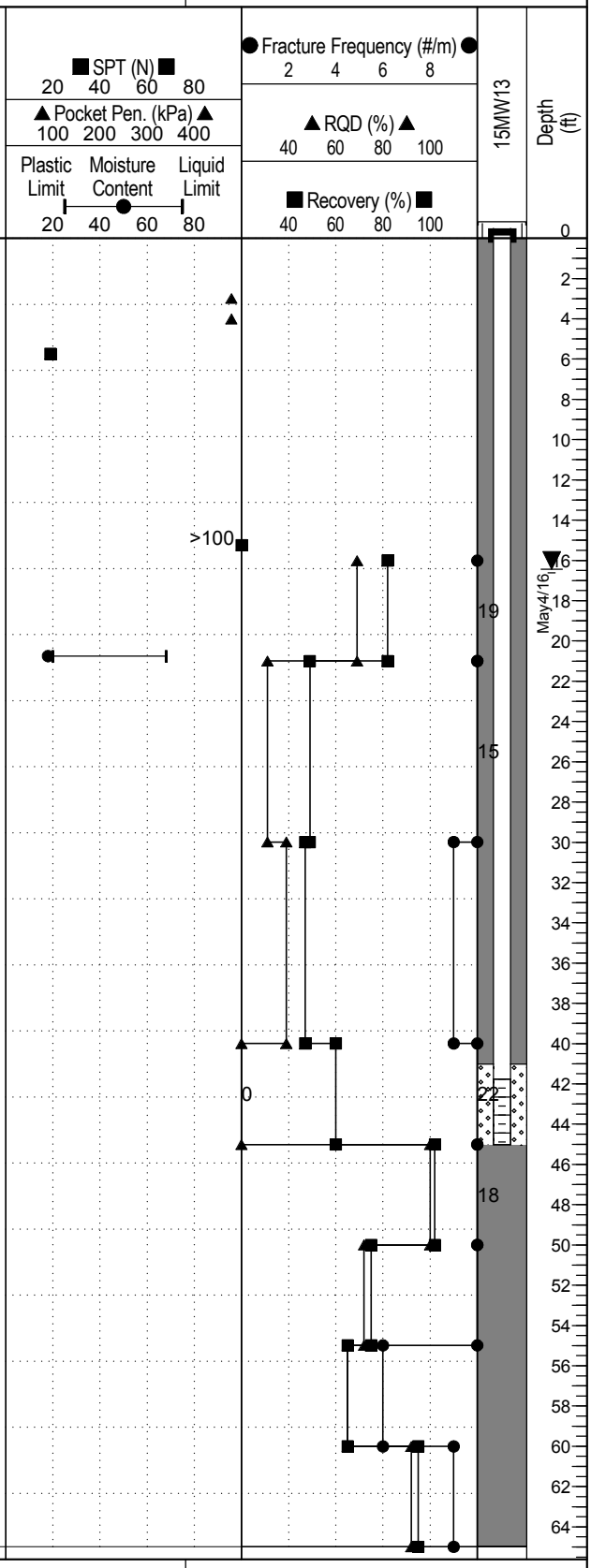
TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 27
Logged By: LQ	Completion Date: 2016 February 27
Reviewed By: CS	Page 2 of 2

Borehole No: **16MW13**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - cultivated at surface, rootlets, damp, brown to black, frozen, (150 mm thick)				
0.3		CLAY AND TOPSOIL - silty, some sand, low plastic, brown, frozen, (300 mm thick)		B1		
0.6	Solid stem auger	CLAY (TILL) - silty, sandy, some gravel, trace cobbles, trace coal, damp to moist, low plastic, brown, trace iron oxide, trace pink inclusions, frozen to 0.80 metres		B2		
0.8		- trace gravel, moist		S1	19	
1.5		- medium plastic		Bulk1		
2.5				B3		
3.0		SANDSTONE - clayey, silty, completely weathered to residual soil, moist, extremely weak, brown, fine sand		B4		
3.7		- at 3.66 m, grey mottling, rust staining		ST1		
4.0		- at 3.96 m, blue grey		B5		
4.6		CLAY SHALE - completely weathered, extremely weak, grey		S2	50/150mm	
5.0		SANDSTONE - clayey, completely weathered, moist, extremely weak, fine to medium sand, interbedded medium strong sandstone, interbedded clay shale - slightly weathered, weak, brown		1		
6.0				C2		17.9
7.6		CLAY SHALE - slightly weathered, very weak, brown		2		
8.5		SANDSTONE - weak, brown, grey mottling, fine sand				
9.1		- at 9.14 m, highly weathered, extremely weak, fine to medium sand, interbedded layers of clay shale - moderately weathered, very weak				
10.5				3		
11.0	Mud Rotary	CLAY SHALE - moderately weathered, moist, weak, grey				
13.0				4		
13.7		- faintly weathered				
14.5				5		
16.0				6		
17.0						
17.5				7		
18.0						
19.0				8		
20						



Contractor: Garritty and Baker	Completion Depth: 19.81 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 25
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 1 of 2

TETRA TECH

Borehole No: **16MW13**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW13	Depth (ft)
20		END OF BOREHOLE (19.81 metres) 50 mm Monitoring well installed to 13.72 metres Stickup = 0.95 metres water - 4.20 metres on May 4, 2016								66
21										68
22										70
23										72
24										74
25										76
26										78
27										80
28										82
29										84
30										86
31										88
32										90
33										92
34										94
35										96
36										98
37										100
38										102
39										104
40										106
										108
										110
										112
										114
										116
										118
										120
										122
										124
										126
										128
										130

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 19.81 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 25
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 2 of 2

Borehole No: **16MW14**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - cultivated at surface, organics, damp, brown to black, white precipitates, frozen, (300 mm thick)				
1	Solid stem auger	CLAY AND TOPSOIL - damp, low plastic, oxide inclusions, white precipitates, frozen, (300 mm thick)				
		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, damp to moist, very stiff, low to medium plastic brown, iron oxide inclusions		B1		
2		- some sand to sandy, moist, medium plastic		B2		
		SILT - sandy, some clay, moist, stiff, brown		Bulk1		
3		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, moist, very stiff, low to medium plastic, brown, grey mottling, iron oxide staining, trace coal inclusions, trace 50 mm diameter silty sand pockets - moist to wet, grey, fine sand		S1	55	
		CLAY SHALE - completely weathered, damp, extremely weak, brown, iron oxide staining		1		
4		SANDSTONE - completely weathered to residual soil, damp to moist, extremely weak, grey, fine to medium sand				
5		CLAY SHALE - slightly weathered, damp to moist, extremely weak, grey, concretions, fossil fragments		C2		13.9
6		- at 5.64 m, weak, dark grey				
7	Mud Rotary	- at 6.25 m, moderately weathered, extremely weak, brown, interbedded layers of sandstone - moderately weathered, extremely weak, grey		2		
8		SANDSTONE - clayey, highly weathered, moist, extremely weak, grey, fine to medium sand, interbedded layers of brown shale to 7.92 metres				
9		CLAY SHALE - highly weathered, extremely weak, grey				
		- at 8.84 m, completely weathered, weak, interbedded light grey				
10				3		
11						
12		- from 12.19 to 12.50 m, damp, medium strong, light grey				
		- at 12.50 m, grey				
13				4		
14						
15		END OF BOREHOLE (15.09 metres)				
		50 mm Monitoring well installed to 4.27 metres				
16		Stickup = 0.77 metres				
		water - 2.93 metres on May 4, 2016				
17						
18						
19						
20						

SPT (N) 20 40 60 80

Pocket Pen. (kPa) 100 200 300 400

Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80

Fracture Frequency (#/m) 2 4 6 8

RQD (%) 40 60 80 100

Recovery (%) 40 60 80 100

16MW14

May4/16

12

Depth (ft)

Contractor: Garritty and Baker	Completion Depth: 14.94 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 23
Logged By: LQ	Completion Date: 2016 February 23
Reviewed By: CS	Page 1 of 1

TETRA TECH

Borehole No: 16BH15

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - cultivated at surface, organics, sandy, roots, moist, brown, frozen, (200 mm thick)				
1	Solid stem auger	SAND AND TOPSOIL - silty, organics, rootlets, brown, frozen, (100 mm thick)		B1		
2		CLAY (TILL) - silty, sandy, trace to some gravel, trace cobbles, damp to moist, very stiff, low plastic, trace iron oxides, frozen, to 0.60 metres		S1	16	
				Bulk1		
		- some white precipitates				
3		- moist, low to medium plastic, trace coal fragments		B2		
		SANDSTONE - clayey, silty, completely weathered to residual soil, extremely weak, blue grey		S2	51	
4		- from 3.05 to 3.51 m, interbedded clay shale layers - highly to completely weathered, very weak, brown		1		
5		- at 4.57 m, highly weathered, moist to wet, extremely weak, blue grey, fine sand				
		- from 4.62 to 5.97 m, interbedded clay shale - highly weathered, medium strong, fractured		2		
6				C3		17.2
7		- at 6.60 m, 6 mm thick fracture filled with completely weathered SANDSTONE at 70°		3		
8	Mud Rotary	CLAY SHALE - moderately weathered, moist, very weak, greyish brown				
		- at 7.72 m, fractured shale at 90°		4		
9		- 8.38 m, 6 mm fractured red shale at 80°				
				C5		27.7
		- 9.53 m, highly weathered shale, 90° fractures				
10		SANDSTONE - clayey, silty, moderately weathered, moist, very weak, grey, dark grey in fractures, fine sand, fossil fragments		5		
		- at 9.68 m, 25 mm thick highly weathered fracture at 90°				
11		CLAY SHALE - slightly weathered, moist, extremely weak, grey				
		- 10.74 m, 6 mm fracture of completely weathered clay shale at 90°		6		
12		- at 10.87 m, very weak, interbedded brown clay shale layers				
		- at 11.58 m, brown				
13		- at 12.50 m, faintly weathered, weak				
				7		
14		- at 14.02 m, grey, 6 mm highly weathered fracture at 50°				
		- at 14.33 m, 6 mm thick highly weathered fracture at 90°				
15						
		END OF BOREHOLE (15.24 metres)				
16		Note: Backfilled at completion.				
17						
18						
19						
20						

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit (20 40 60 80)

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

Backfill

Depth (ft)

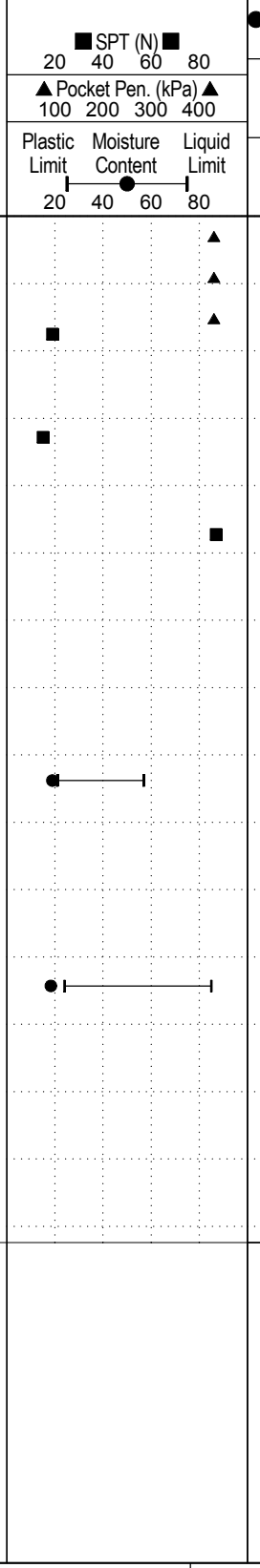
Contractor: Garritty and Baker	Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 27
Logged By: LQ	Completion Date: 2016 February 27
Reviewed By: CS	Page 1 of 1

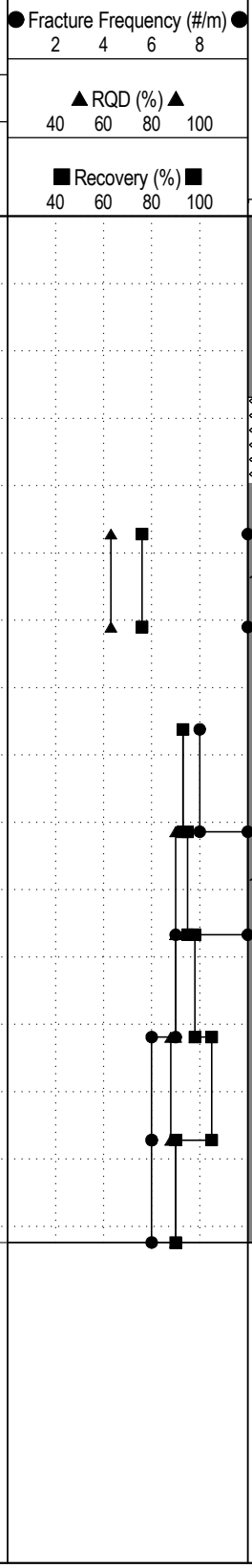
TETRA TECH

Borehole No: **16MW16**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - grass covered, roots, damp, brown to black				
1	Solid stem auger	CLAY (TILL) - silty, sandy, some gravel, trace cobbles, damp to moist, low plastic, brown, coal inclusions, iron oxide inclusions, white precipitates, frozen to 0.80 metres		Bulk1		
2		- moist, medium plastic		S1	19	
				Bulk2		
3		- moist to wet				
				S2	15	
4				Bulk3		
		SANDSTONE - clayey, silty, highly to completely weathered, moist to wet, extremely weak, fine sand		B1		
5				S3	87	
		- at 4.88 m, 12 mm thick interbedded clay shale - moderately weathered, medium strong, brown		1		
6		- at 4.98 m, 100 mm thick concretionary layer - at 5.49 m, 50 mm thick interbedded clay shale - brown - at 5.54 m, medium strong, grey, fine to medium sand				
7		- at 6.03 m, 25 mm thick fractured highly weathered clay shale - at 6.10 m, weak, interbedded clay shale layers		2		
8		- at 6.15 m, interbedded highly weathered clay shale at 90° - at 6.71 m, 150 mm thick interbedded clay shale - highly weathered, very weak, thin fracture at 90°		3		18.9
9	Mud Rotary	- at 7.47 m, 50 mm clay shale - medium strong, brown - at 7.62 m, weak, grey - at 9.07 m, 6 mm thick coal seam				
10		CLAY SHALE - slightly weathered, damp, weak, brown - at 9.63 m, 6 m thick coal seam		4-1		
11		SANDSTONE - clayey, silty, moderately weathered, damp, very weak, blue grey, interbedded clay shale layers - completely weathered, moist, extremely weak, brown				
		- at 10.16 m, 6 mm thick highly weathered sandstone fracture at 90°		4-2		18.3
12		- at 10.56 m, 6 mm fracture at 90°, clay shale in fracture - at 10.82 m, 6 mm fracture filled with sand and clay at 85°				
13		- at 11.20 m, 6 mm thick fracture filled with highly weathered sandstone at 70° - at 11.79 m, 50 mm thick interbedded clay shale - weak, grey		5-1		
14		CLAY SHALE - slightly weathered, moist, weak, grey - from 12.80 to 13.00 m, highly weathered				
15		- at 13.57 m, 25 mm thick highly weathered fracture at 90°		5-2		
16		END OF BOREHOLE (15.24 metres) 51 mm Monitoring well installed to 3.96 metres Stickup - 0.84 metres water - 3.39 metres on May 11, 2016				
17						
18						
19						
20						





May 11/16

Depth (ft): 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 25
Logged By: LQ	Completion Date: 2016 February 25
Reviewed By: CS	Page 1 of 1

Borehole No: **16BH17**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0						
1	Solid stem auger	TOPSOIL - grass covered, roots, moist, brown to black, frozen, (150 mm thick)				
		TOPSOIL AND CLAY - moist, medium plastic, frozen, (300 mm thick)		B1		
		CLAY (TILL) - silty, some sand, trace gravel, trace cobbles, trace coal, moist, low to medium plastic, brown, some white precipitates, frozen to 0.80 metres		S1	15	
2				Bulk1		
		SANDSTONE - clayey, silty, completely weathered to residual soil, moist, extremely weak, brown, iron oxide staining		B2		
3				B3		
				S2	80	
		CLAY SHALE - completely weathered, moist, extremely weak, iron oxide staining		ST1		
4		- at 3.66 m, moderately weathered, damp, medium strong, brown		1		
5		SANDSTONE - clayey, silty, slightly weathered, moist, extremely weak, grey				
		CLAY SHALE - moderately weathered, very weak, grey		2		
6		- at 4.88 m, brown				
		SANDSTONE - completely weathered, moist, extremely weak, blue grey, black staining, interbedded thin brown shale layers, fine sand				
7		- at 6.25 m, 25 mm thick fracture at 90°		3		
		- at 6.48 m, fracture at 70°				
8		- at 7.82 m, interbedded shale - highly weathered, extremely weak, grey		4		
		- at 7.98 m, grey				
9	Mud Rotary	CLAY SHALE - highly weathered, damp, extremely weak, grey				
		- at 8.23 m, fractured at 70°				
10		- at 8.76 m, 6 mm thick fracture at 80°		5		
11						
		- brown				
12		- weak				
				6		
13				C6		23.5
14						
		- at 14.15 m, 6 mm thick highly weathered fractures at 50°		7		
		- at 14.22 m, 25 mm highly weathered fracture at 90°				
15		- at 14.83 m, 6 mm thick highly weathered fractures at 70°				
		END OF BOREHOLE (15.24 metres)				
16		Note: Backfilled at completion.				
17						
18						
19						
20						

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit (20 40 60 80)

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

Backfill: 22 | 11 | 16

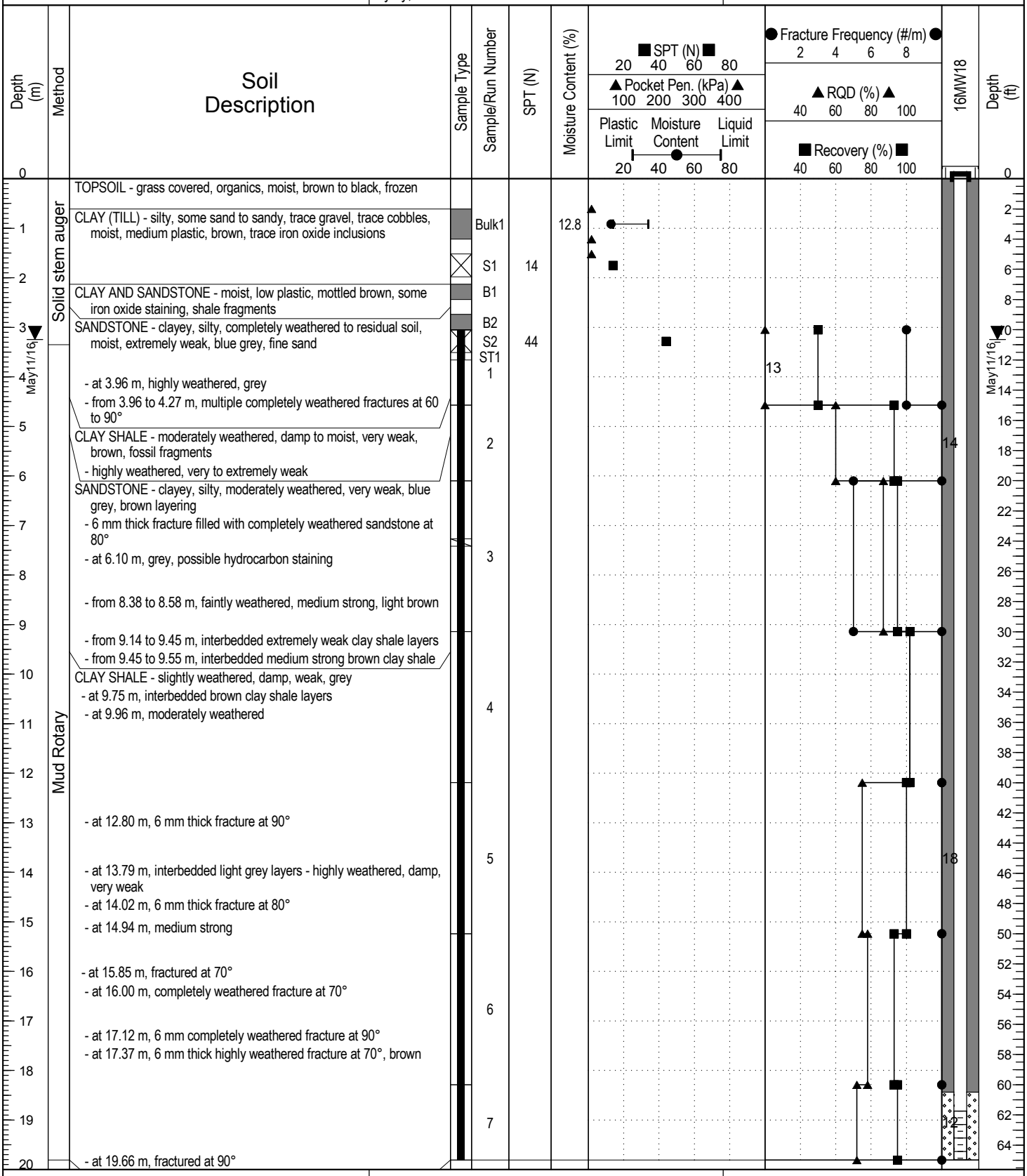
Depth (ft): 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 27
Logged By: LQ	Completion Date: 2016 February 28
Reviewed By: CS	Page 1 of 1

Borehole No: **16MW18**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	



Contractor: Garritty and Baker	Completion Depth: 19.81 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 29
Logged By: LQ	Completion Date: 2016 February 29
Reviewed By: CS	Page 1 of 2

TETRA TECH

Borehole No: **16MW18**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	16MW18	Depth (ft)
20		END OF BOREHOLE (19.81 metres) 51 mm Monitoring well installed to 19.81 metres Stickup = 0.75 metres water - 3.25 metres on May 11, 2016								66
21										68
22										70
23										72
24										74
25										76
26										78
27										80
28										82
29										84
30										86
31										88
32										90
33										92
34										94
35										96
36										98
37										100
38										102
39										104
40										106
										108
										110
										112
										114
										116
										118
										120
										122
										124
										126
										128
										130

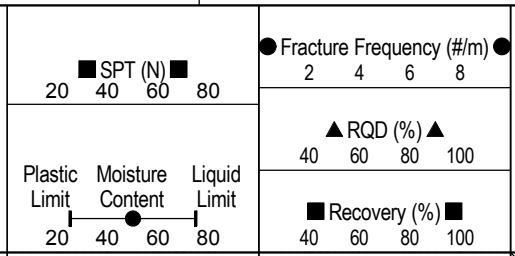
TETRA TECH

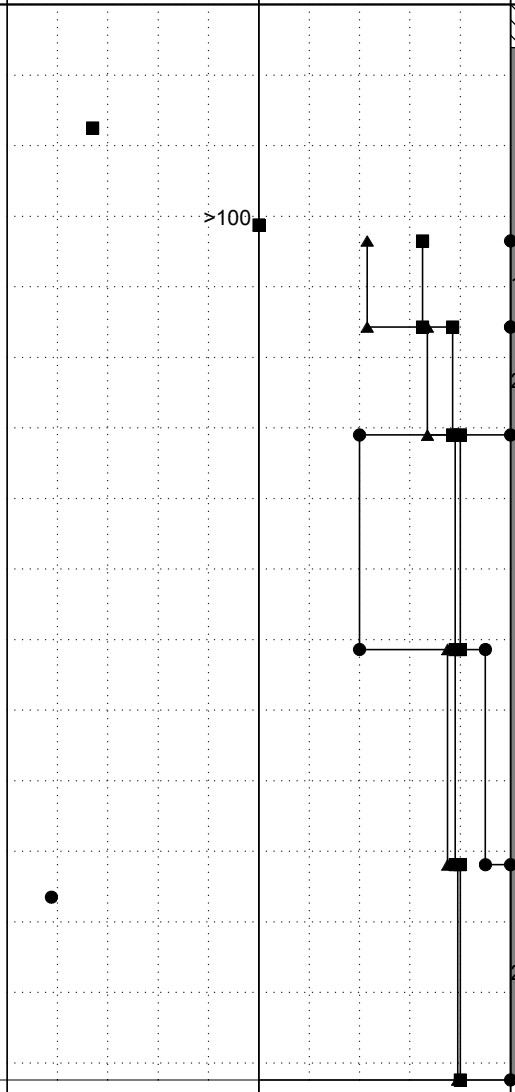
Contractor: Garritty and Baker	Completion Depth: 19.81 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 29
Logged By: LQ	Completion Date: 2016 February 29
Reviewed By: CS	Page 2 of 2

Borehole No: **16BH19**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	Backfill	Depth (ft)
0								0
1	Solid stem auger	TOPSOIL - grass covered, damp, brown, frozen, (200 mm thick)						2
		CLAY AND TOPSOIL - silty, some sand, trace gravel, damp, low plastic, brown, frozen, (260 mm thick)		B1				4
2		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, trace coal, damp to moist, very stiff, low plastic, trace iron oxides, trace pink inclusions, white precipitates, frozen to 1.00 metres		S1	34			6
				B2				8
		CLAY AND SAND - mottled, iron oxide staining						
3		SANDSTONE - clayey, silty, completely weathered to residual soil, moist, extremely weak, grey		B3				10
				S2	50			
		- at 3.05 m, damp		ST1	/150mm			12
		- at 3.10 m, weak						
4		- at 3.35 m, interbedded thick layers of moderately weathered shale, fracture at 80-90°		1			18	14
5		- 3.48 m, medium strong, medium sand						16
		- at 3.51 m, 75 mm thick medium strong brown clay shale		2			26	18
		- from 3.58 to 3.71 m, fractures at 80° to 90°						
6		- at 5.54 m, fractured at 90°						20
		- at 5.64 m, fracture at 80°						22
7		CLAY SHALE - highly weathered, very weak		J1				24
		- from 6.30 to 6.43 m, highly weathered, fractures at 80°						
8		SANDSTONE - clayey, silty, moderately to highly weathered, very weak, blue grey, brown and black layers		3				26
		- 7.47 m, 12 mm fractures						
	Mud Rotary	CLAY SHALE - highly weathered, damp, very weak, grey		J2				28
9								30
		- at 9.30 m, brown						
10								32
		- at 10.36 m, fractured at 80°		4				34
11								36
								38
12								40
		- at 12.50 m, 6 mm thick highly weathered fractures at 90°		C5		17.6		42
13		- at 13.08 m, 6 mm thick highly weathered fractures at 90°						44
		- at 13.44 m, 6 mm thick highly weathered fracture at 60°		5			25	
14								46
		- at 44.22 m, 12 mm thick highly to completely weathered fracture at 80°						48
15								50
		END OF BOREHOLE (15.24 metres)						52
16		Note: Backfilled at completion.						54
17								56
								58
18								60
19								62
20								64





Contractor: Garritty and Baker		Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig		Start Date: 2016 February 29
Logged By: LQ		Completion Date: 2016 March 1
Reviewed By: CS		Page 1 of 1

TETRA TECH

Borehole No: **16BH20**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0						
1	Solid stem auger	TOPSOIL - grass covered, roots, damp, brown to black, frozen, (150 mm thick)				
		TOPSOIL AND CLAY - silty, some sand, trace gravel, organics, rootlets, low plastic, brown, (300 mm thick)		B1		
				B2		
2		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, trace coal, damp to moist, low plastic , trace iron oxide, white precipitates, frozen to 1.00 metres		S1	19	
		- moist		B3		
3		SANDSTONE - silty, clayey, completely weathered to residual soil, moist, extremely weak, brown, iron oxide staining		B4		
		- at 2.59 m, blue grey, mottled clay		S2	50 /100mm	
4				1		
		- at 4.27 m, moderately weathered, interbedded clay shale - moderately weathered, weak, brown				
5		- at 4.77 m, 25 mm thick clay shale - moderately weathered, medium strong, brown		2		
		- from 4.83 to 4.90 m, interbedded clay shale - highly to completely weathered, extremely to very weak				
6		- at 4.98 m, 25 mm thick fracture at 90°		3		
7		- at 5.21 m, fracture at 60°				
		- at 5.54 m 50 mm thick interbedded shale - moderately weathered, medium strong, brown				
8		- from 6.48 to 6.50 m, black staining, oily sheen		4		
	Mud Rotary	CLAY SHALE - moderately weathered, very weak, grey				
9		- at 6.71 m, 6 mm fracture at 90°				
		- from 6.88 to 7.62 m, highly weathered with multiple fractures				
10		- at 7.62 m, highly to completely weathered, brown, multiple fractures at 90°				
		SANDSTONE - moderately weathered, medium strong, fine to medium sand		5		
11		SANDSTONE AND CLAY SHALE - interbedded, Sandstone - moist, very weak, blue grey, Clay shale - damp, very weak to medium strong, brown				
		- at 8.84 m, brown staining				
12		SANDSTONE - silty, moderately weathered, moist, very weak, grey, brown staining, fractures at 80-90°, medium sand, fossil fragments		C6		22.5
13		- from 10.01 to 10.06 m, brown to black staining				
		CLAY SHALE - slightly weathered, moist, very weak, grey		6		
14		- at 10.67 m, brown layers				
		- at 10.97 m, brown				
		- from 10.97 to 12.19 m, highly weathered				
15		- at 12.19 m, moderately weathered, weak, brownish grey				
		- at 12.50 m, fracture at 75°				
16		- at 12.80 m, fracture at 70°				
		- at 13.72 m, fracture at 75°				
17		- at 14.02 m, grey				
		- at 14.96 m, fracture at 80°				
		- at 15.01 m, fracture at 80°				
18		END OF BOREHOLE (15.24 metres)				
		Note: Backfilled at completion.				
19						
20						

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

>100

13

12

13

11

12

Backfill

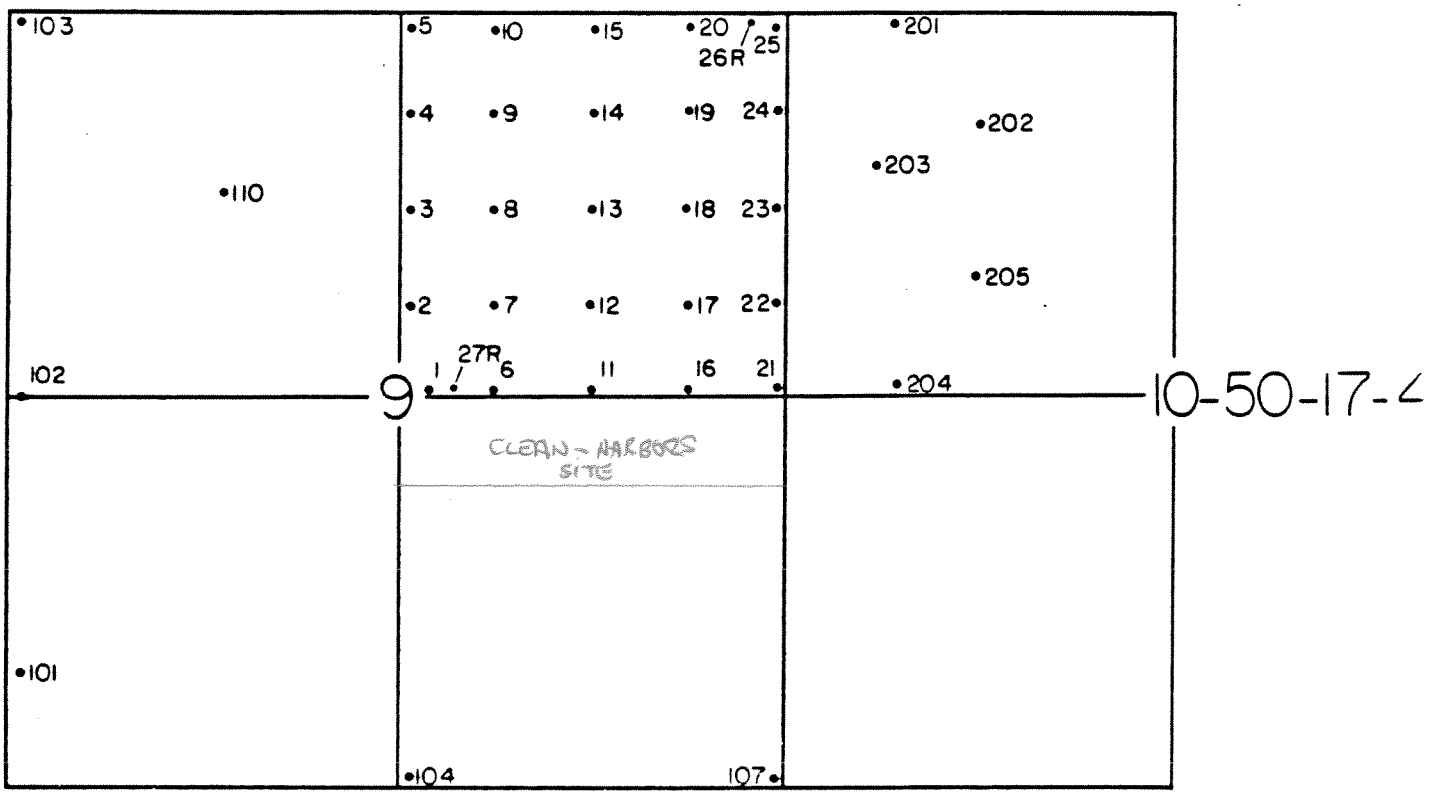
Depth (ft)

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 28
Logged By: LQ	Completion Date: 2016 February 28
Reviewed By: CS	Page 1 of 1

Figure 4.1 TEST HOLE LOCATION PLAN
RYLEY AREA



NOTES: All test holes drilled by dry auger except 26R and 27R (Rotary)

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 1

0 - 0.2	Soil development on till.
0.2 - 3.0	Till, brown mottled with orange, coal fragments, oxidized pebbles, abundant salts down to 1.8 m, CL-L, firm to stiff, slightly moist.
3.0 - 3.2	Shale, dark brown, heavily weathered and oxidized, SiC, slightly moist.
3.2 - 4.0	Shale, dark grey, unweathered, SiC, dense, slightly moist.
4.0 - 4.3	Shale, dark grey becoming green glauconitic sandstone, clayey, with depth, CL, slightly moist.
4.3 - 4.6	Sandstone, dark grey (ash grey when drilled), hard, dry - underlain by light brown concretionary layer.
4.6 - 5.5	Sandstone becoming more glauconitic with depth, minor brown silty clay, SCL texture 4.9 - 5.5 m, moist.

Some moisture noted at the above horizon.

5.5 - 5.8	Sandstone, glauconitic passing down into a brown silty shale, CL, firm, slightly moist.
5.8 - 6.2	Sandstone, dark grey-green, cemented hard ledge, probably overlain and underlain by light brown concretionary horizons.
6.2 - 7.0	Shale, brown, clayey becoming more glauconitic, green sandstone, minor clay, slightly bentonitic (SCL) with depth, slightly moist.
7.0 - 8.5	Sandstone, moderately glauconitic, clayey, bentonitic, CL, slightly moist.
8.5 - 9.3	Sandstone, glauconitic passing down into a brown shale, CL, slightly moist.
9.3 - 10.1	Shale, dark brown-grey, lightly streaked with glauconitic sand, carbonaceous streaks, SiC, dry.
10.1 - 12.2	Shale, dark brown-grey, streaked with grey sand, slightly glauconitic, some carbonaceous materials, minor nautiloid fragments, CL, dense, dry.
12.1 - 16.2	Shale, dark brown-grey, slightly bentonitic and minor nautiloid fragments 14.6 - 16.2 m, SiC-C, dry.
16.2 - 17.7	Shale, dark grey-brown, SiC-C, dry.
17.7 - 23.8	Shale, dark grey, SiC-C, dry.

Hole left overnight open to 20.7 m. Water in hole next morning.

23.8 - 25.3	Shale, dark grey-brown, minor siliceous layer, slightly bentonitic, minor nautiloid fragments 24.7 - 25.3 m, SiC-C, dry.
25.3 - 29.9	Shale, dark grey, SiC, dry.
29.9 - 30.9	Shale, dark grey, lightly spotted with dark green glauconite, sandy, SiC, dry.
30.9 - 31.4	Shale, light brown-grey, SiC, dry.

Water in Hole on Completion

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 2	
0 - 0.3	Topsoil, dark brown, dry, loose.
0.3 - 1.0	Till, brown, salts, hard.
1.0 - 1.5	Till, hard, dry, salts, brown.
1.5 - 2.4	Till, stiff, slightly moist to moist, brown to dark brown, salts, coal fragments.
2.4	Oxidized horizon.
2.4 - 4.0	Till, brown - dark brown, stiff, slightly moist to moist, CL, large coal fragments, some Fe oxides.
4.0 - 4.6	Sand, fine to medium grained, dark olive brown, loose, slightly moist to moist, SCL.
4.6 - 5.5	Sand, soft, bright blue-green, strongly glauconitic, SCL-CL, dense, slightly moist to moist, thin interbeds of dark grey-brown shale (clay).
5.5 - 5.8	Sandstone, hard (consolidated), dark green, glauconitic.
5.8 - 6.4	Sand, very fine grained, glauconitic, argillaceous, SL-SCL, with thin interbeds of dark brown clay (shale).
6.4 - 7.0	Same as before, only alternating beds of sand and clay (same amount of each).
7.0 - 7.6	Sand, very fine grained, argillaceous, fine-grained, glauconitic, green-grey, dense, slightly moist, SCL-CL grading to:
7.6 - 8.5	Shale, sandy, glauconitic, green, grey, dense, slightly moist, CL.
8.5 - 9.3	Shale, same as before, interbedded with thin glauconitic sands, slightly moist.
9.3 - 9.8	Sandstone, soft, light grey-green glauconitic, very fine grained, slightly moist, loose, SCL.
9.8 - 10.1	Same as before, interbedded with brown shale.
10.1 - 11.6	Interbedded light grey, very fine grained sandy shale, brown shale, carbonaceous streaks. Minor amber at 10.7 m.
11.6 - 13.1	Shale, dark grey, dry to slightly moist, dense, minor fossil fragments.
13.1 - 14.6	Shale, grey brown and grey, dry to slightly moist, dense, minor brown bentonite at 14.3 m.
14.6 - 16.2	Shale, dark green-grey, dry to slightly moist, dense, minor fossil fragments.
16.2 - 17.7	Shale, dark green-grey, dry to slightly moist, dense.
17.7	Bentonite horizon, ivory and grey, waxy.
17.7 - 18.3	Shale, same as before.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 3	
0 - 0.5	Till, C-CL, abundant salts, stiff, dark brown.
0.5 - 1.0	Till, brown, oxidized, stiff, CL.
1.0 - 2.3	Till, brown to olive brown, oxidized, slightly moist to moist, stiff, CL.
2.3 - 2.4	Till and sandstone (loose, unconsolidated), mixed.
2.4 - 2.7	Sandstone, weathered, loose, olive brown, fine to medium grained, slightly moist, SL-SCL.
2.7 - 3.0	Sandstone, same as before, dark blue-grey, bentonite streaks.
3.0	Concretionary layer.
3.0 - 3.7	Sandstone, same as before, brown clay bands, glauconite.
3.7 - 4.0	Sandstone, consolidated, dark green-grey.
4.0 - 4.6	Sandstone, glauconitic, fine grained, dense, soft, slightly moist, with interbedded bentonite and hard consolidated brown siltstone (?) layers.
4.6 - 5.5	Sandstone, fine-grained, glauconitic, dark brown clay bands, slightly moist, dense, soft, grading to shale, sandy glauconitic, brown.
5.5 - 6.7	Sandstone argillaceous, very fine grained CL, slightly moist, dense, dark green-grey to dark brown-grey.
6.7 - 7.0	Shale, very fine grained, dark brown, slightly moist.
7.0 - 8.5	Shale, dark brown, very fine grained, sandy, CL, SiCL, minor thin interbeds of glauconitic fine grained sands, minor fossil fragments, slightly moist.
8.5 - 9.0	Sandstone, light grey, fine grained, slightly moist, dense, slightly moist, SCL.
9.0 - 9.8	Interbedded sandstone, same as before and brown sandy shale, slightly moist.
9.8 - 10.1	Shale, sandy, dark brown CL, slightly moist.
10.1 - 11.6	Shale, grey-brown, dense, dry to slightly moist, SiC, minor fossil fragments.
11.6 - 13.1	Shale, brown, dense, dry-slightly moist.
13.1 - 14.6	Shale, grey-brown, dense, dry to slightly moist, fossil fragments (nautiloid flakes).
14.6 - 16.2	Shale, grey, dense, dry to slightly moist.
16,2 - 18.3	Shale, same as before, rare fossil fragments

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 4	
0 - 0.3	Topsoil, dark brown, clay, stiff.
0.3 - 0.6	Lacustrine clay, brown, stiff.
0.6 - 0.9	Till, gleyed and oxidized, salts, CL, slightly moist to moist.
0.9 - 2.1	Till, dark brown, salts and coal fragments, very stiff, slightly moist to moist.
2.1 - 2.7	Sandstone, dark olive green, fine to medium grained, SL-SCL, loose, slightly moist to moist.
2.7 - 3.0	Sandstone, dark blue-grey, fine to medium grained, minor bentonite, SL-SCL, loose, slightly moist.
3.0 - 3.4	Sandstone, glauconitic, abundant bentonite, fine grained, SCL-CL, slightly moist.
3.4	Bentonite horizon, dark brown hard.
3.4 - 4.4	Sandstone, glauconitic, fine-grained, abundant brown bentonite, SLC-CL, firm, slightly moist.
4.4 - 4.6	Sandstone, grey, fine-grained consolidated, dry.
4.6 - 5.5	Sandstone, dark grey-green, glauconitic, abundant brown bentonite horizon, argillaceous, SCL-CL, firm, slightly moist.
5.5 - 7.0	Sandstone, dark green-grey, glauconitic, argillaceous (CL) grading downward to dark grey brown sandy CL-SiCL shale, all materials dense, slightly moist.
7.0 - 7.6	Shale, dark brown, nautiloid fragments, slightly moist.
7.6	Sandstone, dark green-grey, fine to medium grained, loose, slightly moist.
7.6 - 8.1	Shale, dark brown, nautiloid fragments.
8.1 - 8.5	Shale, dark brown, carbonaceous with interbeds of green-grey loose sandstone, nautiloid fragments, slightly moist.
8.5 - 8.8	Shale, dark brown, carbonaceous, dry.
8.8 - 9.1	Sandstone, blue-grey, CL, dense, slightly moist.
9.1 - 10.1	Shale, dark brown-grey, sandy, CL-SiCL, firm, dry to slightly moist.
10.1 - 11.3	Shale, dark grey, minor nautiloid fragments, dry to slightly moist.
11.3 - 11.6	Shale, dark grey-brown, dry to slightly moist.
11.6 - 13.1	Shale, dark brown-grey, rare nautiloid fragments, dry to slightly moist.
13.1 - 14.6	Shale, dark grey, minor nautiloid fragments, very dense, dry to slightly moist.
14.6 - 16.2	Shale, dark brown-grey, common nautiloid fragments, dense, dry to slightly moist.
16.2 - 18.3	Shale, dark greenish-grey, minor nautiloid fragments, dry to slightly moist.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 5

0 - 0.9	Till, brown, weathered, chert pebbles, salts, L, stiff, frozen.
0.9 - 2.4	Till, dark brown mottled with orange, weathered, salts down to 2.1 m, coal fragments, L-CL, firm-stiff, slightly moist.
2.4 - 2.9	Till, dark brown, weathered, increasing shale content with depth, 2 cm wide limonite weathered zone near contact, CL-SiC, stiff, slightly moist.
2.9 - 3.4	Sandstone, green to orange, weathered, fine grained, firm, slightly moist.
3.4 - 3.5	Sandstone, dark grey, cemented, hard ledge, dry.
3.5 - 6.1	Sandstone, clayey, glauconitic, unweathered, grading downward to a silty shale with depth. Glauconitic sand content decreasing, SCL-CL-SiC, firm, slightly moist.
6.1 - 6.7	Shale, dark brown, no glauconite or evidence of weathering, SiC, dense, stiff, slightly moist.
6.7	Siliceous siltstone, light brown, 2 cm thick, hard, dry.
6.7 - 7.0	Shale, dark brown, SiC, dense, slightly moist.
A little moisture noted on the augers.	
7.0 - 7.6	Shale, dark brown, becoming increasingly sandy and glauconitic with depth, minor carbonaceous material, CL.
7.6	Sandstone, green, glauconitic, abundant carbonaceous material, large nautiloid fragments, minor clay content, CL-SCL.
7.6 - 8.5	Sandstone, green, glauconitic, minor clay content, SCL.
8.5	Sandstone, dark grey, some black specks, minor ledge, poorly cemented.
8.5 - 8.8	Shale, dark brown streaked with minor green glauconitic sand grains, minor carbonaceous material and nautiloid fragments, SiC-CL, stiff, slightly moist.
8.8 - 9.4	Shale, dark brown (no glauconite), SiC, slightly moist to dry.
9.4 - 9.8	Shale, dark brown lightly streaked with glauconitic sand grains, SiC-CL, slightly moist.
9.8 - 10.7	Shale, dark grey, SiC, slightly moist to dry.
10.7 - 13.1	Shale, dark brown-grey, slight buffish tinge 11.9 - 12.2 m, minor nautiloid fragments at 13.0 m, SiC, dense, dry.
13.1 - 14.6	Shale, dark grey, slight white bentonite at 14.6 m, SiC-C, dense, dry.
14.6 - 18.3	Shale, dark grey - slightly brown, SiC-C, dense, dry.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 6	
0 - 0.3	Lacustrine, C, dark grey-brown, stiff, salts.
0.3 - 1.0	Lacustrine, C-CL, moist, stiff, brown, salts.
1.0	Till, minor selenite.
1.0 - 2.1	Till, stiff, CL, slightly moist to moist, brown, Fe oxides.
2.1 - 3.0	Sand, olive, fine to medium grained, slightly moist to moist, SCL-CL, stiff.
3.0 - 3.3	Sand, same as before, dark blue-grey.
3.3 - 4.3	Sand, same as before, dark grey-green, glauconitic, purplish brown clay bands (bentonite?).
4.3	Hard layer, consolidated brown shale.
4.3 - 5.5	Interbedded fine-grained glauconitic, green sand, slightly moist, SCL-CL, and purple brown clay, slightly moist (equal amounts of each).
5.5 - 6.6	Shale, very fine grained sandy glauconitic, dark green-brown, slightly moist, CL, dense.
6.6 - 7.0	Shale, dark brown, dry to slightly moist, dense.
7.0 - 9.1	Sand, fine grained, green-grey, SCL, slightly moist, interbedded with chocolate brown carbonaceous shale, slightly moist. Fossil fragments at 8.5 m.
9.1 - 9.6	Sand, very fine grained, light grey, slightly moist, SCL.
9.6	Same as before, grading to brown shale.
9.6 - 10.1	Shale, brown, dry to slightly moist, dense.
10.1 - 11.6	Shale, brown to grey-brown, dry to slightly moist, dense, minor fossil fragments.
11.6 - 13.0	Shale, brown, dry to slightly moist, dense.
13.0 - 13.1	Hard layer, siliceous, very dark grey to black quartzite.
13.1 - 14.6	Shale, grey-brown, dry to slightly moist, dense.
14.6 - 15.8	Shale, grey, brown-grey, dry to slightly moist, dense.
15.8	Bentonite horizon, ivory and grey, waxy.
15.8 - 16.2	Shale, same as before.
16.2 - 18.3	Shale, same as before, greenish-grey.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 7	
0 - 0.3	Lacustrine, C, dark grey.
0.3 - 1.4	Lacustrine, C and SiC, brown, moist, stiff.
1.4 - 1.7	Glaciofluvial sand and dirty gravel, slightly moist to moist, strongly oxidized, brown, SCL.
1.7 - 2.4	Till, dark grey-brown, stiff, CL, slightly moist, moist.
2.4 - 3.3	Sand, argillaceous, dense, slightly moist to moist, fine to medium grained SCL, dark olive brown.
3.3 - 4.3	Sand, dark blue-grey grading to dark blue-green glauconite, purplish brown clay bands, SCL, dense, slightly moist to moist. Sample at 12'.
4.3 - 4.4	Sandstone, dark grey-green, consolidated.
4.4 - 4.6	Sandstone, soft.
4.6	Concretionary layer.
4.6 - 4.9	Sandstone, argillaceous, dense, glauconitic, fine grained, dark grey-green, slightly moist, SCL-CL, minor dark brown clay bands.
4.9 - 5.5	Same as before with thick dark purple-brown clay bands.
5.5	Hard layer, consolidated dark brown shale.
5.5 - 6.0	Sandstone, argillaceous, CL.
6.0 - 7.0	Sandstone, argillaceous, grading to sandy shale, dark green-grey, very fine grained, CL, dense, slightly moist.
7.0 - 7.6	Shale, dark brown-grey, dense, slightly moist, SiC.
7.6 - 7.9	Shale, dark brown, carbonaceous, slightly moist.
7.9 - 9.4	Shale and sandstone, dark brown carbonaceous shale thinly interbedded with glauconite, very fine grained SCL-CL sand. Minor fossil fragments.
9.4 - 9.8	Sand, light green-grey, very fine grained, dense, SCL.
9.8 - 10.1	Shale, grey, moist, soft, C-SiC.
10.1 - 11.6	Shale, grey and grey-brown, dense, dry to slightly moist, minor fossil fragments.
11.6 - 14.6	Shale, brown, grey-brown, dry to slightly moist, dense.
14.6 - 15.8	Shale, same as before, dark grey.
15.8	Bentonite horizon, ivory & grey, waxy.
15.8 - 18.3	Shale, same as before.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 8	
0 - 0.3	Topsoil, reddish brown, dry, silty, sandy.
0.3 - 1.0	Till, brown, dry, salts, hard.
1.0 - 1.7	Till with interbedded lacustrine silt and sand.
1.7	Shale, brown, minor lignite.
1.7 - 2.4	Shales and interbedded CL, sandstone. Weathered olive brown and brown, slightly moist to moist, firm, dense, Disturbed.
2.4 - 3.0	Shale, weathered, with numerous pebbles, quartzitic.
3.0	Oxidized horizon, very abundant Fe oxides, heavy rust.
3.0 - 3.6	Sandstone, dark olive, dense, SCL-CL, slightly moist.
3.6 - 4.0	Sandstone, dark blue-grey.
4.0 - 5.2	Sandstone, slightly moist to moist, very fine to fine-grained, dense, bentonitic, dark grey-green, highly glauconitic, interbedded dark purple-brown clay (bentonite?), SL-SCL, loose.
	Recovered wet sluff at top of auger.
5.2 - 5.5	Consolidated layer, concretion?, light brown.
5.5 - 6.2	Sandstone, glauconitic, soft, interbedded with consolidated layers of fine-grained dark green-grey sandstone and brown shale.
6.2 - 7.0	Sandstone, soft, glauconitic with interbedded chocolate brown shale? horizons, very fine grained. Grades to shale, sandy glauconitic at 7.0 m.
7.0	Hard layer, concretion.
7.0 - 8.5	Sandstone argillaceous, or shale, sandy (CL), dense, slightly glauconitic, dark green-brown and green-grey, slightly moist.
8.5 - 9.1	Shale, dark brown, thin interbeds of grey-green glauconitic sand.
9.1 - 10.1	Shale, deep brown, carbonaceous, dense, dry to slightly moist.
10.1 - 10.4	Shale, same as before, abundant fossil fragments.
10.4 - 10.7	Sandstone, very fine grained, light green-grey, slightly moist, CL.
10.7 - 11.6	Shale, sandy, brown with light grey streaks, CL, slightly moist.
11.6 - 13.1	Shale, dark brown-grey, dry to slightly moist, dense, fossil fragments.
13.1 - 13.7	Shale, same as before, no fossil fragments.
13.7 - 14.6	Shale, same as before, dark brown.
14.6 - 18.3	Shale, dark greenish grey, dense, dry to slightly moist.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 9

0 - 1.0	Lacustrine, C, dark grey-brown, gleyed with oxidized patches, very stiff, slightly moist.
1.0 - 2.3	Till, brown to grey-brown, CL, pebbles, slightly moist to moist.
2.3	Oxidized horizon, rusty, Fe oxides.
2.3 - 2.4	Bedrock, sand.
2.4 - 3.4	Sand, fine to med. grained, slightly moist, loose, dark olive, oxidized patches, SL-SCL.
3.4 - 4.0	Sand, dark blue grey, bentonitic, slightly glauconitic, brown clay streaks, SCL, slightly moist, loose to stiff.
4.0	Hard band.
4.0 - 4.7	Sandstone, argillaceous, glauconitic, fine grained, dark grey-green with brown bentonite stringers, SCL-CL, slightly moist, soft.
4.7 - 5.2	Sandstone, partially cemented, hard, dry, greenish grey, fine grained.
5.2 - 5.5	Sandstone, soft, glauconitic with hard brown bentonite stringers.
5.5 - 7.0	Shale, very fine grained sandy, dark grey-green, dense, slightly moist, brown bentonite stringers, CL.
7.0 - 7.3	Shale, same as before, abundant fossil fragments.
7.3 - 8.5	Shale, grey brown, slightly moist, dense, SiC.
8.5 - 8.8	Shale, sandy, grey brown.
8.8 - 10.1	Sandstone, argillaceous to sandy shale, brown-grey, very fine grained, brown carbonaceous stringers, slightly moist to moist, SCL-CL.
Note: Minor moisture in hole.	
10.1 - 10.4	Shale, brown-grey, slightly moist.
10.4 - 11.6	Shale, grey-brown to brown, dry to slightly moist, very dense, fossil fragments.
11.6 - 13.1	Shale, brown to brown-grey, dry to slightly moist, very dense.
13.1 - 15.8	Shale, grey, brown-grey, dry to slightly moist, very dense.
15.8	Bentonite horizon, ivory and grey, waxy.
15.8 - 16.2	Shale, same as before.
16.2 - 18.3	Shale, grey, dense, dry to slightly moist, rare fossil fragments.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 10	
0 - 0.3	Dark brown Topsoil.
0.3 - 0.6	Lacustrine, C, dark grey, very stiff, slightly moist to moist, salts.
0.6 - 1.0	Lacustrine, C, brown, slightly moist to moist, very stiff.
1.0 - 1.4	Lacustrine, C-SiC, sandy streaks, salts, stiff, moist, dark grey and brown mottled.
1.4 - 2.6	Till, CL, dark grey and brown, minor Fe oxides, slightly moist to moist, stiff.
2.6	Hard layer - oxidized zone, hard Fe oxides.
2.6 - 3.2	Sand, dark olive, SL-SCL, fine-grained, moist.
3.2 - 4.0	Sand, blue-grey grading to green-grey (glauconitic), very fine grained, SL-SCL, with bentonite stringers and brown clay bands, moist.
4.0 - 5.2	Interbedded very fine grained glauconitic grey-green sand and dark brown shale, dense, slightly moist to moist. CL, hard, dry interbeds.
5.2 - 5.5	Sand, argillaceous, very fine grained, slightly moist, SL-SCL, grey.
5.5 - 6.1	Shale, very fine grained sandy, greenish-grey, slightly moist, CL.
6.1 - 7.0	Shale, SiC, brown, dense, slightly moist.
7.0 - 7.6	Sandstone, fine-grained, green-grey, SL-SCL, dark brown carbonaceous streaks and sands, slightly lignitic, slightly moist to moist, dense.
7.6 - 8.5	Shale, sandy, dark brown, slightly moist, CL.
8.5 - 10.1	Shale, sandy dark brown, thin grey-green, very fine grained sandy interbeds, CL, slightly moist, abundant fossil fragments.
10.1 - 11.6	Shale, dark brown SiC, dry to slightly moist, dense.
11.6 - 11.9	Shale
11.9	Concretion layer.
11.9 - 13.1	Shale, dark brown or grey (poor light), dense, dry to slightly moist.
13.1 - 14.8	Shale, dark, dense, dry - slightly moist.
14.8	Bentonite horizon, ivory and grey, waxy.
14.8 - 18.3	Shale, dark, dense, dry to slightly moist, rare fossil fragments.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 11

0 - 0.6	Lacustrine, dark brown, silty clay, stiff.
0.6 - 0.9	Sand and pebbles, rusty, fine to coarse grained, SL-SCL, slightly moist.
0.9 - 1.4	Till, brown, sandy streaks, CL, stiff.
1.4 - 2.4	Till, coal fragments, CL-C, very stiff, slightly moist.
2.4 - 2.9	Shale, brown, C, very stiff, moist.
2.9 - 3.2	Shale, dark grey, unweathered, very stiff, slightly moist.
3.2 - 4.0	Shale, sandy, glauconitic, CL, grading to sandstone, dark grey-green, glauconitic, argillaceous, SCL, moist.
Water in hole.	
4.0 - 5.5	Sandstone, grey-green, glauconitic, fine to medium grained, SCL-CL, increasing bands of bentonite with depth, stiff, moist.
5.5 - 6.7	Sandstone - shale, interbedded, glauconitic, CL, dense, slightly moist to moist. Indurated horizons at 6.4 and 6.7 m depth.
6.7 - 7.6	Shale, greenish-grey, slightly glauconitic, sandy, stiff, slightly moist.
7.6 - 10.1	Shale, dark brown, rare fossil fragments 8.5 - 10.1 m, dense, dry to slightly moist.
10.1 - 11.3	Sandstone, grey-green, slightly glauconitic, SCL-CL, numerous thin interbeds of dark brown carbonaceous shale, abundant fossil fragments at 11.3 m, dense, slightly moist to moist.
11.3 - 11.6	Shale, brown, dense, dry to slightly moist.
11.6 - 14.5	Shale, grey to brown-grey, dense, dry to slightly moist.
14.5 - 14.6	Hard layer, bentonite? free water.
14.6 - 15.2	Shale, dark grey, very dense and stiff, dry to moist, wet 17.1 - 17.7 m, hard layers at 17.1 and 17.7 m depth.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 12	
0 - 0.5	Till, grey-brown, abundant iron oxides, very stiff.
0.5 - 0.9	Till, olive brown, CL-C, very stiff.
0.9 - 1.7	Till, grey-brown, C, very stiff.
1.7 - 2.4	Sandstone, olive brown, fine to medium grained, CL grading to SCL, loose, moist.
2.4 - 3.0	Sandstone, blue-green, glauconitic, unweathered, fine to medium grained, abundant brown bentonite, moist.
3.0 - 3.2	Sandstone, hard layer.
3.2 - 4.0	Sandstone, dark green-grey, glauconitic, fine grained, argillaceous, interbedded with dark brown (bentonitic?) clay horizons, SCL-CL, dense, slightly moist.
4.0 - 5.5	Sandstone - shale, dark green-grey, slightly glauconitic, CL, dense, slightly moist to moist. Indurated horizon at 5.0 m.
5.5 - 6.1	Shale, green-brown, slightly glauconitic, sandy, dense, slightly moist.
6.1 - 7.0	Shale, brown, dense, dry to slightly moist.
7.0 - 8.4	Shale, dark brown, sandy CL-SiCL, dense, dry to slightly moist.
8.4 - 8.5	Sandstone, green-grey, dark brown carbonaceous streaks.
8.5 - 10.1	Sandstone, light grey - grey, argillaceous, fine-grained, SCL-CL, minor dark brown carbonaceous shale bands, dense, slightly moist.
10.1 - 10.4	Sandstone, grey, indurated, hard.
10.4 - 10.8	Sandstone, green-grey, argillaceous, carbonaceous and lignitic horizons, SCL-CL, slightly moist.
10.8 - 11.6	Shale, dark brown, fossil fragments, dense, dry to slightly moist.
11.6 - 13.1	Shale, brown, minor fossil fragments, dense, dry to slightly moist.
13.1 - 18.3	Shale, grey? (poor light), dense, dry to slightly moist, hard band 17.1 - 17.4 m.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 13

0 - 0.6	Till or lacustrine, buff-brown, silty and sandy, weathered, L, frozen.
0.6 - 1.5	Till, dark brown, abundant pebble fragments, weathered, L-CL, firm to stiff, slightly moist.
1.5 - 1.7	Mixed till and weathered bedrock.
1.7 - 2.1	Sandstone, green to orange, weathered glauconitic sandstone, SCL, firm, moist.
2.1 - 2.4	Limonite weathering horizon, slightly moist.
2.4 - 3.0	Sandstone, dark green, unweathered, minor brown silty clay, slightly spotted with bentonite, SCL-CL, firm, slightly moist.
3.0 - 4.0	Sandstone, dark green, glauconitic - brown sandy shale.
4.0	Concretionary layer 2.5 cm thick, hard.
4.0 - 5.5	Sandstone, dark green, glauconitic passing downwards into a glauconitic brown sandy shale, SCL-CL, dense.
(4.3 - 4.4)	Concretion layer, light brown, 2.5 cm thick, hard, bentonitic, abundant carbonaceous materials.
5.5 - 7.0	Shale, brown, silty, minor nautiloid fragments, SiC, dry.
7.0 - 7.2	Sandstone, green-grey, moderately cemented, minor hard ledge, dry.
7.2 - 9.4	Sandstone, dark green, glauconitic, heavily streaked with clay, carbonaceous materials and lightly spotted with bentonite, SCL, interbedded with a silty-sandy shale, SiC, dark brown, lightly streaked with green glauconitic sand grains.
9.4 - 9.6	Sandstone, green glauconitic, minor brown clay, shell fragments, SCL.
9.6 - 10.1	Shale, dark brown, SiC-C, dry.
10.1 - 10.7	Shale, dark grey-brown, very dense 10.1 - 10.2 m, SiC, dry.
10.7 - 13.1	Shale, dark brown, SiC-C, dry.
13.1 - 14.6	Shale, dark brown-grey, SiC-C, dry.
14.6 - 18.3	Shale, dark grey-brown (poor light), SiC-C, dense, dry.

Moisture in hole on completion.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 14	
0 - 0.3	Lacustrine clay, dark brown, very stiff, slightly moist to moist.
0.3 - 0.6	Till, brown, salts, friable, dry.
0.6 - 0.9	Till, gleyed and oxidized, salts, slightly moist to moist.
0.9 - 1.1	Sand, lacustrine, brown, loose, slightly moist.
1.1 - 1.4	Lacustrine clay, brown, C-SiC, very stiff, moist.
1.4 - 1.5	Oxidized horizon, mostly Fe oxides (rust).
1.5 - 2.4	Sandstone, olive green, fine to medium grained, salts, SL-SCL, loose, slightly moist.
2.4 - 2.7	Sandstone, dark blue grey, minor brown bentonite, loose, slightly moist to moist.
2.7 - 4.0	Sandstone, blue-grey, glauconite increasing with depth to grey-green sandstone at 3.0 m depth, abundant brown bentonite, CL-SCL, dense, firm, slightly moist to moist.
4.0 - 4.6	Sandstone, grey-green, glauconitic, dark brown clay bands, dense, moist, SCL-CL.
4.6 - 5.5	Sandstone, glauconitic and interbedded shale, CL-SiC, slightly moist to moist.
5.5 - 6.1	Sandstone to sandy shale, glauconitic, firm, dense, CL, slightly moist to moist.
6.1 - 7.0	Shale, brown with interbedded glauconitic fine grained sandstone, dense, firm, slightly moist.
7.0 - 7.9	Shale, dark brown, minor nautiloid fragments, dense, dry to slightly moist.
7.9 - 8.5	Shale, dark brown with interbedded thin glauconitic sands.
8.5 - 10.1	Shale, brown, grey-brown, nautiloid fragments at 9.1 m, dry to slightly moist.
10.1 - 10.7	Shale, brown, minor nautiloid fragments, dry to slightly moist.
10.7	Concretionary layer.
10.7 - 12.2	Shale, brown, minor nautiloid fragments, dry to slightly moist.
12.2 - 15.8	Shale, grey, brown-grey, dry to slightly moist.
15.8 - 18.3	Shale, green-grey, rare nautiloid fragments, dry to slightly moist.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 15

0 - 0.3	Topsoil, dark brown, loose, dry to slightly moist.
0.3 - 0.6	Till, brown, SL-SCL, loose, dry.
0.6 - 0.9	Till, olive brown, salts, CL, slightly moist to moist.
0.9 - 2.9	Till, grey and brown, salts, minor oxidized streaks and patches, CL, stiff, slightly moist to moist.
2.9 - 4.0	Sandstone, olive grey-brown, minor oxidized inclusions, fine grained, SL-SCL, stiff, slightly moist.
4.0 - 4.6	Shale, dark blue, sandy, (CL), grading to a shale.
4.6 - 4.9	Sandstone, glauconitic, CL, slightly moist.
4.9 - 5.0	Shale, sandy, hard, dry.
5.0 - 5.5	Shale - sandstone, interbedded blue and brown shale with glauconitic sandstone (CL), slightly moist to moist.
5.5 - 7.0	Shale, grey and brown with thin interbedded glauconitic sand seams, CL-SiC, firm, slightly moist.
5.5	Minor hard layer.
7.0 - 7.6	Shale, dark grey with minor brown interbeds, minor nautiloid fragments, slightly moist.
7.6	Shale, brown, hard, dry.
7.6 - 8.5	Shale, dark brown, carbonaceous, minor nautiloid fragments, dry.
8.5 - 10.1	Shale, dark brown with interbedded glauconitic sandstone (CL) grading to grey-green CL sandstone with interbeds of dark brown carbonaceous shale. Abundant nautiloid fragments at 9.8 m, dense, slightly moist.
10.1 - 14.6	Shale, grey-brown, minor nautiloid fragments, dense, dry to slightly moist.
14.6 - 18.3	Shale, dark grey-green, minor nautiloid fragments, dense, dry to slightly moist.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 16	
0 - 0.3	Dark brown soil, dry, loose, powder.
0.3 - 1.0	Brown, weathered till, dry, loose, powder, CL.
1.0 - 2.4	Till, dry to slightly moist, hard, firm, CL, coal fragments, oxidized specks, minor salts, brown, weathered.
2.4 - 3.0	Till, slightly moist to moist, brown, stiff.
3.0 - 4.0	Sand, fine to medium grained, moist, loose, SCL, olive.
4.0 - 4.3	lost sample.
4.3 - 4.6	Sandstone, consolidated, fine-grained, dark green-grey.
4.6 - 6.1	Sand, very fine grained, glauconitic, slightly moist to moist, SCL, interbedded with chocolate brown, shale.
6.1	Hard horizon, consolidated very fine grained sandstone.
6.1 - 7.0	Shale, very fine grained sand, dark grey-green, glauconitic, CL, dense, slightly moist.
7.0 - 7.8	Shale, grey-brown, sandy, dry to slightly moist, slightly glauconitic, dense, CL-SiCL.
7.8 - 8.5	Shale, chocolate brown, carbonaceous, dry to slightly moist, dense.
8.5 - 10.1	Shale and sand, interbedded, dark brown carbonaceous shale, and light green-grey to grey-green very fine grained, slightly glauconitic sand, SCL. Abundant fossil fragments, slightly moist.
10.1 - 10.7	Shale, sandy, grey brown, slightly moist, CL-SiCL, dense.
10.7 - 11.6	Shale, brown, slightly moist, dense.
11.6 - 12.2	Shale, grey brown.
12.2 - 13.1	Shale, brown, dry to slightly moist, dense.
13.1 - 14.6	Shale, brown with numerous thin brown concretionary (consolidated) horizons, dry to slightly moist.
14.6 - 16.2	Shale, dark grey, dry to slightly moist, dense.
16.2 - 18.3	Shale, dark green-grey, dry to slightly moist, dense.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 17

0 - 0.3	Lacustrine, sandy brown, dry.
0.3 - 1.0	Lacustrine, C, very stiff, dark brown.
1.0 - 2.0	Till, brown, salts, CL, slightly moist to moist, stiff.
2.0 - 2.4	Sand, olive, fine to medium grained, slightly moist, mixed with abundant Fe oxides, rust.
2.4 - 3.0	Sand, grey-green, bright glauconitic, SCL, very fine grained, mixed with purple brown shale, moist.
3.0 - 3.5	Sand, same as before, mixed with consolidated sandstone, fine grained, dark green to black.
3.5 - 4.0	Sand mixed with brown shale and consolidated brown concretions, slightly moist to moist.
4.0 - 5.8	Shale to sandstone. Very dark grey-green, dense, very fine grained sandy shale, CL to argillaceous, very fine grained sand, CL, slightly moist to moist, minor bentonite, slightly glauconitic.
5.8 - 6.7	Shale, dark brown, dry to slightly moist, dense, fossil fragments.
6.7 - 7.0	Shale, same as before, with interbedded fine grained light grey-green sands.
7.0 - 8.8	Shale, brown, thinly interbedded with very fine grained green-grey slightly glauconitic sand, slightly moist, abundant fossil fragments.
8.8 - 10.4	Shale, brown and grey-brown, dry to slightly moist, dense.
10.4 - 11.6	Shale, dark brown, dry to slightly moist, dense, fossil fragments.
11.6 - 13.1	Shale, grey-brown, dry to slightly moist, dense.
13.1 - 14.3	Shale, dark green-grey, dry to slightly moist, dense.
14.3	Bentonite horizon, ivory and grey, waxy.
14.3 - 18.3	Shale, same as before.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 18	
0 - 1.0	Till, brown, weathered, dry, salts.
1.0 - 2.4	Till, brown, grey-brown, stiff, slightly moist to moist, CL.
2.4 - 2.7	Sand, SCL, olive mixed with Fe oxides.
2.7 - 3.2	Sand, dark green, glauconitic, SCL, slightly moist to moist, loose, bentonite.
3.2	Hard layer, brown concretion layer, consolidated.
3.2 - 4.0	Interbedded glauconitic sand and purple brown clay, slightly moist to moist.
4.0 - 5.5	Sandstone, argillaceous, CL, very fine grained, dark greenish grey, dense, slightly glauconitic grading down to shale, very fine grained sandy, dense, dark greenish-grey, slightly glauconitic. All slightly moist.
	Lignite seam at 4.9 m.
5.5 - 5.9	Shale, very fine grained sandy, grey, dry to slightly moist.
5.9 - 6.4	Shale, dark brown, carbonaceous, abundant fossil fragments, slightly moist.
6.4 - 7.0	Shale, same as before, with very thin very fine grained sandy laminations.
7.0 - 7.3	Shale, same as before, with abundant fossil fragments.
7.3 - 8.5	Sandstone, fine grained SCL, grey-green, glauconitic, slightly moist, with thin carbonaceous brown shale interbeds, minor lignite streaks at 7.6 m.
8.5 - 10.1	Shale, dark grey-brown, dry to slightly moist, dense.
10.1 - 12.2	Same as before, dark brown, grey-brown.
12.2	Hard horizon, consolidated brown concretion layer. Free water.
12.2 - 13.1	Shale, grey-brown, dry to slightly moist, dense.
13.1 - 14.6	Shale, dark grey, dry to slightly moist, dense, minor fossil fragments.
14.6 - 15.2	Shale, dark grey.
15.2	Bentonite horizon, ivory and grey, waxy.
15.2 - 18.3	Shale, dark grey-brown, dry to slightly moist, dense.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 19	
0 - 0.3	Till, sandy, pebbly, brown, slightly moist.
0.3 - 0.6	Till, brown, CL, salts, slightly moist.
0.6 - 1.0	Till, dark grey, C.
1.0 - 1.2	Mixed till and bedrock.
1.2 - 2.1	Shale, sandy, silty, moist, dark olive green, plastic, weathered, oxidized patches.
2.1 - 2.4	Sandstone, blue-grey, moist.
2.4 - 4.0	Sandstone-shale, sandy shale, dark green-grey, slightly moist to moist, dense.
4.0 - 5.5	Shale, brown and grey, light grey and green grey sandy streaks, dry to slightly moist, dense, fossil fragments.
5.5 - 6.7	Shale, brown and grey, sandy, slightly glauconitic, abundant fossil fragments, slightly moist.
6.7 - 7.0	Shale, sandy to sandstone, argillaceous, grey-brown, slightly moist.
7.0 - 7.6	Shale, sandy, grey, slightly moist, dense.
7.6 - 9.1	Shale, grey-brown, dry to slightly moist, dense.
9.1	Bentonite horizon, ivory.
9.1 - 10.1	Shale, brown, dry to slightly moist, dense.
10.1	Hard horizon - concretions.
10.1 - 11.6	Shale, grey to brown, dense, dry to slightly moist, minor fossil fragments.
11.6 - 18.3	Shale, dark grey, dense, dry to slightly moist.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 20	
0 - 0.3	Topsoil, dark brown.
0.3 - 1.0	Till, brown, CL, stiff, abundant salts, slightly moist to moist.
1.0 - 1.5	Till, sandy, pebbly, CL, brown.
1.5 - 2.4	Till, brown, stiff, CL, slightly moist to moist.
2.4 - 2.7	Gravelly, strongly oxidized, rusty, mixed till and bedrock.
2.7 - 3.7	Shale, sandy, to argillaceous, sand - very fine grained, CL, dark blue-grey, slightly glauconitic, slightly moist, very dense, minor dark brown clay bands.
3.7 - 4.0	Shale, grey to brown, slightly moist, minor sandy interbeds, dense.
4.0 - 4.6	Shale, sandy and silty, glauconitic silty interbeds, dense, slightly moist, CL-SiCL.
4.6 - 5.5	Shale, dark brown, dense, dry to slightly moist.
5.5	Hard band, hard dry brown shale.
5.5 - 6.1	Shale, brown, dry to slightly moist, minor sandy interbeds, fossil fragments.
6.1 - 7.0	Sandstone, argillaceous, green-grey, slightly glauconitic, very fine grained, SCL-CL, with brown shale interbeds, slightly moist.
7.0 - 7.6	Shale, brown, very fine grained sandy interbeds, CL, slightly moist.
7.6 - 7.9	Shale, dark brown, slightly moist, fossil fragments.
7.9 - 9.1	Shale, grey, dry to slightly moist, dense.
9.1 - 10.1	Shale, brown, minor fossil fragments, dry to slightly moist, dense.
10.1 - 11.6	Shale, brown-grey, dry to slightly moist, dense.
11.6 - 13.7	Shale, grey, dry to slightly moist, dense, rare fossil fragments.
13.7	Bentonite horizon, ivory and grey, waxy.
13.7 - 18.3	Shale, dark grey, dry to slightly moist, dense, rare fossil fragments.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 21

0 - 0.6	Soil development on till, brown, L, dry.
0.6 - 1.5	Till, dark brown mottled with orange, abundant rock fragments and pebbles, salts, L-CL, firm, slightly moist.
1.5 - 1.8	Mixed till and shale bedrock, dark brown.
1.8 - 2.1	Shale, heavily oxidized with major limonite content, sandy.
2.1 - 2.9	Sandstone, orange to yellow, clayey, weathered, CL-SCL, slightly moist.
2.9 - 3.2	Sandstone, dark green, glauconitic, unweathered, SCL, firm, slightly moist.
3.2 - 3.4	Sandstone, grey, cemented, hard ledge.
3.4 - 4.0	Sandstone, dark green, glauconitic, fine grained, SCL, firm, slightly moist.
Wet Hole	
4.0 - 4.6	Sandstone, glauconitic - dark grey silty shale, SCL-SiC, moist.
4.6	Concretion, light brown, minor hard layer.
4.6 - 7.6	Sandstone, glauconitic becoming a dark grey-brown silty shale with minor glauconite spotting with depth, CL, firm, slightly moist.
7.6 - 7.9	Shale, dark brown (no glauconite), SiC, firm, slightly moist.
7.9 - 8.5	Sandstone, green, glauconitic with minor brown shale and carbonaceous streaks, SCL-CL, slightly moist.
8.5 - 10.7	Sandstone, green, glauconitic, heavily streaked with dark brown shale (SiC-C) and carbonaceous material, lightly spotted with light brown bentonite, SCL-SL, firm, slightly moist.
10.7 - 14.6	Shale, dark brown-grey, (no glauconite), SiC, dry.
14.6 - 18.3	Shale, dark grey-green, SiC, dry.

Water level 5 m below surface on completion.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 22

0 - 0.3	Topsoil, dark brown.
0.3 - 0.9	Till, brown-grey, gleyed, salts, CL, stiff, slightly moist to moist.
0.9 - 2.4	Till, brown-grey, stony, coal fragments, minor iron oxides, very stiff, slightly moist to moist.
2.4 - 2.9	Sandstone, olive brown, oxidized patches, fine grained, loose, SCL-CL, interbedded with dark brown clay bands, dense, slightly moist to moist.
2.9 - 3.4	Sandstone, olive brown, fine grained, SCL-CL, loose, dense, slightly moist.
3.4	Sandstone, blue-grey, texture as above, unweathered.
3.4 - 4.0	Sandstone, dark grey-green, very glauconitic, fine grained, abundant brown bentonite, argillaceous, SCL-CL, dense, slightly moist to moist.
4.0 - 4.6	Sandstone to sandy shale, dark grey, slightly glauconitic, minor bentonite, CL, slightly moist.
4.6 - 6.1	Shale, dark grey, slightly glauconitic, sandy, slightly moist.
6.1 - 6.7	Shale, brown, dense, slightly moist.
6.7 - 7.0	Shale, brown with minor glauconitic sands, nautiloid fragments.
7.0 - 8.1	Sandstone, glauconitic, very fine grained, thin interbeds of dark brown carbonaceous shale, abundant nautiloid fragments at 8.1 m, CL, very dense, slightly moist.
8.1 - 8.5	Shale, dark grey, dense, slightly moist.
8.5 - 18.3	Shale, dark grey to dark brown-grey, minor nautiloid fragments 13.1 - 14.6 m, concretion horizon 17.7 - 18.0 m, dense, dry to slightly moist.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 23

0 - 0.15	Topsoil, dark brown.
0.15 - 0.9	Till, brown, minor oxides, abundant salts, very stiff, slightly moist.
0.9 - 1.7	Till, grey-brown, CL-C, very stiff, slightly moist.
1.7 - 1.8	Till mixed with bedrock.
1.8 - 2.4	Sandstone, olive green, minor oxide bands, very fine grained, CL, dense, stiff, slightly moist.
2.4 - 4.0	Sandstone, dark green-grey, slightly glauconitic, very fine grained, CL, dense, stiff, slightly moist.
4.0 - 4.9	Shale, brown, slightly carbonaceous, very dense, slightly moist.
4.9 - 5.0	Shale, dark brown interbedded with sandstone, CL, stiff, slightly moist.
5.0 - 5.5	Sandstone, dark greenish-grey, fine to medium grained, SCL-CL, dense, slightly moist.
5.5 - 6.7	Shale, brown and interbedded grey sandstone, abundant nautiloid fragments, CL, dense, slightly moist.
6.7 - 7.0	Sandstone, grey, fine to medium grained, SCL-CL, dense, slightly moist.
7.0 - 7.3	Shale, grey, sandy, CL, dry to slightly moist.
7.3 - 10.1	Shale, brown, minor nautiloid fragments 8.5 - 10.1 m, dense, dry to slightly moist.
10.1 - 10.7	Shale, dark grey, very dense, dry to slightly moist.
10.7	Bentonite horizon, grey, hard.
10.7 - 11.6	Shale, dark grey, very dense, dry to slightly moist.
11.6 - 13.1	Shale, dark grey, as above, minor free water.
Wet slough on top of auger.	
13.1 - 13.9	Shale, dark grey, very dense, dry to slightly moist.
13.9	Bentonite horizon, ivory, waxy.
13.9 - 14.6	Shale, dark grey, very dense, dry to slightly moist.
14.6 - 15.5	Shale, dark grey, dense, dry to slightly moist.
15.5	Concretion, indurated very fine grained horizon.
15.5 - 16.2	Shale, dark grey, minor fossil fragments, dense, dry to slightly moist.
16.2 - 18.3	Shale, dark greenish grey, rare fossil fragments, dense, dry to slightly moist.

DEPTH (m)	LITHOLOGY AND TEXTURE

Test Hole No. 24

0 - 0.15	Topsoil, dark brown.
0.15 - 0.5	Till, dark grey-brown, gleyed, very stiff, slightly moist to moist.
0.5 - 0.9	Till, brown, oxidized, stiff, slightly moist.
0.9 - 1.8	Till, grey-brown, iron oxide streaks, coal fragments, CL, very stiff, slightly moist.
1.8 - 2.4	Sandstone to shale, olive brown, fine grained, CL, very stiff, slightly moist.
2.4 - 2.9	Sandstone to shale, strongly glauconitic, minor bentonite, CL, moderately stiff, slightly moist.
2.9 - 3.5	Shale, slightly glauconitic, sandy, slightly moist.
3.5 - 4.0	Shale, dark brown, slightly moist.
4.0 - 5.5	Sandstone, green-grey, fine to medium grained, SCL, interbeds of dark brown (carbonaceous) clay-shale, dense, slightly moist.
5.5 - 5.8	Shale, brown, slightly moist.
5.8 - 7.0	Sandstone, greenish-grey, SCL-CL with interbeds of brown shale, minor carbonaceous streaks, minor fossil fragments, dense.
7.0 - 8.5	Shale, grey-brown, dense, dry to slightly moist.
8.5 - 10.1	Shale, brown, hard (bentonitic?) horizon at 9.1 m, dense, dry to slightly moist.
10.1 - 11.6	Shale, grey-brown, indurated concretionary layer at 10.4 m, fossil fragments, dense, dry to slightly moist.
Water noted in hole - from concretionary horizon at 10.4 m?	
11.6 - 18.3	Shale, dark grey, minor fossil fragments 11.6 - 13.1 m and 14.6 - 16.2 m, dense, dry to slightly moist.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 25	
0 - 0.9	Till, medium brown, minor rock fragments, abundant salts, L, friable, dry (frozen?).
0.9 - 1.8	Till, medium brown spotted with orange, salts, rock and coal specks, CL, firm.
1.8 - 2.1	Sandstone, buff yellow, weathered, L, firm, slightly moist.
2.1 - 2.4	Shale or till?, dark brown, sandy, carbonaceous material, plastic, moist.
2.4 - 2.9	Shale, dark brown heavily spotted with green glauconite grains, CL, slightly moist.
2.9 - 3.4	Shale, dark brown-grey (no glauconite), SiC, dense, slightly moist.
3.4 - 5.5	Shale, dark brown heavily streaked with green glauconitic sand seams, minor carbonaceous and shell fragments in sand seam, SiC-CL, firm, slightly moist.
5.5 - 7.0	Shale, dark grey brown lightly streaked with grey sandy seams, SiC (silty), slightly moist.
7.0 - 8.8	Shale, dark grey-brown, very silty, little sand, SiC-SiCL, waxy, slightly moist.
8.8 - 9.0	Concretionary layer, light brown, hard.
9.0 - 10.1	Shale, dark brown-grey, SiC-C, dry.
10.1 - 18.3	Shale, dark grey (no brownish coloration), abundant nautiloid fragments at 13.7 m, minor scattered nautiloid fragments 14.6 - 16.2 m, SiC-C, dense, dry.
Dry Hole	

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 26	
0 - 18.3	See log for No. 25
18.3 - 28.0	Shale, grey, silty, dense.
19.0	Concretion, brown, minor hard layer.
28.0 - 30.0	Interbedded greenish-grey bentonitic and carbonaceous shale.
30.0 - 31.0	As above, minor lignite.
31.0 - 33.0	Shale, carbonaceous with minor lignite streaks and interbedded greenish-grey sandy shale.
33.0 - 33.8	Sandstone, argillaceous.
33.8 - 34.2	Concretion, brown, hard layer.
34.2 - 35.5	Sandstone, argillaceous.
35.5 - 38.0	Sandstone, light grey-grey, very fine grained, SCL-CL.
38.0 - 38.5	Sandstone, brown.
38.5 - 40.0	Sandstone, bentonitic.
40.0 - 40.5	Sandstone, brown, fine grained, streaks of lignite.
40.5 - 41.0	Interbedded fine grained SCL sand and lignitic brown sand.
41.0 - 42.0	Shale, brown, sandy, carbonaceous.
42.0 - 44.0	Shale, light brown and grey, sandy, interbedded carbonaceous shale and grey-green bentonite.
44.0 - 48.0	Shale, light brown and grey, thin sandy interbeds.
45.3	Concretion, brown, hard ledge.
48.0 - 49.5	Shale, grey-green and brown lignitic, carbonaceous.
49.5 - 51.0	Bentonite, ivory.
51.0 - 52.0	Shale, grey-green, bentonitic, thin interbeds of carbonaceous shale.
52.0 - 52.6	Concretion, brown, hard.
52.6 - 53.5	Shale, grey and brown.
53.5 - 55.5	Sandstone, light grey, argillaceous, very fine grained.
55.5 - 57.0	Interbedded sandstone and brown carbonaceous shale.
57.0 - 59.0	Shale, grey-green, bentonitic, minor lignite.
59.0 - 60.0	Sandstone, grey, very fine grained, argillaceous.
60.0 - 62.0	Sandstone, grey-green, bentonitic?, glauconitic?
62.0 - 65.5	Sandstone, grey, becoming coarser grained with depth, minor brown carbonaceous streaks.
65.5 - 69.0	Shale, grey, sandy, becoming coarser grained with depth.
69.0 - 72.0	Sandstone, grey, fine grained, minor brown carbonaceous and indurated concretion layers.
72.0 - 73.0	Interbedded sandstone and shale, grey-green.
73.0 - 74.0	Shale, grey-green.
74.0 - 76.0	Shale, grey, brown and green.
76.0 - 78.0	Sandstone, grey, argillaceous to sandy shale.
78.0 - 80.0	Shale, sandy, grading to shale with depth.
80.0 - 83.0	Shale, grey.
83.0 - 84.0	Sandstone, grey, fine grained.

DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 26 (Contd.)	
84.0 - 85.8	No returns, sandstone as above?
85.8 - 86.5	Concretion, brown carbonaceous, indurated.
86.5 - 88.0	Sandstone, grey, carbonaceous.
88.0 - 89.0	Shale, sandy, grey to argillaceous sandstone.
89.0 - 89.5	Sandstone, grey and brown, carbonaceous.
89.5 - 90.0	Shale, sandy, grey to argillaceous sandstone.
Test Hole No. 27	
0 - 18.3	See log for No. 1
18.3 - 24.0	Shale, dark grey.
23.7	Concretion, light brown, hard.
24.0 - 31.8	Shale, dark grey, indurated dark grey-black layers and incompetent clay-shale layers.
31.8 - 33.5	Shale, brown, sandy becoming sandier and green (glauconitic) with depth.
33.5 - 36.8	Interbedded brown carbonaceous shale and glauconitic sandstone (slightly bentonitic) horizons.
36.8 - 38.5	Sandstone, green, fine grained.
38.5 - 39.8	Sandstone, brown, fine grained, coal specks.
41.0 - 42.0	Shale, green and brown, sandy.
42.0 - 43.0	Sandstone, green, fine-grained.
43.0	Concretionary, hard layer.
43.0 - 44.3	Shale, green, sandy.
44.3 - 45.4	Sandstone, greenish-grey, argillaceous, coal specks.
45.4 - 45.6	Sandstone, brownish, lignitic, coal fragments.
45.6 - 46.0	Sandstone, greenish-grey.
46.0 - 46.3	Shale, sandy, greenish, indurated, hard.
46.3 - 47.5	Sandstone, greenish-grey.
47.5 - 49.0	Sandstone, greenish-grey, argillaceous (bentonitic?).
49.0 - 50.2	Sandstone, brown, fine grained and argillaceous, coal specks.
50.2 - 51.6	Shale, greenish-grey, sandy.
51.6 - 52.1	Sandstone, greenish-grey, fine grained and argillaceous.
52.1 - 52.4	Shale, greenish-grey, sandy.
52.4 - 52.9	Shale ,green and brown, sandy.
52.9 - 54.8	Shale, greenish-grey, sandy.
54.8 - 55.2	Shale, greenish-grey, harder.
55.2 - 56.0	Bentonite.
56.0 - 57.0	Shale, sandy, greenish, minor bentonite horizons.
57.0 - 58.6	Shale, sandy, green passing down into brown sandy shale.

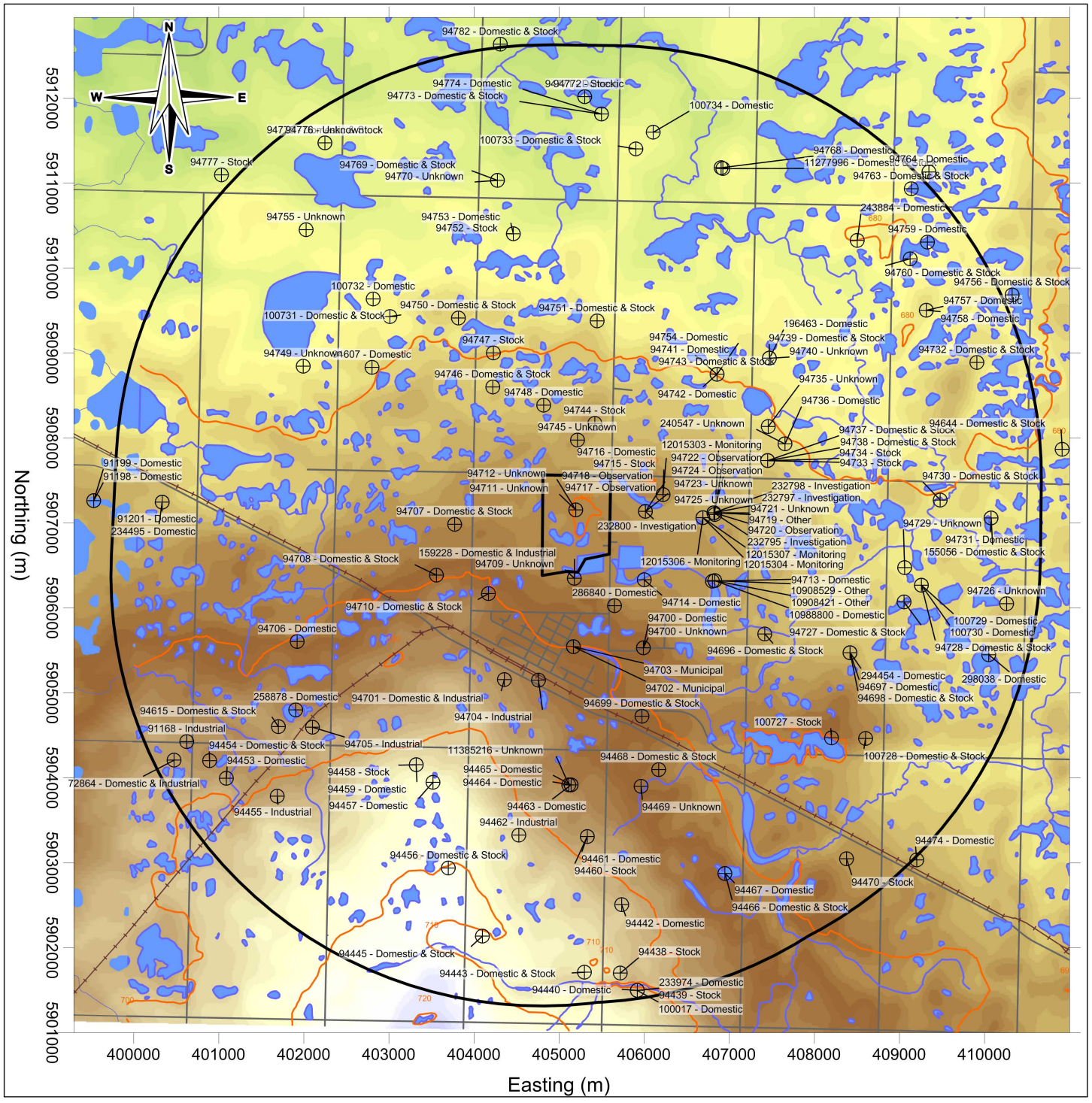
DEPTH (m)	LITHOLOGY AND TEXTURE
Test Hole No. 27 (Contd.)	
58.6 - 62.0	Sandstone, greenish-grey, clayey, bentonite horizons.
62.0 - 62.7	Sandstone, brown, clayey.
62.7 - 64.4	Shale, greenish-grey.
64.4 - 65.1	Sandstone, green-grey, fine-grained, clayey.
65.1 - 69.0	Shale, green-grey.
69.0 - 69.2	Shale, green and brown.
69.2 - 71.0	Sandstone, greenish-grey, clayey, bentonitic (white).
71.0 - 74.4	Sandstone, greenish-grey, clayey, abundant lignite streaks.
74.4 - 74.8	Sandstone, brown,
74.8 - 77.3	Sandstone, greenish-grey, clayey, lignitic.
77.3 - 77.5	Concretion, light brown, hard.
77.5 - 78.0	Shale, greenish-grey.
78.0 - 80.0	Shale, greenish, lignite and coal streaks at 79.8 m.
80.0 - 82.1	Sandstone, greenish-grey, clayey.
82.1 - 82.5	Shale, brown, carbonaceous.
82.5	Bentonite horizon, ivory.
82.5 - 84.0	Shale, greenish with interbedded ivory bentonite horizons.
84.0 - 85.4	Shale, greenish.
85.4 - 87.5	Interbedded greenish shale with grey-green clayey sandstone, streaked with lignite.
87.5 - 90.0	Shale, greenish, indurated and clayey horizons.

APPENDIX B

WATER WELL DRILLING RECORDS

Figure B1 – 5 km Alberta Water Well Information Database Search

Government of Alberta Reconnaissance Report



LEGEND

- Center point of radial search
- Water well
- Waterbody
- Elevation contour (m)
- Roadway
- Railway
- Extent of 5km search
- Watercourse

Elevation (m)

688 670 672 674 676 678 680 682 684 686 688 690 692 694 696 698 700 702 704 706 708 710 712 714 716 718 720

NOTES
NRCAN Basemap Data Set
AWWID - Updated May 16, 2016

STATUS
Issued for Use

Proposed Lateral Expansion
Ryley, Alberta

5 km Alberta Water Well Information Database Search

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

0.0 1.0 2.0
Kilometres

TETRA TECH

FILE NO. 5km_WaterWellDatabaseSearch.srf

PROJECT NO.	DWN	CKD	APVD	REV
ENVSWM03011-05	CF	SB	TJD	0

OFFICE	DATE
TtEBA-CAL	February 2017

Figure B1

filepath: filepath:W:/Projects/CGY/78070/ENVSWM03011-05/Data/Surfer/5km_WaterWellDatabaseSearch.srf (05/07/2016)

Government of Alberta

Reconnaissance Report

All values are metric

TETRA TECH

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94711	94711	0.04	NE	09	050	17	4	BIG QUILL DRILLING LTD.	1/31/1983	90.5	Test Hole-Abandoned	Unknown		6		C.E. MOELL CONSULTING LTD#1	0	0.19
94712	94712	0.04	NE	09	050	17	4	BIG QUILL DRILLING LTD.	2/1/1983	90.5	Test Hole-Abandoned	Unknown		6		C.E. MOELL CONSULTING LTD#2	0	0.25
94745	94745	0.81	SE	16	050	17	4	UNKNOWN DRILLER	1/1/1920	7.6	Federal Well Survey	Unknown				NICHOLS		
94709	94709	0.82	SE	09	050	17	4	UNKNOWN DRILLER		7.3	Chemistry	Unknown				MAGNUSSEN, E.	3.05	
159228	159228	0.82	SE	9	50	17	4	LAKELAND DRILLING LTD.	9/7/1991	140.2	New Well	Domestic & Industrial		4		LAIDLAW ENVIRONMENTAL SVC LTD	18.59	0.63
94717	94717	0.85	NW	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	29.9	Piezometer	Observation				ALTA ENV #2143E		
94718	94718	0.85	NW	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	42.4	Piezometer	Observation				ALTA ENV #2144E		
232800	232800	0.85	NW	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	60.4	Test Hole	Investigation				ALTA ENV #2142		
94744	94744	1.04	08	16	050	17	4	UNKNOWN DRILLER	1/1/1929	123.4	Federal Well Survey	Stock				NICHOLS	21.34	
94715	94715	1.07	14	10	050	17	4	UNKNOWN DRILLER	1/1/1919	91.4	Federal Well Survey	Stock				MCDONAGH, W.N.		

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94716	94716	1.07	14	10	050	17	4	UNKNOWN DRILLER	1/1/1912	6.1	Federal Well Survey	Domestic				MCDONAGH, W.N.		
94714	94714	1.18	SW	10	050	17	4	UNKNOWN DRILLER		67.1	Chemistry	Domestic				GARSTAD, MARK	48.77	
286840	286840	1.24	04	10	050	17	4	LOSNESS DRILLING (1975) LTD.	5/14/1997	82.3	New Well	Domestic			25	PEPPES, RONALD	9.3	0.25
94748	94748	1.27	00	16	050	17	4	UNKNOWN DRILLER		45.7	Chemistry	Domestic				BROOKS, ROBERT	3.05	
94707	94707	1.4	09	08	050	17	4	UNKNOWN DRILLER	1/1/1930	4.3	Federal Well Survey	Domestic & Stock				MAGNUSSEN		
94710	94710	1.41	04	09	050	17	4	UNKNOWN DRILLER		4.3	Federal Well Survey	Domestic & Stock				HOSTLUND		
12015304	1889173	1.53	10	10	50	17	4	HILL DRILLING LTD.	5/21/2013	5.5	Piezometer	Monitoring		1		BEAVER MUNICIPAL SOLUTIONS		
12015306	1889174	1.53	10	10	50	17	4	HILL DRILLING LTD.	5/22/2013	10.1	Piezometer	Monitoring		1		BEAVER MUNICIPAL SOLUTIONS		
12015307	1889175	1.53	10	10	50	17	4	HILL DRILLING LTD.	5/22/2013	21.3	Piezometer	Monitoring		1		BEAVER MUNICIPAL SOLUTIONS		
94702	94702	1.62	NE	4	50	17	4	UNKNOWN DRILLER		15.2	Chemistry	Municipal	2			RYLEY, VILL OF		
94703	94703	1.62	NE	4	50	17	4	UNKNOWN DRILLER		61	Chemistry	Municipal	1			RYLEY, VILL OF		
94719	94719	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	4.6	Test Hole	Other				ALTA ENV #2133E		
94720	94720	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/26/1983	14.9	Piezometer	Observation				ALTA ENV #2140E		

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94721	94721	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/26/1983	15.2	Test Hole	Unknown				ALTA ENV #2137E		
94722	94722	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/26/1983	26.2	Piezometer	Observation				ALTA ENV #2141E		
94723	94723	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/31/1983	14.6	Test Hole	Unknown				ALTA ENV #2139E		
94724	94724	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/31/1983	25.3	Piezometer	Observation				ALTA ENV #2138E		
94725	94725	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/28/1983	29.9	Test Hole	Unknown				ALTA ENV #2136E		
232795	232795	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	91.4	Test Hole	Investigation				ALTA ENV #2132E		
232797	232797	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	61	Test Hole	Investigation				ALTA ENV #2134E		
232798	232798	1.66	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/28/1983	61	Test Hole	Investigation				ALTA ENV #2135E		
12015303	1889172	1.67	9	10	50	17	4	HILL DRILLING LTD.	5/21/2013	36.9	Piezometer	Monitoring		1		BEAVER MUNICIPAL SOLUTIONS		

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94746	94746	1.72	12	16	050	17	4	UNKNOWN DRILLER		11.6	Federal Well Survey	Domestic & Stock				WESMONKE		
94708	94708	1.78	SE	08	050	17	4	UNKNOWN DRILLER		121.9	Federal Well Survey	Domestic & Stock						
94700	94700	1.83	NW	3	50	17	4	HOLLAND WATER WELLS		106.7	Chemistry	Domestic		2		MIZERA, RUDY	45.72	
94700	94700	1.83	NW	3	50	17	4	HOLLAND WATER WELLS		106.7	Chemistry	Unknown		2		MIZERA, RUDY	45.72	
94700	94700	1.83	NW	3	50	17	4	HOLLAND WATER WELLS		106.7	Old Well - Abandoned	Domestic		2		BEAVER COUNTY	45.72	
94700	94700	1.83	NW	3	50	17	4	HOLLAND WATER WELLS		106.7	Old Well - Abandoned	Unknown		2		BEAVER COUNTY	45.72	
94713	94713	1.85	SE	10	050	17	4	UNKNOWN DRILLER	1/1/1915	7	Federal Well Survey	Domestic				MASTERS, J.E.	3.96	
10908421	1888429	1.87	SE	10	50	17	4	HILL DRILLING LTD.	4/16/2004	48.8	Test Hole	Other		2		C. E. MODELL & ASSOC. LTD		
10908529	1888430	1.87	SE	10	050	17	4	HILL DRILLING LTD.	4/15/2004	48.8	Test Hole	Other		3		C. E. MOELLL & ASSOC. LLTD		
10988800	1888439	1.87	SE	10	050	17	4	HILL DRILLING LTD.	4/13/2004	46.3	New Well	Domestic		2	19	C.E. MOELL & ASSOCIATES LTD.		0
94704	94704	2.06	00	04	050	17	4	ALF'S DRILLING & SUPPLIES LTD.	10/2/1986	132.6	New Well	Industrial		5		ANDRUKOW FARM SALES LTD	21.95	3.79
94747	94747	2.06	13	16	050	17	4	GORDON'S DRILLING LTD.	5/3/1985	20.1	New Well	Stock		1		WESTMANCOUT, BRIAN	4.57	0.06
94701	94701	2.16	WH	04	050	17	4	MERV'S WATER WELL DRILLING	5/1/1986	120.4	New Well	Domestic & Industrial		5		ABRAHAM, JOE	24.38	0.16
94751	94751	2.23	01	21	050	17	4	LYONS OMAR	1/1/1920	121.9	Federal Well Survey	Domestic & Stock				LYONS, G.	27.43	

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94741	94741	2.32	NE	15	050	17	4	GLOBE DRLG	4/29/1980	41.1	New Well	Domestic		2		WOOD, DENNIS		
94742	94742	2.32	NE	15	050	17	4	UNKNOWN DRILLER		96	Chemistry	Domestic				WOOD, DENNIS W.	30.48	
94743	94743	2.32	NE	15	050	17	4	ED'S DRLG	8/5/1975	93.9	New Well	Domestic & Stock		5		OSLUND, ROGER	12.8	0.44
94754	94754	2.32	NE	15	050	17	4	UNKNOWN DRILLER	1/1/1920	32.9	Federal Well Survey	Domestic					27.43	
94733	94733	2.36	04	14	050	17	4	J&J DRILLING LTD.	8/9/1984	77.7	Dry Hole	Stock		2		SCHAFFER, E.		
94734	94734	2.36	04	14	050	17	4	J&J DRILLING LTD.	8/16/1984	100.6	New Well	Stock		5		SCHAFFER, E.	18.29	0.16
94737	94737	2.36	04	14	050	17	4	ALF'S DRILLING & SUPPLIES LTD.	3/3/1988	135.6	Deepened	Domestic & Stock		6		SCHAFFER, H.	10.97	0.32
94737	94737	2.36	04	14	050	17	4	ALF'S DRILLING & SUPPLIES LTD.	3/3/1988	135.6	Deepened	Domestic & Stock		6		SCHAFFER, H.	23.77	0.25
94738	94738	2.36	04	14	050	17	4	UNKNOWN DRILLER	1/1/1915	112.8	Federal Well Survey	Domestic & Stock				KUSHINER		
94735	94735	2.49	05	14	050	17	4	ALF'S DRILLING & SUPPLIES LTD.	7/7/1986	36.6	Test Hole	Unknown		1		SCHAFFER, E.		
94699	94699	2.57	SW	03	050	17	4	UNKNOWN DRILLER		61	Chemistry	Domestic & Stock				MIZERA, RUDY		
94736	94736	2.61	SW	14	050	17	4	UNKNOWN DRILLER		4.6	Unknown	Domestic				OSLUND, GUNNER	1.22	
240547	240547	2.61	SW	14	050	17	4	WATER RESOURCES	6/21/1970	91.4	Test Hole	Unknown		4		ALTA ENV/WATER RES #0487E		
94750	94750	2.62	01	20	50	17	4	UNKNOWN DRILLER	1/1/1917	102.1	Federal Well Survey	Domestic & Stock				HUTCHINSON		
94696	94696	2.69	13	02	050	17	4	UNKNOWN DRILLER	1/1/1920	3	Federal Well Survey	Domestic & Stock				GOODALL		

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94607	94607	2.89	NW	17	050	17	4	UNKNOWN DRILLER		94.5	Chemistry	Domestic	2			PHILLIPS, BRENT	9.14	
94739	94739	2.91	13	14	050	17	4	UNKNOWN DRILLER	1/1/1916	106.7	Federal Well Survey	Domestic & Stock				BOOTH, S.		
94740	94740	2.91	13	14	050	17	4	UNKNOWN DRILLER		137.2	Well Inventory	Unknown				WOOD, W.A.	76.2	0.06
196463	196463	2.91	13	14	050	17	4	UNKNOWN DRILLER		5.5	Chemistry	Domestic				WOOD, W.A.	3.05	
100731	100731	3.12	03	20	050	17	4	UNKNOWN DRILLER	1/1/1915	126.5	Federal Well Survey	Domestic & Stock				PEPPER		
94468	94468	3.23	14	34	049	17	4	UNKNOWN DRILLER	1/1/1934	17.1	Federal Well Survey	Domestic & Stock				HUNKA		
94463	94463	3.25	NE	33	049	17	4	UNKNOWN DRILLER		12.2	Chemistry	Domestic				WIENS, JAKE	7.92	
94464	94464	3.25	NE	33	049	17	4	UNKNOWN DRILLER		36.6	Chemistry	Domestic				WEINS, JACOB	11.89	
94465	94465	3.25	NE	33	049	17	4	UNKNOWN DRILLER		91.4	Chemistry	Domestic				MAHLUM, THOR	12.19	
11385216	1130398	3.25	NE	33	049	17	4	BIG IRON DRILLING LTD.	6/6/2003	91.4	Dry Hole-Abandoned	Unknown		1		733466 ALBERTA LTD.		
94752	94752	3.31	NW	21	050	17	4	UNKNOWN DRILLER		161.5	Federal Well Survey	Stock					112.78	
94753	94753	3.31	NW	21	050	17	4	UNKNOWN DRILLER		30.5	Federal Well Survey	Domestic						
94469	94469	3.36	NW	34	049	17	4	UNKNOWN DRILLER		6.1	Chemistry	Unknown				HUNKA, ROBBIN		
100732	100732	3.41	SW	20	050	17	4	UNKNOWN DRILLER		121.9	Chemistry	Domestic	1			PHILLIPS, OTIS	42.67	
94458	94458	3.53	15	32	049	17	4	UNKNOWN DRILLER	1/1/1925	132.9	Federal Well Survey	Stock				NESS, B.	22.86	

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94459	94459	3.53	15	32	049	17	4	UNKNOWN DRILLER	1/1/1917	6.1	Federal Well Survey	Domestic				NESS, B.		
94749	94749	3.59	NE	18	050	17	4	GORDON'S DRILLING LTD.	4/30/1987	18.9	Dry Hole	Unknown				HOPF, BRIAN		
94706	94706	3.6	NE	06	050	17	4	UNKNOWN DRILLER		27.4	Chemistry	Domestic				HEGELAND, SIGNER	6.1	
94457	94457	3.61	NE	32	049	17	4	UNKNOWN DRILLER		11.6	Chemistry	Domestic				NESS, PETER H.	2.44	
94697	94697	3.67	NE	02	050	17	4	UNKNOWN DRILLER		103.6	Chemistry	Domestic				MIZERA, TERRY	54.86	
94698	94698	3.67	NE	02	050	17	4	UNKNOWN DRILLER	1/1/1929	118.9	Federal Well Survey	Domestic & Stock				KADRVITH, J.	24.38	
294454	294454	3.67	NE	02	050	17	4	ALF'S DRILLING & SUPPLIES LTD.	10/8/1999	82.3	New Well	Domestic		3	25	MIZERA, TERRY	15.24	0.19
94460	94460	3.86	08	33	49	17	4	UNKNOWN DRILLER		126.8	Federal Well Survey	Stock				STRONSTAD, A.		
94461	94461	3.86	08	33	049	17	4	UNKNOWN DRILLER		12.2	Federal Well Survey	Domestic				STRONSTAD, A.	9.14	
94462	94462	3.89	06	33	049	17	4	UNKNOWN DRILLER		1005.8	Structure Test Hole	Industrial						
94729	94729	3.96	05	12	050	17	4	UNKNOWN DRILLER		146.3	Test Hole	Unknown		20		HEINING, WILLIAM		
94769	94769	3.97	04	28	050	17	4	UNKNOWN DRILLER		166.4	Federal Well Survey	Domestic & Stock				DARIK		
94770	94770	3.97	04	28	050	17	4	UNKNOWN DRILLER		17.7	Federal Well Survey	Unknown				DARIK		
94705	94705	4	01	06	050	17	4	UNKNOWN DRILLER		304.8	Structure Test Hole	Industrial				IMPERIAL OIL LTD #599		

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
258878	258878	4.02	SE	06	050	17	4	MERV'S WATER WELL DRILLING	6/14/1994	45.7	Deepened	Domestic		4	9	HAMMER, EDNA	7.92	0.08
94727	94727	4.04	04	12	050	17	4	UNKNOWN DRILLER	1/1/1926	97.5	Federal Well Survey	Domestic & Stock				MEXHOINIG	12.19	
100727	100727	4.06	02	02	050	17	4	UNKNOWN DRILLER		118	Well Inventory	Stock	2			ZOOK, M.V.		
94728	94728	4.19	SW	12	050	17	4	UNKNOWN DRILLER		0	Chemistry	Domestic & Stock				CLARK, CYRILL		
100729	100729	4.19	SW	12	050	17	4	UNKNOWN DRILLER		57.9	Chemistry	Domestic	1			HEINIG, W.	3.05	
100730	100730	4.19	SW	12	050	17	4	UNKNOWN DRILLER		57.9	Chemistry	Domestic	1			MIZERA, TERRY		
100733	100733	4.3	05	27	050	17	4	UNKNOWN DRILLER	1/1/1908	96.3	Federal Well Survey	Domestic & Stock				POPE	27.43	
94615	94615	4.31	02	06	050	17	4	UNKNOWN DRILLER		18.3	Federal Well Survey	Domestic & Stock				HULTOM		
94730	94730	4.32	14	12	050	17	4	UNKNOWN DRILLER	1/1/1927	106.7	Federal Well Survey	Domestic & Stock				HARRIS, T.		
100728	100728	4.37	01	02	050	17	4	UNKNOWN DRILLER		114.6	Federal Well Survey	Domestic & Stock				ZOOK, W.		
94768	94768	4.38	SE	27	050	17	4	UNKNOWN DRILLER		0	Chemistry	Domestic				POPE, F.G.		
11277996	1420506	4.38	SE	27	050	17	4	LAKELAND DRILLING LTD.	3/24/2003	128	New Well	Domestic & Stock		2	23	POPE, GORDON	10.36	0.13
94456	94456	4.47	01	32	49	17	4	LYONS OMAR	1/1/1927	137.2	Federal Well Survey	Domestic & Stock				FISH	60.96	
100734	100734	4.53	WH	27	050	17	4	UNKNOWN DRILLER		91.4	Chemistry	Domestic	1			POPE, WILLIAM		
94755	94755	4.54	NE	19	050	17	4	UNKNOWN DRILLER		85.3	Federal Well Survey	Unknown						

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
243884	243884	4.6	NE	23	050	17	4	MID-WEST WATER WELLS LTD.	11/15/1994	97.5	New Well	Domestic		9	21	RICE, DONALD	11.58	0.63
94466	94466	4.65	01	34	049	17	4	UNKNOWN DRILLER	1/1/1923	9.1	Federal Well Survey	Domestic & Stock				ROSS	1.52	
94467	94467	4.65	01	34	049	17	4	UNKNOWN DRILLER		9.1	Federal Well Survey	Domestic				ROSS		
94773	94773	4.66	09	28	050	17	4	UNKNOWN DRILLER	1/1/1919	79.2	Federal Well Survey	Domestic & Stock				PENNER	27.43	
94774	94774	4.66	09	28	050	17	4	UNKNOWN DRILLER		6.1	Well Inventory	Domestic				KOZACK, J.		
94442	94442	4.69	13	27	049	17	4	UNKNOWN DRILLER	1/1/1918	9.1	Federal Well Survey	Domestic				NORDSTROM, J.		
94757	94757	4.77	SW	24	050	17	4	UNKNOWN DRILLER		106.7	Chemistry	Domestic				BUGGE, KEVIN	30.48	
94758	94758	4.77	SW	24	050	17	4	UNKNOWN DRILLER		4	Chemistry	Domestic				BUGGE, KEVIN		
91201	91201	4.83	NE	12	050	18	4	UNKNOWN DRILLER		11.6	Chemistry	Domestic	1			STRILCHUK, PAUL	10.06	
234495	234495	4.83	NE	12	050	18	4	UNKNOWN DRILLER		88.4	Chemistry	Domestic	1			CLEAVER, K.E.	60.96	
94455	94455	4.85	10	31	049	17	4	UNKNOWN DRILLER		824.8	Structure Test Hole	Industrial						
94771	94771	4.86	NE	28	050	17	4	UNKNOWN DRILLER		4.3	Chemistry	Domestic				LITCHFIELD, CHAS	1.83	
94772	94772	4.86	NE	28	050	17	4	J&J DRILLING LTD.	8/22/1980	61	Dry Hole	Stock		2		LITCHFIELD, CHARLES		
94731	94731	4.92	NE	12	050	17	4	UNKNOWN DRILLER		70.1	Chemistry	Domestic				OSLUND, WALTER R.	12.19	
155056	155056	4.92	NE	12	050	17	4	BIG IRON DRILLING LTD.	3/26/1991	76.2	New Well	Domestic & Stock		6		OSLUND, LYLE	10.67	0.63

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94760	94760	4.94	12	24	050	17	4	UNKNOWN DRILLER	1/1/1927	51.8	Federal Well Survey	Domestic & Stock				KNUDSLEIN	9.14	

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KM: distance of each well from centre point of search.
Alberta ESRD abbreviations: CHM = chemistry data sets; LT = number of entries in borehole log; PT = number of recorded water levels in pump test data for this well.

APPENDIX C

HYDRAULIC RESPONSE TESTS

Table C1 – Hydraulic Conductivity Testing

Slug Test Analysis Reports

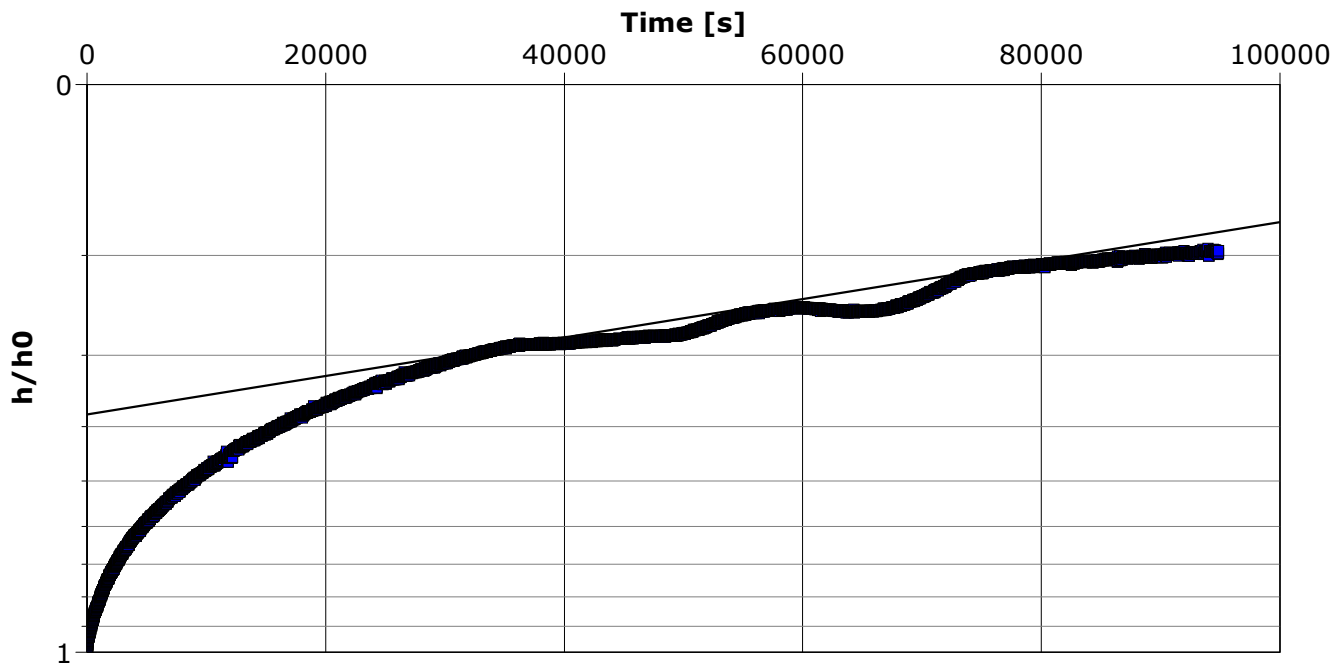
Table C1 - Hydraulic Conductivity Testing

Study	Well	Screen Interval		Material at Screen	Interpreted Unit	Hydraulic Conductivity (K) (m/s)	Comment
		Top	Bottom				
Tt, 2016	16MW16	2.96	3.96	Clay Till		2.2E-09	
Tt, 2016	16MW08A	5.1	6.1	Clayey Sandstone	Upper Bedrock	1.2E-09	above construction depth
	16MW11C	2.35	3.35	Silty Sandstone		2.6E-08	
	16MW14	3.27	4.27	Sandstone		3.0E-09	
Moell, 1983	1S	5.12	5.32	Clayey Sandstone		1.1E-08	
	3S	7.71	7.92	Shale and Clayey Sandstone		3.1E-09	
	4S	5.06	5.26	Clayey Sandstone and Shale		1.2E-08	
	7W	4.5	4.7	Clayey Sandstone		2.0E-08	
	8C	9.76	9.96	Shale		6.3E-10	
	8W	5.07	5.27	Clayey Sandstone and Shale		5.7E-09	
	10W	6.43	6.63	Sandy Shale		5.0E-09	
	11W	4.42	4.62	Clayey Sandstone		7.5E-08	
	12W	6.53	6.73	Shale		5.5E-09	
	16W	4.96	5.16	Clayey Sandstone		1.6E-08	
	17W	8.05	8.25	Sandstone with Clay		5.8E-10	
	18W	4.72	4.92	Clayey Sandstone with Shale		2.5E-09	
	22C	7.29	7.49	Clayey Sandstone		7.8E-10	
				Testing Summary - Upper Bedrock	**No. Tests**	**16**	
					Minimum	**5.8E-10**	
					Maximum	**7.5E-08**	
					Geometric Mean	**4.9E-09**	
Tt, 2016	16MW04	10.58	11.58	Clay Shale	Middle Bedrock	6.5E-09	
	16MW09B	17.06	18.06	Clay Shale		6.6E-10	
	16MW13	12.72	13.72	Clay Shale		6.5E-10	
	16MW18	18.81	19.81	Clay Shale		7.4E-10	
Moell, 1983	1C	10.39	10.59	Shale, Sand Lenses		7.8E-10	
	3N	18.34	18.54	Shale		2.1E-09	
	6C	11.97	12.17	Shale		2.6E-09	
	7E	18.53	18.73	Shale		1.7E-09	
	8E	18.45	18.65	Shale		1.0E-09	
	10E	17.93	18.13	Shale		5.7E-09	
	13C	11.12	11.32	Shale		1.4E-08	
	13E	18.03	18.23	Shale		6.2E-10	
	14C	10.96	11.16	Shale		4.2E-10	
	17C	10.39	10.59	Shale		3.0E-09	
	19C	9.64	9.84	Shale		4.3E-10	
	24C	9.64	9.84	Shale		1.2E-06	
				Testing Summary - Middle Bedrock	**No. Tests**	17	
					Minimum	4.2E-10	
					Maximum	1.2E-06	
					Geometric Mean	**2.3E-09**	
Tt, 2016	16MW11A	35.88	36.88	Silty Sandstone and Shale	Lower Bedrock	4.0E-09	
	16MW09A	35.73	36.73	Silty Sandstone	Lower Bedrock	7.9E-08	
				Testing Summary - Lower Bedrock	**No. Tests**	**2**	
					Minimum	**4.0E-09**	
					Maximum	**7.9E-08**	
					Mean	**4.2E-08**	

Note: Moell data from C.E.Moell and A.M.Hingston, Hydrogeology of the Ryley Site, NE 9-50-17-W4M. December 1983.

	Slug Test Analysis Report
	Project: Ryley Landfill Expansion
	Number: 704-ENVSWM03011-05.003
	Client: Clean Harbors

Location: Ryley, AB	Slug Test: 16MW04	Test Well: 16MW04
Test Conducted by: RJ		Test Date: 5/12/2016
Analysis Performed by: CF		Analysis Date: 5/19/2016
Aquifer Thickness: 10.50 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW04	6.50×10^{-9}	

TETRA TECH

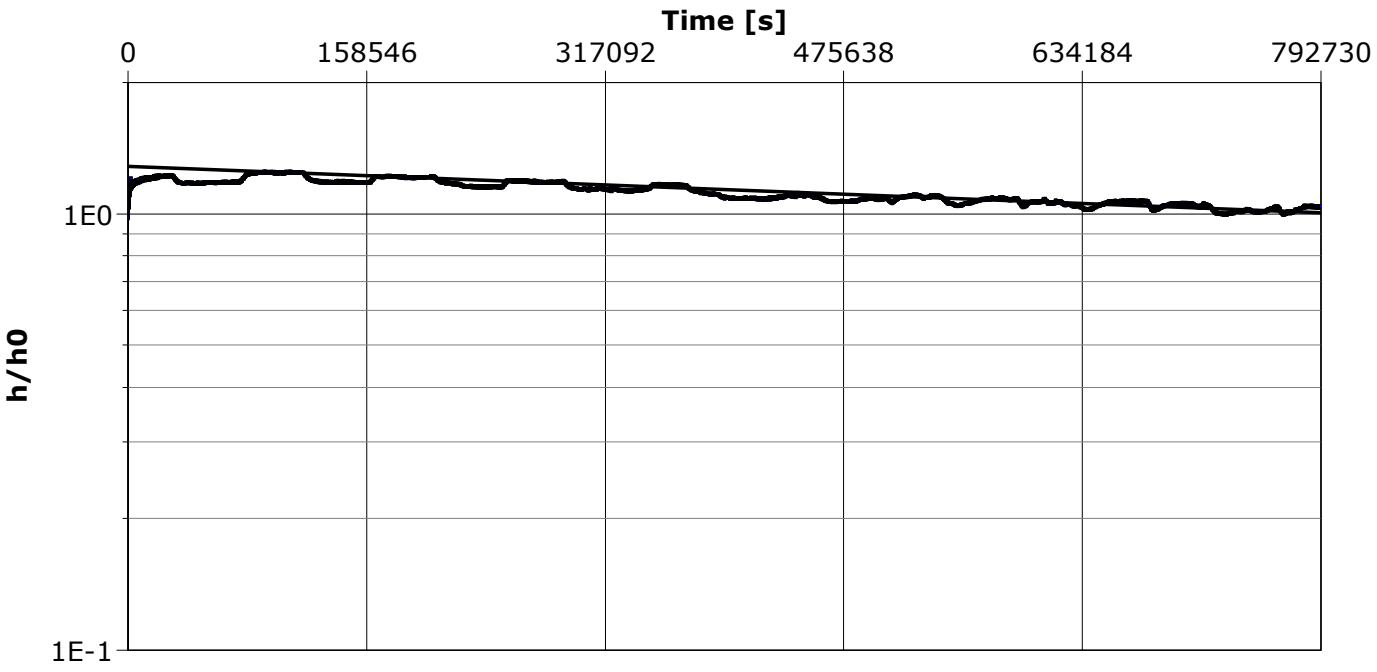
Slug Test Analysis Report

Project: Ryley North Quarter Expansion

Number: ENVSWM03011-05.003

Client: Clean Harbors

Location: NW 1/4, Sec. 9 -50-17 W4M	Slug Test: 16MW08A	Test Well: 16MW08A
Test Conducted by: Sean Buckles		Test Date: 9/12/2016
Analysis Performed by: Seth Xeflide	16MW08A	Analysis Date: 10/12/2016
Aquifer Thickness: 1.30 m		

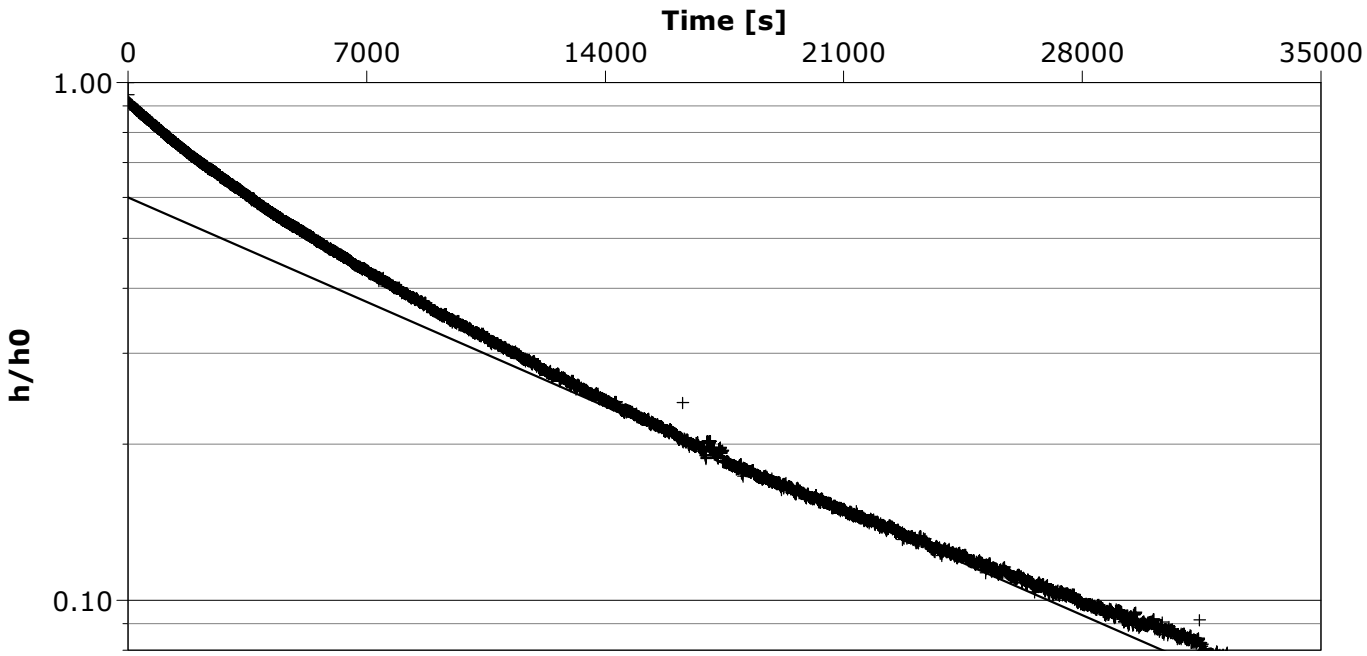


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW08A	1.18×10^{-9}	

	Slug Test Analysis Report
	Project: Ryley Landfill Expansion
	Number: 704-ENVSWM03011-05.003
	Client: Clean Harbors

Location: Ryley, AB	Slug Test: 16MW09A	Test Well: Well 1
Test Conducted by: CF		Test Date: 7/28/2016
Analysis Performed by:	New analysis 1	Analysis Date: 7/28/2016
Aquifer Thickness: 3.50 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
Well 1	7.92×10^{-8}	

TETRA TECH

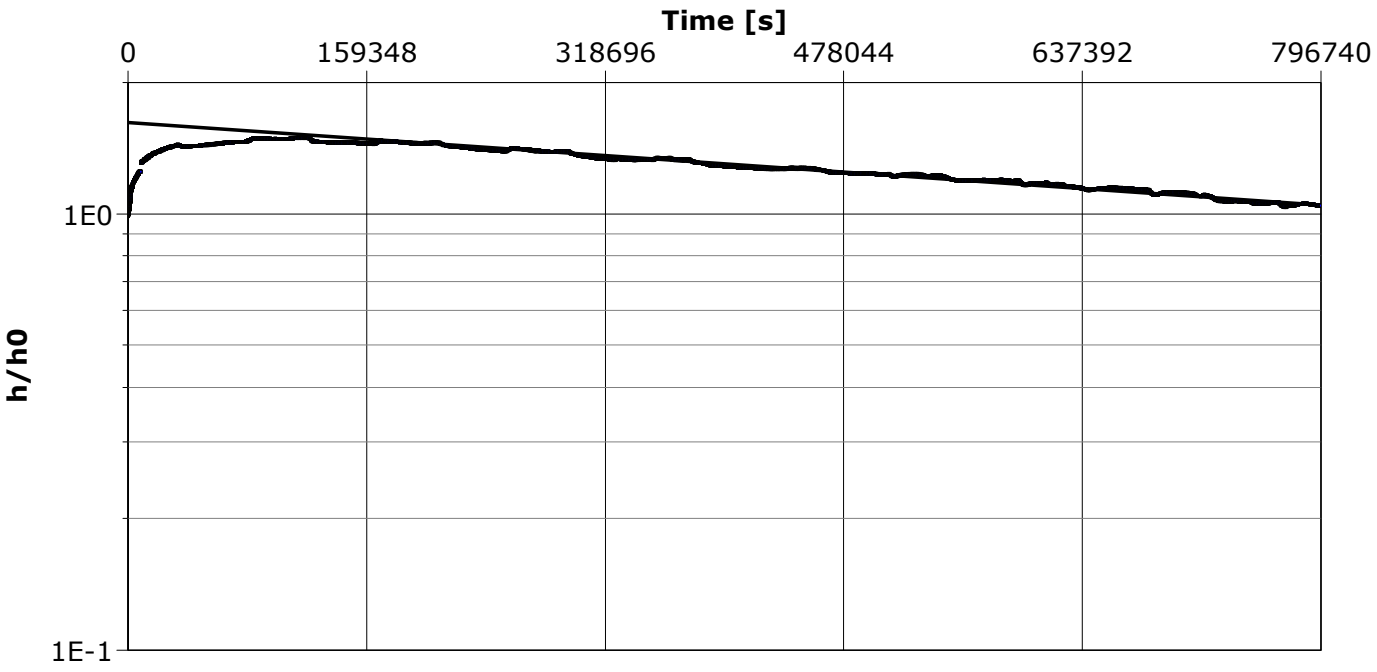
Slug Test Analysis Report

Project: Ryley North Quarter Expansion

Number: ENVSWM03011-05.003

Client: Clean Harbors

Location: NW 1/4, Sec. 9 -50-17 W4M	Slug Test: 16MW09B	Test Well: 16MW09B
Test Conducted by: Sean Buckles		Test Date: 9/13/2016
Analysis Performed by: Seth Xeflide	16MW09B	Analysis Date: 10/12/2016
Aquifer Thickness: 1.30 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW09B	6.55×10^{-10}	

TETRA TECH

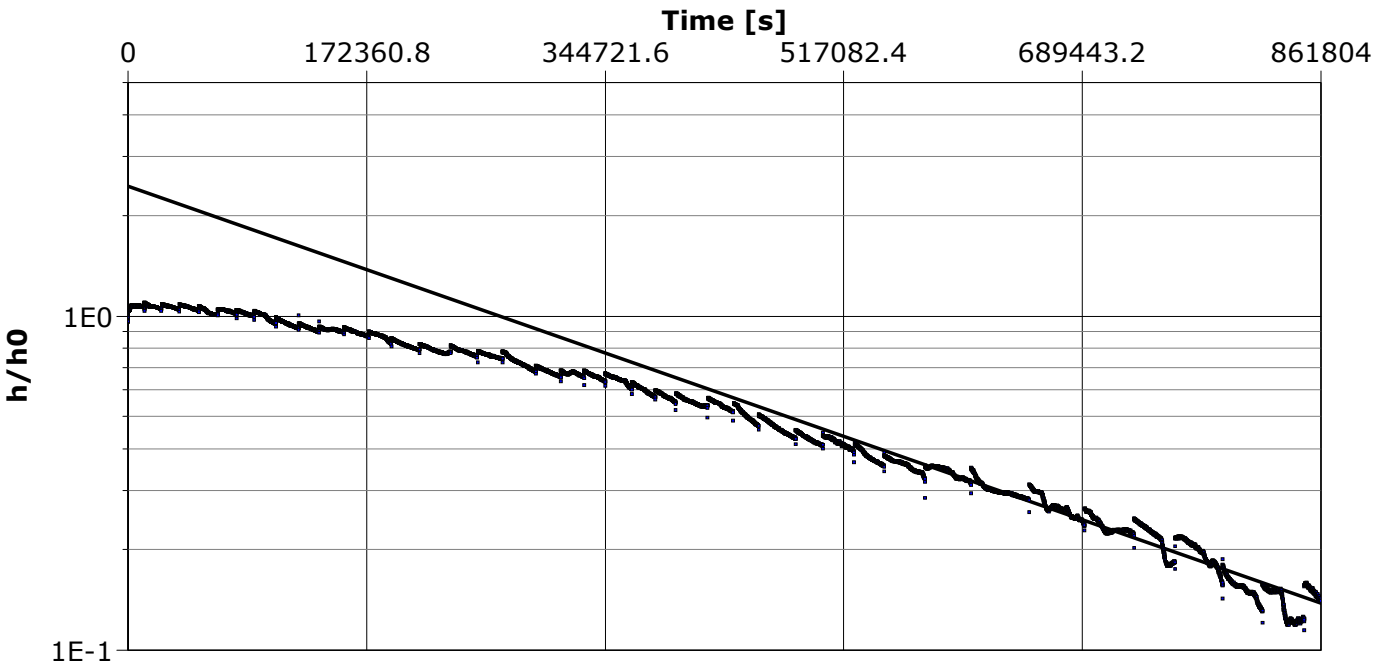
Slug Test Analysis Report

Project: Ryley North Quarter Expansion

Number: ENVSWM03011-05.003

Client: Clean Harbors

Location: NW 1/4, Sec. 9 -50-17 W4M	Slug Test: 16MW11A	Test Well: 16MW11A
Test Conducted by: Sean Buckles		Test Date: 9/12/2016
Analysis Performed by: Seth Xeflide	16MW11A	Analysis Date: 10/12/2016
Aquifer Thickness: 1.30 m		

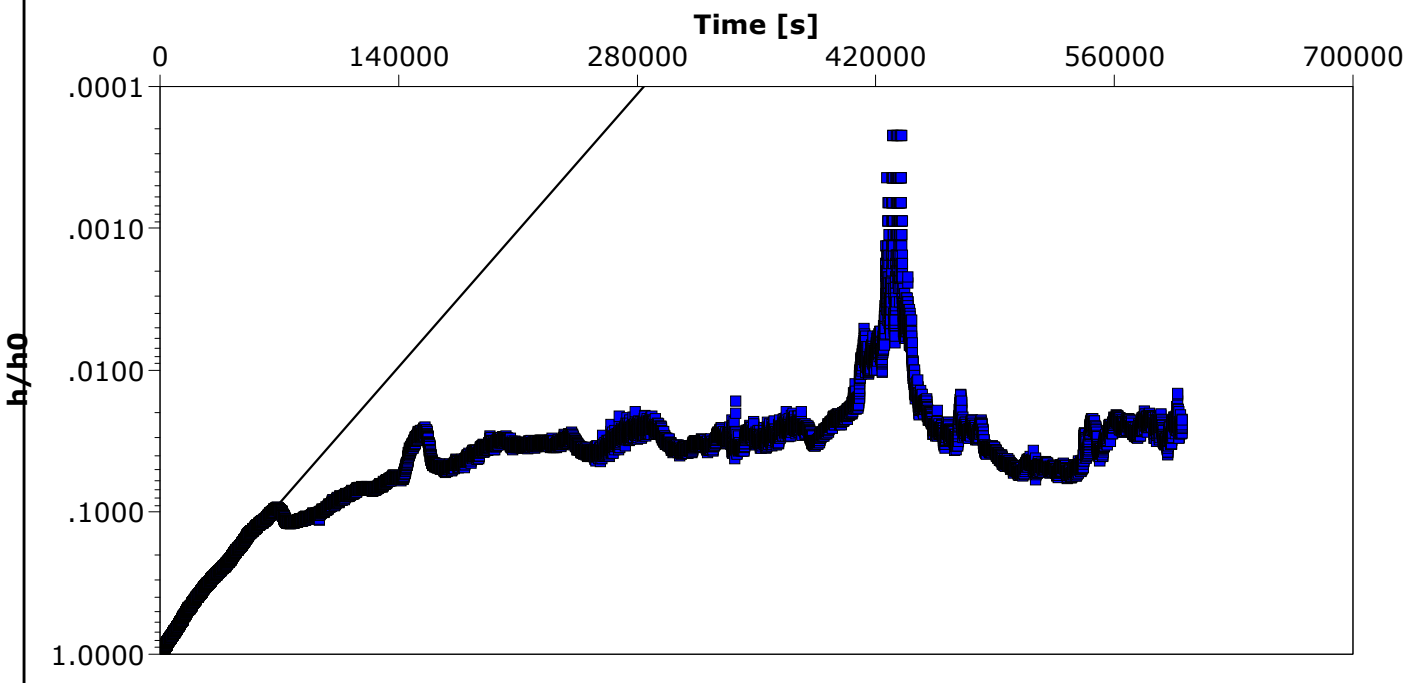


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW11A	3.98×10^{-9}	

	Slug Test Analysis Report
	Project: Ryley Landfill Expansion
	Number: 704-ENVSWM03011-05.003
	Client: Clean Harbors

Location: Ryley, AB	Slug Test: 16MW11C	Test Well: 16MW11C
Test Conducted by: RJ		Test Date: 6/20/2016
Analysis Performed by: CF		Analysis Date: 6/20/2016
Aquifer Thickness: 3.50 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW11C	2.64×10^{-8}	

TETRA TECH

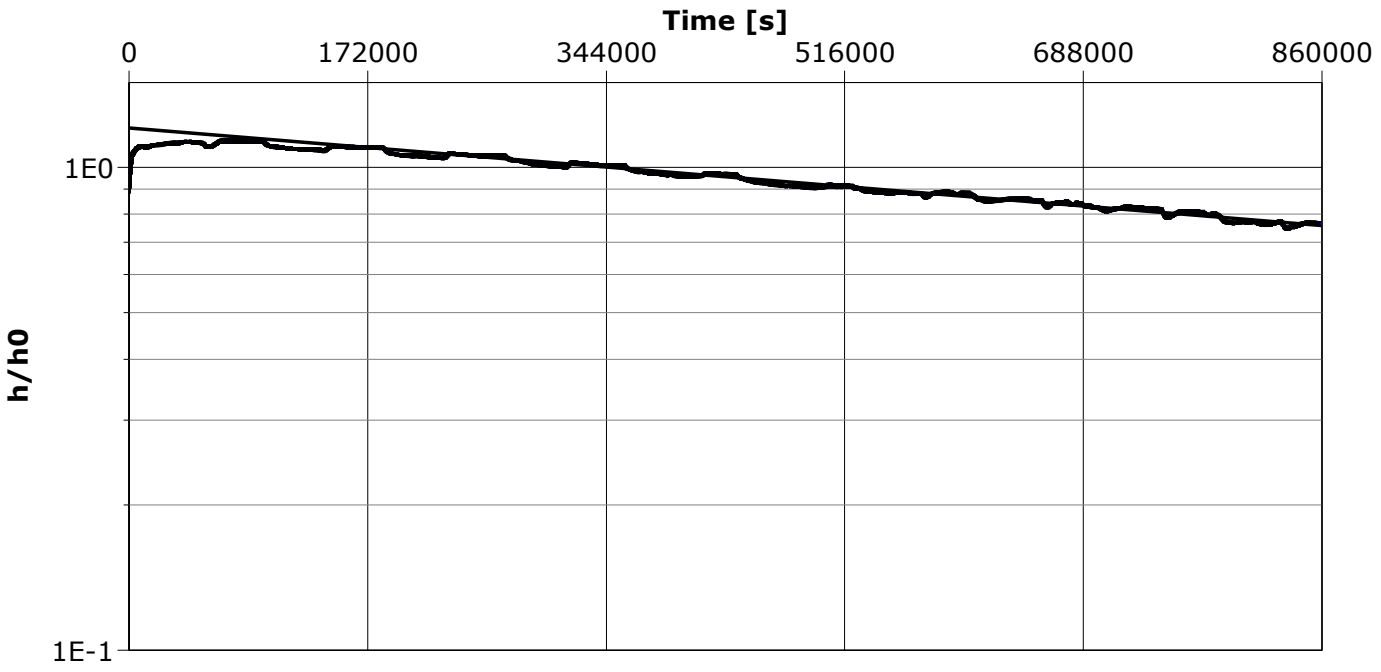
Slug Test Analysis Report

Project: Ryley North Quarter Expansion

Number: ENVSWM03011-05.003

Client: Clean Harbors

Location: NW 1/4, Sec. 9 -50-17 W4M	Slug Test: 16MW13	Test Well: 16MW13
Test Conducted by: Sean Buckles		Test Date: 9/12/2016
Analysis Performed by: Seth Xeflide	16MW13	Analysis Date: 10/12/2016
Aquifer Thickness: 1.30 m		

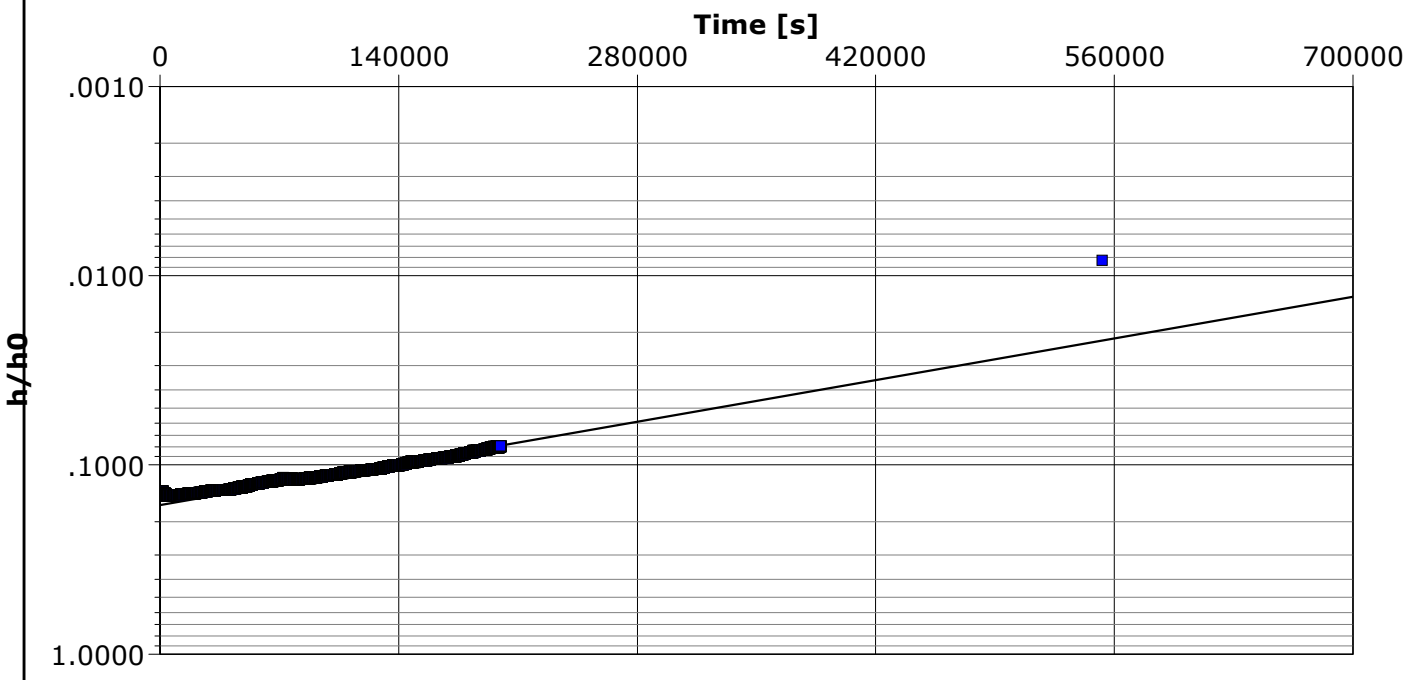


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW13	6.47×10^{-10}	

	Slug Test Analysis Report
	Project: Ryley Landfill Expansion
	Number: 704-ENVSWM03011-05.003
	Client: Clean Harbors

Location: Ryley, AB	Slug Test: 16MW14	Test Well: 16MW14
Test Conducted by: RJ		Test Date: 5/5/2016
Analysis Performed by: CF		Analysis Date: 5/19/2016
Aquifer Thickness: 1.30 m		

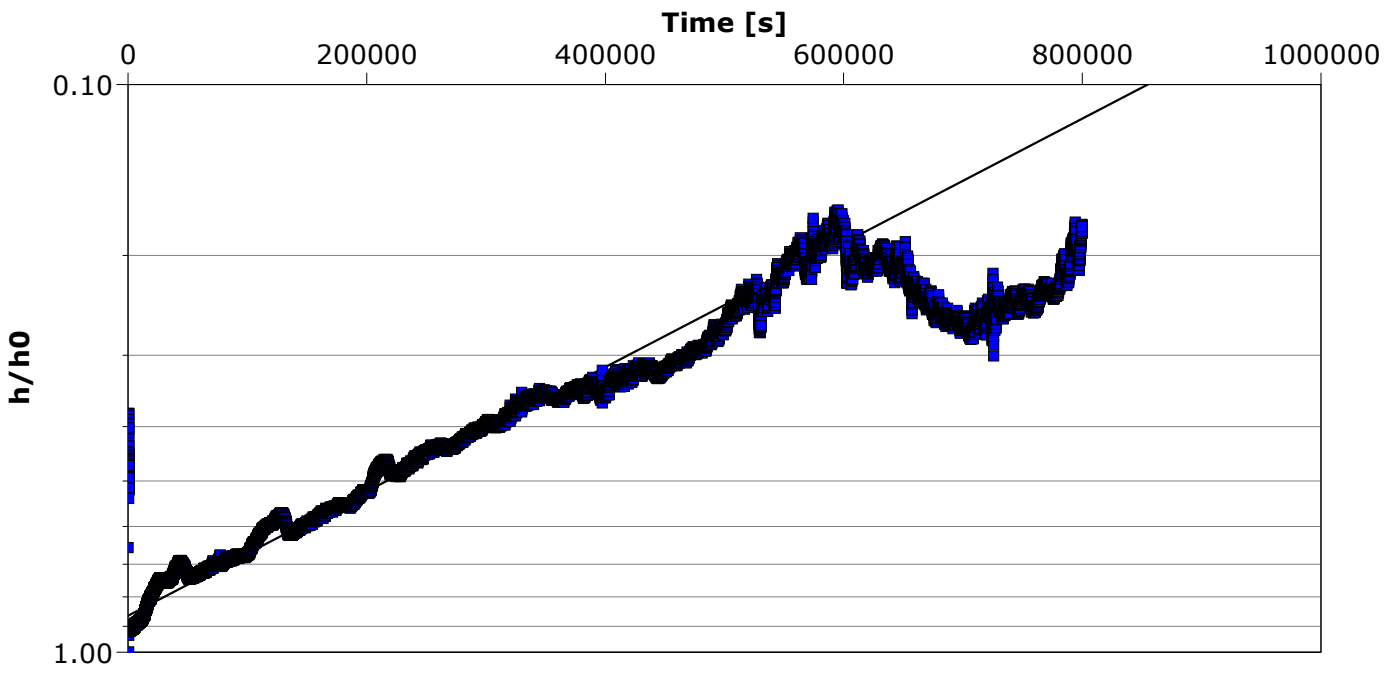


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW14	3.02×10^{-9}	

CleanHarbors / TETRA TECH EBA	**Slug Test Analysis Report**
	Project: Ryley Landfill Expansion
	Number: 704-ENVSWM03011-05.003
	Client: Clean Harbors

Location: Ryley, AB	Slug Test: 16MW16	Test Well: 16MW16
Test Conducted by: RJ		Test Date: 7/29/2016
Analysis Performed by: CF		Analysis Date: 7/29/2016
Aquifer Thickness: 3.30 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW16	2.20×10^{-9}	

TETRA TECH

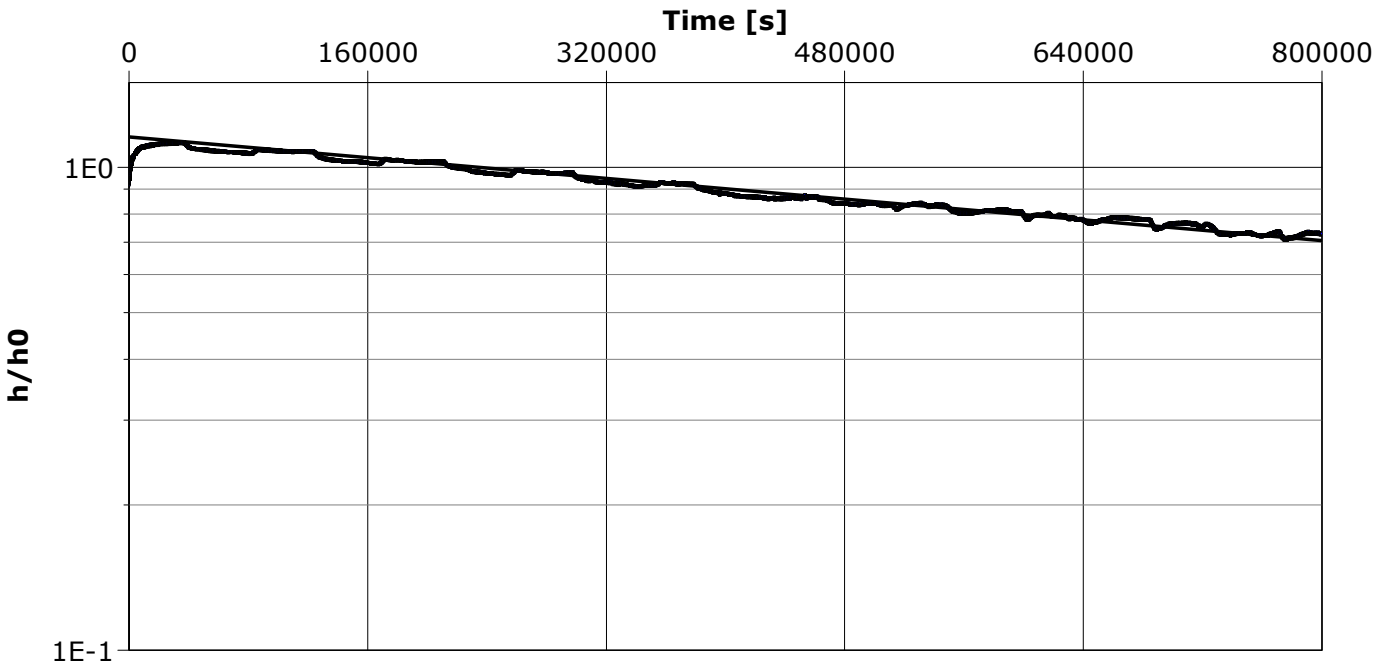
Slug Test Analysis Report

Project: Ryley North Quarter Expansion

Number: ENVSWM03011-05.003

Client: Clean Harbors

Location: NW 1/4, Sec. 9 -50-17 W4M	Slug Test: 16MW18	Test Well: 16MW18
Test Conducted by: Sean Buckles		Test Date: 9/13/2016
Analysis Performed by: Seth Xeflide	16MW18	Analysis Date: 10/12/2016
Aquifer Thickness: 1.50 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
16MW18	7.35×10^{-10}	

APPENDIX D

GEOTECHNICAL LABORATORY TESTS

Atterberg Limits

Grain Size

Standard Proctor Moisture-Density Relationship Tests

Hydraulic Conductivity (Shelby Tube and Remoulded)

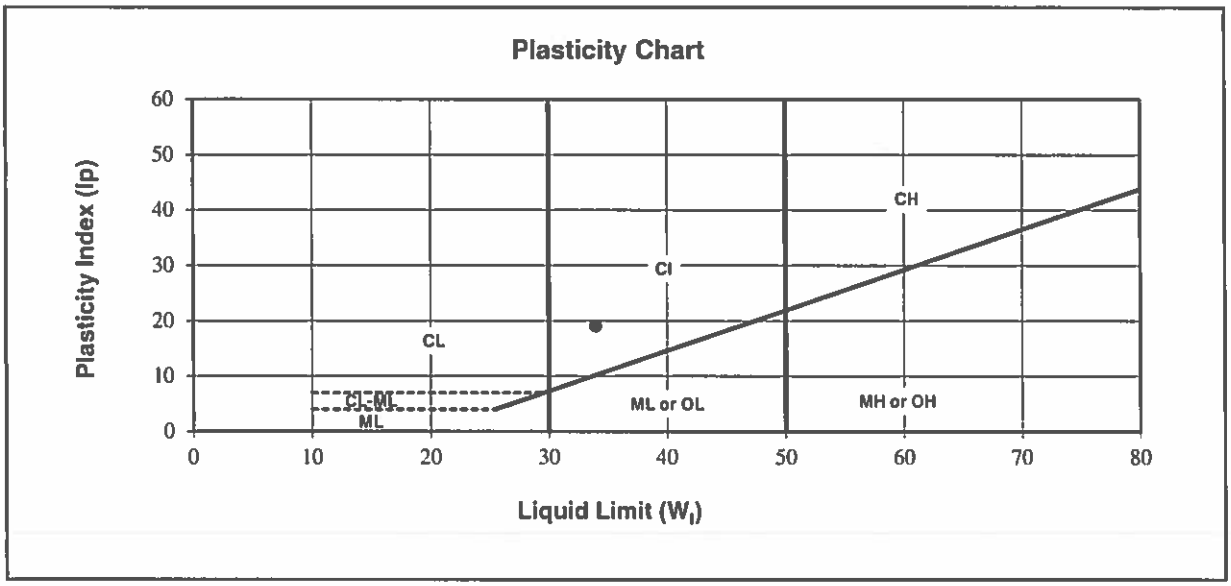
Porosity

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 2
		Borehole Number:	16BH01
Project No:	704-ENV.SWM03011-05.003	Depth:	2.3 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 26, 2016

Sample Description: CLAY, sandy, silty, trace gravel



Liquid Limit ($W_{1)}$:	34	Natural Moisture (%)	15.3
Plastic Limit :	15	Soil Plasticity:	Medium
Plasticity Index (Ip) :	19	Mod.USCS Symbol:	CI

Remarks:

Reviewed By: _____ P.Geol.

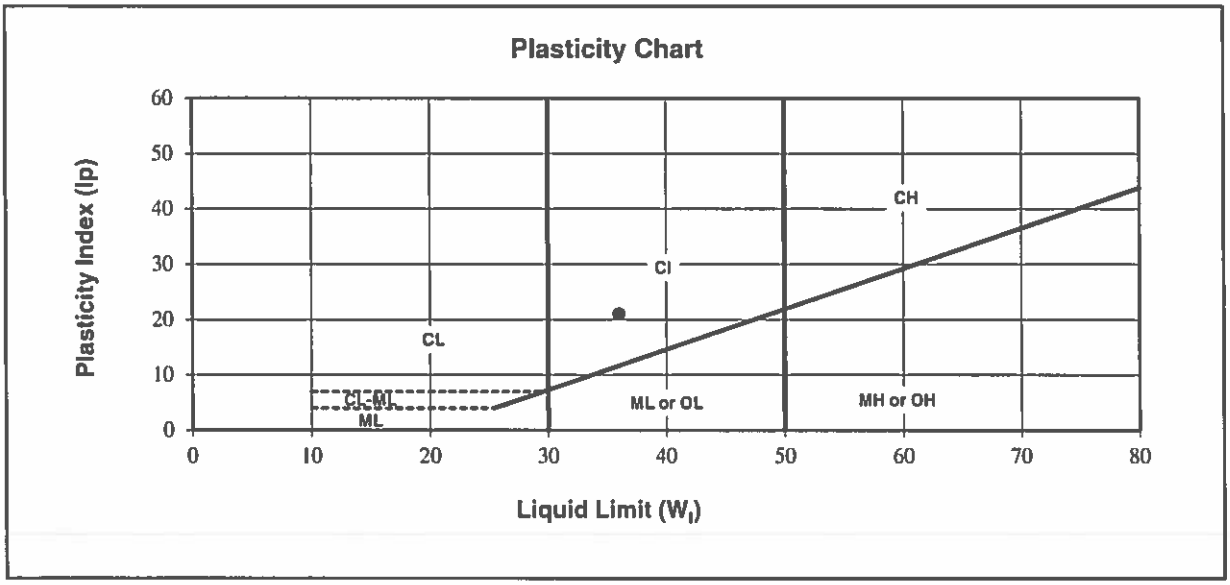
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 1
		Borehole Number:	16BH02
Project No:	704-ENV.SWM03011-05.003	Depth:	0.6 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 9, 2016

Sample Description: CLAY, sandy, silty



Liquid Limit ($W_{1)}$:	36	Natural Moisture (%)	10.5
Plastic Limit :	15	Soil Plasticity:	Medium
Plasticity Index (Ip) :	21	Mod.USCS Symbol:	CI

Remarks:

Reviewed By: _____ P.Geol.

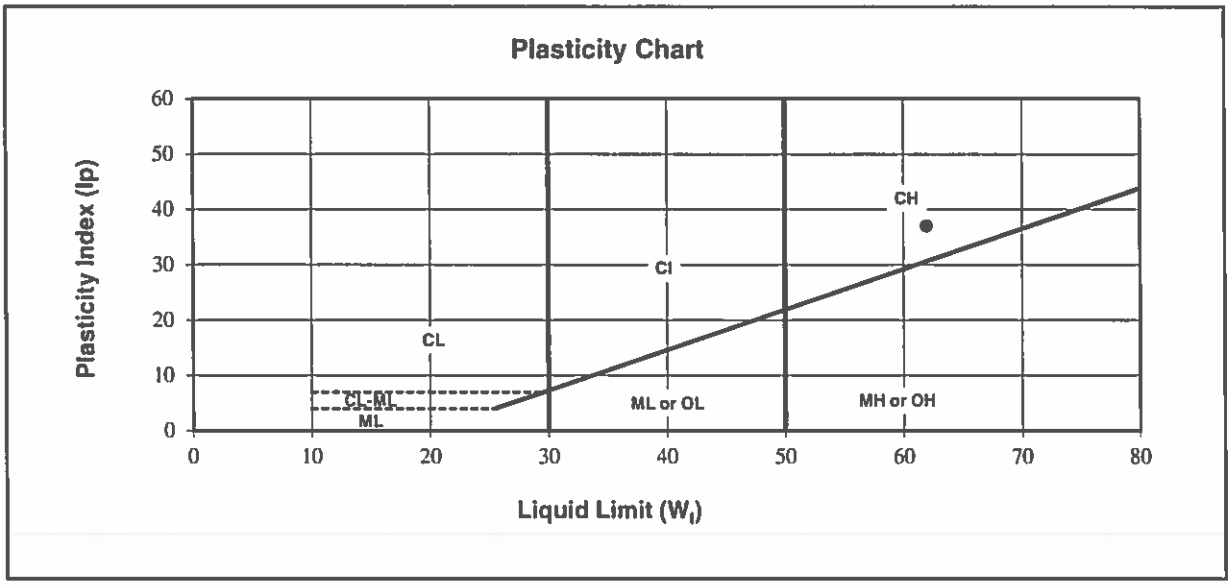
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 1
		Borehole Number:	16BH03
Project No:	704-ENV.SWM03011-05.003	Depth:	2.1 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 9, 2016

Sample Description: CLAY, silty, some sand



Liquid Limit ($W_{1)}$:	62	Natural Moisture (%)	29.2
Plastic Limit :	25	Soil Plasticity:	High
Plasticity Index (Ip) :	37	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

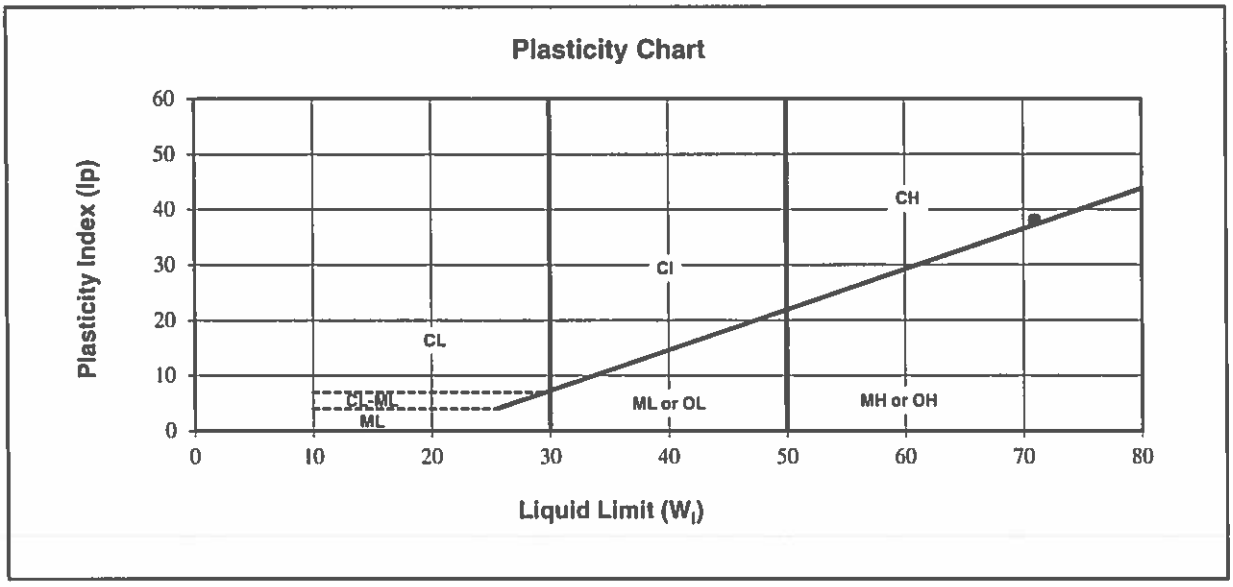
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	B6
		Borehole Number:	16BH04
Project No:	704-ENV.SWM03011-05.003	Depth:	6.4 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 9, 2016

Sample Description: CLAY, silty, sandy



Liquid Limit (W_{l}) :	71	Natural Moisture (%)	23.7
Plastic Limit :	33	Soil Plasticity:	High
Plasticity Index (Ip) :	38	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

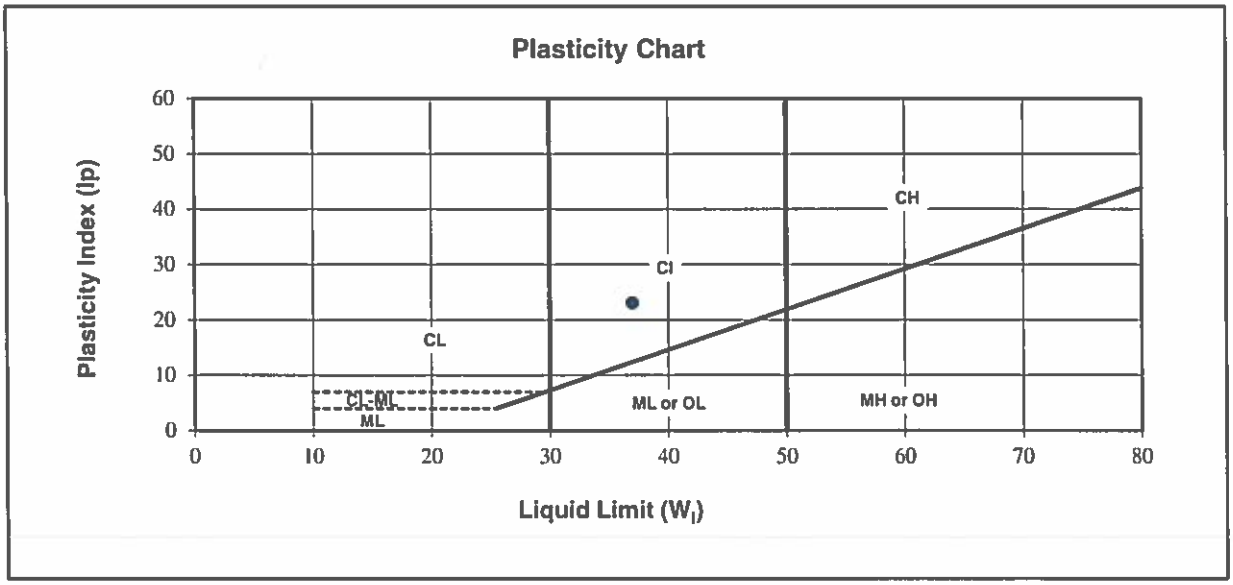
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 1
		Borehole Number:	16BH05
Project No:	704-ENV.SWM03011-05.003	Depth:	0.9 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 11, 2016

Sample Description: CLAY, sandy, silty, trace gravel



Liquid Limit (W_{l}) :	37	Natural Moisture (%)	8.9
Plastic Limit :	14	Soil Plasticity:	Medium
Plasticity Index (Ip) :	23	Mod.USCS Symbol:	CI

Remarks:

Reviewed By: _____ P.Geol.

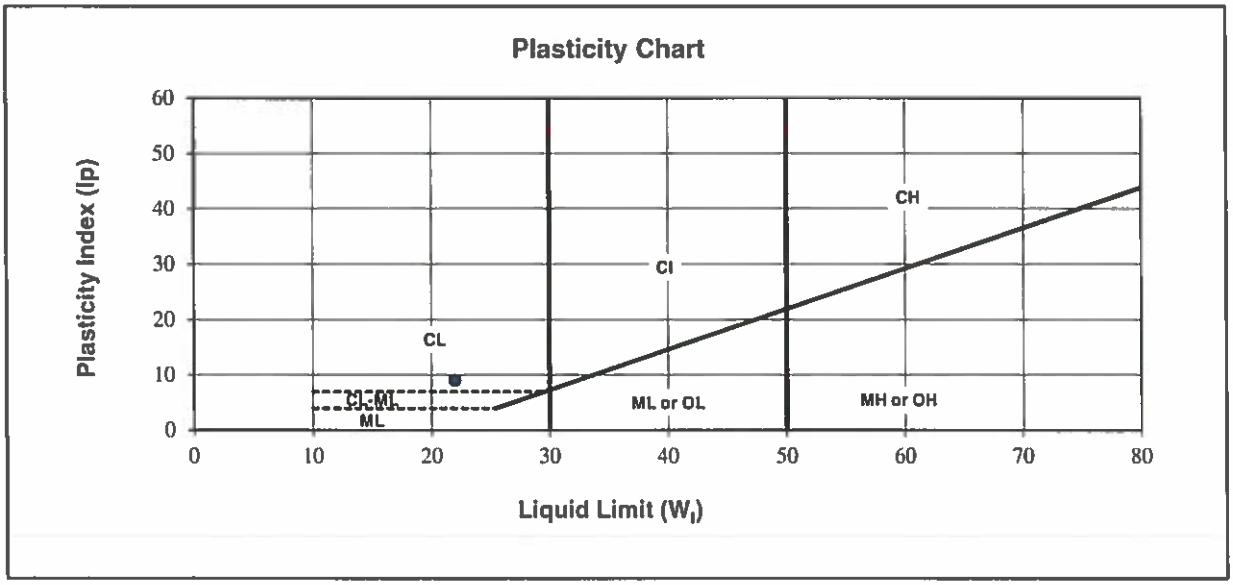
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	B1
		Borehole Number:	16BH06
Project No:	704-ENV.SWM03011-05.003	Depth:	0.6 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 16, 2016

Sample Description: CLAY, sandy, silty, trace gravel



Liquid Limit (W_{l}) :	22	Natural Moisture (%)	8.7
Plastic Limit :	13	Soil Plasticity:	Low
Plasticity Index (Ip) :	9	Mod.USCS Symbol:	CL

Remarks:

Reviewed By: _____ P.Geol.

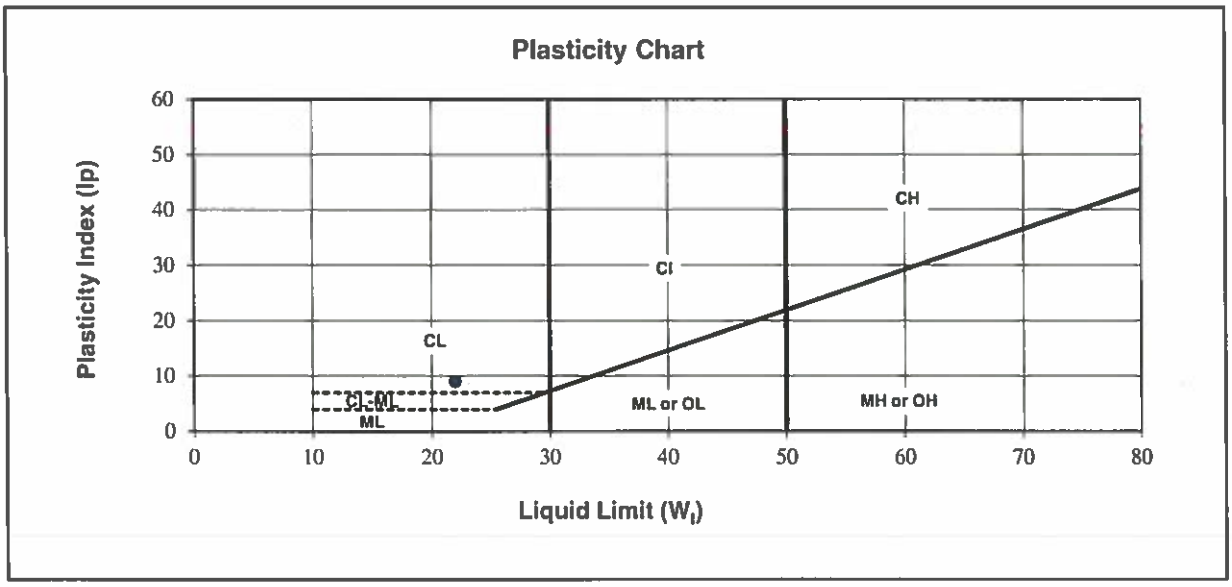
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	B3
		Borehole Number:	16BH06
Project No:	704-ENV.SWM03011-05.003	Depth:	2.4 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 16, 2016

Sample Description: CLAY, sandy, some silt



Liquid Limit ($W_{1)}$:	22	Natural Moisture (%)	8.7
Plastic Limit :	13	Soil Plasticity:	Low
Plasticity Index (Ip) :	9	Mod.USCS Symbol:	CL

Remarks:

Reviewed By: _____ P.Geol.

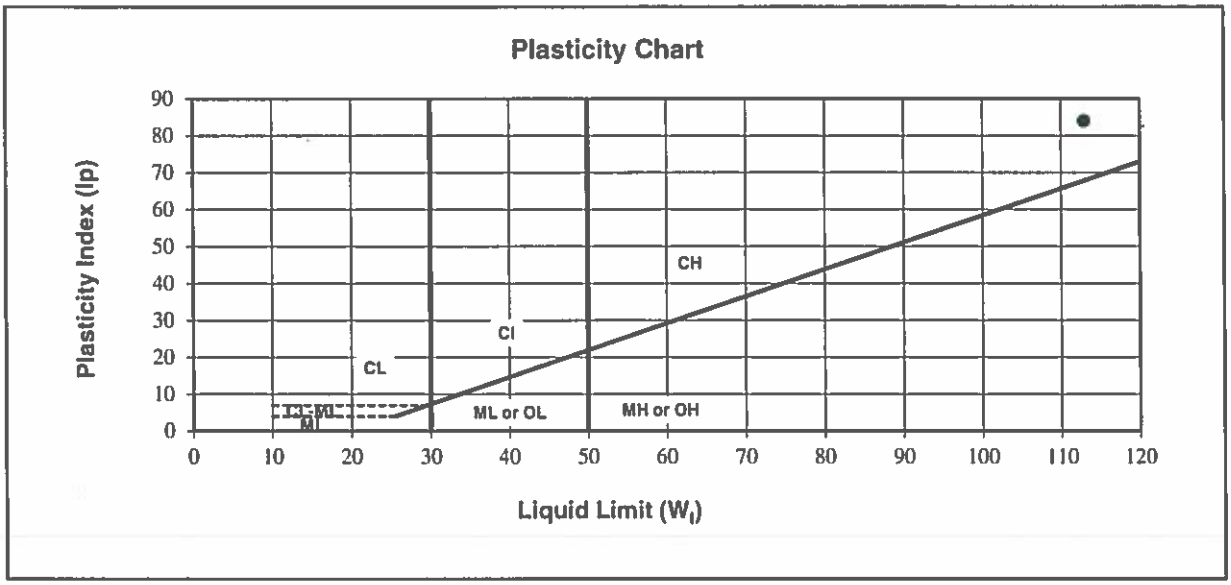
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	B14
		Borehole Number:	16BH06
Project No:	704-ENV.SWM03011-05.003	Depth:	11.6 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 16, 2016

Sample Description: CLAY, sandy, silty



Liquid Limit (W_{l}) :	113	Natural Moisture (%)	22.1
Plastic Limit :	29	Soil Plasticity:	High
Plasticity Index (Ip) :	84	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

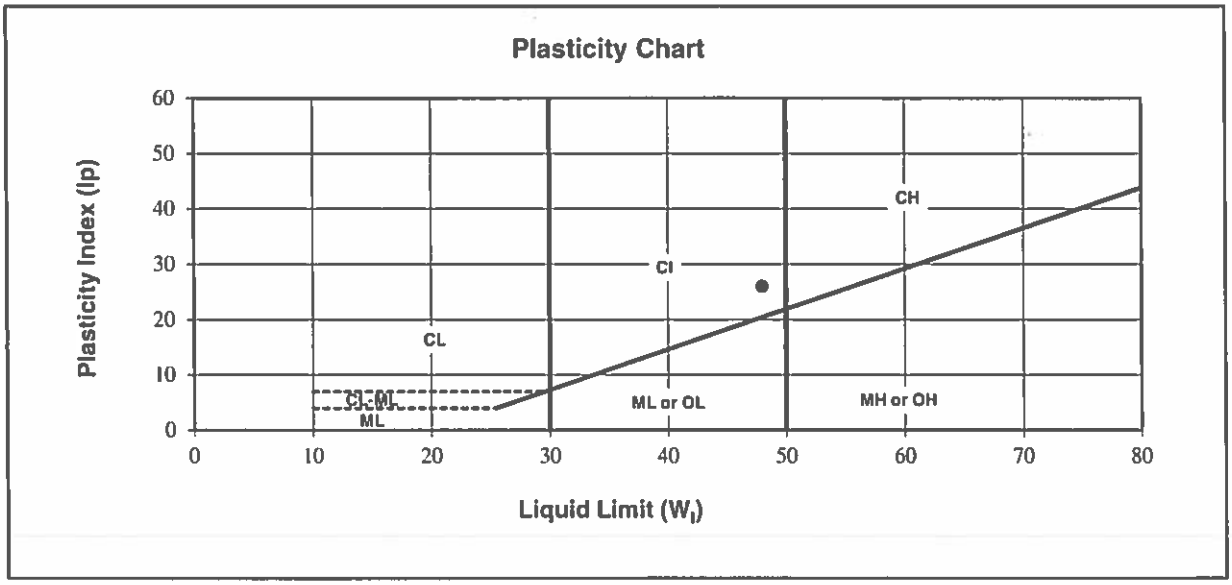
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 1
		Borehole Number:	16BH07
Project No:	704-ENV.SWM03011-05.003	Depth:	2.6 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 11, 2016

Sample Description: CLAY, silty, sandy, trace gravel



Liquid Limit ($W_{l)}$:	48	Natural Moisture (%)	13.3
Plastic Limit :	22	Soil Plasticity:	Medium to High
Plasticity Index (Ip) :	**26**	Mod.USCS Symbol:	CI-CH

Remarks:

Reviewed By: _____ P.Geol.

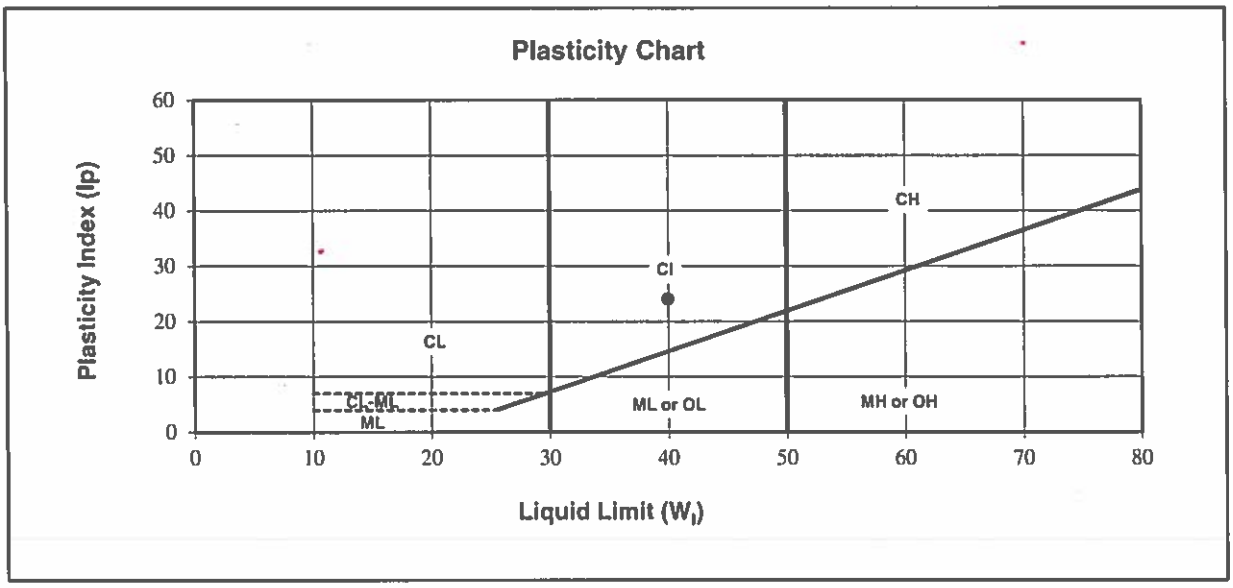
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 2
		Borehole Number:	16MW08 A/B
Project No:	704-ENV.SWM03011-05.003	Depth:	1.8 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 11, 2016

Sample Description: CLAY, silty, sandy, trace gravel



Liquid Limit ($W_{1)}$:	40	Natural Moisture (%)	11.8
Plastic Limit :	16	Soil Plasticity:	Medium
Plasticity Index (Ip) :	24	Mod.USCS Symbol:	CI

Remarks:

Reviewed By: _____ P.Geol.

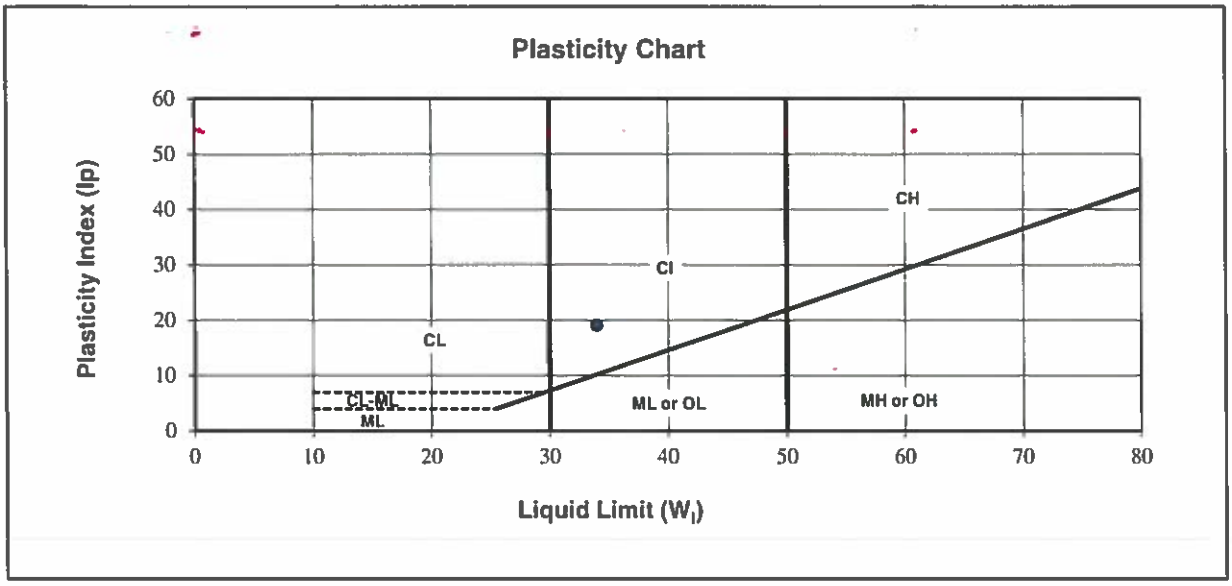
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 1
		Borehole Number:	16MW09 C/D
Project No:	704-ENV.SWM03011-05.003	Depth:	0.8 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 11, 2016

Sample Description: CLAY, silty, sandy



Liquid Limit (W_{l}):	34	Natural Moisture (%)	10.8
Plastic Limit :	15	Soil Plasticity:	Medium
Plasticity Index (Ip) :	19	Mod.USCS Symbol:	CI

Remarks:

Reviewed By: _____ P.Geol.

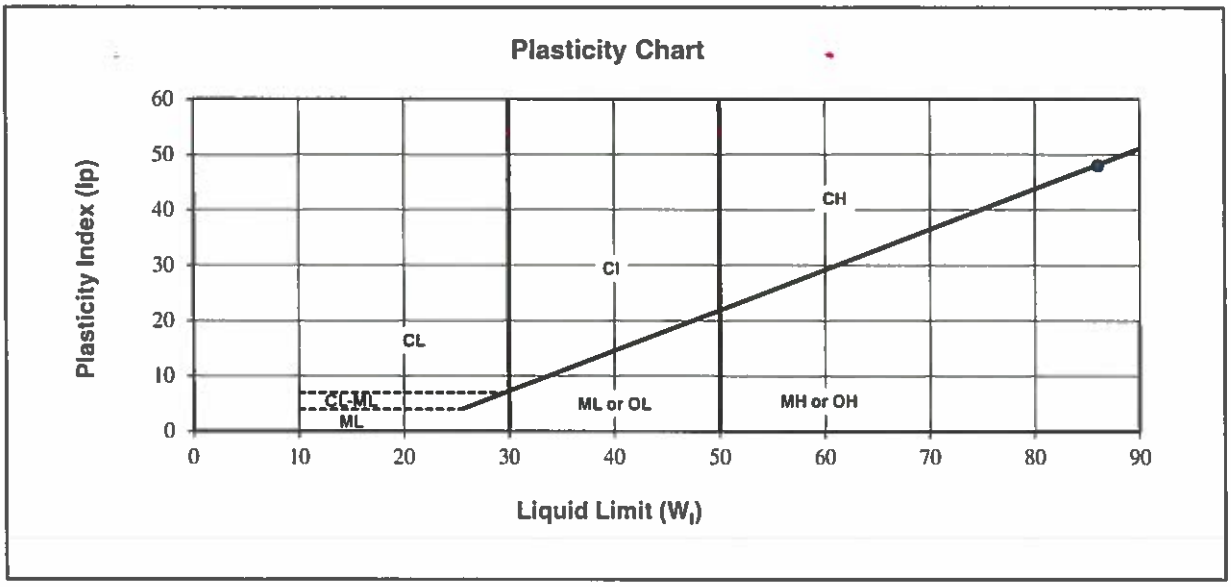
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	C3
		Borehole Number:	16MW09
Project No:	704-ENV.SWM03011-05.003	Depth:	8.8 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 26, 2016

Sample Description: CLAY, silty, trace sand



Liquid Limit (W_{l}) :	86	Natural Moisture (%)	19.6
Plastic Limit :	38	Soil Plasticity:	High
Plasticity Index (Ip) :	48	Mod.USCS Symbol:	MH

Remarks:

Reviewed By: _____ P.Geol.

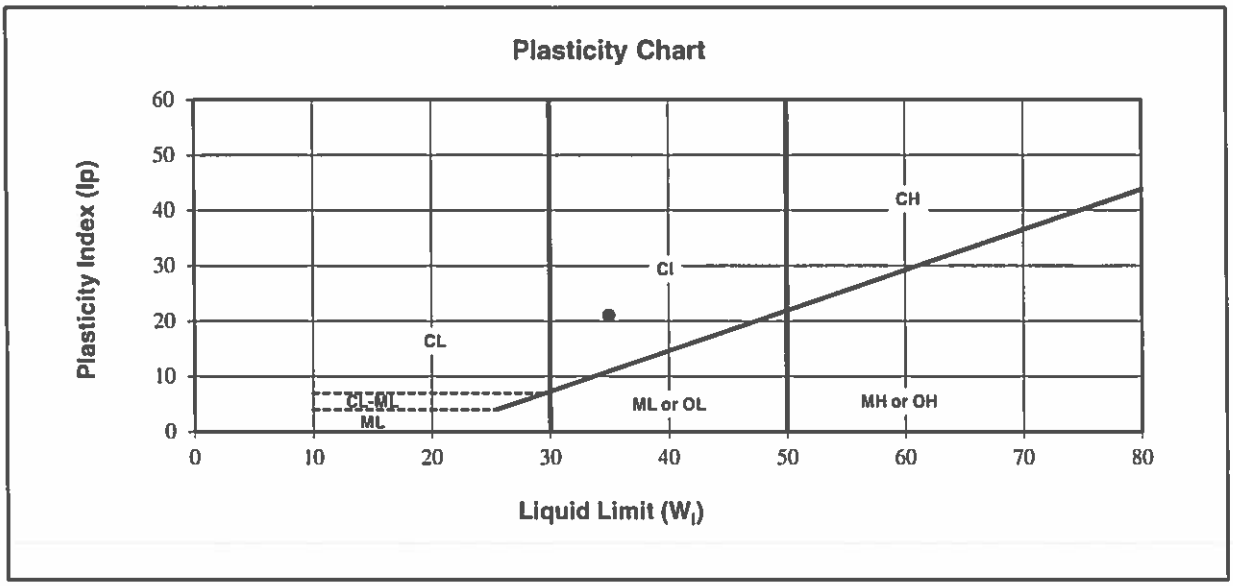
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 1
		Borehole Number:	16MW11
Project No:	704-ENV.SWM03011-05.003	Depth:	
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 26, 2016

Sample Description: CLAY, sandy, silty, trace gravel



Liquid Limit ($W_{l)}$:	35	Natural Moisture (%)	13.2
Plastic Limit :	14	Soil Plasticity:	Medium
Plasticity Index (Ip) :	21	Mod.USCS Symbol:	CI

Remarks:

Reviewed By: _____ P.Geol.

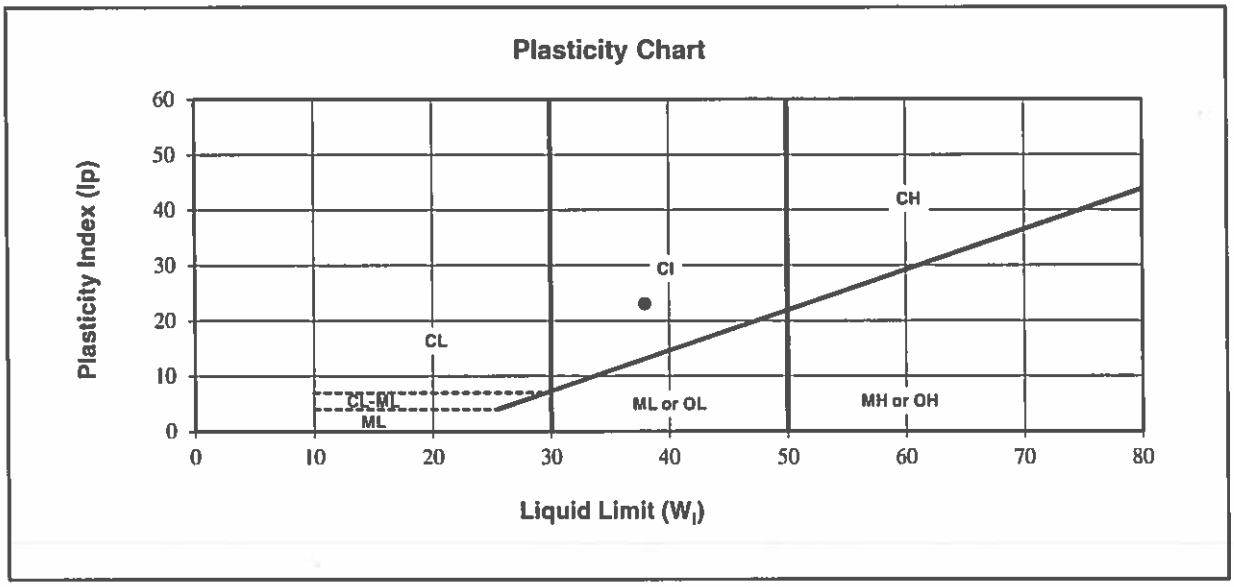
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 2
		Borehole Number:	16MW11 C/D
Project No:	704-ENV.SWM03011-05.003	Depth:	2.1 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 11, 2016

Sample Description: CLAY, sandy, silty, trace gravel



Liquid Limit (W_{l}) :	38	Natural Moisture (%)	16.6
Plastic Limit :	15	Soil Plasticity:	Medium
Plasticity Index (Ip) :	23	Mod.USCS Symbol:	CI

Remarks:

Reviewed By: _____ P.Geol.

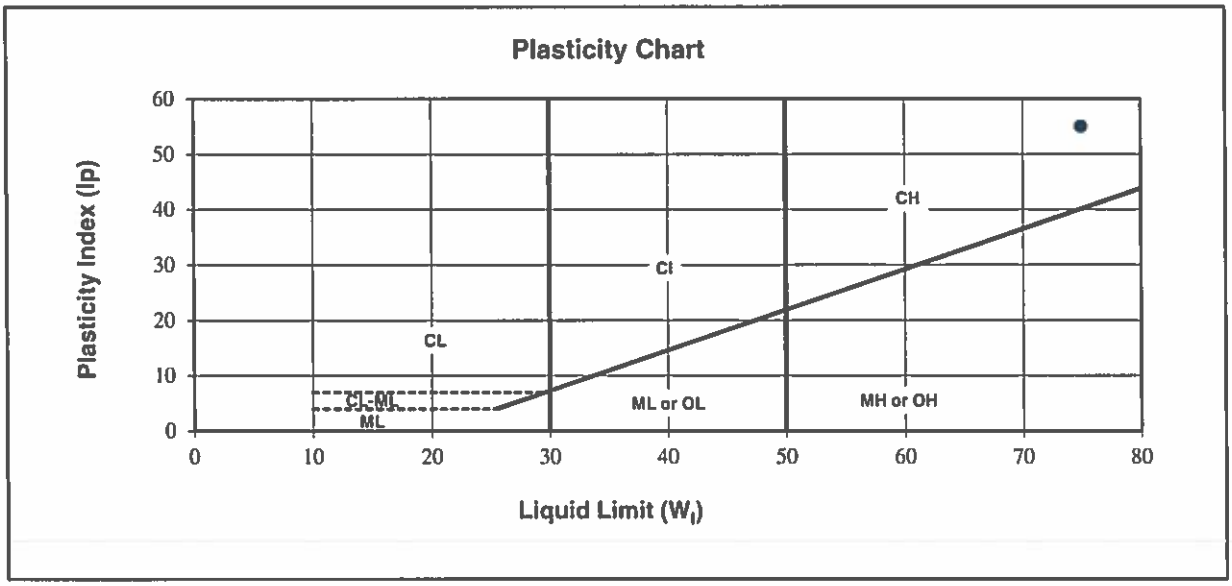
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	C3
		Borehole Number:	16MW12
Project No:	704-ENV.SWM03011-05.003	Depth:	6.1 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 26, 2016

Sample Description: CLAY, sandy, sily



Liquid Limit ($W_{1)}$:	75	Natural Moisture (%)	16.5
Plastic Limit :	20	Soil Plasticity:	High
Plasticity Index (Ip) :	55	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

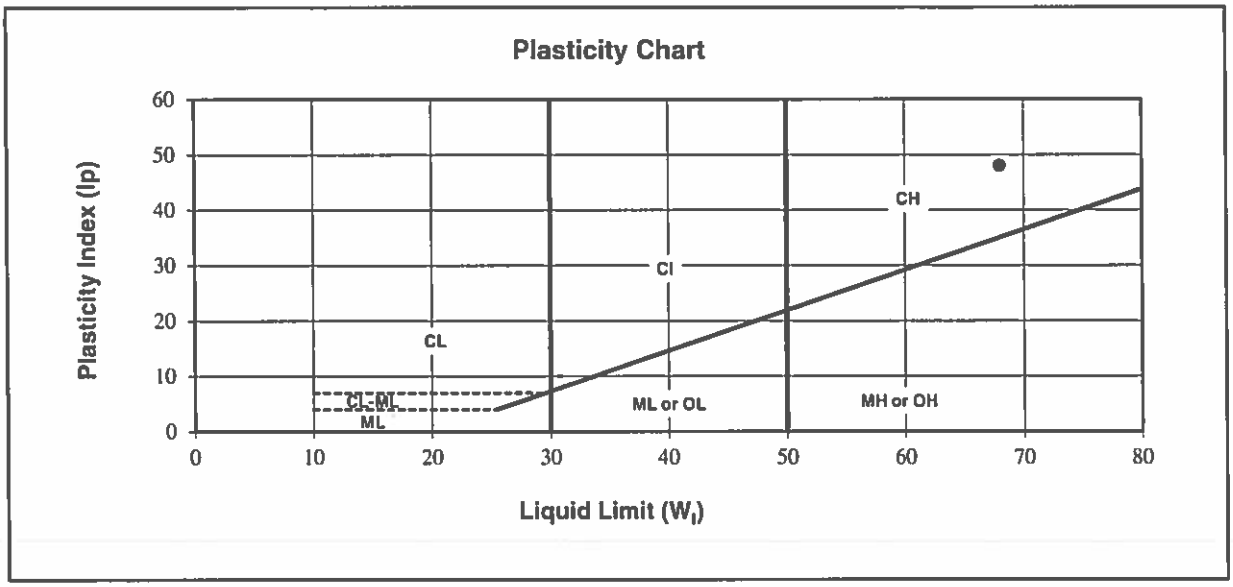
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	C2
		Borehole Number:	16MW13
Project No:	704-ENV.SWM03011-05.003	Depth:	6.4 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 27, 2016

Sample Description: CLAY, sandy, sily



Liquid Limit (W_{l}) :	68	Natural Moisture (%)	17.9
Plastic Limit :	20	Soil Plasticity:	High
Plasticity Index (Ip) :	48	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

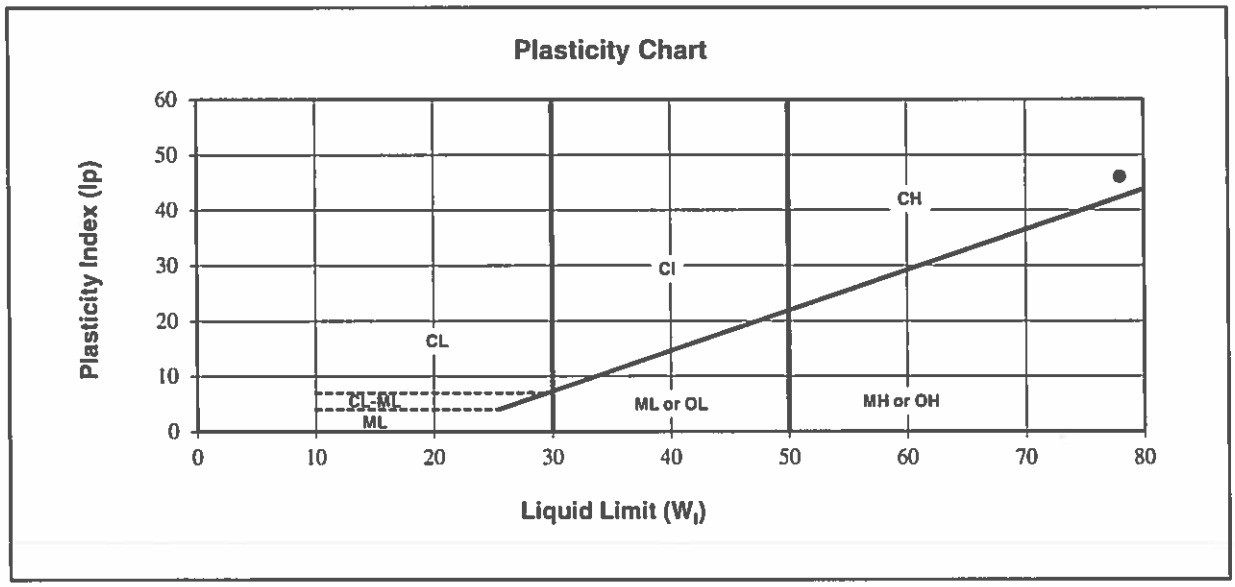
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	C2
		Borehole Number:	16MW14
Project No:	704-ENV.SWM03011-05.003	Depth:	5.8 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 27, 2016

Sample Description: CLAY, silty, trace sand



Liquid Limit ($W_{1)}$:	78	Natural Moisture (%)	13.9
Plastic Limit :	32	Soil Plasticity:	High
Plasticity Index (Ip) :	46	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

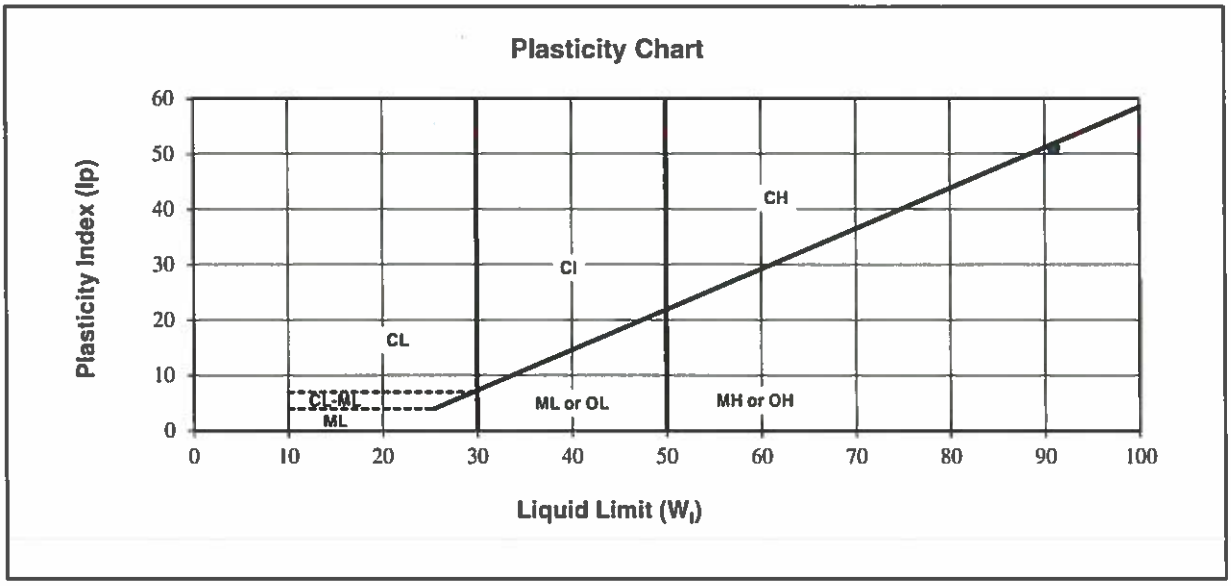
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	C5
		Borehole Number:	16MW15
Project No:	704-ENV.SWM03011-05.003	Depth:	9.1 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 25, 2016

Sample Description: CLAY, silty, some sand



Liquid Limit (W_{l}):	91	Natural Moisture (%)	27.7
Plastic Limit :	40	Soil Plasticity:	High
Plasticity Index (Ip) :	51	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

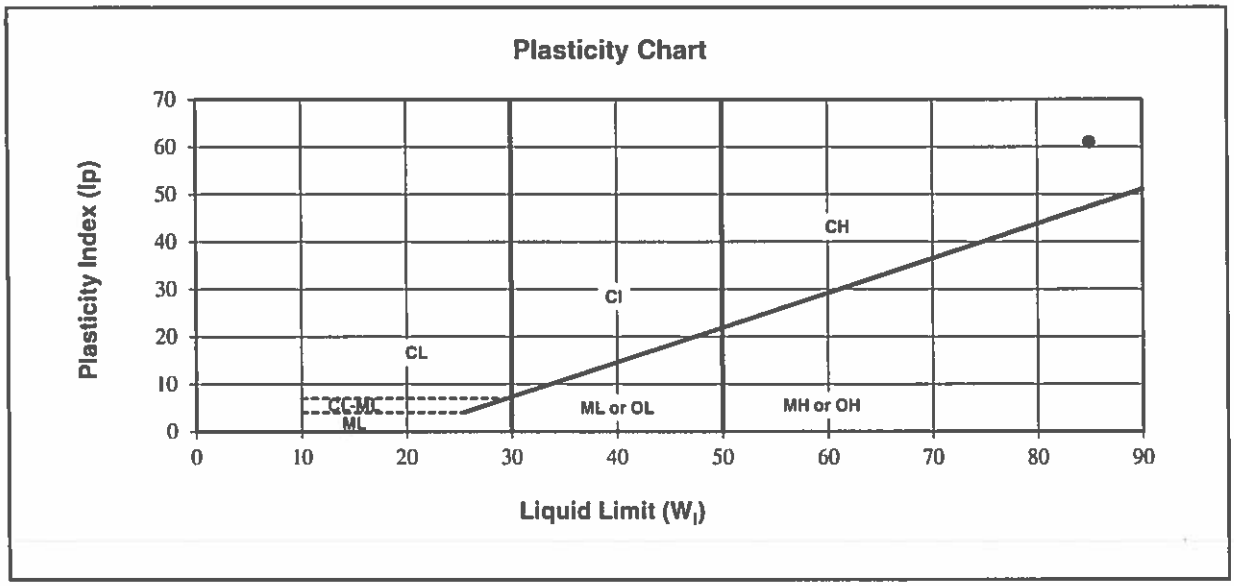
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	C4-2
		Borehole Number:	16MW16
Project No:	704-ENV.SWM03011-05.003	Depth:	10.7 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 27, 2016

Sample Description: CLAY, sandy, silty



Liquid Limit ($W_{1)}$:	85	Natural Moisture (%)	18.3
Plastic Limit :	24	Soil Plasticity:	High
Plasticity Index (Ip) :	61	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

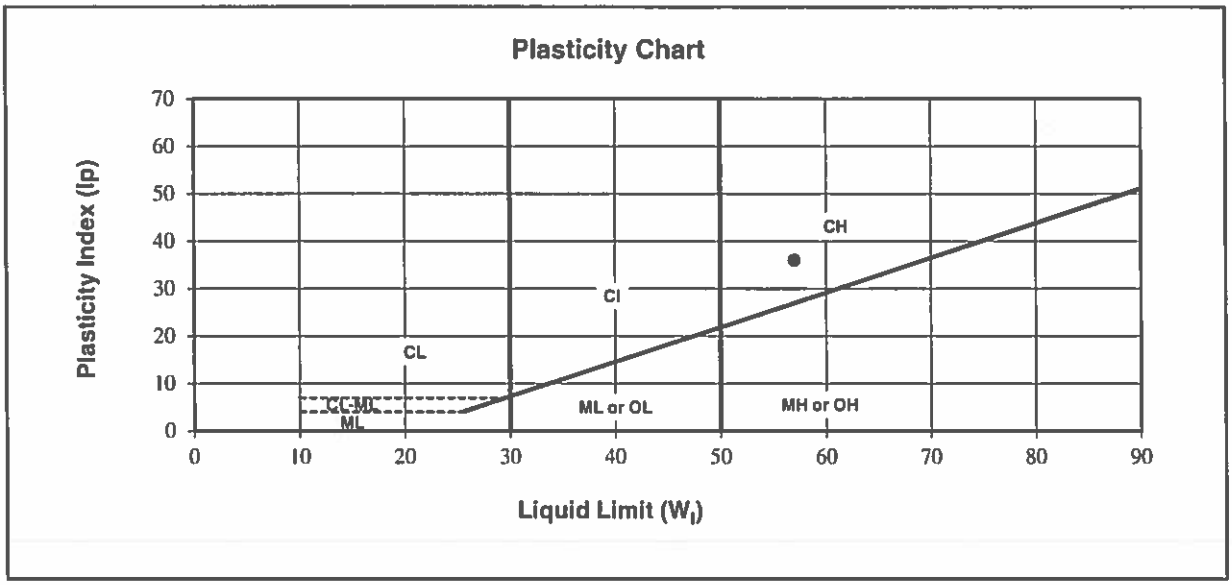
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	C3
		Borehole Number:	16MW16
Project No:	704-ENV.SWM03011-05.003	Depth:	9.1 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 27, 2016

Sample Description: CLAY, silty, sandy



Liquid Limit ($W_{l)}$:	57	Natural Moisture (%)	18.9
Plastic Limit :	21	Soil Plasticity:	High
Plasticity Index (Ip) :	36	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

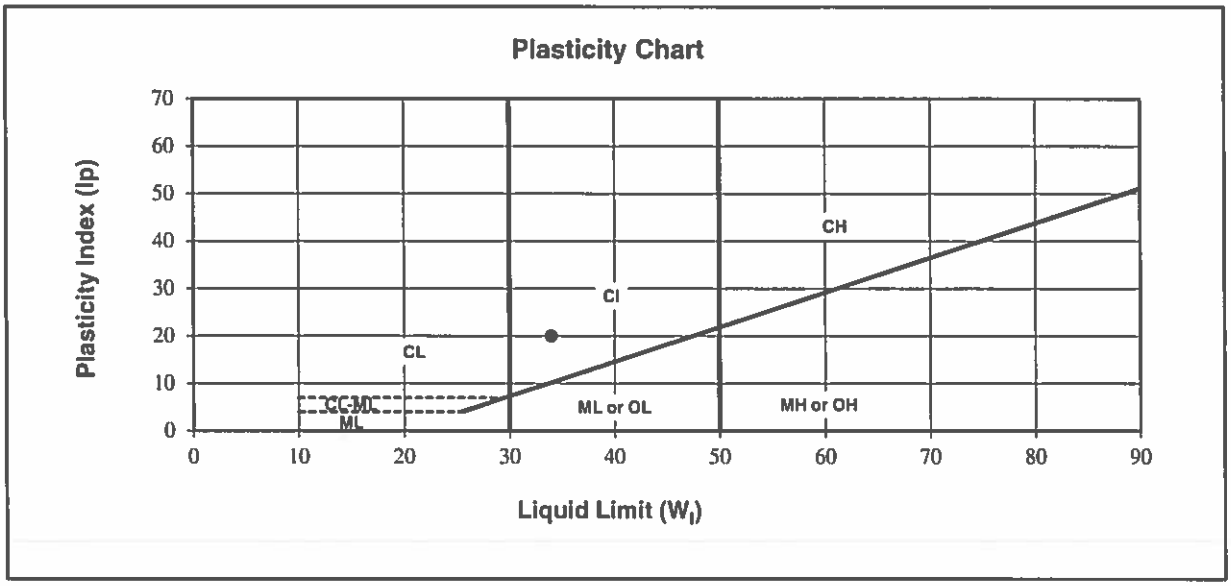
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	Bulk 1
		Borehole Number:	16MW18
Project No:	704-ENV.SWM03011-05.003	Depth:	0.9 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 11, 2016

Sample Description: CLAY, sandy, silty



Liquid Limit ($W_{l)}$:	34	Natural Moisture (%)	12.8
Plastic Limit :	14	Soil Plasticity:	Medium
Plasticity Index (Ip) :	20	Mod.USCS Symbol:	CI

Remarks:

Reviewed By: _____ P.Geol.

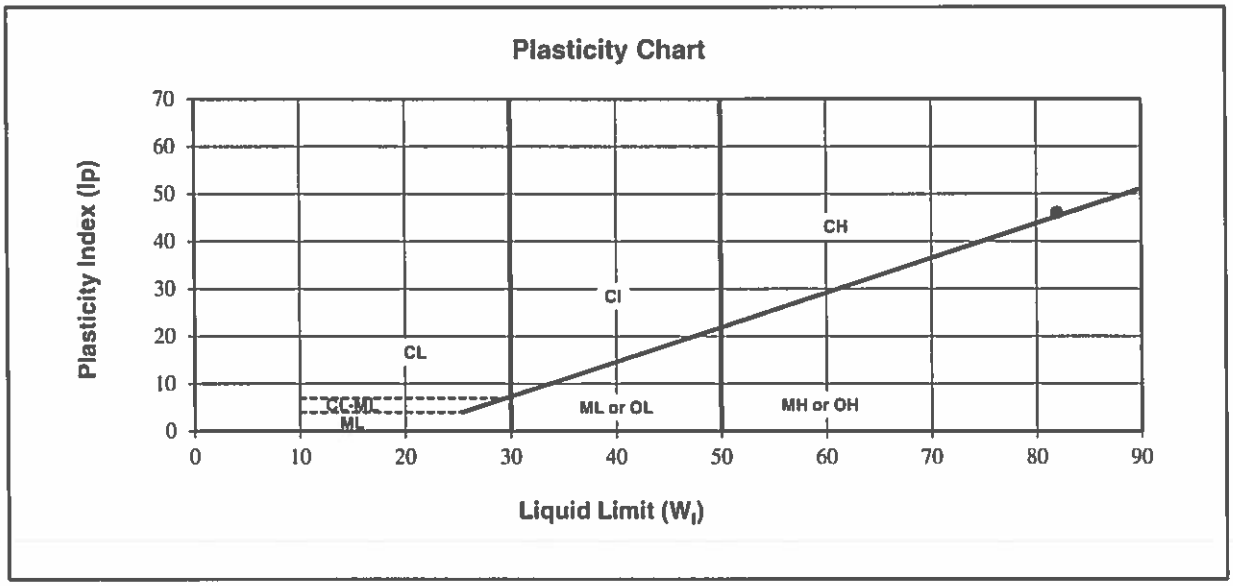
TETRA TECH

ATTERBERG LIMITS TEST REPORT

ASTM D4318

Project:	Clean Harbors Ryley LF Renewal Pern and Expansion Phase 1	Sample Number:	C6
		Borehole Number:	16MW20
Project No:	704-ENV.SWM03011-05.003	Depth:	12.2 m
Client:	Clean Harbors Environ Services Inc.	Sampled By:	Tested By: JB
Attention:	Matei Lega	Date Sampled:	
Email:	lega.matei@cleanharbors.com	Date Tested:	May 26, 2016

Sample Description: CLAY, silty, trace sand



Liquid Limit (W_{l}) :	82	Natural Moisture (%)	22.5
Plastic Limit :	36	Soil Plasticity:	High
Plasticity Index (Ip) :	46	Mod.USCS Symbol:	CH

Remarks:

Reviewed By: _____ P.Geol.

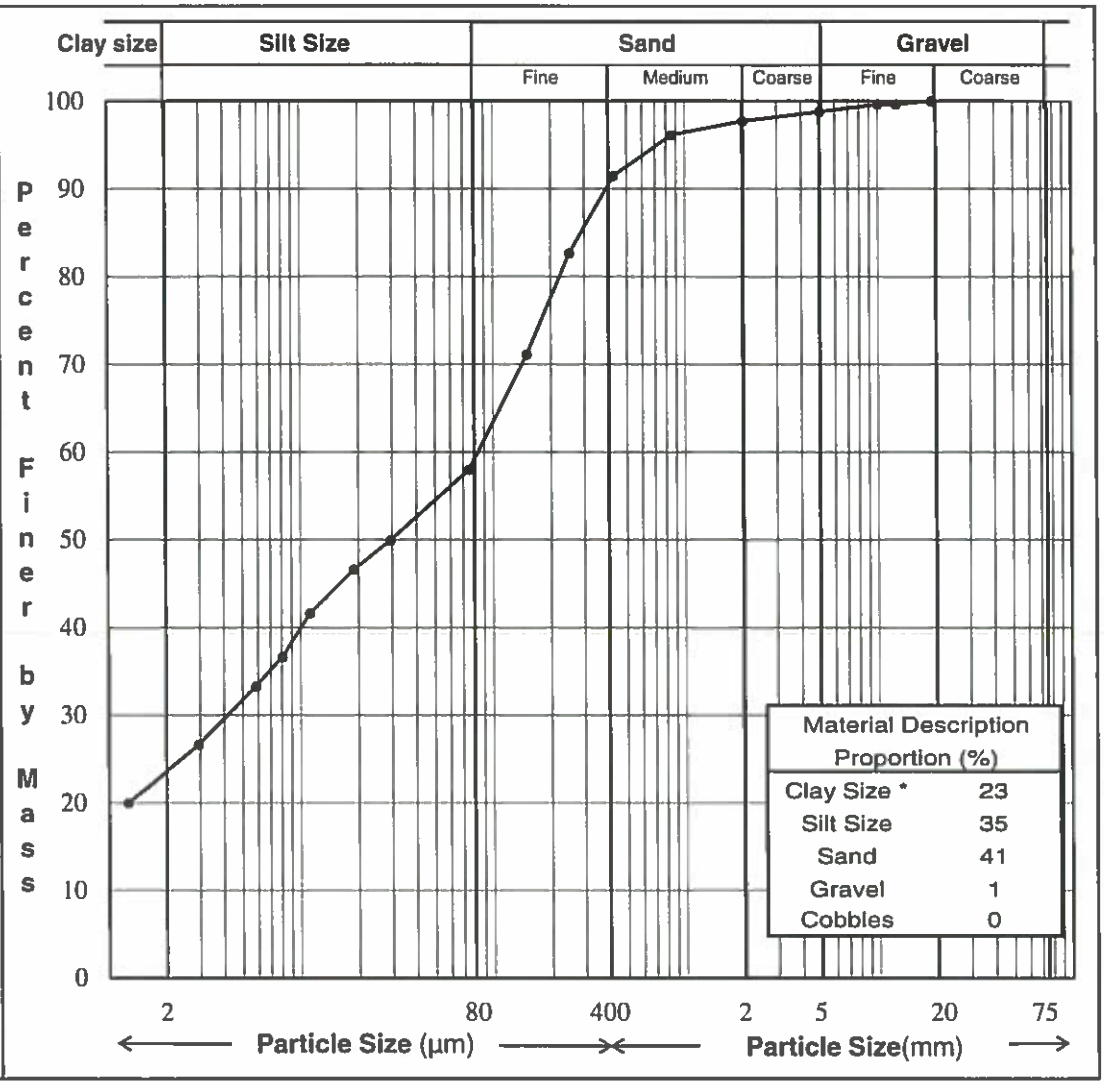
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 2
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH01
Project No.:	704-ENV.SWM03011-05.003	Depth:	2.3 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty, trace gravel	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	100
13 mm	100
10 mm	100
5 mm	99
2 mm	98
850 µm	96
425 µm	91
250 µm	83
150 µm	71
75 µm	58
29 µm	50
19 µm	47
11 µm	42
8 µm	37
6 µm	33
3 µm	27
1 µm	20



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

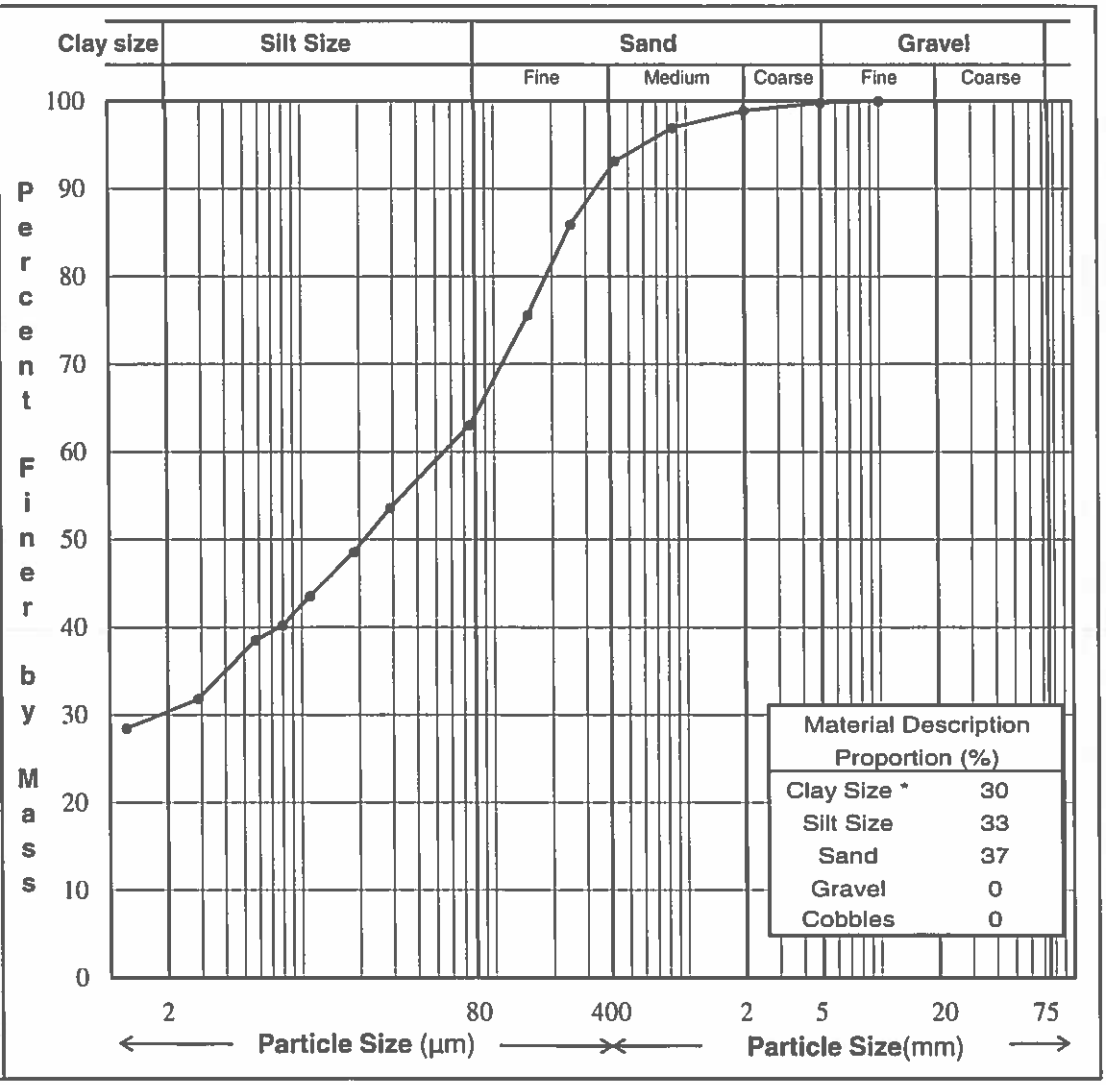
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 1
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH02
Project No.:	704-ENV.SWM03011-05.003	Depth:	0.6 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	100
2 mm	99
850 µm	97
425 µm	93
250 µm	86
150 µm	76
75 µm	63
29 µm	54
19 µm	49
11 µm	44
8 µm	40
6 µm	39
3 µm	32
1 µm	28



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

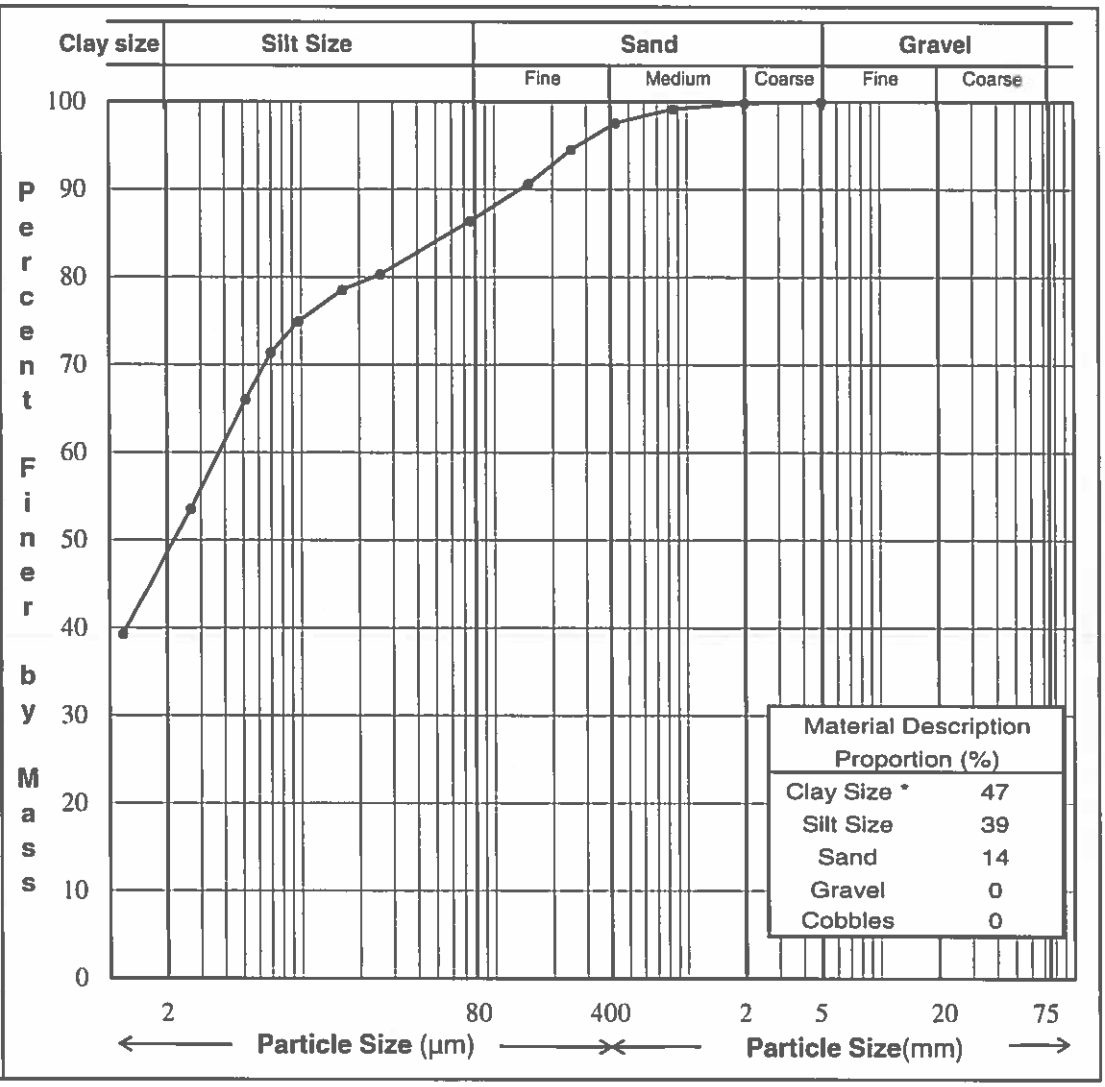
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 1
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH03
Project No.:	704-ENV.SWM03011-05.003	Depth:	2.1 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, silty, some sand	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	100
2 mm	100
850 µm	99
425 µm	98
250 µm	95
150 µm	91
75 µm	86
26 µm	80
16 µm	79
10 µm	75
7 µm	71
5 µm	66
3 µm	54
1 µm	39



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

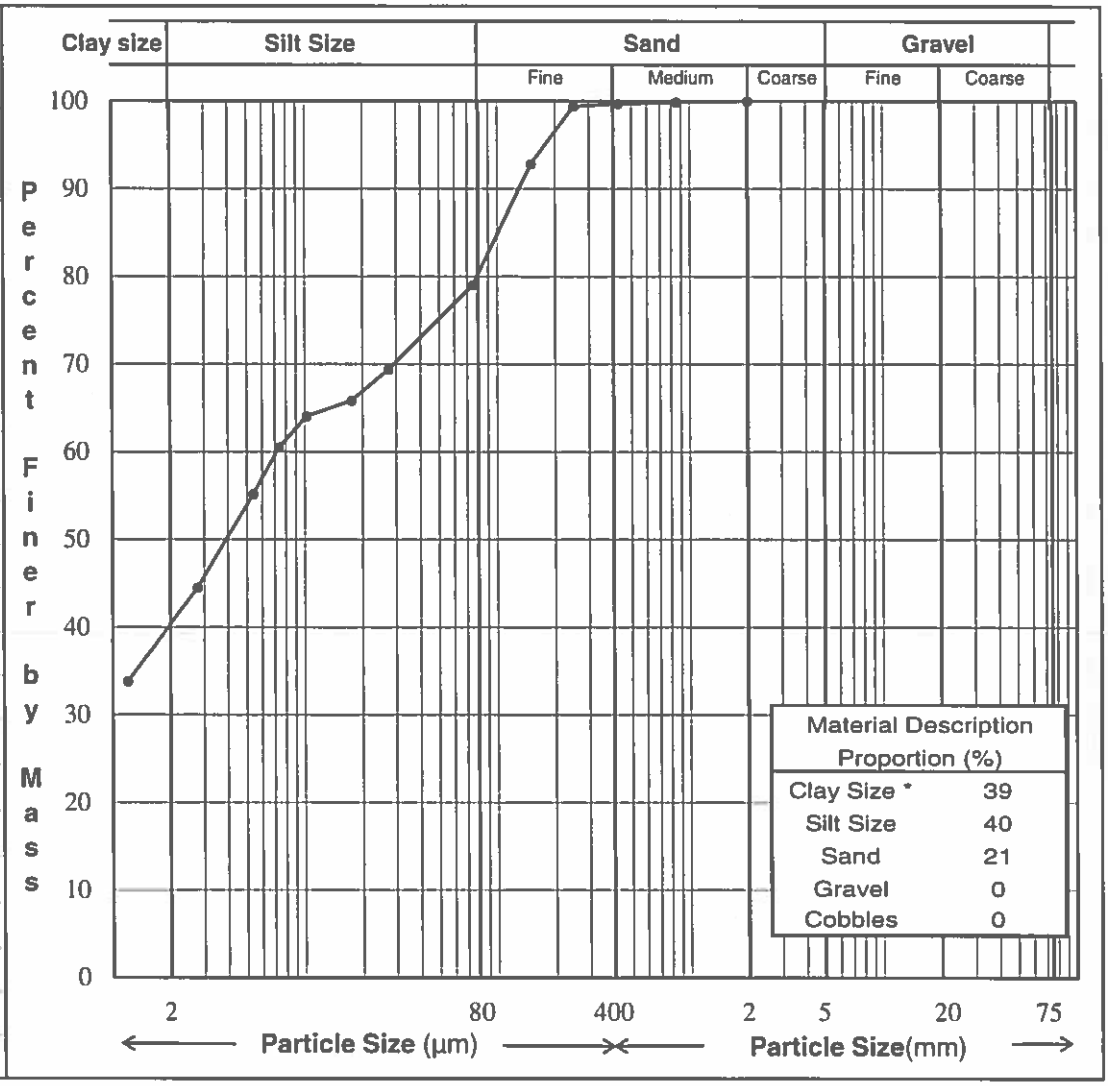
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	B6
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH04
Project No.:	704-ENV.SWM03011-05.003	Depth:	6.4 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, silty, sandy	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	
2 mm	100
850 µm	100
425 µm	100
250 µm	99
150 µm	93
75 µm	79
27 µm	69
17 µm	66
10 µm	64
7 µm	60
5 µm	55
3 µm	44
1 µm	34



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

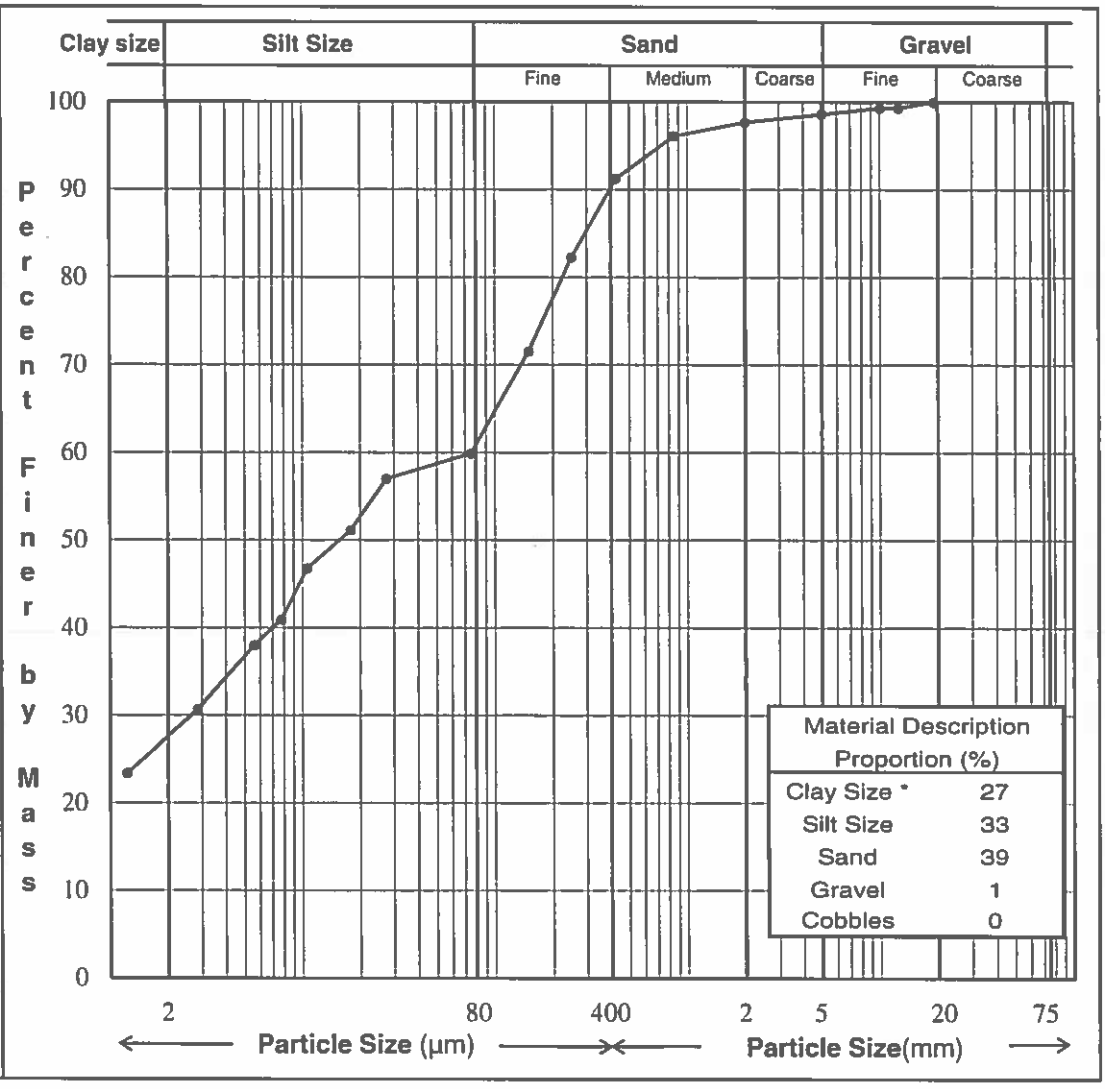
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 1
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH05
Project No.:	704-ENV.SWM03011-05.003	Depth:	0.9 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty, trace gravel	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	100
13 mm	99
10 mm	99
5 mm	99
2 mm	98
850 µm	96
425 µm	91
250 µm	82
150 µm	72
75 µm	60
27 µm	57
18 µm	51
11 µm	47
8 µm	41
6 µm	38
3 µm	31
1 µm	23



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

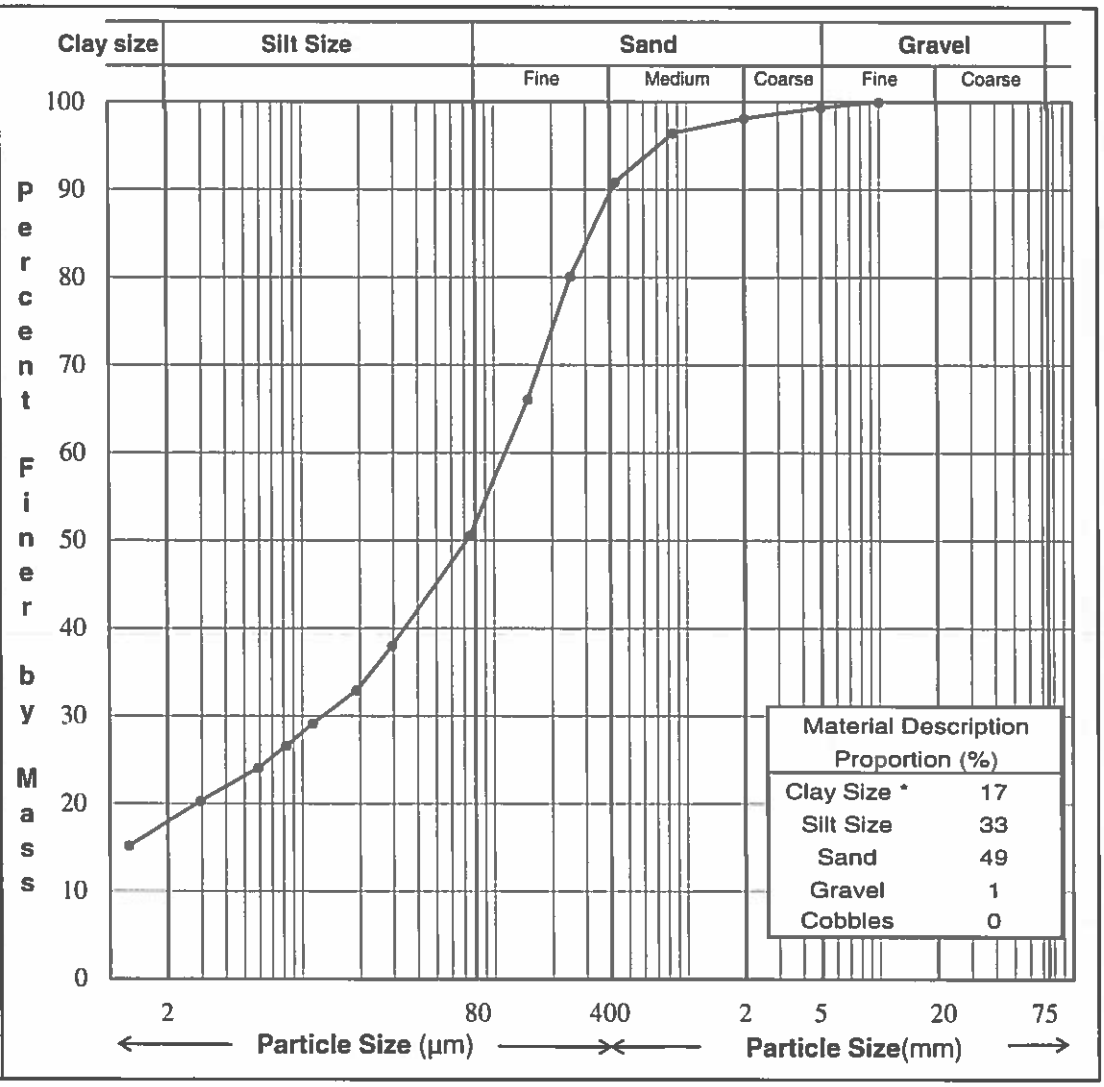
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	B 1
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH06
Project No.:	704-ENV.SWM03011-05.003	Depth:	0.6 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty, trace gravel	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	99
2 mm	98
850 µm	96
425 µm	91
250 µm	80
150 µm	66
75 µm	51
29 µm	38
19 µm	33
11 µm	29
8 µm	27
6 µm	24
3 µm	20
1 µm	15



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

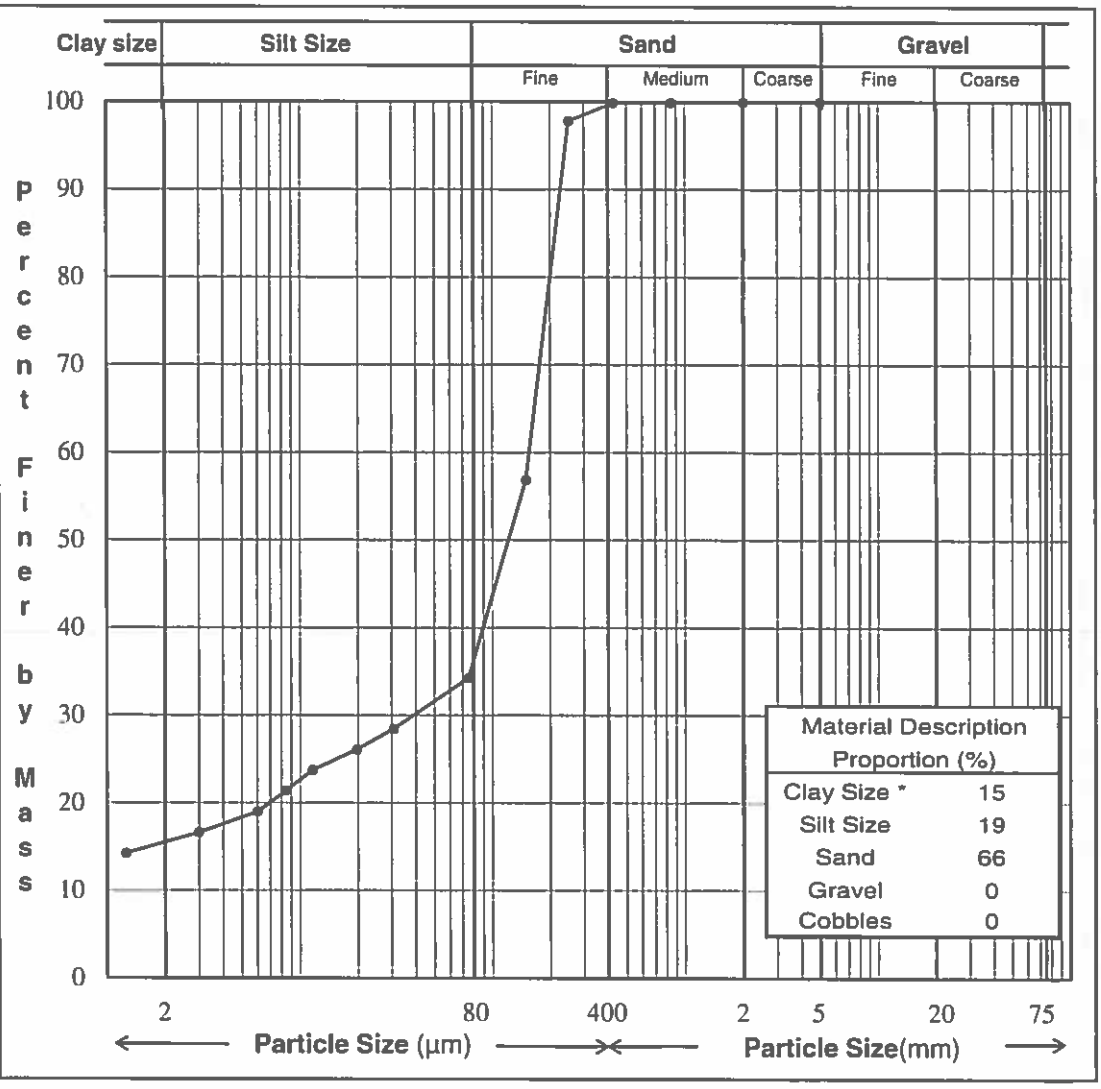
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	B3
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH06
Project No.:	704-ENV.SWM03011-05.003	Depth:	2.4 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, some silt	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	100
2 mm	100
850 µm	100
425 µm	100
250 µm	98
150 µm	57
75 µm	34
31 µm	28
20 µm	26
12 µm	24
8 µm	21
6 µm	19
3 µm	17
1 µm	14



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

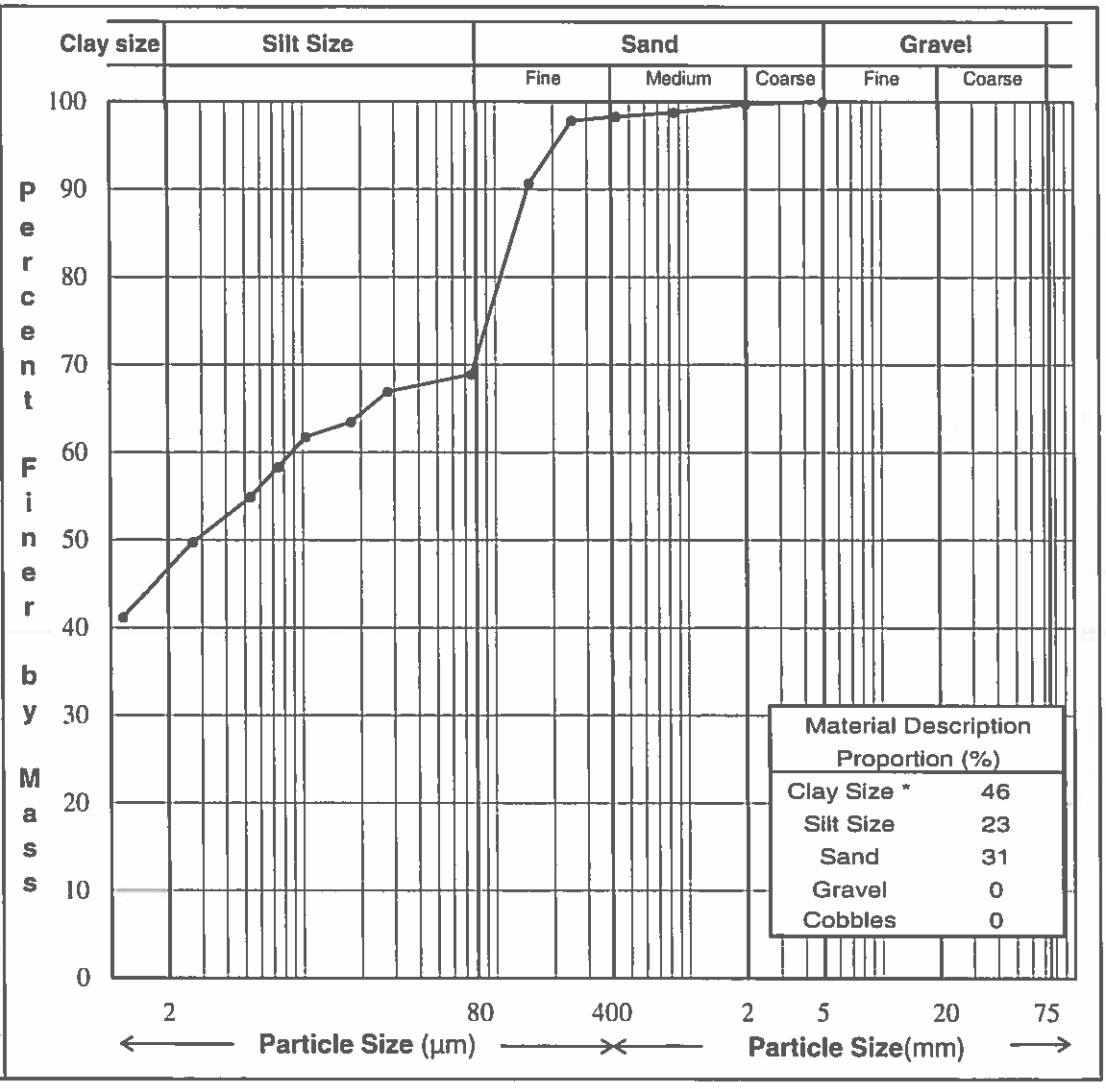
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	B14
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH06
Project No.:	704-ENV.SWM03011-05.003	Depth:	11.6 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	100
2 mm	100
850 µm	99
425 µm	98
250 µm	98
150 µm	91
75 µm	69
28 µm	67
18 µm	63
10 µm	62
7 µm	58
5 µm	55
3 µm	50
1 µm	41



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

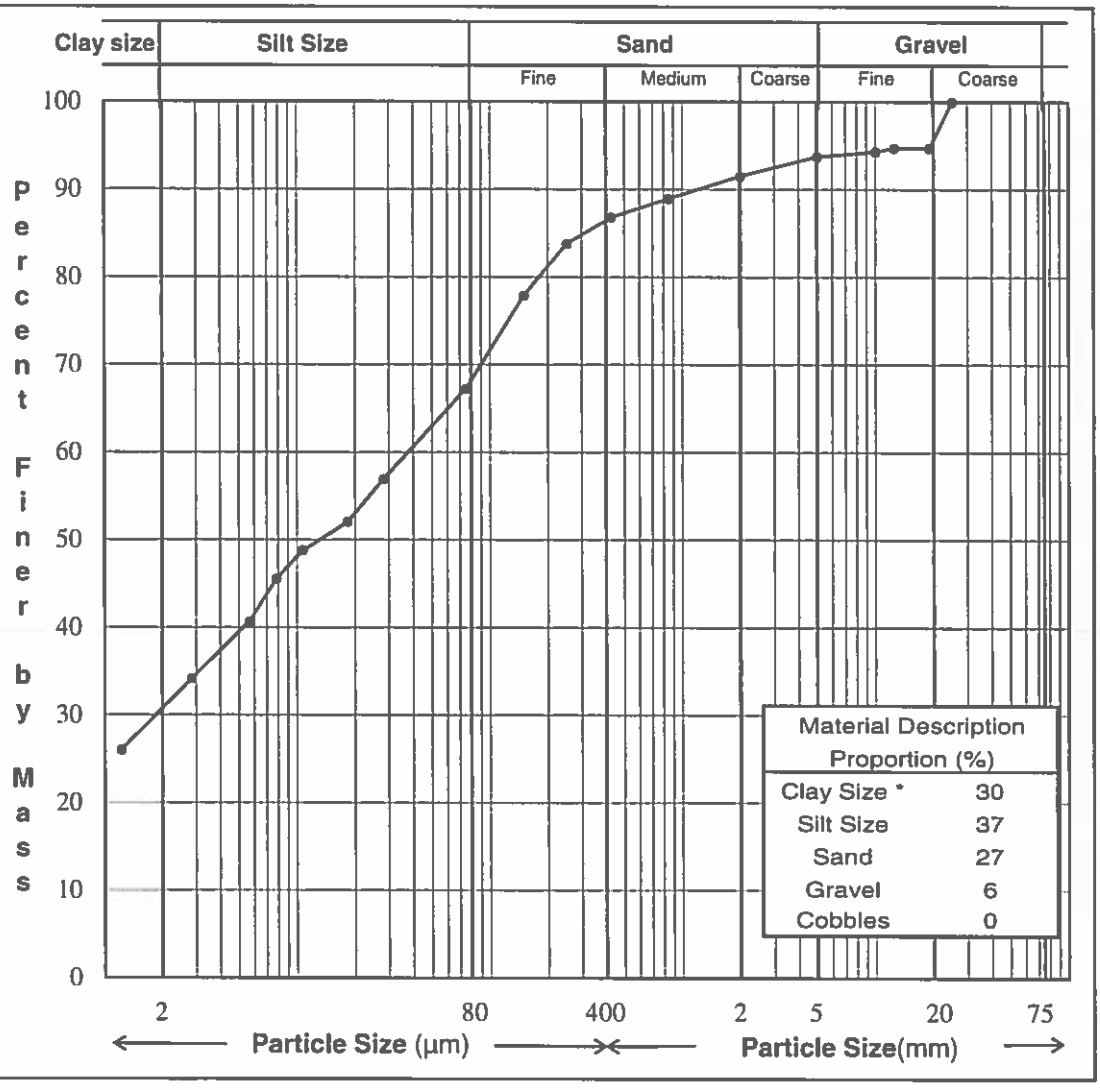
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 1
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16BH07
Project No.:	704-ENV.SWM03011-05.003	Depth:	2.6 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, silty, sandy, trace gravel	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	100
19 mm	95
13 mm	95
10 mm	94
5 mm	94
2 mm	91
850 µm	89
425 µm	87
250 µm	84
150 µm	78
75 µm	67
28 µm	57
18 µm	52
11 µm	49
8 µm	46
6 µm	41
3 µm	34
1 µm	26



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

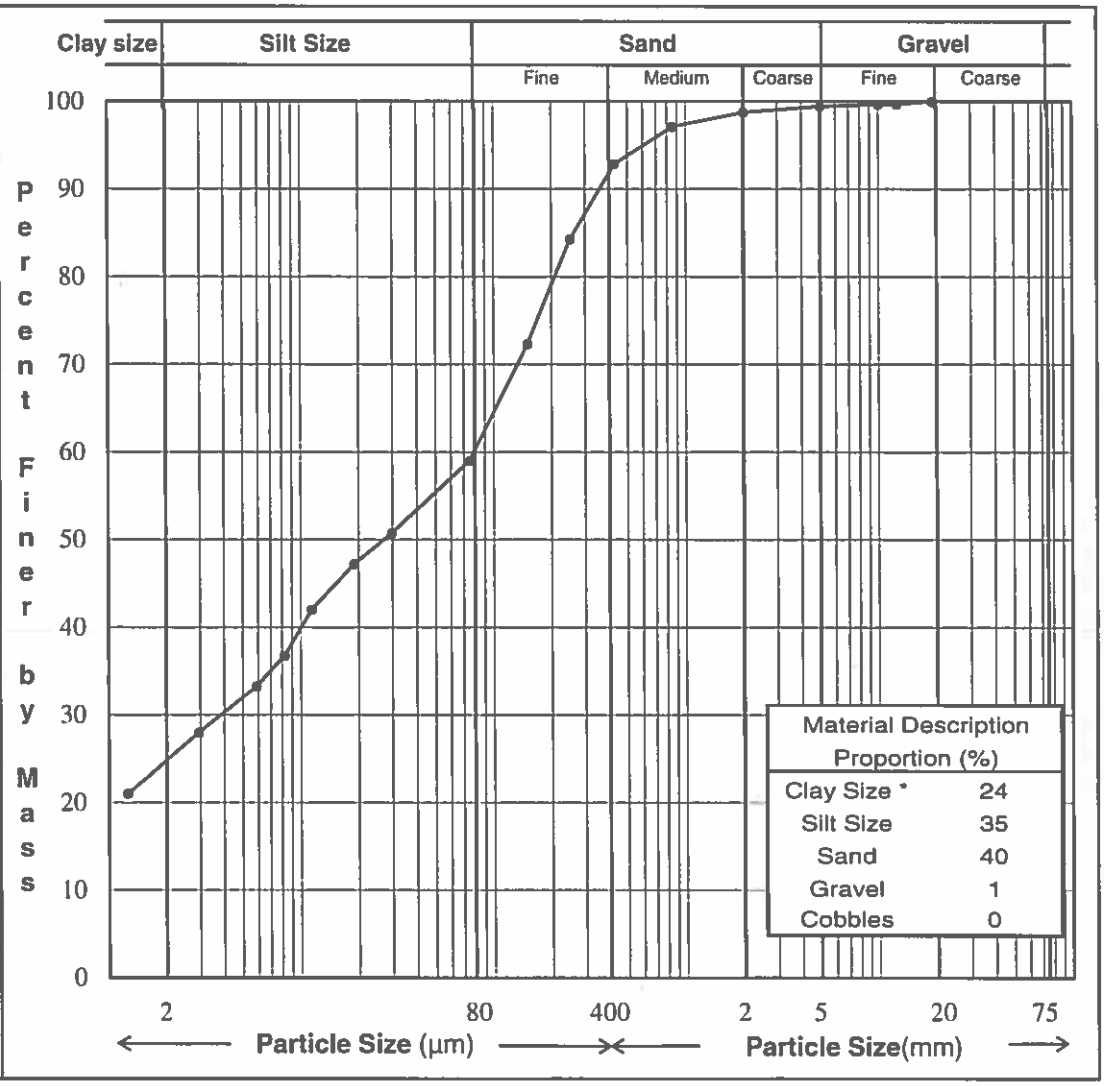
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 2
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW08 A/B
Project No.:	704-ENV.SWM03011-05.003	Depth:	1.8 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty, trace gravel	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	100
13 mm	100
10 mm	100
5 mm	99
2 mm	99
850 µm	97
425 µm	93
250 µm	84
150 µm	72
75 µm	59
30 µm	51
19 µm	47
11 µm	42
8 µm	37
6 µm	33
3 µm	28
1 µm	21



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

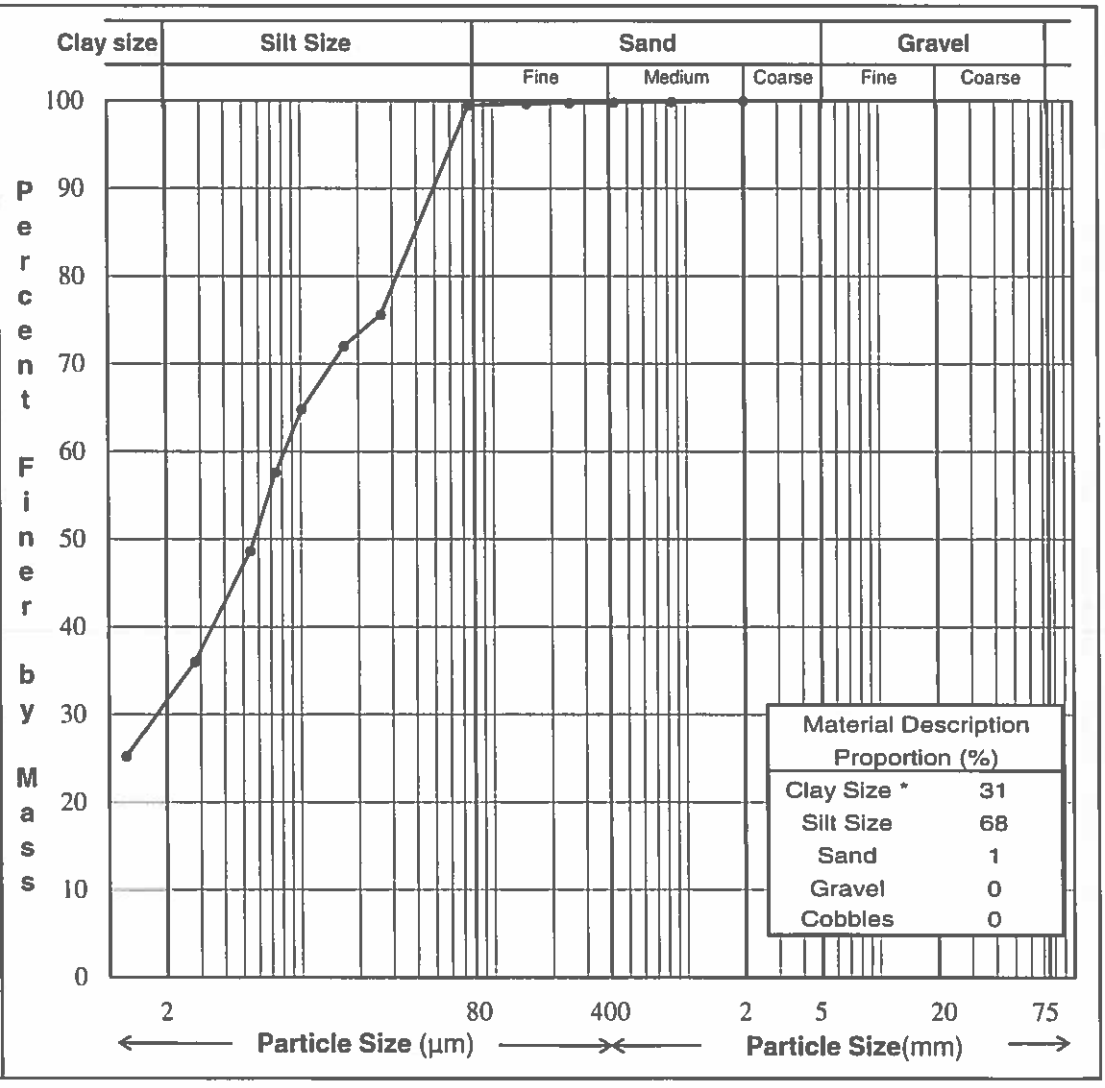
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	C3
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW09
Project No.:	704-ENV.SWM03011-05.003	Depth:	8.8 m
Location:	Ryley, AB	Date Tested	May 19, 2016
Description **:	CLAY, silty, trace sand	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	
2 mm	100
850 µm	100
425 µm	100
250 µm	100
150 µm	100
75 µm	99
26 µm	76
17 µm	72
10 µm	65
7 µm	58
5 µm	49
3 µm	36
1 µm	25



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

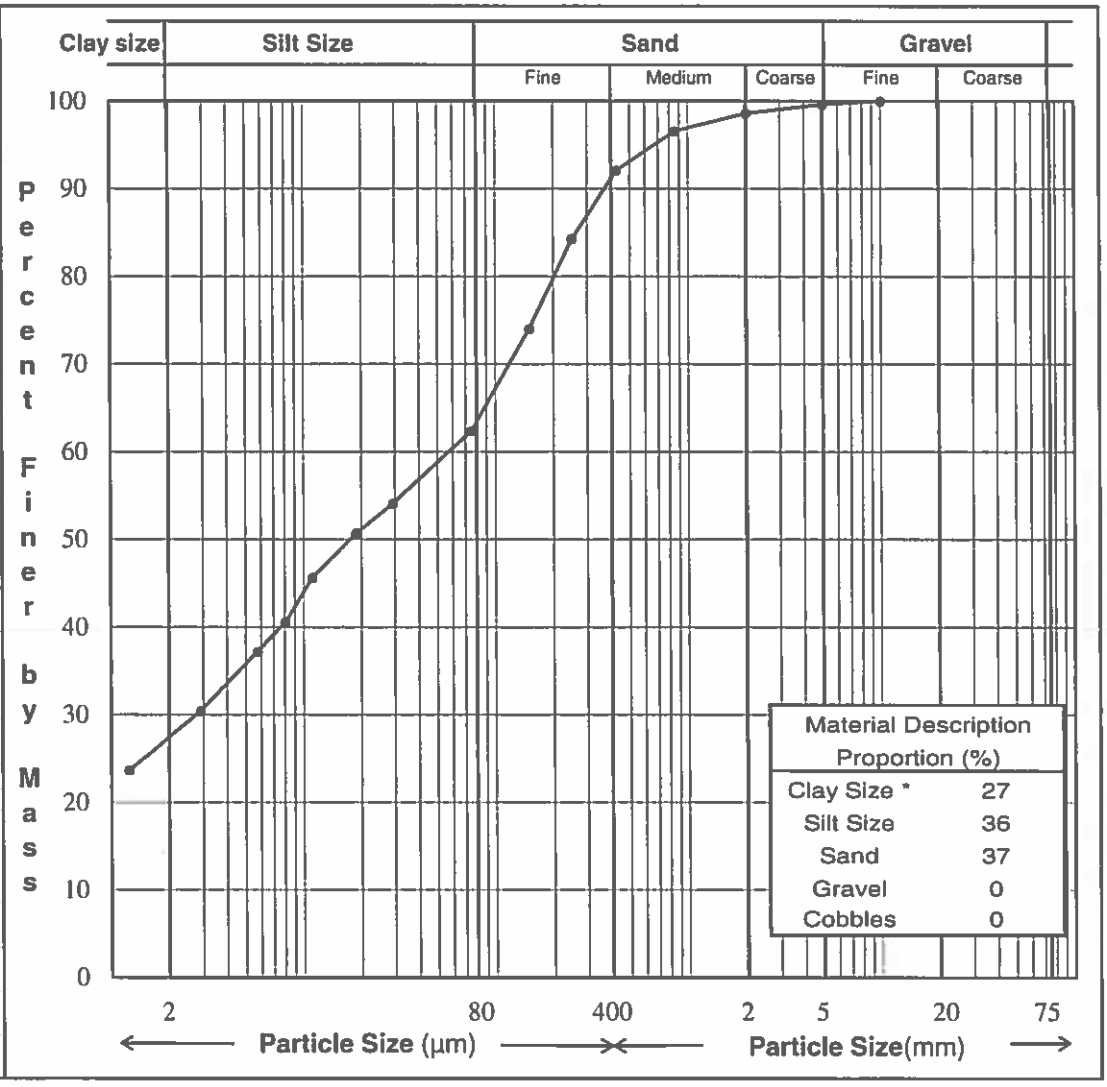
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 1
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW09 C/D
Project No.:	704-ENV.SWM03011-05.003	Depth:	0.8 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	100
2 mm	99
850 µm	97
425 µm	92
250 µm	84
150 µm	74
75 µm	62
29 µm	54
19 µm	51
11 µm	46
8 µm	41
6 µm	37
3 µm	30
1 µm	24



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

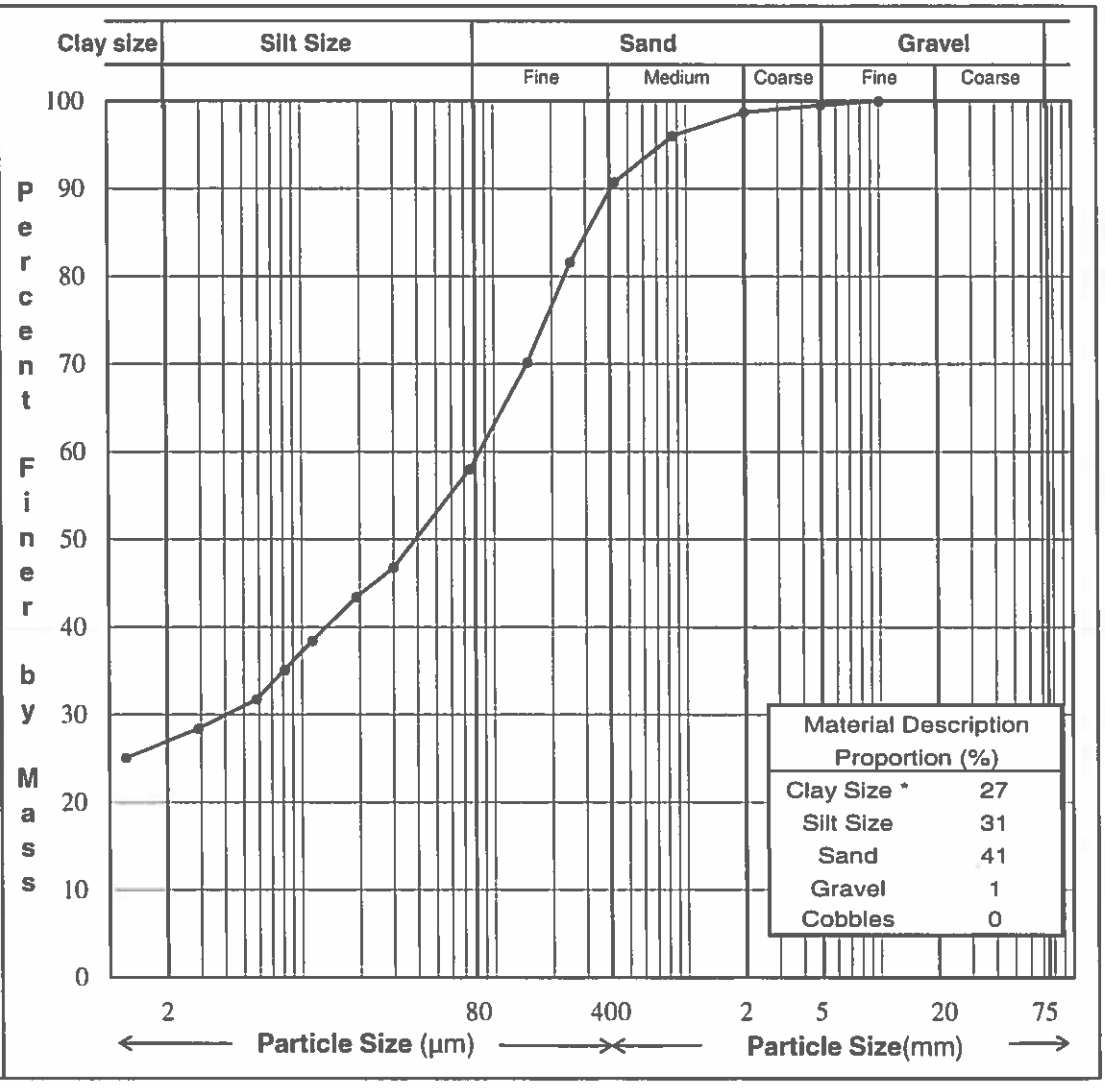
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 1
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW11
Project No.:	704-ENV.SWM03011-05.003	Depth:	0.8 m
Location:	Ryley, AB	Date Tested	May 20, 2016
Description **:	CLAY, sandy, silty, trace gravel	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	100
2 mm	99
850 µm	96
425 µm	91
250 µm	82
150 µm	70
75 µm	58
30 µm	47
19 µm	43
11 µm	38
8 µm	35
6 µm	32
3 µm	28
1 µm	25



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Replacing 16MW10 B1

Reviewed By: _____ P.Geol.

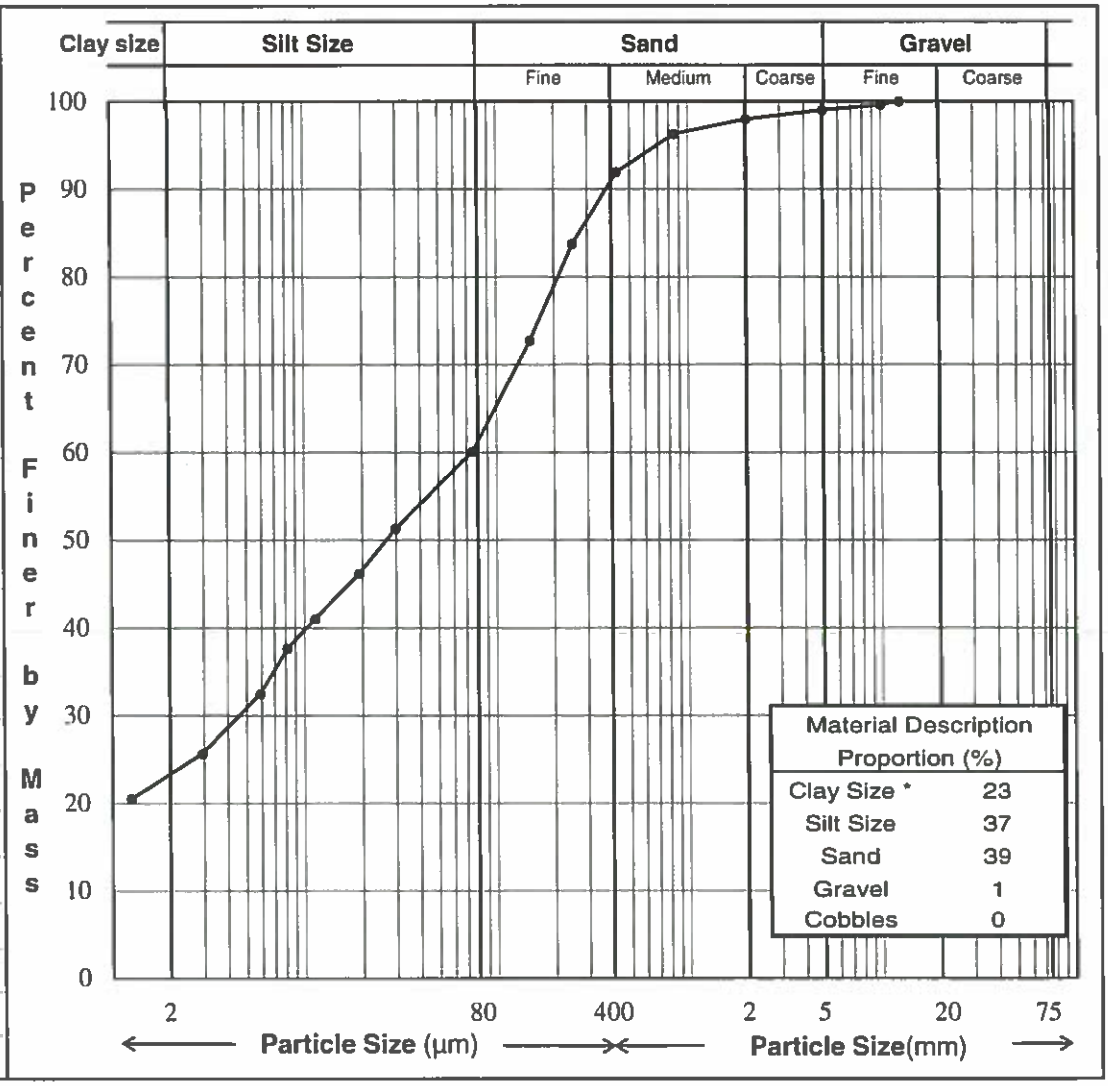
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 2
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW11 C/D
Project No.:	704-ENV.SWM03011-05.003	Depth:	2.1 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty, trace gravel	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	100
10 mm	100
5 mm	99
2 mm	98
850 µm	96
425 µm	92
250 µm	84
150 µm	73
75 µm	60
30 µm	51
19 µm	46
11 µm	41
8 µm	38
6 µm	32
3 µm	26
1 µm	21



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

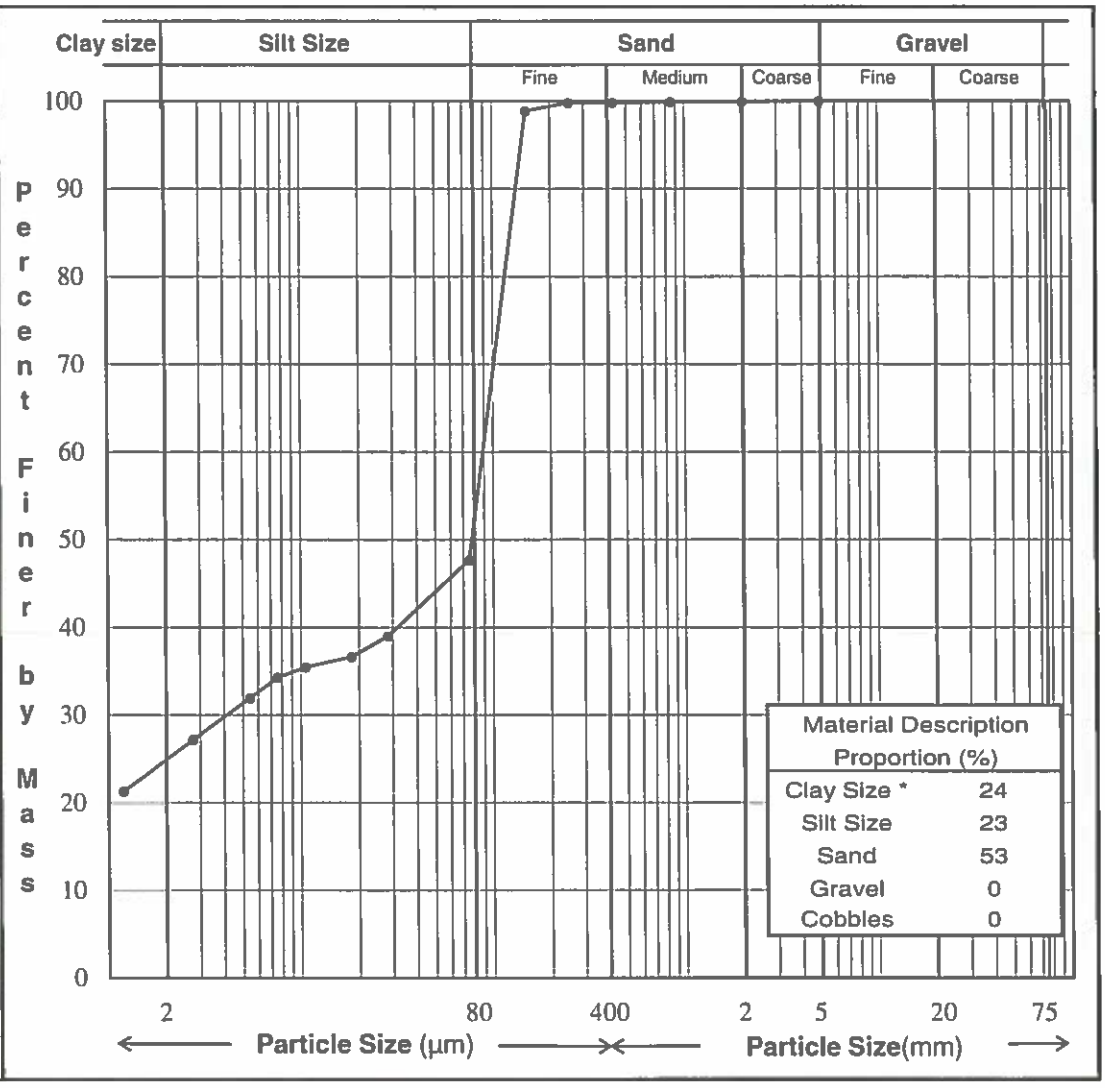
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	C3
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW12
Project No.:	704-ENV.SWM03011-05.003	Depth:	6.1 m
Location:	Ryley, AB	Date Tested	May 19, 2016
Description **:	CLAY, sandy, silty	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	100
2 mm	100
850 µm	100
425 µm	100
250 µm	100
150 µm	99
75 µm	48
28 µm	39
18 µm	37
11 µm	35
8 µm	34
5 µm	32
3 µm	27
1 µm	21



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

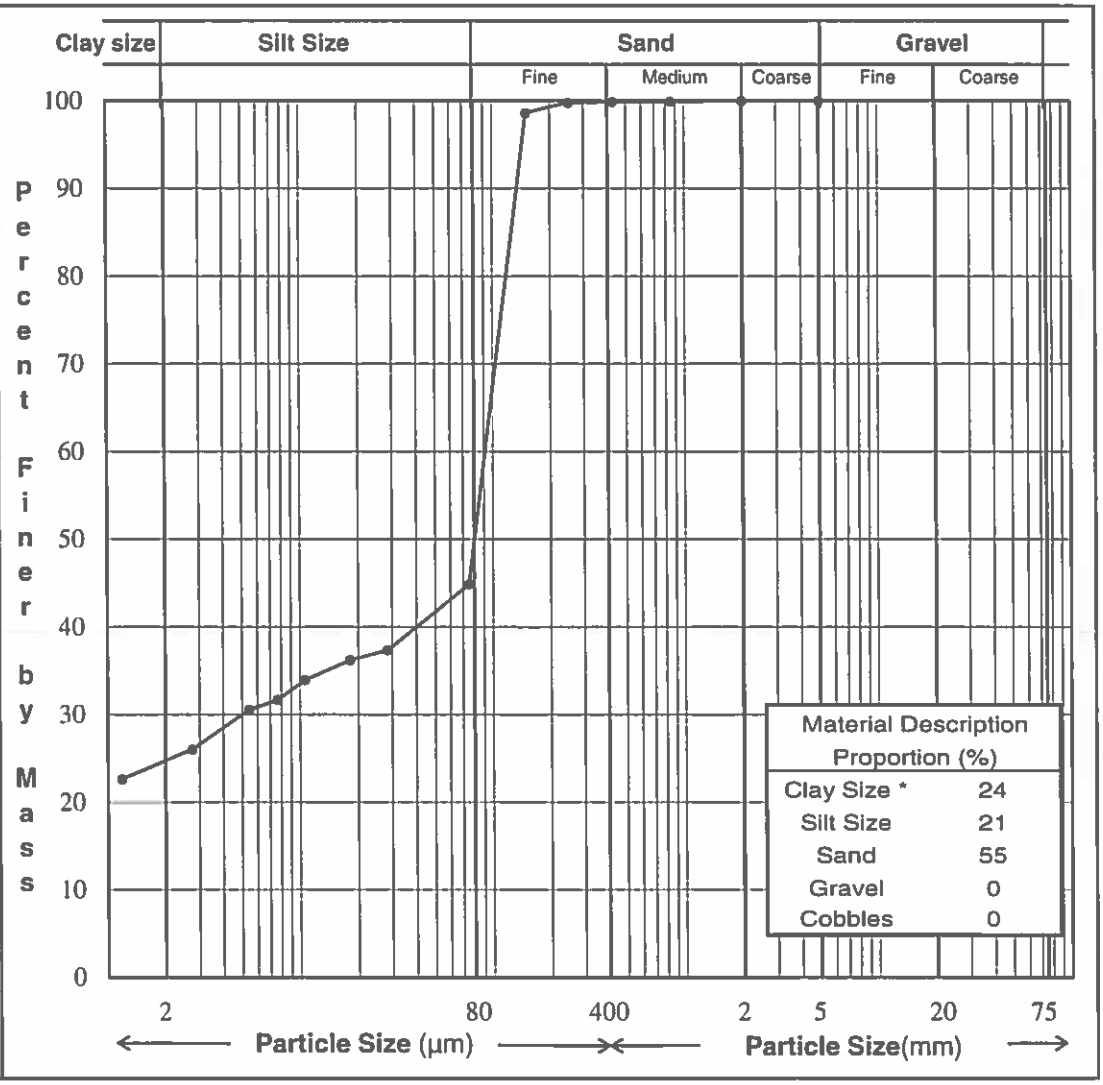
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	C2
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW13
Project No.:	704-ENV.SWM03011-05.003	Depth:	6.4 m
Location:	Ryley, AB	Date Tested	May 19, 2016
Description **:	CLAY, sandy, silty	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	100
2 mm	100
850 µm	100
425 µm	100
250 µm	100
150 µm	99
75 µm	45
28 µm	37
18 µm	36
11 µm	34
8 µm	32
5 µm	31
3 µm	26
1 µm	23



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

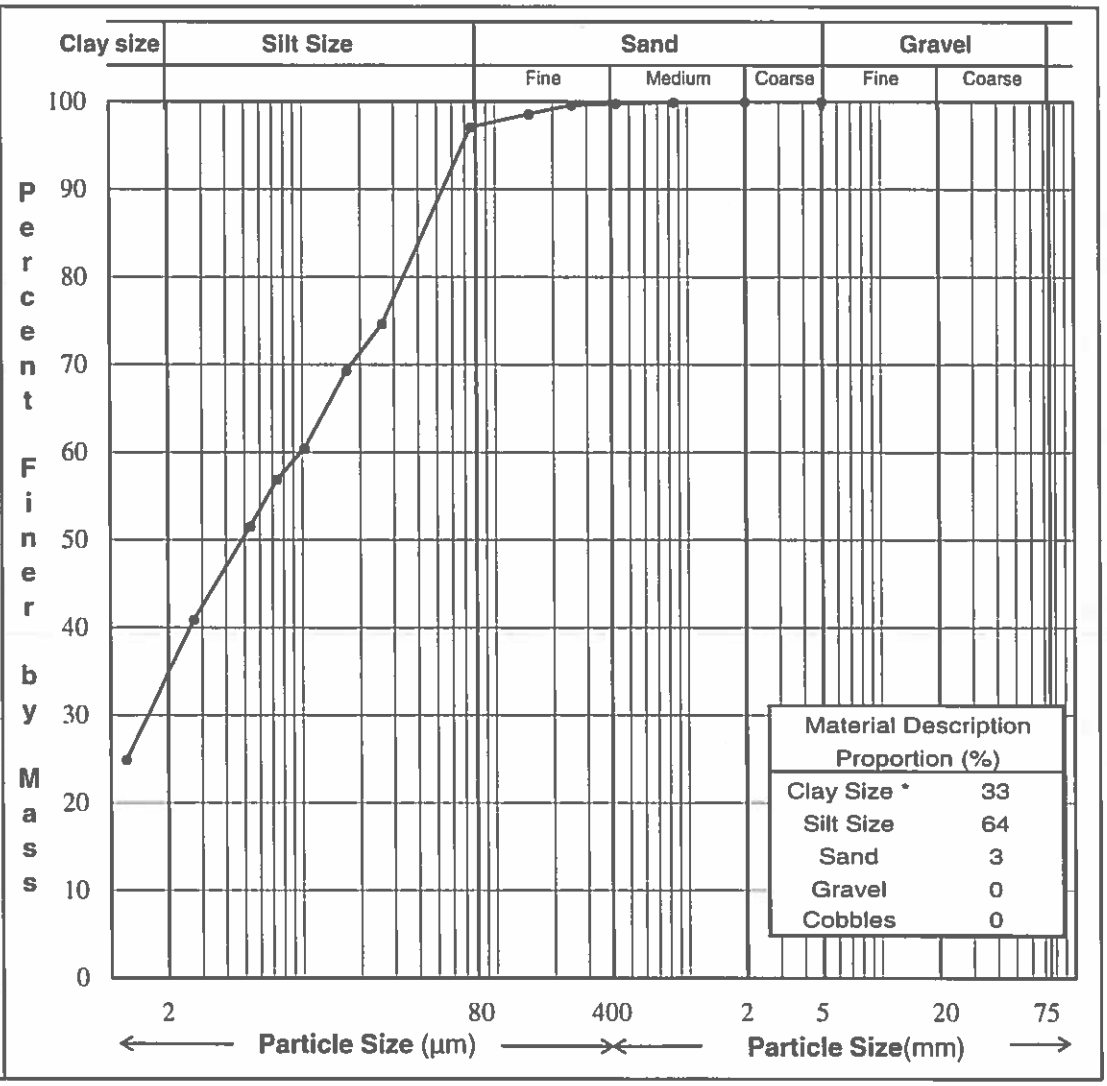
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	C2
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW14
Project No.:	704-ENV.SWM03011-05.003	Depth:	6.4 m
Location:	Ryley, AB	Date Tested	May 24, 2016
Description **:	CLAY, silty, trace sand	Tested By:	AS

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	100
2 mm	100
850 µm	100
425 µm	100
250 µm	100
150 µm	99
75 µm	97
26 µm	75
17 µm	69
10 µm	60
7 µm	57
5 µm	52
3 µm	41
1 µm	25



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

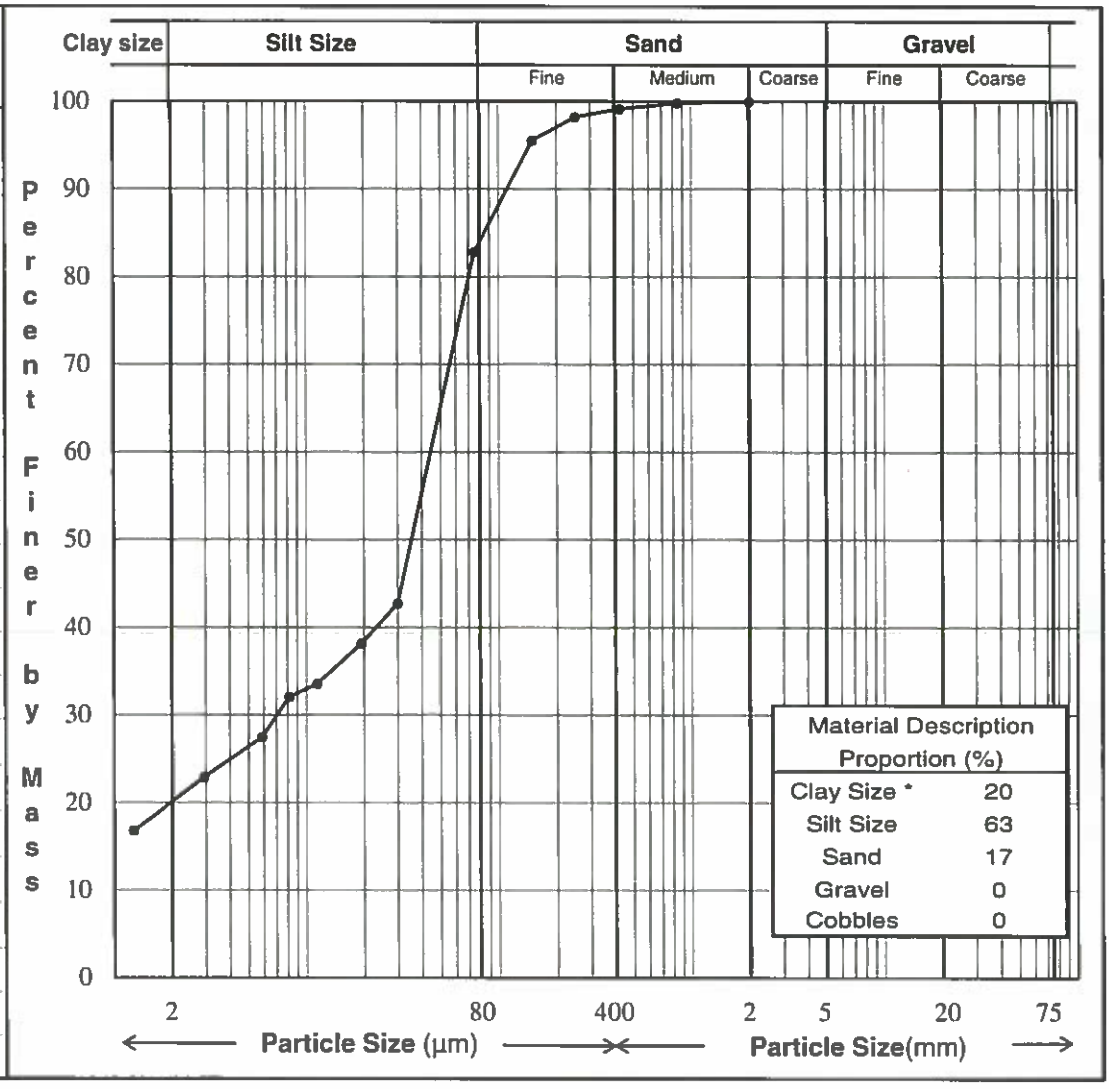
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	C5
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW15
Project No.:	704-ENV.SWM03011-05.003	Depth:	9.1 m
Location:	Ryley, AB	Date Tested	May 28, 2016
Description **:	CLAY, silty, some sand	Tested By:	AS

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	
2 mm	100
850 µm	100
425 µm	99
250 µm	98
150 µm	96
75 µm	83
30 µm	43
19 µm	38
11 µm	34
8 µm	32
6 µm	27
3 µm	23
1 µm	17



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

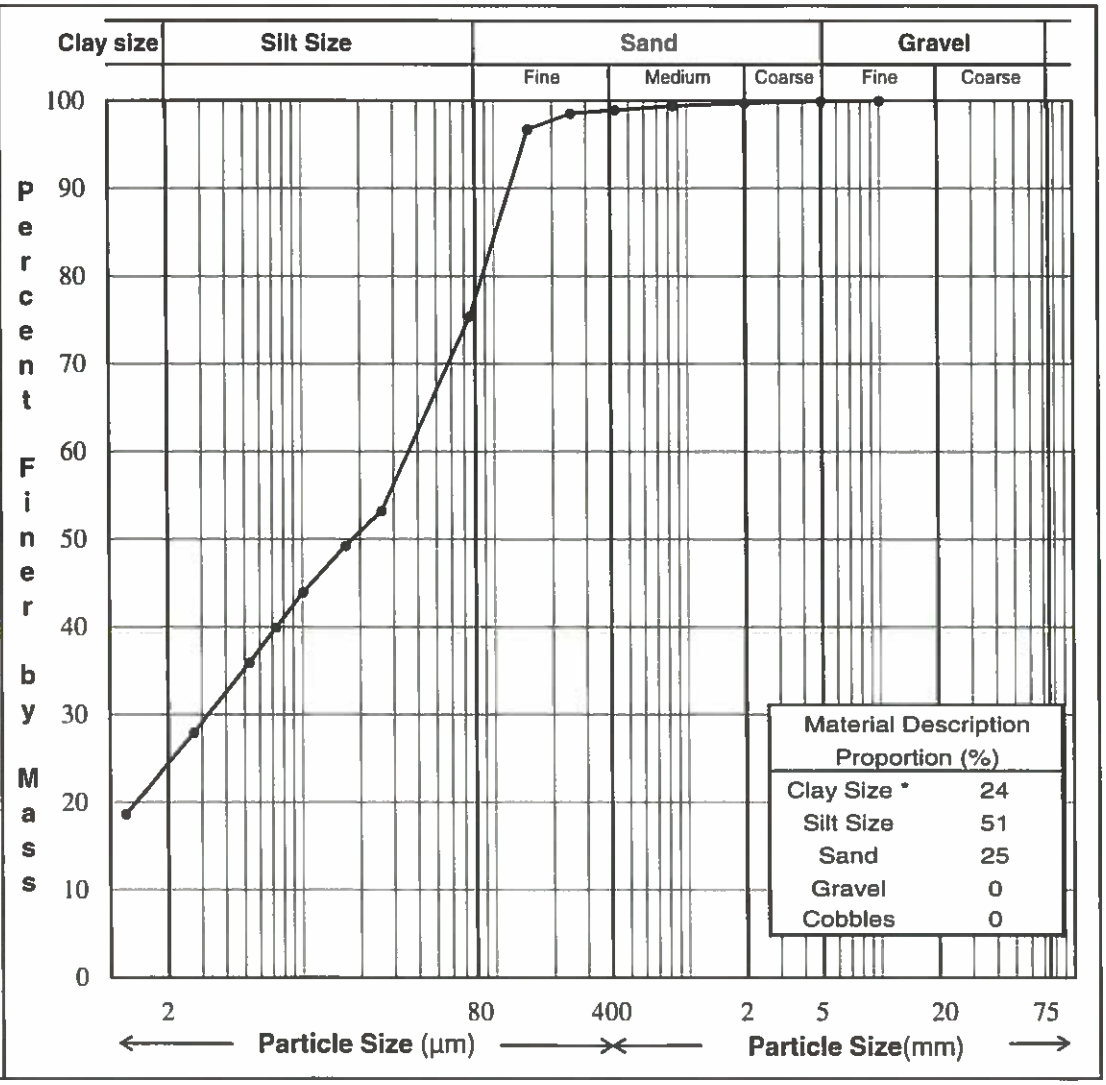
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	C3
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW16
Project No.:	704-ENV.SWM03011-05.003	Depth:	9.1 m
Location:	Ryley, AB	Date Tested	May 19, 2016
Description **:	CLAY, silty, sandy	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	100
2 mm	100
850 µm	99
425 µm	99
250 µm	99
150 µm	97
75 µm	75
26 µm	53
17 µm	49
10 µm	44
7 µm	40
5 µm	36
3 µm	28
1 µm	19



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

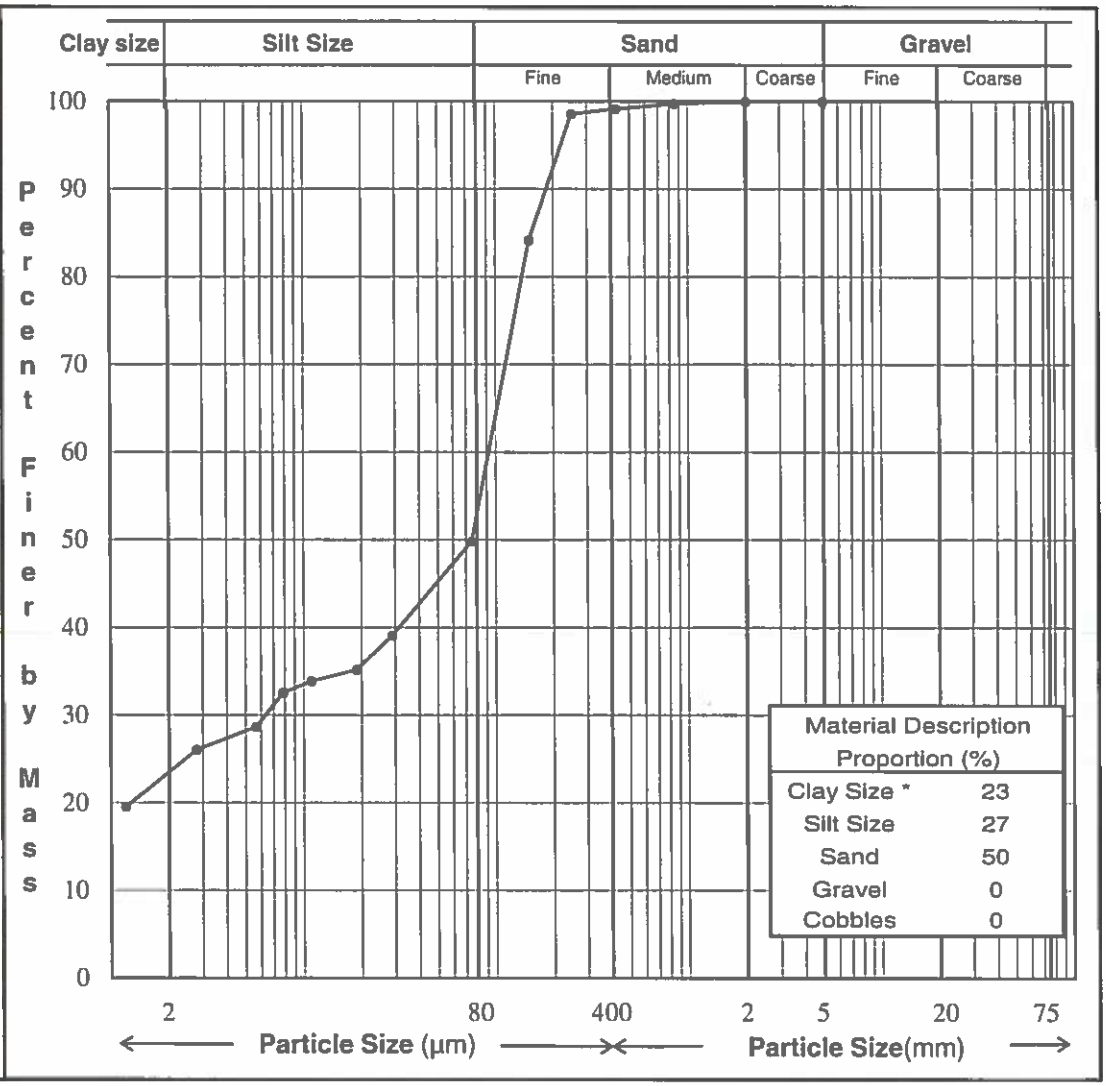
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	C4-2
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW16
Project No.:	704-ENV.SWM03011-05.003	Depth:	10.7 m
Location:	Ryley, AB	Date Tested	May 24, 2016
Description **:	CLAY, sandy, silty	Tested By:	AS

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	100
2 mm	100
850 µm	100
425 µm	99
250 µm	99
150 µm	84
75 µm	50
29 µm	39
19 µm	35
11 µm	34
8 µm	33
6 µm	29
3 µm	26
1 µm	20



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

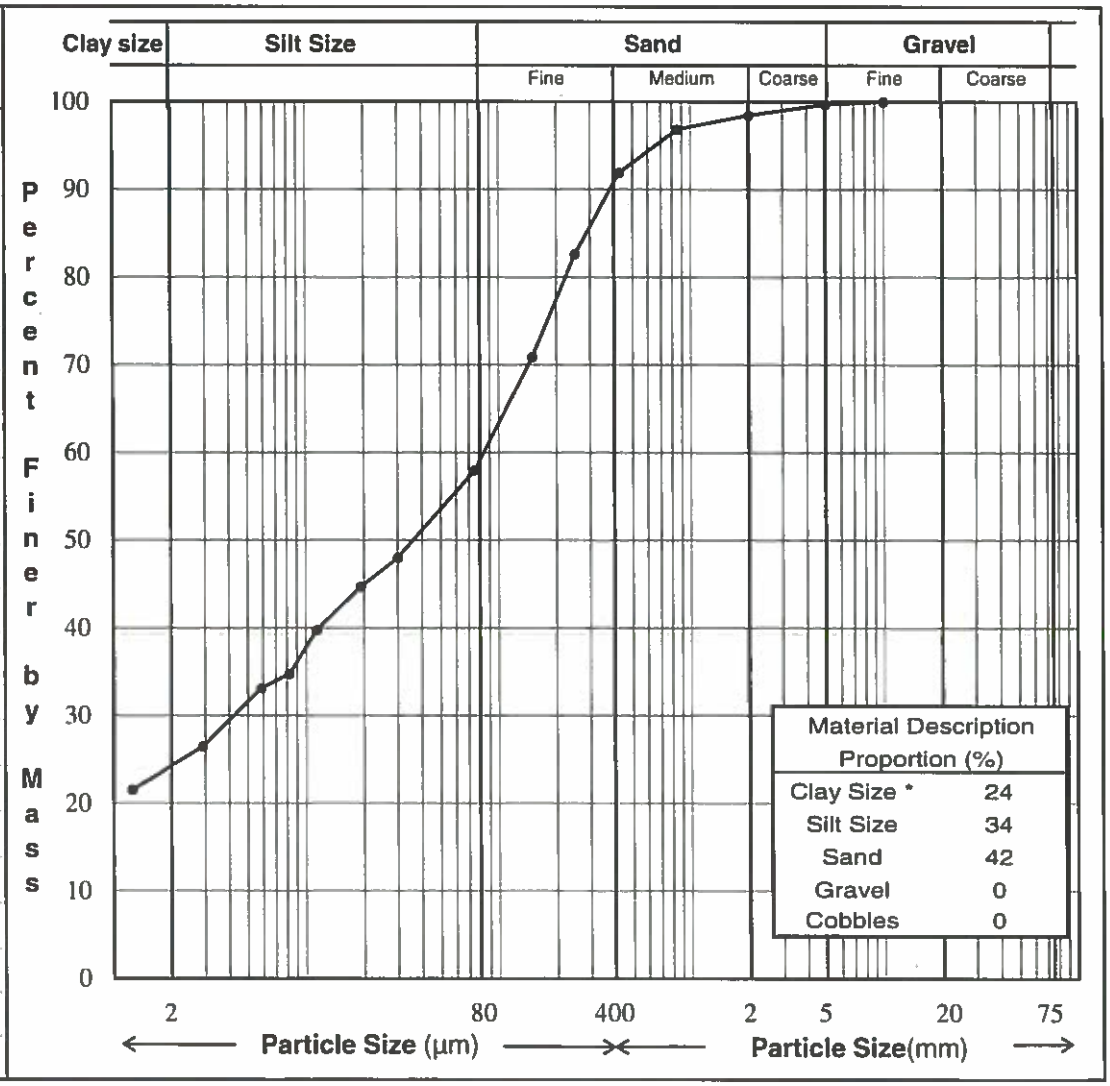
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	Bulk 1
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW18
Project No.:	704-ENV.SWM03011-05.003	Depth:	0.9 m
Location:	Ryley, AB	Date Tested	May 7, 2016
Description **:	CLAY, sandy, silty	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	100
2 mm	98
850 µm	97
425 µm	92
250 µm	83
150 µm	71
75 µm	58
30 µm	48
19 µm	45
11 µm	40
8 µm	35
6 µm	33
3 µm	26
1 µm	22



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

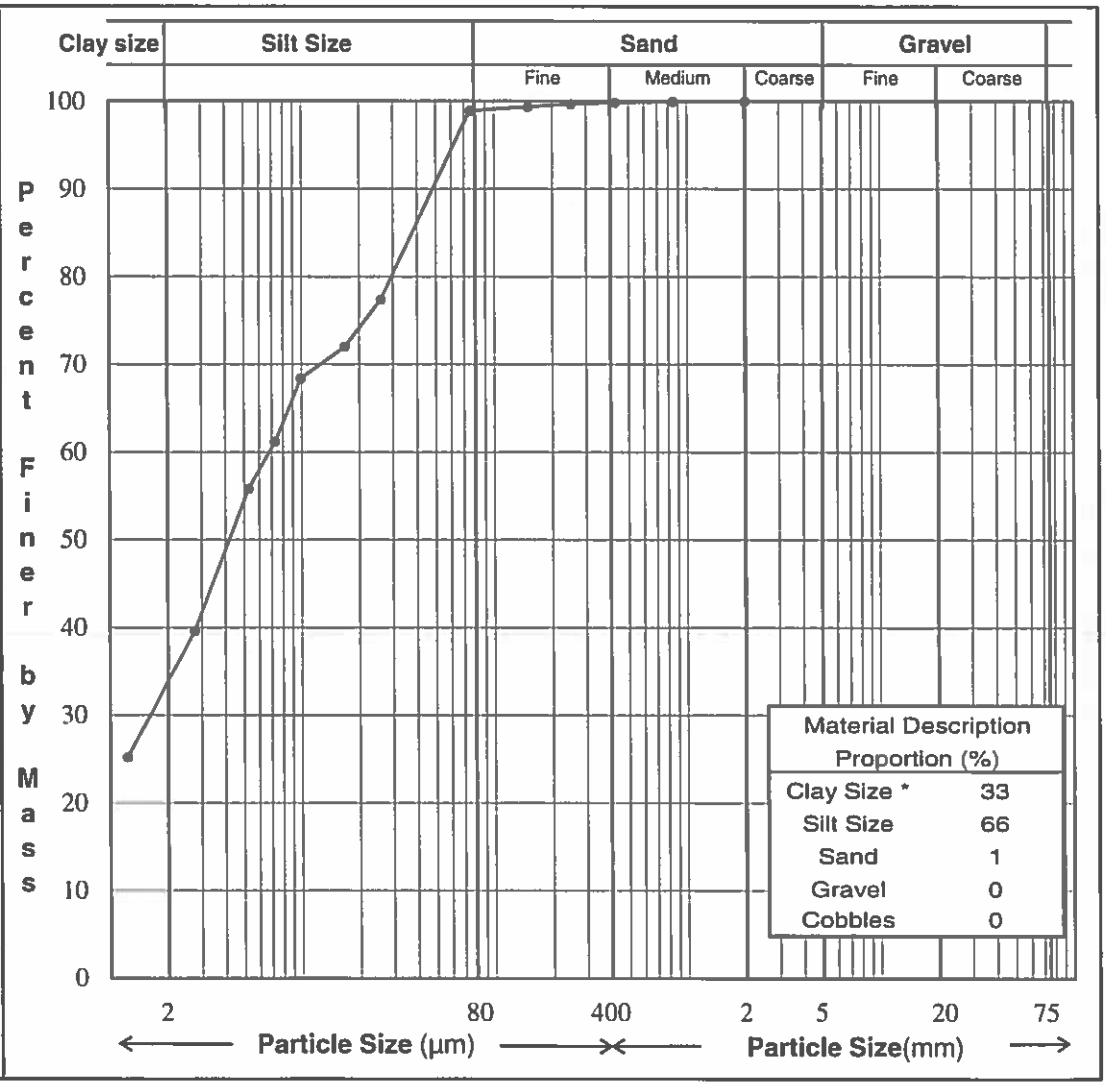
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Clean Harbors Ryley LF Renewal Permint and Expansion Phase 1	Sample No.:	C6
Client:	Clean Harbors Environ Services Inc.	Borehole/ TP:	16MW20
Project No.:	704-ENV.SWM03011-05.003	Depth:	12.2 m
Location:	Ryley, AB	Date Tested	May 19, 2016
Description **:	CLAY, silty, trace sand	Tested By:	JB

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	
5 mm	
2 mm	100
850 µm	100
425 µm	100
250 µm	100
150 µm	99
75 µm	99
26 µm	77
17 µm	72
10 µm	68
7 µm	61
5 µm	56
3 µm	40
1 µm	25



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE CONTENT TEST RESULTS

ASTM D2216

Project:	Clean Harbors Ryley	Sample No.:	BH01 - BH03
Project No.:	704-ENVSWM03011-05.003	Date Tested:	May 10, 2016
Client:	Clean Harbors Environ Services Inc.	Tested By:	AS/JB
Address:	Ryley, AB	Page:	1 of 4

B.H. Number	Sample Number	Moisture Content (%)	Visual Description of Soil
16BH01	Bulk1	8.4	CLAY, sandy, silty, trace gravel
	Bulk2	15.3	CLAY, sandy, silty, trace gravel
	Bulk3	20.5	CLAY, sandy, silty, trace gravel
	B1	18.2	CLAY, sandy, silty, trace gravel
	B2	17.4	CLAY, sandy, silty, trace gravel
	B4	6.7	CLAY, sandy, silty, trace gravel
16BH02	Bulk1	10.5	CLAY, sandy, silty
	B2	15.0	CLAY, sandy, silty, trace gravel
	B3	18.0	CLAY, sandy, silty, trace gravel
	B6	15.7	CLAY, sandy, silty, trace gravel
	B8	21.6	CLAY, silty, some sand
	ST3	25.2	CLAY SHALE - oxidized, dark greyish brown
16BH03	B2	24.2	CLAY, silty, some sand
	Bulk1	29.2	CLAY, silty, some sand
	B4	22.3	CLAY, silty, some sand
	B7	0.0	Missing sample
	B8	22.4	CLAY, silty, some sand

Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE CONTENT TEST RESULTS

ASTM D2216

Project:	Clean Harbors Ryley	Sample No.:	BH04-BH06
Project No.:	704-ENVSWM03011-05.003	Date Tested:	May 10, 2016
Client:	Clean Harbors Environ Services Inc.	Tested By:	AS/JB
Address:	Ryley, AB	Page:	2 of 4

B.H. Number	Sample Number	Moisture Content (%)	Visual Description of Soil
16MW04	Bulk1	16.1	CLAY, sandy, some silt
	B3	18.6	CLAY, sandy, some silt
	B5	24.0	CLAY, silty, sandy
	B6	23.7	CLAY, silty, sandy
	ST2	24.0	CLAYSHALE, trace sand seams, dark brown
16BH05	Bulk 1	8.9	CLAY, sandy, silty, trace gravel
	B2		Missing sample
	ST1	19.2	SANDSTONE, clay seams, oxidized, dark grey
	B6	18.8	CLAY, sandy, some silt
	B8	24.0	CLAY, silty, sandy
	ST3	17.3	SANDSTONE, clay seams, oxidized, grey
BH06	B1	8.7	CLAY, sandy, silty, trace gravel
	B2	10.3	CLAY, sandy, silty
	B3	18.8	CLAY, sandy, some silt
	B5	16.1	CLAY, sandy, some silt
	B6	20.3	CLAY, silty, sandy
	ST2	29.5	CLAYSHALE, weathered, trace organics, very dark greyish brown
	B14	22.1	CLAY, sandy, silty

Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE CONTENT TEST RESULTS

ASTM D2216

Project:	Clean Harbors Ryley	Sample No.:	BH07 - BH11
Project No.:	704-ENVSWM03011-05.003	Date Tested:	May 10, 2016
Client:	Clean Harbors Environ Services Inc.	Tested By:	AS/JB
Address:	Ryley, AB	Page:	3 of 4

B.H. Number	Sample Number	Moisture Content (%)	Visual Description of Soil
16BH07	Bulk 1	13.3	CLAY, silty, sandy, trace gravel
	B5	19.3	CLAY, sandy, silty, trace gravel
	ST3	17.1	SANDSTONE, oxidized, grey
	B8	15.4	CLAY, sandy, silty
	B10	22.7	CLAY, sandy, silty
16MW08 AB	Bulk 2	11.8	CLAY, sandy, silty, trace gravel
	B3	14.9	CLAY, silty, sandy, trace gravel
	B5	16.3	CLAY, silty, sandy, trace gravel
	B7	20.4	CLAY, silty, trace sand
	ST2	19.3	SANDSTONE, coal specks, oxidized, grey
	ST3	16.4	SANDSTONE, clay seams, grey
16MW09	B1	10.9	CLAY, silty, sandy
	S2	19.6	CLAY, silty, trace sand
	C3	19.6	CLAY, silty, trace sand
	C4	21.6	CLAY, sandy, silty; Porosity = 24.1%
16MW09 CD	Bulk 1	10.8	CLAY, sandy, silty
	B1	26.2	CLAY, sandy, silty
	B3	21.7	CLAY, sandy, silty
16MW11	B1	13.2	CLAY, sandy, silty, trace gravel
16MW11	C7	21.9	CLAY, sandy, silty; Porosity = 23.0%

Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE CONTENT TEST RESULTS

ASTM D2216

Project:	Clean Harbors Ryley	Sample No.:	BH11 - BH20
Project No.:	704-ENVSWM03011-05.003	Date Tested:	May 10, 2016
Client:	Clean Harbors Environ Services Inc.	Tested By:	AS/JB
Address:	Ryley, AB	Page:	4 of 4

B.H. Number	Sample Number	Moisture Content (%)	Visual Description of Soil
16MW11 C/D	Bulk 2	16.6	CLAY, sandy, silty, trace gravel
16BH12	C3	16.5	CLAY, sandy, silty
	C5	16.0	CLAY, sandy, silty; Porosity = 19.6%
16MW13	C2	17.9	CLAY, sandy, silty
16MW14	C2	13.9	CLAY, silty, trace sand
16BH15	C3	17.2	CLAY, sandy, silty; Porosity = 22.4%
	C5	27.7	CLAY, silty, some sand
16MW16	C3	18.9	CLAY, silty, sandy
	C4-2	18.3	CLAY, sandy, silty
16BH17	C6	23.5	CLAY, silty, some sand; Porosity = 26.1%
16MW18	Bulk 1	12.8	CLAY, sandy, silty
16BH19	C5	17.6	CLAY, silty, some sand; Porosity = 22.4%
16BH20	C6	22.5	CLAY, silty, trace sand

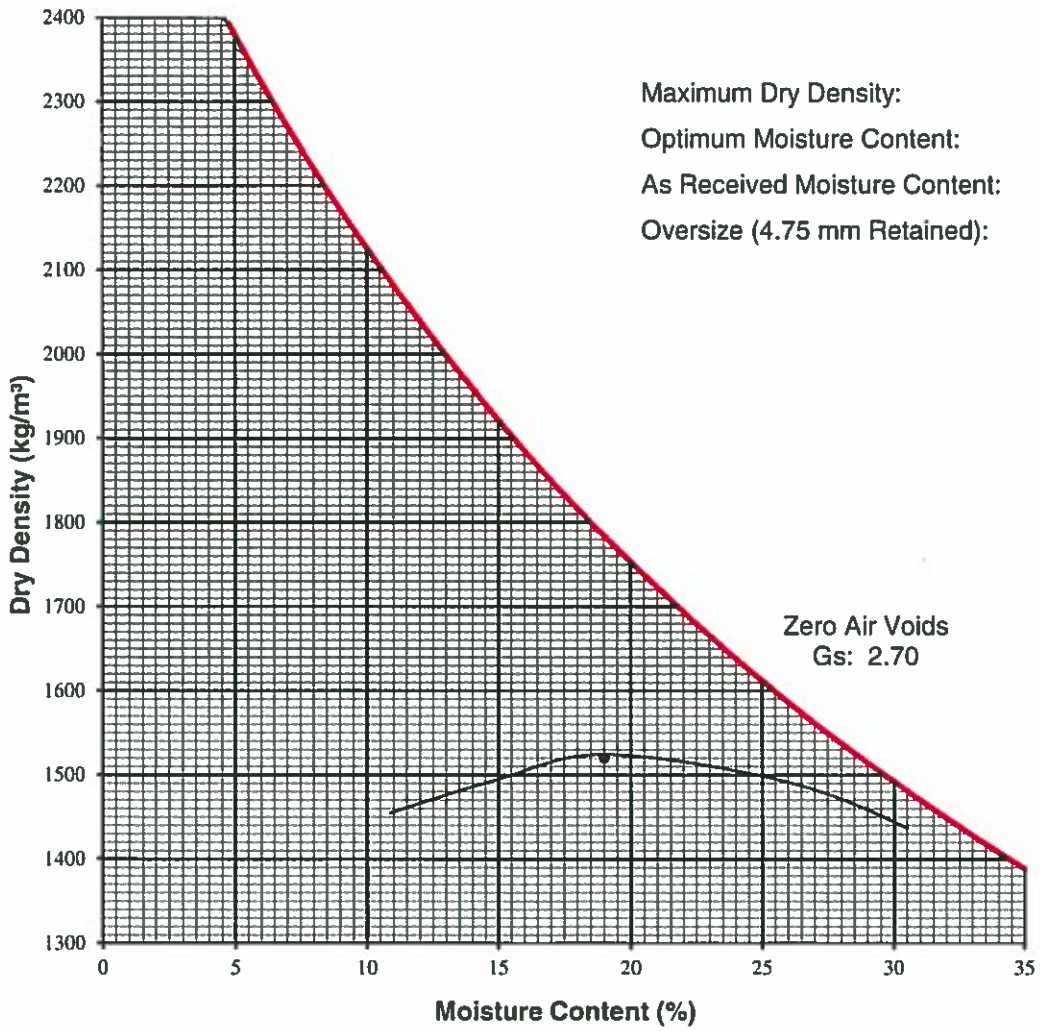
Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.I	Sample No.:	16BH-20
Project No.:	704-ENV.SWM03011-05	Sampled By:	TT
Client:	Clean Harbors Environ Services Inc.	Date Received:	19-Jan-17
Attention:	Mike Parker	Test Date:	24-Jan-16
E-mail:	parker.michaele@cleanharbors.com	Test By:	JB
Source:	Combine sample from BH-20 at interval 3.0 to 9.1 m	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	SANDSTONE, some clay		



Maximum Dry Density:	**1520**	kg/m³
Optimum Moisture Content:	**19.0**	%
As Received Moisture Content:	13.2	%
Oversize (4.75 mm Retained):	0	%

Remarks:

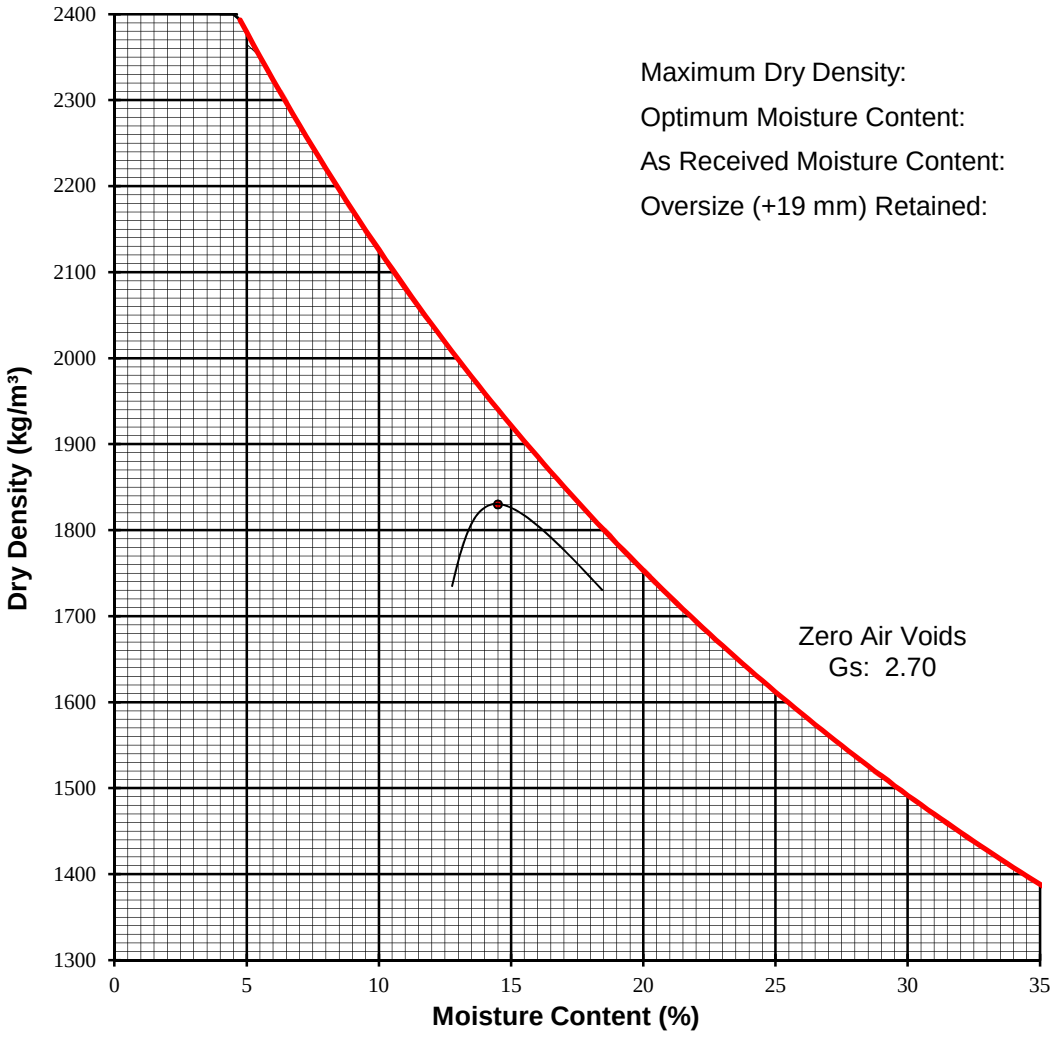
Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.1	Sample No.:	Bulk 1
Project No.:	704-ENV.SWN03011-05.003	Sampled By:	
Client:	Clen Harbors Enviton Services Inc.	Date Received:	
Attention:	Matei Lega	Test Date:	9-May-16
E-mail:	lega.matei@cleanharbors.com	Test By:	AS
Source:	BH-05	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	CLAY, silty, sandy, some gravel		



Maximum Dry Density:	**1830**	kg/m³
Optimum Moisture Content:	**14.5**	%
As Received Moisture Content:	0.0	%
Oversize (+19 mm) Retained:	0	%

Remarks:

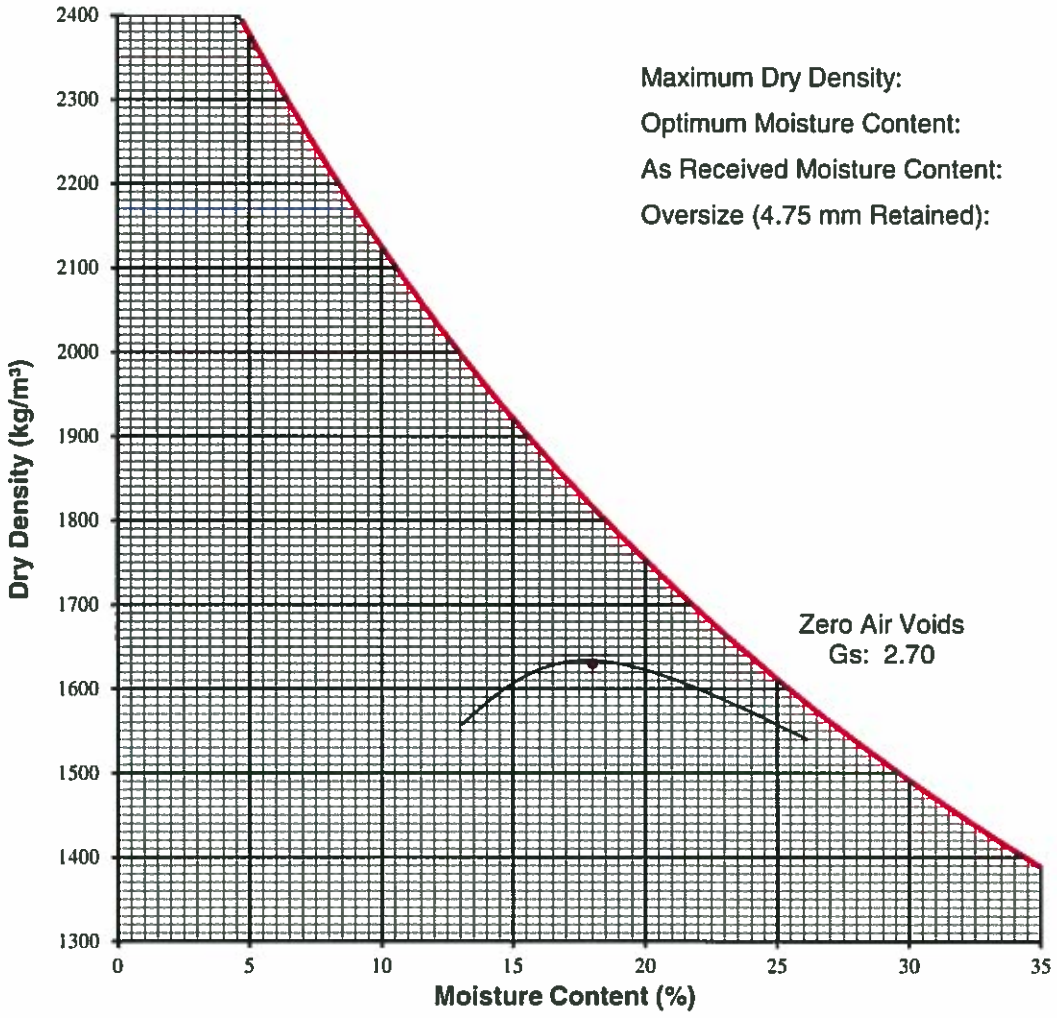
Reviewed By: _____ P.Eng.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.I	Sample No.:	16BH-08
Project No.:	704-ENV.SWM03011-05	Sampled By:	TT
Client:	Clean Harbors Environ Services Inc.	Date Received:	19-Jan-17
Attention:	Mike Parker	Test Date:	24-Jan-16
E-mail:	parker.michaele@cleanharbors.com	Test By:	JB
Source:	Combine sample from BH-08	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	CLAY, silty, sandy		



Maximum Dry Density:	**1630**	kg/m³
Optimum Moisture Content:	**18.0**	%
As Received Moisture Content:	23.0	%
Oversize (4.75 mm Retained):	0	%

Remarks:

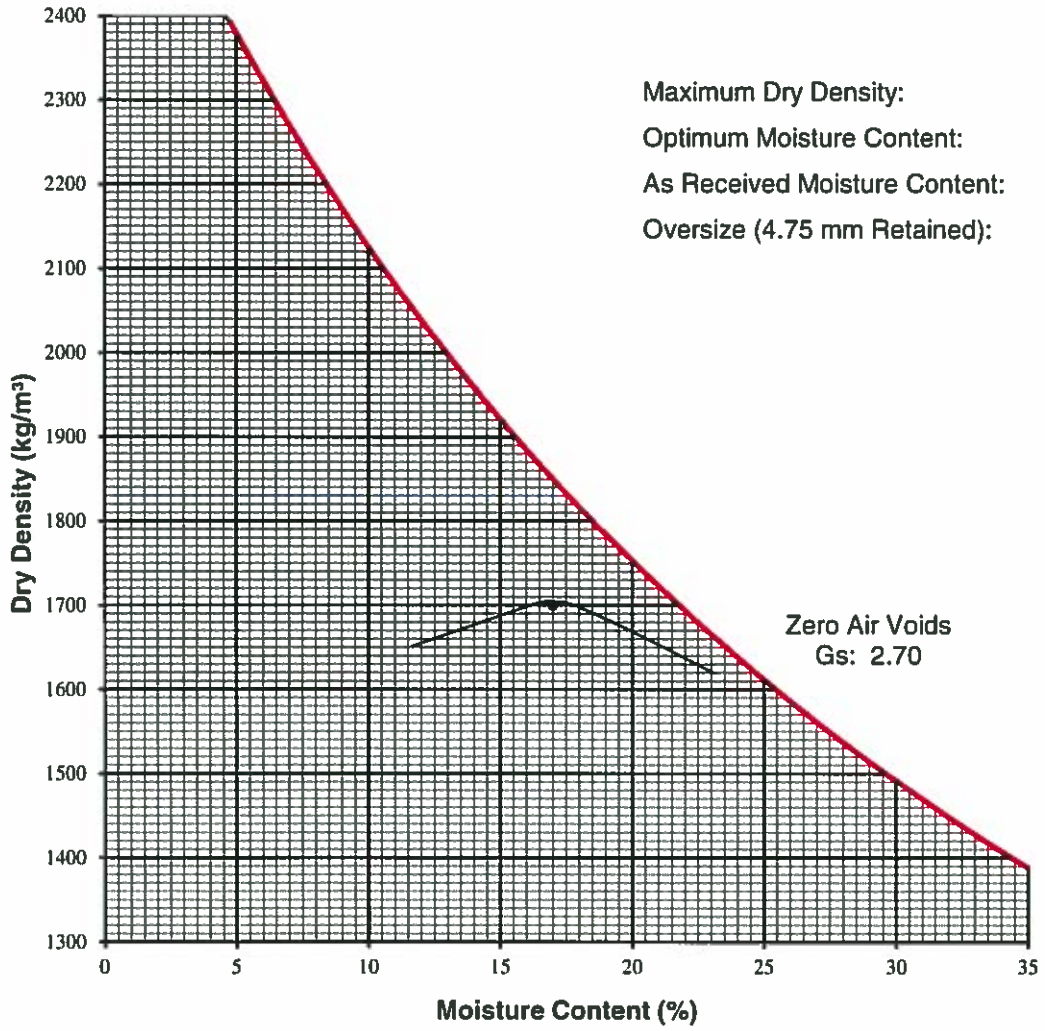
Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.I	Sample No.:	16BH-15
Project No.:	704-ENV.SWM03011-05	Sampled By:	TT
Client:	Clean Harbors Environ Services Inc.	Date Received:	19-Jan-17
Attention:	Mike Parker	Test Date:	25-Jan-17
E-mail:	parker.michaele@cleanharbors.com	Test By:	JB
Source:	Combine sample from BH-15 at interval 4.6 to 9.1 m	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	CLAY, silty, sandy		



Maximum Dry Density:	**1700**	kg/m³
Optimum Moisture Content:	**17.0**	%
As Received Moisture Content:	13.4	%
Oversize (4.75 mm Retained):	0	%

Remarks:

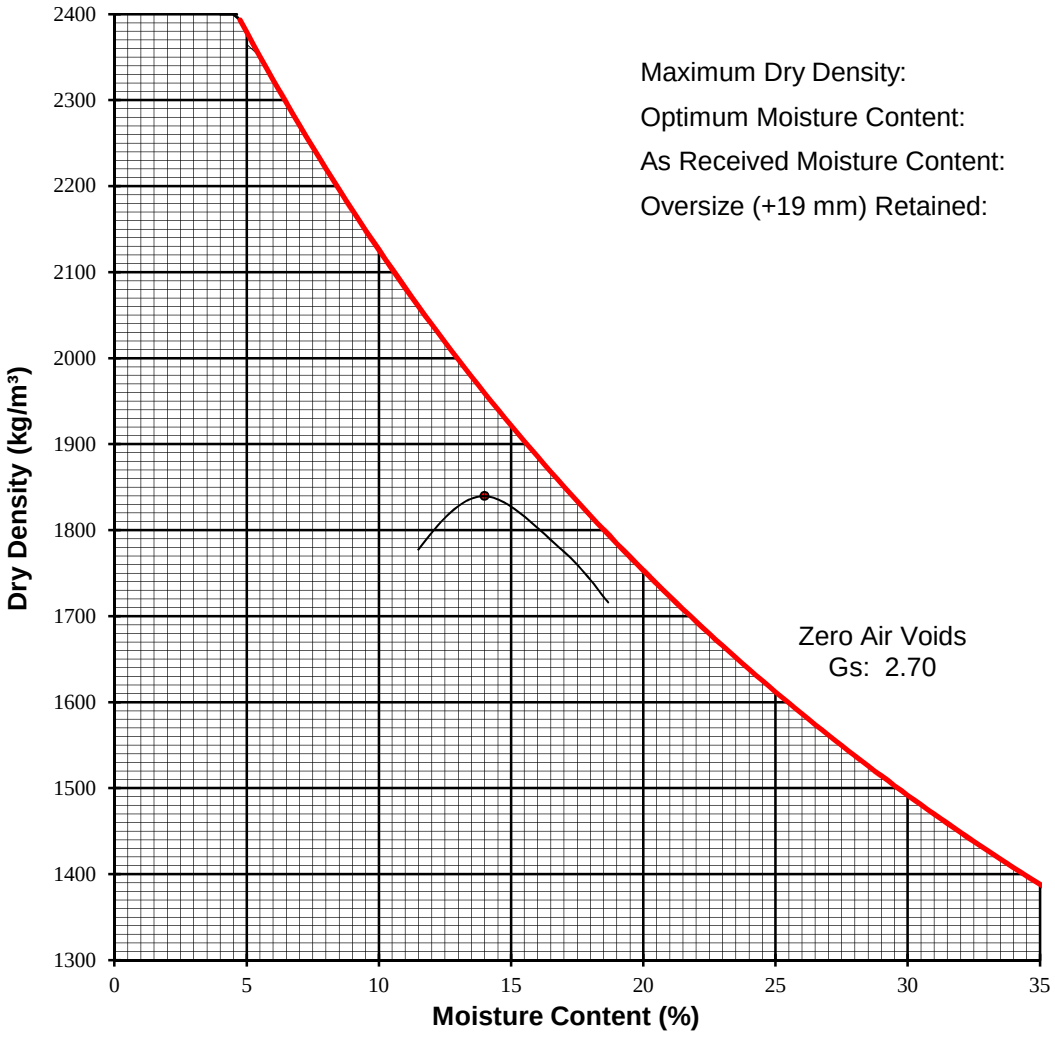
Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.1	Sample No.:	Bulk 1
Project No.:	704-ENV.SWN03011-05.003	Sampled By:	
Client:	Clen Harbors Enviton Services Inc.	Date Received:	
Attention:	Matei Lega	Test Date:	9-May-16
E-mail:	lega.matei@cleanharbors.com	Test By:	AS
Source:	MW-09C	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	CLAY, silty, sandy, some gravel		



Maximum Dry Density:	**1840**	kg/m³
Optimum Moisture Content:	**14.0**	%
As Received Moisture Content:	0.0	%
Oversize (+19 mm) Retained:	0	%

Remarks:

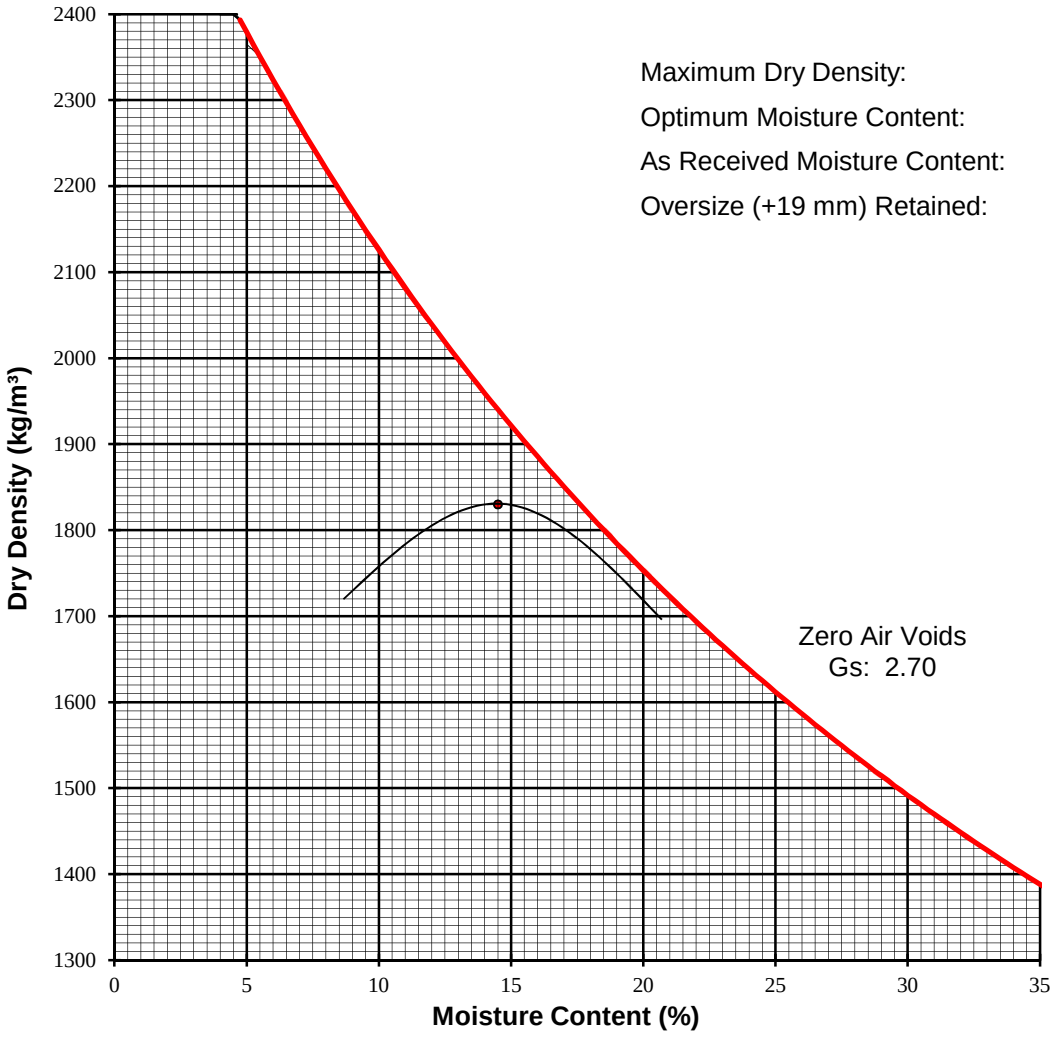
Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.1	Sample No.:	Bulk 2
Project No.:	704-ENV.SWN03011-05.003	Sampled By:	
Client:	Clen Harbors Enviton Services Inc.	Date Received:	
Attention:	Matei Lega	Test Date:	9-May-16
E-mail:	lega.matei@cleanharbors.com	Test By:	AS
Source:	MW-11	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	CLAY, silty, sandy, some gravel		



Maximum Dry Density:	**1830**	kg/m³
Optimum Moisture Content:	**14.5**	%
As Received Moisture Content:	0.0	%
Oversize (+19 mm) Retained:	0	%

Remarks:

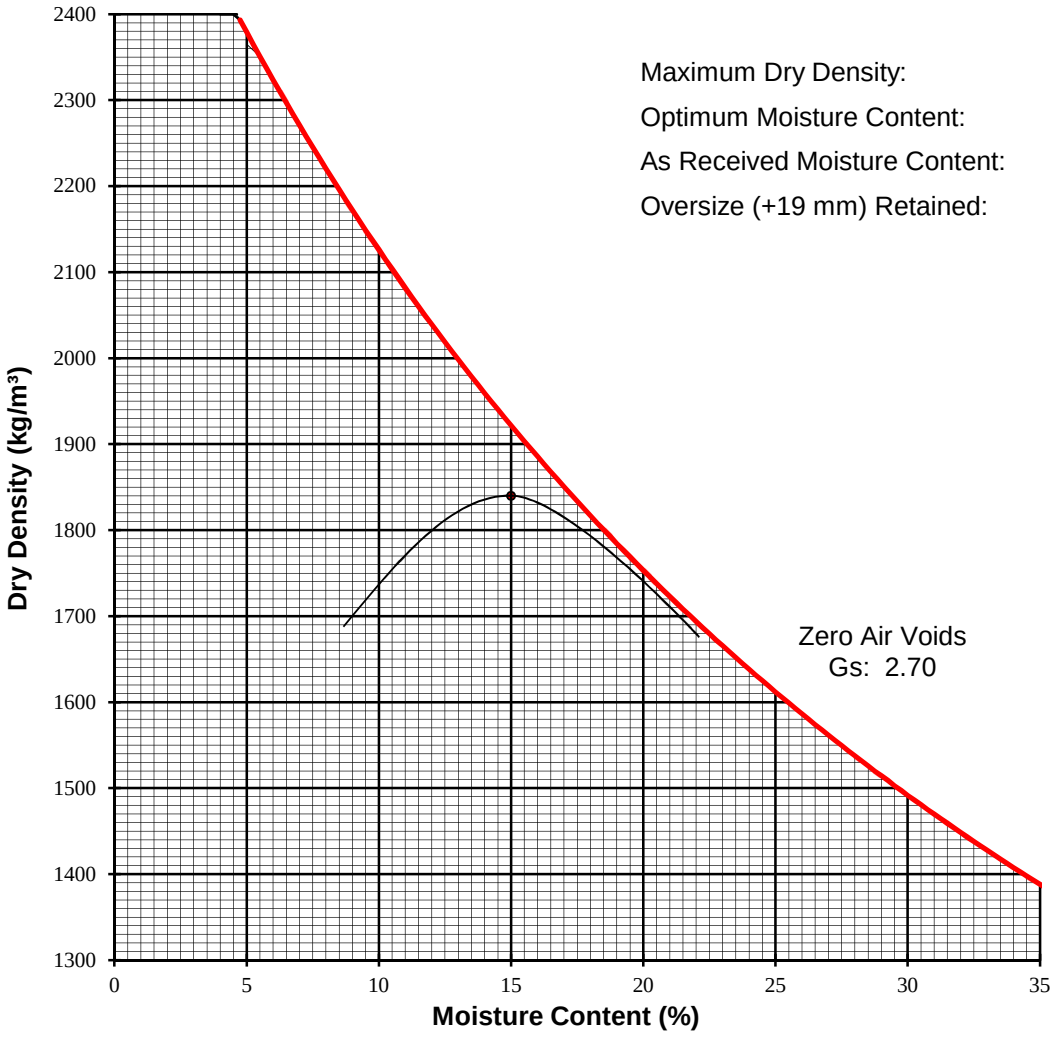
Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.1	Sample No.:	Bulk 2
Project No.:	704-ENV.SWN03011-05.003	Sampled By:	
Client:	Clen Harbors Enviton Services Inc.	Date Received:	
Attention:	Matei Lega	Test Date:	9-May-16
E-mail:	lega.matei@cleanharbors.com	Test By:	AS
Source:	MW-11C	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	CLAY, silty, sandy, some gravel		



Maximum Dry Density:	**1840**	kg/m³
Optimum Moisture Content:	**15.0**	%
As Received Moisture Content:	0.0	%
Oversize (+19 mm) Retained:	0	%

Remarks:

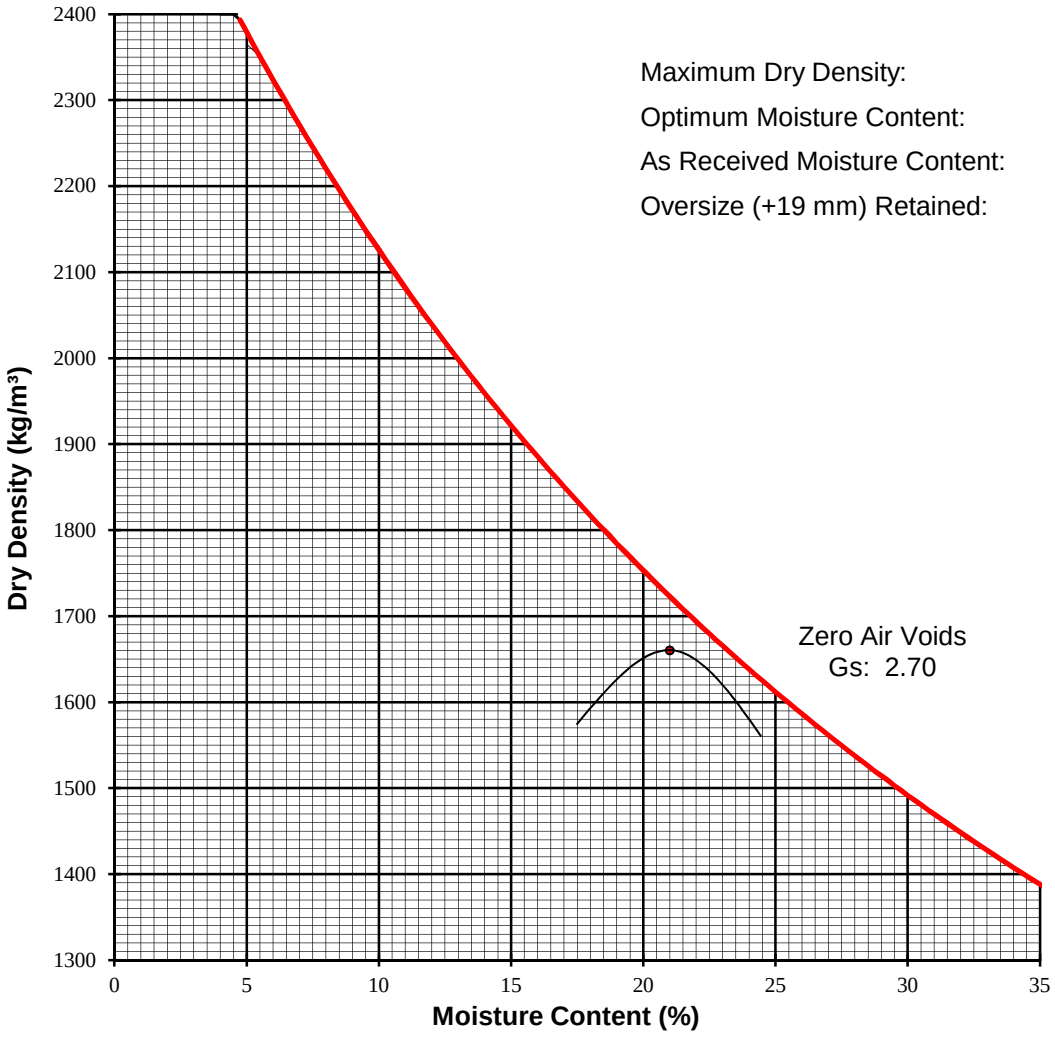
Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.1	Sample No.:	Bulk 1
Project No.:	704-ENV.SWN03011-05.003	Sampled By:	
Client:	Clen Harbors Enviton Services Inc.	Date Received:	
Attention:	Matei Lega	Test Date:	9-May-16
E-mail:	lega.matei@cleanharbors.com	Test By:	AS
Source:	BH-07	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	CLAY, silty, sandy, some gravel		



Maximum Dry Density:	**1660**	kg/m³
Optimum Moisture Content:	**21.0**	%
As Received Moisture Content:	0.0	%
Oversize (+19 mm) Retained:	0	%

Remarks:

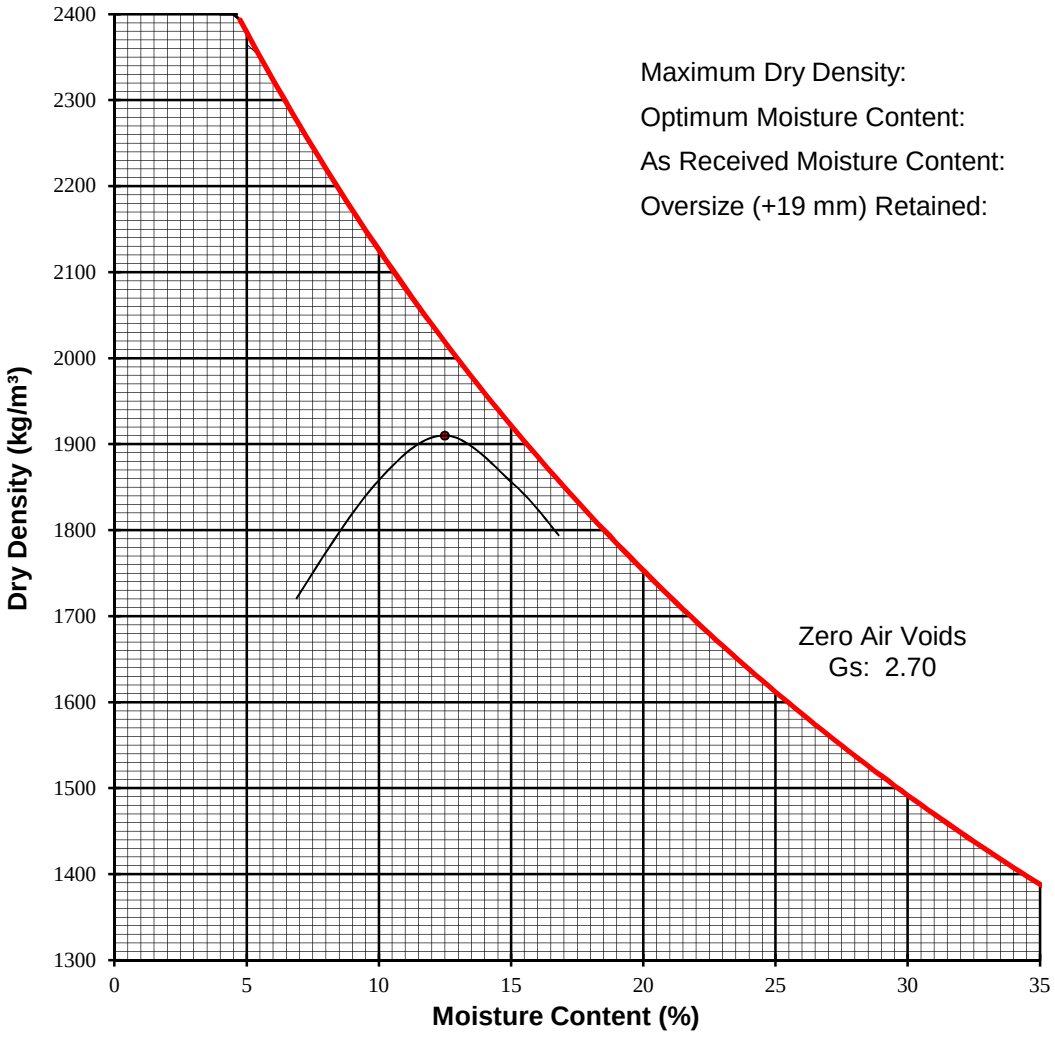
Reviewed By: _____ P.Geol.

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	Cln Harbors Ryley LF Renewal Permit and Expansion Ph.1	Sample No.:	Bulk 1
Project No.:	704-ENV.SWN03011-05.003	Sampled By:	
Client:	Clen Harbors Enviton Services Inc.	Date Received:	
Attention:	Matei Lega	Test Date:	9-May-16
E-mail:	lega.matei@cleanharbors.com	Test By:	AS
Source:	MW-18	Test Method:	A (Manual)
Sample Location:	Ryley, AB		
Sample Description:	CLAY, silty, sandy, some gravel		



Maximum Dry Density:	**1910**	kg/m³
Optimum Moisture Content:	**12.5**	%
As Received Moisture Content:	0.0	%
Oversize (+19 mm) Retained:	0	%

Remarks:

Reviewed By: _____ P.Geol.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

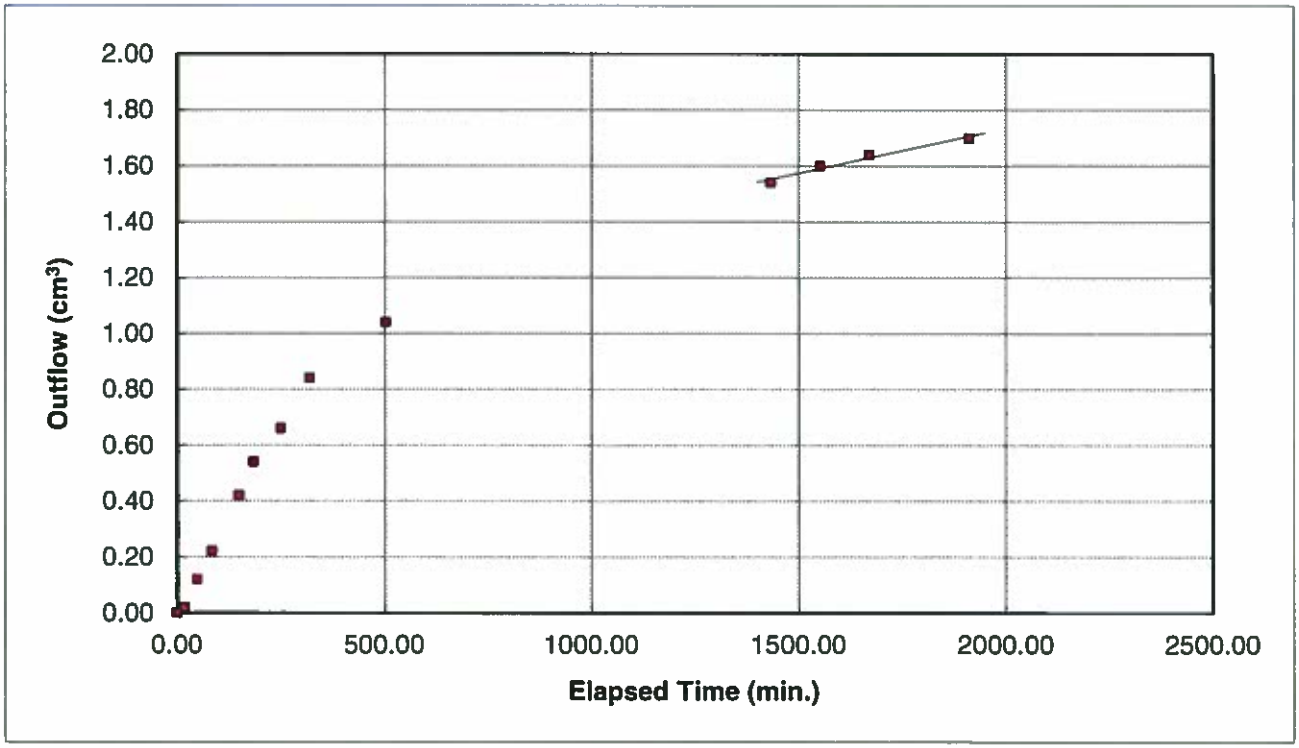
Project:	CLN Harbors Ryley LF Renewal Permit and Expansion Ph.1	Test No.:	Combin sample
Project No.:	704-ENV.SWM03011-05	Borehole No.:	BH-08
Client:	Clean Harbors Environ Services Inc.	Sample Depth:	
Attention:	Mike Parker	Date Tested:	January 26, 2017
		Tested By:	MS

Soil Description: CLAY, silty, sandy

	Initial	Final
Moisture Content (%)	16.8	23.5
Dry Density (kg/m3)	1609	1601
Compaction SPD (if applicable)	98.7%	98.2%

Sample Height =	7.455	cm
Sample Diameter =	7.308	cm
Head Differential =	25	kPa
Flow Q =	5.56E-06	cm^3/sec
Hydraulic Gradient i =	34.21	
Area of Sample A =	41.94	cm^2
Slope =	1.071E-05	

Hydraulic Conductivity k_{20} = 3.78E-09 cm/sec



Remarks:

Reviewed By: _____ P.Geol.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

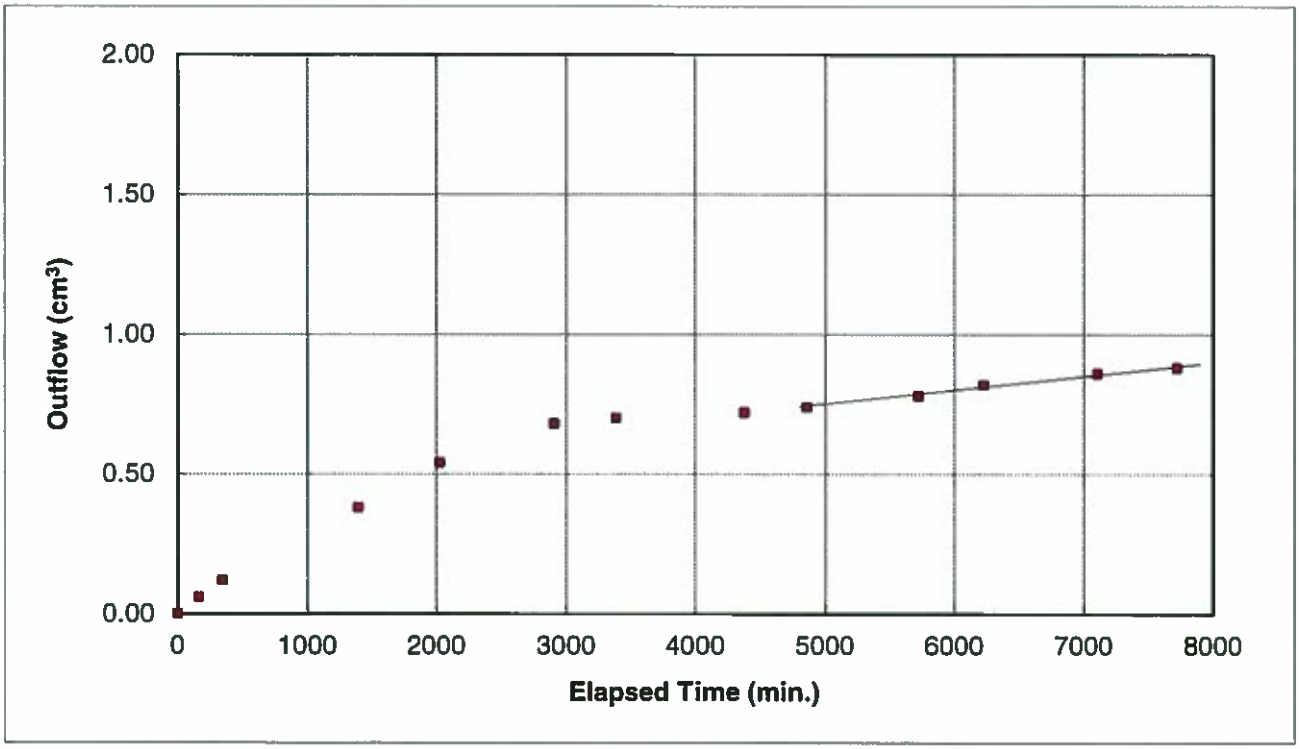
Project:	CLN Harbors Ryley LF Renewal Permit and Expansion Ph.1	Test No.:	Combined sample
Project No.:	704-ENV.SWM03011-05	Borehole No.:	BH-15
Client:	Clean Harbors Environ Services Inc.	Sample Depth:	4.6 - 9.1 m
Attention:	Mike Parker	Date Tested:	January 30, 2017
		Tested By:	MS

Soil Description: CLAY, silty, sandy

	Initial	Final
Moisture Content (%)	16.6	25.3
Dry Density (kg/m3)	1646	1649
Compaction SPD (if applicable)	96.8%	97.0%

Hydraulic Conductivity k_{20} = **5.93E-10 cm/sec**

Sample Height =	7.655	cm
Sample Diameter =	7.250	cm
Head Differential =	25	kPa
Flow Q =	8.35E-07	cm^3/sec
Hydraulic Gradient i =	33.32	
Area of Sample A =	41.28	cm^2
Slope =	7.187E-07	



Remarks:

Reviewed By: _____ P.Geol.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

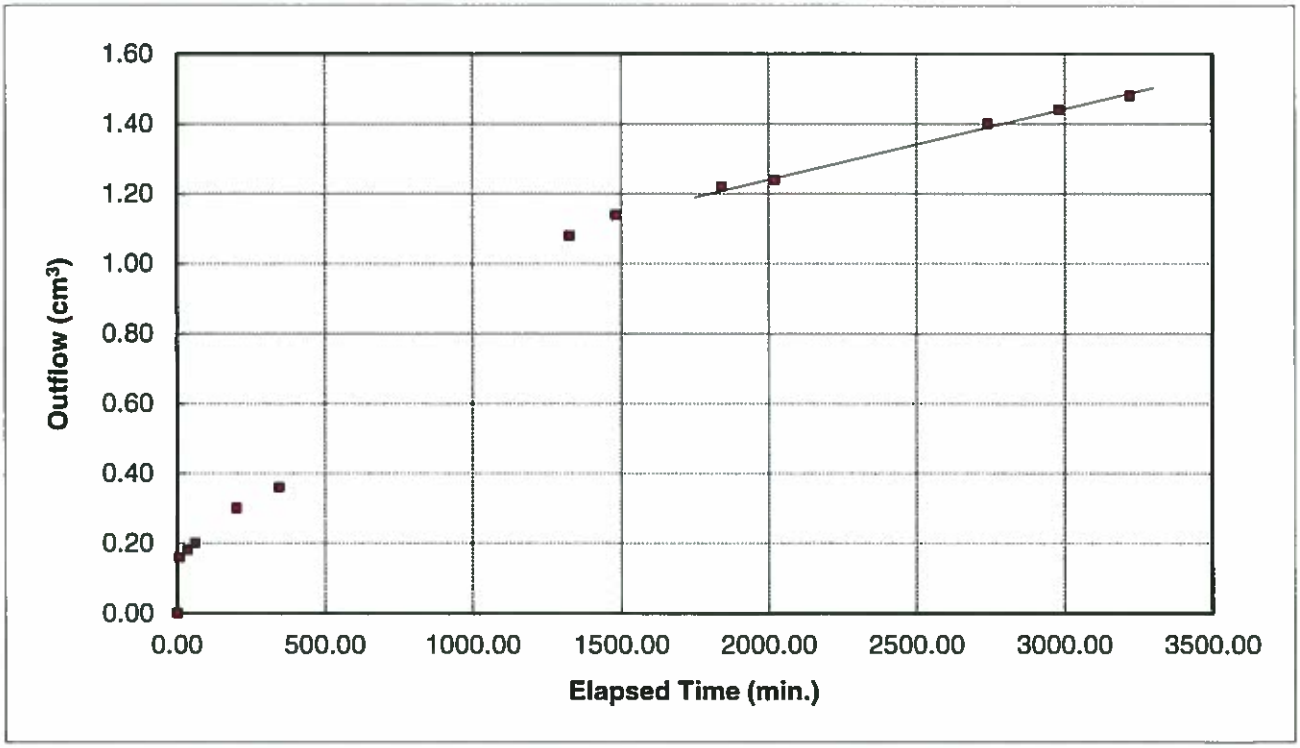
Project:	CLN Harbors Ryley LF Renewal Permit and Expansion Ph.1	Test No.:	Combined sample
Project No.:	704-ENV.SWM03011-05	Borehole No.:	BH-20
Client:	Clean Harbors Environ Services Inc.	Sample Depth:	4.6 - 9.1 m
Attention:	Mike Parker	Date Tested:	February 1, 2017
		Tested By:	MS

Soil Description: CLAY, silty, sandy

	Initial	Final
Moisture Content (%)	18.2	32.3
Dry Density (kg/m3)	1506	1504
Compaction SPD (if applicable)	99.1%	98.9%

Hydraulic Conductivity k_{20} = **2.30E-09 cm/sec**

Sample Height =	7.4675	cm
Sample Diameter =	7.260	cm
Head Differential =	25	kPa
Flow Q =	3.33E-06	cm^3/sec
Hydraulic Gradient i =	34.16	
Area of Sample A =	41.40	cm^2
Slope =	5.712E-06	



Remarks:

Reviewed By: _____ P.Geol.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

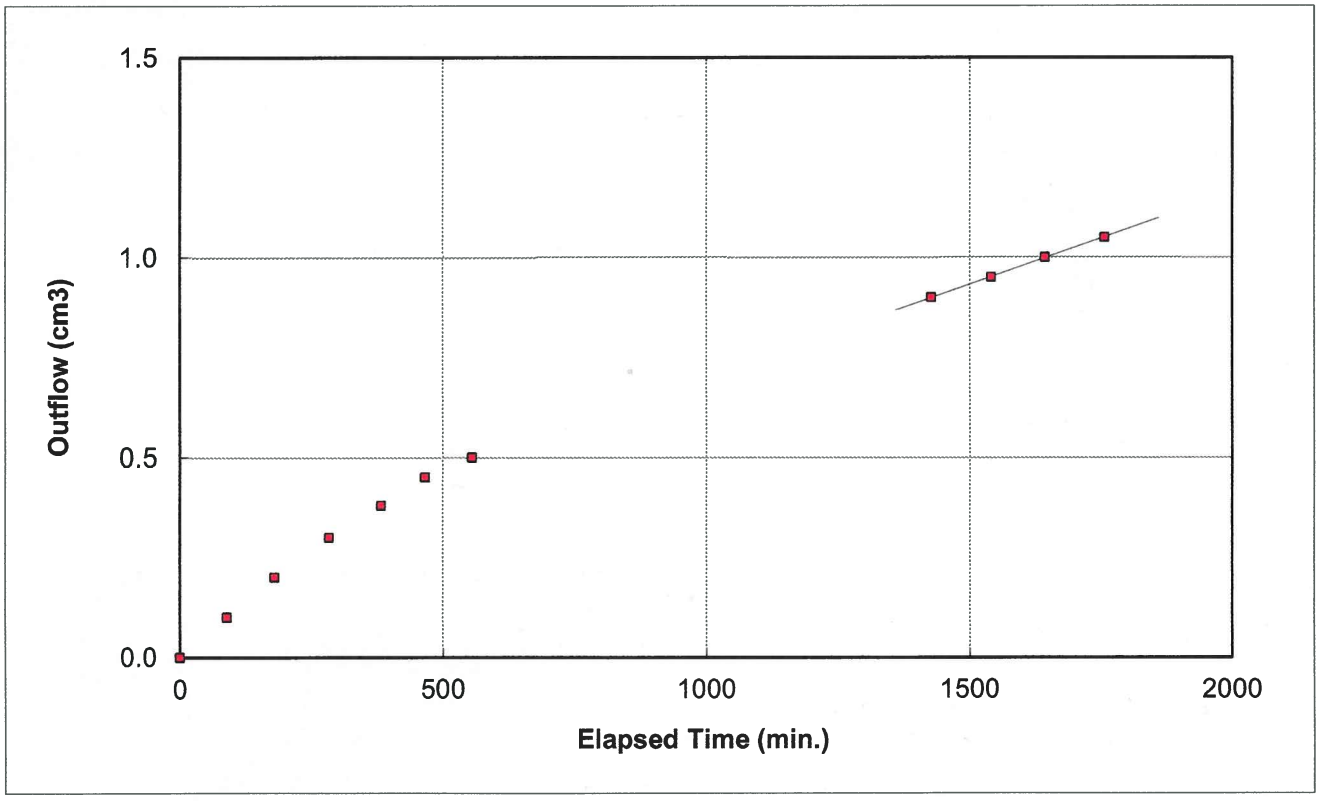
Project:	Clean Harbors Ryley	Test No.:	P-1
Project No.:	ENVSWM03011-05.003	Borehole No.:	16MW02 ST3
Client:	Clean Harbors Environ Services Inc	Sample Depth:	7.6 m
Attention:		Date Tested:	May 11, 2016
		Tested By:	LL

Soil Description: CLAY SHALE, oxidized, dark grayish brown

	Initial	Final
Moisture Content (%)	25.2	34.9
Dry Density (kg/m3)	1362	1340
Compaction SPD (if applicable)	N/A	N/A

Sample Height =	6.014	cm
Sample Diameter =	7.341	cm
Head Differential =	14	kPa
Flow Q =	7.6E-06	cm^3/sec
Hydraulic Gradient i =	23.75	
Area of Sample A =	42.33	cm^2

Hydraulic Conductivity k_{20} = **7.3E-09 cm/sec**



Remarks: Shelby tube sample

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

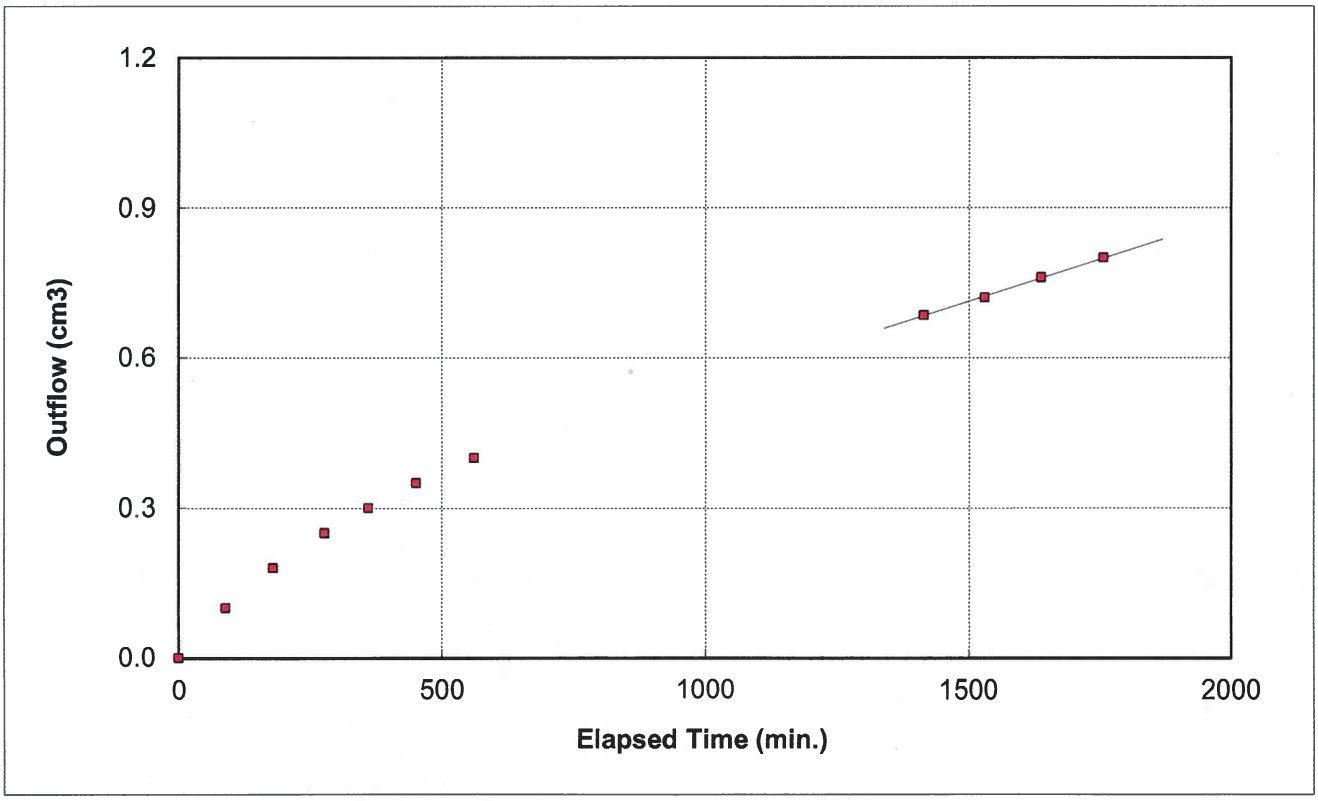
Project:	Clean Harbors Ryley	Test No.:	P-2
Project No.:	ENVSWM03011-05.003	Borehole No.:	16BH04 ST2
Client:	Clean Harbors Environ Services Inc	Sample Depth:	7.6 m
Attention:		Date Tested:	May 11, 2016
		Tested By:	LL

Soil Description: CLAY SHALE, trace sand seams, dark brown

	Initial	Final
Moisture Content (%)	24.0	27.4
Dry Density (kg/m3)	1551	1489
Compaction SPD (if applicable)	N/A	N/A

Sample Height =	5.478	cm
Sample Diameter =	7.463	cm
Head Differential =	14	kPa
Flow Q =	5.6E-06	cm^3/sec
Hydraulic Gradient i =	26.08	
Area of Sample A =	43.74	cm^2

Hydraulic Conductivity k_{20} = **4.7E-09 cm/sec**



Remarks: Shelby tube sample

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

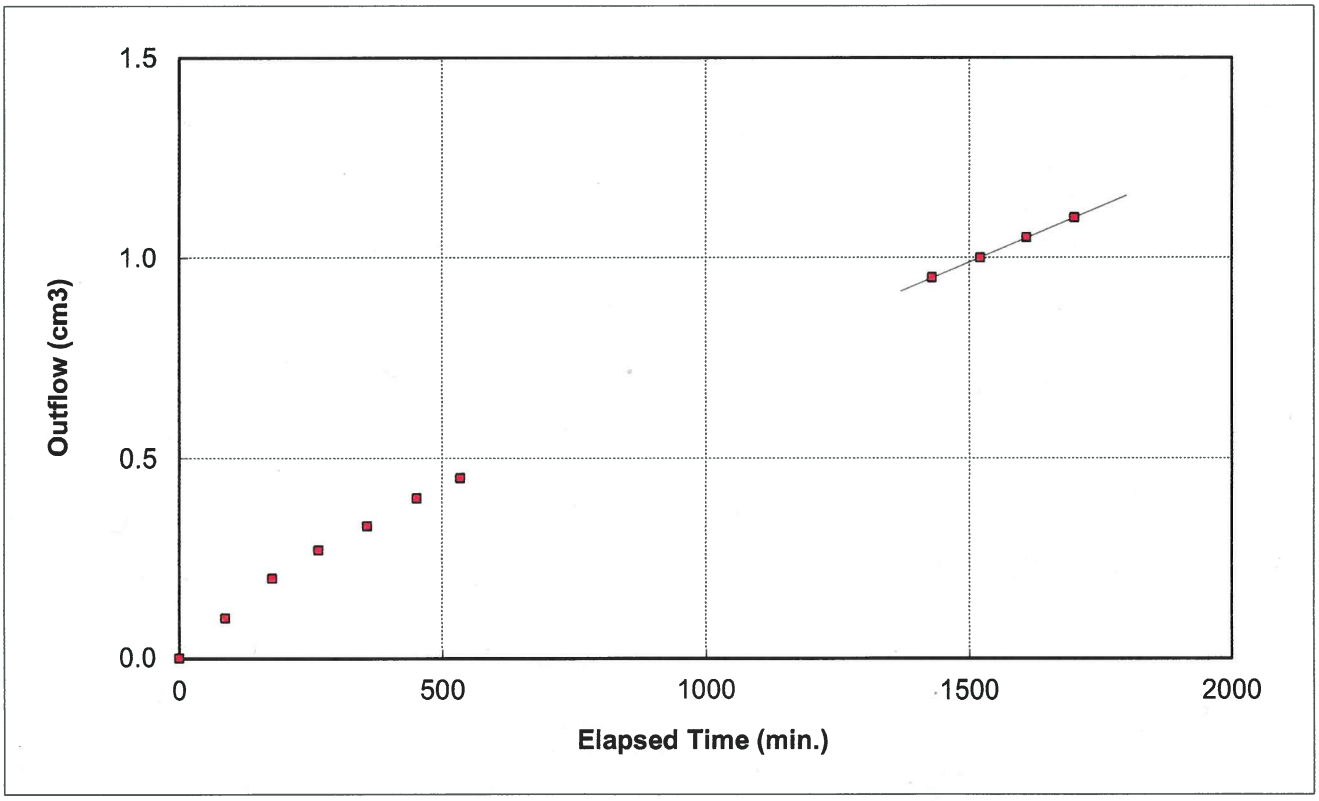
Project:	Clean Harbors Ryley	Test No.:	P-3
Project No.:	ENVSWM03011-05.003	Borehole No.:	16BH05 ST1
Client:	Clean Harbors Environ Services Inc	Sample Depth:	3.7 m
Attention:		Date Tested:	May 12, 2016
		Tested By:	LL

Soil Description: SANDSTONE, clay seams, oxidized, dark gray

	Initial	Final
Moisture Content (%)	19.2	20.4
Dry Density (kg/m3)	1757	1728
Compaction SPD (if applicable)	N/A	N/A

Sample Height =	5.751	cm
Sample Diameter =	7.336	cm
Head Differential =	14	kPa
Flow Q =	9.2E-06	cm^3/sec
Hydraulic Gradient i =	24.84	
Area of Sample A =	42.27	cm^2

Hydraulic Conductivity k_{20} = **8.5E-09 cm/sec**



Remarks: Shelby tube sample

Reviewed By: NI P.Eng.

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

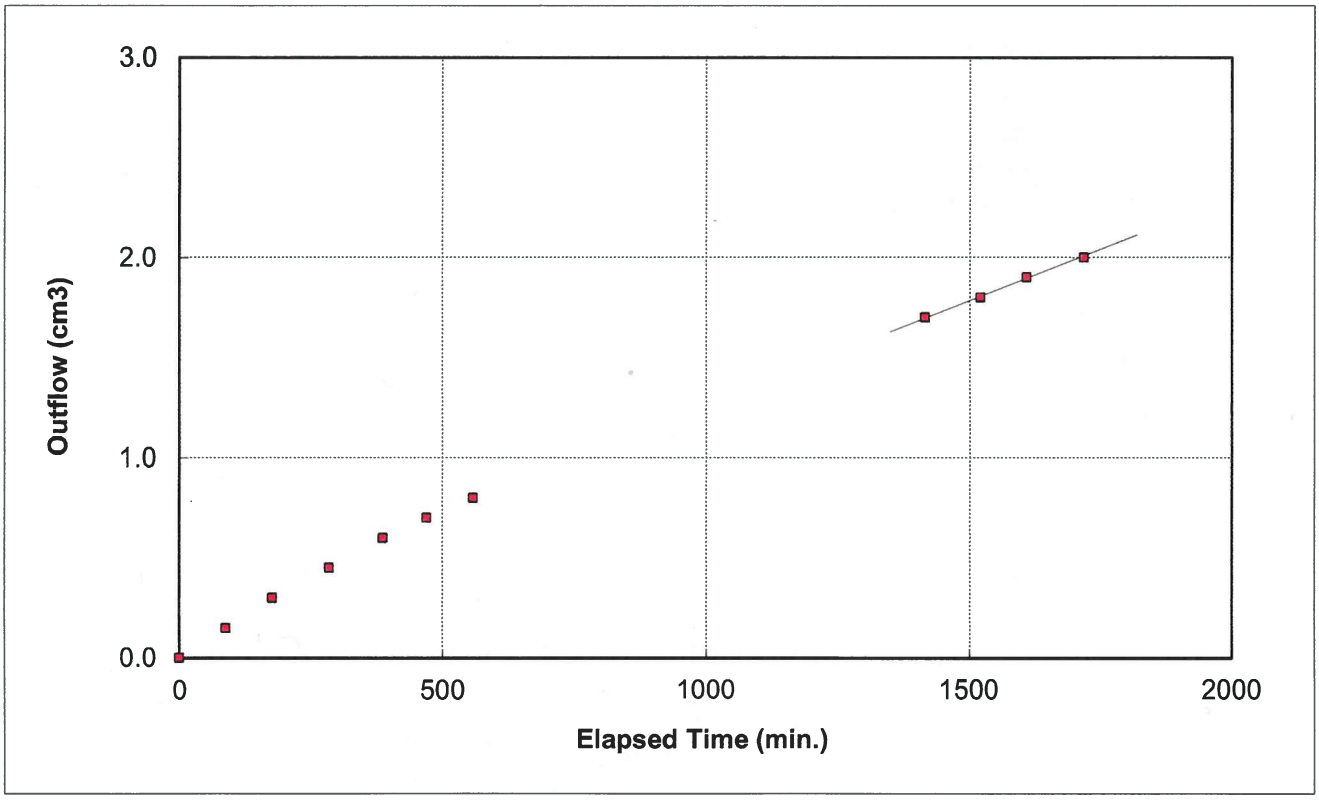
Project:	Clean Harbors Ryley	Test No.:	P-4
Project No.:	ENVSWM03011-05.003	Borehole No.:	16BH05 ST3
Client:	Clean Harbors Environ Services Inc	Sample Depth:	9.6 m
Attention:		Date Tested:	May 12, 2016
		Tested By:	LL

Soil Description: SANDSTONE, clay seams, oxidized, gray

	Initial	Final
Moisture Content (%)	17.3	19.4
Dry Density (kg/m3)	1766	1727
Compaction SPD (if applicable)	N/A	N/A

Sample Height =	5.901	cm
Sample Diameter =	7.371	cm
Head Differential =	14	kPa
Flow Q =	1.7E-05	cm^3/sec
Hydraulic Gradient i =	24.21	
Area of Sample A =	42.67	cm^2

Hydraulic Conductivity k_{20} = **1.5E-08 cm/sec**



Remarks: Shelby tube sample

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

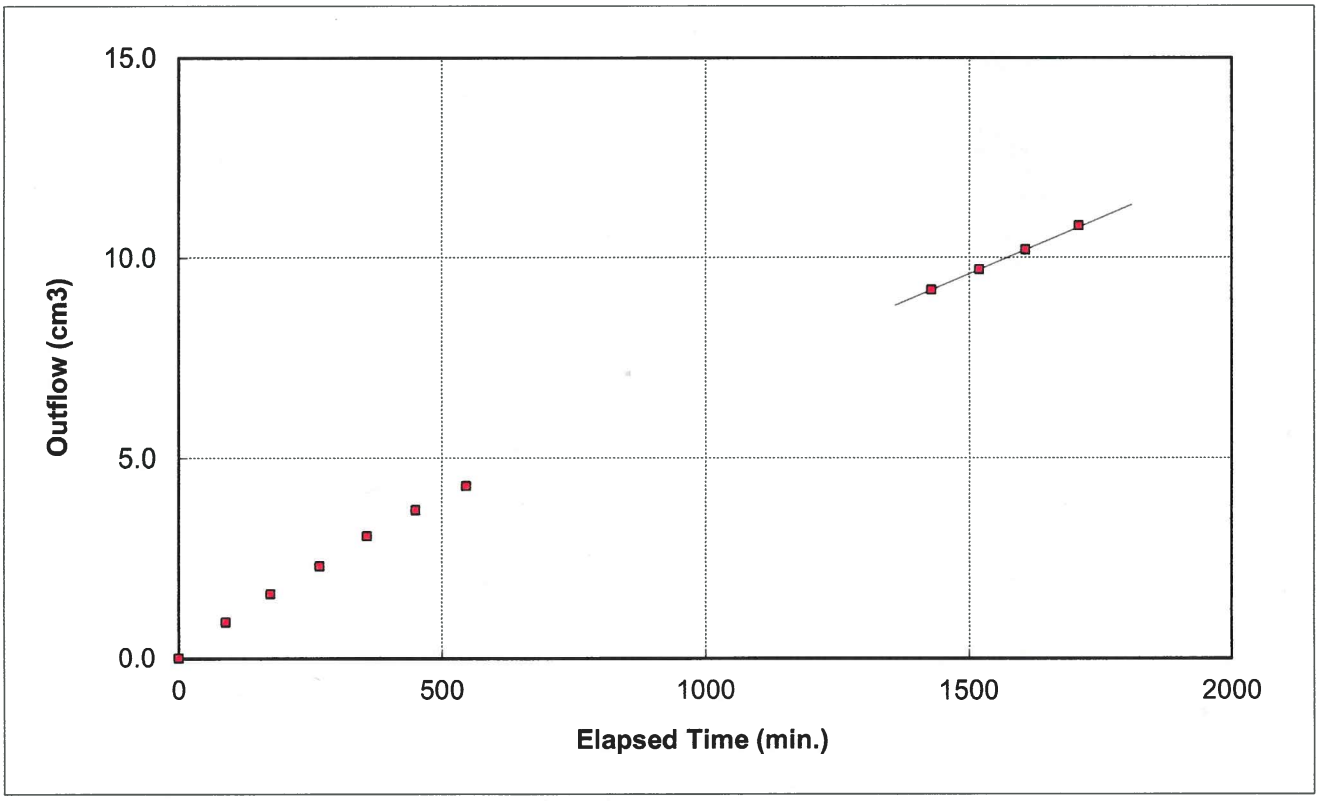
Project:	Clean Harbors Ryley	Test No.:	P-5
Project No.:	ENVSWM03011-05.003	Borehole No.:	16BH06 ST2
Client:	Clean Harbors Environ Services Inc	Sample Depth:	8.4 m
Attention:		Date Tested:	May 13, 2016
		Tested By:	LL

Soil Description: CLAY SHALE, weathered, trace organics, very dark grayish brown

	Initial	Final
Moisture Content (%)	29.5	31.4
Dry Density (kg/m^3)	1393	1363
Compaction SPD (if applicable)	N/A	N/A

Sample Height =	5.889	cm
Sample Diameter =	7.409	cm
Head Differential =	14	kPa
Flow Q =	9.5E-05	cm^3/sec
Hydraulic Gradient i =	24.26	
Area of Sample A =	43.11	cm^2

Hydraulic Conductivity k_{20} = **8.8E-08 cm/sec**



Remarks: Shelby tube sample

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

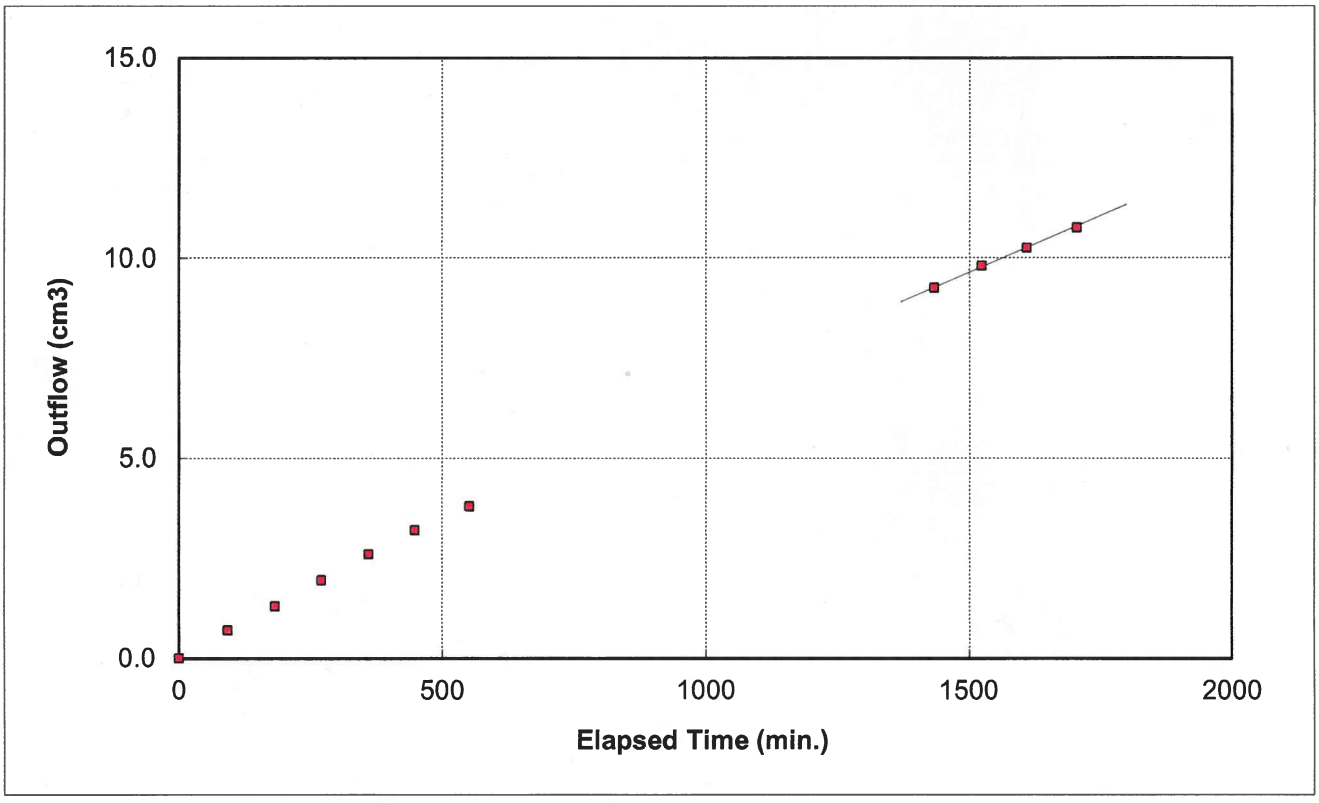
Project:	Clean Harbors Ryley	Test No.:	P-6
Project No.:	ENVSWM03011-05.003	Borehole No.:	16BH07 ST3
Client:	Clean Harbors Environ Services Inc	Sample Depth:	6.4 m
Attention:		Date Tested:	May 17, 2016
		Tested By:	LL

Soil Description: SANDSTONE, oxidized, gray

	Initial	Final
Moisture Content (%)	17.1	23.3
Dry Density (kg/m^3)	1639	1643
Compaction SPD (if applicable)	N/A	N/A

Sample Height =	5.058	cm
Sample Diameter =	7.348	cm
Head Differential =	14	kPa
Flow Q =	9.2E-05	cm^3/sec
Hydraulic Gradient i =	28.24	
Area of Sample A =	42.41	cm^2

Hydraulic Conductivity k_{20} = 7.4E-08 cm/sec



Remarks: Shelby tube sample

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

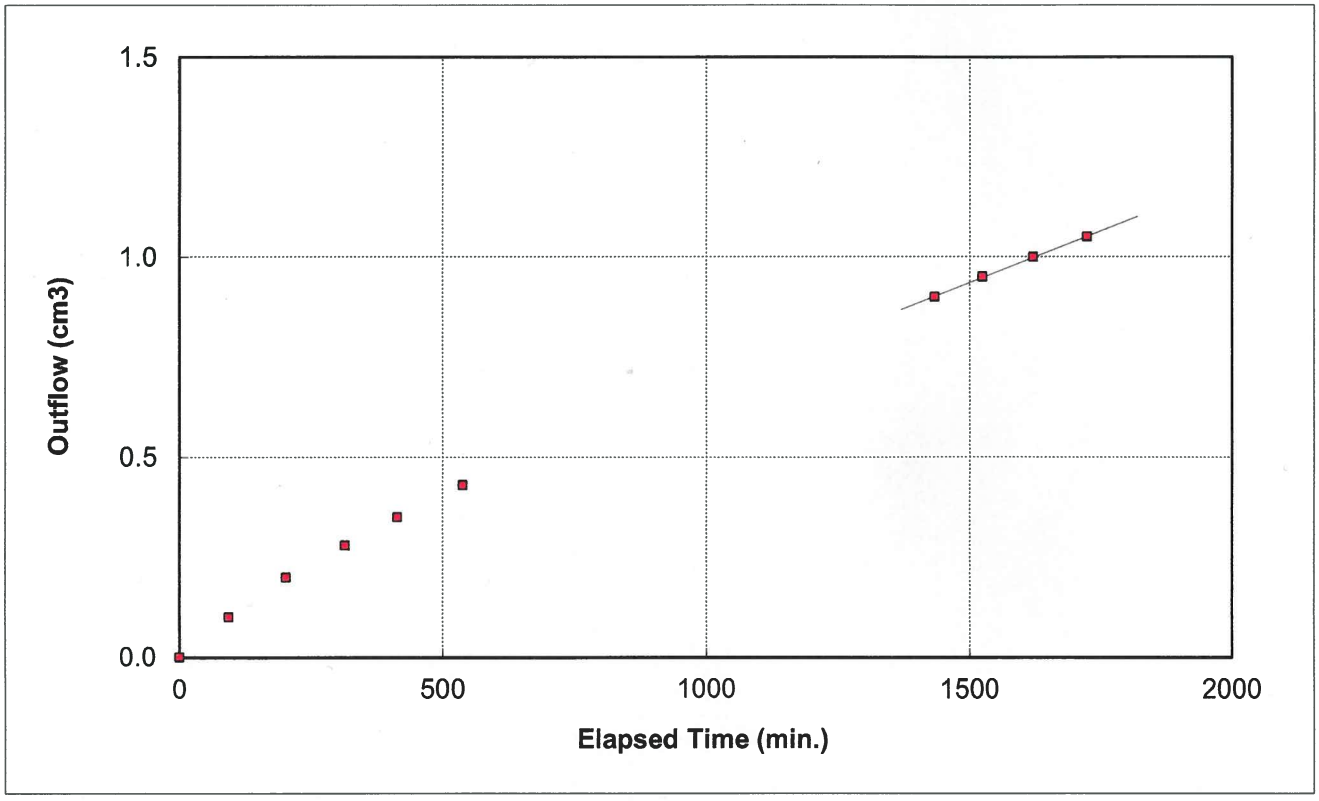
Project:	Clean Harbors Ryley	Test No.:	P-7
Project No.:	ENVSWM03011-05.003	Borehole No.:	16MW08 ST2
Client:	Clean Harbors Environ Services Inc	Sample Depth:	8.2 m
Attention:		Date Tested:	May 17, 2016
		Tested By:	LL

Soil Description: SANDSTONE, coal specks, oxidized, gray

	Initial	Final
Moisture Content (%)	19.3	20.9
Dry Density (kg/m^3)	1762	1739
Compaction SPD (if applicable)	N/A	N/A

Sample Height =	5.364	cm
Sample Diameter =	7.339	cm
Head Differential =	14	kPa
Flow Q =	8.6E-06	cm^3/sec
Hydraulic Gradient i =	26.63	
Area of Sample A =	42.30	cm^2

Hydraulic Conductivity k_{20} = 7.4E-09 cm/sec



Remarks: Shelby tube sample

Reviewed By: N1 P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

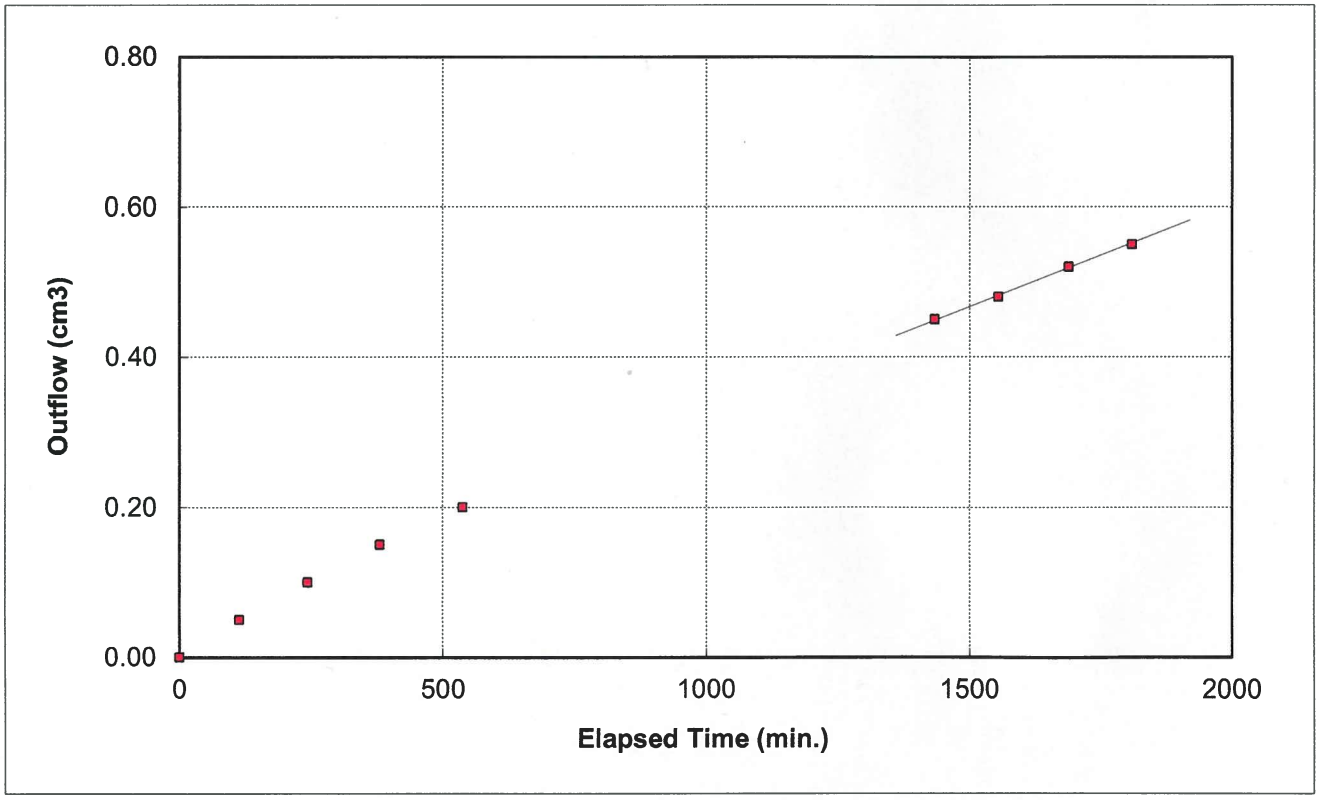
Project:	Clean Harbors Ryley	Test No.:	P-8
Project No.:	ENVSWM03011-05.003	Borehole No.:	16MW08 ST3
Client:	Clean Harbors Environ Services Inc	Sample Depth:	11.4 m
Attention:		Date Tested:	May 17, 2016
		Tested By:	LL

Soil Description: SANDSTONE, clay seams, gray

	Initial	Final
Moisture Content (%)	16.4	18.6
Dry Density (kg/m^3)	1757	1752
Compaction SPD (if applicable)	N/A	N/A

Sample Height =	5.970	cm
Sample Diameter =	7.370	cm
Head Differential =	14	kPa
Flow Q =	4.4E-06	cm^3/sec
Hydraulic Gradient i =	23.93	
Area of Sample A =	42.66	cm^2

Hydraulic Conductivity k_{20} = 4.2E-09 cm/sec



Remarks: Shelby tube sample

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

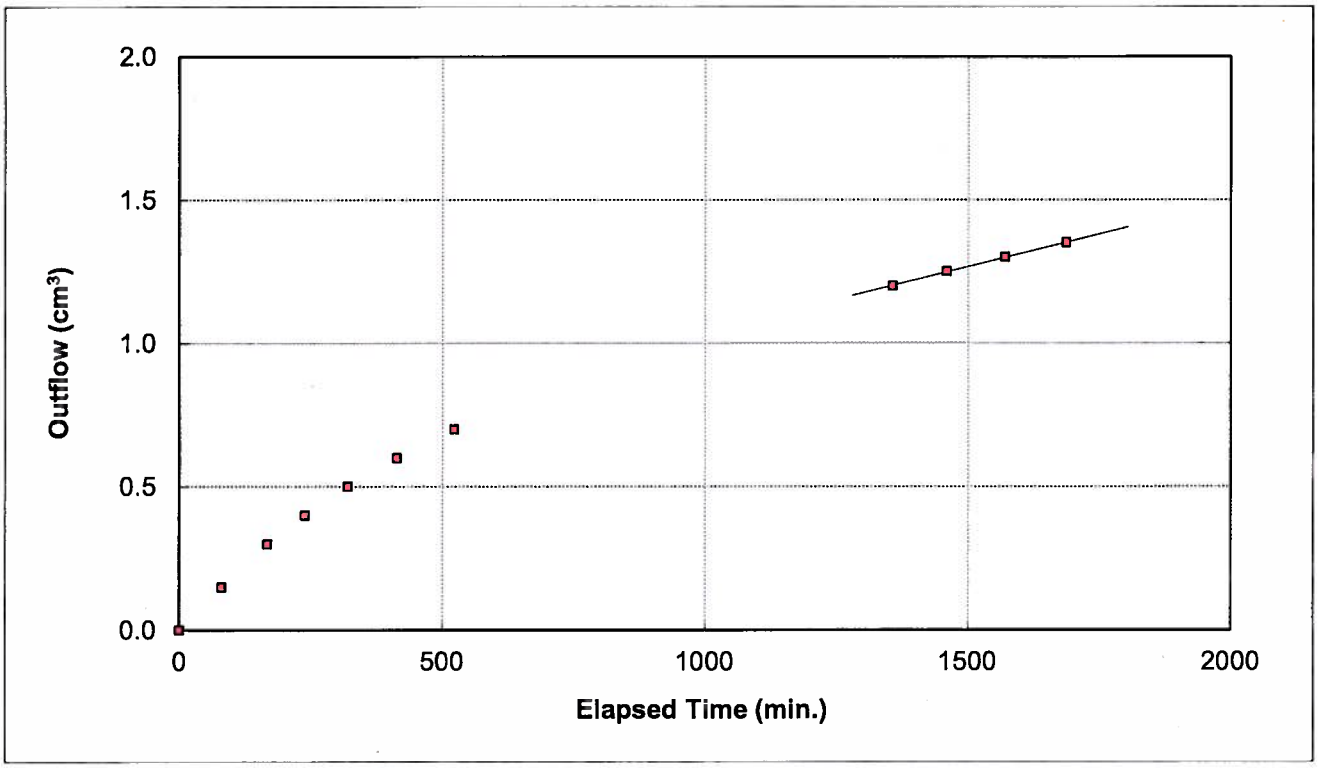
Project:	Clean Harbors Ryley	Test No.:	P-9
Project No.:	ENVSWM03011-05.003	Borehole No.:	16BH05 Bulk1
Client:	Clean Harbors Environ Services Inc	Sample Depth:	0.9 m
Attention:		Date Tested:	May 31, 2016
		Tested By:	TD

Soil Description: CLAY, silty, some sand, dark brown

	Initial	Final
Moisture Content (%)	15.0	18.4
Dry Density (kg/m3)	1798	1802
Compaction SPD (if applicable)	98.3%	98.5%

Sample Height =	5.098	cm
Sample Diameter =	7.107	cm
Head Differential =	14	kPa
Flow Q =	7.6E-06	cm^3/sec
Hydraulic Gradient i =	28.02	
Area of Sample A =	39.67	cm^2

Hydraulic Conductivity k_{20} = **6.6E-09 cm/sec**



Remarks: Remolded sample tested at 98.5% SPD and 15.0% M.C.

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

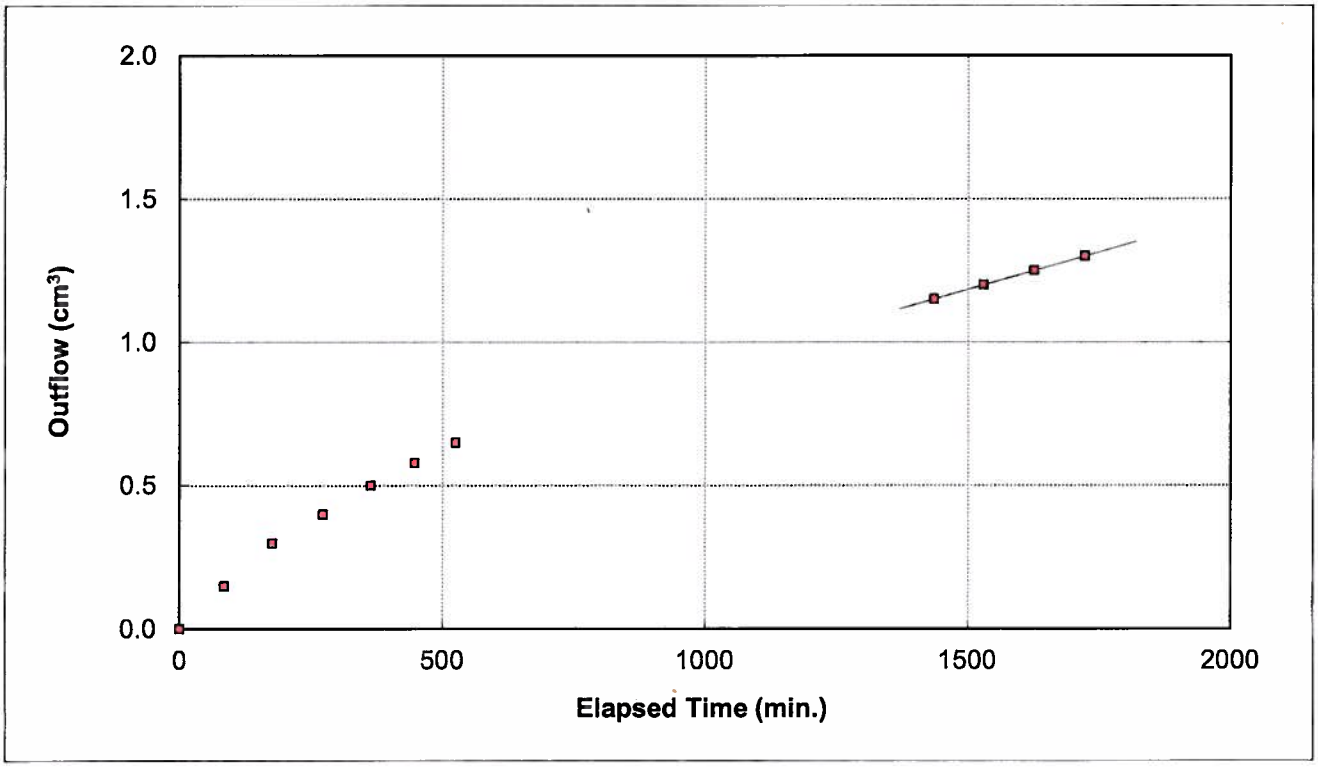
Project:	Clean Harbors Ryley	Test No.:	P-10
Project No.:	ENVSWM03011-05.003	Borehole No.:	16BH07 Bulk1
Client:	Clean Harbors Environ Services Inc	Sample Depth:	2.6 m
Attention:		Date Tested:	June 3, 2016
		Tested By:	TD

Soil Description: CLAY, silty, some sand, dark brown

	Initial	Final
Moisture Content (%)	21.1	23.5
Dry Density (kg/m3)	1639	1637
Compaction SPD (if applicable)	98.7%	98.6%

Sample Height =	5.104	cm
Sample Diameter =	7.098	cm
Head Differential =	14	kPa
Flow Q =	8.7E-06	cm^3/sec
Hydraulic Gradient i =	27.99	
Area of Sample A =	39.57	cm^2

Hydraulic Conductivity k_{20} = **7.6E-09 cm/sec**



Remarks: Remolded sample tested at 98.6% SPD and 21.1% M.C.

Reviewed By: _____ P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

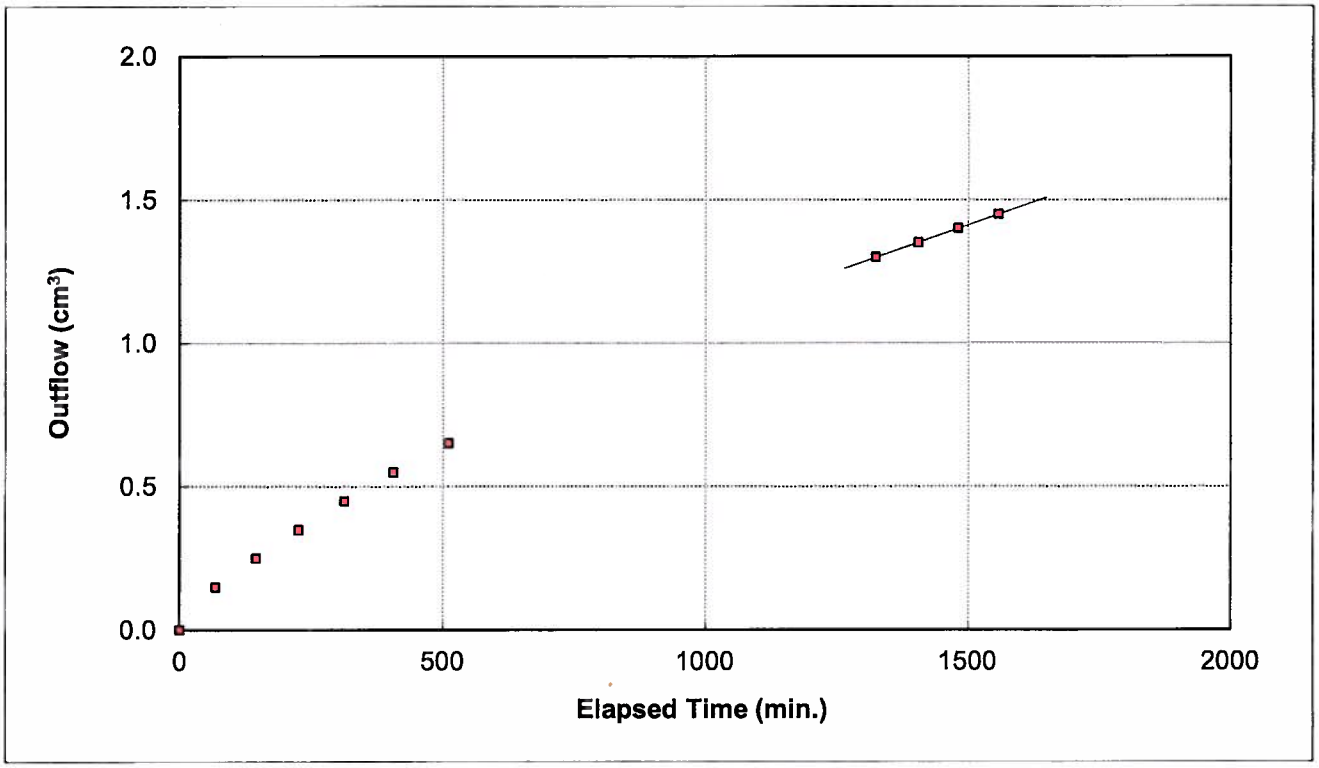
Project:	Clean Harbors Ryley	Test No.:	P-11
Project No.:	ENVSWM03011-05.003	Borehole No.:	16MW09C Bulk 1
Client:	Clean Harbors Environ Services Inc	Sample Depth:	0.8 m
Attention:		Date Tested:	May 31, 2016
		Tested By:	TD

Soil Description: CLAY, silty, some sand, dark brown

	Initial	Final
Moisture Content (%)	14.0	17.9
Dry Density (kg/m3)	1806	1803
Compaction SPD (if applicable)	98.1%	98.0%

Sample Height =	5.141	cm
Sample Diameter =	7.097	cm
Head Differential =	14	kPa
Flow Q =	1.1E-05	cm^3/sec
Hydraulic Gradient i =	27.78	
Area of Sample A =	39.56	cm^2

Hydraulic Conductivity k_{20} = **9.4E-09 cm/sec**



Remarks: Remolded sample tested at 98.0% SPD and 14.0% M.C.

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

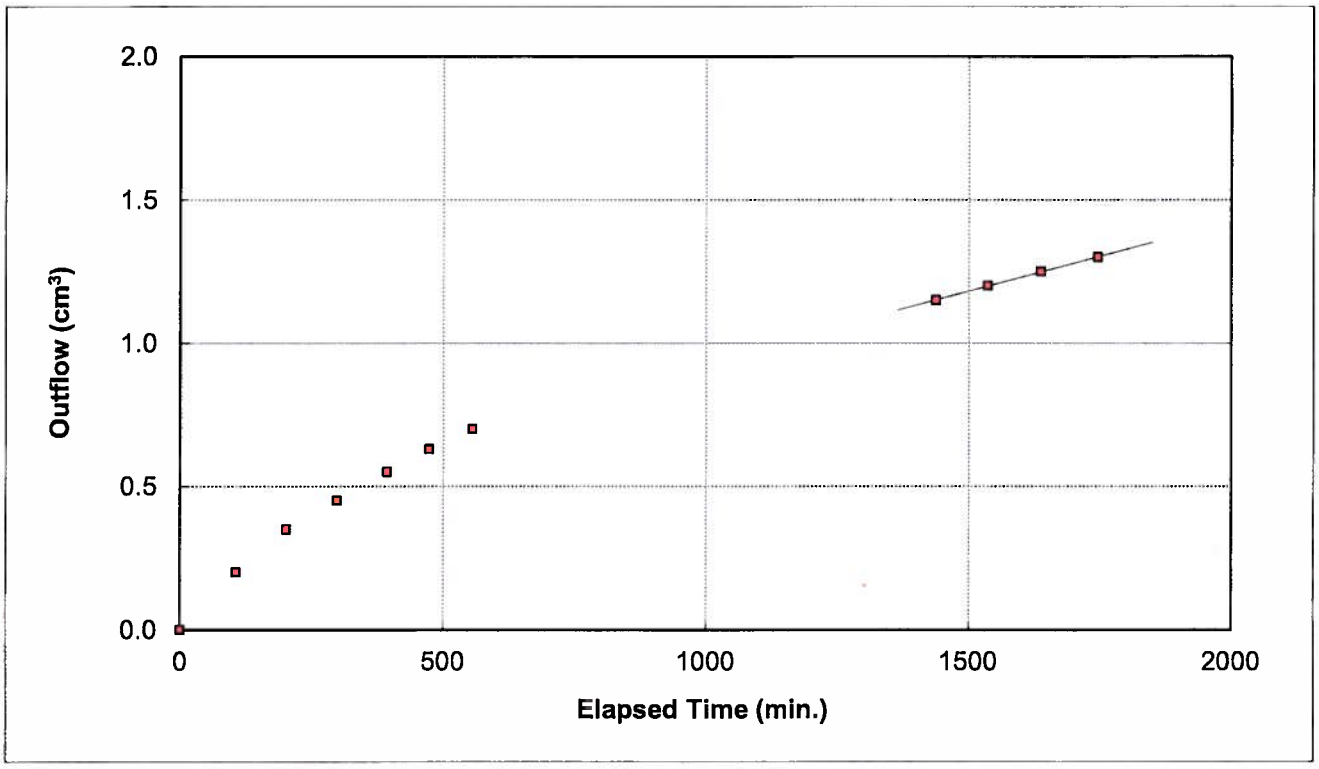
Project:	Clean Harbors Ryley	Test No.:	P-12
Project No.:	ENVSWM03011-05.003	Borehole No.:	16MW11 Bulk 2
Client:	Clean Harbors Environ Services Inc	Sample Depth:	
Attention:		Date Tested:	June 3, 2016
		Tested By:	TD

Soil Description: CLAY, silty, some sand, dark brown

	Initial	Final
Moisture Content (%)	14.3	17.2
Dry Density (kg/m3)	1796	1798
Compaction SPD (if applicable)	98.1%	98.3%

Sample Height =	5.107	cm
Sample Diameter =	7.111	cm
Head Differential =	14	kPa
Flow Q =	8.1E-06	cm^3/sec
Hydraulic Gradient i =	27.97	
Area of Sample A =	39.71	cm^2

Hydraulic Conductivity k_{20} = **7.0E-09 cm/sec**



Remarks: Remolded sample tested at 98.3% SPD and 14.3% M.C.

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

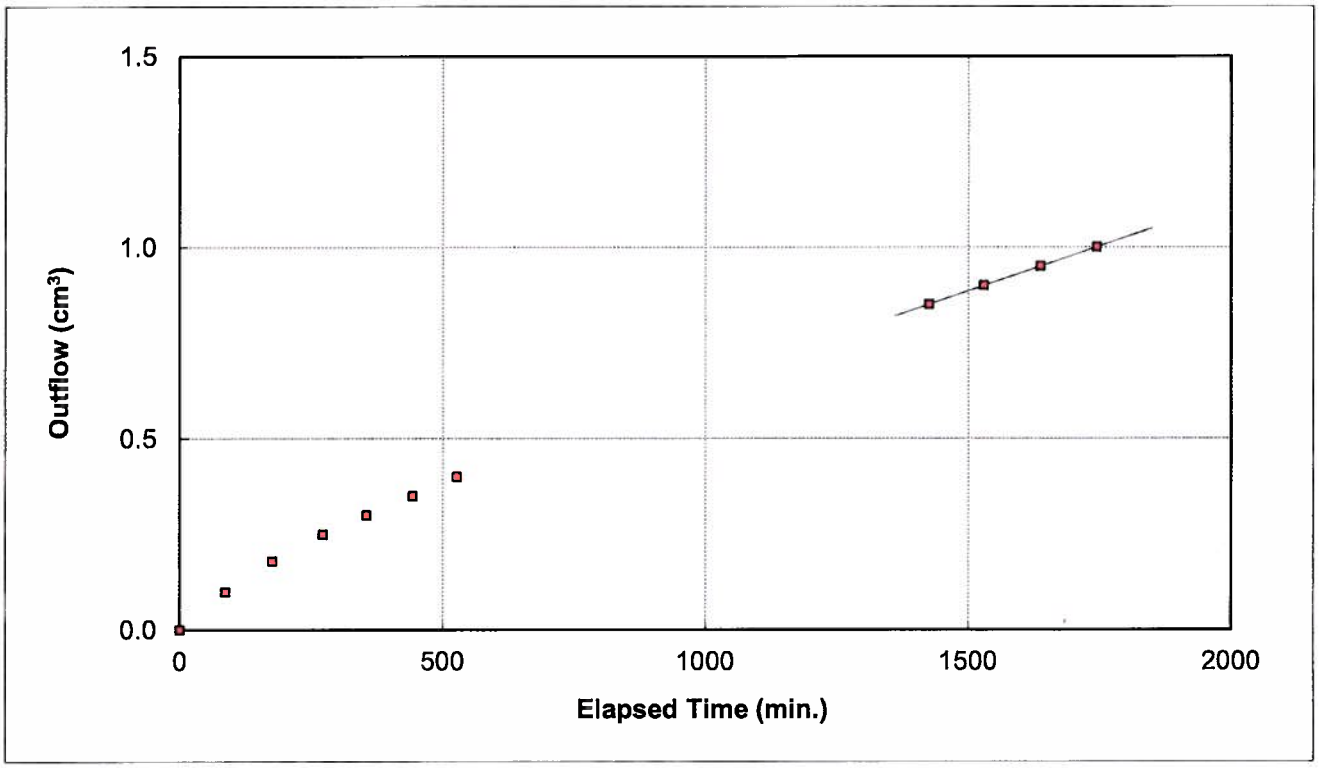
Project:	Clean Harbors Ryley	Test No.:	P-13
Project No.:	ENVSWM03011-05.003	Borehole No.:	16MW11C Bulk 2
Client:	Clean Harbors Environ Services Inc	Sample Depth:	2.1 m
Attention:		Date Tested:	June 8, 2016
		Tested By:	TD,LL

Soil Description: CLAY, silty, some sand, dark brown

	Initial	Final
Moisture Content (%)	15.6	17.7
Dry Density (kg/m3)	1813	1807
Compaction SPD (if applicable)	98.5%	98.2%

Sample Height =	5.084	cm
Sample Diameter =	7.120	cm
Head Differential =	14	kPa
Flow Q =	7.8E-06	cm^3/sec
Hydraulic Gradient i =	28.10	
Area of Sample A =	39.82	cm^2

Hydraulic Conductivity k_{20} = 6.8E-09 cm/sec



Remarks: Remolded sample tested at 98.2% SPD and 15.6% M.C.

Reviewed By: NI P.Eng.

TETRA TECH

CONSTANT HEAD HYDRAULIC CONDUCTIVITY TEST REPORT

ASTM D5084

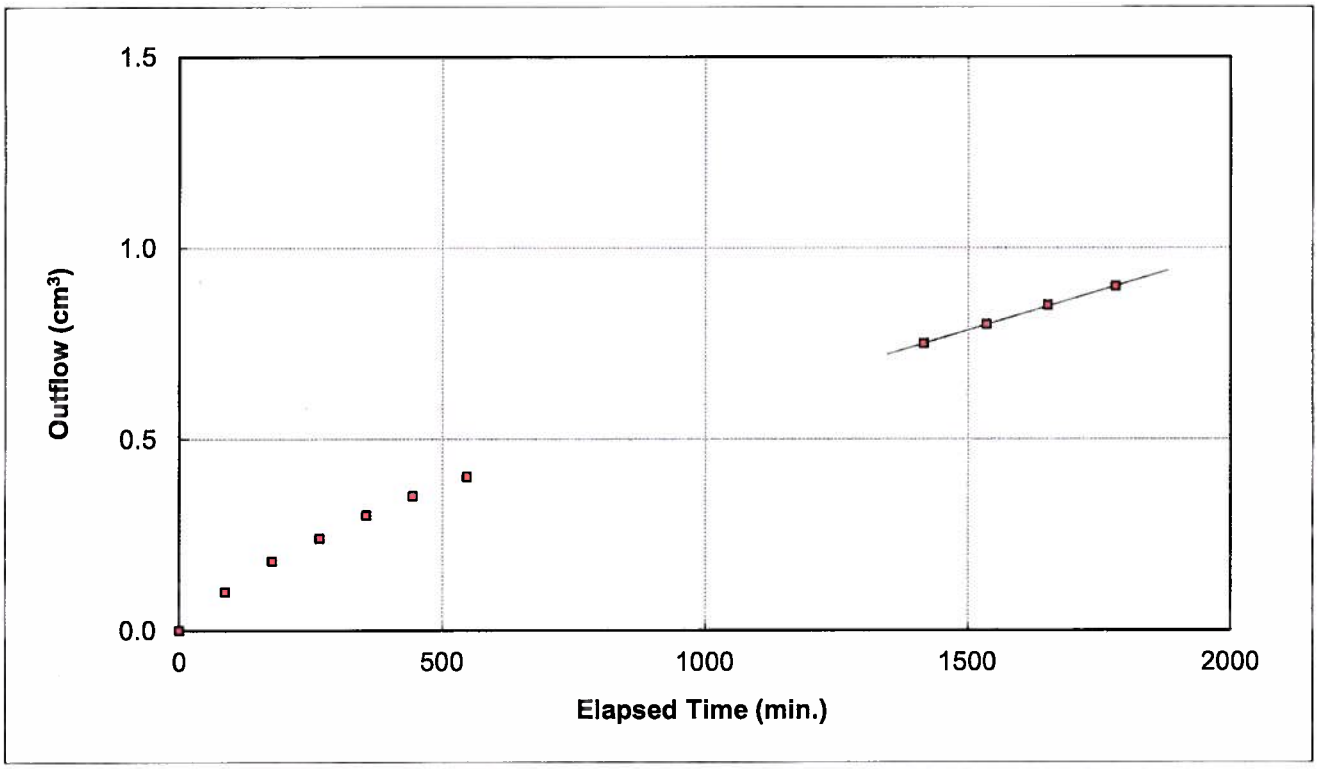
Project:	Clean Harbors Ryley	Test No.:	P-14
Project No.:	ENVSWM03011-05.003	Borehole No.:	16MW18 Bulk 1
Client:	Clean Harbors Environ Services Inc	Sample Depth:	0.9 m
Attention:		Date Tested:	June 8, 2016
		Tested By:	TD,LL

Soil Description: CLAY, silty, some sand, dark brown

	Initial	Final
Moisture Content (%)	12.7	15.6
Dry Density (kg/m3)	1876	1870
Compaction SPD (if applicable)	98.2%	97.9%

Sample Height =	5.112	cm
Sample Diameter =	7.111	cm
Head Differential =	14	kPa
Flow Q =	6.8E-06	cm^3/sec
Hydraulic Gradient i =	27.94	
Area of Sample A =	39.71	cm^2

Hydraulic Conductivity k_{20} = **5.9E-09 cm/sec**



Remarks: Remolded sample tested at 97.9% SPD and 12.7% M.C.

Reviewed By: NI P.Eng.

TETRA TECH

APPENDIX E

ENVIRONMENTAL LABORATORY TESTS

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: ENVSWM03011-05
Your Project #: ENVSWM03011-05.004
Site Location: CLEAN HARBORS RYLEY
Your C.O.C. #: M005774

Attention:LAUREN QUAN

TETRA TECH EBA INC.
115, 200 RIVERCREST DR SE
CALGARY, AB
CANADA T2C 2X5

Report Date: 2016/03/07
Report #: R2139695
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B615290
Received: 2016/02/29, 07:30

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	1	2016/03/01	2016/03/05	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1)	1	2016/03/01	2016/03/03	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture	1	N/A	2016/03/03	AB SOP-00002	CCME PHC-CWS

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) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Sherlyne Sim, B.Eng, Project Manager
Email: SSim@maxxam.ca
Phone# (780)577-7113

==========

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B615290
Report Date: 2016/03/07

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05.004
Site Location: CLEAN HARBORS RYLEY
Your P.O. #: ENVSWM03011-05
Sampler Initials: LQ

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		OE8708		
Sampling Date		2016/02/26 12:15		
COC Number		M005774		
	UNITS	**16MW11 J1**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	18	0.30	8205583
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	17	10	8206795
F3 (C16-C34 Hydrocarbons)	mg/kg	110	50	8206795
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8206795
Reached Baseline at C50	mg/kg	Yes	N/A	8206795
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	8207713
Toluene	mg/kg	<0.020	0.020	8207713
Ethylbenzene	mg/kg	<0.010	0.010	8207713
Xylenes (Total)	mg/kg	<0.040	0.040	8207713
m & p-Xylene	mg/kg	<0.040	0.040	8207713
o-Xylene	mg/kg	<0.020	0.020	8207713
F1 (C6-C10) - BTEX	mg/kg	<12	12	8207713
F1 (C6-C10)	mg/kg	<12	12	8207713
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	100	N/A	8207713
4-Bromofluorobenzene (sur.)	%	104	N/A	8207713
D10-ETHYLBENZENE (sur.)	%	104	N/A	8207713
D4-1,2-Dichloroethane (sur.)	%	98	N/A	8207713
O-TERPHENYL (sur.)	%	105	N/A	8206795

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B615290
Report Date: 2016/03/07

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05.004
Site Location: CLEAN HARBORS RYLEY
Your P.O. #: ENVSWM03011-05
Sampler Initials: LQ

GENERAL COMMENTS

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

Package 1	1.7°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B615290
Report Date: 2016/03/07

QUALITY ASSURANCE REPORT

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05.004
Site Location: CLEAN HARBORS RYLEY
Your P.O. #: ENVSWM03011-05
Sampler Initials: LQ

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8206795	O-TERPHENYL (sur.)	2016/03/03	99	50 - 130	113	50 - 130	98	%		
8207713	1,4-Difluorobenzene (sur.)	2016/03/05	97	60 - 140	99	60 - 140	101	%		
8207713	4-Bromofluorobenzene (sur.)	2016/03/05	103	60 - 140	101	60 - 140	102	%		
8207713	D10-ETHYLBENZENE (sur.)	2016/03/05	95	60 - 130	102	60 - 130	97	%		
8207713	D4-1,2-Dichloroethane (sur.)	2016/03/05	101	60 - 140	102	60 - 140	100	%		
8205583	Moisture	2016/03/03					<0.30	%	0	20
8206795	F2 (C10-C16 Hydrocarbons)	2016/03/03	100	50 - 130	115	70 - 130	<10	mg/kg	NC	50
8206795	F3 (C16-C34 Hydrocarbons)	2016/03/03	104	50 - 130	117	70 - 130	<50	mg/kg	NC	50
8206795	F4 (C34-C50 Hydrocarbons)	2016/03/03	102	50 - 130	115	70 - 130	<50	mg/kg	NC	50
8207713	Benzene	2016/03/05	82	60 - 140	89	60 - 140	<0.0050	mg/kg	NC	50
8207713	Ethylbenzene	2016/03/05	87	60 - 140	93	60 - 140	<0.010	mg/kg	NC	50
8207713	F1 (C6-C10) - BTEX	2016/03/05					<12	mg/kg	NC	50
8207713	F1 (C6-C10)	2016/03/05	102	60 - 140	101	60 - 140	<12	mg/kg	NC	50
8207713	m & p-Xylene	2016/03/05	87	60 - 140	95	60 - 140	<0.040	mg/kg	NC	50
8207713	o-Xylene	2016/03/05	88	60 - 140	94	60 - 140	<0.020	mg/kg	NC	50
8207713	Toluene	2016/03/05	83	60 - 140	92	60 - 140	<0.020	mg/kg	NC	50
8207713	Xylenes (Total)	2016/03/05					<0.040	mg/kg	NC	50

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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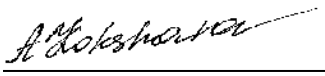
Maxxam Job #: B615290
Report Date: 2016/03/07

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05.004
Site Location: CLEAN HARBORS RYLEY
Your P.O. #: ENVSWM03011-05
Sampler Initials: LQ

VALIDATION SIGNATURE PAGE

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



Anna Koksharova, M.Sc., Senior Analyst

Bert Chi, Senior Analyst

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52/826

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Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca

CHAIN OF CUSTODY RECORD M005774

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Tetra Tech EBA	Company:	Quotation #:	☐ 5 - 7 Days Regular (Most analyses)
Contact Name: Lauren Quan	Contact Name:	P.O. #/ AFE#: ENVSWMO3011-05	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: #115 200 Rivercrest Dr SE Calgary	Address:	Project #: ENVSWMO3011-05.004	Rush TAT (Surcharges will be applied)
Phone: 403 7236852	Phone:	Site Location: Clean Harbors Ryley	☐ Same Day ☐ 2 Days ☐ 1 Day ☐ 3-4 Days
Email: LAUREN.QUAN@TETRATECH.COM	Email:	Site #:	Date Required:
Copies: CHLOE.STONER@TETRATECH.COM	Copies:	Sampled By: Lauren Quan	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present		✓				
Seal Intact		✓	Temp	2	1	2
Cooling Media	✓					
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						

Depot Reception

Analysis Requested

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC ☐	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot ☐ Diss ☐	Mercury Total ☐ Dissolved ☐	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	HOLD - DO NOT ANALYZE
1	16MW09 J1	90' 5"	2016/02/24	14:00	Soil	1		✓									X
2	16MW09 J2	92'	2016/02/24	14:05	Soil	1											X
3	16MW11 J1	26'	2016/02/26	12:15	Soil	1											X
4	16MW11 J2	37'	2016/02/26	13:00	Soil	1											X
5	16MW11 J3	130'	2016/02/26	18:15	Soil	1											X
6																	
7																	
8																	
9																	
10																	

Please indicate Filtered, Preserved or Both (F, P, F/P) →

Regulatory Criteria

☐ AT1/CCME
☐ Drinking Water
☐ Saskatchewan
☐ D50 (Drilling Waste)
☐ Other: _____

Special Instructions

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Lauren Quan / LAUREN QUAN	2016/02/27	19:58	Jenna Walter	2016.02.29	0730	B615290

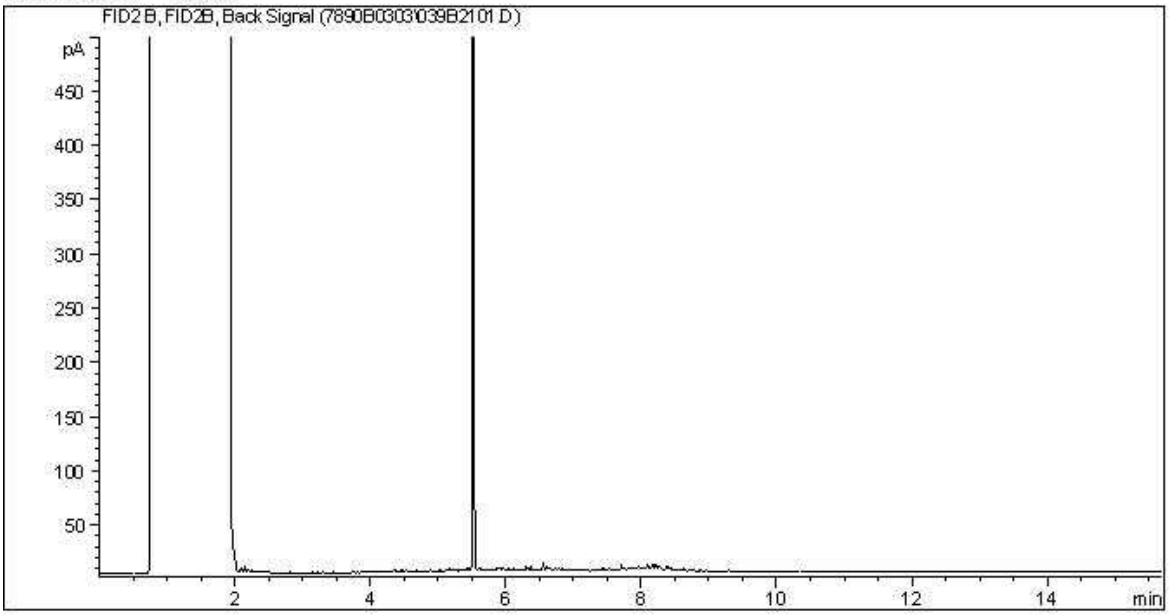
AB FCD-00331/6

Maxxam Job #: B615290
Report Date: 2016/03/07
Maxxam Sample: OE8708

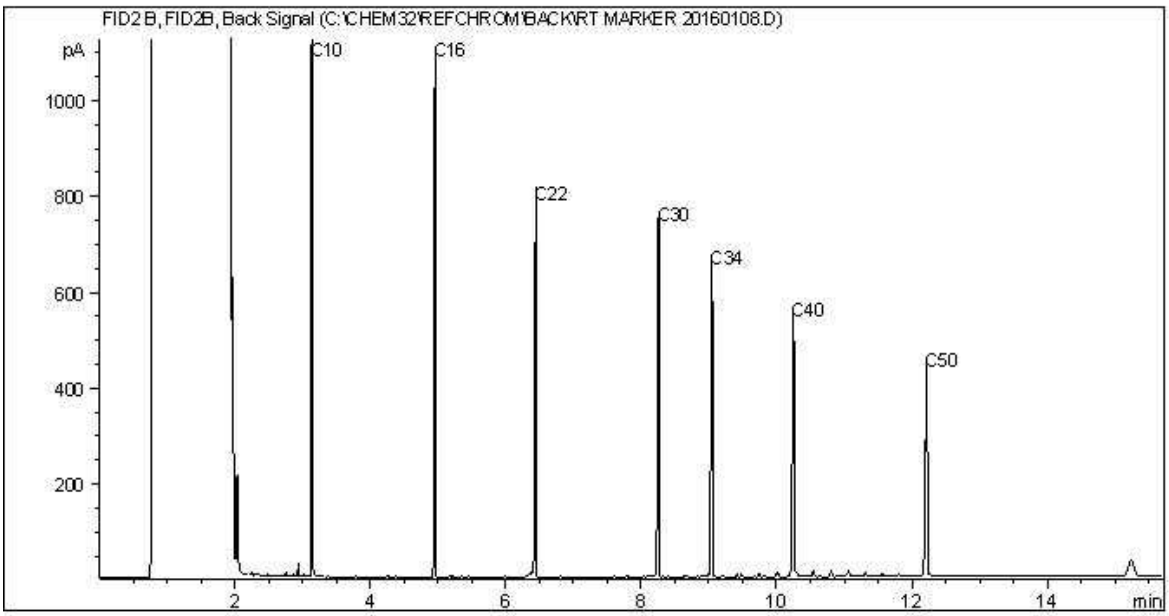
TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05.004
Site Reference: CLEAN HARBORS RYLEY
Client ID: 16MW11 J1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4	- C12	Diesel:	C8	- C22
Varsol:	C8	- C12	Lubricating Oils:	C20	- C40
Kerosene:	C7	- C16	Crude Oils:	C3	- C60+

Page 1 of 1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: ENVSWM03011-05
Site Location: NE 9-50-17 W4M
Your C.O.C. #: M005775

Attention:LAUREN QUAN

TETRA TECH EBA INC.
115, 200 RIVERCREST DR SE
CALGARY, AB
CANADA T2C 2X5

Report Date: 2016/03/10
Report #: R2141574
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B615800
Received: 2016/03/01, 11:19

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	1	2016/03/06	2016/03/07	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1)	1	2016/03/06	2016/03/09	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture	1	N/A	2016/03/10	AB SOP-00002	CCME PHC-CWS

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) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Sherlyne Sim, B.Eng, Project Manager
Email: SSim@maxxam.ca
Phone# (780)577-7113

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Maxxam Job #: B615800
Report Date: 2016/03/10

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05
Site Location: NE 9-50-17 W4M
Sampler Initials: LQ

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		OF2324		
Sampling Date		2016/02/29		
COC Number		M005775		
	UNITS	**16BH19 J1**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	23	0.30	8212271
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	33	10	8210153
F3 (C16-C34 Hydrocarbons)	mg/kg	250	50	8210153
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8210153
Reached Baseline at C50	mg/kg	Yes	N/A	8210153
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	8209248
Toluene	mg/kg	<0.020	0.020	8209248
Ethylbenzene	mg/kg	<0.010	0.010	8209248
Xylenes (Total)	mg/kg	<0.040	0.040	8209248
m & p-Xylene	mg/kg	<0.040	0.040	8209248
o-Xylene	mg/kg	<0.020	0.020	8209248
F1 (C6-C10) - BTEX	mg/kg	<12	12	8209248
F1 (C6-C10)	mg/kg	<12	12	8209248
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	99	N/A	8209248
4-Bromofluorobenzene (sur.)	%	98	N/A	8209248
D10-ETHYLBENZENE (sur.)	%	103	N/A	8209248
D4-1,2-Dichloroethane (sur.)	%	116	N/A	8209248
O-TERPHENYL (sur.)	%	109	N/A	8210153

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B615800
Report Date: 2016/03/10

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05
Site Location: NE 9-50-17 W4M
Sampler Initials: LQ

GENERAL COMMENTS

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

Package 1	-0.3°C

Sample OF2324-01 : Sample was not extracted for BTEX/F1 within 48 hours of sample receipt. Sample was extracted within 7-day hold time.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B615800
Report Date: 2016/03/10

QUALITY ASSURANCE REPORT

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05
Site Location: NE 9-50-17 W4M
Sampler Initials: LQ

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8209248	1,4-Difluorobenzene (sur.)	2016/03/07	99	60 - 140	97	60 - 140	100	%		
8209248	4-Bromofluorobenzene (sur.)	2016/03/07	102	60 - 140	100	60 - 140	99	%		
8209248	D10-ETHYLBENZENE (sur.)	2016/03/07	105	60 - 130	109	60 - 130	99	%		
8209248	D4-1,2-Dichloroethane (sur.)	2016/03/07	114	60 - 140	105	60 - 140	118	%		
8210153	O-TERPHENYL (sur.)	2016/03/09	95	50 - 130	91	50 - 130	113	%		
8209248	Benzene	2016/03/07	94	60 - 140	90	60 - 140	<0.0050	mg/kg	NC	50
8209248	Ethylbenzene	2016/03/07	90	60 - 140	89	60 - 140	<0.010	mg/kg	NC	50
8209248	F1 (C6-C10) - BTEX	2016/03/07					<12	mg/kg	NC	50
8209248	F1 (C6-C10)	2016/03/07	108	60 - 140	95	60 - 140	<12	mg/kg	NC	50
8209248	m & p-Xylene	2016/03/07	91	60 - 140	90	60 - 140	<0.040	mg/kg	NC	50
8209248	o-Xylene	2016/03/07	94	60 - 140	94	60 - 140	<0.020	mg/kg	NC	50
8209248	Toluene	2016/03/07	87	60 - 140	85	60 - 140	<0.020	mg/kg	NC	50
8209248	Xylenes (Total)	2016/03/07					<0.040	mg/kg	NC	50
8210153	F2 (C10-C16 Hydrocarbons)	2016/03/09	NC	50 - 130	103	70 - 130	<10	mg/kg	22	50
8210153	F3 (C16-C34 Hydrocarbons)	2016/03/09	NC	50 - 130	105	70 - 130	<50	mg/kg	29	50
8210153	F4 (C34-C50 Hydrocarbons)	2016/03/09	NC	50 - 130	104	70 - 130	<50	mg/kg	31	50
8212271	Moisture	2016/03/10					<0.30	%	1.9	20

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

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

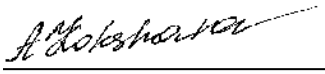
Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B615800
Report Date: 2016/03/10

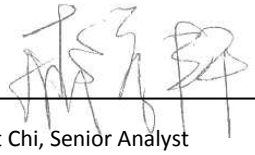
TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05
Site Location: NE 9-50-17 W4M
Sampler Initials: LQ

VALIDATION SIGNATURE PAGE

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



Anna Koksharova, M.Sc., Senior Analyst



Bert Chi, Senior Analyst

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03/020

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Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca

CHAIN OF CUSTODY RECORD M005775

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: Tetra Tech EBA	Company:	Quotation #:	☐ 5 - 7 Days Regular (Most analyses)
Contact Name: Lauren Quan	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: #115, 200 Rivercrest Dr SE Calgary AB	Address:	Project #: ENVSWM03011-05	Rush TAT (Surcharges will be applied)
Phone: 4037104832	Phone:	Site Location: NE 9-50-17 W4M	☐ Same Day ☐ 2 Days ☐ 1 Day ☐ 3-4 Days
Email: lauren.quan@tetratech.com	Email:	Site #:	Date Required:
Copies: chloe.stone@tetratech.com	Copies:	Sampled By: Lauren Quan	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present		✓				
Seal Intact		✓	Temp	-1	1	-1
Cooling Media	✓					
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						

Depot Reception

Analysis Requested

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC ☐	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot ☐ Diss ☐	Mercury Total ☐ Dissolved ☐	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	HOLD - DO NOT ANALYZE
1	16MW18 J1	24'4"	2016/02/29		Soil	1											X
2	16 BH 19 J1	22'8"	2016/07/29		Soil	1											X
3	16 BH 19 J2	27'10"	2016/07/29		Soil	1											X
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Please indicate Filtered, Preserved or Both (F, P, F/P) →

Regulatory Criteria

- ☐ AT1/CCME
- ☐ Drinking Water
- ☐ Saskatchewan
- ☐ D50 (Drilling Waste)
- ☐ Other: _____

Special Instructions

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Lauren Quan	2016/03/01	11:18	Jenna Walter	2016/03/01	1119	B615800

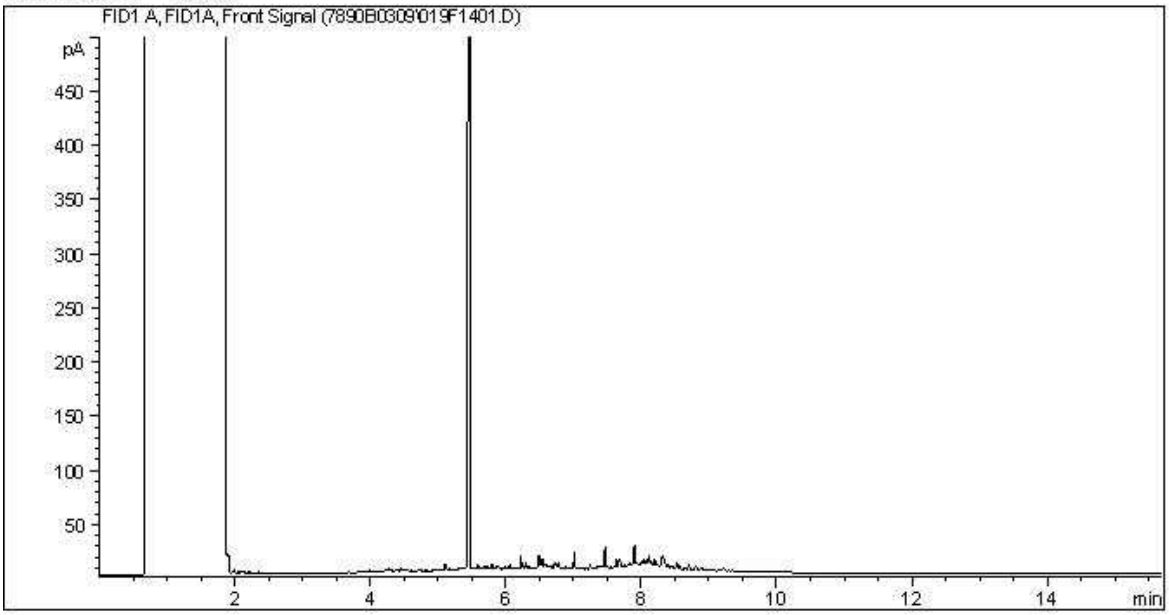
AB FCD-00331/6

Maxxam Job #: B615800
Report Date: 2016/03/10
Maxxam Sample: OF2324

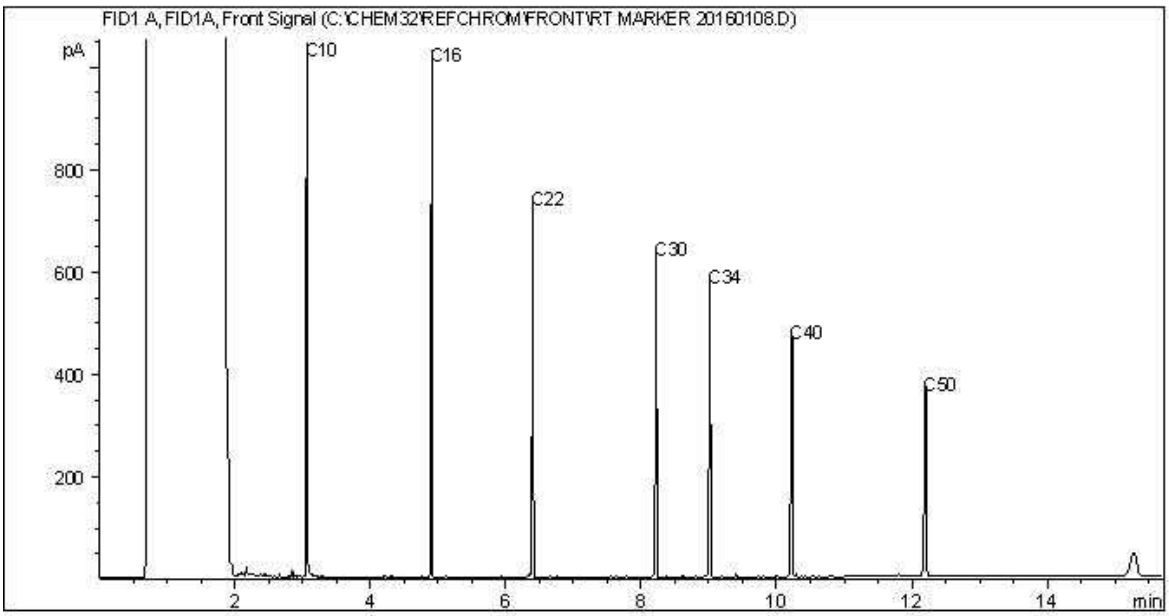
TETRA TECH EBA INC.
Client Project #: ENVSWM03011-05
Site Reference: NE 9-50-17 W4M
Client ID: 16BH19 J1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Success Through Science®

Your Project #: ENVSWMO3011-05.003
Site Location: NE 50 17 W4M
Your C.O.C. #: M002745

Attention:CHLOE STONE

TETRA TECH EBA INC.
115, 200 RIVERCREST DR SE
CALGARY, AB
CANADA T2C 2X5

Report Date: 2016/03/28
Report #: R2148407
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B620851
Received: 2016/03/18, 08:40

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	2	2016/03/22	2016/03/22	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1)	2	2016/03/22	2016/03/23	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture	2	N/A	2016/03/23	AB SOP-00002	CCME PHC-CWS

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) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Sherlyne Sim, B.Eng, Project Manager
Email: SSim@maxxam.ca
Phone# (780)577-7113

==========

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B620851
Report Date: 2016/03/28

TETRA TECH EBA INC.
Client Project #: ENVSWMO3011-05.003
Site Location: NE 50 17 W4M
Sampler Initials: JD, LQ

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		OH8198	OH8200		
Sampling Date		2016/03/17 10:00	2016/03/16 11:00		
COC Number		M002745	M002745		
	UNITS	16BH06 J1	16BH03 J1	RDL	QC Batch
Physical Properties					
Moisture	%	15	17	0.30	8222937
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	10	8223165
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	52	50	8223165
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	50	8223165
Reached Baseline at C50	mg/kg	Yes	Yes	N/A	8223165
Volatiles					
Benzene	mg/kg	<0.0050	<0.0050	0.0050	8223214
Toluene	mg/kg	<0.020	<0.020	0.020	8223214
Ethylbenzene	mg/kg	<0.010	<0.010	0.010	8223214
Xylenes (Total)	mg/kg	<0.040	<0.040	0.040	8223214
m & p-Xylene	mg/kg	<0.040	<0.040	0.040	8223214
o-Xylene	mg/kg	<0.020	<0.020	0.020	8223214
F1 (C6-C10) - BTEX	mg/kg	<12	<12	12	8223214
F1 (C6-C10)	mg/kg	<12	<12	12	8223214
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	97	93	N/A	8223214
4-Bromofluorobenzene (sur.)	%	111	109	N/A	8223214
D10-ETHYLBENZENE (sur.)	%	103	94	N/A	8223214
D4-1,2-Dichloroethane (sur.)	%	96	98	N/A	8223214
O-TERPHENYL (sur.)	%	113	103	N/A	8223165

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B620851
Report Date: 2016/03/28

TETRA TECH EBA INC.
Client Project #: ENVSWMO3011-05.003
Site Location: NE 50 17 W4M
Sampler Initials: JD, LQ

GENERAL COMMENTS

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

Package 1	4.3°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B620851
Report Date: 2016/03/28

QUALITY ASSURANCE REPORT

TETRA TECH EBA INC.
Client Project #: ENVSWMO3011-05.003
Site Location: NE 50 17 W4M
Sampler Initials: JD, LQ

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8223165	O-TERPHENYL (sur.)	2016/03/23	102	50 - 130	97	50 - 130	107	%		
8223214	1,4-Difluorobenzene (sur.)	2016/03/22	92	60 - 140	96	60 - 140	98	%		
8223214	4-Bromofluorobenzene (sur.)	2016/03/22	108	60 - 140	108	60 - 140	110	%		
8223214	D10-ETHYLBENZENE (sur.)	2016/03/22	94	60 - 130	95	60 - 130	98	%		
8223214	D4-1,2-Dichloroethane (sur.)	2016/03/22	97	60 - 140	97	60 - 140	93	%		
8222937	Moisture	2016/03/23					<0.30	%	6.7	20
8223165	F2 (C10-C16 Hydrocarbons)	2016/03/23	104	50 - 130	99	70 - 130	<10	mg/kg	NC	50
8223165	F3 (C16-C34 Hydrocarbons)	2016/03/23	102	50 - 130	98	70 - 130	<50	mg/kg	NC	50
8223165	F4 (C34-C50 Hydrocarbons)	2016/03/23	100	50 - 130	95	70 - 130	<50	mg/kg	NC	50
8223214	Benzene	2016/03/22	80	60 - 140	80	60 - 140	<0.0050	mg/kg	NC	50
8223214	Ethylbenzene	2016/03/22	85	60 - 140	85	60 - 140	<0.010	mg/kg	NC	50
8223214	F1 (C6-C10) - BTEX	2016/03/22					<12	mg/kg	NC	50
8223214	F1 (C6-C10)	2016/03/22	106	60 - 140	105	60 - 140	<12	mg/kg	NC	50
8223214	m & p-Xylene	2016/03/22	85	60 - 140	84	60 - 140	<0.040	mg/kg	NC	50
8223214	o-Xylene	2016/03/22	86	60 - 140	84	60 - 140	<0.020	mg/kg	NC	50
8223214	Toluene	2016/03/22	83	60 - 140	82	60 - 140	<0.020	mg/kg	NC	50
8223214	Xylenes (Total)	2016/03/22					<0.040	mg/kg	NC	50

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

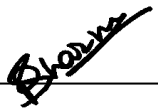
Maxxam Job #: B620851
Report Date: 2016/03/28

TETRA TECH EBA INC.
Client Project #: ENVSWMO3011-05.003
Site Location: NE 50 17 W4M
Sampler Initials: JD, LQ

VALIDATION SIGNATURE PAGE

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

Bert Chi, Senior Analyst



Poonam Sharma, Chem. Tech., Senior Analyst, Organics Department

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Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

03/606

Maxxam
A Bureau Veritas Group Company

Calgary: 4000 19th St. NE, T2E 6P8. Toll Free (800) 386-7247
Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca

CHAIN OF CUSTODY RECORD

M 002745

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: TETRA TECH	Company:	Quotation #:	☒ 5 - 7 Days Regular (Most analyses)
Contact Name: Chloe Stone	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: #115, 200 Rivercrest Dr SE	Address:	Project #: ENVSWMO 3011-05.003	Rush TAT (Surcharges will be applied)
Phone: 403 723 6890	Phone:	Site Location: NE 50 17 W4M	☐ Same Day ☐ 2 Days ☐ 1 Day ☐ 3-4 Days
Email: chloe.stone@tetratech.com	Email:	Site #:	Date Required:
Copies: eba.labdata@tetratech.com	Copies:	Sampled By: Lauren Quan / Jerome Duran	Rush Confirmation #:

Laboratory Use Only

	YES	NO	Cooler ID			
Seal Present		✓				
Seal Intact		✓	Temp	4	6	3
Cooling Media		✓				
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						
	YES	NO	Cooler ID			
Seal Present						
Seal Intact			Temp			
Cooling Media						

Depot Reception

Regulatory Criteria

☐ AT1/CCME
☐ Drinking Water
☐ Saskatchewan
☐ D50 (Drilling Waste)
☐ Other:

Special Instructions

Analysis Requested

	Sample Identification	Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1 ☐ VOC ☐	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals Tot ☐ Diss ☐	Mercury Total ☐ Dissolved ☐	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	HOLD - DO NOT ANALYZE
1	16 BH 06 J1	20'6"	2016/03/17	10:00	Soil	1											X
2	16 BH 06 J2	31'	2016/03/17	6:05	Soil	1											X
3	16 BH 03 J1	31'	2016/03/16	11:00	Soil	1											X
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Please indicate Filtered, Preserved or Both (F, P, F/P) →

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Lauren Quan	2016/03/18	8:39	Jenna Walter	2016/03/18	0840	B620851 / DWR / AWD

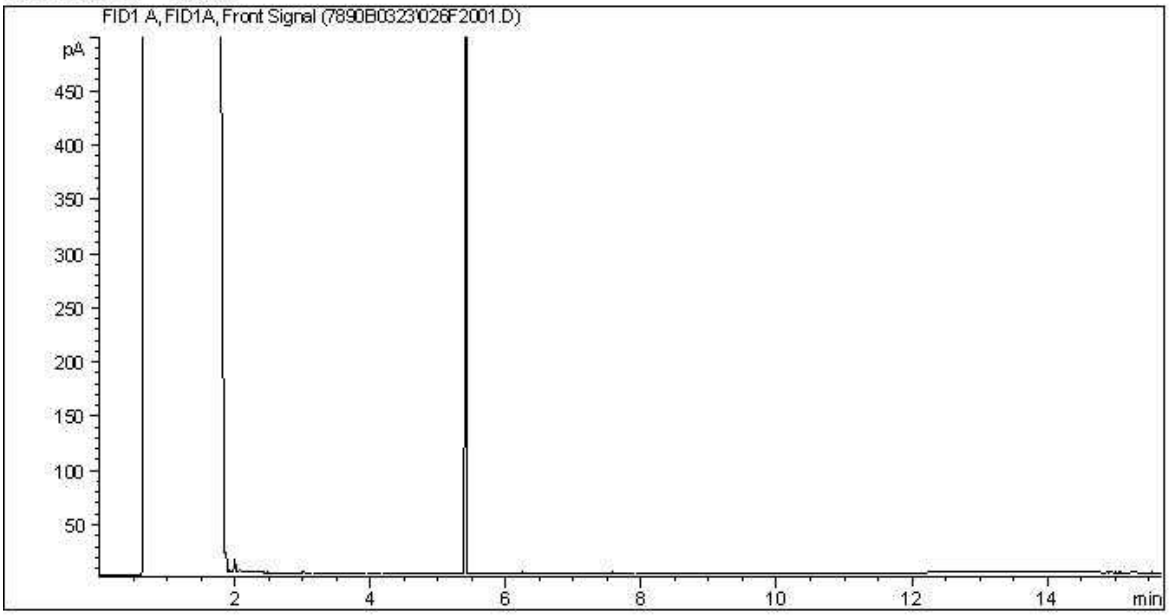
AB FCD-00331/6

Maxxam Job #: B620851
Report Date: 2016/03/28
Maxxam Sample: OH8198

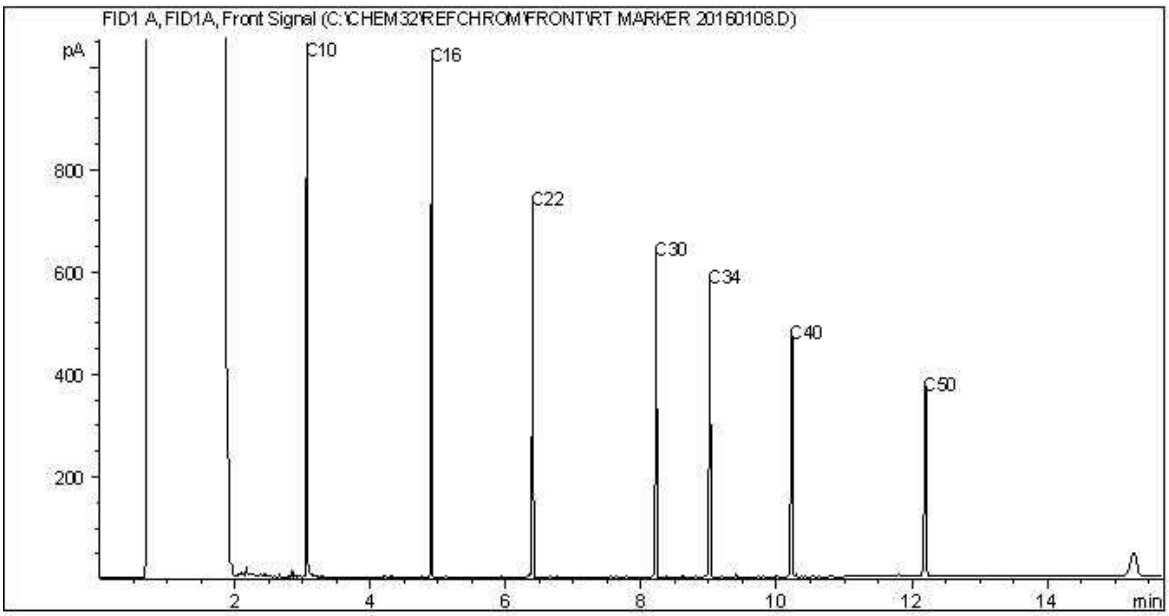
TETRA TECH EBA INC.
Client Project #: ENVSWMO3011-05.003
Site Reference: NE 50 17 W4M
Client ID: 16BH06 J1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

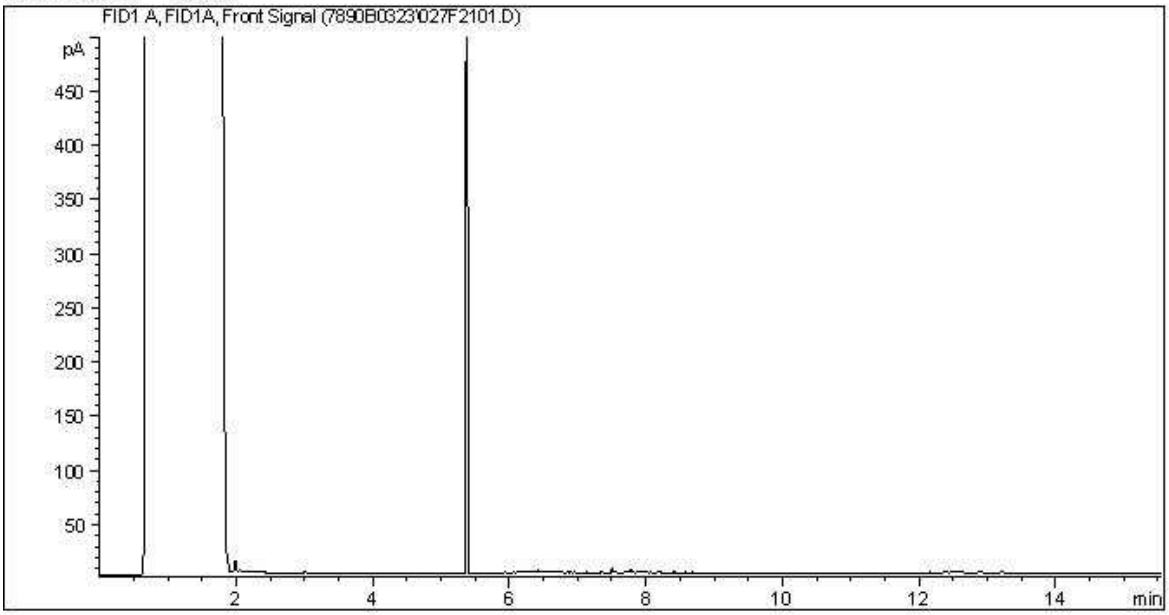
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B620851
Report Date: 2016/03/28
Maxxam Sample: OH8200

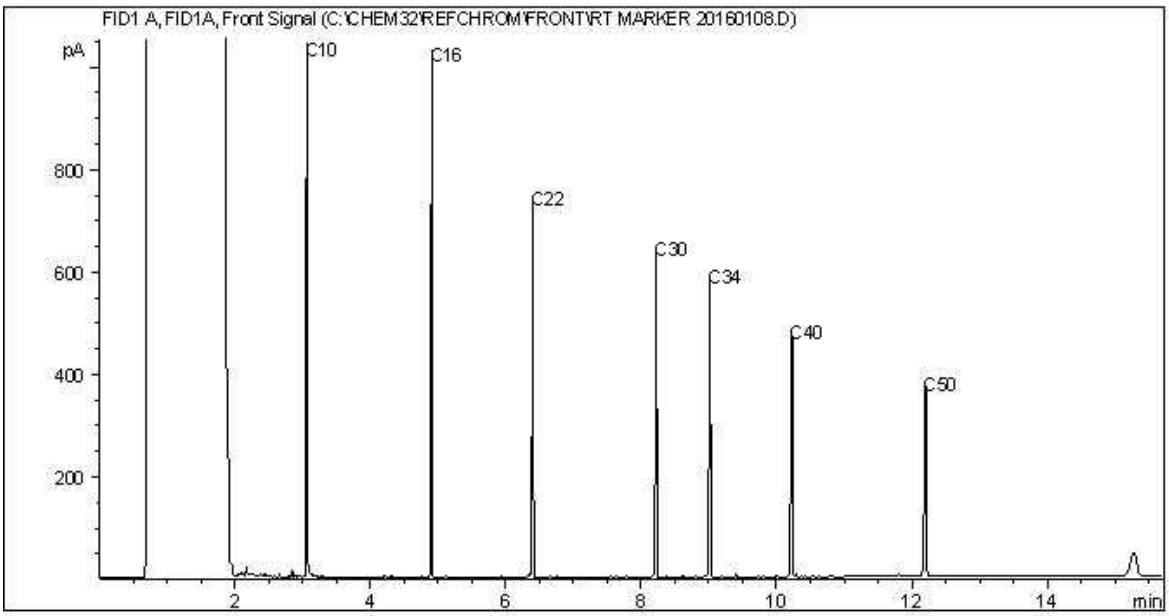
TETRA TECH EBA INC.
Client Project #: ENVSWMO3011-05.003
Site Reference: NE 50 17 W4M
Client ID: 16BH03 J1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

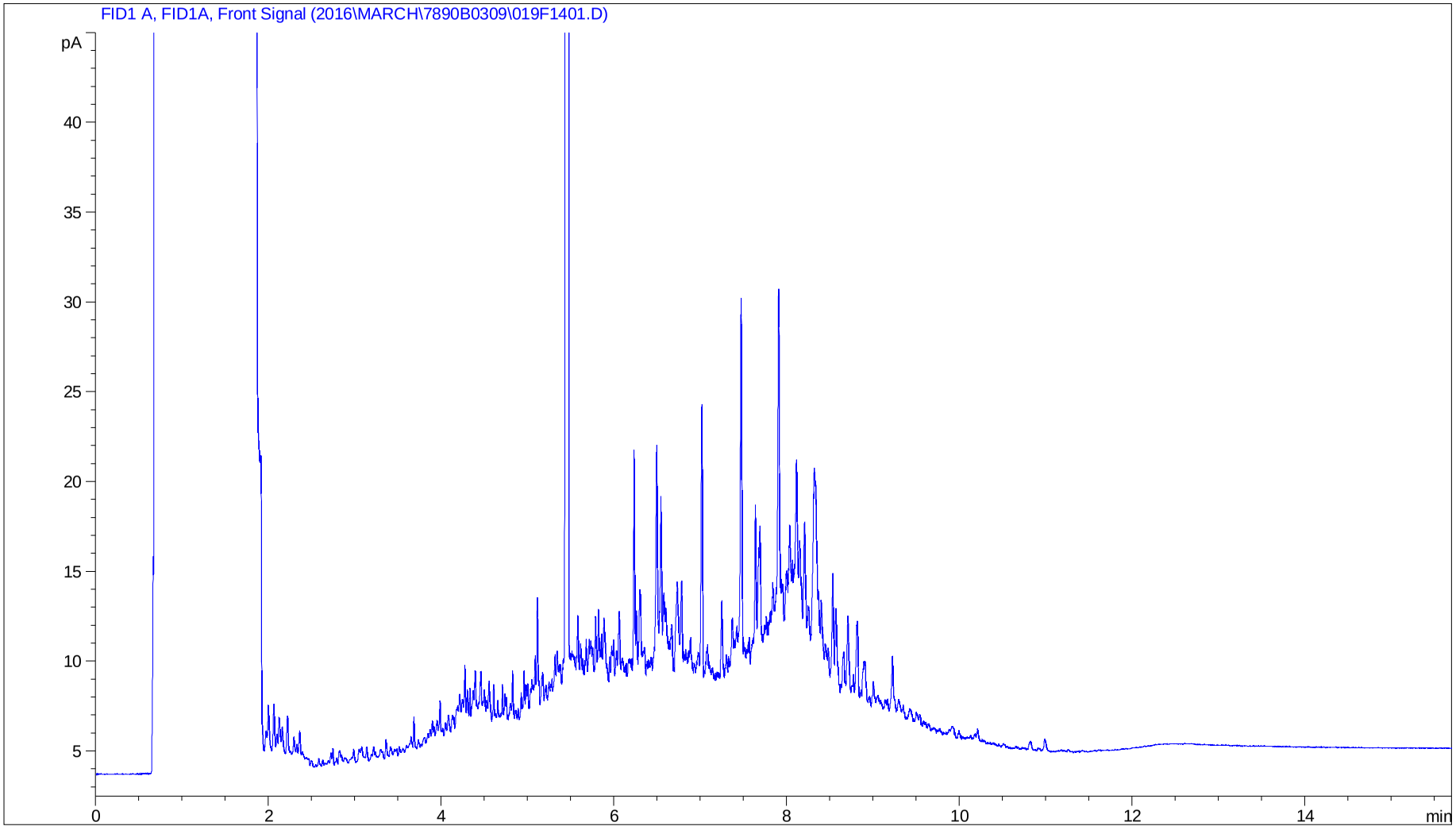
Page 1 of 1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Print of window 38: Current Chromatogram(s)
Data File : C:\CHEM32\1\DATA\2016\MARCH\7890B0309\019F1401.D
Sample Name : OF2324-01

Acq. Operator : 7890B Seq. Line : 14
Acq. Instrument : 7890B Location : Vial 19
Injection Date : 2016/03/09 11:44:56 AM Inj : 1
Inj Volume : 2 µl
Acq. Method : C:\CHEM32\1\METHODS\7890B_RUN.M
Last changed : 2016/03/09 11:37:51 AM by 7890B
(modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\GC0311B.M
Last changed : 2016/03/16 10:04:17 AM by 7890B
(modified after loading)

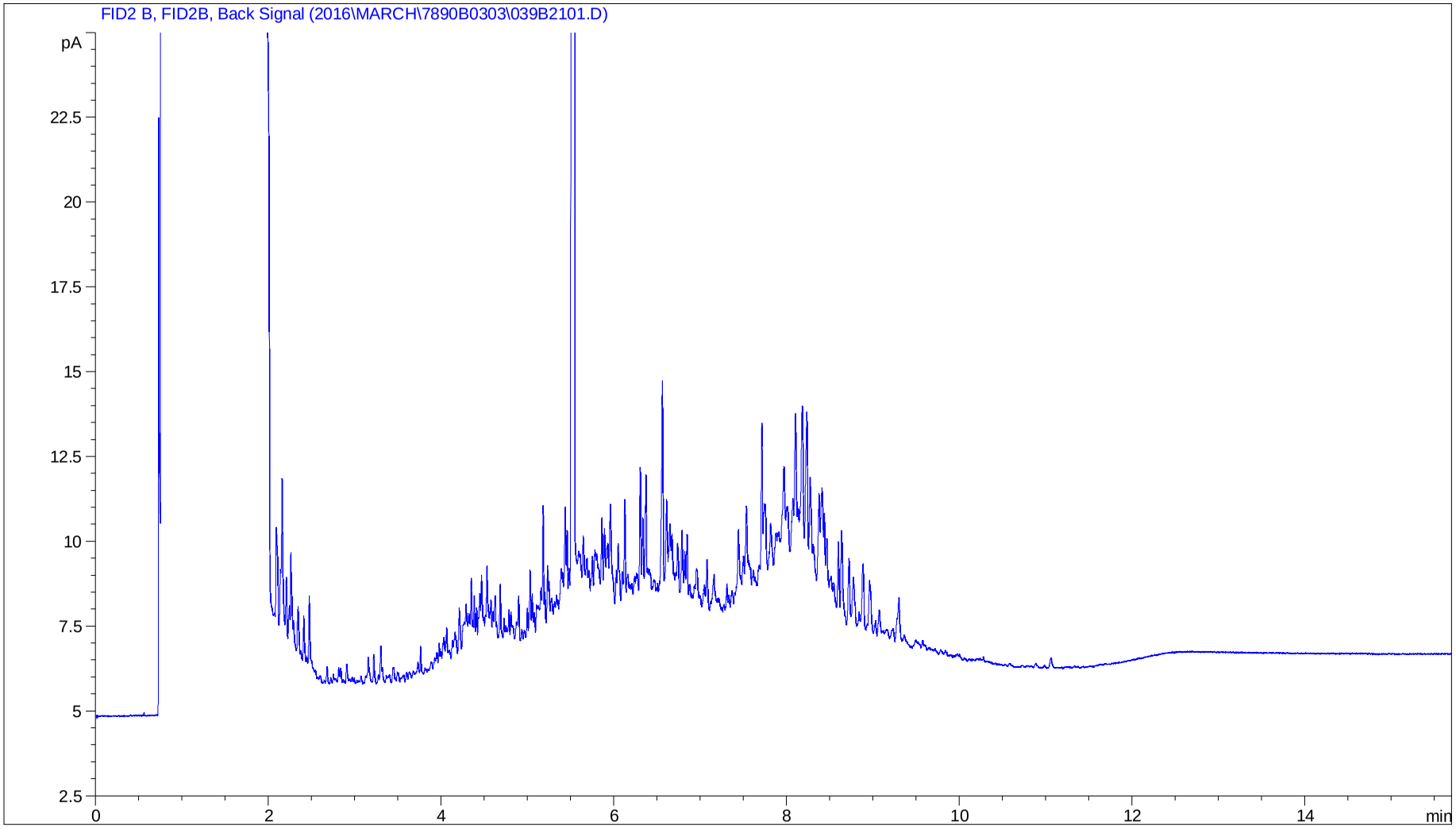
Current Chromatogram(s)



Print of window 38: Current Chromatogram(s)
Data File : C:\CHEM32\1\DATA\2016\MARCH\7890B0303\039B2101.D
Sample Name : OE8708-01

Acq. Operator : 7890B Seq. Line : 21
Acq. Instrument : 7890B Location : Vial 39
Injection Date : 2016/03/03 7:34:44 PM Inj : 1
Inj Volume : 2 µl
Acq. Method : C:\CHEM32\1\METHODS\7890B_RUN.M
Last changed : 2016/03/03 7:28:18 PM by 7890B
(modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\GC0311B.M
Last changed : 2016/03/16 10:02:43 AM by 7890B
(modified after loading)

Current Chromatogram(s)



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Your P.O. #: ENVSWM03011-04.003
Your Project #: ENVSWM03011-04.003
Site Location: RYLEY CLASS I LANDFILL
Your C.O.C. #: A169783

Attention:BRENT SCHMIDT

TETRA TECH EBA INC.
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2015/08/14
Report #: R2023827
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B562537
Received: 2015/07/22, 14:14

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	1	2015/07/23	2015/07/29	AB SOP-00039	CCME CWS/EPA 8260C m
CCME Hydrocarbons (F2-F4 in soil) (1)	1	2015/07/23	2015/07/26	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
CCME Hydrocarbons (F4G in soil) (1)	1	2015/07/23	2015/07/28	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture	1	N/A	2015/07/27	AB SOP-00002	CCME PHC-CWS
Phenols (4-AAP)	1	2015/07/28	2015/07/28	EENVSOP-00061	MMCW 154 1996 m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

(1) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Sherlyne Sim, B.Eng, Project Manager
Email: SSim@maxxam.ca
Phone# (780)577-7113

==========

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

Maxxam Job #: B562537
Report Date: 2015/08/14

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-04.003
Site Location: RYLEY CLASS I LANDFILL
Your P.O. #: ENVSWM03011-04.003
Sampler Initials: BS

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		MS4152		
Sampling Date		2015/07/21 16:30		
COC Number		A169783		
	Units	15MW36-DEEP	RDL	QC Batch
Physical Properties				
Moisture	%	14	0.30	7980577
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	2400	10	7978817
F3 (C16-C34 Hydrocarbons)	mg/kg	6700	50	7978817
F4 (C34-C50 Hydrocarbons)	mg/kg	2400	50	7978817
Reached Baseline at C50	mg/kg	Yes	N/A	7978817
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	8800	500	7982824
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	7978242
Toluene	mg/kg	<0.020	0.020	7978242
Ethylbenzene	mg/kg	<0.010	0.010	7978242
Xylenes (Total)	mg/kg	<0.040	0.040	7978242
m & p-Xylene	mg/kg	<0.040	0.040	7978242
o-Xylene	mg/kg	<0.020	0.020	7978242
F1 (C6-C10) - BTEX	mg/kg	390	12	7978242
F1 (C6-C10)	mg/kg	390	12	7978242
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	92	N/A	7978242
4-Bromofluorobenzene (sur.)	%	104	N/A	7978242
D10-ETHYLBENZENE (sur.)	%	139 (1)	N/A	7978242
D4-1,2-Dichloroethane (sur.)	%	96	N/A	7978242
O-TERPHENYL (sur.)	%	115	N/A	7978817

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Surrogate recovery above acceptance criteria due to matrix interference. Reanalysis yields similar results.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B562537
Report Date: 2015/08/14

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-04.003
Site Location: RYLEY CLASS I LANDFILL
Your P.O. #: ENVSWM03011-04.003
Sampler Initials: BS

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		MS4152		
Sampling Date		2015/07/21 16:30		
COC Number		A169783		
	Units	**15MW36-DEEP**	**RDL**	**QC Batch**
Misc. Organics				
Extractable (Water) Phenols	mg/kg	0.44	0.020	7982969
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B562537
Report Date: 2015/08/14

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-04.003
Site Location: RYLEY CLASS I LANDFILL
Your P.O. #: ENVSWM03011-04.003
Sampler Initials: BS

GENERAL COMMENTS

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

Package 1	2.7°C

Chromatogram for sample MS4152 (15MW36-DEEP) has been reviewed by senior staff. This review was based on a simple visual comparison of the sample chromatogram.

Sample MS4152 (15MW36-DEEP) features chromatographic fingerprint through the CCME Fraction 2 (C10-C16), Fraction 3 (C16-C34) and Fraction 4 (C34-C50) regions where petroleum products are expected to elute. While the chromatogram for this sample is generally consistent with a medium to heavy crude oil or oil sands product, there is potential that an unresolved mix of overlapping (co-eluting) products or a complex mix of both refined and non-refined product may be present.

Maxxam Analytics Disclaimer

HYDROCARBON RESEMBLANCE
The reported hydrocarbon resemblance was obtained by visual comparison of the sample chromatogram with a library of reference product chromatograms. Since variables such as the degree and type of weathering and the presence of non petrogenic hydrocarbons cannot be duplicated in reference spectra, the resemblance information must be regarded as approximate and qualitative and as such, Maxxam can assume no liability for any conclusions drawn from these data.

CHROMATOGRAM PROVISION
The chromatograms are provided for information purposes only. Any conclusion drawn by the data user from these chromatograms is their sole responsibility. Maxxam can assume no liability for any such 3rd party interpretations and is responsible only for the quality of the quantitative data provided.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B562537
Report Date: 2015/08/14

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-04.003
Site Location: RYLEY CLASS I LANDFILL
Your P.O. #: ENVSWM03011-04.003
Sampler Initials: BS

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7978242	NM5	Matrix Spike	1,4-Difluorobenzene (sur.)	2015/07/24		98	%	60 - 140
			4-Bromofluorobenzene (sur.)	2015/07/24		102	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/07/24		125	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/07/24		103	%	60 - 140
			Benzene	2015/07/24		92	%	60 - 140
			Toluene	2015/07/24		90	%	60 - 140
			Ethylbenzene	2015/07/24		89	%	60 - 140
			m & p-Xylene	2015/07/24		89	%	60 - 140
			o-Xylene	2015/07/24		89	%	60 - 140
			F1 (C6-C10)	2015/07/24		127	%	60 - 140
7978242	NM5	Spiked Blank	1,4-Difluorobenzene (sur.)	2015/07/24		99	%	60 - 140
			4-Bromofluorobenzene (sur.)	2015/07/24		101	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/07/24		124	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/07/24		104	%	60 - 140
			Benzene	2015/07/24		94	%	60 - 140
			Toluene	2015/07/24		92	%	60 - 140
			Ethylbenzene	2015/07/24		91	%	60 - 140
			m & p-Xylene	2015/07/24		91	%	60 - 140
			o-Xylene	2015/07/24		92	%	60 - 140
			F1 (C6-C10)	2015/07/24		133	%	60 - 140
7978242	NM5	Method Blank	1,4-Difluorobenzene (sur.)	2015/07/24		102	%	60 - 140
			4-Bromofluorobenzene (sur.)	2015/07/24		102	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2015/07/24		116	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2015/07/24		102	%	60 - 140
			Benzene	2015/07/24	<0.0050		mg/kg	
			Toluene	2015/07/24	<0.020		mg/kg	
			Ethylbenzene	2015/07/24	<0.010		mg/kg	
			Xylenes (Total)	2015/07/24	<0.040		mg/kg	
			m & p-Xylene	2015/07/24	<0.040		mg/kg	
			o-Xylene	2015/07/24	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2015/07/24	<12		mg/kg	
			F1 (C6-C10)	2015/07/24	<12		mg/kg	
7978242	NM5	RPD	Benzene	2015/07/24	NC		%	50
			Toluene	2015/07/24	NC		%	50
			Ethylbenzene	2015/07/24	NC		%	50
			Xylenes (Total)	2015/07/24	NC		%	50
			m & p-Xylene	2015/07/24	NC		%	50
			o-Xylene	2015/07/24	NC		%	50
			F1 (C6-C10) - BTEX	2015/07/24	NC		%	50
			F1 (C6-C10)	2015/07/24	NC		%	50
7978817	AK8	Matrix Spike	O-TERPHENYL (sur.)	2015/07/27		104	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/07/27		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2015/07/27		113	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2015/07/27		108	%	50 - 130
7978817	AK8	Spiked Blank	O-TERPHENYL (sur.)	2015/07/27		95	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/07/27		108	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2015/07/27		104	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2015/07/27		98	%	70 - 130
7978817	AK8	Method Blank	O-TERPHENYL (sur.)	2015/07/27		111	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/07/27	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2015/07/27	<50		mg/kg	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B562537
Report Date: 2015/08/14

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-04.003
Site Location: RYLEY CLASS I LANDFILL
Your P.O. #: ENVSWM03011-04.003
Sampler Initials: BS

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			F4 (C34-C50 Hydrocarbons)	2015/07/27	<50		mg/kg	
7978817	AK8	RPD	F2 (C10-C16 Hydrocarbons)	2015/07/27	2.4		%	50
			F3 (C16-C34 Hydrocarbons)	2015/07/27	NC		%	50
			F4 (C34-C50 Hydrocarbons)	2015/07/27	NC		%	50
7980577	HP5	Method Blank	Moisture	2015/07/27	<0.30		%	
7980577	HP5	RPD	Moisture	2015/07/27	1.8		%	20
7982824	OO1	Spiked Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2015/07/28		109	%	70 - 130
7982824	OO1	Method Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2015/07/28	<500		mg/kg	
7982969	YY	Matrix Spike [MS4152-02]	Extractable (Water) Phenols	2015/07/28		89	%	75 - 125
7982969	YY	Spiked Blank	Extractable (Water) Phenols	2015/07/28		94	%	80 - 120
7982969	YY	Method Blank	Extractable (Water) Phenols	2015/07/28	0.035, RDL=0.020		mg/kg	
7982969	YY	RPD [MS4152-02]	Extractable (Water) Phenols	2015/07/28	22		%	35

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

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B562537
Report Date: 2015/08/14

TETRA TECH EBA INC.
Client Project #: ENVSWM03011-04.003
Site Location: RYLEY CLASS I LANDFILL
Your P.O. #: ENVSWM03011-04.003
Sampler Initials: BS

VALIDATION SIGNATURE PAGE

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

Anna Koksharova, M.Sc., Senior Analyst

Kale Edwards, Senior Analyst

Kelly Gip, B.Sc., Senior Analyst

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody

A169783

Page: 1 of 1

Company:	Invoice To: Tetra Tech EBA	C/O Report Address ☐	Report To:	Same as Invoice ☑
Contact:	Brent Schmidt			
Address:	14940 123 Ave, Edmonton			
	Prov: AB	PC:	Prov:	PC:
Contact #s:	Ph: 780.451.2121	Cell:	Ph:	Cell:

Report Distribution (E-Mail):
Brent.Schmidt@tetratech.com
lab.data@tetratech.com

REGULATORY GUIDELINES:
☒ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	ENVSWM03011-04.003
Project # / Name:	ENVSWM03011-04.003
Site Location:	Ryley Class I Landfill
Quote #:	
Sampled By:	BS

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve) Date Required: ____ ☒ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Phenols	WATER: ☐BTEX F1 ☐VOCs	☐BTEX F1-F2 ☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Dissolved	Mercury	☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	15MW36-Deep	35.3-35.5	Soil	15/07/21 16:30	X						X											2
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Brent Schmidt	15/07/22	14:10
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Special Instructions:		# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:
Jenna Walter	20150722	14:14	B562537

Custody Seal	Temperature	Ice
absent	2,3,3	present

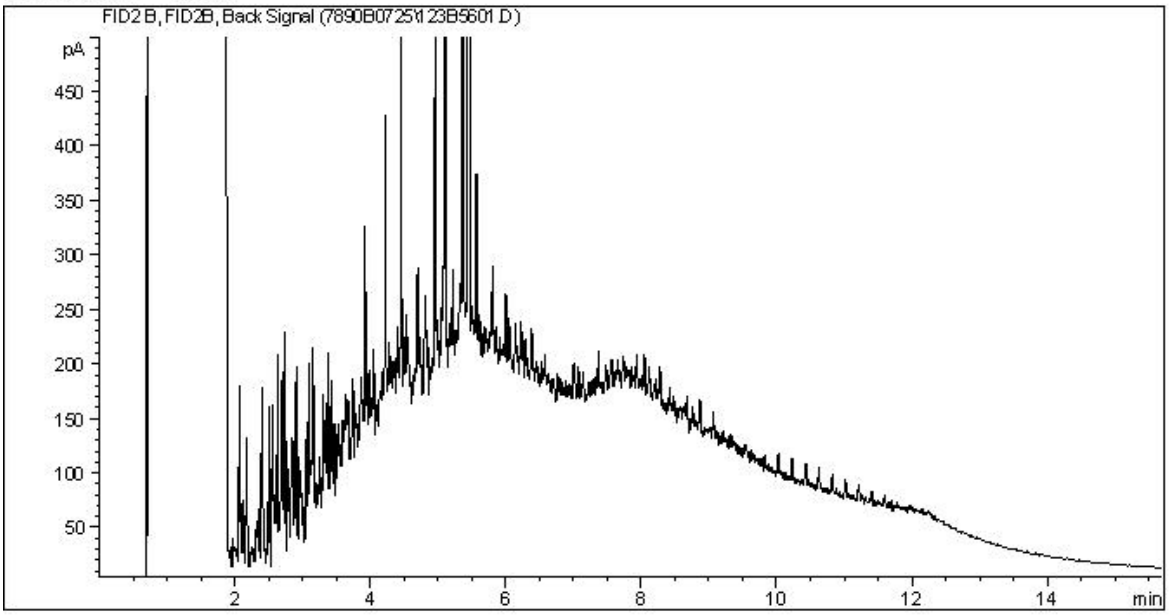
Lab Comments:

Maxxam Job #: B562537
Report Date: 2015/08/14
Maxxam Sample: MS4152

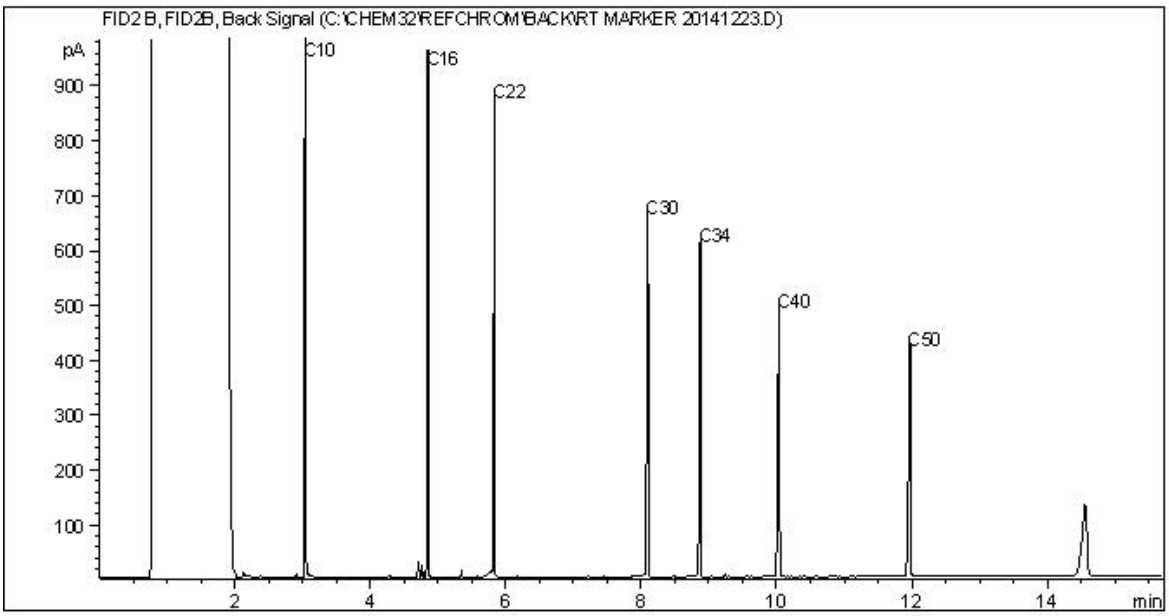
TETRA TECH EBA INC.
Client Project #: ENVSWM03011-04.003
Site Reference: RYLEY CLASS I LANDFILL
Client ID: 15MW36-DEEP

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

APPENDIX F

TETRA TECH'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.1 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of TETRA TECH’s client. TETRA TECH does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than TETRA TECH’s Client unless otherwise authorized in writing by TETRA TECH. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the report, if required, may be obtained upon request.

1.2 ALTERNATE REPORT FORMAT

Where TETRA TECH submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed TETRA TECH’s instruments of professional service); only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by TETRA TECH shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of TETRA TECH’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except TETRA TECH. The Client warrants that TETRA TECH’s instruments of professional service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

1.3 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

1.4 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of the report, TETRA TECH may rely on information provided by persons other than the Client. While TETRA TECH endeavours to verify the accuracy of such information when instructed to do so by the Client, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX D

LETTER FROM ALBERTA ENVIRONMENT AND SUSTAINABLE RESOURCE DEVELOPMENT

Environment and Sustainable Resource Development

Operations
Provincial Programs
111 Twin Atria Building
4999 - 98 Avenue
Edmonton, Alberta T6B 2X3
Canada
Telephone: 780-427-5828
Fax: 780-427-9102
www.environment.alberta.ca

April 10, 2014

Bryan Hensel
Tetra Tech EBA Inc.
14940 – 123 Avenue
Edmonton, AB T5V 1B4
Via Email: Bryan.Hensel@tetratech.com

Dear Mr. Hensel:

Further to your letter of March 18, 2014, I wish to advise you that pursuant to Section 44 of the *Environmental Protection and Enhancement Act* (EPEA), I have considered the application of the environmental assessment process to the proposed Clean Harbors Canada Inc. Ryley Facility Expansion Project. This activity is not a mandatory activity for the purposes of environmental assessment. Having regard to the consideration set out in Section 44(3) of EPEA, I have decided that further assessment of the activity is not required. Therefore, a screening report will not be prepared and an environmental impact assessment report is not required.

Please note that this decision is based on the current information about the project and that I reserve the ability to review this decision should different and/or new information come to light. Clean Harbors should also note that Section 47 of EPEA gives the Minister of Environment and Sustainable Resources Development the authority to order the preparation of an environmental impact assessment report under appropriate circumstances, notwithstanding a director's decision to not require an environmental impact assessment report.

Although an environmental impact assessment report is not required for this project, Alberta Environment and Sustainable Resource Development may have other regulatory requirements under EPEA and/or the *Water Act*. For more information about regulatory requirements under EPEA and/or the *Water Act*, please contact Derek Alexander at (780) 427-9064.

Clean Harbors should also contact Shauna Sigurdson (780-495-2236) with the Canadian Environmental Assessment Agency to discuss the potential submission of a federal project description and any federal environmental assessment requirements under the *Canadian Environmental Assessment Act, 2012*.

If you have any questions or need further information please contact me at 780-427-9116.

Sincerely,

Corinne Kristensen
Acting Environmental Assessment Team Leader
Provincial Programs
(Designated Director, *Environmental Protection and Enhancement Act*)

cc: D. Alexander (ESRD)
N. Hollands (ESRD)
S. Sigurdson (CEAA)
M. Daneluk (ESRD)

APPENDIX E

LETTER FROM CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY

Canadian Environmental Assessment Agency | Agence canadienne d'évaluation environnementale

Prairie and Northern Region
Canada Place
Suite 1145, 9700 Jasper Avenue
Edmonton, Alberta T5J 4C3

Région des Prairies et du Nord
Place Canada
Pièce 1145, 9700 rue Jasper
Edmonton (Alberta) T5J 4C3

September 29, 2014

Agency File No.: 005502

Michael E. Parker
Clean Harbors Canada, Inc.
4090 Telfer Rd. RR#1
Corunna, ON N0N 1G0
Via email: parker.michaele@cleanharbors.com

Dear Mr. Parker:

SUBJECT: Notification of the Screening Decision for the Ryley Facility Expansion Project

I am writing to advise that following the comment period for the proposed Ryley Facility Expansion Project (the Project), the Canadian Environmental Assessment Agency (the Agency) determined that a federal EA is not required for the Project pursuant to the *Canadian Environmental Assessment Act 2012* (CEAA 2012).

In making this determination, the Agency considered the following factors as indicated in section 10 of CEAA 2012:

- the description of the Project provided by Clean Harbors Canada, Inc. (the proponent) on August 14, 2014,
- the possibility that the carrying out of the Project may cause adverse environmental effects, and
- comments received during the 20 day comment period ending September 4, 2014.

The Agency is satisfied that the environmental effects of the Project are well understood and adequately characterized in the Project Description. The Agency is satisfied that the Project is unlikely to result in adverse environmental effects as defined in CEAA 2012.

Therefore, the Agency decided that an environmental assessment of the designated Project, as proposed in the description of the Project, is not required under CEAA 2012.

During the comment period, the Samson Cree Nation provided information to the Agency that there is a site of interest to the First Nation within the project footprint. The Agency strongly recommends that Clean Harbors Canada contact the Samson Cree Nation directly to ensure that any concerns they may have are addressed prior to the start of development. Also, the Agency reminds the proponent that Clean Harbors will require a Historic Resources Act approval from Alberta Culture prior to the start of development. Please contact Anna Curtis at anna.curtis@gov.ab.ca or at (780) 431-2301 for more information.

Should you require additional information, please contact me at tawanis.testart@ceaa-acee.gc.ca or at (780) 495-2460.

Canada

Sincerely,

Tawanis Testart
a/Project Manager
Prairie and Northern Region

cc: Bryan Hensel, bryan.hensel@tetratech.com

APPENDIX F

HISTORICAL RESOURCE ACT CLEARANCE

Alberta
Culture and Tourism

Historic Resources Application

Activity Administration

Date Received: March 24, 2016 HRA Number: 4710-16-0006-001

Project Category:	Waste Management and Water Treatment (4710)

Application Purpose:	☑	Requesting HRA Approval / Requirements
Lands Affected	☑	All New Lands

Project Type:	☑	Landfill

Project Name:	Ryley Hazardous Waste Landfill and Transfer Facility Expansion
Additional Name(s):	

Key Contact:	Charla N Downey	Affiliation:	EBA, a Tetra Tech Company
Address:	14940-123 Avenue	City / Province:	Edmonton, AB
Postal Code:	T5V1B4	Phone:	(780) 451-2130
E-mail:	cdowney@eba.ca	Fax:	(780) 454-5688
		Your File Number:	ENVSWM0301104

Proponent:	Clean Harbors Canada, Inc.	Contact Name:	Michael E Parker
Address:	4090 Telfer Road, RR#1	City / Province:	Corunna, ON
Postal Code:	N0N1G0	Phone:	(519) 864-3836
E-mail:	parker.michaele@cleanharbors.com	Fax:	(519) 864-3866

Proposed Development Area					Land Ownership			
MER	RGE	TWP	SEC	LSD List	FRH	SA	CU	CT
4	17	50	9	9,10,15,16	☑	☐	☐	☐

Historical Resources Impact Assessment:					
For archaeological resources:					
Has a HRIA been conducted?	☐	Yes	☑	No	Permit Number (if applicable):
For palaeontological resource:					
Has a HRIA been conducted?	☐	Yes	☑	No	Permit Number (if applicable):

Historical Resources Act approval is granted subject to Section 31, "a person who discovers an historic resource in the course of making an excavation for a purpose other than for the purpose of seeking historic resources shall forthwith notify the Minister of the discovery." The chance discovery of historical resources is to be reported to the contacts identified within the Listing of Historic Resources.

April 12, 2016

Date

APPENDIX G

CLOSURE AND POST-CLOSURE COST CALCULATIONS

APPENDIX G: CLOSURE AND POST-CLOSURE COSTS

CLOSURE COST ESTIMATES												
ITEM	**QUANTITY**		**COST/UNIT**	**CELL 1**	**CELL 2**	**CELL 3A**	**CELL 3B**	**CELL 3C**	**Cell 3D**	**Cell 3E**	**Cell 4**	**Cell 5**
CLOSURE COSTS, LANDFILL CELLS												
Cell area (m2)				6880	13530	21250	21250	25465	24434	31078	37000	54000
				Capped	**Capped**	**Capped**	**Capped**	**50% of Cell 3C capped**				
Surface preparation/m2			$ 3.75	$ -	$ -	$ -	$ -	$ 47,746.88	$ 91,627.50	$ 116,542.50	$ 138,750.00	$ 202,500.00
Clay required/m2 @ 0.6 m thickness(m3) *	0.6		$ 10.20	$ -	$ -	$ -	$ -	$ 77,922.90	$ 149,536.08	$ 190,197.36	$ 226,440.00	$ 330,480.00
Supply & install HDPE liner/m2 (black) *			$ 9.25	$ -	$ -	$ -	$ -	$ 117,775.63	$ 226,014.50	$ 287,471.50	$ 342,250.00	$ 499,500.00
Supply & install Geotextile/m2 **			$ 1.87	$ -	$ -	$ -	$ -	$ 23,809.78	$ 45,691.58	$ 58,115.86	$ 69,190.00	$ 100,980.00
QA/QC (18% of total of first 4 items) ***	18%			$ -	$ -	$ -	$ -	$ 48,105.93	$ 92,316.54	$ 117,418.90	$ 139,793.40	$ 204,022.80
Sub-soil @ 0.45 m thickness (m3) **	0.45		$ 3.60		$ -	$ -	$ -	$ 20,626.65	$ 39,583.08	$ 50,346.36	$ 59,940.00	$ 87,480.00
Native soil cover @ 0.15 m thickness (m3) **	0.15		$ 1.20	$ -	$ -	$ -	$ -	$ 2,291.85	$ 4,398.12	$ 5,594.04	$ 6,660.00	$ 9,720.00
Fertilizer & hydroseeding - cost/m2 **			$ 0.54	$ -	$ -	$ -	$ -	$ 6,875.55	$ 13,194.36	$ 16,782.12	$ 19,980.00	$ 29,160.00
Subtotal Closure Costs				**$ -**	**$ -**	**$ -**	**$ -**	**$ 345,155.16**	**$ 662,361.76**	**$ 842,468.64**	**$ 1,003,003.40**	**$ 1,463,842.80**
Engineering ***	6%				**$ -**	**$ -**	**$ -**	**$ 20,709.31**	**$ 39,741.71**	**$ 50,548.12**	**$ 60,180.20**	**$ 87,830.57**
Contingency	15%				**$ -**	**$ -**	**$ -**	**$ 54,879.67**	**$ 105,315.52**	**$ 133,952.51**	**$ 159,477.54**	**$ 232,751.01**
Total Closure Costs					**$ -**	**$ -**	**$ -**	**$ 420,744.14**	**$ 807,418.98**	**$ 1,026,969.27**	**$ 1,222,661.14**	**$ 1,784,424.37**
* Cost estimates based on 2014 Cell 3E construction RFQ												
** Cost estimates based on 2014 Cell 3 Capping PO												
*** Cost estimates based on 2013 Capping Engineering & QA-QC PO												
LANDFILL CELL CLOSURE						$ 5,262,217.91						
STORMWATER RETENTION POND CLOSURE												
ITEM			**COST/UNIT**	**POND 1**	**POND 2**	**POND 3**	**POND 4**	**POND 5**				
Pond Volume (m3)				4100	7600	9000	3900	10500				
Pond Area (m2)				2116	5000	5700	2700	6500				
Clay fill (m3)			$ 10.20	$ 41,820.00	$ 77,520.00	$ 91,800.00	$ 39,780.00	$ 107,100.00				
Sub-soil @ 0.45 m thickness (m3)			$ 3.60	$ 7,617.60	$ 18,000.00	$ 20,520.00	$ 9,720.00	$ 23,400.00				
Native soil cover @ 0.15 m thickness (m3)			$ 1.20	$ 2,539.20	$ 6,000.00	$ 6,840.00	$ 3,240.00	$ 7,800.00				
Fertilizer & seeding - cost/m2			$ 0.54	$ 1,142.64	$ 2,700.00	$ 3,078.00	$ 1,458.00	$ 3,510.00				
STORMWATER POND CLOSURE						$ 475,585.44						
CLOSURE COSTS, TRANSFER STATION												
DISPOSAL COST FOR INVENTORY REMOVAL*			$ 565,934.50									
TRANSPORTATION COST FOR INVENTORY DISPOSAL**			$ 66,852.50									
MOBILIZATION***			$ 5,000.00									
UTILITY LOCATES/CONFIRM UTILITY DISCONNECT***			$ 10,000.00									
TANK CLEANING***			$ 148,086.20									
REMOVE TANKS ***			$ 8,137.00									
REMOVE SECONDARY CONTAINMENT***			$ 23,083.00									
BUILDING DEMOLITION & REMOVAL***			$ 114,211.00									
BUILDING FOUNDATION REMOVAL***			$ 302,071.00									
PROCESS EQUIPMENT REMOVAL***			$ 3,500.00									
REMOVE MISCELLANEOUS ITEMS, ASPHALT, FENCING ETC***			$ 111,273.00									
DEMOBILIZATION***			$ 5,000.00									
CONFIRMATORY SOIL SAMPLING***			$ 25,000.00									
ENVIRONMENTAL REPORTING***			$ 7,500.00									
REMEDIATION & RECLAMATION CERTIFICATE/CONFIRMATION OF NO IMPACT***			$ 10,000.00									
ON-SITE CONSULTING FEES (SITE SUPERVISION, LABORERS***			$ 36,000.00									
ON-SITE CONSULTING FEES (POST-CLOSURE ACTIVITIES***			$ 18,000.00									

APPENDIX G: CLOSURE AND POST-CLOSURE COSTS

PROJECT MANAGEMENT FEE (10% OF TOTAL CONSTRUCTION ABANDONMENT/DEMOLITION COSTS)***		$ 67,878.00										
CLOSURE COSTS, TRANSFER STATION		**$1,527,526.20**										
* cost based on rates from SENA Waste Services & Absolute Environmental												
** cost based on typical 2013 transport costs												
*** cost based on TetraTech EBA Estimated Decommissioning & Abandonment Costs & Pardy's Waste Management Cost Estimate												
TRANSFER STATION CLOSURE						$ 1,527,526.20						
POST CLOSURE COST ESTIMATE												
INSPECTIONS BY TECHNICIAN		**TIME (HOUR)**	**COST/HOUR**	**AVERAGE ANNUAL COST**								
1/WEEK, FIRST 3 MONTHS	12			**{(# INSPECTIONS)(TIME)**								
1/MONTH, 4-12	9			**(COST)/25 YR}**								
1 PER 2 MONTHS, YEARS 2-5	24											
1 PER 6 MONTHS, YEARS 6-25	40											
TOTAL	**85**	8	$ 95.00	$ 2,584.00								
INSPECTIONS BY ENGINEER												
2/YEAR, FIRST YEAR	2											
1/YEAR, YEARS 2-25	25											
TOTAL	**27**	8	$ 125.00	$ 1,080.00								
Costs based on 2013 EBA Services Agreement												
TOTAL ANNUAL INSPECTION				**$ 3,664.00**								
MAINTENANCE												
			CELL 1	**CELL 2**	**CELL 3A**	**CELL 3B**	**CELL 3C**	**CELL 3D**	**CELL 3E**	**CELL 4**	**CELL 5**	
GRASS MOWING, PER YEAR			$ 250.00	$ 500.00	$ 850.00	$ 850.00	$ 1,075.00	$ 1,075.00	$ 1,370.00	$ 1,630.00	$ 2,380.00	
Costs based on 2013 pricing from Rameus Investments												
TOTAL ANNUAL MAINTENANCE				**$ 9,980.00**								
ADMINISTRATION COSTS												
ESTIMATED ANNUAL ADMIN, (HOURS)	80											
COST/HOUR	$ 85.00											
ANNUAL ADMINISTRATION COST	**$ 6,800.00**											
TOTAL ANNUAL ADMINISTRATION				**$ 6,800.00**								
LANDFILL GAS MANAGEMENT & MONITORING	**Not applicable - no gas generated from Industrial landfill wastes**											
SURFACE WATER/STORMWATER MANAGEMENT & MONITORING	**Not applicable - site will be re-vegetated, surface water & stormwater will flow to natural drainage areas. Closure costs are shown above**											
LEACHATE MANAGEMENT & MONITORING	**Quantity**	**UNITS**	**COST/UNIT**									
Leachate head monitoring, monthly	14	7	$ 95.00	$ 9,310.00								
Leachate analysis - annual (primary & secondary) (Maxxam 2013)	7	2	$ 375.00	$ 5,250.00								
Leachate disposal (quantity - m3/month)	160	12	$ 80.00	$ 153,600.00								
ANNUAL LEACHATE MANAGEMENT & MONITORING				**$ 168,160.00**								
GROUNDWATER MONITORING												
# MONITORING WELLS	59											
# MONITORING EVENTS/YEAR	1											
COST OF MONITORING/WELL (includes est. reporting costs)	$ 905.00											
ANNUAL MONITORING				**$ 53,395.00**								
Monitoring costs based on 2013 EBA quotation												
ANNUAL MANAGEMENT & MONITORING				**$ 241,999.00**								

APPENDIX G: CLOSURE AND POST-CLOSURE COSTS

SUBTOTAL POST CLOSURE (25 YEARS)						$ 6,049,975.00						
TOTAL CLOSURE & POST CLOSURE (25 YEARS)						**$ 13,315,304.55**						

APPENDIX H
DISCLOSURE PLAN

August 29, 2017

ISSUED FOR USE
FILE: ENVSWM03011-05
Via Email: Weiguo.Wu@gov.ab.ca

Alberta Environment and Parks
111 Twin Atria Building
4999 – 98 Avenue
Edmonton, AB T6B 2X3

Attention: Mr. Weiguo Wu – Industrial Approvals Engineer

Subject: Clean Harbors Ryley Facility Lateral Expansion

As discussed during our previous meeting on June 14, 2017, Clean Harbors Canada, Inc. (Clean Harbors) will be proceeding with an application for lateral expansion of its Class I Landfill capacity into NE 9-50-17W4M, adjacent to the north of the existing Ryley Hazardous Waste Landfill and Transfer Facility. Clean Harbors retained Tetra Tech Canada Inc. (Tetra Tech) to develop its application for the proposed amendment to the Current Approval (i.e., EPEA Approval No.: 10348-03-00).

As discussed during our meeting held on June 14, 2017, please find the attached Disclosure Plan for your review and confirmation to support our submission of the application for amendment to the current approval.

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

Bryan Hensel, B.Sc., P.Biol., R.P.Bio.
Ecologist, Project Manager
Environment and Water Practice
Direct Line: 403.723.1516
Bryan.Hensel@tetratech.com

Attachments: Disclosure Plan

/bh

Tetra Tech Canada Inc.
Riverbend Atrium One, 115, 200 Rivercrest Drive SE
Calgary, AB T2C 2X5 CANADA
Tel 403.203.3355 Fax 403.203.3301

Disclosure Plan

The Clean Harbors Ryley facility has been in operation since 1992. In 1996 it became the first hazardous waste landfill in Alberta. Since that time it has grown and expanded its services to Alberta waste generators.

Waste designated for landfill disposal at the Ryley Facility predominantly originates from waste disposal brokers (understood to be associated with municipal, commercial, and light industrial development) accounting for more than one-third of the solid waste intake (35%). Other activities from which the Ryley Facility receives hazardous waste include: oil sands development (20%), petroleum upgrading (15%), chemical processing (15%), general construction (10%), and other activities (5%).

The tonnage of hazardous waste processed at the Ryley Facility has exhibited sustained growth during its operation for the period from 2001 to 2014; however the volume of waste received at the Facility has slowed with the drop in oil prices since late 2014. Although efficiencies in diversion of hazardous wastes may be realized on a per capita basis, Clean Harbors anticipates that an improved rate of diversion will not offset the cumulative volume of hazardous waste designated for landfill disposal. Production of hazardous waste designated for landfill disposal is anticipated to grow continuously with the rate of development associated with the forecasted growth in sectors that contribute substantial proportions to the hazardous waste processed at the Ryley Facility. Consequently, projected volumes of hazardous waste diverted for landfill disposal at the Ryley Facility are anticipated to increase for the foreseeable future.

Clean Harbors is approaching the end of the available landfill capacity on the existing approved Ryley Facility. In order to continue providing service to Alberta waste generators, Clean Harbors is proposing to expand its operations to the adjacent quarter section in NE 9-50-17 W4M.

1.0 PUBLIC CONSULTATION PROCESS

Clean Harbors has been actively engaging the community regarding the expansion of the facility since 2012. This has taken the form of presentations and requests for zoning with municipal authorities, consultations with local landowners, Village and County officials, local environmental groups, public meetings and Open Houses at the facility. These efforts by Clean Harbors are discussed in more detail in the following sections.

1.1 Previous Consultation – 2012 to 2016

The public consultation process for the proposed lateral expansion of the Ryley Facility began in 2012 with applications to Beaver County for changes to the Land Use Bylaw and the Municipal Development Plan and to Beaver County and the Village of Ryley for a change to the Intermunicipal Development Plan.

A Public Hearing was held May 31, 2012. At this Hearing written and verbal submissions were made regarding the project. Following the Hearing, Clean Harbors requested that the County and Village table the applications until they could address issues raised at the Hearing. Issues raised at this meeting included:

- Dust,
- Odours,
- Real estate values,
- Community support (financial), and

- Communication.

Following the Hearing, meetings were held with neighboring farmers who had raised concerns, citizen groups such as the Ryley Public Advisory Committee (RPAC), and County and Village administrators to address and resolve concerns voiced at the Public Hearing. Clean Harbors' senior management was present at many of these meetings including the Public Meeting held October 10, 2012, during which proposed development of the existing site and the potential expansion to the north quarter was available for reviewand discussion. An Open House was held at the facility on September 11, 2013 during which interested attendees were provided opportunities for direct engagement with Clean Harbors' staff as well as taken on tours of the facility and landfill.

As a result of these meetings and others with Alberta Environment and Parks (AEP), several actions were implemented to address the identified concerns.

- Clean Harbors increased its level of community support and funding through the creation of an annual Community Improvement Grant and the implementation of a quarterly hosting fee payment based on the tonnage landfilled during each calendar quarter
- Clean Harbors and the Village of Ryley created a Liaison Committee composed of two Village Council members, three Village residents and a Clean Harbors representative
- Negotiations were undertaken with neighboring landowners who were concerned with the proximity of the proposed expansion to their property to resolve their concerns regarding property values
- Clean Harbors embarked on an aggressive landfill capping program to reduce concerns over fugitive emissions of dust and odour as well as improving the appearance of the facility, and
- The facility implemented a Fugitive Dust and Odour Best Management Plan (BMP) that defined the procedures that were in place to manage these issues. This BMP included the use of cover material, the positioning and use of units for the dispersion of odour reducing chemicals and the application of water to reduce dust emissions.

In October of 2013, Beaver County approved the changes to the Land Use Bylaw and the Municipal Development Plan as requested by Clean Harbors in 2012 and, in conjunction with the Village of Ryley Council, approved the change to the Intermunicipal Development Plan. These amendments completed the required zoning and planning changes required for the expansion.

In 2014, the Village of Ryley initiated the process to annex NE 9-50-17 W4M, as proposed under the Intermunicipal Development Plan. This action, when completed, will allow the landfill expansion to be governed under the same municipal regulatory structure as the existing landfill facility. The Village of Ryley and Beaver County have been able to negotiate an agreement on the proposed annexation and the annexation was submitted to Alberta Municipal Affairs. Clean Harbors held an Open House June 9, 2014 at which the public was able to meet with Clean Harbors and its consulting team.

Clean Harbors submitted an amendment application in 2013 for the construction of Landfill Cell 3E and a new surface water holding pond. There were no negative comments received by AEP during the amendment approval process and Clean Harbors received the approved amendment on February 24, 2014. This application included the construction of a tipping pad in the landfill to allow trucks to unload without contacting the waste. The construction of this facility has prevented waste from being carried out of the landfill area on the vehicle's tires.

In 2014, submissions were made to AEP and to the Canadian Environmental Assessment Agency (CEAA) regarding the need for the completion of an Environmental Impact Assessment for the proposed expansion to the adjacent quarter section. Both organizations responded indicating that they did not require the completion of an Environmental Impact Assessment for the project under their existing legislation. Clean Harbors' Project Description was made publically available on through the CEAA website, during which time one response from the RPAC identified concerns regarding:

- *"Controlling and mitigating windblown releases of particulate, vapours and odors;*
- *The long term impact of the facility on the environment and public health in the area; and*
- *The socio-economic impact the two Ryley landfills are having on the community."*

An Open House was held at the facility on the afternoon and evening of June 17th 2015. This meeting was attended by 40 people. The event was attended by Senior Clean Harbors personnel as well as the consultant. Tours of the site were given by the General Manager and individuals were given the opportunity to ask questions. Several information boards were displayed that explained many aspects of the facility's operation, environmental monitoring activities, permit renewal and Cell 4 expansion. No negative comments or concerns regarding the facility were received by either Clean Harbors staff or the consultant.

In 2014, Clean Harbors conducted preliminary consultation with the Enoch Cree Nation, Ermineskin Nation, Louis Bull Tribe, Montana Nation, Saddle Lake Nation and Samson Cree Nation, including notification (i.e., Notification Letter) of potential future landfill expansion in NE 9-50-17 W4M, meetings with elders and council at each of the notified First Nations, as well as provision of a Project Update Letter notifying the First Nations of the conclusions from AEP and CEAA that respective Environmental Impact Assessments would not be required for the proposed facility. Although productive conversations identified opportunities for further discussion (i.e., inclusion of First Nation companies in construction contracts), no objections to the Project have been received to date.

On January 11, 2016 the Village of Ryley received approval for the application to annex NE 9-50-17 W4M as per their application to Beaver County.

Clean Harbors hosted an open house on June 15, 2016. This meeting was attended by 25 registered guests and some who did not sign the registry. Clean Harbors personnel and the consultant were available to answer questions regarding the facility operations and monitoring activities. Attendees were invited to tour the site with the General Manager who described the facility operations and answered any questions raised by the attendees during the tour. Information boards were displayed at the gathering area describing the facility's operation, environmental monitoring activities, permit renewal process and Cell 4 expansion. The lateral expansion to NE-9-50-17 W4M was shown on the information boards and discussed by the General Manager and the consultant with the attendees.

1.2 Current and Future Consultation

Clean Harbors has developed and will implement a comprehensive consultation plan for the upcoming approval process that will consist of the following opportunities to provide information to and receive feedback from public stakeholders. This process will comprise:

- Open Houses,
- Newsletters,
- Environmental Concern Telephone Line, and

- Personal Interviews.

It is the goal of the consultation plan to provide meaningful and accessible opportunities for interested public stakeholders to engage with Clean Harbors, providing feedback and requesting information regarding the project design, results of the public stakeholder consultation program and results of the technical investigation. Interested stakeholders may include residents of the Village of Ryley, Ryley Village Council, Ryley Public Advisory Committee, local farmers, Beaver County Council and local businesses.

1.2.1 Open Houses

A subsequent open house was hosted on June 15, 2017, during which 34 registered guests attended. The format of the open house mirrored that provided in 2016; no issues or concerns were identified at that time.

Clean Harbors will host an open house in 2018 to give the public opportunity to see the proposed development of the property and to ask questions or raise concerns about the development with Clean Harbors' staff and consultants. In addition, Clean Harbors and its consultants will meet with concerned stakeholders on an as requested basis, discussing the proposed development, evaluation of environmental effects and mitigation strategies. Comments from the stakeholders will be solicited to identify any concerns that the stakeholders may have.

The number and frequency of these stakeholder meetings will depend upon the number of concerns and the work necessary to resolve or mitigate the concerns. Stakeholders would include neighbouring property owners, Village and County administration, nearby businesses and local citizen groups.

1.2.2 Newsletters

Periodic notifications from the results of the public stakeholder consultation program and progress of the technical investigation will be prepared in the form of a newsletter. Public stakeholders interested in receiving the newsletter may elect to receive it by letter mail and/or electronic mail. Newsletters will be posted to the Project website. Clean Harbors may explore the opportunity for incorporating hyperlinked notifications of the newsletters by select social media vendors.

1.2.3 Environmental Concern Telephone Line

Clean Harbors has established a toll-free telephone line on which interested public stakeholders may solicit concerns, comments and request information regarding the current and future operation of the Ryley Facility.

1.2.4 Personal Interviews

On an on-request basis, Clean Harbors will solicit feedback and information requests, and will provide responses directly to interested public stakeholders.

1.3 Expected Concerns

The concerns expected to be expressed regarding the landfill expansion and its ancillary operations are common to landfills and other waste management operations regarding potential groundwater and surface water contamination, odour, dust, litter, traffic and local real estate values. These are concerns for the existing facility operations which are being addressed through facility engineering and design, operational policies and procedures, monitoring and reporting programs and continuation of best management practices for the control of dust and odours.

1.4 Response to Concerns

Concerns expressed during the Public Consultation will be recorded and identified with the date the concern was expressed and the identity of the stakeholder who expressed the concern. This will allow concerns to be categorized and consolidated for response by the appropriate company official or technical expert. Concerns will be reviewed and responses to resolve or mitigate the concerns will be proposed for incorporation into the development.

APPENDIX I

2016 DUGOUT MONITORING REPORT

2016 Dugout Sampling Program
Class 1 Waste Management Facility
Ryley, Alberta

PRESENTED TO

Clean Harbors Canada Inc.

FEBRUARY 8, 2017
ISSUED FOR USE
FILE: 704-SWM.SWOP03347

Tetra Tech Canada Inc.
14940 - 123 Avenue
Edmonton, AB T5V 1B4 CANADA
Tel 780.451.2121 Fax 780.454.5688

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EXECUTIVE SUMMARY

Foreword

Tetra Tech Canada Inc. (Tetra Tech) was retained by Clean Harbors Canada Inc. (Clean Harbors) to sample all in-use dugouts located within a 1.6 km radius of the Ryley Hazardous Waste Facility in Ryley, Alberta.

The sampling program is required by Alberta Environment's (AENV)[1] Approval No. 10348-02-00 and the Amending Approval No. 10348-02-01, which expires March 31, 2016 (Appendix A). The program included the testing of all dugouts in use, as identified during the baseline sampling program completed during the fall of 1996 and subsequent annual reviews. The permit to operate defines "in use" as water used for human consumption, cooking, washing, and gardening or livestock purposes.

Twenty-one (21) dugouts were sampled during the 2016 dugout sampling program, which is the twentieth annual sampling event, including the baseline event. The baseline sampling program is detailed in the report titled Water Sampling and Testing Program, dated December 1996. All sampling has taken place annually in October.

Findings and Conclusions

The dugout water levels were observed to be similar to those observed in recent years. In general, the concentrations of most parameters analysed in 2016 were similar, had no trend or were on a decreasing trend to the past years with the few exceptions as described in Section 4.2.

The increasing levels of ammonia, COD, DOC, phosphorus, sulphate and TKN concentrations at Dugouts1, 2, 6, 7, 8, 9, 10 and 20 may be attributed to elevated levels of nutrients in the surface water draining into these dugouts, which contained run-off from cattle manure and fertilizers applied at the nearby farms. During fieldwork, several cows were also observed in the vicinity of these dugouts.

Similar to 2015, the increasing concentrations of bicarbonates, carbonates, chloride, EC, potassium, and TDS at Dugouts 1, 2, 3, 4, 6, 7, 8, 10, 12, 19 and 22 may be attributed to the naturally high salt soils in the area (solonetzic soils) and chloride salts. Salt precipitate was observed on surface soils located adjacent to the majority of these dugouts. Dugouts 1 and 8 are located close to roadways treated with winter maintenance de-icing solvents and therefore, the surrounding environment is potentially subjected to stormwater runoff containing elevated levels of dissolved salts and metals. Magnesium and calcium chloride-based products are also used as dust suppressants on roads. Increasing concentrations of magnesium and calcium in Dugouts 1, 4, 10 and 12 were identified.

Chloride does not adsorb readily onto mineral surfaces, biodegrade, volatilize, readily precipitate or bioaccumulate and therefore concentrations remain high in surface water. Overall, inorganic chloride is generally considered to be a hydrologically and chemically inert substance, but these levels will continue to be monitored in the future for irregular patterns (CCME 2011).

The increasing concentrations of molybdenum, nickel and vanadium at Dugouts 1, 6, 8, 10 and 12 may be the result of sewage sludge disposal, livestock manure from the nearby herd, or fertilizers from surrounding cropland. Dugouts 8 and 10 were observed to be turbid. This can be accredited to the livestock that live or feed around these dugouts and the natural soil composition for the region. Most dugouts were observed to be minimally vegetated and composed of fine grain substrates, and therefore the surface water was subject to increased suspended solids (i.e. increased turbidity)

[1] Currently Alberta Environment and Parks (AEP)

Boron in Dugouts 2, 3, 4, 5, 8, 12, 20, 21 and 22 may be from leaching from sedimentary rocks and clays common in Alberta (CCME 2009). Barium is no longer on an increasing trend in dugouts as it was in 2015.

The analytical results for the six previous sampling events are included in the tables section of this report for comparison purposes. The assessment of parameters analyzed does not indicate off-site release from the landfill site to dugouts through groundwater or surface water pathways within a 1.6 km radius study area. The dugout historical chemical analysis results from 1996-2016 are presented in Appendix D.

Sampling conducted in October 2016 concludes that the Ryley Hazardous Landfill Facility is not adversely impacting dugouts within a 1.6 km radius based on the information collected by Tetra Tech. A similar sampling program is recommended for fall 2017, as part of the ongoing site permit compliance process.

Each landowner will be forwarded a copy of the water analysis report pertaining to the dugouts sampled from their property.

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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Clean Harbors Canada Inc. and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Clean Harbors Canada Inc. or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech Canada Inc.'s Services Agreement. Tetra Tech's General Conditions are provided in Appendix B of this report.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Clean Harbors Canada Inc. (Clean Harbors) to sample all in-use dugouts located within a 1.6 km radius of the Ryley Hazardous Waste Facility in Ryley, Alberta.

The sampling program is required by Alberta's *Environmental Protection and Enhancement Act* (EPEA). The facility operates under Alberta Environment (AENV), currently Alberta Environment and Parks (AEP), EPEA Approval No. 10348-02-00 (as amended) (the Approval). This approval has expired, and an application for the renewal of the Approval was submitted to AEP in September 2015, and is currently under review. AEP has, however, granted Clean Harbors an extension until March 31, 2017 (Appendix A). The program included the testing of all dugouts in use, as identified during the baseline sampling program completed during the fall of 1996 and subsequent annual reviews. The permit to operate defines "in use" as water used for human consumption, cooking, washing, and gardening or livestock purposes.

Twenty-one (21) dugouts were sampled during the 2016 dugout sampling program, which is the twentieth annual sampling event, including the baseline event. The baseline sampling program is detailed in the report titled Water Sampling and Testing Program, dated December 1996. All sampling has taken place annually in October.

This report presents the field observations and analytical water quality results of the 2016 sampling program with reference to recently collected data.

2.0 FIELD SAMPLING

The water samples were collected on October 5, 2016 by two Tetra Tech scientists. The contact information for each landowner is presented in Table A. Landowners were contacted prior to sampling where possible. The location of each sampled water source is indicated on Figure 1.

Table A: Landowner Information

Landowner	Contact Name	Mailing Address	Telephone Number
D. Booth	Mr. Doyle Booth	Box 185, Ryley, Alberta T0B 4A0	780.663.3333
Ewert Farms Ltd.	Mr. Mark Ewert	Box 355, Ryley, Alberta T0B 4A0	780.663.2169
B.L. Lyons	Mr. Brian Lyons	Box 222, Ryley, Alberta T0B 4A0	780.663.3318
T. Magneson	Mr. Terry Magneson	Box 239, Ryley, Alberta T0B 4A0	780.603.1537
County of Beaver	c/o Mr. Bob Beck	Box 140, Ryley, Alberta T0B 4A0	780.663.3730
W. Winsnes	Mr. William Winsnes	Box 74, Ryley, Alberta T0B 4A0	780.663.2343
Noregaard	Not Applicable	Out of the country	Not Applicable

The 21 dugouts were sampled at seven properties, and each sample was collected from four corners of the respective dugout at 0.20 m to 0.30 m depths, and submitted as an equal-weighted composite sample.

All samples were obtained using standard procedures that minimized contamination during collection, handling, preservation, and transportation to ensure representative samples were collected and tested. Table B contains a summary of the information gathered during the sampling program, including sample name, legal land description, sample location, and sample source.

Table B: Sample Location Information

Sample	Sample Name	Legal Land Description (W4M)	Dugout Location	Sample Source
1	Booth D.1	NW ¼ 10-17-50	Dugout northwest of house	Composite sample from the four corners of dugout
2	Ewert D.1	SW ¼ 15-17-50	Dugout south of centre barn	Composite sample from the four corners of dugout
3	Ewert D.2	SW ¼ 15-17-50	Extreme west dugout	Composite sample from the four corners of dugout
4	Ewert D.3	SW ¼ 15-17-50	Extreme east dugout	Composite sample from the four corners of dugout
5	Ewert D.4	SW ¼ 15-17-50	Southeast corner of southwest of Section 15	Composite sample from the four corners of dugout
6	Lyons D.1	SE ¼ 16-17-50	Northeast dugout on southeast of Section 16	Composite sample from the four corners of dugout
7	Lyons D.2	SE ¼ 16-17-50	Northwest dugout on southeast of Section 16	Composite sample from the four corners of dugout
8	Lyons D.3	SE ¼ 16-17-50	Southwest dugout on southeast of Section 16	Composite sample from the four corners of dugout
9	Lyons D.4	SW ¼ 16-17-50	Southwest dugout on southwest of Section 16	Composite sample from the four corners of dugout
10	Magneson D.1	SW ¼ 9-17-50	Dugout with windmill on northeast end of yard	Composite sample from the four corners of dugout
11	Magneson D.2	SW ¼ 9-17-50	Southeast corner of northwest quarter of Section 9	Composite sample from the four corners of dugout
12	Magneson D.3 (now on Clean Harbors property)	NE ¼ 9-17-50	Southwest corner of northeast quarter of Section 9, north of Clean Harbors	Composite sample from the four corners of dugout
13	Magneson D.4	SW ¼ 9-17-50	South end of southwest quarter of Section 9, east of main house	Composite sample from the four corners of dugout
14	Magneson D.5	SW ¼ 9-17-50	East end of southwest quarter of Section 9, west of Clean Harbors	Composite sample from the four corners of dugout
15	Magneson D.6	SW ¼ 9-17-50	South end of southwest quarter of Section 9, north of main house	Composite sample from the four corners of dugout
16	Beaver D.1	NW ¼ 3-17-50	Dugout south of house, northwest of Section 3	Composite sample from the four corners of dugout
18	Norgaard D.1	SW ¼ 3-17-50	Southwest quarter of Section 3, east of Highway 854	Composite sample from the four corners of dugout
19	Winsnes D.1	SW ¼ 4-17-50	Dugout on southwest corner of southwest quarter of Section 4	Composite sample from the four corners of dugout
20	Winsnes D.2	NE ¼ 5-17-50	Dugout south of west approach, northeast of Section 5	Composite sample from the four corners of dugout
21	Winsnes D.3	SE ¼ 8-17-50	Dugout on southeast quarter of Section 8	Composite sample from the four corners of dugout
22	Winsnes D.4	SE ¼ 8-17-50	Dugout is west of Winsnes D.3	Composite sample from the four corners of dugout

Note: Dugout 17 was previously backfilled and not sampled.

3.0 LABORATORY TESTING

ALS Laboratory Group (ALS) of Edmonton was the laboratory selected to perform the sample analysis as in past years. ALS prepared sampling kits with bottles for each dugout to be tested. These kits included the individual sample bottles and preservatives needed to perform the analyses required by the Permit to Operate.

The following analytical parameters were tested for all dugouts, as required by Approval No. 10348-02-00 (Page 28):

- pH (measured in field and laboratory).
- Electrical conductivity (EC) (measured in field and laboratory).
- Major ions.
- Trace metals (dissolved).
- Nutrients including ammonia and total Kjeldahl nitrogen (TKN).
- Chemical oxygen demand (COD).
- Dissolved organic carbon (DOC).
- Benzene, ethylbenzene, toluene and xylenes (BTEX).
- Petroleum hydrocarbons (PHC) fractions F1 and F2.

Analytical request forms, including chain-of-custody data, were completed by Tetra Tech when the samples were submitted to the laboratory for analysis.

The analytical reports for each sample collected were forwarded to Tetra Tech once the analysis was completed. Table 1 summarizes the data collected up to and including the 2016 sampling program for each dugout. The 2016 water quality analytical reports, as received from ALS, are presented in Appendix C.

3.1 Quality Control and Quality Assurance

To evaluate field sampling reproducibility, duplicate water samples were collected during the 2016 sampling event. In October 2016, the duplicates were sampled from Dugout 1 (Dup 1) and Dugout 5 (Dup 2) and submitted for laboratory analysis for the same suite of parameters.

To analyze the field sampling and laboratory testing reproducibility, the sample-duplicate pair was evaluated using the relative percentage difference (RPD) method, involving calculation of RPD when both sample-duplicate concentrations were greater than, or equal to, five times the laboratory method detection limit (MDL), as shown in Equation 1.

Equation 1

$$\%RPD = \left(\left| \text{sample} - \text{duplicate concentrations} \right| \text{ divided by } \overline{X} \right) \text{ multiplied by } 100$$

Where $\overline{X}$ is the average concentration of a sample and its duplicate.

Surface water quality parameters were considered as having passed the quality assurance (QA)/quality control (QC) reproducibility procedure, if the RPD was less than or equal to 20%, indicating a close correlation between the sample-duplicate pair.

RPD values were not calculated if one or both of the sample-duplicate concentrations were between the MDL and five times the MDL. In these cases, water quality parameters were still considered as having passed the QA/QC reproducibility procedure if the sample duplicate concentration difference was less than one MDL value.

The RPD calculations are summarized in Table 2 (Duplicate 1) and Table 3 (Duplicate 2). Although most parameters satisfied the requirements, these results indicated that the QA/QC reproducibility guidelines were not satisfied for the following parameters in the listed duplicate sample pairs:

- Dugout 1/Dup-1: Aluminum (RPD=36%); and
- Dugout 7/Dup-2: COD (RPD=97%).

Small variations due to variability in field sampling or laboratory analytical methods (i.e., residuals from previous analysis, etc.) can result in concentration differences that are two or three times greater than the concentration result, which results in higher RPDs which fail the requirements. However, the concentrations are similar in most cases and often have acceptable variability even though the RPD calculation indicates otherwise. Based on this fact, a limited number of failed results is within acceptable variability, and the duplicate analysis indicates the data are stable and reliable.

4.0 DISCUSSION

The chemical analysis results from the 2016 program have been reviewed for significant changes in parameters and compared to the results of all previous sampling events. The intent is not to compare results to provincial standards for acceptable water quality, but to pre-existing baseline conditions in 1996 and identify trends, if any. High variability between years and between sites is expected. In addition, parameters at some locations have exceeded provincial water quality objectives since 1996, and are characteristic of natural conditions in the area or agricultural land use. The objective of this work is to identify elevated and/or increasing trends in parameters that might be sourced from the landfill through a groundwater or surface water pathway. Emphasis has been placed on reviewing sampling points down-gradient (east) of the landfill site, although the landfill site is near a local highpoint and groundwater flow may also flow towards the north. A summary of the recent years' data follows.

4.1 Summary of 2015 Analytical Results

The 2015 dugout water levels were observed to be similar to those observed in previous years (with the exception of Dugout 15, which was added in 2015). The concentrations of most parameters were similar to past records, with a few exceptions. Compared to historical data (1996 to 2015) increasing levels of ammonia, chemical oxygen demand (COD), dissolved organic carbon (DOC) phosphorus, and total Kjeldahl nitrogen (TKN) concentrations at Dugouts 1, 3, 8 and 10 were detected. At Dugout 1, the 2015 COD result was elevated but appeared to be an anomaly. The increasing concentrations of bicarbonates, carbonates, chloride, electrical conductivity (EC), ionic balance, potassium, sodium and total dissolved solids (TDS) at Dugouts 1, 2, 3, 4, 6, 7, 8, 10, 12, 19 and 22 may be attributed to the naturally high salt soils in the area. EC and sodium were within historical ranges. Increasing concentrations of magnesium and calcium in Dugouts 1, 9, 12 and 22 were identified. Chloride at Dugouts 1, 2, 4, 7, 19 and 22 followed increasing trends and within historical ranges. There were increasing concentrations of lithium, molybdenum, nickel and vanadium at Dugouts 1, 6, 8, 12 and Dugouts 1, 6, and 12 were observed to be turbid. Barium and boron in Dugouts 2, 12, 21 and 22 followed increasing concentration trends.

4.2 Summary of 2016 Analytical Results

The 2016 dugout water levels were observed to be similar to those observed in previous years. A Mann-Kendall test was used as a statistical means of investigating possible trends in water quality (Harmancioglu et al. 2010) for parameters analyzed for the past 11 years (maximum). The analysis indicates whether there is an upward or downward trend or, in the case where results are similar, no trend at all. Dugout 15 was not included in this trend analysis, as only two years of data is available and would not provide statistically reliable results. Results of the Mann Kendall trend analysis is presented in Table 4 in the Table Section of this report. The concentrations of most parameters were similar to historical concentrations or were on a downward trend; the following parameters were on an increasing trend:

- Ammonia at Dugout 1, 6, 7, 9, 10 and 20.
- Bicarbonate at Dugouts 1, 3 and 19.
- Boron at Dugouts 2, 3, 4, 5, 8, 12, 20, 21 and 22.
- Calcium at Dugouts 10 and 14.
- Carbonate at Dugout 6 (the 2016 result was below detection limit and therefore within historical ranges).
- Chloride at Dugouts 2, 4, 7 and 19 (the 2016 results were within historical ranges, except at Dugout 19).
- COD at Dugout 1, 2, 7 and 8 (the 2016 results were within historical ranges).
- DOC at Dugout 7 (the 2016 result was within historical ranges).
- EC at Dugouts 8 and10 (the 2016 results were within historical ranges).
- Magnesium Dugouts 1, 4 and 12.
- Molybdenum at Dugouts 8 and 12 (the 2016 results were within historical ranges).
- Nickel at Dugouts 1, 10 and 12 (the 2016 results were within historical ranges).
- pH at Dugout 6 (the 2016 result was within historical ranges).
- Phosphorus at Dugouts 1 and 8 (Dugout 1 is within the 2016 historical range).
- Potassium at Dugouts 1, 2, 4, 10 and 12 (within the 2016 historical range, with the exception of Dugout 10).
- Sulphate at Dugout 8 (within the historical range).
- TDS at Dugout 8 and 10 (TDS is correlated with EC and is within historical range).
- TKN at Dugout 1 (within the 2016 historical range).
- Vanadium at Dugouts 6 (within the 2016 historical range) and 12.

Environment Canada's monthly and annual precipitation data from the Holden AGDM meteorological station for the year to date were summarized in Table 5 of the Tables Section of this report. The total annual precipitation was slightly lower than the precipitation mean since 1996. The spring total precipitation amount was higher than the mean since 1996, the summer, fall and winter were lower. Note that previous precipitation data (1996 to 2013) were obtained from Tofield North Station and the 2014 and 2015 annual precipitation data was obtained from the Elk Island National Park meteorological station. However, recent data was not available at either stations, therefore, the Holden AGDM meteorological station data was utilized for 2016.

5.0 CONCLUSIONS

The dugout water levels were observed to be similar to those observed in recent years. In general, the concentrations of most parameters analysed in 2016 were similar, had no trend or were on a decreasing trend to the past years with the few exceptions as described in Section 4.2.

The increasing levels of ammonia, COD, DOC, phosphorus, sulphate and TKN concentrations at Dugouts1, 2, 6, 7, 8, 9, 10 and 20 may be attributed to elevated levels of nutrients in the surface water draining into these dugouts, which contained run-off from cattle manure and fertilizers applied at the nearby farms. During fieldwork, several cows were also observed in the vicinity of these dugouts.

Similar to 2015, the increasing concentrations of bicarbonates, carbonates, chloride, EC, potassium, and TDS at Dugouts 1, 2, 3, 4, 6, 7, 8, 10, 12, 19 and 22 may be attributed to the naturally high salt soils in the area (solonetzic soils) and chloride salts. Salt precipitate was observed on surface soils located adjacent to the majority of these dugouts. Dugouts 1 and 8 are located close to roadways treated with winter maintenance de-icing solvents and therefore, the surrounding environment is potentially subjected to stormwater runoff containing elevated levels of dissolved salts and metals. Magnesium and calcium chloride-based products are also used as dust suppressants on roads. Increasing concentrations of magnesium and calcium in Dugouts 1, 4, 10 and 12 were identified.

Chloride does not adsorb readily onto mineral surfaces, biodegrade, volatilize, readily precipitate or bioaccumulate and therefore concentrations remain high in surface water. Overall, inorganic chloride is generally considered to be a hydrologically and chemically inert substance, but these levels will continue to be monitored in the future for irregular patterns (CCME 2011).

The increasing concentrations of molybdenum, nickel and vanadium at Dugouts 1, 6, 8, 10 and 12 may be the result of sewage sludge disposal, livestock manure from the nearby herd, or fertilizers from surrounding cropland. Dugouts 8 and 10 were observed to be turbid. This can be accredited to the livestock that live or feed around these dugouts and the natural soil compositions for the region. Most dugouts were observed to be minimally vegetated and composed of fine grain substrates, and therefore the surface water was subject to increased suspended solids (i.e. increased turbidity)

Boron in Dugouts 2, 3, 4, 5, 8, 12, 20, 21 and 22 may be from leaching from sedimentary rocks and clays common in Alberta (CCME 2009). Barium is no longer on an increasing trend in dugouts as it was in 2015.

The analytical results for the six previous sampling events are included in the tables section of this report for comparison purposes. The assessment of parameters analyzed does not indicate off-site release from the landfill site to dugouts through groundwater or surface water pathways within a 1.6 km radius study area. The dugout historical chemical analysis results from 1996-2016 are presented in Appendix D.

Each landowner will be forwarded a copy of the water analysis report pertaining to the dugouts sampled from their property.

6.0 RECOMMENDATIONS

Sampling conducted in October 2016 concludes that the Ryley Hazardous Landfill Facility is not adversely impacting dugouts within a 1.6 km radius based on the information collected by Tetra Tech. A similar sampling program is recommended for fall 2017, as part of the ongoing site permit compliance process.

7.0 CLOSURE

We trust this report meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

Respectfully submitted,
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Feb 9, 2017

PERMIT TO PRACTICE
TETRA TECH CANADA INC.
Signature
Date February 9, 2017
PERMIT NUMBER: P13774
The Association of Professional Engineers and Geoscientists of Alberta

/cee

REFERENCES

Canadian Council of Ministers of the Environment (CCME). 2009. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Boron.

Canadian Council of Ministers of the Environment (CCME). 2011. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Chloride.

Harmancioglu, B. Nilgun, et al. 2010. Environmental Data Management. Water Science and Technology Library

TABLES

Table 1.1: Chemical Analytical Results

Sample ID:		Booth D.1						
Site Number:		1						
Date Sampled:	Units	Oct 18/10	Oct 12/11	Oct 15/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 5/16
Chem. O_2 Demand	mg/L	59.4	75	92	78	71	219	68
Ammonia-N	mg/L	<0.050	<0.050	<0.050	<0.050	0.79	0.108	1.21
Total Kjeldahl Nitrogen	mg/L	2.1	2.89	2.55	2.76	2.76	7.02	3.09
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	22.2	29.4	26.8	29.0	22.7	59.9	21.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	0.00043	<0.0004	0.00077	0.0002
Barium	mg/L	0.0731	0.0674	0.0518	0.0600	0.0673	0.0421	0.0883
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00092	0.00023
Copper	mg/L	0.0046	<0.0010	<0.0010	<0.0010	<0.001	<0.00040	0.00045
Iron	mg/L	0.018	0.029	<0.010	0.025	0.07	0.021	0.021
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	0.00011	<0.00010	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00244	0.00125
Nickel	mg/L	0.0038	0.0047	0.0036	0.0035	0.0041	0.0060	0.0043
Zinc	mg/L	<0.0020	<0.0020	0.0035	<0.0020	0.0119	0.0021	<0.0010
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000095
Aluminium	mg/L	<0.010	<0.010	<0.010	0.013	<0.01	0.0035	0.0016
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00010
Boron	mg/L	0.054	<0.050	<0.050	<0.050	<0.05	<0.020	0.064
Manganese	mg/L	<0.0020	<0.0020	<0.0020	0.0025	0.0024	0.154	0.00071
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00045	0.000114
Titanium	mg/L	<0.0010	<0.0010	<0.0010	0.0013	<0.001	<0.00060	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000010
Vanadium	mg/L	<0.0010	<0.0010	0.0017	0.0026	0.0015	0.0053	0.00087
Routine Water								
Ion Balance	%	109	88	91.9	104	110	96.7	107
Bicarbonate	mg/L	334	425	383	333	342	552	357
Chloride	mg/L	83.2	85.6	96.9	97.1	78.4	80.3	61.7
Carbonate	mg/L	15	11.7	28.7	36.1	11.2	24.6	<5.0
Conductivity (EC)	uS/cm	1100	1130	1180	1100	989	1560	885
Calcium	mg/L	33.3	28	13.1	14.7	19.6	33.6	29
Potassium	mg/L	11.7	9.26	11.8	12.9	12.2	17.9	13.9
Magnesium	mg/L	16.9	13	13.4	15.0	13.6	20.8	13.9
Sodium	mg/L	202	178	210	217	186	254	154
Sulfate	mg/L	135	101	106	90.2	67.7	157	70.6
Phosphorus	mg/L	0.087	0.324	0.16	0.166	0.245	1.09	0.155
pH in H_20	pH	8.6	8.48	8.93	8.96	8.6	8.63	8.37
TDS (Calculated)	mg/L	661	636	668	647	557	860	524
Nitrate	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.040	0.312
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	0.026
Field Data								
pH in H_20	pH	9.03	8.56	9.36	9.5	8.35	9.21	8.7
Conductivity (EC)	uS/cm	717	1241	1157	1127	804	1580	893

Table 1.2: Chemical Analytical Results

Sample ID:		Ewert D.1						
Site Number:		2						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	67	81	81	80	79	131	83
Ammonia-N	mg/L	<0.050	<0.050	0.198	<0.050	0.082	0.304	0.052
Total Kjeldahl Nitrogen	mg/L	3.52	2.66	3.15	3.13	2.95	6.65	3.06
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	31.7	20	24.8	24.9	23.4	37.2	24.3
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00043	0.00013
Barium	mg/L	0.0581	0.044	0.0789	0.0584	0.0826	0.0506	0.0699
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000099	0.0000059
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00013	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00060	0.00025
Copper	mg/L	0.0037	<0.0010	<0.0010	<0.0010	<0.001	0.00180	0.00360
Iron	mg/L	0.055	<0.030	0.027	0.098	0.031	0.062	0.012
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	0.000176	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00252	0.00142
Nickel	mg/L	0.0043	0.0026	0.0046	0.0027	0.0037	0.00581	0.00424
Zinc	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0074	0.0026	<0.0010
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000052	0.0000081
Aluminium	mg/L	0.022	<0.010	<0.010	<0.010	<0.01	0.0167	0.0025
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	0.057	0.058	0.057	0.052	0.061	0.059	0.073
Manganese	mg/L	0.0096	<0.0050	<0.0020	0.0046	<0.002	0.00448	0.00161
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000347	0.000248
Titanium	mg/L	0.0027	<0.0010	<0.0010	<0.0010	<0.001	0.00118	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.0012	<0.0010	<0.0010	<0.0010	<0.001	0.00286	<0.00050
Routine Water								
Ion Balance	%	108	95.5	92.4	107	109	102	111
Bicarbonate	mg/L	298	350	392	272	310	285	354
Chloride	mg/L	13	20.8	20.4	32.0	23.7	27.2	31.5
Carbonate	mg/L	18	21.2	10.3	18.6	14.3	15.8	6.6
Conductivity (EC)	uS/cm	662	692	727	597	648	622	759
Calcium	mg/L	15.3	15.3	16.8	11.8	17.3	10.6	24.8
Potassium	mg/L	13.6	14.6	15.5	17.7	17.8	14.4	19.2
Magnesium	mg/L	8.72	10.6	9.01	10.8	10.3	5.81	12.9
Sodium	mg/L	129	118	124	109	111	115	134
Sulfate	mg/L	50.9	21.4	31.2	13.3	10.8	14.4	39.6
Phosphorus	mg/L	0.332	0.244	0.219	0.207	0.158	0.559	0.28
pH in H20	pH	8.78	8.71	8.56	8.84	8.72	8.81	8.45
TDS (Calculated)	mg/L	395	394	420	347	358	344	444
Nitrate	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.043	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	0.016	<0.010
Field Data								
pH in H_20	pH	9.61	9.61	8.69	9.7	8.5	9.45	8.8
Conductivity (EC)	uS/cm	846	846	748	620	464	642	778

Table 1.3: Chemical Analytical Results

Sample ID:		Ewert D.2						
Site Number:		3						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	55.2	62	77	53	61	158	61
Ammonia-N	mg/L	<0.050	<0.050	0.174	<0.050	<0.05	0.127	<0.05
Total Kjeldahl Nitrogen	mg/L	2.12	1.9	2.44	1.60	1.8	2.62	1.94
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	22.4	18	22.9	31.7	18.2	23.4	21
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00021	0.00015
Barium	mg/L	0.0454	0.0361	0.0532	0.0540	0.0482	0.0511	0.041
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00036	0.00014
Copper	mg/L	0.0036	<0.0010	0.0016	<0.0010	<0.001	0.00063	0.00797
Iron	mg/L	0.085	0.073	0.098	0.046	0.032	0.083	0.045
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	0.000072	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00108	0.000744
Nickel	mg/L	0.0065	0.0048	0.0053	0.0048	0.0034	0.0042	0.00457
Zinc	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.006	0.0010	0.0020
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000066
Aluminium	mg/L	<0.010	0.01	0.055	<0.010	<0.01	0.0055	0.0011
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.038	0.05
Manganese	mg/L	<0.0020	<0.0050	0.0021	0.0067	<0.002	0.00205	0.00125
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000243	0.000245
Titanium	mg/L	<0.0010	<0.0010	0.003	<0.0010	<0.001	0.00034	<0.0003
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.00001
Vanadium	mg/L	<0.0010	<0.0010	0.0012	<0.0010	<0.001	0.00096	0.00072
Routine Water								
Ion Balance	%	109	88.3	97.3	105	109	97.5	100
Bicarbonate	mg/L	238	272	341	306	281	312	355
Chloride	mg/L	10.5	10.3	13.7	15.5	13.2	18.0	31.3
Carbonate	mg/L	7.9	8.7	7.5	8.8	11	8.2	5
Conductivity (EC)	uS/cm	546	571	661	580	568	614	723
Calcium	mg/L	20.9	15.3	12.9	21.5	19.1	16.0	28.2
Potassium	mg/L	12.8	10.4	12.9	15.3	14.5	15.7	15.5
Magnesium	mg/L	7.76	6.78	6.99	8.89	8.08	8.00	11.90
Sodium	mg/L	93.8	85.6	124	101	98.6	98.4	118
Sulfate	mg/L	55.1	47	44	26.8	19.9	19.0	48.4
Phosphorus	mg/L	0.164	0.262	0.223	0.108	0.163	0.224	0.262
pH in H20	pH	8.58	8.61	8.53	8.52	8.65	8.50	8.41
TDS (Calculated)	mg/L	326	318	390	348	322	337	434
Nitrate	mg/L	<0.050	<0.050	0.12	<0.050	<0.05	<0.020	<0.02
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.01
Field Data								
pH in H_20	pH	9.03	9.79	8.8	9.9	8.29	8.94	8.9
Conductivity (EC)	uS/cm	862	382	660	596	565	624	740

Table 1.4: Chemical Analytical Results

Sample ID:		**Ewert D.3**						
Site Number:		**4**						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	62.5	81	72	53	30	117	74
Ammonia-N	mg/L	<0.050	<0.050	2.15	<0.050	<0.05	0.785	0.641
Total Kjeldahl Nitrogen	mg/L	2.08	2.66	4.3	2.04	1.88	5.40	3.84
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	22.9	21	27.8	23.5	19.3	28.4	27.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00050	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00018	0.0001
Barium	mg/L	0.0431	0.0261	0.0631	0.0330	0.0302	0.0300	0.0433
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00014
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00039	0.00024
Copper	mg/L	0.0023	<0.0010	0.0012	<0.0010	<0.001	<0.00020	0.00661
Iron	mg/L	0.05	0.194	0.236	0.037	0.247	0.089	1.79
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	0.000132
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000746	0.000389
Nickel	mg/L	0.0043	0.0025	0.0047	0.0024	<0.002	0.00122	0.00222
Zinc	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0089	<0.0010	0.0024
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000069
Aluminium	mg/L	<0.010	<0.010	0.113	<0.010	<0.01	0.0024	0.0473
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.029	0.044
Manganese	mg/L	<0.0020	<0.0050	0.082	0.0027	<0.002	0.0025	0.00451
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000135	0.000153
Titanium	mg/L	<0.0010	<0.0010	0.004	<0.0010	<0.001	<0.00030	0.00264
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	<0.0010	<0.0010	0.0013	<0.0010	<0.001	0.00099	0.00102
Routine Water								
Ion Balance	%	104	93.9	94.1	104	106	98.3	106
Bicarbonate	mg/L	241	259	298	245	200	205	247
Chloride	mg/L	25.4	52.2	63.1	51.5	32.9	65.3	51
Carbonate	mg/L	7.2	<5.0	<5.0	<5.0	<5	<5.0	<5.0
Conductivity (EC)	uS/cm	506	608	682	547	448	568	549
Calcium	mg/L	20.2	23.2	19.4	22.2	18.8	15.0	25.7
Potassium	mg/L	14	12.7	15.7	16.4	15.8	17.1	15
Magnesium	mg/L	7.68	9.81	9.67	10.3	7.96	8.28	10.5
Sodium	mg/L	78.6	76.2	96.1	79.4	57.1	75.5	76.3
Sulfate	mg/L	13.4	11.8	10.4	6.55	1.09	4.24	3.93
Phosphorus	mg/L	0.12	0.639	0.203	0.224	0.18	0.317	0.596
pH in H_20	pH	8.56	8.41	8.37	8.32	8.45	8.21	8.23
TDS (Calculated)	mg/L	285	316	365	309	236	286	304
Nitrate	mg/L	<0.050	0.06	0.309	<0.050	<0.05	<0.020	0.083
Nitrite	mg/L	<0.050	<0.050	0.083	<0.050	<0.02	<0.010	0.039
Field Data								
pH in H_20	pH	9.25	8.34	8.41	8.8	8.1	9.27	8.4
Conductivity (EC)	uS/cm	726	422	681	564	521	588	522

Table 1.5: Chemical Analytical Results

Sample ID:		**Ewert D.4**						
Site Number:		**5**						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 12/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	69.6	66	95	67	79	109	30
Ammonia-N	mg/L	<0.050	0.055	0.103	0.098	<0.05	0.059	<0.050
Total Kjeldahl Nitrogen	mg/L	3.2	2.8	3.17	2.82	2.25	3.33	2.88
Total Organic Carbon	mg/L	-	-	-	-		-	-
Dissolved Organic Carbon	mg/L	28	27.2	30.6	26.6	23	31.9	29.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00031	0.00018
Barium	mg/L	0.0843	0.0335	0.0722	0.148	0.0639	0.0651	0.0524
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.0010	0.00035
Copper	mg/L	0.0042	<0.0010	0.0017	0.0011	<0.001	0.00139	0.00084
Iron	mg/L	0.171	0.044	0.152	0.044	0.043	0.111	0.04
Lead	mg/L	0.00019	<0.00010	<0.0050	<0.00010	<0.0001	0.000119	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00329	0.00216
Nickel	mg/L	0.0063	0.0056	0.0066	0.0079	0.0052	0.00487	0.00606
Zinc	mg/L	<0.0020	<0.0020	0.002	<0.0020	0.0087	<0.0010	0.001
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000108
Aluminium	mg/L	0.053	0.011	<0.010	<0.010	<0.01	0.0238	0.0013
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.035	0.046
Manganese	mg/L	0.007	<0.0020	0.0024	<0.0020	<0.002	0.0038	0.00066
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	0.00046	<0.00040	<0.00080	<0.00040	<0.0004	0.000372	0.000302
Titanium	mg/L	0.0037	<0.0010	0.0025	<0.0010	<0.001	0.00345	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.0013	<0.0010	0.0014	<0.0010	<0.001	0.00294	<0.00050
Routine Water								
Ion Balance	%	106	92	93.1	106	108	96.2	114
Bicarbonate	mg/L	313	336	369	357	303	280	324
Chloride	mg/L	19.7	15.2	19.4	21.4	15.2	18.5	17.5
Carbonate	mg/L	14.9	7	13.9	10.0	12.2	38.0	<5.0
Conductivity (EC)	uS/cm	606	613	666	668	587	627	599
Calcium	mg/L	15.4	15.9	12.8	27.7	19.4	10.7	21.9
Potassium	mg/L	9.43	10.2	10.1	14.3	12.8	13.4	13.3
Magnesium	mg/L	8.85	10	7.97	13.1	11.1	9.75	12
Sodium	mg/L	116	95	122	114	98.6	106	105
Sulfate	mg/L	11.7	17.8	15.1	28.1	9.27	6.33	15.1
Phosphorus	mg/L	0.271	0.2	0.265	0.129	0.178	0.239	0.248
pH in H_20	pH	8.7	8.46	8.68	8.50	8.64	9.14	8.38
TDS (Calculated)	mg/L	350	336	383	404	327	341	349
Nitrate	mg/L	<0.050	<0.050	<0.050	0.056	<0.05	<0.020	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data								
pH in H_20	pH	9.06	8.99	9.18	8.9	8.57	9.66	8.5
Conductivity (EC)	uS/cm	744	1000	664	691	424	650	623

Table 1.6: Chemical Analytical Results

Sample ID:		Lyons D.1						
Site Number:		6						
Date Sampled:	Units	Oct 18/10	Oct 13/11	Oct 15/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	59.8	63	83	75	71	101	71
Ammonia-N	mg/L	0.155	0.202	0.252	<0.050	<0.05	0.053	1.35
Total Kjeldahl Nitrogen	mg/L	2.91	2.19	2.81	2.59	1.95	3.63	3.62
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	22.9	28.6	26.8	27.1	19.8	26.8	25
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00025	0.00013
Barium	mg/L	0.0554	0.0296	0.033	0.0623	0.0417	0.0472	0.0448
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.0002
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00050	0.0003
Copper	mg/L	0.0073	0.0011	0.0013	<0.0010	<0.001	0.00065	0.00066
Iron	mg/L	0.015	0.089	0.03	0.094	0.024	0.040	0.629
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	0.000189
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000878	0.000596
Nickel	mg/L	0.0035	0.0035	0.0035	0.0038	0.0029	0.00278	0.00337
Zinc	mg/L	<0.0020	0.0027	<0.0020	<0.0020	0.0052	<0.0010	0.0012
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	<0.010	<0.010	<0.010	<0.010	<0.01	0.0040	0.0962
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	<0.050	0.078	0.065	0.055	0.052	0.042
Manganese	mg/L	<0.0020	<0.0050	0.0023	0.0127	<0.002	0.0052	0.00338
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000202	0.000194
Titanium	mg/L	<0.0010	<0.0010	<0.0010	0.0012	<0.001	0.00047	0.00568
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	<0.0010	0.0016	0.0026	0.0023	0.0011	0.00334	0.00241
Routine Water								
Ion Balance	%	103	96.2	94.4	97.3	106	96.3	104
Bicarbonate	mg/L	257	304	291	311	224	213	277
Chloride	mg/L	21.3	19.9	18.4	29.2	22.1	20.9	19.4
Carbonate	mg/L	5.7	5.1	5.4	7.9	6.7	22.2	<5.0
Conductivity (EC)	uS/cm	591	649	605	595	490	526	523
Calcium	mg/L	22.1	22.5	17.5	23.4	22.4	16.7	21.2
Potassium	mg/L	15.5	16.2	16	17.3	14.6	15.3	19.3
Magnesium	mg/L	9.15	8.76	8.54	10.7	7.78	7.64	8.52
Sodium	mg/L	91.7	96.2	92.9	96.2	69.2	75.3	75.3
Sulfate	mg/L	50.2	47.1	45	32.4	14.9	23.9	11.6
Phosphorus	mg/L	0.245	0.846	0.394	0.346	0.417	0.344	0.931
pH in H_20	pH	8.49	8.44	8.48	8.50	8.53	9.00	8.26
TDS (Calculated)	mg/L	342	366	347	370	268	287	295
Nitrate	mg/L	<0.050	0.235	<0.050	<0.050	<0.05	<0.020	0.588
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	0.077
Field Data								
pH in H_20	pH	8.90	8.11	9.10	9.1	8.42	9.51	8.2
Conductivity (EC)	uS/cm	886	300	604	609	491	547	517

Table 1.7: Chemical Analytical Results

Sample ID:		**Lyons D.2**						
Site Number:		**7**						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	55.6	77	71	71	84	103	80
Ammonia-N	mg/L	<0.050	0.663	<0.050	<0.050	<0.05	0.051	0.685
Total Kjeldahl Nitrogen	mg/L	2.53	3.15	2.56	3.83	2.62	3.75	3.69
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	20.5	30.4	25	25.2	21.5	27.4	26.9
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00023	0.00013
Barium	mg/L	0.041	0.0504	0.0469	0.0291	0.0503	0.0403	0.0263
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00017
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00026	0.00029
Copper	mg/L	0.0034	<0.0010	0.0013	0.0012	<0.001	0.00071	0.00073
Iron	mg/L	0.023	0.839	0.016	0.028	0.036	0.013	0.268
Lead	mg/L	<0.00010	0.00032	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000755	0.000696
Nickel	mg/L	0.0038	0.0043	0.0034	0.0030	0.0027	0.00223	0.00433
Zinc	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0054	<0.0010	0.0026
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000007
Aluminium	mg/L	<0.010	0.027	<0.010	0.015	<0.01	0.0070	0.0058
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	0.056	<0.050	<0.050	<0.05	0.053	0.026
Manganese	mg/L	<0.0020	0.0075	0.0055	0.0028	0.0026	0.0031	0.00297
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.0001
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000175	0.000252
Titanium	mg/L	<0.0010	0.0028	<0.0010	<0.0010	<0.001	<0.00030	0.0013
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.0022	0.0022	0.002	0.0022	0.001	0.00394	0.00253
Routine Water								
Ion Balance	%	106	96.6	98.5	108	106	96.6	101
Bicarbonate	mg/L	257	254	354	300	270	279	222
Chloride	mg/L	25	14.1	24.3	32.8	26.9	28.6	11.8
Carbonate	mg/L	33.7	<5.0	12.3	10.9	13.8	14.6	<5.0
Conductivity (EC)	uS/cm	799	505	737	653	590	604	408
Calcium	mg/L	26.1	20.6	25.6	19.1	22.2	15.5	19.3
Potassium	mg/L	22.7	14.1	21.5	18.6	17	19.0	15.2
Magnesium	mg/L	11.6	7.82	10.7	10.5	8.17	7.80	7.55
Sodium	mg/L	137	67.8	117	116	94.8	93.0	51.6
Sulfate	mg/L	108	29.8	48.8	28.4	15.6	13.3	12.5
Phosphorus	mg/L	0.372	0.994	0.346	0.523	0.484	0.392	0.954
pH in H_20	pH	9.05	8.33	8.64	8.57	8.73	8.75	8.15
TDS (Calculated)	mg/L	491	282	435	384	332	329	227
Nitrate	mg/L	<0.050	0.373	<0.050	<0.050	<0.05	<0.020	0.02
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	0.017
Field Data								
pH in H_20	pH	9.98	8.06	9.17	9.0	8.78	9.53	8.2
Conductivity (EC)	uS/cm	884	375	721	670	579	617	397

Table 1.8: Chemical Analytical Results

Sample ID:		**Lyons D.3**						
Site Number:		**8**						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	64.1	86	108	67	127	150	149
Ammonia-N	mg/L	0.133	0.264	0.434	<0.050	0.08	0.256	0.099
Total Kjeldahl Nitrogen	mg/L	2.98	3.48	4.78	2.39	5.93	5.61	6.45
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	24.5	30.4	34.9	29.5	27.6	47.3	35.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	0.00052	0.00076	0.00043
Barium	mg/L	0.0733	0.0607	0.105	0.0416	0.0408	0.119	0.0567
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000062	0.0000078
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00015
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	0.00100	0.00123
Copper	mg/L	0.0062	0.0033	0.0033	0.0028	0.0031	0.00334	0.0046
Iron	mg/L	0.057	0.537	0.114	0.032	0.039	0.030	0.025
Lead	mg/L	<0.00010	0.00029	<0.0050	<0.00010	<0.0001	<0.000050	<0.000005
Molybdenum	mg/L	<0.0050	<0.0050	0.0087	0.0062	0.007	0.0116	0.00669
Nickel	mg/L	0.0106	0.0093	0.0128	0.0089	0.0128	0.0135	0.0135
Zinc	mg/L	<0.0020	0.0024	<0.0020	<0.0020	0.0069	<0.0010	<0.0010
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000051
Aluminium	mg/L	<0.010	0.471	0.095	0.036	0.014	0.0507	0.0166
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	0.055	<0.050	<0.050	<0.050	0.061	0.052	0.068
Manganese	mg/L	0.0089	0.0088	0.0195	0.0021	0.0174	0.00259	0.00127
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000001
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	0.00072	0.00067	0.00085	0.00067	0.00084	0.00141	0.000916
Titanium	mg/L	<0.0010	0.0168	0.0057	0.0022	0.0019	0.00143	0.00098
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000001
Vanadium	mg/L	<0.0010	0.0034	<0.0010	0.0018	0.0028	0.00110	0.0016
Routine Water								
Ion Balance	%	108	95	96.9	102	110	95.3	112
Bicarbonate	mg/L	329	380	389	376	339	474	353
Chloride	mg/L	27.4	20.8	37.8	21.5	20.4	34.0	25.7
Carbonate	mg/L	17.2	7.4	7.8	20.4	25.8	13.5	7.7
Conductivity (EC)	uS/cm	807	733	948	815	937	1210	855
Calcium	mg/L	42.4	24.2	17	28.6	33.2	24.4	42.4
Potassium	mg/L	22.7	15.8	17	21.2	22	20.9	27.6
Magnesium	mg/L	18.3	13.6	12.4	18.2	18.5	14.6	21.2
Sodium	mg/L	115	108	168	136	154	207	118
Sulfate	mg/L	87.4	36.6	108	85.6	122	160	89.4
Phosphorus	mg/L	0.208	0.518	0.503	0.101	0.472	0.620	0.721
pH in H_20	pH	8.63	8.48	8.49	8.68	8.89	8.54	8.45
TDS (Calculated)	mg/L	492	414	559	517	563	709	507
Nitrate	mg/L	<0.050	0.211	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data								
pH in H_20	pH	9.22	8.26	8.45	9.1	9.32	8.68	9.0
Conductivity (EC)	uS/cm	627	200	940	825	943	1233	876

Table 1.9: Chemical Analytical Results

Sample ID:		**Lyons D.4**						
Site Number:		**9**						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 12/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	84.4	165	149	95	132	155	120
Ammonia-N	mg/L	<0.050	0.143	0.491	<0.050	0.055	0.137	0.111
Total Kjeldahl Nitrogen	mg/L	4.36	6.18	4.78	3.71	4.04	6.38	6.87
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	33.6	69.2	56.5	37.8	42	47.7	49.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00069	0.00024
Barium	mg/L	0.0785	0.0171	0.0556	0.0851	0.0658	0.124	0.0338
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000103	0.0000097
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00011	0.00042
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00133	0.00063
Copper	mg/L	0.004	<0.0010	0.0013	0.0012	0.0015	0.00181	0.00152
Iron	mg/L	2.12	0.998	0.268	0.067	1.18	0.216	0.995
Lead	mg/L	0.00065	<0.00010	<0.0050	<0.00010	0.00054	0.000267	0.00028
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00953	0.00113
Nickel	mg/L	0.0057	<0.0020	0.0092	0.0072	0.0062	0.0126	0.00526
Zinc	mg/L	<0.0020	<0.0020	0.0035	<0.0020	0.0066	<0.0010	0.0027
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	0.069	0.03	0.045	0.066	0.032	0.0313	0.0755
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.052	<0.010
Manganese	mg/L	0.03	0.0484	0.0031	0.0022	0.0062	0.00197	0.00355
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000626	0.000393
Titanium	mg/L	0.0092	0.0024	0.0083	0.0026	0.0109	0.00518	0.0061
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.003	0.0014	0.0051	0.0018	0.0022	0.00199	0.00334
Routine Water								
Ion Balance	%	109	92.8	94.8	110	104	98.9	110
Bicarbonate	mg/L	318	470	599	425	297	413	356
Chloride	mg/L	13.6	33.7	48.4	19.1	16.1	32.3	29.8
Carbonate	mg/L	6.4	<5.0	17.3	7.5	9.8	10.6	<5
Conductivity (EC)	uS/cm	553	921	1090	730	559	834	675
Calcium	mg/L	27.7	29.4	31.9	36.6	25.3	28.7	23.5
Potassium	mg/L	21.5	38.7	39.3	35.4	28.5	36.0	35.6
Magnesium	mg/L	12.2	12.3	15.3	16.2	10.9	12.9	12.4
Sodium	mg/L	81.4	121	174	106	71.7	117	101
Sulfate	mg/L	6.13	36.5	15.7	6.24	5.18	25.8	6.68
Phosphorus	mg/L	1.39	5.07	1.48	0.361	1.88	0.531	2.2
pH in H_20	pH	8.43	8.37	8.56	8.41	8.57	8.50	8.4
TDS (Calculated)	mg/L	325	507	637	436	314	467	389
Nitrate	mg/L	<0.050	0.092	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data								
pH in H_20	pH	9.24	7.94	8.33	8.6	8.16	8.86	8.5
Conductivity (EC)	uS/cm	867	300	1093	750	408	846	703

Table 1.10: Chemical Analytical Results

Sample ID:		**Magneson D.1**						
Site Number:		**10**						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 12/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	134	280	211	149	257	197	320
Ammonia-N	mg/L	0.167	0.134	0.138	0.086	0.157	0.215	0.571
Total Kjeldahl Nitrogen	mg/L	10.2	9.14	7.93	3.88	8.78	8.94	12.3
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	72.3	85.5	64	77.4	58.1	93.9	106
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13
CCME Metals								
Antimony	mg/L	0.00067	<0.00040	<0.00080	0.00049	<0.0004	0.00044	0.00045
Barium	mg/L	0.0474	0.031	0.0645	0.0712	0.0308	0.0376	0.0623
Cadmium	mg/L	0.000055	0.000055	<0.0010	0.000074	<0.00005	0.000043	0.00005
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00104	0.00114
Cobalt	mg/L	0.0026	0.0033	0.0044	0.0042	<0.002	0.00336	0.00442
Copper	mg/L	0.0922	0.169	0.198	0.107	0.484	0.309	0.094
Iron	mg/L	0.861	0.864	1.37	2.09	0.42	0.784	1.41
Lead	mg/L	0.00083	0.0006	<0.0050	0.00284	0.00039	0.00053	0.00134
Molybdenum	mg/L	0.0054	<0.0050	0.005	<0.0050	<0.005	0.00595	0.00523
Nickel	mg/L	0.0239	0.0214	0.0316	0.0283	0.0226	0.0261	0.0287
Zinc	mg/L	0.0065	0.0103	0.0143	0.0174	0.0304	0.0055	0.0123
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000205	<0.0000050
Aluminium	mg/L	0.866	0.59	1.63	1.84	<0.01	0.326	0.168
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00020
Boron	mg/L	0.115	0.072	0.086	0.085	0.087	0.087	0.107
Manganese	mg/L	0.079	0.0699	0.232	0.440	0.0279	0.280	0.179
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	0.000034
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020
Selenium	mg/L	<0.0020	0.00069	0.00084	0.00067	0.00051	0.00076	0.00077
Titanium	mg/L	0.0546	0.0342	0.0754	0.0836	0.0031	0.0226	0.0135
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000020
Vanadium	mg/L	0.0121	0.0106	0.0246	0.0201	0.0108	0.0139	0.0152
Routine Water								
Ion Balance	%	94.5	91.6	97.4	106	109	102	108
Bicarbonate	mg/L	481	440	482	453	434	474	540
Chloride	mg/L	149	126	142	136	151	147	174
Carbonate	mg/L	28.4	7.9	15.5	14.0	19.7	12.5	15
Conductivity (EC)	uS/cm	1930	1590	1750	1680	1830	1870	2030
Calcium	mg/L	44.3	32.8	40.3	45.7	42.9	43.1	48.8
Potassium	mg/L	80.2	82.7	99.4	96.0	113	111	131
Magnesium	mg/L	20.2	14.3	19.7	19.9	19.3	18.9	25.1
Sodium	mg/L	288	208	251	263	284	250	304
Sulfate	mg/L	312	202	245	241	260	228	250
Phosphorus	mg/L	5.38	5.26	4.69	4.29	6.43	5.71	7.1
pH in H_20	pH	8.72	8.47	8.6	8.53	8.7	8.50	8.54
TDS (Calculated)	mg/L	1160	892	1050	1040	1110	1050	1220
Nitrate	mg/L	0.138	0.419	0.517	0.882	0.473	0.662	0.43
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	0.034
Field Data								
pH in H_20	pH	9.92	8.65	8.73	8.8	8.21	8.34	8.8
Conductivity (EC)	uS/cm	2080	450	1772	1720	1872	1951	2030

Table 1.11: Chemical Analytical Results

Sample ID:		Magneson D.2						
Site Number:		11						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 12/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	124	185	EMPTY	298	215	267	126
Ammonia-N	mg/L	0.605	0.82		0.187	0.094	0.241	0.076
Total Kjeldahl Nitrogen	mg/L	16.7	11.5		4.11	8.76	13.6	4.64
Total Organic Carbon	mg/L	-	-		-	-	-	-
Dissolved Organic Carbon	mg/L	51.2	77		51.9	39.3	35.6	41.3
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	EMPTY	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050		<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050		<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071		<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10		<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10		<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25		0.44	<0.25	<0.20	<0.13
CCME Metals								
Antimony	mg/L	0.00044	0.00047	EMPTY	<0.00040	<0.0004	0.00040	0.00021
Barium	mg/L	0.0544	0.0685		0.124	0.0733	0.0963	0.0276
Cadmium	mg/L	<0.000050	<0.000050		<0.000050	<0.00005	0.0000095	0.0000108
Chromium	mg/L	<0.0050	<0.0050		<0.0050	<0.005	0.00013	0.00034
Cobalt	mg/L	0.002	<0.0020		0.0024	0.0028	0.00197	0.00079
Copper	mg/L	0.0091	0.0044		<0.0010	<0.001	0.00078	0.00204
Iron	mg/L	0.11	0.159		0.725	0.987	0.592	0.7
Lead	mg/L	<0.00010	0.00014		0.00014	0.00034	0.000141	0.000212
Molybdenum	mg/L	<0.0050	<0.0050		0.0129	<0.005	0.0162	0.00198
Nickel	mg/L	0.0149	0.014		0.0118	0.0104	0.0129	0.00687
Zinc	mg/L	<0.0020	0.0024		<0.0020	0.0065	0.0013	0.0019
Mercury	mg/L	<0.00010	<0.00010		<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	0.021	0.095		0.016	0.018	0.0069	0.132
Beryllium	mg/L	<0.0010	<0.0010		<0.0010	<0.001	<0.00010	<0.0001
Boron	mg/L	0.058	<0.050		0.058	<0.05	0.038	0.038
Manganese	mg/L	0.0342	0.0063		0.424	0.344	0.384	0.00264
Silver	mg/L	<0.00010	<0.00010		<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050		<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.0020	0.00074		0.00051	<0.0004	0.000899	0.000297
Titanium	mg/L	0.0027	0.0065		0.0019	0.0018	0.00171	0.0056
Thallium	mg/L	<0.00010	<0.00010		<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.0074	0.0069		0.0075	0.0019	0.00533	0.00443
Routine Water								
Ion Balance	%	110	91.3	EMPTY	102	107	97	114
Bicarbonate	mg/L	335	501		457	297	409	241
Chloride	mg/L	56.9	42.7		41.8	25.6	63.5	22.4
Carbonate	mg/L	9.9	11.5		14.5	11.8	6.0	<5
Conductivity (EC)	uS/cm	832	946		853	590	904	499
Calcium	mg/L	38.1	30.7		44.8	34.4	40.5	22.8
Potassium	mg/L	47.8	45.3		57.6	38.3	51.5	34
Magnesium	mg/L	15.8	12.2		16.9	12.6	13.7	9.57
Sodium	mg/L	110	121		98.3	61.5	99.8	58.6
Sulfate	mg/L	45.2	3.76		3.38	0.8	16.6	2.91
Phosphorus	mg/L	4.56	2.48		1.69	2.42	1.35	1.93
pH in H_20	pH	8.49	8.5		8.53	8.64	8.40	8.28
TDS (Calculated)	mg/L	491	514		502	331	494	270
Nitrate	mg/L	0.574	0.06		<0.050	<0.05	<0.020	0.248
Nitrite	mg/L	<0.050	<0.050		<0.050	<0.02	<0.010	<0.010
Field Data								
pH in H_20	pH	9.95	8.45	EMPTY	8.6	8.45	9.09	8.8
Conductivity (EC)	uS/cm	997	300		864	433	931	508

Table 1.12: Chemical Analytical Results

Sample ID:		Magneson D.3						
Site Number:		12						
Date Sampled:	**Units**	**Oct 19/10**	**Oct 12/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	45.1	42	49	37	59	49	37
Ammonia-N	mg/L	<0.050	<0.050	0.116	<0.050	<0.05	0.252	<0.050
Total Kjeldahl Nitrogen	mg/L	1.65	1.22	1.77	1.44	1.48	1.97	1.29
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	15.1	17.8	19.1	19.5	15.5	17.6	17.3
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00054	0.00031
Barium	mg/L	0.0455	0.0687	0.0798	0.0262	0.0425	0.0968	0.0264
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000084	0.0000249
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00024	0.00018
Copper	mg/L	0.0087	0.0011	0.0015	0.0016	0.0014	0.00136	0.0013
Iron	mg/L	0.014	0.102	0.047	0.036	<0.01	0.018	<0.010
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	0.0217	0.0146	0.0169	0.0225	0.0212	0.0302	0.0302
Nickel	mg/L	0.0105	0.0113	0.0116	0.0127	0.013	0.0191	0.0172
Zinc	mg/L	<0.0020	0.0021	<0.0020	<0.0020	0.0079	0.0021	0.0015
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	0.011	0.012	0.031	0.039	<0.01	0.0233	0.0023
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	0.058	0.055	0.055	0.053	0.065	0.061
Manganese	mg/L	<0.0020	<0.0020	<0.0020	0.0020	<0.002	0.0009	0.00027
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000412	0.000322
Titanium	mg/L	<0.0010	<0.0010	0.0023	0.0025	<0.001	0.00114	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.0015	0.0034	0.005	0.0127	0.0096	0.00866	0.0164
Routine Water								
Ion Balance	%	95.7	93.6	94.2	104	104	94.5	99.8
Bicarbonate	mg/L	189	267	290	253	230	251	256
Chloride	mg/L	24	19.2	24.5	24.4	21.3	20.9	18.2
Carbonate	mg/L	<5.0	7.1	6	6.7	8.4	<5.0	<5.0
Conductivity (EC)	uS/cm	989	928	1060	993	957	987	943
Calcium	mg/L	25.5	34.4	27.4	26.4	24.4	31.3	27.9
Potassium	mg/L	8.8	8.06	10.9	11.6	10.7	11.5	10.4
Magnesium	mg/L	13.1	13.5	14.2	16.0	14.7	11.8	15.5
Sodium	mg/L	153	132	171	172	162	142	153
Sulfate	mg/L	282	203	252	239	229	231	234
Phosphorus	mg/L	0.161	0.118	0.091	0.051	0.132	0.134	0.038
pH in H_20	pH	8.44	8.51	8.49	8.46	8.62	8.36	8.23
TDS (Calculated)	mg/L	603	549	649	620	583	576	585
Nitrate	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data								
pH in H_20	pH	8.85	8.57	8.86	9.2	8.68	8.57	8.8
Conductivity (EC)	uS/cm	1055	689	1053	1007	693	996	930

Table 1.13: Chemical Analytical Results

Sample ID:		Magneson D.4						
Site Number:		13						
Date Sampled:	Units	Oct 18/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	4810	1220	1550	1560	1580	1190	1300
Ammonia-N	mg/L	5.11	4.39	2.04	2.24	0.828	1.37	3.13
Total Kjeldahl Nitrogen	mg/L	128	44.6	63.8	49.7	54.7	52.8	56.1
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	1430	554	392	756	609	531	507
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	0.00318	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	0.00107	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	0.00825	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.625	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13
CCME Metals								
Antimony	mg/L	<0.0080	<0.00080	0.00121	<0.01	<0.001	0.0013	0.00082
Barium	mg/L	0.317	0.0722	0.305	0.113	0.137	0.330	0.188
Cadmium	mg/L	<0.0010	<0.00010	<0.0010	<0.0010	0.00017	0.000114	0.000094
Chromium	mg/L	<0.0080	<0.010	0.0057	<0.010	<0.005	0.0119	0.00483
Cobalt	mg/L	0.0218	<0.0040	0.013	0.014	0.0144	0.0154	0.0128
Copper	mg/L	0.016	0.0031	0.0283	0.024	0.0335	0.0263	0.0138
Iron	mg/L	4.93	5.83	6.3	2.3	3.64	9.88	3.92
Lead	mg/L	0.003	0.00103	<0.0050	<0.0050	0.0044	0.00689	0.00385
Molybdenum	mg/L	<0.0050	<0.010	0.0189	0.0409	0.0078	0.0179	0.00911
Nickel	mg/L	0.0998	0.0122	0.0658	0.085	0.0507	0.0553	0.0497
Zinc	mg/L	0.094	0.0106	0.0284	<0.10	0.053	0.047	0.0421
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000184	<0.000050
Aluminium	mg/L	0.23	0.617	1.09	0.45	0.075	5.79	0.273
Beryllium	mg/L	<0.010	<0.0020	<0.0010	<0.050	<0.001	<0.0010	<0.00050
Boron	mg/L	0.48	<0.10	0.318	<1.0	0.28	0.270	0.289
Manganese	mg/L	1.83	1.18	1.18	0.649	0.615	1.15	0.945
Silver	mg/L	<0.0020	<0.00020	<0.0050	<0.0010	<0.0001	0.00014	0.000092
Tin	mg/L	<0.050	<0.10	<0.050	<0.050	<0.05	<0.0010	<0.00050
Selenium	mg/L	<0.040	<0.00080	0.00225	<0.010	0.0016	0.00339	0.00192
Titanium	mg/L	0.128	0.0338	0.0989	0.083	0.0437	0.334	0.0677
Thallium	mg/L	<0.0010	<0.00020	<0.050	<0.0050	<0.0001	<0.00010	<0.000050
Vanadium	mg/L	0.0793	0.0072	0.0345	0.055	0.033	0.0481	0.0336
Routine Water								
Ion Balance	%	115	91.8	96.1	96.8	101	97.9	114
Bicarbonate	mg/L	2220	1320	2350	3210	1490	1540	1080
Chloride	mg/L	1190	480	1030	1930	807	744	615
Carbonate	mg/L	73	49.9	140	341	138	88.6	65.1
Conductivity (EC)	uS/cm	7840	4020	7490	11,800	5830	5640	4620
Calcium	mg/L	177	86.6	165	119	93.5	113	89.2
Potassium	mg/L	1290	481	976	1550	788	728	610
Magnesium	mg/L	112	44.9	90.6	148	60.8	59.2	60.3
Sodium	mg/L	915	365	898	1700	680	591	560
Sulfate	mg/L	341	141	521	856	343	331	308
Phosphorus	mg/L	44	30	44.5	48.1	41.6	34.4	34.8
pH in H_20	pH	8.54	8.56	8.72	8.88	8.96	8.73	8.74
TDS (Calculated)	mg/L	5290	2290	4980	8220	3640	3420	2840
Nitrate	mg/L	<5.0	<1.0	<0.50	<1.0	0.36	0.86	<0.10
Nitrite	mg/L	<0.50	<1.0	<0.50	<1.0	0.11	<0.050	<0.050
Field Data								
pH in H_20	pH	9.00	8.34	8.84	9.1	8.79	8.76	9.2
Conductivity (EC)	uS/cm	7290	300	7640	1201	5190	5720	4480

Table 1.14: Chemical Analytical Results

Sample ID:		**Magneson D.5**						
Site Number:		**14**						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 12/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	98.2	156	178	146	100	146	184
Ammonia-N	mg/L	0.087	0.135	0.084	<0.050	0.704	1.38	0.138
Total Kjeldahl Nitrogen	mg/L	8.29	5.73	7.03	4.24	4.16	6.24	6.84
Total Organic Carbon	mg/L	-	-	-	-		-	-
Dissolved Organic Carbon	mg/L	61.6	57.5	60.5	49.1	36.8	55.1	62.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	0.00082	0.00072	0.00099	0.00104	0.00047	0.00055	0.00049
Barium	mg/L	0.0459	0.0428	0.0737	0.0697	0.0402	0.0616	0.0324
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.000010
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	0.00043
Cobalt	mg/L	0.0035	0.0034	<0.0020	<0.0020	0.003	0.00218	0.00169
Copper	mg/L	0.0118	0.0063	0.0035	0.0031	0.0023	0.00201	0.00214
Iron	mg/L	0.064	0.05	0.098	0.143	<0.01	<0.020	0.322
Lead	mg/L	<0.00010	<0.00010	<0.0050	0.00020	<0.0001	<0.00010	0.00024
Molybdenum	mg/L	0.0122	0.0191	0.0458	0.0444	0.0131	0.0218	0.00595
Nickel	mg/L	0.0283	0.0314	0.0408	0.0253	0.0204	0.0236	0.0165
Zinc	mg/L	0.003	0.0021	<0.0020	<0.0020	0.0071	<0.0020	0.0028
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000118
Aluminium	mg/L	0.031	0.035	0.106	0.203	<0.01	0.0288	0.0636
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00020
Boron	mg/L	0.056	<0.050	<0.050	<0.050	<0.05	0.032	0.038
Manganese	mg/L	0.0384	0.0024	0.0033	0.0047	0.0375	0.00208	0.0381
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000020
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020
Selenium	mg/L	<0.0020	0.00121	0.00091	0.00072	0.00063	0.00087	0.00067
Titanium	mg/L	0.0041	0.0015	0.0037	0.0164	<0.001	0.00148	0.00805
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000020
Vanadium	mg/L	0.0074	0.0294	0.0365	0.0286	0.0162	0.0138	0.0178
Routine Water								
Ion Balance	%	105	91.5	95.3	103	111	94.5	107
Bicarbonate	mg/L	491	537	709	549	521	713	589
Chloride	mg/L	76.7	82.1	114	89.3	54.9	81.4	71.4
Carbonate	mg/L	19.8	73	46.7	68.9	42.9	40.3	22.4
Conductivity (EC)	uS/cm	1280	1610	1950	1480	1370	1640	1520
Calcium	mg/L	31.8	39.7	32.9	29.2	33.7	34.3	38.5
Potassium	mg/L	57	52.1	45	40.3	42	44.9	54.5
Magnesium	mg/L	13.2	16.9	14.6	11.3	15.6	13.5	20.4
Sodium	mg/L	227	252	363	296	261	274	263
Sulfate	mg/L	114	172	210	99.7	117	74.4	144
Phosphorus	mg/L	3.05	2.74	1.27	0.994	1.52	1.40	5.4
pH in H_20	pH	8.57	8.99	8.85	9.06	8.86	8.71	8.64
TDS (Calculated)	mg/L	788	952	1170	905	823	915	904
Nitrate	mg/L	1.68	<0.050	<0.050	<0.050	0.075	<0.040	<0.040
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	0.029	<0.020	<0.020
Field Data								
pH in H_20	pH	9.2	9.63	9.10	9.2	8.62	8.87	8.9
Conductivity (EC)	uS/cm	13.84	200	1953	1502	1389	1675	1509

Table 1.15: Chemical Analytical Results

Sample ID:		Magneson D.6	
Site Number:		15	
Date Sampled:	Units	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	121	106
Ammonia-N	mg/L	0.088	0.056
Total Kjeldahl Nitrogen	mg/L	4.06	4.16
Total Organic Carbon	mg/L	-	-
Dissolved Organic Carbon	mg/L	43.1	33
BTEX, F1 (C6-C10) and F2 (>C10-C16)			
Benzene	mg/L	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.10	<0.13
CCME Metals			
Antimony	mg/L	0.00080	0.0007
Barium	mg/L	0.0342	0.0266
Cadmium	mg/L	<0.000025	<0.000025
Chromium	mg/L	<0.00050	<0.0005
Cobalt	mg/L	0.00061	0.00086
Copper	mg/L	<0.0010	0.0016
Iron	mg/L	<0.050	<0.050
Lead	mg/L	<0.00025	<0.00025
Molybdenum	mg/L	0.00327	0.00254
Nickel	mg/L	0.0072	0.0069
Zinc	mg/L	<0.0050	<0.0050
Mercury	mg/L	<0.0000050	<0.0000050
Aluminium	mg/L	0.0224	0.0167
Beryllium	mg/L	<0.0005	<0.00050
Boron	mg/L	0.306	0.279
Manganese	mg/L	0.00404	0.00561
Silver	mg/L	<0.000050	<0.000050
Tin	mg/L	<0.00050	<0.00050
Selenium	mg/L	0.00033	0.00037
Titanium	mg/L	0.0016	<0.0015
Thallium	mg/L	<0.000050	<0.000050
Vanadium	mg/L	0.00450	0.0052
Routine Water			
Ion Balance	%	104	106
Bicarbonate	mg/L	593	343
Chloride	mg/L	334	235
Carbonate	mg/L	30.9	13.1
Conductivity (EC)	uS/cm	4080	2790
Calcium	mg/L	54.3	40.2
Potassium	mg/L	31.3	27.1
Magnesium	mg/L	55.5	42.5
Sodium	mg/L	785	528
Sulfate	mg/L	990	711
Phosphorus	mg/L	0.707	0.385
pH in H_20	pH	8.61	8.56
TDS (Calculated)	mg/L	2570	1770
Nitrate	mg/L	<0.10	<0.10
Nitrite	mg/L	<0.050	<0.050
Field Data			
pH in H_20	pH	8.68	9.5
Conductivity (EC)	uS/cm	4120	2730

Table 1.16: Chemical Analytical Results

Sample ID:		**Beaver W.1**						
Site Number:		**Previous 15**						
Date Sampled:	**Units**	**Oct 19/10**	**Oct 13/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L							
Ammonia-N	mg/L							
Total Kjeldahl Nitrogen	mg/L				Filled in			
Total Organic Carbon	mg/L							
Dissolved Organic Carbon	mg/L							
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L							
Toluene	mg/L							
Ethylbenzene	mg/L							
Xylenes	mg/L				Filled in			
F1 (C6-C10)	mg/L							
F1 - BTEX	mg/L							
F2 - (>C10-C16)	mg/L							
CCME Metals								
Antimony	mg/L							
Barium	mg/L							
Cadmium	mg/L							
Chromium	mg/L							
Cobalt	mg/L							
Copper	mg/L							
Iron	mg/L							
Lead	mg/L							
Molybdenum	mg/L							
Nickel	mg/L							
Zinc	mg/L							
Mercury	mg/L				Filled in			
Aluminium	mg/L							
Beryllium	mg/L							
Boron	mg/L							
Manganese	mg/L							
Silver	mg/L							
Tin	mg/L							
Selenium	mg/L							
Titanium	mg/L							
Thallium	mg/L							
Vanadium	mg/L							
Routine Water								
Ion Balance	%							
Bicarbonate	mg/L							
Chloride	mg/L							
Carbonate	mg/L							
Conductivity (EC)	uS/cm							
Calcium	mg/L							
Potassium	mg/L							
Magnesium	mg/L				Filled in			
Sodium	mg/L							
Sulfate	mg/L							
Phosphorus	mg/L							
pH in H_20	pH							
TDS (Calculated)	mg/L							
Nitrate	mg/L							
Nitrite	mg/L							
Field Data								
pH in H_20	pH				Filled in			
Conductivity (EC)	uS/cm							

Table 1.17: Chemical Analytical Results

Sample ID:		Beaver D.1						
Site Number:		16						
Date Sampled:	**Units**	**Oct 19/10**	**Oct 12/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	66.4	89	302	73	105	60	74
Ammonia-N	mg/L	<0.050	<0.050	<0.050	2.57	<0.05	0.168	<0.05
Total Kjeldahl Nitrogen	mg/L	2.21	2.62	3.98	4.30	3.69	1.61	2.67
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	24.9	29	29.9	29.5	25.6	22.7	22.5
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00025	0.00024
Barium	mg/L	0.037	0.0521	0.0799	0.0952	0.0558	0.0756	0.0581
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00035	0.0003
Copper	mg/L	0.0019	<0.0010	<0.0010	<0.0010	<0.001	0.00043	0.00034
Iron	mg/L	0.013	0.016	0.04	0.212	0.078	0.038	0.011
Lead	mg/L	<0.00010	<0.00010	<0.0050	0.00013	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00199	0.000986
Nickel	mg/L	0.0049	0.0036	0.0049	0.0047	0.0043	0.00725	0.00521
Zinc	mg/L	<0.0020	<0.0020	<0.0020	0.0051	0.0088	<0.0010	<0.0010
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000005
Aluminium	mg/L	0.022	<0.010	<0.010	0.059	<0.01	0.0119	0.0011
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	0.071	<0.050	<0.050	<0.050	<0.05	0.037	0.058
Manganese	mg/L	<0.0020	0.0025	<0.0020	0.248	0.0073	0.00078	0.00062
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000217	0.000194
Titanium	mg/L	<0.0010	<0.0010	<0.0010	0.0037	<0.001	0.00081	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.0024	0.0031	0.0072	0.0038	0.0036	0.00484	0.00328
Routine Water								
Ion Balance	%	93.9	93.5	95.8	101	109	98.6	100
Bicarbonate	mg/L	327	357	345	429	306	307	396
Chloride	mg/L	160	117	205	218	145	149	137
Carbonate	mg/L	11.1	12.8	9.3	11.6	25.2	<5.0	8.4
Conductivity (EC)	uS/cm	1280	1150	1420	1500	1130	1330	1230
Calcium	mg/L	42.1	46.3	43.7	55.7	50.2	53.0	49.4
Potassium	mg/L	13.8	13.4	20.2	21.8	14.9	16.3	16.8
Magnesium	mg/L	18.3	17.2	22.2	24.7	17.9	18.5	20.4
Sodium	mg/L	185	156	207	234	179	166	185
Sulfate	mg/L	122	97.7	114	98.6	55.4	127	93.7
Phosphorus	mg/L	0.568	0.876	0.615	1.45	1.42	0.160	0.612
pH in H_20	pH	8.51	8.54	8.52	8.46	8.85	8.23	8.44
TDS (Calculated)	mg/L	713	636	791	875	638	687	705
Nitrate	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	1.38	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	0.039	<0.010
Field Data								
pH in H_20	pH	9.33	8.50	8.78	8.9	8.84	8.68	8.5
Conductivity (EC)	uS/cm	1258	1468	1423	1564	1146	1323	1225

Table 1.18: Chemical Analytical Results

Sample ID:		Beaver D.2						
Site Number:		17						
Date Sampled:	Units	Oct 19/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 5/16
Chem. O_2 Demand	mg/L	173	105	58				
Ammonia-N	mg/L	0.2	<0.050	3.3				
Total Kjeldahl Nitrogen	mg/L	8.04	3.29	12.2		Filled in		
Total Organic Carbon	mg/L	-	-	-				
Dissolved Organic Carbon	mg/L	47.8	35.5	35.6				
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050				
Toluene	mg/L	<0.00050	<0.00050	<0.00050				
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050				
Xylenes	mg/L	<0.00071	<0.00071	<0.00071		Filled in		
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10				
F1 - BTEX	mg/L	<0.10	<0.10	<0.10				
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25				
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080				
Barium	mg/L	0.0806	0.0589	0.132				
Cadmium	mg/L	<0.000050	<0.000050	<0.0010				
Chromium	mg/L	<0.0050	<0.0050	<0.0050				
Cobalt	mg/L	<0.0020	<0.0020	<0.0020				
Copper	mg/L	0.009	<0.0010	<0.0010				
Iron	mg/L	0.028	0.291	0.099				
Lead	mg/L	<0.00010	0.00013	<0.0050				
Molybdenum	mg/L	<0.0050	<0.0050	0.0105				
Nickel	mg/L	0.0082	0.004	0.0091				
Zinc	mg/L	<0.0020	<0.0020	<0.0020				
Mercury	mg/L	<0.00010	<0.00010	<0.00010		Filled in		
Aluminium	mg/L	<0.010	<0.010	0.045				
Beryllium	mg/L	<0.0010	<0.0010	<0.0010				
Boron	mg/L	0.059	0.072	0.11				
Manganese	mg/L	0.0061	0.0038	0.333				
Silver	mg/L	<0.00010	<0.00010	<0.0050				
Tin	mg/L	<0.050	<0.050	<0.050				
Selenium	mg/L	<0.00040	<0.00040	<0.00080				
Titanium	mg/L	<0.0010	<0.0010	0.0029				
Thallium	mg/L	<0.00010	<0.00010	<0.050				
Vanadium	mg/L	0.0017	<0.0010	0.0012				
Routine Water								
Ion Balance	%	93.7	100	93.5				
Bicarbonate	mg/L	385	394	546				
Chloride	mg/L	34	21.9	32.5				
Carbonate	mg/L	32.3	10.5	9.6				
Conductivity (EC)	uS/cm	842	701	1040				
Calcium	mg/L	10.7	21.4	16.4				
Potassium	mg/L	14.8	13.5	15.7				
Magnesium	mg/L	5.26	7.45	7.35		Filled in		
Sodium	mg/L	160	127	199				
Sulfate	mg/L	25.6	6.02	61.6				
Phosphorus	mg/L	0.624	0.31	1.29				
pH in H_20	pH	8.92	8.54	8.48				
TDS (Calculated)	mg/L	472	402	611				
Nitrate	mg/L	<0.050	<0.050	<0.050				
Nitrite	mg/L	<0.050	<0.050	<0.050				
Field Data								
pH in H_20	pH	9.45	8.64	8.02		Filled in		
Conductivity (EC)	uS/cm	1255	600	1037				

Table 1.19: Chemical Analytical Results

Sample ID:		Norgaard D.1						
Site Number:		18						
Date Sampled:	Units	Oct 19/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	82.8	119	109	106	155	81	80
Ammonia-N	mg/L	<0.050	<0.050	<0.050	<0.050	0.062	1.31	0.553
Total Kjeldahl Nitrogen	mg/L	2.52	4.03	3.42	2.57	2.98	3.14	2.67
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	31.3	34.5	37	34.5	29.5	29.9	27.7
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	<0.00020	0.00012
Barium	mg/L	0.0779	0.086	0.0961	<0.0030	0.0947	0.096	0.0642
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	0.00015
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00045	0.00033
Copper	mg/L	0.0037	<0.0010	<0.0010	<0.0010	<0.001	<0.00040	0.00022
Iron	mg/L	0.025	0.034	0.024	0.022	0.073	0.033	0.129
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.00010	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00088	0.000341
Nickel	mg/L	0.0034	0.0025	0.0039	0.0043	0.0035	0.0057	0.00333
Zinc	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0085	<0.0020	0.0013
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	<0.010	<0.010	<0.010	0.022	<0.01	0.0056	0.0086
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00010
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.027	0.077
Manganese	mg/L	0.0021	0.01	<0.0020	0.411	0.0039	0.0758	0.00168
silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	<0.00010	0.000118
Titanium	mg/L	<0.0010	<0.0010	<0.0010	0.0019	<0.001	<0.00060	0.00072
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000010
Vanadium	mg/L	0.0014	0.0012	0.0038	0.0032	0.0011	0.0032	0.0016
Routine Water								
Ion Balance	%	94.5	95.6	98	99.0	108	99.2	104
Bicarbonate	mg/L	603	537	532	522	414	455	417
Chloride	mg/L	296	181	283	242	155	228	156
Carbonate	mg/L	<5.0	26.3	12.5	32.7	21.1	6.4	11.2
Conductivity (EC)	uS/cm	1800	1560	1790	1600	1250	1740	1180
Calcium	mg/L	77.3	64.9	63.9	63.1	69.4	74.9	59.9
Potassium	mg/L	21.5	22.1	28.8	22.5	19.4	22.9	19.2
Magnesium	mg/L	35.5	25.9	29.1	29.4	20.9	26.7	21.8
Sodium	mg/L	258	213	266	255	181	216	171
Sulfate	mg/L	67.6	53.6	54.8	45.1	32.1	96.2	28.8
Phosphorus	mg/L	1.03	1.43	0.704	1.04	1.76	0.674	1.02
pH in H_20	pH	8.18	8.57	8.49	8.69	8.65	8.37	8.47
TDS (Calculated)	mg/L	1050	851	1000	947	703	896	673
Nitrate	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.219	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	0.029	<0.010
Field Data								
pH in H_20	pH	8.67	8.46	8.45	9.0	7.72	8.15	8.8
Conductivity (EC)	uS/cm	1292	1167	1801	1621	1256	1774	1220

Table 1.20: Chemical Analytical Results

Sample ID:		Winsnes D.1						
Site Number:		19						
Date Sampled:	Units	Oct 19/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	85.8	68	420	79	94	92	69
Ammonia-N	mg/L	0.09	<0.050	<0.050	0.084	0.059	0.069	<0.05
Total Kjeldahl Nitrogen	mg/L	4.36	2.79	3.66	3.62	3.48	3.76	3.52
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	29.7	25	33.6	28.2	26.4	28.2	27
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	0.12	<0.13
CCME Metals								
Antimony	mg/L	0.0004	<0.00040	<0.00080	<0.00040	<0.0004	0.00029	0.00021
Barium	mg/L	0.0425	0.0238	0.0149	0.0257	0.0589	0.0508	0.0633
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00033	0.00022
Copper	mg/L	0.0059	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	0.00021
Iron	mg/L	<0.010	0.032	0.011	0.014	0.024	0.014	0.019
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000688	0.00036
Nickel	mg/L	<0.0020	0.002	<0.0020	<0.0020	0.0025	0.00178	0.00214
Zinc	mg/L	<0.0020	<0.0020	0.0024	<0.0020	0.0058	<0.0010	<0.0010
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000006
Aluminium	mg/L	0.025	<0.010	<0.010	<0.010	<0.01	0.0013	<0.0010
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	0.051	<0.050	<0.050	<0.050	<0.05	0.037	0.046
Manganese	mg/L	0.0022	0.0025	0.0037	0.0029	0.0053	0.00179	0.00088
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000194	0.000232
Titanium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.0018	<0.0010	0.001	<0.0010	0.0015	0.00172	0.00107
Routine Water								
Ion Balance	%	106	97.1	92.7	103	104	93.2	100
Bicarbonate	mg/L	362	370	348	450	420	408	446
Chloride	mg/L	19.4	15	17.7	19.8	23.5	27.2	38.3
Carbonate	mg/L	32	11	46	11.3	30.9	18.2	9.3
Conductivity (EC)	uS/cm	1180	914	1000	1020	1040	971	997
Calcium	mg/L	20.4	24.5	15.7	24.4	27.5	19.6	32.4
Potassium	mg/L	13.9	12.8	12.7	14.2	13.6	12.7	13.7
Magnesium	mg/L	20.8	14.7	15.6	18.2	17.2	14.2	18.7
Sodium	mg/L	256	149	175	191	191	158	168
Sulfate	mg/L	282	128	147	133	116	93.9	99.6
Phosphorus	mg/L	0.459	0.4	0.391	0.467	0.43	0.336	0.515
pH in H_20	pH	8.69	8.54	9.16	8.49	8.85	8.67	8.48
TDS (Calculated)	mg/L	823	537	601	633	626	545	600
Nitrate	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data								
pH in H_20	pH	9.04	8.44	9.49	8.5	8.0	8.84	8.6
Conductivity (EC)	uS/cm	1013	1000	1007	1039	1042	1005	1004

Table 1.21: Chemical Analytical Results

Sample ID:		**Winsnes D.2**						
Site Number:		**20**						
Date Sampled:	**Units**	**Oct 19/10**	**Oct 12/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	49.6	56	61	65	49	54	81
Ammonia-N	mg/L	0.06	<0.050	<0.050	0.056	<0.05	0.139	0.618
Total Kjeldahl Nitrogen	mg/L	1.5	1.32	1.74	2.29	1.54	1.51	3.93
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	18.7	22	21.5	20.2	17.9	20.0	20.9
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00013	<0.00010
Barium	mg/L	0.134	0.134	0.107	0.115	0.103	0.119	0.104
Cadmium	mg/L	0.000661	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00025	0.00012
Copper	mg/L	0.0033	<0.0010	<0.0010	<0.0010	<0.001	0.00022	0.00027
Iron	mg/L	0.416	0.152	0.013	0.444	0.047	<0.010	0.878
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.0015	0.000584
Nickel	mg/L	0.0045	0.0032	0.0031	0.0030	0.0031	0.00341	0.00267
Zinc	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0073	<0.0010	<0.0010
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	<0.010	<0.010	<0.010	<0.010	<0.01	<0.0010	0.0018
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.039	0.04
Manganese	mg/L	0.003	<0.0020	<0.0020	<0.0020	<0.002	0.00053	0.00173
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000186	0.000212
Titanium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00050	<0.00050
Routine Water								
Ion Balance	%	97.6	105	93.9	107	103	102	109
Bicarbonate	mg/L	303	319	295	266	245	255	227
Chloride	mg/L	12.4	12.7	23.4	14.4	13.7	15.6	19.8
Carbonate	mg/L	<5.0	5.4	6.5	6.3	7.6	<5.0	<5.0
Conductivity (EC)	uS/cm	538	567	515	484	465	490	431
Calcium	mg/L	34	40.3	23.7	29.8	32	31.6	32.7
Potassium	mg/L	15.6	17.1	15.7	15.4	14.3	16.7	13.6
Magnesium	mg/L	13.7	15.8	15.2	14.5	11.9	12.3	12.5
Sodium	mg/L	51.3	61.3	61.9	56.8	46.5	44.4	43.4
Sulfate	mg/L	13.3	17	8.42	9.93	7.76	10.3	12.4
Phosphorus	mg/L	0.072	0.112	0.070 *	0.064	0.088	0.050	0.396
pH in H_20	pH	8.38	8.38	8.49	8.44	8.55	8.37	8.04
TDS (Calculated)	mg/L	294	327	300	278	254	260	246
Nitrate	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data								
pH in H_20	pH	8.33	7.63	8.36	8.6	7.99	8.10	8.1
Conductivity (EC)	uS/cm	960	1172	512	503	474	510	4.53

Table 1.22: Chemical Analytical Results

Sample ID:		Winsnes D.3						
Site Number:		21						
Date Sampled:	Units	Oct 18/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	97	96	128	116	108	108	81
Ammonia-N	mg/L	0.083	<0.050	0.225	<0.050	<0.05	0.639	<0.05
Total Kjeldahl Nitrogen	mg/L	4.71	3.08	4.2	4.03	3.81	5.34	2.92
Total Organic Carbon	mg/L	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	36.9	31	39	33.1	32.1	37.9	26.8
BTEX, F1 (C6-C10) and F2(>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	0.00044	0.00054	0.00093	0.00031
Barium	mg/L	0.103	0.0553	0.111	0.101	0.0732	0.134	0.101
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000074	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00156	0.00053
Copper	mg/L	0.0031	<0.0010	0.0016	<0.0010	0.0012	0.00236	0.00132
Iron	mg/L	0.011	0.02	0.025	0.022	0.047	0.022	0.011
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.0074	0.00303
Nickel	mg/L	0.0058	0.0043	0.0074	0.0041	0.0053	0.0117	0.00722
Zinc	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0053	<0.0010	0.0014
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	<0.010	<0.010	<0.010	<0.010	<0.01	0.0405	0.002
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	0.067	0.077	0.073	0.079	0.077	0.094
Manganese	mg/L	<0.0020	<0.0020	<0.0020	0.0593	0.0142	0.00143	0.00076
Silver	mg/L	0.00032	<0.00010	<0.0050	<0.00010	<0.0001	0.00001	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000359	0.000239
Titanium	mg/L	<0.0010	<0.0010	0.0012	<0.0010	0.002	0.00198	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.002	0.0025	0.0098	0.0019	0.0052	0.00154	0.0016
Routine Water								
Ion Balance	%	107	101	97.4	107	106	97.5	105
Bicarbonate	mg/L	353	446	419	375	292	375	396
Chloride	mg/L	270	156	222	209	224	216	238
Carbonate	mg/L	30	21.1	48.3	38.8	59.6	9.3	<5.0
Conductivity (EC)	uS/cm	1880	1350	1530	1410	1400	1500	1420
Calcium	mg/L	54.4	54.1	39.3	38.2	29.7	29.8	52.4
Potassium	mg/L	38.6	28.8	30.4	28.1	26.1	28.5	27.8
Magnesium	mg/L	52.6	37	38	41.6	35.6	30.7	41.4
Sodium	mg/L	288	170	224	219	221	193	195
Sulfate	mg/L	232	60.5	62.9	59.3	37.2	45.9	62.2
Phosphorus	mg/L	0.613	1.24	1.12	0.685	0.707	0.479	0.287
pH in H_20	pH	8.78	8.53	8.97	8.88	9.25	8.47	8.29
TDS (Calculated)	mg/L	1140	747	871	818	777	738	812
Nitrate	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.040	<0.020
Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	<0.010
Field Data								
pH in H_20	pH	9.1	9.23	9.28	9.4	9.65	8.60	8.60
Conductivity (EC)	uS/cm	2160	1780	1541	1439	1393	1530	1476

Table 1.23: Chemical Analytical Results

Sample ID:		Winsnes D.4						
Site Number:		22						
Date Sampled:	**Units**	**Oct 18/10**	**Oct 12/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	88.6	115	116	78	102	96	70
Ammonia-N	mg/L	0.399	<0.050	0.052	<0.050	<0.05	0.070	<0.050
Total Kjeldahl Nitrogen	mg/L	3.47	3.95	4.36	2.65	3.27	2.48	2.33
Total Organic Carbon	mg/L	-	-		-		-	-
Dissolved Organic Carbon	mg/L	34.8	32	38.9	32.3	30.4	33.2	25.3
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals								
Antimony	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00033	0.00017
Barium	mg/L	0.0728	0.0302	0.0782	0.129	0.0722	0.115	0.0559
Cadmium	mg/L	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00056	0.00027
Copper	mg/L	0.0038	<0.0010	<0.0010	<0.0010	<0.001	0.00043	0.00052
Iron	mg/L	0.033	0.018	0.06	<0.010	0.027	0.011	0.021
Lead	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00373	0.00197
Nickel	mg/L	0.0051	0.0029	0.004	0.0058	0.0049	0.00578	0.00391
Zinc	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0086	<0.0010	0.001
Mercury	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	<0.010	<0.010	<0.010	<0.010	<0.01	<0.0010	0.0017
Beryllium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	0.041	0.041
Manganese	mg/L	0.0143	0.0326	0.0046	<0.0020	0.003	0.00099	0.00054
Silver	mg/L	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000293	0.000227
Titanium	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030
Thallium	mg/L	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L	0.0011	<0.0010	0.0026	<0.0010	<0.001	<0.00050	<0.00050
Routine Water								
Ion Balance	%	104	96.5	98.1	110	107	100	107
Bicarbonate	mg/L	313	341	311	300	261	248	216
Chloride	mg/L	242	173	241	240	246	204	170
Carbonate	mg/L	11.9	<5.0	14.4	8.8	8.3	<5.0	<5.0
Conductivity (EC)	uS/cm	1350	1130	1310	1280	1270	1190	889
Calcium	mg/L	31.5	29.8	27.2	34.1	27.9	29.4	27.9
Potassium	mg/L	29.7	25.8	28.1	30.6	28.1	25.9	22.9
Magnesium	mg/L	24.7	20.7	22	24.6	22.3	18.4	18.5
Sodium	mg/L	210	149	197	209	198	150	129
Sulfate	mg/L	31.1	11.3	15.7	16.5	11.5	15.3	9.21
Phosphorus	mg/L	0.269	0.594	0.539	0.083	0.264	0.156	0.111
pH in H_20	pH	8.57	8.38	8.74	8.50	8.57	8.28	8.05
TDS (Calculated)	mg/L	735	580	698	711	671	566	484
Nitrate	mg/L	0.111	<0.050	<0.050	<0.050	<0.05	<0.040	<0.020
Nitrite	mg/L	0.052	<0.050	<0.050	<0.050	<0.02	<0.020	<0.010
Field Data								
pH in H_20	pH	9.48	9.5	9.27	8.8	8.56	8.44	8.9
Conductivity (EC)	uS/cm	2020	1220	1309	1313	1268	1208	862

Table 2: Duplicate 1 Chemical Analytical Results

Sample ID:		Norgaard D.1			
Site Number:		1	DUP 1	% RPD	Pass/ Fail (>30%)
Date Sampled:	Units	Oct 05/16			
Chem. O_2 Demand	mg/L	68	63	8%	Pass
Ammonia-N	mg/L	1.21	1.17	3%	Pass
Total Kjeldahl Nitrogen	mg/L	3.09	3.27	6%	Pass
Dissolved Organic Carbon	mg/L	21.4	21.9	2%	Pass
BTEX, F1 (C6-C10) and F2 (>C10-C16)					
Benzene	mg/L	<0.00050	<0.00050	-	Pass
Toluene	mg/L	<0.00050	<0.00050	-	Pass
Ethylbenzene	mg/L	<0.00050	<0.00050	-	Pass
Xylenes	mg/L	<0.00071	<0.00071	-	Pass
F1 (C6-C10)	mg/L	<0.10	<0.10	-	Pass
F1 - BTEX	mg/L	<0.10	<0.10	-	Pass
F2 - (>C10-C16)	mg/L	<0.13	<0.10	-	Pass
CCME Metals					
Antimony	mg/L	0.0002	0.00021	5%	Pass
Barium	mg/L	0.0883	0.0982	11%	Pass
Cadmium	mg/L	<0.0000050	<0.0000050	-	Pass
Chromium	mg/L	<0.00010	<0.00010	-	Pass
Cobalt	mg/L	0.00023	0.00024	4%	Pass
Copper	mg/L	0.00045	0.00048	6%	Pass
Iron	mg/L	0.021	0.025	17%	Pass
Lead	mg/L	<0.000050	<0.000050	-	Pass
Molybdenum	mg/L	0.00125	0.00117	7%	Pass
Nickel	mg/L	0.0043	0.00447	4%	Pass
Zinc	mg/L	<0.0010	0.0015	-	Pass
Mercury	mg/L	0.0000095	<0.0000050	-	Pass
Aluminium	mg/L	0.0016	0.0023	36%	**Fail**
Beryllium	mg/L	<0.00010	<0.00010	-	Pass
Boron	mg/L	0.064	0.059	-	Pass
Manganese	mg/L	0.00071	0.00085	18%	Pass
silver	mg/L	<0.000010	<0.000010	-	Pass
Tin	mg/L	<0.00010	<0.00010	-	Pass
Selenium	mg/L	0.000114	0.000111	3%	Pass
Titanium	mg/L	<0.00030	<0.00030	-	Pass
Thallium	mg/L	<0.000010	<0.000010	-	Pass
Vanadium	mg/L	0.00087	0.00095	9%	Pass
Routine Water					
Ion Balance	%	107	103	4%	Pass
Bicarbonate	mg/L	357	358	0%	Pass
Chloride	mg/L	61.7	61.6	0%	Pass
Carbonate	mg/L	<5.0	<5.0	-	Pass
Conductivity (EC)	uS/cm	885	870	2%	Pass
Calcium	mg/L	29	28.4	2%	Pass
Potassium	mg/L	13.9	13.5	3%	Pass
Magnesium	mg/L	13.9	13.6	2%	Pass
Sodium	mg/L	154	148	4%	Pass
Sulfate	mg/L	70.6	70.5	0%	Pass
Phosphorus	mg/L	0.155	0.144	7%	Pass
pH in H_20	pH	8.37	8.23	2%	Pass
TDS (Calculated)	mg/L	524	513	2%	Pass
Nitrate	mg/L	0.312	0.315	1%	Pass
Nitrite	mg/L	0.026	0.028	7%	Pass

Table 3: Duplicate 2 Chemical Analytical Results

Sample ID:		Evert D.4			
Site Number:		5	DUP 2	% RPD	Pass/ Fail (>30%)
Date Sampled:	Units	Oct 05/16			
Chem. O_2 Demand	mg/L	30	86	97%	**Fail**
Ammonia-N	mg/L	<0.050	<0.050	-	Pass
Total Kjeldahl Nitrogen	mg/L	2.88	3.26	12%	Pass
Dissolved Organic Carbon	mg/L	29.4	30	2%	Pass
BTEX, F1 (C6-C10) and F2 (>C10-C16)					
Benzene	mg/L	<0.00050	<0.00050	-	Pass
Toluene	mg/L	<0.00050	<0.00050	-	Pass
Ethylbenzene	mg/L	<0.00050	<0.00050	-	Pass
Xylenes	mg/L	<0.00071	<0.00071	-	Pass
F1 (C6-C10)	mg/L	<0.10	<0.10	-	Pass
F1 - BTEX	mg/L	<0.10	<0.10	-	Pass
F2 - (>C10-C16)	mg/L	<0.13	<0.10	-	Pass
CCME Metals					
Antimony	mg/L	0.00018	0.00019	5%	Pass
Barium	mg/L	0.0524	0.0549	5%	Pass
Cadmium	mg/L	<0.0000050	<0.0000005	-	Pass
Chromium	mg/L	<0.00010	<0.00010	-	Pass
Cobalt	mg/L	0.00035	0.00037	6%	Pass
Copper	mg/L	0.00084	0.00083	1%	Pass
Iron	mg/L	0.04	0.041	2%	Pass
Lead	mg/L	<0.000050	<0.000005	-	Pass
Molybdenum	mg/L	0.00216	0.00226	5%	Pass
Nickel	mg/L	0.00606	0.00612	1%	Pass
Zinc	mg/L	0.001	<0.0010	-	Pass
Mercury	mg/L	0.0000108	<0.0000005	-	Pass
Aluminium	mg/L	0.0013	0.0013	0%	Pass
Beryllium	mg/L	<0.00010	<0.00010	-	Pass
Boron	mg/L	0.046	0.047	2%	Pass
Manganese	mg/L	0.00066	0.00068	3%	Pass
Silver	mg/L	<0.000010	<0.000001	-	Pass
Tin	mg/L	<0.00010	<0.00010	-	Pass
Selenium	mg/L	0.000302	0.000322	6%	Pass
Titanium	mg/L	<0.00030	<0.00030	-	Pass
Thallium	mg/L	<0.000010	<0.000001	-	Pass
Vanadium	mg/L	<0.00050	<0.00050	-	Pass
Routine Water					
Ion Balance	%	114	113	1%	Pass
Bicarbonate	mg/L	324	326	1%	Pass
Chloride	mg/L	17.5	17.4	1%	Pass
Carbonate	mg/L	<5.0	<5.0	-	Pass
Conductivity (EC)	uS/cm	599	594	1%	Pass
Calcium	mg/L	21.9	21.6	1%	Pass
Potassium	mg/L	13.3	13.1	2%	Pass
Magnesium	mg/L	12	11.8	2%	Pass
Sodium	mg/L	105	105	0%	Pass
Sulfate	mg/L	15.1	15.1	0%	Pass
Phosphorus	mg/L	0.248	0.247	0%	Pass
pH in H_20	pH	8.38	8.28	1%	Pass
TDS (Calculated)	mg/L	349	345	1%	Pass
Nitrate	mg/L	<0.020	<0.020	-	Pass
Nitrite	mg/L	<0.010	<0.010	-	Pass

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
1	Alkalinity (total as CaCO3)	No	Up	11
1	Aluminum	No	Down	10
1	Ammonia	Yes	Up	11
1	Antimony	No	No Trend	11
1	Arsenic	No	No Trend	9
1	Barium	Yes	No Trend	11
1	Benzene	No	No Trend	10
1	Beryllium	No	Down	10
1	Bicarbonate	No	Up	11
1	Boron (hot water soluble)	Yes	No Trend	10
1	Cadmium	No	Down	11
1	Calcium	No	No Trend	11
1	Carbonate	No	No Trend	11
1	Chemical Oxygen Demand (COD)	No	Up	11
1	Chloride	No	No Trend	11
1	Chromium	No	Down	11
1	Cobalt	No	Down	11
1	Copper	No	Down	11
1	Dissolved Organic Carbon (DOC)	No	No Trend	10
1	Electrical Conductivity (EC)	No	No Trend	11
1	Ethylbenzene	No	No Trend	10
1	F1 (C6-C10) - BTEX	No	No Trend	10
1	F1 (C6-C10_)	No	No Trend	10
1	F2 (C10-C16 Hydrocarbons)	No	No Trend	10
1	Fluoride	No	No Trend	4
1	Hardness as CaCO3	No	Up	11
1	Hydroxide	No	No Trend	11
1	Ionic Balance	No	No Trend	11
1	Iron	No	No Trend	11
1	Lead	No	Down	11
1	Lithium	No	No Trend	9
1	Magnesium	No	Up	11
1	Manganese	No	No Trend	10
1	Mercury	No	Down	11
1	Molybdenum	No	Down	11
1	Nickel	No	Up	11
1	Nitrate (as NO3-N)	Yes	No Trend	11
1	Nitrate and Nitrate	Yes	No Trend	11
1	Nitrite (as NO2-N)	Yes	No Trend	11
1	pH	No	No Trend	11
1	Phosphorus	Yes	Up	7
1	Potassium	No	Up	11
1	Selenium	No	No Trend	10
1	Silver	No	Down	10
1	Sodium	No	No Trend	11
1	Strontium	No	No Trend	1
1	Styrene	No	No Trend	3
1	Sulphate	No	No Trend	11
1	Thallium	No	Down	10
1	Tin	No	Down	10
1	Titanium	No	Down	10
1	Toluene	No	No Trend	10
1	Total Dissolved Solids (TDS)	No	No Trend	11
1	Total Kjeldahl Nitrogen (TKN)	No	Up	11
1	Total Organic Carbon (TOC)	No	No Trend	1
1	TRH	No	No Trend	1
1	Uranium	No	No Trend	9
1	Vanadium	No	No Trend	10
1	Xylene (o)	No	No Trend	8
1	Xylenes (m & p)	No	No Trend	8
1	Xylenes Total	No	Up	10
1	Zinc	No	No Trend	11
2	Alkalinity (total as CaCO3)	No	No Trend	10
2	Aluminum	No	No Trend	9
2	Ammonia	No	No Trend	10
2	Antimony	No	Down	10
2	Arsenic	No	No Trend	8
2	Barium	No	No Trend	10
2	Benzene	No	No Trend	9
2	Beryllium	No	Down	9
2	Bicarbonate	No	No Trend	10
2	Boron (hot water soluble)	Yes	Up	9
2	Cadmium	No	Down	10
2	Calcium	Yes	No Trend	10
2	Carbonate	No	No Trend	10
2	Chemical Oxygen Demand (COD)	No	Up	10
2	Chloride	No	Up	10
2	Chromium	No	Down	10
2	Cobalt	No	Down	10
2	Copper	No	No Trend	10
2	Dissolved Organic Carbon (DOC)	No	No Trend	9
2	Electrical Conductivity (EC)	Yes	No Trend	10
2	Ethylbenzene	No	No Trend	9
2	F1 (C6-C10) - BTEX	No	No Trend	9
2	F1 (C6-C10_)	No	No Trend	9
2	F2 (C10-C16 Hydrocarbons)	No	No Trend	9
2	Fluoride	No	No Trend	2
2	Hardness as CaCO3	Yes	No Trend	10
2	Hydroxide	No	No Trend	10
2	Ionic Balance	Yes	No Trend	10
2	Iron	No	No Trend	10
2	Lead	No	No Trend	10
2	Lithium	No	No Trend	8
2	Magnesium	Yes	No Trend	10
2	Manganese	No	No Trend	9
2	Mercury	No	Down	10
2	Molybdenum	No	No Trend	10
2	Nickel	No	No Trend	10
2	Nitrate (as NO3-N)	No	Down	10
2	Nitrate and Nitrate	No	Down	10

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
2	Nitrite (as NO2-N)	No	Down	10
2	pH	No	No Trend	10
2	Phosphorus	Yes	No Trend	7
2	Potassium	Yes	Up	10
2	Selenium	No	No Trend	9
2	Silver	No	No Trend	9
2	Sodium	No	No Trend	10
2	Strontium	No	No Trend	1
2	Styrene	No	No Trend	2
2	Sulphate	No	Down	10
2	Thallium	No	No Trend	9
2	Tin	No	Down	9
2	Titanium	No	No Trend	9
2	Toluene	No	No Trend	9
2	Total Dissolved Solids (TDS)	Yes	No Trend	10
2	Total Kjeldahl Nitrogen (TKN)	No	No Trend	10
2	Total Organic Carbon (TOC)	No	No Trend	1
2	TRH	No	No Trend	1
2	Uranium	No	No Trend	8
2	Vanadium	No	No Trend	9
2	Xylene (o)	No	No Trend	7
2	Xylenes (m & p)	No	No Trend	7
2	Xylenes Total	No	Up	9
2	Zinc	No	No Trend	10
3	Alkalinity (total as CaCO3)	Yes	Up	10
3	Aluminum	No	Down	9
3	Ammonia	No	No Trend	10
3	Antimony	No	Down	10
3	Arsenic	No	No Trend	8
3	Barium	No	No Trend	10
3	Benzene	No	No Trend	9
3	Beryllium	No	Down	9
3	Bicarbonate	Yes	Up	10
3	Boron (hot water soluble)	Yes	Up	9
3	Cadmium	No	Down	10
3	Calcium	Yes	No Trend	10
3	Carbonate	No	No Trend	10
3	Chemical Oxygen Demand (COD)	No	No Trend	10
3	Chloride	Yes	No Trend	10
3	Chromium	No	Down	10
3	Cobalt	No	Down	10
3	Copper	Yes	No Trend	10
3	Dissolved Organic Carbon (DOC)	No	No Trend	9
3	Electrical Conductivity (EC)	Yes	No Trend	10
3	Ethylbenzene	No	No Trend	9
3	F1 (C6-C10) - BTEX	No	No Trend	9
3	F1 (C6-C10_)	No	No Trend	9
3	F2 (C10-C16 Hydrocarbons)	No	No Trend	9
3	Fluoride	No	No Trend	2
3	Hardness as CaCO3	Yes	No Trend	10
3	Hydroxide	No	No Trend	10
3	Ionic Balance	No	No Trend	10
3	Iron	No	No Trend	10
3	Lead	No	No Trend	10
3	Lithium	No	No Trend	8
3	Magnesium	Yes	No Trend	10
3	Manganese	No	No Trend	9
3	Mercury	No	Down	10
3	Molybdenum	No	Down	10
3	Nickel	No	Down	10
3	Nitrate (as NO3-N)	No	Down	10
3	Nitrate and Nitrate	No	Down	10
3	Nitrite (as NO2-N)	No	Down	10
3	pH	No	No Trend	10
3	Phosphorus	No	No Trend	7
3	Potassium	No	No Trend	10
3	Selenium	No	No Trend	9
3	Silver	No	No Trend	9
3	Sodium	No	No Trend	10
3	Strontium	No	No Trend	1
3	Styrene	No	No Trend	2
3	Sulphate	No	Down	10
3	Thallium	No	No Trend	9
3	Tin	No	Down	9
3	Titanium	No	Down	9
3	Toluene	No	No Trend	9
3	Total Dissolved Solids (TDS)	Yes	No Trend	10
3	Total Kjeldahl Nitrogen (TKN)	No	No Trend	10
3	Total Organic Carbon (TOC)	No	No Trend	1
3	TRH	No	No Trend	1
3	Uranium	No	Down	8
3	Vanadium	No	No Trend	9
3	Xylene (o)	No	No Trend	7
3	Xylenes (m & p)	No	No Trend	7
3	Xylenes Total	No	Up	9
3	Zinc	No	No Trend	10
4	Alkalinity (total as CaCO3)	No	No Trend	10
4	Aluminum	No	No Trend	9
4	Ammonia	No	No Trend	10
4	Antimony	No	Down	10
4	Arsenic	No	No Trend	8
4	Barium	No	No Trend	10
4	Benzene	No	No Trend	9
4	Beryllium	No	Down	9
4	Bicarbonate	No	No Trend	10
4	Boron (hot water soluble)	Yes	Up	9
4	Cadmium	No	Down	10
4	Calcium	Yes	No Trend	10
4	Carbonate	No	No Trend	10
4	Chemical Oxygen Demand (COD)	No	No Trend	10

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
4	Chloride	No	Up	10
4	Chromium	No	No Trend	10
4	Cobalt	No	Down	10
4	Copper	Yes	No Trend	10
4	Dissolved Organic Carbon (DOC)	No	No Trend	9
4	Electrical Conductivity (EC)	No	No Trend	10
4	Ethylbenzene	No	No Trend	9
4	F1 (C6-C10) - BTEX	No	No Trend	9
4	F1 (C6-C10_)	No	No Trend	9
4	F2 (C10-C16 Hydrocarbons)	No	No Trend	9
4	Fluoride	No	No Trend	2
4	Hardness as CaCO3	Yes	No Trend	10
4	Hydroxide	No	No Trend	10
4	Ionic Balance	No	No Trend	10
4	Iron	No	No Trend	10
4	Lead	No	No Trend	10
4	Lithium	No	No Trend	8
4	Magnesium	Yes	Up	10
4	Manganese	No	No Trend	9
4	Mercury	No	Down	10
4	Molybdenum	No	Down	10
4	Nickel	No	No Trend	10
4	Nitrate (as NO3-N)	No	No Trend	10
4	Nitrate and Nitrate	No	No Trend	10
4	Nitrite (as NO2-N)	No	No Trend	10
4	pH	No	No Trend	10
4	Phosphorus	No	No Trend	7
4	Potassium	No	Up	10
4	Selenium	No	Down	9
4	Silver	No	No Trend	9
4	Sodium	No	No Trend	10
4	Strontium	No	No Trend	1
4	Styrene	No	No Trend	2
4	Sulphate	No	Down	10
4	Thallium	No	Down	9
4	Tin	No	Down	9
4	Titanium	No	No Trend	9
4	Toluene	No	No Trend	9
4	Total Dissolved Solids (TDS)	No	No Trend	10
4	Total Kjeldahl Nitrogen (TKN)	No	No Trend	10
4	Total Organic Carbon (TOC)	No	No Trend	1
4	TRH	No	No Trend	1
4	Uranium	No	No Trend	8
4	Vanadium	No	No Trend	9
4	Xylene (o)	No	No Trend	7
4	Xylenes (m & p)	No	No Trend	7
4	Xylenes Total	No	Up	9
4	Zinc	No	No Trend	10
5	Alkalinity (total as CaCO3)	No	Down	10
5	Aluminum	No	Down	9
5	Ammonia	No	No Trend	10
5	Antimony	No	Down	10
5	Arsenic	No	Up	8
5	Barium	No	Down	10
5	Benzene	No	No Trend	9
5	Beryllium	No	Down	9
5	Bicarbonate	No	No Trend	10
5	Boron (hot water soluble)	Yes	Up	9
5	Cadmium	No	Down	10
5	Calcium	No	No Trend	10
5	Carbonate	No	No Trend	10
5	Chemical Oxygen Demand (COD)	No	No Trend	10
5	Chloride	No	Down	10
5	Chromium	No	Down	10
5	Cobalt	No	No Trend	10
5	Copper	No	Down	10
5	Dissolved Organic Carbon (DOC)	No	No Trend	9
5	Electrical Conductivity (EC)	No	No Trend	10
5	Ethylbenzene	No	No Trend	9
5	F1 (C6-C10) - BTEX	No	No Trend	9
5	F1 (C6-C10_)	No	No Trend	9
5	F2 (C10-C16 Hydrocarbons)	No	No Trend	9
5	Fluoride	No	No Trend	3
5	Hardness as CaCO3	No	No Trend	10
5	Hydroxide	No	No Trend	10
5	Ionic Balance	Yes	Up	10
5	Iron	No	Down	10
5	Lead	No	Down	10
5	Lithium	No	Down	8
5	Magnesium	No	No Trend	10
5	Manganese	No	Down	9
5	Mercury	No	Down	10
5	Molybdenum	No	No Trend	10
5	Nickel	No	Down	10
5	Nitrate (as NO3-N)	No	Down	10
5	Nitrate and Nitrate	No	Down	10
5	Nitrite (as NO2-N)	No	Down	10
5	pH	No	No Trend	10
5	Phosphorus	No	No Trend	6
5	Potassium	No	No Trend	10
5	Selenium	No	Down	9
5	Silver	No	Down	9
5	Sodium	No	No Trend	10
5	Strontium	No	No Trend	1
5	Styrene	No	No Trend	3
5	Sulphate	No	No Trend	10
5	Thallium	No	Down	9
5	Tin	No	Down	9
5	Titanium	No	Down	9
5	Toluene	No	No Trend	9

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
5	Total Dissolved Solids (TDS)	No	No Trend	10
5	Total Kjeldahl Nitrogen (TKN)	No	No Trend	10
5	Total Organic Carbon (TOC)	No	No Trend	1
5	TRH	No	No Trend	1
5	Uranium	No	Down	8
5	Vanadium	No	No Trend	9
5	Xylene (o)	No	No Trend	7
5	Xylenes (m & p)	No	No Trend	7
5	Xylenes Total	No	Up	9
5	Zinc	No	Down	10
6	Alkalinity (total as CaCO3)	No	No Trend	10
6	Aluminum	Yes	No Trend	9
6	Ammonia	Yes	Up	10
6	Antimony	No	No Trend	10
6	Arsenic	No	No Trend	8
6	Barium	No	No Trend	10
6	Benzene	No	No Trend	9
6	Beryllium	No	Down	9
6	Bicarbonate	No	No Trend	10
6	Boron (hot water soluble)	No	No Trend	9
6	Cadmium	No	Down	10
6	Calcium	No	No Trend	10
6	Carbonate	No	Up	10
6	Chemical Oxygen Demand (COD)	No	No Trend	10
6	Chloride	No	No Trend	10
6	Chromium	No	No Trend	10
6	Cobalt	No	Down	10
6	Copper	No	No Trend	10
6	Dissolved Organic Carbon (DOC)	No	No Trend	9
6	Electrical Conductivity (EC)	No	No Trend	10
6	Ethylbenzene	No	No Trend	9
6	F1 (C6-C10) - BTEX	No	No Trend	9
6	F1 (C6-C10_)	No	No Trend	9
6	F2 (C10-C16 Hydrocarbons)	No	No Trend	9
6	Fluoride	No	No Trend	2
6	Hardness as CaCO3	No	No Trend	10
6	Hydroxide	No	No Trend	10
6	Ionic Balance	No	No Trend	10
6	Iron	No	No Trend	10
6	Lead	No	No Trend	10
6	Lithium	No	Down	8
6	Magnesium	No	No Trend	10
6	Manganese	No	No Trend	9
6	Mercury	No	Down	10
6	Molybdenum	No	Down	10
6	Nickel	No	Down	10
6	Nitrate (as NO3-N)	Yes	No Trend	10
6	Nitrate and Nitrate	Yes	No Trend	10
6	Nitrite (as NO2-N)	Yes	No Trend	10
6	pH	No	Up	10
6	Phosphorus	No	No Trend	7
6	Potassium	Yes	No Trend	10
6	Selenium	No	Down	9
6	Silver	No	No Trend	9
6	Sodium	No	No Trend	10
6	Strontium	No	No Trend	1
6	Styrene	No	No Trend	2
6	Sulphate	No	Down	10
6	Thallium	No	No Trend	9
6	Tin	No	Down	9
6	Titanium	Yes	No Trend	9
6	Toluene	No	No Trend	9
6	Total Dissolved Solids (TDS)	No	No Trend	10
6	Total Kjeldahl Nitrogen (TKN)	No	No Trend	10
6	Total Organic Carbon (TOC)	No	No Trend	1
6	TRH	No	No Trend	1
6	Uranium	No	Down	8
6	Vanadium	No	Up	9
6	Xylene (o)	No	No Trend	7
6	Xylenes (m & p)	No	No Trend	7
6	Xylenes Total	No	Up	9
6	Zinc	No	No Trend	10
7	Alkalinity (total as CaCO3)	No	No Trend	11
7	Aluminum	No	No Trend	10
7	Ammonia	Yes	Up	11
7	Antimony	No	No Trend	11
7	Arsenic	No	No Trend	9
7	Barium	No	Down	11
7	Benzene	No	No Trend	10
7	Beryllium	No	Down	10
7	Bicarbonate	No	No Trend	11
7	Boron (hot water soluble)	No	No Trend	10
7	Cadmium	No	Down	11
7	Calcium	No	Down	11
7	Carbonate	No	No Trend	11
7	Chemical Oxygen Demand (COD)	No	Up	11
7	Chloride	No	Up	11
7	Chromium	No	Down	11
7	Cobalt	No	Down	11
7	Copper	No	No Trend	11
7	Dissolved Organic Carbon (DOC)	No	Up	10
7	Electrical Conductivity (EC)	No	No Trend	11
7	Ethylbenzene	No	No Trend	10
7	F1 (C6-C10) - BTEX	No	No Trend	10
7	F1 (C6-C10_)	No	No Trend	10
7	F2 (C10-C16 Hydrocarbons)	No	No Trend	10
7	Fluoride	No	No Trend	3
7	Hardness as CaCO3	No	Down	11
7	Hydroxide	No	No Trend	11
7	Ionic Balance	No	No Trend	11

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
7	Iron	No	Down	11
7	Lead	No	Down	11
7	Lithium	No	Down	9
7	Magnesium	No	Down	11
7	Manganese	No	No Trend	10
7	Mercury	No	Down	11
7	Molybdenum	No	Down	11
7	Nickel	Yes	Down	11
7	Nitrate (as NO3-N)	No	Down	11
7	Nitrate and Nitrate	No	Down	11
7	Nitrite (as NO2-N)	No	Down	11
7	pH	No	No Trend	11
7	Phosphorus	No	No Trend	8
7	Potassium	No	Down	11
7	Selenium	No	Down	10
7	Silver	No	Down	10
7	Sodium	No	Down	11
7	Strontium	No	No Trend	1
7	Styrene	No	No Trend	2
7	Sulphate	No	Down	11
7	Thallium	No	Down	10
7	Tin	No	Down	10
7	Titanium	No	No Trend	10
7	Toluene	No	No Trend	10
7	Total Dissolved Solids (TDS)	No	Down	11
7	Total Kjeldahl Nitrogen (TKN)	No	No Trend	11
7	Total Organic Carbon (TOC)	No	No Trend	1
7	TRH	No	No Trend	1
7	Uranium	No	No Trend	9
7	Vanadium	No	No Trend	10
7	Xylene (o)	No	No Trend	8
7	Xylenes (m & p)	No	No Trend	8
7	Xylenes Total	No	Up	10
7	Zinc	No	Down	11
8	Alkalinity (total as CaCO3)	No	No Trend	10
8	Aluminum	No	Down	9
8	Ammonia	No	No Trend	10
8	Antimony	No	No Trend	10
8	Arsenic	No	No Trend	8
8	Barium	No	No Trend	10
8	Benzene	No	No Trend	9
8	Beryllium	No	Down	9
8	Bicarbonate	No	No Trend	10
8	Boron (hot water soluble)	Yes	Up	9
8	Cadmium	No	Down	10
8	Calcium	No	No Trend	10
8	Carbonate	No	No Trend	10
8	Chemical Oxygen Demand (COD)	No	Up	10
8	Chloride	No	No Trend	10
8	Chromium	No	Down	10
8	Cobalt	No	No Trend	10
8	Copper	No	No Trend	10
8	Dissolved Organic Carbon (DOC)	No	No Trend	9
8	Electrical Conductivity (EC)	No	Up	10
8	Ethylbenzene	No	No Trend	9
8	F1 (C6-C10) - BTEX	No	No Trend	9
8	F1 (C6-C10_)	No	No Trend	9
8	F2 (C10-C16 Hydrocarbons)	No	No Trend	9
8	Fluoride	No	No Trend	2
8	Hardness as CaCO3	Yes	No Trend	10
8	Hydroxide	No	No Trend	10
8	Ionic Balance	Yes	No Trend	10
8	Iron	No	Down	10
8	Lead	No	Down	10
8	Lithium	No	No Trend	8
8	Magnesium	Yes	No Trend	10
8	Manganese	No	Down	9
8	Mercury	No	Down	10
8	Molybdenum	No	Up	10
8	Nickel	No	No Trend	10
8	Nitrate (as NO3-N)	No	Down	10
8	Nitrate and Nitrate	No	Down	10
8	Nitrite (as NO2-N)	No	Down	10
8	pH	No	No Trend	10
8	Phosphorus	Yes	No Trend	7
8	Potassium	Yes	Up	10
8	Selenium	No	No Trend	9
8	Silver	No	No Trend	9
8	Sodium	No	No Trend	10
8	Strontium	No	No Trend	1
8	Styrene	No	No Trend	2
8	Sulphate	No	Up	10
8	Thallium	No	No Trend	9
8	Tin	No	Down	9
8	Titanium	No	Down	9
8	Toluene	No	No Trend	9
8	Total Dissolved Solids (TDS)	No	Up	10
8	Total Kjeldahl Nitrogen (TKN)	Yes	No Trend	10
8	Total Organic Carbon (TOC)	No	No Trend	1
8	TRH	No	No Trend	1
8	Uranium	No	No Trend	8
8	Vanadium	No	No Trend	9
8	Xylene (o)	No	No Trend	7
8	Xylenes (m & p)	No	No Trend	7
8	Xylenes Total	No	Up	9
8	Zinc	No	Down	10
9	Alkalinity (total as CaCO3)	No	No Trend	11
9	Aluminum	No	Down	10
9	Ammonia	No	Up	11
9	Antimony	No	No Trend	11

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
9	Arsenic	No	No Trend	9
9	Barium	No	Down	11
9	Benzene	No	No Trend	10
9	Beryllium	No	No Trend	10
9	Bicarbonate	No	No Trend	11
9	Boron (hot water soluble)	No	No Trend	10
9	Cadmium	No	Down	11
9	Calcium	No	No Trend	11
9	Carbonate	No	No Trend	11
9	Chemical Oxygen Demand (COD)	No	No Trend	11
9	Chloride	No	Down	11
9	Chromium	No	No Trend	11
9	Cobalt	No	No Trend	11
9	Copper	No	Down	11
9	Dissolved Organic Carbon (DOC)	No	No Trend	10
9	Electrical Conductivity (EC)	No	No Trend	11
9	Ethylbenzene	No	No Trend	10
9	F1 (C6-C10) - BTEX	No	No Trend	10
9	F1 (C6-C10_)	No	No Trend	10
9	F2 (C10-C16 Hydrocarbons)	No	No Trend	10
9	Fluoride	No	No Trend	2
9	Hardness as CaCO3	No	No Trend	11
9	Hydroxide	No	No Trend	11
9	Ionic Balance	No	No Trend	11
9	Iron	No	No Trend	11
9	Lead	No	No Trend	11
9	Lithium	No	No Trend	9
9	Magnesium	No	No Trend	11
9	Manganese	No	No Trend	10
9	Mercury	No	Down	11
9	Molybdenum	No	No Trend	11
9	Nickel	No	Down	11
9	Nitrate (as NO3-N)	No	No Trend	11
9	Nitrate and Nitrate	No	Down	11
9	Nitrite (as NO2-N)	No	No Trend	11
9	pH	No	No Trend	11
9	Phosphorus	No	No Trend	8
9	Potassium	No	No Trend	11
9	Selenium	No	No Trend	10
9	Silver	No	No Trend	10
9	Sodium	No	No Trend	11
9	Strontium	No	No Trend	3
9	Styrene	No	No Trend	2
9	Sulphate	No	No Trend	11
9	Thallium	No	No Trend	10
9	Tin	No	Down	10
9	Titanium	No	No Trend	10
9	Toluene	No	No Trend	10
9	Total Dissolved Solids (TDS)	No	No Trend	11
9	Total Kjeldahl Nitrogen (TKN)	Yes	No Trend	11
9	Total Organic Carbon (TOC)	No	No Trend	1
9	TRH	No	No Trend	1
9	Uranium	No	No Trend	9
9	Vanadium	No	No Trend	10
9	Xylene (o)	No	No Trend	8
9	Xylenes (m & p)	No	No Trend	8
9	Xylenes Total	No	Up	10
9	Zinc	No	No Trend	11
10	Alkalinity (total as CaCO3)	No	No Trend	11
10	Aluminum	No	Down	10
10	Ammonia	Yes	Up	11
10	Antimony	No	Down	11
10	Arsenic	Yes	No Trend	9
10	Barium	No	No Trend	11
10	Benzene	No	No Trend	10
10	Beryllium	No	Down	10
10	Bicarbonate	No	No Trend	11
10	Boron (hot water soluble)	No	No Trend	10
10	Cadmium	No	No Trend	11
10	Calcium	No	Up	11
10	Carbonate	No	No Trend	11
10	Chemical Oxygen Demand (COD)	Yes	No Trend	11
10	Chloride	Yes	No Trend	11
10	Chromium	No	Down	11
10	Cobalt	No	No Trend	11
10	Copper	No	No Trend	11
10	Dissolved Organic Carbon (DOC)	Yes	No Trend	10
10	Electrical Conductivity (EC)	No	Up	11
10	Ethylbenzene	No	No Trend	10
10	F1 (C6-C10) - BTEX	No	No Trend	10
10	F1 (C6-C10_)	No	No Trend	10
10	F2 (C10-C16 Hydrocarbons)	No	No Trend	10
10	Fluoride	Yes	No Trend	2
10	Hardness as CaCO3	No	Up	11
10	Hydroxide	No	No Trend	11
10	Ionic Balance	No	No Trend	11
10	Iron	No	No Trend	11
10	Lead	No	No Trend	11
10	Lithium	No	No Trend	9
10	Magnesium	No	No Trend	11
10	Manganese	No	No Trend	10
10	Mercury	No	Down	11
10	Molybdenum	No	No Trend	11
10	Nickel	No	Up	11
10	Nitrate (as NO3-N)	No	No Trend	11
10	Nitrate and Nitrate	No	No Trend	11
10	Nitrite (as NO2-N)	No	Down	11
10	pH	No	No Trend	11
10	Phosphorus	No	No Trend	8
10	Potassium	Yes	Up	11

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
10	Selenium	No	No Trend	10
10	Silver	No	Down	10
10	Sodium	No	No Trend	11
10	Strontium	Yes	No Trend	3
10	Styrene	No	No Trend	2
10	Sulphate	No	No Trend	11
10	Thallium	No	No Trend	10
10	Tin	No	Down	10
10	Titanium	No	No Trend	10
10	Toluene	No	No Trend	10
10	Total Dissolved Solids (TDS)	No	Up	11
10	Total Kjeldahl Nitrogen (TKN)	Yes	No Trend	11
10	Total Organic Carbon (TOC)	No	No Trend	1
10	TRH	No	No Trend	1
10	Uranium	No	No Trend	9
10	Vanadium	No	No Trend	10
10	Xylene (o)	No	No Trend	8
10	Xylenes (m & p)	No	No Trend	8
10	Xylenes Total	No	Up	10
10	Zinc	No	No Trend	11
11	Alkalinity (total as CaCO3)	No	No Trend	10
11	Aluminum	No	No Trend	9
11	Ammonia	No	Down	10
11	Antimony	No	No Trend	10
11	Arsenic	No	No Trend	9
11	Barium	No	Down	10
11	Benzene	No	No Trend	9
11	Beryllium	No	No Trend	9
11	Bicarbonate	No	No Trend	10
11	Boron (hot water soluble)	No	No Trend	9
11	Cadmium	No	Down	10
11	Calcium	No	No Trend	10
11	Carbonate	No	No Trend	10
11	Chemical Oxygen Demand (COD)	No	No Trend	10
11	Chloride	No	Down	10
11	Chromium	No	Down	10
11	Cobalt	No	Down	10
11	Copper	No	Down	10
11	Dissolved Organic Carbon (DOC)	No	No Trend	9
11	Electrical Conductivity (EC)	No	No Trend	10
11	Ethylbenzene	No	No Trend	9
11	F1 (C6-C10) - BTEX	No	No Trend	9
11	F1 (C6-C10_)	No	No Trend	9
11	F2 (C10-C16 Hydrocarbons)	No	No Trend	9
11	Fluoride	No	No Trend	2
11	Hardness as CaCO3	No	No Trend	10
11	Hydroxide	No	No Trend	10
11	Ionic Balance	Yes	No Trend	10
11	Iron	No	No Trend	10
11	Lead	No	No Trend	10
11	Lithium	No	No Trend	9
11	Magnesium	No	No Trend	10
11	Manganese	No	No Trend	9
11	Mercury	No	Down	10
11	Molybdenum	No	No Trend	10
11	Nickel	No	Down	10
11	Nitrate (as NO3-N)	No	No Trend	10
11	Nitrate and Nitrate	No	Down	10
11	Nitrite (as NO2-N)	No	Down	10
11	pH	No	No Trend	10
11	Phosphorus	No	No Trend	7
11	Potassium	No	Down	10
11	Selenium	No	No Trend	9
11	Silver	No	No Trend	9
11	Sodium	No	No Trend	10
11	Sulphate	No	No Trend	10
11	Thallium	No	No Trend	9
11	Tin	No	Down	9
11	Titanium	No	No Trend	9
11	Toluene	No	No Trend	9
11	Total Dissolved Solids (TDS)	No	No Trend	10
11	Total Kjeldahl Nitrogen (TKN)	No	Down	10
11	Total Organic Carbon (TOC)	No	No Trend	1
11	TRH	No	No Trend	1
11	Uranium	No	No Trend	9
11	Vanadium	No	Down	9
11	Xylene (o)	No	No Trend	8
11	Xylenes (m & p)	No	No Trend	8
11	Xylenes Total	No	No Trend	9
11	Zinc	No	No Trend	10
12	Alkalinity (total as CaCO3)	No	No Trend	9
12	Aluminum	No	No Trend	8
12	Ammonia	No	No Trend	9
12	Antimony	No	No Trend	9
12	Arsenic	No	No Trend	7
12	Barium	No	No Trend	9
12	Benzene	No	No Trend	8
12	Beryllium	No	Down	8
12	Bicarbonate	No	No Trend	9
12	Boron (hot water soluble)	No	Up	8
12	Cadmium	No	Down	9
12	Calcium	No	No Trend	9
12	Carbonate	No	No Trend	9
12	Chemical Oxygen Demand (COD)	No	No Trend	9
12	Chloride	No	No Trend	9
12	Chromium	No	Down	9
12	Cobalt	No	Down	9
12	Copper	No	Down	9
12	Dissolved Organic Carbon (DOC)	No	No Trend	8
12	Electrical Conductivity (EC)	No	No Trend	9

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
12	Ethylbenzene	No	No Trend	8
12	F1 (C6-C10) - BTEX	No	No Trend	8
12	F1 (C6-C10_)	No	No Trend	8
12	F2 (C10-C16 Hydrocarbons)	No	No Trend	8
12	Fluoride	No	No Trend	2
12	Hardness as CaCO3	Yes	Up	9
12	Hydroxide	No	No Trend	9
12	Ionic Balance	No	No Trend	9
12	Iron	No	Down	9
12	Lead	No	Down	9
12	Lithium	No	Up	7
12	Magnesium	No	Up	9
12	Manganese	No	Down	8
12	Mercury	No	Down	9
12	Molybdenum	No	Up	9
12	Nickel	No	Up	9
12	Nitrate (as NO3-N)	No	Down	9
12	Nitrate and Nitrate	No	Down	9
12	Nitrite (as NO2-N)	No	Down	9
12	pH	No	Down	9
12	Phosphorus	No	No Trend	6
12	Potassium	No	Up	9
12	Selenium	No	No Trend	8
12	Silver	No	No Trend	8
12	Sodium	No	No Trend	9
12	Strontium	No	No Trend	1
12	Styrene	No	No Trend	2
12	Sulphate	No	No Trend	9
12	Thallium	No	Down	8
12	Tin	No	Down	8
12	Titanium	No	No Trend	8
12	Toluene	No	No Trend	8
12	Total Dissolved Solids (TDS)	No	No Trend	9
12	Total Kjeldahl Nitrogen (TKN)	No	No Trend	9
12	Total Organic Carbon (TOC)	No	No Trend	1
12	TRH	No	No Trend	1
12	Uranium	No	Up	7
12	Vanadium	Yes	Up	8
12	Xylene (o)	No	No Trend	6
12	Xylenes (m & p)	No	No Trend	6
12	Xylenes Total	No	Up	8
12	Zinc	No	No Trend	9
13	Alkalinity (total as CaCO3)	No	No Trend	8
13	Aluminum	No	No Trend	7
13	Ammonia	No	No Trend	8
13	Antimony	No	No Trend	8
13	Arsenic	No	Down	6
13	Barium	No	No Trend	8
13	Benzene	No	No Trend	7
13	Beryllium	No	Down	7
13	Bicarbonate	No	No Trend	8
13	Boron (hot water soluble)	No	Down	7
13	Cadmium	No	Down	8
13	Calcium	No	No Trend	8
13	Carbonate	No	No Trend	8
13	Chemical Oxygen Demand (COD)	No	No Trend	8
13	Chloride	No	No Trend	8
13	Chromium	No	Down	8
13	Cobalt	No	Down	8
13	Copper	No	No Trend	8
13	Dissolved Organic Carbon (DOC)	No	No Trend	7
13	Electrical Conductivity (EC)	No	No Trend	8
13	Ethylbenzene	No	No Trend	7
13	F1 (C6-C10) - BTEX	No	No Trend	7
13	F1 (C6-C10_)	No	No Trend	7
13	F2 (C10-C16 Hydrocarbons)	No	No Trend	7
13	Fluoride	No	No Trend	2
13	Hardness as CaCO3	No	No Trend	8
13	Hydroxide	No	No Trend	8
13	Ionic Balance	No	No Trend	8
13	Iron	No	No Trend	8
13	Lead	No	No Trend	8
13	Lithium	No	Down	6
13	Magnesium	No	No Trend	8
13	Manganese	No	No Trend	7
13	Mercury	No	Down	8
13	Molybdenum	No	No Trend	8
13	Nickel	No	Down	8
13	Nitrate (as NO3-N)	No	No Trend	8
13	Nitrate and Nitrate	No	No Trend	8
13	Nitrite (as NO2-N)	No	Down	8
13	pH	No	No Trend	8
13	Phosphorus	No	No Trend	5
13	Potassium	No	No Trend	8
13	Selenium	No	Down	7
13	Silver	No	Down	7
13	Sodium	No	No Trend	8
13	Strontium	No	No Trend	1
13	Styrene	No	No Trend	2
13	Sulphate	No	No Trend	8
13	Thallium	No	Down	7
13	Tin	No	Down	7
13	Titanium	No	No Trend	7
13	Toluene	No	No Trend	7
13	Total Dissolved Solids (TDS)	No	No Trend	8
13	Total Kjeldahl Nitrogen (TKN)	No	No Trend	8
13	Total Organic Carbon (TOC)	No	No Trend	1
13	TRH	No	No Trend	1
13	Uranium	No	No Trend	6
13	Vanadium	No	Down	7

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
13	Xylene (o)	No	No Trend	6
13	Xylenes (m & p)	No	No Trend	6
13	Xylenes Total	No	No Trend	7
13	Zinc	No	No Trend	8
14	Alkalinity (total as CaCO3)	No	No Trend	11
14	Aluminum	No	Down	10
14	Ammonia	No	No Trend	11
14	Antimony	No	Down	11
14	Arsenic	No	No Trend	9
14	Barium	No	Down	11
14	Benzene	No	No Trend	10
14	Beryllium	No	Down	10
14	Bicarbonate	No	No Trend	11
14	Boron (hot water soluble)	No	No Trend	10
14	Cadmium	No	Down	11
14	Calcium	No	Up	11
14	Carbonate	No	No Trend	11
14	Chemical Oxygen Demand (COD)	No	No Trend	11
14	Chloride	No	Down	11
14	Chromium	No	Down	11
14	Cobalt	No	Down	11
14	Copper	No	Down	11
14	Dissolved Organic Carbon (DOC)	No	No Trend	10
14	Electrical Conductivity (EC)	No	No Trend	11
14	Ethylbenzene	No	No Trend	10
14	F1 (C6-C10) - BTEX	No	No Trend	10
14	F1 (C6-C10_)	No	No Trend	10
14	F2 (C10-C16 Hydrocarbons)	No	No Trend	10
14	Fluoride	No	No Trend	2
14	Hardness as CaCO3	No	Up	11
14	Hydroxide	No	No Trend	11
14	Ionic Balance	No	No Trend	11
14	Iron	No	Down	11
14	Lead	No	No Trend	11
14	Lithium	No	No Trend	9
14	Magnesium	No	No Trend	11
14	Manganese	No	No Trend	10
14	Mercury	No	Down	11
14	Molybdenum	No	No Trend	11
14	Nickel	No	Down	11
14	Nitrate (as NO3-N)	No	Down	11
14	Nitrate and Nitrate	No	Down	11
14	Nitrite (as NO2-N)	No	Down	11
14	pH	No	No Trend	11
14	Phosphorus	No	No Trend	8
14	Potassium	No	No Trend	11
14	Selenium	No	Down	10
14	Silver	No	Down	10
14	Sodium	No	No Trend	11
14	Strontium	Yes	No Trend	3
14	Styrene	No	No Trend	2
14	Sulphate	No	No Trend	11
14	Thallium	No	No Trend	10
14	Tin	No	Down	10
14	Titanium	No	No Trend	10
14	Toluene	No	No Trend	10
14	Total Dissolved Solids (TDS)	No	No Trend	11
14	Total Kjeldahl Nitrogen (TKN)	No	Down	11
14	Total Organic Carbon (TOC)	No	No Trend	1
14	TRH	No	No Trend	1
14	Uranium	No	Down	9
14	Vanadium	No	No Trend	10
14	Xylene (o)	No	No Trend	8
14	Xylenes (m & p)	No	No Trend	8
14	Xylenes Total	No	Up	10
14	Zinc	No	Down	11
16	Alkalinity (total as CaCO3)	No	No Trend	9
16	Aluminum	No	No Trend	8
16	Ammonia	No	No Trend	9
16	Antimony	No	Down	9
16	Arsenic	No	No Trend	7
16	Barium	No	No Trend	9
16	Benzene	No	No Trend	8
16	Beryllium	No	Down	8
16	Bicarbonate	No	No Trend	9
16	Boron (hot water soluble)	No	No Trend	8
16	Cadmium	No	Down	9
16	Calcium	No	No Trend	9
16	Carbonate	No	No Trend	9
16	Chemical Oxygen Demand (COD)	No	No Trend	9
16	Chloride	No	Down	9
16	Chromium	No	Down	9
16	Cobalt	No	Down	9
16	Copper	No	Down	9
16	Dissolved Organic Carbon (DOC)	No	Down	8
16	Electrical Conductivity (EC)	No	Down	9
16	Ethylbenzene	No	No Trend	8
16	F1 (C6-C10) - BTEX	No	No Trend	8
16	F1 (C6-C10_)	No	No Trend	8
16	F2 (C10-C16 Hydrocarbons)	No	No Trend	8
16	Fluoride	Yes	No Trend	2
16	Hardness as CaCO3	No	No Trend	9
16	Hydroxide	No	No Trend	9
16	Ionic Balance	No	Up	9
16	Iron	No	No Trend	9
16	Lead	No	Down	9
16	Lithium	No	No Trend	7
16	Magnesium	No	No Trend	9
16	Manganese	No	Down	8
16	Mercury	No	Down	9

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
16	Molybdenum	No	Down	9
16	Nickel	No	No Trend	9
16	Nitrate (as NO3-N)	No	No Trend	9
16	Nitrate and Nitrate	No	Down	9
16	Nitrite (as NO2-N)	No	No Trend	9
16	pH	No	No Trend	9
16	Phosphorus	No	No Trend	6
16	Potassium	No	No Trend	9
16	Selenium	No	Down	8
16	Silver	No	Down	8
16	Sodium	No	Down	9
16	Strontium	No	No Trend	1
16	Styrene	No	No Trend	2
16	Sulphate	No	Down	9
16	Thallium	No	Down	8
16	Tin	No	Down	8
16	Titanium	No	No Trend	8
16	Toluene	No	No Trend	8
16	Total Dissolved Solids (TDS)	No	Down	9
16	Total Kjeldahl Nitrogen (TKN)	No	Down	9
16	Total Organic Carbon (TOC)	No	No Trend	1
16	TRH	No	No Trend	1
16	Uranium	No	No Trend	7
16	Vanadium	No	Down	8
16	Xylene (o)	No	No Trend	6
16	Xylenes (m & p)	No	No Trend	6
16	Xylenes Total	No	Up	8
16	Zinc	No	Down	9
18	Alkalinity (total as CaCO3)	No	Down	9
18	Aluminum	No	No Trend	8
18	Ammonia	No	No Trend	9
18	Antimony	No	Down	9
18	Arsenic	No	Down	7
18	Barium	No	Down	9
18	Benzene	No	No Trend	8
18	Beryllium	No	Down	8
18	Bicarbonate	No	Down	9
18	Boron (hot water soluble)	No	No Trend	8
18	Cadmium	No	Down	9
18	Calcium	No	Down	9
18	Carbonate	No	No Trend	9
18	Chemical Oxygen Demand (COD)	No	No Trend	9
18	Chloride	No	Down	9
18	Chromium	No	Down	9
18	Cobalt	No	Down	9
18	Copper	No	Down	9
18	Dissolved Organic Carbon (DOC)	No	Down	8
18	Electrical Conductivity (EC)	No	Down	9
18	Ethylbenzene	No	No Trend	8
18	F1 (C6-C10) - BTEX	No	No Trend	8
18	F1 (C6-C10_)	No	No Trend	8
18	F2 (C10-C16 Hydrocarbons)	No	No Trend	8
18	Fluoride	No	No Trend	2
18	Hardness as CaCO3	No	Down	9
18	Hydroxide	No	No Trend	9
18	Ionic Balance	No	Up	9
18	Iron	No	No Trend	9
18	Lead	No	Down	9
18	Lithium	No	Down	7
18	Magnesium	No	Down	9
18	Manganese	No	No Trend	8
18	Mercury	No	Down	9
18	Molybdenum	No	Down	9
18	Nickel	No	No Trend	9
18	Nitrate (as NO3-N)	No	No Trend	9
18	Nitrate and Nitrate	No	Down	9
18	Nitrite (as NO2-N)	No	No Trend	9
18	pH	No	No Trend	9
18	Phosphorus	No	No Trend	6
18	Potassium	No	Down	9
18	Selenium	No	Down	8
18	Silver	No	Down	8
18	Sodium	No	Down	9
18	Strontium	No	No Trend	1
18	Styrene	No	No Trend	2
18	Sulphate	No	Down	9
18	Thallium	No	Down	8
18	Tin	No	Down	8
18	Titanium	No	No Trend	8
18	Toluene	No	No Trend	8
18	Total Dissolved Solids (TDS)	No	Down	9
18	Total Kjeldahl Nitrogen (TKN)	No	No Trend	9
18	Total Organic Carbon (TOC)	No	No Trend	1
18	TRH	No	No Trend	1
18	Uranium	No	No Trend	7
18	Vanadium	No	No Trend	8
18	Xylene (o)	No	No Trend	6
18	Xylenes (m & p)	No	No Trend	6
18	Xylenes Total	No	Up	8
18	Zinc	No	No Trend	9
19	Alkalinity (total as CaCO3)	No	Up	9
19	Aluminum	No	Down	8
19	Ammonia	No	No Trend	9
19	Antimony	No	Down	9
19	Arsenic	No	No Trend	7
19	Barium	No	No Trend	9
19	Benzene	No	No Trend	8
19	Beryllium	No	Down	8
19	Bicarbonate	No	Up	9
19	Boron (hot water soluble)	No	No Trend	8

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
19	Cadmium	No	Down	9
19	Calcium	No	No Trend	9
19	Carbonate	No	Down	9
19	Chemical Oxygen Demand (COD)	No	No Trend	9
19	Chloride	Yes	Up	9
19	Chromium	No	Down	9
19	Cobalt	No	Down	9
19	Copper	No	Down	9
19	Dissolved Organic Carbon (DOC)	No	No Trend	8
19	Electrical Conductivity (EC)	No	Down	9
19	Ethylbenzene	No	No Trend	8
19	F1 (C6-C10) - BTEX	No	No Trend	8
19	F1 (C6-C10_)	No	No Trend	8
19	F2 (C10-C16 Hydrocarbons)	No	No Trend	8
19	Fluoride	Yes	No Trend	2
19	Hardness as CaCO3	No	No Trend	9
19	Hydroxide	No	No Trend	9
19	Ionic Balance	No	No Trend	9
19	Iron	No	No Trend	9
19	Lead	No	Down	9
19	Lithium	No	Down	7
19	Magnesium	No	No Trend	9
19	Manganese	No	Down	8
19	Mercury	No	Down	9
19	Molybdenum	No	Down	9
19	Nickel	No	No Trend	9
19	Nitrate (as NO3-N)	No	Down	9
19	Nitrate and Nitrate	No	Down	9
19	Nitrite (as NO2-N)	No	Down	9
19	pH	No	No Trend	9
19	Phosphorus	No	Down	6
19	Potassium	No	No Trend	9
19	Selenium	No	Down	8
19	Silver	No	No Trend	8
19	Sodium	No	No Trend	9
19	Strontium	No	No Trend	1
19	Styrene	No	No Trend	2
19	Sulphate	No	Down	9
19	Thallium	No	No Trend	8
19	Tin	No	Down	8
19	Titanium	No	Down	8
19	Toluene	No	No Trend	8
19	Total Dissolved Solids (TDS)	No	Down	9
19	Total Kjeldahl Nitrogen (TKN)	No	No Trend	9
19	Total Organic Carbon (TOC)	No	No Trend	1
19	TRH	No	No Trend	1
19	Uranium	No	No Trend	7
19	Vanadium	No	Down	8
19	Xylene (o)	No	No Trend	6
19	Xylenes (m & p)	No	No Trend	6
19	Xylenes Total	No	Up	8
19	Zinc	No	Down	9
20	Alkalinity (total as CaCO3)	No	Down	9
20	Aluminum	No	No Trend	8
20	Ammonia	Yes	Up	9
20	Antimony	No	Down	9
20	Arsenic	No	No Trend	7
20	Barium	No	Down	9
20	Benzene	No	No Trend	8
20	Beryllium	No	Down	8
20	Bicarbonate	No	Down	9
20	Boron (hot water soluble)	Yes	Up	8
20	Cadmium	No	Down	9
20	Calcium	No	Down	9
20	Carbonate	No	No Trend	9
20	Chemical Oxygen Demand (COD)	Yes	No Trend	9
20	Chloride	No	No Trend	9
20	Chromium	No	Down	9
20	Cobalt	No	Down	9
20	Copper	No	No Trend	9
20	Dissolved Organic Carbon (DOC)	No	No Trend	8
20	Electrical Conductivity (EC)	No	Down	9
20	Ethylbenzene	No	No Trend	8
20	F1 (C6-C10) - BTEX	No	No Trend	8
20	F1 (C6-C10_)	No	No Trend	8
20	F2 (C10-C16 Hydrocarbons)	No	No Trend	8
20	Fluoride	No	No Trend	2
20	Hardness as CaCO3	No	Down	9
20	Hydroxide	No	No Trend	9
20	Ionic Balance	Yes	Up	9
20	Iron	No	No Trend	9
20	Lead	No	Down	9
20	Lithium	No	No Trend	7
20	Magnesium	No	No Trend	9
20	Manganese	No	No Trend	8
20	Mercury	No	Down	9
20	Molybdenum	No	Down	9
20	Nickel	No	Down	9
20	Nitrate (as NO3-N)	No	Down	9
20	Nitrate and Nitrate	No	Down	9
20	Nitrite (as NO2-N)	No	Down	9
20	pH	No	No Trend	9
20	Phosphorus	No	Down	6
20	Potassium	No	No Trend	9
20	Selenium	No	No Trend	8
20	Silver	No	No Trend	8
20	Sodium	No	Down	9
20	Strontium	No	No Trend	1
20	Styrene	No	No Trend	2
20	Sulphate	No	Down	9

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
20	Thallium	No	No Trend	8
20	Tin	No	Down	8
20	Titanium	No	Down	8
20	Toluene	No	No Trend	8
20	Total Dissolved Solids (TDS)	No	Down	9
20	Total Kjeldahl Nitrogen (TKN)	Yes	No Trend	9
20	Total Organic Carbon (TOC)	No	No Trend	1
20	TRH	No	No Trend	1
20	Uranium	No	No Trend	7
20	Vanadium	No	Down	8
20	Xylene (o)	No	No Trend	6
20	Xylenes (m & p)	No	No Trend	6
20	Xylenes Total	No	Up	8
20	Zinc	No	Down	9
21	Alkalinity (total as CaCO3)	No	Down	9
21	Aluminum	No	No Trend	8
21	Ammonia	No	Down	9
21	Antimony	No	No Trend	9
21	Arsenic	No	Down	7
21	Barium	No	No Trend	9
21	Benzene	No	No Trend	8
21	Beryllium	No	Down	8
21	Bicarbonate	No	No Trend	9
21	Boron (hot water soluble)	Yes	Up	8
21	Cadmium	No	Down	9
21	Calcium	No	No Trend	9
21	Carbonate	No	No Trend	9
21	Chemical Oxygen Demand (COD)	No	No Trend	9
21	Chloride	No	No Trend	9
21	Chromium	No	Down	9
21	Cobalt	No	No Trend	9
21	Copper	No	No Trend	9
21	Dissolved Organic Carbon (DOC)	No	No Trend	8
21	Electrical Conductivity (EC)	No	No Trend	9
21	Ethylbenzene	No	No Trend	8
21	F1 (C6-C10) - BTEX	No	No Trend	8
21	F1 (C6-C10_)	No	No Trend	8
21	F2 (C10-C16 Hydrocarbons)	No	No Trend	8
21	Fluoride	No	No Trend	2
21	Hardness as CaCO3	No	No Trend	9
21	Hydroxide	No	No Trend	9
21	Ionic Balance	No	No Trend	9
21	Iron	No	No Trend	9
21	Lead	No	Down	9
21	Lithium	No	No Trend	7
21	Magnesium	No	No Trend	9
21	Manganese	No	No Trend	8
21	Mercury	No	Down	9
21	Molybdenum	No	No Trend	9
21	Nickel	No	No Trend	9
21	Nitrate (as NO3-N)	No	Down	9
21	Nitrate and Nitrate	No	Down	9
21	Nitrite (as NO2-N)	No	Down	9
21	pH	No	No Trend	9
21	Phosphorus	No	No Trend	6
21	Potassium	No	No Trend	9
21	Selenium	No	No Trend	8
21	Silver	No	Down	8
21	Sodium	No	No Trend	9
21	Strontium	No	No Trend	1
21	Styrene	No	No Trend	2
21	Sulphate	No	No Trend	9
21	Thallium	No	Down	8
21	Tin	No	Down	8
21	Titanium	No	No Trend	8
21	Toluene	No	No Trend	8
21	Total Dissolved Solids (TDS)	No	No Trend	9
21	Total Kjeldahl Nitrogen (TKN)	No	No Trend	9
21	Total Organic Carbon (TOC)	No	No Trend	1
21	TRH	No	No Trend	1
21	Uranium	No	Up	7
21	Vanadium	No	Down	8
21	Xylene (o)	No	No Trend	6
21	Xylenes (m & p)	No	No Trend	6
21	Xylenes Total	No	Up	8
21	Zinc	No	Down	9
22	Alkalinity (total as CaCO3)	No	Down	9
22	Aluminum	No	Down	8
22	Ammonia	No	Down	9
22	Antimony	No	Down	9
22	Arsenic	No	No Trend	7
22	Barium	No	No Trend	9
22	Benzene	No	No Trend	8
22	Beryllium	No	Down	8
22	Bicarbonate	No	Down	9
22	Boron (hot water soluble)	No	Up	8
22	Cadmium	No	Down	9
22	Calcium	No	No Trend	9
22	Carbonate	No	No Trend	9
22	Chemical Oxygen Demand (COD)	No	No Trend	9
22	Chloride	No	No Trend	9
22	Chromium	No	Down	9
22	Cobalt	No	Down	9
22	Copper	No	No Trend	9
22	Dissolved Organic Carbon (DOC)	No	Down	8
22	Electrical Conductivity (EC)	No	No Trend	9
22	Ethylbenzene	No	No Trend	8
22	F1 (C6-C10) - BTEX	No	No Trend	8
22	F1 (C6-C10_)	No	No Trend	8
22	F2 (C10-C16 Hydrocarbons)	No	No Trend	8

Table 4: Trend Analysis Using Mann Kendall

Sample Location	Parameter	Max Value Last	Mann Kendal Trend	Number of Points
22	Fluoride	Yes	No Trend	2
22	Hardness as CaCO3	No	No Trend	9
22	Hydroxide	No	No Trend	9
22	Ionic Balance	No	No Trend	9
22	Iron	No	Down	9
22	Lead	No	Down	9
22	Lithium	No	No Trend	7
22	Magnesium	No	No Trend	9
22	Manganese	No	Down	8
22	Mercury	No	Down	9
22	Molybdenum	No	No Trend	9
22	Nickel	No	No Trend	9
22	Nitrate (as NO3-N)	No	Down	9
22	Nitrate and Nitrate	No	Down	9
22	Nitrite (as NO2-N)	No	Down	9
22	pH	No	No Trend	9
22	Phosphorus	No	Down	6
22	Potassium	No	No Trend	9
22	Selenium	No	No Trend	8
22	Silver	No	Down	8
22	Sodium	No	No Trend	9
22	Strontium	No	No Trend	1
22	Styrene	No	No Trend	2
22	Sulphate	No	Down	9
22	Thallium	No	Down	8
22	Tin	No	Down	8
22	Titanium	No	Down	8
22	Toluene	No	No Trend	8
22	Total Dissolved Solids (TDS)	No	No Trend	9
22	Total Kjeldahl Nitrogen (TKN)	No	Down	9
22	Total Organic Carbon (TOC)	No	No Trend	1
22	TRH	No	No Trend	1
22	Uranium	No	No Trend	7
22	Vanadium	No	Down	8
22	Xylene (o)	No	No Trend	6
22	Xylenes (m & p)	No	No Trend	6
22	Xylenes Total	No	Up	8
22	Zinc	No	Down	9

Table 5: Environment Canada - Historical Precipitation Data - Total Precipitation (mm)

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1996	23	16	18	32.3	29.4	91.8	119.5	106.6	98.8	16.6	68.2	32.2	652.4
1997	11.1	12	24.5	27.7	50.7	143.3	52.3	71.4	96.6	31.6	7.2	4.5	532.9
1998	23	0	12.4	35.2	32.8	99.6	73	32.8	53.8	16.4	17.8	30	426.8
1999	64	4	19	19.6	64.8	21.6	123.8	60.8	11.4	9.4	14.6	12	425
2000	17.5	5	32	24	55.3	73.7	118	32.8	56.6	1	6.5	10	432.4
2001	1	5.8	6.5	0.8	55.2	94.2	260.2	8.4	37.4	23.4	34.5	6	533.4
2002	6	3.5	26	29.4	11.6	35.8	40	70	15.2	39.7	12	3	292.2
2003	39.7	19	20	46.9	64.3	110	80.8	40.8	27.2	23	19	8	498.7
2004	30.5	4	43	22.8	57.5	37.3	131.4	67.3	44.8	31.2	0	34.3	504.1
2005	10	5	35.5	18.6	43.6	95.3	82.8	59.3	24.4	18	3	14	409.5
2006	6	33	40	7.2	72.4	54.3	52.8	47.6	90.2	39.2	45	19.8	507.5
2007	7	23	5	46.9	51.5	78.8	59	59.1	9	5.8	9.6	27	381.7
2008	20.5	9	13.5	63.6	39	64.9	70.9	27.8	41.2	2.8	9	35	397.2
2009	22	9	24	32.7	7.6*	20.6	67.6	19.2	5.8	31.1*	8.6	41.5	251
2010	17	4	5	70.8	70	73.2	109	41.8	43.6	8.7	14	34	491.1
2011	69	20.5	8	14.4	6.8	146.6	113.4	61	12.4	14.8	19.2	16	502.1
2012	9	21.5	23	46.6	64.2	58.8	152.4	93.2	24.7	33.4	43	52	621.8
2013	39.5	10.5	31	17	23.9	96.6	101.4	71.6	4	9.8	61	41.5	507.8
2014	8.7 [1]	10.2	5.8 [1]	75.8 [1]	42.3	98.4	120.1	13.9	34.1	10.8	42.4	5.5	386.4
2015	19.8	24.9	31.3	16.5	37.3	59.7	108.6	10.3	71.1	22.7	17.4	3.5	423.1
2016	26.3	7.6	15.6	7.4	104	64.6	77.3	38.4	10.5	31.4	12.7	12	407.8
Mean	**23.1**	**11.8**	**21.7**	**29.0**	**48.8**	**77.1**	**100.7**	**49.2**	**38.7**	**19.5**	**22.1**	**21.0**	**456.4**

Notes:

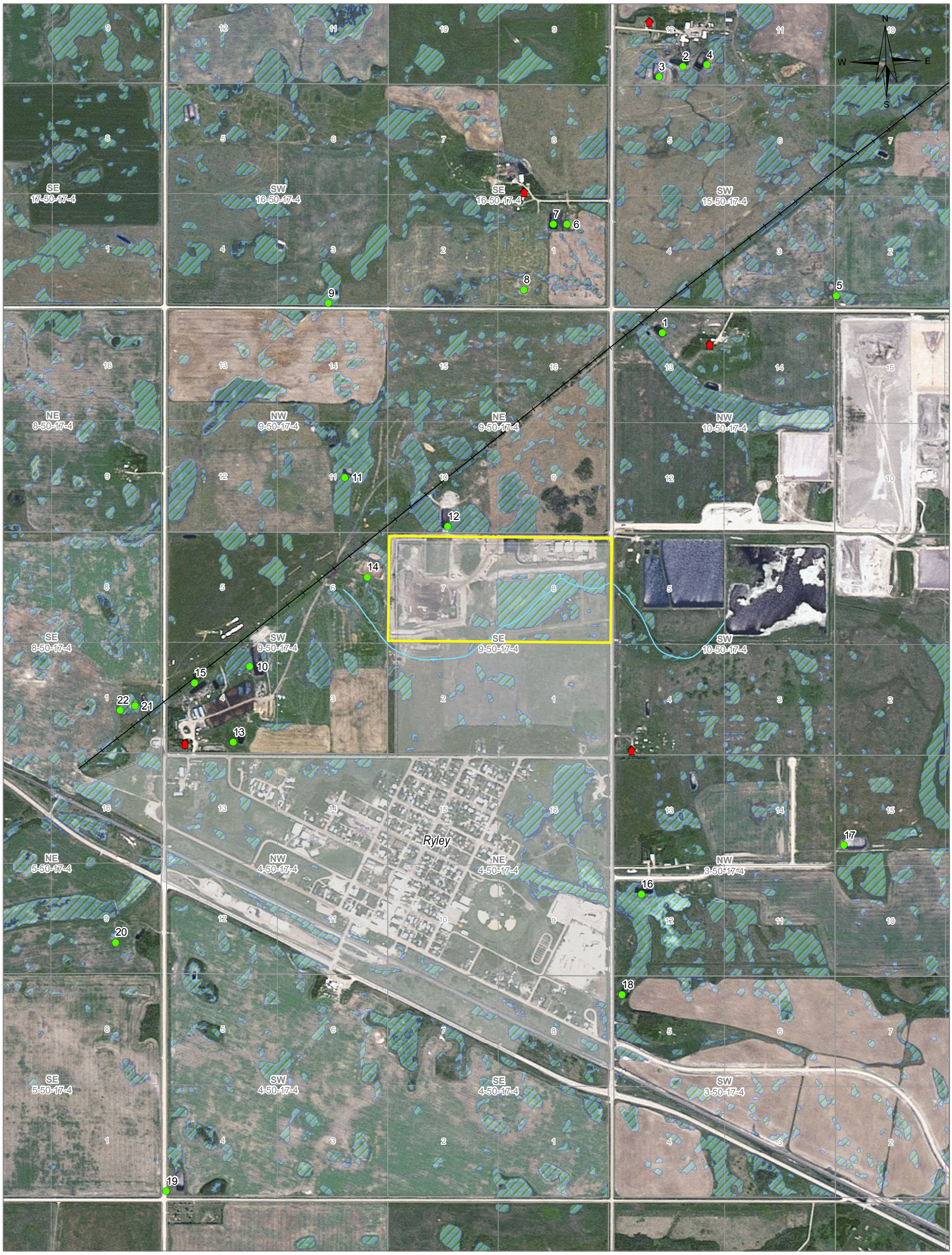
1. Denotes - Based on Incompleted Data

2. Data collected from Tofield North, Elk Island National Park Station and Holden AGDM Stations

3. Link to Data: http://climate.weather.gc.ca/historical_data/search_historic_data_e.html

FIGURES

W:\Projects\CGY\78070\SWOP03347-01\GIS\Maps\SWOP03347-01_Fig2.mxd modified 12/13/2016 by rhia.goo



LEGEND

- Rural Residence
- Water Sample Location
- Site Outline
- Historical Railway Bed (Approximate Centreline)
- Bible Creek (Approximate Centreline)
- Potential Wetland
- Town Boundary

NOTES
Base data source: ESRI, CanVec (50,000) & ESRD

STATUS
ISSUED FOR USE

2016 DUGOUT SAMPLING PROGRAM
CLASS 1 WASTE MANAGEMENT FACILITY
RYLEY, AB

Dugout Sampling Location Plan

PROJECTION UTM Zone 12		**DATUM** NAD83	**CLIENT**
Scale: 1:13,500 200 100 0 200 Metres			TETRA TECH
FILE NO. SWOP03347-01_Fig2.mxd			
OFFICE Tt-CAL	**DWN** RG / **CKD** MS / **APVD** CF / **REV** 0		**Figure 1**
DATE December 13, 2016	**PROJECT NO.** SWM.SWOP03347-01		

APPENDIX A

REGULATORY APPROVAL – ALBERTA ENVIRONMENT

ENVIRONMENT

APPROVAL

PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
R.S.A. 2000, c.E-12, as amended.

APPROVAL NO. 10348-02-00

APPLICATION NO. 005-10348

EFFECTIVE DATE: February 29, 2008

EXPIRY DATE: March 31, 2016

APPROVAL HOLDER: Clean Harbors Canada, Inc.

ACTIVITY: **CONSTRUCTION, OPERATION AND RECLAMATION OF THE**

Ryley Industrial Waste Management Facility, consisting of a Class I and Class II Industrial Landfill and a Hazardous Waste/Recyclable Storage and Processing Facility,

IS SUBJECT TO THE ATTACHED TERMS AND CONDITIONS.

Designated Director under the Act David Helmer

Date Signed February 29, 2008

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 1: DEFINITIONS

SECTION 1.1: DEFINITIONS

1.1.1 All definitions from the Act and the regulations apply except where expressly defined in this approval.

1.1.2 In all PARTS of this approval:

(a) "Act" means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c.E-12, as amended;

(b) “active landfill area" means the area of the landfill that has received or is receiving waste and has not been closed and that is being used for disposal, storage, processing, transport or handling of waste;

(c) “air contaminant” means any solid, liquid or gas or combination of any of them in the atmosphere resulting directly or indirectly from activities of man;

(d) “APEGGA” means the Association of Professional Engineers, Geologists and Geophysicists of Alberta;

(e) "application" means the written submissions to the Director in respect of application number 005-10348;

(f) “cell” means a designed or designated area of the landfill comprised of an excavation or earthen structure in which waste is enclosed by a cover;

(g) “closure” means the construction of a final cover for a landfill phase or cell including placement of previously conserved upper surface soil and re-vegetation as required for the intended future use of the landfill;

(h) “composite liner system” means a liner system that consists of 80 mil high density polyethylene (HDPE) geomembrane primary and secondary liners, a leachate collection system, and a leak detection system underlain by a compacted clay liner, placed at the base and at the sides of a landfill or a cell to restrict the migration of leachate;

(i) "container" means any portable device in which a substance is kept, including but not limited to the following:

(i) drums, barrels and pails which have a capacity greater than 18 litres but less than 210 litres,

(ii) 320 litre overpack drums, and

(iii) 1000 litre tote tanks or sacks;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(j) “cover” means soil or other material that is used to cover compacted wastes in a cell;

(k) "day" means any sampling period of 24 consecutive hours unless otherwise specified;

(l) "decommissioning" means the dismantling and decontamination of the facility undertaken subsequent to the termination or abandonment of any activity or any part of any activity regulated under the Act;

(m) "decontamination" means the treatment or removal of substances from the facility and affected lands;

(n) "Director" means an employee of the Government of Alberta designated as a Director under the Act;

(o) "dismantling" means the removal of buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, railways, roadways, pipelines and any other installations that are being or have been used or held for or in connection with the facility;

(p) “existing ambient air monitoring program” means the ambient air monitoring program conducted under Subsections 4.1.5, 4.1.6, and 4.1.7 of *Environmental Protection and Enhancement Act* Approval No. 10348-01-00, which includes but is not limited to the following:

  (i) ambient air monitoring for suspended particulate once every 12 days for a 24 hour period, and

  (ii) monitoring of wind speed and direction whenever hazardous waste is being landfilled;

(q) “existing cells” means Cell 1, Cell 2, Cell 3A, Cell 3B, and Cell 3C as designated and described in the application;

(r) “facility” means all buildings, structures, process and pollution abatement equipment, vessels, landfills, storage and material handling facilities, industrial runoff control systems, railways, roadways, pipelines, monitoring wells and other installations, and includes the land, located on the SE 1/4 of Section 9, Township 050, Range 17, West of the 4th Meridian, that is being or has been used or held for or in connection with the Ryley Industrial Waste Management Facility;

(s) "facility developed area" means the areas of the facility used for the storage, treatment, processing, transport, or handling of raw material, intermediate product, by-product, finished product, process chemicals, or waste material;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(t) ”final closure” means the period of time when waste will no longer be placed in the defined portion of the landfill and activities are undertaken to complete the final cover system and decommission components and facilities that are no longer required, and this period of time includes the construction of any additional components or monitoring systems that are necessary for post-closure;

(u) "final cover" means soils and other material used on the surface of a landfill that is completed to its maximum designated waste elevation;

(v) "fugitive emissions" means emissions of substances to the atmosphere other than ozone depleting substances, originating from a facility source other than a flue, vent, or stack but does not include sources which may occur due to breaks or ruptures in process equipment;

(w) "geomembrane" means a sheet of manufactured synthetic material designed to control the migration of liquid;

(x) "grab sample" means an individual sample collected in less than 30 minutes and which is representative of the substance sampled;

(y) “groundwater” means groundwater as defined in the *Water Act*;

(z) “Hazardous Waste/Recyclable Storage and Processing Facility” means all buildings, structures, process and pollution abatement equipment, vessels, storage and material handling facilities, and other installations, and includes the portion of land within the facility that is being or has been used or held for or in connection with the Hazardous Waste/Recyclable Storage and Processing Facility;

(aa) “hydraulic conductivity” means the ease with which a fluid can be transported through a material;

(bb) “hydrocarbon” means a chemical compound that consists entirely of carbon and hydrogen;

(cc) “ISO 17025” means the international standard, developed and published by International Organization for Standardization (ISO), specifying management and technical requirements for laboratories;

(dd) "incompatible wastes or incompatible hazardous recyclables" means substances which when mixed can produce effects which are harmful to human health or the environment such as heat, pressure, fire, explosion, violent reaction, toxic dusts, mists, fumes or gases, or flammable fumes or gases, and include those substances listed in Appendix 5 of the *Guidelines for Industrial Landfills*, Alberta Environment, June 1987, as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ee) "industrial runoff" means precipitation that falls on or traverses the facility developed area;

(ff) "industrial runoff control system" means the parts of the facility that collect, store or treat industrial runoff from the facility and includes but is not limited to a surface water collection ditch, surface water detention pond, and tank farm bermed area;

(gg) "industrial wastewater" means the composite of liquid wastes and water-carried wastes, any portion of which results from any industrial process carried on at the facility;

(hh) “landfill” means the area at which waste is disposed of by placing it in a cell and includes all soil stock piles, trenches, berms, fences, run-on control systems, run-off control systems, leachate collection systems, leak detection systems, and other installations, and includes the portion of land within the facility that is being or has been used or held for or in connection with the Class I and Class II Industrial Landfill;

(ii) “lateral expansion” means an expansion of the waste boundaries of a landfill beyond the property area approved for landfilling by this approval;

(jj) “leachate” means a liquid that has been in contact with waste in any cell and has undergone chemical or physical changes;

(kk) “leachate collection system” means a system that gathers leachate so that it may be removed from a landfill and includes a permeable drainage material, a network of perforated pipes, and sumps or manholes from where leachate can be removed;

(ll) “leak detection liquid” means any liquid within the leak detection system;

(mm) “leak detection system” means a system that gathers liquids between a primary liner and a secondary liner system and consists of drainage material and sumps from where liquid can be removed;

(nn) “liner” means a continuous layer of synthetic material or natural clay soils placed beneath and at the sides of a cell to restrict the migration of leachate;

(oo) "local environmental authority" means the Department of Environment, in the Province of Alberta, or the agency that has the equivalent responsibilities for any jurisdiction outside the Province;

(pp) “maximum acceptable leachate head” means the head of leachate above the lowest part of the primary liner, not including the sumps or leachate pipe trenches and is either:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(i) a maximum of 1.0 m in existing cells during landfill operations, closure and post-closure, or

(ii) a maximum of 0.3 m in each new cell during landfill operations, closure and post-closure;

(qq) “maximum designated waste elevation” means the maximum elevation of waste in metres above sea level, as proposed in the letter dated February 22, 2007 from Clean Harbors Canada, Inc. as part of the application;

(rr) "monitoring system" means all equipment used for sampling, conditioning, analyzing or recording data in respect of any parameter listed or referred to in this approval including equipment used for continuous monitoring;

(ss) "monitoring well" means a well drilled at a site to measure groundwater levels and collect groundwater samples for the purpose of physical, chemical, or biological analysis to determine the concentration of groundwater constituents;

(tt) "month" means calendar month;

(uu) “new cell” means Cell 3D or Cell 3E as designated in the application;

(vv) “points of compliance” means the location or locations of the groundwater monitoring wells where measurements of groundwater quality are taken to assess landfill and waste treatment performance;

(ww) “post-closure” means the longest of the following periods of time:

(i) 25 years from the final closure of the landfill,

(ii) so long as groundwater quality in groundwater monitoring wells does not meet the quality objectives specified in the approval, or

(iii) so long after final closure as leachate is generated from the leachate collection system at the landfill;

(xx) “primary liner” means the uppermost geomembrane liner;

(yy) "QA/QC" means quality assurance and quality control;

(zz) “quality assurance” means a planned system of activities that provide assurances that the facility was constructed as specified in the design;

(aaa) “quality control” means a planned system of inspections that are used to monitor and control the quality of a construction project;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(bbb) "quarter year" means a time period of three consecutive months designated as January, February, and March; or April, May, and June; or July, August, and September; or October, November, and December;

(ccc) "representative grab sample" means a sample consisting of equal volume portions of water collected from at least four sites between 0.20 & 0.30 metres below the water surface within the surface water detention pond of the industrial runoff control system;

(ddd) “run-off” means any rainwater or melt water that drains as surface flow from the active landfill area;

(eee) “run-off control system means any parts of the landfill that collect, store or treat run-off;

(fff) “run-on” means any rainwater or melt water that drains as surface flow into the active landfill area;

(ggg) “run-on control system” means parts of the landfill that divert run-on away from the active landfill area;

(hhh) “secondary liner” means the lowermost geomembrane liner;

(iii) "soil" means unconsolidated mineral or organic surficial materials that can be, have been, or are being altered by weathering, biological processes, or human activity;

(jjj) "storm event" means a 1 in 10 year precipitation event that occurs over 24 hours at Ryley, Alberta;

(kkk) "subsoil" means the layer of soil directly below the topsoil layer that consists of the B and C horizons as defined in *The Canadian System of Soil Classification*, Third Edition, 1998, as amended;

(lll) "suitable quality" means topsoil having a good, fair or poor rating as described in the *Soil Quality Criteria Relative to Disturbance and Reclamation,* Alberta Agriculture March, 1987, as amended;

(mmm) "tank" means a stationary device, designed to contain an accumulation of a substance, which is constructed primarily of non-earthen materials that provide structural support;

(nnn) “TDG” means the *Transportation of Dangerous Goods Regulations* (SOR/2001-286) made under the *Transportation of Dangerous Goods Act*, 1992 (Canada), as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ooo) “third-party hazardous waste” means hazardous waste generated on property that is not owned by the approval holder;

(ppp) “topsoil” means the uppermost layers of soil that consist of the L, F, H, O, and A horizons as defined in *The Canadian System of Soil Classification*, Third Edition, 1998, as amended;

(qqq) "waste storage area" means the areas designated for waste and hazardous recyclable container storage, and/or waste and hazardous recyclable tank storage, as described in the application;

(rrr) "week" means any consecutive 7-day period unless otherwise specified;

(sss) “working face” means that portion of the active landfill area where waste is currently being deposited, spread and compacted; and

(ttt) “year” means a calendar year, unless otherwise specified.

PART 2: GENERAL

SECTION 2.1: GENERAL

2.1.1 The approval holder shall immediately report to the Director by telephone any contravention of the terms and conditions of this approval at 1-780-422-4505.

2.1.2 The approval holder shall submit a written report to the Director within 7 days of the reporting pursuant to 2.1.1.

2.1.3 The terms and conditions of this approval are severable. If any term or condition of this approval or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of this approval shall not be affected thereby.

2.1.4 The approval holder shall immediately notify the Director in writing if any of the following events occurs:

(a) the approval holder is served with a petition into bankruptcy;

(b) the approval holder files an assignment in bankruptcy or Notice of Intent to make a proposal;

(c) a receiver or receiver-manager is appointed;

(d) an application for protection from creditors is filed for the benefit of the approval holder under any creditor protection legislation; or

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(e) any of the assets, which are the subject matter of this approval, are seized for any reason.

2.1.5 If the approval holder monitors for any substances or parameters which are the subject of operational limits as set out in this approval more frequently than is required and using procedures authorized in this approval, then the approval holder shall provide the results of such monitoring as an addendum to the reports required by this approval.

2.1.6 All abbreviations used in this approval follow those given in *Standard Methods for the Examination of Water and Wastewater* published jointly by the American Public Health Association, the American Water Works Association, and the Water Environment Federation, 1998, as amended, unless otherwise specified in this approval.

2.1.7 *Environmental Protection and Enhancement Act* Approval No. 10348-01-00, as amended, is cancelled.

SECTION 2.2: RECORD KEEPING

2.2.1 The approval holder shall record and retain all the following information in respect of any sampling conducted or analyses performed in accordance with this approval for a minimum of ten years, unless otherwise authorized in writing by the Director:

(a) the place, date and time of sampling;

(b) the dates the analyses were performed;

(c) the analytical techniques, methods or procedures used in the analyses;

(d) the names of the persons who collected and analyzed each sample; and

(e) the results of the analyses.

2.2.2 The approval holder shall record and retain all of the following information for a minimum of ten years:

(a) the name and addresses of all persons who discover any contravention for a minimum of ten years;

(b) the names and addresses of all persons who take any remedial actions arising from the contravention of the Act, the regulations or this approval; and

(c) a description of the remedial measures taken in respect of a contravention of the Act, the regulations or this approval.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 2.3: ANALYTICAL REQUIREMENTS

2.3.1 With respect to any sample required to be taken pursuant to this approval, the approval holder shall ensure that:

(a) collection;
(b) preservation;
(c) storage;
(d) handling; and
(e) analysis;

shall be conducted in accordance with the following unless otherwise authorized in writing by the Director:

(i) for air monitoring:

(A) the *Alberta Stack Sampling Code,* Alberta Environment, 1995, as amended;

(B) the *Methods Manual for Chemical Analysis of Atmospheric Pollutants*, Alberta Environment, 1993, as amended;

(C) the *Air Monitoring Directive*, Alberta Environment, 1989, as amended; and

(D) the *CEMS Code*;

(ii) for industrial wastewater, industrial runoff, run-on, run-off, leachate, leak detection liquid, dugout and water well, groundwater and domestic wastewater parameters:

(A) the *Standard Methods for the Examination of Water and Wastewater*, published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation, 2005, as amended;

(iii) for whole effluent toxicity tests:

(A) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout*, Environment Canada, Environmental Protection Series 1/RM/13, July 1990, as amended;

(B) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia Magna*, Environment Canada, Environmental Protection Series 1/RM/14, July 1990, as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(C) the *Biological Test Method: Growth Inhibition Test Using the Freshwater Alga Selenastrum capricornutum*, Environment Canada, Environmental Protection Series, November 1992, as amended;

(D) the *Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia*, Environment Canada, Environmental Protection Series 1/RM/21, February 1992, as amended;

(E) the *Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows*, Environment Canada, Environmental Protection Series 1/RM/22, February 1992, as amended; and

(F) the Chlorinated Phenolic Compounds in Bleached Kraft Mill Effluents and Receiving Waters (Method No. AE130.0) available, as amended from time to time, from the chemistry division, Alberta Environmental Centre, Vegreville, sample preservation shall be with sulphuric acid (one half vial of 12 N per one litre sample) instead of nitric acid;

(iv) for soil samples:

(A) *Soil Sampling and Methods of Analysis*, Lewis Publishers, 1993, as amended;

(B) the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, USEPA, SW-846, September 1986, as amended;

(C) the *Soil Quality Criteria Relative to Disturbance and Reclamation*, Alberta Agriculture, March 1987, as amended;

(D) the *Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites – Volume I: Main Report*, CCME EPC-NCS62E, 1993, as amended; and

(E) the *Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites – Volume II: Analytical Method Summaries*, CCME EPC-NCS66E, 1993, as amended; and

(v) for waste analysis:

(A) the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, USEPA, SW-846, September 1986, as amended; or

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(B) the *Methods Manual for Chemical Analysis of Water and Wastes*, Alberta Environmental Centre, Vegreville, Alberta, 1996, AECV96-M1 as amended; or

(C) the *Toxicity Characteristic Leaching Procedure (TCLP)* USEPA Regulation 40 CFR261, Appendix II, Method No. 1311, as amended; or

(D) the *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, American Water Works Association, and the Water Environment Federation, as amended.

2.3.2 The approval holder shall analyze all samples that are required to be obtained by this approval in a laboratory accredited pursuant to ISO 17025, as amended, for the specific parameter(s) to be analyzed, unless otherwise authorized in writing by the Director.

2.3.3 The approval holder shall comply with the terms and conditions of any written authorization issued by the Director under 2.3.2.

SECTION 2.4: OTHER

2.4.1 All above ground tanks shall conform to the *Guideline for Secondary Containment for Above Ground Storage Tanks,* Alberta Environment, 1997, as amended, unless otherwise authorized in writing by the Director.

PART 3: CONSTRUCTION

SECTION 3.1: LANDFILL

3.1.1 The approval holder shall construct each new cell of the Class I Industrial Landfill in accordance with the following, unless modifications are authorized in writing by the Director:

(a) the application; and

(b) in a way that each new Class 1 cell shall consist of the following components, at a minimum:

(i) a composite liner system that consists of:

(A) a 1.5 meter clay liner compacted to achieve an in-place hydraulic conductivity of 1×10^{-7} cm/s or less;

(B) a 80 mil HDPE (High Density Polyethylene) geomembrane liner (secondary liner) overlying the clay liner;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(C) a geocomposite drainage layer with a transmissivity of at least 1×10^{-2} cm/s placed over the secondary liner;

(D) a 80 mil HDPE geomembrane liner (primary liner) placed over top of the geocomposite drainage layer;

(E) a geocomposite drainage layer with a transmissivity of at least 1×10^{-2} cm/s placed over top of the primary liner; and

(F) a 0.45 meter thick cover of clean sand/soil placed over top of the geocomposite layer;

(ii) a leachate collection system:

(A) placed over the primary liner system;

(B) capable of maintaining the maximum acceptable leachate head; and

(C) consisting of:

(I) a geocomposite drainage layer with a transmissivity of at least 1×10^{-2} cm/s, and

(II) a primary leachate collection system sump(s) and a network of perforated collection pipes;

(iii) a leak detection system placed over the secondary liner system;

(iv) a run-on control system; and

(v) a run-off control system.

3.1.2 The composite liner system for the landfill shall be constructed on a foundation or base such that there shall be no failure of the liners due to settlement, compression, or uplift.

3.1.3 The approval holder shall implement the QA/QC monitoring program in accordance with the following:

(a) the Waste Management Unit 2 Construction Specifications and Construction Quality Assurance Program as described in the application; or

(b) equivalent as the program is revised.

3.1.4 The approval holder shall submit the following information to the Director prior to the construction of each new cell identified in the application:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) a Design Plan and Specifications, stamped and signed by a professional registered with APEGGA;

(b) an up-to-date copy of the QA/QC monitoring program;

(c) any proposed changes to the groundwater monitoring system;

(d) any proposed changes to the landfill run-on and run-off control systems; and

(e) any proposed changes to the facility industrial runoff control system.

3.1.5 The approval holder shall construct each new cell only as authorized in writing by the Director.

3.1.6 The approval holder shall not make any deviation that results in an adjustment to the Design Plan and Specifications, as submitted under 3.1.4(a), unless the following conditions are met:

(a) the deviation results in a minor adjustment to the Design Plan and Specifications in 3.1.4 (a) to suit field conditions encountered; and

(b) the deviation will not reduce the design performance of the landfill.

3.1.7 Prior to commencing the operation of any new cell following construction, the approval holder shall submit to the Director a summary report of the QA/QC monitoring program results stamped and signed by a professional registered with APEGGA.

3.1.8 The summary report in 3.1.7 shall contain the following:

(a) confirmation that the landfill has been constructed according to:

(i) the Design Plan and Specifications, and

(ii) the QA/QC monitoring program;

(b) documentation of any minor deviations as per 3.1.6;

(c) confirmation by the professional registered with APEGGA, that deviations as per 3.1.6 will not reduce landfill performance; and

(d) as-built plans for the constructed cell(s).

3.1.9 The approval holder shall maintain the following at all times after construction is complete:

(a) the integrity of the liners;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(b) the integrity of the leachate collection system; and

(c) the integrity of the leak detection system.

3.1.10 The approval holder shall notify the Director in writing at least 14 days prior to commencing operations of any new cell.

SECTION 3.2: SOIL CONSERVATION

3.2.1 The approval holder shall conserve all topsoil from disturbed land at the landfill.

3.2.2 The topsoil in 3.2.1 shall be used for reclamation of the landfill.

3.2.3 The approval holder shall not use topsoil for daily cover of the working face.

3.2.4 The approval holder shall salvage, from disturbed land, sufficient subsoil to meet the subsoil replacement requirements for closure of each cell.

3.2.5 The approval holder shall locate all topsoil stockpiles at the landfill.

3.2.6 The approval holder shall stockpile all topsoil as follows:

(a) on stable foundations; and

(b) in a manner that prevents admixing with subsoil.

3.2.7 The approval holder shall stockpile all subsoil as follows:

(a) on stable foundations; and

(b) in a manner that prevents admixing with topsoil.

3.2.8 When topsoil and subsoil are stockpiled, the stockpile shall be constructed as follows:

(a) topsoil and subsoil shall be stockpiled separately from each other;

(b) stockpile foundations must be stable;

(c) stockpiles shall be stabilized to control wind and water erosion;

(d) stockpiles shall be accessible and retrievable; and

(e) stockpiles shall be revegetated.

3.2.9 The approval holder shall immediately suspend topsoil and subsoil salvage when:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) wet or frozen field conditions will result in the admixing, degradation, or compaction of topsoil or subsoil; or

(b) high wind velocities, any other field conditions or facility operations will result in the admixing, degradation, or loss of topsoil or subsoil.

3.2.10 The approval holder shall only recommence topsoil and subsoil salvage when suspended under section 3.2.9, if field conditions referred to in section 3.2.9 no longer exist.

PART 4: OPERATIONS, LIMITS, MONITORING AND REPORTING

SECTION 4.1: GENERAL

4.1.1 The approval holder shall restrict access to the facility to only personnel authorized by the approval holder.

FACILITY AUDIT

4.1.2 The approval holder shall cause the facility to be audited by an independent third-party environmental consultant or organization to assess compliance with the terms and conditions of this approval:

(a) at least once every three years; and

(b) commencing on or before October 1, 2009 for the first audit.

4.1.3 The approval holder shall submit the Audit Report specified in 4.1.2, in the Annual Landfill Operations Report as required in 4.5.40(j).

4.1.4 The requirements in 4.1.2 and 4.1.3 do not relieve the approval holder of any duty under the Act or its regulations or this approval.

LANDFILL OPERATIONS PLAN

4.1.5 The approval holder shall:

(a) develop;

(b) maintain; and

(c) implement

a Landfill Operations Plan that does not contravene the requirements of this approval.

4.1.6 The approval holder shall:

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(a) retain a copy of the Landfill Operations Plan at the facility at all times; and

(b) update the Landfill Operations Plan on an annual basis at a minimum.

4.1.7 The Landfill Operations Plan shall include, at a minimum, all of the following:

(a) operational procedures for waste control, run-on and run-off controls, and nuisance controls;

(b) details on keeping and maintaining an operating record;

(c) a program for detecting and preventing the disposal of unauthorized wastes;

(d) procedures for the acceptance, handling and disposal of wastes, including;
(i) waste characterization and classification at source,
(ii) waste manifesting and tracking,
(iii) QA/QC Waste Acceptance procedures, and
(iv) waste sampling;

(e) procedures for placing waste in a cell including;
(i) compaction,
(ii) working face width,
(iii) lift depth, and
(iv) waste placement location using a grid system;

(f) an Odour Response Program;

(g) procedures for managing contaminated sulphur and sulphur containing wastes;

(h) a monitoring and maintenance program for the scale house and heavy operational equipment;

(i) a groundwater monitoring program;

(j) a remediation plan to deal with groundwater quality deterioration;

(k) a leachate monitoring and management program;

(l) a leak detection liquid monitoring and management program;

(m) a cell cover system;

(n) a health and safety program;

(o) an emergency response program, including procedures for handling fires, releases to the environment and health concerns;

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(p) an up-to-date plan of the landfill layout with survey records giving the location of all structural components of the landfill including final cover elevations and contours; and

(q) procedures for placing leachate, leak detection liquid, or other authorized wastes and liquids over the surface of the active landfill area for the purpose of evaporation or dust suppression.

4.1.8 The approval holder shall submit to the Director an up-to-date Operations Plan when requested in writing by the Director.

SECTION 4.2: AIR

OPERATIONS

4.2.1 The approval holder shall not release any effluent streams from the facility to the atmosphere except as provided in this approval.

4.2.2 The approval holder shall only release effluent streams to the atmosphere from the following sources:

(a) the air emission scrubber exhaust stack;

(b) building vents which include but are not limited to lab hoods, building fans and shop exhausts;

(c) tank heaters;

(d) building furnaces; and

(e) any other source authorized in writing by the Director.

4.2.3 The approval holder shall not operate any process equipment unless and until the pollution abatement equipment associated with the process equipment is:

(a) operational; and

(b) operating.

4.2.4 Except as provided for by the Director in writing, the approval holder shall control fugitive emissions and any source not specified in 4.2.2 in accordance with 4.2.5 of this approval.

4.2.5 With respect to fugitive emissions and any source not specified in 4.2.2, the approval holder shall not release a substance or cause to be released a substance that causes or may cause any of the following:

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(a) impairment, degradation or alteration of the quality of natural resources; or

(b) material discomfort, harm or adverse affect to the well being or health of a person; or

(c) harm to property or to plant or animal life.

4.2.6 The approval holder shall exhaust air from the exhaust stacks through a caustic scrubber and an activated carbon filter while:

(a) hazardous waste or hazardous recyclables are being processed;

(b) hazardous waste or hazardous recyclables are being transferred; or

(c) containers of hazardous waste or hazardous recyclables are open.

4.2.7 The exhaust stacks in 4.2.6 are defined as the ones in the following buildings:

(a) drum processing building, as designated in the application; and

(b) staging building, as designated in the application.

4.2.8 The activated carbon in the filter referred to in 4.2.6, shall be replaced immediately when the concentration of total petroleum hydrocarbons in the stack exhaust exceeds 50 ppm.

4.2.9 The exhaust stacks referred to in 4.2.6 shall be sampled and measured weekly using the total petroleum hydrocarbon sampler/analyzer.

4.2.10 The portable, total petroleum hydrocarbon sampler/analyzer shall:

(a) have a detection limit of 1.0 ppm or less of total petroleum hydrocarbons; and

(b) be located within the exhaust stack, 1 metre downstream of the blower, but before the gas exists the exhaust stack.

4.2.11 Each caustic scrubber referred to in 4.2.6 shall be:

(a) monitored for pH daily; and

(b) maintained at a pH value of 8.0, or greater.

4.2.12 The approval holder shall not burn any debris by means of an open fire unless authorized in writing by the Director.

4.2.13 If the approval holder receives complaints of offensive odours beyond the facility boundaries, the approval holder shall:

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(a) place restrictions on waste disposal types, and volumes of waste being deposited that are causing those odours;

(b) increase the frequency of cover placement and modify waste handling activities at the landfill to reduce the release of those odours; and

(c) activate the Odour Response Program as specified in the Landfill Operations Plan 4.1.7(f).

MONITORING AND REPORTING

4.2.14 The approval holder shall monitor the ambient air for the facility in accordance with the existing ambient air monitoring program until the new ambient air monitoring program is implemented.

4.2.15 By July 1, 2008, the approval holder shall submit to the Director a proposal for a new ambient air monitoring program for the facility.

4.2.16 The proposal for the new ambient air monitoring program shall include the following monitoring parameters at a minimum:

(a) total hydrocarbons;

(b) volatile organic compounds;

(c) particulate matter;

(d) wind speed; and

(e) wind direction.

4.2.17 If the proposal for the new ambient air monitoring program is found deficient by the Director, the approval holder shall correct all the deficiencies as outlined by the Director within 120 days of the deficiency letter.

4.2.18 The approval holder shall implement the proposal for the new ambient air monitoring program as authorized in writing by the Director.

4.2.19 The approval holder shall report to the Director the results of the new ambient air monitoring program as specified in writing by the Director.

4.2.20 Notwithstanding 4.2.19, the approval holder shall submit to the Director an Annual Air Monitoring Report on or before March 31 each year on the information collected in the previous year.

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SECTION 4.3: INDUSTRIAL RUNOFF AND INDUSTRIAL WASTEWATER

OPERATIONS

4.3.1 The approval holder shall not release any substances from the facility to the surrounding watershed except as authorized by this approval.

4.3.2 The approval holder shall operate and maintain the following in accordance with the Landfill Operations Plan:

(a) a run-on control system to prevent flow onto the active landfill area from at least the peak discharge from a 1 in 25 year, 24 hour duration precipitation event at the landfill; and

(b) a run-off control system for the active landfill area to collect and control at least the run-off volume resulting from a 1 in 25 year, 24 hour duration precipitation event at the landfill.

4.3.3 All industrial runoff from the facility developed area shall be directed to the industrial runoff control system, as described in the application.

4.3.4 Subject to 4.3.8, the approval holder shall make or permit a release from the surface water detention pond of the industrial runoff control system only at the discharge point as designated in the application, which:

(a) is located in the south west corner of the surface water detention pond;

(b) discharges the water through a pump and discharge hose over the south berm and into the natural drainage area located south and east of the surface water detention pond; and

(c) is referred to as sampling location “A” in 4.3.15

unless an alternative location for (a) or (b) is authorized in writing by the Director.

4.3.5 The approval holder is only authorized to dispose of industrial wastewater and industrial runoff from the sources listed in TABLE 4.3-A to one or more of the following facilities:

(a) facilities holding a current Approval, Registration or as otherwise authorized under the Act to accept such waste;

(b) facilities approved by a local environmental authority outside of Alberta to accept such waste; or

(c) a deep well approved by the Energy Resources Conservation Board.

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TABLE 4.3-A: SELECTED SOURCES OF INDUSTRIAL WASTEWATER AND INDUSTRIAL RUNOFF

SOURCES
Industrial wastewater from the caustic scrubber
Industrial runoff that exceeds any of the parameters listed in TABLE 4.3-B or TABLE 4.3-C
Industrial runoff for which the results of parameters listed in TABLE 4.3-B or TABLE 4.3-C are unavailable at the time that the industrial wastewater and industrial runoff must be disposed of
Industrial wastewater removed from bulk tanks
Industrial wastewater from the storage and process building sumps

LEACHATE COLLECTION AND LEAK DETECTION SYSTEMS

4.3.6 The approval holder shall only dispose of leachate removed from the leachate collection system by one or more of the following methods:

(a) disposal to facilities holding a current Approval, Registration or as otherwise authorized under the Act to accept such waste;

(b) disposal to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) disposal to a deep well approved by the Energy Resources Conservation Board; or

(d) placing leachate over the surface of the active landfill area for the purpose of evaporation, as described in the application.

4.3.7 The approval holder shall only dispose of liquid removed from the leak detection system by one or more of the following methods:

(a) disposal to facilities holding a current Approval, Registration or as otherwise authorized under the Act to accept such waste;

(b) disposal to facilities approved by a local environmental authority outside of Alberta to accept such waste;

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(c) disposal to a deep well approved by the Energy Resources Conservation Board; or

(d) placing leak detection liquid over the surface of the active landfill area for the purpose of evaporation, as described in the application.

INDUSTRIAL RUNOFF LIMITS

4.3.8 Releases of industrial runoff from the surface water detention pond of the industrial runoff control system, to the surrounding watershed, shall comply with the limits specified in TABLE 4.3-B.

4.3.9 Releases of industrial runoff from within the tank farm bermed area of the industrial runoff control system, to the surrounding watershed, shall comply with the limits specified in TABLE 4.3-C.

TABLE 4.3-B: INDUSTRIAL RUNOFF LIMITS FOR THE SURFACE WATER DETENTION POND

PARAMETER	LIMITS Maximum unless otherwise indicated
Chemical Oxygen Demand	50 mg/L
Total Suspended Solids	25 mg/L
Ammonia, dissolved (expressed as Nitrogen)	5 mg/L
pH	6.0 – 9.5 pH units
Oil or other substances	Not present in amounts sufficient to create a visible film or sheen
96-Hour Multiple Concentration Acute Lethality Test Using Rainbow Trout (*Oncorhynchus mykiss*)	50% or greater survival
48-Hour Static Acute Lethality Test Using *Daphnia magna*	Result must “PASS” test

TABLE 4.3-C: INDUSTRIAL RUNOFF LIMITS FOR THE TANK FARM BERMED AREA

PARAMETER	LIMITS Maximum unless otherwise indicated
Chemical Oxygen Demand	50 mg/L
Total Suspended Solids	25 mg/L
Ammonia, dissolved (expressed as Nitrogen)	5 mg/L
pH	6.0 – 9.5 pH units
Oil or other substances	Not present in amounts sufficient to create a visible film or sheen

LEACHATE COLLECTION SYSTEM AND LEAK DETECTION SYSTEM LIMITS

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.3.10 Effective August 15, 2008, the approval holder shall not exceed the maximum acceptable leachate head in any cell.

4.3.11 Notwithstanding 4.3.10, the leachate head shall only exceed the maximum acceptable leachate head for a maximum duration of 14 days subsequent to a precipitation event, unless otherwise authorized in writing by the Director.

4.3.12 The volume of liquid in the leak detection system, as monitored in TABLE 4.5-B, shall not exceed the action leakage rate of 790 litres/ha/day in any cell.

INDUSTRIAL RUNOFF MONITORING AND REPORTING

4.3.13 The approval holder shall monitor the industrial runoff control system as required in TABLE 4.3-D.

4.3.14 The approval holder shall report to the Director the monitoring results of the industrial runoff control system as required in TABLE 4.3-D.

4.3.15 For the purpose of TABLE 4.3-D:

(a) sampling location A is defined as the surface water detention pond; and

(b) sampling location B is defined as industrial runoff collected within the tank farm bermed area.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.3-D: INDUSTRIAL RUNOFF CONTROL SYSTEM MONITORING AND REPORTING

MONITORING				REPORTING	
Parameter, Test, Event, Study Proposal or Reporting Requirement	**Frequency**	**Sample Type**	**Sampling Location**	**Monthly**	**Annually**
Surface Water Detention Pond:				Monthly Industrial Runoff Report for each month where discharge occurs (Due on or before the end of the month following the month in which the information was collected) Number of Copies Required 1	Annual Industrial Runoff Report (Provide annual summary of data by March 31 of the year following the year in which the information was collected) Number of Copies Required 1
Flow (in cubic meters per day)	Daily	Estimate	A		
96-Hour Multiple Concentration Acute Lethality Test Using Rainbow Trout (*Oncorhynchus mykiss*)	Once per month during the first discharge	Grab	A		
48-Hour Static Acute Lethality Test Using *Daphnia magna*		Grab	A		
pH	Once per batch discharge, prior to discharge	Representative Grab	A		
Chemical Oxygen Demand		Representative Grab	A		
Total Suspended Solids		Representative Grab	A		
Ammonia, dissolved (expressed as nitrogen)		Representative Grab	A		
Oil or other substances	Daily during discharge	Visual	A		
Tank Farm Bermed Area:					
pH	Once per batch discharge, prior to discharge to Industrial Runoff Control System	Grab	B		
Chemical Oxygen Demand		Grab	B		
Total Suspended Solids		Grab	B		
Ammonia, dissolved (expressed as nitrogen)		Grab	B		
Oil or other substances		Grab	B		
Volume (cubic meters)	Total batch volume discharged	Estimate	B		

TERMS AND CONDITIONS ATTACHED TO APPROVAL

The approval holder shall comply with the following requirements regarding Acute Lethality Testing:

(c) perform a 96 hour static acute bioassay using rainbow trout as the test organism on grab samples collected from the surface water detention pond;

(d) perform the 48-hour static acute bioassay using Daphnia magna as the test organism on grab samples collected from the surface water detention pond;

(e) all samples for static acute bioassays must be transported and received by the laboratory within 48 hours of collection;

(f) if any sample has been continuously chilled at a temperature between 1^0C to 8^0C, then testing on that sample shall begin no later than 5 days after collection;

(g) should any control response exceed 10% in any bioassay, that bioassay shall be repeated; and

(h) any deviations from the recommended conditions and procedures for culturing, test conditions, and procedures as outlined in the test methods specified in 2.3 shall be repeated upon submission of the results to the Director.

4.3.16 The approval holder shall repeat a bioassay if notified in writing by the Director that, in the Director's opinion, significant deviations from the conditions and procedures in the analytical methods in 2.3 have occurred.

4.3.17 In the event that less than 50% of the rainbow trout survived in the 100% concentration sample, the approval holder shall:

(a) immediately implement a program to identify the source of the toxicity; and

(b) submit to the Director within 90 days after the analytical result above, a proposed program to reduce the toxicity of the industrial runoff.

4.3.18 In addition to the monthly reporting in TABLE 4.3-D, the Monthly Industrial Runoff Report shall include, at a minimum, all of the following information:

(a) an assessment of the monitoring results relative to the limits in TABLE 4.3-B;

(b) an assessment of the monitoring results relative to the limits in TABLE 4.3-C;

(c) an assessment of the performance of each of the industrial runoff control system, pollution abatement equipment and monitoring equipment;

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(d) a summary of industrial runoff contraventions reported pursuant to 2.1.1; and

(e) any other information as required in writing by the Director.

4.3.19 In addition to the annual reporting in TABLE 4.3-D, the Annual Industrial Runoff Report shall include, at a minimum, all of the following information:

(a) an overview of the operation and performance of the industrial runoff control system, pollution abatement equipment and monitoring equipment; and

(b) any other information as required in writing by the Director.

4.3.20 The approval holder shall analyze a representative grab sample from the surface water detention pond of the industrial runoff control system at least once per year for the parameters outlined in TABLE 4.3-E.

4.3.21 The approval holder shall submit the results of the analyses in 4.3.21 to the Director on or before March 31 of the following year.

TABLE 4.3-E: ANNUAL MONITORING OF SURFACE WATER DETENTION POND

PARAMETERS			
Chemical Oxygen Demand	Phenol	Boron, dissolved	Lead, dissolved
Total Suspended Solids	Polychlorinated biphenyls, total	Cadmium, dissolved	Manganese, dissolved
Ammonia, dissolved (expressed as Nitrogen)	Total chlorinated phenol	Chromium, dissolved (hexavalent)	Mercury, total
pH	Total organic halogens	Chromium, total	Molybdenum, dissolved
Oil or other substances	Aluminum, dissolved	Cobalt, dissolved	Nickel, dissolved
	Antimony, dissolved	Copper, dissolved	Selenium, dissolved
	Arsenic, dissolved	Cyanide (weak acid dissociable)	Tin, dissolved
	Barium, dissolved	Fluoride, dissolved	Zinc, dissolved

LEACHATE COLLECTION AND LEAK DETECTION SYSTEMS MONITORING AND REPORTING

4.3.22 Subject to TABLE 4.3-F, the approval holder shall monitor the

(a) leachate; and

(b) leak detection liquid

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at the landfill as required in TABLE 4.5-B.

TABLE 4.3-F: LEACHATE AND LEAK DETECTION LIQUID MONITORING

PARAMETERS	
pH (field and laboratory)	Nutrients
Electrical Conductivity (field and laboratory)	Chemical Oxygen Demand
Major Ions	Dissolved Organic Carbon
Trace Metals (dissolved)	Petroleum Hydrocarbons Fractions, F1 and F2

4.3.24 If the volume of liquid removed from the leak detection system exceeds the action leakage rate of 790 litres/ha/day, in addition to reporting pursuant to 2.1.1, the approval holder shall submit a response action plan to the Director within 30 days of the excess.

4.3.25 The approval holder shall report to the Director the results of the leachate and leak detection liquid monitoring as required in TABLE 4.5-B.

SECTION 4.4: SPECIAL MONITORING AND REPORTING

4.4.1 The approval holder shall

(a) collect a representative sample from:

(i) each dugout within an approximate 1.6 kilometre radius, and

(ii) each of the wells within an approximate 1.6 kilometre radius around the facility; and

(b) analyze the sample for parameters listed in TABLE 4.4-A

unless the approval holder is not granted access by the landowner.

4.4.2 The monitoring required in 4.4.1 shall be conducted once each year in October unless otherwise authorized in writing by the Director.

4.4.3 The approval holder shall record the analytical results of the sampling information required in 4.4.1 in an Annual Dugout and Water Well Sampling Program Report.

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4.4.4 The Annual Dugout and Water Well Sampling Program Report shall be submitted to the Director by March 31 of each year following the year in which the information was collected.

TABLE 4.4-A: DUGOUT AND WATER WELL MONITORING

PARAMETERS	
pH (field and laboratory)	Nutrients
Electrical Conductivity (field and laboratory)	Chemical Oxygen Demand
Major Ions	Dissolved Organic Carbon
Trace Metals (dissolved)	Petroleum Hydrocarbons, F1 and F2

SECTION 4.5: WASTE MANAGEMENT AND LANDFILL OPERATIONS

GENERAL

4.5.1 The approval holder shall classify all materials entering the facility in accordance with the *Waste Control Regulation (AR 192/96)* and *The Alberta User Guide For Waste Managers*, May 1995, as amended.

4.5.2 The approval holder shall not receive or dispose of any of the following wastes:

(a) explosives (Class 1 *Transportation of Dangerous Goods Regulation* (TDGR) wastes) at the facility;

(b) radioactive wastes regulated under the *Canadian Nuclear Safety Act* (Canada) at the facility;

(c) radioactive wastes (Class 7 TDGR wastes) at the facility;

(d) biological, biomedical and/or pathological waste (as defined in the *Waste Control Regulation, AR 192/96*, as amended) at the facility;

(e) waste containing free liquids (as determined by the US EPA Method 9095 Paint Filter Liquids Test, specified in Test Methods for Evaluating Solid

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Wastes Physical/Chemical Methods, US EPA Publication No. SW-846, as amended) at the landfill;

(f) material containing ozone depleting substances at the landfill; or

(g) domestic or municipal wastes at the facility.

4.5.3 All wastes or hazardous recyclables shall be transferred only at designated transfer areas designed to contain spills and leaks.

4.5.4 Hazardous waste or hazardous recyclables stored in containers or tanks shall be stored in accordance with the *Hazardous Waste Storage Guidelines*, June 1988, Alberta Environment, as amended.

4.5.5 All tanks within the tank farm shall be equipped, at a minimum, with all of the following:

(a) sensors for detecting the level in each tank;

(b) high level alarms that activate when a tank overfill is imminent;

(c) automatic shut-off devices or sufficient free board space above the high level sensor to allow operators time to prevent overfill from occurring; and

(d) earthen dikes or equivalent secondary containment structures capable of containing 110% of the volume of the largest tank within the bermed area plus 10% of the aggregate capacity of all other tanks in the bermed area.

4.5.6 Effective July 31, 2009, all tanks containing hazardous waste or hazardous recyclables in each building shall be equipped, at a minimum, with all of the following:

(a) sensors or gauges for detecting the level in each tank;

(b) a written operating procedure to prevent tank overfill; and

(c) secondary containment structures capable of containing 110% of the volume of the largest tank within the building plus 10% of the aggregate capacity of all other tanks containing hazardous waste or hazardous recyclables in the same building.

4.5.7 All wastes or hazardous recyclables that are unloaded shall be immediately transferred to the waste storage area.

4.5.8 All containers and unrinsed empty containers shall be stored in the waste storage area.

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4.5.9 The approval holder shall provide and maintain an adequate aisle space between containers in the waste storage area to allow inspection, unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of the waste storage area. Inspection aisles shall be arranged such that each container is exposed to view from at least one side.

4.5.10 Incompatible wastes or incompatible hazardous recyclables shall be prevented from mixing.

4.5.11 The approval holder shall use the following when transferring substances to, from, or between containers, tanks, or trucks:

(a) couplings equipped with seals that are compatible with the substance transferred;

(b) the necessary precautions to prevent spills when the couplings are disconnected;

(c) emergency shut-off valves;

(d) established transfer areas and associated curbing, paving and catchment areas;

(e) drip trays to capture potential losses under coupling devices and other connections; and

(f) manual inspections of the transfer area for leaks and spills during and after waste transfer.

4.5.12 The approval holder shall only carry out the following activities at the facility in relation to hazardous waste or hazardous recyclables as follows:

(a) commingling of hazardous waste or hazardous recyclables shall be conducted only:

(i) to make maximum use of available container or tank capacity, and

(ii) if the resultant mixture has the same TDG hazard classification as any one of the individual components;

(b) phase separation by gravity settling shall be conducted only without the addition of any chemicals designed to accelerate settling;

(c) dispersion of solids into liquids by natural or mechanical means shall be conducted only if the resultant mixture has the same TDG hazard classification as the original waste;

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(d) physical segregation of hazardous from non-hazardous articles or components from the same container shall be conducted only if, no process equipment is used;

(e) washing of drums and other objects shall be conducted only for the purpose of removing hazardous residue;

(f) crushing and shredding of used filters, rags, absorbent materials, and empty containers shall be conducted only for the purpose of volume reduction and liquid recovery unless otherwise authorized in writing by the Director; and

(g) treatment of third-party hazardous waste only as authorized in writing by the Director.

4.5.13 Notwithstanding 4.5.12(g), the approval holder shall not incinerate hazardous waste at the facility.

4.5.14 The approval holder shall dispose of waste generated at the facility only to facilities holding a current Approval, Registration or as otherwise authorized under the Act, or to facilities approved by a local environmental authority outside of Alberta.

LANDFILL

4.5.15 The approval holder shall obtain, at a minimum, a detailed chemical and physical representative analysis of the wastes prior to disposal into the landfill at the following times:

(a) the first time a waste is received from a new generator;

(b) the first time a delivery is received from a different process associated with a known waste generator;

(c) the first time a waste is received from a different location associated with a known waste generator; and

(d) when the nature or composition of the waste that was previously characterized by the generator changes.

4.5.16 The approval holder shall not dispose of hazardous waste in any Class II cell.

4.5.17 The approval holder shall dispose of asbestos wastes in accordance with *Guidelines for the Disposal of Asbestos Waste*, Alberta Environmental Protection, as amended.

4.5.18 The approval holder shall dispose of wastes that the landfill is not authorized to dispose of only to a facility holding a current Approval, Registration or as otherwise authorized under the Act, or to facilities approved by a local environmental authority outside of Alberta.

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4.5.19 The approval holder shall remove all waste that the landfill is not authorized to dispose of within 7 days of receiving the waste.

4.5.20 The approval holder shall restrict the working face of each cell to the smallest practicable area.

4.5.21 For any waste disposed of at the landfill that is subject to wind dispersal, the approval holder shall:

(a) wet the waste to prevent dispersal of particulate matter; or

(b) immediately apply cover on top of the waste to minimize entrainment of particulate matter.

4.5.22 Notwithstanding 4.5.2(e), the approval holder is authorized to place the following wastes over the surface of the active landfill area for the purpose of dust suppression:

(a) leachate;

(b) leak detection liquid;

(c) sump waste of car wash bays or similar operations;

(d) waste from hydrovac excavation operations; and

(e) any other waste authorized by *The Alberta User Guide For Waste Managers,* May 1995, as amended.

4.5.23 Prior to placement of final cover, the elevation of waste in the landfill shall not exceed the maximum designated waste elevation.

LIMITS

4.5.24 The approval holder shall not store more than a cumulative total of 752,500 litres of all hazardous recyclables and hazardous waste at the Hazardous Waste/Recyclable Storage and Processing Facility at any time.

4.5.25 In addition to the storage limits in 4.5.24, the approval holder shall not exceed the waste storage limits as specified in TABLE 4.5-A.

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TABLE 4.5-A: STORAGE LIMITS FOR HAZARDOUS WASTE/RECYCLABLES AT THE HAZARDOUS WASTE/RECYCLABLE STORAGE AND PROCESSING FACILITY

Waste/Recyclable Type	Material	Maximum Quantity
Containers: Hazardous waste, hazardous recyclables	TDG classification 2,3,4,5,6,8 and 9 waste type only	512,500 litres (consisting of 2500 drums of 205 litre capacity)
Bulk Tanks: Hazardous waste, hazardous recyclables	Waste flammable liquids, used oil, wastewaters TDG classification 3,5,6,8 and 9 waste type only	240,000 litres (consisting of 135 m^3 in the tank farm and a 105 m^3 total inside the buildings)

4.5.26 Containers other than 205 litre drums shall be prorated to 205 litre drum equivalents based on their nominal volumes (e.g. 10 X 20 litre pails = 1 X 205 litre drum).

4.5.27 The limits referred to in 4.5.24 and 4.5.25 shall be calculated based on:

(a) summing nominal volumes of all containers at the Hazardous Waste/Recyclable Storage and Processing Facility and filled tank capacities; and

(b) treating all partially filled containers as if they were full.

4.5.28 The approval holder shall keep a daily total and inventory of all materials being stored at the Hazardous Waste/Recyclable Storage and Processing Facility.

4.5.29 The daily total and inventory records in 4.5.28 shall be available at all times for inspection by the Director or an inspector.

WASTE AND LANDFILL MONITORING

4.5.30 The approval holder shall:

(a) identify;

(b) characterize; and

(c) classify;

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all hazardous recyclables and waste streams, generated and received at the facility, not including industrial wastewater streams or air effluent streams.

4.5.31 The approval holder shall measure or, when not feasible to measure, estimate, the quantity of each waste and hazardous recyclable identified in 4.5.30 each year.

4.5.32 The approval holder shall inspect the landfill, at a minimum:

(a) weekly; and

(b) immediately after each storm event to:

(i) detect evidence of any deterioration of the composite liner system,

(ii) detect any malfunction or improper operation of the run-on and run-off control systems, leachate collection system or leak detection system, and

(iii) take corrective measures to repair any damage to the composite liner system, run-on and runoff control systems, leachate collection system or leak detection system.

4.5.33 The approval holder shall:

(a) keep a record of inspections conducted pursuant to 4.5.32;

(b) have the record of inspections available for review at the site upon request from a representative of the Director; and

(c) immediately report any deficiencies detected by the inspection in 4.5.32 to the Director in writing along with any corrective measures taken or proposed.

4.5.34 The approval holder shall monitor the landfill as required in TABLE 4.5-B.

WASTE AND LANDFILL REPORTING

4.5.35 The approval holder shall submit a Monthly Waste Management Report to the Director within 30 days following the month in which the information was collected.

4.5.36 The approval holder shall compile all of the information required by 4.5.37 in the Monthly Waste Management Report as indicated by TABLE 4.5-C.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.5-B: LANDFILL MONITORING AND REPORTING REQUIREMENTS

MONITORING AND REPORTING					
Parameter, Test, Event, Study, Proposal or Reporting Requirement	**Frequency**	**Sample Type**	**Sampling Location**	**Reporting**	**Report to**
Volume and type of waste received	Continuously (when operating)	Measured or estimated	At entrance to landfill	Annually on or before March 31 of the year following the year in which the information was collected.	Director
Volume and type of material removed	Continuously (when operating)	Measured or estimated	At entrance to landfill		
General location of waste deposited	Continuously (when operating)	As per survey or using grid system	At the active landfill area of each cell or survey		
Leachate head	Effective May 1, 2008, at least once every three working days and immediately prior to leachate removal	Measured or calculated	At primary leachate collection system sumps of existing cells		
		Measured	At leachate collection system sump(s) of each new cell		
Leachate analysis, as per TABLE 4.3-F	At least once every quarter year	Grab sample	At each primary leachate collection system sump		
Volume of leachate removed from the leachate collection system	As removed	Measured or calculated	At leachate collection system sump(s)		
Leak detection liquid analysis, as per TABLE 4.3-F	At least once every quarter year	Grab sample	At each leak detection system sump		
Volume of leak detection liquid removed from the leak detection system	At least once every working day, as removed	Measured or calculated	At leak detection system sump(s)		
Final cover	When cover is applied, as per 6.3.6	Final cover by survey cores and/or test pits	On each completed cell		

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.5-C MONTHLY WASTE INVENTORY REPORT (by waste class)

Fax to: (780) 422-3625

COMPANY NAME: _____ APPROVAL NO.: _____
REPORT PERIOD: MONTH _____ YEAR_____

CLASS	UNIT (Kg OR L)	OPENING BALANCE	+ RECEIVED IN PROVINCE	+ RECEIVED OUT OF PROVINCE	- SHIPPED*		- ON-SITE DISPOSAL	+ or - ADJUSTMENT **	CLOSING BALANCE	APPROVAL LIMIT
					RECYCLING/ PRODUCT	OFF-SITE DISPOSAL				
2										
3										
4										
5										
6.1										
8										
9.1										
9.2										
9.3										
PCB										
NR										
TOTAL										**XXXXX**
							No. of Containers On site			**XXXXX**
							Total Litres in Bulk Tanks			**XXXXX**

Name of Company Official:_____ Title:_____ Signature:_____
Report Date: _____

* Provide a list of the recycling and disposal locations

** Identity the amount and reason for each adjustment.
Adjustments include consolidation/reclassification, losses to processing, spills, volume miscalculations, or any other circumstances, which would affect the mass balance of the monthly inventory report.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.5.37 The Monthly Waste Management Report referred to in 4.5.35 by shall contain the following information:

(a) an opening waste and hazardous recyclables inventory balance in kilograms or litres by waste class or material type;

(b) the amount and type of waste and hazardous recyclables received within the province and from outside the province;

(c) the amount and type of waste and hazardous recyclables shipped for recycling/product, shipped off-site for disposal, and disposed on-site;

(d) any adjustments including consolidation and processing adjustments;

(e) closing balance in kilograms or litres;

(f) a summary of contraventions reported pursuant to 2.1.1 related to waste and hazardous recyclables; and

(g) any other information as required in writing by the Director.

4.5.38 The approval holder shall compile all the information required by 4.5.30 and 4.5.31 in an Annual Waste Management Summary Report:

(a) as specified in TABLE 4.5-D; and

(b) in accordance with *Industrial Waste Identification and Management Options*, Alberta Environment, May 1996 as amended, and the *Alberta User Guide for Waste Managers*, Alberta Environment, August 1996, as amended.

TABLE 4.5-D: ANNUAL WASTE MANAGEMENT SUMMARY

Hazardous Recyclable or Waste Name	Uniform Waste Code				Quantity (kg or L)		Stored	Recycled		Disposed	
	WC	PIN	Class	Mgmt	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
				TOTAL							

4.5.39 The Annual Waste Management Summary Report shall be submitted to the Director by March 31 of each year following the year in which the information was collected.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.5.40 The approval holder shall compile an Annual Landfill Operations Report which shall include, at a minimum, all of the following:

(a) a summary of all of the information collected as required in TABLE 4.5-B;

(b) the landfill inspection records as required in 4.5.33;

(c) any revisions to the Landfill Operations Plan from the previous year;

(d) a summary of the performance of the run-on and run-off control systems;

(e) any operational problems and emergencies and how they were handled;

(f) a summary of the performance of the leachate collection system, including a comparison to the maximum acceptable leachate head;

(g) a summary of the performance of the leak detection system, including a comparison to the action leakage rate limit;

(h) the name of the person responsible for the facility;

(i) an up-to-date financial security estimate in accordance with 5.1.2;

(j) the results of any audit conducted in accordance with 4.1.2 for a given year;

(k) a record of public complaints and the approval holder's responses;

(l) a summary of contraventions reported pursuant to 2.1.1 related to landfill operations; and

(m) any other information as required in writing by the Director.

4.5.41 The Annual Landfill Operations Report shall be submitted to the Director by March 31 of each year following the year in which the information was collected.

SECTION 4.6: DOMESTIC WASTEWATER

4.6.1 The approval holder shall release domestic wastewater only to the septic tank(s) with subsequent disposal to a wastewater treatment facility holding a current Approval or Registration under the Act.

4.6.2 Sludge produced by the domestic wastewater collection system shall be disposed of only at a facility holding a current Approval or Registration under the Act.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 4.7: WATERWORKS

Not used at this time.

SECTION 4.8: GROUNDWATER

MONITORING

4.8.1 The approval holder shall continue to implement the Groundwater Monitoring Program as authorized in writing by the Director.

4.8.2 The approval holder shall:

(a) collect a representative groundwater sample from each of the groundwater monitor wells, listed as the Monitoring Well Identification System in the Groundwater Monitoring Program, including the groundwater monitoring wells, designated as point of compliance; and

(b) analyze each sample for the parameters listed in TABLE 4.8-A.

TABLE 4.8-A: GROUNDWATER MONITORING PROGRAM

GROUNDWATER MONITORING WELLS AT POINTS OF COMPLIANCE PARAMETERS	
pH (field and laboratory)	Nutrients
Electrical Conductivity (field and laboratory)	Chemical Oxygen Demand
Major Ions	Dissolved Organic Carbon
Trace Metals (dissolved)	Petroleum Hydrocarbons Fractions F1, F2

4.8.3 The monitoring required in 4.8.2 shall be conducted at the following frequencies unless otherwise authorized in writing by the Director:

(a) a minimum of once per year during each of the active, closure and post-closure periods; and

(b) a minimum of four times per year following detection of leachate constituents at levels above those specified in 4.8.4, and until the levels specified in 4.8.4 have been met.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.8.4 The groundwater quality in the monitoring wells, designated as points of compliance in the Groundwater Monitoring Program, shall not exceed the higher of:

(a) the objectives established in the water quality objectives in the *Canadian Environmental Quality Guidelines (CEQG)* for drinking water published by the Canadian Council of Ministers of the Environment (CCME), as amended, or;

(b) background groundwater chemistry as determined through a statistical analysis, as a derived alternate groundwater performance standard.

4.8.5 The approval holder shall implement the Remediation Plan as specified in the Landfill Operations Plan, when groundwater quality exceeds the groundwater performance criteria in 4.8.4 (a) and (b).

4.8.6 The samples extracted from the groundwater monitor wells shall be collected using scientifically acceptable purging, sampling and preservation procedures so that a representative groundwater sample is obtained.

4.8.7 All groundwater monitor wells shall be:

(a) protected from damage; and

(b) locked except when being sampled; unless otherwise authorized in writing by the Director.

4.8.8 If a representative groundwater sample cannot be collected because the groundwater monitor well is damaged or is no longer capable of producing a representative groundwater sample:

(a) the groundwater monitor well shall be cleaned, repaired or replaced; and

(b) a representative groundwater sample shall be collected and analyzed prior to the next scheduled sampling event; unless otherwise authorized in writing by the Director.

4.8.9 In addition to the sampling information recorded in 4.8.2, the approval holder shall record the following sampling information for all groundwater samples collected:

(a) a description of purging and sampling procedures;

(b) the static elevations, above sea level, of fluid phases in the groundwater monitor well prior to purging;

(c) the temperature of each sample at the time of sampling;

(d) the pH of each sample at the time of sampling; and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(e) the specific conductance of each sample at the time of sampling.

4.8.10 The approval holder shall compile an Annual Groundwater Monitoring Program Report which shall include, at a minimum, all of the following information:

(a) a legal description of the facility and a map illustrating the facility boundaries;

(b) a topographic map of the facility;

(c) a description of the industrial activity and processes;

(d) a map showing the location of all surface and groundwater users, and, a listing describing surface water and water well use details, within at least a 1.6 kilometre radius of the facility;

(e) a general hydrogeological characterization of the region within a five kilometre radius of the facility;

(f) a detailed hydrogeological characterization of the facility;

(g) a geological cross-section(s) of the facility;

(h) a map of surface drainage patterns located within the facility;

(i) a map of groundwater monitor well locations and a description of the existing groundwater monitoring program for the facility;

(j) a summary of any changes to the groundwater monitoring program made since the last groundwater monitoring report;

(k) analytical data recorded as required in 4.8.2 and 4.8.9;

(l) a summary of fluid elevations recorded as required in 4.8.9 (b) and an interpretation of changes in fluid elevations;

(m) an interpretation of groundwater flow patterns;

(n) an interpretation of the analytical results including the following:

(i) diagrams indicating the location of any contamination identified,

(ii) probable sources of any contamination, and

(iii) the extent of any contamination identified;

(o) a summary and interpretation of the data collected since the groundwater monitoring program began including:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(i) control charts which indicate trends in contaminant concentrations, and

(ii) the migration of contaminants, if any;

(p) a description of the following:

(i) contaminated groundwater remediation techniques employed,

(ii) source elimination measures employed,

(iii) risk assessment studies undertaken, and

(iv) risk management studies undertaken;

(q) a sampling schedule for the following year;

(r) recommendations, as follows;

(i) for changes to the groundwater monitoring program to make it more effective, and

(ii) for remediation, risk assessment or risk management of contamination identified.

REPORTING

4.8.11 The approval holder shall submit two copies of the Annual Groundwater Monitoring Report to the Director on or before March 31 of the year following the year in which the information on which the report is based was collected, unless otherwise authorized in writing by the Director.

SECTION 4.9: SOIL

MONITORING

4.9.1 The approval holder shall develop and document proposals for the Soil Monitoring Program in accordance with the *Soil Monitoring Directive*, Alberta Environment, May 1996, as amended.

4.9.2 The approval holder shall submit the Soil Monitoring Program proposals to the Director according to the following schedule:

(a) for the first soil monitoring proposal, no later than, January 31, 2009; and

(b) for the second soil monitoring proposal no later than, January 31, 2014; or

unless otherwise authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.3 If the Soil Monitoring Program proposals are found deficient by the Director, the approval holder shall correct all the deficiencies as outlined by the Director within 120 days of the deficiency letter.

4.9.4 The approval holder shall implement the Soil Monitoring Program proposals as authorized in writing by the Director.

4.9.5 The approval holder shall implement QA/QC provisions in accordance with the *CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites, Volume I*, Report CCME EPC-NCS62E, Winnipeg, Manitoba, December 1993, as amended.

STANDARDS

4.9.6 For sampling locations which meet the conditions in C.1 of the *Soil Monitoring Directive*, May 1996, as amended, the concentration of substances in soil shall be compared to values in the following:

(a) for petroleum hydrocarbons, *Alberta Soil and Water Quality Guidelines for Hydrocarbons at Upstream Oil and Gas Facilities*, Alberta Environment, 2001, as amended;

(b) for salt, *Salt Contamination Assessment and Remediation Guidelines,* Alberta Environment, 2001, as amended;

(c) for substances not included in 4.9.6 (a) or (b), *Canadian Environmental Quality Guidelines,* Canadian Council of Ministers of the Environment, PN1299, 1999, as amended, excluding values determined before 1997;

(d) for substances not found in 4.9.6 (a) to (c), for soil which will be remediated to an agricultural, residential, or parkland land use, *Alberta Tier I Criteria for Contaminated Soil Assessment and Remediation*, Alberta Environmental Protection, March 1994, as amended; and

(e) for substances not found in 4.9.6 (a) to (c), for soil which will be remediated to a commercial or industrial land use, the *Interim Canadian Environmental Quality Criteria for Contaminated Sites*, Canadian Council of Ministers of the Environment, EPC-CS34, September 1991, as amended.

4.9.7 For sampling locations which do not meet the conditions in C.1 of the *Soil Monitoring Directive*, May 1996, as amended, or if substances are present that are not listed in the standards referred to in 4.9.6 (a) to 4.9.6 (e), the concentrations of substances in soil shall be compared to values derived using methods in C.2 of the *Soil Monitoring Directive*.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

REPORTING

4.9.8 The approval holder shall submit two copies of each Soil Monitoring Program Report to the Director summarizing the data obtained from the soil monitoring referred to in 4.9.4 according to the following schedule:

(a) for the first soil monitoring report, no later than January 31, 2010; and

(b) for the second soil monitoring report, no later than January 31, 2015; or

unless otherwise authorized in writing by the Director.

4.9.9 The Soil Monitoring Program reports shall be as prescribed in the reporting requirements of the *Soil Monitoring Directive*, May 1996, as amended.

SOIL MANAGEMENT PROGRAM

4.9.10 If the Soil Monitoring Program, or any other soil monitoring, reveals that there are substances present in the soil at concentrations greater than the applicable concentrations in 4.9.6 or 4.9.7, the approval holder shall develop and document a Soil Management Program Proposal in accordance with the *Guideline for Monitoring and Management of Soil Contamination Under EPEA Approvals*, Chemicals Assessment and Management Division, May 1996, as amended, or as otherwise authorized in writing by the Director.

4.9.11 If required pursuant to 4.9.10, the approval holder shall submit a Soil Management Program Proposal to the Director within six months after the date that the Soil Monitoring Report referred to in 4.9.8 is due.

4.9.12 The Soil Management Program Proposal shall include, at a minimum, all of the following:

(a) steps to be taken to control sources of contamination;

(b) remediation objectives for substances identified by soil monitoring as exceeding the applicable maximum standards in 4.9.6 or 4.9.7;

(c) proposed steps for management of soil contamination; and

(d) a schedule for implementing the Soil Management Program.

4.9.13 If the Soil Management Program Proposal is found deficient by the Director, the approval holder shall correct all the deficiencies as outlined by the Director by the date specified in the deficiency letter.

4.9.14 The approval holder shall implement the Soil Management Program as authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.15 If the approval holder must implement a Soil Management Program pursuant to 4.9.14, the approval holder shall submit a written Soil Management Program Report to the Director on or before March 31 of each year, unless otherwise authorized in writing by the Director.

4.9.16 The Soil Management Program Report shall include, at a minimum, all of the following information:

(a) a summary of actions taken under the Soil Management Program during the previous year;

(b) a description and interpretation of results obtained, including any soil testing, from the Soil Management Program; and

(c) events planned for the current year including any deviations from the program authorized in writing by the Director.

PART 5: FINANCIAL SECURITY REQUIREMENTS

5.1.1 The approval holder shall annually review and revise the cost estimate for reclamation of the facility including decommissioning, reclamation, closure and post-closure.

5.1.2 The approval holder shall:

(a) adjust the financial security of the facility based on the review in 5.1.1 or due to inflation; and

(b) submit to the Director for review the revised estimate of financial security as part of the Annual Landfill Operations Report in 4.5.40.

5.1.3 The approval holder shall provide additional financial security as required in writing by the Director.

5.1.4 The approval holder shall ensure the required financial security is maintained and renewed for the facility at least 30 days prior to the date it expires.

5.1.5 The approval holder shall renew the financial security for the facility 30 days prior to the date of expiry of the financial security.

PART 6: DECOMMISSIONING, RECLAMATION, CLOSURE AND POST-CLOSURE

SECTION 6.1: GENERAL

6.1.1 The approval holder shall reclaim the facility as authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 6.2: HAZARDOUS WASTE/RECYCLABLE STORAGE AND PROCESSING FACILITY

6.2.1 The approval holder shall apply for an amendment to this approval to reclaim the Hazardous Waste/Recyclable Storage and Processing Facility by submitting a Decommissioning and Land Reclamation Plan to the Director.

6.2.2 The Decommissioning and Land Reclamation Plan referred to in 6.2.1 shall be submitted within six months of the Hazardous Waste/Recyclable Storage and Processing Facility ceasing operation, except for repairs and maintenance, unless otherwise authorized in writing by the Director.

6.2.3 The approval holder shall implement the Decommissioning and Land Reclamation Plan for the Hazardous Waste/Recyclable Storage and Processing Facility as authorized in writing by the Director.

SECTION 6.3: LANDFILL

GENERAL

6.3.1 The approval holder shall implement the Closure and Post-Closure Plan as described in the application, unless otherwise directed in this approval or as otherwise authorized in writing by the Director.

6.3.2 The approval holder shall correct any deficiencies in the Closure and Post-Closure Plan as directed in writing by the Director.

6.3.3 The approval holder shall submit any additions, deletions or changes to the Closure and Post-Closure Plan to the Director, and shall be in receipt of a letter of acknowledgement from the Director prior to the implementing of any addition, deletion or change to the plan.

CLOSURE AND RECLAMATION

6.3.4 The approval holder shall commence closure no later than 180 days of any cell reaching the maximum designated waste elevation, unless as otherwise authorized in writing by the Director.

6.3.5 The approval holder shall notify the Director in writing at least 14 days before commencing closure of any cell.

6.3.6 All cells shall be closed in accordance with the following requirements at a minimum, unless otherwise specified in writing by the Director:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) covering the waste with a soil layer consisting of 600 mm of clay to provide a smooth surface on which to place the geomembrane;

(b) placing a final barrier layer consisting of an 80 mil HDPE geomembrane on top of the clay;

(c) the geomembrane shall be extrusion welded to the primary liner system providing an impermeable seal over the clay;

(d) placing a geotextile cover over the geomembrane;

(e) placing subsoil equal to the natural depths in the area on top of the geotextile;

(f) placing topsoil equal to the natural depths in the area on top of the subsoil;

(g) the final slope shall not exceed 30%;

(h) the area shall be vegetated and contoured such that no water pools over the cells; and

(i) the area shall be reclaimed to a state that returns the cell to the intended use, as described in the application.

6.3.7 By March 31 of the year following the year in which any cell is closed, the approval holder shall submit to the Director an Annual Closure and Reclamation Report.

6.3.8 The Annual Closure and Reclamation Report in 6.3.7 shall include, at a minimum, all of the following:

(a) certified as-built plans and details on the location of cells that have been closed;

(b) certified construction QA/QC procedures employed during cover construction and installation;

(c) survey reports showing the final cover depths; and

(d) details on progress made on meeting all other requirements of the Closure Plan.

6.3.9 The approval holder shall notify the Director of the date of commencement of final closure of the landfill no later than 30 days following commencement of final closure.

6.3.10 The approval holder shall submit a Final Closure Report prepared by a professional registered with APEGGA within 60 days of completion of the final closure of the landfill.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

6.3.11 The Final Closure Report shall include, at a minimum, all of the following:

(a) the date of completion of the final closure;

(b) a statement including supporting evidence that the final closure has been completed in accordance with the final closure plan;

(c) a description of any deviations to the final closure plan and the reasons for the deviations;

(d) a description of the final cover system and the installation methods and procedures used;

(e) an estimate of the maximum quantity of waste placed in the landfill for disposal over the life of the landfill;

(f) a description of how the following elements have been, or will be dealt with

(i) the final use of the closed areas,

(ii) drainage restorations,

(iii) soil replacement,

(iv) final cover slopes,

(v) erosion control,

(vi) re-vegetation and condition of the site, and

(vii) subsidence and differential settlement remediation; and

(g) as-built plans for the landfill showing the location of fill areas, final grades and structural components.

POST-CLOSURE

6.3.12 No later than 30 days following commencement of final closure, the approval holder shall submit an up-to-date Post-Closure Plan to the Director.

6.3.13 The approval holder shall include the following in the Post-Closure Plan at a minimum:

(a) a plan for maintaining the integrity of the final cover systems;

(b) a plan for maintaining the run-on and run-off control systems;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(c) a plan for maintaining the groundwater monitoring system;

(d) the groundwater monitoring program including performance standards and points of compliance;

(e) a plan for maintaining the leachate collection and leak detection systems;

(f) quantity and quality objectives of leachate and leak detection liquid that show the landfill has stabilized;

(g) a plan for remediating areas affected by subsidence and differential settlement;

(h) a plan for erosion control;

(i) a plan for maintaining vegetative cover; and

(j) any other information requested in writing by the Director.

6.3.14 The approval holder shall monitor in accordance with the Post-Closure Plan, as authorized in writing by the Director, for the duration of the post-closure period.

6.3.15 By March 31 of each year following final closure, the approval holder shall submit to the Director an Annual Post-Closure Report.

6.3.16 The Annual Post-Closure Report in 6.3.15 shall include, at a minimum, all of the following:

(a) details on any repairs and maintenance of the final cover system and vegetation;

(b) a report of any remedial or corrective actions taken;

(c) submission of Annual Groundwater Monitoring Reports as outlined in 4.8.11;

(d) details on progress made on meeting all other requirements of the Post-Closure Plan; and

(e) any other information requested in writing by the Director.

February 29, 2008
DATED

David Helmer
DESIGNATED DIRECTOR UNDER THE ACT

Government of Alberta ■
Environment

AMENDING APPROVAL

PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
R.S.A. 2000, c.E-12, as amended.

APPROVAL NO. 10348-02-01

APPLICATION NO. 008-10348

EFFECTIVE DATE: ..... April 20, 2010

EXPIRY DATE: ..... March 31, 2016

APPROVAL HOLDER ..... Clean Harbors Canada, Inc.

Pursuant to Division 2, of Part 2, of the *Environmental Protection and Enhancement Act*, R.S.A.2000, c.E-12, as amended, the approval for the following activity:

Ryley Industrial Waste Management Facility, consisting of a Class I and Class II Industrial Landfill and a Hazardous Waste/Recyclable Storage and Processing Facility,

is amended as per the attached terms and conditions.

Designated Director under the Act ..... Neil Hollands, P.Eng.

Date Signed ..... April 20, 2010

TERMS AND CONDITIONS ATTACHED TO APPROVAL

Environmental Protection and Enhancement Act Approval No. 10348-02-00 is hereby amended as follows:

1. 1.1.2(hh) is revised as follows:

   1.1.2(hh) "landfill" means the area at which waste is disposed of by placing it in a cell and includes all soil stock piles, trenches, berms, fences, run-on control systems, run-off control systems, leachate collection systems, leak detection systems, waste stabilization/solidification areas, and other installations, and includes the portion of land within the facility that is being or has been used or held for or in connection with the Class I and Class II Industrial Landfill;

2. The following is inserted between 1.1.2(ppp) and 1.1.2(qqq):

   1.1.2(ppp.1) "waste stabilization area" means the portion of the landfill that is used for waste stabilization/solidification, as described in application no. 008-10348;

3. The following is added after 3.2.10:

   SECTION 3.3: WASTE STABILIZATION

   3.3.1 The approval holder shall construct the waste stabilization area in accordance with the following, unless modifications are authorized in writing by the Director:

   (a) application no. 008-10348;

   (b) within a Class I cell; and

   3.3.2 In addition to 3.3.1, the approval holder shall conduct annual visual internal inspections for corrosion and ultrasonic testing to monitor the thickness of the steel plate within the Class I cell.

4. The following is inserted between 4.1.7(a) and 4.1.7(b):

   4.1.7(a.1) operational procedures for the waste stabilization area;

5. The following is added after 4.1.8:

   WASTE STABILIZATION AREA

   4.1.9 The approval holder shall prevent any waste from the waste stabilization area from contacting the wastes disposed of in the cell before the stabilization/solidification has occurred.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.1.10 The approval holder shall only dispose of any liquid collected within the waste stabilization area by one or more of the following methods:

(a) disposal to facilities holding a current Approval, Registration or as otherwise authorized under the Act to accept such waste;

(b) disposal to facilities approved by a local environmental authority outside of Alberta to accept such waste; or

(c) disposal to a deep well approved by the Energy Resources Conservation Board;

unless otherwise authorized in writing by the Director.

6. 4.5.2(e) is revised as follows:

4.5.2(e) waste containing free liquids (as determined by the US EPA Method 9095 Paint Filter Liquids Test, specified in Test Methods for Evaluating Solid Wastes Physical/Chemical Methods, US EPA Publication No. SW-846, as amended) at the landfill, excluding the waste stabilization area;

7. 4.5.12(g) is deleted and the following are substituted:

4.5.12(g) operation of the waste stabilization area; and

4.5.12(h) not withstanding 4.5.12(g), treatment of third-party hazardous waste only as authorized in writing by the Director.

8. The following is inserted between 4.5.40(d) and 4.5.40(e):

4.5.40(d.1) a summary and evaluation of the operations of the waste stabilization area;

April 20, 2010
Dated Signed

DESIGNATED DIRECTOR UNDER THE ACT
Neil Hollands, P.Eng.

Alberta Environment and Parks

MAR 3 0 2016

Operations
111 Twin Atria Building
4999 – 98 Avenue NW
Edmonton, Alberta T6B 2X3
Telephone 780-427-7617
Fax 780-427-7824
aep.alberta.ca

File No.: 10348-02-00

March 24, 2016

Mr. Stan Yuha
Facility Manager
Clean Harbors Canada, Inc.
P.O. Box 390
Ryley, AB T0B 4A0

Dear Mr. Yuha:

Re: *Environment Protection and Enhancement Act* (EPEA) Approval No. 10348-02-00
Extension of Approval Expiry Date

In accordance with Section 69 of the *Environmental Protection and Enhancement Act* (EPEA), the expiry date of the above noted approval is extended to March 31, 2017 from the present expiry date of March 31, 2016.

By way of this letter you are to follow the terms and conditions of the above noted approval until March 31, 2017, or until a new EPEA approval is issued, whichever occurs first.

If you have any questions regarding the extension or require information on application requirements, please contact Weiguo Wu at 780-427-0630.

Sincerely,

Mohammad Habib, P. Eng.
Approvals Manager
Red Deer/North Saskatchewan Region
(Designated Director under the Act)

cc: John Collins, Compliance, AEP
Valerie Collins, Regulatory Approvals Centre, AEP
Weiguo Wu, Industrial Approvals, AEP

APPENDIX B

TETRA TECH'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.1 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

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APPENDIX C

ALS CHEMICAL ANALYSIS REPORT

Tetra Tech EBA Inc.
ATTN: Michele Crawford
14940 123 Ave NW
North Bldg.
Edmonton AB T5V 1B4

Date Received: 05-OCT-16
Report Date: 26-OCT-16 15:21 (MT)
Version: FINAL

Client Phone: 780-451-2121

Certificate of Analysis

Lab Work Order #: L1839506

Project P.O. #: NOT SUBMITTED
Job Reference: 704-PENVSWM03917-01
C of C Numbers:
Legal Site Desc:

Jessica Spira, Env. Tech. DIPL
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-1 1							
Sampled By: MC on 05-OCT-16 @ 11:30							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	11-OCT-16	11-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	11-OCT-16	11-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	11-OCT-16	11-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	11-OCT-16	11-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	89.1		70-130	%	11-OCT-16	11-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	95.5		70-130	%	11-OCT-16	11-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	93.2		70-130	%	11-OCT-16	11-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3569329
Surrogate: 2-Bromobenzotrifluoride	88.6		60-140	%	11-OCT-16	12-OCT-16	R3569329
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					12-OCT-16	R3569197
Mercury (Hg)-Dissolved	0.0000095		0.0000050	mg/L		13-OCT-16	R3569423
Miscellaneous Parameters							
Ammonia, Total (as N)	1.21		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	68		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	21.4		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.09		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.155		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	61.7		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0016		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00020		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00367		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0883		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.064		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	29.0		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00023		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00045		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.021		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0417		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	13.9		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00071		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00125		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00430		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	13.9		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000114		0.000050	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-1 1							
Sampled By: MC on 05-OCT-16 @ 11:30							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	154		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000798		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00087		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.301		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	107			%		20-OCT-16	
TDS (Calculated)	524			mg/L		20-OCT-16	
Hardness (as CaCO3)	130			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	0.312		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.338		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.026		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	70.6		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.37		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	885		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	357		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	299		2.0	mg/L		15-OCT-16	R3571133
L1839506-2 2							
Sampled By: MC on 05-OCT-16 @ 12:25							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	11-OCT-16	11-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	11-OCT-16	11-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	11-OCT-16	11-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	11-OCT-16	11-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	74.4		70-130	%	11-OCT-16	11-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	88.8		70-130	%	11-OCT-16	11-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	83.7		70-130	%	11-OCT-16	11-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	93.0		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-2 2							
Sampled By: MC on 05-OCT-16 @ 12:25							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					12-OCT-16	R3569197
Mercury (Hg)-Dissolved	0.0000081		0.0000050	mg/L		13-OCT-16	R3569423
Miscellaneous Parameters							
Ammonia, Total (as N)	0.052		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	83		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	24.3		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.06		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.280		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	31.5		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0025		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00013		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00376		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0699		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.073		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	0.0000059		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	24.8		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00025		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00360		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.012		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0349		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	12.9		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00161		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00142		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00424		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	19.2		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000248		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	134		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00101		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.396		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	111	BL:INT		%		20-OCT-16	
TDS (Calculated)	444			mg/L		20-OCT-16	
Hardness (as CaCO3)	115			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-2 2							
Sampled By: MC on 05-OCT-16 @ 12:25							
Matrix: WATER							
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	39.6		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.45		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	759		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	354		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	6.6		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	302		2.0	mg/L		15-OCT-16	R3571133
L1839506-3 3							
Sampled By: MC on 05-OCT-16 @ 12:15							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	11-OCT-16	11-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	11-OCT-16	11-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	11-OCT-16	11-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	11-OCT-16	11-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	11-OCT-16	11-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	76.5		70-130	%	11-OCT-16	11-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	95.1		70-130	%	11-OCT-16	11-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	89.9		70-130	%	11-OCT-16	11-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	94.9		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					12-OCT-16	R3569197
Mercury (Hg)-Dissolved	0.0000066		0.0000050	mg/L		12-OCT-16	R3569423
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	61		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	21.0		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	1.94		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.262		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	31.3		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0011		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00015		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00376		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0410		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.050		0.010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-3 3							
Sampled By: MC on 05-OCT-16 @ 12:15							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	28.2		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00014		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00797		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.045		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0249		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	11.9		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00125		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.000744		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00457		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	15.5		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000245		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	118		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000681		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00072		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0020		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.267		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	100			%		20-OCT-16	
TDS (Calculated)	434			mg/L		20-OCT-16	
Hardness (as CaCO3)	119			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	48.4		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.41		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	723		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	355		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	300		2.0	mg/L		15-OCT-16	R3571133
L1839506-4 4							
Sampled By: MC on 05-OCT-16 @ 12:45							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-4 4							
Sampled By: MC on 05-OCT-16 @ 12:45							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	79.9		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	97.6		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	86.9		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	101.5		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					12-OCT-16	R3569197
Mercury (Hg)-Dissolved	0.0000069		0.0000050	mg/L		12-OCT-16	R3569423
Miscellaneous Parameters							
Ammonia, Total (as N)	0.641		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	74		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	27.2		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.84		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.596		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	51.0		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0473		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00010		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00332		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0433		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.044		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	25.7		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00014		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00024		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00661		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	1.79		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	0.000132		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0109		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	10.5		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00451		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.000389		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00222		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	15.0		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000153		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	76.3		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-4 4							
Sampled By: MC on 05-OCT-16 @ 12:45							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Titanium (Ti)-Dissolved	0.00264		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000141		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00102		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0024		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.137		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	106			%		20-OCT-16	
TDS (Calculated)	304			mg/L		20-OCT-16	
Hardness (as CaCO3)	107			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	0.083		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.122		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.039		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	3.93		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.23		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	549		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	247		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	202		2.0	mg/L		15-OCT-16	R3571133
L1839506-5 5							
Sampled By: MC on 05-OCT-16 @ 11:50							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	78.9		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	89.9		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	90.8		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	98.0		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					12-OCT-16	R3569197
Mercury (Hg)-Dissolved	0.0000108		0.0000050	mg/L		13-OCT-16	R3569423
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		14-OCT-16	R3571247

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-5 5							
Sampled By: MC on 05-OCT-16 @ 11:50							
Matrix: WATER							
Chemical Oxygen Demand	30		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	29.4		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	2.88		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.248		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	17.5	RRV	0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0013		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00018		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00621		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0524		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.046		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	21.9	RRV	0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00035		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00084		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.040		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0186		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	12.0	RRV	0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00066		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00216		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00606		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	13.3	RRV	0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000302		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	105	RRV	1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000882		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0010		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.594		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	114	BL:INT		%		20-OCT-16	
TDS (Calculated)	349			mg/L		20-OCT-16	
Hardness (as CaCO3)	104			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	15.1	RRV	0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-5 5							
Sampled By: MC on 05-OCT-16 @ 11:50							
Matrix: WATER							
pH, Conductivity and Total Alkalinity							
pH	8.38		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	599	RRV	2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	324	RRV	5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	272	RRV	2.0	mg/L		15-OCT-16	R3571133
L1839506-6 6							
Sampled By: MC on 05-OCT-16 @ 12:20							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	79.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	110.7		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	95.1		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	97.3		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	1.35		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	71		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	25.0		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.62		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.931		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	19.4		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0962		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00013		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00569		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0448		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.042		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	21.2		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00020		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00030		0.00010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-6 6							
Sampled By: MC on 05-OCT-16 @ 12:20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Copper (Cu)-Dissolved	0.00066		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.629		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	0.000189		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0129		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	8.52		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00338		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.000596		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00337		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	19.3		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000194		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	75.3		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	0.00568		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000352		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00241		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0012		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.202		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	104			%		20-OCT-16	
TDS (Calculated)	295			mg/L		20-OCT-16	
Hardness (as CaCO3)	88.0			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	0.588		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.665		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.077		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	11.6		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.26		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	523		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	277		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	227		2.0	mg/L		15-OCT-16	R3571133
L1839506-7 7							
Sampled By: MC on 05-OCT-16 @ 13:30							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-7 7							
Sampled By: MC on 05-OCT-16 @ 13:30							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	90.9		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	115.5		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	104.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	104.1		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	0.0000070		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.685		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	80		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	26.9		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.69		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.954		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	11.8		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0058		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00013		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00585		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0263		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.026		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	19.3		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00017		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00029		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00073		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.268		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0096		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	7.55		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00297		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.000696		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00433		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	15.2		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000252		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	51.6		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	0.00130		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000281		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00253		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0026		0.0010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-7 7							
Sampled By: MC on 05-OCT-16 @ 13:30							
Matrix: WATER							
Fluoride in Water by IC							
Fluoride (F)	0.141		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	101			%		20-OCT-16	
TDS (Calculated)	227			mg/L		20-OCT-16	
Hardness (as CaCO3)	79.3			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.037		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.017		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	12.5		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.15		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	408		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	222		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	182		2.0	mg/L		15-OCT-16	R3571133
L1839506-8 8							
Sampled By: MC on 05-OCT-16 @ 13:50							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	83.7		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	94.9		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	97.0		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	100.9		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	0.0000051		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.099		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	149		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	35.8		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	6.45		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.721		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-8 8							
Sampled By: MC on 05-OCT-16 @ 13:50							
Matrix: WATER							
Chloride in Water by IC							
Chloride (Cl)	25.7		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0166		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00043		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00385		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0567		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.068		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	0.0000078		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	42.4		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00015		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00123		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00460		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.025		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0159		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	21.2		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00127		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00669		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.0135		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	27.6		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000916		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	118		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	0.00098		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00411		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00160		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.495		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	112	BL:INT		%		20-OCT-16	
TDS (Calculated)	507			mg/L		20-OCT-16	
Hardness (as CaCO3)	193			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	89.4		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.45		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	855		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	353		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	7.7		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	303		2.0	mg/L		15-OCT-16	R3571133

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-8 8							
Sampled By: MC on 05-OCT-16 @ 13:50							
Matrix: WATER							
L1839506-9 9							
Sampled By: MC on 05-OCT-16 @ 14:00							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	81.6		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	96.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	94.8		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	116.7		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.111		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	120		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	49.2		1.0	mg/L		19-OCT-16	R3575598
Total Kjeldahl Nitrogen	6.87		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	2.20	DLHC	0.10	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	29.8		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0755		0.0010	mg/L		22-OCT-16	R3577311
Antimony (Sb)-Dissolved	0.00024		0.00010	mg/L		22-OCT-16	R3577311
Arsenic (As)-Dissolved	0.00577		0.00010	mg/L		22-OCT-16	R3577311
Barium (Ba)-Dissolved	0.0338		0.000050	mg/L		22-OCT-16	R3577311
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		22-OCT-16	R3577311
Boron (B)-Dissolved	<0.010		0.010	mg/L		22-OCT-16	R3577311
Cadmium (Cd)-Dissolved	0.0000097		0.0000050	mg/L		22-OCT-16	R3577311
Calcium (Ca)-Dissolved	23.5		0.50	mg/L		22-OCT-16	R3577311
Chromium (Cr)-Dissolved	0.00042		0.00010	mg/L		22-OCT-16	R3577311
Cobalt (Co)-Dissolved	0.00063		0.00010	mg/L		22-OCT-16	R3577311
Copper (Cu)-Dissolved	0.00152		0.00020	mg/L		22-OCT-16	R3577311
Iron (Fe)-Dissolved	0.995		0.010	mg/L		22-OCT-16	R3577311
Lead (Pb)-Dissolved	0.000280		0.000050	mg/L		22-OCT-16	R3577311
Lithium (Li)-Dissolved	0.0190		0.0010	mg/L		22-OCT-16	R3577311
Magnesium (Mg)-Dissolved	12.4		0.10	mg/L		22-OCT-16	R3577311
Manganese (Mn)-Dissolved	0.00355		0.00010	mg/L		22-OCT-16	R3577311
Molybdenum (Mo)-Dissolved	0.00113		0.000050	mg/L		22-OCT-16	R3577311

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-9 9							
Sampled By: MC on 05-OCT-16 @ 14:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.00526		0.00050	mg/L		22-OCT-16	R3577311
Potassium (K)-Dissolved	35.6		0.50	mg/L		22-OCT-16	R3577311
Selenium (Se)-Dissolved	0.000393		0.000050	mg/L		22-OCT-16	R3577311
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		22-OCT-16	R3577311
Sodium (Na)-Dissolved	101		1.0	mg/L		22-OCT-16	R3577311
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		22-OCT-16	R3577311
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		22-OCT-16	R3577311
Titanium (Ti)-Dissolved	0.00610		0.00030	mg/L		22-OCT-16	R3577311
Uranium (U)-Dissolved	0.000515		0.000010	mg/L		22-OCT-16	R3577311
Vanadium (V)-Dissolved	0.00334		0.00050	mg/L		22-OCT-16	R3577311
Zinc (Zn)-Dissolved	0.0027		0.0010	mg/L		22-OCT-16	R3577311
Fluoride in Water by IC							
Fluoride (F)	0.260		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	110			%		22-OCT-16	
TDS (Calculated)	389			mg/L		22-OCT-16	
Hardness (as CaCO3)	110			mg/L		22-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	6.68		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.40		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	675		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	356		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	300		2.0	mg/L		15-OCT-16	R3571133
L1839506-10 10							
Sampled By: MC on 05-OCT-16 @ 14:40							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	74.3		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	83.3		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	84.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-10 10							
Sampled By: MC on 05-OCT-16 @ 14:40							
Matrix: WATER							
CCME F2-4 Hydrocarbons							
Surrogate: 2-Bromobenzotrifluoride	103.3		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.571		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	320	DLHC	50	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	106	DLHC	2.0	mg/L		20-OCT-16	R3576668
Total Kjeldahl Nitrogen	12.3		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	7.10	DLHC	0.20	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	174	DLDS	1.0	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.168		0.0020	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00045		0.00020	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.0152		0.00020	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0623		0.00010	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.107		0.020	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	0.000050		0.000010	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	48.8		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00114		0.00020	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00442		0.00020	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.0940		0.00040	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	1.41		0.020	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	0.00134		0.00010	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0594		0.0020	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	25.1		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.179		0.00020	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00523		0.00010	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.0287		0.0010	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	131		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.00077		0.00010	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	0.000034		0.000020	mg/L		24-OCT-16	R3578536
Sodium (Na)-Dissolved	304		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000020	DLDS	0.000020	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00020	DLDS	0.00020	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	0.0135		0.00060	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00221		0.000020	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.0152		0.0010	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0123		0.0020	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.189	DLDS	0.040	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	108			%		24-OCT-16	
TDS (Calculated)	1220			mg/L		24-OCT-16	
Hardness (as CaCO3)	225			mg/L		24-OCT-16	
Nitrate in Water by IC							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-10 10							
Sampled By: MC on 05-OCT-16 @ 14:40							
Matrix: WATER							
Nitrate in Water by IC							
Nitrate (as N)	0.430	DLDS	0.040	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.464		0.045	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.034	DLDS	0.020	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	250	DLDS	0.60	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.54		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	2030		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	540		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	15.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	467		2.0	mg/L		15-OCT-16	R3571133
L1839506-11 11							
Sampled By: MC on 05-OCT-16 @ 10:40							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	72.3		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	82.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	82.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	111.1		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.076		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	126		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	41.3		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	4.64		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	1.93	DLHC	0.10	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	22.4		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.132		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00021		0.00010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-11 11							
Sampled By: MC on 05-OCT-16 @ 10:40							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Arsenic (As)-Dissolved	0.00439		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0276		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.038		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	0.0000108		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	22.8		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00034		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00079		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00204		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.700		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	0.000212		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0101		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	9.57		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00264		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00198		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00687		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	34.0		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000297		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	58.6		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	0.00560		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000839		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00443		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0019		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.250		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	114	BL:INT		%		20-OCT-16	
TDS (Calculated)	270			mg/L		20-OCT-16	
Hardness (as CaCO3)	96.3			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	0.248		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.248		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	2.91		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.28		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	499		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	241		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	198		2.0	mg/L		15-OCT-16	R3571133
L1839506-12 12							
Sampled By: MC on 05-OCT-16 @ 10:00							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-12 12							
Sampled By: MC on 05-OCT-16 @ 10:00							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	90.1		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	94.3		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	93.8		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	128.8		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	37		10	mg/L		08-OCT-16	R3567002
Dissolved Organic Carbon	17.3		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	1.29		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.038		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	18.2		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0023		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00031		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00366		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0264		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.061		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	0.0000249		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	27.9		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00018		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00130		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0555		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	15.5		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00027		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.0302		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.0172		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	10.4		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000322		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-12 12							
Sampled By: MC on 05-OCT-16 @ 10:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Sodium (Na)-Dissolved	153		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00332		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.0164		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0015		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.559		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	99.8			%		20-OCT-16	
TDS (Calculated)	585			mg/L		20-OCT-16	
Hardness (as CaCO3)	133			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	234		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.23		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	943		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	256		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	209		2.0	mg/L		15-OCT-16	R3571133
L1839506-13 13							
Sampled By: MC on 05-OCT-16 @ 15:00							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	96.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	82.2		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	78.9		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	101.3		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-13 13							
Sampled By: MC on 05-OCT-16 @ 15:00							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Mercury (Hg)-Dissolved	<0.000050	DLM	0.000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	3.13	DLM	0.50	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	1300	DLHC	100	mg/L		08-OCT-16	R3568240
Dissolved Organic Carbon	507	DLHC	10	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	56.1	DLHC	2.0	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	34.8	DLHC	0.80	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	615	DLDS	2.5	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.273		0.0050	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00082		0.00050	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.0296		0.00050	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.188		0.00025	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.289		0.050	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	0.000094		0.000025	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	89.2		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00483		0.00050	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.0128		0.00050	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.0138		0.0010	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	3.92		0.050	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	0.00385		0.00025	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0875		0.0050	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	60.3		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.945		0.00050	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00911		0.00025	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.0497		0.0025	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	610		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.00192		0.00025	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	0.000092		0.000050	mg/L		24-OCT-16	R3578536
Sodium (Na)-Dissolved	560		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00050	DLDS	0.00050	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	0.0677		0.0015	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00344		0.000050	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.0336		0.0025	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0421		0.0050	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	<0.10	DLDS	0.10	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	114	BL:INT		%		24-OCT-16	
TDS (Calculated)	2840			mg/L		24-OCT-16	
Hardness (as CaCO3)	471			mg/L		24-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.11		0.11	mg/L		13-OCT-16	
Nitrite in Water by IC							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-13 13							
Sampled By: MC on 05-OCT-16 @ 15:00							
Matrix: WATER							
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	308	DLDS	1.5	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.74		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	4620		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	1080		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	65.1		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	992		2.0	mg/L		15-OCT-16	R3571133
L1839506-14 14							
Sampled By: MC on 05-OCT-16 @ 10:20							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Toluene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Ethylbenzene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
o-Xylene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
m+p-Xylene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Xylenes	<0.00071		0.00071	mg/L	13-OCT-16	13-OCT-16	R3570777
Styrene	<0.0010		0.0010	mg/L	13-OCT-16	13-OCT-16	R3570777
F1(C6-C10)	<0.10		0.10	mg/L	13-OCT-16	13-OCT-16	R3570777
F1-BTEX	<0.10		0.10	mg/L	13-OCT-16	13-OCT-16	R3570777
Surrogate: 4-Bromofluorobenzene	103.5		70-130	%	13-OCT-16	13-OCT-16	R3570777
Surrogate: 3,4-Dichlorotoluene	110.3		70-130	%	13-OCT-16	13-OCT-16	R3570777
Surrogate: 1,4-Difluorobenzene	102.2		70-130	%	13-OCT-16	13-OCT-16	R3570777
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	98.6		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	0.0000118		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.138		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	184	DLHC	20	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	62.4		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	6.84		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	5.40	DLHC	0.20	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	71.4	DLDS	1.0	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0636		0.0020	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00049		0.00020	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.0150		0.00020	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0324		0.00010	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00020	DLDS	0.00020	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.038		0.020	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-14 14							
Sampled By: MC on 05-OCT-16 @ 10:20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Cadmium (Cd)-Dissolved	<0.000010	DLDS	0.000010	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	38.5		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00043		0.00020	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00169		0.00020	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00214		0.00040	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.322		0.020	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	0.00024		0.00010	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0499		0.0020	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	20.4		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.0381		0.00020	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00595		0.00010	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.0165		0.0010	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	54.5		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.00067		0.00010	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000020	DLDS	0.000020	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	263		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000020	DLDS	0.000020	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00020	DLDS	0.00020	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	0.00805		0.00060	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00143		0.000020	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.0178		0.0010	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0028		0.0020	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.451	DLDS	0.040	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	107			%		20-OCT-16	
TDS (Calculated)	904			mg/L		20-OCT-16	
Hardness (as CaCO3)	180			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLDS	0.040	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.045		0.045	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLDS	0.020	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	144	DLDS	0.60	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.64		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	1520		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	589		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	22.4		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	520		2.0	mg/L		15-OCT-16	R3571133
L1839506-15 15							
Sampled By: MC on 05-OCT-16 @ 15:10							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-15 15							
Sampled By: MC on 05-OCT-16 @ 15:10							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	74.8		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	70.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	78.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	94.6		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.056		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	106		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	33.0		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	4.16		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.385		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	235	DLDS	2.5	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0167		0.0050	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00070		0.00050	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.0153		0.00050	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0266		0.00025	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00050	DLDS	0.00050	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.279		0.050	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	40.2		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00086		0.00050	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.0016		0.0010	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	<0.050	DLDS	0.050	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0832		0.0050	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	42.5		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00561		0.00050	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00254		0.00025	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.0069		0.0025	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	27.1		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.00037		0.00025	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	528		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000050	DLDS	0.000050	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00050	DLDS	0.00050	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-15 15							
Sampled By: MC on 05-OCT-16 @ 15:10							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Titanium (Ti)-Dissolved	<0.0015	DLDS	0.0015	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00482		0.000050	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.0052		0.0025	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.27	DLDS	0.10	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	106			%		20-OCT-16	
TDS (Calculated)	1770			mg/L		20-OCT-16	
Hardness (as CaCO3)	275			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.11		0.11	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	711	DLDS	1.5	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.56		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	2790		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	343		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	13.1		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	303		2.0	mg/L		15-OCT-16	R3571133
L1839506-16 16							
Sampled By: MC on 05-OCT-16 @ 16:10							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	76.7		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	94.8		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	96.0		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	96.7		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		14-OCT-16	R3571247

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-16 16							
Sampled By: MC on 05-OCT-16 @ 16:10							
Matrix: WATER							
Chemical Oxygen Demand	74		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	22.5		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	2.67		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.612		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	137		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0011		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00024		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00511		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0581		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.058		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	49.4		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00030		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00034		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.011		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0264		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	20.4		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00062		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.000986		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00521		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	16.8		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000194		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	185		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00148		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00328		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.190		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	100			%		20-OCT-16	
TDS (Calculated)	705			mg/L		20-OCT-16	
Hardness (as CaCO3)	207			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	93.7		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-16 16							
Sampled By: MC on 05-OCT-16 @ 16:10							
Matrix: WATER							
pH, Conductivity and Total Alkalinity							
pH	8.44		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	1230		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	396		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	8.4		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	338		2.0	mg/L		15-OCT-16	R3571133
L1839506-17 18							
Sampled By: MC on 05-OCT-16 @ 16:00							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	71.6		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	90.1		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	82.1		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	100.0		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.553		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	80		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	27.7		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	2.67		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	1.02	DLHC	0.10	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	156		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	0.0086		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00012		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00232		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0642		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.077		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	59.9		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	0.00015		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00033		0.00010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-17 18							
Sampled By: MC on 05-OCT-16 @ 16:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Copper (Cu)-Dissolved	0.00022		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.129		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0228		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	21.8		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00168		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.000341		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00333		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	19.2		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000118		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	171		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	0.00072		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000438		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00160		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0013		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.193		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	104			%		20-OCT-16	
TDS (Calculated)	673			mg/L		20-OCT-16	
Hardness (as CaCO3)	239			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	28.8		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.47		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	1180		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	417		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	11.2		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	361		2.0	mg/L		15-OCT-16	R3571133
L1839506-18 19							
Sampled By: MC on 05-OCT-16 @ 15:50							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Toluene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Ethylbenzene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
o-Xylene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
m+p-Xylene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Xylenes	<0.00071		0.00071	mg/L	13-OCT-16	13-OCT-16	R3570777
Styrene	<0.0010		0.0010	mg/L	13-OCT-16	13-OCT-16	R3570777

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-18 19							
Sampled By: MC on 05-OCT-16 @ 15:50							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1(C6-C10)	<0.10		0.10	mg/L	13-OCT-16	13-OCT-16	R3570777
F1-BTEX	<0.10		0.10	mg/L	13-OCT-16	13-OCT-16	R3570777
Surrogate: 4-Bromofluorobenzene	105.3		70-130	%	13-OCT-16	13-OCT-16	R3570777
Surrogate: 3,4-Dichlorotoluene	125.8		70-130	%	13-OCT-16	13-OCT-16	R3570777
Surrogate: 1,4-Difluorobenzene	105.1		70-130	%	13-OCT-16	13-OCT-16	R3570777
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	96.8		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	0.0000060		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	69		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	27.0		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.52		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.515		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	38.3		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573477
Aluminum (Al)-Dissolved	<0.0010		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00021		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00685		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0633		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.046		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	32.4		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00022		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00021		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.019		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0247		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	18.7		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00088		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.000360		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00214		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	13.7		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000232		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	168		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00120		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00107		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-18 19							
Sampled By: MC on 05-OCT-16 @ 15:50							
Matrix: WATER							
Fluoride in Water by IC							
Fluoride (F)	0.321		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	100			%		20-OCT-16	
TDS (Calculated)	600			mg/L		20-OCT-16	
Hardness (as CaCO3)	158			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	99.6		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.48		0.10	pH		15-OCT-16	R3571133
Conductivity (EC)	997		2.0	uS/cm		15-OCT-16	R3571133
Bicarbonate (HCO3)	446		5.0	mg/L		15-OCT-16	R3571133
Carbonate (CO3)	9.3		5.0	mg/L		15-OCT-16	R3571133
Hydroxide (OH)	<5.0		5.0	mg/L		15-OCT-16	R3571133
Alkalinity, Total (as CaCO3)	381		2.0	mg/L		15-OCT-16	R3571133
L1839506-19 20							
Sampled By: MC on 05-OCT-16 @ 15:40							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Toluene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Ethylbenzene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
o-Xylene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
m+p-Xylene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Xylenes	<0.00071		0.00071	mg/L	13-OCT-16	13-OCT-16	R3570777
Styrene	<0.0010		0.0010	mg/L	13-OCT-16	13-OCT-16	R3570777
F1(C6-C10)	<0.10		0.10	mg/L	13-OCT-16	13-OCT-16	R3570777
F1-BTEX	<0.10		0.10	mg/L	13-OCT-16	13-OCT-16	R3570777
Surrogate: 4-Bromofluorobenzene	103.2		70-130	%	13-OCT-16	13-OCT-16	R3570777
Surrogate: 3,4-Dichlorotoluene	123.9		70-130	%	13-OCT-16	13-OCT-16	R3570777
Surrogate: 1,4-Difluorobenzene	103.3		70-130	%	13-OCT-16	13-OCT-16	R3570777
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	99.6		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	0.618		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	81		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	20.9		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.93		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.396		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-19 20							
Sampled By: MC on 05-OCT-16 @ 15:40							
Matrix: WATER							
Chloride in Water by IC							
Chloride (Cl)	19.8		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573481
Aluminum (Al)-Dissolved	0.0018		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00259		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.104		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.040		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	32.7		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00012		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00027		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.878		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0167		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	12.5		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00173		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.000584		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00267		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	13.6		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000212		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	43.4		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000207		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.194		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	109			%		20-OCT-16	
TDS (Calculated)	246			mg/L		20-OCT-16	
Hardness (as CaCO3)	133			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	12.4		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.04		0.10	pH		13-OCT-16	R3569137
Conductivity (EC)	431		2.0	uS/cm		13-OCT-16	R3569137
Bicarbonate (HCO3)	227		5.0	mg/L		13-OCT-16	R3569137
Carbonate (CO3)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Hydroxide (OH)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Alkalinity, Total (as CaCO3)	186		2.0	mg/L		13-OCT-16	R3569137

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-19 20							
Sampled By: MC on 05-OCT-16 @ 15:40							
Matrix: WATER							
L1839506-20 21							
Sampled By: MC on 05-OCT-16 @ 14:20							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	84.8		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	123.0		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	100.3		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176
Surrogate: 2-Bromobenzotrifluoride	96.5		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	81		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	26.8		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	2.92		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.287		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	238		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573481
Aluminum (Al)-Dissolved	0.0020		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00031		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00526		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.101		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.094		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	52.4		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00053		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00132		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.011		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0635		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	41.4		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00076		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00303		0.000050	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-20 21							
Sampled By: MC on 05-OCT-16 @ 14:20							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Nickel (Ni)-Dissolved	0.00722		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	27.8		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000239		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	195		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00358		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00160		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0014		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.335		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	105			%		20-OCT-16	
TDS (Calculated)	812			mg/L		20-OCT-16	
Hardness (as CaCO3)	301			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	62.2		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.29		0.10	pH		13-OCT-16	R3569137
Conductivity (EC)	1420		2.0	uS/cm		13-OCT-16	R3569137
Bicarbonate (HCO3)	396		5.0	mg/L		13-OCT-16	R3569137
Carbonate (CO3)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Hydroxide (OH)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Alkalinity, Total (as CaCO3)	325		2.0	mg/L		13-OCT-16	R3569137
L1839506-21 22							
Sampled By: MC on 05-OCT-16 @ 02:20							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	81.7		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	125.9		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	98.7		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.13	DLIS	0.13	mg/L	11-OCT-16	12-OCT-16	R3570176

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-21 22							
Sampled By: MC on 05-OCT-16 @ 02:20							
Matrix: WATER							
CCME F2-4 Hydrocarbons							
Surrogate: 2-Bromobenzotrifluoride	125.2		60-140	%	11-OCT-16	12-OCT-16	R3570176
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	70		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	25.3		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	2.33		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.111		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	170		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573481
Aluminum (Al)-Dissolved	0.0017		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00017		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00248		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0559		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.041		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	27.9		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00027		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00052		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.021		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0114		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	18.5		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00054		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00197		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00391		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	22.9		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000227		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	129		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.00136		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0010		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.205		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	107			%		20-OCT-16	
TDS (Calculated)	484			mg/L		20-OCT-16	
Hardness (as CaCO3)	146			mg/L		20-OCT-16	
Nitrate in Water by IC							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-21 22							
Sampled By: MC on 05-OCT-16 @ 02:20							
Matrix: WATER							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	9.21		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.05		0.10	pH		13-OCT-16	R3569137
Conductivity (EC)	889		2.0	uS/cm		13-OCT-16	R3569137
Bicarbonate (HCO3)	216		5.0	mg/L		13-OCT-16	R3569137
Carbonate (CO3)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Hydroxide (OH)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Alkalinity, Total (as CaCO3)	177		2.0	mg/L		13-OCT-16	R3569137
L1839506-22 DUPLICATE 1							
Sampled By: MC on 05-OCT-16							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Toluene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Ethylbenzene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
o-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
m+p-Xylene	<0.00050		0.00050	mg/L	12-OCT-16	12-OCT-16	R3570275
Xylenes	<0.00071		0.00071	mg/L	12-OCT-16	12-OCT-16	R3570275
Styrene	<0.0010		0.0010	mg/L	12-OCT-16	12-OCT-16	R3570275
F1(C6-C10)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
F1-BTEX	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570275
Surrogate: 4-Bromofluorobenzene	84.4		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 3,4-Dichlorotoluene	122.1		70-130	%	12-OCT-16	12-OCT-16	R3570275
Surrogate: 1,4-Difluorobenzene	99.8		70-130	%	12-OCT-16	12-OCT-16	R3570275
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570336
Surrogate: 2-Bromobenzotrifluoride	83.5		60-140	%	12-OCT-16	12-OCT-16	R3570336
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	1.17		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	63		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	21.9		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.27		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.144		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	61.6		0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573481
Aluminum (Al)-Dissolved	0.0023		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00021		0.00010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-22 DUPLICATE 1							
Sampled By: MC on 05-OCT-16							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Arsenic (As)-Dissolved	0.00369		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0982		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.059		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	28.4		0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00024		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00048		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.025		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0423		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	13.6		0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00085		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00117		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00447		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	13.5		0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000111		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Sodium (Na)-Dissolved	148		1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000771		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	0.00095		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	0.0015		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.297		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	103			%		20-OCT-16	
TDS (Calculated)	513			mg/L		20-OCT-16	
Hardness (as CaCO3)	127			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	0.315		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.342		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.028		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	70.5		0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.23		0.10	pH		13-OCT-16	R3569137
Conductivity (EC)	870		2.0	uS/cm		13-OCT-16	R3569137
Bicarbonate (HCO3)	358		5.0	mg/L		13-OCT-16	R3569137
Carbonate (CO3)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Hydroxide (OH)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Alkalinity, Total (as CaCO3)	293		2.0	mg/L		13-OCT-16	R3569137
L1839506-23 DUPLICATE 2							
Sampled By: MC on 05-OCT-16							
Matrix: WATER							
BTEX,Styrene, F1 (C6-C10), F2 (>C10-C16)							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-23 DUPLICATE 2							
Sampled By: MC on 05-OCT-16							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Toluene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Ethylbenzene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
o-Xylene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
m+p-Xylene	<0.00050		0.00050	mg/L	13-OCT-16	13-OCT-16	R3570777
Xylenes	<0.00071		0.00071	mg/L	13-OCT-16	13-OCT-16	R3570777
Styrene	<0.0010		0.0010	mg/L	13-OCT-16	13-OCT-16	R3570777
F1(C6-C10)	<0.10		0.10	mg/L	13-OCT-16	13-OCT-16	R3570777
F1-BTEX	<0.10		0.10	mg/L	13-OCT-16	13-OCT-16	R3570777
Surrogate: 4-Bromofluorobenzene	103.7		70-130	%	13-OCT-16	13-OCT-16	R3570777
Surrogate: 3,4-Dichlorotoluene	124.9		70-130	%	13-OCT-16	13-OCT-16	R3570777
Surrogate: 1,4-Difluorobenzene	103.9		70-130	%	13-OCT-16	13-OCT-16	R3570777
CCME F2-4 Hydrocarbons							
F2: (C10-C16)	<0.10		0.10	mg/L	12-OCT-16	12-OCT-16	R3570336
Surrogate: 2-Bromobenzotrifluoride	80.7		60-140	%	12-OCT-16	12-OCT-16	R3570336
Dissolved Metals - CCME							
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	LAB					14-OCT-16	R3570779
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		14-OCT-16	R3571226
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		14-OCT-16	R3571247
Chemical Oxygen Demand	86		10	mg/L		08-OCT-16	R3567167
Dissolved Organic Carbon	30.0		1.0	mg/L		20-OCT-16	R3575598
Total Kjeldahl Nitrogen	3.26		0.20	mg/L	13-OCT-16	14-OCT-16	R3571355
Phosphorus (P)-Total	0.247		0.020	mg/L	13-OCT-16	14-OCT-16	R3571184
Routine Water Analysis							
Chloride in Water by IC							
Chloride (Cl)	17.4	RRV	0.50	mg/L		08-OCT-16	R3570123
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	LAB					18-OCT-16	R3573481
Aluminum (Al)-Dissolved	0.0013		0.0010	mg/L		19-OCT-16	R3574915
Antimony (Sb)-Dissolved	0.00019		0.00010	mg/L		19-OCT-16	R3574915
Arsenic (As)-Dissolved	0.00604		0.00010	mg/L		19-OCT-16	R3574915
Barium (Ba)-Dissolved	0.0549		0.000050	mg/L		19-OCT-16	R3574915
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Boron (B)-Dissolved	0.047		0.010	mg/L		19-OCT-16	R3574915
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		19-OCT-16	R3574915
Calcium (Ca)-Dissolved	21.6	RRV	0.50	mg/L		19-OCT-16	R3574915
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Cobalt (Co)-Dissolved	0.00037		0.00010	mg/L		19-OCT-16	R3574915
Copper (Cu)-Dissolved	0.00083		0.00020	mg/L		19-OCT-16	R3574915
Iron (Fe)-Dissolved	0.041		0.010	mg/L		19-OCT-16	R3574915
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		19-OCT-16	R3574915
Lithium (Li)-Dissolved	0.0192		0.0010	mg/L		19-OCT-16	R3574915
Magnesium (Mg)-Dissolved	11.8	RRV	0.10	mg/L		19-OCT-16	R3574915
Manganese (Mn)-Dissolved	0.00068		0.00010	mg/L		19-OCT-16	R3574915
Molybdenum (Mo)-Dissolved	0.00226		0.000050	mg/L		19-OCT-16	R3574915
Nickel (Ni)-Dissolved	0.00612		0.00050	mg/L		19-OCT-16	R3574915
Potassium (K)-Dissolved	13.1	RRV	0.50	mg/L		19-OCT-16	R3574915
Selenium (Se)-Dissolved	0.000322		0.000050	mg/L		19-OCT-16	R3574915
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839506-23 DUPLICATE 2							
Sampled By: MC on 05-OCT-16							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Sodium (Na)-Dissolved	105	RRV	1.0	mg/L		19-OCT-16	R3574915
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L		19-OCT-16	R3574915
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L		19-OCT-16	R3574915
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L		19-OCT-16	R3574915
Uranium (U)-Dissolved	0.000919		0.000010	mg/L		19-OCT-16	R3574915
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L		19-OCT-16	R3574915
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		19-OCT-16	R3574915
Fluoride in Water by IC							
Fluoride (F)	0.592		0.020	mg/L		08-OCT-16	R3570123
Ion Balance Calculation							
Ion Balance	113	BL:INT		%		20-OCT-16	
TDS (Calculated)	345			mg/L		20-OCT-16	
Hardness (as CaCO3)	103			mg/L		20-OCT-16	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-OCT-16	R3570123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		13-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-OCT-16	R3570123
Sulfate in Water by IC							
Sulfate (SO4)	15.1	RRV	0.30	mg/L		08-OCT-16	R3570123
pH, Conductivity and Total Alkalinity							
pH	8.28		0.10	pH		13-OCT-16	R3569137
Conductivity (EC)	594	RRV	2.0	uS/cm		13-OCT-16	R3569137
Bicarbonate (HCO3)	326	RRV	5.0	mg/L		13-OCT-16	R3569137
Carbonate (CO3)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Hydroxide (OH)	<5.0		5.0	mg/L		13-OCT-16	R3569137
Alkalinity, Total (as CaCO3)	267	RRV	2.0	mg/L		13-OCT-16	R3569137

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLIS	Detection Limit Adjusted: Insufficient Sample
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-CL	Water	BTEX, Styrene and F1 (C6-C10)	EPA 8260C/5021A, and CWS PHC Tier 1

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method

C-DIS-ORG-ED	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COD-T-COL-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F2-4-ME-FID-CL	Water	CCME F2-4 Hydrocarbons	EPA 3511/ CCME PHC CWS GC-FID

Water samples are spiked with 2-BBTF surrogate, and extracted by reciprocal action shaker for 30 minutes using a single micro-extraction with hexane. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Tier 1 Method, CCME, December 2001.

HG-D-CVAA-ED	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-CFA-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
P-T-COL-ED	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed). pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H_2SO_4 is performed. Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TKN-CFA-ED	Water	TKN in Water by Colour	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-CL	**Water**							
Batch R3570275								
WG2408932-17 DUP		**L1839506-10**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	12-OCT-16
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	12-OCT-16
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	12-OCT-16
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	12-OCT-16
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	12-OCT-16
Xylenes		<0.00071	<0.00071	RPD-NA	mg/L	N/A	30	12-OCT-16
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	12-OCT-16
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	12-OCT-16
WG2408932-22 DUP		**L1839513-3**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
Xylenes		<0.00071	<0.00071	RPD-NA	mg/L	N/A	30	13-OCT-16
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	13-OCT-16
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	13-OCT-16
WG2408932-15 LCS								
Benzene			93.5		%		70-130	11-OCT-16
Toluene			95.7		%		70-130	11-OCT-16
Ethylbenzene			93.8		%		70-130	11-OCT-16
o-Xylene			97.9		%		70-130	11-OCT-16
m+p-Xylene			97.4		%		70-130	11-OCT-16
Xylenes			97.7		%		70-130	11-OCT-16
Styrene			97.0		%		70-130	11-OCT-16
F1(C6-C10)			103.3		%		70-130	11-OCT-16
WG2408932-18 LCS								
Benzene			94.6		%		70-130	12-OCT-16
Toluene			95.5		%		70-130	12-OCT-16
Ethylbenzene			92.8		%		70-130	12-OCT-16
o-Xylene			99.0		%		70-130	12-OCT-16
m+p-Xylene			99.2		%		70-130	12-OCT-16
Xylenes			99.1		%		70-130	12-OCT-16
Styrene			103.2		%		70-130	12-OCT-16

Quality Control Report

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Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-CL	**Water**							
Batch R3570275								
WG2408932-18 LCS								
F1(C6-C10)			105.8		%		70-130	12-OCT-16
WG2408932-13 MB								
Benzene			<0.00050		mg/L		0.0005	11-OCT-16
Toluene			<0.00050		mg/L		0.0005	11-OCT-16
Ethylbenzene			<0.00050		mg/L		0.0005	11-OCT-16
o-Xylene			<0.00050		mg/L		0.0005	11-OCT-16
m+p-Xylene			<0.00050		mg/L		0.0005	11-OCT-16
Xylenes			<0.00071		mg/L		0.00071	11-OCT-16
Styrene			<0.0010		mg/L		0.001	11-OCT-16
F1(C6-C10)			<0.10		mg/L		0.1	11-OCT-16
Surrogate: 4-Bromofluorobenzene			77.6		%		70-130	11-OCT-16
Surrogate: 3,4-Dichlorotoluene			100.3		%		70-130	11-OCT-16
Surrogate: 1,4-Difluorobenzene			98.0		%		70-130	11-OCT-16
WG2408932-16 MB								
Benzene			<0.00050		mg/L		0.0005	12-OCT-16
Toluene			<0.00050		mg/L		0.0005	12-OCT-16
Ethylbenzene			<0.00050		mg/L		0.0005	12-OCT-16
o-Xylene			<0.00050		mg/L		0.0005	12-OCT-16
m+p-Xylene			<0.00050		mg/L		0.0005	12-OCT-16
Xylenes			<0.00071		mg/L		0.00071	12-OCT-16
Styrene			<0.0010		mg/L		0.001	12-OCT-16
F1(C6-C10)			<0.10		mg/L		0.1	12-OCT-16
Surrogate: 4-Bromofluorobenzene			86.9		%		70-130	12-OCT-16
Surrogate: 3,4-Dichlorotoluene			90.9		%		70-130	12-OCT-16
Surrogate: 1,4-Difluorobenzene			103.4		%		70-130	12-OCT-16
Batch R3570777								
WG2410337-3 DUP		**L1839506-23**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	13-OCT-16
Xylenes		<0.00071	<0.00071	RPD-NA	mg/L	N/A	30	13-OCT-16
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	13-OCT-16

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-CL	**Water**							
Batch R3570777								
WG2410337-3 DUP		**L1839506-23**						
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	13-OCT-16
WG2410337-5 DUP		**L1839797-63**						
Benzene		0.0838	0.0821		mg/L	2.1	30	14-OCT-16
Toluene		0.0773	0.0756		mg/L	2.2	30	14-OCT-16
Ethylbenzene		0.0824	0.0843		mg/L	2.2	30	14-OCT-16
o-Xylene		0.0837	0.0862		mg/L	3.0	30	14-OCT-16
m+p-Xylene		0.155	0.157		mg/L	1.1	30	14-OCT-16
Xylenes		0.239	0.243		mg/L	1.7	30	14-OCT-16
Styrene		0.0754	0.0793		mg/L	5.1	30	14-OCT-16
F1(C6-C10)		0.63	0.62		mg/L	0.9	30	14-OCT-16
WG2410337-2 LCS								
Benzene			82.4		%		70-130	13-OCT-16
Toluene			81.9		%		70-130	13-OCT-16
Ethylbenzene			81.3		%		70-130	13-OCT-16
o-Xylene			78.8		%		70-130	13-OCT-16
m+p-Xylene			87.0		%		70-130	13-OCT-16
Xylenes			82.9		%		70-130	13-OCT-16
Styrene			85.5		%		70-130	13-OCT-16
F1(C6-C10)			96.9		%		70-130	13-OCT-16
WG2410337-6 LCS								
Benzene			98.4		%		70-130	14-OCT-16
Toluene			97.5		%		70-130	14-OCT-16
Ethylbenzene			94.3		%		70-130	14-OCT-16
o-Xylene			92.7		%		70-130	14-OCT-16
m+p-Xylene			94.5		%		70-130	14-OCT-16
Xylenes			93.6		%		70-130	14-OCT-16
Styrene			96.5		%		70-130	14-OCT-16
F1(C6-C10)			92.6		%		70-130	14-OCT-16
WG2410337-1 MB								
Benzene			<0.00050		mg/L		0.0005	13-OCT-16
Toluene			<0.00050		mg/L		0.0005	13-OCT-16
Ethylbenzene			<0.00050		mg/L		0.0005	13-OCT-16
o-Xylene			<0.00050		mg/L		0.0005	13-OCT-16
m+p-Xylene			<0.00050		mg/L		0.0005	13-OCT-16

Quality Control Report

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-CL	**Water**							
Batch R3570777								
WG2410337-1 MB								
Xylenes			<0.00071		mg/L		0.00071	13-OCT-16
Styrene			<0.0010		mg/L		0.001	13-OCT-16
F1(C6-C10)			<0.10		mg/L		0.1	13-OCT-16
Surrogate: 4-Bromofluorobenzene			103.0		%		70-130	13-OCT-16
Surrogate: 3,4-Dichlorotoluene			111.5		%		70-130	13-OCT-16
Surrogate: 1,4-Difluorobenzene			101.2		%		70-130	13-OCT-16
WG2410337-4 MB								
Benzene			<0.00050		mg/L		0.0005	13-OCT-16
Toluene			<0.00050		mg/L		0.0005	13-OCT-16
Ethylbenzene			<0.00050		mg/L		0.0005	13-OCT-16
o-Xylene			<0.00050		mg/L		0.0005	13-OCT-16
m+p-Xylene			<0.00050		mg/L		0.0005	13-OCT-16
Xylenes			<0.00071		mg/L		0.00071	13-OCT-16
Styrene			<0.0010		mg/L		0.001	13-OCT-16
F1(C6-C10)			<0.10		mg/L		0.1	13-OCT-16
Surrogate: 4-Bromofluorobenzene			105.0		%		70-130	13-OCT-16
Surrogate: 3,4-Dichlorotoluene			126.4		%		70-130	13-OCT-16
Surrogate: 1,4-Difluorobenzene			104.6		%		70-130	13-OCT-16
C-DIS-ORG-ED	**Water**							
Batch R3575598								
WG2414439-3 DUP		**L1839506-15**						
Dissolved Organic Carbon		33.0	32.7		mg/L	1.0	20	20-OCT-16
WG2414439-7 DUP		**L1839527-8**						
Dissolved Organic Carbon		2.2	2.0		mg/L	14	20	20-OCT-16
WG2414439-2 LCS								
Dissolved Organic Carbon			92.8		%		80-120	19-OCT-16
WG2414439-6 LCS								
Dissolved Organic Carbon			91.5		%		80-120	20-OCT-16
WG2414439-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	19-OCT-16
WG2414439-5 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	20-OCT-16
WG2414439-4 MS		**L1839506-18**						
Dissolved Organic Carbon			N/A	MS-B	%		-	20-OCT-16
WG2414439-8 MS		**L1839527-10**						

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-ED	**Water**							
Batch R3575598								
WG2414439-8 MS		**L1839527-10**						
Dissolved Organic Carbon			93.9		%		70-130	20-OCT-16
Batch R3576668								
WG2415302-2 LCS								
Dissolved Organic Carbon			90.6		%		80-120	20-OCT-16
WG2415302-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	20-OCT-16
CL-IC-N-ED	**Water**							
Batch R3570123								
WG2406658-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	08-OCT-16
COD-T-COL-ED	**Water**							
Batch R3567002								
WG2406574-3 DUP		**L1838832-1**						
Chemical Oxygen Demand		48	45		mg/L	6.4	20	08-OCT-16
WG2406574-2 LCS								
Chemical Oxygen Demand			87.1		%		85-115	08-OCT-16
WG2406574-1 MB								
Chemical Oxygen Demand			<10		mg/L		10	08-OCT-16
WG2406574-4 MS		**L1838832-1**						
Chemical Oxygen Demand			117.4		%		75-125	08-OCT-16
Batch R3567167								
WG2407018-3 DUP		**L1840498-1**						
Chemical Oxygen Demand		121	107		mg/L	13	20	08-OCT-16
WG2407018-2 LCS								
Chemical Oxygen Demand			98.0		%		85-115	08-OCT-16
WG2407018-1 MB								
Chemical Oxygen Demand			<10		mg/L		10	08-OCT-16
WG2407018-4 MS		**L1840498-1**						
Chemical Oxygen Demand			N/A	MS-B	%		-	08-OCT-16
Batch R3568240								
WG2407132-3 DUP		**L1839739-1**						
Chemical Oxygen Demand		34	36		mg/L	3.6	20	08-OCT-16
WG2407132-2 LCS								
Chemical Oxygen Demand			98.6		%		85-115	08-OCT-16
WG2407132-1 MB								

Quality Control Report

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Edmonton AB T5V 1B4
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-T-COL-ED	**Water**							
Batch R3568240								
WG2407132-1 MB								
Chemical Oxygen Demand			<10		mg/L		10	08-OCT-16
WG2407132-4 MS		**L1839739-1**						
Chemical Oxygen Demand			113.4		%		75-125	08-OCT-16
F-IC-N-ED	**Water**							
Batch R3570123								
WG2406658-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	08-OCT-16
F2-4-ME-FID-CL	**Water**							
Batch R3569329								
WG2407848-1 MB								
F2: (C10-C16)			<0.10		mg/L		0.1	11-OCT-16
Surrogate: 2-Bromobenzotrifluoride			67.3		%		60-140	11-OCT-16
Batch R3570176								
WG2407849-1 MB								
F2: (C10-C16)			<0.10		mg/L		0.1	12-OCT-16
Surrogate: 2-Bromobenzotrifluoride			91.1		%		60-140	12-OCT-16
Batch R3570336								
WG2407956-1 MB								
F2: (C10-C16)			<0.10		mg/L		0.1	13-OCT-16
Surrogate: 2-Bromobenzotrifluoride			86.0		%		60-140	13-OCT-16
HG-D-CVAA-ED	**Water**							
Batch R3569423								
WG2408178-3 DUP		**L1837799-2**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	12-OCT-16
WG2408178-7 DUP		**L1839506-3**						
Mercury (Hg)-Dissolved		0.0000066	0.0000072		mg/L	8.7	20	12-OCT-16
WG2408178-2 LCS								
Mercury (Hg)-Dissolved			106.0		%		80-120	12-OCT-16
WG2408178-6 LCS								
Mercury (Hg)-Dissolved			105.0		%		80-120	12-OCT-16
WG2408178-1 MB								
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	12-OCT-16
WG2408178-5 MB								
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	12-OCT-16
WG2408178-4 MS		**L1837799-3**						

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-ED	**Water**							
Batch R3569423								
WG2408178-4 MS		**L1837799-3**						
Mercury (Hg)-Dissolved			104.5		%		70-130	12-OCT-16
WG2408178-8 MS		**L1839506-4**						
Mercury (Hg)-Dissolved			105.1		%		70-130	12-OCT-16
Batch R3571226								
WG2410437-3 DUP		**L1839506-22**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	14-OCT-16
WG2410437-2 LCS								
Mercury (Hg)-Dissolved			103.0		%		80-120	14-OCT-16
WG2410437-1 MB								
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	14-OCT-16
WG2410437-4 MS		**L1839506-23**						
Mercury (Hg)-Dissolved			85.6		%		70-130	14-OCT-16
MET-D-CCMS-ED	**Water**							
Batch R3574915								
WG2412777-3 DUP		**L1839506-1**						
Aluminum (Al)-Dissolved		0.0016	0.0019		mg/L	14	20	19-OCT-16
Antimony (Sb)-Dissolved		0.00020	0.00021		mg/L	1.4	20	19-OCT-16
Arsenic (As)-Dissolved		0.00367	0.00364		mg/L	0.7	20	19-OCT-16
Barium (Ba)-Dissolved		0.0883	0.0918		mg/L	3.9	20	19-OCT-16
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-OCT-16
Boron (B)-Dissolved		0.064	0.061		mg/L	5.3	20	19-OCT-16
Cadmium (Cd)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	19-OCT-16
Calcium (Ca)-Dissolved		29.0	28.8		mg/L	0.6	20	19-OCT-16
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-OCT-16
Cobalt (Co)-Dissolved		0.00023	0.00022		mg/L	1.4	20	19-OCT-16
Copper (Cu)-Dissolved		0.00045	0.00043		mg/L	5.5	20	19-OCT-16
Iron (Fe)-Dissolved		0.021	0.021		mg/L	2.8	20	19-OCT-16
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-OCT-16
Lithium (Li)-Dissolved		0.0417	0.0401		mg/L	3.9	20	19-OCT-16
Magnesium (Mg)-Dissolved		13.9	13.6		mg/L	2.6	20	19-OCT-16
Manganese (Mn)-Dissolved		0.00071	0.00073		mg/L	2.4	20	19-OCT-16
Molybdenum (Mo)-Dissolved		0.00125	0.00131		mg/L	4.5	20	19-OCT-16
Nickel (Ni)-Dissolved		0.00430	0.00428		mg/L	0.5	20	19-OCT-16
Potassium (K)-Dissolved		13.9	13.2		mg/L	5.0	20	19-OCT-16

Quality Control Report

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED	**Water**							
Batch R3574915								
WG2412778-3 DUP		**L1839520-1**						
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-OCT-16
Titanium (Ti)-Dissolved		0.00288	0.00277		mg/L	3.8	20	19-OCT-16
Uranium (U)-Dissolved		0.000124	0.000122		mg/L	1.2	20	19-OCT-16
Vanadium (V)-Dissolved		0.00052	0.00055		mg/L	5.5	20	19-OCT-16
Zinc (Zn)-Dissolved		0.0020	0.0021		mg/L	3.5	20	19-OCT-16
WG2412777-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-OCT-16
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	19-OCT-16
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-OCT-16
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	19-OCT-16
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-OCT-16
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-OCT-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-OCT-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-OCT-16
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	19-OCT-16
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-OCT-16
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-OCT-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-OCT-16
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-OCT-16
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-OCT-16
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-OCT-16
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-OCT-16
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-OCT-16
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	19-OCT-16
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-OCT-16
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	19-OCT-16
							0.001	

Quality Control Report

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED	**Water**							
Batch R3574915								
WG2412777-1 MB								
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-OCT-16
WG2412778-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-OCT-16
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	19-OCT-16
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-OCT-16
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	19-OCT-16
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-OCT-16
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-OCT-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-OCT-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-OCT-16
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	19-OCT-16
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-OCT-16
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-OCT-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-OCT-16
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-OCT-16
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-OCT-16
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-OCT-16
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-OCT-16
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-OCT-16
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	19-OCT-16
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	19-OCT-16
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-OCT-16
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	19-OCT-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-OCT-16
NH3-CFA-ED	**Water**							

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-CFA-ED	**Water**							
Batch R3571247								
WG2410787-11 DUP		**L1839506-23**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	14-OCT-16
WG2410787-3 DUP		**L1843149-1**						
Ammonia, Total (as N)		1.41	1.36		mg/L	3.0	20	14-OCT-16
WG2410787-7 DUP		**L1839506-3**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	14-OCT-16
WG2410787-10 LCS								
Ammonia, Total (as N)			108.5		%		70-130	14-OCT-16
WG2410787-2 LCS								
Ammonia, Total (as N)			105.1		%		70-130	14-OCT-16
WG2410787-6 LCS								
Ammonia, Total (as N)			104.7		%		70-130	14-OCT-16
WG2410787-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	14-OCT-16
WG2410787-5 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	14-OCT-16
WG2410787-9 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	14-OCT-16
WG2410787-12 MS		**L1839506-23**						
Ammonia, Total (as N)			104.7		%		75-125	14-OCT-16
WG2410787-4 MS		**L1843149-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	14-OCT-16
WG2410787-8 MS		**L1839506-3**						
Ammonia, Total (as N)			104.5		%		75-125	14-OCT-16
NO2-IC-N-ED	**Water**							
Batch R3570123								
WG2406658-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	08-OCT-16
NO3-IC-N-ED	**Water**							
Batch R3570123								
WG2406658-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	08-OCT-16
P-T-COL-ED	**Water**							

Quality Control Report

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-ED	**Water**							
Batch R3571184								
WG2410172-3 DUP		**L1839491-28**						
Phosphorus (P)-Total		0.149	0.153		mg/L	2.9	20	14-OCT-16
WG2410172-7 DUP		**L1839739-1**						
Phosphorus (P)-Total		0.055	0.046		mg/L	16	20	14-OCT-16
WG2410172-2 LCS								
Phosphorus (P)-Total			99.8		%		80-120	14-OCT-16
WG2410172-6 LCS								
Phosphorus (P)-Total			101.1		%		80-120	14-OCT-16
WG2410172-1 MB								
Phosphorus (P)-Total			<0.020		mg/L		0.02	14-OCT-16
WG2410172-5 MB								
Phosphorus (P)-Total			<0.020		mg/L		0.02	14-OCT-16
WG2410172-4 MS		**L1839491-28**						
Phosphorus (P)-Total			95.6		%		70-130	14-OCT-16
WG2410172-8 MS		**L1839739-1**						
Phosphorus (P)-Total			93.9		%		70-130	14-OCT-16
PH/EC/ALK-ED	**Water**							
Batch R3569137								
WG2408730-18 DUP		**L1839516-6**						
pH		7.91	7.96	J	pH	0.06	0.2	13-OCT-16
Conductivity (EC)		803	806		uS/cm	0.4	10	13-OCT-16
Bicarbonate (HCO3)		496	494		mg/L	0.5	25	13-OCT-16
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	13-OCT-16
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	13-OCT-16
Alkalinity, Total (as CaCO3)		407	405		mg/L	0.5	20	13-OCT-16
WG2408730-24 DUP		**L1839519-6**						
pH		5.22	5.13	J	pH	0.09	0.2	13-OCT-16
Conductivity (EC)		<2.0	<2.0	RPD-NA	uS/cm	N/A	10	13-OCT-16
Bicarbonate (HCO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	13-OCT-16
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	13-OCT-16
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	13-OCT-16
Alkalinity, Total (as CaCO3)		<2.0	<2.0	RPD-NA	mg/L	N/A	20	13-OCT-16
WG2408730-10 LCS								
Alkalinity, Total (as CaCO3)			98.7		%		85-115	12-OCT-16
WG2408730-11 LCS								
Conductivity (EC)			95.0		%		90-110	12-OCT-16
WG2408730-13 LCS								

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R3569137								
WG2408730-13 LCS								
Conductivity (EC)			95.9		%		90-110	12-OCT-16
WG2408730-15 LCS								
pH			6.05		pH		5.9-6.1	12-OCT-16
WG2408730-16 LCS								
Alkalinity, Total (as CaCO3)			96.7		%		85-115	13-OCT-16
WG2408730-17 LCS								
Conductivity (EC)			94.4		%		90-110	13-OCT-16
WG2408730-19 LCS								
Conductivity (EC)			94.8		%		90-110	13-OCT-16
WG2408730-2 LCS								
Conductivity (EC)			96.3		%		90-110	12-OCT-16
WG2408730-21 LCS								
pH			6.06		pH		5.9-6.1	13-OCT-16
WG2408730-22 LCS								
Alkalinity, Total (as CaCO3)			93.3		%		85-115	13-OCT-16
WG2408730-23 LCS								
Conductivity (EC)			92.6		%		90-110	13-OCT-16
WG2408730-25 LCS								
Conductivity (EC)			94.3		%		90-110	13-OCT-16
WG2408730-27 LCS								
pH			6.06		pH		5.9-6.1	13-OCT-16
WG2408730-28 LCS								
Alkalinity, Total (as CaCO3)			90.3		%		85-115	13-OCT-16
WG2408730-29 LCS								
Conductivity (EC)			92.1		%		90-110	13-OCT-16
WG2408730-3 LCS								
pH			6.05		pH		5.9-6.1	12-OCT-16
WG2408730-4 LCS								
Alkalinity, Total (as CaCO3)			97.8		%		85-115	12-OCT-16
WG2408730-5 LCS								
Conductivity (EC)			95.5		%		90-110	12-OCT-16
WG2408730-7 LCS								
Conductivity (EC)			96.4		%		90-110	12-OCT-16
WG2408730-9 LCS								
pH			6.06		pH		5.9-6.1	12-OCT-16
WG2408730-1 MB								
Conductivity (EC)			<2.0		uS/cm		2	12-OCT-16

Quality Control Report

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R3571133								
WG2410566-18 DUP		**L1839491-20**						
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	15-OCT-16
Alkalinity, Total (as CaCO3)		402	402		mg/L	0.0	20	15-OCT-16
WG2410566-24 DUP		**L1839506-18**						
pH		8.48	8.51	J	pH	0.03	0.2	15-OCT-16
Conductivity (EC)		997	1040		uS/cm	4.4	10	15-OCT-16
Bicarbonate (HCO3)		446	419		mg/L	6.2	25	15-OCT-16
Carbonate (CO3)		9.3	10.7		mg/L	14	25	15-OCT-16
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	15-OCT-16
Alkalinity, Total (as CaCO3)		381	361		mg/L	5.3	20	15-OCT-16
WG2410566-10 LCS								
Alkalinity, Total (as CaCO3)			97.2		%		85-115	14-OCT-16
WG2410566-11 LCS								
Conductivity (EC)			95.0		%		90-110	14-OCT-16
WG2410566-13 LCS								
Conductivity (EC)			96.6		%		90-110	14-OCT-16
WG2410566-15 LCS								
pH			6.05		pH		5.9-6.1	14-OCT-16
WG2410566-16 LCS								
Alkalinity, Total (as CaCO3)			93.9		%		85-115	14-OCT-16
WG2410566-17 LCS								
Conductivity (EC)			95.9		%		90-110	14-OCT-16
WG2410566-19 LCS								
Conductivity (EC)			94.5		%		90-110	15-OCT-16
WG2410566-2 LCS								
Conductivity (EC)			97.2		%		90-110	14-OCT-16
WG2410566-21 LCS								
pH			6.04		pH		5.9-6.1	15-OCT-16
WG2410566-22 LCS								
Alkalinity, Total (as CaCO3)			97.4		%		85-115	15-OCT-16
WG2410566-23 LCS								
Conductivity (EC)			95.3		%		90-110	15-OCT-16
WG2410566-25 LCS								
Conductivity (EC)			93.8		%		90-110	15-OCT-16
WG2410566-27 LCS								
pH			6.01		pH		5.9-6.1	15-OCT-16
WG2410566-28 LCS								

Quality Control Report

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R3571133								
WG2410566-28 LCS								
Alkalinity, Total (as CaCO3)			103.0		%		85-115	15-OCT-16
WG2410566-29 LCS								
Conductivity (EC)			94.6		%		90-110	15-OCT-16
WG2410566-3 LCS								
pH			6.03		pH		5.9-6.1	14-OCT-16
WG2410566-4 LCS								
Alkalinity, Total (as CaCO3)			88.7		%		85-115	14-OCT-16
WG2410566-5 LCS								
Conductivity (EC)			96.1		%		90-110	14-OCT-16
WG2410566-7 LCS								
Conductivity (EC)			96.3		%		90-110	14-OCT-16
WG2410566-9 LCS								
pH			6.04		pH		5.9-6.1	14-OCT-16
WG2410566-1 MB								
Conductivity (EC)			<2.0		uS/cm		2	14-OCT-16
Bicarbonate (HCO3)			<5.0		mg/L		5	14-OCT-16
Carbonate (CO3)			<5.0		mg/L		5	14-OCT-16
Hydroxide (OH)			<5.0		mg/L		5	14-OCT-16
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	14-OCT-16
WG2410566-14 MB								
Conductivity (EC)			<2.0		uS/cm		2	14-OCT-16
Bicarbonate (HCO3)			<5.0		mg/L		5	14-OCT-16
Carbonate (CO3)			<5.0		mg/L		5	14-OCT-16
Hydroxide (OH)			<5.0		mg/L		5	14-OCT-16
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	14-OCT-16
WG2410566-20 MB								
Conductivity (EC)			<2.0		uS/cm		2	15-OCT-16
Bicarbonate (HCO3)			<5.0		mg/L		5	15-OCT-16
Carbonate (CO3)			<5.0		mg/L		5	15-OCT-16
Hydroxide (OH)			<5.0		mg/L		5	15-OCT-16
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	15-OCT-16
WG2410566-26 MB								
Bicarbonate (HCO3)			<5.0		mg/L		5	15-OCT-16
Carbonate (CO3)			<5.0		mg/L		5	15-OCT-16
Hydroxide (OH)			<5.0		mg/L		5	15-OCT-16
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	15-OCT-16

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R3571133								
WG2410566-8 MB								
Conductivity (EC)			<2.0		uS/cm		2	14-OCT-16
Bicarbonate (HCO3)			<5.0		mg/L		5	14-OCT-16
Carbonate (CO3)			<5.0		mg/L		5	14-OCT-16
Hydroxide (OH)			<5.0		mg/L		5	14-OCT-16
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	14-OCT-16
SO4-IC-N-ED	**Water**							
Batch R3570123								
WG2406658-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	08-OCT-16
TKN-CFA-ED	**Water**							
Batch R3571355								
WG2410103-11 DUP		**L1839739-3**						
Total Kjeldahl Nitrogen		0.55	0.60		mg/L	9.2	20	14-OCT-16
WG2410103-7 DUP		**L1839506-23**						
Total Kjeldahl Nitrogen		3.26	3.28		mg/L	0.5	20	14-OCT-16
WG2410103-10 LCS								
Total Kjeldahl Nitrogen			109		%		75-125	14-OCT-16
WG2410103-2 LCS								
Total Kjeldahl Nitrogen			105		%		75-125	14-OCT-16
WG2410103-6 LCS								
Total Kjeldahl Nitrogen			108		%		75-125	14-OCT-16
WG2410103-1 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	14-OCT-16
WG2410103-5 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	14-OCT-16
WG2410103-9 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	14-OCT-16
WG2410103-12 MS		**L1839739-3**						
Total Kjeldahl Nitrogen			113		%		70-130	14-OCT-16
WG2410103-8 MS		**L1839506-23**						
Total Kjeldahl Nitrogen			108		%		70-130	14-OCT-16

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrate in Water by IC							
	1	05-OCT-16 11:30	08-OCT-16 08:00	48	68	hours	EHT
	2	05-OCT-16 12:25	08-OCT-16 08:00	48	68	hours	EHT
	3	05-OCT-16 12:15	08-OCT-16 08:00	48	68	hours	EHT
	4	05-OCT-16 12:45	08-OCT-16 08:00	48	67	hours	EHT
	5	05-OCT-16 11:50	08-OCT-16 08:00	48	68	hours	EHT
	6	05-OCT-16 12:20	08-OCT-16 08:00	48	68	hours	EHT
	7	05-OCT-16 13:30	08-OCT-16 08:00	48	66	hours	EHT
	8	05-OCT-16 13:50	08-OCT-16 08:00	48	66	hours	EHT
	9	05-OCT-16 14:00	08-OCT-16 08:00	48	66	hours	EHT
	10	05-OCT-16 14:40	08-OCT-16 08:00	48	65	hours	EHT
	11	05-OCT-16 10:40	08-OCT-16 08:00	48	69	hours	EHT
	12	05-OCT-16 10:00	08-OCT-16 08:00	48	70	hours	EHT
	13	05-OCT-16 15:00	08-OCT-16 08:00	48	65	hours	EHT
	14	05-OCT-16 10:20	08-OCT-16 08:00	48	70	hours	EHT
	15	05-OCT-16 15:10	08-OCT-16 08:00	48	65	hours	EHT
	16	05-OCT-16 16:10	08-OCT-16 08:00	48	64	hours	EHT
	17	05-OCT-16 16:00	08-OCT-16 08:00	48	64	hours	EHT
	18	05-OCT-16 15:50	08-OCT-16 08:00	48	64	hours	EHT
	19	05-OCT-16 15:40	08-OCT-16 08:00	48	64	hours	EHT
	20	05-OCT-16 14:20	08-OCT-16 08:00	48	66	hours	EHT
	21	05-OCT-16 02:20	08-OCT-16 08:00	48	78	hours	EHT
	22	05-OCT-16	08-OCT-16 08:00	48	68	hours	EHT
	23	05-OCT-16	08-OCT-16 08:00	48	68	hours	EHT
Nitrite in Water by IC							
	1	05-OCT-16 11:30	08-OCT-16 08:00	48	68	hours	EHT
	2	05-OCT-16 12:25	08-OCT-16 08:00	48	68	hours	EHT
	3	05-OCT-16 12:15	08-OCT-16 08:00	48	68	hours	EHT
	4	05-OCT-16 12:45	08-OCT-16 08:00	48	67	hours	EHT
	5	05-OCT-16 11:50	08-OCT-16 08:00	48	68	hours	EHT
	6	05-OCT-16 12:20	08-OCT-16 08:00	48	68	hours	EHT
	7	05-OCT-16 13:30	08-OCT-16 08:00	48	66	hours	EHT
	8	05-OCT-16 13:50	08-OCT-16 08:00	48	66	hours	EHT
	9	05-OCT-16 14:00	08-OCT-16 08:00	48	66	hours	EHT
	10	05-OCT-16 14:40	08-OCT-16 08:00	48	65	hours	EHT
	11	05-OCT-16 10:40	08-OCT-16 08:00	48	69	hours	EHT
	12	05-OCT-16 10:00	08-OCT-16 08:00	48	70	hours	EHT
	13	05-OCT-16 15:00	08-OCT-16 08:00	48	65	hours	EHT
	14	05-OCT-16 10:20	08-OCT-16 08:00	48	70	hours	EHT
	15	05-OCT-16 15:10	08-OCT-16 08:00	48	65	hours	EHT
	16	05-OCT-16 16:10	08-OCT-16 08:00	48	64	hours	EHT
	17	05-OCT-16 16:00	08-OCT-16 08:00	48	64	hours	EHT
	18	05-OCT-16 15:50	08-OCT-16 08:00	48	64	hours	EHT
	19	05-OCT-16 15:40	08-OCT-16 08:00	48	64	hours	EHT
	20	05-OCT-16 14:20	08-OCT-16 08:00	48	66	hours	EHT
	21	05-OCT-16 02:20	08-OCT-16 08:00	48	78	hours	EHT
	22	05-OCT-16	08-OCT-16 08:00	48	68	hours	EHT
	23	05-OCT-16	08-OCT-16 08:00	48	68	hours	EHT

Legend & Qualifier Definitions:

Quality Control Report

Workorder: L1839506 Report Date: 26-OCT-16

Client: Tetra Tech EBA Inc.
14940 123 Ave NW North Bldg.
Edmonton AB T5V 1B4
Contact: Michele Crawford

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1839506 were received on 05-OCT-16 17:53.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Tetra Tech (Account 10176)
Contact:	Michele Crawford
Phone:	(780) 451-2121
	Company address below will appear on the final report
Street:	14940 123 AVE NORTH BLDG
City/Province:	EDMONTON, AB
Postal Code:	T5V 1B4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

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

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

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

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Michele.Crawford@tetratech.com

Email 2:

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax:

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

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

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

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

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

Project Information

ALS Account # / Quote #: Q58524

Job #: 704-PENVSWM03917-01

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#

Major/Minor Code: | Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only): L1839506

ALS Contact: JESSICA SPIRA **Sampler:** MC

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX F1, F2	ROU	DOC	COD	MET_R-DIS-CCME	NH3-CFA	P-T-COL	TKN-CFA	Number of Containers
	1	Oct 5	11:30	Water	X	X	X	X	X	X	X	X	10
	2	2016	12:25	Water	X	X	X	X	X	X	X	X	10
	3		12:15	Water	X	X	X	X	X	X	X	X	10
	4		12:45	Water	X	X	X	X	X	X	X	X	10
	5		11:50	Water	X	X	X	X	X	X	X	X	10
	6		13:20		X	X	X	X	X	X	X	X	10
	7		13:30		X	X	X	X	X	X	X	X	10
	8		13:50		X	X	X	X	X	X	X	X	10
	9		14:00		X	X	X	X	X	X	X	X	10
	10		14:40		X	X	X	X	X	X	X	X	10
	11		10:40		X	X	X	X	X	X	X	X	10
	12		1000		X	X	X	X	X	X	X	X	10

L1839506-COFC

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

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

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below

Criteria = ABTier 1 (electronic COC only)

Metals, Mercury, dissolved organic carbon bottles were not field filtered. Need to be filtered in lab. TOC bottle was preserved

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

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

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	Oct 5/2016	1750						

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2016 FRONT

1 Cooler: 3.9°C
1 Cooler: 5.5°C
1 Cooler: 3.8°C
1 Cooler: 3.1°C
1 Cooler: 2.9°C

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page 2 of 2

Report To	Contact and company name below will appear on the final report
Company:	Tetra Tech (Account 10176)
Contact:	Michele Crawford
Phone:	(780) 451-2121
	Company address below will appear on the final report
Street:	14940 123 AVE NORTH BLDG
City/Province:	EDMONTON, AB
Postal Code:	T5V 1B4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

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

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

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

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Michele.Crawford@tetratech.com

Email 2:

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax:

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

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

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

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

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

Project Information

ALS Account # / Quote #:	Q58524
Job #:	704-PENVSWM03917-01
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: JESSICA SPIRA Sampler: MC

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX F1, F2	ROU	DOC	COD	MET_R-DIS-CCME	NH3-CFA	P-T-COL	TKN-CFA	Number of Containers
	13	Oct 5 2016	15:00	Water	X	X	X	X	X	X	X	X	10
	14		10:20	Water	X	X	X	X	X	X	X	X	10
	15		15:10	Water	X	X	X	X	X	X	X	X	10
	16		16:10	Water	X	X	X	X	X	X	X	X	10
	~~17~~			~~Water~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~10~~
	18		16:00		X	X	X	X	X	X	X	X	10
	19		15:50		X	X	X	X	X	X	X	X	10
	20		15:40		X	X	X	X	X	X	X	X	10
	21		14:20		X	X	X	X	X	X	X	X	10
	22		14:30		X	X	X	X	X	X	X	X	10
	~~23~~ DUPLICATE 1		N/A		X	X	X	X	X	X	X	X	10
	~~DUPLICATE 1~~ DUPLICATE 2		N/A		X	X	X	X	X	X	X	X	10
													10

L1839506-COFC

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

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

Are samples for human drinking water use? ☐ YES ☑ NO

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

Cpl See page 1

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

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

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)

Released by: [signature] Date: Oct 5/2016 Time: 1730

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

APPENDIX D

HISTORICAL DUGOUT CHEMICAL ANALYTICAL RESULTS

Table 1.1: Chemical Analytical Results

Sample ID:		Booth D.1																			
Site Number:		1																			
Date Sampled:	Units	Oct 15/96	Oct 3/97	Oct 8/98	Oct 20/99	Oct 11/00	Oct 24/01	Oct 8/02	Oct 15/03	Oct 14/04	Oct 20/05	Oct 13/06	Oct 3/07	Oct 16/08	Oct 28/09	Oct 18/10	Oct 12/11	Oct 15/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 5/16
Chem. O_2 Demand	mg/L	70	40	50	70	50	40	60	50	40	55	61	50	69	65.5	59.4	75	92	78	71	219	68
Ammonia-N	mg/L	<0.05	<0.05	<0.05	0.06	0.58	0.16	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	0.79	0.108	1.21
Total Kjeldahl Nitrogen	mg/L	<0.2	0.6	1.6	1.8	1.5	2.4	1.8	1.7	1.8	1.8	1.8	1.7	2.5	1.84	2.1	2.89	2.55	2.76	2.76	7.02	3.09
Total Organic Carbon	mg/L	16	15	19	17	17	16	22	17	21	21	21	19	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	22.5	22.2	29.4	26.8	29.0	22.7	59.9	21.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	0.0007	0.0005	0.0009	5E-04	0.0007	0.0006	0.0009	0.0012	0.0024	0.0007	0.0009	0.0019	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	0.00043	<0.0004	0.00077	0.0002
Barium	mg/L	0.033	0.025	0.03	0.032	0.051	0.049	0.025	0.039	0.018	0.033	0.079	0.075	0.073	0.0655	0.0731	0.0674	0.0518	0.0600	0.0673	0.0421	0.0883
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	<0.00010
Cobalt	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00092	0.00023
Copper	mg/L	0.022	0.007	0.011	0.012	0.014	0.025	0.016	0.016	0.005	<0.001	0.001	<0.001	<0.001	<0.0010	0.0046	<0.0010	<0.0010	<0.0010	<0.001	<0.00040	0.00045
Iron	mg/L	0.120	0.328	0.445	0.572	0.403	0.126	0.181	0.577	0.081	0.077	0.212	0.175	0.022	0.02	0.018	0.029	<0.010	0.025	0.07	0.021	0.021
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	0.00011	<0.00010	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00244	0.00125
Nickel	mg/L	<0.002	<0.002	0.003	0.005	0.005	0.003	0.004	0.006	<0.002	<0.002	0.004	0.003	0.003	0.0035	0.0038	0.0047	0.0036	0.0035	0.0041	0.0060	0.0043
Zinc	mg/L	0.293	0.256	0.106	0.055	0.117	0.099	0.011	0.026	0.054	0.002	0.005	0.011	0.008	<0.0020	<0.0020	<0.0020	0.0035	<0.0020	0.0119	0.0021	<0.0010
Mercury	mg/L	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000095
Aluminium	mg/L	Not required under previous permit												<0.01	0.01	<0.010	<0.010	<0.010	0.013	<0.01	0.0035	0.0016
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00010
Boron	mg/L													<0.05	<0.050	0.054	<0.050	<0.050	<0.050	<0.05	<0.020	0.064
Manganese	mg/L													0.003	0.005	<0.0020	<0.0020	<0.0020	0.0025	0.0024	0.154	0.00071
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00010
Selenium	mg/L													<0.0004	<0.00080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00045	0.000114
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.001	<0.00060	<0.00030
Thallium	mg/L													0.0002	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000010
Vanadium	mg/L													0.001	<0.0010	<0.0010	<0.0010	0.0017	0.0026	0.0015	0.0053	0.00087
Routine Water																						
Ion Balance	%	100	108	101	101	102	102	98.5	104	102	104	101	99.2	98.8	95	109	88	91.9	104	110	96.7	107
Bicarbonate	mg/L	299	283	324	302	330	345	210	164	215	299	311	342	340	291	334	425	383	333	342	552	357
Chloride	mg/L	15.8	16.1	18.1	20.0	31.0	54.0	62	43	55	52	72	65	73	76	83.2	85.6	96.9	97.1	78.4	80.3	61.7
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	76	37	45	<5	<5	<5	12	29.3	15	11.7	28.7	36.1	11.2	24.6	<5.0
Conductivity (EC)	uS/cm	1080	986	903	956	1070	1260	1500	998	1150	898	951	944	987	1010	1100	1130	1180	1100	989	1560	885
Calcium	mg/L	25.5	20.5	18.1	15.5	26.2	28.6	13.2	14.2	14.6	23	31.2	30.1	21.7	14.8	33.3	28	13.1	14.7	19.6	33.6	29
Potassium	mg/L	7.6	7.2	7.8	7.8	11	10.5	12.3	9.6	9.3	9.7	12.3	10.6	10.9	12.2	11.7	9.26	11.8	12.9	12.2	17.9	13.9
Magnesium	mg/L	14.0	10.8	11.3	10.4	14.3	17.1	18	11.7	12.7	11.4	12.9	12.3	14	12.2	16.9	13	13.4	15.0	13.6	20.8	13.9
Sodium	mg/L	211	198	194	175	204	250	333	194	219	178	163	153	171	182	202	178	210	217	186	254	154
Sulfate	mg/L	307	231	216	185	223	332	382	233	228	159	136	100	98.3	125	135	101	106	90.2	67.7	157	70.6
Phosphorus	mg/L	Not required under previous permit													0.057	0.087	0.324	0.16	0.166	0.245	1.09	0.155
pH in H_20	pH	8.4	8.4	8.0	8.3	8.0	8.1	9.5	9.4	9.3	8.3	8.1	8.4	8.6	8.84	8.6	8.48	8.93	8.96	8.6	8.63	8.37
TDS (Calculated)	mg/L	729	625	625	563	659	870	966	624	690	580	581	542	568	594	661	636	668	647	557	860	524
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.040	0.312
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	0.026
Field Data																						
pH in H_20	pH	Not required under previous permit												8.41	8.19	9.03	8.56	9.36	9.5	8.35	9.21	8.7
Conductivity (EC)	uS/cm													1044	650	717	1241	1157	1127	804	1580	893

Table 1.2: Chemical Analytical Results

Sample ID:		**Ewert D.1**																			
Site Number:		**2**																			
Date Sampled:	**Units**	**Oct 16/96**	**Oct 7/97**	**Oct 9/98**	**Oct 20/99**	**Oct 11/00**	**Oct 4/01**	**Oct 8/02**	**Oct 15/03**	**Oct 14/04**	**Oct 20/05**	**Oct 13/06**	**Oct 3/07**	**Oct 16/08**	**Oct 28/09**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	40	50	100	90	50	90	90	80	40	85	55	68	70	103	67	81	81	80	79	131	83
Ammonia-N	mg/L	1.65	0.36	0.8	<0.05	<0.05	0.28	<0.05	<0.05	<0.05	<0.05	1.64	<0.05	<0.05	0.207	<0.050	<0.050	0.198	<0.050	0.082	0.304	0.052
Total Kjeldahl Nitrogen	mg/L	3.3	2.7	3	2.5	1.7	0.9	3.9	4.8	2.7	2.2	3.9	2.3	2.4	5.8	3.52	2.66	3.15	3.13	2.95	6.65	3.06
Total Organic Carbon	mg/L	17	24	23	19	19	31	37	29	23	31	20	24	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	29.1	31.7	20	24.8	24.9	23.4	37.2	24.3
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	<0.0002	0.0005	<0.0004	0.0005	0.0009	0.0015	0.0015	0.0016	0.0015	0.0012	0.002	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00043	0.00013
Barium	mg/L	0.051	0.075	0.064	0.111	0.078	0.075	0.131	0.155	0.155	0.041	0.088	0.071	0.057	0.048	0.0581	0.044	0.0789	0.0584	0.0826	0.0506	0.0699
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000099	0.0000059
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00013	<0.00010
Cobalt	mg/L	<0.002	0.005	0.018	<0.002	<0.002	0.002	0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00060	0.00025
Copper	mg/L	0.132	0.008	0.014	0.016	0.011	0.028	0.021	0.027	0.007	0.004	0.003	0.005	0.001	0.0019	0.0037	<0.0010	<0.0010	<0.0010	<0.001	0.00180	0.00360
Iron	mg/L	0.277	0.754	0.595	1.400	0.770	2.920	4.33	7.07	0.616	0.454	1.67	1.19	0.032	0.087	0.055	<0.030	0.027	0.098	0.031	0.062	0.012
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	0.00018	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	0.000176	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.007	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00252	0.00142
Nickel	mg/L	<0.002	<0.002	0.018	0.01	0.004	0.004	0.01	0.013	<0.002	0.004	0.006	0.006	0.005	0.0047	0.0043	0.0026	0.0046	0.0027	0.0037	0.00581	0.00424
Zinc	mg/L	<0.051	0.038	0.078	0.018	0.009	0.085	0.02	0.043	0.037	0.003	0.006	0.007	0.009	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0074	0.0026	<0.0010
Mercury	mg/L	<0.0002	<0.0004	0.0005	<0.0002	<0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000052	0.0000081
Aluminium	mg/L	Not required under previous permit												<0.01	0.026	0.022	<0.010	<0.010	<0.010	<0.01	0.0167	0.0025
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													0.05	0.052	0.057	0.058	0.057	0.052	0.061	0.059	0.073
Manganese	mg/L													0.002	0.0075	0.0096	<0.0050	<0.0020	0.0046	<0.002	0.00448	0.00161
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0005	0.00058	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000347	0.000248
Titanium	mg/L													<0.001	0.0026	0.0027	<0.0010	<0.0010	<0.0010	<0.001	0.00118	<0.00030
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													<0.001	0.002	0.0012	<0.0010	<0.0010	<0.0010	<0.001	0.00286	<0.00050
Routine Water																						
Ion Balance	%	93	108	99	99	101	92.3	101	103	99.5	103	103	98.9	103	106	108	95.5	92.4	107	109	102	111
Bicarbonate	mg/L	401	368	422	421	349	282	499	280	315	211	554	297	307	277	298	350	392	272	310	285	354
Chloride	mg/L	11.5	12.7	10.7	15.0	13.0	18.0	27	26	13	12	13	13	16	14.8	13	20.8	20.4	32.0	23.7	27.2	31.5
Carbonate	mg/L	<5	13	<5	<5	<5	41	41	111	<5	36	<5	12	20	32.6	18	21.2	10.3	18.6	14.3	15.8	6.6
Conductivity (EC)	uS/cm	718	889	828	1050	1140	1170	1680	1410	656	519	554	653	734	662	662	692	727	597	648	622	759
Calcium	mg/L	15.6	27.6	32.2	32.5	27.5	17.1	23.3	17.5	17.4	16	18.8	16.7	17.1	12.8	15.3	15.3	16.8	11.8	17.3	10.6	24.8
Potassium	mg/L	15	17.4	17.6	17	19.5	13.8	22.5	14.8	13.9	9.6	14.1	12.2	13.4	13.8	13.6	14.6	15.5	17.7	17.8	14.4	19.2
Magnesium	mg/L	8.5	14.4	12.9	14.8	14.5	9.7	18.1	11	8.7	7.0	9.4	8	9.9	7.34	8.72	10.6	9.01	10.8	10.3	5.81	12.9
Sodium	mg/L	122	175	145	172	203	214	388	310	110	99	88	114	135	138	129	118	124	109	111	115	134
Sulfate	mg/L	39.9	144	111	170	261	278	390	293	59.2	35.1	24.1	57.7	73.9	53.3	50.9	21.4	31.2	13.3	10.8	14.4	39.6
Phosphorus	mg/L	Not required under previous permit													0.451	0.332	0.244	0.219	0.207	0.158	0.559	0.28
pH in H20	pH	8.2	8.6	8.0	8.1	8.5	9.1	8.6	9.7	8.4	9.3	8.2	8.7	8.8	8.95	8.78	8.71	8.56	8.84	8.72	8.81	8.45
TDS (Calculated)	mg/L	410	586	537	629	727	729	1120	921	381	318	316	379	436	409	395	394	420	347	358	344	444
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.043	<0.020
Nitrite	mg/L													-	<0.0050	<0.050	<0.050	<0.050	<0.050	<0.02	0.016	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												8.91	8.19	9.61	9.61	8.69	9.7	8.5	9.45	8.8
Conductivity (EC)	uS/cm													857	500	846	846	748	620	464	642	778

TETRA TECH

Table 1.3: Chemical Analytical Results

Sample ID:		**Ewert D.2**																	
Site Number:		**3**																	
Date Sampled:	**Units**	**Oct 16/96**	**Oct 7/97**	**Oct 9/98**	**Oct 11/00**	**Oct 4/01**	**Oct 8/02**	**Oct 15/03**	**Oct 14/04**	**Oct 20/05**	**Oct 13/06**	**Oct 3/07**	**Oct 16/08**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	40	50	70	50	60	70	30	30	49	53	67	65	55.2	62	77	53	61	158	61
Ammonia-N	mg/L	0.69	<0.05	0.06	0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	0.174	<0.050	<0.05	0.127	<0.05
Total Kjeldahl Nitrogen	mg/L	3.1	2.1	2.7	1.8	3.6	3.5	1.3	1.9	1.6	1.8	1.7	2.3	2.12	1.9	2.44	1.60	1.8	2.62	1.94
Total Organic Carbon	mg/L	19	27	31	21	21	32	11	21	16	23	19	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit											18	22.4	18	22.9	31.7	18.2	23.4	21
BTEX, F1 (C6-C10) and F2 (>C10-C16)																				
Benzene	mg/L	Not required under previous permit											<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L												<0.0005	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L												<0.1	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L												<0.1	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L												<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																				
Antimony	mg/L	0.0004	<0.0002	0.0008	0.0005	0.0007	0.002	0.0011	0.0013	0.001	0.0010	0.0025	0.0004	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00021	0.00015
Barium	mg/L	0.106	0.065	0.056	0.059	0.093	0.046	0.077	0.018	0.034	0.069	0.052	0.042	0.0454	0.0361	0.0532	0.0540	0.0482	0.0511	0.041
Cadmium	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	0.003	0.005	0.022	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00036	0.00014
Copper	mg/L	0.008	<0.001	0.01	0.006	0.011	0.012	0.009	0.004	0.001	0.003	0.001	0.001	0.0036	<0.0010	0.0016	<0.0010	<0.001	0.00063	0.00797
Iron	mg/L	7.200	1.060	1.510	1.280	4.770	1.28	3.04	0.216	0.452	1.13	0.734	0.046	0.085	0.073	0.098	0.046	0.032	0.083	0.045
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	0.000072	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00108	0.000744
Nickel	mg/L	0.009	0.004	0.019	0.008	0.004	0.008	0.009	<0.002	0.004	0.007	0.006	0.005	0.0065	0.0048	0.0053	0.0048	0.0034	0.0042	0.00457
Zinc	mg/L	0.028	0.025	0.027	0.014	0.039	0.011	0.016	0.066	0.002	0.006	0.008	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.006	0.0010	0.0020
Mercury	mg/L	<0.0002	<0.0004	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000066
Aluminium	mg/L	Not required under previous permit											0.01	<0.010	0.01	0.055	<0.010	<0.01	0.0055	0.0011
Beryllium	mg/L												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L												<0.05	<0.050	<0.050	<0.050	<0.050	<0.05	0.038	0.05
Manganese	mg/L												0.003	<0.0020	<0.0050	0.0021	0.0067	<0.002	0.00205	0.00125
Silver	mg/L												<0.0001	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L												<0.05	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L												0.0005	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000243	0.000245
Titanium	mg/L												0.001	<0.0010	<0.0010	0.003	<0.0010	<0.001	0.00034	<0.0003
Thallium	mg/L												<0.0001	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.00001
Vanadium	mg/L												0.001	<0.0010	<0.0010	0.0012	<0.0010	<0.001	0.00096	0.00072
Routine Water																				
Ion Balance	%	103	109	103	103	92.9	101	102	99.9	103	105	99.4	103	109	88.3	97.3	105	109	97.5	100
Bicarbonate	mg/L	380	369	394	327	341	445	261	130	175	242	255	251	238	272	341	306	281	312	355
Chloride	mg/L	12.5	14.3	11.8	10.0	14.0	22	9	15	10	12	13	16	10.5	10.3	13.7	15.5	13.2	18.0	31.3
Carbonate	mg/L	<5	25	13	<5	14	51	17	111	15	<5	<5	19	7.9	8.7	7.5	8.8	11	8.2	5
Conductivity (EC)	uS/cm	845	926	869	941	1080	1610	852	1170	430	529	639	702	546	571	661	580	568	614	723
Calcium	mg/L	15.9	19.2	29.8	29.8	27.9	16.2	17.4	13.9	17.7	22.5	21.5	17.1	20.9	15.3	12.9	21.5	19.1	16.0	28.2
Potassium	mg/L	15.1	15.5	15.8	17	16.5	23.4	13.5	12	9.8	14.1	13.9	13.2	12.8	10.4	12.9	15.3	14.5	15.7	15.5
Magnesium	mg/L	8.5	9.7	9.4	12.4	15.8	18.5	9.7	8.6	6.4	8.2	8.7	8.6	7.76	6.78	6.99	8.89	8.08	8.00	11.90
Sodium	mg/L	174	201	182	157	177	365	167	223	71	81	98	128	93.8	85.6	124	101	98.6	98.4	118
Sulfate	mg/L	122	130	125	187	261	370	191	248	46.9	52.9	91.2	98.3	55.1	47	44	26.8	19.9	19.0	48.4
Phosphorus	mg/L	Not required under previous permit												0.164	0.262	0.223	0.108	0.163	0.224	0.262
pH in H20	pH	8.3	8.9	8.5	8.2	8.5	9	8.8	10.0	9.0	8.2	8.3	8.8	8.58	8.61	8.53	8.52	8.65	8.50	8.41
TDS (Calculated)	mg/L	535	596	570	575	699	1050	553	696	263	310	372	424	326	318	390	348	322	337	434
Nitrate	mg/L	Not required under previous permit											<0.1	<0.050	<0.050	0.12	<0.050	<0.05	<0.020	<0.02
Nitrite	mg/L												-	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.01
Field Data																				
pH in H_20	pH	Not required under previous permit											9.06	9.03	9.79	8.8	9.9	8.29	8.94	8.9
Conductivity (EC)	uS/cm												812	862	382	660	596	565	624	740

Table 1.4: Chemical Analytical Results

Sample ID:		**Ewert D.3**																			
Site Number:		**4**																			
Date Sampled:	**Units**	**Oct 16/96**	**Oct 7/97**	**Oct 9/98**	**Oct 20/99**	**Oct 11/00**	**Oct 4/01**	**Oct 8/02**	**Oct 15/03**	**Oct 14/04**	**Oct 20/05**	**Oct 13/06**	**Oct 3/07**	**Oct 16/08**	**Oct 28/09**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	50	60	50	70	60	80	70	50	40	43	48	82	83	77	62.5	81	72	53	30	117	74
Ammonia-N	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.845	<0.050	<0.050	2.15	<0.050	<0.05	0.785	0.641
Total Kjeldahl Nitrogen	mg/L	2.7	1.8	2.1	2	1.8	3.9	4.6	3.9	3.1	1.5	1.5	2.3	2.9	3.38	2.08	2.66	4.3	2.04	1.88	5.40	3.84
Total Organic Carbon	mg/L	19	21	21	18	23	26	29	17	24	15	19	25	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	26.6	22.9	21	27.8	23.5	19.3	28.4	27.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	<0.0002	0.0007	<0.0004	0.0005	0.0005	0.001	0.0009	0.0014	0.0006	0.0014	0.0018	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00018	0.0001
Barium	mg/L	0.059	0.057	0.046	0.064	0.05	0.064	0.076	0.046	0.024	0.026	0.045	0.052	0.028	0.0629	0.0431	0.0261	0.0631	0.0330	0.0302	0.0300	0.0433
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00014
Cobalt	mg/L	<0.002	0.004	0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00039	0.00024
Copper	mg/L	0.002	<0.001	0.011	0.003	0.002	0.006	0.009	0.004	0.002	<0.001	<0.001	0.002	<0.001	<0.0010	0.0023	<0.0010	0.0012	<0.0010	<0.001	<0.00020	0.00661
Iron	mg/L	0.951	0.987	0.462	1.770	0.671	1.870	3.11	0.793	0.666	0.328	0.561	1.82	0.181	0.455	0.05	0.194	0.236	0.037	0.247	0.089	1.79
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	0.00019	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	0.000132
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000746	0.000389
Nickel	mg/L	<0.002	0.003	0.016	0.006	0.004	<0.002	0.006	0.005	<0.002	0.003	0.003	0.004	0.002	0.0039	0.0043	0.0025	0.0047	0.0024	<0.002	0.00122	0.00222
Zinc	mg/L	0.011	0.02	0.019	0.007	0.002	0.043	0.017	0.007	0.036	0.002	0.004	0.007	0.015	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0089	<0.0010	0.0024
Mercury	mg/L	<0.0002	0.0012	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000069
Aluminium	mg/L	Not required under previous permit												<0.01	0.069	<0.010	<0.010	0.113	<0.010	<0.01	0.0024	0.0473
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.029	0.044
Manganese	mg/L													0.008	0.0812	<0.0020	<0.0050	0.082	0.0027	<0.002	0.0025	0.00451
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													<0.0004	<0.00080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000135	0.000153
Titanium	mg/L													<0.001	0.0031	<0.0010	<0.0010	0.004	<0.0010	<0.001	<0.00030	0.00264
Thallium	mg/L													0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	<0.001	0.00099	0.00102
Routine Water																						
Ion Balance	%	106	108	107	98	102	96.1	101	103	99.6	103	104	99	96.9	114	104	93.9	94.1	104	106	98.3	106
Bicarbonate	mg/L	250	232	244	232	255	265	381	234	272	153	179	207	232	289	241	259	298	245	200	205	247
Chloride	mg/L	9.7	15.2	9.8	13.0	12.0	13.0	20	7	11	14	21	25	30	33.3	25.4	52.2	63.1	51.5	32.9	65.3	51
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12	<5.0	7.2	<5.0	<5.0	<5.0	<5	<5.0	<5.0
Conductivity (EC)	uS/cm	462	480	476	488	523	543	860	403	545	277	363	460	488	577	506	608	682	547	448	568	549
Calcium	mg/L	17.3	19.4	19.9	15.8	20.7	17.3	18.5	21.4	16.6	16.9	17.8	19.4	19.6	20.9	20.2	23.2	19.4	22.2	18.8	15.0	25.7
Potassium	mg/L	16.2	13.4	15	12.9	16.3	15	18.6	13.1	12.9	9.8	13.0	12.9	13.1	14.9	14	12.7	15.7	16.4	15.8	17.1	15
Magnesium	mg/L	6.8	8.1	8.6	7.7	8.9	9.5	10.7	7.6	6.9	5.8	7.2	7.8	8.7	9.31	7.68	9.81	9.67	10.3	7.96	8.28	10.5
Sodium	mg/L	70	77	75	69	74	73	186	64	89	37	46	62	71	109	78.6	76.2	96.1	79.4	57.1	75.5	76.3
Sulfate	mg/L	12.2	33.9	34.2	33.2	37.9	45	118	30.1	41	9.4	7.4	28.1	11.2	20.2	13.4	11.8	10.4	6.55	1.09	4.24	3.93
Phosphorus	mg/L	Not required under previous permit													0.25	0.12	0.639	0.203	0.224	0.18	0.317	0.596
pH in H_20	pH	8.1	8.4	7.9	8.3	7.9	8.3	8.1	8.2	8.3	8.2	7.9	8.3	8.7	8.18	8.56	8.41	8.37	8.32	8.45	8.21	8.23
TDS (Calculated)	mg/L	255	282	283	266	295	309	536	258	312	168	201	257	280	353	285	316	365	309	236	286	304
Nitrate	mg/L	Not required under previous permit												<0.1	0.692	<0.050	0.06	0.309	<0.050	<0.05	<0.020	0.083
Nitrite	mg/L													-	<0.050	<0.050	<0.050	0.083	<0.050	<0.02	<0.010	0.039
Field Data																						
pH in H_20	pH	Not required under previous permit												8.28	8.63	9.25	8.34	8.41	8.8	8.1	9.27	8.4
Conductivity (EC)	uS/cm													588	588	726	422	681	564	521	588	522

Table 1.5: Chemical Analytical Results

Sample ID:		**Ewert D.4**																			
Site Number:		**5**																			
Date Sampled:	**Units**	**Oct 16/96**	**Oct 7/97**	**Oct 9/98**	**Oct 20/99**	**Oct 11/00**	**Oct 4/01**	**Oct 8/02**	**Oct 15/03**	**Oct 14/04**	**Oct 20/05**	**Oct 13/06**	**Oct 3/07**	**Oct 16/08**	**Oct 28/09**	**Oct 18/10**	**Oct 12/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	30	40	50	80	60	60	60	50	40	103	123	82	78	98.5	69.6	66	95	67	79	109	30
Ammonia-N	mg/L	<0.05	<0.05	0.042	<0.05	<0.05	0.06	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	0.124	<0.050	0.055	0.103	0.098	<0.05	0.059	<0.050
Total Kjeldahl Nitrogen	mg/L	1.5	1.2	2.7	2.3	1.7	3.1	3.4	2.1	3.1	4	5	6	2.9	4.74	3.2	2.8	3.17	2.82	2.25	3.33	2.88
Total Organic Carbon	mg/L	16	17	21	19	18	23	31	20	23	35	48	26	-	-	-	-	-	-		-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												22	31.2	28	27.2	30.6	26.6	23	31.9	29.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	<0.0002	0.0009	0.0004	0.0005	0.0006	0.0011	0.0011	0.0019	0.0011	0.002	0.003	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00031	0.00018
Barium	mg/L	0.054	0.058	0.058	0.135	0.083	0.056	0.203	0.069	0.054	0.126	0.1	0.1	0.127	0.0772	0.0843	0.0335	0.0722	0.148	0.0639	0.0651	0.0524
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.002	0.003	0.021	0.002	<0.002	<0.002	0.003	<0.002	<0.002	0.003	0.003	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.0010	0.00035
Copper	mg/L	0.003	<0.001	0.01	0.005	0.004	0.006	0.011	0.005	0.002	0.004	0.002	0.002	0.001	0.0017	0.0042	<0.0010	0.0017	0.0011	<0.001	0.00139	0.00084
Iron	mg/L	1.310	1.180	1.100	4.150	2.190	0.964	9.66	1.32	0.463	2.31	3.8	1.92	0.058	0.083	0.171	0.044	0.152	0.044	0.043	0.111	0.04
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	0.00019	<0.00010	<0.0050	<0.00010	<0.0001	0.000119	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00329	0.00216
Nickel	mg/L	0.003	<0.002	0.014	0.01	0.008	0.004	0.013	0.009	0.003	0.011	0.01	0.008	0.009	0.0066	0.0063	0.0056	0.0066	0.0079	0.0052	0.00487	0.00606
Zinc	mg/L	0.007	0.018	0.023	0.012	0.007	0.052	0.023	0.004	0.05	0.02	0.005	0.009	0.003	<0.0020	<0.0020	<0.0020	0.002	<0.0020	0.0087	<0.0010	0.001
Mercury	mg/L	<0.0002	0.0009	0.0009	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000108
Aluminium	mg/L													0.02	0.033	0.053	0.011	<0.010	<0.010	<0.01	0.0238	0.0013
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.035	0.046
Manganese	mg/L													0.004	0.0021	0.007	<0.0020	0.0024	<0.0020	<0.002	0.0038	0.00066
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0006	0.00056	0.00046	<0.00040	<0.00080	<0.00040	<0.0004	0.000372	0.000302
Titanium	mg/L													0.001	0.002	0.0037	<0.0010	0.0025	<0.0010	<0.001	0.00345	<0.00030
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													<0.001	0.001	0.0013	<0.0010	0.0014	<0.0010	<0.001	0.00294	<0.00050
Routine Water																						
Ion Balance	%	109	109	100	99	103	93.5	99.1	97	97	102	102	97.4	99.2	99.1	106	92	93.1	106	108	96.2	114
Bicarbonate	mg/L	286	294	338	360	352	342	485	289	274	317	407	348	357	337	313	336	369	357	303	280	324
Chloride	mg/L	4.2	4.3	3.4	6.0	6.0	9.0	14	12	16	18	28	20	23	21.7	19.7	15.2	19.4	21.4	15.2	18.5	17.5
Carbonate	mg/L	25	17	<5	24	7	42	46	56	65	30	<5	<5	10	21.8	14.9	7	13.9	10.0	12.2	38.0	<5.0
Conductivity (EC)	uS/cm	645	601	565	682	658	735	974	735	711	598	700	602	637	627	606	613	666	668	587	627	599
Calcium	mg/L	14	12.8	14.3	18.1	16.4	10.7	13.7	14.5	10.5	18.7	21.4	18.7	19.5	11.8	15.4	15.9	12.8	27.7	19.4	10.7	21.9
Potassium	mg/L	6.7	5.6	7	7.2	7.6	7.2	8.1	6.4	9.7	11.2	17.6	12.8	11.4	10.4	9.43	10.2	10.1	14.3	12.8	13.4	13.3
Magnesium	mg/L	6.8	7.5	7.4	9.0	9.0	10.0	11.9	7.6	8.5	10.4	12.5	10.2	10.8	9.7	8.85	10	7.97	13.1	11.1	9.75	12
Sodium	mg/L	133	130	109	126	117	131	259	149	139	115	118	96	111	122	116	95	122	114	98.6	106	105
Sulfate	mg/L	47.4	47.8	27.7	27.7	35	42	67	62.5	26.8	9.6	5.4	8.5	10.2	8.19	11.7	17.8	15.1	28.1	9.27	6.33	15.1
Phosphorus	mg/L	Not required under previous permit													0.253	0.271	0.2	0.265	0.129	0.178	0.239	0.248
pH in H_20	pH	8.9	8.9	8.1	8.8	8.5	9.1	8.9	9.3	9.5	9.0	8.2	8.3	8.5	8.71	8.7	8.46	8.68	8.50	8.64	9.14	8.38
TDS (Calculated)	mg/L	377	369	335	395	377	427	614	450	407	370	403	339	371	372	350	336	383	404	327	341	349
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	0.056	<0.05	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												8.34	8.79	9.06	8.99	9.18	8.9	8.57	9.66	8.5
Conductivity (EC)	uS/cm													770	460	744	1000	664	691	424	650	623

Table 1.6: Chemical Analytical Results

Sample ID:		**Lyons D.1**																			
Site Number:		**6**																			
Date Sampled:	**Units**	**Oct 15/96**	**Oct 3/97**	**Oct 8/98**	**Oct 20/99**	**Oct 10/00**	**Oct 5/01**	**Oct 8/02**	**Oct 15/03**	**Oct 14/04**	**Oct 20/05**	**Oct 13/06**	**Oct 3/07**	**Oct 16/08**	**Oct 28/09**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	50	50	80	90	80	80	160	60	60	56	61	84	71	91.1	59.8	63	83	75	71	101	71
Ammonia-N	mg/L	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.0021	<0.05	<0.05	<0.050	0.155	0.202	0.252	<0.050	<0.05	0.053	1.35
Total Kjeldahl Nitrogen	mg/L	1.2	2	3.7	2.9	2.9	3.5	5.8	1.7	3.2	2	1.7	3.8	2.4	4.73	2.91	2.19	2.81	2.59	1.95	3.63	3.62
Total Organic Carbon	mg/L	19	20	26	24	27	31	40	22	26	21	20	36	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												21	27.4	22.9	28.6	26.8	27.1	19.8	26.8	25
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	0.0006	0.0006	<0.0004	0.0006	0.0006	0.0008	0.001	0.0012	0.0012	0.0021	0.0012	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00025	0.00013
Barium	mg/L	0.052	0.058	0.066	0.085	0.078	0.082	0.105	0.015	0.046	0.023	0.044	0.075	0.053	0.0369	0.0554	0.0296	0.033	0.0623	0.0417	0.0472	0.0448
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.0002
Cobalt	mg/L	<0.002	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00050	0.0003
Copper	mg/L	0.002	<0.001	<0.001	0.003	0.002	0.004	0.009	0.023	0.002	0.002	0.001	0.003	<0.001	<0.0010	0.0073	0.0011	0.0013	<0.0010	<0.001	0.00065	0.00066
Iron	mg/L	<0.005	0.377	0.854	1.910	1.640	1.020	2.28	0.642	0.418	0.145	0.141	2.57	0.026	0.071	0.015	0.089	0.03	0.094	0.024	0.040	0.629
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	0.000189
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000878	0.000596
Nickel	mg/L	0.002	<0.002	0.01	0.009	0.012	0.007	0.007	0.005	<0.002	0.003	0.005	0.009	0.006	0.004	0.0035	0.0035	0.0035	0.0038	0.0029	0.00278	0.00337
Zinc	mg/L	0.007	0.038	0.028	0.01	0.017	0.038	0.008	0.006	0.053	0.001	0.005	0.012	0.002	<0.0020	<0.0020	0.0027	<0.0020	<0.0020	0.0052	<0.0010	0.0012
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	Not required under previous permit												<0.01	0.012	<0.010	<0.010	<0.010	<0.010	<0.01	0.0040	0.0962
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													0.05	0.056	<0.050	<0.050	0.078	0.065	0.055	0.052	0.042
Manganese	mg/L													0.002	0.033	<0.0020	<0.0050	0.0023	0.0127	<0.002	0.0052	0.00338
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0004	0.00042	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000202	0.000194
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.001	0.00047	0.00568
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.001	0.0018	<0.0010	0.0016	0.0026	0.0023	0.0011	0.00334	0.00241
Routine Water																						
Ion Balance	%	98	106	108	100	109	106	99.9	106	103	105	103	104	104	91.6	103	96.2	94.4	97.3	106	96.3	104
Bicarbonate	mg/L	334	314	361	359	338	427	510	281	452	211	259	207	271	287	257	304	291	311	224	213	277
Chloride	mg/L	7.5	8.3	11.5	12.0	12.0	17.0	24	14	35	21	23	15	19	25.1	21.3	19.9	18.4	29.2	22.1	20.9	19.4
Carbonate	mg/L	<5	<5	<5	5	5	17	25	48	8	<5	<5	<5	<5	5.4	5.7	5.1	5.4	7.9	6.7	22.2	<5.0
Conductivity (EC)	uS/cm	844	734	735	900	887	1110	1980	1450	1680	504	612	455	594	612	591	649	605	595	490	526	523
Calcium	mg/L	33.8	29.3	30.1	29	29.8	47.8	33.3	44.6	44.9	28.3	29	18.8	27.1	18.6	22.1	22.5	17.5	23.4	22.4	16.7	21.2
Potassium	mg/L	11.6	12.5	16.1	14.6	17.8	20.9	24.1	19.3	23.6	15.5	17.1	18	17.3	16.3	15.5	16.2	16	17.3	14.6	15.3	19.3
Magnesium	mg/L	13.5	11.3	12.5	13.4	14.0	20.3	30.2	26.3	24.5	9.4	10.9	7.4	10.4	9.16	9.15	8.76	8.54	10.7	7.78	7.64	8.52
Sodium	mg/L	140	123	153	147	151	230	455	292	281	71	83	65	86	89.3	91.7	96.2	92.9	96.2	69.2	75.3	75.3
Sulfate	mg/L	176	107	126	143	165	204	561	481	429	65.7	64	40.2	56.5	45.3	50.2	47.1	45	32.4	14.9	23.9	11.6
Phosphorus	mg/L	Not required under previous permit													0.43	0.245	0.846	0.394	0.346	0.417	0.344	0.931
pH in H_20	pH	8.2	8.4	7.9	8.5	8.5	8.5	8.4	9.1	8.4	8.2	8.1	7.8	8.4	8.41	8.49	8.44	8.48	8.50	8.53	9.00	8.26
TDS (Calculated)	mg/L	547	449	527	541	574	732	1340	1060	1090	315	355	266	353	350	342	366	347	370	268	287	295
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	0.235	<0.050	<0.050	<0.05	<0.020	0.588
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	0.077
Field Data																						
pH in H_20	pH	Not required under previous permit												8.15	8.17	8.90	8.11	9.10	9.1	8.42	9.51	8.2
Conductivity (EC)	uS/cm													704	330	886	300	604	609	491	547	517

Table 1.7: Chemical Analytical Results

Sample ID:		Lyons D.2																			
Site Number:		7																			
Date Sampled:	**Units**	**Oct 15/96**	**Oct 3/97**	**Oct 8/98**	**Oct 20/99**	**Oct 10/00**	**Oct 5/01**	**Oct 8/02**	**Oct 15/03**	**Oct 14/04**	**Oct 20/05**	**Oct 13/06**	**Oct 3/07**	**Oct 16/08**	**Oct 28/09**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	60	70	80	110	70	90	100	60	60	56	95	80	72	75	55.6	77	71	71	84	103	80
Ammonia-N	mg/L	<0.05	0.48	0.16	0.15	<0.05	<0.05	<0.05	0.51	0.24	<0.05	<0.05	<0.05	<0.05	0.267	<0.050	0.663	<0.050	<0.050	<0.05	0.051	0.685
Total Kjeldahl Nitrogen	mg/L	2.5	2.8	2.8	3.8	2.7	4.9	5.2	3.5	4.2	2	2.9	3.4	2.7	3.27	2.53	3.15	2.56	3.83	2.62	3.75	3.69
Total Organic Carbon	mg/L	24	23	25	24	23	26	30	25	35	23	29	30	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	25.9	20.5	30.4	25	25.2	21.5	27.4	26.9
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	<0.0004	0.0037	<0.0004	0.0005	0.0005	0.0013	0.0013	0.0014	0.0017	0.0013	0.002	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00023	0.00013
Barium	mg/L	0.057	0.073	0.049	0.095	0.071	0.08	0.068	0.069	0.047	0.031	0.039	0.045	0.044	0.0588	0.041	0.0504	0.0469	0.0291	0.0503	0.0403	0.0263
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00017
Cobalt	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00026	0.00029
Copper	mg/L	0.004	0.004	0.003	0.009	0.004	0.008	0.013	0.035	0.004	0.003	0.002	0.001	0.001	0.0018	0.0034	<0.0010	0.0013	0.0012	<0.001	0.00071	0.00073
Iron	mg/L	<0.005	0.837	0.680	2.430	0.680	1.480	1.64	0.601	0.113	0.122	0.215	0.547	0.056	0.044	0.023	0.839	0.016	0.028	0.036	0.013	0.268
Lead	mg/L	<0.005	<0.005	<0.005	0.95	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	0.00032	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000755	0.000696
Nickel	mg/L	0.003	<0.002	0.007	0.007	0.005	0.005	0.006	0.006	<0.002	0.004	0.005	0.004	0.004	0.0042	0.0038	0.0043	0.0034	0.0030	0.0027	0.00223	0.00433
Zinc	mg/L	0.012	0.033	0.03	0.007	0.009	0.068	0.009	0.017	0.046	0.002	0.007	0.006	0.014	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0054	<0.0010	0.0026
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000007
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	<0.010	0.027	<0.010	0.015	<0.01	0.0070	0.0058
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.056	<0.050	<0.050	<0.05	0.053	0.026
Manganese	mg/L													0.02	0.0318	<0.0020	0.0075	0.0055	0.0028	0.0026	0.0031	0.00297
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.0001
Selenium	mg/L													0.0005	0.00041	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000175	0.000252
Titanium	mg/L													0.001	<0.0010	<0.0010	0.0028	<0.0010	<0.0010	<0.001	<0.00030	0.0013
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.002	0.0027	0.0022	0.0022	0.002	0.0022	0.001	0.00394	0.00253
Routine Water																						
Ion Balance	%	107	104	107	99	104	96.7	99.9	106	101	103	103	95.9	102	104	106	96.6	98.5	108	106	96.6	101
Bicarbonate	mg/L	300	318	351	326	348	372	406	386	346	308	288	250	289	318	257	254	354	300	270	279	222
Chloride	mg/L	9.9	11.7	15.3	15.0	15.0	20.0	23	24	30	27	28	19	24	23.7	25	14.1	24.3	32.8	26.9	28.6	11.8
Carbonate	mg/L	<5	<5	<5	7	7	35	48	38	58	5	13	<5	13	21.5	33.7	<5.0	12.3	10.9	13.8	14.6	<5.0
Conductivity (EC)	uS/cm	600	650	643	721	791	963	1120	1120	1300	772	738	478	657	759	799	505	737	653	590	604	408
Calcium	mg/L	25.6	25.7	25.6	23.8	30.5	43.6	25.4	30.4	28.6	29	25.9	19	28.4	32.7	26.1	20.6	25.6	19.1	22.2	15.5	19.3
Potassium	mg/L	20	18.5	23.1	20.5	23.1	26.3	29.9	28.2	26	22.1	22.3	19.7	20.7	23.4	22.7	14.1	21.5	18.6	17	19.0	15.2
Magnesium	mg/L	8.3	9.1	9.4	9.0	11.0	15.4	16.6	16.2	15.0	11.3	11.1	7.2	10.6	11.3	11.6	7.82	10.7	10.5	8.17	7.80	7.55
Sodium	mg/L	97	105	125	112	132	192	239	228	214	131	118	74	98	124	137	67.8	117	116	94.8	93.0	51.6
Sulfate	mg/L	49.8	60.6	65	68	102	121	185	217	236	114	82	41.2	53.6	79.1	108	29.8	48.8	28.4	15.6	13.3	12.5
Phosphorus	mg/L	Not required under previous permit													0.427	0.372	0.994	0.346	0.523	0.484	0.392	0.954
pH in H_20	pH	7.8	8.2	7.6	8.6	8.5	8.8	8.9	9	9.2	8.4	8.4	8	8.7	8.65	9.05	8.33	8.64	8.57	8.73	8.75	8.15
TDS (Calculated)	mg/L	358	387	436	419	494	599	742	774	795	491	442	303	391	472	491	282	435	384	332	329	227
Nitrate	mg/L	Not required under previous permit												<0.1	0.082	<0.050	0.373	<0.050	<0.050	<0.05	<0.020	0.02
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	0.017
Field Data																						
pH in H_20	pH	Not required under previous permit												8.51	8.21	9.98	8.06	9.17	9.0	8.78	9.53	8.2
Conductivity (EC)	uS/cm													731	560	884	375	721	670	579	617	397

Table 1.8: Chemical Analytical Results

Sample ID:		Lyons D.3																				
Site Number:		8																				
Date Sampled:	**Units**	**Oct 15/96**	**Oct 3/97**	**Oct 8/98**	**Oct 20/99**	**Oct 10/00**	**Oct 5/01**	**Oct 8/02**	**Oct 15/03**	**Oct 14/04**	**Oct 20/05**	**Oct 13/06**	**Oct 3/07**	**Oct 16/08**	**Oct 28/09**	**Oct 18/10**	**Oct 13/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	40	100	70	100	90	110	230	80	60	66	92	78	105	110	64.1	86	108	67	127	150	149
Ammonia-N	mg/L	0.05	0.74	<0.05	<0.05	0.31	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	<0.050	0.133	0.264	0.434	<0.050	0.08	0.256	0.099
Total Kjeldahl Nitrogen	mg/L	2.7	4.7	2.7	3	3.2	6.5	22.2	2.8	2.7	2.4	2.9	3.5	3.9	5.64	2.98	3.48	4.78	2.39	5.93	5.61	6.45
Total Organic Carbon	mg/L	19	36	27	30	34	42	151	27	29	26	32	33	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												31	41.8	24.5	30.4	34.9	29.5	27.6	47.3	35.8
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	0.0006	0.0006	0.0008	<0.0004	0.0006	0.0006	0.0021	0.0011	0.0014	0.001	0.0014	0.0033	0.0007	0.00046	<0.00040	<0.00040	<0.00080	<0.00040	0.00052	0.00076	0.00043
Barium	mg/L	0.117	0.136	<0.003	0.095	0.116	0.159	0.26	0.091	0.077	0.085	0.111	0.146	0.058	0.0635	0.0733	0.0607	0.105	0.0416	0.0408	0.119	0.0567
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000062	0.0000078
Chromium	mg/L	0.012	0.006	<0.005	<0.005	<0.005	<0.005	0.017	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	0.00015
Cobalt	mg/L	0.003	<0.002	<0.002	<0.002	0.003	0.003	0.01	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	0.00100	0.00123
Copper	mg/L	0.008	0.004	0.001	0.004	0.004	0.009	0.032	0.016	0.004	0.004	0.004	0.01	0.003	0.0031	0.0062	0.0033	0.0033	0.0028	0.0031	0.00334	0.0046
Iron	mg/L	8.390	8.430	0.006	1.530	3.600	4.340	15.9	1.56	1.46	2.32	1.6	9.23	0.653	0.194	0.057	0.537	0.114	0.032	0.039	0.030	0.025
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	0.0004	0.00015	<0.00010	0.00029	<0.0050	<0.00010	<0.0001	<0.000050	<0.000005
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.023	<0.005	<0.005	<0.005	<0.005	0.006	0.006	<0.0050	<0.0050	<0.0050	0.0087	0.0062	0.007	0.0116	0.00669
Nickel	mg/L	0.01	0.012	<0.002	0.01	0.015	0.017	0.04	0.013	0.004	0.008	0.011	0.021	0.012	0.0093	0.0106	0.0093	0.0128	0.0089	0.0128	0.0135	0.0135
Zinc	mg/L	0.037	0.036	0.005	0.006	0.034	0.098	0.049	0.013	0.061	0.007	0.007	0.032	0.017	<0.0020	<0.0020	0.0024	<0.0020	<0.0020	0.0069	<0.0010	<0.0010
Mercury	mg/L	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000051
Aluminium	mg/L	Not required under previous permit												0.82	0.104	<0.010	0.471	0.095	0.036	0.014	0.0507	0.0166
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	0.055	<0.050	<0.050	<0.050	0.061	0.052	0.068
Manganese	mg/L													0.035	0.0062	0.0089	0.0088	0.0195	0.0021	0.0174	0.00259	0.00127
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000001
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0012	0.00117	0.00072	0.00067	0.00085	0.00067	0.00084	0.00141	0.000916
Titanium	mg/L													0.032	0.0065	<0.0010	0.0168	0.0057	0.0022	0.0019	0.00143	0.00098
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000001
Vanadium	mg/L													0.003	0.0035	<0.0010	0.0034	<0.0010	0.0018	0.0028	0.00110	0.0016
Routine Water																						
Ion Balance	%	99	106	110	101	104	109	101	103	98.4	106	103	102	94.6	98.4	108	95	96.9	102	110	95.3	112
Bicarbonate	mg/L	335	383	391	405	446	503	872	387	329	339	314	357	393	366	329	380	389	376	339	474	353
Chloride	mg/L	11.7	22.5	14.0	16.0	19.0	32.0	120	29	21	17	23	23	29	25.1	27.4	20.8	37.8	21.5	20.4	34.0	25.7
Carbonate	mg/L	<5	<5	<5	19	<5	27	196	13	17	<5	<5	<5	13	32.3	17.2	7.4	7.8	20.4	25.8	13.5	7.7
Conductivity (EC)	uS/cm	810	689	717	897	998	1440	2980	913	760	628	693	673	781	782	807	733	948	815	937	1210	855
Calcium	mg/L	17.7	22.5	20.8	19.6	30.1	30.6	12.8	32.3	18.3	20.8	25.4	26	24.4	17.6	42.4	24.2	17	28.6	33.2	24.4	42.4
Potassium	mg/L	7.3	20.6	11	10.8	16.1	18.9	21.1	19.1	18	15.3	17.9	18.8	16.8	17.5	22.7	15.8	17	21.2	22	20.9	27.6
Magnesium	mg/L	8.9	10.9	10.0	11.2	15.4	22.8	30.2	16.8	13.1	13.8	13.2	14	15.7	14.5	18.3	13.6	12.4	18.2	18.5	14.6	21.2
Sodium	mg/L	146	122	166	169	180	290	752	168	122	110	107	116	123	140	115	108	168	136	154	207	118
Sulfate	mg/L	116	22.6	83.3	85.1	145	264	421	137	69.4	43.6	68.3	62.1	51.4	46.3	87.4	36.6	108	85.6	122	160	89.4
Phosphorus	mg/L	Not required under previous permit													0.426	0.208	0.518	0.503	0.101	0.472	0.620	0.721
pH in H_20	pH	8.4	8.2	7.8	8.7	7.8	8.6	9.3	8.6	8.7	8.4	8.2	8.2	8.5	8.82	8.63	8.48	8.49	8.68	8.89	8.54	8.45
TDS (Calculated)	mg/L	476	411	497	529	631	942	1920	606	443	392	409	435	467	473	492	414	559	517	563	709	507
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	0.211	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												8.36	8.22	9.22	8.26	8.45	9.1	9.32	8.68	9.0
Conductivity (EC)	uS/cm													886	590	627	200	940	825	943	1233	876

Table 1.9: Chemical Analytical Results

Sample ID:		Lyons D.4																			
Site Number:		9																			
Date Sampled:	**Units**	**Oct 15/96**	**Oct 3/97**	**Oct 8/98**	**Oct 20/99**	**Oct 10/00**	**Oct 5/01**	**Oct 8/02**	**Oct 15/03**	**Oct 15/04**	**Oct 20/05**	**Oct 13/07**	**Oct 3/07**	**Oct 16/08**	**Oct 28/09**	**Oct 18/10**	**Oct 12/11**	**Oct 15/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	60	50	190	730	250	290	EMPTY	90	90	126	112	130	132	131	84.4	165	149	95	132	155	120
Ammonia-N	mg/L	<0.05	<0.05	0.06	1.59	0.89	5.69		0.16	0.73	0.42	0.68	<0.05	<0.05	0.065	<0.050	0.143	0.491	<0.050	0.055	0.137	0.111
Total Kjeldahl Nitrogen	mg/L	3.9	2.5	5	19.6	2.6	20.2		3.8	3.8	5.1	7.3	5.9	5.1	6.39	4.36	6.18	4.78	3.71	4.04	6.38	6.87
Total Organic Carbon	mg/L	33	20	47	184	156	26		33	33	47	48	51	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required by previous permit												35	54	33.6	69.2	56.5	37.8	42	47.7	49.2
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required by previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	0.0009	0.0009	0.003	<0.0004	0.0021	0.0011	EMPTY	0.0014	0.0021	0.0012	0.0016	0.0012	0.0006	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00069	0.00024
Barium	mg/L	0.097	0.106	0.143	0.677	0.388	0.399		0.181	0.245	0.136	0.297	0.133	0.057	0.0671	0.0785	0.0171	0.0556	0.0851	0.0658	0.124	0.0338
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000103	0.0000097
Chromium	mg/L	0.008	<0.005	0.007	0.032	0.028	0.017		0.01	0.016	0.008	0.025	0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00011	0.00042
Cobalt	mg/L	<0.002	<0.002	<0.002	0.011	0.011	0.011		0.005	0.006	0.004	0.010	0.003	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00133	0.00063
Copper	mg/L	0.004	0.004	0.007	0.024	0.027	0.02		0.055	0.015	0.008	0.02	0.006	0.004	0.002	0.004	<0.0010	0.0013	0.0012	0.0015	0.00181	0.00152
Iron	mg/L	1.830	4.620	7.320	27.800	15.300	27.400		8.99	13.9	7.47	20.6	4.71	0.142	0.3	2.12	0.998	0.268	0.067	1.18	0.216	0.995
Lead	mg/L	<0.005	<0.005	<0.005	0.016	0.016	0.01		0.006	0.008	<0.005	0.012	<0.005	0.0001	0.0003	0.00065	<0.00010	<0.0050	<0.00010	0.00054	0.000267	0.00028
Molybdenum	mg/L	<0.005	<0.005	0.007	<0.005	0.008	0.01		0.007	0.008	<0.005	0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00953	0.00113
Nickel	mg/L	0.003	0.003	0.014	0.039	0.056	0.039		0.021	0.023	0.013	0.030	0.013	0.008	0.0079	0.0057	<0.0020	0.0092	0.0072	0.0062	0.0126	0.00526
Zinc	mg/L	0.038	0.025	0.058	0.029	0.605	0.088		0.032	0.143	0.063	0.079	0.021	0.012	<0.0020	<0.0020	<0.0020	0.0035	<0.0020	0.0066	<0.0010	0.0027
Mercury	mg/L	0.0004	<0.0002	<0.0002	<0.0002	0.0005	<0.0005		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	Not required by previous permit												0.23	0.129	0.069	0.03	0.045	0.066	0.032	0.0313	0.0755
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.052	<0.010
Manganese	mg/L													0.001	0.004	0.03	0.0484	0.0031	0.0022	0.0062	0.00197	0.00355
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0007	0.00095	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000626	0.000393
Titanium	mg/L													0.01	0.008	0.0092	0.0024	0.0083	0.0026	0.0109	0.00518	0.0061
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.006	0.0025	0.003	0.0014	0.0051	0.0018	0.0022	0.00199	0.00334
Routine Water																						
Ion Balance	%	98	108	100	99	114	105	EMPTY	104	103	105	102	98.1	98.6	99.9	109	92.8	94.8	110	104	98.9	110
Bicarbonate	mg/L	385	331	459	705	650	636		402	411	429	459	428	343	405	318	470	599	425	297	413	356
Chloride	mg/L	18.2	10.2	21.9	181.0	120.0	173.0		40	41	37	45	38	38	31.2	13.6	33.7	48.4	19.1	16.1	32.3	29.8
Carbonate	mg/L	<5	<5	<5	<5	<5	<5		9	<5	<5	<5	<5	42	17.4	6.4	<5.0	17.3	7.5	9.8	10.6	<5
Conductivity (EC)	uS/cm	742	713	745	1740	1390	1840		887	891	730	879	760	774	758	553	921	1090	730	559	834	675
Calcium	mg/L	23.1	20.5	21.9	39.5	45.9	56.6		39.1	29.5	27	28.2	24.4	22.7	20.5	27.7	29.4	31.9	36.6	25.3	28.7	23.5
Potassium	mg/L	12.5	9.2	20.9	93.4	75.8	54.1		28.9	28.9	32.8	34.9	32.8	23.5	25.6	21.5	38.7	39.3	35.4	28.5	36.0	35.6
Magnesium	mg/L	10.1	9.5	11.4	21.1	22.3	29.8		16.9	14.7	13.9	14.9	13.1	12.9	12	12.2	12.3	15.3	16.2	10.9	12.9	12.4
Sodium	mg/L	125	139	149	254	208	373		151	140	123	141	116	130	132	81.4	121	174	106	71.7	117	101
Sulfate	mg/L	51.7	83.2	38.9	36.2	37.4	224		105	73.1	10.7	34.3	12.3	22.8	15.3	6.13	36.5	15.7	6.24	5.18	25.8	6.68
Phosphorus	mg/L	Not required by previous permit							Not required by previous permit						0.507	1.39	5.07	1.48	0.361	1.88	0.531	2.2
pH in H_20	pH	8.2	8.4	7.7	8.4	7.7	8.2		8.5	8.4	8.4	8.2	8.1	9	8.59	8.43	8.37	8.56	8.41	8.57	8.50	8.4
TDS (Calculated)	mg/L	430	437	493	975	874	1180		591	540	460	524	447	461	453	325	507	637	436	314	467	389
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	0.092	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data																						
pH in H_20	pH	Not required by previous permit												9.08	8.19	9.24	7.94	8.33	8.6	8.16	8.86	8.5
Conductivity (EC)	uS/cm													919	580	867	300	1093	750	408	846	703

Table 1.10: Chemical Analytical Results

Sample ID:		Magneson D.1																			
Site Number:		10																			
Date Sampled:	Units	Oct 17/96	Oct 3/97	Oct 8/98	Oct 19/99	Oct 10/00	Oct 5/01	Oct 8/02	Oct 21/03	Oct 15/04	Oct 20/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 18/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	50	70	110	90	130	80	140	120	120	88	126	244	186	96.3	134	280	211	149	257	197	320
Ammonia-N	mg/L	<0.05	0.27	0.85	1.6	1.42	0.36	0.53	0.21	0.79	0.13	0.13	0.13	<0.05	<0.050	0.167	0.134	0.138	0.086	0.157	0.215	0.571
Total Kjeldahl Nitrogen	mg/L	2.5	2.8	4.7	5.2	5.5	8.6	6.2	4.2	4.8	3.7	4.5	7.6	6.7	5.59	10.2	9.14	7.93	3.88	8.78	8.94	12.3
Total Organic Carbon	mg/L	20	24	38	32	44	53	55	43	43	37	45	54	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												55	34.7	72.3	85.5	64	77.4	58.1	93.9	106
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13
CCME Metals																						
Antimony	mg/L	0.0005	0.001	0.0012	<0.0004	0.0008	0.0008	0.0012	0.0013	0.0013	0.001	0.0010	0.002	0.0009	<0.00040	0.00067	<0.00040	<0.00080	0.00049	<0.0004	0.00044	0.00045
Barium	mg/L	0.03	0.036	0.042	0.052	0.06	0.055	0.041	0.038	0.045	0.058	0.06	0.104	0.062	0.0618	0.0474	0.031	0.0645	0.0712	0.0308	0.0376	0.0623
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0003	<0.000050	0.000055	0.000055	<0.0010	0.000074	<0.00005	0.000043	0.00005
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00104	0.00114
Cobalt	mg/L	<0.002	<0.002	0.021	0.002	0.003	0.002	<0.002	<0.002	<0.002	0.002	0.002	0.005	<0.002	<0.0020	0.0026	0.0033	0.0044	0.0042	<0.002	0.00336	0.00442
Copper	mg/L	0.004	0.002	0.011	0.006	0.014	0.009	0.012	0.005	0.005	0.096	0.226	0.162	0.139	0.0014	0.0922	0.169	0.198	0.107	0.484	0.309	0.094
Iron	mg/L	<0.005	0.549	1.100	1.680	1.560	1.500	0.37	0.455	0.53	3.65	3.4	6.6	1.93	0.309	0.861	0.864	1.37	2.09	0.42	0.784	1.41
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0014	0.00032	0.00083	0.0006	<0.0050	0.00284	0.00039	0.00053	0.00134
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	0.0054	<0.0050	0.005	<0.0050	<0.005	0.00595	0.00523
Nickel	mg/L	0.007	0.01	0.016	0.012	0.014	0.011	0.013	0.013	0.01	0.015	0.02	0.022	0.022	0.0058	0.0239	0.0214	0.0316	0.0283	0.0226	0.0261	0.0287
Zinc	mg/L	0.023	0.017	0.014	0.01	0.021	0.062	0.008	0.008	0.049	0.08	0.021	0.051	0.015	<0.0020	0.0065	0.0103	0.0143	0.0174	0.0304	0.0055	0.0123
Mercury	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000205	<0.0000050
Aluminium	mg/L	Not required under previous permit												2.43	0.075	0.866	0.59	1.63	1.84	<0.01	0.326	0.168
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00020
Boron	mg/L													0.11	<0.050	0.115	0.072	0.086	0.085	0.087	0.087	0.107
Manganese	mg/L													0.029	0.0223	0.079	0.0699	0.232	0.440	0.0279	0.280	0.179
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	0.000034
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020
Selenium	mg/L													0.0021	<0.00040	<0.0020	0.00069	0.00084	0.00067	0.00051	0.00076	0.00077
Titanium	mg/L													0.119	0.006	0.0546	0.0342	0.0754	0.0836	0.0031	0.0226	0.0135
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000020
Vanadium	mg/L													0.016	0.0034	0.0121	0.0106	0.0246	0.0201	0.0108	0.0139	0.0152
Routine Water																						
Ion Balance	%	102	102	94	103	108	105	103	106	102	105	96.5	100	101	105	94.5	91.6	97.4	106	109	102	108
Bicarbonate	mg/L	346	328	465	360	646	590	675	746	717	434	483	471	516	251	481	440	482	453	434	474	540
Chloride	mg/L	73.1	70.5	96.1	97.0	110.0	159.0	161	149	158	94	101	123	157	12.2	149	126	142	136	151	147	174
Carbonate	mg/L	19	16	<5	48	<5	64	86	60	90	16	30	10	19	53.6	28.4	7.9	15.5	14.0	19.7	12.5	15
Conductivity (EC)	uS/cm	1490	1150	1200	1420	1900	2160	2370	2500	2430	1410	1580	1430	1850	569	1930	1590	1750	1680	1830	1870	2030
Calcium	mg/L	28.4	27	28.6	28.3	40.7	40.3	40.6	44.4	48.9	32.3	35.0	38.2	45.5	19.8	44.3	32.8	40.3	45.7	42.9	43.1	48.8
Potassium	mg/L	22.9	33.4	46.2	45.7	49.1	55.8	68	61.8	62.7	48.5	62.6	76.7	79.4	15.7	80.2	82.7	99.4	96.0	113	111	131
Magnesium	mg/L	13.0	11.5	11.2	12.3	20.5	22.0	26.1	24.7	25.5	16.0	17.5	18.9	23.2	7.6	20.2	14.3	19.7	19.9	19.3	18.9	25.1
Sodium	mg/L	280	211	222	250	357	404	495	520	528	280	270	245	302	110	288	208	251	263	284	250	304
Sulfate	mg/L	314	199	176	186	322	349	361	402	447	249	256	209	263	9.83	312	202	245	241	260	228	250
Phosphorus	mg/L	Not required under previous permit													0.8	5.38	5.26	4.69	4.29	6.43	5.71	7.1
pH in H_20	pH	8.8	8.7	7.8	9.1	8.2	8.9	9	8.9	9.0	8.6	8.6	8.4	8.5	9.24	8.72	8.47	8.6	8.53	8.7	8.50	8.54
TDS (Calculated)	mg/L	920	730	809	843	1250	1430	1550	1630	1710	952	1010	961	1150	352	1160	892	1050	1040	1110	1050	1220
Nitrate	mg/L	Not required under previous permit												2	<0.050	0.138	0.419	0.517	0.882	0.473	0.662	0.43
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	0.034
Field Data																						
pH in H_20	pH	Not required under previous permit												8.62	8.73	9.92	8.65	8.73	8.8	8.21	8.34	8.8
Conductivity (EC)	uS/cm													1738	500	2080	450	1772	1720	1872	1951	2030

Table 1.11: Chemical Analytical Results

Sample ID:		Magneson D.2																			
Site Number:		11																			
Date Sampled:	Units	Oct 17/96	Oct 3/97	Oct 8/98	Oct 19/99	Oct 10/00	Oct 5/01	Oct 8/02	Oct 15/03	Oct 15/04	Oct 20/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 18/10	Oct 12/11	Oct 15/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	250	220	370	590	260	550	EMPTY	340	160	395	165	349	231	EMPTY	124	185	EMPTY	298	215	267	126
Ammonia-N	mg/L	4.6	2.09	4.98	4.83	5	2.31		6.22	10.5	6.03	2.71	0.19	6.04		0.605	0.82		0.187	0.094	0.241	0.076
Total Kjeldahl Nitrogen	mg/L	20.5	18.8	23.3	19.4	3.6	30.1		31.8	17.2	22	12.0	16.7	23.7		16.7	11.5		4.11	8.76	13.6	4.64
Total Organic Carbon	mg/L	96	88	183	154	100	144		170	66	114	61	125	-		-	-		-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												117		51.2	77		51.9	39.3	35.6	41.3
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	EMPTY	<0.00050	<0.00050	EMPTY	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005		<0.00050	<0.00050		<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005		<0.00050	<0.00050		<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005		<0.00071	<0.00071		<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1		<0.10	<0.10		<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1		<0.10	<0.10		<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.2		<0.25	<0.25		0.44	<0.25	<0.20	<0.13
CCME Metals																						
Antimony	mg/L	0.0005	0.0007	0.0014	0.0004	0.0008	0.0007	EMPTY	0.0026	0.0021	0.0013	0.0020	0.0015	0.0011	EMPTY	0.00044	0.00047	EMPTY	<0.00040	<0.0004	0.00040	0.00021
Barium	mg/L	0.726	1.28	0.967	1.3	1.03	1.04		1.9	0.343	0.967	0.394	1.08	0.147		0.0544	0.0685		0.124	0.0733	0.0963	0.0276
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001		<0.000050	<0.000050		<0.000050	<0.00005	0.0000095	0.0000108
Chromium	mg/L	0.019	0.052	0.047	0.085	0.07	0.096		0.147	0.022	0.059	0.033	0.075	<0.005		<0.0050	<0.0050		<0.0050	<0.005	0.00013	0.00034
Cobalt	mg/L	0.008	<0.002	0.044	0.018	0.016	0.031		0.042	0.008	0.019	0.011	0.021	0.003		0.002	<0.0020		0.0024	0.0028	0.00197	0.00079
Copper	mg/L	0.015	0.04	0.037	0.031	0.033	0.052		0.102	0.016	0.035	0.026	0.045	0.01		0.0091	0.0044		<0.0010	<0.001	0.00078	0.00204
Iron	mg/L	22.7	67.4	56.8	76.8	56.6	120		130	18.2	65.4	30.3	71.7	0.24		0.11	0.159		0.725	0.987	0.592	0.7
Lead	mg/L	0.017	0.009	<0.005	0.031	0.032	0.054		0.07	0.011	0.043	0.019	0.045	0.0002		<0.00010	0.00014		0.00014	0.00034	0.000141	0.000212
Molybdenum	mg/L	<0.005	<0.005	0.005	<0.005	<0.005	0.007		0.01	0.018	0.007	0.009	<0.005	0.021		<0.0050	<0.0050		0.0129	<0.005	0.0162	0.00198
Nickel	mg/L	0.022	0.086	0.07	0.052	0.077	0.079		0.111	0.028	0.049	0.033	0.055	0.019		0.0149	0.014		0.0118	0.0104	0.0129	0.00687
Zinc	mg/L	0.068	0.232	0.188	0.109	0.381	0.274		0.384	0.126	0.198	0.125	0.192	0.01		<0.0020	0.0024		<0.0020	0.0065	0.0013	0.0019
Mercury	mg/L	0.0002	0.0002	<0.0002	<0.0002	0.0002	<0.0002		<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	Not required under previous permit												0.33		0.021	0.095		0.016	0.018	0.0069	0.132
Beryllium	mg/L													<0.001		<0.0010	<0.0010		<0.0010	<0.001	<0.00010	<0.0001
Boron	mg/L													0.07		0.058	<0.050		0.058	<0.05	0.038	0.038
Manganese	mg/L													0.197		0.0342	0.0063		0.424	0.344	0.384	0.00264
Silver	mg/L													<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05		<0.050	<0.050		<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.002		<0.0020	0.00074		0.00051	<0.0004	0.000899	0.000297
Titanium	mg/L													0.025		0.0027	0.0065		0.0019	0.0018	0.00171	0.0056
Thallium	mg/L													<0.0001		<0.00010	<0.00010		<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.008		0.0074	0.0069		0.0075	0.0019	0.00533	0.00443
Routine Water																						
Ion Balance	%	101	97	105	107	112	107	EMPTY	101	104	102	100	98.7	96	EMPTY	110	91.3	EMPTY	102	107	97	114
Bicarbonate	mg/L	597	520	514	562	541	521		847	495	598	318	592	745		335	501		457	297	409	241
Chloride	mg/L	94.2	64.0	71.3	97.0	71.0	145.0		187	109	102	80	72	168		56.9	42.7		41.8	25.6	63.5	22.4
Carbonate	mg/L	<5	<5	<5	<5	<5	<5		<5	<5	6	<5	7	<5		9.9	11.5		14.5	11.8	6.0	<5
Conductivity (EC)	uS/cm	1310	998	922	1190	1070	1350		1600	1350	1160	904	1120	1780		832	946		853	590	904	499
Calcium	mg/L	42.4	27.1	31.9	34.2	47.8	88.6		84.5	55.7	47.1	24.4	37.5	54.6		38.1	30.7		44.8	34.4	40.5	22.8
Potassium	mg/L	75	68.8	58.1	66.3	73.6	94.8		101	69.4	74.6	48.9	71.2	79.8		47.8	45.3		57.6	38.3	51.5	34
Magnesium	mg/L	19.0	12.7	13.5	15.5	23.4	38.7		33.1	19.8	19.9	10.3	17.8	24.6		15.8	12.2		16.9	12.6	13.7	9.57
Sodium	mg/L	187	148	172	199	166	231		251	185	173	128	169	262		110	121		98.3	61.5	99.8	58.6
Sulfate	mg/L	53	26	35.5	27.5	23	74		62.7	157	32.4	73.3	28.1	116		45.2	3.76		3.38	0.8	16.6	2.91
Phosphorus	mg/L	Not required under previous permit							Not required under previous permit							4.56	2.48		1.69	2.42	1.35	1.93
pH in H_20	pH	8.2	8.0	7.5	8.2	7.7	8.0		8.3	8.3	8.4	7.9	8.3	8.2		8.49	8.5		8.53	8.64	8.40	8.28
TDS (Calculated)	mg/L	765	602	636	716	650	603		1140	841	752	525	702	1070		491	514		502	331	494	270
Nitrate	mg/L	Not required under previous permit												0.2		0.574	0.06		<0.050	<0.05	<0.020	0.248
Nitrite	mg/L													-		<0.050	<0.050		<0.050	<0.02	<0.010	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												na	EMPTY	9.95	8.45	EMPTY	8.6	8.45	9.09	8.8
Conductivity (EC)	uS/cm													na		997	300		864	433	931	508

Table 1.12: Chemical Analytical Results

Sample ID:		Magneson D.3																			
Site Number:		12																			
Date Sampled:	Units	Oct 17/96	Oct. 3/97	Oct 8/98	Oct 19/99	Oct 10/00	Oct 5/01	Oct 8/02	Oct 15/03	Oct 15/04	Oct 20/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 19/10	Oct 12/11	Oct 15/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	10	30	30	50	40	40	30	30	30	40	39	49	53	57.2	45.1	42	49	37	59	49	37
Ammonia-N	mg/L	0.06	<0.05	0.05	<0.05	<0.05	<0.05	0.12	<0.05	0.38	<0.05	<0.05	0.1	<0.05	<0.050	<0.050	<0.050	0.116	<0.050	<0.05	0.252	<0.050
Total Kjeldahl Nitrogen	mg/L	1.3	<0.2	1.1	1	0.9	2.9	1.1	1.3	1.5	1	0.9	1.2	1.5	1.86	1.65	1.22	1.77	1.44	1.48	1.97	1.29
Total Organic Carbon	mg/L	9	12	13	13	12	13	14	12	16	14	14	17	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												18	20.1	15.1	17.8	19.1	19.5	15.5	17.6	17.3
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13
CCME Metals																						
Antimony	mg/L	0.0004	0.0008	0.0012	<0.0004	0.0006	0.0005	0.0011	0.0011	0.0012	0.0014	0.0011	0.0018	0.0005	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00054	0.00031
Barium	mg/L	0.039	0.041	0.039	0.069	0.053	0.058	0.082	0.058	0.079	0.047	0.047	0.071	0.066	0.0646	0.0455	0.0687	0.0798	0.0262	0.0425	0.0968	0.0264
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000084	0.0000249
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	0.002	0.002	0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00024	0.00018
Copper	mg/L	0.006	0.002	0.009	0.002	0.004	0.004	0.007	0.005	0.007	0.003	0.003	0.002	0.002	0.0022	0.0087	0.0011	0.0015	0.0016	0.0014	0.00136	0.0013
Iron	mg/L	<0.005	0.982	0.603	0.977	0.266	0.810	2.36	1.48	3.32	0.437	1.07	0.872	0.032	0.071	0.014	0.102	0.047	0.036	<0.01	0.018	<0.010
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	0.008	<0.005	0.007	0.006	<0.005	0.006	0.007	0.008	0.007	0.006	0.006	<0.005	0.007	0.0072	0.0217	0.0146	0.0169	0.0225	0.0212	0.0302	0.0302
Nickel	mg/L	0.013	0.009	0.015	0.008	0.01	0.008	0.011	0.009	0.012	0.007	0.007	0.007	0.007	0.0081	0.0105	0.0113	0.0116	0.0127	0.013	0.0191	0.0172
Zinc	mg/L	0.016	0.015	0.031	0.009	<0.001	0.032	0.01	0.009	0.066	0.004	0.009	0.009	0.009	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	0.0079	0.0021	0.0015
Mercury	mg/L	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L													0.02	0.082	0.011	0.012	0.031	0.039	<0.01	0.0233	0.0023
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.058	0.055	0.055	0.053	0.065	0.061
Manganese	mg/L													0.002	0.0026	<0.0020	<0.0020	<0.0020	0.0020	<0.002	0.0009	0.00027
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.00010	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0007	0.00054	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000412	0.000322
Titanium	mg/L													0.001	0.0037	<0.0010	<0.0010	0.0023	0.0025	<0.001	0.00114	<0.00030
Thallium	mg/L													0.0002	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.001	<0.0010	0.0015	0.0034	0.005	0.0127	0.0096	0.00866	0.0164
Routine Water																						
Ion Balance	%	103	106	109	103	105	108	97.6	104	102	109	104	103	99.5	92.3	95.7	93.6	94.2	104	104	94.5	99.8
Bicarbonate	mg/L	237	198	227	222	222	246	247	200	261	225	224	256	268	228	189	267	290	253	230	251	256
Chloride	mg/L	4.4	3.9	4.4	5.0	4.0	6.0	7	6	8	6	7	6	12	10.6	24	19.2	24.5	24.4	21.3	20.9	18.2
Carbonate	mg/L	<5	<5	<5	5	<5	<5	13	9	<5	<5	<5	<5	14	7.1	<5.0	7.1	6	6.7	8.4	<5.0	<5.0
Conductivity (EC)	uS/cm	876	603	632	745	789	918	1050	909	1110	779	790	683	831	918	989	928	1060	993	957	987	943
Calcium	mg/L	21.8	24.9	21.1	23	24.3	28.7	22.8	21.6	35.6	37.5	26.3	27.5	25.7	19	25.5	34.4	27.4	26.4	24.4	31.3	27.9
Potassium	mg/L	6.9	6.6	7.3	7.3	7.8	8.4	9.5	7.1	7.7	7.1	8.4	8.5	8.6	8.39	8.8	8.06	10.9	11.6	10.7	11.5	10.4
Magnesium	mg/L	8.0	6.4	7.9	8.8	10.2	12.0	13	10	11.0	10.6	10.4	9.9	12.4	12.4	13.1	13.5	14.2	16.0	14.7	11.8	15.5
Sodium	mg/L	168	100	130	129	139	181	213	174	201	145	140	107	140	154	153	132	171	172	162	142	153
Sulfate	mg/L	238	124	149	168	198	246	331	267	333	220	205	119	166	257	282	203	252	239	229	231	234
Phosphorus	mg/L	Not required under previous permit													0.055	0.161	0.118	0.091	0.051	0.132	0.134	0.038
pH in H_20	pH	8.4	8.4	7.9	8.6	8.4	8.3	8.3	8.7	8.3	8.4	8.3	8.5	8.7	8.51	8.44	8.51	8.49	8.46	8.62	8.36	8.23
TDS (Calculated)	mg/L	565	365	431	456	493	595	722	593	725	540	508	409	511	581	603	549	649	620	583	576	585
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												8.72	8.24	8.85	8.57	8.86	9.2	8.68	8.57	8.8
Conductivity (EC)	uS/cm													867	750	1055	689	1053	1007	693	996	930

Table 1.13: Chemical Analytical Results

Sample ID:		Magneson D.4																		
Site Number:		13																		
Date Sampled:	Units	Oct 7/97	Oct 8/98	Oct 19/99	Oct 10/00	Oct 5/01	Oct 8/02	Oct 15/03	Oct 14/04	Oct 20/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 18/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	350	1430	680	1450	5260	EMPTY	1270	EMPTY	259	1120	1070	1440	EMPTY	4810	1220	1550	1560	1580	1190	1300
Ammonia-N	mg/L	9.72	2.35	2.41	14.6	1.73		0.77		0.26	1.48	1.37	0.67		5.11	4.39	2.04	2.24	0.828	1.37	3.13
Total Kjeldahl Nitrogen	mg/L	27.8	86.2	30.7	<3	91.2		58.2		11.9	45.1	44.4	71		128	44.6	63.8	49.7	54.7	52.8	56.1
Total Organic Carbon	mg/L	168	714	187	813	1690		356		105	271	251	-		-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit											527		1430	554	392	756	609	531	507
BTEX, F1 (C6-C10) and F2 (>C10-C16)																					
Benzene	mg/L	Not required under previous permit											<0.0005	EMPTY	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L												<0.0005		0.00318	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L												<0.0005		0.00107	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L												<0.0005		0.00825	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L												<0.1		<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L												<0.1		<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L												<0.2		<0.625	<0.25	<0.25	<0.25	<0.25	<0.20	<0.13
CCME Metals																					
Antimony	mg/L	<0.0002	0.003	<0.0004	0.0034	0.0021	EMPTY	0.0007	EMPTY	0.0019	<0.0004	0.0012	<0.008	EMPTY	<0.0080	<0.00080	0.00121	<0.01	<0.001	0.0013	0.00082
Barium	mg/L	0.383	1.09	0.208	1.29	0.998		0.137		0.083	0.03	0.736	<0.06		0.317	0.0722	0.305	0.113	0.137	0.330	0.188
Cadmium	mg/L	<0.001	<0.001	<0.001	0.002	<0.001		<0.001		<0.001	<0.001	<0.001	<0.002		<0.0010	<0.00010	<0.0010	<0.0010	0.00017	0.000114	0.000094
Chromium	mg/L	0.039	0.079	0.026	0.114	0.055		0.018		0.005	<0.005	0.07	<0..1		<0.0080	<0.010	0.0057	<0.010	<0.005	0.0119	0.00483
Cobalt	mg/L	0.024	0.063	0.011	0.069	0.061		0.008		0.006	0.003	0.036	<0.04		0.0218	<0.0040	0.013	0.014	0.0144	0.0154	0.0128
Copper	mg/L	0.017	0.084	0.017	0.136	0.188		0.018		0.0011	0.008	0.078	0.02		0.016	0.0031	0.0283	0.024	0.0335	0.0263	0.0138
Iron	mg/L	29.100	80.000	14.900	93.800	98.300		113		5.19	5.76	62.7	0.43		4.93	5.83	6.3	2.3	3.64	9.88	3.92
Lead	mg/L	0.011	0.009	0.005	0.048	0.043		0.007		<0.005	<0.005	0.033	<0.002		0.003	0.00103	<0.0050	<0.0050	0.0044	0.00689	0.00385
Molybdenum	mg/L	0.006	0.019	0.006	0.036	0.017		0.005		0.021	<0.005	0.005	0.03		<0.0050	<0.010	0.0189	0.0409	0.0078	0.0179	0.00911
Nickel	mg/L	0.059	0.18	0.047	0.212	0.201		0.029		0.024	0.011	0.099	0.07	EMPTY	0.0998	0.0122	0.0658	0.085	0.0507	0.0553	0.0497
Zinc	mg/L	0.149	0.424	0.027	0.505	1.92		0.067		0.073	0.015	0.261	<0.04		0.094	0.0106	0.0284	<0.10	0.053	0.047	0.0421
Mercury	mg/L	0.0009	<0.0002	<0.0002	0.0008	<0.0002		<0.0002		<0.0002	<0.0002	<0.0002	<0.0001		<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	0.0000184	<0.000050
Aluminium	mg/L	Not required under previous permit											<0.2		0.23	0.617	1.09	0.45	0.075	5.79	0.273
Beryllium	mg/L												<0.02		<0.010	<0.0020	<0.0010	<0.050	<0.001	<0.0010	<0.00050
Boron	mg/L												<1		0.48	<0.10	0.318	<1.0	0.28	0.270	0.289
Manganese	mg/L												0.3		1.83	1.18	1.18	0.649	0.615	1.15	0.945
Silver	mg/L												<0.002		<0.0020	<0.00020	<0.0050	<0.0010	<0.0001	0.00014	0.000092
Tin	mg/L												<1		<0.050	<0.10	<0.050	<0.050	<0.05	<0.0010	<0.00050
Selenium	mg/L												0.014		<0.040	<0.00080	0.00225	<0.010	0.0016	0.00339	0.00192
Titanium	mg/L												<0.02		0.128	0.0338	0.0989	0.083	0.0437	0.334	0.0677
Thallium	mg/L												<0.002		<0.0010	<0.00020	<0.050	<0.0050	<0.0001	<0.00010	<0.000050
Vanadium	mg/L												0.06		0.0793	0.0072	0.0345	0.055	0.033	0.0481	0.0336
Routine Water																					
Ion Balance	%	104	102	105	107	107	EMPTY	103	EMPTY	102	111	98.1	95	EMPTY	115	91.8	96.1	96.8	101	97.9	114
Bicarbonate	mg/L	1240	1650	1450	2200	2500		1890		883	1570	1470	2830		2220	1320	2350	3210	1490	1540	1080
Chloride	mg/L	505	868	674	1420	2530		1640		424	921	605	2040		1190	480	1030	1930	807	744	615
Carbonate	mg/L	29	70	95	<5	189		81		53	57	75	359		73	49.9	140	341	138	88.6	65.1
Conductivity (EC)	uS/cm	3620	4920	4510	7690	11700		8430		3000	6190	3980	11500		7840	4020	7490	11,800	5830	5640	4620
Calcium	mg/L	86.3	113	74.1	205	212		244		113	144	108	61.9		177	86.6	165	119	93.5	113	89.2
Potassium	mg/L	322	492	359	1090	1310		1120		329	678	545	1260		1290	481	976	1550	788	728	610
Magnesium	mg/L	61.4	95.8	84.0	142.0	198.0		246		67.0	112	56	177		112	44.9	90.6	148	60.8	59.2	60.3
Sodium	mg/L	517	870	709	1220	2450		1540		432	838	515	1760		915	365	898	1700	680	591	560
Sulfate	mg/L	140	418	126	555	713		2150		448	751	174	826		341	141	521	856	343	331	308
Phosphorus	mg/L	Not required under previous permit								Not required under previous permit					44	30	44.5	48.1	41.6	34.4	34.8
pH in H_20	pH	8.5	8.4	8.7	8.2	8.7		8.5		8.6	8.5	8.7	8.8		8.54	8.56	8.72	8.88	8.96	8.73	8.74
TDS (Calculated)	mg/L	2270	3740	2830	5410	8260		7950		2300	4060	2800	7880		5290	2290	4980	8220	3640	3420	2840
Nitrate	mg/L	Not required under previous permit											0.2		<5.0	<1.0	<0.50	<1.0	0.36	0.86	<0.10
Nitrite	mg/L												-		<0.50	<1.0	<0.50	<1.0	0.11	<0.050	<0.050
Field Data																					
pH in H_20	pH	Not required under previous permit											na	EMPTY	9.00	8.34	8.84	9.1	8.79	8.76	9.2
Conductivity (EC)	uS/cm												na		7290	300	7640	1201	5190	5720	4480

Table 1.14: Chemical Analytical Results

Sample ID:		Magneson D.5																		
Site Number:		14																		
Date Sampled:	Units	Oct 7/97	Oct 8/98	Oct 19/99	Oct 10/00	Oct 5/01	Oct 8/02	Oct 15/03	Oct 15/04	Oct 20/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 18/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	90	120	130	120	280	440	240	130	156	117	153	191	181	98.2	156	178	146	100	146	184
Ammonia-N	mg/L	0.05	0.32	0.1	0.08	<0.05	0.13	0.05	1.15	<0.05	1.04	0.52	0.95	0.432	0.087	0.135	0.084	<0.050	0.704	1.38	0.138
Total Kjeldahl Nitrogen	mg/L	3.7	5.1	5.2	4.6	14.2	21.5	8.2	7	5.9	7.5	6.6	8.6	9.67	8.29	5.73	7.03	4.24	4.16	6.24	6.84
Total Organic Carbon	mg/L	34	45	49	47	76	201	49	52	63	46	56	-	-	-	-	-	-		-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit											60	68.7	61.6	57.5	60.5	49.1	36.8	55.1	62.4
BTEX, F1 (C6-C10) and F2 (>C10-C16)																					
Benzene	mg/L	Not required under previous permit											<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L												<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L												<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L												<0.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																					
Antimony	mg/L	<0.0002	0.001	0.0009	0.0009	0.001	0.0022	0.0023	0.0021	0.0012	0.0022	0.0015	0.003	0.00138	0.00082	0.00072	0.00099	0.00104	0.00047	0.00055	0.00049
Barium	mg/L	0.068	0.081	0.092	0.063	0.121	0.188	0.191	0.197	0.057	0.327	0.083	0.09	0.0835	0.0459	0.0428	0.0737	0.0697	0.0402	0.0616	0.0324
Cadmium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.00005	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.000010
Chromium	mg/L	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	0.024	0.019	<0.005	0.047	0.008	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	0.00043
Cobalt	mg/L	0.005	0.022	0.004	0.003	0.003	0.008	0.014	0.01	0.004	0.015	0.005	0.004	0.0034	0.0035	0.0034	<0.0020	<0.0020	0.003	0.00218	0.00169
Copper	mg/L	<0.001	0.014	0.009	0.007	0.008	0.032	0.028	0.016	0.005	0.031	0.008	0.008	0.0055	0.0118	0.0063	0.0035	0.0031	0.0023	0.00201	0.00214
Iron	mg/L	2.770	3.470	3.220	1.510	4.460	6.480	15.2	13.1	0.725	32.2	3.34	0.726	0.059	0.064	0.05	0.098	0.143	<0.01	<0.020	0.322
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.01	0.009	<0.005	0.025	<0.005	0.0086	<0.00010	<0.00010	<0.00010	<0.0050	0.00020	<0.0001	<0.00010	0.00024
Molybdenum	mg/L	<0.005	0.005	0.007	0.007	0.012	0.065	0.014	0.019	0.016	0.015	0.008	0.04	0.0326	0.0122	0.0191	0.0458	0.0444	0.0131	0.0218	0.00595
Nickel	mg/L	0.011	0.024	0.02	0.019	0.019	0.071	0.056	0.042	0.025	0.055	0.025	0.033	0.0319	0.0283	0.0314	0.0408	0.0253	0.0204	0.0236	0.0165
Zinc	mg/L	0.032	0.052	0.013	0.064	0.246	0.031	0.098	0.168	0.01	0.210	0.036	0.006	0.0108	0.003	0.0021	<0.0020	<0.0020	0.0071	<0.0020	0.0028
Mercury	mg/L	<0.0004	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.0000118
Aluminium	mg/L	Not required under previous permit											1.16	0.057	0.031	0.035	0.106	0.203	<0.01	0.0288	0.0636
Beryllium	mg/L												<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00020
Boron	mg/L												<0.05	<0.050	0.056	<0.050	<0.050	<0.050	<0.05	0.032	0.038
Manganese	mg/L												0.066	<0.0020	0.0384	0.0024	0.0033	0.0047	0.0375	0.00208	0.0381
Silver	mg/L												<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000020
Tin	mg/L												<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00020
Selenium	mg/L												0.0018	0.002	<0.0020	0.00121	0.00091	0.00072	0.00063	0.00087	0.00067
Titanium	mg/L												0.05	0.0037	0.0041	0.0015	0.0037	0.0164	<0.001	0.00148	0.00805
Thallium	mg/L												<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000020
Vanadium	mg/L												0.009	0.0044	0.0074	0.0294	0.0365	0.0286	0.0162	0.0138	0.0178
Routine Water																					
Ion Balance	%	109	100	108	105	107	102	98.2	107	104	102	98.7	100	104	105	91.5	95.3	103	111	94.5	107
Bicarbonate	mg/L	360	529	455	408	571	1370	482	622	565	658	533	687	664	491	537	709	549	521	713	589
Chloride	mg/L	40.9	51.6	57.0	60.0	109.0	323.0	104	103	106	99	95	140	126	76.7	82.1	114	89.3	54.9	81.4	71.4
Carbonate	mg/L	26	<5	60	45	69	89	20	19	19	<5	22	29	67.1	19.8	73	46.7	68.9	42.9	40.3	22.4
Conductivity (EC)	uS/cm	1020	976	1200	1030	1460	3320	1410	1700	1530	1500	1420	1830	1810	1280	1610	1950	1480	1370	1640	1520
Calcium	mg/L	30.4	31.1	32	23.7	33.1	36.3	43	48.5	46.2	23.7	30.9	33.8	30	31.8	39.7	32.9	29.2	33.7	34.3	38.5
Potassium	mg/L	40.4	43.2	42.2	32.6	35.1	43.1	57.1	52.5	48.1	35.7	52.6	42.9	40.6	57	52.1	45	40.3	42	44.9	54.5
Magnesium	mg/L	11.8	12.2	13.5	10.5	12.3	23.2	15.1	18.7	17.2	9.7	15.3	14.2	15.3	13.2	16.9	14.6	11.3	15.6	13.5	20.4
Sodium	mg/L	194	184	238	205	367	802	253	307	323	299	235	359	388	227	252	363	296	261	274	263
Sulfate	mg/L	146	75.2	101	70.2	55	152	221	250	179	97.6	117	162	157	114	172	210	99.7	117	74.4	144
Phosphorus	mg/L	Not required under previous permit												0.77	3.05	2.74	1.27	0.994	1.52	1.40	5.4
pH in H_20	pH	8.9	8.3	9.1	9.0	9.0	8.7	8.6	8.5	9.0	8.3	8.6	8.6	8.89	8.57	8.99	8.85	9.06	8.86	8.71	8.64
TDS (Calculated)	mg/L	666	661	767	647	904	2110	953	1140	1070	889	831	1120	1150	788	952	1170	905	823	915	904
Nitrate	mg/L	Not required under previous permit											<0.1	<0.050	1.68	<0.050	<0.050	<0.050	0.075	<0.040	<0.040
Nitrite	mg/L												-	<0.050	<0.050	<0.050	<0.050	<0.050	0.029	<0.020	<0.020
Field Data																					
pH in H_20	pH	Not required under previous permit											8.54	8.26	9.2	9.63	9.10	9.2	8.62	8.87	8.9
Conductivity (EC)	uS/cm												1775	1180	13.84	200	1953	1502	1389	1675	1509

Table 1.15: Chemical Analytical Results

Sample ID:		**Magneson D.6**	
Site Number:		**15**	
Date Sampled:	**Units**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	121	106
Ammonia-N	mg/L	0.088	0.056
Total Kjeldahl Nitrogen	mg/L	4.06	4.16
Total Organic Carbon	mg/L	-	-
Dissolved Organic Carbon	mg/L	43.1	33
BTEX, F1 (C6-C10) and F2 (>C10-C16)			
Benzene	mg/L	<0.00050	<0.00050
Toluene	mg/L	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050
Xylenes	mg/L	<0.00071	<0.00071
F1 (C6-C10)	mg/L	<0.10	<0.10
F1 - BTEX	mg/L	<0.10	<0.10
F2 - (>C10-C16)	mg/L	<0.10	<0.13
CCME Metals			
Antimony	mg/L	0.00080	0.0007
Barium	mg/L	0.0342	0.0266
Cadmium	mg/L	<0.000025	<0.000025
Chromium	mg/L	<0.00050	<0.0005
Cobalt	mg/L	0.00061	0.00086
Copper	mg/L	<0.0010	0.0016
Iron	mg/L	<0.050	<0.050
Lead	mg/L	<0.00025	<0.00025
Molybdenum	mg/L	0.00327	0.00254
Nickel	mg/L	0.0072	0.0069
Zinc	mg/L	<0.0050	<0.0050
Mercury	mg/L	<0.0000050	<0.0000050
Aluminium	mg/L	0.0224	0.0167
Beryllium	mg/L	<0.0005	<0.00050
Boron	mg/L	0.306	0.279
Manganese	mg/L	0.00404	0.00561
Silver	mg/L	<0.000050	<0.000050
Tin	mg/L	<0.00050	<0.00050
Selenium	mg/L	0.00033	0.00037
Titanium	mg/L	0.0016	<0.0015
Thallium	mg/L	<0.000050	<0.000050
Vanadium	mg/L	0.00450	0.0052
Routine Water			
Ion Balance	%	104	106
Bicarbonate	mg/L	593	343
Chloride	mg/L	334	235
Carbonate	mg/L	30.9	13.1
Conductivity (EC)	uS/cm	4080	2790
Calcium	mg/L	54.3	40.2
Potassium	mg/L	31.3	27.1
Magnesium	mg/L	55.5	42.5
Sodium	mg/L	785	528
Sulfate	mg/L	990	711
Phosphorus	mg/L	0.707	0.385
pH in H_20	pH	8.61	8.56
TDS (Calculated)	mg/L	2570	1770
Nitrate	mg/L	<0.10	<0.10
Nitrite	mg/L	<0.050	<0.050
Field Data			
pH in H_20	pH	8.68	9.5
Conductivity (EC)	uS/cm	4120	2730

Table 1.16: Chemical Analytical Results

Sample ID:		Beaver W.1																			
Site Number:		**Previous 15**																			
Date Sampled:	**Units**	**Oct 18/96**	**Oct 3/97**	**Oct 8/98**	**Oct 20/99**	**Oct 11/00**	**Oct 4/01**	**Oct 9/02**	**Oct 16/03**	**Oct 14/04**	**Oct 21/05**	**Oct 13/06**	**Oct 3/07**	**Oct 17/08**	**Oct 28/09**	**Oct 19/10**	**Oct 13/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	20	50	40	80	40	50	40	30	40	44	Not Sampled	48	56	49.6	Filled in						
Ammonia-N	mg/L	3.3	0.91	3.25	0.87	1.15	1.5	2.72	3.34	3.41	3.21		3.38	3.19	3.24							
Total Kjeldahl Nitrogen	mg/L	4.8	2.3	3.1	3.6	2.9	3	2.5	3.3	3.2	3.4		7.4	3.4	3.4							
Total Organic Carbon	mg/L	6	6	7	6	6	7	6	<1	<1	6		5	-	-							
Dissolved Organic Carbon	mg/L	Not required under previous permit												5	5.5							
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	Filled in						
Toluene	mg/L													<0.0005	<0.00050							
Ethylbenzene	mg/L													<0.0005	<0.00050							
Xylenes	mg/L													<0.0005	<0.00050							
F1 (C6-C10)	mg/L													<0.1	<0.10							
F1 - BTEX	mg/L													<0.1	<0.10							
F2 - (>C10-C16)	mg/L													<0.05	<0.25							
CCME Metals																						
Antimony	mg/L	<0.0004	<0.0004	0.0006	<0.0004	<0.0004	<0.0004	<0.0004	0.0008	0.0006	0.0007	Not Sampled	0.0008	<0.008	<0.0080	Filled in						
Barium	mg/L	2.19	2.13	1.78	2.36	2.06	1.81	2.46	2.13	1.97	2.11		2.45	2.83	2.29							
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.002	<0.0010							
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		0.035	<0.1	0.0139							
Cobalt	mg/L	<0.002	<0.002	0.015	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.04	<0.0020							
Copper	mg/L	0.003	0.003	0.012	0.017	0.001	0.066	0.036	0.003	0.022	0.044		0.127	<0.02	<0.012							
Iron	mg/L	<0.005	0.299	0.205	0.614	0.121	0.294	0.291	0.256	0.442	0.423		1.67	<0.005	<0.050							
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005		0.017	0.04	<0.0020							
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.1	<0.0050							
Nickel	mg/L	<0.002	<0.002	0.01	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	0.002		0.002	<0.04	<0.0020							
Zinc	mg/L	0.566	0.473	0.398	0.367	0.426	0.312	0.27	0.267	0.37	0.361		0.382	0.4	0.396							
Mercury	mg/L	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.0003	0.0004	<0.0002	<0.0002	0.0003		<0.0002	<0.0001	<0.00010							
Aluminium	mg/L	Not required under previous permit												<0.2	0.1							
Beryllium	mg/L													<0.02	<0.010							
Boron	mg/L													<1	0.876							
Manganese	mg/L													0.056	0.0571							
Silver	mg/L													<0.002	<0.0020							
Tin	mg/L													<1	<0.050							
Selenium	mg/L													0.053	0.0198							
Titanium	mg/L													<0.02	<0.0060							
Thallium	mg/L													<0.002	<0.0010							
Vanadium	mg/L													0.04	0.0146							
Routine Water																						
Ion Balance	%	90	101	104	94	108	92.1	100	98	94.3	99.4	Not Sampled	91.4	93.3	95.7	Filled in						
Bicarbonate	mg/L	162	159	162	159	160	157	156	156	161	160		167	163	162							
Chloride	mg/L	3080	3100	2930	2950	2910	3040	2870	3050	3090	3040		3460	3260	3020							
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5.0							
Conductivity (EC)	uS/cm	9320	9050	7990	9270	9280	8870	8660	7650	9280	8160		10000	9370	9030							
Calcium	mg/L	49.5	56	56.3	55.7	53.9	55.3	56.4	56.8	57.6	61.3		61.5	59	53.4							
Potassium	mg/L	7.1	7.2	6.4	6.6	6.4	7.2	6.9	8.6	5.8	6.3		4.3	4.3	6.94							
Magnesium	mg/L	6.5	6.6	6.1	8.6	6.2	6.8	6.6	6.8	6.6	7.1		6.4	7.3	6.45							
Sodium	mg/L	1790	2020	1960	1780	2010	1690	2030	1910	1860	1930		2020	1940	1850							
Sulfate	mg/L	11.2	6	3	10.9	2.2	3.5	4.6	4.1	1.4	5.3		2.7	<0.5	<0.50							
Phosphorus	mg/L	Not required under previous permit											Not required under previous permit		0.227							
pH in H_20	pH	8.0	8.0	7.7	8.0	7.9	7.9	7.8	8.1	8.1	8.1		7.9	8.1	7.96							
TDS (Calculated)	mg/L	5020	5270	5040	4890	5070	4980	4860	5110	5100	5130		5640	5350	5020							
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050							
Nitrite	mg/L													-	<0.050							
Field Data																						
pH in H_20	pH	Not required under previous permit												7.82	7.51	Filled in						
Conductivity (EC)	uS/cm													5580	3540							

TETRA TECH

Table 1.17: Chemical Analytical Results

Sample ID:		Beaver D.1																			
Site Number:		**16**																			
Date Sampled:	**Units**	**Oct 18/96**	**Oct 3/97**	**Oct 8/98**	**Oct 20/99**	**Oct 11/00**	**Oct 4/01**	**Oct 9/02**	**Oct 16/03**	**Oct 14/04**	**Oct 21/05**	**Oct 13/06**	**Oct 3/07**	**Oct 17/08**	**Oct 28/09**	**Oct 19/10**	**Oct 12/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 05/16**
Chem. O_2 Demand	mg/L	60	70	90	90	80	100	80	50	70	59	65	78	85	140	66.4	89	302	73	105	60	74
Ammonia-N	mg/L	0.1	<0.05	0.07	<0.05	<0.05	1.24	<0.05	<0.05	0.05	0.22	<0.05	2.11	0.46	5.66	<0.050	<0.050	<0.050	2.57	<0.05	0.168	<0.05
Total Kjeldahl Nitrogen	mg/L	4.9	2.2	2.9	2.5	2	5.9	2.3	<0.2	2	1.8	2.1	8.5	2.8	9	2.21	2.62	3.98	4.30	3.69	1.61	2.67
Total Organic Carbon	mg/L	25	28	30	25	26	30	32	26	24	22	22	27	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												27	63.2	24.9	29	29.9	29.5	25.6	22.7	22.5
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	0.0006	0.0011	<0.0004	0.0005	0.0007	<0.0004	0.0009	0.0018	0.001	0.0014	0.0009	0.0008	<0.0016	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00025	0.00024
Barium	mg/L	0.15	0.049	0.029	0.084	0.074	0.123	0.15	0.051	0..040	0.047	0.061	0.092	0.039	0.115	0.037	0.0521	0.0799	0.0952	0.0558	0.0756	0.0581
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.010	0.01	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	0.005	<0.002	0.019	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00035	0.0003
Copper	mg/L	0.01	<0.001	0.006	<0.001	0.001	0.007	0.022	0.005	0.001	<0.001	0.002	0.001	0.001	<0.0024	0.0019	<0.0010	<0.0010	<0.0010	<0.001	0.00043	0.00034
Iron	mg/L	6.880	0.376	0.201	0.581	0.127	1.220	0.339	1.17	0.09	0.316	0.311	0.74	0.008	0.089	0.013	0.016	0.04	0.212	0.078	0.038	0.011
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0002	<0.00040	<0.00010	<0.00010	<0.0050	0.00013	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00199	0.000986
Nickel	mg/L	0.011	<0.002	0.015	0.005	0.003	<0.002	0.005	0.005	<0.005	<0.002	0.005	0.006	0.007	0.004	0.0049	0.0036	0.0049	0.0047	0.0043	0.00725	0.00521
Zinc	mg/L	0.046	0.017	0.031	0.005	0.009	0.036	0.011	0.006	0.022	0.002	0.006	0.006	0.009	<0.0040	<0.0020	<0.0020	<0.0020	0.0051	0.0088	<0.0010	<0.0010
Mercury	mg/L	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000005
Aluminium	mg/L	Not required under previous permit												<0.01	0.074	0.022	<0.010	<0.010	0.059	<0.01	0.0119	0.0011
Beryllium	mg/L													<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													0.07	<0.050	0.071	<0.050	<0.050	<0.050	<0.05	0.037	0.058
Manganese	mg/L													0.025	0.137	<0.0020	0.0025	<0.0020	0.248	0.0073	0.00078	0.00062
Silver	mg/L													<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0015	0.0038	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000217	0.000194
Titanium	mg/L													0.002	<0.0012	<0.0010	<0.0010	<0.0010	0.0037	<0.001	0.00081	<0.00030
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.01	0.0052	0.0024	0.0031	0.0072	0.0038	0.0036	0.00484	0.00328
Routine Water																						
Ion Balance	%	97	103	103	94	103	91.7	102	102	96.7	103	103	97.4	95.5	92.5	93.9	93.5	95.8	101	109	98.6	100
Bicarbonate	mg/L	338	315	271	315	310	423	520	193	361	335	270	386	408	348	327	357	345	429	306	307	396
Chloride	mg/L	138.0	125.0	146.0	203.0	175.0	267.0	436	192	245	182	166	153	233	384	160	117	205	218	145	149	137
Carbonate	mg/L	<5	7	27	15	16	<5	<5	15	<5	<5	<5	<5	9	6.1	11.1	12.8	9.3	11.6	25.2	<5.0	8.4
Conductivity (EC)	uS/cm	1200	1210	1020	1530	1380	1640	2860	1210	1520	1130	1120	1410	1620	1980	1280	1150	1420	1500	1130	1330	1230
Calcium	mg/L	43.9	43.1	36.1	48.7	47.2	55.8	70.9	63.6	53.2	48.9	46.8	55.9	62.9	72.9	42.1	46.3	43.7	55.7	50.2	53.0	49.4
Potassium	mg/L	12.5	14.5	15.5	14.7	14.6	16.3	31.5	14.4	14.3	10	11.7	13.9	16.4	19.2	13.8	13.4	20.2	21.8	14.9	16.3	16.8
Magnesium	mg/L	19.3	18.4	18.3	21.9	19.0	22.3	55.5	21.7	19.7	17.7	16.0	19.9	24	23.2	18.3	17.2	22.2	24.7	17.9	18.5	20.4
Sodium	mg/L	186	200	204	223	219	228	498	185	234	194	171	206	238	283	185	156	207	234	179	166	185
Sulfate	mg/L	149	165	134	182	135	113	436	195	131	75.3	92.7	174	149	170	122	97.7	114	98.6	55.4	127	93.7
Phosphorus	mg/L	Not required under previous permit													0.258	0.568	0.876	0.615	1.45	1.42	0.160	0.612
pH in H_20	pH	8.4	8.6	8.7	8.7	8.7	8.1	7.1	8.8	8.3	8.4	8.3	8.2	8.4	8.38	8.51	8.54	8.52	8.46	8.85	8.23	8.44
TDS (Calculated)	mg/L	717	728	714	864	777	918	1780	782	878	698	637	812	933	1130	713	636	791	875	638	687	705
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	1.38	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	0.039	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												8.68	7.93	9.33	8.50	8.78	8.9	8.84	8.68	8.5
Conductivity (EC)	uS/cm													1634	1310	1258	1468	1423	1564	1146	1323	1225

Table 1.18: Chemical Analytical Results

Sample ID:		Beaver D.2																			
Site Number:		**17**																			
Date Sampled:	**Units**	**Oct 18/96**	**Oct 3/97**	**Oct 8/98**	**Oct 20/99**	**Oct 11/00**	**Oct 4/01**	**Oct 9/02**	**Oct 16/03**	**Oct 14/04**	**Oct 21/05**	**Oct 13/06**	**Oct 3/07**	**Oct 17/08**	**Oct 28/09**	**Oct 19/10**	**Oct 12/11**	**Oct 16/12**	**Oct 8/13**	**Oct 15/14**	**Oct 14/15**	**Oct 5/16**
Chem. O_2 Demand	mg/L	110	110	130	440	130	160	150	210	150	140	107	135	96	90.2	173	105	58	Filled in			
Ammonia-N	mg/L	0.07	<0.05	0.08	0.11	0.19	0.6	1.06	<0.05	0.08	0.92	<0.05	0.05	0.5	<0.050	0.2	<0.050	3.3				
Total Kjeldahl Nitrogen	mg/L	6.3	4.6	4.6	6.4	4.2	15.3	10.7	8.6	14.9	7.2	3.8	7.2	4	3.07	8.04	3.29	12.2				
Total Organic Carbon	mg/L	42	44	48	60	54	47	57	64	79	46	36	64	-	-	-	-	-				
Dissolved Organic Carbon	mg/L	Not required under previous permit												30	33.4	47.8	35.5	35.6				
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	Filled in			
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050				
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050				
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071				
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10				
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10				
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25				
CCME Metals																						
Antimony	mg/L	<0.0004	0.0006	0.0005	<0.0004	0.0004	0.0006	0.0005	0.0012	0.0012	0.001	0.0019	0.0017	0.0005	<0.0016	<0.00040	<0.00040	<0.00080	Filled in			
Barium	mg/L	0.102	0.08	0.141	0.052	0.064	0.06	0.103	0.07	0.073	0.042	0.048	0.074	0.08	0.071	0.0806	0.0589	0.132				
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010				
Chromium	mg/L	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	0.006	<0.005	<0.0050	<0.0050	<0.0050	<0.0050				
Cobalt	mg/L	<0.002	<0.002	0.023	<0.002	<0.002	<0.002	0.002	0.003	<0.002	<0.002	<0.002	0.003	<0.002	<0.0020	<0.0020	<0.0020	<0.0020				
Copper	mg/L	0.006	0.001	0.016	0.002	0.004	0.006	0.011	0.004	0.003	0.002	0.001	0.002	0.001	<0.0024	0.009	<0.0010	<0.0010				
Iron	mg/L	7.830	6.570	10.200	4.250	4.160	0.618	2.83	1.2	0.703	0.856	3.54	6.71	0.322	0.014	0.028	0.291	0.099				
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0005	<0.00040	<0.00010	0.00013	<0.0050				
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	0.0105				
Nickel	mg/L	0.003	0.004	0.029	0.005	0.005	0.002	0.01	0.01	0.003	0.005	0.004	0.005	0.005	0.008	0.0082	0.004	0.0091				
Zinc	mg/L	0.043	0.029	0.039	0.003	0.011	0.08	0.014	0.009	0.046	0.003	0.009	0.01	0.003	<0.0040	<0.0020	<0.0020	<0.0020				
Mercury	mg/L	0.0004	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010				
Aluminium	mg/L	Not required under previous permit												0.02	0.02	<0.010	<0.010	0.045				
Beryllium	mg/L													<0.001	<0.0020	<0.0010	<0.0010	<0.0010				
Boron	mg/L													<0.05	0.073	0.059	0.072	0.11				
Manganese	mg/L													0.009	0.0022	0.0061	0.0038	0.333				
Silver	mg/L													<0.0001	<0.00040	<0.00010	<0.00010	<0.0050				
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050				
Selenium	mg/L													<0.0004	0.0028	<0.00040	<0.00040	<0.00080				
Titanium	mg/L													0.003	<0.0012	<0.0010	<0.0010	0.0029				
Thallium	mg/L													0.0003	<0.00020	<0.00010	<0.00010	<0.050				
Vanadium	mg/L													0.001	0.0047	0.0017	<0.0010	0.0012				
Routine Water																						
Ion Balance	%	92	108	95	103	106	91.7	102	98.9	96.8	104	102	99.1	98.1	95.4	93.7	100	93.5	Filled in			
Bicarbonate	mg/L	378	365	282	370	372	418	564	384	502	421	252	330	374	300	385	394	546				
Chloride	mg/L	98.0	81.5	74.2	71.0	91.0	38.0	57	52	57	35	40	39	30	266	34	21.9	32.5				
Carbonate	mg/L	<5	<5	<5	<5	<5	44	54	113	71	12	<5	<5	7	8.4	32.3	10.5	9.6				
Conductivity (EC)	uS/cm	943	835	742	846	927	906	1230	1050	1180	799	550	641	704	1710	842	701	1040				
Calcium	mg/L	11	14.3	11	9.4	11.5	9.9	8.8	16.1	9.5	16.9	20.4	19.1	13.5	45.2	10.7	21.4	16.4				
Potassium	mg/L	23.6	21.7	21.1	28.6	27.7	11.8	14	19.2	16	13.7	24	28.8	14.8	19.4	14.8	13.5	15.7				
Magnesium	mg/L	9.0	9.3	6.4	9.1	9.0	6.3	6	9.4	5.8	6.9	8.8	11.1	6.9	23.6	5.26	7.45	7.35				
Sodium	mg/L	150	165	134	152	167	176	307	230	249	162	76	92	132	274	160	127	199				
Sulfate	mg/L	10.1	10.8	54.7	12.5	20.8	21	37.2	32.6	19.6	13.5	14.6	7.6	14.3	226	25.6	6.02	61.6				
Phosphorus	mg/L	Not required under previous permit													0.252	0.624	0.31	1.29				
pH in H_20	pH	7.6	8.0	7.6	8.3	8.1	9.2	8.9	9.6	9.2	8.5	8.2	8.2	8.4	8.46	8.92	8.54	8.48				
TDS (Calculated)	mg/L	488	482	440	465	517	513	739	662	675	467	308	360	404	1010	472	402	611				
Nitrate	mg/L	Not required under previous permit												0.3	<0.050	<0.050	<0.050	<0.050				
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050				
Field Data																						
pH in H_20	pH	Not required under previous permit												8.74	8.01	9.45	8.64	8.02	Filled in			
Conductivity (EC)	uS/cm													772	1560	1255	600	1037				

Table 1.19: Chemical Analytical Results

Sample ID:		Norgaard D.1																			
Site Number:		18																			
Date Sampled:	Units	Oct 17/96	Oct 3/97	Oct 8/98	Oct 20/99	Oct 11/00	Oct 5/01	Oct 9/02	Oct 16/03	Oct 14/04	Oct 21/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 19/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	60	90	100	120	90	110	180	200	110	120	99	<5	109	131	82.8	119	109	106	155	81	80
Ammonia-N	mg/L	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	0.06	<0.05	3.85	<0.050	<0.050	<0.050	<0.050	0.062	1.31	0.553
Total Kjeldahl Nitrogen	mg/L	4	1.8	3.8	3.6	2.4	4.7	4.9	3.2	3	3.4	2.7	3.1	3.5	7.86	2.52	4.03	3.42	2.57	2.98	3.14	2.67
Total Organic Carbon	mg/L	24	32	35	45	32	37	62	45	66	47	35	54	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												38	54.4	31.3	34.5	37	34.5	29.5	29.9	27.7
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	0.0006	0.0006	<0.0004	0.0005	0.0004	0.0007	0.0011	0.0015	0.001	0.0010	0.0021	<0.002	<0.0080	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	<0.00020	0.00012
Barium	mg/L	0.111	0.087	0.084	0.101	0.1	0.133	0.217	0.038	0.048	0.056	0.105	0.145	0.1	0.168	0.0779	0.086	0.0961	<0.0030	0.0947	0.096	0.0642
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0004	<0.0010	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.000010	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	0.013	0.012	<0.02	<0.0080	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00020	0.00015
Cobalt	mg/L	<0.002	<0.002	0.019	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.008	0.0049	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00045	0.00033
Copper	mg/L	0.003	0.04	0.005	<0.001	0.001	0.004	0.017	0.005	0.002	<0.001	0.001	0.002	<0.004	<0.012	0.0037	<0.0010	<0.0010	<0.0010	<0.001	<0.00040	0.00022
Iron	mg/L	<0.005	0.265	0.243	0.469	0.063	0.377	4.04	0.372	0.098	0.067	0.136	0.646	0.011	<0.010	0.025	0.034	0.024	0.022	0.073	0.033	0.129
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0005	<0.0020	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.00010	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.02	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00088	0.000341
Nickel	mg/L	0.003	<0.002	<0.002	0.004	0.003	<0.002	0.011	0.003	<0.002	<0.002	0.005	0.006	<0.008	0.06	0.0034	0.0025	0.0039	0.0043	0.0035	0.0057	0.00333
Zinc	mg/L	0.021	0.051	0.025	0.002	0.001	0.041	0.026	0.006	0.037	0.002	0.01	0.034	<0.008	<0.020	<0.0020	<0.0020	<0.0020	<0.0020	0.0085	<0.0020	0.0013
Mercury	mg/L	0.0002	<0.0002	<0.0002	0.0002	0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	Not required under previous permit												<0.04	0.14	<0.010	<0.010	<0.010	0.022	<0.01	0.0056	0.0086
Beryllium	mg/L													<0.004	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	<0.00010
Boron	mg/L													<0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.027	0.077
Manganese	mg/L													0.165	0.378	0.0021	0.01	<0.0020	0.411	0.0039	0.0758	0.00168
silver	mg/L													<0.0004	<0.0020	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000020	<0.000010
Tin	mg/L													<0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00020	<0.00010
Selenium	mg/L													0.003	0.0093	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	<0.00010	0.000118
Titanium	mg/L													<0.004	<0.0060	<0.0010	<0.0010	<0.0010	0.0019	<0.001	<0.00060	0.00072
Thallium	mg/L													<0.0004	<0.0010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000020	<0.000010
Vanadium	mg/L													0.009	<0.0020	0.0014	0.0012	0.0038	0.0032	0.0011	0.0032	0.0016
Routine Water																						
Ion Balance	%	101	103	99	95	102	103	100	104	98.7	98.2	99.9	95.3	99.5	95.2	94.5	95.6	98	99.0	108	99.2	104
Bicarbonate	mg/L	537	639	420	598	551	607	567	228	480	747	602	778	820	718	603	537	532	522	414	455	417
Chloride	mg/L	268.0	375.0	339.0	465.0	343.0	544.0	881	579	586	520	443	514	595	756	296	181	283	242	155	228	156
Carbonate	mg/L	<5	<5	<5	18	<5	<5	44	21	<5	10	<5	6	32	<5.0	<5.0	26.3	12.5	32.7	21.1	6.4	11.2
Conductivity (EC)	uS/cm	2250	2510	2140	2770	2410	2890	4120	2890	3080	2790	2350	3030	3230	3820	1800	1560	1790	1600	1250	1740	1180
Calcium	mg/L	93.2	91.1	60.6	64.6	96.8	109	57.7	113	83.7	91.6	90.8	98.7	87.3	102	77.3	64.9	63.9	63.1	69.4	74.9	59.9
Potassium	mg/L	21.3	26.1	23.9	23.9	24.9	31.5	36.9	38.1	30.3	31.5	25.7	32	32.6	40	21.5	22.1	28.8	22.5	19.4	22.9	19.2
Magnesium	mg/L	49.7	57.5	39.5	48.2	49.0	62.4	66.5	91.7	57.9	58.9	48.4	59.5	63.4	67.3	35.5	25.9	29.1	29.4	20.9	26.7	21.8
Sodium	mg/L	348	380	348	443	344	556	816	556	498	452	360	449	540	613	258	213	266	255	181	216	171
Sulfate	mg/L	378	220	282	245	273	315	342	771	407	153	120	202	133	357	67.6	53.6	54.8	45.1	32.1	96.2	28.8
Phosphorus	mg/L	Not required under previous permit													<0.020	1.03	1.43	0.704	1.04	1.76	0.674	1.02
pH in H_20	pH	8.0	8.3	8.1	8.5	8.2	8.2	8.4	8.8	8.3	8.3	8.3	8.3	8.5	8.31	8.18	8.57	8.49	8.69	8.65	8.37	8.47
TDS (Calculated)	mg/L	1420	1470	1300	1600	1410	1850	2480	2280	1910	1680	1390	1740	1890	2290	1050	851	1000	947	703	896	673
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.219	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	0.029	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												8.42	7.85	8.67	8.46	8.45	9.0	7.72	8.15	8.8
Conductivity (EC)	uS/cm													2240	1890	1292	1167	1801	1621	1256	1774	1220

Table 1.20: Chemical Analytical Results

Sample ID:		Winsnes D.1																			
Site Number:		19																			
Date Sampled:	Units	Oct 16/96	Oct 7/97	Oct 9/98	Oct 19/99	Oct 10/00	Oct 4/01	Oct 9/02	Oct 16/03	Oct 14/04	Oct 21/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 19/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	60	70	70	90	100	110	100	80	80	54	65	68	65	101	85.8	68	420	79	94	92	69
Ammonia-N	mg/L	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.105	0.09	<0.050	<0.050	0.084	0.059	0.069	<0.05
Total Kjeldahl Nitrogen	mg/L	3.1	2.5	2.6	2.5	3.4	6.2	4.1	3.6	2.1	1.7	2.4	2.7	3.8	4.48	4.36	2.79	3.66	3.62	3.48	3.76	3.52
Total Organic Carbon	mg/L	25	28	28	27	31	36	40	37	30	23	24	24	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												23	31.9	29.7	25	33.6	28.2	26.4	28.2	27
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.12	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	0.0002	0.0009	<0.0004	0.0006	0.0008	0.0006	0.0014	0.0014	0.0015	0.0021	0.0011	0.0007	0.00045	0.0004	<0.00040	<0.00080	<0.00040	<0.0004	0.00029	0.00021
Barium	mg/L	0.036	0.055	0.049	0.051	0.053	0.042	0.105	0.04	0.011	0.022	0.043	0.081	0.04	0.0418	0.0425	0.0238	0.0149	0.0257	0.0589	0.0508	0.0633
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.002	0.002	0.021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00033	0.00022
Copper	mg/L	0.002	<0.001	0.009	0.002	0.003	0.006	0.009	0.006	0.003	0.001	0.002	0.002	<0.001	<0.0010	0.0059	<0.0010	<0.0010	<0.0010	<0.001	<0.00020	0.00021
Iron	mg/L	<0.005	0.291	0.200	0.460	0.342	0.081	0.991	0.369	0.203	0.101	0.211	0.76	0.005	0.022	<0.010	0.032	0.011	0.014	0.024	0.014	0.019
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.000688	0.00036
Nickel	mg/L	<0.002	<0.002	0.012	0.003	0.004	<0.002	0.006	0.004	<0.002	0.002	0.005	0.006	<0.002	0.0026	<0.0020	0.002	<0.0020	<0.0020	0.0025	0.00178	0.00214
Zinc	mg/L	0.006	0.025	0.057	0.003	0.017	0.048	0.008	0.008	0.074	0.002	0.008	0.008	0.03	<0.0020	<0.0020	<0.0020	0.0024	<0.0020	0.0058	<0.0010	<0.0010
Mercury	mg/L	0.0003	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	0.000006
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	0.025	<0.010	<0.010	<0.010	<0.01	0.0013	<0.0010
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	0.051	0.051	<0.050	<0.050	<0.050	<0.05	0.037	0.046
Manganese	mg/L													0.006	0.0341	0.0022	0.0025	0.0037	0.0029	0.0053	0.00179	0.00088
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0007	0.00049	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000194	0.000232
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.004	0.0041	0.0018	<0.0010	0.001	<0.0010	0.0015	0.00172	0.00107
Routine Water																						
Ion Balance	%	98	110	108	103	109	90.3	101	106	105	107	106	97.7	98	100	106	97.1	92.7	103	104	93.2	100
Bicarbonate	mg/L	483	445	475	485	464	457	635	361	276	285	315	366	319	366	362	370	348	450	420	408	446
Chloride	mg/L	20.7	20.0	17.0	21.0	21.0	25.0	32	29	29	17	18	15	19	17.9	19.4	15	17.7	19.8	23.5	27.2	38.3
Carbonate	mg/L	<5	<5	<5	17	25	60	44	49	75	13	7	12	46	52.4	32	11	46	11.3	30.9	18.2	9.3
Conductivity (EC)	uS/cm	1270	1230	1100	1270	1320	1520	1850	1950	2400	1530	1280	1030	1080	1150	1180	914	1000	1020	1040	971	997
Calcium	mg/L	31.5	32.4	32.3	27.8	26.3	20.8	23.4	32.9	31.9	40.2	39.3	42.2	19.1	19.5	20.4	24.5	15.7	24.4	27.5	19.6	32.4
Potassium	mg/L	8.8	10.6	10.3	11.1	10.8	11	13.4	13.5	11.9	10.9	12.5	11.6	11	13.2	13.9	12.8	12.7	14.2	13.6	12.7	13.7
Magnesium	mg/L	16.6	17.5	17.8	17.7	18.9	19.5	21.6	34.9	31.7	26.3	22	18.7	17.8	19.6	20.8	14.7	15.6	18.2	17.2	14.2	18.7
Sodium	mg/L	219	248	250	259	277	279	415	444	482	289	221	159	191	225	256	149	175	191	191	158	168
Sulfate	mg/L	250	239	235	233	265	278	331	693	809	498	340	206	189	214	282	128	147	133	116	93.9	99.6
Phosphorus	mg/L	Not required under previous permit													0.523	0.459	0.4	0.391	0.467	0.43	0.336	0.515
pH in H_20	pH	8.2	8.4	8.0	8.6	8.6	9.0	8.7	9.1	9.4	8.6	8.5	8.6	9	9.01	8.69	8.54	9.16	8.49	8.85	8.67	8.48
TDS (Calculated)	mg/L	762	790	796	825	886	902	1160	1470	1610	1040	815	645	649	742	823	537	601	633	626	545	600
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												9.11	8.5	9.04	8.44	9.49	8.5	8.0	8.84	8.6
Conductivity (EC)	uS/cm													1062	800	1013	1000	1007	1039	1042	1005	1004

Table 1.21: Chemical Analytical Results

Sample ID:		Winsnes D.2																			
Site Number:		20																			
Date Sampled:	Units	Oct 16/96	Oct 7/97	Oct 9/98	Nov 26/99	Oct 10/00	Oct 4/01	Oct 9/02	Oct 16/03	Oct 14/04	Oct 21/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 19/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	40	50	50	60	70	70	70	50	60	45	56	65	62	80.7	49.6	56	61	65	49	54	81
Ammonia-N	mg/L	<0.05	0.06	<0.05	0.14	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	0.06	<0.050	<0.050	0.056	<0.05	0.139	0.618
Total Kjeldahl Nitrogen	mg/L	0.9	0.9	1.5	1.6	1.9	2.8	1.5	1.6	1.3	1.6	1.7	1.8	2	2.99	1.5	1.32	1.74	2.29	1.54	1.51	3.93
Total Organic Carbon	mg/L	17	18	21	17	22	24	26	28	18	19	22	25	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												20	27.8	18.7	22	21.5	20.2	17.9	20.0	20.9
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	<0.0002	0.0005	<0.0004	<0.0004	0.0005	<0.0004	0.0009	0.0011	0.0006	0.0012	0.0015	<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00013	<0.00010
Barium	mg/L	0.086	0.179	0.112	0.17	0.118	0.087	0.06	0.128	0.096	0.095	0.132	0.136	0.116	0.189	0.134	0.134	0.107	0.115	0.103	0.119	0.104
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.000050	0.000661	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.002	0.002	0.023	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00025	0.00012
Copper	mg/L	0.002	<0.001	0.007	0.001	0.003	0.002	0.003	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.0010	0.0033	<0.0010	<0.0010	<0.0010	<0.001	0.00022	0.00027
Iron	mg/L	<0.005	0.771	1.490	0.065	0.765	0.748	0.308	0.818	0.983	1.29	0.927	1.96	0.057	0.095	0.416	0.152	0.013	0.444	0.047	<0.010	0.878
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.0015	0.000584
Nickel	mg/L	<0.002	0.002	0.013	0.007	0.007	<0.002	0.004	0.005	<0.002	0.002	0.005	0.005	0.005	0.0093	0.0045	0.0032	0.0031	0.0030	0.0031	0.00341	0.00267
Zinc	mg/L	0.005	0.022	0.135	0.021	0.028	0.038	0.007	0.003	0.044	0.007	0.004	0.01	0.003	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0073	<0.0010	<0.0010
Mercury	mg/L	0.0002	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	Not required under previous permit												<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.0010	0.0018
Beryllium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.039	0.04
Manganese	mg/L													<0.001	0.0306	0.003	<0.0020	<0.0020	<0.0020	<0.002	0.00053	0.00173
Silver	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													<0.0004	<0.00040	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000186	0.000212
Titanium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030
Thallium	mg/L													<0.0001	<0.00010	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00050	<0.00050
Routine Water																						
Ion Balance	%	99	106	104	101	99.5	101	103	103	98.5	105	109	98.7	97.5	96.3	97.6	105	93.9	107	103	102	109
Bicarbonate	mg/L	262	273	273	307	272	286	173	293	310	277	299	315	323	340	303	319	295	266	245	255	227
Chloride	mg/L	15.4	15.1	9.3	17.0	15.0	19.0	21	14	13	10	12	13	17	15.8	12.4	12.7	23.4	14.4	13.7	15.6	19.8
Carbonate	mg/L	<5	<5	<5	<5	<5	<5	56	<5	<5	<5	<5	<5	<5	<5.0	<5.0	5.4	6.5	6.3	7.6	<5.0	<5.0
Conductivity (EC)	uS/cm	514	557	511	591	479	523	514	482	518	501	529	542	552	567	538	567	515	484	465	490	431
Calcium	mg/L	27.3	34.5	36.2	34.1	34.2	26.7	11.7	34.6	32.2	37.6	38.3	41.2	38.3	34.9	34	40.3	23.7	29.8	32	31.6	32.7
Potassium	mg/L	11.5	11.5	11.2	13.3	12.2	13	15.2	14.5	14.4	12.9	14.2	13.8	14.4	16.6	15.6	17.1	15.7	15.4	14.3	16.7	13.6
Magnesium	mg/L	11.2	14.4	13.7	14.7	12.1	13.6	14.7	14.1	12.8	13.4	15.2	14.1	14.3	15.5	13.7	15.8	15.2	14.5	11.9	12.3	12.5
Sodium	mg/L	60	70	65	72	56	56	85	56	51	50	57	52	56	62.2	51.3	61.3	61.9	56.8	46.5	44.4	43.4
Sulfate	mg/L	26	46.9	51.7	39.9	19.3	21	16	16.5	8.9	15.4	14	18.1	13	17.7	13.3	17	8.42	9.93	7.76	10.3	12.4
Phosphorus	mg/L	Not required under previous permit													<0.050	0.072	0.112	0.070 *	0.064	0.088	0.050	0.396
pH in H_20	pH	8.1	8.0	7.7	8.0	7.5	8.1	9.5	8.2	8.2	8.2	8.3	8.2	8.3	8.2	8.38	8.38	8.49	8.44	8.55	8.37	8.04
TDS (Calculated)	mg/L	280	327	322	342	278	300	301	294	290	281	300	308	316	330	294	327	300	278	254	260	246
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.020	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.010	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												8.39	8.4	8.33	7.63	8.36	8.6	7.99	8.10	8.1
Conductivity (EC)	uS/cm													642	450	960	1172	512	503	474	510	4.53

Table 1.22: Chemical Analytical Results

Sample ID:		Winsnes D.3																			
Site Number:		21																			
Date Sampled:	Units	Oct 16/96	Oct 7/97	Oct 9/98	Oct 19/99	Oct 10/00	Oct 4/01	Oct 9/02	Oct 16/03	Oct 15/04	Oct 20/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 18/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	60	80	160	110	110	260	Empty	90	110	54	85	64	106	251	97	96	128	116	108	108	81
Ammonia-N	mg/L	0.06	<0.05	1.45	0.3	<0.05	2.78		<0.05	<0.05	<0.05	0.15	1.47	0.34	1.02	0.083	<0.050	0.225	<0.050	<0.05	0.639	<0.05
Total Kjeldahl Nitrogen	mg/L	5.5	3.2	10.5	5.2	4	15.8		2.9	3.4	1.7	3.1	3.8	4.1	13.8	4.71	3.08	4.2	4.03	3.81	5.34	2.92
Total Organic Carbon	mg/L	26	32	44	28	39	71		49	38	20	29	29	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												33	82.1	36.9	31	39	33.1	32.1	37.9	26.8
BTEX, F1 (C6-C10) and F2(>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	0.0008	<0.0002	0.0014	<0.0004	0.001	0.001	Empty	0.0017	0.0013	0.0014	0.0013	0.001	0.0008	<0.0016	<0.00040	<0.00040	<0.00080	0.00044	0.00054	0.00093	0.00031
Barium	mg/L	0.109	0.011	0.155	0.159	0.105	0.175		0.006	0.008	0.013	0.12	0.094	0.091	0.109	0.103	0.0553	0.111	0.101	0.0732	0.134	0.101
Cadmium	mg/L	<0.001	0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	0.0000074	<0.0000050
Chromium	mg/L	0.008	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	0.003	0.003	0.022	<0.002	0.002	0.003		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00156	0.00053
Copper	mg/L	0.006	<0.001	0.008	0.001	0.006	0.01		0.005	0.002	<0.001	<0.001	<0.001	0.001	<0.0024	0.0031	<0.0010	0.0016	<0.0010	0.0012	0.00236	0.00132
Iron	mg/L	1.320	1.090	2.500	1.110	0.628	3.690		0.146	0.163	0.051	0.083	0.508	0.015	0.062	0.011	0.02	0.025	0.022	0.047	0.022	0.011
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.0074	0.00303
Nickel	mg/L	0.007	<0.002	0.027	0.008	0.014	0.008		0.007	<0.002	<0.002	0.004	0.004	0.006	0.0063	0.0058	0.0043	0.0074	0.0041	0.0053	0.0117	0.00722
Zinc	mg/L	0.016	0.022	0.049	0.004	0.063	0.047		0.009	0.06	0.006	0.003	0.017	0.016	0.006	<0.0020	<0.0020	<0.0020	<0.0020	0.0053	<0.0010	0.0014
Mercury	mg/L	0.0003	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	Not required under previous permit												<0.01	0.034	<0.010	<0.010	<0.010	<0.010	<0.01	0.0405	0.002
Beryllium	mg/L													<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	0.067	0.077	0.073	0.079	0.077	0.094
Manganese	mg/L													0.003	0.0538	<0.0020	<0.0020	<0.0020	0.0593	0.0142	0.00143	0.00076
Silver	mg/L													<0.0001	<0.00040	0.00032	<0.00010	<0.0050	<0.00010	<0.0001	0.00001	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0014	0.003	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000359	0.000239
Titanium	mg/L													0.003	<0.0012	<0.0010	<0.0010	0.0012	<0.0010	0.002	0.00198	<0.00030
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.006	0.007	0.002	0.0025	0.0098	0.0019	0.0052	0.00154	0.0016
Routine Water																						
Ion Balance	%	109	109	109	97	107	92.2	Empty	107	103	104	103	101	96.5	106	107	101	97.4	107	106	97.5	105
Bicarbonate	mg/L	219	285	336	357	428	623		72	693	381	450	455	352	386	353	446	419	375	292	375	396
Chloride	mg/L	81.9	112.0	156.0	158.0	152.0	248.0		318	294	76	101	133	213	266	270	156	222	209	224	216	238
Carbonate	mg/L	55	15	<5	7	34	<5		114	14	15	28	<5	69	70.5	30	21.1	48.3	38.8	59.6	9.3	<5.0
Conductivity (EC)	uS/cm	793	886	992	1210	1310	1640		2950	2620	832	1140	1180	1380	1620	1880	1350	1530	1410	1400	1500	1420
Calcium	mg/L	19.8	32.4	27.9	34	29.1	26.6		57.6	105	46.6	45.4	50.4	39.9	36.7	54.4	54.1	39.3	38.2	29.7	29.8	52.4
Potassium	mg/L	20.6	22.4	22.5	24.5	25.8	26.4		67.3	73	26.1	32.2	25.6	23.3	33.1	38.6	28.8	30.4	28.1	26.1	28.5	27.8
Magnesium	mg/L	18.9	19.3	22.8	28.2	24.6	27.1		158	133.0	34.6	43.9	35.4	32.9	38.7	52.6	37	38	41.6	35.6	30.7	41.4
Sodium	mg/L	136	133	196	175	232	267		506	376	106	142	137	207	288	288	170	224	219	221	193	195
Sulfate	mg/L	26.9	21.6	67	102	51.3	17		1100	638	57.7	67.0	39.5	36.8	61.2	232	60.5	62.9	59.3	37.2	45.9	62.2
Phosphorus	mg/L	Not required under previous permit							Not required under previous permit						1.47	0.613	1.24	1.12	0.685	0.707	0.479	0.287
pH in H_20	pH	9.4	8.8	8.3	8.5	8.8	7.9		10	8.4	8.6	8.5	8.4	9.1	9.06	8.78	8.53	8.97	8.88	9.25	8.47	8.29
TDS (Calculated)	mg/L	466	496	658	705	764	922		2360	1970	550	681	650	795	984	1140	747	871	818	777	738	812
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.040	<0.020
Nitrite	mg/L													-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.020	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												9.08	8.55	9.1	9.23	9.28	9.4	9.65	8.60	8.60
Conductivity (EC)	uS/cm													1356	1050	2160	1780	1541	1439	1393	1530	1476

Table 1.23: Chemical Analytical Results

Sample ID:		Winsnes D.4																			
Site Number:		22																			
Date Sampled:	Units	Oct 16/96	Oct 7/97	Oct 9/98	Oct 19/99	Oct 10/00	Oct 4/01	Oct 9/02	Oct 16/03	Oct 15/04	Oct 20/05	Oct 13/06	Oct 3/07	Oct 17/08	Oct 28/09	Oct 18/10	Oct 12/11	Oct 16/12	Oct 8/13	Oct 15/14	Oct 14/15	Oct 05/16
Chem. O_2 Demand	mg/L	70	70	100	90	130	150	180	140	150	83	97	86	95	138	88.6	115	116	78	102	96	70
Ammonia-N	mg/L	0.06	<0.05	1.58	<0.05	<0.05	0.52	<0.05	<0.05	0.75	<0.05	<0.05	0.06	3.11	0.917	0.399	<0.050	0.052	<0.050	<0.05	0.070	<0.050
Total Kjeldahl Nitrogen	mg/L	4.5	3	5.5	3.4	3.7	8.2	5.4	5.9	9.3	2.9	2.9	2.6	6.1	8.08	3.47	3.95	4.36	2.65	3.27	2.48	2.33
Total Organic Carbon	mg/L	29	25	34	28	46	61	68	59	55	32	33	33	-	-	-	-		-		-	-
Dissolved Organic Carbon	mg/L	Not required under previous permit												32	47	34.8	32	38.9	32.3	30.4	33.2	25.3
BTEX, F1 (C6-C10) and F2 (>C10-C16)																						
Benzene	mg/L	Not required under previous permit												<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Toluene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Ethylbenzene	mg/L													<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050
Xylenes	mg/L													<0.0005	<0.00050	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071
F1 (C6-C10)	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F1 - BTEX	mg/L													<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10
F2 - (>C10-C16)	mg/L													<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.13
CCME Metals																						
Antimony	mg/L	<0.0004	<0.0004	0.0009	<0.0004	0.0006	0.0009	<0.0004	0.0015	0.0015	0.0016	0.0016	0.0022	<0.0004	<0.0016	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.00033	0.00017
Barium	mg/L	0.058	0.044	0.063	0.083	0.058	0.052	<0.003	0.089	0.061	0.01	0.022	0.014	0.084	0.0693	0.0728	0.0302	0.0782	0.129	0.0722	0.115	0.0559
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00020	<0.000050	<0.000050	<0.0010	<0.000050	<0.00005	<0.0000050	<0.0000050
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.00010	<0.00010
Cobalt	mg/L	<0.002	0.005	0.019	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.00056	0.00027
Copper	mg/L	0.002	<0.001	0.007	0.002	0.007	0.009	<0.001	0.006	0.003	<0.001	<0.001	<0.001	<0.001	<0.0024	0.0038	<0.0010	<0.0010	<0.0010	<0.001	0.00043	0.00052
Iron	mg/L	0.612	0.807	1.140	1.810	0.373	0.639	0.065	3.48	0.815	0.3	0.602	0.581	0.041	0.053	0.033	0.018	0.06	<0.010	0.027	0.011	0.021
Lead	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000050	<0.000050
Molybdenum	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	0.00373	0.00197
Nickel	mg/L	0.002	0.003	0.018	0.006	0.015	<0.002	<0.002	0.011	0.006	0.002	0.005	0.003	0.006	0.0051	0.0051	0.0029	0.004	0.0058	0.0049	0.00578	0.00391
Zinc	mg/L	0.11	0.016	0.05	0.015	0.246	0.045	0.007	0.014	0.243	0.003	0.005	0.012	0.004	<0.0040	<0.0020	<0.0020	<0.0020	<0.0020	0.0086	<0.0010	0.001
Mercury	mg/L	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0000050	<0.0000050
Aluminium	mg/L	Not required under previous permit												0.02	0.062	<0.010	<0.010	<0.010	<0.010	<0.01	<0.0010	0.0017
Beryllium	mg/L													<0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00010	<0.00010
Boron	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	0.041	0.041
Manganese	mg/L													0.404	0.0068	0.0143	0.0326	0.0046	<0.0020	0.003	0.00099	0.00054
Silver	mg/L													<0.0001	<0.00040	<0.00010	<0.00010	<0.0050	<0.00010	<0.0001	<0.000010	<0.000010
Tin	mg/L													<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.00010	<0.00010
Selenium	mg/L													0.0011	0.0021	<0.00040	<0.00040	<0.00080	<0.00040	<0.0004	0.000293	0.000227
Titanium	mg/L													0.001	<0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.00030	<0.00030
Thallium	mg/L													<0.0001	<0.00020	<0.00010	<0.00010	<0.050	<0.00010	<0.0001	<0.000010	<0.000010
Vanadium	mg/L													0.003	0.0049	0.0011	<0.0010	0.0026	<0.0010	<0.001	<0.00050	<0.00050
Routine Water																						
Ion Balance	%	109	107	103	105	109	92	102	104	102	101	103	99.6	95.6	105	104	96.5	98.1	110	107	100	107
Bicarbonate	mg/L	253	287	284	223	591	526	536	387	509	347	336	322	384	288	313	341	311	300	261	248	216
Chloride	mg/L	135.0	105.0	183.0	181.0	134.0	189.0	235	200	207	98	101	83	146	156	242	173	241	240	246	204	170
Carbonate	mg/L	17	41	<5	16	<5	64	124	90	47	<5	13	<5	<5	38.2	11.9	<5.0	14.4	8.8	8.3	<5.0	<5.0
Conductivity (EC)	uS/cm	884	934	1000	1050	1490	1660	1990	1520	1550	773	905	787	1050	1070	1350	1130	1310	1280	1270	1190	889
Calcium	mg/L	28.1	34	34	29.9	32.4	22.2	25.7	34.2	26.4	21.9	20.5	25.5	28.9	25.8	31.5	29.8	27.2	34.1	27.9	29.4	27.9
Potassium	mg/L	24.4	19.7	25.6	22.8	26	24.6	27.7	29.9	27.7	18.8	24.1	21.2	23.1	25.7	29.7	25.8	28.1	30.6	28.1	25.9	22.9
Magnesium	mg/L	16.8	26.9	21.3	18.8	23.3	20.0	<0.1	19.2	19.5	13.0	15.9	16.5	18.1	16.9	24.7	20.7	22	24.6	22.3	18.4	18.5
Sodium	mg/L	141	138	168	169	299	299	2	320	304	138	145	107	153	184	210	149	197	209	198	150	129
Sulfate	mg/L	13.7	36.3	60.5	54.7	105	96	84.6	111	41.9	6	9.4	11.9	22.2	21.3	31.1	11.3	15.7	16.5	11.5	15.3	9.21
Phosphorus	mg/L	Not required under previous permit													0.849	0.269	0.594	0.539	0.083	0.264	0.156	0.111
pH in H_20	pH	8.9	9.2	8.1	8.8	8.2	9.0	9.3	9.4	8.9	8.4	8.4	8.4	8.3	8.96	8.57	8.38	8.74	8.50	8.57	8.28	8.05
TDS (Calculated)	mg/L	501	541	633	602	907	977	1200	995	924	468	494	428	582	610	735	580	698	711	671	566	484
Nitrate	mg/L	Not required under previous permit												<0.1	<0.050	0.111	<0.050	<0.050	<0.050	<0.05	<0.040	<0.020
Nitrite	mg/L														<0.050	0.052	<0.050	<0.050	<0.050	<0.02	<0.020	<0.010
Field Data																						
pH in H_20	pH	Not required under previous permit												8.63	8.41	9.48	9.5	9.27	8.8	8.56	8.44	8.9
Conductivity (EC)	uS/cm													1086	750	2020	1220	1309	1313	1268	1208	862

APPENDIX J

2016 GROUNDWATER MONITORING REPORT

Groundwater Monitoring Program – 2016
Class I Waste Management Facility
Ryley, Alberta

PRESENTED TO

Clean Harbors Environmental Services, Inc.

FEBRUARY 2017
ISSUED FOR USE
FILE: SWM.SWOP03097-01

Tetra Tech Canada Inc.
14940 - 123 Avenue
Edmonton, AB T5V 1B4 CANADA
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EXECUTIVE SUMMARY

Clean Harbors Environmental Services, Inc. (Clean Harbors) retained Tetra Tech Canada Inc. (Tetra Tech) to conduct the 2016 Groundwater Monitoring Program for the Clean Harbors Waste Management facility (the facility). The site is located within the south east quarter section of Section 9, Township 50, Range 17, West of the 4th Meridian, approximately 2 km north of the Village of Ryley, Alberta.

The facility is a Class I landfill, storage, and disposal facility, licensed to accept various hazardous waste liquids and solids for disposal and/or transfer to authorized treatment or disposal facilities in accordance with the Alberta's *Environmental Protection and Enhancement Act* (EPEA). The facility operates under Alberta Environment (AENV), currently Alberta Environment and Parks (AEP), EPEA Approval No. 10348-02-00 (as amended) (the Approval). This approval has expired, and an application for the renewal of the Approval was submitted to AEP in September 2015, and is currently under review. AEP has, however, granted Clean Harbors an extension until March 31, 2017.

The objective of the current work was to provide an assessment of the current groundwater conditions, comment on the results, and provide recommendations for future groundwater monitoring.

Tetra Tech conducted the Groundwater Monitoring Program at the site in May and June 2016. The 2016 Groundwater Monitoring Program included monitoring and sampling of 52 existing monitoring wells including eight monitoring wells (15MW34A, 15MW34B, 15MW35-Deep, 15MW35A, 15MW35B, 15MW35C, 15MW36-Deep, and 15MW36A) installed after the 2015 monitoring program as part of the Approval renewal process.

The results of the 2016 Groundwater Monitoring Program are summarized below:

- Similar to previous years, the interpreted groundwater elevations in May 2016 indicated that the facility is primarily located in a groundwater recharge area, creating a radial pattern of the groundwater flow both in shallow and deep groundwater zones.
- The natural groundwater type is sodium sulphate and natural mineralization accounts for high concentrations of sodium, sulphate, and total dissolved solids (TDS) concentrations in the groundwater at the facility.
- In 2016, dissolved metal and routine parameters were within the historical concentration ranges.
- PAHs detected at MW26B in 2015 were not detected in 2016. PAHs at other wells sampled were also not detected.
- Overall, there were no indications of adverse groundwater impacts resulting from the site activities.

Based on the results of the 2016 Groundwater Monitoring Program, the following is recommended for Clean Harbors' consideration.

- Monitoring wells MW25A, MW25B, MW26B, and MW27B should be sampled in 2017 for PAHs to confirm the 2016 results. If PAHs are non-detect in these wells in 2017, PAHs should be removed from the analytical suite in 2018.
- The 2017 groundwater monitoring and sampling fieldwork should be conducted in late May or early June to maximize groundwater availability and reduce potential for frozen wells. The parameters that were analyzed in 2016 should be continued to be analyzed in 2017.
- The deep monitoring wells installed in the expansion area should be monitored in 2017 to provide better understanding of the deeper groundwater flow systems.
- Any changes to the current Groundwater Monitoring Program specified in the new operating approval should be reviewed and implemented according to the approval requirements in the future.

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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Clean Harbors Environmental Services, Inc. and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Clean Harbors Environmental Services, Inc., or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech Canada Inc.'s Services Agreement. Tetra Tech's General Conditions are provided in Appendix F of this report.

1.0 INTRODUCTION

Clean Harbors Environmental Services, Inc. (Clean Harbors) retained Tetra Tech Canada Inc. (Tetra Tech) to conduct the 2016 Groundwater Monitoring Program at The Ryley Landfill facility (the facility), located at the southeast quarter section of Section 9, Township 50, Range 17, West of the 4th Meridian, approximately 2 km north of the Village of Ryley, Alberta (Figure 1). The site is a Class I landfill, storage, and disposal facility, licensed to accept various hazardous waste liquids and solids for disposal and/or transfer to authorized treatment or disposal facilities in accordance with the Alberta's *Environmental Protection and Enhancement Act* (EPEA).

The facility operates under Alberta Environment (AENV), currently Alberta Environment and Parks (AEP), EPEA Approval No. 10348-02-00 (as amended) (the Approval). The Approval expired on March 31, 2016. An application for the renewal of the Approval was submitted to AEP in September 2015, and is currently under review. AEP issued a letter to Clean Harbors on March 24, 2016 providing an extension until March 31, 2017. A copy of the Approval, approval amendments, and extension letter is provided in Appendix A.

Tetra Tech conducted the Groundwater Monitoring Program at the site in May and June of 2016, which included monitoring and sampling of the existing 52 monitoring wells on site including eight additional monitoring wells, which were installed after the 2015 monitoring program was conducted. These monitoring wells were installed as part of the Approval renewal process.

The objective of the project was to provide an assessment of the current groundwater conditions, comment on the results, and provide recommendations for future groundwater monitoring.

Mr. Stan Yuha, Facility Manager at Clean Harbors provided written authorization to proceed with this work to Mr. Jeroen Pieterse of Tetra Tech on April 6, 2016.

2.0 SCOPE OF WORK

The scope of work for the 2016 monitoring program included:

- Measuring groundwater levels within each monitoring well and observing monitoring well integrity.
- Purging each well until approximately three standing well volumes of water had been removed or until practically dry, and allowing the water level in the well to recover prior to sampling.
- Collecting groundwater samples from each monitoring well within the sampling program and submitting these samples for laboratory chemical analyses.
- Evaluating water quality data promptly so any unusual findings can be reported in a timely manner.
- Preparing an annual report to summarize the field activities undertaken during the year, providing and interpreting the measured groundwater levels and groundwater analytical results.

3.0 GROUNDWATER REGULATORY CONTEXT

As stated in Approval Section 4.8.4, the water quality objectives in the Canadian Environmental Quality Guidelines (CEQG) for drinking water, published by the Canadian Council of Ministers of the Environment (CCME) are to be used for comparison for groundwater samples. The CCME now directs users to the Health Canada Federal Provincial Territorial Committee on Drinking Water Guidelines for Canadian Drinking Water Quality (GCDWQ, 2014). These guidelines were adopted for the Groundwater Monitoring Program for the facility. As part of the Approval requirements, the groundwater quality in previous reports was also compared to the background water chemistry obtained from monitoring well MW11. In 2015, additional wells were drilled in the southwest portion of the facility as part of the renewal application. The application was submitted in September 2015. Newly installed monitoring wells 15MW35-Deep, 15MW35A, 15MW35B, and 15MW36C are also considered to represent background groundwater chemistry.

4.0 BACKGROUND INFORMATION

4.1 Groundwater

As required in Section 4.8.10 of the Approval, a water well database search must be conducted to a minimum of a 1.6 km radius from the Site. The provincial water well database is maintained by the AEP Groundwater Information Centre. To account for the distance from the centre of the site, and spatial inaccuracies within the water well database, a 2.0 km radius was used. The search gave a listing of 41 water well records as of October 2016.

The following table (Table 4.1) summarizes the well use within the search radius:

Table 4.1: Water Well Information Database Summary

Domestic	Domestic & Industrial	Domestic & Stock	Industrial	Municipal	Observation Monitoring and Investigation	Stock	Unknown/ Other
7	2	3	1	2	13	2	11

The average drilling depth of the water wells is 50.5 m below ground level (mbgl), and the maximum depth is 140.2 mbgl. A full reconnaissance report is provided in Appendix B.

4.2 Surface Water

Surface water sampling locations surrounding the facility (dugout sites as shown on Figure 2) are sampled annually in the fall of each year. The analytical results for these surface water sampling locations were reported under a separate cover (Clean Harbors Alberta 2016 Dugout Sampling Program).

Figures 3 shows the surface water drainage and historical monitoring well locations at the facility. The northwest corner of the site is a local topographic high point for surface water. Ditches have been constructed around the waste cells, to collect surface water, and allow perimeter drainage to the retention pond, located on the east side of the facility. A ditch on the northern edge is sloped downward to the east along the north base of Cells 1 and 2 to a gravelled storage pad. It then drains water into a second ditch that conveys the surface runoff east to connect to the ditch that drains water to the retention pond. Surface water from the northwest corner also drains south, through a perimeter ditch that collects water from the west base of Cells 2 and 3A. At the southwest corner of Cell 3A, the

ditch turns east to collect perimeter drainage along the south portion of the facility. Surface water then drains east into the retention pond. All surface water runoff is collected and not discharged off site until it meets surface water requirements. Surface water from around the site are collected and not allowed to flow onto the site.

4.3 Geology and Hydrogeology

The surficial geology in the area consists of unconsolidated glacial deposits (till), of Quaternary age. The till is up to 4 m thick at the facility and overlies Cretaceous sedimentary bedrock. The Bearpaw Formation underlies the till and consists of marine shales, silty shales, sandstone and bentonite beds that interfinger with sandstone. The Belly River Group lies underneath the Bearpaw Formation. The group contains the Oldman Formation, and the Continental and Marine Foremost Formations. In the upper portion of the group, bedrock consists mainly of non-marine, grey to greenish grey, thick bedded, feldspathic sandstone, grey, clayey siltstone, grey and green mudstone (Stein, 1982. Fenton, et al. 2013). Due to the similarities between the two units, and the overlapping deposition and subsequent interfingering of the layers, distinct boundaries are difficult to define. Together these formations are estimated up to approximately 24 m thick beneath the facility (Prior, et al. 2013).

Based on review of a hydrogeological report and map of the area east of Edmonton (Stein and Carlson 2005), the regional groundwater flow is inferred to generally mimic the surface topography in the area. This would suggest a flow towards the north to Beaverhill Lake and eventually to the North Saskatchewan River, although local flow direction may vary. Hydraulic conductivity values for the Belly River and Bearpaw Formations are reported to be approximately 0.5 m/day (5.8×10^{-6} m/s). The facility is situated in an area where groundwater in the bedrock contains total dissolved solids (TDS) concentrations ranging from 1,500 mg/L to more than 8,000 mg/L. Groundwater chemistry within the till material is naturally mineralized, and is sodium sulphate water type.

Geologic cross-section alignments are shown on Figure 4a and cross-sections through different portions of the Site are presented in Figures 4b to 4e.

4.4 Groundwater Monitoring Network

Historically there had been 44 monitoring wells on site, however wells MW34A, MW34B, MW35-Deep, MW35A, MW35B, MW35C, MW36-Deep and MW36A were installed in the summer of 2015 as part of the Approval renewal. The total number of groundwater monitoring wells on site is now 52. All 52 wells were monitored in June 2016, however 15MW35C had insufficient water and therefore could not be sampled. The locations of the monitoring wells are shown on Figure 3.

Table 2 summarizes the monitoring wells and hydro-stratigraphic units, where these wells were installed. Table 3 summarizes the well construction details.

5.0 FIELD WORK METHODS

5.1 Safety

Tetra Tech contacted Clean Harbors prior to starting fieldwork to coordinate field activities. A Tetra Tech safe work form (SWF) identifying and mitigating on site hazards was completed before beginning the fieldwork, and Tetra Tech personnel reviewed and signed the SWF prior to starting work each day.

5.2 Groundwater Monitoring and Sampling

Tetra Tech personnel followed environmental industry accepted practices to ensure that representative groundwater samples were obtained for analysis. Monitoring of the monitoring well network was conducted on May 31, and sampling on June 3, 4, 8, and 9 of 2016. Monitoring and sampling involved the following field activities and data collection process:

- Recorded static groundwater levels in each well using an interface probe;
- Purged water from each monitoring well by removing three well volumes, or until nearly dry;
- Recorded volume and description of the groundwater purged;
- Recorded field parameters including electrical conductivity (EC), pH, and temperature using a multi meter probe;
- Allowed wells to recover groundwater levels to sufficient levels to obtain representative samples; and
- Collected groundwater samples using dedicated rigid polyvinyl chloride (PVC) bailers, or waterra tubing with a foot valve.

Groundwater samples were collected in laboratory-supplied containers, stored in coolers with ice to keep sample temperature below 10°C throughout the fieldwork and submitted to Maxxam Analytics (Maxxam) in Edmonton, Alberta under chain-of-custody (COC). A total of 55 samples were submitted to Maxxam; 51 samples from monitoring wells and five duplicate sets of samples from [MW22B (Dup 1), MW26B (Dup 2), MW36A (Dup 3), MW10 (Dup 4), and MW34B (Dup 5)]; Samples were analyzed for the following parameters as required by the Approval:

- pH;
- EC;
- Major ions (routine);
- Trace metals (dissolved);
- Nutrients (total Kjeldahl nitrogen [TKN] and ammonia-N);
- Chemical oxygen demand (COD);
- Dissolved organic carbon (DOC); and
- Benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbon (PHC) fractions F1 and F2.

In 2015, groundwater collected from monitoring well MW26B was analyzed for polycyclic aromatic hydrocarbons (PAHs) after PAHs were detected in soils near MW26B during the 2014 Soil Monitoring Program (Tetra Tech, 2014). In 2015, Benzo(a) pyrene was detected at greater than the guideline value, and all other PAH compounds were greater than laboratory detection limits. PAH analysis was continued in 2016 at MW26B and also was analysed in the samples collected from the adjacent wells MW25A, MW25B, and MW27B.

A summary of the laboratory analytical program for groundwater is detailed in Table 1. Laboratory results are presented in Appendix C.

6.0 RESULTS

6.1 Groundwater Elevations and Direction

Table 4 summarizes 2016 and historical groundwater elevations. The 2016 groundwater elevations in each of the 52 monitoring wells were compared to historic groundwater elevations from April 1991 to May 2015. The wells were resurveyed in 2015, and historic groundwater elevations were adjusted to the 2015 survey data.

The hydrographs based on the groundwater elevations measured in the monitoring wells installed in the clay till, upper sandstone, clay shale and lower bedrock units are shown on Figures 5a to 5d, respectively. The groundwater elevations in 2016 have remained generally consistent with historical values with an average variation of +/- 0.50 m except at the newly installed monitoring wells installed in 2015. The following Table 6.1 summarizes the monitoring wells where elevation difference was greater than 1 m between 2015 and 2016, and well screen elevations. Complete borehole logs are presented in Appendix D.

Table 6.1: Groundwater Elevation Differences Greater than 1 m between 2015 and 2016

Well ID	Screen Interval (amsl)		2015 Groundwater Elevation (amsl)	2016 Groundwater Elevation (amsl)	Difference
	Top	Bottom			
MW 5A	683.04	681.54	686.96	685.79	-1.17
MW 14	681.88	680.38	684.86	685.923	1.07
MW 20A	680.39	678.89	686.87	685.55	1.33
MW 29A	680.13	678.63	684.93	685.98	1.05
MW 29B	684.96	683.46	684.95	686.10	1.15
MW 30A	682.42	680.42	684.87	685.95	1.09
15MW34A	677.78	676.04	683.60	685.38	1.79
15MW34B	684.77	683.17	683.16	685.89	2.72
15MW35A	676.76	674.75	677.64	681.61	3.97
15MW35B	682.97	681.30	683.05	684.62	1.56
15MW36-Deep	653.43	652.39	665.02	681.87	16.86

Note: Negative value denotes water level decreased in 2016.

Increases in the groundwater elevations in the wells installed in 2015, particularly at 15MW36-Deep is considered to be due to the water levels not reaching equilibrium in 2015. These wells were monitored shortly after drilling and installation.

Groundwater elevations for the 2016 monitoring event were contoured using Surfer Mapping System Version 13. Contours were created by grouping wells within the same water bearing units, and interpolating groundwater elevation data between wells. Through analysis of the contour maps by using integrated software tools, an estimate

of flow direction. Professional judgement was applied to ensure that the information presented in the figures is reasonably applicable given site history and hydrogeological conditions.

Figures 6a through 6d show groundwater flow directions for four geologic units (surficial material, upper sandstone, clay shale, and lower bedrock). The contours on each of these maps were created using wells screened across one distinct unit, within a general depth range. The historical monitoring wells, which were screened across multiple units, were not used to create these contour maps.

- Figure 6a shows groundwater elevation contours for the clay till (surficial) unit. The screen depths range from 4.2 mbgl to 5.8 mbgl. Groundwater in this unit flows to the northeast. It is likely that this unit is discontinuous across the site due to landfill cells and infrastructure construction. Only three wells were screened within the clay till material on the east side of the site.
- Figure 6b shows groundwater elevation contours for the upper sandstone unit. This unit is likely laterally continuous in wells across the facility. Screen depths in this unit range from 4.5 mbgl to 13.9 mbgl. Groundwater in this unit flows away from monitoring well MW08B to the southeast on the eastern half of the site, and to the northwest on the western portion of the site.
- Figure 6c shows groundwater elevation contours for the clay shale unit. This material is laterally continuous in wells across the facility. Screen depths range from 9.4 mbgl to 10.1 mbgl. The groundwater flow direction in this zone is towards east northeast, however, in the southwest corner of the site, the flow is radial from monitoring wells MW23A and MW25A to the southwest, north, and northeast. . Overall the groundwater flow direction in this unit is consistent with historical data.
- Figure 6d shows deep groundwater contours, based on elevations monitored in four monitoring wells installed in the Belly River Formation. Additional data from two wells was used from the lateral expansion area to the north (Tetra Tech, 2016). Well depths in this zone range from 38.8 to 42.4 mbgl. The groundwater flow in this zone is interpreted to be from south to north, with a westward flow component, towards Beaverhill Lake. This is in agreement with regional hydrogeological data.

From the 2016 groundwater elevations, and interpreted groundwater flow directions, the southwest area of the site is considered to be up-gradient in most units as seen in Figures 6a through 6d. Therefore, the newly installed nested set of wells 15MW35A/B/C/Deep can be considered as up-gradient monitoring well in future when stabilized groundwater flow conditions are observed and more analytical data is available at these wells.

Vertical and horizontal hydraulic gradients were also calculated, and are reported in Tables 6.1-1 and 6.1-2 respectively.

Table 6.1-1: Vertical Hydraulic Gradients

Wells	Vertical Groundwater Flow Direction
MW1B/MW1C, MW5A/MW5B, MW8A/MW8B, MW12A/MW12B, MW18A/MW18B, MW21A/MW21B, MW22A/MW22B, MW24A/MW24B, MW26A/MW26B, MW28A/MW28B, MW29A/MW29B, MW31A/MW31B, MW32A/MW32B, MW33A/MW33B, MW34A/MW34B, MW35A/MW35B, MW36-Deep/MW36C	Downward
MW20A/MW20B, MW23A/MW23B, MW25A/MW25B, MW27A/MW27B, MW30A/MW30B, MW35-Deep/MW35A	Upward
MW19A/MW19B	No Gradient

Table 6.1-2: Horizontal Hydraulic Gradients

Hydro-stratigraphic Unit	Gradient (m/m)
Surficial Material	0.0001 to 0.0150
Upper Sandstone	0.0001 to 0.0160
Clay Shale	0.0001 to 0.0187
Lower Bedrock	0.0032 to 0.0119

6.2 Groundwater Chemistry

The laboratory analytical results are presented in Tables 5.1A to 5.33B with results compared to GCDWQ. Parameters with concentrations greater than the GCDWQ guidelines or outside of the GCDWQ guidelines range are shaded on the tables. As with previous years, groundwater data collected during 2016 show a moderate to high degree of mineralization exhibited by the elevated sodium, sulphate, and TDS concentrations. Historical results are contained in Appendix E.

The parameters exceeding the GCDWQ guidelines and select parameters are discussed in the following Table 6.2-1.

Table 6.2-1: 2016 Analytical Results Summary for Select Parameters

Parameter	Drinking Water Guidelines for Canadian Drinking Water Quality	2016 Measured Concentrations	Greater than Guidelines Value in 2016
Sodium	200 mg/L	320 – 3200 mg/L	All Wells
▪ Sodium concentrations have remained within historical ranges, no notable trends are observed. ▪ A historical high concentration (3400 mg/L) was measured at MW12B in 2014. Concentrations have stabilized to approximately 2500 mg/L in 2015 and 2016.			
Chloride	250 mg/L	1.1 – 1100.0 mg/L	MW-36-Deep
▪ Chloride concentrations have remained within historical levels at many wells, some increasing trends are observed (MW08B, MW18). ▪ Concentration trends are plotted in Figure 7a and Figure 7b.			
Nitrate (N)	10 mg/L	<0.01 – 17.0 mg/L	MW22A
▪ Concentration trends of MW20A, MW21A and MW22A are plotted on Figure 8. ▪ Trends show monitoring well MW22A has been consistently exceeding the guideline since 2012. ▪ MW20A and MW21A have decreased to below guideline since an all-time high observed in 2007. ▪ Trends in MW22A, and surrounding wells should continue to be monitored.			
Sulphate	500 mg/L	<1.0 to 6800 mg/L	All wells, excluding MW8A, MW18A, MW21A, MW23A, MW25A, MW26A, MW31A, MW33A, MW35A, and MW35-Deep
▪ Sulphate concentrations have remained within historical ranges, no notable trends are observed. ▪ A historical high (6,900 mg/L) was observed at MW28B in 2014, concentrations have remained consistent in 2015 and 2016.			
TDS	500 mg/L	870 to 11,000 mg/L	All Wells
▪ TDS concentrations have remained within historical ranges, no notable trends are observed. ▪ TDS appears to be naturally elevated at the facility			
pH (Laboratory)	6.5-8.5	7.65 – 8.66	MW26A and MW31B
pH (Field)		7.65 - 8.66	MW23A, MW27A, MW28A, MW31A, MW33A, MW34A, MW35A, MW36A and MW36-Deep
▪ pH values have remained within historical ranges, no notable trends are observed. ▪ Wells along the southern boundary, in deeper monitoring units have consistently high pH levels, near guideline values. ▪ Monitoring wells MW31A and MW27A have fluctuated historically above and below the guideline, and in 2016 were above the guideline value. ▪ Monitoring wells MW5B and MW8A were greater than guideline for the first time in 2016.			

Parameter	Drinking Water Guidelines for Canadian Drinking Water Quality	2016 Measured Concentrations	Greater than Guidelines Value in 2016
Aluminum	0.1 mg/L	0.11 – 3.8 mg/L	MW18B, MW26A, MW30A, MW31A, MW33A, MW36-Deep;
▪ Aluminum has been analyzed since 2015 and concentrations were greater than the guideline at monitoring wells MW30A and MW31A both in 2015 and 2016. ▪ At other wells, aluminum concentrations remained consistent in 2015 and 2016. ▪ Wells with aluminum concentrations over guideline should continue to be monitored, and trends observed.			
Iron (greater than guideline)	0.3 mg/L	0.35 – 1.4 mg/L	MW29B, MW30A, MW33A, MW33B
Iron (detection limit greater than guideline)	0.3 mg/L	<0.6 mg/L	MW9, MW20B, MW22A, MW22B, MW23B, MW24A, MW31A, MW32B;
▪ Iron concentrations have generally remained within historical ranges. ▪ No notable increasing concentration trends have been observed.			
Manganese	0.05 mg/L	<0.004 – 0.85 mg/L	MW1B, MW1C, MW5A, MW8B, MW9, MW10, MW12A, MW12B, MW14, MW18A, MW19A, MW19B, MW23B, MW24A, MW25A, MW25B, MW26B, MW27B, MW28B, MW29A, MW29B, MW30A, MW32A, MW32B, MW33A, MW33B, MW34A, MW34B, MW35B
▪ Manganese has only been analyzed for the last two monitoring events (2015 and 2016). Further sampling is required to establish trends.			
Uranium	0.02 mg/L	0.00013 – 0.2 mg/L	MW11, MW12B and MW24B
▪ Uranium is likely naturally occurring on site. ▪ No notable increasing concentration trends have been observed. ▪ Concentrations should continue to be monitored, and trends observed.			
Benzo(a) pyrene	0.00001 mg/L	-	No Wells
▪ In 2015, MW26B had a benzo(a) pyrene concentration of 0.0015 mg/L greater than the guideline. However, in 2016 all PAH parameters, including benzo(a) pyrene were non-detect at all wells sampled for PAH.			

Concentrations for BTEX, PHC fractions F1 and F2 were less than referenced guidelines in 2016 in all wells. Toluene was detected in MW21A (0.00074 mg/L), however it was less than the guideline value of 0.024 mg/L.

The GCDWQ does not have guideline concentrations for ammonia, TKN, COD, or DOC. The table below summarizes the results of these parameters in 2016.

Table 6.2-2: Ammonia-N, TKN, COD and DOC Summary

Parameter	Maximum Concentration (mg/L)	Monitoring Well	Minimum Concentration (mg/L)	Monitoring Well	Average in All Wells (mg/L)
Ammonia	2.9	MW32A	0.061	MW24A	0.58
TKN	12	MW35A	0.07	MW22A	1.3
COD	1,100	MW35A	17	MW20B	75
DOC	72.0	MW34A	4.2	MW21A	13.0

6.3 Quality assurance and Quality Control

To evaluate field sampling reproducibility, duplicate groundwater samples were collected during the sampling event in 2016. Duplicates were collected from MW-22B (Dup 1), MW-26B (Dup 2), MW-36A (Dup 3), MW-10 (Dup 4), and MW-34B (Dup 5) and submitted for laboratory analysis for the same suite of parameters as the parent samples.

The field sampling and laboratory testing reproducibility of each sample-duplicate pair was evaluated using the relative percent difference (RPD) method, involving calculation of RPD when both sample-duplicate concentrations were greater than, or equal to, five times the laboratory method detection limit (MDL), as shown in Equation 1.

Equation 1:

$$\%RPD = \left(\frac{|Sample - Duplicate|}{\overline{X}} \right) * 100$$

Where $\overline{X}$ is the calculated average concentration of the parent sample and the corresponding duplicate.

Groundwater quality parameters were considered as having passed the quality assurance and quality control (QA/QC) reproducibility procedure if the RPD was less than or equal to 20%, indicating a close correlation between the sample-duplicate pair.

The RPD values were not calculated if one or both of the sample-duplicate concentrations were between the MDL and five times the MDL. In these cases, groundwater quality parameters were still considered as having passed the QA/QC reproducibility procedure if the sample-duplicate concentration difference was less than one MDL value.

The RPD calculations are summarized in Table 6. These results indicate that all the parameters had RPD less than 20% except the following listed in Table 6.3:

Table 6.3: Parameters with RPD > 20%

MW26B and Duplicate 2	MW10 and Duplicate 4	MW34B and Duplicate 5
Total Kjeldahl Nitrogen = 22% Dissolved Molybdenum = 32% Dissolved Nickel = 24%	Chloride = 30% Chemical Oxygen Demand = 22% Copper = 37%	Total Kjeldahl Nitrogen = 37% Dissolved Manganese = 43% Dissolved Phosphorus 36% Dissolved Silicon = 22% Dissolved Sulphur = 25%

The relatively low percent of RPD values for most of the samples indicates that the 2016 results are acceptable for inclusion into the historical database for trend comparison. Some dissolved metals are noted to have high RPD in the 30% to 40% range. Initial laboratory review of the samples indicated the presence of sediment in MW1B, MW27A, MW28A, MW31A, MW33A and MW34B. After communication with Maxxam, it was agreed that filtered samples with sediment would be laboratory filtered using water from the routine bottle. The calculated RPD values for the dissolved metals results may reflect variation due to sediment in the sample. Other dissolved metals samples were field filtered; however, it is possible that an incomplete field filtration of the sample occurred. Sampling for the dissolved metal analysis should be conducted again in 2017 to confirm 2016 results.

6.4 Discussion

The nested wells location 15MW35A/B/C/Deep is considered to be up-gradient of the facility operations, however additional monitoring data is required once stabilization of the groundwater flow system occurs, for comparison purposes. Groundwater chemistry from monitoring well MW11 has been used in the past as background chemistry. This well is still considered to have groundwater quality without potential facility impacts. Groundwater quality at MW11 has a high degree of natural mineralization producing elevated concentrations for sodium, sulphate, TDS, which exceeded the GCDWQ guidelines.

All wells in the monitoring network have exhibited similar evidence of groundwater mineralization (sodium, sulphate and TDS) as observed at MW11. This is consistent with the chemical quality of the shallow groundwater reported in the area.

Historically, chloride concentrations at decommissioned well MW13 had fluctuated from less than to greater than the referenced guideline value and had the most elevated chloride concentrations in groundwater on site. In 2004, chloride concentrations at MW13 had been in the range of 173 mg/L and 550 mg/L with no apparent concentration trends (Figure 6a). It is possible that the elevated chloride concentrations detected at this location originated from the sewage lagoon that was previously located near these monitoring wells. Monitoring wells MW8A and MW33A/B near the decommissioned wells do not show evidence of increasing chloride concentrations.

Since groundwater monitoring and sampling at this facility has been conducted, nitrate concentrations at MW22A, which is located near the southwest corner of Cell 3A, have varied from less than to greater than the referenced guideline concentration of 10 mg-N/L. In 2016, the nitrate concentration at MW22A (17 mg-N/L) was greater than the referenced guideline. The elevated nitrate concentrations detected at MW22A may be associated with previous land use in the area (i.e., agriculture, livestock, etc.) or potentially related to current livestock use immediately west of the facility. Values are within historical ranges and are observed to be within +/- 1 mg-N/L over the past four years (Figure 7).

Historically pH values have been slightly above or just below the upper guideline value. It is likely that pH is naturally slightly elevated in some of the wells on site. pH will continue to be analyzed at the above wells where it exceeded the guideline to assess any trends.

The dissolved iron concentrations at monitoring wells MW29B, MW30A, MW33A, MW33B, and MW36-Deep were greater than the referenced guideline concentration of 0.3 mg/L in 2016. Iron concentrations at these monitoring wells range from 0.35 mg/L (MW33B) to 0.60 mg/L (MW31A), monitoring wells MW9, MW20B, MW22A, MW22B, MW23B, MW24A, MW31A, MW32B, and MW35B were reported as having detection limits greater than the guideline value. The iron appears to be related to naturally occurring anoxic subsurface conditions.

In 2016, concentrations of manganese were greater than the guideline value of 0.05 mg/L in all wells on site, with the exception of wells MW05B, MW08A, MW11, MW18B, MW20A, MW20B, MW21A, MW21B, MW22A, MW22B, MW23A, MW24B, MW26A, MW27A, MW28A, MW30B, MW31A, MW31B, MW35A, MW35-Deep, MW36A, and MW36-Deep. The guideline value of 0.05 mg/L is considered to be primarily an aesthetic guideline value. The groundwater is known to be associated with reducing conditions in the subsurface, and manganese is naturally occurring in Alberta (Government of Canada, 1987). Monitoring of manganese in the groundwater should continue in future sampling events to establish trends.

Uranium is reported as being in exceedance of guideline values at wells MW11, MW12B, and MW24B. Uranium is considered to be naturally occurring in surface waters, and groundwater around Alberta within glacial till deposits (CCME, 2007). Further trends should be established through future sampling events.

In 2016, monitoring well MW26B was sampled to confirm PAH parameters concentrations observed in 2015 at this well. Also nearby wells MW25A, MW25B, and MW27B were analysed for PAHs in 2016. In 2016, all PAH parameter concentrations were reported as less than the detection limits in all wells tested. Tetra Tech recommends that MW26B and adjacent wells MW25A, MW25B, and MW27B be tested again in 2017 and if no PAH parameters are detected, PAHs be removed from the analytical suite.

7.0 CONCLUSIONS

The 2016 groundwater monitoring report findings are summarized as follows:

- Similar to previous years, the interpreted groundwater elevations in May 2016 indicated that the facility is primarily located in a groundwater recharge area, creating a radial pattern of the groundwater flow both in shallow and deep groundwater zones.
- The natural groundwater type is sodium sulphate and natural mineralization accounts for high concentrations of sodium, sulphate, and TDS concentrations in the groundwater at the facility.
- In 2016, dissolved metal and routine parameters were within the historical concentration ranges.
- PAHs detected at MW26B in 2015 were not detected in 2016. PAHs at other wells sampled were also not detected.
- Overall, there were no indications of adverse groundwater impacts resulting from the site activities.

Based on the results from the work conducted in 2016, the following is recommended for Clean Harbors' consideration:

- Monitoring wells MW25A, MW25B, MW26B, and MW27B should be sampled in 2017 for PAHs to confirm the 2016 results. If PAHs are non-detect in these wells in 2017, PAHs should be removed from the analytical suite in 2018.
- The 2017 groundwater monitoring and sampling fieldwork should be conducted in late May or early June to maximize groundwater availability and reduce potential for frozen wells. The parameters that were analyzed in 2016 should be continued to be analyzed in 2017.
- The deep monitoring wells installed in the expansion area should be monitored in 2017 to provide better understanding of the deeper groundwater flow systems.
- Any changes to the current Groundwater Monitoring Program specified in the new operating approval should be reviewed and implemented according to the approval requirements in the future.

8.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
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PERMIT TO PRACTICE
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Signature
Date February 13, 2017
PERMIT NUMBER: P13774
The Association of Professional Engineers and Geoscientists of Alberta

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TABLES

Table 1: Summary of Laboratory Analytical Program - 2016

Clean Harbors Well Identification	Lab Analysis Parameters
52 wells, 5 duplicates and 1 trip blank	pH (field and laboratory) Electrical Conductivity (field and laboratory) Major Ions (routine) Trace Metals (dissolved) Nutrients (Total Kjeldahl Nitrogen and ammonia-N) Chemical Oxygen Demand Dissolved Organic Carbon Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) Petroleum Hydrocarbon (PHC) Fractions F1 and F2 Polycyclic Aromatic Hydrocarbons (PAHs)

Table 2: Monitoring Well Identification System - Current Network

Well Identification	Date Installed	Unit Type
MW 1B	30-Sep-96	Clay Shale
MW 1C	14-Jun-11	Upper Sandstone
MW 5A	19-Feb-91	Upper Sandstone
MW 5B	23-Sep-96	Clay Shale
MW 8A	4-Oct-12	Clay Shale
MW 8B	4-Oct-12	Upper Sandstone
MW 9	19-Feb-91	Surficial Materials
MW 10	19-Feb-91	Surficial Materials
MW 11	19-Feb-91	Upper Sandstone
MW 12A	19-Feb-91	Upper Sandstone
MW 12B	30-Sep-96	Clay Shale
MW 14	22-Jul-92	Upper Sandstone
MW 18A	1-Oct-96	Clay Shale
MW 18B	30-Sep-96	Surficial Materials
MW 19A	1-Oct-96	Clay Shale
MW 19B	1-Oct-96	Surficial Materials
MW 20A	1-Oct-96	Clay Shale
MW 20B	1-Oct-96	Surficial Materials
MW 21A	1-Oct-98	Clay Shale
MW 21B	1-Oct-98	Surficial Materials
MW 22A	1-Oct-98	Clay Shale
MW 22B	1-Oct-98	Surficial Materials
MW 23A	1-Oct-98	Clay Shale
MW 23B	1-Oct-98	Upper Sandstone
MW 24A	13-Aug-04	Clay Shale
MW 24B	13-Aug-04	Surficial Materials
MW 25A	13-Aug-04	Clay Shale
MW 25B	13-Aug-04	Upper Sandstone
MW 26A	13-Aug-04	Clay Shale
MW 26B	13-Aug-04	Upper Sandstone
MW 27A	Oct-07	Clay Shale
MW 27B	Oct-07	Upper Sandstone
MW 28A	4-Oct-12	Clay Shale
MW 28B	4-Oct-12	Upper Sandstone
MW 29A	6-Oct-14	Upper Sandstone
MW 29B	8-Oct-14	Surficial Materials
MW 30A	8-Oct-14	Upper Sandstone
MW 30B	8-Oct-14	Surficial Materials
MW 31A	8-Oct-14	Upper Sandstone
MW 31B	8-Oct-14	Surficial Materials
MW 32A	8-Oct-14	Clay Shale
MW 32B	8-Oct-14	Surficial Materials
MW 33A	6-Oct-14	Upper Sandstone
MW 33B	6-Oct-14	Surficial Materials
15MW34A	21-Jul-15	Clay Shale
15MW34B	21-Jul-15	Surficial Materials
15MW35-Deep	28-Jul-15	Lower Bedrock
15MW35A	28-Jul-15	Clay Shale
15MW35B	28-Jul-15	Upper Sandstone
15MW35C	28-Jul-15	Surficial Materials
15MW36-Deep	21-Jul-15	Lower Bedrock
15MW36A	28-Jul-15	Clay Shale

Notes:

mbgl - metres below ground level

Unit Types

	Surficial Materials
	Upper Sandstone
	Clay Shale
	Lower Bedrock

Table 3: Monitoring Well Construction Details - Existing Monitoring Wells

Well	Date Installed	Surface Elevation[1] (m AMSL)	Top of Casing Elevation[1] (m AMSL)	Measured Stick-up (m)	Measured Well Depth			Screened Interval (mbgl)				Sand Pack Interval (mbgl)		Lithology Screened
					(m BTOC)	(mbgl)	(m AMSL)	Top Screen Depth	Bottom Screen Depth	Top Screen Elevation (m AMSL)	Bottom Screen Elevation (m AMSL)	Top Sand Depth	Bottom Sand Depth	
MW 1B	30-Sep-96	687.82	688.70	0.87	10.72	9.86	677.98	8.36	9.86	679.46	677.96	8.00	9.86	clay shale
MW 1C	14-Jun-11	687.64	688.61	0.94	6.45	5.51	682.16	4.01	5.51	683.64	682.14	3.70	5.51	clay shale/ sandstone
MW 5A	19-Feb-91	688.28	689.17	0.90	7.64	6.74	681.53	5.24	6.74	683.04	681.54	4.74	6.74	clay shale / sandstone
MW 5B	23-Sep-96	688.25	689.10	0.83	10.52	9.69	678.58	8.19	9.69	680.07	678.57	7.90	9.69	clay shale
MW 8A	4-Oct-12	686.84	687.83	0.98	11.26	10.28	676.57	7.28	10.28	679.56	676.56	6.6	10.28	clay / sand / siltstone
MW 8B	4-Oct-12	686.82	687.69	0.85	5.418	4.57	682.27	3.07	4.57	683.76	682.26	1.8	4.57	clay / sand
MW 9	19-Feb-91	686.97	687.47	0.42	5.35	4.93	682.12	3.43	4.93	683.55	682.05	3.13	4.93	clay till / sandstone
MW 10	19-Feb-91	687.44	687.96	0.38	3.87	3.49	684.09	1.99	3.49	685.45	683.95	1.69	3.49	clay till / clay shale / sandstone
MW 11	19-Feb-91	687.95	688.37	0.42	6.25	5.83	682.12	4.33	5.83	683.61	682.11	4.03	5.83	clay shale / sandstone
MW 12A	19-Feb-91	686.62	687.13	0.39	6.17	5.78	680.96	4.28	5.78	682.34	680.84	3.98	5.78	clay till / clay shale / sandstone
MW 12B	30-Sep-96	687.27	687.78	0.20	10.69	10.49	677.09	8.99	10.49	678.29	676.79	8.69	10.49	clay shale
MW 14	22-Jul-92	686.52	687.56	0.94	7.08	6.14	680.48	4.64	6.14	681.88	680.38	4.34	6.14	clay till / sandstone
MW 18A	1-Oct-96	687.13	687.77	0.64	10.72	10.08	677.05	8.58	10.08	678.56	677.06	8.15	10.08	clay shale
MW 18B	30-Sep-96	687.12	687.85	0.74	6.01	5.27	681.85	2.27	5.27	684.84	681.84	2.10	5.27	clay till / clay shale / sandstone
MW 19A	1-Oct-96	686.60	687.10	0.46	10.72	10.26	676.38	8.76	10.26	677.84	676.34	8.20	10.26	clay shale
MW 19B	1-Oct-96	686.65	687.14	0.50	5.33	4.84	681.81	1.84	4.84	684.81	681.81	1.64	4.84	clay shale / sandstone
MW 20A	1-Oct-96	688.89	689.54	0.60	10.60	10.00	678.94	8.50	10.00	680.39	678.89	8.30	10.00	clay shale / sandstone
MW 20B	1-Oct-96	688.92	689.65	0.71	5.11	4.40	684.55	1.40	4.40	687.53	684.53	1.20	4.40	clay till / clay shale / sandstone
MW 21A	1-Oct-98	687.60	688.30	0.69	10.67	9.98	677.63	8.48	9.98	679.12	677.62	8.18	9.98	clay shale / siltstone
MW 21B	1-Oct-98	687.54	688.55	0.97	6.08	5.11	682.47	2.11	5.11	685.43	682.43	1.81	5.11	clay till / sandstone / siltstone
MW 22A	1-Oct-98	687.83	688.66	0.84	10.66	9.82	678.01	8.32	9.82	679.52	678.02	8.02	9.82	clay shale / sandstone / siltstone
MW 22B	1-Oct-98	687.81	688.70	0.87	6.09	5.22	682.61	2.22	5.22	685.59	682.59	2.22	5.22	clay till / sandstone / clay shale
MW 23A	1-Oct-98	686.45	687.16	0.67	10.66	9.99	676.50	8.49	9.99	677.96	676.46	7.99	9.99	clay shale / sandstone / siltstone
MW 23B	1-Oct-98	686.48	687.38	0.86	5.35	4.50	682.03	1.50	4.50	684.98	681.98	1.30	4.50	sand / sandstone
MW 24A	13-Aug-04	688.88	689.68	0.70	10.50	9.80	679.18	8.30	9.80	680.58	679.08	8.00	9.80	sandstone / siltstone
MW 24B	13-Aug-04	688.86	689.63	0.70	6.07	5.38	683.56	2.38	5.38	686.49	683.49	2.18	5.38	clay till/clay shale
MW 25A	13-Aug-04	686.73	687.54	0.82	10.72	9.90	676.82	8.40	9.90	678.34	676.84	7.90	9.90	clay shale
MW 25B	13-Aug-04	686.91	687.48	0.59	6.10	5.51	681.39	2.51	5.51	684.41	681.41	2.31	5.51	sandstone / clay shale
MW 26A	13-Aug-04	687.00	687.60	0.56	10.73	10.17	676.87	8.67	10.17	678.33	676.83	8.17	10.17	clay shale
MW 26B	13-Aug-04	687.14	687.63	0.49	6.04	5.56	681.58	2.56	5.56	684.58	681.58	2.26	5.56	clay shale / sandstone / siltstone
MW 27A	1-Oct-07	686.65	687.19	0.53	10.97	10.44	676.23	8.94	10.44	677.72	676.22	9.24	10.44	siltstone
MW 27B	1-Oct-07	686.50	687.15	0.63	6.61	5.98	680.54	2.98	5.98	683.52	680.52	2.68	5.98	sand / siltstone
MW 28A	4-Oct-12	687.36	687.96	0.59	11.77	11.18	676.19	9.68	11.18	677.67	676.17	9.38	11.18	siltstone
MW 28B	4-Oct-12	687.44	687.97	0.52	7.08	6.57	680.89	3.57	6.57	683.87	680.87	3.27	6.57	sand / siltstone
MW 29A	6-Oct-14	688.06	688.89	0.82	10.24	9.42	678.64	7.92	9.42	680.13	678.63	7.42	9.42	sandstone
MW 29B	8-Oct-14	688.13	688.93	0.78	5.45	4.67	683.47	3.17	4.67	684.96	683.46	2.87	4.67	sand
MW 30A	8-Oct-14	688.57	689.37	0.76	8.91	8.15	680.46	6.15	8.15	682.42	680.42	5.85	9.00	sandstone
MW 30B	8-Oct-14	688.52	689.31	0.75	5.45	4.70	683.86	3.20	4.70	685.32	683.82	2.90	4.70	clay till
MW 31A	8-Oct-14	686.38	687.12	0.69	9.75	9.07	677.37	7.07	9.07	679.31	677.31	6.77	9.07	sandstone
MW 31B	8-Oct-14	686.40	687.17	0.73	3.92	3.19	683.25	1.69	3.19	684.71	683.21	1.39	3.19	clay till / sandstone
MW 32A	8-Oct-14	686.53	687.19	0.65	10.12	9.47	677.08	7.47	9.47	679.06	677.06	7.17	9.47	clay
MW 32B	8-Oct-14	686.54	687.23	0.68	4.88	4.20	682.35	2.70	4.20	683.84	682.34	2.40	4.50	clay till / sand
MW 33A	6-Oct-14	686.92	687.93	0.92	14.12	13.20	673.82	11.20	13.20	675.72	673.72	10.90	13.20	sandstone
MW 33B	6-Oct-14	686.94	687.87	0.90	5.51	4.61	682.36	3.11	4.61	683.83	682.33	2.81	4.61	sand / sandstone
15MW34A	21-Jul-15	687.98	689.02	1.05	12.98	11.94	676.04	10.20	11.94	677.78	676.04	9.80	11.94	clay shale
15MW34B	21-Jul-15	687.97	688.96	0.99	5.79	4.80	683.17	3.20	4.80	684.77	683.17	2.80	4.80	clay
15MW35-Deep	28-Jul-15	688.43	689.32	0.85	33.44	32.59	655.88	31.00	32.59	657.43	655.85	29.70	32.59	sandstone
15MW35A	28-Jul-15	688.46	689.32	0.85	14.56	13.71	674.76	11.70	13.71	676.76	674.75	11.50	13.71	clay shale
15MW35B	28-Jul-15	688.47	689.40	0.81	7.98	7.17	681.41	5.50	7.17	682.97	681.30	5.20	7.17	sandstone
15MW35C	28-Jul-15	688.53	689.50	0.94	4.19	3.25	685.31	2.00	3.25	686.53	685.29	1.70	3.25	clay till
15MW36-Deep	21-Jul-15	687.03	687.79	0.74	35.38	34.64	652.41	33.60	34.64	653.43	652.39	33.30	34.64	sandstone
15MW36A	28-Jul-15	687.05	687.95	0.85	15.83	14.98	672.12	12.70	14.98	674.35	672.08	12.40	14.98	clay shale

Notes:

[1]Monitoring well network re-surveyed on July 30, 2015

Metres above mean sea level (m AMSL)

Metres below ground level (mbgl)

Metres below top of casing (m BTOC)

Information not available (n/a)

	Surficial Materials
	Upper Sandstone
	Clay Shale
	Lower Bedrock

Table 4: Groundwater Elevation Data - Existing Monitoring Wells

Well	Surface Elevation[1] (m AMSL)	Top of Casing Elevation[1] (m AMSL)	Groundwater Elevation (m AMSL)																	
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00
MW 1B	687.82	688.70	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	683.71	685.12	685.1	684.21	685.02	684.74	685.06	684.45
MW 1C	687.64	688.61	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 5A	688.28	689.17	685.17	685.44	685.05	685.04	684.77	684.49	684.25	685.03	684.75	684.92	684.17	n/a	685.75	685.97	685.535	685.75	685.76	685.61	685.33
MW 5B	688.25	689.10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	678.55	681.14	681.97	682.375	682.05	682.23	681.65	681.93
MW 8A	686.84	687.83	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 8B	686.82	687.69	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 9	686.97	687.47	684.96	684.74	685.21	684.27	684.27	684.35	683.93	684.55	685.01	684.41	684.73	684.74	684.86	684.82	684.63	684.64	684.72	683.47	684.02
MW 10	687.44	687.96	685.4	684.92	dry	dry	dry	dry	dry	685.71	dry	685.66	dry	685.89	686.16	686.06	685.59	685.8	685.91	685.71	dry
MW 11	687.95	688.37	685.62	684.86	685.31	685.41	685.15	685.53	685.36	685.85	685.36	685.8	685.49	685.27	686.53	686.13	685.775	685.95	686.08	685.81	685.37
MW 12A	686.62	687.13	686.07	685.37	685.61	685.7	685.42	684.95	684.76	685.56	685.34	684.99	684.72	685.57	685.80	686.20	685.79	685.99	685.84	685.87	685.51
MW 12B	687.27	687.78	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	678.67	685.22	685.64	685.185	685.41	685.14	685.25	684.89
MW 14	686.52	687.56	n/a	n/a	n/a	684.36	684.78	684.42	684.19	684.61	684.44	684.32	684.07	684.86	685.11	684.64	684.945	684.69	684.99	684.31	684.36
MW 18A	687.13	687.77	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	682.79	686.09	685.73	685.68	684.87	685.65	685.54	685.33
MW 18B	687.12	687.85	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	685.94	685.25	685.59	685.05	685.57	685.35	685.30	684.92
MW 19A	686.60	687.10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	684.79	681.69	680.53	682.29	686.32	685.54	685.83	681.23
MW 19B	686.65	687.14	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	686.34	685.34	686.03	685.33	686.34	685.59	685.81	685.18
MW 20A	688.89	689.54	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	680.20	685.22	686.12	685.515	686.14	685.77	686.07	685.27
MW 20B	688.92	689.65	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	685.79	685.33	686.13	685.51	686.5	685.56	685.96	685.29
MW 21A	687.60	688.30	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	683.54	683.93	683.00	683.72
MW 21B	687.54	688.55	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	686.47	685.67	686.00	685.31
MW 22A	687.83	688.66	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	678.97	685.43	685.55	685.02
MW 22B	687.81	688.70	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	686.29	685.71	685.87	685.32
MW 23A	686.45	687.16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	681.03	684.27	683.44	683.97
MW 23B	686.48	687.38	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	686.17	frozen	685.66	685.22
MW 24A	688.88	689.68	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 24B	688.86	689.63	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 25A	686.73	687.54	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 25B	686.91	687.48	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 26A	687.00	687.60	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 26B	687.14	687.63	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 27A	686.65	687.19	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 27B	686.50	687.15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 28A	687.36	687.96	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 28B	687.44	687.97	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 29A	688.06	688.89	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 29B	688.13	688.93	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 30A	688.57	689.37	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 30B	688.52	689.31	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 31A	686.38	687.12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 31B	686.40	687.17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 32A	686.53	687.19	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 32B	686.54	687.23	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 33A	686.92	687.93	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 33B	686.94	687.87	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW34A	687.98	689.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW34B	687.97	688.96	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW35-Deep	688.43	689.32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW35A	688.46	689.32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW35B	688.47	689.40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW35C	688.53	689.50	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW36-Deep	687.03	687.79	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW36A	687.05	687.95	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes:

[1]Monitoring well network re-surveyed on July 30, 2015

Metres above mean sea level (m AMSL)

Information not available (n/a)

Water levels measured August 6, 2015 after installation

	Surficial Materials
	Upper Sandstone
	Clay Shale
	Lower Bedrock

Table 4: Groundwater Elevation Data - Existing Monitoring Wells

Well	Ground Elevation (m AMSL)	Top of Casing Elevation	Groundwater Elevation (m AMSL)																			
			Oct 2000	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12
MW 1B	687.82	688.70	685.02	685.02	684.53	684.86	684.77	684.55	684.38	684.89	684.58	685.01	684.78	685.36	684.84	685.01	684.91	684.73	684.73	685.02	684.54	685.02	685.02
MW 1C	687.64	688.61	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	685.24
MW 5A	688.28	689.17	686.01	686.01	685.58	685.66	685.07	685.14	684.83	685.49	684.86	685.63	685.37	685.88	685.24	684.84	686.31	685.32	685.32	686.01	685.39	686.01	686.01
MW 5B	688.25	689.10	680.82	680.82	681.89	681.03	681.55	680.74	680.94	681.06	680.89	681.39	682.53	682.41	682.05	681.85	680.66	678.6	678.60	680.82	687.39	680.82	680.82
MW 8A	686.84	687.83	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 8B	686.82	687.69	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 9	686.97	687.47	684.71	684.71	683.92	684.37	683.67	684.23	683.91	684.60	684.19	685.47	684.48	684.83	683.88	684.93	685	685.06	685.06	684.71	bent	684.71	684.71
MW 10	687.44	687.96	685.71	685.71	dry	685.63	dry	685.48	dry	685.74	685.38	685.82	685.95	686.20	685.63	685.98	686.32	686.18	686.18	685.71	685.67	685.71	685.71
MW 11	687.95	688.37	685.96	685.96	685.25	685.77	685.19	685.50	685.25	685.96	684.99	686.13	685.92	685.47	685.37	685.84	686.41	686.38	686.38	685.96	685.68	685.96	685.96
MW 12A	686.62	687.13	686.01	686.01	685.54	685.72	685.33	685.25	685.00	685.60	685.17	685.68	685.68	686.15	685.47	685.94	686.2	686.41	686.41	686.01	685.07	686.01	686.01
MW 12B	687.27	687.78	685.13	685.13	684.92	685.13	684.75	684.75	684.43	685.04	684.67	685.04	685.06	685.53	685.00	685.37	685.03	685.77	685.77	685.13	685.12	685.13	685.13
MW 14	686.52	687.56	684.73	684.73	684.08	684.31	683.73	684.37	684.27	684.70	684.62	684.46	684.53	684.22	683.96	684.58	684.8	684.37	684.37	684.73	685.49	684.73	684.73
MW 18A	687.13	687.77	685.31	685.31	685.30	685.06	685.24	685.00	684.99	685.13	685.36	685.46	685.55	685.73	685.64	685.72	685.83	685.75	685.75	685.31	685.16	685.31	685.31
MW 18B	687.12	687.85	685.43	685.43	684.89	685.26	684.75	684.95	684.49	685.38	685.00	685.48	685.17	685.55	685.17	685.67	685.3	686.01	686.01	685.43	685.40	685.43	685.43
MW 19A	686.60	687.10	681.48	681.48	frozen	685.74	frozen	685.40	681.59	685.58	685.51	686.02	685.75	686.10	685.57	686.22	686.08	686.24	686.24	681.48	685.71	681.48	681.48
MW 19B	686.65	687.14	685.87	685.87	frozen	685.72	685.18	685.33	684.92	685.86	685.48	686.13	685.80	686.11	685.69	686.20	686.13	686.34	686.34	685.87	685.71	685.87	685.87
MW 20A	688.89	689.54	685.91	685.91	685.33	685.87	685.32	685.51	685.03	685.91	685.33	686.12	685.74	686.23	685.62	685.95	686.04	686.51	686.51	685.91	685.35	685.91	685.91
MW 20B	688.92	689.65	686.00	686.00	685.26	685.86	685.22	685.55	684.98	685.92	685.47	686.16	685.77	686.25	685.54	686.35	686.17	686.37	686.37	686.00	685.66	686.00	686.00
MW 21A	687.60	688.30	682.39	682.39	683.37	681.96	682.75	681.40	681.57	680.84	681.48	681.28	683.02	681.84	680.88	681.62	682.1	681.28	681.28	682.39	683.77	682.39	682.39
MW 21B	687.54	688.55	686.04	686.04	685.35	685.88	685.14	685.44	684.97	685.83	685.3	686.06	685.62	686.19	685.49	686.27	686.03	686.36	686.36	686.04	685.71	686.04	686.04
MW 22A	687.83	688.66	685.03	685.03	684.86	684.57	684.42	683.64	683.55	683.31	683.39	683.66	684.28	684.63	683.61	683.81	682.68	683.08	683.08	685.03	684.40	685.03	685.03
MW 22B	687.81	688.70	685.96	685.96	685.36	685.79	685.10	685.30	684.96	685.77	685.31	686.06	685.71	686.17	685.55	686.23	686.18	686.36	686.36	685.96	686.12	685.96	685.96
MW 23A	686.45	687.16	684.00	684.00	684.05	683.53	684.09	683.53	684.10	683.59	684.67	684.58	685.13	685.06	684.69	684.88	684.63	685.17	685.17	684.00	685.65	684.00	684.00
MW 23B	686.48	687.38	685.78	685.78	685.11	685.63	684.93	685.19	684.78	685.59	685.28	686.00	685.62	685.78	683.50	685.92	685.13	686.28	686.28	685.78	685.72	685.78	685.78
MW 24A	688.88	689.68	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	685.98	685.76	686.10	685.67	686.31	686.33	686.66	686.66	685.61	685.96	686.70	686.50
MW 24B	688.86	689.63	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	686.13	685.87	686.30	685.68	686.48	686.30	686.76	686.76	686.21	686.41	687.16	687.02
MW 25A	686.73	687.54	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	684.45	685.60	685.79	685.75	685.51	686.00	686.09	686.09	686.09	685.83	686.15	686.68
MW 25B	686.91	687.48	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	686.16	685.70	686.21	685.53	686.11	686.31	686.62	686.62	685.92	685.96	686.32	686.31
MW 26A	687.00	687.60	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	683.83	684.64	684.35	684.17	683.98	682.33	684.25	684.25	685.56	685.41	685.75	685.79
MW 26B	687.14	687.63	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	686.00	685.52	686.00	685.36	685.99	686.09	686.64	686.64	685.86	685.89	686.31	686.36
MW 27A	686.65	687.19	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	684.92	684.92	685.55	685.13	685.50	686.16
MW 27B	686.50	687.15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	686.25	686.25	685.26	685.53	686.07	686.79
MW 28A	687.36	687.96	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 28B	687.44	687.97	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 29A	688.06	688.89	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 29B	688.13	688.93	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 30A	688.57	689.37	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 30B	688.52	689.31	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 31A	686.38	687.12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 31B	686.40	687.17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 32A	686.53	687.19	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 32B	686.54	687.23	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 33A	686.92	687.93	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 33B	686.94	687.87	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW34A	687.98	689.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW34B	687.97	688.96	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW35-Deep	688.43	689.32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW35A	688.46	689.32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW35B	688.47	689.40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW35C	688.53	689.50	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW36-Deep	687.03	687.79	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15MW36A	687.05	687.95	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes:

[1]Monitoring well network re-surveyed on July 30, 2015

Metres above mean sea level (m AMSL)

Information not available (n/a)

Water levels measured August 6, 2015 after installation

	Surficial Materials
	Upper Sandstone
	Clay Shale
	Lower Bedrock

Table 4: Groundwater Elevation Data - Existing Monitoring Wells

Well	Ground Elevation (m AMSL)	Top of Casing Elevation	Groundwater Elevation (m AMSL)			
			Jun-13	May-14	May-15[1]	May-16
MW 1B	687.82	688.70	684.98	684.90	685.06	684.83
MW 1C	687.64	688.61	682.41	685.73	685.62	685.15
MW 5A	688.28	689.17	685.32	685.11	686.96	685.79
MW 5B	688.25	689.10	685.87	685.07	684.27	683.48
MW 8A	686.84	687.83	686.39	685.78	685.96	686.06
MW 8B	686.82	687.69	686.23	685.39	685.86	686.13
MW 9	686.97	687.47	685.64	685.14	685.35	685.55
MW 10	687.44	687.96	686.11	685.76	686.13	685.89
MW 11	687.95	688.37	686.02	685.89	686.06	685.90
MW 12A	686.62	687.13	685.59	685.44	685.67	685.40
MW 12B	687.27	687.78	685.56	685.40	685.57	685.24
MW 14	686.52	687.56	685.28	685.38	684.86	685.92
MW 18A	687.13	687.77	685.62	685.63	685.73	685.57
MW 18B	687.12	687.85	685.97	686.03	685.98	685.80
MW 19A	686.60	687.10	685.91	686.00	686.04	685.76
MW 19B	686.65	687.14	685.99	686.05	686.03	685.75
MW 20A	688.89	689.54	685.67	685.75	686.87	685.55
MW 20B	688.92	689.65	685.84	685.99	685.88	685.74
MW 21A	687.60	688.30	683.68	683.29	683.31	684.09
MW 21B	687.54	688.55	685.62	685.54	685.46	685.27
MW 22A	687.83	688.66	684.35	683.97	683.90	683.60
MW 22B	687.81	688.70	685.62	685.56	685.43	685.20
MW 23A	686.45	687.16	686.15	686.28	686.15	686.13
MW 23B	686.48	687.38	685.77	685.80	685.71	685.44
MW 24A	688.88	689.68	686.18	686.14	686.34	686.09
MW 24B	688.86	689.63	686.78	685.82	686.89	687.08
MW 25A	686.73	687.54	686.35	686.46	686.39	686.22
MW 25B	686.91	687.48	686.03	686.13	685.83	685.58
MW 26A	687.00	687.60	685.78	685.70	685.76	685.51
MW 26B	687.14	687.63	686.16	686.96	685.94	685.64
MW 27A	686.65	687.19	685.59	686.87	686.86	686.76
MW 27B	686.50	687.15	684.38	686.47	686.15	685.98
MW 28A	687.36	687.96	685.39	685.57	685.78	685.71
MW 28B	687.44	687.97	685.20	685.38	685.58	685.84
MW 29A	688.06	688.89	n/a	n/a	684.93	685.98
MW 29B	688.13	688.93	n/a	n/a	684.95	686.10
MW 30A	688.57	689.37	n/a	n/a	684.87	685.95
MW 30B	688.52	689.31	n/a	n/a	684.90	685.80
MW 31A	686.38	687.12	n/a	n/a	685.07	684.32
MW 31B	686.40	687.17	n/a	n/a	684.71	684.95
MW 32A	686.53	687.19	n/a	n/a	684.58	684.87
MW 32B	686.54	687.23	n/a	n/a	684.68	684.90
MW 33A	686.92	687.93	n/a	n/a	685.52	685.63
MW 33B	686.94	687.87	n/a	n/a	686.21	686.27
15MW34A	687.98	689.02	n/a	n/a	683.59	685.38
15MW34B	687.97	688.96	n/a	n/a	683.17	685.89
15MW35-Deep	688.43	689.32	n/a	n/a	682.28	682.44
15MW35A	688.46	689.32	n/a	n/a	677.64	681.61
15MW35B	688.47	689.40	n/a	n/a	683.06	684.62
15MW35C	688.53	689.50	n/a	n/a	685.68	Dry
15MW36-Deep	687.03	687.79	n/a	n/a	665.02	681.87
15MW36A	687.05	687.95	n/a	n/a	683.89	683.97

Notes:

[1]Monitoring well network re-surveyed on July 30, 2015

Metres above mean sea level (m AMSL)

Information not available (n/a)

Water levels measured August 6, 2015 after installation

	Surficial Materials
	Upper Sandstone
	Clay Shale
	Lower Bedrock

Table 5.1B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 1B					
			Jun-11	May-12	Jun-13	Jun-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.67	7.61	6.17	9.9	8.4	6.33
Field EC	mS	-	3.08	2.47	4.11	2.95	3.05	3.67
Field Temperature	^{o}C	-	8	7.7	8.2	7.5	8.3	n/a
Routine Water								
pH	-	6.5 - 8.5	8.32	8.44	8.41	8.05	8.24	8.44
Conductivity (EC)	µS/cm	-	2900	3700	3,200	2800	2900	2700
Calcium	mg/L	-	13	19	14	12	12	10
Magnesium	mg/L	-	1.9	2.8	2	1.7	1.6	1.3
Sodium	mg/L	200	750	890	730	740	740	680
Potassium	mg/L	-	2.2	3.6	2.6	2.5	2.4	2.1
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.64	<0.060	<0.060
Sulphate	mg/L	500	670	1200	860	680	680	540
Chloride	mg/L	250	6	4.8	5.2	5.1	6.1	6.1
Bicarbonate	mg/L	-	1100	1000	1,000	1100	1100	1100
Carbonate	mg/L	-	8.4	15	16	<0.50	<0.50	13
Nitrate (N)	mg/L	10	2.2	5	5.3	3.7	0.89	1.1
TDS*	mg/L	500	2000	2700	2,200	2000	2000	1800
Water Nutrients								
Ammonia-N	mg/L	-	0.41	0.47	0.36	<0.050	0.26	0.36
TKN	mg/L	-	2.2	2.8	2.4	2.2*	1.6	0.96
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10) - BTEX	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.75	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	33	120	270	98	120	47
DOC	mg/L	-	14	13	11	9.9	10	8.8
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0044	0.061
Antimony	mg/L	0.006	<0.006	<0.00060	0.00064	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.0012	0.0015
Barium	mg/L	1	0.017	0.015	0.017	0.039	0.017	0.021
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.63	0.62
Cadmium	mg/L	0.005	<0.000050	0.000038	0.000057	<0.000025	0.000029	0.000029
Chromium	mg/L	0.05	<0.01	<0.0010	<0.0010	0.0034	<0.0010	<0.0010
Cobalt	mg/L	-	<0.003	0.00066	0.00068	0.001	0.00058	0.00083
Copper	mg/L	1	<0.002	0.0008	0.0032	0.0057	0.0020	0.0035
Lead	mg/L	0.010	<0.002	<0.00020	<0.00020	0.00056	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.10	0.057
Mercury	mg/L	0.001	<0.000005	<3E n/a 06	<3E n/a 07	0.00003	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.011	0.0095	0.011	0.0085	0.0082	0.0084
Nickel	mg/L	-	<0.005	0.004	0.0053	0.0068	0.0038	0.0060
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	0.00058
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0019	0.0022
Zinc	mg/L	5	<0.03	<0.0030	0.0078	0.0034	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	10.614
Volume Purged (L)	20 (dry)
Sampling Date	2-Jun-16
Static Water Level	3.868

Table 5.1C: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 1C					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.61	6.1	5.41	8.0	8.2	6.43
Field EC	mS	-	5.85	19.99	7.03	6.1	6.42	7.54
Field Temperature	^{o}C	-	11.3	10	6.4	6.7	6.6	8.1
Routine Water								
pH	-	6.5 - 8.5	8.05	8.11	8.26	8.08	7.98	8.18
Conductivity (EC)	µS/cm	-	5800	5800	5900	5900	6100	6100
Calcium	mg/L	-	150	130	130	130	140	140
Magnesium	mg/L	-	37	34	34	33	34	36
Sodium	mg/L	200	1300	1400	1300	1300	1400	1300
Potassium	mg/L	-	7.6	6.7	6.2	4.8	6.6	6.9
Iron	mg/L	0.3	<0.06	<0.060	0.095	<0.60	<0.060	<0.060
Sulphate	mg/L	500	2700	2600	2800	3000	2900	2800
Chloride	mg/L	250	2	1.8	1.3	1.1	1.7	1.4
Bicarbonate	mg/L	-	740	760	760	770	750	710
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.009	0.0078	0.25	0.093	0.080	0.22
TDS*	mg/L	500	4600	4600	4600	4800	4800	4700
Water Nutrients								
Ammonia-N	mg/L	-	0.74	0.66	0.57	0.57	0.60	0.46
TKN	mg/L	-	1.6	1.3	1.2	1.2	1.2	0.58
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	78	56	46	39	42	51
DOC	mg/L	-	11	10	12	9.6	11	11
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0079
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.0011
Barium	mg/L	1	0.06	0.037	0.035	<0.10	0.025	0.023
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.24	0.24
Cadmium	mg/L	0.005	0.00009	<0.050	0.000065	<0.000050	<0.00020	0.000036
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00087
Copper	mg/L	1	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00070
Lead	mg/L	0.010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.27	0.28
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.003	<0.0020	0.002	<0.0020	<0.0020	0.0013
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0021
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	<0.0010	0.00036
Zinc	mg/L	5	<0.03	<0.030	0.074	<0.030	<0.030	0.0037

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	6.434
Volume Purged (L)	11.5 (dry)
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	3.458

Table 5.5A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 5A				
			May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements							
Field pH	-	-	7.35	6.41	7.8	7.8	6.15
Field EC	mS	-	3.86	1.03	9.71	10.05	12.74
Field Temperature	°C	-	8.3	6.5	6.0	7.1	n/a
Routine Water							
pH	-	6.5 - 8.5	7.97	8.11	8.18	7.83	8.00
Conductivity (EC)	µS/cm	-	8800	9200	9200	9500	9600
Calcium	mg/L	-	220	230	260	250	270
Magnesium	mg/L	-	73	77	95	100	95
Sodium	mg/L	200	2300	2100	2400	2300	2100
Potassium	mg/L	-	10	9.1	10	10	11
Iron	mg/L	0.3	<0.060	<0.06	<0.60	<0.60	<0.060
Sulphate	mg/L	500	5000	5200	5500	5500	5200
Chloride	mg/L	250	2.4	1.7	2.6	2.4	2.1
Bicarbonate	mg/L	-	730	740	740	730	660
Carbonate	mg/L	-	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.34	0.46	0.3	0.058	0.20
TDS*	mg/L	500	7900	7900	8600	8500	8000
Water Nutrients							
Ammonia-N	mg/L		0.59	0.55	0.52	1.0	0.67
TKN	mg/L	-	1.7	1.5	1.6	2.2	1.3
Hydrocarbons							
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10	<0.10
Organics							
COD	mg/L	-	69	75	63	71	64
DOC	mg/L	-	23	25	21	28	24
Metals							
Aluminum	mg/L	0.1	n/a	n/a	n/a	<0.030	<0.0030
Antimony	mg/L	0.006	<0.0060	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	<0.0020	0.00058
Barium	mg/L	1	<0.010	<0.010	<0.10	<0.10	<0.010
Boron	mg/L	5	n/a	n/a	n/a	0.60	0.56
Cadmium	mg/L	0.005	<0.050	<0.000050	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.0030	<0.0030	<0.0030	<0.0030	0.00086
Copper	mg/L	1	<0.0020	<0.0020	<0.0020	<0.0020	0.0057
Lead	mg/L	0.010	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	0.15	0.15
Mercury	mg/L	0.001	0.000004	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.0020	<0.0020	<0.0020	<0.0020	0.00080
Nickel	mg/L	-	<0.0050	<0.0050	<0.0050	0.0065	0.0086
Selenium	mg/L	0.05	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	<0.0010	0.00031
Zinc	mg/L	5	<0.030	<0.030	<0.030	<0.030	0.0033

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	7.658
Volume Purged (L)	19 (dry)
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	3.380

Table 5.5B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 5B					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	8.45	7.91	6.9	8.3	8.3	n/a
Field EC	mS	-	1.25	2.65	2.53	2.43	2.89	n/a
Field Temperature	^{o}C	-	11.4	12.5	10.7	10.0	9.3	n/a
Routine Water								
pH	-	6.5 - 8.5	8.26	8.01	8.37	8.56	8.28	8.34
Conductivity (EC)	µS/cm	-	1000	2200	2200	2700	2700	3000
Calcium	mg/L	-	23	67	61	23	13	13
Magnesium	mg/L	-	5.7	25	26	11	16	3.2
Sodium	mg/L	200	210	430	390	570	600	750
Potassium	mg/L	-	2.4	2.8	2.6	3.7	3.6	4.2
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.13	<0.060	<0.060
Sulphate	mg/L	500	270	600	560	630	600	650
Chloride	mg/L	250	17	61	45	30	24	16
Bicarbonate	mg/L	-	290	660	690	950	1000	1200
Carbonate	mg/L	-	<0.5	<0.50	9	36	<0.50	5
Nitrate (N)	mg/L	10	0.55	0.43	0.29	0.93	1.1	0.36
TDS*	mg/L	500	670	1500	1400	1800	1800	2000
Water Nutrients								
Ammonia-N	mg/L	-	0.19	0.29	0.2	0.36	0.50	0.10
TKN	mg/L	-	0.66	0.87	0.65	1.1	1.4	0.49
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	37	39	25	52	56	23
DOC	mg/L	-	6.7	4.7	3.9	5.2	6.1	7.2
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0049	0.0062
Antimony	mg/L	0.006	<0.006	0.00074	0.00075	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.00068	0.00094
Barium	mg/L	1	0.025	0.034	0.022	0.027	0.016	0.018
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.53	0.84
Cadmium	mg/L	0.005	<0.000050	0.000095	0.000053	<0.000025	<0.00002	<0.000020
Chromium	mg/L	0.05	<0.01	<0.0010	0.01	0.011	0.0082	0.010
Cobalt	mg/L	-	<0.003	0.00065	0.0003	<0.0003	<0.00030	0.00040
Copper	mg/L	1	<0.002	0.0026	0.0051	0.0033	0.0015	0.0033
Lead	mg/L	0.010	<0.002	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.024	0.026
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.02	0.0059	0.0037	0.0061	0.0059	0.010
Nickel	mg/L	-	<0.005	0.021	0.013	0.0077	0.0077	0.013
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.011	0.0041
Zinc	mg/L	5	<0.03	0.01	0.01	0.0033	<0.0030	0.0033

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	10.44
Volume Purged (L)	10 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	5.615

Table 5.8A: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 8A			
			Jun-13	May-14	May-15	Jun-16
Field Measurements						
Field pH	-	-	7.14	8.5	8.5	8.51
Field EC	mS	-	4.92	2.56	2.91	2.51
Field Temperature	^{o}C	-	6.1	5.4	6.0	8.7
Routine Water						
pH	-	6.5 - 8.5	8.45	8.67	8.32	8.49
Conductivity (EC)	µS/cm	-	4100	2400	2700	2400
Calcium	mg/L	-	25	7.7	7.6	7.8
Magnesium	mg/L	-	7.3	1.7	1.5	1.3
Sodium	mg/L	200	930	610	670	600
Potassium	mg/L	-	3.7	2.2	2.1	2.3
Iron	mg/L	0.3	<0.060	0.31	<0.060	<0.060
Sulphate	mg/L	500	1300	300	450	290
Chloride	mg/L	250	9.8	8.0	7.6	7.4
Bicarbonate	mg/L	-	1200	1300	1300	1200
Carbonate	mg/L	-	26	49	3.0	25
Nitrate (N)	mg/L	10	0.017	<0.010	<0.010	<0.010
TDS*	mg/L	500	2900	1600	1800	1500
Water Nutrients						
Ammonia-N	mg/L	-	1.1	0.89	0.96	0.81
TKN	mg/L	-	1.9	1.5	1.6	1.1
Hydrocarbons						
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10
Organics						
COD	mg/L	-	79	68	71	36
DOC	mg/L	-	11	9	10	11
Metals						
Aluminum	mg/L	0.1	n/a	n/a	0.0043	0.0093
Antimony	mg/L	0.006	0.00081	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	0.0014	0.0021
Barium	mg/L	1	0.04	0.041	0.025	0.045
Boron	mg/L	5	n/a	n/a	0.68	0.72
Cadmium	mg/L	0.005	0.000035	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	-	0.0012	0.0014	0.00033	0.00046
Copper	mg/L	1	0.0017	0.00047	0.00064	0.00042
Lead	mg/L	0.01	<0.00020	<0.0002	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	0.017	0.015
Mercury	mg/L	0.001	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.012	0.00036	0.0057	0.0070
Nickel	mg/L	-	0.005	0.0023	0.0020	0.0023
Selenium	mg/L	0.05	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	0.00071	0.00092
Zinc	mg/L	5	0.012	0.007	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	3-Jun-16
Well Depth (mbtoc)	11.22
Volume Purged (L)	21 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	1.765

Table 5.8B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 8B			
			Jun-13	May-14	May-15	Jun-16
Field Measurements						
Field pH	-	-	6.57	7.6	8	7.73
Field EC	mS	-	10.05	8.96	9.28	8.94
Field Temperature	^{o}C	-	7.4	4.0	6.6	6.8
Routine Water						
pH	-	6.5 - 8.5	8.31	8.37	7.95	8.19
Conductivity (EC)	µS/cm	-	8800	8500	8700	8700
Calcium	mg/L	-	92	110	90	97
Magnesium	mg/L	-	48	62	56	54
Sodium	mg/L	200	2100	2300	2200	2000
Potassium	mg/L	-	5.8	5.4	6.2	6.7
Iron	mg/L	0.3	<0.060	<0.60	<0.60	<0.060
Sulphate	mg/L	500	4300	4500	4200	3900
Chloride	mg/L	250	23	23	26	28
Bicarbonate	mg/L	-	1100	1100	1100	1100
Carbonate	mg/L	-	7.2	18	<0.50	<0.50
Nitrate (N)	mg/L	10	0.022	0.074	0.12	0.10
TDS*	mg/L	500	7100	7600	7100	6600
Water Nutrients						
Ammonia-N	mg/L	-	0.61	0.57	0.69	0.62
TKN	mg/L	-	1.7	1.4	1.6	1.3
Hydrocarbons						
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10
Organics						
COD	mg/L	-	75	39	48	47
DOC	mg/L	-	13	13	14	15
Metals						
Aluminum	mg/L	0.1	n/a	n/a	<0.030	0.0050
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	0.0021	0.0015
Barium	mg/L	1	0.025	<0.10	<0.10	0.013
Boron	mg/L	5	n/a	n/a	0.41	0.41
Cadmium	mg/L	0.005	0.000096	<0.000050	<0.00020	0.00003
Chromium	mg/L	0.05	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.0030	<0.0030	<0.0030	0.0011
Copper	mg/L	1	<0.0020	0.0031	<0.0020	0.00034
Lead	mg/L	0.01	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	0.18	0.18
Mercury	mg/L	0.001	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0021	0.0023	<0.0020	0.0016
Nickel	mg/L	-	0.0052	0.006	<0.0050	0.0035
Selenium	mg/L	0.05	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	0.0022	0.0024
Zinc	mg/L	5	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	3-Jun-16
Well Depth (mbtoc)	5.42
Volume Purged (L)	23 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	1.560

Table 5.9: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 9					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.53	7.37	6.17	7.7	7.9	7.59
Field EC	mS	-	7.53	7.775	8.86	8.1	8.26	8.32
Field Temperature	°C	-	19.8	11.6	7.2	5.3	5.5	8.0
Routine Water								
pH	-	6.5 - 8.5	7.99	7.76	8.21	8.27	7.81	7.96
Conductivity (EC)	µS/cm	-	7600	7500	7700	7800	7800	7800
Calcium	mg/L	-	98	110	110	120	110	120
Magnesium	mg/L	-	51	60	59	66	56	66
Sodium	mg/L	200	1800	1900	1800	1800	1900	1900
Potassium	mg/L	-	13	15	14	15	15	15
Iron	mg/L	0.3	1.2	0.79	0.33	<0.60	<0.060	<0.60
Sulphate	mg/L	500	3500	3700	3900	4000	3800	4000
Chloride	mg/L	250	3	2.6	1.9	2.1	1.6	1.2
Bicarbonate	mg/L	-	1100	1100	1100	1100	1100	1100
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.09	<0.0030	0.11	0.079	0.17	0.081
TDS*	mg/L	500	6100	6300	6400	6600	6400	6500
Water Nutrients		-						
Ammonia-N	mg/L		0.86	1.4	0.85	0.81	0.53	0.32
TKN	mg/L	-	3.1	1.6	1.4	1.6	1.3	0.77
Hydrocarbons		-						
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics		-						
COD	mg/L	-	26	460	46	42	62	21
DOC	mg/L	-	9.8	8.3	7.8	5.5	6.9	5.9
Metals		-						
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.011
Antimony	mg/L	0.006	<0.006	<0.0060	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00036
Barium	mg/L	1	0.015	0.016	0.014	<0.10	0.010	<0.10
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.29	0.31
Cadmium	mg/L	0.005	<0.000050	0.000061	0.000051	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	0.003	<0.0030	0.00069
Copper	mg/L	1	<0.002	0.0054	<0.0020	<0.0020	<0.0020	0.0013
Lead	mg/L	0.01	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00027
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.22	0.21
Mercury	mg/L	0.001	<0.000005	0.0000042	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.004	<0.0020	0.0023	0.0033	0.0022	0.0017
Nickel	mg/L	-	<0.005	0.007	<0.0050	0.0061	<0.0050	0.0020
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	0.00023
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0037	0.004
Zinc	mg/L	5	<0.03	<0.030	<0.030	<0.030	<0.030	0.0034

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	5.35
Volume Purged (L)	10 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	1.920

Table 5.10: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 10					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.92	7.69	7.77	8.3	8.3	8.06
Field EC	mS	-	4.52	2.03	4.52	4.92	4.98	4.42
Field Temperature	°C	-	17	8.6	11.5	4.2	7.5	9.8
Routine Water								
pH	-	6.5 - 8.5	8.18	8.1	8.33	8.12	7.79	8.26
Conductivity (EC)	µS/cm	-	4600	4900	4600	4600	4700	4500
Calcium	mg/L	-	72	91	83	68	140	60
Magnesium	mg/L	-	34	33	34	35	44	31
Sodium	mg/L	200	990	1200	1100	990	910	840
Potassium	mg/L	-	4.2	5	4.4	4	4.5	4.4
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.060	8.3	<0.060
Sulphate	mg/L	500	1900	2200	2200	2100	1900	1700
Chloride	mg/L	250	23	25	23	26	140	60
Bicarbonate	mg/L	-	590	600	580	600	590	620
Carbonate	mg/L	-	<0.5	<0.50	4.6	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.14	0.019	0.13	0.079	0.014	0.04
TDS*	mg/L	500	3300	3900	3700	3500	3400	3000
Water Nutrients		-						
Ammonia-N	mg/L		0.07	0.31	0.094	0.17	0.23	0.16
TKN	mg/L	-	0.61	0.86	0.69	0.68	0.68	0.57
Hydrocarbons		-						
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	32	33	43	33	35	32
DOC	mg/L	-	11	10	11	9.6	11	9.7
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.0030	0.0091
Antimony	mg/L	0.006	<0.0006	<0.0030	0.00073	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.00049	0.0006
Barium	mg/L	1	0.018	0.015	0.015	0.016	0.087	0.023
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.11	0.12
Cadmium	mg/L	0.005	<0.000025	0.000047	0.000045	<0.000025	0.000049	0.000023
Chromium	mg/L	0.05	0.002	<0.0050	<0.0010	0.0014	<0.0010	0.0021
Cobalt	mg/L	-	<0.0003	<0.0015	0.00059	0.00042	0.014	0.00057
Copper	mg/L	1	0.0014	0.0012	0.0025	0.17	0.0079	0.0035
Lead	mg/L	0.01	<0.0002	<0.0010	<0.00020	0.009	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	1.8	0.094
Mercury	mg/L	0.001	<0.000005	0.0000056	<0.000010	<0.0000050	<0.0000050	0.0000034
Molybdenum	mg/L	-	0.0019	0.0012	0.0015	0.0022	0.0017	0.0038
Nickel	mg/L	-	0.0059	0.0094	0.0088	0.0078	1.5	0.059
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	0.0003	0.00052
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0048	0.0093
Zinc	mg/L	5	0.009	0.018	0.0063	0.11	0.0038	0.0065

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	3-Jun-16
Well Depth (mbtoc)	3.868
Volume Purged (L)	7 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.063

Table 5.11: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 11					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.73	7.41	7.31	7.5	7.8	7.61
Field EC	mS	-	9.6	4.31	9.67	10.02	10.14	9.90
Field Temperature	^{o}C	-	9.9	8.8	10.5	6.2	6.4	8.6
Routine Water								
pH	-	6.5 - 8.5	8.04	7.98	8.06	8.19	7.79	8.03
Conductivity (EC)	µS/cm	-	9800	9900	9300	9500	9500	9600
Calcium	mg/L	-	190	240	220	240	210	230
Magnesium	mg/L	-	110	130	110	130	110	120
Sodium	mg/L	200	2200	2600	2100	2300	2200	2100
Potassium	mg/L	-	7.1	9.1	7.1	7.6	8.4	9.1
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.60	<0.060	<0.060
Sulphate	mg/L	500	5300	5600	5400	5600	5100	4800
Chloride	mg/L	250	16	14	14	14	20	32
Bicarbonate	mg/L	-	920	880	890	840	900	930
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.49	0.27	0.37	0.27	0.19	0.23
TDS*	mg/L	500	8300	9000	8300	8800	8200	7800
Water Nutrients								
Ammonia-N	mg/L		<0.05	0.14	0.081	0.14	0.17	0.15
TKN	mg/L	-	1.8	1.8	1.5	1.7	1.7	0.81
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	110	100	95	96	100	100
DOC	mg/L	-	36	36	33	29	34	36
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0060
Antimony	mg/L	0.006	<0.006	<0.0060	0.001	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.0011
Barium	mg/L	1	<0.01	<0.010	<0.010	<0.10	<0.010	<0.010
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.19	0.20
Cadmium	mg/L	0.005	<0.000050	0.000055	0.000084	<0.000050	<0.00020	0.000024
Chromium	mg/L	0.05	<0.01	<0.010	<0.0010	<0.010	<0.010	0.0011
Cobalt	mg/L	-	<0.003	<0.0030	<0.00030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	0.003	0.0032	0.0031	0.0024	<0.0020	0.0025
Lead	mg/L	0.01	<0.002	<0.0020	<0.00020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.015	0.0081
Mercury	mg/L	0.001	<0.000005	0.0000038	<0.000010	<0.0000050	<0.0000050	0.0000022
Molybdenum	mg/L	-	<0.002	<0.0020	0.0017	<0.0020	<0.0020	0.0009
Nickel	mg/L	-	0.008	0.0064	0.0062	0.006	0.0058	0.0060
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	0.0011
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.024	0.030
Zinc	mg/L	5	<0.03	<0.030	0.0098	<0.030	<0.030	0.0077

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	3-Jun-16
Well Depth (mbtoc)	6.247
Volume Purged (L)	18 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.437

Table 5.12A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 12A					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.66	7.33	6	7.8	7.6	6.15
Field EC	mS	-	10.84	4.75	13.32	11.38	11.13	15.40
Field Temperature	^{o}C	-	9.7	6.1	6.2	8.7	5.7	n/a
Routine Water								
pH	-	6.5 - 8.5	7.98	8	8.15	8.25	7.75	8.00
Conductivity (EC)	µS/cm	-	11000	11000	11000	11,000	11,000	11,000
Calcium	mg/L	-	140	140	130	150	120	150
Magnesium	mg/L	-	75	71	72	86	64	82
Sodium	mg/L	200	2700	3000	2700	3000	2600	2600
Potassium	mg/L	-	11	11	9.7	10	10	11
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.60	0.75	<0.060
Sulphate	mg/L	500	5800	5900	6100	6700	5600	6300
Chloride	mg/L	250	3	1.8	1.8	1.9	2.2	1.6
Bicarbonate	mg/L	-	850	860	910	900	900	880
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.067	0.095	0.15	0.11	0.082	0.082
Nitrite (N)	mg/L	1	n/a	n/a	n/a	n/a	0.05	0.04
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	0.13	0.12
TDS*	mg/L	500	9200	9500	9600	10,000	8900	9600
Water Nutrients								
Ammonia-N	mg/L	-	0.37	0.46	0.27	0.26	0.38	0.21
TKN	mg/L	-	1.2	1.2	0.87	0.89	1.3	0.45
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	78	61	53	41	68	48
DOC	mg/L	-	14	15	14	15	16	17
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.19	0.0087
Antimony	mg/L	0.006	<0.01	<0.012	0.00074	<0.0060	<0.012	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0040	0.00097
Barium	mg/L	1	<0.01	<0.010	<0.010	<0.10	<0.010	<0.010
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.44	0.42
Cadmium	mg/L	0.005	0.0001	<0.10	<0.0001	<0.000050	<0.00040	0.000042
Chromium	mg/L	0.05	<0.02	<0.020	<0.020	<0.010	<0.020	<0.0010
Cobalt	mg/L	-	<0.006	<0.0060	<0.0060	<0.0030	<0.0060	0.00048
Copper	mg/L	1	<0.004	<0.0040	<0.0040	<0.0020	<0.0040	0.0028
Lead	mg/L	0.01	<0.004	<0.0040	<0.0040	<0.0020	<0.0040	0.00022
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.087	0.055
Mercury	mg/L	0.001	<0.000005	0.0000062	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.004	<0.0040	<0.0040	<0.0020	<0.0040	0.00071
Nickel	mg/L	-	<0.01	<0.010	<0.010	<0.0050	<0.010	0.0035
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0040	0.00023
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	<0.0020	0.0021
Zinc	mg/L	5	<0.06	<0.060	<0.060	<0.030	<0.060	0.010
Polycyclic Aromatic Hydrocarbons (PAHs)								
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	<0.000010	n/a
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	<0.00010	n/a
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	<0.00010	n/a
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	<0.00010	n/a
Acridine	mg/L	-	n/a	n/a	n/a	n/a	<0.00020	n/a
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	<0.000010	n/a
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	<0.0000085	n/a
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	<0.0000075	n/a
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	<0.0000085	n/a
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	<0.000050	n/a
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	<0.000050	n/a
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	<0.0000085	n/a
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	<0.0000085	n/a
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	<0.0000085	n/a
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	<0.0000075	n/a
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	<0.000010	n/a
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	<0.000050	n/a
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	<0.0000085	n/a
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	<0.00010	n/a
Perylene	mg/L	-	n/a	n/a	n/a	n/a	<0.000050	n/a
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	<0.000050	n/a
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	<0.000020	n/a
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	<0.00020	n/a

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	6.173
Volume Purged (L)	18 (dry)
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	1.735

Table 5.12B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 12B					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.62	7.52	6.17	7.3	7.7	6.28
Field EC	mS	-	10.85	4.29	11.9	11.87	11.50	13.83
Field Temperature	^{o}C	-	10.2	7.5	7.1	6.9	7.5	n/a
Routine Water								
pH	-	6.5 - 8.5	7.96	7.97	8.14	8.17	7.71	8.00
Conductivity (EC)	µS/cm	-	11000	9700	10000	11,000	11,000	11,000
Calcium	mg/L	-	250	160	210	380	260	270
Magnesium	mg/L	-	40	29	37	78	60	54
Sodium	mg/L	200	2600	2500	2400	3400	2800	2500
Potassium	mg/L	-	10	8	8.2	11	10	11
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.60	<0.60	0.13
Sulphate	mg/L	500	6100	5300	5600	6800	6100	5600
Chloride	mg/L	250	6	4	3.7	6.2	5.6	6.0
Bicarbonate	mg/L	-	770	760	790	870	850	820
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	1.4	1.8	0.58	0.2	0.12	0.19
TDS*	mg/L	500	9400	8400	8700	11,000	9700	8900
Water Nutrients								
Ammonia-N	mg/L	-	2.1	1.6	1.7	2.1	2.2	2.1
TKN	mg/L	-	3.5	2.2	2.7	3.3	3.4	2.8
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	98	37	56	71	61	71
DOC	mg/L	-	26	14	20	21	22	24
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.060	<0.0030
Antimony	mg/L	0.006	<0.01	<0.0060	0.00084	<0.0060	<0.012	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0040	0.00088
Barium	mg/L	1	0.01	<0.010	<0.010	<0.10	<0.10	<0.010
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.56	0.57
Cadmium	mg/L	0.005	0.0001	<0.050	<0.00010	<0.000050	<0.00040	0.000027
Chromium	mg/L	0.05	<0.02	<0.010	<0.020	<0.010	<0.020	<0.0010
Cobalt	mg/L	-	<0.006	<0.0030	<0.0060	<0.0030	<0.0060	0.00050
Copper	mg/L	1	<0.004	0.0028	<0.0040	<0.0020	<0.0040	0.0023
Lead	mg/L	0.01	<0.004	<0.0020	<0.0040	<0.0020	<0.0040	0.00021
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.43	0.36
Mercury	mg/L	0.001	<0.000005	<0.0000021	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.004	<0.0020	<0.0040	<0.0020	<0.0040	0.00077
Nickel	mg/L	-	<0.01	<0.0050	<0.010	<0.0050	<0.010	0.0030
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0040	0.00029
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.019	0.021
Zinc	mg/L	5	<0.06	0.037	<0.060	<0.030	<0.060	0.0061

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	10.684
Volume Purged (L)	22 (dry)
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	2.534

Table 5.14: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 14					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.46	7.4	6	7.5	7.8	7.61
Field EC	mS	-	3.08	1.47	4.05	3.81	4.30	4.73
Field Temperature	^{o}C	-	12.3	7.5	9.4	5.6	7.0	8.5
Routine Water								
pH	-	6.5 - 8.5	8.05	8.04	8.13	8.14	7.78	8.05
Conductivity (EC)	µS/cm	-	3000	3300	3400	3500	4000	4600
Calcium	mg/L	-	120	160	150	160	190	230
Magnesium	mg/L	-	86	130	130	130	140	190
Sodium	mg/L	200	400	580	490	550	630	690
Potassium	mg/L	-	17	22	22	21	22	25
Iron	mg/L	0.3	0.11	<0.060	<0.060	<0.060	<0.060	<0.060
Sulphate	mg/L	500	790	1000	1100	1300	1500	1900
Chloride	mg/L	250	5	2.5	2.1	2.7	1.7	1.6
Bicarbonate	mg/L	-	1200	1200	1200	1200	1200	1100
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.072	0.024	0.082	0.09	0.091	0.19
TDS*	mg/L	500	2000	2500	2500	2700	3100	3600
Water Nutrients								
Ammonia-N	mg/L	-	0.29	0.4	0.37	0.37	0.53	0.35
TKN	mg/L	-	1.7	1.1	1	1.1	1.1	0.91
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	54	37	52	37	34	34
DOC	mg/L	-	11	9.8	9.7	8.6	9.6	11
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.0030	<0.0030
Antimony	mg/L	0.006	<0.0006	<0.0030	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.00077	0.00069
Barium	mg/L	1	0.084	0.1	0.087	0.066	0.052	0.042
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.12	0.13
Cadmium	mg/L	0.005	<0.000025	<0.	0.000068	0.00003	<0.000020	0.000025
Chromium	mg/L	0.05	<0.001	<0.025	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	0.003	0.0021	0.002	0.0018	0.0017	0.0019
Copper	mg/L	1	0.0003	<0.0010	0.0014	0.00087	<0.00020	0.00045
Lead	mg/L	0.01	<0.0002	<0.0010	0.0005	<0.0002	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.62	0.63
Mercury	mg/L	0.001	<0.000005	0.0000049	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0006	<0.0010	0.0008	0.0016	0.00068	0.00074
Nickel	mg/L	-	0.0062	0.0042	0.0047	0.0044	0.0033	0.0031
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0008	0.0011
Zinc	mg/L	5	0.005	<0.015	0.01	0.0059	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	3-Jun-16
Well Depth (mbtoc)	7.079
Volume Purged (L)	15 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	1.635

Table 5.18A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 18A					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	8.34	8.31	6.09	8.4	8.8	6.75
Field EC	mS	-	1.56	1.614	1.80	15.82	1.64	1.916
Field Temperature	^{o}C	-	10.9	7.6	6.79	6.4	6.6	8.3
Routine Water								
pH	-	6.5 - 8.5	8.45	8.52	8.58	8.61	8.39	8.44
Conductivity (EC)	µS/cm	-	1500	1500	1,500	1500	1500	1500
Calcium	mg/L	-	3.8	3.8	3.1	3	2.7	3.0
Magnesium	mg/L	-	0.4	0.39	0.36	<2.0	0.30	0.34
Sodium	mg/L	200	400	380	360	390	360	380
Potassium	mg/L	-	1.5	1.4	1.3	<3.0	1.3	1.5
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.60	<0.060	0.11
Sulphate	mg/L	500	2	<1.0	2.0	2.4	1.4	6.9
Chloride	mg/L	250	7	6.7	6.2	7.3	7.2	7.4
Bicarbonate	mg/L	-	960	960	980	970	1000	950
Carbonate	mg/L	-	17	26	30	38	8.9	9.5
Nitrate (N)	mg/L	10	0.12	<0.0030	<0.003	<0.010	<0.010	0.011
TDS*	mg/L	500	910	900	890	920	880	870
Water Nutrients								
Ammonia-N	mg/L	-	0.64	0.64	0.62	0.62	0.64	0.66
TKN	mg/L	-	1.1	1	1.1	1.1	0.98	0.90
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	34	24	34	29	28	27
DOC	mg/L	-	7.9	7.2	6.5	5.2	6.9	6.9
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0046	0.029
Antimony	mg/L	0.006	<0.006	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.0010	0.00092
Barium	mg/L	1	0.1	0.095	0.098	<0.10	0.089	0.091
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.78	0.81
Cadmium	mg/L	0.005	<0.00005	0.000024	<0.000025	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.0010	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	<0.003	0.00056	0.00045	0.00067	0.00031	0.00031
Copper	mg/L	1	<0.002	0.00059	0.00039	0.00057	0.00025	0.00023
Lead	mg/L	0.01	<0.002	<0.00020	<0.00020	0.00033	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.045	0.059
Mercury	mg/L	0.001	<0.000005	<0.002	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.004	0.0046	0.0047	0.0048	0.0043	0.0043
Nickel	mg/L	-	0.006	0.0043	0.0036	0.0044	0.0039	0.0035
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.00026	0.00013
Zinc	mg/L	5	<0.03	0.0038	<0.0030	0.0033	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	10.725
Volume Purged (L)	33 (dry)
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	2.200

Table 5.18B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 18B					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.34	7.06	6.04	7.6	8.0	6.00
Field EC	mS	-	6.33	3.10	4.92	2.92	3.80	4.24
Field Temperature	°C	-	7	7.2	11.6	8.9	5.9	8.3
Routine Water								
pH	-	6.5 - 8.5	7.8	7.92	8.11	8.27	7.79	7.96
Conductivity (EC)	µS/cm	-	6200	6900	4200	2900	3600	3400
Calcium	mg/L	-	450	540	230	120	190	180
Magnesium	mg/L	-	120	150	57	33	47	45
Sodium	mg/L	200	1100	1300	690	510	670	570
Potassium	mg/L	-	7.4	8.4	4.9	3.7	4.6	4.5
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.060	<0.060	0.25
Sulphate	mg/L	500	3300	3700	2200	1400	1700	1500
Chloride	mg/L	250	48	3.5	17	14	17	22
Bicarbonate	mg/L	-	780	980	400	350	410	390
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.23	0.016	0.2	0.2	0.13	0.089
TDS*	mg/L	500	5400	6200	3400	2300	2800	2600
Water Nutrients								
Ammonia-N	mg/L	-	0.63	0.48	0.23	0.09	0.14	0.10
TKN	mg/L	-	1.3	1.2	1.1	0.68	1.5	0.32
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	60	53	34	27	64	30
DOC	mg/L	-	11	8.9	9.3	7.3	9.2	8.2
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0034	0.11
Antimony	mg/L	0.006	<0.006	<0.0060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.0004	0.00041
Barium	mg/L	1	0.01	0.012	0.011	0.017	0.012	0.014
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.071	0.075
Cadmium	mg/L	0.005	<0.000050	0.000053	0.00004	<0.000025	<0.00002	<0.000020
Chromium	mg/L	0.05	<0.01	<0.010	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	0.0005	0.00039	0.00041	0.00031
Copper	mg/L	1	0.003	<0.0020	0.0014	0.0012	0.0007	0.0013
Lead	mg/L	0.01	<0.002	<0.0020	<0.00020	<0.0002	<0.00020	0.00037
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.15	0.046
Mercury	mg/L	0.001	<0.000005	0.0000033	<0.0000050	<0.0000050	<0.0000050	0.0000068
Molybdenum	mg/L	-	<0.002	<0.0020	0.0009	0.0011	0.00074	0.00072
Nickel	mg/L	-	0.005	0.0053	0.0039	0.0035	0.0039	0.0044
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0011	0.00091
Zinc	mg/L	5	<0.03	<0.030	0.005	<0.0030	<0.0030	0.0047

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	5.995
Volume Purged (L)	24
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	2.055

Table 5.19A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 19A					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.8	7.47	5.23	8.2	7.7	7.97
Field EC	mS	-	8.19	3.67	7.94	6.35	7.87	8.51
Field Temperature	^{o}C	-	9.3	7.5	8.2	8.7	6.3	n/a
Routine Water								
pH	-	6.5 - 8.5	8.07	8.11	8.45	8.09	7.99	8.25
Conductivity (EC)	µS/cm	-	8100	8300	6200	7900	7500	6900
Calcium	mg/L	-	78	85	32	90	62	55
Magnesium	mg/L	-	44	46	20	42	37	32
Sodium	mg/L	200	2000	2300	1500	2200	1900	1500
Potassium	mg/L	-	11	11	7.7	8.9	9.4	8.9
Iron	mg/L	0.3	<0.06	<0.060	0.13	<0.60	<0.060	<0.060
Sulphate	mg/L	500	3900	3900	2600	3700	3400	3000
Chloride	mg/L	250	11	10	3.1	8.8	8.9	6.7
Bicarbonate	mg/L	-	1100	1200	1100	1200	1200	1100
Carbonate	mg/L	-	<0.5	<0.50	25	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.15	0.2	0.02	0.15	0.023	<0.050
TDS*	mg/L	500	6600	6900	4700	6700	6000	5200
Water Nutrients								
Ammonia-N	mg/L	-	0.66	0.69	0.82	0.98	0.43	0.49
TKN	mg/L	-	1.1	1.2	1	1.4	0.80	0.96
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	25	28	22	20	25	19
DOC	mg/L	-	8.1	7.3	6.8	6	7.5	7.1
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0072
Antimony	mg/L	0.006	<0.006	<0.0060	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00065
Barium	mg/L	1	0.02	0.013	0.028	<0.10	<0.010	<0.010
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.40	0.41
Cadmium	mg/L	0.005	0.00008	0.000092	<0.000050	0.000055	<0.00020	0.000039
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00042
Copper	mg/L	1	<0.002	0.0043	<0.0020	<0.0020	<0.0020	0.0014
Lead	mg/L	0.01	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.39	0.36
Mercury	mg/L	0.001	<0.000005	<0.0020	0.0000082	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.002	<0.0020	0.0037	0.0022	<0.0020	0.0016
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0028
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.005	0.006
Zinc	mg/L	5	<0.03	<0.030	<0.030	<0.030	<0.030	0.0082

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	10.718
Volume Purged (L)	25 (dry)
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	1.338

Table 5.19B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW19B					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.65	7.75	5.32	7.5	8.4	8.09
Field EC	mS	-	6.24	2.81	7.51	8.08	6.26	7.17
Field Temperature	^{o}C	-	10.7	7.9	8	8.3	6.5	n/a
Routine Water								
pH	-	6.5 - 8.5	8.1	8.4	8.27	8.33	8.26	8.43
Conductivity (EC)	µS/cm	-	6200	6500	8200	6000	5900	5700
Calcium	mg/L	-	62	61	77	29	32	31
Magnesium	mg/L	-	23	25	35	20	17	17
Sodium	mg/L	200	1500	1800	2000	1500	1500	1300
Potassium	mg/L	-	8.9	8.8	8.7	6.7	7.4	7.6
Iron	mg/L	0.3	<0.06	0.26	<0.060	<0.60	0.36	0.21
Sulphate	mg/L	500	2600	2800	3700	2600	2400	2200
Chloride	mg/L	250	4	4.2	9.8	2.6	3.1	3.1
Bicarbonate	mg/L	-	1100	1100	1200	1100	1100	1000
Carbonate	mg/L	-	<0.5	19	<0.50	5	<0.50	13
Nitrate (N)	mg/L	10	0.032	0.015	0.21	<0.010	<0.010	0.015
TDS*	mg/L	500	4800	5200	6500	4700	4500	4100
Water Nutrients								
Ammonia-N	mg/L	-	0.64	0.73	1	0.76	0.76	0.73
TKN	mg/L	-	1.6	1.1	1.6	1.1	1.1	1.1
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.0006
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	86	22	27	28	17	17
DOC	mg/L	-	6.1	5.9	8.2	5	5.7	6.0
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	<0.0030
Antimony	mg/L	0.006	<0.006	<0.0060	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.0021	0.0025
Barium	mg/L	1	0.02	0.019	0.02	<0.10	0.027	0.029
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.47	0.48
Cadmium	mg/L	0.005	<0.00005	<0.050	0.00011	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.0003
Copper	mg/L	1	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00023
Lead	mg/L	0.01	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.21	0.21
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.002	<0.0020	0.0021	0.0029	<0.0020	0.0020
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0025
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	<0.0010	0.00021
Zinc	mg/L	5	<0.030	<0.030	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Detection limit adjusted (*)

Pipe is bent and was unable to measure water elevation (bent)

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	5.34
Volume Purged (L)	24
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	1.383

Table 5.20A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 20A					
			Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	7.710	7.63	n/a	8.0	8.2	8.6
Field EC	mS	-	3.4	1.999	3.98	3.5	3.31	3.57
Field Temperature	^{o}C	-	10	8.7	8.4	7.8	7.9	8.1
Routine Water								
pH	-	6.5 - 8.5	8.25	8.37	8.4	8.05	8.03	8.15
Conductivity (EC)	µS/cm	-	3400	3400	3400	3300	3100	3300
Calcium	mg/L	-	18	22	19	19	18	19
Magnesium	mg/L	-	2.5	2.9	2.6	2.7	2.4	2.5
Sodium	mg/L	200	850	930	800	800	750	830
Potassium	mg/L	-	3	3.8	3.3	3.3	3.5	3.3
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.44	<0.060	<0.060
Sulphate	mg/L	500	830	830	800	800	680	740
Chloride	mg/L	250	8	6.9	6.7	6.9	8.3	7.0
Bicarbonate	mg/L	-	1200	1200	1200	1300	1200	1300
Carbonate	mg/L	-	<0.5	15	18	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	6.9	1.8	3.4	1.8	6.6	3.1
TDS*	mg/L	500	2300	2400	2300	2300	2100	2200
Water Nutrients								
Ammonia-N	mg/L	-	0.41	0.49	0.55	0.33	0.23	0.53
TKN	mg/L	-	1.1	1	1.3	1	0.93	1.2
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	38	45	75	66	28	19
DOC	mg/L	-	9.6	5.9	5.2	4.4	5.7	4.3
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0052	0.0040
Antimony	mg/L	0.006	<0.0006	<0.0030	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.00037	0.00051
Barium	mg/L	1	0.018	0.022	0.021	0.025	0.015	0.018
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.80	0.92
Cadmium	mg/L	0.005	0.00005	0.000066	0.000031	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.001	<0.0050	<0.0010	0.0019	<0.0010	<0.0010
Cobalt	mg/L	-	<0.0003	<0.0015	<0.00030	0.00057	<0.00030	<0.00030
Copper	mg/L	1	0.0023	0.0025	0.0016	0.0036	0.00075	0.00038
Lead	mg/L	0.01	<0.0002	<0.0010	<0.00020	0.0003	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.026	0.026
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0017	0.0018	0.0018	0.0016	0.0016	0.0014
Nickel	mg/L	-	0.0017	<0.0025	0.0016	0.0031	0.0015	0.0011
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	0.0014
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0015	0.0016
Zinc	mg/L	5	0.014	0.017	0.0084	0.0036	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	10.600
Volume Purged (L)	18 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	3.994

Table 5.20B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 20B					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.54	7.41	5.32	7.9	7.9	7.64
Field EC	mS	-	4.59	1.97	5.35	5.32	5.03	4.97
Field Temperature	^{o}C	-	10.1	6.9	7.1	7.9	5.5	7.3
Routine Water								
pH	-	6.5 - 8.5	8.13	8.14	8.19	8.02	8.04	8.04
Conductivity (EC)	µS/cm	-	4700	4600	4600	4900	4700	4700
Calcium	mg/L	-	100	110	110	130	120	110
Magnesium	mg/L	-	36	34	39	47	39	37
Sodium	mg/L	200	1000	1100	960	1000	1000	1000
Potassium	mg/L	-	8	9.2	8.7	9.4	9.0	9.0
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.24	<0.060	<0.60
Sulphate	mg/L	500	1800	1800	1900	2200	1900	1800
Chloride	mg/L	250	2	1.6	1.6	1.3	1.5	1.4
Bicarbonate	mg/L	-	990	1000	960	950	990	1100
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.11	0.052	0.28	0.27	0.17	0.14
TDS*	mg/L	500	3400	3600	3500	3800	3600	3500
Water Nutrients								
Ammonia-N	mg/L	-	<0.05	0.13	<0.05	0.058	<0.050	<0.050
TKN	mg/L	-	0.32	1.3	2.9	3	3.7	0.29
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	58	91	63	96	120	15
DOC	mg/L	-	6.9	5.9	5.6	7.2	6.4	4.3
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0035	<0.0030
Antimony	mg/L	0.006	<0.0006	<0.0030	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.00032	0.00030
Barium	mg/L	1	0.018	0.015	0.017	0.022	0.014	<0.10
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.33	0.38
Cadmium	mg/L	0.005	<0.000025	0.000051	0.00018	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	0.003	<0.0050	0.0033	0.0036	0.0029	0.0035
Cobalt	mg/L	-	<0.0003	<0.0015	<0.00030	<0.0003	<0.00030	<0.00030
Copper	mg/L	1	0.0014	0.0025	0.0012	0.002	0.0013	0.00053
Lead	mg/L	0.01	<0.0002	<0.0010	<0.00020	0.00036	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0040	<0.040
Mercury	mg/L	0.001	<0.000005	0.0000032	<0.0000050	<0.0000050	<0.0000050	0.0000026
Molybdenum	mg/L	-	0.0009	<0.0010	0.00096	0.00094	0.00083	0.00076
Nickel	mg/L	-	0.0013	<0.0025	0.0013	0.0023	0.0011	0.0016
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	0.0031	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0033	0.0013
Zinc	mg/L	5	0.013	<0.015	0.0037	0.0045	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	5.100
Volume Purged (L)	6 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	3.910

Table 5.21A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 21A					
			Jun-11	May-12	Jun-13	Jun-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	7.94	8.2	7.79	9.9	8.3	7.88
Field EC	mS	-	2.16	1.5	2.38	2.12	2.11	2.14
Field Temperature	^{o}C	-	8.7	8.9	10.2	8.3	8.4	7.9
Routine Water								
pH	-	6.5 - 8.5	8.28	8.59	8.33	8.18	8.19	8.29
Conductivity (EC)	µS/cm	-	2100	2100	2000	2000	2000	2000
Calcium	mg/L	-	4.6	4.1	4.8	4.4	4.4	4.7
Magnesium	mg/L	-	0.5	0.47	0.53	0.47	0.44	0.45
Sodium	mg/L	200	440	540	460	470	490	490
Potassium	mg/L	-	1.5	2	1.6	1.8	1.9	1.7
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.22	<0.060	<0.060
Sulphate	mg/L	500	81	91	82	90	72	71
Chloride	mg/L	250	9	8.9	8.4	9.3	9.4	8.7
Bicarbonate	mg/L	-	1300	1200	1300	1300	1300	1300
Carbonate	mg/L	-	<0.5	38	8.5	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	1.8	1.8	1.8	2.3	1.2	1.3
TDS*	mg/L	500	1200	1300	1200	1200	1200	1200
Water Nutrients								
Ammonia-N	mg/L	-	0.13	0.065	0.24	0.068	0.12	0.12
TKN	mg/L	-	1.5	0.95	2.2	1.4	1.7	0.81
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	0.00074
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	29	41	110	96	74	28
DOC	mg/L	-	9.5	9.8	10	7	8.4	7.1
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0058	0.0047
Antimony	mg/L	0.006	<0.0006	<0.00060	0.0011	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.00093	0.0010
Barium	mg/L	1	0.084	0.085	0.084	0.073	0.062	0.073
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.83	0.93
Cadmium	mg/L	0.005	0.00024	0.000062	0.0001	0.000034	0.000067	0.000079
Chromium	mg/L	0.05	<0.001	<0.0010	<0.0010	0.0014	<0.0010	<0.0010
Cobalt	mg/L	-	<0.0003	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper	mg/L	1	0.002	0.0009	0.003	0.0015	0.0012	0.0025
Lead	mg/L	0.01	<0.0002	<0.00020	<0.00020	0.00024	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0040	<0.0040
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.000010	0.0000058	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0076	0.0071	0.0069	0.0065	0.0058	0.0062
Nickel	mg/L	-	0.0031	0.0025	0.0027	0.0027	0.0029	0.0031
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	0.00022	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0034	0.0033
Zinc	mg/L	5	0.014	<0.0030	0.005	<0.0030	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	10.673
Volume Purged (L)	21 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	4.210

Table 5.21B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 21B					
			Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	7.83	7.68	5.6	8.0	8.3	7.89
Field EC	mS	-	2.78	1.18	2.99	2.87	2.82	2.84
Field Temperature	°C	-	12.3	6.9	n/a	6.6	6.9	6.5
Routine Water								
pH	-	6.5 - 8.5	8.27	8.33	8.43	8.21	8.16	8.25
Conductivity (EC)	µS/cm	-	2700	2700	2700	2700	2700	2600
Calcium	mg/L	-	17	17	16	17	16	16
Magnesium	mg/L	-	5.4	5.6	5.4	5.6	4.9	5.0
Sodium	mg/L	200	650	700	620	610	630	630
Potassium	mg/L	-	4.2	4.3	3.9	4	4.2	3.9
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.071	<0.060	<0.060
Sulphate	mg/L	500	600	590	590	650	570	530
Chloride	mg/L	250	2	1.1	1.7	1.5	1.6	1.1
Bicarbonate	mg/L	-	1000	1000	1000	1000	1000	1000
Carbonate	mg/L	-	<0.5	8.3	19	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.052	0.022	0.045	<0.010	0.11	0.11
TDS*	mg/L	500	1800	1800	1800	1800	1800	1700
Water Nutrients								
Ammonia-N	mg/L	-	<0.05	<0.050	<0.05	<0.050	<0.050	<0.050
TKN	mg/L	-	0.45	0.4	0.36	0.34	0.28	<0.05
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	32	34	23	31	20	20
DOC	mg/L	-	4.6	5.5	4.7	3.8	4.2	4.4
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0042	<0.0030
Antimony	mg/L	0.006	<0.006	<0.0030	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.00053	0.00064
Barium	mg/L	1	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.22	0.25
Cadmium	mg/L	0.005	<0.00005	0.000057	0.000038	0.000042	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.0050	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0015	<0.00030	<0.0003	<0.00030	<0.00030
Copper	mg/L	1	<0.002	0.0011	0.0014	0.0014	0.0008	0.00066
Lead	mg/L	0.01	<0.002	<0.0010	<0.00020	<0.0002	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	<0.004	<0.0040
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.002	0.0011	0.002	0.0063	0.0051	0.0027
Nickel	mg/L	-	<0.005	<0.0025	0.001	0.0015	0.0013	0.0013
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0016	0.0017
Zinc	mg/L	5	<0.03	0.016	0.0051	0.003	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	6.080
Volume Purged (L)	12 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	3.283

Table 5.22A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 22A					
			Jun-11	May-12	Jun-13	Jun-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	7.71	7.9	7.45	9.9	n/a	7.76
Field EC	mS	-	5.27	1.34	4.78	5.64	n/a	5.60
Field Temperature	^{o}C	-	11	9.6	10.9	7.4	n/a	10.0
Routine Water								
pH	-	6.5 - 8.5	8.19	8.33	8.18	7.83	8.08	8.09
Conductivity (EC)	µS/cm	-	5400	5500	5300	5300	5300	5300
Calcium	mg/L	-	33	35	36	36	36	35
Magnesium	mg/L	-	3.5	3.8	3.6	3.7	3.6	3.4
Sodium	mg/L	200	1200	1300	1300	1300	1200	1200
Potassium	mg/L	-	3.8	4.9	3.9	4.1	4.7	4.1
Iron	mg/L	0.3	<0.06	0.083	<0.060	0.065	<0.060	<0.60
Sulphate	mg/L	500	1900	2500	2200	2200	2000	2000
Chloride	mg/L	250	12	11	11	11	12	11
Bicarbonate	mg/L	-	950	940	950	940	960	960
Carbonate	mg/L	-	<0.5	4.8	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	7	16	15	16	16	17
TDS*	mg/L	500	3700	4400	4100	4100	3800	3800
Water Nutrients								
Ammonia-N	mg/L	-	0.1	0.34	0.18	<0.050	0.11	<0.050
TKN	mg/L	-	0.83	0.74	0.83	1.2	0.99	0.070
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.75	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	100	56	49	92	49	21
DOC	mg/L	-	8.3	6.2	7.4	5.1	7.0	5.4
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0047
Antimony	mg/L	0.006	<0.006	<0.0060	0.00091	<0.00060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00033
Barium	mg/L	1	0.011	0.011	0.01	0.014	<0.010	<0.10
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.82	0.85
Cadmium	mg/L	0.005	0.00012	0.00022	0.00012	0.000059	<0.00020	0.000026
Chromium	mg/L	0.05	<0.01	<0.010	<0.0010	<0.0010	<0.010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.00030	<0.00030	<0.0030	<0.00030
Copper	mg/L	1	<0.002	<0.0020	0.0024	0.00084	<0.0020	0.0024
Lead	mg/L	0.01	<0.002	<0.0020	<0.00020	<0.00020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.018	<0.040
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.01	0.006	0.0062	0.0054	0.0056	0.0057
Nickel	mg/L	-	<0.005	<0.0050	0.0028	0.0024	<0.0050	0.0051
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.004	0.0042
Zinc	mg/L	5	<0.03	<0.030	0.0052	<0.0030	<0.030	0.0033

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	10.630
Volume Purged (L)	16
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	5.061

Table 5.22B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 22B					
			Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	7.71	7.35	5.5	7.7	7.8	7.57
Field EC	mS	-	8.11	3.5	8.25	8.56	8.25	8.78
Field Temperature	^{o}C	-	9.6	6.8	10.3	6.4	8.4	9.7
Routine Water								
pH	-	6.5 - 8.5	8.03	8.18	8.24	8.07	7.86	7.97
Conductivity (EC)	µS/cm	-	8100	8100	8200	8100	8200	8200
Calcium	mg/L	-	110	120	100	110	120	110
Magnesium	mg/L	-	52	52	49	51	55	55
Sodium	mg/L	200	2000	2100	2000	2100	1900	2000
Potassium	mg/L	-	9.9	9.8	9	8.5	10	10
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.075	<0.60	<0.60
Sulphate	mg/L	500	3900	3800	3800	3900	3900	3900
Chloride	mg/L	250	3	1.5	1.8	1.3	1.8	1.4
Bicarbonate	mg/L	-	1200	1200	1200	1200	1200	1300
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.14	0.18	0.11	0.11	0.16	<0.010
TDS*	mg/L	500	6600	6700	6600	6800	6600	6600
Water Nutrients								
Ammonia-N	mg/L	-	<0.05	<0.050	<0.05	<0.050	<0.050	<0.050
TKN	mg/L	-	0.51	0.36	0.46	0.36	0.52	0.27
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	41	19	37	15	51	18
DOC	mg/L	-	8	5.9	6	5.3	5.7	4.7
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	<0.0030
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00035
Barium	mg/L	1	<0.01	<0.010	<0.010	<0.010	<0.10	<0.10
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.25	0.25
Cadmium	mg/L	0.005	0.00013	0.000096	0.000082	0.00018	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	0.0015
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	<0.002	0.0046	<0.0020	<0.0020	<0.0020	0.0012
Lead	mg/L	0.01	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	<0.040	<0.040
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00081
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0020
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	0.00036
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	<0.03	<0.030	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	6.095
Volume Purged (L)	9
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	3.500

Table 5.23A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 23A					
			Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	8.63	7.85	6.08	8.5	8.8	8.65
Field EC	mS	-	2.52	3.5	2.81	2.25	2.24	2.24
Field Temperature	^{o}C	-	11.3	12	9.1	7.9	8.9	8.6
Routine Water								
pH	-	6.5 - 8.5	8.63	8.57	8.63	8.48	8.44	8.53
Conductivity (EC)	µS/cm	-	2400	2300	2200	2200	2100	2100
Calcium	mg/L	-	6	4.7	4.8	5.4	4.1	4.1
Magnesium	mg/L	-	0.8	0.62	0.6	0.63	0.48	0.49
Sodium	mg/L	200	600	580	550	570	500	560
Potassium	mg/L	-	2.2	2.2	1.9	1.8	2.2	2.0
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.38	<0.060	<0.060
Sulphate	mg/L	500	190	190	160	110	90	85
Chloride	mg/L	250	18	19	19	17	20	18
Bicarbonate	mg/L	-	1200	1300	1200	1300	1300	1300
Carbonate	mg/L	-	44	35	55	28	17	26
Nitrate (N)	mg/L	10	0.016	0.005	<0.003	<0.010	<0.010	<0.010
TDS*	mg/L	500	1500	1500	1400	1400	1300	1300
Water Nutrients								
Ammonia-N	mg/L	-	1.1	0.86	0.79	0.6	0.76	0.76
TKN	mg/L	-	3.2	1.7	2	1.5	1.4	1.5
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	0.12	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	190	78	78	81	55	55
DOC	mg/L	-	16	19	18	16	16	16
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0043	0.0049
Antimony	mg/L	0.006	<0.006	<0.00060	0.0012	0.00082	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.0065	0.0058
Barium	mg/L	1	0.04	0.037	0.043	0.040	0.038	0.050
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.77	0.88
Cadmium	mg/L	0.005	0.00006	0.00011	0.000066	0.000075	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	-	<0.003	0.00036	0.0003	0.0007	<0.00030	<0.00030
Copper	mg/L	1	<0.002	0.00059	0.00026	0.0028	0.00042	0.00049
Lead	mg/L	0.01	<0.002	<0.00020	<0.00020	0.00088	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.0071	0.0079
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.006	0.0058	0.0055	0.0050	0.0042	0.0046
Nickel	mg/L	-	0.011	0.0069	0.0069	0.0097	0.0032	0.0031
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0032	0.0027
Zinc	mg/L	5	<0.03	0.0071	<0.0030	0.0031	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	10.689
Volume Purged (L)	21
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	1.032

Table 5.23B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 23B					
			Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	7.43	7.17	5.77	7.5	7.8	7.45
Field EC	mS	-	9.39	4.38	10.67	9.8	9.75	10.17
Field Temperature	°C	-	12.9	8.8	9.5	9.9	9.8	10.3
Routine Water								
pH	-	6.5 - 8.5	7.94	8.07	8.24	8.06	7.76	7.89
Conductivity (EC)	µS/cm	-	9400	9400	9700	9600	9700	9900
Calcium	mg/L	-	160	160	150	170	170	170
Magnesium	mg/L	-	56	56	55	64	62	63
Sodium	mg/L	200	2300	2500	2300	2400	2300	2400
Potassium	mg/L	-	12	11	11	11	13	12
Iron	mg/L	0.3	0.07	0.07	<0.060	<0.60	<0.60	<0.60
Sulphate	mg/L	500	5000	4900	5400	5200	4900	4900
Chloride	mg/L	250	3	2.2	2.6	2.2	2.6	1.9
Bicarbonate	mg/L	-	1000	1000	1100	1100	1000	1100
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.24	0.073	0.26	0.36	0.072	0.32
TDS*	mg/L	500	8100	8200	8500	8400	7900	8000
Water Nutrients								
Ammonia-N	mg/L	-	0.42	0.3	0.39	0.18	0.42	<0.050
TKN	mg/L	-	0.91	0.76	1.1	0.56	0.76	0.46
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	0.23	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	37	30	45	47	23	22
DOC	mg/L	-	9.6	6.5	7.1	5.8	7.4	5.5
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0081
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00024
Barium	mg/L	1	<0.01	<0.010	<0.010	<0.10	<0.10	<0.10
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.35	0.40
Cadmium	mg/L	0.005	0.00014	0.000083	0.00062	0.00005	<0.00020	0.00028
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.0013
Lead	mg/L	0.01	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.14	0.065
Mercury	mg/L	0.001	<0.000005	0.0000025	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.0005
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0028
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0023	0.0020
Zinc	mg/L	5	<0.03	<0.030	<0.030	<0.030	<0.030	0.0039

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	4.457
Volume Purged (L)	17 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	1.940

Table 5.24A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 24A					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.9	7.69	6.74	7.9	8.1	7.85
Field EC	mS	-	6.5	2.66	7.17	6.24	6.57	6.91
Field Temperature	^{o}C	-	9.3	8.7	10.1	9.9	8.0	8.5
Routine Water								
pH	-	6.5 - 8.5	8.13	8.21	8.24	8.28	7.98	8.08
Conductivity (EC)	µS/cm	-	6300	6200	6300	6200	6200	6100
Calcium	mg/L	-	71	73	64	80	67	69
Magnesium	mg/L	-	8.7	8.1	7.3	9.7	7.5	7.9
Sodium	mg/L	200	1700	1600	1400	1500	1500	1400
Potassium	mg/L	-	5.2	5.8	5.3	5.2	5.6	5.6
Iron	mg/L	0.3	<0.06	<0.060	<0.060	1.1	<0.060	<0.60
Sulphate	mg/L	500	2800	2900	3000	3100	2900	2800
Chloride	mg/L	250	4	4	3.9	4.3	5.0	4.0
Bicarbonate	mg/L	-	700	700	720	720	710	710
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	1.8	0.91	1.5	1.1	1.2	1.2
TDS*	mg/L	500	4900	5000	4900	5100	4800	4700
Water Nutrients								
Ammonia-N	mg/L	-	1.5	1.5	1.2	0.84	1.1	0.061
TKN	mg/L	-	1.8	1.9	1.8	1.4	1.5	0.45
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	37	41	23	27	37	16
DOC	mg/L	-	5.7	5	5.2	4.5	5.3	4.3
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0049
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00045
Barium	mg/L	1	0.02	0.021	0.02	<0.10	0.018	<0.10
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.79	0.84
Cadmium	mg/L	0.005	<0.000050	<0.050	0.000076	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00069
Lead	mg/L	0.01	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.055	0.065
Mercury	mg/L	0.001	<0.000005	0.0000022	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.003	0.0028	0.0027	<0.0020	0.0021	0.0025
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0019
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	<0.0010	0.00090
Zinc	mg/L	5	<0.03	<0.030	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	10.640
Volume Purged (L)	20 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	3.589

Table 5.24B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 24B					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.45	7.33	6.22	7.8	7.5	6.15
Field EC	mS	-	9.21	3.89	9.92	10.01	9.48	11.85
Field Temperature	°C	-	10.5	8.2	10.1	4.9	7.8	n/a
Routine Water								
pH	-	6.5 - 8.5	8.02	8.07	8.1	8.15	7.74	7.96
Conductivity (EC)	µS/cm	-	9500	9200	9000	9100	9000	9100
Calcium	mg/L	-	190	240	240	270	280	320
Magnesium	mg/L	-	110	130	130	160	140	170
Sodium	mg/L	200	2300	2300	1900	2000	2000	1900
Potassium	mg/L	-	9	10	9.4	9.1	10	12
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.60	<0.060	<0.060
Sulphate	mg/L	500	4200	4700	4700	5100	4700	4400
Chloride	mg/L	250	n/a	100	93	82	81	72
Bicarbonate	mg/L	-	1200	1200	1200	1100	1100	1000
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.09	0.0055	0.022	0.013	0.014	<0.010
TDS*	mg/L	500	7500	8000	7600	8100	7700	7300
Water Nutrients								
Ammonia-N	mg/L	-	0.07	<0.050	<0.05	0.064	0.094	0.11
TKN	mg/L	-	1.4	1.3	1.3	1.2	1.1	0.75
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	98	73	68	58	62	47
DOC	mg/L	-	25	22	24	19	19	19
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	<0.0030
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00085
Barium	mg/L	1	0.012	0.011	0.012	<0.10	<0.010	<0.010
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.24	0.26
Cadmium	mg/L	0.005	<0.000050	<0.050	0.000066	0.000064	<0.00020	0.000047
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	0.004	0.0044	0.0036	0.0042	0.0036	0.0041
Lead	mg/L	0.01	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.0041	<0.0040
Mercury	mg/L	0.001	<0.000005	0.0000024	<0.0000050	<0.0000050	<0.0000050	0.0000029
Molybdenum	mg/L	-	0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.0023
Nickel	mg/L	-	0.05	0.049	0.055	0.06	0.06	0.071
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	0.00035
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.18	0.20
Zinc	mg/L	5	<0.03	<0.030	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Insufficient amount of water available during time of sampling (n/a[1])

Exceeds Regulatory Limit

Field Data - June 2016

Date	2-Jun-16
Well Depth (mbtoc)	6.080
Volume Purged (L)	17 (dry)
Sampling Date	2-Jun-16
Static Water Level (mbtoc)	2.555

Table 5.25A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 25A					
			Jun-11	May-12	Jun-13	Jun-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	8.4	8.42	8.02	10	8.6	8.39
Field EC	mS	-	2.16	0.93	2.29	2.22	2.19	2.13
Field Temperature	°C	-	10.7	8.6	10.1	7.1	8.3	9.4
Routine Water								
pH	-	6.5 - 8.5	8.56	8.67	8.53	8.28	8.39	8.45
Conductivity (EC)	µS/cm	-	2100	2200	2100	2000	2100	2100
Calcium	mg/L	-	4.7	5.4	4.7	4.7	4.6	5.1
Magnesium	mg/L	-	0.5	0.59	0.5	0.49	0.44	0.47
Sodium	mg/L	200	450	490	570	480	490	540
Potassium	mg/L	-	1.8	2	1.9	1.9	2.3	1.8
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.060	<0.060	<0.060
Sulphate	mg/L	500	n/a	3.2	7.1	14	13	4.3
Chloride	mg/L	250	10	8.3	8.5	8	9.2	8.4
Bicarbonate	mg/L	-	1300	1300	1400	1400	1400	1400
Carbonate	mg/L	-	38	62	39	<0.50	11	19
Nitrate (N)	mg/L	10	0.065	0.031	0.32	0.97	0.85	0.18
TDS*	mg/L	500	1200	1200	1300	1200	1200	1300
Water Nutrients								
Ammonia-N	mg/L	-	0.67	1.2	0.59	0.42	0.41	0.62
TKN	mg/L	-	1.1	3.9	1.2	1.1	1.1	1.2
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	40	190	29	32	35	29
DOC	mg/L	-	14	9.8	9.3	7.9	8.1	7.9
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0051	0.0046
Antimony	mg/L	0.006	0.0011	0.0033	0.0012	0.00078	0.0011	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.0021	0.0019
Barium	mg/L	1	0.074	0.11	0.085	0.081	0.081	0.088
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.81	0.94
Cadmium	mg/L	0.005	0.00011	0.000041	0.000033	<0.000025	0.000022	<0.000020
Chromium	mg/L	0.05	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	-	0.0006	0.00068	0.00037	0.00046	<0.00030	0.00034
Copper	mg/L	1	0.0018	0.0014	0.0022	0.0009	0.0009	0.00045
Lead	mg/L	0.01	0.0002	0.00029	<0.00020	<0.00020	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.051	0.10
Mercury	mg/L	0.001	<0.000005	0.0000059	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.005	0.013	0.0044	0.0039	0.0051	0.0064
Nickel	mg/L	-	0.0041	0.0054	0.0025	0.0025	0.0032	0.0023
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	0.00041	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.0015	0.00074
Zinc	mg/L	5	0.011	0.005	0.0033	<0.0030	<0.0030	<0.0030
Polycyclic Aromatic Hydrocarbons (PAHs)								
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000010
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00010
Acridine	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00020
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000010
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	n/a	<0.0000075
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000075
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000010
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00010
Perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000020
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00020

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	10.725
Volume Purged (L)	19 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	1.319

Table 5.25B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 25B					
			Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	7.5	7.3	5.91	7.4	7.8	7.56
Field EC	mS	-	9.03	3.98	10.59	9.91	10.02	9.51
Field Temperature	°C	-	11.9	8.3	10.1	7.2	8.2	8.6
Routine Water								
pH	-	6.5 - 8.5	8.05	7.84	8.19	8.12	7.85	8.09
Conductivity (EC)	µS/cm	-	9200	9200	9400	9400	9500	9500
Calcium	mg/L	-	180	190	170	190	190	190
Magnesium	mg/L	-	48	50	47	54	53	51
Sodium	mg/L	200	2200	2500	2200	2300	2200	2100
Potassium	mg/L	-	12	12	11	11	12	12
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.60	<0.60	<0.060
Sulphate	mg/L	500	4800	4700	5100	5200	4600	4500
Chloride	mg/L	250	3	1.4	2	1.9	2.2	2.5
Bicarbonate	mg/L	-	1000	1000	1000	1100	1000	970
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.12	0.09	0.5	0.42	0.77	0.62
TDS*	mg/L	500	7800	8000	8000	8300	7600	7300
Water Nutrients								
Ammonia-N	mg/L	-	0.77	0.82	0.56	0.59	0.29	0.58
TKN	mg/L	-	1.3	1.2	0.53	0.84	0.86	1.2
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	42	36	42	35	29	30
DOC	mg/L	-	9.3	9.2	8.4	9	9.9	10
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0084
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00055
Barium	mg/L	1	0.01	0.012	0.015	<0.10	<0.10	0.011
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.46	0.46
Cadmium	mg/L	0.005	0.00009	<0.050	0.000069	0.00021	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	0.0016
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00075
Copper	mg/L	1	<0.002	0.0036	<0.0020	<0.0020	<0.0020	0.00081
Lead	mg/L	0.01	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.17	0.18
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00072
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0031
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	<0.0010	0.00033
Zinc	mg/L	5	<0.03	<0.030	<0.030	<0.030	<0.030	<0.0030
Polycyclic Aromatic Hydrocarbons (PAHs)								
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000010
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00010
Acridine	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00020
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000010
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	n/a	<0.0000075
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000075
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000010
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.0000085
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00010
Perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000050
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.000020
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	n/a	<0.00020

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	28-May-15
Well Depth (mbtoc)	6.095
Volume Purged (L)	24 (dry)
Sampling Date	4-Jun-15
Static Water Level (mbtoc)	1.651

Table 5.26A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 26A					
			Jun-11	May-12	Jun-13	Jun-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	8.48	8.1	8.31	9.9	n/a	n/a
Field EC	mS	-	2.94	2.15	2.97	2.91	n/a	n/a
Field Temperature	^{o}C	-	10.5	8.6	9.4	6.7	n/a	n/a
Routine Water								
pH	-	6.5 - 8.5	8.58	8.68	8.58	8.45	8.38	8.53
Conductivity (EC)	µS/cm	-	2900	2800	2,700	2700	2700	2600
Calcium	mg/L	-	9.6	7.5	9.5	9.5	9.1	8.7
Magnesium	mg/L	-	1.6	1.1	1.4	1.4	1.2	1.1
Sodium	mg/L	200	770	680	690	680	650	640
Potassium	mg/L	-	2.2	2.3	2.3	2.4	2.7	2.5
Iron	mg/L	0.3	<0.06	<0.060	<0.060	0.15	<0.060	0.084
Sulphate	mg/L	500	680	730	610	610	520	490
Chloride	mg/L	250	6	5.4	5.8	5.9	5.3	5.0
Bicarbonate	mg/L	-	1000	970	1,000	1000	1100	1100
Carbonate	mg/L	-	29	41	34	15	8.6	23
Nitrate (N)	mg/L	10	3.4	1.5	1.8	1.6	0.94	1.0
TDS*	mg/L	500	2000	2000	1,900	1800	1700	1700
Water Nutrients								
Ammonia-N	mg/L	-	<0.05	<0.050	<0.05	<0.050	<0.050	<0.050
TKN	mg/L	-	0.58	0.89	1.2	0.78	1.7	1.2
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.21	<0.10	<0.26	<0.10
Organics								
COD	mg/L	-	33	50	77	29	n/a	51
DOC	mg/L	-	9.9	9.8	9.8	7.8	9.3	10
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0049	0.15
Antimony	mg/L	0.006	<0.0006	<0.00060	0.00061	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.0021	0.0024
Barium	mg/L	1	0.041	0.039	0.041	0.045	0.033	0.047
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.74	0.85
Cadmium	mg/L	0.005	0.000076	<0.050	0.00021	0.000034	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.001	<0.0010	0.0015	0.0012	<0.0010	<0.0010
Cobalt	mg/L	-	<0.0003	<0.00030	0.00032	0.00034	<0.00030	<0.00030
Copper	mg/L	1	0.0016	0.00068	0.0020	0.0018	0.0015	0.0058
Lead	mg/L	0.01	<0.0002	0.00022	<0.00020	0.0012	<0.00020	0.00083
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.0098	<0.0040
Mercury	mg/L	0.001	<0.000005	0.0000021	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0034	0.0036	0.0034	0.0029	0.0020	0.0035
Nickel	mg/L	-	0.0015	0.0029	0.0019	0.0024	0.0017	0.0039
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.00063	0.00065
Zinc	mg/L	5	0.014	0.0039	0.0064	0.013	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Not measured (NM)

Exceeds Regulatory Limit

Field Data - June 2016

Date	8-Jun-16
Well Depth (mbtoc)	10.730
Volume Purged (L)	16 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	2.087

Table 5.26B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 26B					
			Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	7.67	7.35	5.62	7.7	7.5	7.63
Field EC	mS	-	6.54	2.79	7.14	5.28	7.45	6.45
Field Temperature	°C	-	9.1	9.2	8.1	5.8	9.1	8.9
Routine Water								
pH	-	6.5 - 8.5	8.1	8.05	8.37	8.09	7.93	8.15
Conductivity (EC)	µS/cm	-	6400	6300	6400	6100	7100	7400
Calcium	mg/L	-	78	89	74	73	100	110
Magnesium	mg/L	-	41	44	40	36	56	58
Sodium	mg/L	200	1500	1700	1500	1400	1600	1600
Potassium	mg/L	-	6.4	6.4	5.9	5	8.3	7.7
Iron	mg/L	0.3	<0.06	<0.060	<0.060	<0.060	<0.60	<0.060
Sulphate	mg/L	500	2600	2900	3000	3000	3300	3400
Chloride	mg/L	250	2	<1.0	1.6	1.7	3.5	3.9
Bicarbonate	mg/L	-	980	1000	1000	960	1000	990
Carbonate	mg/L	-	<0.5	<0.50	15	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.081	0.043	0.14	0.052	0.23	0.19
TDS*	mg/L	500	4700	5200	5100	4900	5600	5600
Water Nutrients								
Ammonia-N	mg/L	-	0.6	0.54	0.51	0.52	0.43	0.43
TKN	mg/L	-	1.3	0.98	1.1	0.89	0.86	0.73
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	46	29	59	49	24	35
DOC	mg/L	-	8.6	8.3	8.7	7.3	9.0	10
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0095
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.00081
Barium	mg/L	1	0.01	0.01	0.01	0.01	<0.10	0.010
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.30	0.32
Cadmium	mg/L	0.005	0.00007	0.0037	0.000056	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	0.0017
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00087
Copper	mg/L	1	0.11	0.0049	<0.0020	<0.0020	<0.0020	0.0014
Lead	mg/L	0.01	0.004	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.20	0.20
Mercury	mg/L	0.001	<0.000005	0.0000038	<0.0000050	<0.0000050	<0.0000050	0.0000040
Molybdenum	mg/L	-	<0.002	0.0022	<0.0020	<0.0020	0.0024	0.0013
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0029
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.001	0.0012
Zinc	mg/L	5	0.07	<0.030	<0.030	<0.030	<0.030	0.0084
Polycyclic Aromatic Hydrocarbons (PAHs)								
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	0.0037	<0.000010
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	0.0019	<0.00010
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	0.0019	<0.00010
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	0.0020	<0.00010
Acridine	mg/L	-	n/a	n/a	n/a	n/a	0.0014	<0.00020
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	0.0020	<0.000010
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	0.0016	<0.0000085
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	0.0015	<0.0000075
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	0.0026	<0.0000085
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	0.0017	<0.000050
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	0.0014	<0.000050
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	0.0014	<0.0000085
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	0.0015	<0.0000085
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	0.0015	<0.0000085
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	0.0014	<0.0000075
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	0.0018	<0.000010
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	0.0018	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	0.0014	<0.0000085
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	0.0020	<0.00010
Perylene	mg/L	-	n/a	n/a	n/a	n/a	0.0015	<0.000050
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	0.0019	<0.000050
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	0.0019	<0.000020
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	0.0019	<0.00020

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	28-May-15
Well Depth (mbtoc)	6.044
Volume Purged (L)	26
Sampling Date	4-Jun-15
Static Water Level (mbtoc)	1.684

Table 5.27A: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 27A					
			Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements								
Field pH	-	-	8.52	8.35	6.03	8.3	8.9	8.62
Field EC	mS	-	2.98	1.3	3.66	2.89	2.88	2.86
Field Temperature	^{o}C	-	10.6	8.1	6.3	7.0	10.3	6.2
Routine Water								
pH	-	6.5 - 8.5	8.53	8.45	8.64	8.52	8.38	8.57
Conductivity (EC)	µS/cm	-	2800	2700	2800	2800	2900	2800
Calcium	mg/L	-	8.5	9.7	8.2	9.0	8.5	8.5
Magnesium	mg/L	-	1.5	1.5	1.4	1.2	1.1	1.0
Sodium	mg/L	200	700	740	670	730	690	620
Potassium	mg/L	-	2.3	2.3	2.3	2.1	2.5	2.2
Iron	mg/L	0.3	<0.06	1.1	<0.060	0.46	<0.060	<0.060
Sulphate	mg/L	500	710	630	730	770	730	710
Chloride	mg/L	250	8	4.4	5.8	6.2	5.2	5.0
Bicarbonate	mg/L	-	900	940	910	920	930	850
Carbonate	mg/L	-	24	14	35	27	7.5	21
Nitrate (N)	mg/L	10	0.21	0.093	0.14	0.11	0.046	0.21
TDS*	mg/L	500	1900	1900	1900	2000	1900	1800
Water Nutrients								
Ammonia-N	mg/L	-	0.89	0.87	0.85	0.97	0.63	0.86
TKN	mg/L	-	1.5	1.4	1.4	1.2	1.2	0.76
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	40	48	49	43	34	39
DOC	mg/L	-	12	9.5	10	11	11	11
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	0.0043	0.073
Antimony	mg/L	0.006	<0.006	<0.0030	0.0017	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	0.0024	0.0028
Barium	mg/L	1	0.01	0.044	0.013	0.025	0.011	0.014
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.77	0.75
Cadmium	mg/L	0.005	<0.000050	0.000027	0.000026	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.01	<0.0050	<0.0010	0.0031	<0.0010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0015	<0.00030	0.00066	<0.00030	0.00043
Copper	mg/L	1	<0.002	0.0038	0.0014	0.0019	0.00053	0.00098
Lead	mg/L	0.01	<0.002	0.0015	<0.00020	0.00077	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.013	0.011
Mercury	mg/L	0.001	<0.000005	0.0000022	<0.0000050	<0.0000050	<0.0000050	0.0000021
Molybdenum	mg/L	-	0.003	0.0031	0.0028	0.0019	0.0013	0.0023
Nickel	mg/L	-	<0.005	0.0068	0.002	0.003	0.0012	0.0033
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	0.00055	0.00065
Zinc	mg/L	5	<0.03	<0.015	0.0057	0.0049	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	3-Jun-16
Well Depth (mbtoc)	10.954
Volume Purged (L)	20 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	0.428

Table 5.27B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 27B									
			Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements												
Field pH	-	-	7.23	7.818	7.6	7.96	7.86	7.62	6.2	7.5	8.1	7.74
Field EC	mS	-	20.75	8.250	>3.999	2.4	10.47	4.53	12.45	11.56	11.53	11.53
Field Temperature	^{o}C	-	9.66	4.7	10.5	13.4	13	10.9	10.1	9.8	9.1	7.8
Routine Water												
pH	-	6.5 - 8.5	8.2	8.2	8.4	8.33	8.15	8.07	8.38	8.14	7.97	8.19
Conductivity (EC)	µS/cm	-	9620	8440	8320	8240	10000	10000	11000	11,000	11,000	11,000
Calcium	mg/L	-	91.5	83.4	74.4	71.2	100	130	110	130	130	140
Magnesium	mg/L	-	85.6	53	45.8	40.7	82	96	96	110	100	100
Sodium	mg/L	200	2530	2170	1980	1930	2600	2900	2900	2800	2700	2700
Potassium	mg/L	-	8.6	4.1	9.01	8.13	9.1	9.5	9.3	9.2	11	11
Iron	mg/L	0.3	<0.005	<0.005	<0.0050	0.048	<0.06	0.088	<0.060	<0.60	<0.60	<0.060
Sulphate	mg/L	500	4520	3610	3580	3280 *	4700	5600	6000	6100	5100	5300
Chloride	mg/L	250	41	41	35.6	28 *	37	36	37	40	35	42
Bicarbonate	mg/L	-	1420	1380	1270	1250	1400	1500	1600	1700	1700	1600
Carbonate	mg/L	-	<5	<5	25.7	12.5	<0.5	<0.50	27	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.1	0.1	0.448	<1.0 *	0.11	0.11	0.35	0.29	1.1	0.91
TDS*	mg/L	500	7970	6640	6370	5990	8200	9500	9900	10,000	9000	9100
Water Nutrients												
Ammonia-N	mg/L	-	0.63	0.98	0.571	0.625	0.72	0.6	0.53	0.51	0.15	0.42
TKN	mg/L	-	1.3	1.5	1.33	1.71	1.7	1.4	0.49	1.5	1.0	0.55
Hydrocarbons												
Benzene	mg/L	0.005	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics												
COD	mg/L	-	33	31	37.6	20.9	45	43	42	64	35	37
DOC	mg/L	-	n/a	11	253	10.2	12	12	14	13	13	15
Metals												
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.060	0.0056
Antimony	mg/L	0.006	0.0013	n/a	n/a	0.00049	<0.006	<0.012	<0.012	<0.012	<0.012	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	0.0020
Barium	mg/L	1	0.040	0.02	0.019	0.0194	0.02	0.013	0.013	<0.10	<0.10	<0.010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.42	0.43
Cadmium	mg/L	0.005	0.0001	<0.001	<0.0010	0.00013	0.00006	<0.10	0.00011	<0.0001	<0.00040	0.00004
Chromium	mg/L	0.05	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.020	<0.020	<0.020	<0.020	0.0011
Cobalt	mg/L	-	0.006	<0.002	<0.0020	<0.0020	<0.003	<0.0060	<0.0060	<0.0060	<0.0060	0.0011
Copper	mg/L	1	0.006	0.009	0.0079	0.0089	<0.002	0.0073	<0.0040	<0.0040	<0.0040	0.0010
Lead	mg/L	0.01	<0.0001	<0.005	<0.0050	0.00075	<0.002	<0.0040	<0.0040	<0.0040	<0.0040	<0.00020
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.052	0.052
Mercury	mg/L	0.001	0.0002	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.005	0.007	0.0057	<0.0050	0.002	<0.0040	<0.0040	<0.0040	<0.0040	0.0022
Nickel	mg/L	-	0.019	0.009	0.0068	0.006	<0.005	<0.010	<0.010	<0.010	<0.010	0.0077
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	0.00039
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0021	0.0025
Zinc	mg/L	5	0.018	0.01	0.007	0.0096	<0.03	<0.060	<0.060	<0.060	<0.060	0.0048
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo[a]pyrene equivalency	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000010
2-methylnaphthalene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthylene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.00010
Acridine	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.00020
Anthracene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000010
Benz(a)anthracene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(a) pyrene	mg/L	0.00001					n/a	n/a	n/a	n/a	n/a	<0.0000075
Benzo(b+j)fluoranthene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(c)phenanthrene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(e)pyrene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(g,h,i)perylene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(k)fluoranthene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.0000085
Chrysene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.0000085
Dibenz(a,h)anthracene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.0000075
Fluoranthene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000010
Fluorene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.0000085
Naphthalene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.00010
Perylene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000050
Phenanthrene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000050
Pyrene	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.000020
Quinoline	mg/L	-					n/a	n/a	n/a	n/a	n/a	<0.00020

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	28-May-15
Well Depth (mbtoc)	6.612
Volume Purged (L)	24 (dry)
Sampling Date	4-Jun-15
Static Water Level (mbtoc)	1.000

Table 5.28A: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 28A			
			Jun-13	May-14	Jun-15	Jun-16
Field Measurements						
Field pH	-	-	8.28	8.4	8.4	8.51
Field EC	mS	-	3.66	3.63	3.59	3.38
Field Temperature	^{o}C	-	10	6.2	8.5	7.7
Routine Water						
pH	-	6.5 - 8.5	8.48	8.46	8.34	8.54
Conductivity (EC)	µS/cm	-	3400	3400	3400	3300
Calcium	mg/L	-	14	13	13	12
Magnesium	mg/L	-	1.5	1.4	1.3	1.1
Sodium	mg/L	200	820	850	870	800
Potassium	mg/L	-	2.6	2.5	3.1	2.6
Iron	mg/L	0.3	<0.060	0.29	<0.060	<0.060
Sulphate	mg/L	500	1200	1200	1100	1000
Chloride	mg/L	250	5	5.3	5.0	5.2
Bicarbonate	mg/L	-	820	830	850	780
Carbonate	mg/L	-	18	19	3.4	16
Nitrate (N)	mg/L	10	0.037	0.027	<0.010	0.066
TDS*	mg/L	500	2400	2500	2400	2200
Water Nutrients						
Ammonia-N	mg/L	-	1.2	1.3	1.1	1.2
TKN	mg/L	-	1.6	1.6	1.6	1.7
Hydrocarbons						
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10
Organics						
COD	mg/L	-	47	42	39	31
DOC	mg/L	-	11	9.6	8.5	10
Metals						
Aluminum	mg/L	0.1	n/a	n/a	0.0046	0.012
Antimony	mg/L	0.006	0.00061	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	0.001	0.00084
Barium	mg/L	1	0.013	0.015	<0.010	<0.010
Boron	mg/L	5	n/a	n/a	0.74	0.77
Cadmium	mg/L	0.005	<0.000025	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	0.00069	0.00062	<0.00030	0.00039
Copper	mg/L	1	0.0013	0.0021	0.00044	0.00085
Lead	mg/L	0.01	<0.00020	0.00022	<0.00020	<0.00020
Manganese	mg/L	0.05	n/a	n/a	0.029	<0.0040
Mercury	mg/L	0.001	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0035	0.0026	0.0021	0.0017
Nickel	mg/L	-	0.0027	0.0024	0.0014	0.0018
Selenium	mg/L	0.05	n/a	n/a	<0.00020	<0.00020
Uranium	mg/L	0.02	n/a	n/a	0.00056	0.00031
Zinc	mg/L	5	<0.0030	0.0039	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	3-Jun-16
Well Depth (mbtoc)	11.775
Volume Purged (L)	26 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.244

Table 5.28B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 28B			
			Jun-13	May-14	Jun-15	Jun-16
Field Measurements						
Field pH	-	-	7.55	7.4	7.8	7.58
Field EC	mS	-	11.63	12.78	13.02	12.86
Field Temperature	^{o}C	-	9.1	6.5	7.2	7.8
Routine Water						
pH	-	6.5 - 8.5	8.07	8.08	7.9	8.14
Conductivity (EC)	µS/cm	-	12000	12000	12,000	13,000
Calcium	mg/L	-	210	230	220	210
Magnesium	mg/L	-	60	89	95	93
Sodium	mg/L	200	2700	3200	3000	2800
Potassium	mg/L	-	9.4	11	13	13
Iron	mg/L	0.3	<0.060	<0.60	<0.60	<0.060
Sulphate	mg/L	500	6500	6900	6500	6700
Chloride	mg/L	250	34	37	35	33
Bicarbonate	mg/L	-	1000	1100	1100	1000
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	0.16	0.075	0.24	0.31
TDS*	mg/L	500	10,000	11,000	10,000	10,000
Water Nutrients						
Ammonia-N	mg/L	-	2	1.6	1.2	1.4
TKN	mg/L	-	2.8	2.5	2.0	2.1
Hydrocarbons						
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10
Organics						
COD	mg/L	-	45	61	45	48
DOC	mg/L	-	19	15	16	17
Metals						
Aluminum	mg/L	0.1	n/a	n/a	<0.060	0.011
Antimony	mg/L	0.006	0.00091	<0.012	<0.012	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	<0.0040	0.00044
Barium	mg/L	1	0.033	<0.10	<0.10	0.010
Boron	mg/L	5	n/a	n/a	0.44	0.45
Cadmium	mg/L	0.005	0.00027	<0.00010	<0.00040	0.000034
Chromium	mg/L	0.05	<0.0010	<0.020	<0.020	0.0012
Cobalt	mg/L	-	0.0051	<0.0060	<0.0060	0.0019
Copper	mg/L	1	0.0021	<0.0040	<0.0040	0.0015
Lead	mg/L	0.01	<0.00020	<0.0040	<0.0040	<0.00020
Manganese	mg/L	0.05	n/a	n/a	0.27	0.25
Mercury	mg/L	0.001	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0029	<0.0040	<0.0040	0.0009
Nickel	mg/L	-	0.012	<0.010	<0.010	0.0049
Selenium	mg/L	0.05	n/a	n/a	<0.0040	<0.00020
Uranium	mg/L	0.02	n/a	n/a	<0.0020	0.00062
Zinc	mg/L	5	0.0037	<0.060	<0.060	0.0052

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - June 2016

Date	3-Jun-16
Well Depth (mbtoc)	7.104
Volume Purged (L)	26 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.129

Table 5.29A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 29A	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.5	8.15
Field EC	mS	-	4.74	3.44
Field Temperature	°C	-	6.7	7.0
Routine Water				
pH	-	6.5 - 8.5	8.28	8.41
Conductivity (EC)	µS/cm	-	4900	3400
Calcium	mg/L	-	72	33
Magnesium	mg/L	-	9.9	5.1
Sodium	mg/L	200	1200	810
Potassium	mg/L	-	7.4	4.1
Iron	mg/L	0.3	<0.060	<0.060
Sulphate	mg/L	500	2000	1200
Chloride	mg/L	250	7.3	3.3
Bicarbonate	mg/L	-	680	710
Carbonate	mg/L	-	<0.50	7.7
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.054	0.063
Nitrite (N)	mg/L	-	0.084	0.014
Nitrate and Nitrate (N)	mg/L	-	0.14	0.077
TDS*	mg/L	500	3600	2400
Hardness	mg/L	-	220	100
Alkalinity (total as CaCO3)	mg/L	-	560	590
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	6.4
Ionic Balance	N/A	-	1.0	1.0
Water Nutrients				
Ammonia-N	mg/L	-	4.3	1.2
TKN	mg/L	-	16	1.3
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	1100	55
DOC	mg/L	-	13	8.3
Metals				
Aluminum	mg/L	0.1	0.0048	0.0067
Antimony	mg/L	0.006	0.0012	<0.00060
Arsenic	mg/L	0.01	0.0030	0.0011
Barium	mg/L	1	0.021	0.015
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.50	0.75
Cadmium	mg/L	0.005	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.0010
Cobalt	mg/L	-	0.00044	0.00061
Copper	mg/L	1	0.0012	0.0020
Lead	mg/L	0.01	<0.00020	<0.00020
Lithium	mg/L	-	0.26	0.22
Manganese	mg/L	0.05	0.081	0.064
Mercury	mg/L	0.001	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0091	0.0017
Nickel	mg/L	-	0.0036	0.0020
Phosphorus	mg/L	-	<0.10	<0.10
Selenium	mg/L	0.05	0.00039	0.00022
Silicon	mg/L	-	1.7	3.6
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	1.4	0.67
Sulphur	mg/L	-	740	400
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	<0.0010
Uranium	mg/L	0.02	0.0093	0.0006
Vanadium	mg/L	-	<0.0010	0.0011
Zinc	mg/L	5	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	10.240
Volume Purged (L)	22 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.910

Table 5.29B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 29B	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	7.4	7.21
Field EC	mS	-	8.67	8.80
Field Temperature	°C	-	7.1	7.7
Routine Water				
pH	-	6.5 - 8.5	7.62	7.85
Conductivity (EC)	µS/cm	-	8200	8400
Calcium	mg/L	-	520	560
Magnesium	mg/L	-	260	230
Sodium	mg/L	200	1400	1600
Potassium	mg/L	-	12	11
Iron	mg/L	0.3	<0.60	0.54
Sulphate	mg/L	500	4700	5100
Chloride	mg/L	250	5.7	5.2
Bicarbonate	mg/L	-	570	520
Carbonate	mg/L	-	<0.50	<0.50
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.39	0.11
Nitrite (N)	mg/L	-	0.027	0.025
Nitrate and Nitrate (N)	mg/L	-	0.42	0.13
TDS*	mg/L	500	7200	7700
Hardness	mg/L	-	2300	2400
Alkalinity (total as CaCO3)	mg/L	-	470	420
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	<0.50
Ionic Balance	N/A	-	1.0	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.72	1.1
TKN	mg/L	-	4.5	0.96
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	150	41
DOC	mg/L	-	17	15
Metals				
Aluminum	mg/L	0.1	0.0041	0.022
Antimony	mg/L	0.006	0.0017	<0.00060
Arsenic	mg/L	0.01	0.0077	0.00054
Barium	mg/L	1	<0.10	0.019
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	<0.20	0.20
Cadmium	mg/L	0.005	0.00017	0.000082
Chromium	mg/L	0.05	<0.0010	0.0014
Cobalt	mg/L	-	0.018	0.0056
Copper	mg/L	1	0.0019	0.0019
Lead	mg/L	0.01	<0.00020	<0.00020
Lithium	mg/L	-	0.55	0.65
Manganese	mg/L	0.05	0.77	0.85
Mercury	mg/L	0.001	<0.0000050	0.0000043
Molybdenum	mg/L	-	0.016	0.00045
Nickel	mg/L	-	0.048	0.0099
Phosphorus	mg/L	-	<1.0	<0.10
Selenium	mg/L	0.05	0.001	<0.00020
Silicon	mg/L	-	4.4	5.3
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	6.9	7.9
Sulphur	mg/L	-	1600	1800
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	<0.0010
Uranium	mg/L	0.02	0.019	0.0042
Vanadium	mg/L	-	<0.0010	0.0015
Zinc	mg/L	5	0.014	0.0051

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	5.457
Volume Purged (L)	12 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.827

Table 5.30A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 30A	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.5	8.29
Field EC	mS	-	2.40	2.32
Field Temperature	°C	-	7.5	8.7
Routine Water				
pH	-	6.5 - 8.5	8.34	8.37
Conductivity (EC)	µS/cm	-	2300	2200
Calcium	mg/L	-	16	12
Magnesium	mg/L	-	2.2	1.6
Sodium	mg/L	200	540	540
Potassium	mg/L	-	2.9	2.4
Iron	mg/L	0.3	0.44	0.63
Sulphate	mg/L	500	510	510
Chloride	mg/L	250	5.3	3.0
Bicarbonate	mg/L	-	770	780
Carbonate	mg/L	-	3.5	5.3
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.013	0.16
Nitrite (N)	mg/L	-	<0.033	0.046
Nitrate and Nitrate (N)	mg/L	-	0.023	0.21
TDS*	mg/L	500	1500	1500
Hardness	mg/L	-	48	36
Alkalinity (total as CaCO3)	mg/L	-	640	650
Alkalinity (pp as CaCO3)	mg/L	-	2.9	4.5
Ionic Balance	N/A	-	1.0	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.78	0.42
TKN	mg/L	-	2.6	1.1
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	130	43
DOC	mg/L	-	15	9.9
Metals				
Aluminum	mg/L	0.1	1.0	3.8
Antimony	mg/L	0.006	0.0008	<0.00060
Arsenic	mg/L	0.01	0.0037	0.0030
Barium	mg/L	1	0.028	0.025
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.43	0.52
Cadmium	mg/L	0.005	0.00004	0.000026
Chromium	mg/L	0.05	0.0016	0.0045
Cobalt	mg/L	-	0.0012	0.0012
Copper	mg/L	1	0.0056	0.0075
Lead	mg/L	0.01	0.00077	0.00054
Lithium	mg/L	-	0.11	0.13
Manganese	mg/L	0.05	0.081	0.059
Mercury	mg/L	0.001	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.013	0.0082
Nickel	mg/L	-	0.013	0.010
Phosphorus	mg/L	-	<0.10	0.11
Selenium	mg/L	0.05	0.0012	0.00064
Silicon	mg/L	-	3.4	3.7
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	0.15	0.13
Sulphur	mg/L	-	190	170
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	0.033	0.084
Uranium	mg/L	0.02	0.0063	0.0035
Vanadium	mg/L	-	0.0034	0.0090
Zinc	mg/L	5	0.0034	0.0037

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	8-Jun-16
Total Depth Measured (mbtoc)	8.855
Volume Purged (L)	18 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	3.422

Table 5.30B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 30B	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.1	8.19
Field EC	mS	-	2.83	2.65
Field Temperature	°C	-	6.5	7.4
Routine Water				
pH	-	6.5 - 8.5	8.06	8.44
Conductivity (EC)	µS/cm	-	2700	2600
Calcium	mg/L	-	29	26
Magnesium	mg/L	-	9.1	9.5
Sodium	mg/L	200	680	610
Potassium	mg/L	-	3.3	3.2
Iron	mg/L	0.3	<0.060	<0.060
Sulphate	mg/L	500	830	830
Chloride	mg/L	250	1.4	1.5
Bicarbonate	mg/L	-	670	610
Carbonate	mg/L	-	<0.50	8.0
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	1.3	0.12
Nitrite (N)	mg/L	-	<0.010	0.012
Nitrate and Nitrate (N)	mg/L	-	1.3	0.13
TDS*	mg/L	500	1900	1800
Hardness	mg/L	-	110	100
Alkalinity (total as CaCO3)	mg/L	-	550	520
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	6.7
Ionic Balance	N/A	-	1.1	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.16	<0.050
TKN	mg/L	-	0.49	0.40
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	110	44
DOC	mg/L	-	8.4	9.1
Metals				
Aluminum	mg/L	0.1	<0.030	0.011
Antimony	mg/L	0.006	<0.0060	<0.00060
Arsenic	mg/L	0.01	0.0024	0.0010
Barium	mg/L	1	0.022	0.022
Beryllium	mg/L	-	<0.010	<0.0010
Boron	mg/L	5	0.11	0.14
Cadmium	mg/L	0.005	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.010	0.0012
Cobalt	mg/L	-	<0.0030	<0.00030
Copper	mg/L	1	0.0035	0.0024
Lead	mg/L	0.01	<0.0020	<0.00020
Lithium	mg/L	-	0.21	0.24
Manganese	mg/L	0.05	0.068	<0.0040
Mercury	mg/L	0.001	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0028	0.0011
Nickel	mg/L	-	0.0053	0.0023
Phosphorus	mg/L	-	<0.10	<0.10
Selenium	mg/L	0.05	<0.0020	0.00024
Silicon	mg/L	-	4.6	4.7
Silver	mg/L	-	<0.0010	<0.00010
Strontium	mg/L	-	0.37	0.33
Sulphur	mg/L	-	260	290
Thallium	mg/L	-	<0.0020	<0.00020
Tin	mg/L	-	<0.010	<0.0010
Titanium	mg/L	-	<0.010	<0.0010
Uranium	mg/L	0.02	0.0053	0.0032
Vanadium	mg/L	-	<0.010	0.0019
Zinc	mg/L	5	<0.030	0.0064

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	5.452
Volume Purged (L)	9 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	3.512

Table 5.31A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 31A	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.6	8.53
Field EC	mS	-	1.98	1.72
Field Temperature	°C	-	10.5	9.5
Routine Water				
pH	-	6.5 - 8.5	8.57	8.53
Conductivity (EC)	µS/cm	-	1900	1800
Calcium	mg/L	-	7.8	4.5
Magnesium	mg/L	-	3.1	<2.0
Sodium	mg/L	200	420	430
Potassium	mg/L	-	3.2	<3.0
Iron	mg/L	0.3	9.0	<0.60
Sulphate	mg/L	500	220	120
Chloride	mg/L	250	12	6.7
Bicarbonate	mg/L	-	920	940
Carbonate	mg/L	-	22	18
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.017	2.0
Nitrite (N)	mg/L	-	0.013	0.028
Nitrate and Nitrate (N)	mg/L	-	0.03	2.0
TDS*	mg/L	500	1100	1000
Hardness	mg/L	-	32	11
Alkalinity (total as CaCO3)	mg/L	-	790	800
Alkalinity (pp as CaCO3)	mg/L	-	19	15
Ionic Balance	N/A	-	0.94	1.0
Water Nutrients				
Ammonia-N	mg/L	-	1.1	1.1
TKN	mg/L	-	5.2	1.0
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	560	380
DOC	mg/L	-	19	17
Metals				
Aluminum	mg/L	0.1	1.5	0.31
Antimony	mg/L	0.006	0.0013	<0.00060
Arsenic	mg/L	0.01	0.0069	0.00088
Barium	mg/L	1	0.097	<0.10
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.58	0.66
Cadmium	mg/L	0.005	0.000048	<0.000020
Chromium	mg/L	0.05	0.0017	<0.0010
Cobalt	mg/L	-	0.0034	0.00039
Copper	mg/L	1	0.0093	0.00093
Lead	mg/L	0.01	0.0021	0.00043
Lithium	mg/L	-	0.064	<0.20
Manganese	mg/L	0.05	0.068	<0.040
Mercury	mg/L	0.001	0.000008	0.000043
Molybdenum	mg/L	-	0.023	0.0021
Nickel	mg/L	-	0.020	0.0026
Phosphorus	mg/L	-	0.12	<1.0
Selenium	mg/L	0.05	0.0013	<0.00020
Silicon	mg/L	-	55	2.7
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	0.10	<0.20
Sulphur	mg/L	-	75	40
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	0.030	0.0032
Uranium	mg/L	0.02	0.0095	0.00054
Vanadium	mg/L	-	0.0028	<0.0010
Zinc	mg/L	5	0.0051	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	9.660
Volume Purged (L)	20 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.800

Table 5.31B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 31B	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.4	8.33
Field EC	mS	-	2.53	2.50
Field Temperature	°C	-	8.0	9.4
Routine Water				
pH	-	6.5 - 8.5	8.29	8.56
Conductivity (EC)	µS/cm	-	2400	2500
Calcium	mg/L	-	15	15
Magnesium	mg/L	-	4.3	5.4
Sodium	mg/L	200	550	590
Potassium	mg/L	-	3.7	3.6
Iron	mg/L	0.3	0.75	0.26
Sulphate	mg/L	500	670	750
Chloride	mg/L	250	1.1	1.4
Bicarbonate	mg/L	-	690	610
Carbonate	mg/L	-	<0.50	13
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.046	<0.010
Nitrite (N)	mg/L	-	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	0.046	<0.020
TDS*	mg/L	500	1600	1700
Hardness	mg/L	-	55	59
Alkalinity (total as CaCO3)	mg/L	-	570	520
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	11
Ionic Balance	N/A	-	0.99	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.59	0.13
TKN	mg/L	-	2.2	0.38
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	0.12	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	140	28
DOC	mg/L	-	9	8.2
Metals				
Aluminum	mg/L	0.1	0.70	0.084
Antimony	mg/L	0.006	0.00095	<0.00060
Arsenic	mg/L	0.01	0.0094	0.0017
Barium	mg/L	1	0.024	0.023
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.16	0.20
Cadmium	mg/L	0.005	<0.00002	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.0010
Cobalt	mg/L	-	0.0021	0.00053
Copper	mg/L	1	0.0022	0.0022
Lead	mg/L	0.01	0.00048	<0.00020
Lithium	mg/L	-	0.12	0.16
Manganese	mg/L	0.05	0.061	0.041
Mercury	mg/L	0.001	<0.0000050	0.0000027
Molybdenum	mg/L	-	0.0058	0.0015
Nickel	mg/L	-	0.0086	0.0033
Phosphorus	mg/L	-	<0.10	<0.10
Selenium	mg/L	0.05	0.00064	<0.00020
Silicon	mg/L	-	5.2	3.9
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	0.17	0.23
Sulphur	mg/L	-	220	270
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	0.018	<0.0010
Uranium	mg/L	0.02	0.0034	0.00099
Vanadium	mg/L	-	0.0024	0.0011
Zinc	mg/L	5	<0.0030	0.0078

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	3.860
Volume Purged (L)	10 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.225

Table 5.32A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 32A	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.2	7.79
Field EC	mS	-	8.66	7.91
Field Temperature	°C	-	7.6	8.2
Routine Water				
pH	-	6.5 - 8.5	8.16	8.25
Conductivity (EC)	µS/cm	-	8200	8100
Calcium	mg/L	-	120	120
Magnesium	mg/L	-	15	15
Sodium	mg/L	200	2000	2000
Potassium	mg/L	-	11	8.4
Iron	mg/L	0.3	<0.60	0.12
Sulphate	mg/L	500	4100	3900
Chloride	mg/L	250	8.9	3.1
Bicarbonate	mg/L	-	960	980
Carbonate	mg/L	-	<0.50	<0.50
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.010	<0.050
Nitrite (N)	mg/L	-	0.013	<0.050
Nitrate and Nitrate (N)	mg/L	-	0.013	<0.020
TDS*	mg/L	500	6700	6500
Hardness	mg/L	-	370	360
Alkalinity (total as CaCO3)	mg/L	-	790	800
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	<0.50
Ionic Balance	N/A	-	0.92	1.0
Water Nutrients				
Ammonia-N	mg/L	-	3.5	2.9
TKN	mg/L	-	6.8	3.2
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	410	26
DOC	mg/L	-	12	7.9
Metals				
Aluminum	mg/L	0.1	<0.030	0.029
Antimony	mg/L	0.006	<0.0060	<0.00060
Arsenic	mg/L	0.01	0.0041	0.00051
Barium	mg/L	1	<0.10	0.015
Beryllium	mg/L	-	<0.010	<0.0010
Boron	mg/L	5	0.85	1.2
Cadmium	mg/L	0.005	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.010	0.0015
Cobalt	mg/L	-	<0.0030	0.00077
Copper	mg/L	1	<0.0020	0.0031
Lead	mg/L	0.01	<0.0020	<0.00020
Lithium	mg/L	-	0.36	0.47
Manganese	mg/L	0.05	0.15	0.12
Mercury	mg/L	0.001	<0.0000050	0.0000023
Molybdenum	mg/L	-	0.014	0.00054
Nickel	mg/L	-	0.011	0.0032
Phosphorus	mg/L	-	<1.0	<0.10
Selenium	mg/L	0.05	<0.0020	<0.00020
Silicon	mg/L	-	2.4	5.2
Silver	mg/L	-	<0.0010	<0.00010
Strontium	mg/L	-	2.6	2.9
Sulphur	mg/L	-	1300	1300
Thallium	mg/L	-	<0.0020	<0.00020
Tin	mg/L	-	<0.010	<0.0010
Titanium	mg/L	-	<0.010	<0.0010
Uranium	mg/L	0.02	0.0080	0.00016
Vanadium	mg/L	-	<0.010	<0.0010
Zinc	mg/L	5	<0.030	0.015

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	10.120
Volume Purged (L)	29 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.319

Table 5.32B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 32B	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	7.7	7.69
Field EC	mS	-	12.55	13.26
Field Temperature	°C	-	7.6	9.1
Routine Water				
pH	-	6.5 - 8.5	7.73	7.97
Conductivity (EC)	µS/cm	-	12,000	13,000
Calcium	mg/L	-	210	230
Magnesium	mg/L	-	100	120
Sodium	mg/L	200	2800	3200
Potassium	mg/L	-	18	17
Iron	mg/L	0.3	<0.60	<0.60
Sulphate	mg/L	500	6300	6800
Chloride	mg/L	250	110	120
Bicarbonate	mg/L	-	1300	1300
Carbonate	mg/L	-	<0.50	<0.50
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.050	<0.050
Nitrite (N)	mg/L	-	<0.050	<0.050
Nitrate and Nitrate (N)	mg/L	-	<0.050	<0.020
TDS*	mg/L	500	10,000	11,000
Hardness	mg/L	-	930	1100
Alkalinity (total as CaCO3)	mg/L	-	1100	1100
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	<0.50
Ionic Balance	N/A	-	0.91	0.97
Water Nutrients				
Ammonia-N	mg/L	-	1.3	1.5
TKN	mg/L	-	3.5	2.6
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	210	78
DOC	mg/L	-	18	15
Metals				
Aluminum	mg/L	0.1	0.0045	0.0038
Antimony	mg/L	0.006	0.0016	<0.00060
Arsenic	mg/L	0.01	0.012	0.0016
Barium	mg/L	1	<0.10	<0.10
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.40	0.48
Cadmium	mg/L	0.005	0.00011	0.00046
Chromium	mg/L	0.05	<0.0010	<0.0010
Cobalt	mg/L	-	0.0093	0.0054
Copper	mg/L	1	0.0012	0.0036
Lead	mg/L	0.01	<0.00020	<0.00020
Lithium	mg/L	-	0.43	0.54
Manganese	mg/L	0.05	0.68	0.85
Mercury	mg/L	0.001	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0089	0.0016
Nickel	mg/L	-	0.031	0.013
Phosphorus	mg/L	-	<1.0	<1.0
Selenium	mg/L	0.05	0.00079	0.00046
Silicon	mg/L	-	3.9	4.7
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	4.3	5.1
Sulphur	mg/L	-	2000	2300
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	<0.0010
Uranium	mg/L	0.02	0.0027	0.00085
Vanadium	mg/L	-	<0.0010	<0.0010
Zinc	mg/L	5	0.0055	0.0040

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	8-Jun-16
Total Depth Measured (mbtoc)	4.832
Volume Purged (L)	8 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	2.328

Table 5.33A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 33A	
			May-15	Jun-16
Field Measurements				
Field pH	-	-	8.6	8.66
Field EC	mS	-	2.54	2.01
Field Temperature	°C	-	6.9	7.0
Routine Water				
pH	-	6.5 - 8.5	8.32	8.52
Conductivity (EC)	µS/cm	-	3300	2100
Calcium	mg/L	-	35	7.4
Magnesium	mg/L	-	10	1.4
Sodium	mg/L	200	930	480
Potassium	mg/L	-	5.8	2.2
Iron	mg/L	0.3	<0.060	0.60
Sulphate	mg/L	500	860	230
Chloride	mg/L	250	28	27
Bicarbonate	mg/L	-	1100	990
Carbonate	mg/L	-	2.6	16
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.010	<0.010
Nitrite (N)	mg/L	-	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	<0.010	<0.020
TDS*	mg/L	500	2400	1200
Hardness	mg/L	-	130	24
Alkalinity (total as CaCO3)	mg/L	-	870	840
Alkalinity (pp as CaCO3)	mg/L	-	2.2	13
Ionic Balance	N/A	-	1.2	0.96
Water Nutrients				
Ammonia-N	mg/L	-	1.3	0.89
TKN	mg/L	-	8.0	2.6
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	460	140
DOC	mg/L	-	39	33
Metals				
Aluminum	mg/L	0.1	0.0044	0.66
Antimony	mg/L	0.006	0.00076	<0.00060
Arsenic	mg/L	0.01	0.0089	0.0042
Barium	mg/L	1	0.070	0.080
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.50	0.71
Cadmium	mg/L	0.005	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.0010
Cobalt	mg/L	-	0.0032	0.0016
Copper	mg/L	1	0.0017	0.028
Lead	mg/L	0.01	<0.00020	0.00094
Lithium	mg/L	-	0.20	0.089
Manganese	mg/L	0.05	0.13	0.058
Mercury	mg/L	0.001	<0.0000050	<0.0000060
Molybdenum	mg/L	-	0.023	0.018
Nickel	mg/L	-	0.016	0.0083
Phosphorus	mg/L	-	<0.10	0.17
Selenium	mg/L	0.05	0.00058	<0.00020
Silicon	mg/L	-	3.5	3.9
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	0.7	0.16
Sulphur	mg/L	-	360	64
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	0.0095
Uranium	mg/L	0.02	0.0096	0.0035
Vanadium	mg/L	-	0.0015	0.0040
Zinc	mg/L	5	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	14.740
Volume Purged (L)	25 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	2.305

Table 5.33B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 33B	
			May-15	Jun-16
Field Measurements				
Field pH	-	-	7.5	7.48
Field EC	mS	-	5.18	5.34
Field Temperature	°C	-	6.0	6.9
Routine Water				
pH	-	6.5 - 8.5	7.89	8.15
Conductivity (EC)	µS/cm	-	5000	5400
Calcium	mg/L	-	91	110
Magnesium	mg/L	-	26	38
Sodium	mg/L	200	1200	1300
Potassium	mg/L	-	6.9	6.9
Iron	mg/L	0.3	<0.060	0.35
Sulphate	mg/L	500	1900	2000
Chloride	mg/L	250	21	20
Bicarbonate	mg/L	-	1000	1100
Carbonate	mg/L	-	<0.50	<0.50
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.010	<0.050
Nitrite (N)	mg/L	-	<0.010	<0.050
Nitrate and Nitrate (N)	mg/L	-	<0.010	<0.020
TDS*	mg/L	500	3700	4000
Hardness	mg/L	-	340	440
Alkalinity (total as CaCO3)	mg/L	-	850	920
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	<0.50
Ionic Balance	N/A	-	1.0	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.83	0.78
TKN	mg/L	-	5.3	2.6
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	280	140
DOC	mg/L	-	45	44
Metals				
Aluminum	mg/L	0.1	0.0056	0.060
Antimony	mg/L	0.006	0.0013	<0.00060
Arsenic	mg/L	0.01	0.0065	0.0013
Barium	mg/L	1	0.038	0.031
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.23	0.28
Cadmium	mg/L	0.005	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	0.0020
Cobalt	mg/L	-	0.0030	0.0020
Copper	mg/L	1	0.00037	0.0027
Lead	mg/L	0.01	<0.00020	0.00024
Lithium	mg/L	-	0.30	0.35
Manganese	mg/L	0.05	0.19	0.24
Mercury	mg/L	0.001	<0.0000050	0.00023
Molybdenum	mg/L	-	0.0070	0.00038
Nickel	mg/L	-	0.015	0.0096
Phosphorus	mg/L	-	<0.10	<0.10
Selenium	mg/L	0.05	0.00064	0.00038
Silicon	mg/L	-	3.9	5.0
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	1.6	2.1
Sulphur	mg/L	-	610	720
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	0.0033
Uranium	mg/L	0.02	0.0021	0.00016
Vanadium	mg/L	-	<0.0010	<0.0010
Zinc	mg/L	5	<0.0030	0.0056

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	5.335
Volume Purged (L)	24.0
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	1.398

Table 5.34A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-34A
			Jun-16
Field Measurements			
Field pH	-	-	8.66
Field EC	mS	-	3.02
Field Temperature	°C	-	8.1
Routine Water			
pH	-	6.5 - 8.5	8.57
Conductivity (EC)	µS/cm	-	3000
Calcium	mg/L	-	19
Magnesium	mg/L	-	4.5
Sodium	mg/L	200	710
Potassium	mg/L	-	4.1
Iron	mg/L	0.3	0.13
Sulphate	mg/L	500	510
Chloride	mg/L	250	51
Bicarbonate	mg/L	-	1200
Carbonate	mg/L	-	25
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	<0.050
Nitrite (N)	mg/L	-	<0.050
Nitrate and Nitrate (N)	mg/L	-	<0.020
TDS*	mg/L	500	1900
Hardness	mg/L	-	67
Alkalinity (total as CaCO3)	mg/L	-	990
Alkalinity (pp as CaCO3)	mg/L	-	21
Ionic Balance	N/A	-	1.0
Water Nutrients			
Ammonia-N	mg/L	-	1.1
TKN	mg/L	-	2.6
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	470
DOC	mg/L	-	72
Metals			
Aluminum	mg/L	0.1	0.036
Antimony	mg/L	0.006	0.00078
Arsenic	mg/L	0.01	0.0030
Barium	mg/L	1	0.030
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.80
Cadmium	mg/L	0.005	<0.000020
Chromium	mg/L	0.05	0.0010
Cobalt	mg/L	-	0.0010
Copper	mg/L	1	0.0019
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.14
Manganese	mg/L	0.05	0.14
Mercury	mg/L	0.001	0.000044
Molybdenum	mg/L	-	0.042
Nickel	mg/L	-	0.0074
Phosphorus	mg/L	-	<0.10
Selenium	mg/L	0.05	0.00029
Silicon	mg/L	-	3.2
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.30
Sulphur	mg/L	-	170
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.018
Vanadium	mg/L	-	0.0023
Zinc	mg/L	5	0.011

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	13.04
Volume Purged (L)	20 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	3.635

Table 5.34B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-34B Jun-16
Field Measurements			
Field pH	-	-	7.05
Field EC	mS	-	2.49
Field Temperature	°C	-	7.9
Routine Water			
pH	-	6.5 - 8.5	7.65
Conductivity (EC)	µS/cm	-	2400
Calcium	mg/L	-	180
Magnesium	mg/L	-	55
Sodium	mg/L	200	320
Potassium	mg/L	-	11
Iron	mg/L	0.3	<0.060
Sulphate	mg/L	500	510
Chloride	mg/L	250	39
Bicarbonate	mg/L	-	1000
Carbonate	mg/L	-	<0.50
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	0.014
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	<0.020
TDS*	mg/L	500	1600
Hardness	mg/L	-	670
Alkalinity (total as CaCO3)	mg/L	-	840
Alkalinity (pp as CaCO3)	mg/L	-	<0.50
Ionic Balance	N/A	-	0.96
Water Nutrients			
Ammonia-N	mg/L	-	0.16
TKN	mg/L	-	0.89
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	81
DOC	mg/L	-	14
Metals			
Aluminum	mg/L	0.1	0.0064
Antimony	mg/L	0.006	<0.00060
Arsenic	mg/L	0.01	0.00054
Barium	mg/L	1	0.054
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.060
Cadmium	mg/L	0.005	0.00010
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.0015
Copper	mg/L	1	0.0041
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.12
Manganese	mg/L	0.05	0.11
Mercury	mg/L	0.001	0.0000025
Molybdenum	mg/L	-	0.0012
Nickel	mg/L	-	0.0096
Phosphorus	mg/L	-	0.26
Selenium	mg/L	0.05	<0.00020
Silicon	mg/L	-	5.6
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	1.2
Sulphur	mg/L	-	140
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.0050
Vanadium	mg/L	-	0.0031
Zinc	mg/L	5	0.0073

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	8.580
Volume Purged (L)	11 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	3.065

Table 5.35-Deep: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-35-DEEP
			Jun-16
Field Measurements			
Field pH	-	-	8.22
Field EC	mS	-	4.90
Field Temperature	°C	-	8.9
Routine Water			
pH	-	6.5 - 8.5	8.19
Conductivity (EC)	µS/cm	-	4700
Calcium	mg/L	-	18
Magnesium	mg/L	-	2.1
Sodium	mg/L	200	970
Potassium	mg/L	-	3.3
Iron	mg/L	0.3	<0.060
Sulphate	mg/L	500	25
Chloride	mg/L	250	1100
Bicarbonate	mg/L	-	560
Carbonate	mg/L	-	<0.50
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	0.25
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	0.25
TDS*	mg/L	500	2400
Hardness	mg/L	-	53
Alkalinity (total as CaCO3)	mg/L	-	460
Alkalinity (pp as CaCO3)	mg/L	-	<0.50
Ionic Balance	N/A	-	1.0
Water Nutrients			
Ammonia-N	mg/L	-	1.1
TKN	mg/L	-	2.2
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	110
DOC	mg/L	-	18
Metals			
Aluminum	mg/L	0.1	0.017
Antimony	mg/L	0.006	<0.00060
Arsenic	mg/L	0.01	0.0018
Barium	mg/L	1	0.27
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.69
Cadmium	mg/L	0.005	0.000040
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00069
Copper	mg/L	1	0.00094
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.15
Manganese	mg/L	0.05	0.048
Mercury	mg/L	0.001	0.0000020
Molybdenum	mg/L	-	0.021
Nickel	mg/L	-	0.0038
Phosphorus	mg/L	-	<0.10
Selenium	mg/L	0.05	0.00020
Silicon	mg/L	-	3.5
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.36
Sulphur	mg/L	-	9.2
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.0023
Vanadium	mg/L	-	<0.0010
Zinc	mg/L	5	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	8-Jun-16
Total Depth Measured (mbtoc)	33.3
Volume Purged (L)	60 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	6.876

Table 5.35A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-35A
			Jun-16
Field Measurements			
Field pH	-	-	n/a
Field EC	mS	-	n/a
Field Temperature	°C	-	n/a
Routine Water			
pH	-	6.5 - 8.5	8.60
Conductivity (EC)	µS/cm	-	1500
Calcium	mg/L	-	3.8
Magnesium	mg/L	-	0.36
Sodium	mg/L	200	370
Potassium	mg/L	-	2.2
Iron	mg/L	0.3	0.11
Sulphate	mg/L	500	41
Chloride	mg/L	250	36
Bicarbonate	mg/L	-	900
Carbonate	mg/L	-	26
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	<0.010
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	<0.020
TDS*	mg/L	500	930
Hardness	mg/L	-	11
Alkalinity (total as CaCO3)	mg/L	-	780
Alkalinity (pp as CaCO3)	mg/L	-	22
Ionic Balance	N/A	-	0.95
Water Nutrients			
Ammonia-N	mg/L	-	0.83
TKN	mg/L	-	12
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.27
Organics			
COD	mg/L	-	1100
DOC	mg/L	-	15
Metals			
Aluminum	mg/L	0.1	0.092
Antimony	mg/L	0.006	<0.00060
Arsenic	mg/L	0.01	0.0035
Barium	mg/L	1	0.080
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.75
Cadmium	mg/L	0.005	<0.000020
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00042
Copper	mg/L	1	0.0011
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.068
Manganese	mg/L	0.05	0.012
Mercury	mg/L	0.001	<0.000020
Molybdenum	mg/L	-	0.020
Nickel	mg/L	-	0.0053
Phosphorus	mg/L	-	0.15
Selenium	mg/L	0.05	<0.00020
Silicon	mg/L	-	3.7
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.076
Sulphur	mg/L	-	11
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	0.0015
Uranium	mg/L	0.02	0.0013
Vanadium	mg/L	-	0.0014
Zinc	mg/L	5	0.0035

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	8-Jun-16
Total Depth Measured (mbtoc)	14.560
Volume Purged (L)	16 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	7.711

Table 5.35B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-35B Jun-16
Field Measurements			
Field pH	-	-	7.83
Field EC	mS	-	8.08
Field Temperature	°C	-	7.6
Routine Water			
pH	-	6.5 - 8.5	8.16
Conductivity (EC)	µS/cm	-	7700
Calcium	mg/L	-	99
Magnesium	mg/L	-	14
Sodium	mg/L	200	1800
Potassium	mg/L	-	7.8
Iron	mg/L	0.3	<0.60
Sulphate	mg/L	500	3700
Chloride	mg/L	250	5.2
Bicarbonate	mg/L	-	790
Carbonate	mg/L	-	<0.50
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	0.42
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	0.42
TDS*	mg/L	500	6000
Hardness	mg/L	-	300
Alkalinity (total as CaCO3)	mg/L	-	650
Alkalinity (pp as CaCO3)	mg/L	-	<0.50
Ionic Balance	N/A	-	0.95
Water Nutrients			
Ammonia-N	mg/L	-	1.9
TKN	mg/L	-	2.7
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	37
DOC	mg/L	-	8.2
Metals			
Aluminum	mg/L	0.1	0.012
Antimony	mg/L	0.006	0.00069
Arsenic	mg/L	0.01	0.0019
Barium	mg/L	1	<0.10
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.70
Cadmium	mg/L	0.005	<0.000020
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00065
Copper	mg/L	1	0.0018
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.50
Manganese	mg/L	0.05	0.066
Mercury	mg/L	0.001	<0.0000020
Molybdenum	mg/L	-	0.0055
Nickel	mg/L	-	0.0041
Phosphorus	mg/L	-	<1.0
Selenium	mg/L	0.05	0.00082
Silicon	mg/L	-	3.1
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	2.2
Sulphur	mg/L	-	1200
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.0023
Vanadium	mg/L	-	<0.0010
Zinc	mg/L	5	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	8-Jun-16
Total Depth Measured (mbtoc)	7.987
Volume Purged (L)	12 (dry)
Sampling Date	8-Jun-16
Static Water Level (mbtoc)	4.778

Table 5.36-Deep: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-36-DEEP
			Jun-16
Field Measurements			
Field pH	-	-	8.52
Field EC	mS	-	3.83
Field Temperature	°C	-	7.7
Routine Water			
pH	-	6.5 - 8.5	8.51
Conductivity (EC)	µS/cm	-	3600
Calcium	mg/L	-	17
Magnesium	mg/L	-	2.4
Sodium	mg/L	200	800
Potassium	mg/L	-	5.4
Iron	mg/L	0.3	0.41
Sulphate	mg/L	500	46
Chloride	mg/L	250	770
Bicarbonate	mg/L	-	650
Carbonate	mg/L	-	13
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	0.018
Nitrite (N)	mg/L	-	0.043
Nitrate and Nitrate (N)	mg/L	-	0.061
TDS*	mg/L	500	2000
Hardness	mg/L	-	52
Alkalinity (total as CaCO3)	mg/L	-	550
Alkalinity (pp as CaCO3)	mg/L	-	11
Ionic Balance	N/A	-	1.1
Water Nutrients			
Ammonia-N	mg/L	-	0.92
TKN	mg/L	-	1.9
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	99
DOC	mg/L	-	12
Metals			
Aluminum	mg/L	0.1	0.19
Antimony	mg/L	0.006	0.0030
Arsenic	mg/L	0.01	0.0088
Barium	mg/L	1	0.23
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.71
Cadmium	mg/L	0.005	0.000070
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00082
Copper	mg/L	1	0.011
Lead	mg/L	0.01	0.00094
Lithium	mg/L	-	0.11
Manganese	mg/L	0.05	0.030
Mercury	mg/L	0.001	0.00019
Molybdenum	mg/L	-	0.041
Nickel	mg/L	-	0.0086
Phosphorus	mg/L	-	0.13
Selenium	mg/L	0.05	0.00096
Silicon	mg/L	-	2.6
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.34
Sulphur	mg/L	-	17
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	0.0030
Uranium	mg/L	0.02	0.0066
Vanadium	mg/L	-	0.0078
Zinc	mg/L	5	0.0068

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	35.6
Volume Purged (L)	60 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	5.916

Table 5.36A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-36A
			Jun-16
Field Measurements			
Field pH	-	-	8.87
Field EC	mS	-	1.588
Field Temperature	°C	-	9.1
Routine Water			
pH	-	6.5 - 8.5	8.66
Conductivity (EC)	µS/cm	-	1600
Calcium	mg/L	-	3.9
Magnesium	mg/L	-	0.41
Sodium	mg/L	200	390
Potassium	mg/L	-	1.4
Iron	mg/L	0.3	<0.060
Sulphate	mg/L	500	<1.0
Chloride	mg/L	250	7.4
Bicarbonate	mg/L	-	970
Carbonate	mg/L	-	25
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	<0.010
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	<0.020
TDS*	mg/L	500	900
Hardness	mg/L	-	12
Alkalinity (total as CaCO3)	mg/L	-	830
Alkalinity (pp as CaCO3)	mg/L	-	21
Ionic Balance	N/A	-	1.0
Water Nutrients			
Ammonia-N	mg/L	-	0.60
TKN	mg/L	-	1.3
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	55
DOC	mg/L	-	13
Metals			
Aluminum	mg/L	0.1	0.015
Antimony	mg/L	0.006	<0.00060
Arsenic	mg/L	0.01	0.0012
Barium	mg/L	1	0.031
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.82
Cadmium	mg/L	0.005	<0.000020
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00056
Copper	mg/L	1	0.0026
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.064
Manganese	mg/L	0.05	0.022
Mercury	mg/L	0.001	0.000017
Molybdenum	mg/L	-	0.010
Nickel	mg/L	-	0.0019
Phosphorus	mg/L	-	0.13
Selenium	mg/L	0.05	0.00023
Silicon	mg/L	-	3.4
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.045
Sulphur	mg/L	-	1.0
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.00037
Vanadium	mg/L	-	0.0028
Zinc	mg/L	5	0.0033

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Field Data - June 2016

Date Well Purged	3-Jun-16
Total Depth Measured (mbtoc)	15.830
Volume Purged (L)	42 (dry)
Sampling Date	3-Jun-16
Static Water Level (mbtoc)	3.533

Table 6: Groundwater QA/QC Duplicate Analysis - 2016

Parameter	Unit	RDL	DUPLICATE 1 (TRIP BLANK)	MW-22B	DUPLICATE-1	RPD (%)	MW-26B	DUPLICATE 2	RPD (%)	MW-36A	DUPLICATE 3	RPD (%)	MW-10	DUPLICATE 4	RPD (%)	MW-34B	DUPLICATE 5	RPD (%)
			Jun-16	Jun-16			Jun-16			Jun-16			Jun-16			Jun-16		
Routine																		
pH	pH Units	N/A	5.80	7.97	7.94	0.4	8.15	8.20	1	8.66	8.66	0	8.26	8.42	2	7.65	7.92	3
Electrical Conductivity (EC)	µS/cm	1	<1.0	8200	8200	0	7400	7300	1	1600	1600	0	4500	4400	2	2400	2400	0
Calcium	mg/L	0.3	<0.3	110	110	0	110	100	10	3.9	3.8	3	60	60	0	180	190	5
Magnesium	mg/L	0.2	<0.2	55	56	2	58	59	2	0.41	0.40	-	31	29	7	55	63	14
Sodium	mg/L	0.5	<0.50	2000	2000	0	1600	1800	12	390	370	5	840	920	9	320	340	6
Potassium	mg/L	0.3	<0.3	10	9.7	3	7.7	7.6	1	1.4	1.4	-	4.4	4.2	5	11	12	9
Iron	mg/L	0.06	<0.060	<0.60	<0.60	-	<0.060	0.12	-	<0.060	<0.060	-	<0.060	0.080	-	<0.060	1.4	-
Sulphate	mg/L	1	<1.0	3900	3900	0	3400	3500	3	<1.0	<1.0	-	1700	1600	6	510	510	0
Chloride	mg/L	1	<1.0	1.4	1.3	-	3.9	3.8	-	7.4	7.9	7	60	81	30	39	38	3
Bicarbonate	mg/L	0.5	<0.50	1300	1200	8	990	960	3	970	980	1	620	590	5	1000	1000	0
Carbonate	mg/L	0.5	<0.50	<0.50	<0.50	-	<0.50	<0.50	-	25	27	8	<0.50	7	-	<0.50	<0.50	-
Hydroxide	mg/L	0.5	<0.50	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Nitrate (as NO_3-N)	mg/L	0.01	<0.010	<0.010	0.075	-	0.19	0.18	5	<0.010	<0.010	-	0.040	0.067	-	0.014	0.015	-
Nitrite (as NO_2-N)	mg/L	0.01	<0.010	<0.010	<0.050	-	0.036	0.034	-	<0.010	<0.010	-	0.010	0.010	-	<0.010	<0.010	-
Nitrate and Nitrite (as N)	mg/L	0.02	<0.020	<0.020	0.075	-	0.23	0.22	4	<0.020	<0.020	-	0.05	0.078	-	<0.020	<0.020	-
Total Dissolved Solids (TDS)	mg/L	10	<10	6600	6700	2	5600	5900	5	900	900	0	3000	3000	0	1600	1700	6
Hardness as $CaCO_3$	mg/L	0.5	<0.50	510	510	0	500	510	2	12	11	9	280	270	4	670	740	10
Alkalinity (total as $CaCO_3$)	mg/L	0.5	<0.50		1000	100	810	790	3	830	850	2	500	490	2	840	840	0
Alkalinity (pp as $CaCO_3$)	mg/L	0.5	<0.50	<0.50	<0.50	-	<0.50	<0.50	-	21	23	9	<0.50	5.9	-	<0.50	<0.50	-
Ionic Balance	N/A	0.01		0.95	0.93	2	0.91	0.96	5	1.0	0.97	3	0.9	1.0	11	0.96	1.1	14
Nutrients																		
Ammonia	mg/L	0.05	<0.050	<0.050	<0.050	-	0.43	0.45	5	0.60	0.58	3	0.16	0.21	-	0.16	0.22	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.05	0.068	0.27	0.24	-	0.73	0.91	22	1.3	1.2	8	0.57	0.55	4	0.89	0.61	**37**
Hydrocarbons																		
Benzene	mg/L	0.0004	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-
Toluene	mg/L	0.0004	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-
Ethylbenzene	mg/L	0.0004	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-	<0.00040	<0.00040	-
Xylenes Total	mg/L	0.0008	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	-	<0.00080	<0.00080	-	<0.00080	<0.00080	-	<0.00080	<0.00080	-
F1 (C_6-C_{10}) - BTEX	mg/L	0.1	<0.10	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-
F2 (C_{10}-C_{16})	mg/L	0.1	<0.10	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-
Organics																		
Chemical Oxygen Demand (COD)	mg/L	5	<5.0	18	19	-	35	31	12	55	52	6	32	40	22	81	61	28
Dissolved Organic Carbon (DOC)	mg/L	0.5	<0.50	4.7	5.4	14	10	11	10	13	13	0	9.7	10	3	14	14	0
Laboratory Work Order Number			B644197	B646208	B646208		B644197	B644197		B644197	B644197		B644197	B644197		B644197	B644197	
Laboratory Identification Number			OT6000	OU6405	OU6374		OT5956	OT6001		OT5999	OT6002		OT5950	OT6003		OT5981	OT6180	

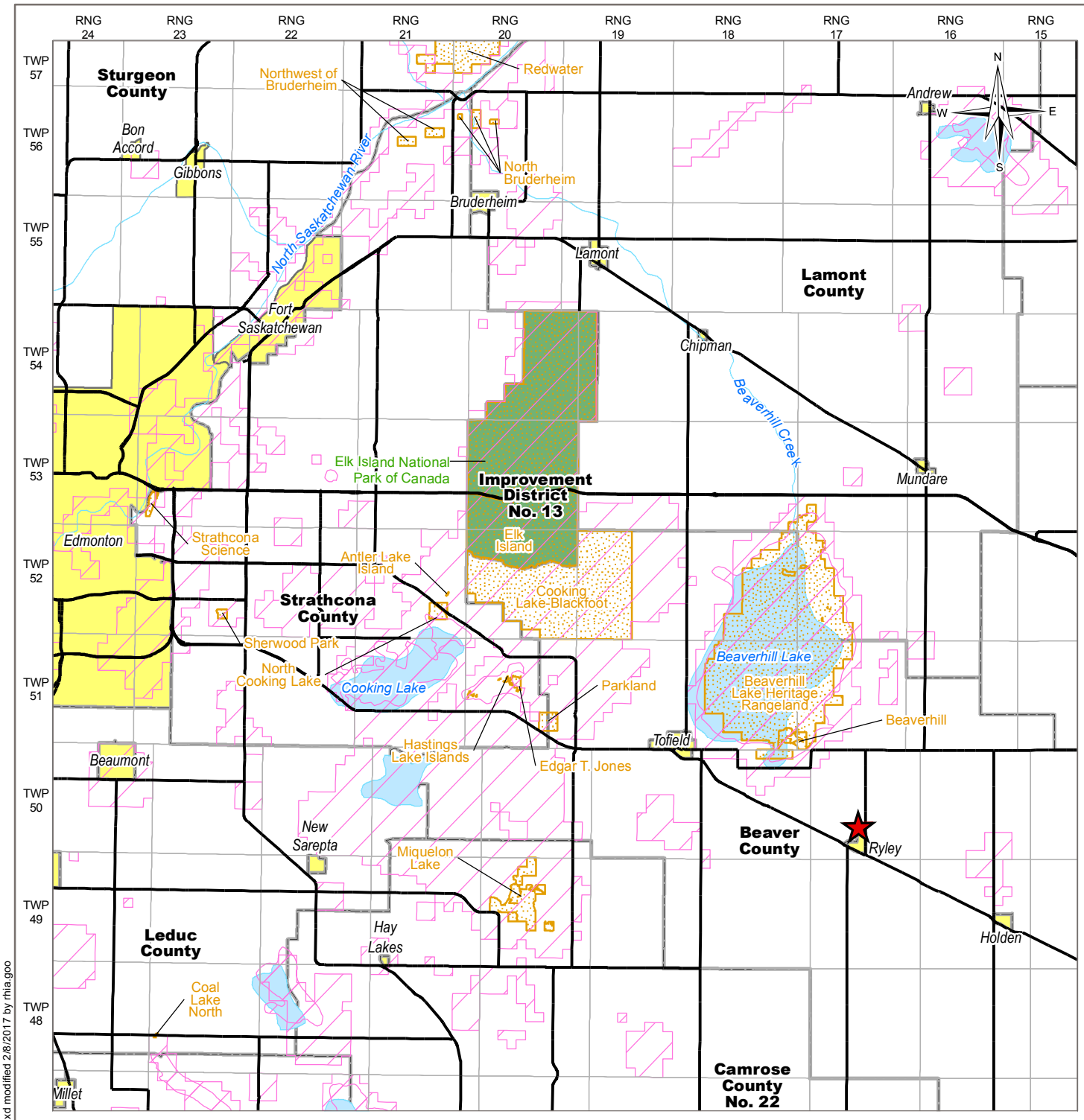
Notes:
RDL - Reportable detection limit
RPD - Relative percent difference calculated as (abs(C1-C2)/average(C1+C2))*100
"-" Indicates RPD not calculated. RPD cannot be calculated if one or more of the analytical results are less than detection limits or within 5 times the detection limits.
N/A - Not applicable
Blank - Not analyzed
Shaded - RPD value greater than 30%

Table 6: Groundwater QA/QC Duplicate Analysis - 2016

Parameter	Unit	RDL	DUPLICATE 1 (TRIP BLANK)	MW-22B	DUPLICATE-1	RPD (%)	MW-26B	DUPLICATE 2	RPD (%)	MW-36A	DUPLICATE 3	RPD (%)	MW-10	DUPLICATE 4	RPD (%)	MW-34B	DUPLICATE 5	RPD (%)
			Jun-16	Jun-16			Jun-16			Jun-16			Jun-16			Jun-16		
Dissolved Metals																		
Aluminum	mg/L	0.003	<0.0030	<0.0030	0.0037	-	0.0095	0.024	-	0.015	0.017	13	0.0091	0.010	-	0.0064	0.0036	-
Antimony	mg/L	0.0006	<0.00060	<0.00060	<0.00060	-	<0.00060	<0.00060	-	<0.00060	<0.00060	-	<0.00060	<0.00060	-	<0.00060	<0.00060	-
Arsenic	mg/L	0.0002	<0.00020	0.00035	0.00043	-	0.00081	0.00086	-	0.0012	0.0011	9	0.0006	0.00052	-	0.00054	<0.00020	-
Barium	mg/L	0.01	<0.010	<0.10	<0.10	-	0.010	0.011	-	0.031	0.030	-	0.023	0.024	-	0.054	0.057	5
Beryllium	mg/L	0.001	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Boron	mg/L	0.02	<0.020	0.25	0.25	0	0.32	0.33	3	0.82	0.80	2	0.12	0.12	0	0.060	0.068	-
Cadmium	mg/L	0.00002	<0.000020	<0.000020	<0.000020	-	<0.000020	<0.000020	-	<0.000020	<0.000020	-	0.000023	<0.000020	-	0.00010	<0.000020	-
Chromium	mg/L	0.001	0.0016	0.0015	0.0013	-	0.0017	0.0030	-	<0.0010	0.0012	-	0.0021	0.0021	-	<0.0010	<0.0010	-
Cobalt	mg/L	0.0003	<0.00030	<0.00030	<0.00030	-	0.00087	0.00082	-	0.00056	0.00053	-	0.00057	0.00054	-	0.0015	<0.00030	-
Copper	mg/L	0.0002	<0.00020	0.0012	0.00065	-	0.0014	0.0011	24	0.0026	0.0025	4	0.0035	0.0051	**37**	0.0041	0.00033	-
Lead	mg/L	0.0002	<0.00020	<0.00020	0.00026	-	<0.00020	<0.00020	-	<0.00020	<0.00020	-	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Lithium	mg/L	0.02	<0.020	0.74	0.74	0	0.38	0.40	5	0.064	0.060	-	0.23	0.23	0	0.12	0.13	8
Manganese	mg/L	0.004	<0.0040	<0.040	<0.040	-	0.20	0.20	0	0.022	0.022	0	0.094	0.10	6	0.11	0.17	**43**
Mercury	mg/L	0.000002	0.0000036	<0.0000020	<0.0000020	-	0.0000040	0.0000024	-	0.000017	0.0000022	-	0.0000034	0.0000046	-	0.0000025	0.00035	-
Molybdenum	mg/L	0.0002	<0.00020	0.00081	0.00083	-	0.0013	0.0018	**32**	0.010	0.0094	6	0.0038	0.0034	11	0.0012	<0.00020	-
Nickel	mg/L	0.0005	<0.00050	0.0020	0.0020	-	0.0029	0.0037	24	0.0019	0.0023	-	0.059	0.059	0	0.0096	<0.00050	-
Phosphorus	mg/L	0.1	<0.10	<1.0	<1.0	-	<0.10	<0.10	-	0.13	0.19	-	<0.10	<0.10	-	0.26	0.18	**36**
Selenium	mg/L	0.0002	<0.00020	0.00036	0.00051	-	<0.00020	<0.00020	-	0.00023	<0.00020	-	0.00052	0.0004	-	<0.00020	<0.00020	-
Silicon	mg/L	0.1	<0.10	4.8	4.7	2	4.4	4.4	0	3.4	3.3	3	4.7	4.5	4	5.6	7.0	22
Silver	mg/L	0.0001	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Strontium	mg/L	0.02	<0.020	2.4	2.4	0	2.0	2.1	5	0.045	0.043	5	0.92	0.93	1	1.2	1.3	8
Sulphur	mg/L	0.2	<0.20	1200	1200	0	1100	1200	9	1.0	1.2	18	510	540	6	140	180	25
Thallium	mg/L	0.0002	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	-	<0.00020	<0.00020	-	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Tin	mg/L	0.001	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Titanium	mg/L	0.001	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	0.0010	0.0010	-	<0.0010	<0.0010	-
Uranium	mg/L	0.0001	<0.00010	0.0079	0.0081	2	0.0012	0.0012	0	0.00037	0.00032	-	0.0093	0.0086	8	0.0050	<0.00010	-
Vanadium	mg/L	0.001	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	-	0.0028	0.0026	-	<0.0010	<0.0010	-	0.0031	<0.0010	-
Zinc	mg/L	0.003	<0.0030	<0.0030	<0.0030	-	0.0084	0.0036	-	0.0033	0.0054	-	0.0065	0.0092	-	0.0073	<0.0030	-
Polycyclic Aromatic Hydrocarbons (PAHs)																		
Benzo[a]pyrene equivalency	mg/L	0.00001					<0.000010	<0.000010	-									
2-methylnaphthalene	mg/L	0.0001					<0.00010	<0.00010	-									
Acenaphthene	mg/L	0.0001					<0.00010	<0.00010	-									
Acenaphthylene	mg/L	0.0001					<0.00010	<0.00010	-									
Acridine	mg/L	0.0002					<0.00020	<0.00020	-									
Anthracene	mg/L	0.00001					<0.000010	<0.000010	-									
Benz(a)anthracene	mg/L	0.0000085					<0.0000085	<0.0000085	-									
Benzo(a) pyrene	mg/L	0.0000075					<0.0000075	<0.0000075	-									
Benzo(b+j)fluoranthene	mg/L	0.0000085					<0.0000085	<0.0000085	-									
Benzo(c)phenanthrene	mg/L	0.00005					<0.000050	<0.000050	-									
Benzo(e)pyrene	mg/L	0.00005					<0.000050	<0.000050	-									
Benzo(g,h,i)perylene	mg/L	0.0000085					<0.0000085	<0.0000085	-									
Benzo(k)fluoranthene	mg/L	0.0000085					<0.0000085	<0.0000085	-									
Chrysene	mg/L	0.0000085					<0.0000085	<0.0000085	-									
Dibenz(a,h)anthracene	mg/L	0.0000075					<0.0000075	<0.0000075	-									
Fluoranthene	mg/L	0.00001					<0.000010	<0.000010	-									
Fluorene	mg/L	0.00005					<0.000050	<0.000050	-									
Indeno(1,2,3-c,d)pyrene	mg/L	0.0000085					<0.0000085	<0.0000085	-									
Naphthalene	mg/L	0.0001					<0.00010	<0.00010	-									
Perylene	mg/L	0.00005					<0.000050	<0.000050	-									
Phenanthrene	mg/L	0.00005					<0.000050	<0.000050	-									
Pyrene	mg/L	0.00002					<0.000020	<0.000020	-									
Quinoline	mg/L	0.0002					<0.00020	<0.00020	-									
Laboratory Work Order Number			B644197	B646208	B646208		B644197	B644197		B644197	B644197		B644197	B644197		B644197	B644197	
Laboratory Identification Number			OT6000	OU6405	OU6374		OT5956	OT6001		OT5999	OT6002		OT5950	OT6003		OT5981	OT6180	

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.
N/A - Not applicable
Blank - Not analyzed
Shaded - RPD value greater than 30%

FIGURES



LEGEND

- Site Location
- Primary/Secondary Highway
- Environmentally Significant Area
- Protected Area
- National Parks
- Indian Reserve
- Urban Area
- Municipal Area
- Watercourse
- Waterbody

NOTES

Base data source: ESRI, CanVec (50,000), AltaLIS, ESRD & Government of Alberta (Tourism, Parks and Recreation)

STATUS
ISSUED FOR USE

2016 GROUNDWATER MONITORING PROGRAM, RYLEY, AB

Regional Environmental Context

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:500,000
10 5 0 10
Kilometers

FILE NO. SWOP03097-01_Fig1.mxd

PROJECT NO.	DWN	CKD	APVD	REV
SWM.SWOP03097-01	RG	MS	BH	0

OFFICE	DATE
Tt EBA-CAL	February 8, 2017

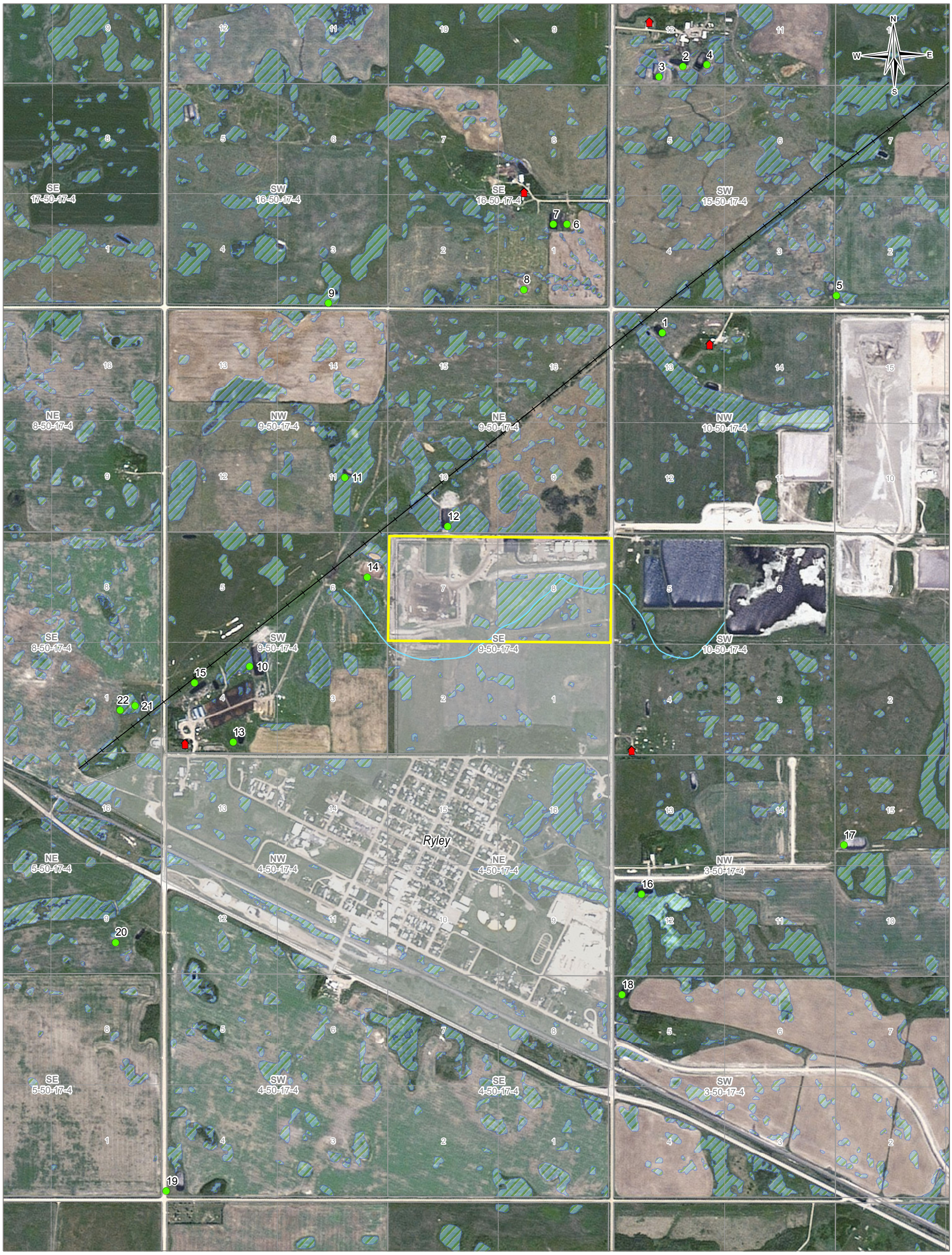
CleanHarbors

PREPARED BY:
TETRA TECH

Figure 1

W:\Projects\CGY\78070\SWOP03097-01\GIS\Maps\SWOP03097-01_Fig1.mxd modified 2/8/2017 by rhia.goo

W:\Projects\CGY\78070\SWOP03097-01\GIS\Maps\SWOP03097-01_Fig2_11x17.mxd modified 2/8/2017 by rhia.goo



LEGEND

- Rural Residence
- Water Sample Location
- Site Outline
- Historical Railway Bed (Approximate Centreline)
- Bible Creek (Approximate Centreline)
- Potential Wetland
- Town Boundary

NOTES
Base data source: ESRI, CanVec (50,000) & ESRD

STATUS
ISSUED FOR USE

2016 GROUNDWATER MONITORING PROGRAM, RYLEY, AB

Local Environmental Context

PROJECTION	DATUM	CLIENT
UTM Zone 12	NAD83	CleanHarbors

Scale: 1:13,500

200 100 0 200

Metres

TETRA TECH

FILE NO. SWOP03097-01_Fig2_11x17.mxd

OFFICE	DWN	CKD	APVD	REV
Tt-CAL	RG	MS	CF	0

DATE	PROJECT NO.
February 8, 2017	SWM.SWOP03097-01

Figure 2

PROPERTY LINE
MW1B
MW1C
MW12B
MW12A
15MW34A
15MW34B
MW14
MW9
MW11
MW10
MW18A
MW18B
MW5A
MW5B
PROPOSED CELL 4
ACCESS RAMP
MW8B
MW8A
MW33B
MW33A
CELL 2
CELL 1
CELL 2 LEACHATE TANK
CELL 1 LEACHATE TANK
MW24A
MW24B
MW19A
MW19B
EL. 686.84
PROPERTY LINE
MW32B
MW32A
PROPERTY LINE
EL. 685.90
CELL 3D
CELL 3E
RETENTION POND
CELL 3A
CELL 3B
CELL 3C
MW20A
MW20B
CELL 3A LEACHATE PIPES
RUN-ON DIVERSION DITCH CENTRELINE
87.2 m
MW31B
MW31A
15MW36A
15MW36DEEP
EL. 685.86
EL. 685.96
MW27B
MW27A
MW28B
MW28A
EL. 686.48
EL. 683.34
MW21A
MW21B
EL. 686.29
EL. 685.95
EL. 686.09
MW25B
MW25A
MW26B
MW26A
ACCESS ROAD
CELL 3D LEACHATE TANK
MW30B
MW30A
MW29B
MW29A
MW23A
MW23B
MW22A
MW22B
CELL 3B LEACHATE TANK
CELL 3C LEACHATE TANK
EL. 683.81
EL. 685.00
RUN-ON DIVERSION DITCH
RUN-OFF CONTROL DITCH
15MW35C
15MW35B
15MW35A
15MW35DEEP

LEGEND:

- MONITORING WELL LOCATION
- SURFICIAL MATERIALS
- UPPER SANDSTONE
- CLAY SHALE
- LOWER BEDROCK
- SURFACE WATER DRAINAGE DITCH
- TOPOGRAPHIC CONTOURS
- SURFACE WATER DRAINAGE DIRECTION

0 100 m

Scale: 1: 2 500

CLIENT

CleanHarbors

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2016 GROUNDWATER MONITORING PROGRAM RYLEY, AB

Monitoring Well Location Plan and Surface Water Drainage

PROJECT NO.	DWN	CKD	REV
SWM.SWOP03097-01	MM/DBD	CF	0

OFFICE	DATE
EDM	December 2016

Figure 3

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Clean Harbors Ryley\PROJECTS\SWM.SWOP03097-01_Groundwater Monitoring\03_Acad\SWM.SWOP03097-01 Figure 3_December 05_2016.dwg [FIGURE 3]_ january 18, 2017 - 10:39:02 am (BY: DAS, DEBASHIS)

PROPERTY LINE
MW1B
MW1C
MW12B
MW12A
15MW34A
15MW34B
MW14
MW9
MW11
MW10
MW18A
MW18B
MW5A
MW5B
PROPOSED CELL 4
ACCESS RAMP
MW8B
MW8A
MW33B
MW33A
CELL 2
CELL 1
CELL 2 LEACHATE TANK
CELL 1 LEACHATE TANK
MW24A
MW24B
MW19A
MW19B
EL. 686.84
PROPERTY LINE
MW32B
MW32A
PROPERTY LINE
EL. 685.90
CELL 3D
CELL 3E
RETENTION POND
CELL 3A
CELL 3B
CELL 3C
MW20A
MW20B
CELL 3A LEACHATE PIPES
87.2 m
RUN-ON DIVERSION DITCH CENTRELINE
MW31B
MW31A
15MW36A
15MW36DEEP
EL. 685.96
EL. 685.86
EL. 686.48
EL. 683.34
MW27B
MW27A
MW28B
MW28A
MW21A
MW21B
EL. 686.09
MW25B
MW25A
MW26B
MW26A
EL. 686.29
EL. 685.95
ACCESS ROAD
CELL 3D LEACHATE TANK
MW30B
MW30A
MW29B
MW29A
CELL 3B LEACHATE TANK
CELL 3C LEACHATE TANK
MW23A
MW23B
MW22A
MW22B
EL. 683.81
EL. 685.00
RUN-ON DIVERSION DITCH
RUN-OFF CONTROL DITCH
15MW35C
15MW35B
15MW35A
15MW35DEEP

LEGEND:

- MONITORING WELL LOCATION
- SURFICIAL MATERIALS
- UPPER SANDSTONE
- CLAY SHALE
- LOWER BEDROCK
- CROSS-SECTION LOCATION

0 100 m

Scale: 1: 2 500

CLIENT

Clean Harbors

TETRA TECH

2016 GROUNDWATER MONITORING PROGRAM RYLEY, AB

Cross-Section Location

PROJECT NO.	DWN	CKD	REV
SWM.SWOP03097-01	MM/DBD	CF	0

OFFICE: EDM

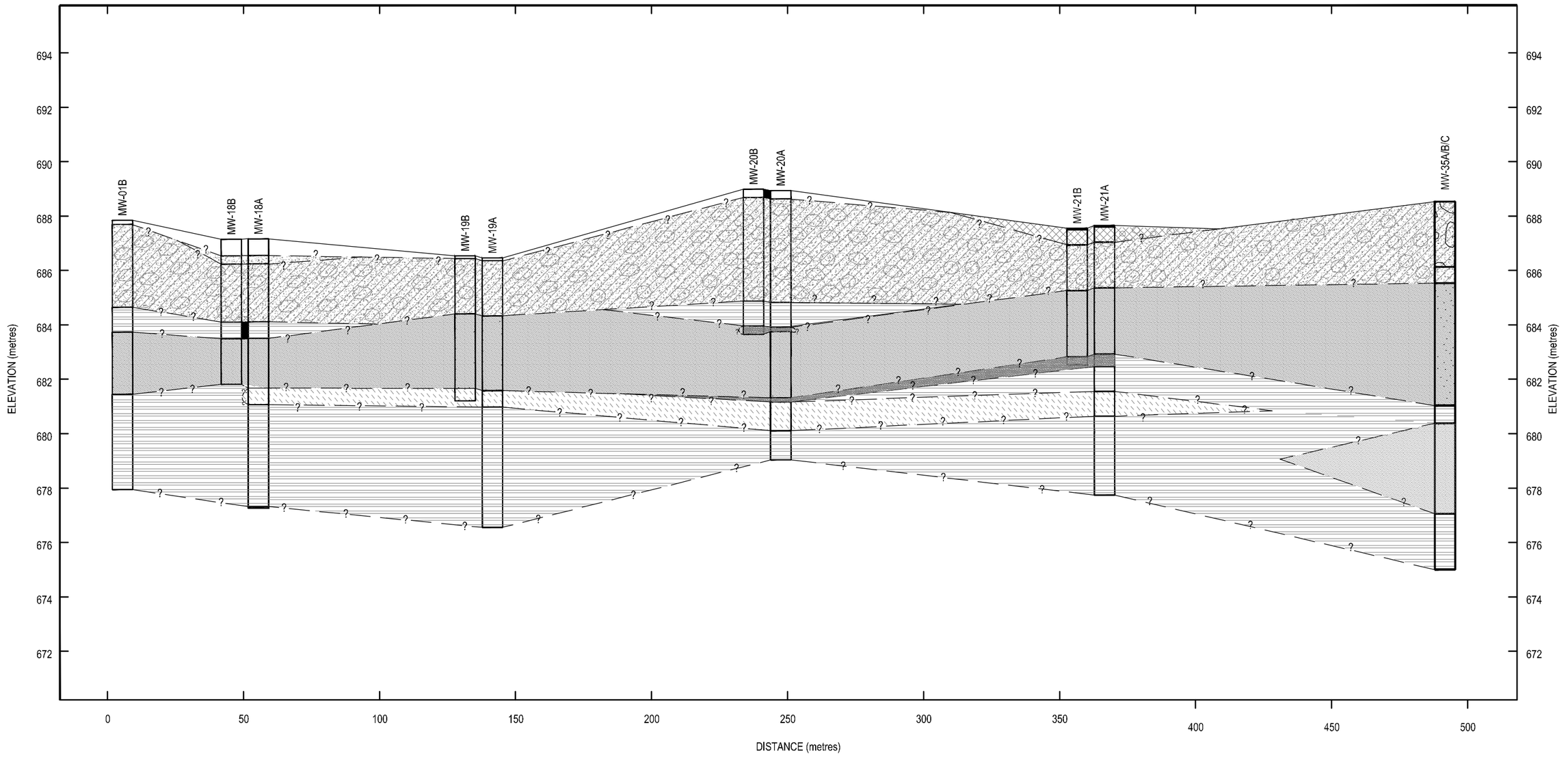
DATE: December 2016

Figure 4a

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Clean Harbors Ryley\PROJECTS\SWM.SWOP03097-01_Groundwater Monitoring\03_Acad\SWM.SWOP03097-01 Figure 4a_December 05_2016.dwg [FIGURE 4A] December 05, 2016 - 11:23:50 am (BY: DAS, DEBASHIS)

A (NORTH)

A' (SOUTH)



SCALE AS SHOWN

10 X VERTICAL EXAGGERATION

LEGEND:

- TOPSOIL
- SAND
- SHALE
- SAND AND SHALE STONE
- CLAY
- GRAVEL
- SANDSTONE
- FILL
- SILT
- TILL
- SILTSTONE
- INFERRED

CLIENT

CleanHarbors

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2016 GROUNDWATER MONITORING PROGRAM
RYLEY, AB

Cross-Section A-A'

PROJECT NO.	DWN	CKD	REV
SWM.SWOP03097-01	MM/DBD	CF	0

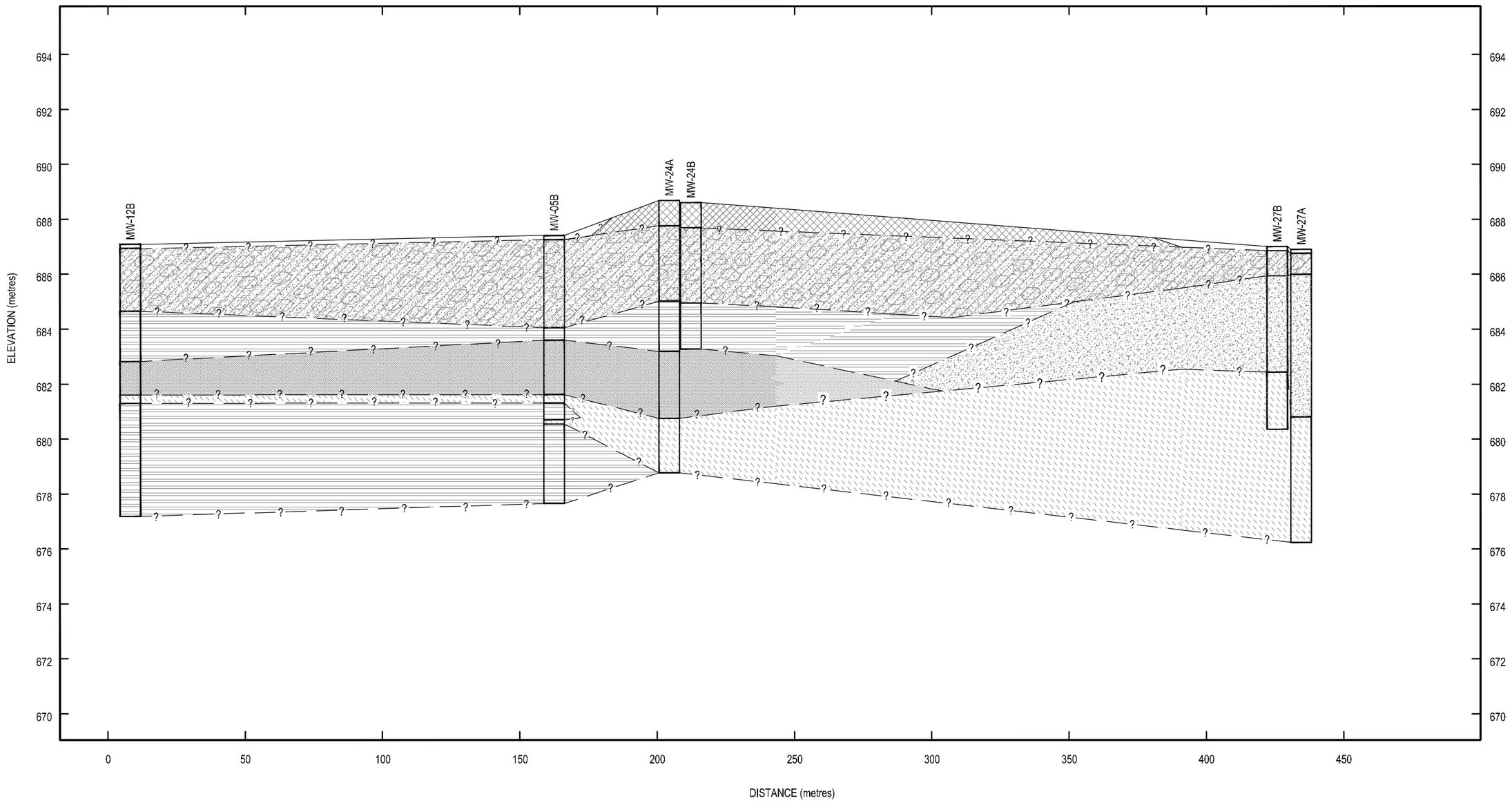
OFFICE	DATE
EDM	December 2016

Figure 4b

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Clean Harbors Ryley\PROJECTS\SWM.SWOP03097-01_Groundwater Monitoring\03_Acad\SWM.SWOP03097-01 Figure 4b-e.dwg [FIGURE 4B] December 05, 2016 - 11:30:10 am (BY: DAS, DEBASHIS)

B (NORTH-WEST)

B' (SOUTH-EAST)



SCALE AS SHOWN
10 X VERTICAL EXAGGERATION

LEGEND:

- TOPSOIL
- SAND
- SHALE
- SAND AND SHALE STONE
- CLAY
- GRAVEL
- SANDSTONE
- FILL
- SILT
- TILL
- SILTSTONE
- INFERRED

CLIENT

Clean Harbors

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2016 GROUNDWATER MONITORING PROGRAM
RYLEY, AB

Cross-Section B-B'

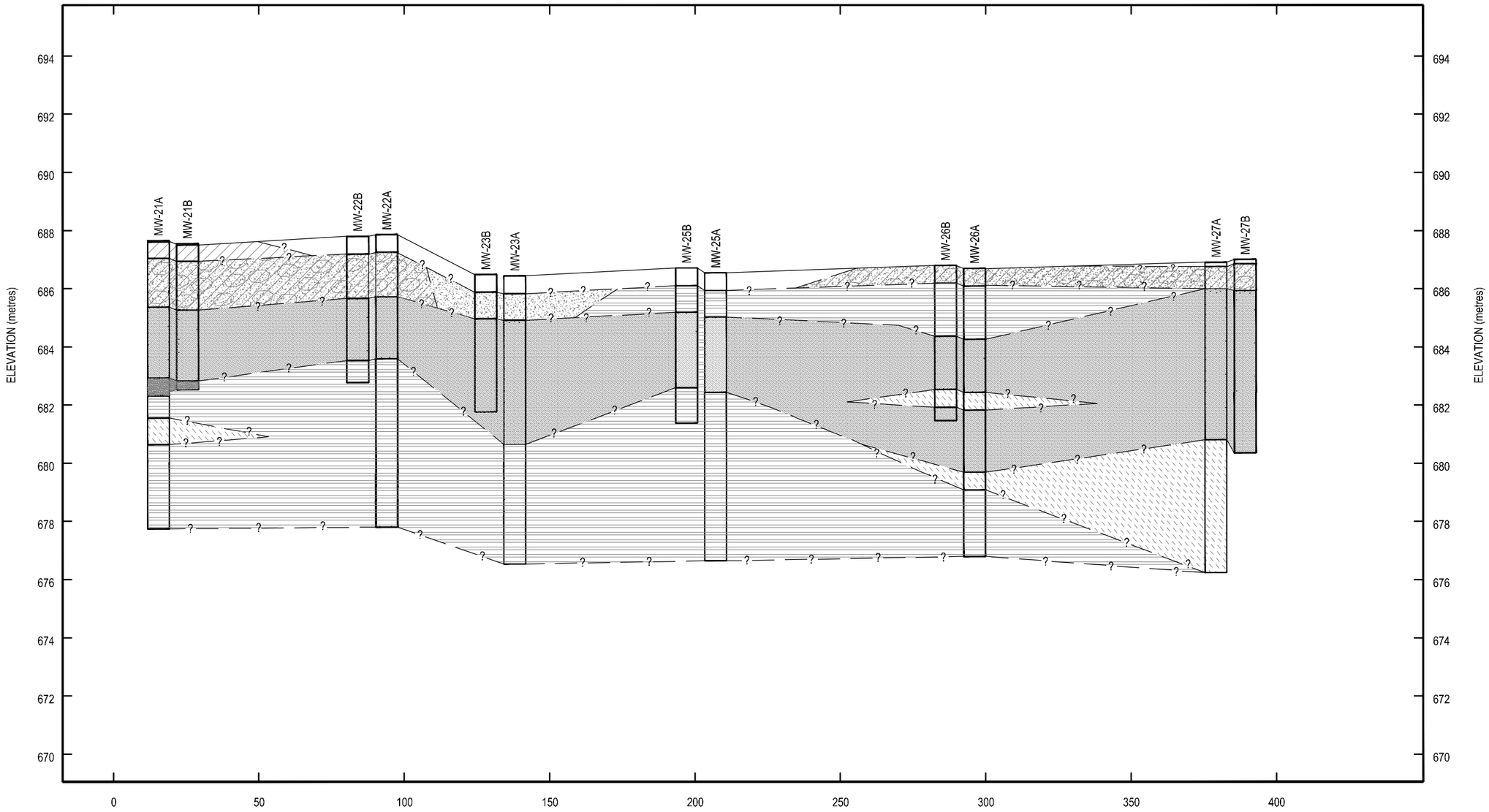
PROJECT NO.	DWN	CKD	REV
SWM.SWOP03097-01	MM/DBD	CF	0

OFFICE: EDM
DATE: December 2016

Figure 4c

C (WEST)

C' (EAST)



SCALE AS SHOWN
10 X VERTICAL EXAGGERATION

LEGEND:

- TOPSOIL
- CLAY
- SILT
- SAND
- GRAVEL
- TILL
- SHALE
- SANDSTONE
- SILTSTONE
- SAND AND SHALE STONE
- FILL
- INFERRED

CLIENT

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TETRA TECH

2016 GROUNDWATER MONITORING PROGRAM
RYLEY, AB

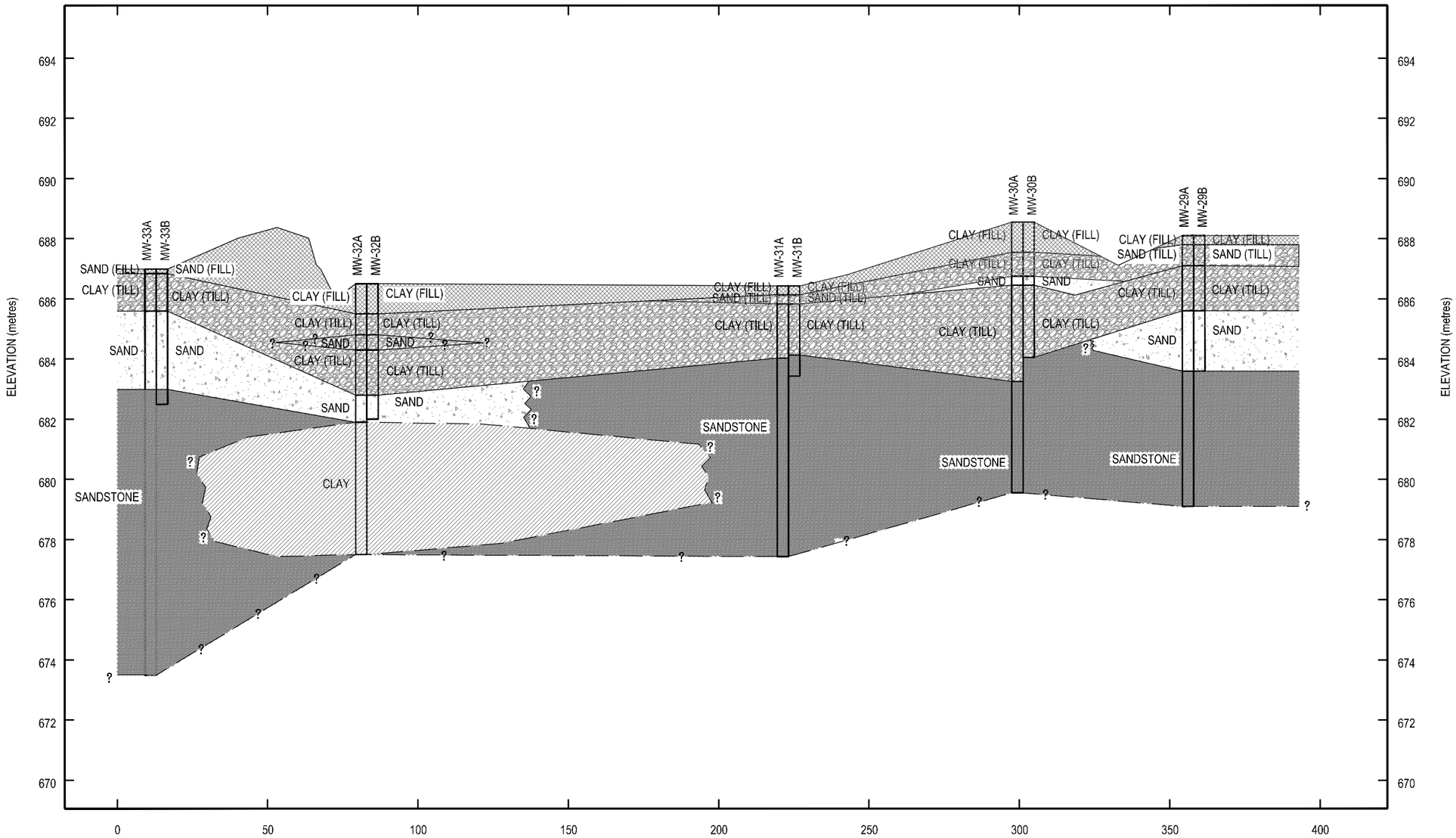
Cross-Section C-C'

PROJECT NO.	DWN	CKD	REV
SWM.SWOP03097-01	MM/DBD	CF	0
OFFICE: EDM	DATE: December 2016		

Figure 4d

D (NORTH)

D' (SOUTH)



SCALE AS SHOWN
10 X VERTICAL EXAGGERATION

LEGEND:

- FILL
- CLAY
- TILL
- SAND
- SANDSTONE
- ? —— ? —— ? — - INFERRED

CLIENT

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2016 GROUNDWATER MONITORING PROGRAM
RYLEY, AB

Cross-Section D-D'

PROJECT NO.	DWN	CKD	REV
SWM.SWOP03097-01	MM/DBD	CF	0
OFFICE: EDM	DATE: December 2016		

Figure 4e

Figure 5a - Clay Till Hydrograph

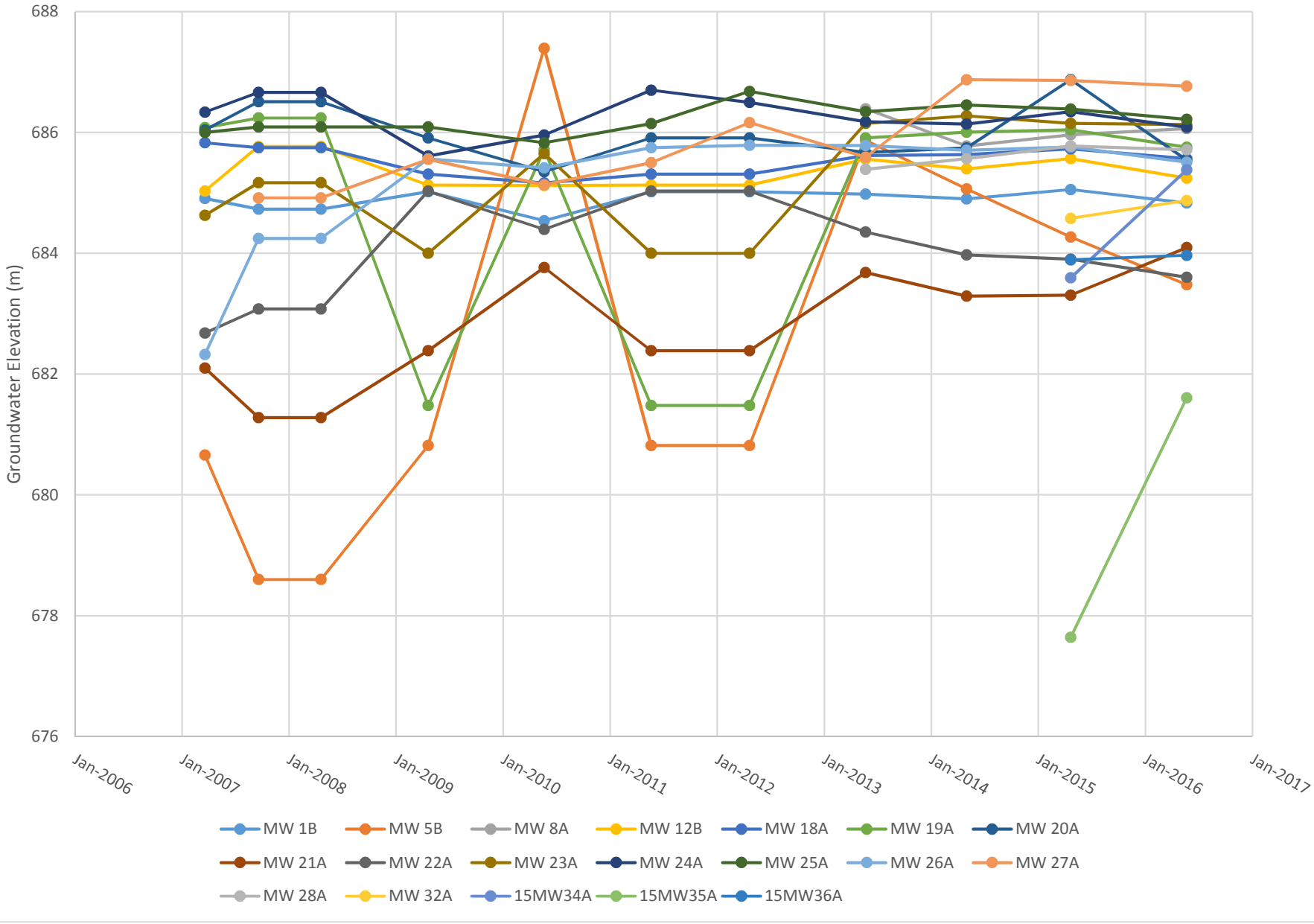


Figure 5b - Upper Sandstone Hydrograph

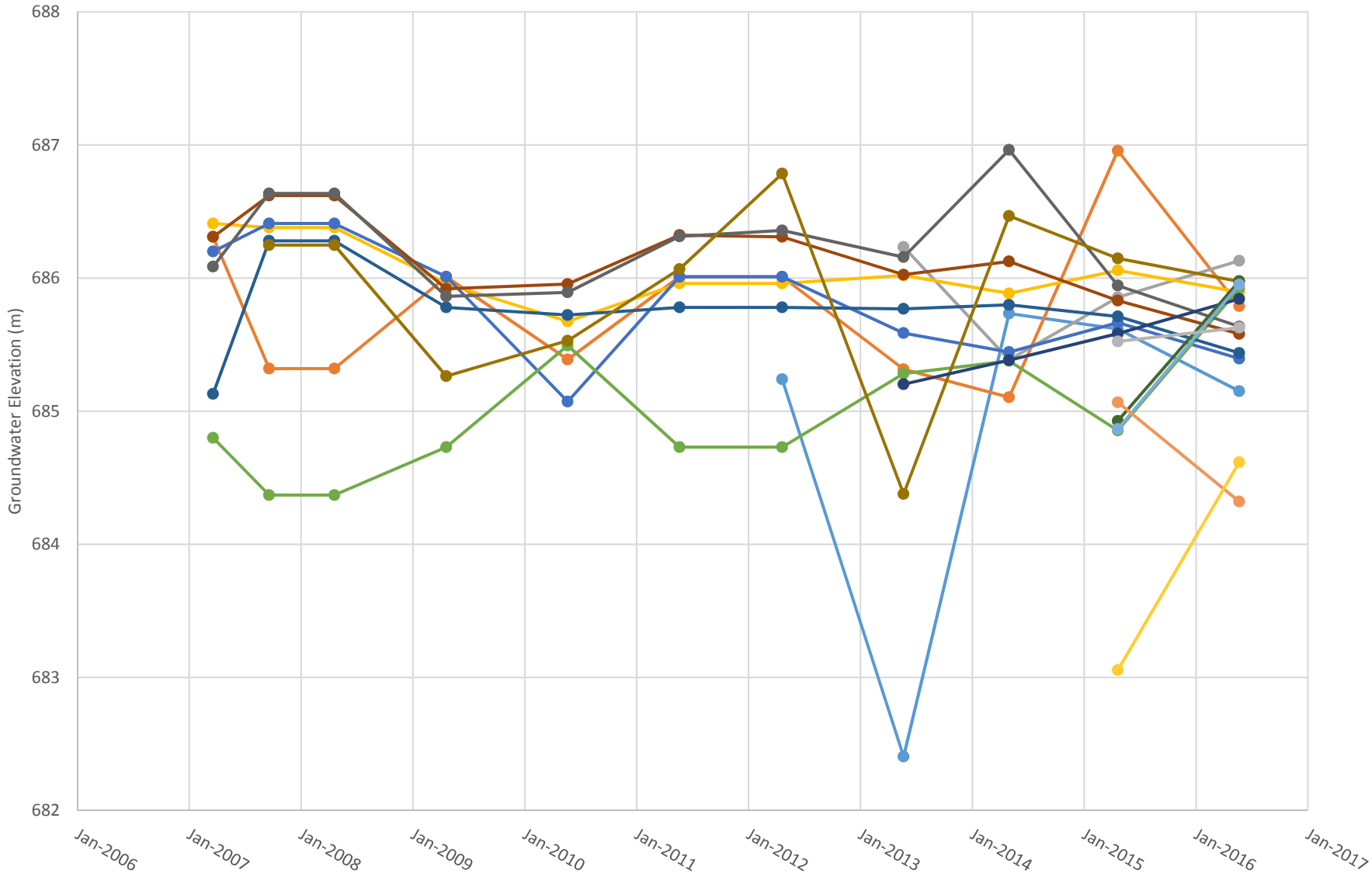


Figure 5c - Clay Shale Hydrograph

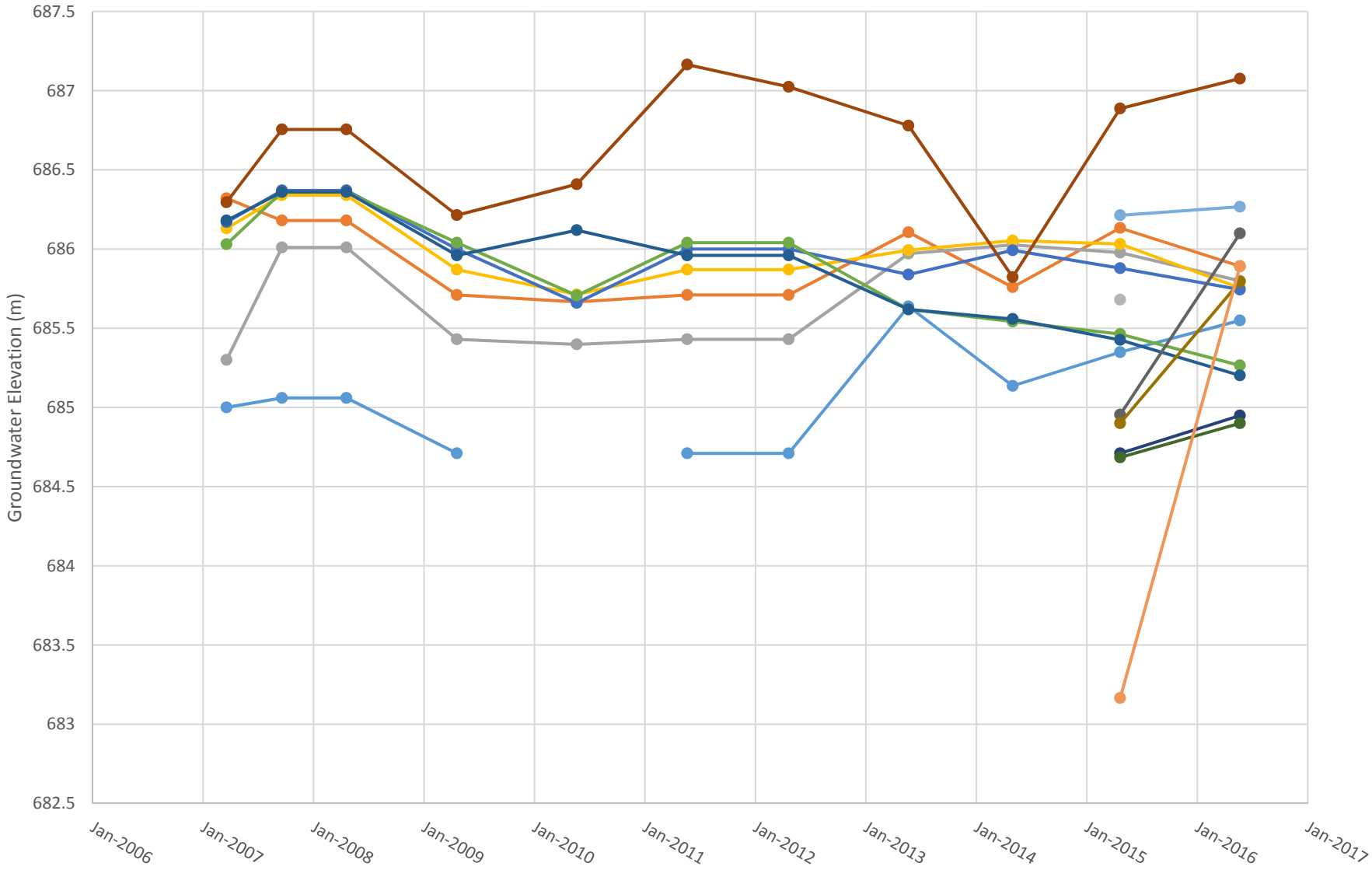
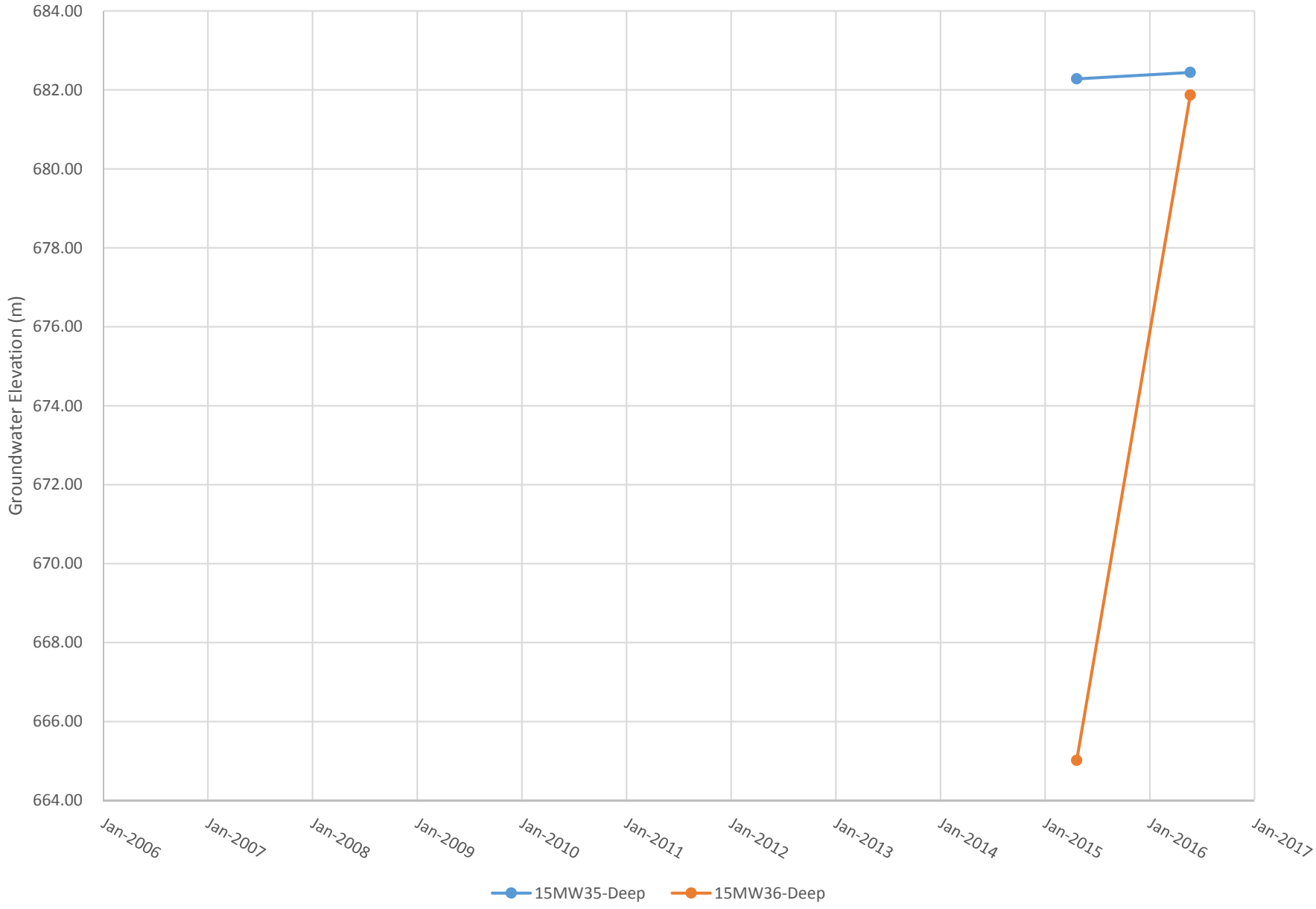
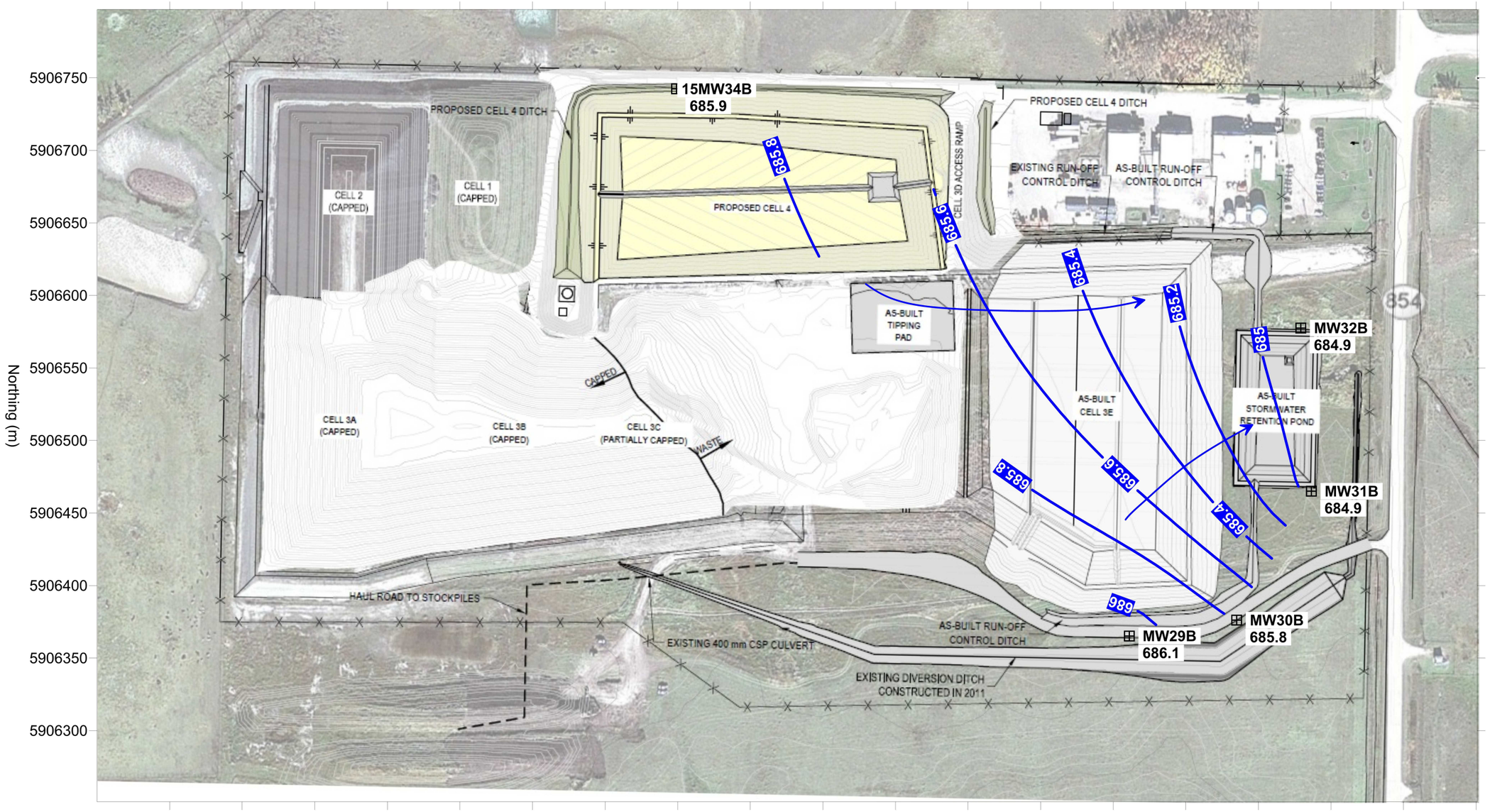


Figure 5d - Lower Bedrock Hydrograph





LEGEND

- ⊞ - MONITORING WELL LOCATION
- 686.55 m - GROUNDWATER ELEVATION (MASL = Metres above sea level)
- GROUNDWATER ELEVATION CONTOUR
- INTERPOLATED GROUNDWATER FLOW DIRECTION

Note: MW34B was added in 2016, and MW35C was dry, and could not be included.

UTM ZONE 12
NAD 83 DATUM

CLIENT

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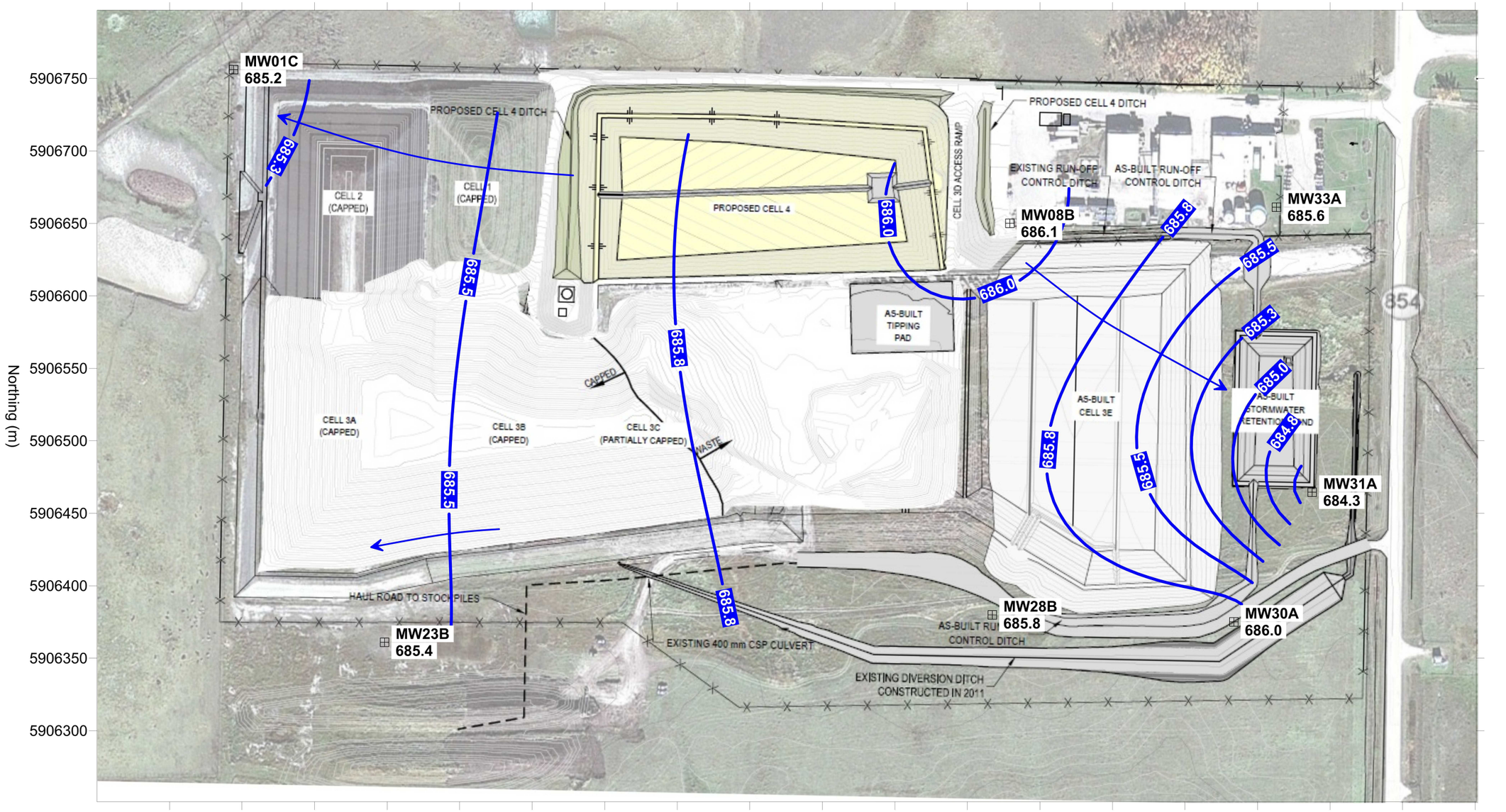
2016 GROUNDWATER MONITORING PROGRAM
RYLEY, AB

GROUNDWATER ELEVATION CONTOURS SURFICIAL MATERIALS (MAY 2016)

PROJECT NO.	DWN	CKD	APVD	REV
SWM.SWOP03097-01	CF	BS	AS	000
OFFICE: EBA-CALGARY	DATE: January 2017		STATUS: Issued for Use	

Figure 6a

filepath here:W:/Environment/EnvSWM/Projects/ENVSWM03645-01/Applications/Surfer/Figre 6A - Surficial Materials.srf



LEGEND

- ⊞ - MONITORING WELL LOCATION
- 686.55 m - GROUNDWATER ELEVATION (MASL = Metres above sea level)
- GROUNDWATER ELEVATION CONTOUR
- INTERPOLATED GROUNDWATER FLOW DIRECTION

UTM ZONE 12
NAD 83 DATUM

CLIENT

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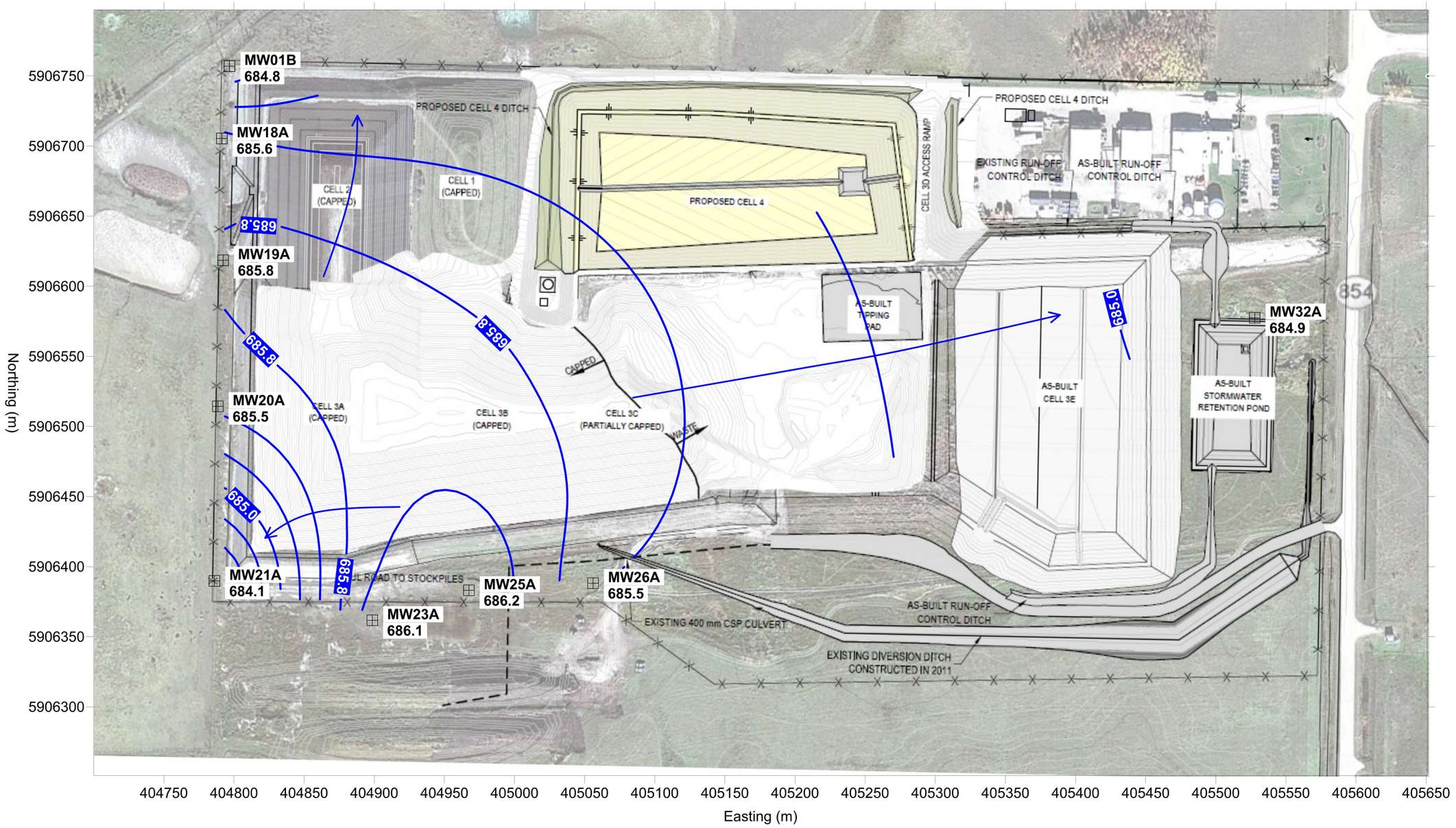
2016 GROUNDWATER MONITORING PROGRAM
RYLEY, AB

GROUNDWATER ELEVATION CONTOURS
UPPER SANDSTONE (MAY 2016)

PROJECT NO.	DWN	CKD	APVD	REV
SWOP03097-01	CF	BS	AS	000
OFFICE: EBA-CALGARY	DATE: January 2017		STATUS: Issued for Use	

Figure 6b

filepath here:W:/Environment/EnvSWM/Projects/ENVSWM03645-01/Applications/Surfer/Figre 5B - Upper Bedrock.srf



LEGEND

- ⊞ - MONITORING WELL LOCATION
- 686.55 m - GROUNDWATER ELEVATION (MASL = Metres above sea level)
- GROUNDWATER ELEVATION CONTOUR
- INTERPOLATED GROUNDWATER FLOW DIRECTION

UTM ZONE 12
NAD 83 DATUM

CLIENT

CleanHarbors®

TETRA TECH

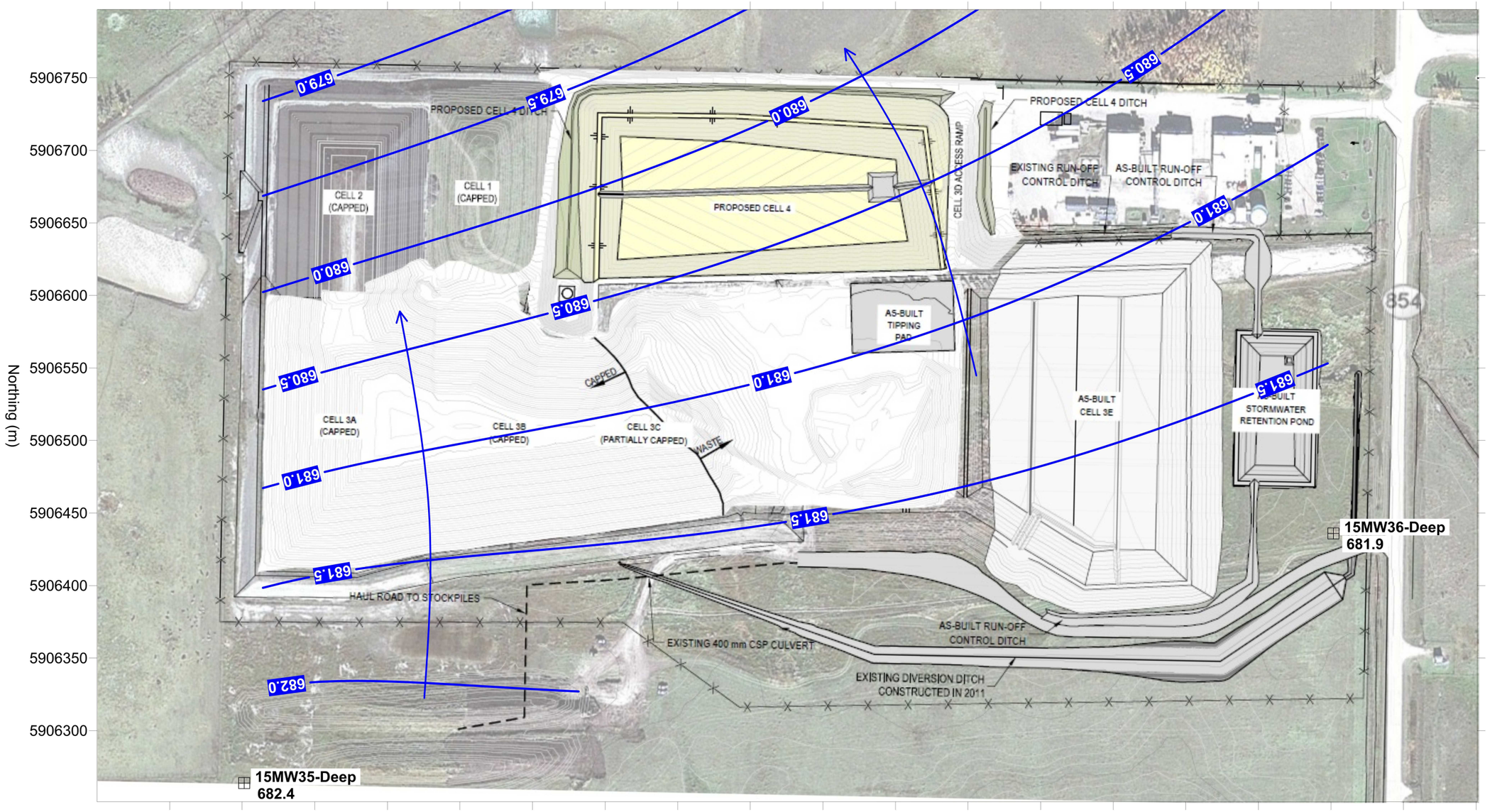
2016 GROUNDWATER MONITORING PROGRAM
RYLEY, AB

GROUNDWATER ELEVATION CONTOURS CLAY SHALE (MAY 2016)

PROJECT NO.	DWN	CKD	APVD	REV
SWM.SWOP03097-01	CF	BS	AS	000
OFFICE: EBA-CALGARY	DATE: January 2017		STATUS: Issued for Use	

Figure 6c

filepath here:W:/Environment/EnvSWM/Projects/ENVSWM03645-01/Applications/Surfer/Figure 6C - Middle Bedrock.srf



LEGEND

- ⊞ - MONITORING WELL LOCATION
- 686.55 m - GROUNDWATER ELEVATION (MASL = Metres above sea level)
- — - GROUNDWATER ELEVATION CONTOUR
- ↗ - INTERPOLATED GROUNDWATER FLOW DIRECTION

Note: Data from wells 16MW11A and 16MW09A from expansion used for contouring purposes.

UTM ZONE 12
NAD 83 DATUM

CLIENT

CleanHarbors

TETRA TECH

2016 GROUNDWATER MONITORING PROGRAM RYLEY, AB

GROUNDWATER ELEVATION CONTOURS LOWER BEDROCK (MAY 2016)

PROJECT NO.	DWN	CKD	APVD	REV
SWM.SWOP03097-01	CF	BS	AS	000
OFFICE: EBA-CALGARY	DATE: January 2017		STATUS: Issued for Use	

Figure 6d

filepath here:W:/Environment/EnvSWM/Projects/ENVSWM03645-01/Applications/Surfer/Figure 6d - LowerBedrock.srf

Figure 7a - Chloride Concentration Trends

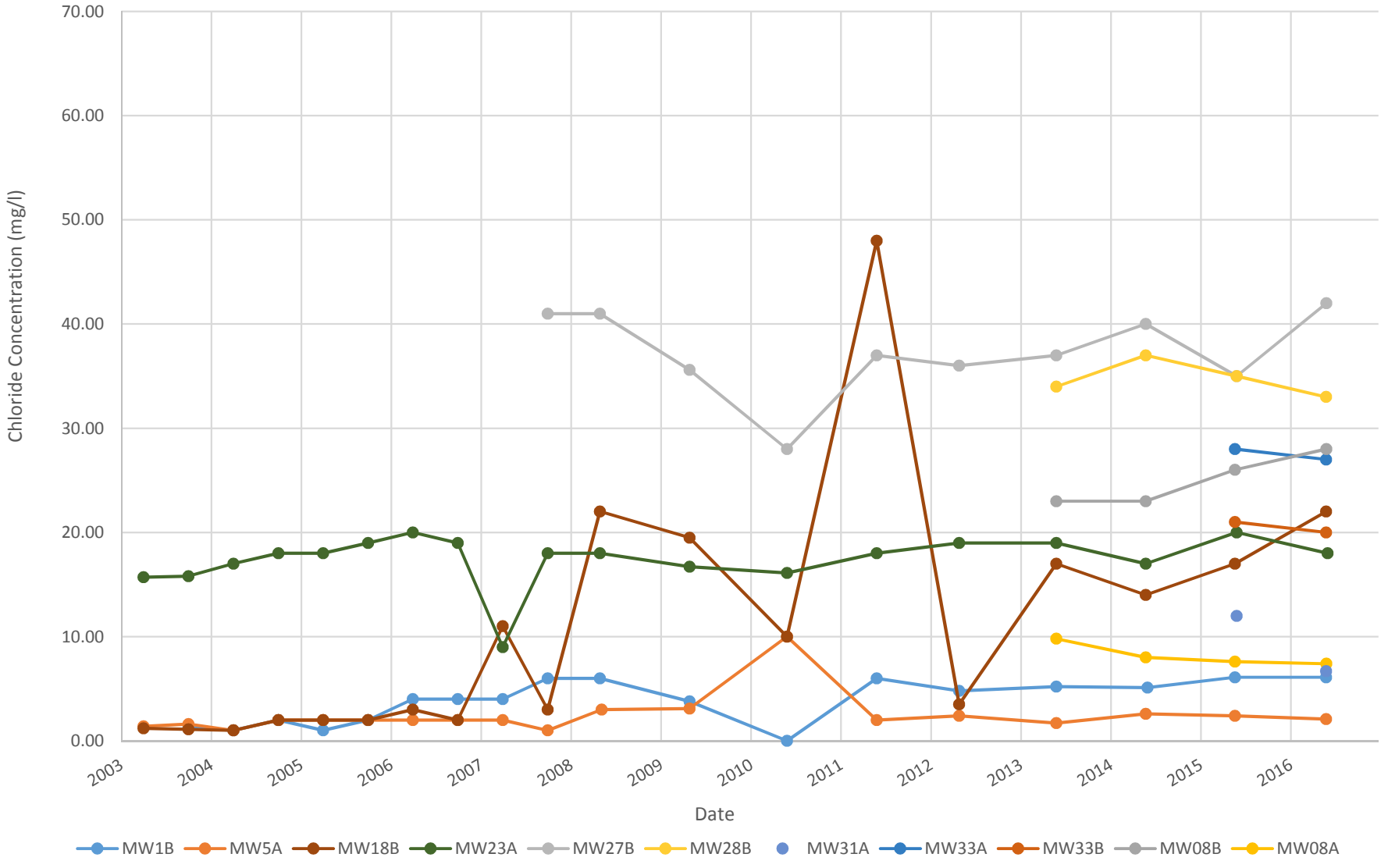


Figure 7b - Chloride Concentration Trends

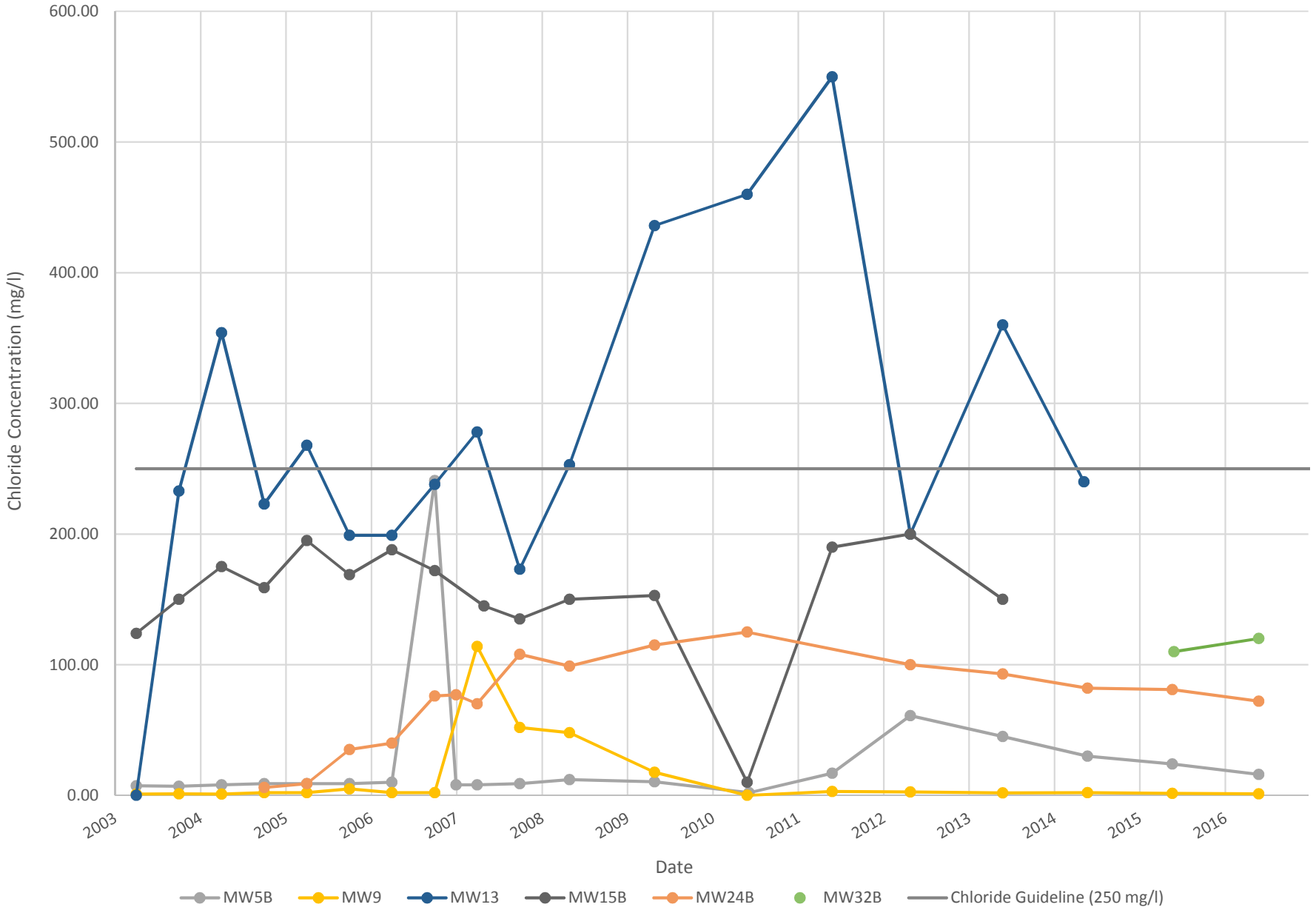
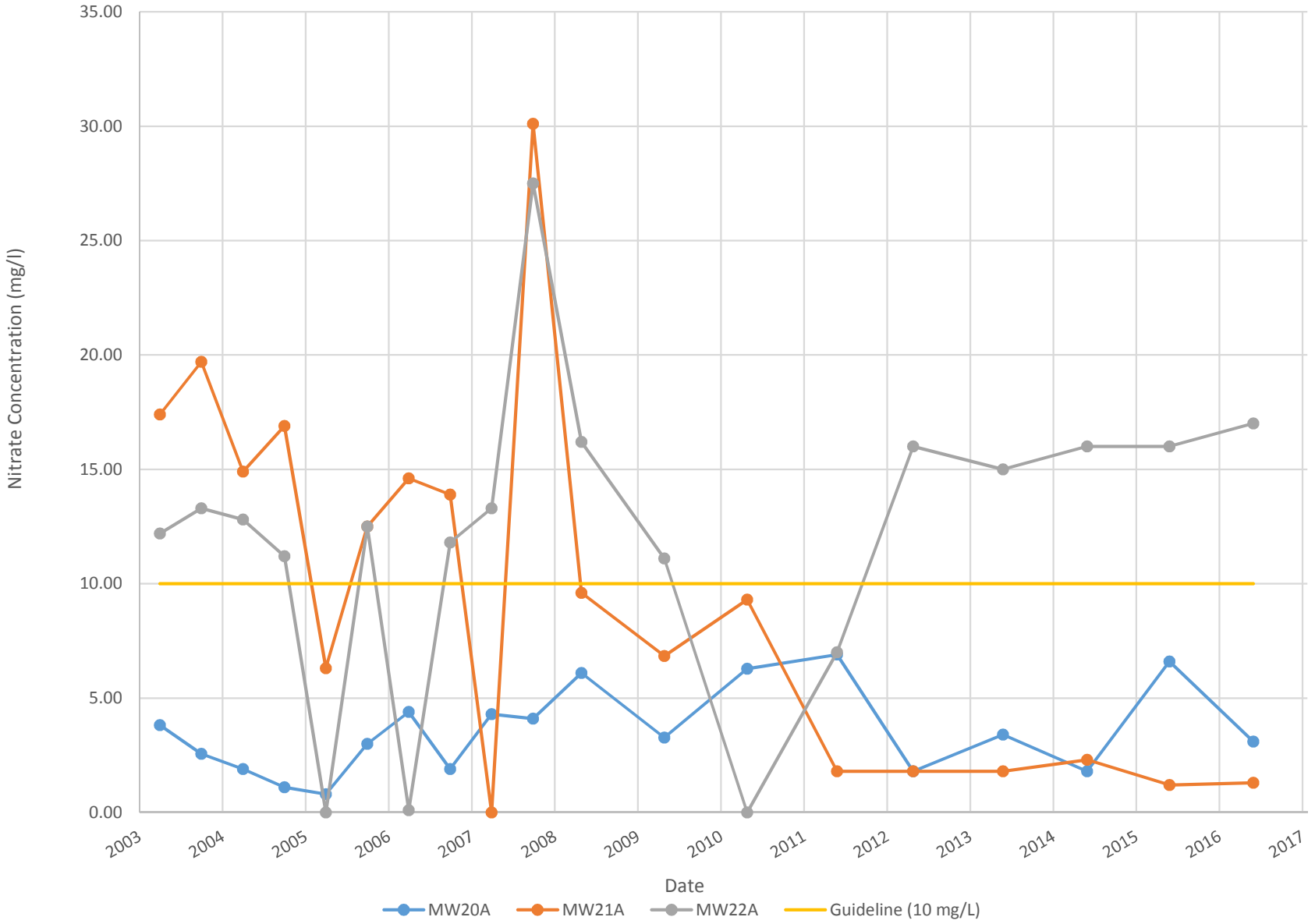


Figure 8 - Nitrate Concentration Trends



APPENDIX A

REGULATORY APPROVAL – ALBERTA ENVIRONMENT

ENVIRONMENT

APPROVAL

PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
R.S.A. 2000, c.E-12, as amended.

APPROVAL NO. 10348-02-00

APPLICATION NO. 005-10348

EFFECTIVE DATE: February 29, 2008

EXPIRY DATE: March 31, 2016

APPROVAL HOLDER: Clean Harbors Canada, Inc.

ACTIVITY: **CONSTRUCTION, OPERATION AND RECLAMATION OF THE**

Ryley Industrial Waste Management Facility, consisting of a Class I and Class II Industrial Landfill and a Hazardous Waste/Recyclable Storage and Processing Facility,

IS SUBJECT TO THE ATTACHED TERMS AND CONDITIONS.

Designated Director under the Act David Helmer

Date Signed February 29, 2008

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 1: DEFINITIONS

SECTION 1.1: DEFINITIONS

1.1.1 All definitions from the Act and the regulations apply except where expressly defined in this approval.

1.1.2 In all PARTS of this approval:

(a) "Act" means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c.E-12, as amended;

(b) “active landfill area" means the area of the landfill that has received or is receiving waste and has not been closed and that is being used for disposal, storage, processing, transport or handling of waste;

(c) “air contaminant” means any solid, liquid or gas or combination of any of them in the atmosphere resulting directly or indirectly from activities of man;

(d) “APEGGA” means the Association of Professional Engineers, Geologists and Geophysicists of Alberta;

(e) "application" means the written submissions to the Director in respect of application number 005-10348;

(f) “cell” means a designed or designated area of the landfill comprised of an excavation or earthen structure in which waste is enclosed by a cover;

(g) “closure” means the construction of a final cover for a landfill phase or cell including placement of previously conserved upper surface soil and re-vegetation as required for the intended future use of the landfill;

(h) “composite liner system” means a liner system that consists of 80 mil high density polyethylene (HDPE) geomembrane primary and secondary liners, a leachate collection system, and a leak detection system underlain by a compacted clay liner, placed at the base and at the sides of a landfill or a cell to restrict the migration of leachate;

(i) "container" means any portable device in which a substance is kept, including but not limited to the following:

(i) drums, barrels and pails which have a capacity greater than 18 litres but less than 210 litres,

(ii) 320 litre overpack drums, and

(iii) 1000 litre tote tanks or sacks;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(j) “cover” means soil or other material that is used to cover compacted wastes in a cell;

(k) "day" means any sampling period of 24 consecutive hours unless otherwise specified;

(l) "decommissioning" means the dismantling and decontamination of the facility undertaken subsequent to the termination or abandonment of any activity or any part of any activity regulated under the Act;

(m) "decontamination" means the treatment or removal of substances from the facility and affected lands;

(n) "Director" means an employee of the Government of Alberta designated as a Director under the Act;

(o) "dismantling" means the removal of buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, railways, roadways, pipelines and any other installations that are being or have been used or held for or in connection with the facility;

(p) “existing ambient air monitoring program” means the ambient air monitoring program conducted under Subsections 4.1.5, 4.1.6, and 4.1.7 of *Environmental Protection and Enhancement Act* Approval No. 10348-01-00, which includes but is not limited to the following:

  (i) ambient air monitoring for suspended particulate once every 12 days for a 24 hour period, and

  (ii) monitoring of wind speed and direction whenever hazardous waste is being landfilled;

(q) “existing cells” means Cell 1, Cell 2, Cell 3A, Cell 3B, and Cell 3C as designated and described in the application;

(r) “facility” means all buildings, structures, process and pollution abatement equipment, vessels, landfills, storage and material handling facilities, industrial runoff control systems, railways, roadways, pipelines, monitoring wells and other installations, and includes the land, located on the SE 1/4 of Section 9, Township 050, Range 17, West of the 4th Meridian, that is being or has been used or held for or in connection with the Ryley Industrial Waste Management Facility;

(s) "facility developed area" means the areas of the facility used for the storage, treatment, processing, transport, or handling of raw material, intermediate product, by-product, finished product, process chemicals, or waste material;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(t) ”final closure” means the period of time when waste will no longer be placed in the defined portion of the landfill and activities are undertaken to complete the final cover system and decommission components and facilities that are no longer required, and this period of time includes the construction of any additional components or monitoring systems that are necessary for post-closure;

(u) "final cover" means soils and other material used on the surface of a landfill that is completed to its maximum designated waste elevation;

(v) "fugitive emissions" means emissions of substances to the atmosphere other than ozone depleting substances, originating from a facility source other than a flue, vent, or stack but does not include sources which may occur due to breaks or ruptures in process equipment;

(w) "geomembrane" means a sheet of manufactured synthetic material designed to control the migration of liquid;

(x) "grab sample" means an individual sample collected in less than 30 minutes and which is representative of the substance sampled;

(y) “groundwater” means groundwater as defined in the *Water Act*;

(z) “Hazardous Waste/Recyclable Storage and Processing Facility” means all buildings, structures, process and pollution abatement equipment, vessels, storage and material handling facilities, and other installations, and includes the portion of land within the facility that is being or has been used or held for or in connection with the Hazardous Waste/Recyclable Storage and Processing Facility;

(aa) “hydraulic conductivity” means the ease with which a fluid can be transported through a material;

(bb) “hydrocarbon” means a chemical compound that consists entirely of carbon and hydrogen;

(cc) “ISO 17025” means the international standard, developed and published by International Organization for Standardization (ISO), specifying management and technical requirements for laboratories;

(dd) "incompatible wastes or incompatible hazardous recyclables" means substances which when mixed can produce effects which are harmful to human health or the environment such as heat, pressure, fire, explosion, violent reaction, toxic dusts, mists, fumes or gases, or flammable fumes or gases, and include those substances listed in Appendix 5 of the *Guidelines for Industrial Landfills*, Alberta Environment, June 1987, as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ee) "industrial runoff" means precipitation that falls on or traverses the facility developed area;

(ff) "industrial runoff control system" means the parts of the facility that collect, store or treat industrial runoff from the facility and includes but is not limited to a surface water collection ditch, surface water detention pond, and tank farm bermed area;

(gg) "industrial wastewater" means the composite of liquid wastes and water-carried wastes, any portion of which results from any industrial process carried on at the facility;

(hh) “landfill” means the area at which waste is disposed of by placing it in a cell and includes all soil stock piles, trenches, berms, fences, run-on control systems, run-off control systems, leachate collection systems, leak detection systems, and other installations, and includes the portion of land within the facility that is being or has been used or held for or in connection with the Class I and Class II Industrial Landfill;

(ii) “lateral expansion” means an expansion of the waste boundaries of a landfill beyond the property area approved for landfilling by this approval;

(jj) “leachate” means a liquid that has been in contact with waste in any cell and has undergone chemical or physical changes;

(kk) “leachate collection system” means a system that gathers leachate so that it may be removed from a landfill and includes a permeable drainage material, a network of perforated pipes, and sumps or manholes from where leachate can be removed;

(ll) “leak detection liquid” means any liquid within the leak detection system;

(mm) “leak detection system” means a system that gathers liquids between a primary liner and a secondary liner system and consists of drainage material and sumps from where liquid can be removed;

(nn) “liner” means a continuous layer of synthetic material or natural clay soils placed beneath and at the sides of a cell to restrict the migration of leachate;

(oo) "local environmental authority" means the Department of Environment, in the Province of Alberta, or the agency that has the equivalent responsibilities for any jurisdiction outside the Province;

(pp) “maximum acceptable leachate head” means the head of leachate above the lowest part of the primary liner, not including the sumps or leachate pipe trenches and is either:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(i) a maximum of 1.0 m in existing cells during landfill operations, closure and post-closure, or

(ii) a maximum of 0.3 m in each new cell during landfill operations, closure and post-closure;

(qq) “maximum designated waste elevation” means the maximum elevation of waste in metres above sea level, as proposed in the letter dated February 22, 2007 from Clean Harbors Canada, Inc. as part of the application;

(rr) "monitoring system" means all equipment used for sampling, conditioning, analyzing or recording data in respect of any parameter listed or referred to in this approval including equipment used for continuous monitoring;

(ss) "monitoring well" means a well drilled at a site to measure groundwater levels and collect groundwater samples for the purpose of physical, chemical, or biological analysis to determine the concentration of groundwater constituents;

(tt) "month" means calendar month;

(uu) “new cell” means Cell 3D or Cell 3E as designated in the application;

(vv) “points of compliance” means the location or locations of the groundwater monitoring wells where measurements of groundwater quality are taken to assess landfill and waste treatment performance;

(ww) “post-closure” means the longest of the following periods of time:

(i) 25 years from the final closure of the landfill,

(ii) so long as groundwater quality in groundwater monitoring wells does not meet the quality objectives specified in the approval, or

(iii) so long after final closure as leachate is generated from the leachate collection system at the landfill;

(xx) “primary liner” means the uppermost geomembrane liner;

(yy) "QA/QC" means quality assurance and quality control;

(zz) “quality assurance” means a planned system of activities that provide assurances that the facility was constructed as specified in the design;

(aaa) “quality control” means a planned system of inspections that are used to monitor and control the quality of a construction project;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(bbb) "quarter year" means a time period of three consecutive months designated as January, February, and March; or April, May, and June; or July, August, and September; or October, November, and December;

(ccc) "representative grab sample" means a sample consisting of equal volume portions of water collected from at least four sites between 0.20 & 0.30 metres below the water surface within the surface water detention pond of the industrial runoff control system;

(ddd) “run-off” means any rainwater or melt water that drains as surface flow from the active landfill area;

(eee) “run-off control system means any parts of the landfill that collect, store or treat run-off;

(fff) “run-on” means any rainwater or melt water that drains as surface flow into the active landfill area;

(ggg) “run-on control system” means parts of the landfill that divert run-on away from the active landfill area;

(hhh) “secondary liner” means the lowermost geomembrane liner;

(iii) "soil" means unconsolidated mineral or organic surficial materials that can be, have been, or are being altered by weathering, biological processes, or human activity;

(jjj) "storm event" means a 1 in 10 year precipitation event that occurs over 24 hours at Ryley, Alberta;

(kkk) "subsoil" means the layer of soil directly below the topsoil layer that consists of the B and C horizons as defined in *The Canadian System of Soil Classification*, Third Edition, 1998, as amended;

(lll) "suitable quality" means topsoil having a good, fair or poor rating as described in the *Soil Quality Criteria Relative to Disturbance and Reclamation,* Alberta Agriculture March, 1987, as amended;

(mmm) "tank" means a stationary device, designed to contain an accumulation of a substance, which is constructed primarily of non-earthen materials that provide structural support;

(nnn) “TDG” means the *Transportation of Dangerous Goods Regulations* (SOR/2001-286) made under the *Transportation of Dangerous Goods Act*, 1992 (Canada), as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ooo) “third-party hazardous waste” means hazardous waste generated on property that is not owned by the approval holder;

(ppp) “topsoil” means the uppermost layers of soil that consist of the L, F, H, O, and A horizons as defined in *The Canadian System of Soil Classification*, Third Edition, 1998, as amended;

(qqq) "waste storage area" means the areas designated for waste and hazardous recyclable container storage, and/or waste and hazardous recyclable tank storage, as described in the application;

(rrr) "week" means any consecutive 7-day period unless otherwise specified;

(sss) “working face” means that portion of the active landfill area where waste is currently being deposited, spread and compacted; and

(ttt) “year” means a calendar year, unless otherwise specified.

PART 2: GENERAL

SECTION 2.1: GENERAL

2.1.1 The approval holder shall immediately report to the Director by telephone any contravention of the terms and conditions of this approval at 1-780-422-4505.

2.1.2 The approval holder shall submit a written report to the Director within 7 days of the reporting pursuant to 2.1.1.

2.1.3 The terms and conditions of this approval are severable. If any term or condition of this approval or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of this approval shall not be affected thereby.

2.1.4 The approval holder shall immediately notify the Director in writing if any of the following events occurs:

(a) the approval holder is served with a petition into bankruptcy;

(b) the approval holder files an assignment in bankruptcy or Notice of Intent to make a proposal;

(c) a receiver or receiver-manager is appointed;

(d) an application for protection from creditors is filed for the benefit of the approval holder under any creditor protection legislation; or

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(e) any of the assets, which are the subject matter of this approval, are seized for any reason.

2.1.5 If the approval holder monitors for any substances or parameters which are the subject of operational limits as set out in this approval more frequently than is required and using procedures authorized in this approval, then the approval holder shall provide the results of such monitoring as an addendum to the reports required by this approval.

2.1.6 All abbreviations used in this approval follow those given in *Standard Methods for the Examination of Water and Wastewater* published jointly by the American Public Health Association, the American Water Works Association, and the Water Environment Federation, 1998, as amended, unless otherwise specified in this approval.

2.1.7 *Environmental Protection and Enhancement Act* Approval No. 10348-01-00, as amended, is cancelled.

SECTION 2.2: RECORD KEEPING

2.2.1 The approval holder shall record and retain all the following information in respect of any sampling conducted or analyses performed in accordance with this approval for a minimum of ten years, unless otherwise authorized in writing by the Director:

(a) the place, date and time of sampling;

(b) the dates the analyses were performed;

(c) the analytical techniques, methods or procedures used in the analyses;

(d) the names of the persons who collected and analyzed each sample; and

(e) the results of the analyses.

2.2.2 The approval holder shall record and retain all of the following information for a minimum of ten years:

(a) the name and addresses of all persons who discover any contravention for a minimum of ten years;

(b) the names and addresses of all persons who take any remedial actions arising from the contravention of the Act, the regulations or this approval; and

(c) a description of the remedial measures taken in respect of a contravention of the Act, the regulations or this approval.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 2.3: ANALYTICAL REQUIREMENTS

2.3.1 With respect to any sample required to be taken pursuant to this approval, the approval holder shall ensure that:

(a) collection;
(b) preservation;
(c) storage;
(d) handling; and
(e) analysis;

shall be conducted in accordance with the following unless otherwise authorized in writing by the Director:

(i) for air monitoring:

(A) the *Alberta Stack Sampling Code,* Alberta Environment, 1995, as amended;

(B) the *Methods Manual for Chemical Analysis of Atmospheric Pollutants*, Alberta Environment, 1993, as amended;

(C) the *Air Monitoring Directive*, Alberta Environment, 1989, as amended; and

(D) the *CEMS Code*;

(ii) for industrial wastewater, industrial runoff, run-on, run-off, leachate, leak detection liquid, dugout and water well, groundwater and domestic wastewater parameters:

(A) the *Standard Methods for the Examination of Water and Wastewater*, published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation, 2005, as amended;

(iii) for whole effluent toxicity tests:

(A) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout*, Environment Canada, Environmental Protection Series 1/RM/13, July 1990, as amended;

(B) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia Magna*, Environment Canada, Environmental Protection Series 1/RM/14, July 1990, as amended;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(C) the *Biological Test Method: Growth Inhibition Test Using the Freshwater Alga Selenastrum capricornutum*, Environment Canada, Environmental Protection Series, November 1992, as amended;

(D) the *Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia*, Environment Canada, Environmental Protection Series 1/RM/21, February 1992, as amended;

(E) the *Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows*, Environment Canada, Environmental Protection Series 1/RM/22, February 1992, as amended; and

(F) the Chlorinated Phenolic Compounds in Bleached Kraft Mill Effluents and Receiving Waters (Method No. AE130.0) available, as amended from time to time, from the chemistry division, Alberta Environmental Centre, Vegreville, sample preservation shall be with sulphuric acid (one half vial of 12 N per one litre sample) instead of nitric acid;

(iv) for soil samples:

(A) *Soil Sampling and Methods of Analysis*, Lewis Publishers, 1993, as amended;

(B) the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, USEPA, SW-846, September 1986, as amended;

(C) the *Soil Quality Criteria Relative to Disturbance and Reclamation*, Alberta Agriculture, March 1987, as amended;

(D) the *Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites – Volume I: Main Report*, CCME EPC-NCS62E, 1993, as amended; and

(E) the *Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites – Volume II: Analytical Method Summaries*, CCME EPC-NCS66E, 1993, as amended; and

(v) for waste analysis:

(A) the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, USEPA, SW-846, September 1986, as amended; or

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(B) the *Methods Manual for Chemical Analysis of Water and Wastes*, Alberta Environmental Centre, Vegreville, Alberta, 1996, AECV96-M1 as amended; or

(C) the *Toxicity Characteristic Leaching Procedure (TCLP)* USEPA Regulation 40 CFR261, Appendix II, Method No. 1311, as amended; or

(D) the *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, American Water Works Association, and the Water Environment Federation, as amended.

2.3.2 The approval holder shall analyze all samples that are required to be obtained by this approval in a laboratory accredited pursuant to ISO 17025, as amended, for the specific parameter(s) to be analyzed, unless otherwise authorized in writing by the Director.

2.3.3 The approval holder shall comply with the terms and conditions of any written authorization issued by the Director under 2.3.2.

SECTION 2.4: OTHER

2.4.1 All above ground tanks shall conform to the *Guideline for Secondary Containment for Above Ground Storage Tanks,* Alberta Environment, 1997, as amended, unless otherwise authorized in writing by the Director.

PART 3: CONSTRUCTION

SECTION 3.1: LANDFILL

3.1.1 The approval holder shall construct each new cell of the Class I Industrial Landfill in accordance with the following, unless modifications are authorized in writing by the Director:

(a) the application; and

(b) in a way that each new Class 1 cell shall consist of the following components, at a minimum:

(i) a composite liner system that consists of:

(A) a 1.5 meter clay liner compacted to achieve an in-place hydraulic conductivity of 1×10^{-7} cm/s or less;

(B) a 80 mil HDPE (High Density Polyethylene) geomembrane liner (secondary liner) overlying the clay liner;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(C) a geocomposite drainage layer with a transmissivity of at least 1×10^{-2} cm/s placed over the secondary liner;

(D) a 80 mil HDPE geomembrane liner (primary liner) placed over top of the geocomposite drainage layer;

(E) a geocomposite drainage layer with a transmissivity of at least 1×10^{-2} cm/s placed over top of the primary liner; and

(F) a 0.45 meter thick cover of clean sand/soil placed over top of the geocomposite layer;

(ii) a leachate collection system:

(A) placed over the primary liner system;

(B) capable of maintaining the maximum acceptable leachate head; and

(C) consisting of:

(I) a geocomposite drainage layer with a transmissivity of at least 1×10^{-2} cm/s, and

(II) a primary leachate collection system sump(s) and a network of perforated collection pipes;

(iii) a leak detection system placed over the secondary liner system;

(iv) a run-on control system; and

(v) a run-off control system.

3.1.2 The composite liner system for the landfill shall be constructed on a foundation or base such that there shall be no failure of the liners due to settlement, compression, or uplift.

3.1.3 The approval holder shall implement the QA/QC monitoring program in accordance with the following:

(a) the Waste Management Unit 2 Construction Specifications and Construction Quality Assurance Program as described in the application; or

(b) equivalent as the program is revised.

3.1.4 The approval holder shall submit the following information to the Director prior to the construction of each new cell identified in the application:

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(a) a Design Plan and Specifications, stamped and signed by a professional registered with APEGGA;

(b) an up-to-date copy of the QA/QC monitoring program;

(c) any proposed changes to the groundwater monitoring system;

(d) any proposed changes to the landfill run-on and run-off control systems; and

(e) any proposed changes to the facility industrial runoff control system.

3.1.5 The approval holder shall construct each new cell only as authorized in writing by the Director.

3.1.6 The approval holder shall not make any deviation that results in an adjustment to the Design Plan and Specifications, as submitted under 3.1.4(a), unless the following conditions are met:

(a) the deviation results in a minor adjustment to the Design Plan and Specifications in 3.1.4 (a) to suit field conditions encountered; and

(b) the deviation will not reduce the design performance of the landfill.

3.1.7 Prior to commencing the operation of any new cell following construction, the approval holder shall submit to the Director a summary report of the QA/QC monitoring program results stamped and signed by a professional registered with APEGGA.

3.1.8 The summary report in 3.1.7 shall contain the following:

(a) confirmation that the landfill has been constructed according to:

(i) the Design Plan and Specifications, and

(ii) the QA/QC monitoring program;

(b) documentation of any minor deviations as per 3.1.6;

(c) confirmation by the professional registered with APEGGA, that deviations as per 3.1.6 will not reduce landfill performance; and

(d) as-built plans for the constructed cell(s).

3.1.9 The approval holder shall maintain the following at all times after construction is complete:

(a) the integrity of the liners;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(b) the integrity of the leachate collection system; and

(c) the integrity of the leak detection system.

3.1.10 The approval holder shall notify the Director in writing at least 14 days prior to commencing operations of any new cell.

SECTION 3.2: SOIL CONSERVATION

3.2.1 The approval holder shall conserve all topsoil from disturbed land at the landfill.

3.2.2 The topsoil in 3.2.1 shall be used for reclamation of the landfill.

3.2.3 The approval holder shall not use topsoil for daily cover of the working face.

3.2.4 The approval holder shall salvage, from disturbed land, sufficient subsoil to meet the subsoil replacement requirements for closure of each cell.

3.2.5 The approval holder shall locate all topsoil stockpiles at the landfill.

3.2.6 The approval holder shall stockpile all topsoil as follows:

(a) on stable foundations; and

(b) in a manner that prevents admixing with subsoil.

3.2.7 The approval holder shall stockpile all subsoil as follows:

(a) on stable foundations; and

(b) in a manner that prevents admixing with topsoil.

3.2.8 When topsoil and subsoil are stockpiled, the stockpile shall be constructed as follows:

(a) topsoil and subsoil shall be stockpiled separately from each other;

(b) stockpile foundations must be stable;

(c) stockpiles shall be stabilized to control wind and water erosion;

(d) stockpiles shall be accessible and retrievable; and

(e) stockpiles shall be revegetated.

3.2.9 The approval holder shall immediately suspend topsoil and subsoil salvage when:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) wet or frozen field conditions will result in the admixing, degradation, or compaction of topsoil or subsoil; or

(b) high wind velocities, any other field conditions or facility operations will result in the admixing, degradation, or loss of topsoil or subsoil.

3.2.10 The approval holder shall only recommence topsoil and subsoil salvage when suspended under section 3.2.9, if field conditions referred to in section 3.2.9 no longer exist.

PART 4: OPERATIONS, LIMITS, MONITORING AND REPORTING

SECTION 4.1: GENERAL

4.1.1 The approval holder shall restrict access to the facility to only personnel authorized by the approval holder.

FACILITY AUDIT

4.1.2 The approval holder shall cause the facility to be audited by an independent third-party environmental consultant or organization to assess compliance with the terms and conditions of this approval:

(a) at least once every three years; and

(b) commencing on or before October 1, 2009 for the first audit.

4.1.3 The approval holder shall submit the Audit Report specified in 4.1.2, in the Annual Landfill Operations Report as required in 4.5.40(j).

4.1.4 The requirements in 4.1.2 and 4.1.3 do not relieve the approval holder of any duty under the Act or its regulations or this approval.

LANDFILL OPERATIONS PLAN

4.1.5 The approval holder shall:

(a) develop;

(b) maintain; and

(c) implement

a Landfill Operations Plan that does not contravene the requirements of this approval.

4.1.6 The approval holder shall:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) retain a copy of the Landfill Operations Plan at the facility at all times; and

(b) update the Landfill Operations Plan on an annual basis at a minimum.

4.1.7 The Landfill Operations Plan shall include, at a minimum, all of the following:

(a) operational procedures for waste control, run-on and run-off controls, and nuisance controls;

(b) details on keeping and maintaining an operating record;

(c) a program for detecting and preventing the disposal of unauthorized wastes;

(d) procedures for the acceptance, handling and disposal of wastes, including;
(i) waste characterization and classification at source,
(ii) waste manifesting and tracking,
(iii) QA/QC Waste Acceptance procedures, and
(iv) waste sampling;

(e) procedures for placing waste in a cell including;
(i) compaction,
(ii) working face width,
(iii) lift depth, and
(iv) waste placement location using a grid system;

(f) an Odour Response Program;

(g) procedures for managing contaminated sulphur and sulphur containing wastes;

(h) a monitoring and maintenance program for the scale house and heavy operational equipment;

(i) a groundwater monitoring program;

(j) a remediation plan to deal with groundwater quality deterioration;

(k) a leachate monitoring and management program;

(l) a leak detection liquid monitoring and management program;

(m) a cell cover system;

(n) a health and safety program;

(o) an emergency response program, including procedures for handling fires, releases to the environment and health concerns;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(p) an up-to-date plan of the landfill layout with survey records giving the location of all structural components of the landfill including final cover elevations and contours; and

(q) procedures for placing leachate, leak detection liquid, or other authorized wastes and liquids over the surface of the active landfill area for the purpose of evaporation or dust suppression.

4.1.8 The approval holder shall submit to the Director an up-to-date Operations Plan when requested in writing by the Director.

SECTION 4.2: AIR

OPERATIONS

4.2.1 The approval holder shall not release any effluent streams from the facility to the atmosphere except as provided in this approval.

4.2.2 The approval holder shall only release effluent streams to the atmosphere from the following sources:

(a) the air emission scrubber exhaust stack;

(b) building vents which include but are not limited to lab hoods, building fans and shop exhausts;

(c) tank heaters;

(d) building furnaces; and

(e) any other source authorized in writing by the Director.

4.2.3 The approval holder shall not operate any process equipment unless and until the pollution abatement equipment associated with the process equipment is:

(a) operational; and

(b) operating.

4.2.4 Except as provided for by the Director in writing, the approval holder shall control fugitive emissions and any source not specified in 4.2.2 in accordance with 4.2.5 of this approval.

4.2.5 With respect to fugitive emissions and any source not specified in 4.2.2, the approval holder shall not release a substance or cause to be released a substance that causes or may cause any of the following:

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(a) impairment, degradation or alteration of the quality of natural resources; or

(b) material discomfort, harm or adverse affect to the well being or health of a person; or

(c) harm to property or to plant or animal life.

4.2.6 The approval holder shall exhaust air from the exhaust stacks through a caustic scrubber and an activated carbon filter while:

(a) hazardous waste or hazardous recyclables are being processed;

(b) hazardous waste or hazardous recyclables are being transferred; or

(c) containers of hazardous waste or hazardous recyclables are open.

4.2.7 The exhaust stacks in 4.2.6 are defined as the ones in the following buildings:

(a) drum processing building, as designated in the application; and

(b) staging building, as designated in the application.

4.2.8 The activated carbon in the filter referred to in 4.2.6, shall be replaced immediately when the concentration of total petroleum hydrocarbons in the stack exhaust exceeds 50 ppm.

4.2.9 The exhaust stacks referred to in 4.2.6 shall be sampled and measured weekly using the total petroleum hydrocarbon sampler/analyzer.

4.2.10 The portable, total petroleum hydrocarbon sampler/analyzer shall:

(a) have a detection limit of 1.0 ppm or less of total petroleum hydrocarbons; and

(b) be located within the exhaust stack, 1 metre downstream of the blower, but before the gas exists the exhaust stack.

4.2.11 Each caustic scrubber referred to in 4.2.6 shall be:

(a) monitored for pH daily; and

(b) maintained at a pH value of 8.0, or greater.

4.2.12 The approval holder shall not burn any debris by means of an open fire unless authorized in writing by the Director.

4.2.13 If the approval holder receives complaints of offensive odours beyond the facility boundaries, the approval holder shall:

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(a) place restrictions on waste disposal types, and volumes of waste being deposited that are causing those odours;

(b) increase the frequency of cover placement and modify waste handling activities at the landfill to reduce the release of those odours; and

(c) activate the Odour Response Program as specified in the Landfill Operations Plan 4.1.7(f).

MONITORING AND REPORTING

4.2.14 The approval holder shall monitor the ambient air for the facility in accordance with the existing ambient air monitoring program until the new ambient air monitoring program is implemented.

4.2.15 By July 1, 2008, the approval holder shall submit to the Director a proposal for a new ambient air monitoring program for the facility.

4.2.16 The proposal for the new ambient air monitoring program shall include the following monitoring parameters at a minimum:

(a) total hydrocarbons;

(b) volatile organic compounds;

(c) particulate matter;

(d) wind speed; and

(e) wind direction.

4.2.17 If the proposal for the new ambient air monitoring program is found deficient by the Director, the approval holder shall correct all the deficiencies as outlined by the Director within 120 days of the deficiency letter.

4.2.18 The approval holder shall implement the proposal for the new ambient air monitoring program as authorized in writing by the Director.

4.2.19 The approval holder shall report to the Director the results of the new ambient air monitoring program as specified in writing by the Director.

4.2.20 Notwithstanding 4.2.19, the approval holder shall submit to the Director an Annual Air Monitoring Report on or before March 31 each year on the information collected in the previous year.

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SECTION 4.3: INDUSTRIAL RUNOFF AND INDUSTRIAL WASTEWATER

OPERATIONS

4.3.1 The approval holder shall not release any substances from the facility to the surrounding watershed except as authorized by this approval.

4.3.2 The approval holder shall operate and maintain the following in accordance with the Landfill Operations Plan:

(a) a run-on control system to prevent flow onto the active landfill area from at least the peak discharge from a 1 in 25 year, 24 hour duration precipitation event at the landfill; and

(b) a run-off control system for the active landfill area to collect and control at least the run-off volume resulting from a 1 in 25 year, 24 hour duration precipitation event at the landfill.

4.3.3 All industrial runoff from the facility developed area shall be directed to the industrial runoff control system, as described in the application.

4.3.4 Subject to 4.3.8, the approval holder shall make or permit a release from the surface water detention pond of the industrial runoff control system only at the discharge point as designated in the application, which:

(a) is located in the south west corner of the surface water detention pond;

(b) discharges the water through a pump and discharge hose over the south berm and into the natural drainage area located south and east of the surface water detention pond; and

(c) is referred to as sampling location “A” in 4.3.15

unless an alternative location for (a) or (b) is authorized in writing by the Director.

4.3.5 The approval holder is only authorized to dispose of industrial wastewater and industrial runoff from the sources listed in TABLE 4.3-A to one or more of the following facilities:

(a) facilities holding a current Approval, Registration or as otherwise authorized under the Act to accept such waste;

(b) facilities approved by a local environmental authority outside of Alberta to accept such waste; or

(c) a deep well approved by the Energy Resources Conservation Board.

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TABLE 4.3-A: SELECTED SOURCES OF INDUSTRIAL WASTEWATER AND INDUSTRIAL RUNOFF

SOURCES
Industrial wastewater from the caustic scrubber
Industrial runoff that exceeds any of the parameters listed in TABLE 4.3-B or TABLE 4.3-C
Industrial runoff for which the results of parameters listed in TABLE 4.3-B or TABLE 4.3-C are unavailable at the time that the industrial wastewater and industrial runoff must be disposed of
Industrial wastewater removed from bulk tanks
Industrial wastewater from the storage and process building sumps

LEACHATE COLLECTION AND LEAK DETECTION SYSTEMS

4.3.6 The approval holder shall only dispose of leachate removed from the leachate collection system by one or more of the following methods:

(a) disposal to facilities holding a current Approval, Registration or as otherwise authorized under the Act to accept such waste;

(b) disposal to facilities approved by a local environmental authority outside of Alberta to accept such waste;

(c) disposal to a deep well approved by the Energy Resources Conservation Board; or

(d) placing leachate over the surface of the active landfill area for the purpose of evaporation, as described in the application.

4.3.7 The approval holder shall only dispose of liquid removed from the leak detection system by one or more of the following methods:

(a) disposal to facilities holding a current Approval, Registration or as otherwise authorized under the Act to accept such waste;

(b) disposal to facilities approved by a local environmental authority outside of Alberta to accept such waste;

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(c) disposal to a deep well approved by the Energy Resources Conservation Board; or

(d) placing leak detection liquid over the surface of the active landfill area for the purpose of evaporation, as described in the application.

INDUSTRIAL RUNOFF LIMITS

4.3.8 Releases of industrial runoff from the surface water detention pond of the industrial runoff control system, to the surrounding watershed, shall comply with the limits specified in TABLE 4.3-B.

4.3.9 Releases of industrial runoff from within the tank farm bermed area of the industrial runoff control system, to the surrounding watershed, shall comply with the limits specified in TABLE 4.3-C.

TABLE 4.3-B: INDUSTRIAL RUNOFF LIMITS FOR THE SURFACE WATER DETENTION POND

PARAMETER	LIMITS Maximum unless otherwise indicated
Chemical Oxygen Demand	50 mg/L
Total Suspended Solids	25 mg/L
Ammonia, dissolved (expressed as Nitrogen)	5 mg/L
pH	6.0 – 9.5 pH units
Oil or other substances	Not present in amounts sufficient to create a visible film or sheen
96-Hour Multiple Concentration Acute Lethality Test Using Rainbow Trout (*Oncorhynchus mykiss*)	50% or greater survival
48-Hour Static Acute Lethality Test Using *Daphnia magna*	Result must “PASS” test

TABLE 4.3-C: INDUSTRIAL RUNOFF LIMITS FOR THE TANK FARM BERMED AREA

PARAMETER	LIMITS Maximum unless otherwise indicated
Chemical Oxygen Demand	50 mg/L
Total Suspended Solids	25 mg/L
Ammonia, dissolved (expressed as Nitrogen)	5 mg/L
pH	6.0 – 9.5 pH units
Oil or other substances	Not present in amounts sufficient to create a visible film or sheen

LEACHATE COLLECTION SYSTEM AND LEAK DETECTION SYSTEM LIMITS

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.3.10 Effective August 15, 2008, the approval holder shall not exceed the maximum acceptable leachate head in any cell.

4.3.11 Notwithstanding 4.3.10, the leachate head shall only exceed the maximum acceptable leachate head for a maximum duration of 14 days subsequent to a precipitation event, unless otherwise authorized in writing by the Director.

4.3.12 The volume of liquid in the leak detection system, as monitored in TABLE 4.5-B, shall not exceed the action leakage rate of 790 litres/ha/day in any cell.

INDUSTRIAL RUNOFF MONITORING AND REPORTING

4.3.13 The approval holder shall monitor the industrial runoff control system as required in TABLE 4.3-D.

4.3.14 The approval holder shall report to the Director the monitoring results of the industrial runoff control system as required in TABLE 4.3-D.

4.3.15 For the purpose of TABLE 4.3-D:

(a) sampling location A is defined as the surface water detention pond; and

(b) sampling location B is defined as industrial runoff collected within the tank farm bermed area.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.3-D: INDUSTRIAL RUNOFF CONTROL SYSTEM MONITORING AND REPORTING

MONITORING				REPORTING	
Parameter, Test, Event, Study Proposal or Reporting Requirement	**Frequency**	**Sample Type**	**Sampling Location**	**Monthly**	**Annually**
Surface Water Detention Pond:				Monthly Industrial Runoff Report for each month where discharge occurs (Due on or before the end of the month following the month in which the information was collected) Number of Copies Required 1	Annual Industrial Runoff Report (Provide annual summary of data by March 31 of the year following the year in which the information was collected) Number of Copies Required 1
Flow (in cubic meters per day)	Daily	Estimate	A		
96-Hour Multiple Concentration Acute Lethality Test Using Rainbow Trout (*Oncorhynchus mykiss*)	Once per month during the first discharge	Grab	A		
48-Hour Static Acute Lethality Test Using *Daphnia magna*		Grab	A		
pH	Once per batch discharge, prior to discharge	Representative Grab	A		
Chemical Oxygen Demand		Representative Grab	A		
Total Suspended Solids		Representative Grab	A		
Ammonia, dissolved (expressed as nitrogen)		Representative Grab	A		
Oil or other substances	Daily during discharge	Visual	A		
Tank Farm Bermed Area:					
pH	Once per batch discharge, prior to discharge to Industrial Runoff Control System	Grab	B		
Chemical Oxygen Demand		Grab	B		
Total Suspended Solids		Grab	B		
Ammonia, dissolved (expressed as nitrogen)		Grab	B		
Oil or other substances		Grab	B		
Volume (cubic meters)	Total batch volume discharged	Estimate	B		

TERMS AND CONDITIONS ATTACHED TO APPROVAL

The approval holder shall comply with the following requirements regarding Acute Lethality Testing:

(c) perform a 96 hour static acute bioassay using rainbow trout as the test organism on grab samples collected from the surface water detention pond;

(d) perform the 48-hour static acute bioassay using Daphnia magna as the test organism on grab samples collected from the surface water detention pond;

(e) all samples for static acute bioassays must be transported and received by the laboratory within 48 hours of collection;

(f) if any sample has been continuously chilled at a temperature between 1^0C to 8^0C, then testing on that sample shall begin no later than 5 days after collection;

(g) should any control response exceed 10% in any bioassay, that bioassay shall be repeated; and

(h) any deviations from the recommended conditions and procedures for culturing, test conditions, and procedures as outlined in the test methods specified in 2.3 shall be repeated upon submission of the results to the Director.

4.3.16 The approval holder shall repeat a bioassay if notified in writing by the Director that, in the Director's opinion, significant deviations from the conditions and procedures in the analytical methods in 2.3 have occurred.

4.3.17 In the event that less than 50% of the rainbow trout survived in the 100% concentration sample, the approval holder shall:

(a) immediately implement a program to identify the source of the toxicity; and

(b) submit to the Director within 90 days after the analytical result above, a proposed program to reduce the toxicity of the industrial runoff.

4.3.18 In addition to the monthly reporting in TABLE 4.3-D, the Monthly Industrial Runoff Report shall include, at a minimum, all of the following information:

(a) an assessment of the monitoring results relative to the limits in TABLE 4.3-B;

(b) an assessment of the monitoring results relative to the limits in TABLE 4.3-C;

(c) an assessment of the performance of each of the industrial runoff control system, pollution abatement equipment and monitoring equipment;

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(d) a summary of industrial runoff contraventions reported pursuant to 2.1.1; and

(e) any other information as required in writing by the Director.

4.3.19 In addition to the annual reporting in TABLE 4.3-D, the Annual Industrial Runoff Report shall include, at a minimum, all of the following information:

(a) an overview of the operation and performance of the industrial runoff control system, pollution abatement equipment and monitoring equipment; and

(b) any other information as required in writing by the Director.

4.3.20 The approval holder shall analyze a representative grab sample from the surface water detention pond of the industrial runoff control system at least once per year for the parameters outlined in TABLE 4.3-E.

4.3.21 The approval holder shall submit the results of the analyses in 4.3.21 to the Director on or before March 31 of the following year.

TABLE 4.3-E: ANNUAL MONITORING OF SURFACE WATER DETENTION POND

PARAMETERS			
Chemical Oxygen Demand	Phenol	Boron, dissolved	Lead, dissolved
Total Suspended Solids	Polychlorinated biphenyls, total	Cadmium, dissolved	Manganese, dissolved
Ammonia, dissolved (expressed as Nitrogen)	Total chlorinated phenol	Chromium, dissolved (hexavalent)	Mercury, total
pH	Total organic halogens	Chromium, total	Molybdenum, dissolved
Oil or other substances	Aluminum, dissolved	Cobalt, dissolved	Nickel, dissolved
	Antimony, dissolved	Copper, dissolved	Selenium, dissolved
	Arsenic, dissolved	Cyanide (weak acid dissociable)	Tin, dissolved
	Barium, dissolved	Fluoride, dissolved	Zinc, dissolved

LEACHATE COLLECTION AND LEAK DETECTION SYSTEMS MONITORING AND REPORTING

4.3.22 Subject to TABLE 4.3-F, the approval holder shall monitor the

(a) leachate; and

(b) leak detection liquid

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at the landfill as required in TABLE 4.5-B.

TABLE 4.3-F: LEACHATE AND LEAK DETECTION LIQUID MONITORING

PARAMETERS	
pH (field and laboratory)	Nutrients
Electrical Conductivity (field and laboratory)	Chemical Oxygen Demand
Major Ions	Dissolved Organic Carbon
Trace Metals (dissolved)	Petroleum Hydrocarbons Fractions, F1 and F2

4.3.24 If the volume of liquid removed from the leak detection system exceeds the action leakage rate of 790 litres/ha/day, in addition to reporting pursuant to 2.1.1, the approval holder shall submit a response action plan to the Director within 30 days of the excess.

4.3.25 The approval holder shall report to the Director the results of the leachate and leak detection liquid monitoring as required in TABLE 4.5-B.

SECTION 4.4: SPECIAL MONITORING AND REPORTING

4.4.1 The approval holder shall

(a) collect a representative sample from:

(i) each dugout within an approximate 1.6 kilometre radius, and

(ii) each of the wells within an approximate 1.6 kilometre radius around the facility; and

(b) analyze the sample for parameters listed in TABLE 4.4-A

unless the approval holder is not granted access by the landowner.

4.4.2 The monitoring required in 4.4.1 shall be conducted once each year in October unless otherwise authorized in writing by the Director.

4.4.3 The approval holder shall record the analytical results of the sampling information required in 4.4.1 in an Annual Dugout and Water Well Sampling Program Report.

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4.4.4 The Annual Dugout and Water Well Sampling Program Report shall be submitted to the Director by March 31 of each year following the year in which the information was collected.

TABLE 4.4-A: DUGOUT AND WATER WELL MONITORING

PARAMETERS	
pH (field and laboratory)	Nutrients
Electrical Conductivity (field and laboratory)	Chemical Oxygen Demand
Major Ions	Dissolved Organic Carbon
Trace Metals (dissolved)	Petroleum Hydrocarbons, F1 and F2

SECTION 4.5: WASTE MANAGEMENT AND LANDFILL OPERATIONS

GENERAL

4.5.1 The approval holder shall classify all materials entering the facility in accordance with the *Waste Control Regulation (AR 192/96)* and *The Alberta User Guide For Waste Managers*, May 1995, as amended.

4.5.2 The approval holder shall not receive or dispose of any of the following wastes:

(a) explosives (Class 1 *Transportation of Dangerous Goods Regulation* (TDGR) wastes) at the facility;

(b) radioactive wastes regulated under the *Canadian Nuclear Safety Act* (Canada) at the facility;

(c) radioactive wastes (Class 7 TDGR wastes) at the facility;

(d) biological, biomedical and/or pathological waste (as defined in the *Waste Control Regulation, AR 192/96*, as amended) at the facility;

(e) waste containing free liquids (as determined by the US EPA Method 9095 Paint Filter Liquids Test, specified in Test Methods for Evaluating Solid

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Wastes Physical/Chemical Methods, US EPA Publication No. SW-846, as amended) at the landfill;

(f) material containing ozone depleting substances at the landfill; or

(g) domestic or municipal wastes at the facility.

4.5.3 All wastes or hazardous recyclables shall be transferred only at designated transfer areas designed to contain spills and leaks.

4.5.4 Hazardous waste or hazardous recyclables stored in containers or tanks shall be stored in accordance with the *Hazardous Waste Storage Guidelines*, June 1988, Alberta Environment, as amended.

4.5.5 All tanks within the tank farm shall be equipped, at a minimum, with all of the following:

(a) sensors for detecting the level in each tank;

(b) high level alarms that activate when a tank overfill is imminent;

(c) automatic shut-off devices or sufficient free board space above the high level sensor to allow operators time to prevent overfill from occurring; and

(d) earthen dikes or equivalent secondary containment structures capable of containing 110% of the volume of the largest tank within the bermed area plus 10% of the aggregate capacity of all other tanks in the bermed area.

4.5.6 Effective July 31, 2009, all tanks containing hazardous waste or hazardous recyclables in each building shall be equipped, at a minimum, with all of the following:

(a) sensors or gauges for detecting the level in each tank;

(b) a written operating procedure to prevent tank overfill; and

(c) secondary containment structures capable of containing 110% of the volume of the largest tank within the building plus 10% of the aggregate capacity of all other tanks containing hazardous waste or hazardous recyclables in the same building.

4.5.7 All wastes or hazardous recyclables that are unloaded shall be immediately transferred to the waste storage area.

4.5.8 All containers and unrinsed empty containers shall be stored in the waste storage area.

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4.5.9 The approval holder shall provide and maintain an adequate aisle space between containers in the waste storage area to allow inspection, unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of the waste storage area. Inspection aisles shall be arranged such that each container is exposed to view from at least one side.

4.5.10 Incompatible wastes or incompatible hazardous recyclables shall be prevented from mixing.

4.5.11 The approval holder shall use the following when transferring substances to, from, or between containers, tanks, or trucks:

(a) couplings equipped with seals that are compatible with the substance transferred;

(b) the necessary precautions to prevent spills when the couplings are disconnected;

(c) emergency shut-off valves;

(d) established transfer areas and associated curbing, paving and catchment areas;

(e) drip trays to capture potential losses under coupling devices and other connections; and

(f) manual inspections of the transfer area for leaks and spills during and after waste transfer.

4.5.12 The approval holder shall only carry out the following activities at the facility in relation to hazardous waste or hazardous recyclables as follows:

(a) commingling of hazardous waste or hazardous recyclables shall be conducted only:

(i) to make maximum use of available container or tank capacity, and

(ii) if the resultant mixture has the same TDG hazard classification as any one of the individual components;

(b) phase separation by gravity settling shall be conducted only without the addition of any chemicals designed to accelerate settling;

(c) dispersion of solids into liquids by natural or mechanical means shall be conducted only if the resultant mixture has the same TDG hazard classification as the original waste;

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(d) physical segregation of hazardous from non-hazardous articles or components from the same container shall be conducted only if, no process equipment is used;

(e) washing of drums and other objects shall be conducted only for the purpose of removing hazardous residue;

(f) crushing and shredding of used filters, rags, absorbent materials, and empty containers shall be conducted only for the purpose of volume reduction and liquid recovery unless otherwise authorized in writing by the Director; and

(g) treatment of third-party hazardous waste only as authorized in writing by the Director.

4.5.13 Notwithstanding 4.5.12(g), the approval holder shall not incinerate hazardous waste at the facility.

4.5.14 The approval holder shall dispose of waste generated at the facility only to facilities holding a current Approval, Registration or as otherwise authorized under the Act, or to facilities approved by a local environmental authority outside of Alberta.

LANDFILL

4.5.15 The approval holder shall obtain, at a minimum, a detailed chemical and physical representative analysis of the wastes prior to disposal into the landfill at the following times:

(a) the first time a waste is received from a new generator;

(b) the first time a delivery is received from a different process associated with a known waste generator;

(c) the first time a waste is received from a different location associated with a known waste generator; and

(d) when the nature or composition of the waste that was previously characterized by the generator changes.

4.5.16 The approval holder shall not dispose of hazardous waste in any Class II cell.

4.5.17 The approval holder shall dispose of asbestos wastes in accordance with *Guidelines for the Disposal of Asbestos Waste*, Alberta Environmental Protection, as amended.

4.5.18 The approval holder shall dispose of wastes that the landfill is not authorized to dispose of only to a facility holding a current Approval, Registration or as otherwise authorized under the Act, or to facilities approved by a local environmental authority outside of Alberta.

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4.5.19 The approval holder shall remove all waste that the landfill is not authorized to dispose of within 7 days of receiving the waste.

4.5.20 The approval holder shall restrict the working face of each cell to the smallest practicable area.

4.5.21 For any waste disposed of at the landfill that is subject to wind dispersal, the approval holder shall:

(a) wet the waste to prevent dispersal of particulate matter; or

(b) immediately apply cover on top of the waste to minimize entrainment of particulate matter.

4.5.22 Notwithstanding 4.5.2(e), the approval holder is authorized to place the following wastes over the surface of the active landfill area for the purpose of dust suppression:

(a) leachate;

(b) leak detection liquid;

(c) sump waste of car wash bays or similar operations;

(d) waste from hydrovac excavation operations; and

(e) any other waste authorized by *The Alberta User Guide For Waste Managers,* May 1995, as amended.

4.5.23 Prior to placement of final cover, the elevation of waste in the landfill shall not exceed the maximum designated waste elevation.

LIMITS

4.5.24 The approval holder shall not store more than a cumulative total of 752,500 litres of all hazardous recyclables and hazardous waste at the Hazardous Waste/Recyclable Storage and Processing Facility at any time.

4.5.25 In addition to the storage limits in 4.5.24, the approval holder shall not exceed the waste storage limits as specified in TABLE 4.5-A.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.5-A: STORAGE LIMITS FOR HAZARDOUS WASTE/RECYCLABLES AT THE HAZARDOUS WASTE/RECYCLABLE STORAGE AND PROCESSING FACILITY

Waste/Recyclable Type	Material	Maximum Quantity
Containers: Hazardous waste, hazardous recyclables	TDG classification 2,3,4,5,6,8 and 9 waste type only	512,500 litres (consisting of 2500 drums of 205 litre capacity)
Bulk Tanks: Hazardous waste, hazardous recyclables	Waste flammable liquids, used oil, wastewaters TDG classification 3,5,6,8 and 9 waste type only	240,000 litres (consisting of 135 m^3 in the tank farm and a 105 m^3 total inside the buildings)

4.5.26 Containers other than 205 litre drums shall be prorated to 205 litre drum equivalents based on their nominal volumes (e.g. 10 X 20 litre pails = 1 X 205 litre drum).

4.5.27 The limits referred to in 4.5.24 and 4.5.25 shall be calculated based on:

(a) summing nominal volumes of all containers at the Hazardous Waste/Recyclable Storage and Processing Facility and filled tank capacities; and

(b) treating all partially filled containers as if they were full.

4.5.28 The approval holder shall keep a daily total and inventory of all materials being stored at the Hazardous Waste/Recyclable Storage and Processing Facility.

4.5.29 The daily total and inventory records in 4.5.28 shall be available at all times for inspection by the Director or an inspector.

WASTE AND LANDFILL MONITORING

4.5.30 The approval holder shall:

(a) identify;

(b) characterize; and

(c) classify;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

all hazardous recyclables and waste streams, generated and received at the facility, not including industrial wastewater streams or air effluent streams.

4.5.31 The approval holder shall measure or, when not feasible to measure, estimate, the quantity of each waste and hazardous recyclable identified in 4.5.30 each year.

4.5.32 The approval holder shall inspect the landfill, at a minimum:

(a) weekly; and

(b) immediately after each storm event to:

(i) detect evidence of any deterioration of the composite liner system,

(ii) detect any malfunction or improper operation of the run-on and run-off control systems, leachate collection system or leak detection system, and

(iii) take corrective measures to repair any damage to the composite liner system, run-on and runoff control systems, leachate collection system or leak detection system.

4.5.33 The approval holder shall:

(a) keep a record of inspections conducted pursuant to 4.5.32;

(b) have the record of inspections available for review at the site upon request from a representative of the Director; and

(c) immediately report any deficiencies detected by the inspection in 4.5.32 to the Director in writing along with any corrective measures taken or proposed.

4.5.34 The approval holder shall monitor the landfill as required in TABLE 4.5-B.

WASTE AND LANDFILL REPORTING

4.5.35 The approval holder shall submit a Monthly Waste Management Report to the Director within 30 days following the month in which the information was collected.

4.5.36 The approval holder shall compile all of the information required by 4.5.37 in the Monthly Waste Management Report as indicated by TABLE 4.5-C.

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TABLE 4.5-B: LANDFILL MONITORING AND REPORTING REQUIREMENTS

MONITORING AND REPORTING					
Parameter, Test, Event, Study, Proposal or Reporting Requirement	**Frequency**	**Sample Type**	**Sampling Location**	**Reporting**	**Report to**
Volume and type of waste received	Continuously (when operating)	Measured or estimated	At entrance to landfill	Annually on or before March 31 of the year following the year in which the information was collected.	Director
Volume and type of material removed	Continuously (when operating)	Measured or estimated	At entrance to landfill		
General location of waste deposited	Continuously (when operating)	As per survey or using grid system	At the active landfill area of each cell or survey		
Leachate head	Effective May 1, 2008, at least once every three working days and immediately prior to leachate removal	Measured or calculated	At primary leachate collection system sumps of existing cells		
		Measured	At leachate collection system sump(s) of each new cell		
Leachate analysis, as per TABLE 4.3-F	At least once every quarter year	Grab sample	At each primary leachate collection system sump		
Volume of leachate removed from the leachate collection system	As removed	Measured or calculated	At leachate collection system sump(s)		
Leak detection liquid analysis, as per TABLE 4.3-F	At least once every quarter year	Grab sample	At each leak detection system sump		
Volume of leak detection liquid removed from the leak detection system	At least once every working day, as removed	Measured or calculated	At leak detection system sump(s)		
Final cover	When cover is applied, as per 6.3.6	Final cover by survey cores and/or test pits	On each completed cell		

TERMS AND CONDITIONS ATTACHED TO APPROVAL

TABLE 4.5-C MONTHLY WASTE INVENTORY REPORT (by waste class)

Fax to: (780) 422-3625

COMPANY NAME: _____ APPROVAL NO.: _____
REPORT PERIOD: MONTH _____ YEAR_____

CLASS	UNIT (Kg OR L)	OPENING BALANCE	+ RECEIVED IN PROVINCE	+ RECEIVED OUT OF PROVINCE	- SHIPPED*		- ON-SITE DISPOSAL	+ or - ADJUSTMENT **	CLOSING BALANCE	APPROVAL LIMIT
					RECYCLING/ PRODUCT	OFF-SITE DISPOSAL				
2										
3										
4										
5										
6.1										
8										
9.1										
9.2										
9.3										
PCB										
NR										
TOTAL										**XXXXX**
							No. of Containers On site			**XXXXX**
							Total Litres in Bulk Tanks			**XXXXX**

Name of Company Official:_____ Title:_____ Signature:_____
Report Date: _____

* Provide a list of the recycling and disposal locations

** Identity the amount and reason for each adjustment.
Adjustments include consolidation/reclassification, losses to processing, spills, volume miscalculations, or any other circumstances, which would affect the mass balance of the monthly inventory report.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.5.37 The Monthly Waste Management Report referred to in 4.5.35 by shall contain the following information:

(a) an opening waste and hazardous recyclables inventory balance in kilograms or litres by waste class or material type;

(b) the amount and type of waste and hazardous recyclables received within the province and from outside the province;

(c) the amount and type of waste and hazardous recyclables shipped for recycling/product, shipped off-site for disposal, and disposed on-site;

(d) any adjustments including consolidation and processing adjustments;

(e) closing balance in kilograms or litres;

(f) a summary of contraventions reported pursuant to 2.1.1 related to waste and hazardous recyclables; and

(g) any other information as required in writing by the Director.

4.5.38 The approval holder shall compile all the information required by 4.5.30 and 4.5.31 in an Annual Waste Management Summary Report:

(a) as specified in TABLE 4.5-D; and

(b) in accordance with *Industrial Waste Identification and Management Options*, Alberta Environment, May 1996 as amended, and the *Alberta User Guide for Waste Managers*, Alberta Environment, August 1996, as amended.

TABLE 4.5-D: ANNUAL WASTE MANAGEMENT SUMMARY

Hazardous Recyclable or Waste Name	Uniform Waste Code				Quantity (kg or L)		Stored	Recycled		Disposed	
	WC	PIN	Class	Mgmt	Hazardous	Non-hazardous	On-site	On-site	Off-site	On-site	Off-site
				TOTAL							

4.5.39 The Annual Waste Management Summary Report shall be submitted to the Director by March 31 of each year following the year in which the information was collected.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.5.40 The approval holder shall compile an Annual Landfill Operations Report which shall include, at a minimum, all of the following:

(a) a summary of all of the information collected as required in TABLE 4.5-B;

(b) the landfill inspection records as required in 4.5.33;

(c) any revisions to the Landfill Operations Plan from the previous year;

(d) a summary of the performance of the run-on and run-off control systems;

(e) any operational problems and emergencies and how they were handled;

(f) a summary of the performance of the leachate collection system, including a comparison to the maximum acceptable leachate head;

(g) a summary of the performance of the leak detection system, including a comparison to the action leakage rate limit;

(h) the name of the person responsible for the facility;

(i) an up-to-date financial security estimate in accordance with 5.1.2;

(j) the results of any audit conducted in accordance with 4.1.2 for a given year;

(k) a record of public complaints and the approval holder's responses;

(l) a summary of contraventions reported pursuant to 2.1.1 related to landfill operations; and

(m) any other information as required in writing by the Director.

4.5.41 The Annual Landfill Operations Report shall be submitted to the Director by March 31 of each year following the year in which the information was collected.

SECTION 4.6: DOMESTIC WASTEWATER

4.6.1 The approval holder shall release domestic wastewater only to the septic tank(s) with subsequent disposal to a wastewater treatment facility holding a current Approval or Registration under the Act.

4.6.2 Sludge produced by the domestic wastewater collection system shall be disposed of only at a facility holding a current Approval or Registration under the Act.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 4.7: WATERWORKS

Not used at this time.

SECTION 4.8: GROUNDWATER

MONITORING

4.8.1 The approval holder shall continue to implement the Groundwater Monitoring Program as authorized in writing by the Director.

4.8.2 The approval holder shall:

(a) collect a representative groundwater sample from each of the groundwater monitor wells, listed as the Monitoring Well Identification System in the Groundwater Monitoring Program, including the groundwater monitoring wells, designated as point of compliance; and

(b) analyze each sample for the parameters listed in TABLE 4.8-A.

TABLE 4.8-A: GROUNDWATER MONITORING PROGRAM

GROUNDWATER MONITORING WELLS AT POINTS OF COMPLIANCE PARAMETERS	
pH (field and laboratory)	Nutrients
Electrical Conductivity (field and laboratory)	Chemical Oxygen Demand
Major Ions	Dissolved Organic Carbon
Trace Metals (dissolved)	Petroleum Hydrocarbons Fractions F1, F2

4.8.3 The monitoring required in 4.8.2 shall be conducted at the following frequencies unless otherwise authorized in writing by the Director:

(a) a minimum of once per year during each of the active, closure and post-closure periods; and

(b) a minimum of four times per year following detection of leachate constituents at levels above those specified in 4.8.4, and until the levels specified in 4.8.4 have been met.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.8.4 The groundwater quality in the monitoring wells, designated as points of compliance in the Groundwater Monitoring Program, shall not exceed the higher of:

(a) the objectives established in the water quality objectives in the *Canadian Environmental Quality Guidelines (CEQG)* for drinking water published by the Canadian Council of Ministers of the Environment (CCME), as amended, or;

(b) background groundwater chemistry as determined through a statistical analysis, as a derived alternate groundwater performance standard.

4.8.5 The approval holder shall implement the Remediation Plan as specified in the Landfill Operations Plan, when groundwater quality exceeds the groundwater performance criteria in 4.8.4 (a) and (b).

4.8.6 The samples extracted from the groundwater monitor wells shall be collected using scientifically acceptable purging, sampling and preservation procedures so that a representative groundwater sample is obtained.

4.8.7 All groundwater monitor wells shall be:

(a) protected from damage; and

(b) locked except when being sampled; unless otherwise authorized in writing by the Director.

4.8.8 If a representative groundwater sample cannot be collected because the groundwater monitor well is damaged or is no longer capable of producing a representative groundwater sample:

(a) the groundwater monitor well shall be cleaned, repaired or replaced; and

(b) a representative groundwater sample shall be collected and analyzed prior to the next scheduled sampling event; unless otherwise authorized in writing by the Director.

4.8.9 In addition to the sampling information recorded in 4.8.2, the approval holder shall record the following sampling information for all groundwater samples collected:

(a) a description of purging and sampling procedures;

(b) the static elevations, above sea level, of fluid phases in the groundwater monitor well prior to purging;

(c) the temperature of each sample at the time of sampling;

(d) the pH of each sample at the time of sampling; and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(e) the specific conductance of each sample at the time of sampling.

4.8.10 The approval holder shall compile an Annual Groundwater Monitoring Program Report which shall include, at a minimum, all of the following information:

(a) a legal description of the facility and a map illustrating the facility boundaries;

(b) a topographic map of the facility;

(c) a description of the industrial activity and processes;

(d) a map showing the location of all surface and groundwater users, and, a listing describing surface water and water well use details, within at least a 1.6 kilometre radius of the facility;

(e) a general hydrogeological characterization of the region within a five kilometre radius of the facility;

(f) a detailed hydrogeological characterization of the facility;

(g) a geological cross-section(s) of the facility;

(h) a map of surface drainage patterns located within the facility;

(i) a map of groundwater monitor well locations and a description of the existing groundwater monitoring program for the facility;

(j) a summary of any changes to the groundwater monitoring program made since the last groundwater monitoring report;

(k) analytical data recorded as required in 4.8.2 and 4.8.9;

(l) a summary of fluid elevations recorded as required in 4.8.9 (b) and an interpretation of changes in fluid elevations;

(m) an interpretation of groundwater flow patterns;

(n) an interpretation of the analytical results including the following:

(i) diagrams indicating the location of any contamination identified,

(ii) probable sources of any contamination, and

(iii) the extent of any contamination identified;

(o) a summary and interpretation of the data collected since the groundwater monitoring program began including:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(i) control charts which indicate trends in contaminant concentrations, and

(ii) the migration of contaminants, if any;

(p) a description of the following:

(i) contaminated groundwater remediation techniques employed,

(ii) source elimination measures employed,

(iii) risk assessment studies undertaken, and

(iv) risk management studies undertaken;

(q) a sampling schedule for the following year;

(r) recommendations, as follows;

(i) for changes to the groundwater monitoring program to make it more effective, and

(ii) for remediation, risk assessment or risk management of contamination identified.

REPORTING

4.8.11 The approval holder shall submit two copies of the Annual Groundwater Monitoring Report to the Director on or before March 31 of the year following the year in which the information on which the report is based was collected, unless otherwise authorized in writing by the Director.

SECTION 4.9: SOIL

MONITORING

4.9.1 The approval holder shall develop and document proposals for the Soil Monitoring Program in accordance with the *Soil Monitoring Directive*, Alberta Environment, May 1996, as amended.

4.9.2 The approval holder shall submit the Soil Monitoring Program proposals to the Director according to the following schedule:

(a) for the first soil monitoring proposal, no later than, January 31, 2009; and

(b) for the second soil monitoring proposal no later than, January 31, 2014; or

unless otherwise authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.3 If the Soil Monitoring Program proposals are found deficient by the Director, the approval holder shall correct all the deficiencies as outlined by the Director within 120 days of the deficiency letter.

4.9.4 The approval holder shall implement the Soil Monitoring Program proposals as authorized in writing by the Director.

4.9.5 The approval holder shall implement QA/QC provisions in accordance with the *CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites, Volume I*, Report CCME EPC-NCS62E, Winnipeg, Manitoba, December 1993, as amended.

STANDARDS

4.9.6 For sampling locations which meet the conditions in C.1 of the *Soil Monitoring Directive*, May 1996, as amended, the concentration of substances in soil shall be compared to values in the following:

(a) for petroleum hydrocarbons, *Alberta Soil and Water Quality Guidelines for Hydrocarbons at Upstream Oil and Gas Facilities*, Alberta Environment, 2001, as amended;

(b) for salt, *Salt Contamination Assessment and Remediation Guidelines,* Alberta Environment, 2001, as amended;

(c) for substances not included in 4.9.6 (a) or (b), *Canadian Environmental Quality Guidelines,* Canadian Council of Ministers of the Environment, PN1299, 1999, as amended, excluding values determined before 1997;

(d) for substances not found in 4.9.6 (a) to (c), for soil which will be remediated to an agricultural, residential, or parkland land use, *Alberta Tier I Criteria for Contaminated Soil Assessment and Remediation*, Alberta Environmental Protection, March 1994, as amended; and

(e) for substances not found in 4.9.6 (a) to (c), for soil which will be remediated to a commercial or industrial land use, the *Interim Canadian Environmental Quality Criteria for Contaminated Sites*, Canadian Council of Ministers of the Environment, EPC-CS34, September 1991, as amended.

4.9.7 For sampling locations which do not meet the conditions in C.1 of the *Soil Monitoring Directive*, May 1996, as amended, or if substances are present that are not listed in the standards referred to in 4.9.6 (a) to 4.9.6 (e), the concentrations of substances in soil shall be compared to values derived using methods in C.2 of the *Soil Monitoring Directive*.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

REPORTING

4.9.8 The approval holder shall submit two copies of each Soil Monitoring Program Report to the Director summarizing the data obtained from the soil monitoring referred to in 4.9.4 according to the following schedule:

(a) for the first soil monitoring report, no later than January 31, 2010; and

(b) for the second soil monitoring report, no later than January 31, 2015; or

unless otherwise authorized in writing by the Director.

4.9.9 The Soil Monitoring Program reports shall be as prescribed in the reporting requirements of the *Soil Monitoring Directive*, May 1996, as amended.

SOIL MANAGEMENT PROGRAM

4.9.10 If the Soil Monitoring Program, or any other soil monitoring, reveals that there are substances present in the soil at concentrations greater than the applicable concentrations in 4.9.6 or 4.9.7, the approval holder shall develop and document a Soil Management Program Proposal in accordance with the *Guideline for Monitoring and Management of Soil Contamination Under EPEA Approvals*, Chemicals Assessment and Management Division, May 1996, as amended, or as otherwise authorized in writing by the Director.

4.9.11 If required pursuant to 4.9.10, the approval holder shall submit a Soil Management Program Proposal to the Director within six months after the date that the Soil Monitoring Report referred to in 4.9.8 is due.

4.9.12 The Soil Management Program Proposal shall include, at a minimum, all of the following:

(a) steps to be taken to control sources of contamination;

(b) remediation objectives for substances identified by soil monitoring as exceeding the applicable maximum standards in 4.9.6 or 4.9.7;

(c) proposed steps for management of soil contamination; and

(d) a schedule for implementing the Soil Management Program.

4.9.13 If the Soil Management Program Proposal is found deficient by the Director, the approval holder shall correct all the deficiencies as outlined by the Director by the date specified in the deficiency letter.

4.9.14 The approval holder shall implement the Soil Management Program as authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.15 If the approval holder must implement a Soil Management Program pursuant to 4.9.14, the approval holder shall submit a written Soil Management Program Report to the Director on or before March 31 of each year, unless otherwise authorized in writing by the Director.

4.9.16 The Soil Management Program Report shall include, at a minimum, all of the following information:

(a) a summary of actions taken under the Soil Management Program during the previous year;

(b) a description and interpretation of results obtained, including any soil testing, from the Soil Management Program; and

(c) events planned for the current year including any deviations from the program authorized in writing by the Director.

PART 5: FINANCIAL SECURITY REQUIREMENTS

5.1.1 The approval holder shall annually review and revise the cost estimate for reclamation of the facility including decommissioning, reclamation, closure and post-closure.

5.1.2 The approval holder shall:

(a) adjust the financial security of the facility based on the review in 5.1.1 or due to inflation; and

(b) submit to the Director for review the revised estimate of financial security as part of the Annual Landfill Operations Report in 4.5.40.

5.1.3 The approval holder shall provide additional financial security as required in writing by the Director.

5.1.4 The approval holder shall ensure the required financial security is maintained and renewed for the facility at least 30 days prior to the date it expires.

5.1.5 The approval holder shall renew the financial security for the facility 30 days prior to the date of expiry of the financial security.

PART 6: DECOMMISSIONING, RECLAMATION, CLOSURE AND POST-CLOSURE

SECTION 6.1: GENERAL

6.1.1 The approval holder shall reclaim the facility as authorized in writing by the Director.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

SECTION 6.2: HAZARDOUS WASTE/RECYCLABLE STORAGE AND PROCESSING FACILITY

6.2.1 The approval holder shall apply for an amendment to this approval to reclaim the Hazardous Waste/Recyclable Storage and Processing Facility by submitting a Decommissioning and Land Reclamation Plan to the Director.

6.2.2 The Decommissioning and Land Reclamation Plan referred to in 6.2.1 shall be submitted within six months of the Hazardous Waste/Recyclable Storage and Processing Facility ceasing operation, except for repairs and maintenance, unless otherwise authorized in writing by the Director.

6.2.3 The approval holder shall implement the Decommissioning and Land Reclamation Plan for the Hazardous Waste/Recyclable Storage and Processing Facility as authorized in writing by the Director.

SECTION 6.3: LANDFILL

GENERAL

6.3.1 The approval holder shall implement the Closure and Post-Closure Plan as described in the application, unless otherwise directed in this approval or as otherwise authorized in writing by the Director.

6.3.2 The approval holder shall correct any deficiencies in the Closure and Post-Closure Plan as directed in writing by the Director.

6.3.3 The approval holder shall submit any additions, deletions or changes to the Closure and Post-Closure Plan to the Director, and shall be in receipt of a letter of acknowledgement from the Director prior to the implementing of any addition, deletion or change to the plan.

CLOSURE AND RECLAMATION

6.3.4 The approval holder shall commence closure no later than 180 days of any cell reaching the maximum designated waste elevation, unless as otherwise authorized in writing by the Director.

6.3.5 The approval holder shall notify the Director in writing at least 14 days before commencing closure of any cell.

6.3.6 All cells shall be closed in accordance with the following requirements at a minimum, unless otherwise specified in writing by the Director:

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(a) covering the waste with a soil layer consisting of 600 mm of clay to provide a smooth surface on which to place the geomembrane;

(b) placing a final barrier layer consisting of an 80 mil HDPE geomembrane on top of the clay;

(c) the geomembrane shall be extrusion welded to the primary liner system providing an impermeable seal over the clay;

(d) placing a geotextile cover over the geomembrane;

(e) placing subsoil equal to the natural depths in the area on top of the geotextile;

(f) placing topsoil equal to the natural depths in the area on top of the subsoil;

(g) the final slope shall not exceed 30%;

(h) the area shall be vegetated and contoured such that no water pools over the cells; and

(i) the area shall be reclaimed to a state that returns the cell to the intended use, as described in the application.

6.3.7 By March 31 of the year following the year in which any cell is closed, the approval holder shall submit to the Director an Annual Closure and Reclamation Report.

6.3.8 The Annual Closure and Reclamation Report in 6.3.7 shall include, at a minimum, all of the following:

(a) certified as-built plans and details on the location of cells that have been closed;

(b) certified construction QA/QC procedures employed during cover construction and installation;

(c) survey reports showing the final cover depths; and

(d) details on progress made on meeting all other requirements of the Closure Plan.

6.3.9 The approval holder shall notify the Director of the date of commencement of final closure of the landfill no later than 30 days following commencement of final closure.

6.3.10 The approval holder shall submit a Final Closure Report prepared by a professional registered with APEGGA within 60 days of completion of the final closure of the landfill.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

6.3.11 The Final Closure Report shall include, at a minimum, all of the following:

(a) the date of completion of the final closure;

(b) a statement including supporting evidence that the final closure has been completed in accordance with the final closure plan;

(c) a description of any deviations to the final closure plan and the reasons for the deviations;

(d) a description of the final cover system and the installation methods and procedures used;

(e) an estimate of the maximum quantity of waste placed in the landfill for disposal over the life of the landfill;

(f) a description of how the following elements have been, or will be dealt with

(i) the final use of the closed areas,

(ii) drainage restorations,

(iii) soil replacement,

(iv) final cover slopes,

(v) erosion control,

(vi) re-vegetation and condition of the site, and

(vii) subsidence and differential settlement remediation; and

(g) as-built plans for the landfill showing the location of fill areas, final grades and structural components.

POST-CLOSURE

6.3.12 No later than 30 days following commencement of final closure, the approval holder shall submit an up-to-date Post-Closure Plan to the Director.

6.3.13 The approval holder shall include the following in the Post-Closure Plan at a minimum:

(a) a plan for maintaining the integrity of the final cover systems;

(b) a plan for maintaining the run-on and run-off control systems;

TERMS AND CONDITIONS ATTACHED TO APPROVAL

(c) a plan for maintaining the groundwater monitoring system;

(d) the groundwater monitoring program including performance standards and points of compliance;

(e) a plan for maintaining the leachate collection and leak detection systems;

(f) quantity and quality objectives of leachate and leak detection liquid that show the landfill has stabilized;

(g) a plan for remediating areas affected by subsidence and differential settlement;

(h) a plan for erosion control;

(i) a plan for maintaining vegetative cover; and

(j) any other information requested in writing by the Director.

6.3.14 The approval holder shall monitor in accordance with the Post-Closure Plan, as authorized in writing by the Director, for the duration of the post-closure period.

6.3.15 By March 31 of each year following final closure, the approval holder shall submit to the Director an Annual Post-Closure Report.

6.3.16 The Annual Post-Closure Report in 6.3.15 shall include, at a minimum, all of the following:

(a) details on any repairs and maintenance of the final cover system and vegetation;

(b) a report of any remedial or corrective actions taken;

(c) submission of Annual Groundwater Monitoring Reports as outlined in 4.8.11;

(d) details on progress made on meeting all other requirements of the Post-Closure Plan; and

(e) any other information requested in writing by the Director.

February 29, 2008
DATED

David Helmer
DESIGNATED DIRECTOR UNDER THE ACT

Government of Alberta ■
Environment

AMENDING APPROVAL

PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
R.S.A. 2000, c.E-12, as amended.

APPROVAL NO. 10348-02-01

APPLICATION NO. 008-10348

EFFECTIVE DATE: ..... April 20, 2010

EXPIRY DATE: ..... March 31, 2016

APPROVAL HOLDER ..... Clean Harbors Canada, Inc.

Pursuant to Division 2, of Part 2, of the *Environmental Protection and Enhancement Act*, R.S.A.2000, c.E-12, as amended, the approval for the following activity:

Ryley Industrial Waste Management Facility, consisting of a Class I and Class II Industrial Landfill and a Hazardous Waste/Recyclable Storage and Processing Facility,

is amended as per the attached terms and conditions.

Designated Director under the Act ..... Neil Hollands, P.Eng.

Date Signed ..... April 20, 2010

TERMS AND CONDITIONS ATTACHED TO APPROVAL

Environmental Protection and Enhancement Act Approval No. 10348-02-00 is hereby amended as follows:

1. 1.1.2(hh) is revised as follows:

   1.1.2(hh) "landfill" means the area at which waste is disposed of by placing it in a cell and includes all soil stock piles, trenches, berms, fences, run-on control systems, run-off control systems, leachate collection systems, leak detection systems, waste stabilization/solidification areas, and other installations, and includes the portion of land within the facility that is being or has been used or held for or in connection with the Class I and Class II Industrial Landfill;

2. The following is inserted between 1.1.2(ppp) and 1.1.2(qqq):

   1.1.2(ppp.1) "waste stabilization area" means the portion of the landfill that is used for waste stabilization/solidification, as described in application no. 008-10348;

3. The following is added after 3.2.10:

   SECTION 3.3: WASTE STABILIZATION

   3.3.1 The approval holder shall construct the waste stabilization area in accordance with the following, unless modifications are authorized in writing by the Director:

   (a) application no. 008-10348;

   (b) within a Class I cell; and

   3.3.2 In addition to 3.3.1, the approval holder shall conduct annual visual internal inspections for corrosion and ultrasonic testing to monitor the thickness of the steel plate within the Class I cell.

4. The following is inserted between 4.1.7(a) and 4.1.7(b):

   4.1.7(a.1) operational procedures for the waste stabilization area;

5. The following is added after 4.1.8:

   WASTE STABILIZATION AREA

   4.1.9 The approval holder shall prevent any waste from the waste stabilization area from contacting the wastes disposed of in the cell before the stabilization/solidification has occurred.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.1.10 The approval holder shall only dispose of any liquid collected within the waste stabilization area by one or more of the following methods:

(a) disposal to facilities holding a current Approval, Registration or as otherwise authorized under the Act to accept such waste;

(b) disposal to facilities approved by a local environmental authority outside of Alberta to accept such waste; or

(c) disposal to a deep well approved by the Energy Resources Conservation Board;

unless otherwise authorized in writing by the Director.

6. 4.5.2(e) is revised as follows:

4.5.2(e) waste containing free liquids (as determined by the US EPA Method 9095 Paint Filter Liquids Test, specified in Test Methods for Evaluating Solid Wastes Physical/Chemical Methods, US EPA Publication No. SW-846, as amended) at the landfill, excluding the waste stabilization area;

7. 4.5.12(g) is deleted and the following are substituted:

4.5.12(g) operation of the waste stabilization area; and

4.5.12(h) not withstanding 4.5.12(g), treatment of third-party hazardous waste only as authorized in writing by the Director.

8. The following is inserted between 4.5.40(d) and 4.5.40(e):

4.5.40(d.1) a summary and evaluation of the operations of the waste stabilization area;

April 20, 2010
Dated Signed

DESIGNATED DIRECTOR UNDER THE ACT
Neil Hollands, P.Eng.

Alberta Environment and Parks

MAR 3 0 2016

Operations
111 Twin Atria Building
4999 – 98 Avenue NW
Edmonton, Alberta T6B 2X3
Telephone 780-427-7617
Fax 780-427-7824
aep.alberta.ca

File No.: 10348-02-00

March 24, 2016

Mr. Stan Yuha
Facility Manager
Clean Harbors Canada, Inc.
P.O. Box 390
Ryley, AB T0B 4A0

Dear Mr. Yuha:

Re: *Environment Protection and Enhancement Act* (EPEA) Approval No. 10348-02-00
Extension of Approval Expiry Date

In accordance with Section 69 of the *Environmental Protection and Enhancement Act* (EPEA), the expiry date of the above noted approval is extended to March 31, 2017 from the present expiry date of March 31, 2016.

By way of this letter you are to follow the terms and conditions of the above noted approval until March 31, 2017, or until a new EPEA approval is issued, whichever occurs first.

If you have any questions regarding the extension or require information on application requirements, please contact Weiguo Wu at 780-427-0630.

Sincerely,

Mohammad Habib, P. Eng.
Approvals Manager
Red Deer/North Saskatchewan Region
(Designated Director under the Act)

cc: John Collins, Compliance, AEP
Valerie Collins, Regulatory Approvals Centre, AEP
Weiguo Wu, Industrial Approvals, AEP

APPENDIX B

WATER WELL AND SURFACE WATER SEARCH RESULTS

Government of Alberta

Reconnaissance Report

All values are metric

TETRA TECH

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94709	94709	0.27	SE	09	050	17	4	UNKNOWN DRILLER		7.3	Chemistry	Unknown				MAGNUSSEN, E.	3.05	
159228	159228	0.27	SE	9	50	17	4	LAKELAND DRILLING LTD.	9/7/1991	140.2	New Well	Domestic & Industrial		4		LAIDLAW ENVIRONMENTAL SVC LTD	18.59	0.63
94711	94711	0.54	NE	09	050	17	4	BIG QUILL DRILLING LTD.	1/31/1983	90.5	Test Hole-Abandoned	Unknown		6		C.E. MOELL CONSULTING LTD#1	0	0.19
94712	94712	0.54	NE	09	050	17	4	BIG QUILL DRILLING LTD.	2/1/1983	90.5	Test Hole-Abandoned	Unknown		6		C.E. MOELL CONSULTING LTD#2	0	0.25
286840	286840	0.73	04	10	050	17	4	LOSNESS DRILLING (1975) LTD.	5/14/1997	82.3	New Well	Domestic			25	PEPPES, RONALD	9.3	0.25
94714	94714	0.83	SW	10	050	17	4	UNKNOWN DRILLER		67.1	Chemistry	Domestic				GARSTAD, MARK	48.77	
94717	94717	0.95	NW	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	29.9	Piezometer	Observation				ALTA ENV #2143E		
94718	94718	0.95	NW	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	42.4	Piezometer	Observation				ALTA ENV #2144E		
232800	232800	0.95	NW	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	60.4	Test Hole	Investigation				ALTA ENV #2142		
94702	94702	1.07	NE	4	50	17	4	UNKNOWN DRILLER		15.2	Chemistry	Municipal	2			RYLEY, VILL OF		
94703	94703	1.07	NE	4	50	17	4	UNKNOWN DRILLER		61	Chemistry	Municipal	1			RYLEY, VILL OF		

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94710	94710	1.14	04	09	050	17	4	UNKNOWN DRILLER		4.3	Federal Well Survey	Domestic & Stock				HOSTLUND		
94715	94715	1.24	14	10	050	17	4	UNKNOWN DRILLER	1/1/1919	91.4	Federal Well Survey	Stock				MCDONAGH, W.N.		
94716	94716	1.24	14	10	050	17	4	UNKNOWN DRILLER	1/1/1912	6.1	Federal Well Survey	Domestic				MCDONAGH, W.N.		
94700	94700	1.33	NW	3	50	17	4	HOLLAND WATER WELLS		106.7	Chemistry	Domestic		2		MIZERA, RUDY	45.72	
94700	94700	1.33	NW	3	50	17	4	HOLLAND WATER WELLS		106.7	Chemistry	Unknown		2		MIZERA, RUDY	45.72	
94700	94700	1.33	NW	3	50	17	4	HOLLAND WATER WELLS		106.7	Old Well - Abandoned	Domestic		2		BEAVER COUNTY	45.72	
94700	94700	1.33	NW	3	50	17	4	HOLLAND WATER WELLS		106.7	Old Well - Abandoned	Unknown		2		BEAVER COUNTY	45.72	
94745	94745	1.36	SE	16	050	17	4	UNKNOWN DRILLER	1/1/1920	7.6	Federal Well Survey	Unknown				NICHOLS		
94707	94707	1.49	09	08	050	17	4	UNKNOWN DRILLER	1/1/1930	4.3	Federal Well Survey	Domestic & Stock				MAGNUSSEN		
94704	94704	1.54	00	04	050	17	4	ALF'S DRILLING & SUPPLIES LTD.	10/2/1986	132.6	New Well	Industrial		5		ANDRUKOW FARM SALES LTD	21.95	3.79
12015304	1889173	1.54	10	10	50	17	4	HILL DRILLING LTD.	5/21/2013	5.5	Piezometer	Monitoring		1		BEAVER MUNICIPAL SOLUTIONS		
12015306	1889174	1.54	10	10	50	17	4	HILL DRILLING LTD.	5/22/2013	10.1	Piezometer	Monitoring		1		BEAVER MUNICIPAL SOLUTIONS		
12015307	1889175	1.54	10	10	50	17	4	HILL DRILLING LTD.	5/22/2013	21.3	Piezometer	Monitoring		1		BEAVER MUNICIPAL SOLUTIONS		

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94744	94744	1.57	08	16	050	17	4	UNKNOWN DRILLER	1/1/1929	123.4	Federal Well Survey	Stock				NICHOLS	21.34	
94713	94713	1.62	SE	10	050	17	4	UNKNOWN DRILLER	1/1/1915	7	Federal Well Survey	Domestic				MASTERS, J.E.	3.96	
10908421	1888429	1.64	SE	10	50	17	4	HILL DRILLING LTD.	4/16/2004	48.8	Test Hole	Other		2		C. E. MODELL & ASSOC. LTD		
10908529	1888430	1.64	SE	10	050	17	4	HILL DRILLING LTD.	4/15/2004	48.8	Test Hole	Other		3		C. E. MOELLL & ASSOC. LLTD		
10988800	1888439	1.64	SE	10	050	17	4	HILL DRILLING LTD.	4/13/2004	46.3	New Well	Domestic		2	19	C.E. MOELL & ASSOCIATES LTD.		0
94708	94708	1.67	SE	08	050	17	4	UNKNOWN DRILLER		121.9	Federal Well Survey	Domestic & Stock						
94719	94719	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	4.6	Test Hole	Other				ALTA ENV #2133E		
94720	94720	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/26/1983	14.9	Piezometer	Observation				ALTA ENV #2140E		
94721	94721	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/26/1983	15.2	Test Hole	Unknown				ALTA ENV #2137E		
94722	94722	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/26/1983	26.2	Piezometer	Observation				ALTA ENV #2141E		
94723	94723	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/31/1983	14.6	Test Hole	Unknown				ALTA ENV #2139E		

WELL ID	GIC ID	KM	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL	TEST RATE (L/s)
94724	94724	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/31/1983	25.3	Piezometer	Observation				ALTA ENV #2138E		
94725	94725	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/28/1983	29.9	Test Hole	Unknown				ALTA ENV #2136E		
232795	232795	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	91.4	Test Hole	Investigation				ALTA ENV #2132E		
232797	232797	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/27/1983	61	Test Hole	Investigation				ALTA ENV #2134E		
232798	232798	1.68	NE	10	050	17	4	ALBERTA ENVIRONMENT/EARTH SCIENCES DIVISION	1/28/1983	61	Test Hole	Investigation				ALTA ENV #2135E		
12015303	1889172	1.68	9	10	50	17	4	HILL DRILLING LTD.	5/21/2013	36.9	Piezometer	Monitoring		1		BEAVER MUNICIPAL SOLUTIONS		
94701	94701	1.69	WH	04	050	17	4	MERV'S WATER WELL DRILLING	5/1/1986	120.4	New Well	Domestic & Industrial		5		ABRAHAM, JOE	24.38	0.16
94748	94748	1.82	00	16	050	17	4	UNKNOWN DRILLER		45.7	Chemistry	Domestic				BROOKS, ROBERT	3.05	

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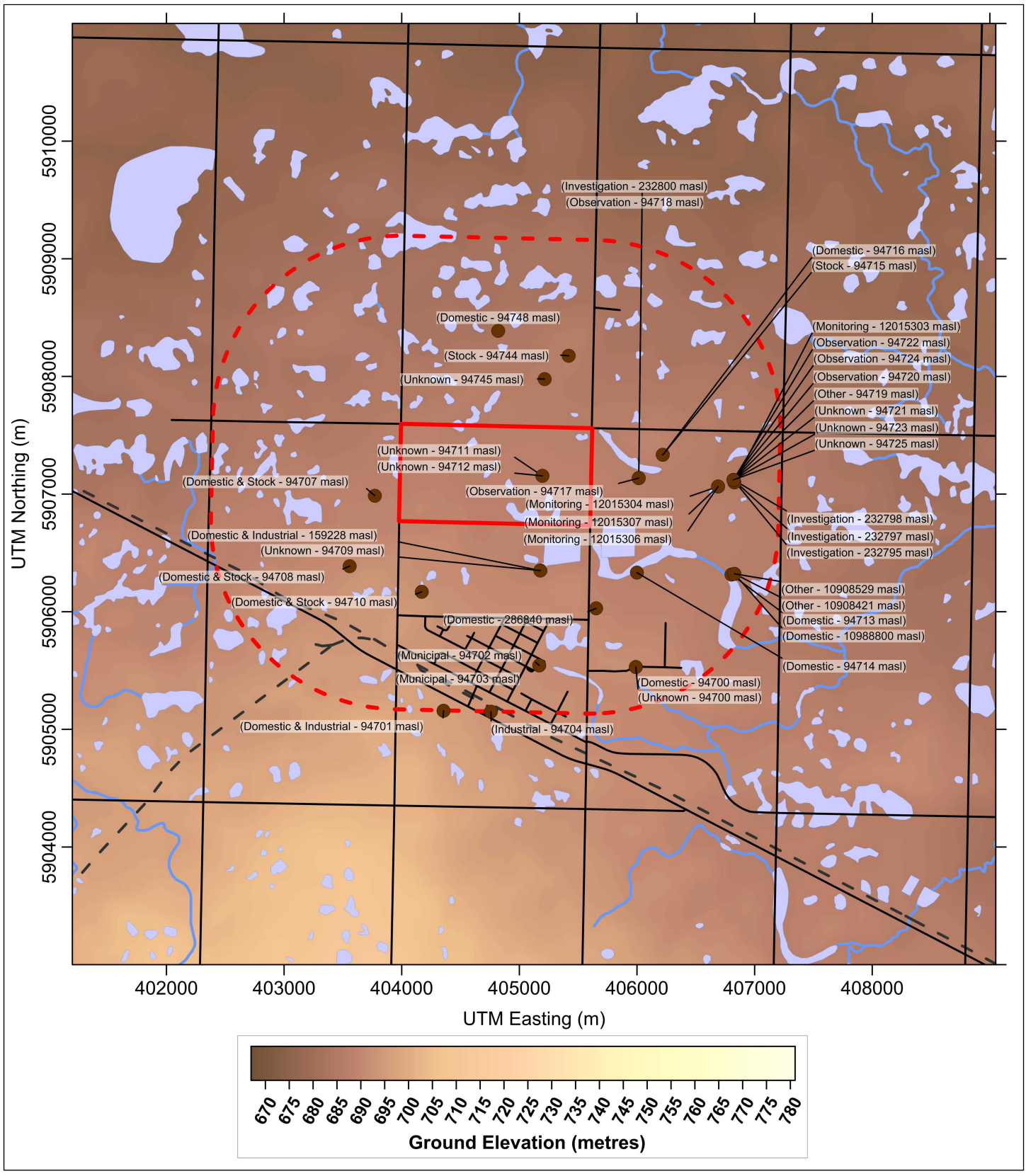
KM: distance of each well from centre point of search.
Alberta ESRD abbreviations: CHM = chemistry data sets; LT = number of entries in borehole log; PT = number of recorded water levels in pump test data for this well.

List of Active Surface Water Licences within a 5 km at SE 9-50-17-4
Data Extracted on November 29, 2016

APPROVAL ID	INTERIM LICENCE #	APPROVAL NAME	STATUS	DOC TYPE	INDUSTRY ACTIVITY	SPECIFIC ACTIVITY CODE	EFFECTIVE DATE	EXPIRY DATE	WA ID	WATER ALLOCATION TYPE	PRIORITY	SOURCE	PUMP RATE (sw=m3/sec, gw=m3/day)	QUANTITY (m3)	CONSUMPTIVE (m3)	LOSSES (m3)	RETURN FLOW (m3)	LSD	QUA	SEC	TWP	RNG	MER	WSC	RIVER SUB BASIN NAME	LATITUDE	LONGITUDE	APPROVAL HOLDER
00176664-00-00	00176664 00 00	RYLEY/REGISTRATION/POPE DELBERT - F00176664	IS	WAREG	WDREG	REGISTRY	13-Mar-2002		68376	SW	19571231090	Unnamed Stream - Unclassified	0.000	101	101	0	0		SE	28	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34204	-112.422665	POPE, DELBERT
00176747-00-00	00176747 00 00	TOFIELD/REGISTRATION/BOETTGER KEN W - F00176747	IS	WAREG	WDREG	REGISTRY	06-Mar-2006		173330	SW	19891231921	Surface Runoff	0.000	177	177	0	0		SE	35	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.26917	-112.519966	BOETTGER, KENNETH
00176747-00-00	00176747 00 00	TOFIELD/REGISTRATION/BOETTGER KEN W - F00176747	IS	WAREG	WDREG	REGISTRY	06-Mar-2006		173335	SW	19831231485	Surface Runoff	0.000	133	133	0	0		SW	2	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.28382	-112.532068	BOETTGER, KENNETH
00176747-00-00	00176747 00 00	TOFIELD/REGISTRATION/BOETTGER KEN W - F00176747	IS	WAREG	WDREG	REGISTRY	06-Mar-2006		173337	SW	19831231486	Surface Runoff	0.000	333	333	0	0		SE	2	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.28381	-112.520032	BOETTGER, KENNETH
00176752-00-00	00176752 00 00	TOFIELD/REGISTRATION/BOETTGER KEVIN - F00176752	IS	WAREG	WDREG	REGISTRY	03-Apr-2003		114244	SW	19961231554	Unnamed Stream - Unclassified	0.000	205	205	0	0		NW	30	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.26196	-112.483314	BOETTGER, KEVIN
00176752-00-00	00176752 00 00	TOFIELD/REGISTRATION/BOETTGER KEVIN - F00176752	IS	WAREG	WDREG	REGISTRY	03-Apr-2003		114245	SW	19961231555	Unnamed Stream - Unclassified	0.000	205	205	0	0		SW	31	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.26919	-112.483315	BOETTGER, KEVIN
00177122-00-00	00177122 00 00	RYLEY/REGISTRATION/SCHAFFER MOLLY & FENSKE MARILYNN - F00177122	IS	WAREG	WDREG	REGISTRY	07-Jun-2002		100638	SW	19861231553	Unnamed Stream - Unclassified	0.000	213	213	0	0		SW	14	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31295	-112.385996	MOLLY SCHAFFER & MARILYNN FENSKE
00177122-00-00	00177122 00 00	RYLEY/REGISTRATION/SCHAFFER MOLLY & FENSKE MARILYNN - F00177122	IS	WAREG	WDREG	REGISTRY	07-Jun-2002		100639	SW	19821231453	Surface Runoff	0.000	213	213	0	0		SW	14	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31295	-112.385996	MOLLY SCHAFFER & MARILYNN FENSKE
00177122-00-00	00177122 00 00	RYLEY/REGISTRATION/SCHAFFER MOLLY & FENSKE MARILYNN - F00177122	IS	WAREG	WDREG	REGISTRY	07-Jun-2002		100640	SW	19821231454	Surface Runoff	0.000	214	214	0	0		SE	14	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31295	-112.373974	MOLLY SCHAFFER & MARILYNN FENSKE
00177122-00-00	00177122 00 00	RYLEY/REGISTRATION/SCHAFFER MOLLY & FENSKE MARILYNN - F00177122	IS	WAREG	WDREG	REGISTRY	07-Jun-2002		100641	SW	19821231455	Surface Runoff	0.000	214	214	0	0		NW	14	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32018	-112.385985	MOLLY SCHAFFER & MARILYNN FENSKE
00177122-00-00	00177122 00 00	RYLEY/REGISTRATION/SCHAFFER MOLLY & FENSKE MARILYNN - F00177122	IS	WAREG	WDREG	REGISTRY	07-Jun-2002		100642	SW	19791231399	Surface Runoff	0.000	214	214	0	0		NE	14	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32018	-112.373976	MOLLY SCHAFFER & MARILYNN FENSKE
00177122-00-00	00177122 00 00	RYLEY/REGISTRATION/SCHAFFER MOLLY & FENSKE MARILYNN - F00177122	IS	WAREG	WDREG	REGISTRY	07-Jun-2002		100643	SW	19821231456	Surface Runoff	0.000	214	214	0	0		NW	18	50	16	4	05EB	COOKING/BEAVERHILL LAKE	53.32017	-112.337138	MOLLY SCHAFFER & MARILYNN FENSKE
00177137-00-00	00177137 00 00	RYLEY/REGISTRATION/LYLE OSLUND - F00177137	IS	WAREG	WDREG	REGISTRY	21-Mar-2002		77285	SW	19711231201	Surface Runoff	0.000	233	233	0	0		NE	12	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.30552	-112.349488	OSLUND, LYLE
00177137-00-00	00177137 00 00	RYLEY/REGISTRATION/LYLE OSLUND - F00177137	IS	WAREG	WDREG	REGISTRY	21-Mar-2002		77287	SW	19801231847	Unnamed Stream - Unclassified	0.000	233	233	0	0		SE	12	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29829	-112.349462	OSLUND, LYLE
00177137-00-00	00177137 00 00	RYLEY/REGISTRATION/LYLE OSLUND - F00177137	IS	WAREG	WDREG	REGISTRY	21-Mar-2002		77289	SW	19950430013	Surface Runoff	0.000	228	228	0	0		NW	12	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.30551	-112.361582	OSLUND, LYLE
00177216-00-00	00177216 00 00	TOFIELD/REGISTRATION/MICHAEL & TRACY HERKLOTZ - F00177216	IS	WAREG	WDREG	REGISTRY	03-Apr-2003		114341	SW	19671231287	Surface Runoff	0.000	244	244	0	0		NW	26	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.34928	-112.53208	MICHAEL & TRACY HERKLOTZ
00177216-00-00	00177216 00 00	TOFIELD/REGISTRATION/MICHAEL & TRACY HERKLOTZ - F00177216	IS	WAREG	WDREG	REGISTRY	03-Apr-2003		114342	SW	19671231288	Unnamed Stream - Unclassified	0.000	244	244	0	0		NE	26	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.34928	-112.520052	MICHAEL & TRACY HERKLOTZ
00177299-00-00	00177299 00 00	TOFIELD/REGISTRATION/DALE & SANDY LUSK - F00177299	IS	WAREG	WDREG	REGISTRY	03-May-2002		91755	SW	19901231895	Unnamed Stream - Unclassified	0.000	135	135	0	0		NE	26	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.34928	-112.520052	DALE & SANDY LUSK
00178002-00-00	00178002 00 00	HOLDEN/REGISTRATION/HELLEKSON, ALLAN & HELEN - F00178002	IS	WAREG	WDREG	REGISTRY	18-Mar-2002		72616	SW	19701231605	Unnamed Stream - Unclassified	0.000	228	228	0	0		SE	25	49	17	4	05EE	VERMILION RIVER	53.25478	-112.349393	ALLAN & HELEN HELLEKSON
00179373-00-00	00179373 00 00	HOLDEN/REGISTRATION/HELLEKSON DON - F00179373	IS	WAREG	WDREG	REGISTRY	29-May-2002		97909	SW	19951231509	Surface Runoff	0.000	246	246	0	0		NW	25	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.26206	-112.36145	HELLEKSON, DONALD
00180090-00-00	00180090 00 00	RYLEY/REGISTRATION/POPE GORDON - F00180090	IS	WAREG	WDREG	REGISTRY	29-Apr-2002		88057	SW	19581231193	Unnamed Stream - Unclassified	0.000	1,315	1,315	0	0		SE	27	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34204	-112.398291	POPE, GORDON
00180113-00-00	00180113 00 00	RYLEY/REGISTRATION/MAHLUM CLARENCE - F00180113	IS	WAREG	WDREG	REGISTRY	22-Jan-2003		106525	SW	19751231936	Unnamed Stream - Unclassified	0.000	7	7	0	0		NE	26	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34927	-112.373945	MAHLUM, CLARENCE
00180113-00-00	00180113 00 00	RYLEY/REGISTRATION/MAHLUM CLARENCE - F00180113	IS	WAREG	WDREG	REGISTRY	22-Jan-2003		106526	SW	19751231937	Unnamed Stream - Unclassified	0.000	7	7	0	0		SW	36	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.35649	-112.361577	MAHLUM, CLARENCE
00180113-00-00	00180113 00 00	RYLEY/REGISTRATION/MAHLUM CLARENCE - F00180113	IS	WAREG	WDREG	REGISTRY	22-Jan-2003		106527	SW	19821231475	Unnamed Stream - Unclassified	0.000	7	7	0	0		NE	26	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34927	-112.373945	MAHLUM, CLARENCE
00180232-00-00	00180232 00 00	RYLEY/REGISTRATION/ROTH VIRGIL - F00180232	IS	WAREG	WDREG	REGISTRY	27-Mar-2002		84547	SW	19960209003	Surface Runoff	0.000	3,735	3,735	0	0		NE	11	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.30548	-112.520067	ROTH, VIRGIL
00180277-00-00	00180277 00 00	TOFIELD/REGISTRATION/REGEHR, RONALD & GERALD - F00180277	IS	WAREG	WDREG	REGISTRY	16-Mar-2002		71977	SW	19691231200	Surface Runoff	0.000	1,214	1,214	0	0		SW	24	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.32737	-112.507735	RONALD & GERALD REGEHR
00180277-00-00	00180277 00 00	TOFIELD/REGISTRATION/REGEHR, RONALD & GERALD - F00180277	IS	WAREG	WDREG	REGISTRY	16-Mar-2002		71978	SW	19681231228	Surface Runoff	0.000	1,214	1,214	0	0		SW	24	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.32737	-112.507735	RONALD & GERALD REGEHR
00180277-00-00	00180277 00 00	TOFIELD/REGISTRATION/REGEHR, RONALD & GERALD - F00180277	IS	WAREG	WDREG	REGISTRY	16-Mar-2002		71981	SW	19901231526	Surface Runoff	0.000	1,214	1,214	0	0		SW	24	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.32737	-112.507735	RONALD & GERALD REGEHR
00180574-00-00	00180574 00 00	RYLEY/REGISTRATION/STEINWAND NORBERT - F00180574	IS	WAREG	WDREG	REGISTRY	28-May-2002		97672	SW	19590401004	Unnamed Stream - Unclassified	0.000	126	126	0	0		SE	27	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.25483	-112.398176	STEINWAND, NORBERT
00180574-00-00	00180574 00 00	RYLEY/REGISTRATION/STEINWAND NORBERT - F00180574	IS	WAREG	WDREG	REGISTRY	28-May-2002		97673	SW	19800715020	Unnamed Stream - Unclassified	0.000	126	126	0	0		SE	27	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.25483	-112.398176	STEINWAND, NORBERT
00180574-00-00	00180574 00 00	RYLEY/REGISTRATION/STEINWAND NORBERT - F00180574	IS	WAREG	WDREG	REGISTRY	28-May-2002		97674	SW	19750910004	Surface Runoff	0.000	126	126	0	0		NW	22	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.24742	-112.410216	STEINWAND, NORBERT
00180574-00-00	00180574 00 00	RYLEY/REGISTRATION/STEINWAND NORBERT - F00180574	IS	WAREG	WDREG	REGISTRY	28-May-2002		97677	SW	19600910001	Surface Runoff	0.000	126	126	0	0		NW	22	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.24742	-112.410216	STEINWAND, NORBERT
00180574-00-00	00180574 00 00	RYLEY/REGISTRATION/STEINWAND NORBERT - F00180574	IS	WAREG	WDREG	REGISTRY	28-May-2002		97678	SW	19590401005	Surface Runoff	0.000	126	126	0	0		NW	22	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.24742	-112.410216	STEINWAND, NORBERT
00180881-00-00	00180881 00 00	RYLEY/REGISTRATION/SHARLYN & RUSSELL TOLLEFSON - F00180881	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70707	SW	19661231127	Surface Runoff	0.000	1,040	1,040	0	0		NE	36	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.2764	-112.495646	SHARLYN & RUSSELL TOLLEFSON
00183364-00-00	00183364 00 00	RYLEY/REGISTRATION/PEPPER ALLAN - F00174272	IS	WAREG	WDREG	REGISTRY	21-Mar-2002		77743	SW	19501231694	Surface Runoff	0.000	105	105	0	0		NW	28	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34928	-112.434716	PEPPER, ALLAN
00260074-00-00	00260074 00 00	CROWN LAND/REGISTRATION/ASRD/GRP 788161	IS	WAREG	WDREG	REGISTRY	29-May-2009		159633	SW	19791105012	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	261	261	0	0		NE	35	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.3629	-112.5211	PUBLIC LAND MANAGEMENT
00022220-00-00	19128	COUNTY OF BEAVER, WR, 51502	IS	WRINL	WDDEWAT	FLOODCNT	06-Oct-1993		220	SW	19930329005	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	0	0	0	0		SW	25	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.34203	-112.507734	BEAVER COUNTY
00023332-00-00	10677	KNUDSLIEN, WR, 43309	IS	WRLIC	WDDEWAT	FLOODCNT	08-Apr-1981		1331	SW	19810218001	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	0	0	0	0		SE	32	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3542	-112.4486	KNUDSLIEN, GLEN
00023858-00-00	L21183	REIL, WR, 27497-5	IS	WRINL	WDIRR	CROP	27-Sep-1996		1893	SW	19960220008	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	14,800	14,800	0	0		SW	36	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.3565	-112.507706	DUCKS UNLIMITED CANADA, EDMONTON
00023859-00-00	L21182	REIL, WR, 27497-4	IS	WRINL	WDHBTENH	WTLNDS	27-Sep-1996		1894	SW	19960220005	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	34,530	0	34,530	0		SE	35	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.3542	-112.5217	DUCKS UNLIMITED CANADA, EDMONTON
00023860-00-00	L21181	REIL, WR, 27497-3	IS	WRINL	WDHBTENH	WTLNDS	27-Sep-1996		1895	SW	19960220004	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	28,370	0	28,370	0		NW	25	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.34926	-112.507712	DUCKS UNLIMITED CANADA, EDMONTON
00023861-00-00	L21180	REIL, WR, 27497-2	IS	WRINL	WDIRR	CROP	27-Sep-1996		1896	SW	19960220003	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	62,908	62,908	0	0		NE	26	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.34928	-112.520052	DUCKS UNLIMITED CANADA, EDMONTON
00023862-00-00	L21179	REIL, WR, 27497-1	IS	WRINL	WDHBTENH	WTLNDS	27-Sep-1996		1897	SW	19960220002	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	97,440	0	97,440	0		NW	25	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.34926	-112.507712	DUCKS UNLIMITED CANADA, EDMONTON
00024404-00-00	21976	BEAVER REG WASTE MGT SVCS, WR, 26835	IS	WRLIC	WDCOM	OTHR	30-Aug-1996		2784	SW	19950303013	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	9,860	1,230	8,630	0		NE	10	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.30554	-112.398341	BEAVER COUNTY
00024893-00-00	19708	PATTERSON BOOTH, WR, 26358	IS	WRINL	WDHBTENH	WTLNDS	04-Oct-1993		3429	SW	19930428002	Beaverhill Creek (057-20-W4)	0.000	53,040	0	53,040	0		SE	30	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3397	-112.4728	DUCKS UNLIMITED CANADA, EDMONTON
00026794-00-00	17918	LAIDLAW ENVIRONMENTAL SERVICE, WR, 24753	IS	WRINL	WDDEWAT	FLOODCNT	09-Mar-1992		5908	SW	19910826001	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	0	0	0	0		SE	9	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.2958	-112.4242	LAIDLAW ENVIRONMENTAL SERVICES LTD.
00028088-00-00	16095	MAGNESON, WR, 23378	IS	WRLIC	WDAGR	STCKWT	30-Sep-1991		7606	SW	19881223001	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	6,160	4,930	1,230	0		SW	9	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.2958	-112.4361	STIER, PAT
00035644-00-00	11274	COUNTY OF BEAVER, WR, 14772	IS	WRLIC	WDDEWAT	FLOODCNT	04-Feb-1982		16328	SW	19720726001	North Saskatchewan River	0.000	0	0	0	0		NW	16	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3193	-112.4356	BEAVER COUNTY
00036156-00-00	17926	SALAMANDER, WR, 14246	IS	WRLIC	WDHBTENH	WTLNDS	09-Apr-1991		16907	SW	19680321001	Beaverhill Creek (057-20-W4)	0.000	43,170	0	43,170	0		SW	34	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3542	-112.4117	DUCKS UNLIMITED CANADA, EDMONTON
00045489-00-00	09001	YODER, WR, 00711	IS	WRLIC	WDDEWAT	FLOODCNT	17-Mar-1983		26304	SW	19770822004	Beaverhill Creek (057-20-W4)	0.000	0	0	0	0		SE	35	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.3521	-112.5151	YODER, K. D. ET AL
00045490-00-00	Null-3209	YODER, WR, 00711	IS	WRLIC	WDDEWAT	FLOODCNT	29-Aug-1985		26305	SW	19650917001	Katchemut Creek	0.000	0	0	0	0		NE	23	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.3322	-112.5217	BEAVER COUNTY
00067670-00-00	00067670 00 00	RYLEY/DIVERSION/BRWMSC	IS	WRINL	WDOTHER	SOTHER	28-Jul-1998		107560	SW	19980417001	Unnamed Lake - Noncontributing	0.000	57,000	57,000	0	0		NW	10	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.30554	-112.410384	BEAVER REGIONAL WASTE MANAGEMENT SERVICES COMMISSION
00072398-00-00	00072398 00 00	RYLEY/PARK/BRWMSC - F85381	IS	WALIC	WDREC	RCRTN	21-Oct-1998		30719	SW	19981021002	Beaverhill Lake (051 & 052-17 & 18-W4)	0.000	18,000	15,000	3,000	0		NW	10	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.30554	-112.410384	BEAVER REGIONAL WASTE MANAGEMENT SERVICES COMMISSION
00074935-00-00	00074935 00 00	RYLEY/DRAINAGE/COUNTY OF BEAVER - F 85416	IS	WRINL	WDWMNGT	STBLZTN	16-Jul-1999		31365	SW	19981202002	Unnamed Lake - Unclassified	0.000	0	0	0	0		NW	26	50	17	4	EDMN	EDMONTON COMPOSITE (SDF, SEB)	53.352	-112.3929	BEAVER COUNTY
00142708-00-00	00142708 00 00	TOFIELD/REGISTRATION/YODER RUTH	IS	WAREG	WDREG	REGISTRY	31-Jan-2002		43600	SW	19940615001	Surface Runoff	0.000	53	53	0	0		SE	23	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.32738	-112.520077	YODER, RUTH
00142708-00-00	00142708 00 00	TOFIELD/REGISTRATION/YODER RUTH	IS	WAREG	WDREG	REGISTRY	31-Jan-2002		43601	SW	19660131001	Surface Runoff	0.000	54	54	0	0		NE	23	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.33463	-112.520084	YODER, RUTH
00142708-00-00	00142708 00 00	TOFIELD/REGISTRATION/YODER RUTH	IS	WAREG	WDREG	REGISTRY	31-Jan-2002		43602	SW	19750131001	Surface Runoff	0.000	53	53	0	0		SE	26	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.34204	-112.520074	YODER, RUTH
00143517-00-00	00143517 00 00	RYLEY/REGISTRATION/RUDY & GERTIE MIZERA	IS	WAREG	WDREG	REGISTRY	28-Jan-2002		42947	SW	19801231084	Surface Runoff	0.000	285	285	0	0		NW	3	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29107	-112.410307	RUDY & GERTIE MIZERA
00143517-00-00	00143517 00 00	RYLEY/REGISTRATION/RUDY & GERTIE MIZERA	IS	WAREG	WDREG	REGISTRY	28-Jan-2002		42948	SW	19801231085	Surface Runoff	0.000	285	285	0	0		NW	3	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29107	-112.410307	RUDY & GERTIE MIZERA
00147397-00-00	00147397 00 00	RYLEY/REGISTRATION/GLEN & BEVERLY KNUDSLIEN	IS	WAREG	WDREG	REGISTRY	04-Mar-2004		130141	SW	19621231408	Surface Runoff	0.000	510	510	0	0		SE	34	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3565	-112.398253	GLEN & BEVERLY KNUDSLIEN
00147397-00-00	00147397 00 00	RYLEY/REGISTRATION/GLEN & BEVERLY KNUDSLIEN	IS	WAREG	WDREG	REGISTRY	04-Mar-2004		130142	SW	19651231938	Surface Runoff	0.000	260	260	0	0		NW	26	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34927	-112.385964	GLEN & BEVERLY KNUDSLIEN
00147397-00-00	00147397 00 00	RYLEY/REGISTRATION/GLEN & BEVERLY KNUDSLIEN	IS	WAREG	WDREG	REGISTRY	04-Mar-2004		130143	SW	19601230559	Surface Runoff	0.000	140	140	0	0		SE	32	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3565	-112.447096	GLEN & BEVERLY KNUDSLIEN
00147397-00-00	00147397 00 00	RYLEY/REGISTRATION/GLEN & BEVERLY KNUDSLIEN	IS	WAREG	WDREG	REGISTRY	04-Mar-2004		130144	SW	19770901010	Surface Runoff	0.000	510	510	0	0		NE	34	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.36368	-112.398209	GLEN & BEVERLY KNUDSLIEN
00149332-00-00	00149332 00 00	EDMONTON/REGISTRATION/BUDINSKI MADELENE - F00149332	IS	WAREG	WDREG	REGISTRY	27-Mar-2002		84353	SW	19891231445	Unnamed Stream - Unclassified	0.000	142	142	0	0		NE	33	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3637	-112.422594	BUDINSKI, MADELENE
00149332-00-00	00149332 00 00	EDMONTON/REGISTRATION/BUDINSKI MADELENE - F00149332	IS	WAREG	WDREG	REGISTRY	27-Mar-2002		84356	SW	19781231343	Unnamed Stream - Unclassified	0.000	79	79	0	0		SE	33	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3565	-112.422616	BUDINSKI, MADELENE
00150710-00-00	00150710 00 00	RYLEY/REGISTRATION/HELGELAND SIGNAR - F00150710	IS	WAREG	WDREG	REGISTRY	13-Jun-2002		102264	SW	19660930007	Unnamed Stream - Unclassified	0.000	242	242	0	0		NE	6	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29103	-112.471336	HELGELAND, SIGNAR
00150710-00-00	00150710 00 00	RYLEY/REGISTRATION/HELGELAND SIGNAR - F00150710	IS	WAREG	WDREG	REGISTRY	13-Jun-2002		102266	SW	19660930008	Surface Runoff	0.000	241	241	0	0		NE	6	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29103	-112.471336	HELGELAND, SIGNAR
00150710-00-00	00150710 00 00	RYLEY/REGISTRATION/HELGELAND SIGNAR - F00150710	IS	WAREG	WDREG	REGISTRY	13-Jun-2002		102269	SW	19420630005	Surface Runoff	0.000	10	10	0	0		NW	6	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29103	-112.483344	HELGELAND, SIGNAR
00150710-00-00	00150710 00 00	RYLEY/REGISTRATION/HELGELAND SIGNAR - F00150710	IS	WAREG	WDREG	REGISTRY	13-Jun-2002		102271	SW	19420630006	Surface Runoff	0.000	11	11	0	0		NW	5	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29105	-112.459024	HELGELAND, SIGNAR

APPROVAL ID	INTERIM LICENCE #	APPROVAL NAME	STATUS	DOC TYPE	INDUSTRY ACTIVITY	SPECIFIC ACTIVITY CODE	EFFECTIVE DATE	EXPIRY DATE	WA ID	WATER ALLOCATION TYPE	PRIORITY	SOURCE	PUMP RATE (sw=m3/sec, gw=m3/day)	QUANTITY (m3)	CONSUMPTIVE (m3)	LOSSES (m3)	RETURN FLOW (m3)	LSD	QUA	SEC	TWP	RNG	MER	WSC	RIVER SUB BASIN NAME	LATITUDE	LONGITUDE	APPROVAL HOLDER
00150995-00-00	00150995 00 00	HOLDEN/REGISTRATION/HRABEC PETER - F00150995	IS	WAREG	WDREG	REGISTRY	02-May-2002		91418	SW	19921231468	Surface Runoff	0.000	20	20	0	0	SW	8	50	16	4	05EE	VERMILION RIVER	53.29832	-112.312687	HRABEC, PETER
00151931-00-00	00151931 00 00	RYLEY/REGISTRATION/KOPE BERNIE - F00151931	IS	WAREG	WDREG	REGISTRY	02-May-2002		91135	SW	19941031012	Surface Runoff	0.000	550	550	0	0	NW	31	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.36369	-112.483341	KOPE, BERNIE
00151931-00-00	00151931 00 00	RYLEY/REGISTRATION/KOPE BERNIE - F00151931	IS	WAREG	WDREG	REGISTRY	02-May-2002		91136	SW	19960430016	Surface Runoff	0.000	125	125	0	0	NW	31	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.36369	-112.483341	KOPE, BERNIE
00151931-00-00	00151931 00 00	RYLEY/REGISTRATION/KOPE BERNIE - F00151931	IS	WAREG	WDREG	REGISTRY	02-May-2002		91137	SW	19960430017	Surface Runoff	0.000	120	120	0	0	NW	31	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.36369	-112.483341	KOPE, BERNIE
00155215-00-00	00155215 00 00	RYLEY/REGISTRATION/MIZERA TERRY - F00155215	IS	WAREG	WDREG	REGISTRY	19-Feb-2003		108980	SW	19831231344	Surface Runoff	0.000	83	83	0	0	NE	2	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29107	-112.373862	MIZERA, TERRY
00155215-00-00	00155215 00 00	RYLEY/REGISTRATION/MIZERA TERRY - F00155215	IS	WAREG	WDREG	REGISTRY	19-Feb-2003		108981	SW	19881231695	Surface Runoff	0.000	1,128	1,128	0	0	NE	2	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29107	-112.373862	MIZERA, TERRY
00155215-00-00	00155215 00 00	RYLEY/REGISTRATION/MIZERA TERRY - F00155215	IS	WAREG	WDREG	REGISTRY	19-Feb-2003		108982	SW	19861231620	Unnamed Stream - Unclassified	0.000	147	147	0	0	NE	1	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.29107	-112.349438	MIZERA, TERRY
00168306-00-00	00168306 00 00	TOFIELD/REGISTRATION/JOHANSEN HAROLD - F00168306	IS	WAREG	WDREG	REGISTRY	23-May-2002		96475	SW	19851231943	Surface Runoff	0.000	125	125	0	0	NW	19	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.24732	-112.48331	JOHANSEN, HAROLD
00168306-00-00	00168306 00 00	TOFIELD/REGISTRATION/JOHANSEN HAROLD - F00168306	IS	WAREG	WDREG	REGISTRY	23-May-2002		96476	SW	19801230235	Surface Runoff	0.000	125	125	0	0	SE	30	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.25476	-112.47128	JOHANSEN, HAROLD
00168306-00-00	00168306 00 00	TOFIELD/REGISTRATION/JOHANSEN HAROLD - F00168306	IS	WAREG	WDREG	REGISTRY	23-May-2002		96478	SW	19551231304	Surface Runoff	0.000	125	125	0	0	NW	24	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.2473	-112.50763	JOHANSEN, HAROLD
00168306-00-00	00168306 00 00	TOFIELD/REGISTRATION/JOHANSEN HAROLD - F00168306	IS	WAREG	WDREG	REGISTRY	23-May-2002		96480	SW	19601230090	Surface Runoff	0.000	125	125	0	0	SW	36	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.26917	-112.507643	JOHANSEN, HAROLD
00168693-00-00	00168693 00 00	RYLEY/REGISTRATION/LEE & SHANNON HARTE - F00168693	IS	WAREG	WDREG	REGISTRY	26-Mar-2002		82972	SW	19971219007	Surface Runoff	0.000	250	250	0	0	NW	31	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.2764	-112.483317	LEE & SHANNON HARTE
00168693-00-00	00168693 00 00	RYLEY/REGISTRATION/LEE & SHANNON HARTE - F00168693	IS	WAREG	WDREG	REGISTRY	26-Mar-2002		82974	SW	19971219008	Surface Runoff	0.000	250	250	0	0	NW	31	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.2764	-112.483317	LEE & SHANNON HARTE
00169280-00-00	00169280 00 00	RYLEY/REGISTRATION/DENNIS W.WOOD - F00169280	IS	WAREG	WDREG	REGISTRY	20-Mar-2002		75771	SW	19791111001	Surface Runoff	0.000	430	430	0	0	NE	15	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32018	-112.398317	WOOD, DENNIS
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69339	SW	19791231200	Unnamed Stream - Unclassified	0.000	1,227	1,227	0	0	NW	13	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.32013	-112.507727	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69340	SW	19851231515	Surface Runoff	0.000	1,295	1,295	0	0	SE	13	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.31288	-112.495695	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69342	SW	19851231516	Unnamed Stream - Unclassified	0.000	336	336	0	0	SW	13	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.31289	-112.507724	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69345	SW	19851231517	Surface Runoff	0.000	336	336	0	0	NE	12	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.30547	-112.495686	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69349	SW	19871231205	Unnamed Stream - Unclassified	0.000	168	168	0	0	SE	31	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.35647	-112.471301	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69351	SW	19871231206	Surface Runoff	0.000	168	168	0	0	SE	31	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.35647	-112.471301	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69356	SW	19871231207	Unnamed Stream - Unclassified	0.000	168	168	0	0	SW	31	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.35646	-112.483326	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69361	SW	19871231208	Surface Runoff	0.000	168	168	0	0	SW	31	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.35646	-112.483326	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69366	SW	19871231209	Unnamed Stream - Unclassified	0.000	336	336	0	0	NW	35	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.36368	-112.385904	ROBERT & DOREEN & MIKE BONHAM
00169478-00-00	00169478 00 00	TOFIELD/REGISTRATION/ROBERT, DOREEN & MIKE BONHAM - F00169478	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69367	SW	19871231210	Surface Runoff	0.000	336	336	0	0	SE	11	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.29826	-112.520055	ROBERT & DOREEN & MIKE BONHAM
00173237-00-00	00173237 00 00	RYLEY/REGISTRATION/BRENT PHILLIPS - F00173237	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70937	SW	19641231204	Unnamed Stream - Unclassified	0.000	400	400	0	0	SW	20	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3274	-112.459003	PHILLIPS, BRENT
00173237-00-00	00173237 00 00	RYLEY/REGISTRATION/BRENT PHILLIPS - F00173237	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70940	SW	19921231261	Unnamed Stream - Unclassified	0.000	400	400	0	0	SW	20	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3274	-112.459003	PHILLIPS, BRENT
00173725-00-00	00173725 00 00	RYLEY/REGISTRATION/ARBON LEALA - F00173725	IS	WAREG	WDREG	REGISTRY	24-May-2002		96624	SW	19980501067	Surface Runoff	0.000	132	132	0	0	SW	27	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.25483	-112.410222	ARBON, LEALA
00174272-00-00	00174272 00 00	RYLEY/REGISTRATION/PEPPER ALLAN - F00174272	IS	WAREG	WDREG	REGISTRY	21-Mar-2002		77728	SW	19751231577	Surface Runoff	0.000	165	165	0	0	NE	32	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.36371	-112.447223	PEPPER, ALLAN
00174284-00-00	00174284 00 00	RYLEY/REGISTRATION/PEPPER JERRY - F00174284	IS	WAREG	WDREG	REGISTRY	23-Mar-2002		80235	SW	19921231364	Surface Runoff	0.000	535	535	0	0	NE	36	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.36366	-112.349517	PEPPER, JERRY
00174320-00-00	00174320 00 00	RYLEY/REGISTRATION/TERRY & ELAINE CANNAN	IS	WAREG	WDREG	REGISTRY	16-Mar-2002		72101	SW	19841231245	Unnamed Stream - Unclassified	0.000	145	145	0	0	NE	30	50	16	4	05EE	VERMILION RIVER	53.34926	-112.325109	TERRY & ELAINE CANNAN
00174332-00-00	00174332 00 00	RYLEY/REGISTRATION/JOHNSON BRIAN - F00174332	IS	WAREG	WDREG	REGISTRY	21-Mar-2002		76719	SW	18941231221	Unnamed Stream - Unclassified	0.000	94	94	0	0	SW	34	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3565	-112.410267	JOHNSON, BRIAN
00174451-00-00	00174451 00 00	RYLEY/REGISTRATION/GARRY & THERESA & KEN & BRIAN & DAVID MANDERSON - F00174451	IS	WAREG	WDREG	REGISTRY	19-Mar-2002		74623	SW	19381230001	Unnamed Stream - Unclassified	0.000	185	185	0	0	NE	35	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.36368	-112.373879	GARRY & THERESA & KEN & BRIAN & DAVID MANDERSON
00175254-00-00	00175254 00 00	RYLEY/REGISTRATION/CATHAY FARMS - F00175254	IS	WAREG	WDREG	REGISTRY	16-Jan-2003		106131	SW	19661231265	Surface Runoff	0.000	156	156	0	0	SE	21	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32741	-112.422699	CATHAY FARMS
00175254-00-00	00175254 00 00	RYLEY/REGISTRATION/CATHAY FARMS - F00175254	IS	WAREG	WDREG	REGISTRY	16-Jan-2003		106132	SW	19661231266	Surface Runoff	0.000	156	156	0	0	NE	21	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33463	-112.422686	CATHAY FARMS
00175254-00-00	00175254 00 00	RYLEY/REGISTRATION/CATHAY FARMS - F00175254	IS	WAREG	WDREG	REGISTRY	16-Jan-2003		106133	SW	19661231267	Surface Runoff	0.000	156	156	0	0	NW	21	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33465	-112.434769	CATHAY FARMS
00175254-00-00	00175254 00 00	RYLEY/REGISTRATION/CATHAY FARMS - F00175254	IS	WAREG	WDREG	REGISTRY	16-Jan-2003		106134	SW	19661231268	Surface Runoff	0.000	623	623	0	0	NE	16	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32018	-112.422712	CATHAY FARMS
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70961	SW	19521231110	Surface Runoff	0.000	435	435	0	0	SW	28	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34205	-112.434751	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70965	SW	19521231111	Surface Runoff	0.000	436	436	0	0	SW	28	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34205	-112.434751	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70968	SW	19521231112	Surface Runoff	0.000	436	436	0	0	SW	28	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34205	-112.434751	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70973	SW	19521231113	Surface Runoff	0.000	197	197	0	0	NE	29	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34927	-112.447037	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70976	SW	19501231581	Surface Runoff	0.000	33	33	0	0	NE	30	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34924	-112.471296	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70977	SW	19501231582	Surface Runoff	0.000	33	33	0	0	SE	30	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34202	-112.471301	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		70996	SW	19501231584	Surface Runoff	0.000	65	65	0	0	SW	32	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.35649	-112.459078	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71001	SW	19681231219	Surface Runoff	0.000	292	292	0	0	NW	22	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33463	-112.410328	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71006	SW	19681231220	Surface Runoff	0.000	292	292	0	0	NW	22	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33463	-112.410328	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71007	SW	19681231221	Surface Runoff	0.000	291	291	0	0	SE	22	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32741	-112.398311	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71009	SW	19651231394	Surface Runoff	0.000	196	196	0	0	NW	23	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33464	-112.385985	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71012	SW	19651231395	Surface Runoff	0.000	196	196	0	0	NE	23	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33464	-112.373985	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71016	SW	19741231184	Surface Runoff	0.000	82	82	0	0	NE	13	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32017	-112.349515	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71018	SW	19741231185	Surface Runoff	0.000	82	82	0	0	SE	13	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31294	-112.349505	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71022	SW	19741231186	Surface Runoff	0.000	82	82	0	0	SW	13	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31295	-112.361606	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71025	SW	19741231187	Surface Runoff	0.000	82	82	0	0	SW	13	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31295	-112.361606	LORNE & ROLAND BOOTH
00175341-00-00	00175341 00 00	RYLEY/REGISTRATION/LORNE & ROLAND BOOTH - F00175341	IS	WAREG	WDREG	REGISTRY	15-Mar-2002		71027	SW	19901231510	Surface Runoff	0.000	195	195	0	0	SW	35	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.3565	-112.385939	LORNE & ROLAND BOOTH
00175365-00-00	00175365 00 00	TOFIELD/REGISTRATION/HILLERVD GLENN - F00175365	IS	WAREG	WDREG	REGISTRY	16-Jan-2003		106182	SW	19610101012	Bell Lake	0.000	107	107	0	0	NE	35	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.27641	-112.520007	HILLERVD, GLENN
00175365-00-00	00175365 00 00	TOFIELD/REGISTRATION/HILLERVD GLENN - F00175365	IS	WAREG	WDREG	REGISTRY	16-Jan-2003		106183	SW	19710101019	Surface Runoff	0.000	58	58	0	0	NW	36	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.2764	-112.507673	HILLERVD, GLENN
00175365-00-00	00175365 00 00	TOFIELD/REGISTRATION/HILLERVD GLENN - F00175365	IS	WAREG	WDREG	REGISTRY	16-Jan-2003		106184	SW	19920101035	Surface Runoff	0.000	115	115	0	0	NW	25	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.26194	-112.507627	HILLERVD, GLENN
00175365-00-00	00175365 00 00	TOFIELD/REGISTRATION/HILLERVD GLENN - F00175365	IS	WAREG	WDREG	REGISTRY	16-Jan-2003		106185	SW	19630101005	Surface Runoff	0.000	115	115	0	0	NE	25	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.26194	-112.495629	HILLERVD, GLENN
00175508-00-00	00175508 00 00	RYLEY/REGISTRATION/BUGGE KEVIN - F0017550B	IS	WAREG	WDREG	REGISTRY	08-Apr-2003		114872	SW	19541231200	Surface Runoff	0.000	85	85	0	0	NW	24	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33463	-112.361654	BUGGE, KEVIN
00175508-00-00	00175508 00 00	RYLEY/REGISTRATION/BUGGE KEVIN - F00175508	IS	WAREG	WDREG	REGISTRY	08-Apr-2003		114874	SW	19691231423	Surface Runoff	0.000	432	432	0	0	SW	24	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32741	-112.361632	BUGGE, KEVIN
00175508-00-00	00175508 00 00	RYLEY/REGISTRATION/BUGGE KEVIN - F00175508	IS	WAREG	WDREG	REGISTRY	08-Apr-2003		114875	SW	19501230295	Surface Runoff	0.000	285	285	0	0	SW	26	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34204	-112.385977	BUGGE, KEVIN
00175508-00-00	00175508 00 00	RYLEY/REGISTRATION/BUGGE KEVIN - F00175508	IS	WAREG	WDREG	REGISTRY	08-Apr-2003		114876	SW	19571231199	Unnamed Stream - Unclassified	0.000	87	87	0	0	SE	23	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32741	-112.37398	BUGGE, KEVIN
00175508-00-00	00175508 00 00	RYLEY/REGISTRATION/BUGGE KEVIN - F00175508	IS	WAREG	WDREG	REGISTRY	08-Apr-2003		114877	SW	19571231200	Unnamed Stream - Unclassified	0.000	88	88	0	0	SE	23	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32741	-112.37398	BUGGE, KEVIN
00175508-00-00	00175508 00 00	RYLEY/REGISTRATION/BUGGE KEVIN - F00175508	IS	WAREG	WDREG	REGISTRY	08-Apr-2003		114878	SW	19981227097	Unnamed Stream - Unclassified	0.000	195	195	0	0	NE	14	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.32018	-112.373976	BUGGE, KEVIN
00175961-00-00	00175961 00 00	MIQUELON LAKE/REGISTRATION/LEONARD & VIOLET HELGELAND	IS	WAREG	WDREG	REGISTRY	14-Oct-2004		140492	SW	19901230437	Surface Runoff	0.000	364	364	0	0	SE	23	49	18	4	05EB	COOKING/BEAVERHILL LAKE	53.24008	-112.519953	LEONARD & VIOLET HEGLELAND
00176002-00-00	00176002 00 00	HOLDEN/REGISTRATION/JIM & TERRY LUSK - F00176002	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69133	SW	19701231553	Surface Runoff	0.000	269	269	0	0	NE	25	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.26201	-112.349395	JIM & TERRY LUSK
00176002-00-00	00176002 00 00	HOLDEN/REGISTRATION/JIM & TERRY LUSK - F00176002	IS	WAREG	WDREG	REGISTRY	14-Mar-2002		69135	SW	19511231080	Unnamed Stream - Unclassified	0.000	269	269	0	0	NE	25	49	17	4	05EB	COOKING/BEAVERHILL LAKE	53.26201	-112.349395	JIM & TERRY LUSK
00176258-00-00	00176258 00 00	ROYAL PARK/REGISTRATION/POPE, J.L. DALE - F00176258	IS	WAREG	WDREG	REGISTRY	19-Mar-2002		73512	SW	19571231098	Surface Runoff	0.000	20	20	0	0	NW	27	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34927	-112.410294	POPE, J L DALE
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85715	SW	19601231912	Surface Runoff	0.000	419	419	0	0	SE	16	50	17	4	05EE	VERMILION RIVER	53.31296	-112.422725	LYONS, BRIAN
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85718	SW	19901231805	Surface Runoff	0.000	419	419	0	0	SE	16	50	17	4	05EE	VERMILION RIVER	53.31296	-112.422725	LYONS, BRIAN
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85721	SW	19901231806	Surface Runoff	0.000	279	279	0	0	SE	16	50	17	4	05EE	VERMILION RIVER	53.31296	-112.422725	LYONS, BRIAN

APPROVAL ID	INTERIM LICENCE #	APPROVAL NAME	STATUS	DOC TYPE	INDUSTRY ACTIVITY	SPECIFIC ACTIVITY CODE	EFFECTIVE DATE	EXPIRY DATE	WA ID	WATER ALLOCATION TYPE	PRIORITY	SOURCE	PUMP RATE (sw=m3/sec, gw=m3/day)	QUANTITY (m3)	CONSUMPTIVE (m3)	LOSSES (m3)	RETURN FLOW (m3)	LSD	QUA	SEC	TWP	RNG	MER	WSC	RIVER SUB BASIN NAME	LATITUDE	LONGITUDE	APPROVAL HOLDER
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85725	SW	19601231913	Surface Runoff	0.000	28	28	0	0		SE	16	50	17	4	05EE	VERMILION RIVER	53.31296	-112.422725	LYONS, BRIAN
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85731	SW	19901231807	Surface Runoff	0.000	56	56	0	0		SW	16	50	17	4	05EE	VERMILION RIVER	53.31297	-112.434753	LYONS, BRIAN
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85735	SW	19701231829	Surface Runoff	0.000	28	28	0	0		SW	16	50	17	4	05EE	VERMILION RIVER	53.31297	-112.434753	LYONS, BRIAN
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85745	SW	19901231809	Surface Runoff	0.000	558	558	0	0		SW	29	50	17	4	05EE	VERMILION RIVER	53.34204	-112.459007	LYONS, BRIAN
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85746	SW	19601231916	Surface Runoff	0.000	94	94	0	0		SW	29	50	17	4	05EE	VERMILION RIVER	53.34204	-112.459007	LYONS, BRIAN
00176295-00-00	00176295 00 00	RYLEY/REGISTRATION/LYONS BRIAN - F00176295	IS	WAREG	WDREG	REGISTRY	28-Mar-2002		85749	SW	19601231917	Surface Runoff	0.000	39	39	0	0		NW	29	50	17	4	05EE	VERMILION RIVER	53.34926	-112.458998	LYONS, BRIAN
00176300-00-00	00176300 00 00	VEGREVILLE/REGISTRATION/LYONS AUDREY - F00176300	IS	WAREG	WDREG	REGISTRY	19-Mar-2002		74426	SW	19600607001	Surface Runoff	0.000	104	104	0	0		NE	20	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33464	-112.447078	LYONS, AUDREY
00176300-00-00	00176300 00 00	VEGREVILLE/REGISTRATION/LYONS AUDREY - F00176300	IS	WAREG	WDREG	REGISTRY	19-Mar-2002		74428	SW	19900510020	Unnamed Stream - Unclassified	0.000	456	456	0	0		NE	19	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33461	-112.471303	LYONS, AUDREY
00176300-00-00	00176300 00 00	VEGREVILLE/REGISTRATION/LYONS AUDREY - F00176300	IS	WAREG	WDREG	REGISTRY	19-Mar-2002		74432	SW	19600607002	Unnamed Stream - Unclassified	0.000	215	215	0	0		NW	19	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.33459	-112.483361	LYONS, AUDREY
00176325-00-00	00176325 00 00	RYLEY/REGISTRATION/NIMCHUK SHARON - F00176325	IS	WAREG	WDREG	REGISTRY	13-Mar-2002		67735	SW	19931231189	Unnamed Stream - Unclassified	0.000	193	193	0	0		NE	11	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.30551	-112.373953	NIMCHUK, SHARON
00176371-00-00	00176371 00 00	RYLEY/REGISTRATION/MANDERSON D C - F00176371	IS	WAREG	WDREG	REGISTRY	13-Mar-2002		67745	SW	19570501003	Surface Runoff	0.000	650	650	0	0		SE	35	50	17	4	05EE	VERMILION RIVER	53.35649	-112.373914	MANDERSON, D.C.
00176506-00-00	00176506 00 00	RYLEY/REGISTRATION/RICHARD & JUDITH DUECK - F00176506	IS	WAREG	WDREG	REGISTRY	27-Mar-2002		83703	SW	19661231181	Unnamed Stream - Unclassified	0.000	260	260	0	0		SW	17	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31295	-112.458993	RICHARD & JUDITH DUECK
00176506-00-00	00176506 00 00	RYLEY/REGISTRATION/RICHARD & JUDITH DUECK - F00176506	IS	WAREG	WDREG	REGISTRY	27-Mar-2002		83704	SW	19601231879	Unnamed Stream - Unclassified	0.000	260	260	0	0		SW	17	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31295	-112.458993	RICHARD & JUDITH DUECK
00176506-00-00	00176506 00 00	RYLEY/REGISTRATION/RICHARD & JUDITH DUECK - F00176506	IS	WAREG	WDREG	REGISTRY	27-Mar-2002		83705	SW	19601231880	Unnamed Stream - Unclassified	0.000	65	65	0	0		SW	17	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31295	-112.458993	RICHARD & JUDITH DUECK
00176506-00-00	00176506 00 00	RYLEY/REGISTRATION/RICHARD & JUDITH DUECK - F00176506	IS	WAREG	WDREG	REGISTRY	27-Mar-2002		83707	SW	19781231338	Unnamed Stream - Unclassified	0.000	175	175	0	0		SE	17	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.31297	-112.447044	RICHARD & JUDITH DUECK
00176564-00-00	00176564 00 00	TOFIELD/REGISTRATION/KALLAL HEREFORD RANCH LTD - F00176564	IS	WAREG	WDREG	REGISTRY	06-Mar-2006		173281	SW	19661231360	Surface Runoff	0.000	89	89	0	0		SW	36	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.3565	-112.507706	KALLAL HEREFORD RANCH LTD
00176564-00-00	00176564 00 00	TOFIELD/REGISTRATION/KALLAL HEREFORD RANCH LTD - F00176564	IS	WAREG	WDREG	REGISTRY	06-Mar-2006		173283	SW	19661231361	Surface Runoff	0.000	89	89	0	0		SE	36	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.35647	-112.495659	KALLAL HEREFORD RANCH LTD
00176564-00-00	00176564 00 00	TOFIELD/REGISTRATION/KALLAL HEREFORD RANCH LTD - F00176564	IS	WAREG	WDREG	REGISTRY	06-Mar-2006		173285	SW	19931231537	Surface Runoff	0.000	151	151	0	0		SE	25	50	18	4	05EB	COOKING/BEAVERHILL LAKE	53.342	-112.49569	KALLAL HEREFORD RANCH LTD
00176664-00-00	00176664 00 00	RYLEY/REGISTRATION/POPE DELBERT - F00176664	IS	WAREG	WDREG	REGISTRY	13-Mar-2002		68372	SW	19201231306	Unnamed Stream - Unclassified	0.000	101	101	0	0		SW	27	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34204	-112.41031	POPE, DELBERT
00176664-00-00	00176664 00 00	RYLEY/REGISTRATION/POPE DELBERT - F00176664	IS	WAREG	WDREG	REGISTRY	13-Mar-2002		68373	SW	18941231171	Unnamed Stream - Unclassified	0.000	151	151	0	0		SW	27	50	17	4	05EB	COOKING/BEAVERHILL LAKE	53.34204	-112.41031	POPE, DELBERT



LEGEND

- Water Well (Use - Well ID)
- Approximate Site (N1/2 9-50-17 W4M)
- Search Radius
- Road
- Rail
- Waterbody
- Watercourse

UTM ZONE 12
NAD 83 DATUM

CLIENT

CleanHarbors

TETRA TECH EBA

2016 GROUNDWATER MONITORING PROGRAM RYLEY, ALBERTA

Alberta Water Well Information Database 2.0 km Search Radius

PROJECT NO.	DWN	CKD	APVD	REV
SWM.SWOP03097-01	CF	BS	AS	000

OFFICE	DATE	STATUS
EBA-CALGARY	November, 2016	Issued for Use

Appendix B

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APPENDIX C

LABORATORY ANALYTICAL REPORT

Your Project #: EBA, 704-SWM.SWOP03097-01

Attention:MICHELE CRAWFORD

TETRA TECH EBA INC.
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Your C.O.C. #: 493715-01-01, 493715-02-01, 493715-03-01, 493715-04-01, 493715-05-01, 493715-06-01

Report Date: 2016/06/14
Report #: R2197119
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B644197
Received: 2016/06/03, 15:23

Sample Matrix: Water
Samples Received: 38

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	26	N/A	2016/06/09	AB SOP-00005	SM 22 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH	12	N/A	2016/06/10	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	38	N/A	2016/06/12	AB SOP-00039	CCME CWS/EPA 8260c m
Cadmium - low level CCME - Dissolved	6	N/A	2016/06/10	AB WI-00065	Auto Calc
Cadmium - low level CCME - Dissolved	20	N/A	2016/06/11	AB WI-00065	Auto Calc
Cadmium - low level CCME - Dissolved	12	N/A	2016/06/12	AB WI-00065	Auto Calc
Chloride by Automated Colourimetry	12	N/A	2016/06/10	AB SOP-00020	SM 22-4500-Cl G m
Chloride by Automated Colourimetry	26	N/A	2016/06/11	AB SOP-00020	SM 22-4500-Cl G m
Chemical Oxygen Demand	6	N/A	2016/06/08	AB SOP-00016	SM 22 5220D m
Chemical Oxygen Demand	28	N/A	2016/06/09	AB SOP-00016	SM 22 5220D m
Chemical Oxygen Demand	3	N/A	2016/06/10	AB SOP-00016	SM 22 5220D m
Chemical Oxygen Demand	1	N/A	2016/06/14	AB SOP-00016	SM 22 5220D m
Carbon (DOC) -Lab Filtered (2)	6	N/A	2016/06/09	CAL SOP-00077	MMCW 119 1996 m
Carbon (DOC) (2)	32	N/A	2016/06/08	CAL SOP-00077	MMCW 119 1996 m
Conductivity @25C	26	N/A	2016/06/09	AB SOP-00005	SM 22 2510 B m
Conductivity @25C	12	N/A	2016/06/10	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16)	4	2016/06/08	2016/06/09	AB SOP-00040 AB SOP-00037	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16)	4	2016/06/09	2016/06/10	AB SOP-00040 AB SOP-00037	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16)	10	2016/06/09	2016/06/11	AB SOP-00040 AB SOP-00037	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16)	11	2016/06/10	2016/06/10	AB SOP-00040 AB SOP-00037	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16)	9	2016/06/10	2016/06/11	AB SOP-00040 AB SOP-00037	CCME PHC-CWS m
Hardness	23	N/A	2016/06/11	AB WI-00065	Auto Calc
Hardness	12	N/A	2016/06/13	AB WI-00065	Auto Calc

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Your Project #: EBA, 704-SWM.SWOP03097-01

Attention:MICHELE CRAWFORD

TETRA TECH EBA INC.
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Your C.O.C. #: 493715-01-01, 493715-02-01, 493715-03-01, 493715-04-01, 493715-05-01, 493715-06-01

Report Date: 2016/06/14
Report #: R2197119
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B644197
Received: 2016/06/03, 15:23

Sample Matrix: Water
Samples Received: 38

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hardness	3	N/A	2016/06/14	AB WI-00065	Auto Calc
Mercury - Low Level (Dissolved)	6	2016/06/10	2016/06/10	CAL SOP-00007	EPA 1631 RE 20460 m
Mercury - Low Level (Dissolved)	26	2016/06/10	2016/06/13	CAL SOP-00007	EPA 1631 RE 20460 m
Mercury-Low Level-Dissolved-Lab Filtered	6	2016/06/13	2016/06/13	CAL SOP-00007	EPA 1631 RE 20460 m
Elements by ICP - Dissolved	32	N/A	2016/06/10	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP-Dissolved-Lab Filtered	3	N/A	2016/06/10	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP-Dissolved-Lab Filtered	3	N/A	2016/06/13	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved	32	N/A	2016/06/11	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS-Dissolved-Lab Filtered	6	N/A	2016/06/10	AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	38	N/A	2016/06/08	AB WI-00065	Auto Calc
Sum of cations, anions	23	N/A	2016/06/11	AB WI-00065	Auto Calc
Sum of cations, anions	12	N/A	2016/06/13	AB WI-00065	Auto Calc
Sum of cations, anions	3	N/A	2016/06/14	AB WI-00065	Auto Calc
Ammonia-N (Total)	24	N/A	2016/06/11	AB SOP-00007	EPA 350.1 R2.0 m
Ammonia-N (Total)	8	N/A	2016/06/12	AB SOP-00007	EPA 350.1 R2.0 m
Ammonia-N (Total)	6	N/A	2016/06/14	AB SOP-00007	EPA 350.1 R2.0 m
Nitrate and Nitrite	2	N/A	2016/06/11	AB WI-00065	Auto Calc
Nitrate and Nitrite	36	N/A	2016/06/14	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	2	N/A	2016/06/11	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	36	N/A	2016/06/14	AB WI-00065	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC (1)	14	N/A	2016/06/10	AB SOP-00023	SM 22 4110 B m
Nitrogen, (Nitrite, Nitrate) by IC (1)	23	N/A	2016/06/11	AB SOP-00023	SM 22 4110 B m
Nitrogen, (Nitrite, Nitrate) by IC (1)	1	N/A	2016/06/13	AB SOP-00023	SM 22 4110 B m
Benzo[a]pyrene Equivalency (3)	4	N/A	2016/06/09	AB SOP-00003	Auto Calc
PAH in Water by GC/MS	4	2016/06/08	2016/06/08	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270D m
pH @25°C	26	N/A	2016/06/09	AB SOP-00005	SM 22 4500-H+B m

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Your Project #: EBA, 704-SWM.SWOP03097-01

Attention:MICHELE CRAWFORD

TETRA TECH EBA INC.
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Your C.O.C. #: 493715-01-01, 493715-02-01, 493715-03-01, 493715-04-01, 493715-05-01, 493715-06-01

Report Date: 2016/06/14
Report #: R2197119
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B644197
Received: 2016/06/03, 15:23

Sample Matrix: Water
Samples Received: 38

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH @25°C	12	N/A	2016/06/10	AB SOP-00005	SM 22 4500-H+B m
Sulphate by Automated Colourimetry	12	N/A	2016/06/10	AB SOP-00018	SM 22 4500-SO4 E m
Sulphate by Automated Colourimetry	26	N/A	2016/06/11	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	23	N/A	2016/06/11	AB WI-00065	Auto Calc
Total Dissolved Solids (Calculated)	12	N/A	2016/06/13	AB WI-00065	Auto Calc
Total Dissolved Solids (Calculated)	3	N/A	2016/06/14	AB WI-00065	Auto Calc
Total Kjeldahl Nitrogen	1	2016/06/09	2016/06/09	AB SOP-00008	EPA 351.1 R1978 m
Total Kjeldahl Nitrogen	21	2016/06/09	2016/06/13	AB SOP-00008	EPA 351.1 R1978 m
Total Kjeldahl Nitrogen	6	2016/06/10	2016/06/10	AB SOP-00008	EPA 351.1 R1978 m
Total Kjeldahl Nitrogen	4	2016/06/10	2016/06/14	AB SOP-00008	EPA 351.1 R1978 m
Total Kjeldahl Nitrogen	6	2016/06/14	2016/06/14	AB SOP-00008	EPA 351.1 R1978 m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Sherlyne Sim, B.Eng, Project Manager
Email: SSim@maxxam.ca
Phone# (780)577-7113

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5939			OT5940			OT5941		
Sampling Date		2016/06/03 09:35			2016/06/03 09:40			2016/06/02 11:05		
COC Number		493715-01-01			493715-01-01			493715-01-01		
	UNITS	MW-8A	RDL	QC Batch	MW-8B	RDL	QC Batch	MW-5A	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	26	N/A	8290096	100	N/A	8290096	120	N/A	8290646
Cation Sum	meq/L	27	N/A	8290096	97	N/A	8290096	110	N/A	8290646
Hardness (CaCO3)	mg/L	25	0.50	8290200	460	0.50	8290200	1100	0.50	8290200
Ion Balance	N/A	1.0	0.010	8290095	0.97	0.010	8290095	0.93	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	<0.044	0.044	8290201	0.46	0.22	8290201	0.88	0.044	8290201
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8290202	0.10	0.020	8290202	0.27	0.020	8290202
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	8290201	<0.16	0.16	8290201	0.23	0.033	8290201
Calculated Total Dissolved Solids	mg/L	1500	10	8290097	6600	10	8290097	8000	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	36	5.0	8291773	47	5.0	8291773	64	5.0	8291773
Misc. Inorganics										
Conductivity	uS/cm	2400	1.0	8292820	8700	1.0	8292820	9600	1.0	8292820
Dissolved Organic Carbon (C)	mg/L	11	0.50	8292372	15	0.50	8292372	24 (1)	1.0	8292372
pH	pH	8.49	N/A	8292821	8.19	N/A	8292821	8.00	N/A	8292821
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8290197	0.030	0.020	8290197	<0.020	0.020	8290197
Anions										
Alkalinity (PP as CaCO3)	mg/L	21	0.50	8292818	<0.50	0.50	8292818	<0.50	0.50	8292818
Alkalinity (Total as CaCO3)	mg/L	1000	0.50	8292818	870	0.50	8292818	540	0.50	8292818
Bicarbonate (HCO3)	mg/L	1200	0.50	8292818	1100	0.50	8292818	660	0.50	8292818
Carbonate (CO3)	mg/L	25	0.50	8292818	<0.50	0.50	8292818	<0.50	0.50	8292818
Hydroxide (OH)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292818	<0.50	0.50	8292818
Dissolved Sulphate (SO4)	mg/L	290 (1)	2.0	8296182	3900 (1)	50	8296182	5200 (1)	50	8296182
Dissolved Chloride (Cl)	mg/L	7.4	1.0	8296180	28	1.0	8296180	2.1	1.0	8296180
Nutrients										
Total Ammonia (N)	mg/L	0.81	0.050	8296186	0.62	0.050	8296186	0.67	0.050	8296186
Total Total Kjeldahl Nitrogen	mg/L	1.1	0.050	8294672	1.3	0.050	8294452	1.3	0.050	8294452
Dissolved Nitrite (N)	mg/L	<0.010	0.010	8295891	<0.050 (2)	0.050	8295891	0.069	0.010	8295896
Dissolved Nitrate (N)	mg/L	<0.010	0.010	8295891	0.10 (2)	0.050	8295891	0.20	0.010	8295896

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5942			OT5943			OT5944		
Sampling Date		2016/06/02 10:20			2016/06/02 10:25			2016/06/02 09:20		
COC Number		493715-01-01			493715-01-01			493715-01-01		
	UNITS	MW-12B	RDL	QC Batch	MW-12A	RDL	QC Batch	MW-18A	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	130	N/A	8290646	150	N/A	8290646	16	N/A	8290646
Cation Sum	meq/L	130	N/A	8290646	130	N/A	8290646	17	N/A	8290646
Hardness (CaCO3)	mg/L	900	0.50	8290200	710	0.50	8290200	8.9	0.50	8290200
Ion Balance	N/A	0.99	0.010	8290644	0.89	0.010	8290644	1.0	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	0.85	0.044	8290201	0.36	0.044	8290201	0.048	0.044	8290201
Nitrate plus Nitrite (N)	mg/L	0.25	0.020	8290202	0.12	0.020	8290202	<0.020	0.020	8290202
Dissolved Nitrite (NO2)	mg/L	0.17	0.033	8290201	0.13	0.033	8290201	<0.033	0.033	8290201
Calculated Total Dissolved Solids	mg/L	8900	10	8290612	9600	10	8290612	870	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	71	5.0	8291773	48	5.0	8291773	27	5.0	8291773
Misc. Inorganics										
Conductivity	uS/cm	11000	1.0	8292820	11000	1.0	8292800	1500	1.0	8292800
Dissolved Organic Carbon (C)	mg/L	24	0.50	8292619	17	0.50	8292619	6.9	0.50	8292372
pH	pH	8.00	N/A	8292821	8.00	N/A	8292802	8.44	N/A	8292802
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	0.027	0.020	8290197	0.042	0.020	8290197	<0.020	0.020	8290197
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292794	7.9	0.50	8292794
Alkalinity (Total as CaCO3)	mg/L	670	0.50	8292818	720	0.50	8292794	800	0.50	8292794
Bicarbonate (HCO3)	mg/L	820	0.50	8292818	880	0.50	8292794	950	0.50	8292794
Carbonate (CO3)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292794	9.5	0.50	8292794
Hydroxide (OH)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292794	<0.50	0.50	8292794
Dissolved Sulphate (SO4)	mg/L	5600 (1)	50	8296182	6300 (1)	50	8295605	6.9	1.0	8296182
Dissolved Chloride (Cl)	mg/L	6.0	1.0	8296180	1.6	1.0	8295598	7.4	1.0	8296180
Nutrients										
Total Ammonia (N)	mg/L	2.1 (1)	0.25	8296186	0.21	0.050	8296156	0.66	0.050	8296186
Total Total Kjeldahl Nitrogen	mg/L	2.8 (1)	0.25	8294452	0.45	0.050	8294672	0.90	0.050	8294452
Dissolved Nitrite (N)	mg/L	0.053	0.010	8295896	0.040	0.010	8295896	<0.010	0.010	8295896
Dissolved Nitrate (N)	mg/L	0.19	0.010	8295896	0.082	0.010	8295896	0.011	0.010	8295896

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5945			OT5946			OT5948		
Sampling Date		2016/06/02 09:20			2016/06/03 09:20			2016/06/03 08:50		
COC Number		493715-01-01			493715-01-01			493715-02-01		
	UNITS	MW-18B	RDL	QC Batch	MW-11	RDL	QC Batch	MW-14	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	39	N/A	8290646	120	N/A	8290646	58	N/A	8290646
Cation Sum	meq/L	38	N/A	8290646	110	N/A	8290646	58	N/A	8290646
Hardness (CaCO3)	mg/L	630	0.50	8290200	1100	0.50	8290200	1400	0.50	8290200
Ion Balance	N/A	0.96	0.010	8290644	0.97	0.010	8290644	1.0	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	0.39	0.044	8290201	1.0	0.044	8290201	0.85	0.044	8290201
Nitrate plus Nitrite (N)	mg/L	0.10	0.020	8290202	0.25	0.020	8290202	0.22	0.020	8290202
Dissolved Nitrite (NO2)	mg/L	0.049	0.033	8290201	0.048	0.033	8290201	0.081	0.033	8290201
Calculated Total Dissolved Solids	mg/L	2600	10	8290612	7800	10	8290612	3600	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	30	5.0	8291773	100	5.0	8291773	34	5.0	8291773
Misc. Inorganics										
Conductivity	uS/cm	3400	1.0	8292800	9600	1.0	8292820	4600	1.0	8292820
Dissolved Organic Carbon (C)	mg/L	8.2	0.50	8292372	36 (1)	2.5	8292619	11	0.50	8292372
pH	pH	7.96	N/A	8292802	8.03	N/A	8292821	8.05	N/A	8292821
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8290197	0.024	0.020	8290197	0.025	0.020	8290197
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292818	<0.50	0.50	8292818
Alkalinity (Total as CaCO3)	mg/L	320	0.50	8292794	770	0.50	8292818	940	0.50	8292818
Bicarbonate (HCO3)	mg/L	390	0.50	8292794	930	0.50	8292818	1100	0.50	8292818
Carbonate (CO3)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292818	<0.50	0.50	8292818
Hydroxide (OH)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292818	<0.50	0.50	8292818
Dissolved Sulphate (SO4)	mg/L	1500 (1)	10	8296036	4800 (1)	50	8296182	1900 (1)	20	8296182
Dissolved Chloride (Cl)	mg/L	22	1.0	8296032	32	1.0	8296180	1.6	1.0	8296180
Nutrients										
Total Ammonia (N)	mg/L	0.10	0.050	8296156	0.15	0.050	8296156	0.35	0.050	8296186
Total Total Kjeldahl Nitrogen	mg/L	0.32	0.050	8293588	0.81	0.050	8293588	0.91	0.050	8294452
Dissolved Nitrite (N)	mg/L	0.015	0.010	8295896	0.015	0.010	8295896	0.025	0.010	8295896
Dissolved Nitrate (N)	mg/L	0.089	0.010	8295896	0.23	0.010	8295896	0.19	0.010	8295896

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5949			OT5950			OT5951		
Sampling Date		2016/06/02 10:55			2016/06/03 09:00			2016/06/02 10:00		
COC Number		493715-02-01			493715-02-01			493715-02-01		
	UNITS	MW-24B	RDL	QC Batch	MW-10	RDL	QC Batch	MW-1B	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	110	N/A	8290646	47	N/A	8290646	30	N/A	8290646
Cation Sum	meq/L	110	N/A	8290646	42	N/A	8290646	30	N/A	8290646
Hardness (CaCO3)	mg/L	1500	0.50	8290200	280	0.50	8290200	30	0.50	8290200
Ion Balance	N/A	1.0	0.010	8290644	0.90	0.010	8290644	1.0	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	<0.044	0.044	8290201	0.18	0.044	8290201	4.7	0.044	8290201
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8290202	0.050	0.020	8290202	1.1	0.020	8290202
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	8290201	0.033	0.033	8290201	0.063	0.033	8290201
Calculated Total Dissolved Solids	mg/L	7300	10	8290612	3000	10	8290612	1800	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	47	5.0	8291773	32	5.0	8291773	47	5.0	8291773
Misc. Inorganics										
Conductivity	uS/cm	9100	1.0	8292820	4500	1.0	8292820	2700	1.0	8292820
Dissolved Organic Carbon (C)	mg/L	19	0.50	8292372	9.7	0.50	8292619	N/A	0.50	8292619
pH	pH	7.96	N/A	8292821	8.26	N/A	8292821	8.44	N/A	8292821
Lab Filtered Inorganics										
Dissolved Organic Carbon (C)	mg/L	N/A	N/A	N/A	N/A	0.50	8293311	8.8	0.50	8293311
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	0.047	0.020	8290197	0.023	0.020	8290197	0.029	0.020	8290197
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292818	10	0.50	8292818
Alkalinity (Total as CaCO3)	mg/L	820	0.50	8292818	500	0.50	8292818	900	0.50	8292818
Bicarbonate (HCO3)	mg/L	1000	0.50	8292818	620	0.50	8292818	1100	0.50	8292818
Carbonate (CO3)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292818	13	0.50	8292818
Hydroxide (OH)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292818	<0.50	0.50	8292818
Dissolved Sulphate (SO4)	mg/L	4400 (1)	50	8296182	1700 (1)	20	8296182	540 (1)	5.0	8296182
Dissolved Chloride (Cl)	mg/L	72	1.0	8296180	60	1.0	8296180	6.1	1.0	8296180
Nutrients										
Total Ammonia (N)	mg/L	0.11	0.050	8296186	0.16	0.050	8296156	0.36	0.050	8296618
Total Total Kjeldahl Nitrogen	mg/L	0.75	0.050	8294452	0.57	0.050	8294672	0.96	0.050	8293574
Dissolved Nitrite (N)	mg/L	<0.010	0.010	8295896	0.010	0.010	8295896	0.019	0.010	8295896
Dissolved Nitrate (N)	mg/L	<0.010	0.010	8295896	0.040	0.010	8295896	1.1	0.010	8295896

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5952			OT5953			OT5954		
Sampling Date		2016/06/02 10:00			2016/06/02 08:50			2016/06/02 08:50		
COC Number		493715-02-01			493715-02-01			493715-02-01		
	UNITS	MW-1C	RDL	QC Batch	MW-19A	RDL	QC Batch	MW-19B	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	71	N/A	8290646	80	N/A	8290646	64	N/A	8290646
Cation Sum	meq/L	68	N/A	8290646	73	N/A	8290646	61	N/A	8290646
Hardness (CaCO3)	mg/L	510	0.50	8290200	270	0.50	8290200	150	0.50	8290200
Ion Balance	N/A	0.96	0.010	8290644	0.91	0.010	8290644	0.96	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	0.96	0.044	8290201	<0.22	0.22	8290201	0.068	0.044	8290201
Nitrate plus Nitrite (N)	mg/L	0.23	0.020	8290202	<0.020	0.020	8290202	0.028	0.020	8290202
Dissolved Nitrite (NO2)	mg/L	0.058	0.033	8290201	<0.16	0.16	8290201	0.041	0.033	8290201
Calculated Total Dissolved Solids	mg/L	4700	10	8290612	5200	10	8290612	4100	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	51	5.0	8294989	19	5.0	8293135	17	5.0	8293135
Misc. Inorganics										
Conductivity	uS/cm	6100	1.0	8292800	6900	1.0	8292800	5700	1.0	8292820
Dissolved Organic Carbon (C)	mg/L	11	0.50	8292372	7.1	0.50	8292372	6.0	0.50	8292372
pH	pH	8.18	N/A	8292802	8.25	N/A	8292802	8.43	N/A	8292821
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	0.036	0.020	8290197	0.039	0.020	8290197	<0.020	0.020	8290197
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	11	0.50	8292818
Alkalinity (Total as CaCO3)	mg/L	580	0.50	8292794	880	0.50	8292794	860	0.50	8292818
Bicarbonate (HCO3)	mg/L	710	0.50	8292794	1100	0.50	8292794	1000	0.50	8292818
Carbonate (CO3)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	13	0.50	8292818
Hydroxide (OH)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	<0.50	0.50	8292818
Dissolved Sulphate (SO4)	mg/L	2800 (1)	20	8296182	3000 (1)	20	8295605	2200 (1)	20	8296182
Dissolved Chloride (Cl)	mg/L	1.4	1.0	8296180	6.7	1.0	8295598	3.1	1.0	8296180
Nutrients										
Total Ammonia (N)	mg/L	0.46	0.050	8296156	0.49	0.050	8298261	0.73	0.050	8296156
Total Total Kjeldahl Nitrogen	mg/L	0.58	0.050	8293588	0.96	0.050	8298457	1.1	0.050	8293588
Dissolved Nitrite (N)	mg/L	0.018	0.010	8295896	<0.050 (2)	0.050	8295896	0.013	0.010	8295896
Dissolved Nitrate (N)	mg/L	0.22	0.010	8295896	<0.050 (2)	0.050	8295896	0.015	0.010	8295896

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5955			OT5956			OT5967		
Sampling Date		2016/06/03 13:40			2016/06/03 13:15			2016/06/03 12:50		
COC Number		493715-03-01			493715-03-01			493715-04-01		
	UNITS	MW-25B	RDL	QC Batch	MW-26B	RDL	QC Batch	MW-27A	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	110	N/A	8290646	87	N/A	8290646	29	N/A	8290646
Cation Sum	meq/L	100	N/A	8290646	79	N/A	8290646	28	N/A	8290646
Hardness (CaCO3)	mg/L	680	0.50	8290200	500	0.50	8290200	25	0.50	8290200
Ion Balance	N/A	0.95	0.010	8290644	0.91	0.010	8290644	0.94	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	2.7	0.044	8290201	0.85	0.044	8290201	0.92	0.044	8290201
Nitrate plus Nitrite (N)	mg/L	0.64	0.020	8290202	0.23	0.020	8290202	0.28	0.020	8290202
Dissolved Nitrite (NO2)	mg/L	0.063	0.033	8290201	0.12	0.033	8290201	0.23	0.033	8290201
Calculated Total Dissolved Solids	mg/L	7300	10	8290612	5600	10	8290612	1800	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	30	5.0	8291773	35	5.0	8291773	39	5.0	8291755
Misc. Inorganics										
Conductivity	uS/cm	9500	1.0	8292800	7400	1.0	8292800	2800	1.0	8292820
Dissolved Organic Carbon (C)	mg/L	10	0.50	8292035	10	0.50	8292035	N/A	0.50	N/A
pH	pH	8.09	N/A	8292802	8.15	N/A	8292802	8.57	N/A	8292821
Lab Filtered Inorganics										
Dissolved Organic Carbon (C)	mg/L	N/A	N/A	N/A	N/A	0.50	N/A	11	0.50	8293311
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8290197	<0.020	0.020	8290197	<0.020	0.020	8290197
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	17	0.50	8292818
Alkalinity (Total as CaCO3)	mg/L	790	0.50	8292794	810	0.50	8292794	730	0.50	8292818
Bicarbonate (HCO3)	mg/L	970	0.50	8292794	990	0.50	8292794	850	0.50	8292818
Carbonate (CO3)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	21	0.50	8292818
Hydroxide (OH)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	<0.50	0.50	8292818
Dissolved Sulphate (SO4)	mg/L	4500 (1)	50	8296192	3400 (1)	20	8296192	710 (1)	5.0	8296182
Dissolved Chloride (Cl)	mg/L	2.5	1.0	8296187	3.9	1.0	8296187	5.0	1.0	8296180
Nutrients										
Total Ammonia (N)	mg/L	0.58	0.050	8298261	0.43	0.050	8296618	0.86	0.050	8296618
Total Total Kjeldahl Nitrogen	mg/L	1.2	0.050	8298457	0.73	0.050	8293574	0.76	0.050	8293574
Dissolved Nitrite (N)	mg/L	0.019	0.010	8295896	0.036	0.010	8295896	0.071	0.010	8295896
Dissolved Nitrate (N)	mg/L	0.62	0.010	8295896	0.19	0.010	8295896	0.21	0.010	8295896

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5968			OT5969			OT5970		
Sampling Date		2016/06/03 13:00			2016/06/03 12:35			2016/06/03 12:20		
COC Number		493715-04-01			493715-04-01			493715-04-01		
	UNITS	MW-27B	RDL	QC Batch	MW-28A	RDL	QC Batch	MW-28B	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	140	N/A	8290646	34	N/A	8290646	160	N/A	8290646
Cation Sum	meq/L	130	N/A	8290646	36	N/A	8290646	140	N/A	8290646
Hardness (CaCO3)	mg/L	770	0.50	8290200	35	0.50	8290200	920	0.50	8290643
Ion Balance	N/A	0.97	0.010	8290644	1.0	0.010	8290644	0.91	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	4.0	0.044	8290201	0.29	0.044	8290201	1.4	0.044	8290649
Nitrate plus Nitrite (N)	mg/L	0.92	0.020	8290202	0.096	0.020	8290202	0.35	0.020	8290650
Dissolved Nitrite (NO2)	mg/L	0.046	0.033	8290201	0.10	0.033	8290201	0.13	0.033	8290649
Calculated Total Dissolved Solids	mg/L	9100	10	8290612	2200	10	8290612	10000	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	37	5.0	8294989	31	5.0	8291755	48	5.0	8291773
Misc. Inorganics										
Conductivity	uS/cm	11000	1.0	8292820	3300	1.0	8292820	13000	1.0	8292800
Dissolved Organic Carbon (C)	mg/L	15	0.50	8292372	N/A	0.50	N/A	17	0.50	8292372
pH	pH	8.19	N/A	8292821	8.54	N/A	8292821	8.14	N/A	8292802
Lab Filtered Inorganics										
Dissolved Organic Carbon (C)	mg/L	N/A	0.50	N/A	10	0.50	8293311	N/A	0.50	N/A
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	0.040	0.020	8290197	<0.020	0.020	8290197	0.034	0.020	8290197
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8292818	13	0.50	8292818	<0.50	0.50	8292794
Alkalinity (Total as CaCO3)	mg/L	1300	0.50	8292818	660	0.50	8292818	840	0.50	8292794
Bicarbonate (HCO3)	mg/L	1600	0.50	8292818	780	0.50	8292818	1000	0.50	8292794
Carbonate (CO3)	mg/L	<0.50	0.50	8292818	16	0.50	8292818	<0.50	0.50	8292794
Hydroxide (OH)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292818	<0.50	0.50	8292794
Dissolved Sulphate (SO4)	mg/L	5300 (1)	50	8296182	1000 (1)	10	8296182	6700 (1)	50	8296192
Dissolved Chloride (Cl)	mg/L	42	1.0	8296180	5.2	1.0	8296180	33	1.0	8296187
Nutrients										
Total Ammonia (N)	mg/L	0.42	0.050	8296156	1.2	0.050	8298261	1.4	0.050	8298261
Total Total Kjeldahl Nitrogen	mg/L	0.55	0.050	8293588	1.7	0.050	8298457	2.1 (2)	0.25	8298457
Dissolved Nitrite (N)	mg/L	0.014	0.010	8295896	0.030	0.010	8295896	0.038	0.010	8295896

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Dissolved greater than total. Reanalysis yields similar results.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5968			OT5969			OT5970		
Sampling Date		2016/06/03 13:00			2016/06/03 12:35			2016/06/03 12:20		
COC Number		493715-04-01			493715-04-01			493715-04-01		
	UNITS	MW-27B	RDL	QC Batch	MW-28A	RDL	QC Batch	MW-28B	RDL	QC Batch
Dissolved Nitrate (N)	mg/L	0.91	0.010	8295896	0.066	0.010	8295896	0.31	0.010	8295896
RDL = Reportable Detection Limit										

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5971			OT5972			OT5973		
Sampling Date		2016/06/03 12:10			2016/06/03 12:00			2016/06/03 11:50		
COC Number		493715-04-01			493715-04-01			493715-04-01		
	UNITS	MW-29A	RDL	QC Batch	MW-29B	RDL	QC Batch	MW-30B	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	37	N/A	8290646	110	N/A	8290646	28	N/A	8290646
Cation Sum	meq/L	38	N/A	8290646	120	N/A	8290646	28	N/A	8290646
Hardness (CaCO3)	mg/L	100	0.50	8290643	2400	0.50	8290643	100	0.50	8290643
Ion Balance	N/A	1.0	0.010	8290644	1.0	0.010	8290644	1.0	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	0.28	0.044	8290649	0.48	0.044	8290649	0.52	0.044	8290649
Nitrate plus Nitrite (N)	mg/L	0.077	0.020	8290650	0.13	0.020	8290650	0.13	0.020	8290650
Dissolved Nitrite (NO2)	mg/L	0.047	0.033	8290649	0.083	0.033	8290649	0.039	0.033	8290649
Calculated Total Dissolved Solids	mg/L	2400	10	8290612	7700	10	8290612	1800	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	55	5.0	8293135	41	5.0	8293135	44	5.0	8293135
Misc. Inorganics										
Conductivity	uS/cm	3400	1.0	8292820	8400	1.0	8292820	2600	1.0	8292800
Dissolved Organic Carbon (C)	mg/L	8.3	0.50	8292619	15	0.50	8292619	9.1	0.50	8292372
pH	pH	8.41	N/A	8292821	7.85	N/A	8292821	8.44	N/A	8292802
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8290197	0.082	0.020	8290197	<0.020	0.020	8290639
Anions										
Alkalinity (PP as CaCO3)	mg/L	6.4	0.50	8292818	<0.50	0.50	8292818	6.7	0.50	8292794
Alkalinity (Total as CaCO3)	mg/L	590	0.50	8292818	420	0.50	8292818	520	0.50	8292794
Bicarbonate (HCO3)	mg/L	710	0.50	8292818	520	0.50	8292818	610	0.50	8292794
Carbonate (CO3)	mg/L	7.7	0.50	8292818	<0.50	0.50	8292818	8.0	0.50	8292794
Hydroxide (OH)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292818	<0.50	0.50	8292794
Dissolved Sulphate (SO4)	mg/L	1200 (1)	10	8295605	5100 (1)	50	8295605	830 (1)	5.0	8295605
Dissolved Chloride (Cl)	mg/L	3.3	1.0	8295598	5.2	1.0	8295598	1.5	1.0	8295598
Nutrients										
Total Ammonia (N)	mg/L	1.2	0.050	8296156	1.1 (2)	0.050	8296156	<0.050	0.050	8296156
Total Total Kjeldahl Nitrogen	mg/L	1.3	0.050	8293588	0.96	0.050	8293588	0.40	0.050	8294672
Dissolved Nitrite (N)	mg/L	0.014	0.010	8295896	0.025	0.010	8295897	0.012	0.010	8295897
Dissolved Nitrate (N)	mg/L	0.063	0.010	8295896	0.11	0.010	8295897	0.12	0.010	8295897

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Ammonia greater than TKN. Results are within acceptable limits of precision.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5974			OT5975			OT5977		
Sampling Date		2016/06/03 10:55			2016/06/03 11:00			2016/06/03 10:40		
COC Number		493715-04-01			493715-04-01			493715-05-01		
	UNITS	MW-31A	RDL	QC Batch	MW-31B	RDL	QC Batch	MW-32A	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	19	N/A	8290646	26	N/A	8290646	96	N/A	8290646
Cation Sum	meq/L	19	N/A	8290646	27	N/A	8290646	96	N/A	8290646
Hardness (CaCO3)	mg/L	11	0.50	8290643	59	0.50	8290643	360	0.50	8290643
Ion Balance	N/A	1.0	0.010	8290644	1.0	0.010	8290644	1.0	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	8.8	0.044	8290649	<0.044	0.044	8290649	<0.22	0.22	8290649
Nitrate plus Nitrite (N)	mg/L	2.0	0.020	8290650	<0.020	0.020	8290650	<0.020	0.020	8290650
Dissolved Nitrite (NO2)	mg/L	0.092	0.033	8290649	<0.033	0.033	8290649	<0.16	0.16	8290649
Calculated Total Dissolved Solids	mg/L	1000	10	8290612	1700	10	8290612	6500	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	380 (1)	100	8294512	28	5.0	8293135	26	5.0	8293135
Misc. Inorganics										
Conductivity	uS/cm	1800	1.0	8292820	2500	1.0	8292800	8100	1.0	8292800
Dissolved Organic Carbon (C)	mg/L	N/A	N/A	N/A	8.2	0.50	8292372	7.9	0.50	8292619
pH	pH	8.53	N/A	8292821	8.56	N/A	8292802	8.25	N/A	8292802
Lab Filtered Inorganics										
Dissolved Organic Carbon (C)	mg/L	17 (2)	5.0	8293311	N/A	N/A	N/A	N/A	N/A	N/A
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8290639	<0.020	0.020	8290639	<0.020	0.020	8290639
Anions										
Alkalinity (PP as CaCO3)	mg/L	15	0.50	8292818	11	0.50	8292794	<0.50	0.50	8292794
Alkalinity (Total as CaCO3)	mg/L	800	0.50	8292818	520	0.50	8292794	800	0.50	8292794
Bicarbonate (HCO3)	mg/L	940	0.50	8292818	610	0.50	8292794	980	0.50	8292794
Carbonate (CO3)	mg/L	18	0.50	8292818	13	0.50	8292794	<0.50	0.50	8292794
Hydroxide (OH)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292794	<0.50	0.50	8292794
Dissolved Sulphate (SO4)	mg/L	120	1.0	8296192	750 (3)	5.0	8295605	3900 (3)	25	8295605
Dissolved Chloride (Cl)	mg/L	6.7	1.0	8296187	1.4	1.0	8295598	3.1	1.0	8295598
Nutrients										
Total Ammonia (N)	mg/L	1.1 (4)	0.050	8296156	0.13	0.050	8296156	2.9 (3)	0.25	8298261

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to matrix interference.
(2) Detection limits raised due to sample matrix.
(3) Detection limits raised due to dilution to bring analyte within the calibrated range.
(4) Ammonia greater than TKN. Results are within acceptable limits of precision.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5974			OT5975			OT5977		
Sampling Date		2016/06/03 10:55			2016/06/03 11:00			2016/06/03 10:40		
COC Number		493715-04-01			493715-04-01			493715-05-01		
	UNITS	MW-31A	RDL	QC Batch	MW-31B	RDL	QC Batch	MW-32A	RDL	QC Batch
Total Total Kjeldahl Nitrogen	mg/L	1.0	0.050	8293574	0.38	0.050	8293574	3.2 (1)	0.25	8298457
Dissolved Nitrite (N)	mg/L	0.028	0.010	8295897	<0.010	0.010	8295897	<0.050 (2)	0.050	8295897
Dissolved Nitrate (N)	mg/L	2.0	0.010	8295897	<0.010	0.010	8295897	<0.050 (2)	0.050	8295897

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Reanalysis yields similar results.
(2) Detection limits raised due to matrix interference.

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5978			OT5979			OT5980		
Sampling Date		2016/06/03 10:05			2016/06/03 09:55			2016/06/03 08:30		
COC Number		493715-05-01			493715-05-01			493715-05-01		
	UNITS	MW-33A	RDL	QC Batch	MW-33B	RDL	QC Batch	MW-34A	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	22	N/A	8290646	62	N/A	8290646	32	N/A	8290646
Cation Sum	meq/L	21	N/A	8290646	63	N/A	8290646	32	N/A	8290646
Hardness (CaCO3)	mg/L	24	0.50	8290643	440	0.50	8290643	67	0.50	8290643
Ion Balance	N/A	0.96	0.010	8290644	1.0	0.010	8290644	1.0	0.010	8290644
Dissolved Nitrate (NO3)	mg/L	<0.044	0.044	8290649	<0.22	0.22	8290649	<0.22	0.22	8290649
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8290650	<0.020	0.020	8290650	<0.020	0.020	8290650
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	8290649	<0.16	0.16	8290649	<0.16	0.16	8290649
Calculated Total Dissolved Solids	mg/L	1200	10	8290612	4000	10	8290612	1900	10	8290612
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	140 (1)	10	8291755	140	5.0	8293135	470	5.0	8293135
Misc. Inorganics										
Conductivity	uS/cm	2100	1.0	8292800	5400	1.0	8292800	3000	1.0	8292800
Dissolved Organic Carbon (C)	mg/L	N/A	N/A	N/A	44 (2)	2.5	8292619	72 (2)	5.0	8292619
pH	pH	8.52	N/A	8292802	8.15	N/A	8292802	8.57	N/A	8292802
Lab Filtered Inorganics										
Dissolved Organic Carbon (C)	mg/L	33 (2)	1.0	8293311	N/A	N/A	N/A	N/A	N/A	N/A
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8290639	<0.020	0.020	8290639	<0.020	0.020	8290639
Anions										
Alkalinity (PP as CaCO3)	mg/L	13	0.50	8292794	<0.50	0.50	8292794	21	0.50	8292794
Alkalinity (Total as CaCO3)	mg/L	840	0.50	8292794	920	0.50	8292794	990	0.50	8292794
Bicarbonate (HCO3)	mg/L	990	0.50	8292794	1100	0.50	8292794	1200	0.50	8292794
Carbonate (CO3)	mg/L	16	0.50	8292794	<0.50	0.50	8292794	25	0.50	8292794
Hydroxide (OH)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	<0.50	0.50	8292794
Dissolved Sulphate (SO4)	mg/L	230 (2)	2.0	8296192	2000 (2)	20	8295605	510 (2)	5.0	8295605
Dissolved Chloride (Cl)	mg/L	27	1.0	8296187	20	1.0	8295598	51	1.0	8295598
Nutrients										
Total Ammonia (N)	mg/L	0.89	0.050	8296618	0.78	0.050	8296156	1.1	0.050	8296156
Total Total Kjeldahl Nitrogen	mg/L	2.6 (2)	0.25	8293574	2.6 (2)	0.25	8293588	2.6 (2)	0.25	8293574
Dissolved Nitrite (N)	mg/L	<0.010	0.010	8295897	<0.050 (1)	0.050	8295897	<0.050 (1)	0.050	8295897

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

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5978			OT5979			OT5980		
Sampling Date		2016/06/03 10:05			2016/06/03 09:55			2016/06/03 08:30		
COC Number		493715-05-01			493715-05-01			493715-05-01		
	UNITS	MW-33A	RDL	QC Batch	MW-33B	RDL	QC Batch	MW-34A	RDL	QC Batch
Dissolved Nitrate (N)	mg/L	<0.010	0.010	8295897	<0.050 (1)	0.050	8295897	<0.050 (1)	0.050	8295897

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT5981			OT5998			OT5999		
Sampling Date		2016/06/03 08:10			2016/06/03 11:35			2016/06/03 11:15		
COC Number		493715-05-01			493715-06-01			493715-06-01		
	UNITS	MW-34B	RDL	QC Batch	MW-36-DEEP	RDL	QC Batch	MW-36A	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	29	N/A	8290646	34	N/A	8290646	17	N/A	8290648
Cation Sum	meq/L	28	N/A	8290646	36	N/A	8290646	17	N/A	8290648
Hardness (CaCO3)	mg/L	670	0.50	8290643	52	0.50	8290643	12	0.50	8290643
Ion Balance	N/A	0.96	0.010	8290644	1.1	0.010	8290644	1.0	0.010	8290645
Dissolved Nitrate (NO3)	mg/L	0.063	0.044	8290649	0.080	0.044	8290649	<0.044	0.044	8290649
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8290650	0.061	0.020	8290650	<0.020	0.020	8290650
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	8290649	0.14	0.033	8290649	<0.033	0.033	8290649
Calculated Total Dissolved Solids	mg/L	1600	10	8290612	2000	10	8290612	900	10	8290613
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	81	5.0	8291755	99	5.0	8293135	55	5.0	8293135
Misc. Inorganics										
Conductivity	uS/cm	2400	1.0	8292820	3600	1.0	8292820	1600	1.0	8292800
Dissolved Organic Carbon (C)	mg/L	N/A	0.50	N/A	12	0.50	8292372	13	0.50	8292372
pH	pH	7.65	N/A	8292821	8.51	N/A	8292821	8.66	N/A	8292802
Lab Filtered Inorganics										
Dissolved Organic Carbon (C)	mg/L	14	0.50	8293311	N/A	0.50	N/A	N/A	0.50	N/A
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	0.10	0.020	8290639	0.070	0.020	8290639	<0.020	0.020	8290639
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8292818	11	0.50	8292818	21	0.50	8292794
Alkalinity (Total as CaCO3)	mg/L	840	0.50	8292818	550	0.50	8292818	830	0.50	8292794
Bicarbonate (HCO3)	mg/L	1000	0.50	8292818	650	0.50	8292818	970	0.50	8292794
Carbonate (CO3)	mg/L	<0.50	0.50	8292818	13	0.50	8292818	25	0.50	8292794
Hydroxide (OH)	mg/L	<0.50	0.50	8292818	<0.50	0.50	8292818	<0.50	0.50	8292794
Dissolved Sulphate (SO4)	mg/L	510 (1)	5.0	8296192	46	1.0	8296182	<1.0	1.0	8295605
Dissolved Chloride (Cl)	mg/L	39	1.0	8296187	770 (1)	5.0	8296180	7.4	1.0	8295598
Nutrients										
Total Ammonia (N)	mg/L	0.16	0.050	8296618	0.92	0.050	8296156	0.60	0.050	8296156
Total Total Kjeldahl Nitrogen	mg/L	0.89	0.050	8293574	1.9	0.050	8293574	1.3	0.050	8293574
Dissolved Nitrite (N)	mg/L	<0.010	0.010	8295897	0.043	0.010	8295897	<0.010	0.010	8295897
Dissolved Nitrate (N)	mg/L	0.014	0.010	8295897	0.018	0.010	8295897	<0.010	0.010	8295897

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

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT6000			OT6001			OT6002		
Sampling Date		2016/06/03			2016/06/03			2016/06/03		
COC Number		493715-06-01			493715-06-01			493715-06-01		
	UNITS	TRIP BLANK	RDL	QC Batch	DUPLICATE 2	RDL	QC Batch	DUPLICATE 3	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	0.0000	N/A	8290648	90	N/A	8290648	17	N/A	8290648
Cation Sum	meq/L	0.0020	N/A	8290648	87	N/A	8290648	17	N/A	8290648
Hardness (CaCO3)	mg/L	<0.50	0.50	8290643	510	0.50	8290643	11	0.50	8290643
Ion Balance	N/A	NC	0.010	8290645	0.96	0.010	8290645	0.97	0.010	8290645
Dissolved Nitrate (NO3)	mg/L	<0.044	0.044	8290649	0.80	0.044	8290649	<0.044	0.044	8290649
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8290650	0.22	0.020	8290650	<0.020	0.020	8290650
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	8290649	0.11	0.033	8290649	<0.033	0.033	8290649
Calculated Total Dissolved Solids	mg/L	<10	10	8290613	5900	10	8290613	900	10	8290613
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	<5.0	5.0	8298451	31	5.0	8291755	52	5.0	8291755
Misc. Inorganics										
Conductivity	uS/cm	<1.0	1.0	8292800	7300	1.0	8292800	1600	1.0	8292800
Dissolved Organic Carbon (C)	mg/L	<0.50	0.50	8292619	11	0.50	8292372	13	0.50	8292372
pH	pH	5.80	N/A	8292802	8.20	N/A	8292802	8.66	N/A	8292802
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8290639	<0.020	0.020	8290639	<0.020	0.020	8290639
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	23	0.50	8292794
Alkalinity (Total as CaCO3)	mg/L	<0.50	0.50	8292794	790	0.50	8292794	850	0.50	8292794
Bicarbonate (HCO3)	mg/L	<0.50	0.50	8292794	960	0.50	8292794	980	0.50	8292794
Carbonate (CO3)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	27	0.50	8292794
Hydroxide (OH)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8292794	<0.50	0.50	8292794
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	8295605	3500 (1)	20	8295605	<1.0	1.0	8296192
Dissolved Chloride (Cl)	mg/L	<1.0	1.0	8295598	3.8	1.0	8295598	7.9	1.0	8296187
Nutrients										
Total Ammonia (N)	mg/L	<0.050	0.050	8296156	0.45	0.050	8298261	0.58	0.050	8296618
Total Total Kjeldahl Nitrogen	mg/L	0.068	0.050	8293574	0.91	0.050	8298457	1.2	0.050	8293574
Dissolved Nitrite (N)	mg/L	<0.010	0.010	8295897	0.034	0.010	8295897	<0.010	0.010	8295897
Dissolved Nitrate (N)	mg/L	<0.010	0.010	8295897	0.18	0.010	8295897	<0.010	0.010	8295897

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OT6003			OT6180		
Sampling Date		2016/06/03			2016/06/03		
COC Number		493715-06-01			493715-06-01		
	UNITS	DUPLICATE 4	RDL	QC Batch	DUPLICATE 5	RDL	QC Batch
Calculated Parameters							
Anion Sum	meq/L	46	N/A	8290648	28	N/A	8290648
Cation Sum	meq/L	46	N/A	8290648	30	N/A	8290648
Hardness (CaCO3)	mg/L	270	0.50	8290643	740	0.50	8290643
Ion Balance	N/A	1.0	0.010	8290645	1.1	0.010	8290645
Dissolved Nitrate (NO3)	mg/L	0.30	0.044	8290649	0.068	0.044	8290649
Nitrate plus Nitrite (N)	mg/L	0.078	0.020	8290650	<0.020	0.020	8290650
Dissolved Nitrite (NO2)	mg/L	0.033	0.033	8290649	<0.033	0.033	8290649
Calculated Total Dissolved Solids	mg/L	3000	10	8290613	1700	10	8290613
Demand Parameters							
Total Chemical Oxygen Demand	mg/L	40	5.0	8291773	61	5.0	8291773
Misc. Inorganics							
Conductivity	uS/cm	4400	1.0	8292800	2400	1.0	8293867
Dissolved Organic Carbon (C)	mg/L	10	0.50	8292372	14	0.50	8292372
pH	pH	8.42	N/A	8292802	7.92	N/A	8293870
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8290639	<0.020	0.020	8290639
Anions							
Alkalinity (PP as CaCO3)	mg/L	5.9	0.50	8292794	<0.50	0.50	8293866
Alkalinity (Total as CaCO3)	mg/L	490	0.50	8292794	840	0.50	8293866
Bicarbonate (HCO3)	mg/L	590	0.50	8292794	1000	0.50	8293866
Carbonate (CO3)	mg/L	7.0	0.50	8292794	<0.50	0.50	8293866
Hydroxide (OH)	mg/L	<0.50	0.50	8292794	<0.50	0.50	8293866
Dissolved Sulphate (SO4)	mg/L	1600 (1)	20	8296192	510 (1)	5.0	8296192
Dissolved Chloride (Cl)	mg/L	81	1.0	8296187	38	1.0	8296187
Nutrients							
Total Ammonia (N)	mg/L	0.21	0.050	8296618	0.22	0.050	8296618
Total Total Kjeldahl Nitrogen	mg/L	0.55	0.050	8292975	0.61	0.050	8293574
Dissolved Nitrite (N)	mg/L	0.010	0.010	8295897	<0.010	0.010	8295897
Dissolved Nitrate (N)	mg/L	0.067	0.010	8295897	0.015	0.010	8295897

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		OT5939	OT5940	OT5941	OT5942	OT5943	OT5944		
Sampling Date		2016/06/03 09:35	2016/06/03 09:40	2016/06/02 11:05	2016/06/02 10:20	2016/06/02 10:25	2016/06/02 09:20		
COC Number		493715-01-01	493715-01-01	493715-01-01	493715-01-01	493715-01-01	493715-01-01		
	UNITS	MW-8A	MW-8B	MW-5A	MW-12B	MW-12A	MW-18A	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8291534
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	103	100	97	104	103	106	N/A	8291534

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		OT5945	OT5946	OT5948	OT5949	OT5950	OT5951		
Sampling Date		2016/06/02 09:20	2016/06/03 09:20	2016/06/03 08:50	2016/06/02 10:55	2016/06/03 09:00	2016/06/02 10:00		
COC Number		493715-01-01	493715-01-01	493715-02-01	493715-02-01	493715-02-01	493715-02-01		
	UNITS	MW-18B	MW-11	MW-14	MW-24B	MW-10	MW-1B	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8291534
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	98	100	99	102	95	105	N/A	8291534

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		OT5952	OT5953	OT5954		OT5955	OT5956		
Sampling Date		2016/06/02 10:00	2016/06/02 08:50	2016/06/02 08:50		2016/06/03 13:40	2016/06/03 13:15		
COC Number		493715-02-01	493715-02-01	493715-02-01		493715-03-01	493715-03-01		
	UNITS	MW-1C	MW-19A	MW-19B	QC Batch	MW-25B	MW-26B	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	8291534	<0.10	<0.10	0.10	8291528
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	98	96	96	8291534	98	104	N/A	8291528

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		OT5967		OT5968		OT5969	OT5970	OT5971		
Sampling Date		2016/06/03 12:50		2016/06/03 13:00		2016/06/03 12:35	2016/06/03 12:20	2016/06/03 12:10		
COC Number		493715-04-01		493715-04-01		493715-04-01	493715-04-01	493715-04-01		
	UNITS	MW-27A	QC Batch	MW-27B	QC Batch	MW-28A	MW-28B	MW-29A	RDL	QC Batch
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	8291534	<0.10	8291528	<0.10	<0.10	<0.10	0.10	8291534
Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	98	8291534	97	8291528	99	101	93	N/A	8291534

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		OT5972		OT5973	OT5974	OT5975	OT5977		
Sampling Date		2016/06/03 12:00		2016/06/03 11:50	2016/06/03 10:55	2016/06/03 11:00	2016/06/03 10:40		
COC Number		493715-04-01		493715-04-01	493715-04-01	493715-04-01	493715-05-01		
	UNITS	MW-29B	QC Batch	MW-30B	MW-31A	MW-31B	MW-32A	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	8291534	<0.10	<0.10	<0.10	<0.10	0.10	8291535
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	101	8291534	96	96	90	93	N/A	8291535

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		OT5978	OT5979	OT5980	OT5981	OT5998	OT5999		
Sampling Date		2016/06/03 10:05	2016/06/03 09:55	2016/06/03 08:30	2016/06/03 08:10	2016/06/03 11:35	2016/06/03 11:15		
COC Number		493715-05-01	493715-05-01	493715-05-01	493715-05-01	493715-06-01	493715-06-01		
	UNITS	MW-33A	MW-33B	MW-34A	MW-34B	MW-36-DEEP	MW-36A	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8291535
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	95	89	95	94	98	95	N/A	8291535

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		OT6000		OT6001		OT6002	OT6003	OT6180		
Sampling Date		2016/06/03		2016/06/03		2016/06/03	2016/06/03	2016/06/03		
COC Number		493715-06-01		493715-06-01		493715-06-01	493715-06-01	493715-06-01		
	UNITS	TRIP BLANK	QC Batch	DUPLICATE 2	QC Batch	DUPLICATE 3	DUPLICATE 4	DUPLICATE 5	RDL	QC Batch
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	8291535	<0.10	8291528	<0.10	<0.10	<0.10	0.10	8291535
Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	97	8291535	99	8291528	99	98	90	N/A	8291535

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		OT5955	OT5956	OT5968		OT6001		
Sampling Date		2016/06/03 13:40	2016/06/03 13:15	2016/06/03 13:00		2016/06/03		
COC Number		493715-03-01	493715-03-01	493715-04-01		493715-06-01		
	UNITS	MW-25B	MW-26B	MW-27B	QC Batch	DUPLICATE 2	RDL	QC Batch
Polycyclic Aromatics								
Benzo[a]pyrene equivalency	ug/L	<0.010	<0.010	<0.010	8290204	<0.010	0.010	8290502
Acenaphthene	ug/L	<0.10	<0.10	<0.10	8291527	<0.10	0.10	8291527
Acenaphthylene	ug/L	<0.10	<0.10	<0.10	8291527	<0.10	0.10	8291527
Acridine	ug/L	<0.20	<0.20	<0.20	8291527	<0.20	0.20	8291527
Anthracene	ug/L	<0.010	<0.010	<0.010	8291527	<0.010	0.010	8291527
Benzo(a)anthracene	ug/L	<0.0085	<0.0085	<0.0085	8291527	<0.0085	0.0085	8291527
Benzo(b&j)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	8291527	<0.0085	0.0085	8291527
Benzo(k)fluoranthene	ug/L	<0.0085	<0.0085	<0.0085	8291527	<0.0085	0.0085	8291527
Benzo(g,h,i)perylene	ug/L	<0.0085	<0.0085	<0.0085	8291527	<0.0085	0.0085	8291527
Benzo(c)phenanthrene	ug/L	<0.050	<0.050	<0.050	8291527	<0.050	0.050	8291527
Benzo(a)pyrene	ug/L	<0.0075	<0.0075	<0.0075	8291527	<0.0075	0.0075	8291527
Benzo[e]pyrene	ug/L	<0.050	<0.050	<0.050	8291527	<0.050	0.050	8291527
Chrysene	ug/L	<0.0085	<0.0085	<0.0085	8291527	<0.0085	0.0085	8291527
Dibenz(a,h)anthracene	ug/L	<0.0075	<0.0075	<0.0075	8291527	<0.0075	0.0075	8291527
Fluoranthene	ug/L	<0.010	<0.010	<0.010	8291527	<0.010	0.010	8291527
Fluorene	ug/L	<0.050	<0.050	<0.050	8291527	<0.050	0.050	8291527
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	<0.0085	<0.0085	8291527	<0.0085	0.0085	8291527
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	8291527	<0.10	0.10	8291527
Naphthalene	ug/L	<0.10	<0.10	<0.10	8291527	<0.10	0.10	8291527
Phenanthrene	ug/L	<0.050	<0.050	<0.050	8291527	<0.050	0.050	8291527
Perylene	ug/L	<0.050	<0.050	<0.050	8291527	<0.050	0.050	8291527
Pyrene	ug/L	<0.020	<0.020	<0.020	8291527	<0.020	0.020	8291527
Quinoline	ug/L	<0.20	<0.20	<0.20	8291527	<0.20	0.20	8291527
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	109	85	109	8291527	110	N/A	8291527
D8-ACENAPHTHYLENE (sur.)	%	98	76	89	8291527	96	N/A	8291527
D8-NAPHTHALENE (sur.)	%	81	60	74	8291527	72	N/A	8291527
TERPHENYL-D14 (sur.)	%	108	84	105	8291527	108	N/A	8291527

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5939		OT5940	OT5941		OT5942		
Sampling Date		2016/06/03 09:35		2016/06/03 09:40	2016/06/02 11:05		2016/06/02 10:20		
COC Number		493715-01-01		493715-01-01	493715-01-01		493715-01-01		
	UNITS	MW-8A	RDL	MW-8B	MW-5A	RDL	MW-12B	RDL	QC Batch
Elements									
Dissolved Aluminum (Al)	mg/L	0.0093	0.0030	0.0050 (1)	<0.0030	0.0030	<0.0030	0.0030	8291317
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	<0.00060	0.00060	<0.00060	0.00060	8291317
Dissolved Arsenic (As)	mg/L	0.0021	0.00020	0.0015	0.00058	0.00020	0.00088	0.00020	8291317
Dissolved Barium (Ba)	mg/L	0.045	0.010	0.013	<0.010	0.010	<0.010	0.010	8295001
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	8291317
Dissolved Boron (B)	mg/L	0.72	0.020	0.41	0.56	0.020	0.57	0.020	8295001
Dissolved Calcium (Ca)	mg/L	7.8	0.30	97	270	0.30	270	0.30	8295001
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	8291317
Dissolved Cobalt (Co)	mg/L	0.00046	0.00030	0.0011	0.00086	0.00030	0.00050	0.00030	8291317
Dissolved Copper (Cu)	mg/L	0.00042	0.00020	0.00034	0.0057	0.00020	0.0023	0.00020	8291317
Dissolved Iron (Fe)	mg/L	<0.060	0.060	<0.060	<0.060	0.060	0.13	0.060	8295001
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.00020	<0.00020	0.00020	0.00021	0.00020	8291317
Dissolved Lithium (Li)	mg/L	0.11	0.020	0.30	0.63	0.020	0.56	0.020	8295001
Dissolved Magnesium (Mg)	mg/L	1.3	0.20	54	95	0.20	54	0.20	8295001
Dissolved Manganese (Mn)	mg/L	0.015	0.0040	0.18	0.15	0.0040	0.36	0.0040	8295001
Dissolved Molybdenum (Mo)	mg/L	0.0070	0.00020	0.0016	0.00080	0.00020	0.00077	0.00020	8291317
Dissolved Nickel (Ni)	mg/L	0.0023	0.00050	0.0035	0.0086	0.00050	0.0030	0.00050	8291317
Dissolved Phosphorus (P)	mg/L	0.10	0.10	<0.10	<0.10	0.10	<0.10	0.10	8295001
Dissolved Potassium (K)	mg/L	2.3	0.30	6.7	11	0.30	11	0.30	8295001
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	<0.00020	<0.00020	0.00020	0.00029	0.00020	8291317
Dissolved Silicon (Si)	mg/L	3.6	0.10	4.3	4.6	0.10	4.5	0.10	8295001
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00010	8291317
Dissolved Sodium (Na)	mg/L	600 (2)	5.0	2000 (2)	2100 (2)	5.0	2500 (2)	5.0	8295001
Dissolved Strontium (Sr)	mg/L	0.17	0.020	2.1	4.6	0.020	5.2 (2)	0.20	8295001
Dissolved Sulphur (S)	mg/L	100	0.20	1400 (2)	1800 (2)	2.0	2000 (2)	2.0	8295001
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	<0.00020	0.00020	<0.00020	0.00020	8291317
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	8291317
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	0.0011	<0.0010	0.0010	<0.0010	0.0010	8291317
Dissolved Uranium (U)	mg/L	0.00092	0.00010	0.0024	0.00031	0.00010	0.021	0.00010	8291317
Dissolved Vanadium (V)	mg/L	0.0028	0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	8291317
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	<0.0030	0.0033	0.0030	0.0061	0.0030	8291317

RDL = Reportable Detection Limit
(1) Matrix spike exceeds acceptance limits due to matrix interference.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5939		OT5940	OT5941		OT5942		
Sampling Date		2016/06/03 09:35		2016/06/03 09:40	2016/06/02 11:05		2016/06/02 10:20		
COC Number		493715-01-01		493715-01-01	493715-01-01		493715-01-01		
	UNITS	MW-8A	RDL	MW-8B	MW-5A	RDL	MW-12B	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	0.0020	<0.0020	<0.0020	0.0020	<0.0020	0.0020	8294971
RDL = Reportable Detection Limit									

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Maxxam Job #: B644197
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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5943		OT5944		OT5945	OT5946		
Sampling Date		2016/06/02 10:25		2016/06/02 09:20		2016/06/02 09:20	2016/06/03 09:20		
COC Number		493715-01-01		493715-01-01		493715-01-01	493715-01-01		
	UNITS	MW-12A	RDL	MW-18A	RDL	MW-18B	MW-11	RDL	QC Batch
Elements									
Dissolved Aluminum (Al)	mg/L	0.0087	0.0030	0.029	0.0030	0.11	0.0060	0.0030	8291317
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	0.00060	<0.00060	<0.00060	0.00060	8291317
Dissolved Arsenic (As)	mg/L	0.00097	0.00020	0.00092	0.00020	0.00041	0.0011	0.00020	8291317
Dissolved Barium (Ba)	mg/L	<0.010 (1)	0.010	0.091	0.010	0.014	<0.010	0.010	8295001
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	8291317
Dissolved Boron (B)	mg/L	0.42	0.020	0.81	0.020	0.075	0.20	0.020	8295001
Dissolved Calcium (Ca)	mg/L	150	0.30	3.0	0.30	180	230	0.30	8295001
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0011	0.0010	8291317
Dissolved Cobalt (Co)	mg/L	0.00048	0.00030	0.00031	0.00030	0.00031	<0.00030	0.00030	8291317
Dissolved Copper (Cu)	mg/L	0.0028	0.00020	0.00023	0.00020	0.0013	0.0025	0.00020	8291317
Dissolved Iron (Fe)	mg/L	<0.060	0.060	0.11	0.060	0.25	<0.060	0.060	8295001
Dissolved Lead (Pb)	mg/L	0.00022	0.00020	<0.00020	0.00020	0.00037	<0.00020	0.00020	8291317
Dissolved Lithium (Li)	mg/L	0.59	0.020	0.073	0.020	0.17	0.55	0.020	8295001
Dissolved Magnesium (Mg)	mg/L	82	0.20	0.34	0.20	45	120	0.20	8295001
Dissolved Manganese (Mn)	mg/L	0.055	0.0040	0.059	0.0040	0.046	0.0081	0.0040	8295001
Dissolved Molybdenum (Mo)	mg/L	0.00071	0.00020	0.0043	0.00020	0.00072	0.00090	0.00020	8291317
Dissolved Nickel (Ni)	mg/L	0.0035	0.00050	0.0035	0.00050	0.0044	0.0060	0.00050	8291317
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	0.10	0.10	<0.10	<0.10	0.10	8295001
Dissolved Potassium (K)	mg/L	11	0.30	1.5	0.30	4.5	9.1	0.30	8295001
Dissolved Selenium (Se)	mg/L	0.00023	0.00020	<0.00020	0.00020	<0.00020	0.0011	0.00020	8291317
Dissolved Silicon (Si)	mg/L	4.5	0.10	3.5	0.10	4.1	4.9	0.10	8295001
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	<0.00010	0.00010	8291317
Dissolved Sodium (Na)	mg/L	2600 (2)	5.0	380	0.50	570 (2)	2100 (2)	5.0	8295001
Dissolved Strontium (Sr)	mg/L	3.0	0.020	0.066	0.020	1.5	4.0	0.020	8295001
Dissolved Sulphur (S)	mg/L	2100 (2)	2.0	0.22	0.20	510 (2)	1700 (2)	2.0	8295001
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	<0.00020	<0.00020	0.00020	8291317
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	8291317
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	0.0013	0.0010	0.0011	<0.0010	0.0010	8291317
Dissolved Uranium (U)	mg/L	0.0021	0.00010	0.00013	0.00010	0.00091	0.030	0.00010	8291317
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	8291317
Dissolved Zinc (Zn)	mg/L	0.010	0.0030	<0.0030	0.0030	0.0047	0.0077	0.0030	8291317

RDL = Reportable Detection Limit

(1) Matrix Spike exceeds acceptance limits due to matrix interference. Reanalysis yields similar results.

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5943		OT5944		OT5945	OT5946		
Sampling Date		2016/06/02 10:25		2016/06/02 09:20		2016/06/02 09:20	2016/06/03 09:20		
COC Number		493715-01-01		493715-01-01		493715-01-01	493715-01-01		
	UNITS	MW-12A	RDL	MW-18A	RDL	MW-18B	MW-11	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	0.0020	<0.0020	0.0020	0.0068	0.0022	0.0020	8294971
RDL = Reportable Detection Limit									

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5948	OT5949	OT5950	OT5951	OT5952	OT5953		
Sampling Date		2016/06/03 08:50	2016/06/02 10:55	2016/06/03 09:00	2016/06/02 10:00	2016/06/02 10:00	2016/06/02 08:50		
COC Number		493715-02-01	493715-02-01	493715-02-01	493715-02-01	493715-02-01	493715-02-01		
	UNITS	MW-14	MW-24B	MW-10	MW-1B	MW-1C	MW-19A	RDL	QC Batch
Elements									
Dissolved Aluminum (Al)	mg/L	<0.0030	<0.0030	0.0091	N/A	0.0079	0.0072	0.0030	8291317
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	N/A	<0.00060	<0.00060	0.00060	8291317
Dissolved Arsenic (As)	mg/L	0.00069	0.00085	0.00060	N/A	0.0011	0.00065	0.00020	8291317
Dissolved Barium (Ba)	mg/L	0.042	<0.010	0.023	N/A	0.023	<0.010	0.010	8295001
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	N/A	<0.0010	<0.0010	0.0010	8291317
Dissolved Boron (B)	mg/L	0.13	0.26	0.12	N/A	0.24	0.41	0.020	8295001
Dissolved Calcium (Ca)	mg/L	230	320	60	N/A	140	55	0.30	8295001
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0021	N/A	<0.0010	<0.0010	0.0010	8291317
Dissolved Cobalt (Co)	mg/L	0.0019	<0.00030	0.00057	N/A	0.00087	0.00042	0.00030	8291317
Dissolved Copper (Cu)	mg/L	0.00045	0.0041	0.0035	N/A	0.00070	0.0014	0.00020	8291317
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	<0.060	N/A	<0.060	<0.060	0.060	8295001
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	N/A	<0.00020	<0.00020	0.00020	8291317
Dissolved Lithium (Li)	mg/L	0.36	0.86	0.23	N/A	0.32	0.51	0.020	8295001
Dissolved Magnesium (Mg)	mg/L	190	170	31	N/A	36	32	0.20	8295001
Dissolved Manganese (Mn)	mg/L	0.63	<0.0040	0.094	N/A	0.28	0.36	0.0040	8295001
Dissolved Molybdenum (Mo)	mg/L	0.00074	0.0023	0.0038	N/A	0.0013	0.0016	0.00020	8291317
Dissolved Nickel (Ni)	mg/L	0.0031	0.071	0.059	N/A	0.0021	0.0028	0.00050	8291317
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	N/A	<0.10	<0.10	0.10	8295001
Dissolved Potassium (K)	mg/L	25	12	4.4	N/A	6.9	8.9	0.30	8295001
Dissolved Selenium (Se)	mg/L	<0.00020	0.00035	0.00052	N/A	<0.00020	<0.00020	0.00020	8291317
Dissolved Silicon (Si)	mg/L	7.2	9.7	4.7	N/A	4.1	4.5	0.10	8295001
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	0.00010	8291317
Dissolved Sodium (Na)	mg/L	690 (1)	1900 (1)	840 (1)	N/A	1300 (1)	1500 (1)	5.0	8295001
Dissolved Strontium (Sr)	mg/L	3.4	4.6	0.92	N/A	2.2	1.3	0.020	8295001
Dissolved Sulphur (S)	mg/L	640 (1)	1600 (1)	510 (1)	N/A	950 (1)	980 (1)	2.0	8295001
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	N/A	<0.00020	<0.00020	0.00020	8291317
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	N/A	<0.0010	<0.0010	0.0010	8291317
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	0.0010	N/A	<0.0010	<0.0010	0.0010	8291317
Dissolved Uranium (U)	mg/L	0.0011	0.20	0.0093	N/A	0.00036	0.0060	0.00010	8291317
Dissolved Vanadium (V)	mg/L	<0.0010	0.0038	<0.0010	N/A	<0.0010	<0.0010	0.0010	8291317
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	0.0065	N/A	0.0037	0.0082	0.0030	8291317

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

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5948	OT5949	OT5950	OT5951	OT5952	OT5953		
Sampling Date		2016/06/03 08:50	2016/06/02 10:55	2016/06/03 09:00	2016/06/02 10:00	2016/06/02 10:00	2016/06/02 08:50		
COC Number		493715-02-01	493715-02-01	493715-02-01	493715-02-01	493715-02-01	493715-02-01		
	UNITS	MW-14	MW-24B	MW-10	MW-1B	MW-1C	MW-19A	RDL	QC Batch
Lab Filtered Elements									
Dissolved Aluminum (Al)	mg/L	N/A	N/A	N/A	0.061	N/A	N/A	0.0030	8293622
Dissolved Antimony (Sb)	mg/L	N/A	N/A	N/A	<0.00060	N/A	N/A	0.00060	8293622
Dissolved Arsenic (As)	mg/L	N/A	N/A	N/A	0.0015	N/A	N/A	0.00020	8293622
Dissolved Barium (Ba)	mg/L	N/A	N/A	N/A	0.021	N/A	N/A	0.010	8297704
Dissolved Beryllium (Be)	mg/L	N/A	N/A	N/A	<0.0010	N/A	N/A	0.0010	8293622
Dissolved Boron (B)	mg/L	N/A	N/A	N/A	0.62	N/A	N/A	0.020	8297704
Dissolved Calcium (Ca)	mg/L	N/A	N/A	N/A	10	N/A	N/A	0.30	8297704
Dissolved Chromium (Cr)	mg/L	N/A	N/A	N/A	<0.0010	N/A	N/A	0.0010	8293622
Dissolved Cobalt (Co)	mg/L	N/A	N/A	N/A	0.00083	N/A	N/A	0.00030	8293622
Dissolved Copper (Cu)	mg/L	N/A	N/A	N/A	0.0035	N/A	N/A	0.00020	8293622
Dissolved Iron (Fe)	mg/L	N/A	N/A	N/A	<0.060	N/A	N/A	0.060	8297704
Dissolved Lead (Pb)	mg/L	N/A	N/A	N/A	<0.00020	N/A	N/A	0.00020	8293622
Dissolved Lithium (Li)	mg/L	N/A	N/A	N/A	0.13	N/A	N/A	0.020	8297704
Dissolved Magnesium (Mg)	mg/L	N/A	N/A	N/A	1.3	N/A	N/A	0.20	8297704
Dissolved Manganese (Mn)	mg/L	N/A	N/A	N/A	0.057	N/A	N/A	0.0040	8297704
Dissolved Molybdenum (Mo)	mg/L	N/A	N/A	N/A	0.0084	N/A	N/A	0.00020	8293622
Dissolved Nickel (Ni)	mg/L	N/A	N/A	N/A	0.0060	N/A	N/A	0.00050	8293622
Dissolved Phosphorus (P)	mg/L	N/A	N/A	N/A	0.11	N/A	N/A	0.10	8297704
Dissolved Potassium (K)	mg/L	N/A	N/A	N/A	2.1	N/A	N/A	0.30	8297704
Dissolved Selenium (Se)	mg/L	N/A	N/A	N/A	0.00058	N/A	N/A	0.00020	8293622
Dissolved Silicon (Si)	mg/L	N/A	N/A	N/A	2.2	N/A	N/A	0.10	8297704
Dissolved Silver (Ag)	mg/L	N/A	N/A	N/A	<0.00010	N/A	N/A	0.00010	8293622
Dissolved Sodium (Na)	mg/L	N/A	N/A	N/A	680 (1)	N/A	N/A	2.5	8297704
Dissolved Strontium (Sr)	mg/L	N/A	N/A	N/A	0.25	N/A	N/A	0.020	8297704
Dissolved Sulphur (S)	mg/L	N/A	N/A	N/A	150	N/A	N/A	0.20	8297704
Dissolved Thallium (Tl)	mg/L	N/A	N/A	N/A	<0.00020	N/A	N/A	0.00020	8293622
Dissolved Tin (Sn)	mg/L	N/A	N/A	N/A	<0.0010	N/A	N/A	0.0010	8293622
Dissolved Titanium (Ti)	mg/L	N/A	N/A	N/A	0.0018	N/A	N/A	0.0010	8293622
Dissolved Uranium (U)	mg/L	N/A	N/A	N/A	0.0022	N/A	N/A	0.00010	8293622
Dissolved Vanadium (V)	mg/L	N/A	N/A	N/A	0.0012	N/A	N/A	0.0010	8293622
Dissolved Zinc (Zn)	mg/L	N/A	N/A	N/A	<0.0030	N/A	N/A	0.0030	8293622

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

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5948	OT5949	OT5950	OT5951	OT5952	OT5953		
Sampling Date		2016/06/03 08:50	2016/06/02 10:55	2016/06/03 09:00	2016/06/02 10:00	2016/06/02 10:00	2016/06/02 08:50		
COC Number		493715-02-01	493715-02-01	493715-02-01	493715-02-01	493715-02-01	493715-02-01		
	UNITS	MW-14	MW-24B	MW-10	MW-1B	MW-1C	MW-19A	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	0.0029	0.0034	N/A	<0.0020	<0.0020	0.0020	8294971
Lab Filtered Elements-Low									
Dissolved Mercury (Hg)	ug/L	N/A	N/A	N/A	<0.0020	N/A	N/A	0.0020	8297054

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5954	OT5955	OT5956			OT5967		
Sampling Date		2016/06/02 08:50	2016/06/03 13:40	2016/06/03 13:15			2016/06/03 12:50		
COC Number		493715-02-01	493715-03-01	493715-03-01			493715-04-01		
	UNITS	MW-19B	MW-25B	MW-26B	RDL	QC Batch	MW-27A	RDL	QC Batch
Elements									
Dissolved Aluminum (Al)	mg/L	<0.0030	0.0084	0.0095	0.0030	8291317	N/A	0.0030	8291317
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	8291317	N/A	0.00060	8291317
Dissolved Arsenic (As)	mg/L	0.0025	0.00055	0.00081	0.00020	8291317	N/A	0.00020	8291317
Dissolved Barium (Ba)	mg/L	0.029	0.011	0.010	0.010	8295001	N/A	0.010	8295001
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	8291317	N/A	0.0010	8291317
Dissolved Boron (B)	mg/L	0.48	0.46	0.32	0.020	8295001	N/A	0.020	8295001
Dissolved Calcium (Ca)	mg/L	31	190	110	0.30	8295001	N/A	0.30	8295001
Dissolved Chromium (Cr)	mg/L	0.0010	0.0016	0.0017	0.0010	8291317	N/A	0.0010	8291317
Dissolved Cobalt (Co)	mg/L	0.00030	0.00075	0.00087	0.00030	8291317	N/A	0.00030	8291317
Dissolved Copper (Cu)	mg/L	0.00023	0.00081	0.0014	0.00020	8291317	N/A	0.00020	8291317
Dissolved Iron (Fe)	mg/L	0.21	<0.060	<0.060	0.060	8295001	N/A	0.060	8295001
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	8291317	N/A	0.00020	8291317
Dissolved Lithium (Li)	mg/L	0.47	0.64	0.38	0.020	8295001	N/A	0.020	8295001
Dissolved Magnesium (Mg)	mg/L	17	51	58	0.20	8295001	N/A	0.20	8295001
Dissolved Manganese (Mn)	mg/L	0.21	0.18	0.20	0.0040	8295001	N/A	0.0040	8295001
Dissolved Molybdenum (Mo)	mg/L	0.0020	0.00072	0.0013	0.00020	8291317	N/A	0.00020	8291317
Dissolved Nickel (Ni)	mg/L	0.0025	0.0031	0.0029	0.00050	8291317	N/A	0.00050	8291317
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	8295001	N/A	0.10	8295001
Dissolved Potassium (K)	mg/L	7.6	12	7.7	0.30	8295001	N/A	0.30	8295001
Dissolved Selenium (Se)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	8291317	N/A	0.00020	8291317
Dissolved Silicon (Si)	mg/L	4.4	4.5	4.4	0.10	8295001	N/A	0.10	8295001
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	8291317	N/A	0.00010	8291317
Dissolved Sodium (Na)	mg/L	1300 (1)	2100 (1)	1600 (1)	5.0	8295001	N/A	5.0	8295001
Dissolved Strontium (Sr)	mg/L	1.1	3.7	2.0	0.020	8295001	N/A	0.020	8295001
Dissolved Sulphur (S)	mg/L	750 (1)	1600 (1)	1100 (1)	2.0	8295001	N/A	2.0	8295001
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	8291317	N/A	0.00020	8291317
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	8291317	N/A	0.0010	8291317
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0011	<0.0010	0.0010	8291317	N/A	0.0010	8291317
Dissolved Uranium (U)	mg/L	0.00021	0.00033	0.0012	0.00010	8291317	N/A	0.00010	8291317
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	8291317	N/A	0.0010	8291317
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	0.0084	0.0030	8291317	N/A	0.0030	8291317

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5954	OT5955	OT5956			OT5967		
Sampling Date		2016/06/02 08:50	2016/06/03 13:40	2016/06/03 13:15			2016/06/03 12:50		
COC Number		493715-02-01	493715-03-01	493715-03-01			493715-04-01		
	UNITS	MW-19B	MW-25B	MW-26B	RDL	QC Batch	MW-27A	RDL	QC Batch
Lab Filtered Elements									
Dissolved Aluminum (Al)	mg/L	N/A	N/A	N/A	0.0030	8293622	0.073	0.0030	8293622
Dissolved Antimony (Sb)	mg/L	N/A	N/A	N/A	0.00060	8293622	<0.00060	0.00060	8293622
Dissolved Arsenic (As)	mg/L	N/A	N/A	N/A	0.00020	8293622	0.0028	0.00020	8293622
Dissolved Barium (Ba)	mg/L	N/A	N/A	N/A	0.010	8297704	0.014	0.010	8295165
Dissolved Beryllium (Be)	mg/L	N/A	N/A	N/A	0.0010	8293622	<0.0010	0.0010	8293622
Dissolved Boron (B)	mg/L	N/A	N/A	N/A	0.020	8297704	0.75	0.020	8295165
Dissolved Calcium (Ca)	mg/L	N/A	N/A	N/A	0.30	8297704	8.5	0.30	8295165
Dissolved Chromium (Cr)	mg/L	N/A	N/A	N/A	0.0010	8293622	<0.0010	0.0010	8293622
Dissolved Cobalt (Co)	mg/L	N/A	N/A	N/A	0.00030	8293622	0.00043	0.00030	8293622
Dissolved Copper (Cu)	mg/L	N/A	N/A	N/A	0.00020	8293622	0.00098	0.00020	8293622
Dissolved Iron (Fe)	mg/L	N/A	N/A	N/A	0.060	8297704	<0.060	0.060	8295165
Dissolved Lead (Pb)	mg/L	N/A	N/A	N/A	0.00020	8293622	<0.00020	0.00020	8293622
Dissolved Lithium (Li)	mg/L	N/A	N/A	N/A	0.020	8297704	0.12	0.020	8295165
Dissolved Magnesium (Mg)	mg/L	N/A	N/A	N/A	0.20	8297704	1.0	0.20	8295165
Dissolved Manganese (Mn)	mg/L	N/A	N/A	N/A	0.0040	8297704	0.011	0.0040	8295165
Dissolved Molybdenum (Mo)	mg/L	N/A	N/A	N/A	0.00020	8293622	0.0023	0.00020	8293622
Dissolved Nickel (Ni)	mg/L	N/A	N/A	N/A	0.00050	8293622	0.0033	0.00050	8293622
Dissolved Phosphorus (P)	mg/L	N/A	N/A	N/A	0.10	8297704	0.28	0.10	8295165
Dissolved Potassium (K)	mg/L	N/A	N/A	N/A	0.30	8297704	2.2	0.30	8295165
Dissolved Selenium (Se)	mg/L	N/A	N/A	N/A	0.00020	8293622	<0.00020	0.00020	8293622
Dissolved Silicon (Si)	mg/L	N/A	N/A	N/A	0.10	8297704	3.5	0.10	8295165
Dissolved Silver (Ag)	mg/L	N/A	N/A	N/A	0.00010	8293622	<0.00010	0.00010	8293622
Dissolved Sodium (Na)	mg/L	N/A	N/A	N/A	2.5	8297704	620 (1)	5.0	8295165
Dissolved Strontium (Sr)	mg/L	N/A	N/A	N/A	0.020	8297704	0.21	0.020	8295165
Dissolved Sulphur (S)	mg/L	N/A	N/A	N/A	0.20	8297704	200	0.20	8295165
Dissolved Thallium (Tl)	mg/L	N/A	N/A	N/A	0.00020	8293622	<0.00020	0.00020	8293622
Dissolved Tin (Sn)	mg/L	N/A	N/A	N/A	0.0010	8293622	<0.0010	0.0010	8293622
Dissolved Titanium (Ti)	mg/L	N/A	N/A	N/A	0.0010	8293622	0.0017	0.0010	8293622
Dissolved Uranium (U)	mg/L	N/A	N/A	N/A	0.00010	8293622	0.00065	0.00010	8293622
Dissolved Vanadium (V)	mg/L	N/A	N/A	N/A	0.0010	8293622	0.020	0.0010	8293622
Dissolved Zinc (Zn)	mg/L	N/A	N/A	N/A	0.0030	8293622	<0.0030	0.0030	8293622

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5954	OT5955	OT5956			OT5967		
Sampling Date		2016/06/02 08:50	2016/06/03 13:40	2016/06/03 13:15			2016/06/03 12:50		
COC Number		493715-02-01	493715-03-01	493715-03-01			493715-04-01		
	UNITS	MW-19B	MW-25B	MW-26B	RDL	QC Batch	MW-27A	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0040	0.0020	8294971	N/A	0.0020	8294971
Lab Filtered Elements-Low									
Dissolved Mercury (Hg)	ug/L	N/A	N/A	N/A	0.0020	8297054	0.0021	0.0020	8297054

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5968			OT5969		OT5970		
Sampling Date		2016/06/03 13:00			2016/06/03 12:35		2016/06/03 12:20		
COC Number		493715-04-01			493715-04-01		493715-04-01		
	UNITS	MW-27B	RDL	QC Batch	MW-28A	QC Batch	MW-28B	RDL	QC Batch
Elements									
Dissolved Aluminum (Al)	mg/L	0.0056	0.0030	8291317	N/A	8291317	0.011	0.0030	8291322
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	8291317	N/A	8291317	<0.00060	0.00060	8291322
Dissolved Arsenic (As)	mg/L	0.0020	0.00020	8291317	N/A	8291317	0.00044	0.00020	8291322
Dissolved Barium (Ba)	mg/L	<0.010	0.010	8295001	N/A	8295001	0.010	0.010	8295001
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8291317	N/A	8291317	<0.0010	0.0010	8291322
Dissolved Boron (B)	mg/L	0.43	0.020	8295001	N/A	8295001	0.45	0.020	8295001
Dissolved Calcium (Ca)	mg/L	140	0.30	8295001	N/A	8295001	210	0.30	8295001
Dissolved Chromium (Cr)	mg/L	0.0011	0.0010	8291317	N/A	8291317	0.0012	0.0010	8291322
Dissolved Cobalt (Co)	mg/L	0.0011	0.00030	8291317	N/A	8291317	0.0019	0.00030	8291322
Dissolved Copper (Cu)	mg/L	0.0010	0.00020	8291317	N/A	8291317	0.0015	0.00020	8291322
Dissolved Iron (Fe)	mg/L	<0.060	0.060	8295001	N/A	8295001	<0.060	0.060	8295001
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	8291317	N/A	8291317	<0.00020	0.00020	8291322
Dissolved Lithium (Li)	mg/L	0.49	0.020	8295001	N/A	8295001	0.61	0.020	8295001
Dissolved Magnesium (Mg)	mg/L	100	0.20	8295001	N/A	8295001	93	0.20	8295001
Dissolved Manganese (Mn)	mg/L	0.052	0.0040	8295001	N/A	8295001	0.25	0.0040	8295001
Dissolved Molybdenum (Mo)	mg/L	0.0022	0.00020	8291317	N/A	8291317	0.00090	0.00020	8291322
Dissolved Nickel (Ni)	mg/L	0.0077	0.00050	8291317	N/A	8291317	0.0049	0.00050	8291322
Dissolved Phosphorus (P)	mg/L	0.14	0.10	8295001	N/A	8295001	<0.10	0.10	8295001
Dissolved Potassium (K)	mg/L	11	0.30	8295001	N/A	8295001	13	0.30	8295001
Dissolved Selenium (Se)	mg/L	0.00039	0.00020	8291317	N/A	8291317	<0.00020	0.00020	8291322
Dissolved Silicon (Si)	mg/L	4.2	0.10	8295001	N/A	8295001	4.8	0.10	8295001
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8291317	N/A	8291317	<0.00010	0.00010	8291322
Dissolved Sodium (Na)	mg/L	2700 (1)	5.0	8295001	N/A	8295001	2800 (1)	5.0	8295001
Dissolved Strontium (Sr)	mg/L	3.8	0.020	8295001	N/A	8295001	4.7	0.020	8295001
Dissolved Sulphur (S)	mg/L	1900 (1)	2.0	8295001	N/A	8295001	2200 (1)	2.0	8295001
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8291317	N/A	8291317	<0.00020	0.00020	8291322
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8291317	N/A	8291317	<0.0010	0.0010	8291322
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	8291317	N/A	8291317	<0.0010	0.0010	8291322
Dissolved Uranium (U)	mg/L	0.0025	0.00010	8291317	N/A	8291317	0.00062	0.00010	8291322
Dissolved Vanadium (V)	mg/L	0.0070	0.0010	8291317	N/A	8291317	0.0013	0.0010	8291322
Dissolved Zinc (Zn)	mg/L	0.0048	0.0030	8291317	N/A	8291317	0.0052	0.0030	8291322

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5968			OT5969		OT5970		
Sampling Date		2016/06/03 13:00			2016/06/03 12:35		2016/06/03 12:20		
COC Number		493715-04-01			493715-04-01		493715-04-01		
	UNITS	MW-27B	RDL	QC Batch	MW-28A	QC Batch	MW-28B	RDL	QC Batch
Lab Filtered Elements									
Dissolved Aluminum (Al)	mg/L	N/A	0.0030	8293622	0.012	8293622	N/A	0.0030	N/A
Dissolved Antimony (Sb)	mg/L	N/A	0.00060	8293622	<0.00060	8293622	N/A	0.00060	N/A
Dissolved Arsenic (As)	mg/L	N/A	0.00020	8293622	0.00084	8293622	N/A	0.00020	N/A
Dissolved Barium (Ba)	mg/L	N/A	0.010	8295165	<0.010	8297704	N/A	0.010	N/A
Dissolved Beryllium (Be)	mg/L	N/A	0.0010	8293622	<0.0010	8293622	N/A	0.0010	N/A
Dissolved Boron (B)	mg/L	N/A	0.020	8295165	0.77	8297704	N/A	0.020	N/A
Dissolved Calcium (Ca)	mg/L	N/A	0.30	8295165	12	8297704	N/A	0.30	N/A
Dissolved Chromium (Cr)	mg/L	N/A	0.0010	8293622	<0.0010	8293622	N/A	0.0010	N/A
Dissolved Cobalt (Co)	mg/L	N/A	0.00030	8293622	0.00039	8293622	N/A	0.00030	N/A
Dissolved Copper (Cu)	mg/L	N/A	0.00020	8293622	0.00085	8293622	N/A	0.00020	N/A
Dissolved Iron (Fe)	mg/L	N/A	0.060	8295165	<0.060	8297704	N/A	0.060	N/A
Dissolved Lead (Pb)	mg/L	N/A	0.00020	8293622	<0.00020	8293622	N/A	0.00020	N/A
Dissolved Lithium (Li)	mg/L	N/A	0.020	8295165	0.14	8297704	N/A	0.020	N/A
Dissolved Magnesium (Mg)	mg/L	N/A	0.20	8295165	1.1	8297704	N/A	0.20	N/A
Dissolved Manganese (Mn)	mg/L	N/A	0.0040	8295165	<0.0040	8297704	N/A	0.0040	N/A
Dissolved Molybdenum (Mo)	mg/L	N/A	0.00020	8293622	0.0017	8293622	N/A	0.00020	N/A
Dissolved Nickel (Ni)	mg/L	N/A	0.00050	8293622	0.0018	8293622	N/A	0.00050	N/A
Dissolved Phosphorus (P)	mg/L	N/A	0.10	8295165	0.12	8297704	N/A	0.10	N/A
Dissolved Potassium (K)	mg/L	N/A	0.30	8295165	2.6	8297704	N/A	0.30	N/A
Dissolved Selenium (Se)	mg/L	N/A	0.00020	8293622	<0.00020	8293622	N/A	0.00020	N/A
Dissolved Silicon (Si)	mg/L	N/A	0.10	8295165	3.3	8297704	N/A	0.10	N/A
Dissolved Silver (Ag)	mg/L	N/A	0.00010	8293622	<0.00010	8293622	N/A	0.00010	N/A
Dissolved Sodium (Na)	mg/L	N/A	5.0	8295165	800 (1)	8297704	N/A	2.5	N/A
Dissolved Strontium (Sr)	mg/L	N/A	0.020	8295165	0.31	8297704	N/A	0.020	N/A
Dissolved Sulphur (S)	mg/L	N/A	0.20	8295165	300	8297704	N/A	0.20	N/A
Dissolved Thallium (Tl)	mg/L	N/A	0.00020	8293622	<0.00020	8293622	N/A	0.00020	N/A
Dissolved Tin (Sn)	mg/L	N/A	0.0010	8293622	<0.0010	8293622	N/A	0.0010	N/A
Dissolved Titanium (Ti)	mg/L	N/A	0.0010	8293622	<0.0010	8293622	N/A	0.0010	N/A
Dissolved Uranium (U)	mg/L	N/A	0.00010	8293622	0.00031	8293622	N/A	0.00010	N/A
Dissolved Vanadium (V)	mg/L	N/A	0.0010	8293622	0.0029	8293622	N/A	0.0010	N/A
Dissolved Zinc (Zn)	mg/L	N/A	0.0030	8293622	<0.0030	8293622	N/A	0.0030	N/A

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5968			OT5969		OT5970		
Sampling Date		2016/06/03 13:00			2016/06/03 12:35		2016/06/03 12:20		
COC Number		493715-04-01			493715-04-01		493715-04-01		
	UNITS	MW-27B	RDL	QC Batch	MW-28A	QC Batch	MW-28B	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	0.0020	8294971	N/A	N/A	<0.0020	0.0020	8294971
Lab Filtered Elements-Low									
Dissolved Mercury (Hg)	ug/L	N/A	0.0020	8297054	<0.0020	8297054	N/A	0.0020	N/A

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5971		OT5972			OT5973	OT5974		
Sampling Date		2016/06/03 12:10		2016/06/03 12:00			2016/06/03 11:50	2016/06/03 10:55		
COC Number		493715-04-01		493715-04-01			493715-04-01	493715-04-01		
	UNITS	MW-29A	RDL	MW-29B	RDL	QC Batch	MW-30B	MW-31A	RDL	QC Batch
Elements										
Dissolved Aluminum (Al)	mg/L	0.0067	0.0030	0.022	0.0030	8291322	0.011	N/A	0.0030	8291322
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	0.00060	8291322	<0.00060	N/A	0.00060	8291322
Dissolved Arsenic (As)	mg/L	0.0011	0.00020	0.00054	0.00020	8291322	0.0010	N/A	0.00020	8291322
Dissolved Barium (Ba)	mg/L	0.015	0.010	0.019	0.010	8294968	0.022	N/A	0.010	8294968
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8291322	<0.0010	N/A	0.0010	8291322
Dissolved Boron (B)	mg/L	0.75	0.020	0.20	0.020	8294968	0.14	N/A	0.020	8294968
Dissolved Calcium (Ca)	mg/L	33	0.30	560 (1)	1.5	8294968	26	N/A	0.30	8294968
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	0.0014	0.0010	8291322	0.0012	N/A	0.0010	8291322
Dissolved Cobalt (Co)	mg/L	0.00061	0.00030	0.0056	0.00030	8291322	<0.00030	N/A	0.00030	8291322
Dissolved Copper (Cu)	mg/L	0.0020	0.00020	0.0019	0.00020	8291322	0.0024	N/A	0.00020	8291322
Dissolved Iron (Fe)	mg/L	<0.060	0.060	0.54	0.060	8294968	<0.060	N/A	0.060	8294968
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8291322	<0.00020	N/A	0.00020	8291322
Dissolved Lithium (Li)	mg/L	0.22	0.020	0.65	0.020	8294968	0.24	N/A	0.020	8294968
Dissolved Magnesium (Mg)	mg/L	5.1	0.20	230	0.20	8294968	9.5	N/A	0.20	8294968
Dissolved Manganese (Mn)	mg/L	0.064	0.0040	0.85	0.0040	8294968	<0.0040	N/A	0.0040	8294968
Dissolved Molybdenum (Mo)	mg/L	0.0017	0.00020	0.00045	0.00020	8291322	0.0011	N/A	0.00020	8291322
Dissolved Nickel (Ni)	mg/L	0.0020	0.00050	0.0099	0.00050	8291322	0.0023	N/A	0.00050	8291322
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	<0.10	0.10	8294968	<0.10	N/A	0.10	8294968
Dissolved Potassium (K)	mg/L	4.1	0.30	11	0.30	8294968	3.2	N/A	0.30	8294968
Dissolved Selenium (Se)	mg/L	0.00022	0.00020	<0.00020	0.00020	8291322	0.00024	N/A	0.00020	8291322
Dissolved Silicon (Si)	mg/L	3.6	0.10	5.3	0.10	8294968	4.7	N/A	0.10	8294968
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	8291322	<0.00010	N/A	0.00010	8291322
Dissolved Sodium (Na)	mg/L	810 (1)	2.5	1600 (1)	2.5	8294968	610 (1)	N/A	2.5	8294968
Dissolved Strontium (Sr)	mg/L	0.67	0.020	7.9 (1)	0.10	8294968	0.33	N/A	0.020	8294968
Dissolved Sulphur (S)	mg/L	400	0.20	1800 (1)	1.0	8294968	290	N/A	0.20	8294968
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8291322	<0.00020	N/A	0.00020	8291322
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8291322	<0.0010	N/A	0.0010	8291322
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8291322	<0.0010	N/A	0.0010	8291322
Dissolved Uranium (U)	mg/L	0.00060	0.00010	0.0042	0.00010	8291322	0.0032	N/A	0.00010	8291322
Dissolved Vanadium (V)	mg/L	0.0011	0.0010	0.0015	0.0010	8291322	0.0019	N/A	0.0010	8291322
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	0.0051	0.0030	8291322	0.0064	N/A	0.0030	8291322

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Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5971		OT5972			OT5973	OT5974		
Sampling Date		2016/06/03 12:10		2016/06/03 12:00			2016/06/03 11:50	2016/06/03 10:55		
COC Number		493715-04-01		493715-04-01			493715-04-01	493715-04-01		
	UNITS	MW-29A	RDL	MW-29B	RDL	QC Batch	MW-30B	MW-31A	RDL	QC Batch
Lab Filtered Elements										
Dissolved Aluminum (Al)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.31	0.0030	8293622
Dissolved Antimony (Sb)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.00060	0.00060	8293622
Dissolved Arsenic (As)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.00088	0.00020	8293622
Dissolved Barium (Ba)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.10	0.10	8297704
Dissolved Beryllium (Be)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.0010	0.0010	8293622
Dissolved Boron (B)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.66	0.20	8297704
Dissolved Calcium (Ca)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	4.5	3.0	8297704
Dissolved Chromium (Cr)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.0010	0.0010	8293622
Dissolved Cobalt (Co)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.00039	0.00030	8293622
Dissolved Copper (Cu)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.00093	0.00020	8293622
Dissolved Iron (Fe)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.60	0.60	8297704
Dissolved Lead (Pb)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.00043	0.00020	8293622
Dissolved Lithium (Li)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.20	0.20	8297704
Dissolved Magnesium (Mg)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<2.0	2.0	8297704
Dissolved Manganese (Mn)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.040	0.040	8297704
Dissolved Molybdenum (Mo)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.0021	0.00020	8293622
Dissolved Nickel (Ni)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.0026	0.00050	8293622
Dissolved Phosphorus (P)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<1.0	1.0	8297704
Dissolved Potassium (K)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<3.0	3.0	8297704
Dissolved Selenium (Se)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.00020	0.00020	8293622
Dissolved Silicon (Si)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	2.7	1.0	8297704
Dissolved Silver (Ag)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.00010	0.00010	8293622
Dissolved Sodium (Na)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	430	5.0	8297704
Dissolved Strontium (Sr)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.20	0.20	8297704
Dissolved Sulphur (S)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	40	2.0	8297704
Dissolved Thallium (Tl)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.00020	0.00020	8293622
Dissolved Tin (Sn)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.0010	0.0010	8293622
Dissolved Titanium (Ti)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.0032	0.0010	8293622
Dissolved Uranium (U)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.00054	0.00010	8293622
Dissolved Vanadium (V)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.0010	0.0010	8293622
Dissolved Zinc (Zn)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.0030	0.0030	8293622

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5971		OT5972			OT5973	OT5974		
Sampling Date		2016/06/03 12:10		2016/06/03 12:00			2016/06/03 11:50	2016/06/03 10:55		
COC Number		493715-04-01		493715-04-01			493715-04-01	493715-04-01		
	UNITS	**MW-29A**	**RDL**	**MW-29B**	**RDL**	**QC Batch**	**MW-30B**	**MW-31A**	**RDL**	**QC Batch**
Low Level Elements										
Dissolved Mercury (Hg)	ug/L	<0.0020	0.0020	0.0043	0.0020	8294971	<0.0020	N/A	0.0020	8295564
Lab Filtered Elements-Low										
Dissolved Mercury (Hg)	ug/L	N/A	N/A	N/A	N/A	N/A	N/A	0.043 (1)	0.020	8297054

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5975		OT5977		OT5978		
Sampling Date		2016/06/03 11:00		2016/06/03 10:40		2016/06/03 10:05		
COC Number		493715-04-01		493715-05-01		493715-05-01		
	UNITS	MW-31B	RDL	MW-32A	QC Batch	MW-33A	RDL	QC Batch
Elements								
Dissolved Aluminum (Al)	mg/L	0.084	0.0030	0.029	8291322	N/A	0.0030	8291322
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	8291322	N/A	0.00060	8291322
Dissolved Arsenic (As)	mg/L	0.0017	0.00020	0.00051	8291322	N/A	0.00020	8291322
Dissolved Barium (Ba)	mg/L	0.023	0.010	0.015	8294968	N/A	0.010	8294968
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	8291322	N/A	0.0010	8291322
Dissolved Boron (B)	mg/L	0.20	0.020	1.2	8294968	N/A	0.020	8294968
Dissolved Calcium (Ca)	mg/L	15	0.30	120	8294968	N/A	0.30	8294968
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	0.0015	8291322	N/A	0.0010	8291322
Dissolved Cobalt (Co)	mg/L	0.00053	0.00030	0.00077	8291322	N/A	0.00030	8291322
Dissolved Copper (Cu)	mg/L	0.0022	0.00020	0.0031	8291322	N/A	0.00020	8291322
Dissolved Iron (Fe)	mg/L	0.26	0.060	0.12	8294968	N/A	0.060	8294968
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.00020	8291322	N/A	0.00020	8291322
Dissolved Lithium (Li)	mg/L	0.16	0.020	0.47	8294968	N/A	0.020	8294968
Dissolved Magnesium (Mg)	mg/L	5.4	0.20	15	8294968	N/A	0.20	8294968
Dissolved Manganese (Mn)	mg/L	0.041	0.0040	0.12	8294968	N/A	0.0040	8294968
Dissolved Molybdenum (Mo)	mg/L	0.0015	0.00020	0.00054	8291322	N/A	0.00020	8291322
Dissolved Nickel (Ni)	mg/L	0.0033	0.00050	0.0032	8291322	N/A	0.00050	8291322
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	<0.10	8294968	N/A	0.10	8294968
Dissolved Potassium (K)	mg/L	3.6	0.30	8.4	8294968	N/A	0.30	8294968
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	<0.00020	8291322	N/A	0.00020	8291322
Dissolved Silicon (Si)	mg/L	3.9	0.10	5.2	8294968	N/A	0.10	8294968
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	8291322	N/A	0.00010	8291322
Dissolved Sodium (Na)	mg/L	590 (1)	2.5	2000 (1)	8294968	N/A	2.5	8294968
Dissolved Strontium (Sr)	mg/L	0.23	0.020	2.9	8294968	N/A	0.020	8294968
Dissolved Sulphur (S)	mg/L	270	0.20	1300 (1)	8294968	N/A	1.0	8294968
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	8291322	N/A	0.00020	8291322
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	8291322	N/A	0.0010	8291322
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	<0.0010	8291322	N/A	0.0010	8291322
Dissolved Uranium (U)	mg/L	0.00099	0.00010	0.00016	8291322	N/A	0.00010	8291322
Dissolved Vanadium (V)	mg/L	0.0011	0.0010	<0.0010	8291322	N/A	0.0010	8291322
Dissolved Zinc (Zn)	mg/L	0.0078	0.0030	0.015	8291322	N/A	0.0030	8291322

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5975		OT5977		OT5978		
Sampling Date		2016/06/03 11:00		2016/06/03 10:40		2016/06/03 10:05		
COC Number		493715-04-01		493715-05-01		493715-05-01		
	UNITS	MW-31B	RDL	MW-32A	QC Batch	MW-33A	RDL	QC Batch
Lab Filtered Elements								
Dissolved Aluminum (Al)	mg/L	N/A	0.0030	N/A	8293622	0.66	0.0030	8293622
Dissolved Antimony (Sb)	mg/L	N/A	0.00060	N/A	8293622	<0.00060	0.00060	8293622
Dissolved Arsenic (As)	mg/L	N/A	0.00020	N/A	8293622	0.0042	0.00020	8293622
Dissolved Barium (Ba)	mg/L	N/A	0.10	N/A	8297704	0.080	0.010	8295165
Dissolved Beryllium (Be)	mg/L	N/A	0.0010	N/A	8293622	<0.0010	0.0010	8293622
Dissolved Boron (B)	mg/L	N/A	0.20	N/A	8297704	0.71	0.020	8295165
Dissolved Calcium (Ca)	mg/L	N/A	3.0	N/A	8297704	7.4	0.30	8295165
Dissolved Chromium (Cr)	mg/L	N/A	0.0010	N/A	8293622	<0.0010	0.0010	8293622
Dissolved Cobalt (Co)	mg/L	N/A	0.00030	N/A	8293622	0.0016	0.00030	8293622
Dissolved Copper (Cu)	mg/L	N/A	0.00020	N/A	8293622	0.028	0.00020	8293622
Dissolved Iron (Fe)	mg/L	N/A	0.60	N/A	8297704	0.60	0.060	8295165
Dissolved Lead (Pb)	mg/L	N/A	0.00020	N/A	8293622	0.00094	0.00020	8293622
Dissolved Lithium (Li)	mg/L	N/A	0.20	N/A	8297704	0.089	0.020	8295165
Dissolved Magnesium (Mg)	mg/L	N/A	2.0	N/A	8297704	1.4	0.20	8295165
Dissolved Manganese (Mn)	mg/L	N/A	0.040	N/A	8297704	0.058	0.0040	8295165
Dissolved Molybdenum (Mo)	mg/L	N/A	0.00020	N/A	8293622	0.018	0.00020	8293622
Dissolved Nickel (Ni)	mg/L	N/A	0.00050	N/A	8293622	0.0083	0.00050	8293622
Dissolved Phosphorus (P)	mg/L	N/A	1.0	N/A	8297704	0.17	0.10	8295165
Dissolved Potassium (K)	mg/L	N/A	3.0	N/A	8297704	2.2	0.30	8295165
Dissolved Selenium (Se)	mg/L	N/A	0.00020	N/A	8293622	<0.00020	0.00020	8293622
Dissolved Silicon (Si)	mg/L	N/A	1.0	N/A	8297704	3.9	0.10	8295165
Dissolved Silver (Ag)	mg/L	N/A	0.00010	N/A	8293622	<0.00010	0.00010	8293622
Dissolved Sodium (Na)	mg/L	N/A	5.0	N/A	8297704	480	0.50	8295165
Dissolved Strontium (Sr)	mg/L	N/A	0.20	N/A	8297704	0.16	0.020	8295165
Dissolved Sulphur (S)	mg/L	N/A	2.0	N/A	8297704	64	0.20	8295165
Dissolved Thallium (Tl)	mg/L	N/A	0.00020	N/A	8293622	<0.00020	0.00020	8293622
Dissolved Tin (Sn)	mg/L	N/A	0.0010	N/A	8293622	<0.0010	0.0010	8293622
Dissolved Titanium (Ti)	mg/L	N/A	0.0010	N/A	8293622	0.0095	0.0010	8293622
Dissolved Uranium (U)	mg/L	N/A	0.00010	N/A	8293622	0.0035	0.00010	8293622
Dissolved Vanadium (V)	mg/L	N/A	0.0010	N/A	8293622	0.0040	0.0010	8293622
Dissolved Zinc (Zn)	mg/L	N/A	0.0030	N/A	8293622	<0.0030	0.0030	8293622

RDL = Reportable Detection Limit
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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5975		OT5977		OT5978		
Sampling Date		2016/06/03 11:00		2016/06/03 10:40		2016/06/03 10:05		
COC Number		493715-04-01		493715-05-01		493715-05-01		
	UNITS	MW-31B	RDL	MW-32A	QC Batch	MW-33A	RDL	QC Batch
Low Level Elements								
Dissolved Mercury (Hg)	ug/L	0.0027	0.0020	0.0023	8295564	N/A	0.0020	N/A
Lab Filtered Elements-Low								
Dissolved Mercury (Hg)	ug/L	N/A	0.020	N/A	8297054	<0.0060 (1)	0.0060	8297054

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5979			OT5980	OT5981		OT5998		
Sampling Date		2016/06/03 09:55			2016/06/03 08:30	2016/06/03 08:10		2016/06/03 11:35		
COC Number		493715-05-01			493715-05-01	493715-05-01		493715-06-01		
	UNITS	MW-33B	RDL	QC Batch	MW-34A	MW-34B	RDL	MW-36-DEEP	RDL	QC Batch
Elements										
Dissolved Aluminum (Al)	mg/L	0.060	0.0030	8291317	0.036	N/A	0.0030	0.19	0.0030	8291322
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	8291317	0.00078	N/A	0.00060	0.0030	0.00060	8291322
Dissolved Arsenic (As)	mg/L	0.0013	0.00020	8291317	0.0030	N/A	0.00020	0.0088	0.00020	8291322
Dissolved Barium (Ba)	mg/L	0.031	0.010	8294968	0.030	N/A	0.010	0.23	0.010	8294968
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8291317	<0.0010	N/A	0.0010	<0.0010	0.0010	8291322
Dissolved Boron (B)	mg/L	0.28	0.020	8294968	0.80	N/A	0.020	0.71	0.020	8294968
Dissolved Calcium (Ca)	mg/L	110	0.30	8294968	19	N/A	0.30	17	0.30	8294968
Dissolved Chromium (Cr)	mg/L	0.0020	0.0010	8291317	0.0010	N/A	0.0010	<0.0010	0.0010	8291322
Dissolved Cobalt (Co)	mg/L	0.0020	0.00030	8291317	0.0010	N/A	0.00030	0.00082	0.00030	8291322
Dissolved Copper (Cu)	mg/L	0.0027	0.00020	8291317	0.0019	N/A	0.00020	0.011	0.00020	8291322
Dissolved Iron (Fe)	mg/L	0.35	0.060	8294968	0.13	N/A	0.060	0.41	0.060	8294968
Dissolved Lead (Pb)	mg/L	0.00024	0.00020	8291317	<0.00020	N/A	0.00020	0.00094	0.00020	8291322
Dissolved Lithium (Li)	mg/L	0.35	0.020	8294968	0.14	N/A	0.020	0.11	0.020	8294968
Dissolved Magnesium (Mg)	mg/L	38	0.20	8294968	4.5	N/A	0.20	2.4	0.20	8294968
Dissolved Manganese (Mn)	mg/L	0.24	0.0040	8294968	0.14	N/A	0.0040	0.030	0.0040	8294968
Dissolved Molybdenum (Mo)	mg/L	0.00038	0.00020	8291317	0.042	N/A	0.00020	0.041	0.00020	8291322
Dissolved Nickel (Ni)	mg/L	0.0096	0.00050	8291317	0.0074	N/A	0.00050	0.0086	0.00050	8291322
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	8294968	<0.10	N/A	0.10	0.13	0.10	8294968
Dissolved Potassium (K)	mg/L	6.9	0.30	8294968	4.1	N/A	0.30	5.4	0.30	8294968
Dissolved Selenium (Se)	mg/L	0.00038	0.00020	8291317	0.00029	N/A	0.00020	0.00096	0.00020	8291322
Dissolved Silicon (Si)	mg/L	5.0	0.10	8294968	3.2	N/A	0.10	2.6	0.10	8294968
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8291317	<0.00010	N/A	0.00010	<0.00010	0.00010	8291322
Dissolved Sodium (Na)	mg/L	1300 (1)	2.5	8294968	710 (1)	N/A	2.5	800 (1)	2.5	8294968
Dissolved Strontium (Sr)	mg/L	2.1	0.020	8294968	0.30	N/A	0.020	0.34	0.020	8294968
Dissolved Sulphur (S)	mg/L	720 (1)	1.0	8294968	170	N/A	0.20	17	0.20	8294968
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8291317	<0.00020	N/A	0.00020	<0.00020	0.00020	8291322
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8291317	<0.0010	N/A	0.0010	<0.0010	0.0010	8291322
Dissolved Titanium (Ti)	mg/L	0.0033	0.0010	8291317	<0.0010	N/A	0.0010	0.0030	0.0010	8291322
Dissolved Uranium (U)	mg/L	0.00016	0.00010	8291317	0.018	N/A	0.00010	0.0066	0.00010	8291322
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	8291317	0.0023	N/A	0.0010	0.0078	0.0010	8291322
Dissolved Zinc (Zn)	mg/L	0.0056	0.0030	8291317	0.011	N/A	0.0030	0.0068	0.0030	8291322

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5979			OT5980	OT5981		OT5998		
Sampling Date		2016/06/03 09:55			2016/06/03 08:30	2016/06/03 08:10		2016/06/03 11:35		
COC Number		493715-05-01			493715-05-01	493715-05-01		493715-06-01		
	UNITS	MW-33B	RDL	QC Batch	MW-34A	MW-34B	RDL	MW-36-DEEP	RDL	QC Batch
Lab Filtered Elements										
Dissolved Aluminum (Al)	mg/L	N/A	0.0030	N/A	N/A	0.0064	0.0030	N/A	0.0030	8293622
Dissolved Antimony (Sb)	mg/L	N/A	0.00060	N/A	N/A	<0.00060	0.00060	N/A	0.00060	8293622
Dissolved Arsenic (As)	mg/L	N/A	0.00020	N/A	N/A	0.00054	0.00020	N/A	0.00020	8293622
Dissolved Barium (Ba)	mg/L	N/A	0.010	N/A	N/A	0.054	0.010	N/A	0.010	8295165
Dissolved Beryllium (Be)	mg/L	N/A	0.0010	N/A	N/A	<0.0010	0.0010	N/A	0.0010	8293622
Dissolved Boron (B)	mg/L	N/A	0.020	N/A	N/A	0.060	0.020	N/A	0.020	8295165
Dissolved Calcium (Ca)	mg/L	N/A	0.30	N/A	N/A	180	0.30	N/A	0.30	8295165
Dissolved Chromium (Cr)	mg/L	N/A	0.0010	N/A	N/A	<0.0010	0.0010	N/A	0.0010	8293622
Dissolved Cobalt (Co)	mg/L	N/A	0.00030	N/A	N/A	0.0015	0.00030	N/A	0.00030	8293622
Dissolved Copper (Cu)	mg/L	N/A	0.00020	N/A	N/A	0.0041	0.00020	N/A	0.00020	8293622
Dissolved Iron (Fe)	mg/L	N/A	0.060	N/A	N/A	<0.060	0.060	N/A	0.060	8295165
Dissolved Lead (Pb)	mg/L	N/A	0.00020	N/A	N/A	<0.00020	0.00020	N/A	0.00020	8293622
Dissolved Lithium (Li)	mg/L	N/A	0.020	N/A	N/A	0.12	0.020	N/A	0.020	8295165
Dissolved Magnesium (Mg)	mg/L	N/A	0.20	N/A	N/A	55	0.20	N/A	0.20	8295165
Dissolved Manganese (Mn)	mg/L	N/A	0.0040	N/A	N/A	0.11	0.0040	N/A	0.0040	8295165
Dissolved Molybdenum (Mo)	mg/L	N/A	0.00020	N/A	N/A	0.0012	0.00020	N/A	0.00020	8293622
Dissolved Nickel (Ni)	mg/L	N/A	0.00050	N/A	N/A	0.0096	0.00050	N/A	0.00050	8293622
Dissolved Phosphorus (P)	mg/L	N/A	0.10	N/A	N/A	0.26	0.10	N/A	0.10	8295165
Dissolved Potassium (K)	mg/L	N/A	0.30	N/A	N/A	11	0.30	N/A	0.30	8295165
Dissolved Selenium (Se)	mg/L	N/A	0.00020	N/A	N/A	<0.00020	0.00020	N/A	0.00020	8293622
Dissolved Silicon (Si)	mg/L	N/A	0.10	N/A	N/A	5.6	0.10	N/A	0.10	8295165
Dissolved Silver (Ag)	mg/L	N/A	0.00010	N/A	N/A	<0.00010	0.00010	N/A	0.00010	8293622
Dissolved Sodium (Na)	mg/L	N/A	0.50	N/A	N/A	320	0.50	N/A	0.50	8295165
Dissolved Strontium (Sr)	mg/L	N/A	0.020	N/A	N/A	1.2	0.020	N/A	0.020	8295165
Dissolved Sulphur (S)	mg/L	N/A	0.20	N/A	N/A	140	0.20	N/A	0.20	8295165
Dissolved Thallium (Tl)	mg/L	N/A	0.00020	N/A	N/A	<0.00020	0.00020	N/A	0.00020	8293622
Dissolved Tin (Sn)	mg/L	N/A	0.0010	N/A	N/A	<0.0010	0.0010	N/A	0.0010	8293622
Dissolved Titanium (Ti)	mg/L	N/A	0.0010	N/A	N/A	<0.0010	0.0010	N/A	0.0010	8293622
Dissolved Uranium (U)	mg/L	N/A	0.00010	N/A	N/A	0.0050	0.00010	N/A	0.00010	8293622
Dissolved Vanadium (V)	mg/L	N/A	0.0010	N/A	N/A	0.0031	0.0010	N/A	0.0010	8293622
Dissolved Zinc (Zn)	mg/L	N/A	0.0030	N/A	N/A	0.0073	0.0030	N/A	0.0030	8293622

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5979			OT5980	OT5981		OT5998		
Sampling Date		2016/06/03 09:55			2016/06/03 08:30	2016/06/03 08:10		2016/06/03 11:35		
COC Number		493715-05-01			493715-05-01	493715-05-01		493715-06-01		
	UNITS	**MW-33B**	**RDL**	**QC Batch**	**MW-34A**	**MW-34B**	**RDL**	**MW-36-DEEP**	**RDL**	**QC Batch**
Low Level Elements										
Dissolved Mercury (Hg)	ug/L	0.23 (1)	0.10	8295564	0.044 (1)	N/A	0.020	0.19 (1)	0.10	8295564
Lab Filtered Elements-Low										
Dissolved Mercury (Hg)	ug/L	N/A	N/A	N/A	N/A	0.0025	0.0020	N/A	N/A	8297054

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5999		OT6000			OT6001		
Sampling Date		2016/06/03 11:15		2016/06/03			2016/06/03		
COC Number		493715-06-01		493715-06-01			493715-06-01		
	UNITS	MW-36A	QC Batch	TRIP BLANK	RDL	QC Batch	DUPLICATE 2	RDL	QC Batch
Elements									
Dissolved Aluminum (Al)	mg/L	0.015	8291322	<0.0030	0.0030	8291317	0.024	0.0030	8291322
Dissolved Antimony (Sb)	mg/L	<0.00060	8291322	<0.00060	0.00060	8291317	<0.00060	0.00060	8291322
Dissolved Arsenic (As)	mg/L	0.0012	8291322	<0.00020	0.00020	8291317	0.00086	0.00020	8291322
Dissolved Barium (Ba)	mg/L	0.031	8294968	<0.010	0.010	8295001	0.011	0.010	8294968
Dissolved Beryllium (Be)	mg/L	<0.0010	8291322	<0.0010	0.0010	8291317	<0.0010	0.0010	8291322
Dissolved Boron (B)	mg/L	0.82	8294968	<0.020	0.020	8295001	0.33	0.020	8294968
Dissolved Calcium (Ca)	mg/L	3.9	8294968	<0.30	0.30	8295001	100	0.30	8294968
Dissolved Chromium (Cr)	mg/L	<0.0010	8291322	0.0016	0.0010	8291317	0.0030	0.0010	8291322
Dissolved Cobalt (Co)	mg/L	0.00056	8291322	<0.00030	0.00030	8291317	0.00082	0.00030	8291322
Dissolved Copper (Cu)	mg/L	0.0026	8291322	<0.00020	0.00020	8291317	0.0011	0.00020	8291322
Dissolved Iron (Fe)	mg/L	<0.060	8294968	<0.060	0.060	8295001	0.12	0.060	8294968
Dissolved Lead (Pb)	mg/L	<0.00020	8291322	<0.00020	0.00020	8291317	<0.00020	0.00020	8291322
Dissolved Lithium (Li)	mg/L	0.064	8294968	<0.020	0.020	8295001	0.40	0.020	8294968
Dissolved Magnesium (Mg)	mg/L	0.41	8294968	<0.20	0.20	8295001	59	0.20	8294968
Dissolved Manganese (Mn)	mg/L	0.022	8294968	<0.0040	0.0040	8295001	0.20	0.0040	8294968
Dissolved Molybdenum (Mo)	mg/L	0.010	8291322	<0.00020	0.00020	8291317	0.0018	0.00020	8291322
Dissolved Nickel (Ni)	mg/L	0.0019	8291322	<0.00050	0.00050	8291317	0.0037	0.00050	8291322
Dissolved Phosphorus (P)	mg/L	0.13	8294968	<0.10	0.10	8295001	<0.10	0.10	8294968
Dissolved Potassium (K)	mg/L	1.4	8294968	<0.30	0.30	8295001	7.6	0.30	8294968
Dissolved Selenium (Se)	mg/L	0.00023	8291322	<0.00020	0.00020	8291317	<0.00020	0.00020	8291322
Dissolved Silicon (Si)	mg/L	3.4	8294968	<0.10	0.10	8295001	4.4	0.10	8294968
Dissolved Silver (Ag)	mg/L	<0.00010	8291322	<0.00010	0.00010	8291317	<0.00010	0.00010	8291322
Dissolved Sodium (Na)	mg/L	390	8294968	<0.50	0.50	8295001	1800 (1)	2.5	8294968
Dissolved Strontium (Sr)	mg/L	0.045	8294968	<0.020	0.020	8295001	2.1	0.020	8294968
Dissolved Sulphur (S)	mg/L	1.0	8294968	<0.20	0.20	8295001	1200 (1)	1.0	8294968
Dissolved Thallium (Tl)	mg/L	<0.00020	8291322	<0.00020	0.00020	8291317	<0.00020	0.00020	8291322
Dissolved Tin (Sn)	mg/L	<0.0010	8291322	<0.0010	0.0010	8291317	<0.0010	0.0010	8291322
Dissolved Titanium (Ti)	mg/L	<0.0010	8291322	<0.0010	0.0010	8291317	<0.0010	0.0010	8291322
Dissolved Uranium (U)	mg/L	0.00037	8291322	<0.00010	0.00010	8291317	0.0012	0.00010	8291322
Dissolved Vanadium (V)	mg/L	0.0028	8291322	<0.0010	0.0010	8291317	<0.0010	0.0010	8291322
Dissolved Zinc (Zn)	mg/L	0.0033	8291322	<0.0030	0.0030	8291317	0.0036	0.0030	8291322

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

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT5999		OT6000			OT6001		
Sampling Date		2016/06/03 11:15		2016/06/03			2016/06/03		
COC Number		493715-06-01		493715-06-01			493715-06-01		
	UNITS	MW-36A	QC Batch	TRIP BLANK	RDL	QC Batch	DUPLICATE 2	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	0.017	8295564	0.0036	0.0020	8295564	0.0024	0.0020	8295564
RDL = Reportable Detection Limit									

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT6002		OT6003			OT6180		
Sampling Date		2016/06/03		2016/06/03			2016/06/03		
COC Number		493715-06-01		493715-06-01			493715-06-01		
	UNITS	DUPLICATE 3	RDL	DUPLICATE 4	RDL	QC Batch	DUPLICATE 5	RDL	QC Batch
Elements									
Dissolved Aluminum (Al)	mg/L	0.017	0.0030	0.010	0.0030	8291322	0.0036	0.0030	8291317
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	0.00060	8291322	<0.00060	0.00060	8291317
Dissolved Arsenic (As)	mg/L	0.0011	0.00020	0.00052	0.00020	8291322	<0.00020	0.00020	8291317
Dissolved Barium (Ba)	mg/L	0.030	0.010	0.024	0.010	8294968	0.057	0.010	8295001
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8291322	<0.0010	0.0010	8291317
Dissolved Boron (B)	mg/L	0.80	0.020	0.12	0.020	8294968	0.068	0.020	8295001
Dissolved Calcium (Ca)	mg/L	3.8	0.30	60	0.30	8294968	190	0.30	8295001
Dissolved Chromium (Cr)	mg/L	0.0012	0.0010	0.0021	0.0010	8291322	<0.0010	0.0010	8291317
Dissolved Cobalt (Co)	mg/L	0.00053	0.00030	0.00054	0.00030	8291322	<0.00030	0.00030	8291317
Dissolved Copper (Cu)	mg/L	0.0025	0.00020	0.0051	0.00020	8291322	0.00033	0.00020	8291317
Dissolved Iron (Fe)	mg/L	<0.060	0.060	0.080	0.060	8294968	1.4	0.060	8295001
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8291322	<0.00020	0.00020	8291317
Dissolved Lithium (Li)	mg/L	0.060	0.020	0.23	0.020	8294968	0.13	0.020	8295001
Dissolved Magnesium (Mg)	mg/L	0.40	0.20	29	0.20	8294968	63	0.20	8295001
Dissolved Manganese (Mn)	mg/L	0.022	0.0040	0.10	0.0040	8294968	0.17	0.0040	8295001
Dissolved Molybdenum (Mo)	mg/L	0.0094	0.00020	0.0034	0.00020	8291322	<0.00020	0.00020	8291317
Dissolved Nickel (Ni)	mg/L	0.0023	0.00050	0.059	0.00050	8291322	<0.00050	0.00050	8291317
Dissolved Phosphorus (P)	mg/L	0.19	0.10	<0.10	0.10	8294968	0.18	0.10	8295001
Dissolved Potassium (K)	mg/L	1.4	0.30	4.2	0.30	8294968	12	0.30	8295001
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	0.00040	0.00020	8291322	<0.00020	0.00020	8291317
Dissolved Silicon (Si)	mg/L	3.3	0.10	4.5	0.10	8294968	7.0	0.10	8295001
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	8291322	<0.00010	0.00010	8291317
Dissolved Sodium (Na)	mg/L	370	0.50	920 (1)	2.5	8294968	340	0.50	8295001
Dissolved Strontium (Sr)	mg/L	0.043	0.020	0.93	0.020	8294968	1.3	0.020	8295001
Dissolved Sulphur (S)	mg/L	1.2	0.20	540 (1)	1.0	8294968	180	0.20	8295001
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8291322	<0.00020	0.00020	8291317
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8291322	<0.0010	0.0010	8291317
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	0.0010	0.0010	8291322	<0.0010	0.0010	8291317
Dissolved Uranium (U)	mg/L	0.00032	0.00010	0.0086	0.00010	8291322	<0.00010	0.00010	8291317
Dissolved Vanadium (V)	mg/L	0.0026	0.0010	<0.0010	0.0010	8291322	<0.0010	0.0010	8291317
Dissolved Zinc (Zn)	mg/L	0.0054	0.0030	0.0092	0.0030	8291322	<0.0030	0.0030	8291317

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OT6002		OT6003			OT6180		
Sampling Date		2016/06/03		2016/06/03			2016/06/03		
COC Number		493715-06-01		493715-06-01			493715-06-01		
	UNITS	DUPLICATE 3	RDL	DUPLICATE 4	RDL	QC Batch	DUPLICATE 5	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	0.0022	0.0020	0.0046	0.0020	8295564	0.35 (1)	0.20	8295564

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		OT5939	OT5940	OT5941	OT5942	OT5943	OT5944		
Sampling Date		2016/06/03 09:35	2016/06/03 09:40	2016/06/02 11:05	2016/06/02 10:20	2016/06/02 10:25	2016/06/02 09:20		
COC Number		493715-01-01	493715-01-01	493715-01-01	493715-01-01	493715-01-01	493715-01-01		
	UNITS	MW-8A	MW-8B	MW-5A	MW-12B	MW-12A	MW-18A	RDL	QC Batch
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292682
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292682
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292682
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292682
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292682
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292682
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292682
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292682
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	107	109	107	107	106	108	N/A	8292682
4-Bromofluorobenzene (sur.)	%	104	104	104	104	104	104	N/A	8292682
D4-1,2-Dichloroethane (sur.)	%	111	109	113	112	114	111	N/A	8292682

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		OT5945	OT5946	OT5948	OT5949	OT5950	OT5951		
Sampling Date		2016/06/02 09:20	2016/06/03 09:20	2016/06/03 08:50	2016/06/02 10:55	2016/06/03 09:00	2016/06/02 10:00		
COC Number		493715-01-01	493715-01-01	493715-02-01	493715-02-01	493715-02-01	493715-02-01		
	UNITS	MW-18B	MW-11	MW-14	MW-24B	MW-10	MW-1B	RDL	QC Batch
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292682
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292682
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292682
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292682
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292682
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292682
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292682
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292682
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	105	106	107	106	107	107	N/A	8292682
4-Bromofluorobenzene (sur.)	%	104	104	105	105	104	104	N/A	8292682
D4-1,2-Dichloroethane (sur.)	%	112	112	112	114	113	111	N/A	8292682

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		OT5952	OT5953		OT5954		OT5955		
Sampling Date		2016/06/02 10:00	2016/06/02 08:50		2016/06/02 08:50		2016/06/03 13:40		
COC Number		493715-02-01	493715-02-01		493715-02-01		493715-03-01		
	UNITS	MW-1C	MW-19A	RDL	MW-19B	RDL	MW-25B	RDL	QC Batch
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	0.00040	<0.00040	0.00040	<0.00040	0.00040	8292682
Toluene	mg/L	<0.00040	<0.00040	0.00040	<0.00060 (1)	0.00060	<0.00040	0.00040	8292682
Ethylbenzene	mg/L	<0.00040	<0.00040	0.00040	<0.00040	0.00040	<0.00040	0.00040	8292682
m & p-Xylene	mg/L	<0.00080	<0.00080	0.00080	<0.00080	0.00080	<0.00080	0.00080	8292682
o-Xylene	mg/L	<0.00040	<0.00040	0.00040	<0.00040	0.00040	<0.00040	0.00040	8292682
Xylenes (Total)	mg/L	<0.00080	<0.00080	0.00080	<0.00080	0.00080	<0.00080	0.00080	8292682
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	8292682
F1 (C6-C10)	mg/L	<0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	8292682
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	107	106	N/A	107	N/A	106	N/A	8292682
4-Bromofluorobenzene (sur.)	%	105	104	N/A	104	N/A	104	N/A	8292682
D4-1,2-Dichloroethane (sur.)	%	113	112	N/A	113	N/A	112	N/A	8292682

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limit raised due to interferent.

Maxxam ID		OT5956	OT5967	OT5968	OT5969		OT5970		
Sampling Date		2016/06/03 13:15	2016/06/03 12:50	2016/06/03 13:00	2016/06/03 12:35		2016/06/03 12:20		
COC Number		493715-03-01	493715-04-01	493715-04-01	493715-04-01		493715-04-01		
	UNITS	MW-26B	MW-27A	MW-27B	MW-28A	QC Batch	MW-28B	RDL	QC Batch
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	8292682	<0.00040	0.00040	8292684
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	8292682	<0.00040	0.00040	8292684
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	8292682	<0.00040	0.00040	8292684
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	8292682	<0.00080	0.00080	8292684
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	8292682	<0.00040	0.00040	8292684
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	8292682	<0.00080	0.00080	8292684
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	8292682	<0.10	0.10	8292684
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	8292682	<0.10	0.10	8292684
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	106	107	107	107	8292682	105	N/A	8292684
4-Bromofluorobenzene (sur.)	%	104	104	104	104	8292682	106	N/A	8292684
D4-1,2-Dichloroethane (sur.)	%	112	112	112	112	8292682	114	N/A	8292684

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		OT5971	OT5972	OT5973	OT5974	OT5975	OT5977		
Sampling Date		2016/06/03 12:10	2016/06/03 12:00	2016/06/03 11:50	2016/06/03 10:55	2016/06/03 11:00	2016/06/03 10:40		
COC Number		493715-04-01	493715-04-01	493715-04-01	493715-04-01	493715-04-01	493715-05-01		
	UNITS	MW-29A	MW-29B	MW-30B	MW-31A	MW-31B	MW-32A	RDL	QC Batch
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292684
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292684
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292684
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292684
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	107	107	108	108	107	106	N/A	8292684
4-Bromofluorobenzene (sur.)	%	104	104	104	105	105	105	N/A	8292684
D4-1,2-Dichloroethane (sur.)	%	111	112	112	111	113	112	N/A	8292684

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		OT5978	OT5979	OT5980	OT5981	OT5998	OT5999		
Sampling Date		2016/06/03 10:05	2016/06/03 09:55	2016/06/03 08:30	2016/06/03 08:10	2016/06/03 11:35	2016/06/03 11:15		
COC Number		493715-05-01	493715-05-01	493715-05-01	493715-05-01	493715-06-01	493715-06-01		
	UNITS	MW-33A	MW-33B	MW-34A	MW-34B	MW-36-DEEP	MW-36A	RDL	QC Batch
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292684
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292684
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292684
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292684
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	108	107	107	107	108	107	N/A	8292684
4-Bromofluorobenzene (sur.)	%	104	105	105	104	106	104	N/A	8292684
D4-1,2-Dichloroethane (sur.)	%	110	111	112	111	111	111	N/A	8292684

RDL = Reportable Detection Limit
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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		OT6000	OT6001	OT6002	OT6003	OT6180		
Sampling Date		2016/06/03	2016/06/03	2016/06/03	2016/06/03	2016/06/03		
COC Number		493715-06-01	493715-06-01	493715-06-01	493715-06-01	493715-06-01		
	UNITS	TRIP BLANK	DUPLICATE 2	DUPLICATE 3	DUPLICATE 4	DUPLICATE 5	RDL	QC Batch
Volatiles								
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292684
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8292684
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8292684
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292684
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8292684
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	107	107	109	106	107	N/A	8292684
4-Bromofluorobenzene (sur.)	%	105	105	104	103	104	N/A	8292684
D4-1,2-Dichloroethane (sur.)	%	112	113	113	110	112	N/A	8292684

RDL = Reportable Detection Limit
N/A = Not Applicable

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Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

GENERAL COMMENTS

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

Package 1	8.7°C
Package 2	11.7°C
Package 3	11.0°C
Package 4	-0.7°C
Package 5	10.3°C
Package 6	7.0°C
Package 7	1.3°C

Sample OT5943-01 : Cation anion balance investigated data quality confirmed.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample OT5974-01 Elements by ICP-Dissolved-Lab Filtered: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Results relate only to the items tested.

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8291317	HC7	Matrix Spike [OT5940-02]	Dissolved Aluminum (Al)	2016/06/11		75 (1)	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/11		101	%	80 - 120
			Dissolved Arsenic (As)	2016/06/11		100	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/11		103	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/11		101	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/11		98	%	80 - 120
			Dissolved Copper (Cu)	2016/06/11		94	%	80 - 120
			Dissolved Lead (Pb)	2016/06/11		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/11		113	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/11		94	%	80 - 120
			Dissolved Selenium (Se)	2016/06/11		93	%	80 - 120
			Dissolved Silver (Ag)	2016/06/11		97	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/11		95	%	80 - 120
			Dissolved Tin (Sn)	2016/06/11		109	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/11		106	%	80 - 120
			Dissolved Uranium (U)	2016/06/11		101	%	80 - 120
			Dissolved Vanadium (V)	2016/06/11		106	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/11		101	%	80 - 120
8291317	HC7	Spiked Blank	Dissolved Aluminum (Al)	2016/06/11		108	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/11		111	%	80 - 120
			Dissolved Arsenic (As)	2016/06/11		112	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/11		107	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/11		116	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/11		114	%	80 - 120
			Dissolved Copper (Cu)	2016/06/11		115	%	80 - 120
			Dissolved Lead (Pb)	2016/06/11		107	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/11		114	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/11		110	%	80 - 120
			Dissolved Selenium (Se)	2016/06/11		103	%	80 - 120
			Dissolved Silver (Ag)	2016/06/11		110	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/11		111	%	80 - 120
			Dissolved Tin (Sn)	2016/06/11		113	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/11		117	%	80 - 120
			Dissolved Uranium (U)	2016/06/11		111	%	80 - 120
			Dissolved Vanadium (V)	2016/06/11		115	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/11		115	%	80 - 120
8291317	HC7	Method Blank	Dissolved Aluminum (Al)	2016/06/11	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2016/06/11	<0.00060		mg/L	
			Dissolved Arsenic (As)	2016/06/11	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2016/06/11	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2016/06/11	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2016/06/11	<0.00030		mg/L	
			Dissolved Copper (Cu)	2016/06/11	<0.00020		mg/L	
			Dissolved Lead (Pb)	2016/06/11	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2016/06/11	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2016/06/11	<0.00050		mg/L	
			Dissolved Selenium (Se)	2016/06/11	<0.00020		mg/L	
			Dissolved Silver (Ag)	2016/06/11	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2016/06/11	<0.00020		mg/L	
			Dissolved Tin (Sn)	2016/06/11	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2016/06/11	<0.0010		mg/L	
			Dissolved Uranium (U)	2016/06/11	<0.00010		mg/L	
			Dissolved Vanadium (V)	2016/06/11	<0.0010		mg/L	

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Maxxam Job #: B644197
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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Zinc (Zn)	2016/06/11	<0.0030		mg/L	
8291317	HC7	RPD [OT5940-02]	Dissolved Aluminum (Al)	2016/06/11	NC		%	20
			Dissolved Antimony (Sb)	2016/06/11	NC		%	20
			Dissolved Arsenic (As)	2016/06/11	15		%	20
			Dissolved Beryllium (Be)	2016/06/11	NC		%	20
			Dissolved Chromium (Cr)	2016/06/11	NC		%	20
			Dissolved Cobalt (Co)	2016/06/11	NC		%	20
			Dissolved Copper (Cu)	2016/06/11	NC		%	20
			Dissolved Lead (Pb)	2016/06/11	NC		%	20
			Dissolved Molybdenum (Mo)	2016/06/11	2.3		%	20
			Dissolved Nickel (Ni)	2016/06/11	1.9		%	20
			Dissolved Selenium (Se)	2016/06/11	NC		%	20
			Dissolved Silver (Ag)	2016/06/11	NC		%	20
			Dissolved Thallium (Tl)	2016/06/11	NC		%	20
			Dissolved Tin (Sn)	2016/06/11	NC		%	20
			Dissolved Titanium (Ti)	2016/06/11	NC		%	20
			Dissolved Uranium (U)	2016/06/11	2.3		%	20
			Dissolved Vanadium (V)	2016/06/11	NC		%	20
			Dissolved Zinc (Zn)	2016/06/11	NC		%	20
8291322	HC7	Matrix Spike [OT5971-02]	Dissolved Aluminum (Al)	2016/06/11		113	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/11		98	%	80 - 120
			Dissolved Arsenic (As)	2016/06/11		100	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/11		106	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/11		94	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/11		93	%	80 - 120
			Dissolved Copper (Cu)	2016/06/11		89	%	80 - 120
			Dissolved Lead (Pb)	2016/06/11		93	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/11		103	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/11		90	%	80 - 120
			Dissolved Selenium (Se)	2016/06/11		95	%	80 - 120
			Dissolved Silver (Ag)	2016/06/11		96	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/11		91	%	80 - 120
			Dissolved Tin (Sn)	2016/06/11		105	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/11		99	%	80 - 120
			Dissolved Uranium (U)	2016/06/11		96	%	80 - 120
			Dissolved Vanadium (V)	2016/06/11		97	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/11		105	%	80 - 120
8291322	HC7	Spiked Blank	Dissolved Aluminum (Al)	2016/06/11		112	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/11		94	%	80 - 120
			Dissolved Arsenic (As)	2016/06/11		99	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/11		99	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/11		95	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/11		97	%	80 - 120
			Dissolved Copper (Cu)	2016/06/11		98	%	80 - 120
			Dissolved Lead (Pb)	2016/06/11		93	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/11		98	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/11		95	%	80 - 120
			Dissolved Selenium (Se)	2016/06/11		97	%	80 - 120
			Dissolved Silver (Ag)	2016/06/11		95	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/11		94	%	80 - 120
			Dissolved Tin (Sn)	2016/06/11		99	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/11		96	%	80 - 120
			Dissolved Uranium (U)	2016/06/11		93	%	80 - 120

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Vanadium (V)	2016/06/11		99	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/11		115	%	80 - 120
8291322	HC7	Method Blank	Dissolved Aluminum (Al)	2016/06/12	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2016/06/12	<0.00060		mg/L	
			Dissolved Arsenic (As)	2016/06/12	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2016/06/12	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2016/06/12	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2016/06/12	<0.00030		mg/L	
			Dissolved Copper (Cu)	2016/06/12	<0.00020		mg/L	
			Dissolved Lead (Pb)	2016/06/12	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2016/06/12	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2016/06/12	<0.00050		mg/L	
			Dissolved Selenium (Se)	2016/06/12	<0.00020		mg/L	
			Dissolved Silver (Ag)	2016/06/12	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2016/06/12	<0.00020		mg/L	
			Dissolved Tin (Sn)	2016/06/12	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2016/06/12	<0.0010		mg/L	
			Dissolved Uranium (U)	2016/06/12	<0.00010		mg/L	
			Dissolved Vanadium (V)	2016/06/12	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2016/06/12	<0.0030		mg/L	
8291322	HC7	RPD [OT5971-02]	Dissolved Aluminum (Al)	2016/06/11	NC		%	20
			Dissolved Antimony (Sb)	2016/06/11	NC		%	20
			Dissolved Arsenic (As)	2016/06/11	9.3		%	20
			Dissolved Beryllium (Be)	2016/06/11	NC		%	20
			Dissolved Chromium (Cr)	2016/06/11	NC		%	20
			Dissolved Cobalt (Co)	2016/06/11	NC		%	20
			Dissolved Copper (Cu)	2016/06/11	4.5		%	20
			Dissolved Lead (Pb)	2016/06/11	NC		%	20
			Dissolved Molybdenum (Mo)	2016/06/11	7.5		%	20
			Dissolved Nickel (Ni)	2016/06/11	NC		%	20
			Dissolved Selenium (Se)	2016/06/11	NC		%	20
			Dissolved Silver (Ag)	2016/06/11	NC		%	20
			Dissolved Thallium (Tl)	2016/06/11	NC		%	20
			Dissolved Tin (Sn)	2016/06/11	NC		%	20
			Dissolved Titanium (Ti)	2016/06/11	NC		%	20
			Dissolved Uranium (U)	2016/06/11	10		%	20
			Dissolved Vanadium (V)	2016/06/11	NC		%	20
			Dissolved Zinc (Zn)	2016/06/11	NC		%	20
8291527	LZ3	Matrix Spike	D10-ANTHRACENE (sur.)	2016/06/08		108	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2016/06/08		98	%	50 - 130
			D8-NAPHTHALENE (sur.)	2016/06/08		74	%	50 - 130
			TERPHENYL-D14 (sur.)	2016/06/08		103	%	50 - 130
			Acenaphthene	2016/06/08		73	%	50 - 130
			Acenaphthylene	2016/06/08		78	%	50 - 130
			Acridine	2016/06/08		94	%	50 - 130
			Anthracene	2016/06/08		87	%	50 - 130
			Benzo(a)anthracene	2016/06/08		106	%	50 - 130
			Benzo(b&j)fluoranthene	2016/06/08		101	%	50 - 130
			Benzo(k)fluoranthene	2016/06/08		97	%	50 - 130
			Benzo(g,h,i)perylene	2016/06/08		95	%	50 - 130
			Benzo(c)phenanthrene	2016/06/08		103	%	50 - 130
			Benzo(a)pyrene	2016/06/08		98	%	50 - 130
			Benzo[e]pyrene	2016/06/08		99	%	50 - 130

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chrysene	2016/06/08		98	%	50 - 130
			Dibenz(a,h)anthracene	2016/06/08		100	%	50 - 130
			Fluoranthene	2016/06/08		108	%	50 - 130
			Fluorene	2016/06/08		88	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2016/06/08		100	%	50 - 130
			2-Methylnaphthalene	2016/06/08		61	%	50 - 130
			Naphthalene	2016/06/08		70	%	50 - 130
			Phenanthrene	2016/06/08		96	%	50 - 130
			Perylene	2016/06/08		98	%	50 - 130
			Pyrene	2016/06/08		105	%	50 - 130
			Quinoline	2016/06/08		103	%	50 - 130
8291527	LZ3	Spiked Blank	D10-ANTHRACENE (sur.)	2016/06/08		108	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2016/06/08		102	%	50 - 130
			D8-NAPHTHALENE (sur.)	2016/06/08		78	%	50 - 130
			TERPHENYL-D14 (sur.)	2016/06/08		106	%	50 - 130
			Acenaphthene	2016/06/08		89	%	50 - 130
			Acenaphthylene	2016/06/08		97	%	50 - 130
			Acridine	2016/06/08		101	%	50 - 130
			Anthracene	2016/06/08		91	%	50 - 130
			Benzo(a)anthracene	2016/06/08		111	%	50 - 130
			Benzo(b&j)fluoranthene	2016/06/08		109	%	50 - 130
			Benzo(k)fluoranthene	2016/06/08		106	%	50 - 130
			Benzo(g,h,i)perylene	2016/06/08		104	%	50 - 130
			Benzo(c)phenanthrene	2016/06/08		106	%	50 - 130
			Benzo(a)pyrene	2016/06/08		108	%	50 - 130
			Benzo[e]pyrene	2016/06/08		106	%	50 - 130
			Chrysene	2016/06/08		106	%	50 - 130
			Dibenz(a,h)anthracene	2016/06/08		110	%	50 - 130
			Fluoranthene	2016/06/08		107	%	50 - 130
			Fluorene	2016/06/08		101	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2016/06/08		109	%	50 - 130
			2-Methylnaphthalene	2016/06/08		78	%	50 - 130
			Naphthalene	2016/06/08		86	%	50 - 130
			Phenanthrene	2016/06/08		103	%	50 - 130
			Perylene	2016/06/08		109	%	50 - 130
			Pyrene	2016/06/08		105	%	50 - 130
			Quinoline	2016/06/08		102	%	50 - 130
8291527	LZ3	Method Blank	D10-ANTHRACENE (sur.)	2016/06/08		106	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2016/06/08		96	%	50 - 130
			D8-NAPHTHALENE (sur.)	2016/06/08		75	%	50 - 130
			TERPHENYL-D14 (sur.)	2016/06/08		105	%	50 - 130
			Acenaphthene	2016/06/08	<0.10		ug/L	
			Acenaphthylene	2016/06/08	<0.10		ug/L	
			Acridine	2016/06/08	<0.20		ug/L	
			Anthracene	2016/06/08	<0.010		ug/L	
			Benzo(a)anthracene	2016/06/08	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2016/06/08	<0.0085		ug/L	
			Benzo(k)fluoranthene	2016/06/08	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2016/06/08	<0.0085		ug/L	
			Benzo(c)phenanthrene	2016/06/08	<0.050		ug/L	
			Benzo(a)pyrene	2016/06/08	<0.0075		ug/L	
			Benzo[e]pyrene	2016/06/08	<0.050		ug/L	
			Chrysene	2016/06/08	<0.0085		ug/L	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dibenz(a,h)anthracene	2016/06/08	<0.0075		ug/L	
			Fluoranthene	2016/06/08	<0.010		ug/L	
			Fluorene	2016/06/08	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2016/06/08	<0.0085		ug/L	
			2-Methylnaphthalene	2016/06/08	<0.10		ug/L	
			Naphthalene	2016/06/08	<0.10		ug/L	
			Phenanthrene	2016/06/08	<0.050		ug/L	
			Perylene	2016/06/08	<0.050		ug/L	
			Pyrene	2016/06/08	<0.020		ug/L	
			Quinoline	2016/06/08	<0.20		ug/L	
8291527	LZ3	RPD	Acenaphthene	2016/06/08	NC		%	40
			Acenaphthylene	2016/06/08	NC		%	40
			Acridine	2016/06/08	NC		%	40
			Anthracene	2016/06/08	NC		%	40
			Benzo(a)anthracene	2016/06/08	NC		%	40
			Benzo(b&j)fluoranthene	2016/06/08	NC		%	40
			Benzo(k)fluoranthene	2016/06/08	NC		%	40
			Benzo(g,h,i)perylene	2016/06/08	NC		%	40
			Benzo(c)phenanthrene	2016/06/08	NC		%	40
			Benzo(a)pyrene	2016/06/08	NC		%	40
			Benzo[e]pyrene	2016/06/08	NC		%	40
			Chrysene	2016/06/08	NC		%	40
			Dibenz(a,h)anthracene	2016/06/08	NC		%	40
			Fluoranthene	2016/06/08	NC		%	40
			Fluorene	2016/06/08	NC		%	40
			Indeno(1,2,3-cd)pyrene	2016/06/08	NC		%	40
			2-Methylnaphthalene	2016/06/08	NC		%	40
			Naphthalene	2016/06/08	NC		%	40
			Phenanthrene	2016/06/08	NC		%	40
			Perylene	2016/06/08	NC		%	40
			Pyrene	2016/06/08	NC		%	40
			Quinoline	2016/06/08	NC		%	40
8291528	DO1	Matrix Spike	O-TERPHENYL (sur.)	2016/06/09		92	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/09		NC	%	50 - 130
8291528	DO1	Spiked Blank	O-TERPHENYL (sur.)	2016/06/08		99	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/08		101	%	70 - 130
8291528	DO1	Method Blank	O-TERPHENYL (sur.)	2016/06/08		92	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/08	<0.10		mg/L	
8291528	DO1	RPD	F2 (C10-C16 Hydrocarbons)	2016/06/09	NC		%	40
8291534	DO1	Matrix Spike [OT5939-06]	O-TERPHENYL (sur.)	2016/06/10		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/10		106	%	50 - 130
8291534	DO1	Spiked Blank	O-TERPHENYL (sur.)	2016/06/10		102	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/10		112	%	70 - 130
8291534	DO1	Method Blank	O-TERPHENYL (sur.)	2016/06/10		103	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/10	<0.10		mg/L	
8291534	DO1	RPD [OT5972-06]	F2 (C10-C16 Hydrocarbons)	2016/06/10	NC		%	40
8291535	LSH	Matrix Spike	O-TERPHENYL (sur.)	2016/06/10		95	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/10		95	%	50 - 130
8291535	LSH	Spiked Blank	O-TERPHENYL (sur.)	2016/06/10		90	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/10		91	%	70 - 130
8291535	LSH	Method Blank	O-TERPHENYL (sur.)	2016/06/10		100	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/10	<0.10		mg/L	
8291535	LSH	RPD [OT6180-06]	F2 (C10-C16 Hydrocarbons)	2016/06/10	NC		%	40

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8291755	ARB	Matrix Spike	Total Chemical Oxygen Demand	2016/06/08		100	%	80 - 120
8291755	ARB	Spiked Blank	Total Chemical Oxygen Demand	2016/06/08		102	%	80 - 120
8291755	ARB	Method Blank	Total Chemical Oxygen Demand	2016/06/08	<5.0		mg/L	
8291755	ARB	RPD	Total Chemical Oxygen Demand	2016/06/08	6.3		%	20
8291773	ARB	Matrix Spike [OT5951-03]	Total Chemical Oxygen Demand	2016/06/09		98	%	80 - 120
8291773	ARB	Spiked Blank	Total Chemical Oxygen Demand	2016/06/09		98	%	80 - 120
8291773	ARB	Method Blank	Total Chemical Oxygen Demand	2016/06/09	6.0, RDL=5.0		mg/L	
8291773	ARB	RPD [OT5939-03]	Total Chemical Oxygen Demand	2016/06/09	5.7		%	20
8292035	MUK	Matrix Spike	Dissolved Organic Carbon (C)	2016/06/08		NC	%	80 - 120
8292035	MUK	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/08		100	%	80 - 120
8292035	MUK	Method Blank	Dissolved Organic Carbon (C)	2016/06/08	<0.50		mg/L	
8292035	MUK	RPD	Dissolved Organic Carbon (C)	2016/06/08	3.1		%	20
8292372	MUK	Matrix Spike [OT5939-04]	Dissolved Organic Carbon (C)	2016/06/08		NC	%	80 - 120
8292372	MUK	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/08		103	%	80 - 120
8292372	MUK	Method Blank	Dissolved Organic Carbon (C)	2016/06/08	<0.50		mg/L	
8292372	MUK	RPD [OT5939-04]	Dissolved Organic Carbon (C)	2016/06/08	5.4		%	20
8292619	MUK	Matrix Spike	Dissolved Organic Carbon (C)	2016/06/08		NC	%	80 - 120
8292619	MUK	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/08		102	%	80 - 120
8292619	MUK	Method Blank	Dissolved Organic Carbon (C)	2016/06/08	<0.50		mg/L	
8292619	MUK	RPD	Dissolved Organic Carbon (C)	2016/06/08	0.71		%	20
8292682	GP4	Matrix Spike [OT5940-07]	1,4-Difluorobenzene (sur.)	2016/06/12		100	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		107	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		127	%	70 - 130
			Benzene	2016/06/12		82	%	70 - 130
			Toluene	2016/06/12		82	%	70 - 130
			Ethylbenzene	2016/06/12		92	%	70 - 130
			m & p-Xylene	2016/06/12		92	%	70 - 130
			o-Xylene	2016/06/12		94	%	70 - 130
			F1 (C6-C10)	2016/06/12		89	%	70 - 130
8292682	GP4	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/06/12		102	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		109	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		125	%	70 - 130
			Benzene	2016/06/12		82	%	70 - 130
			Toluene	2016/06/12		83	%	70 - 130
			Ethylbenzene	2016/06/12		94	%	70 - 130
			m & p-Xylene	2016/06/12		94	%	70 - 130
			o-Xylene	2016/06/12		94	%	70 - 130
			F1 (C6-C10)	2016/06/12		113	%	70 - 130
8292682	GP4	Method Blank	1,4-Difluorobenzene (sur.)	2016/06/12		107	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		104	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		110	%	70 - 130
			Benzene	2016/06/12	<0.00040		mg/L	
			Toluene	2016/06/12	<0.00040		mg/L	
			Ethylbenzene	2016/06/12	<0.00040		mg/L	
			m & p-Xylene	2016/06/12	<0.00080		mg/L	
			o-Xylene	2016/06/12	<0.00040		mg/L	
			Xylenes (Total)	2016/06/12	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2016/06/12	<0.10		mg/L	
			F1 (C6-C10)	2016/06/12	<0.10		mg/L	
8292682	GP4	RPD [OT5939-07]	Benzene	2016/06/12	NC		%	40
			Toluene	2016/06/12	NC		%	40
			Ethylbenzene	2016/06/12	NC		%	40

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			m & p-Xylene	2016/06/12	NC		%	40
			o-Xylene	2016/06/12	NC		%	40
			Xylenes (Total)	2016/06/12	NC		%	40
			F1 (C6-C10) - BTEX	2016/06/12	NC		%	40
			F1 (C6-C10)	2016/06/12	NC		%	40
8292684	GP4	Matrix Spike [OT5971-07]	1,4-Difluorobenzene (sur.)	2016/06/12		98	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		108	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		116	%	70 - 130
			Benzene	2016/06/12		82	%	70 - 130
			Toluene	2016/06/12		81	%	70 - 130
			Ethylbenzene	2016/06/12		92	%	70 - 130
			m & p-Xylene	2016/06/12		92	%	70 - 130
			o-Xylene	2016/06/12		94	%	70 - 130
			F1 (C6-C10)	2016/06/12		87	%	70 - 130
8292684	GP4	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/06/12		101	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		108	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		125	%	70 - 130
			Benzene	2016/06/12		89	%	70 - 130
			Toluene	2016/06/12		89	%	70 - 130
			Ethylbenzene	2016/06/12		100	%	70 - 130
			m & p-Xylene	2016/06/12		101	%	70 - 130
			o-Xylene	2016/06/12		100	%	70 - 130
			F1 (C6-C10)	2016/06/12		113	%	70 - 130
8292684	GP4	Method Blank	1,4-Difluorobenzene (sur.)	2016/06/12		103	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		106	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		123	%	70 - 130
			Benzene	2016/06/12	<0.00040		mg/L	
			Toluene	2016/06/12	<0.00040		mg/L	
			Ethylbenzene	2016/06/12	<0.00040		mg/L	
			m & p-Xylene	2016/06/12	<0.00080		mg/L	
			o-Xylene	2016/06/12	<0.00040		mg/L	
			Xylenes (Total)	2016/06/12	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2016/06/12	<0.10		mg/L	
			F1 (C6-C10)	2016/06/12	<0.10		mg/L	
8292684	GP4	RPD [OT5970-07]	Benzene	2016/06/12	NC		%	40
			Toluene	2016/06/12	NC		%	40
			Ethylbenzene	2016/06/12	NC		%	40
			m & p-Xylene	2016/06/12	NC		%	40
			o-Xylene	2016/06/12	NC		%	40
			Xylenes (Total)	2016/06/12	NC		%	40
			F1 (C6-C10) - BTEX	2016/06/12	NC		%	40
			F1 (C6-C10)	2016/06/12	NC		%	40
8292794	JLD	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/09		94	%	80 - 120
8292794	JLD	Method Blank	Alkalinity (PP as CaCO3)	2016/06/09	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/09	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/09	<0.50		mg/L	
			Carbonate (CO3)	2016/06/09	<0.50		mg/L	
			Hydroxide (OH)	2016/06/09	<0.50		mg/L	
8292794	JLD	RPD [OT5980-01]	Alkalinity (PP as CaCO3)	2016/06/09	0.70		%	20
			Alkalinity (Total as CaCO3)	2016/06/09	0.67		%	20
			Bicarbonate (HCO3)	2016/06/09	0.73		%	20
			Carbonate (CO3)	2016/06/09	0.70		%	20
			Hydroxide (OH)	2016/06/09	NC		%	20

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8292800	JLD	Spiked Blank	Conductivity	2016/06/09		101	%	90 - 110
8292800	JLD	Method Blank	Conductivity	2016/06/09	<1.0		uS/cm	
8292800	JLD	RPD [OT5980-01]	Conductivity	2016/06/09	1.0		%	20
8292802	JLD	Spiked Blank	pH	2016/06/09		100	%	97 - 103
8292802	JLD	RPD [OT5980-01]	pH	2016/06/09	0.077		%	N/A
8292818	JLD	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/09		94	%	80 - 120
8292818	JLD	Method Blank	Alkalinity (PP as CaCO3)	2016/06/09	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/09	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/09	<0.50		mg/L	
			Carbonate (CO3)	2016/06/09	<0.50		mg/L	
			Hydroxide (OH)	2016/06/09	<0.50		mg/L	
8292818	JLD	RPD [OT5981-01]	Alkalinity (PP as CaCO3)	2016/06/09	NC		%	20
			Alkalinity (Total as CaCO3)	2016/06/09	0.39		%	20
			Bicarbonate (HCO3)	2016/06/09	0.39		%	20
			Carbonate (CO3)	2016/06/09	NC		%	20
			Hydroxide (OH)	2016/06/09	NC		%	20
8292820	JLD	Spiked Blank	Conductivity	2016/06/09		99	%	90 - 110
8292820	JLD	Method Blank	Conductivity	2016/06/09	<1.0		uS/cm	
8292820	JLD	RPD [OT5981-01]	Conductivity	2016/06/09	0.41		%	20
8292821	JLD	Spiked Blank	pH	2016/06/09		100	%	97 - 103
8292821	JLD	RPD [OT5981-01]	pH	2016/06/09	0.19		%	N/A
8292975	MB5	Matrix Spike	Total Total Kjeldahl Nitrogen	2016/06/09		96	%	80 - 120
8292975	MB5	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/09		92	%	80 - 120
8292975	MB5	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/09		98	%	80 - 120
8292975	MB5	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/09	<0.050		mg/L	
8292975	MB5	RPD	Total Total Kjeldahl Nitrogen	2016/06/09	NC		%	20
8293135	ARB	Matrix Spike [OT5953-03]	Total Chemical Oxygen Demand	2016/06/09		97	%	80 - 120
8293135	ARB	Spiked Blank	Total Chemical Oxygen Demand	2016/06/09		101	%	80 - 120
8293135	ARB	Method Blank	Total Chemical Oxygen Demand	2016/06/09	6.0, RDL=5.0		mg/L	
8293135	ARB	RPD [OT5953-03]	Total Chemical Oxygen Demand	2016/06/09	NC		%	20
8293311	MUK	Matrix Spike	Dissolved Organic Carbon (C)	2016/06/09		NC	%	80 - 120
8293311	MUK	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/09		95	%	80 - 120
8293311	MUK	Method Blank	Dissolved Organic Carbon (C)	2016/06/09	<0.50		mg/L	
8293311	MUK	RPD	Dissolved Organic Carbon (C)	2016/06/09	3.8		%	20
8293574	MB5	Matrix Spike [OT6000-03]	Total Total Kjeldahl Nitrogen	2016/06/13		87	%	80 - 120
8293574	MB5	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/13		93	%	80 - 120
8293574	MB5	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/13		89	%	80 - 120
8293574	MB5	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/13	0.079, RDL=0.050		mg/L	
8293574	MB5	RPD [OT6000-03]	Total Total Kjeldahl Nitrogen	2016/06/13	NC		%	20
8293588	MB5	Matrix Spike [OT5954-03]	Total Total Kjeldahl Nitrogen	2016/06/13		NC	%	80 - 120
8293588	MB5	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/13		108	%	80 - 120
8293588	MB5	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/13		96	%	80 - 120
8293588	MB5	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/13	0.066, RDL=0.050		mg/L	
8293588	MB5	RPD [OT5954-03]	Total Total Kjeldahl Nitrogen	2016/06/13	13		%	20
8293622	PC5	Matrix Spike	Dissolved Aluminum (Al)	2016/06/09		119	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/09		101	%	80 - 120
			Dissolved Arsenic (As)	2016/06/09		98	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/09		102	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/09		99	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/09		93	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Copper (Cu)	2016/06/09		95	%	80 - 120
			Dissolved Lead (Pb)	2016/06/09		93	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/09		104	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/09		96	%	80 - 120
			Dissolved Selenium (Se)	2016/06/09		99	%	80 - 120
			Dissolved Silver (Ag)	2016/06/09		98	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/09		102	%	80 - 120
			Dissolved Tin (Sn)	2016/06/09		100	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/09		95	%	80 - 120
			Dissolved Uranium (U)	2016/06/09		NC	%	80 - 120
			Dissolved Vanadium (V)	2016/06/09		98	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/09		NC	%	80 - 120
8293622	PC5	Spiked Blank	Dissolved Aluminum (Al)	2016/06/09		119	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/09		103	%	80 - 120
			Dissolved Arsenic (As)	2016/06/09		104	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/09		99	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/09		106	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/09		101	%	80 - 120
			Dissolved Copper (Cu)	2016/06/09		103	%	80 - 120
			Dissolved Lead (Pb)	2016/06/09		103	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/09		105	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/09		102	%	80 - 120
			Dissolved Selenium (Se)	2016/06/09		97	%	80 - 120
			Dissolved Silver (Ag)	2016/06/09		102	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/09		103	%	80 - 120
			Dissolved Tin (Sn)	2016/06/09		103	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/09		101	%	80 - 120
			Dissolved Uranium (U)	2016/06/09		99	%	80 - 120
			Dissolved Vanadium (V)	2016/06/09		105	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/09		113	%	80 - 120
8293622	PC5	Method Blank	Dissolved Aluminum (Al)	2016/06/09	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2016/06/09	<0.00060		mg/L	
			Dissolved Arsenic (As)	2016/06/09	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2016/06/09	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2016/06/09	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2016/06/09	<0.00030		mg/L	
			Dissolved Copper (Cu)	2016/06/09	0.00025, RDL=0.00020		mg/L	
			Dissolved Lead (Pb)	2016/06/09	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2016/06/09	0.00021, RDL=0.00020		mg/L	
			Dissolved Nickel (Ni)	2016/06/09	<0.00050		mg/L	
			Dissolved Selenium (Se)	2016/06/09	<0.00020		mg/L	
			Dissolved Silver (Ag)	2016/06/09	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2016/06/09	<0.00020		mg/L	
			Dissolved Tin (Sn)	2016/06/09	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2016/06/09	<0.0010		mg/L	
			Dissolved Uranium (U)	2016/06/09	<0.00010		mg/L	
			Dissolved Vanadium (V)	2016/06/09	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2016/06/09	<0.0030		mg/L	
8293622	PC5	RPD	Dissolved Aluminum (Al)	2016/06/10	NC		%	20
			Dissolved Antimony (Sb)	2016/06/10	NC		%	20
			Dissolved Arsenic (As)	2016/06/10	4.7		%	20

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			Dissolved Beryllium (Be)	2016/06/10	NC		%	20
			Dissolved Chromium (Cr)	2016/06/10	NC		%	20
			Dissolved Cobalt (Co)	2016/06/10	0.44		%	20
			Dissolved Copper (Cu)	2016/06/10	0.77		%	20
			Dissolved Lead (Pb)	2016/06/10	NC		%	20
			Dissolved Molybdenum (Mo)	2016/06/10	5.0		%	20
			Dissolved Nickel (Ni)	2016/06/10	6.2		%	20
			Dissolved Selenium (Se)	2016/06/10	NC		%	20
			Dissolved Silver (Ag)	2016/06/10	NC		%	20
			Dissolved Thallium (Tl)	2016/06/10	NC		%	20
			Dissolved Tin (Sn)	2016/06/10	NC		%	20
			Dissolved Titanium (Ti)	2016/06/10	NC		%	20
			Dissolved Uranium (U)	2016/06/10	2.3		%	20
			Dissolved Vanadium (V)	2016/06/10	NC		%	20
			Dissolved Zinc (Zn)	2016/06/10	NC		%	20
8293866	JLD	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/10		94	%	80 - 120
8293866	JLD	Method Blank	Alkalinity (PP as CaCO3)	2016/06/10	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/10	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/10	<0.50		mg/L	
			Carbonate (CO3)	2016/06/10	<0.50		mg/L	
			Hydroxide (OH)	2016/06/10	<0.50		mg/L	
8293866	JLD	RPD	Alkalinity (PP as CaCO3)	2016/06/10	NC		%	20
			Alkalinity (Total as CaCO3)	2016/06/10	NC		%	20
			Bicarbonate (HCO3)	2016/06/10	NC		%	20
			Carbonate (CO3)	2016/06/10	NC		%	20
			Hydroxide (OH)	2016/06/10	NC		%	20
8293867	JLD	Spiked Blank	Conductivity	2016/06/10		101	%	90 - 110
8293867	JLD	Method Blank	Conductivity	2016/06/10	<1.0		uS/cm	
8293867	JLD	RPD	Conductivity	2016/06/10	NC		%	20
8293870	JLD	Spiked Blank	pH	2016/06/10		100	%	97 - 103
8293870	JLD	RPD	pH	2016/06/10	2.9		%	N/A
8294452	MB5	Matrix Spike	Total Total Kjeldahl Nitrogen	2016/06/10		90	%	80 - 120
8294452	MB5	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/10		93	%	80 - 120
8294452	MB5	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/10		105	%	80 - 120
8294452	MB5	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/10	<0.050		mg/L	
8294452	MB5	RPD	Total Total Kjeldahl Nitrogen	2016/06/10	NC		%	20
8294512	ARB	Matrix Spike	Total Chemical Oxygen Demand	2016/06/10		98	%	80 - 120
8294512	ARB	Spiked Blank	Total Chemical Oxygen Demand	2016/06/10		99	%	80 - 120
8294512	ARB	Method Blank	Total Chemical Oxygen Demand	2016/06/10	<5.0		mg/L	
8294512	ARB	RPD	Total Chemical Oxygen Demand	2016/06/10	19		%	20
8294672	MB5	Matrix Spike	Total Total Kjeldahl Nitrogen	2016/06/14		102	%	80 - 120
8294672	MB5	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/14		99	%	N/A
8294672	MB5	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/14		103	%	80 - 120
8294672	MB5	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/14	<0.050		mg/L	
8294672	MB5	RPD	Total Total Kjeldahl Nitrogen	2016/06/14	NC		%	20
8294968	JHC	Matrix Spike [OT5979-02]	Dissolved Barium (Ba)	2016/06/10		81	%	80 - 120
			Dissolved Boron (B)	2016/06/10		93	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/10		NC	%	80 - 120
			Dissolved Iron (Fe)	2016/06/10		103	%	80 - 120
			Dissolved Lithium (Li)	2016/06/10		99	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/10		96	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/10		98	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/10		103	%	80 - 120

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			Dissolved Potassium (K)	2016/06/10		102	%	80 - 120
			Dissolved Silicon (Si)	2016/06/10		94	%	80 - 120
			Dissolved Sodium (Na)	2016/06/10		NC	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/10		NC	%	80 - 120
8294968	JHC	Spiked Blank	Dissolved Barium (Ba)	2016/06/10		99	%	80 - 120
			Dissolved Boron (B)	2016/06/10		95	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/10		100	%	80 - 120
			Dissolved Iron (Fe)	2016/06/10		105	%	80 - 120
			Dissolved Lithium (Li)	2016/06/10		100	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/10		99	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/10		100	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/10		99	%	80 - 120
			Dissolved Potassium (K)	2016/06/10		98	%	80 - 120
			Dissolved Silicon (Si)	2016/06/10		94	%	80 - 120
			Dissolved Sodium (Na)	2016/06/10		97	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/10		99	%	80 - 120
8294968	JHC	Method Blank	Dissolved Barium (Ba)	2016/06/10	<0.010		mg/L	
			Dissolved Boron (B)	2016/06/10	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/06/10	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/06/10	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/06/10	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/06/10	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/06/10	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/06/10	<0.10		mg/L	
			Dissolved Potassium (K)	2016/06/10	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/06/10	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/06/10	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/06/10	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/06/10	<0.20		mg/L	
8294968	JHC	RPD [OT5979-02]	Dissolved Barium (Ba)	2016/06/10	NC		%	20
			Dissolved Boron (B)	2016/06/10	0.81		%	20
			Dissolved Calcium (Ca)	2016/06/10	0.50		%	20
			Dissolved Iron (Fe)	2016/06/10	1.7		%	20
			Dissolved Lithium (Li)	2016/06/10	1.7		%	20
			Dissolved Magnesium (Mg)	2016/06/10	1.3		%	20
			Dissolved Manganese (Mn)	2016/06/10	0.97		%	20
			Dissolved Phosphorus (P)	2016/06/10	NC		%	20
			Dissolved Potassium (K)	2016/06/10	1.3		%	20
			Dissolved Silicon (Si)	2016/06/10	0.91		%	20
			Dissolved Sodium (Na)	2016/06/10	1.5		%	20
			Dissolved Strontium (Sr)	2016/06/10	0.96		%	20
			Dissolved Sulphur (S)	2016/06/10	1.4		%	20
8294971	RK3	Matrix Spike [OT5940-05]	Dissolved Mercury (Hg)	2016/06/10		106	%	80 - 120
8294971	RK3	Spiked Blank	Dissolved Mercury (Hg)	2016/06/10		102	%	80 - 120
8294971	RK3	Method Blank	Dissolved Mercury (Hg)	2016/06/13	<0.0020		ug/L	
8294971	RK3	RPD [OT5939-05]	Dissolved Mercury (Hg)	2016/06/10	NC		%	20
8294989	ARB	Matrix Spike [OT5952-03]	Total Chemical Oxygen Demand	2016/06/10		101	%	80 - 120
8294989	ARB	Spiked Blank	Total Chemical Oxygen Demand	2016/06/10		100	%	80 - 120
8294989	ARB	Method Blank	Total Chemical Oxygen Demand	2016/06/10	<5.0		mg/L	
8294989	ARB	RPD [OT5952-03]	Total Chemical Oxygen Demand	2016/06/10	4.0		%	20
8295001	JBX	Matrix Spike [OT5943-02]	Dissolved Barium (Ba)	2016/06/11		64 (1)	%	80 - 120
			Dissolved Boron (B)	2016/06/11		88	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/11		NC	%	80 - 120

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			Dissolved Iron (Fe)	2016/06/11		87	%	80 - 120
			Dissolved Lithium (Li)	2016/06/11		90	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/11		NC	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/11		91	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/11		96	%	80 - 120
			Dissolved Potassium (K)	2016/06/11		98	%	80 - 120
			Dissolved Silicon (Si)	2016/06/11		93	%	80 - 120
			Dissolved Sodium (Na)	2016/06/11		NC	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/11		NC	%	80 - 120
8295001	JBX	Spiked Blank	Dissolved Barium (Ba)	2016/06/10		94	%	80 - 120
			Dissolved Boron (B)	2016/06/10		93	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/10		100	%	80 - 120
			Dissolved Iron (Fe)	2016/06/10		95	%	80 - 120
			Dissolved Lithium (Li)	2016/06/10		96	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/10		102	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/10		102	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/10		95	%	80 - 120
			Dissolved Potassium (K)	2016/06/10		97	%	80 - 120
			Dissolved Silicon (Si)	2016/06/10		93	%	80 - 120
			Dissolved Sodium (Na)	2016/06/10		98	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/10		94	%	80 - 120
8295001	JBX	Method Blank	Dissolved Barium (Ba)	2016/06/10	<0.010		mg/L	
			Dissolved Boron (B)	2016/06/10	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/06/10	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/06/10	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/06/10	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/06/10	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/06/10	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/06/10	<0.10		mg/L	
			Dissolved Potassium (K)	2016/06/10	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/06/10	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/06/10	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/06/10	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/06/10	<0.20		mg/L	
8295001	JBX	RPD [OT5943-02]	Dissolved Barium (Ba)	2016/06/10	NC		%	20
			Dissolved Boron (B)	2016/06/10	0.97		%	20
			Dissolved Calcium (Ca)	2016/06/10	1.5		%	20
			Dissolved Iron (Fe)	2016/06/10	NC		%	20
			Dissolved Lithium (Li)	2016/06/10	0.071		%	20
			Dissolved Magnesium (Mg)	2016/06/10	0.83		%	20
			Dissolved Manganese (Mn)	2016/06/10	2.2		%	20
			Dissolved Phosphorus (P)	2016/06/10	NC		%	20
			Dissolved Potassium (K)	2016/06/10	0.83		%	20
			Dissolved Silicon (Si)	2016/06/10	1.5		%	20
			Dissolved Sodium (Na)	2016/06/10	0.16		%	20
			Dissolved Strontium (Sr)	2016/06/10	0.90		%	20
			Dissolved Sulphur (S)	2016/06/10	0.33		%	20
8295165	JBX	Matrix Spike	Dissolved Barium (Ba)	2016/06/10		90	%	80 - 120
			Dissolved Boron (B)	2016/06/10		92	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/10		NC	%	80 - 120
			Dissolved Iron (Fe)	2016/06/10		94	%	80 - 120
			Dissolved Lithium (Li)	2016/06/10		92	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/10		95	%	80 - 120

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			Dissolved Manganese (Mn)	2016/06/10		97	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/10		97	%	80 - 120
			Dissolved Potassium (K)	2016/06/10		95	%	80 - 120
			Dissolved Silicon (Si)	2016/06/10		91	%	80 - 120
			Dissolved Sodium (Na)	2016/06/10		94	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/10		90	%	80 - 120
8295165	JBX	Spiked Blank	Dissolved Barium (Ba)	2016/06/10		92	%	80 - 120
			Dissolved Boron (B)	2016/06/10		91	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/10		101	%	80 - 120
			Dissolved Iron (Fe)	2016/06/10		95	%	80 - 120
			Dissolved Lithium (Li)	2016/06/10		93	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/10		100	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/10		103	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/10		96	%	80 - 120
			Dissolved Potassium (K)	2016/06/10		94	%	80 - 120
			Dissolved Silicon (Si)	2016/06/10		93	%	80 - 120
			Dissolved Sodium (Na)	2016/06/10		95	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/10		95	%	80 - 120
8295165	JBX	Method Blank	Dissolved Barium (Ba)	2016/06/10	<0.010		mg/L	
			Dissolved Boron (B)	2016/06/10	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/06/10	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/06/10	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/06/10	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/06/10	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/06/10	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/06/10	<0.10		mg/L	
			Dissolved Potassium (K)	2016/06/10	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/06/10	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/06/10	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/06/10	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/06/10	<0.20		mg/L	
8295165	JBX	RPD	Dissolved Calcium (Ca)	2016/06/10	3.4		%	20
			Dissolved Iron (Fe)	2016/06/10	NC		%	20
			Dissolved Magnesium (Mg)	2016/06/10	2.3		%	20
			Dissolved Manganese (Mn)	2016/06/10	NC		%	20
			Dissolved Potassium (K)	2016/06/10	3.1		%	20
			Dissolved Sodium (Na)	2016/06/10	2.3		%	20
8295564	RK3	Matrix Spike [OT5975-05]	Dissolved Mercury (Hg)	2016/06/10		95	%	80 - 120
8295564	RK3	Spiked Blank	Dissolved Mercury (Hg)	2016/06/10		103	%	80 - 120
8295564	RK3	Method Blank	Dissolved Mercury (Hg)	2016/06/13	<0.0020		ug/L	
8295564	RK3	RPD [OT5973-05]	Dissolved Mercury (Hg)	2016/06/13	NC		%	20
8295598	ZI	Matrix Spike	Dissolved Chloride (Cl)	2016/06/10		NC	%	80 - 120
8295598	ZI	Spiked Blank	Dissolved Chloride (Cl)	2016/06/10		106	%	80 - 120
8295598	ZI	Method Blank	Dissolved Chloride (Cl)	2016/06/10	<1.0		mg/L	
8295598	ZI	RPD	Dissolved Chloride (Cl)	2016/06/10	1.2		%	20
8295605	ZI	Matrix Spike	Dissolved Sulphate (SO4)	2016/06/10		NC	%	80 - 120
8295605	ZI	Spiked Blank	Dissolved Sulphate (SO4)	2016/06/10		104	%	80 - 120
8295605	ZI	Method Blank	Dissolved Sulphate (SO4)	2016/06/10	<1.0		mg/L	
8295605	ZI	RPD	Dissolved Sulphate (SO4)	2016/06/10	1.4		%	20
8295891	MPH	Matrix Spike	Dissolved Nitrite (N)	2016/06/11		101	%	80 - 120
			Dissolved Nitrate (N)	2016/06/11		103	%	80 - 120
8295891	MPH	Spiked Blank	Dissolved Nitrite (N)	2016/06/11		99	%	80 - 120
			Dissolved Nitrate (N)	2016/06/11		101	%	80 - 120

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8295891	MPH	Method Blank	Dissolved Nitrite (N)	2016/06/11	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/06/11	<0.010		mg/L	
8295891	MPH	RPD	Dissolved Nitrite (N)	2016/06/11	NC		%	20
			Dissolved Nitrate (N)	2016/06/11	0.20		%	20
8295896	MPH	Matrix Spike [OT5941-01]	Dissolved Nitrite (N)	2016/06/10		102	%	80 - 120
			Dissolved Nitrate (N)	2016/06/10		105	%	80 - 120
8295896	MPH	Spiked Blank	Dissolved Nitrite (N)	2016/06/10		100	%	80 - 120
			Dissolved Nitrate (N)	2016/06/10		102	%	80 - 120
8295896	MPH	Method Blank	Dissolved Nitrite (N)	2016/06/10	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/06/10	<0.010		mg/L	
8295896	MPH	RPD [OT5941-01]	Dissolved Nitrite (N)	2016/06/10	2.0		%	20
			Dissolved Nitrate (N)	2016/06/10	1.5		%	20
8295897	MPH	Matrix Spike [OT5972-01]	Dissolved Nitrite (N)	2016/06/11		102	%	80 - 120
			Dissolved Nitrate (N)	2016/06/11		106	%	80 - 120
8295897	MPH	Spiked Blank	Dissolved Nitrite (N)	2016/06/11		100	%	80 - 120
			Dissolved Nitrate (N)	2016/06/11		103	%	80 - 120
8295897	MPH	Method Blank	Dissolved Nitrite (N)	2016/06/11	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/06/11	<0.010		mg/L	
8295897	MPH	RPD [OT5972-01]	Dissolved Nitrite (N)	2016/06/11	NC		%	20
			Dissolved Nitrate (N)	2016/06/11	1.1		%	20
8296032	KP9	Matrix Spike	Dissolved Chloride (Cl)	2016/06/11		NC	%	80 - 120
8296032	KP9	Spiked Blank	Dissolved Chloride (Cl)	2016/06/11		102	%	80 - 120
8296032	KP9	Method Blank	Dissolved Chloride (Cl)	2016/06/11	<1.0		mg/L	
8296032	KP9	RPD	Dissolved Chloride (Cl)	2016/06/11	1.9		%	20
8296036	KP9	Matrix Spike	Dissolved Sulphate (SO4)	2016/06/11		NC	%	80 - 120
8296036	KP9	Spiked Blank	Dissolved Sulphate (SO4)	2016/06/11		101	%	80 - 120
8296036	KP9	Method Blank	Dissolved Sulphate (SO4)	2016/06/11	<1.0		mg/L	
8296036	KP9	RPD	Dissolved Sulphate (SO4)	2016/06/11	0.25		%	20
8296156	RM9	Matrix Spike [OT5943-03]	Total Ammonia (N)	2016/06/11		95	%	80 - 120
8296156	RM9	Spiked Blank	Total Ammonia (N)	2016/06/11		107	%	80 - 120
8296156	RM9	Method Blank	Total Ammonia (N)	2016/06/11	<0.050		mg/L	
8296156	RM9	RPD [OT5943-03]	Total Ammonia (N)	2016/06/11	NC		%	20
8296180	KP9	Matrix Spike	Dissolved Chloride (Cl)	2016/06/11		NC	%	80 - 120
8296180	KP9	Spiked Blank	Dissolved Chloride (Cl)	2016/06/11		103	%	80 - 120
8296180	KP9	Method Blank	Dissolved Chloride (Cl)	2016/06/11	<1.0		mg/L	
8296180	KP9	RPD	Dissolved Chloride (Cl)	2016/06/11	3.9		%	20
8296182	KP9	Matrix Spike	Dissolved Sulphate (SO4)	2016/06/11		NC	%	80 - 120
8296182	KP9	Spiked Blank	Dissolved Sulphate (SO4)	2016/06/11		101	%	80 - 120
8296182	KP9	Method Blank	Dissolved Sulphate (SO4)	2016/06/11	<1.0		mg/L	
8296182	KP9	RPD	Dissolved Sulphate (SO4)	2016/06/11	0.18		%	20
8296186	RM9	Matrix Spike [OT5939-03]	Total Ammonia (N)	2016/06/11		NC	%	80 - 120
8296186	RM9	Spiked Blank	Total Ammonia (N)	2016/06/11		104	%	80 - 120
8296186	RM9	Method Blank	Total Ammonia (N)	2016/06/12	<0.050		mg/L	
8296186	RM9	RPD [OT5939-03]	Total Ammonia (N)	2016/06/11	5.7		%	20
8296187	KP9	Matrix Spike	Dissolved Chloride (Cl)	2016/06/11		NC	%	80 - 120
8296187	KP9	Spiked Blank	Dissolved Chloride (Cl)	2016/06/11		106	%	80 - 120
8296187	KP9	Method Blank	Dissolved Chloride (Cl)	2016/06/11	<1.0		mg/L	
8296187	KP9	RPD	Dissolved Chloride (Cl)	2016/06/11	0.24		%	20
8296192	KP9	Matrix Spike	Dissolved Sulphate (SO4)	2016/06/11		NC	%	80 - 120
8296192	KP9	Spiked Blank	Dissolved Sulphate (SO4)	2016/06/11		100	%	80 - 120
8296192	KP9	Method Blank	Dissolved Sulphate (SO4)	2016/06/11	<1.0		mg/L	
8296192	KP9	RPD	Dissolved Sulphate (SO4)	2016/06/11	0.71		%	20
8296618	RM9	Matrix Spike	Total Ammonia (N)	2016/06/12		103	%	80 - 120

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8296618	RM9	Spiked Blank	Total Ammonia (N)	2016/06/12		103	%	80 - 120
8296618	RM9	Method Blank	Total Ammonia (N)	2016/06/12	<0.050		mg/L	
8296618	RM9	RPD	Total Ammonia (N)	2016/06/12	NC		%	20
8297054	RK3	Matrix Spike	Dissolved Mercury (Hg)	2016/06/13		119	%	80 - 120
8297054	RK3	Spiked Blank	Dissolved Mercury (Hg)	2016/06/13		117	%	80 - 120
8297054	RK3	Method Blank	Dissolved Mercury (Hg)	2016/06/13	<0.0020		ug/L	
8297054	RK3	RPD	Dissolved Mercury (Hg)	2016/06/13	NC		%	20
8297704	MAP	Matrix Spike	Dissolved Barium (Ba)	2016/06/13		94	%	80 - 120
			Dissolved Boron (B)	2016/06/13		87	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/13		NC	%	80 - 120
			Dissolved Iron (Fe)	2016/06/13		89	%	80 - 120
			Dissolved Lithium (Li)	2016/06/13		93	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/13		NC	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/13		90	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/13		104	%	80 - 120
			Dissolved Potassium (K)	2016/06/13		93	%	80 - 120
			Dissolved Silicon (Si)	2016/06/13		83	%	80 - 120
			Dissolved Sodium (Na)	2016/06/13		87	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/13		NC	%	80 - 120
8297704	MAP	Spiked Blank	Dissolved Barium (Ba)	2016/06/13		98	%	80 - 120
			Dissolved Boron (B)	2016/06/13		93	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/13		101	%	80 - 120
			Dissolved Iron (Fe)	2016/06/13		100	%	80 - 120
			Dissolved Lithium (Li)	2016/06/13		95	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/13		100	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/13		99	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/13		100	%	80 - 120
			Dissolved Potassium (K)	2016/06/13		98	%	80 - 120
			Dissolved Silicon (Si)	2016/06/13		94	%	80 - 120
			Dissolved Sodium (Na)	2016/06/13		97	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/13		98	%	80 - 120
8297704	MAP	Method Blank	Dissolved Barium (Ba)	2016/06/13	<0.010		mg/L	
			Dissolved Boron (B)	2016/06/13	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/06/13	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/06/13	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/06/13	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/06/13	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/06/13	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/06/13	<0.10		mg/L	
			Dissolved Potassium (K)	2016/06/13	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/06/13	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/06/13	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/06/13	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/06/13	<0.20		mg/L	
8297704	MAP	RPD	Dissolved Calcium (Ca)	2016/06/13	1.8		%	20
			Dissolved Iron (Fe)	2016/06/13	0.30		%	20
			Dissolved Magnesium (Mg)	2016/06/13	3.1		%	20
			Dissolved Manganese (Mn)	2016/06/13	2.1		%	20
			Dissolved Potassium (K)	2016/06/13	2.4		%	20
			Dissolved Sodium (Na)	2016/06/13	4.1		%	20
8298261	MB5	Matrix Spike	Total Ammonia (N)	2016/06/14		89	%	80 - 120
8298261	MB5	Spiked Blank	Total Ammonia (N)	2016/06/14		100	%	80 - 120
8298261	MB5	Method Blank	Total Ammonia (N)	2016/06/14	<0.050		mg/L	

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Maxxam Job #: B644197
Report Date: 2016/06/14

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8298261	MB5	RPD	Total Ammonia (N)	2016/06/14	NC		%	20
8298451	JM0	Matrix Spike	Total Chemical Oxygen Demand	2016/06/14		107	%	80 - 120
8298451	JM0	Spiked Blank	Total Chemical Oxygen Demand	2016/06/14		103	%	80 - 120
8298451	JM0	Method Blank	Total Chemical Oxygen Demand	2016/06/14	9.0, RDL=5.0		mg/L	
8298451	JM0	RPD	Total Chemical Oxygen Demand	2016/06/14	NC		%	20
8298457	MB5	Matrix Spike	Total Total Kjeldahl Nitrogen	2016/06/14		31 (1)	%	80 - 120
8298457	MB5	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/14		102	%	80 - 120
8298457	MB5	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/14		107	%	80 - 120
8298457	MB5	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/14	<0.050		mg/L	
8298457	MB5	RPD	Total Total Kjeldahl Nitrogen	2016/06/14	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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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

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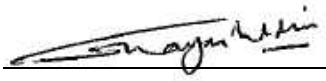
TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

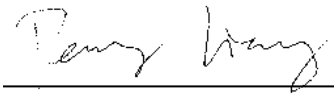
VALIDATION SIGNATURE PAGE

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

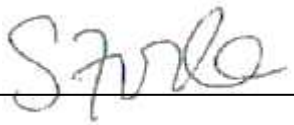
Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics



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



Harry (Peng) Liang, Senior Analyst



Suwan Fock, B.Sc., QP, Inorganics Senior Analyst

Jingyuan Song, Organics – Senior Analyst

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

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

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Your Project #: EBA, 704-SWM.SWOP03097-01

Attention:MICHELE CRAWFORD

TETRA TECH EBA INC.
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Your C.O.C. #: 493715-01-01, 493715-02-01, 493715-03-01, 493715-04-01, 493715-05-01

Report Date: 2016/06/16
Report #: R2199210
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B646208
Received: 2016/06/08, 15:03

Sample Matrix: Water
Samples Received: 20

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	19	N/A	2016/06/13	AB SOP-00005	SM 22 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2016/06/14	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	19	N/A	2016/06/13	AB SOP-00039	CCME CWS/EPA 8260c m
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2016/06/14	AB SOP-00039	CCME CWS/EPA 8260c m
Cadmium - low level CCME - Dissolved	20	N/A	2016/06/15	AB WI-00065	Auto Calc
Chloride by Automated Colourimetry	20	N/A	2016/06/13	AB SOP-00020	SM 22 4500-Cl G m
Chemical Oxygen Demand	20	N/A	2016/06/14	AB SOP-00016	SM 22 5220D m
Carbon (DOC) -Lab Filtered (1)	1	N/A	2016/06/14	EENVSOP-00060	MMCW 119 1996 m
Carbon (DOC) -Lab Filtered (1)	1	N/A	2016/06/15	EENVSOP-00060	MMCW 119 1996 m
Carbon (DOC) (1)	17	N/A	2016/06/15	EENVSOP-00060	MMCW 119 1996 m
Carbon (DOC) (1)	1	N/A	2016/06/16	EENVSOP-00060	MMCW 119 1996 m
Conductivity @25C	20	N/A	2016/06/13	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16)	20	2016/06/13	2016/06/13	AB SOP-00040 / AB SOP-00037	CCME PHC-CWS m
Hardness	20	N/A	2016/06/15	AB WI-00065	Auto Calc
Mercury - Low Level (Dissolved)	19	2016/06/15	2016/06/15	EENVSOP-00031	EPA 1631E/245.1 R3 m
Mercury-Low Level-Dissolved-Lab Filtered	1	2016/06/15	2016/06/15	EENVSOP-00031	EPA 1631E/245.1 R3 m
Elements by ICP - Dissolved	20	N/A	2016/06/15	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved	18	N/A	2016/06/14	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Dissolved	2	N/A	2016/06/15	AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	20	N/A	2016/06/15	AB WI-00065	Auto Calc
Sum of cations, anions	20	N/A	2016/06/15	AB WI-00065	Auto Calc
Ammonia-N (Total)	20	N/A	2016/06/14	AB SOP-00007	EPA 350.1 R2.0 m
Nitrate and Nitrite	20	N/A	2016/06/15	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	20	N/A	2016/06/15	AB WI-00065	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	20	N/A	2016/06/14	AB SOP-00023	SM 22 4110 B m
Benzo[a]pyrene Equivalency (2)	1	N/A	2016/06/15	AB SOP-00003	Auto Calc

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Your Project #: EBA, 704-SWM.SWOP03097-01

Attention:MICHELE CRAWFORD

TETRA TECH EBA INC.
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Your C.O.C. #: 493715-01-01, 493715-02-01, 493715-03-01, 493715-04-01, 493715-05-01

Report Date: 2016/06/16
Report #: R2199210
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B646208
Received: 2016/06/08, 15:03

Sample Matrix: Water
Samples Received: 20

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
PAH in Water by GC/MS	1	2016/06/13	2016/06/14	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270D m
pH @25°C	20	N/A	2016/06/13	AB SOP-00005	SM 22 4500 H+ B m
Sulphate by Automated Colourimetry	20	N/A	2016/06/13	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	20	N/A	2016/06/15	AB WI-00065	Auto Calc
Total Kjeldahl Nitrogen	20	2016/06/14	2016/06/15	AB SOP-00008	EPA 351.1 R 1978 m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) DOC present in the sample should be considered as non-purgeable DOC.
(2) 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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Sherlyne Sim, B.Eng, Project Manager
Email: SSim@maxxam.ca
Phone# (780)577-7113
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		OU6374	OU6375	OU6376	OU6393		OU6394		
Sampling Date		2016/06/08	2016/06/08 13:10	2016/06/08 13:25	2016/06/08 13:00		2016/06/08 08:50		
COC Number		493715-01-01	493715-01-01	493715-01-01	493715-02-01		493715-02-01		
	UNITS	DUPLICATE-1	MW-5B	MW-9	MW-24A	QC Batch	MW-20A	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	8296682	<0.10	0.10	8296682
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	8296569	<0.00040	0.00040	8296571
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	8296569	<0.00040	0.00040	8296571
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	8296569	<0.00040	0.00040	8296571
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	8296569	<0.00080	0.00080	8296571
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	8296569	<0.00040	0.00040	8296571
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	8296569	<0.00080	0.00080	8296571
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	8296569	<0.10	0.10	8296571
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	8296569	<0.10	0.10	8296571
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	104	96	95	8296569	95	N/A	8296571
4-Bromofluorobenzene (sur.)	%	104	109	91	100	8296569	99	N/A	8296571
D4-1,2-Dichloroethane (sur.)	%	113	114	100	107	8296569	106	N/A	8296571
O-TERPHENYL (sur.)	%	100	102	99	101	8296682	100	N/A	8296682

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		OU6395		OU6402		OU6403	OU6404		
Sampling Date		2016/06/08 09:00		2016/06/08 09:15		2016/06/08 09:25	2016/06/08 10:50		
COC Number		493715-02-01		493715-03-01		493715-03-01	493715-03-01		
	UNITS	MW-20B	QC Batch	MW-21A	QC Batch	MW-21B	MW-22A	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	8296682	<0.10	8296682	<0.10	<0.10	0.10	8296682
Volatiles									
Benzene	mg/L	<0.00040	8296571	<0.00040	8296435	<0.00040	<0.00040	0.00040	8296569
Toluene	mg/L	<0.00040	8296571	0.00074	8296435	<0.00040	<0.00040	0.00040	8296569
Ethylbenzene	mg/L	<0.00040	8296571	<0.00040	8296435	<0.00040	<0.00040	0.00040	8296569
m & p-Xylene	mg/L	<0.00080	8296571	<0.00080	8296435	<0.00080	<0.00080	0.00080	8296569
o-Xylene	mg/L	<0.00040	8296571	<0.00040	8296435	<0.00040	<0.00040	0.00040	8296569
Xylenes (Total)	mg/L	<0.00080	8296571	<0.00080	8296435	<0.00080	<0.00080	0.00080	8296569
F1 (C6-C10) - BTEX	mg/L	<0.10	8296571	<0.10	8296435	<0.10	<0.10	0.10	8296569
F1 (C6-C10)	mg/L	<0.10	8296571	<0.10	8296435	<0.10	<0.10	0.10	8296569
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	8296571	97	8296435	100	94	N/A	8296569
4-Bromofluorobenzene (sur.)	%	104	8296571	102	8296435	102	100	N/A	8296569
D4-1,2-Dichloroethane (sur.)	%	116	8296571	110	8296435	105	115	N/A	8296569
O-TERPHENYL (sur.)	%	102	8296682	101	8296682	102	100	N/A	8296682

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		OU6405	OU6406	OU6407	OU6408	OU6409	OU6423		
Sampling Date		2016/06/08 10:30	2016/06/08 11:25	2016/06/08 11:30	2016/06/08 11:25	2016/06/08 11:50	2016/06/08 11:15		
COC Number		493715-03-01	493715-03-01	493715-03-01	493715-03-01	493715-03-01	493715-04-01		
	UNITS	MW-22B	MW-23A	MW-23B	MW-25A	MW-26A	MW-30A	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8296682
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8296569
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8296569
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8296569
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8296569
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8296569
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8296569
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8296569
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8296569
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	97	89	97	97	88	96	N/A	8296569
4-Bromofluorobenzene (sur.)	%	100	100	99	100	99	100	N/A	8296569
D4-1,2-Dichloroethane (sur.)	%	103	104	105	101	105	103	N/A	8296569
O-TERPHENYL (sur.)	%	102	100	107	109	109	110	N/A	8296682

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		OU6450	OU6451		OU6452		OU6453		
Sampling Date		2016/06/08 12:40	2016/06/08 09:50		2016/06/08 10:10		2016/06/08 10:00		
COC Number		493715-05-01	493715-05-01		493715-05-01		493715-05-01		
	UNITS	MW-32B	MW-35-DEEP	RDL	MW-35A	RDL	MW-35B	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.10	<0.27 (1)	0.27	<0.10	0.10	8296682
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	0.00040	<0.00040	0.00040	<0.00040	0.00040	8296569
Toluene	mg/L	<0.00040	<0.00040	0.00040	<0.00040	0.00040	<0.00040	0.00040	8296569
Ethylbenzene	mg/L	<0.00040	<0.00040	0.00040	<0.00040	0.00040	<0.00040	0.00040	8296569
m & p-Xylene	mg/L	<0.00080	<0.00080	0.00080	<0.00080	0.00080	<0.00080	0.00080	8296569
o-Xylene	mg/L	<0.00040	<0.00040	0.00040	<0.00040	0.00040	<0.00040	0.00040	8296569
Xylenes (Total)	mg/L	<0.00080	<0.00080	0.00080	<0.00080	0.00080	<0.00080	0.00080	8296569
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	8296569
F1 (C6-C10)	mg/L	<0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	8296569
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	101	96	N/A	94	N/A	99	N/A	8296569
4-Bromofluorobenzene (sur.)	%	106	98	N/A	99	N/A	98	N/A	8296569
D4-1,2-Dichloroethane (sur.)	%	113	107	N/A	107	N/A	103	N/A	8296569
O-TERPHENYL (sur.)	%	109	109	N/A	110	N/A	108	N/A	8296682

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

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		OU6454		
Sampling Date				
COC Number		493715-05-01		
	UNITS	FIELD BLANK	RDL	QC Batch
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	8296682
Volatiles				
Benzene	mg/L	<0.00040	0.00040	8296569
Toluene	mg/L	<0.00040	0.00040	8296569
Ethylbenzene	mg/L	<0.00040	0.00040	8296569
m & p-Xylene	mg/L	<0.00080	0.00080	8296569
o-Xylene	mg/L	<0.00040	0.00040	8296569
Xylenes (Total)	mg/L	<0.00080	0.00080	8296569
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	8296569
F1 (C6-C10)	mg/L	<0.10	0.10	8296569
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	96	N/A	8296569
4-Bromofluorobenzene (sur.)	%	99	N/A	8296569
D4-1,2-Dichloroethane (sur.)	%	106	N/A	8296569
O-TERPHENYL (sur.)	%	111	N/A	8296682

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6374		OU6375		OU6376		OU6393		
Sampling Date		2016/06/08		2016/06/08 13:10		2016/06/08 13:25		2016/06/08 13:00		
COC Number		493715-01-01		493715-01-01		493715-01-01		493715-02-01		
	UNITS	DUPLICATE-1	RDL	MW-5B	RDL	MW-9	RDL	MW-24A	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	100	N/A	33	N/A	100	N/A	71	N/A	8295689
Cation Sum	meq/L	96	N/A	34	N/A	92	N/A	67	N/A	8295689
Hardness (CaCO3)	mg/L	510	0.50	45	0.50	560	0.50	200	0.50	8295686
Ion Balance	N/A	0.93	0.010	1.0	0.010	0.92	0.010	0.95	0.010	8295687
Dissolved Nitrate (NO3)	mg/L	0.33	0.22	1.6	0.044	0.36	0.22	5.5	0.22	8295691
Nitrate plus Nitrite (N)	mg/L	0.075	0.020	0.41	0.020	0.081	0.020	1.2	0.020	8295692
Dissolved Nitrite (NO2)	mg/L	<0.16	0.16	0.17	0.033	<0.16	0.16	<0.16	0.16	8295691
Calculated Total Dissolved Solids	mg/L	6700	10	2000	10	6500	10	4700	10	8295694
Misc. Inorganics										
Conductivity	uS/cm	8200	1.0	3000	1.0	7800	1.0	6100	1.0	8296694
pH	pH	7.94	N/A	8.34	N/A	7.96	N/A	8.08	N/A	8296692
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	8295331
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	4.2	0.50	<0.50	0.50	<0.50	0.50	8296693
Alkalinity (Total as CaCO3)	mg/L	1000	0.50	970	0.50	890	0.50	580	0.50	8296693
Bicarbonate (HCO3)	mg/L	1200	0.50	1200	0.50	1100	0.50	710	0.50	8296693
Carbonate (CO3)	mg/L	<0.50	0.50	5.0	0.50	<0.50	0.50	<0.50	0.50	8296693
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	8296693
Dissolved Sulphate (SO4)	mg/L	3900 (1)	25	650 (1)	5.0	4000 (1)	25	2800 (1)	20	8296517
Dissolved Chloride (Cl)	mg/L	1.3	1.0	16	1.0	1.2	1.0	4.0	1.0	8296516
Nutrients										
Dissolved Nitrite (N)	mg/L	<0.050 (2)	0.050	0.051	0.010	<0.050 (2)	0.050	<0.050 (2)	0.050	8297909
Dissolved Nitrate (N)	mg/L	0.075 (2)	0.050	0.36	0.010	0.081 (2)	0.050	1.2 (2)	0.050	8297909
Elements										
Dissolved Aluminum (Al)	mg/L	0.0037	0.0030	0.0062	0.0030	0.011	0.0030	0.0049	0.0030	8297237
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	0.00060	<0.00060	0.00060	<0.00060	0.00060	8297237
Dissolved Arsenic (As)	mg/L	0.00043	0.00020	0.00094	0.00020	0.00036	0.00020	0.00045	0.00020	8297237
Dissolved Barium (Ba)	mg/L	<0.10	0.10	0.018	0.010	<0.10	0.10	<0.10	0.10	8298698
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8297237

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

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6374		OU6375		OU6376		OU6393		
Sampling Date		2016/06/08		2016/06/08 13:10		2016/06/08 13:25		2016/06/08 13:00		
COC Number		493715-01-01		493715-01-01		493715-01-01		493715-02-01		
	UNITS	DUPLICATE-1	RDL	MW-5B	RDL	MW-9	RDL	MW-24A	RDL	QC Batch
Dissolved Boron (B)	mg/L	0.25	0.20	0.84	0.020	0.31	0.20	0.84	0.20	8298698
Dissolved Calcium (Ca)	mg/L	110	3.0	13	0.30	120	3.0	69	3.0	8298698
Dissolved Chromium (Cr)	mg/L	0.0013	0.0010	0.010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	0.00040	0.00030	0.00069	0.00030	<0.00030	0.00030	8297237
Dissolved Copper (Cu)	mg/L	0.00065	0.00020	0.0033	0.00020	0.0013	0.00020	0.00069	0.00020	8297237
Dissolved Iron (Fe)	mg/L	<0.60	0.60	<0.060	0.060	<0.60	0.60	<0.60	0.60	8298698
Dissolved Lead (Pb)	mg/L	0.00026	0.00020	<0.00020	0.00020	0.00027	0.00020	<0.00020	0.00020	8297237
Dissolved Lithium (Li)	mg/L	0.74	0.20	0.16	0.020	0.38	0.20	0.38	0.20	8298698
Dissolved Magnesium (Mg)	mg/L	56	2.0	3.2	0.20	66	2.0	7.9	2.0	8298698
Dissolved Manganese (Mn)	mg/L	<0.040	0.040	0.026	0.0040	0.21	0.040	0.065	0.040	8298698
Dissolved Molybdenum (Mo)	mg/L	0.00083	0.00020	0.010	0.00020	0.0017	0.00020	0.0025	0.00020	8297237
Dissolved Nickel (Ni)	mg/L	0.0020	0.00050	0.013	0.00050	0.0020	0.00050	0.0019	0.00050	8297237
Dissolved Phosphorus (P)	mg/L	<1.0	1.0	<0.10	0.10	<1.0	1.0	<1.0	1.0	8298698
Dissolved Potassium (K)	mg/L	9.7	3.0	4.2	0.30	15	3.0	5.6	3.0	8298698
Dissolved Selenium (Se)	mg/L	0.00051	0.00020	<0.00020	0.00020	0.00023	0.00020	<0.00020	0.00020	8297237
Dissolved Silicon (Si)	mg/L	4.7	1.0	3.1	0.10	4.6	1.0	3.2	1.0	8298698
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	8297237
Dissolved Sodium (Na)	mg/L	2000	5.0	750 (1)	5.0	1900	5.0	1400	5.0	8298698
Dissolved Strontium (Sr)	mg/L	2.4	0.20	0.28	0.020	2.2	0.20	1.5	0.20	8298698
Dissolved Sulphur (S)	mg/L	1200	2.0	210	0.20	1200	2.0	900	2.0	8298698
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	8297237
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Uranium (U)	mg/L	0.0081	0.00010	0.0041	0.00010	0.0040	0.00010	0.00090	0.00010	8297237
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	0.0069	0.0010	<0.0010	0.0010	0.0016	0.0010	8297237
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	0.0033	0.0030	0.0034	0.0030	<0.0030	0.0030	8297237

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6394		OU6395			OU6402		
Sampling Date		2016/06/08 08:50		2016/06/08 09:00			2016/06/08 09:15		
COC Number		493715-02-01		493715-02-01			493715-03-01		
	UNITS	MW-20A	RDL	MW-20B	RDL	QC Batch	MW-21A	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	37	N/A	55	N/A	8295689	23	N/A	8295689
Cation Sum	meq/L	37	N/A	53	N/A	8295689	22	N/A	8295689
Hardness (CaCO3)	mg/L	58	0.50	430	0.50	8295686	14	0.50	8295686
Ion Balance	N/A	1.0	0.010	0.96	0.010	8295687	0.93	0.010	8295687
Dissolved Nitrate (NO3)	mg/L	14	0.044	0.64	0.044	8295691	5.7	0.044	8295691
Nitrate plus Nitrite (N)	mg/L	3.1	0.020	0.14	0.020	8295692	1.3	0.020	8295692
Dissolved Nitrite (NO2)	mg/L	0.13	0.033	<0.033	0.033	8295691	0.075	0.033	8295691
Calculated Total Dissolved Solids	mg/L	2200	10	3500	10	8295694	1200	10	8295694
Misc. Inorganics									
Conductivity	uS/cm	3300	1.0	4700	1.0	8296694	2000	1.0	8296694
pH	pH	8.15	N/A	8.04	N/A	8296692	8.29	N/A	8296692
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	<0.020	0.020	8295331	0.079	0.020	8295331
Anions									
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	0.50	8296693	<0.50	0.50	8296693
Alkalinity (Total as CaCO3)	mg/L	1100	0.50	880	0.50	8296693	1100	0.50	8296693
Bicarbonate (HCO3)	mg/L	1300	0.50	1100	0.50	8296693	1300	0.50	8296693
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	0.50	8296693	<0.50	0.50	8296693
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	8296693	<0.50	0.50	8296693
Dissolved Sulphate (SO4)	mg/L	740 (1)	5.0	1800 (1)	10	8296515	71	1.0	8296517
Dissolved Chloride (Cl)	mg/L	7.0	1.0	1.4	1.0	8296514	8.7	1.0	8296516
Nutrients									
Dissolved Nitrite (N)	mg/L	0.041	0.010	<0.010	0.010	8298719	0.023	0.010	8298719
Dissolved Nitrate (N)	mg/L	3.1	0.010	0.14	0.010	8298719	1.3	0.010	8298719
Elements									
Dissolved Aluminum (Al)	mg/L	0.0040	0.0030	<0.0030	0.0030	8297237	0.0047	0.0030	8297237
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	0.00060	8297237	<0.00060	0.00060	8297237
Dissolved Arsenic (As)	mg/L	0.00051	0.00020	0.00030	0.00020	8297237	0.0010	0.00020	8297237
Dissolved Barium (Ba)	mg/L	0.018	0.010	<0.10	0.10	8298698	0.073	0.010	8298698
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Boron (B)	mg/L	0.92	0.020	0.38	0.20	8298698	0.93	0.020	8298698

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6394		OU6395			OU6402		
Sampling Date		2016/06/08 08:50		2016/06/08 09:00			2016/06/08 09:15		
COC Number		493715-02-01		493715-02-01			493715-03-01		
	UNITS	MW-20A	RDL	MW-20B	RDL	QC Batch	MW-21A	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	19	0.30	110	3.0	8298698	4.7	0.30	8298698
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	0.0035	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	<0.00030	0.00030	8297237	<0.00030	0.00030	8297237
Dissolved Copper (Cu)	mg/L	0.00038	0.00020	0.00053	0.00020	8297237	0.0025	0.00020	8297237
Dissolved Iron (Fe)	mg/L	<0.060	0.060	<0.60	0.60	8298698	<0.060	0.060	8298698
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Lithium (Li)	mg/L	0.23	0.020	0.49	0.20	8298698	0.12	0.020	8298698
Dissolved Magnesium (Mg)	mg/L	2.5	0.20	37	2.0	8298698	0.45	0.20	8298698
Dissolved Manganese (Mn)	mg/L	0.026	0.0040	<0.040	0.040	8298698	<0.0040	0.0040	8298698
Dissolved Molybdenum (Mo)	mg/L	0.0014	0.00020	0.00076	0.00020	8297237	0.0062	0.00020	8297237
Dissolved Nickel (Ni)	mg/L	0.0011	0.00050	0.0016	0.00050	8297237	0.0031	0.00050	8297237
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	<1.0	1.0	8298698	<0.10	0.10	8298698
Dissolved Potassium (K)	mg/L	3.3	0.30	9.0	3.0	8298698	1.7	0.30	8298698
Dissolved Selenium (Se)	mg/L	0.0014	0.00020	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Silicon (Si)	mg/L	3.1	0.10	4.5	1.0	8298698	2.8	0.10	8298698
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	8297237	<0.00010	0.00010	8297237
Dissolved Sodium (Na)	mg/L	830 (1)	5.0	1000	5.0	8298698	490	0.50	8298698
Dissolved Strontium (Sr)	mg/L	0.39	0.020	1.6	0.20	8298698	0.11	0.020	8298698
Dissolved Sulphur (S)	mg/L	240	0.20	580	2.0	8298698	23	0.20	8298698
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Uranium (U)	mg/L	0.0016	0.00010	0.0013	0.00010	8297237	0.0033	0.00010	8297237
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	<0.0030	0.0030	8297237	<0.0030	0.0030	8297237

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6403		OU6404		OU6405		OU6406		
Sampling Date		2016/06/08 09:25		2016/06/08 10:50		2016/06/08 10:30		2016/06/08 11:25		
COC Number		493715-03-01		493715-03-01		493715-03-01		493715-03-01		
	UNITS	MW-21B	RDL	MW-22A	RDL	MW-22B	RDL	MW-23A	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	28	N/A	59	N/A	100	N/A	24	N/A	8295689
Cation Sum	meq/L	29	N/A	55	N/A	96	N/A	25	N/A	8295689
Hardness (CaCO3)	mg/L	61	0.50	100	0.50	510	0.50	12	0.50	8295686
Ion Balance	N/A	1.0	0.010	0.93	0.010	0.95	0.010	1.0	0.010	8295687
Dissolved Nitrate (NO3)	mg/L	0.49	0.044	77	0.089	<0.044	0.044	<0.044	0.044	8295691
Nitrate plus Nitrite (N)	mg/L	0.11	0.020	17	0.020	<0.020	0.020	<0.020	0.020	8295692
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	<0.033	0.033	<0.033	0.033	<0.033	0.033	8295691
Calculated Total Dissolved Solids	mg/L	1700	10	3800	10	6600	10	1300	10	8295694
Misc. Inorganics										
Conductivity	uS/cm	2600	1.0	5300	1.0	8200	1.0	2100	1.0	8296694
pH	pH	8.25	N/A	8.09	N/A	7.97	N/A	8.53	N/A	8296692
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	0.026	0.020	<0.020	0.020	<0.020	0.020	8295331
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	22	0.50	8296693
Alkalinity (Total as CaCO3)	mg/L	850	0.50	790	0.50	1000	0.50	1100	0.50	8296693
Bicarbonate (HCO3)	mg/L	1000	0.50	960	0.50	1300	0.50	1300	0.50	8296693
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	26	0.50	8296693
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	8296693
Dissolved Sulphate (SO4)	mg/L	530 (1)	5.0	2000 (1)	20	3900 (1)	25	85	1.0	8296515
Dissolved Chloride (Cl)	mg/L	1.1	1.0	11	1.0	1.4	1.0	18	1.0	8296514
Nutrients										
Dissolved Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	8298719
Dissolved Nitrate (N)	mg/L	0.11	0.010	17 (1)	0.020	<0.010	0.010	<0.010	0.010	8298719
Elements										
Dissolved Aluminum (Al)	mg/L	<0.0030	0.0030	0.0047	0.0030	<0.0030	0.0030	0.0049	0.0030	8297237
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	0.00060	<0.00060	0.00060	<0.00060	0.00060	8297237
Dissolved Arsenic (As)	mg/L	0.00064	0.00020	0.00033	0.00020	0.00035	0.00020	0.0058	0.00020	8297237
Dissolved Barium (Ba)	mg/L	<0.010	0.010	<0.10	0.10	<0.10	0.10	0.050	0.010	8298698
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Boron (B)	mg/L	0.25	0.020	0.85	0.20	0.25	0.20	0.88	0.020	8298698

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6403		OU6404		OU6405		OU6406		
Sampling Date		2016/06/08 09:25		2016/06/08 10:50		2016/06/08 10:30		2016/06/08 11:25		
COC Number		493715-03-01		493715-03-01		493715-03-01		493715-03-01		
	UNITS	MW-21B	RDL	MW-22A	RDL	MW-22B	RDL	MW-23A	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	16	0.30	35	3.0	110	3.0	4.1	0.30	8298698
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	<0.0010	0.0010	0.0015	0.0010	<0.0010	0.0010	8297237
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	<0.00030	0.00030	<0.00030	0.00030	<0.00030	0.00030	8297237
Dissolved Copper (Cu)	mg/L	0.00066	0.00020	0.0024	0.00020	0.0012	0.00020	0.00049	0.00020	8297237
Dissolved Iron (Fe)	mg/L	<0.060	0.060	<0.60	0.60	<0.60	0.60	<0.060	0.060	8298698
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	8297237
Dissolved Lithium (Li)	mg/L	0.24	0.020	0.32	0.20	0.74	0.20	0.11	0.020	8298698
Dissolved Magnesium (Mg)	mg/L	5.0	0.20	3.4	2.0	55	2.0	0.49	0.20	8298698
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	<0.040	0.040	<0.040	0.040	0.0079	0.0040	8298698
Dissolved Molybdenum (Mo)	mg/L	0.0027	0.00020	0.0057	0.00020	0.00081	0.00020	0.0046	0.00020	8297237
Dissolved Nickel (Ni)	mg/L	0.0013	0.00050	0.0051	0.00050	0.0020	0.00050	0.0031	0.00050	8297237
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	<1.0	1.0	<1.0	1.0	0.12	0.10	8298698
Dissolved Potassium (K)	mg/L	3.9	0.30	4.1	3.0	10	3.0	2.0	0.30	8298698
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	<0.00020	0.00020	0.00036	0.00020	<0.00020	0.00020	8297237
Dissolved Silicon (Si)	mg/L	3.9	0.10	2.8	1.0	4.8	1.0	3.1	0.10	8298698
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	8297237
Dissolved Sodium (Na)	mg/L	630 (1)	5.0	1200	5.0	2000	5.0	560 (1)	5.0	8298698
Dissolved Strontium (Sr)	mg/L	0.26	0.020	0.85	0.20	2.4	0.20	0.11	0.020	8298698
Dissolved Sulphur (S)	mg/L	180	0.20	630	2.0	1200	2.0	28	0.20	8298698
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	8297237
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Uranium (U)	mg/L	0.0017	0.00010	0.0042	0.00010	0.0079	0.00010	0.0027	0.00010	8297237
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	0.0033	0.0030	<0.0030	0.0030	<0.0030	0.0030	8297237

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6407			OU6408		OU6409		
Sampling Date		2016/06/08 11:30			2016/06/08 11:25		2016/06/08 11:50		
COC Number		493715-03-01			493715-03-01		493715-03-01		
	UNITS	MW-23B	RDL	QC Batch	MW-25A	RDL	MW-26A	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	120	N/A	8295689	24	N/A	29	N/A	8295689
Cation Sum	meq/L	120	N/A	8295689	24	N/A	29	N/A	8295689
Hardness (CaCO3)	mg/L	670	0.50	8295686	15	0.50	26	0.50	8295686
Ion Balance	N/A	0.98	0.010	8295687	1.0	0.010	1.0	0.010	8295687
Dissolved Nitrate (NO3)	mg/L	1.4	0.044	8295691	0.82	0.044	4.4	0.044	8295691
Nitrate plus Nitrite (N)	mg/L	0.32	0.020	8295692	0.21	0.020	1.1	0.020	8295692
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	8295691	0.097	0.033	0.25	0.033	8295691
Calculated Total Dissolved Solids	mg/L	8000	10	8295694	1300	10	1700	10	8295694
Misc. Inorganics									
Conductivity	uS/cm	9900	1.0	8296694	2100	1.0	2600	1.0	8296694
pH	pH	7.89	N/A	8296692	8.45	N/A	8.53	N/A	8296692
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	0.28	0.020	8295331	<0.020	0.020	<0.020	0.020	8295331
Anions									
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8296693	16	0.50	19	0.50	8296693
Alkalinity (Total as CaCO3)	mg/L	860	0.50	8296693	1200	0.50	910	0.50	8296693
Bicarbonate (HCO3)	mg/L	1100	0.50	8296693	1400	0.50	1100	0.50	8296693
Carbonate (CO3)	mg/L	<0.50	0.50	8296693	19	0.50	23	0.50	8296693
Hydroxide (OH)	mg/L	<0.50	0.50	8296693	<0.50	0.50	<0.50	0.50	8296693
Dissolved Sulphate (SO4)	mg/L	4900 (1)	50	8296515	4.3	1.0	490 (1)	5.0	8296517
Dissolved Chloride (Cl)	mg/L	1.9	1.0	8296514	8.4	1.0	5.0	1.0	8296516
Nutrients									
Dissolved Nitrite (N)	mg/L	<0.010	0.010	8298719	0.029	0.010	0.075	0.010	8298719
Dissolved Nitrate (N)	mg/L	0.32	0.010	8298719	0.18	0.010	1.0	0.010	8298719
Elements									
Dissolved Aluminum (Al)	mg/L	0.0081	0.0030	8297237	0.0046	0.0030	0.15	0.0030	8297237
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	8297237	<0.00060	0.00060	<0.00060	0.00060	8297237
Dissolved Arsenic (As)	mg/L	0.00024	0.00020	8297237	0.0019	0.00020	0.0024	0.00020	8297237
Dissolved Barium (Ba)	mg/L	<0.10	0.10	8298698	0.088	0.010	0.047	0.010	8298698
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8297237	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Boron (B)	mg/L	0.40	0.20	8298698	0.94	0.020	0.85	0.020	8298698

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

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6407			OU6408		OU6409		
Sampling Date		2016/06/08 11:30			2016/06/08 11:25		2016/06/08 11:50		
COC Number		493715-03-01			493715-03-01		493715-03-01		
	UNITS	MW-23B	RDL	QC Batch	MW-25A	RDL	MW-26A	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	170	3.0	8298698	5.1	0.30	8.7	0.30	8298698
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	8297237	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	8297237	0.00034	0.00030	<0.00030	0.00030	8297237
Dissolved Copper (Cu)	mg/L	0.0013	0.00020	8297237	0.00045	0.00020	0.0058	0.00020	8297237
Dissolved Iron (Fe)	mg/L	<0.60	0.60	8298698	<0.060	0.060	0.084	0.060	8298698
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	8297237	<0.00020	0.00020	0.00083	0.00020	8297237
Dissolved Lithium (Li)	mg/L	0.86	0.20	8298698	0.11	0.020	0.14	0.020	8298698
Dissolved Magnesium (Mg)	mg/L	63	2.0	8298698	0.47	0.20	1.1	0.20	8298698
Dissolved Manganese (Mn)	mg/L	0.065	0.040	8298698	0.10	0.0040	<0.0040	0.0040	8298698
Dissolved Molybdenum (Mo)	mg/L	0.00050	0.00020	8297237	0.0064	0.00020	0.0035	0.00020	8297237
Dissolved Nickel (Ni)	mg/L	0.0028	0.00050	8297237	0.0023	0.00050	0.0039	0.00050	8297237
Dissolved Phosphorus (P)	mg/L	<1.0	1.0	8298698	<0.10	0.10	0.21	0.10	8298698
Dissolved Potassium (K)	mg/L	12	3.0	8298698	1.8	0.30	2.5	0.30	8298698
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	8297237	<0.00020	0.00020	<0.00020	0.00020	8297237
Dissolved Silicon (Si)	mg/L	5.5	1.0	8298698	3.4	0.10	4.1	0.10	8298698
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8297237	<0.00010	0.00010	<0.00010	0.00010	8297237
Dissolved Sodium (Na)	mg/L	2400	5.0	8298698	540 (1)	5.0	640 (1)	5.0	8298698
Dissolved Strontium (Sr)	mg/L	3.7	0.20	8298698	0.11	0.020	0.19	0.020	8298698
Dissolved Sulphur (S)	mg/L	1600	2.0	8298698	2.4	0.20	160	0.20	8298698
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8297237	<0.00020	0.00020	<0.00020	0.00020	8297237
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8297237	<0.0010	0.0010	<0.0010	0.0010	8297237
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	8297237	<0.0010	0.0010	0.0029	0.0010	8297237
Dissolved Uranium (U)	mg/L	0.0020	0.00010	8297237	0.00074	0.00010	0.00065	0.00010	8297237
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	8297237	0.0013	0.0010	0.014	0.0010	8297237
Dissolved Zinc (Zn)	mg/L	0.0039	0.0030	8297237	<0.0030	0.0030	<0.0030	0.0030	8297237

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6423		OU6450			OU6451		
Sampling Date		2016/06/08 11:15		2016/06/08 12:40			2016/06/08 09:50		
COC Number		493715-04-01		493715-05-01			493715-05-01		
	UNITS	MW-30A	RDL	MW-32B	RDL	QC Batch	MW-35-DEEP	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	24	N/A	170	N/A	8295689	42	N/A	8295689
Cation Sum	meq/L	24	N/A	160	N/A	8295689	43	N/A	8295689
Hardness (CaCO3)	mg/L	36	0.50	1100	0.50	8295793	53	0.50	8295793
Ion Balance	N/A	1.0	0.010	0.97	0.010	8295687	1.0	0.010	8295687
Dissolved Nitrate (NO3)	mg/L	0.73	0.044	<0.22	0.22	8295691	1.1	0.044	8295691
Nitrate plus Nitrite (N)	mg/L	0.21	0.020	<0.020	0.020	8295692	0.25	0.020	8295692
Dissolved Nitrite (NO2)	mg/L	0.15	0.033	<0.16	0.16	8295691	<0.033	0.033	8295691
Calculated Total Dissolved Solids	mg/L	1500	10	11000	10	8295694	2400	10	8295694
Misc. Inorganics									
Conductivity	uS/cm	2200	1.0	13000	1.0	8296694	4700	1.0	8296694
pH	pH	8.37	N/A	7.97	N/A	8296692	8.19	N/A	8296692
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	0.026	0.020	0.46	0.020	8295331	0.040	0.020	8295331
Anions									
Alkalinity (PP as CaCO3)	mg/L	4.5	0.50	<0.50	0.50	8296693	<0.50	0.50	8296693
Alkalinity (Total as CaCO3)	mg/L	650	0.50	1100	0.50	8296693	460	0.50	8296693
Bicarbonate (HCO3)	mg/L	780	0.50	1300	0.50	8296693	560	0.50	8296693
Carbonate (CO3)	mg/L	5.3	0.50	<0.50	0.50	8296693	<0.50	0.50	8296693
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	8296693	<0.50	0.50	8296693
Dissolved Sulphate (SO4)	mg/L	510 (1)	5.0	6800 (1)	50	8296517	25	1.0	8296515
Dissolved Chloride (Cl)	mg/L	3.0	1.0	120	1.0	8296516	1100 (1)	10	8296514
Nutrients									
Dissolved Nitrite (N)	mg/L	0.046	0.010	<0.050 (2)	0.050	8298719	<0.010	0.010	8298719
Dissolved Nitrate (N)	mg/L	0.16	0.010	<0.050 (2)	0.050	8298719	0.25	0.010	8298719
Elements									
Dissolved Aluminum (Al)	mg/L	3.8	0.0030	0.0038	0.0030	8297237	0.017	0.0030	8297237
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	<0.00060	0.00060	8297237	<0.00060	0.00060	8297237
Dissolved Arsenic (As)	mg/L	0.0030	0.00020	0.0016	0.00020	8297237	0.0018	0.00020	8297237
Dissolved Barium (Ba)	mg/L	0.025	0.010	<0.10	0.10	8298698	0.27	0.010	8298698
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6423		OU6450			OU6451		
Sampling Date		2016/06/08 11:15		2016/06/08 12:40			2016/06/08 09:50		
COC Number		493715-04-01		493715-05-01			493715-05-01		
	UNITS	MW-30A	RDL	MW-32B	RDL	QC Batch	MW-35-DEEP	RDL	QC Batch
Dissolved Boron (B)	mg/L	0.52	0.020	0.48	0.20	8298698	0.69	0.020	8298698
Dissolved Calcium (Ca)	mg/L	12	0.30	230	3.0	8298698	18	0.30	8298698
Dissolved Chromium (Cr)	mg/L	0.0045	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Cobalt (Co)	mg/L	0.0012	0.00030	0.0054	0.00030	8297237	0.00069	0.00030	8297237
Dissolved Copper (Cu)	mg/L	0.0075	0.00020	0.0036	0.00020	8297237	0.00094	0.00020	8297237
Dissolved Iron (Fe)	mg/L	0.63	0.060	<0.60	0.60	8298698	<0.060	0.060	8298698
Dissolved Lead (Pb)	mg/L	0.00054	0.00020	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Lithium (Li)	mg/L	0.13	0.020	0.54	0.20	8298698	0.15	0.020	8298698
Dissolved Magnesium (Mg)	mg/L	1.6	0.20	120	2.0	8298698	2.1	0.20	8298698
Dissolved Manganese (Mn)	mg/L	0.059	0.0040	0.85	0.040	8298698	0.048	0.0040	8298698
Dissolved Molybdenum (Mo)	mg/L	0.0082	0.00020	0.0016	0.00020	8297237	0.021	0.00020	8297237
Dissolved Nickel (Ni)	mg/L	0.010	0.00050	0.013	0.00050	8297237	0.0038	0.00050	8297237
Dissolved Phosphorus (P)	mg/L	0.11	0.10	<1.0	1.0	8298698	<0.10	0.10	8298698
Dissolved Potassium (K)	mg/L	2.4	0.30	17	3.0	8298698	3.3	0.30	8298698
Dissolved Selenium (Se)	mg/L	0.00064	0.00020	0.00046	0.00020	8297237	0.00020	0.00020	8297237
Dissolved Silicon (Si)	mg/L	3.7	0.10	4.7	1.0	8298698	3.5	0.10	8298698
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	8297237	<0.00010	0.00010	8297237
Dissolved Sodium (Na)	mg/L	540 (1)	5.0	3200	5.0	8298698	970 (1)	5.0	8298698
Dissolved Strontium (Sr)	mg/L	0.13	0.020	5.1	0.20	8298698	0.36	0.020	8298698
Dissolved Sulphur (S)	mg/L	170	0.20	2300	2.0	8298698	9.2	0.20	8298698
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Titanium (Ti)	mg/L	0.084	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Uranium (U)	mg/L	0.0035	0.00010	0.00085	0.00010	8297237	0.0023	0.00010	8297237
Dissolved Vanadium (V)	mg/L	0.0090	0.0010	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Zinc (Zn)	mg/L	0.0037	0.0030	0.0040	0.0030	8297237	<0.0030	0.0030	8297237

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

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6452			OU6453			OU6454		
Sampling Date		2016/06/08 10:10			2016/06/08 10:00					
COC Number		493715-05-01			493715-05-01			493715-05-01		
	UNITS	MW-35A	RDL	QC Batch	MW-35B	RDL	QC Batch	FIELD BLANK	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	18	N/A	8295689	89	N/A	8295689	0.0000	N/A	8295689
Cation Sum	meq/L	17	N/A	8295689	85	N/A	8295689	0.012	N/A	8295689
Hardness (CaCO3)	mg/L	11	0.50	8295793	300	0.50	8295793	<0.50	0.50	8295793
Ion Balance	N/A	0.95	0.010	8295687	0.95	0.010	8295687	NC	0.010	8295687
Dissolved Nitrate (NO3)	mg/L	<0.044	0.044	8295691	1.9	0.044	8295691	<0.044	0.044	8295691
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	8295692	0.42	0.020	8295692	<0.020	0.020	8295692
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	8295691	<0.033	0.033	8295691	<0.033	0.033	8295691
Calculated Total Dissolved Solids	mg/L	930	10	8295694	6000	10	8295694	<10	10	8295694
Misc. Inorganics										
Conductivity	uS/cm	1500	1.0	8296690	7700	1.0	8297284	<1.0	1.0	8296694
pH	pH	8.60	N/A	8296688	8.16	N/A	8296692	4.94	N/A	8296692
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8295331	<0.020	0.020	8295331	<0.020	0.020	8295792
Anions										
Alkalinity (PP as CaCO3)	mg/L	22	0.50	8296689	<0.50	0.50	8296693	<0.50	0.50	8296693
Alkalinity (Total as CaCO3)	mg/L	780	0.50	8296689	650	0.50	8296693	<0.50	0.50	8296693
Bicarbonate (HCO3)	mg/L	900	0.50	8296689	790	0.50	8296693	<0.50	0.50	8296693
Carbonate (CO3)	mg/L	26	0.50	8296689	<0.50	0.50	8296693	<0.50	0.50	8296693
Hydroxide (OH)	mg/L	<0.50	0.50	8296689	<0.50	0.50	8296693	<0.50	0.50	8296693
Dissolved Sulphate (SO4)	mg/L	41 (1)	2.0	8296517	3700 (1)	25	8296517	<1.0	1.0	8296517
Dissolved Chloride (Cl)	mg/L	36	1.0	8296516	5.2	1.0	8296516	<1.0	1.0	8296516
Nutrients										
Dissolved Nitrite (N)	mg/L	<0.010	0.010	8298719	<0.010	0.010	8298719	<0.010	0.010	8298719
Dissolved Nitrate (N)	mg/L	<0.010	0.010	8298719	0.42	0.010	8298719	<0.010	0.010	8298719
Elements										
Dissolved Aluminum (Al)	mg/L	0.092	0.0030	8297237	0.012	0.0030	8297237	<0.0030	0.0030	8297237
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	8297237	0.00069	0.00060	8297237	<0.00060	0.00060	8297237
Dissolved Arsenic (As)	mg/L	0.0035	0.00020	8297237	0.0019	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Barium (Ba)	mg/L	0.080	0.010	8298698	<0.10	0.10	8298698	<0.010	0.010	8298698
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Boron (B)	mg/L	0.75	0.020	8298698	0.70	0.20	8298698	<0.020	0.020	8298698

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU6452			OU6453			OU6454		
Sampling Date		2016/06/08 10:10			2016/06/08 10:00					
COC Number		493715-05-01			493715-05-01			493715-05-01		
	UNITS	MW-35A	RDL	QC Batch	MW-35B	RDL	QC Batch	FIELD BLANK	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	3.8	0.30	8298698	99	3.0	8298698	<0.30	0.30	8298698
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Cobalt (Co)	mg/L	0.00042	0.00030	8297237	0.00065	0.00030	8297237	<0.00030	0.00030	8297237
Dissolved Copper (Cu)	mg/L	0.0011	0.00020	8297237	0.0018	0.00020	8297237	0.00051	0.00020	8297237
Dissolved Iron (Fe)	mg/L	0.11	0.060	8298698	<0.60	0.60	8298698	<0.060	0.060	8298698
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Lithium (Li)	mg/L	0.068	0.020	8298698	0.50	0.20	8298698	<0.020	0.020	8298698
Dissolved Magnesium (Mg)	mg/L	0.36	0.20	8298698	14	2.0	8298698	<0.20	0.20	8298698
Dissolved Manganese (Mn)	mg/L	0.012	0.0040	8298698	0.066	0.040	8298698	<0.0040	0.0040	8298698
Dissolved Molybdenum (Mo)	mg/L	0.020	0.00020	8297237	0.0055	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Nickel (Ni)	mg/L	0.0053	0.00050	8297237	0.0041	0.00050	8297237	0.0011	0.00050	8297237
Dissolved Phosphorus (P)	mg/L	0.15	0.10	8298698	<1.0	1.0	8298698	<0.10	0.10	8298698
Dissolved Potassium (K)	mg/L	2.2	0.30	8298698	7.8	3.0	8298698	<0.30	0.30	8298698
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	8297237	0.00082	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Silicon (Si)	mg/L	3.7	0.10	8298698	3.1	1.0	8298698	<0.10	0.10	8298698
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8297237	<0.00010	0.00010	8297237	<0.00010	0.00010	8297237
Dissolved Sodium (Na)	mg/L	370	0.50	8298698	1800	5.0	8298698	<0.50	0.50	8298698
Dissolved Strontium (Sr)	mg/L	0.076	0.020	8298698	2.2	0.20	8298698	<0.020	0.020	8298698
Dissolved Sulphur (S)	mg/L	11	0.20	8298698	1200	2.0	8298698	<0.20	0.20	8298698
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237	<0.00020	0.00020	8297237
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237	0.0013	0.0010	8297237
Dissolved Titanium (Ti)	mg/L	0.0015	0.0010	8297237	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Uranium (U)	mg/L	0.0013	0.00010	8297237	0.0023	0.00010	8297237	<0.00010	0.00010	8297237
Dissolved Vanadium (V)	mg/L	0.0014	0.0010	8297237	<0.0010	0.0010	8297237	<0.0010	0.0010	8297237
Dissolved Zinc (Zn)	mg/L	0.0035	0.0030	8297237	<0.0030	0.0030	8297237	<0.0030	0.0030	8297237

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OU6374	OU6375		OU6376		OU6393		
Sampling Date		2016/06/08	2016/06/08 13:10		2016/06/08 13:25		2016/06/08 13:00		
COC Number		493715-01-01	493715-01-01		493715-01-01		493715-02-01		
	UNITS	DUPLICATE-1	MW-5B	QC Batch	MW-9	QC Batch	MW-24A	RDL	QC Batch
Demand Parameters									
Total Chemical Oxygen Demand	mg/L	19	23	8298597	21	8298597	16	5.0	8298597
Misc. Inorganics									
Dissolved Organic Carbon (C)	mg/L	5.4	7.2	8300733	5.9	8300733	4.3	0.50	8300733
Nutrients									
Total Ammonia (N)	mg/L	<0.050	0.10	8298550	0.32	8298554	0.061	0.050	8298550
Total Total Kjeldahl Nitrogen	mg/L	0.24	0.49	8299062	0.77	8299062	0.45	0.050	8299062
RDL = Reportable Detection Limit									

Maxxam ID		OU6394	OU6395		OU6402		OU6403		
Sampling Date		2016/06/08 08:50	2016/06/08 09:00		2016/06/08 09:15		2016/06/08 09:25		
COC Number		493715-02-01	493715-02-01		493715-03-01		493715-03-01		
	UNITS	MW-20A	MW-20B	QC Batch	MW-21A	QC Batch	MW-21B	RDL	QC Batch
Demand Parameters									
Total Chemical Oxygen Demand	mg/L	19	15	8298597	28	8298597	20	5.0	8298597
Misc. Inorganics									
Dissolved Organic Carbon (C)	mg/L	4.3	4.3	8300733	7.1	8300733	4.4	0.50	8300733
Nutrients									
Total Ammonia (N)	mg/L	0.53	<0.050	8298550	0.12	8298554	<0.050	0.050	8298550
Total Total Kjeldahl Nitrogen	mg/L	1.2	0.29	8299062	0.81	8299062	<0.050	0.050	8299062
RDL = Reportable Detection Limit									

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OU6404		OU6405		OU6406		OU6407		
Sampling Date		2016/06/08 10:50		2016/06/08 10:30		2016/06/08 11:25		2016/06/08 11:30		
COC Number		493715-03-01		493715-03-01		493715-03-01		493715-03-01		
	UNITS	MW-22A	QC Batch	MW-22B	QC Batch	MW-23A	QC Batch	MW-23B	RDL	QC Batch
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	21	8298597	18	8298597	55	8298597	22	5.0	8298597
Misc. Inorganics										
Dissolved Organic Carbon (C)	mg/L	5.4	8300733	4.7	8300733	16	8300733	5.5	0.50	8300733
Nutrients										
Total Ammonia (N)	mg/L	<0.050	8298554	<0.050	8298550	0.76	8298554	<0.050	0.050	8298550
Total Total Kjeldahl Nitrogen	mg/L	0.070	8299062	0.27	8299062	1.5	8299062	0.46	0.050	8299062

RDL = Reportable Detection Limit

Maxxam ID		OU6408		OU6409		OU6423		OU6450		
Sampling Date		2016/06/08 11:25		2016/06/08 11:50		2016/06/08 11:15		2016/06/08 12:40		
COC Number		493715-03-01		493715-03-01		493715-04-01		493715-05-01		
	UNITS	MW-25A	QC Batch	MW-26A	QC Batch	MW-30A	RDL	MW-32B	RDL	QC Batch
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	29	8298597	51 (1)	8298597	43	5.0	78	5.0	8298597
Misc. Inorganics										
Dissolved Organic Carbon (C)	mg/L	7.9	8300733	10	8300733	9.9	0.50	15	0.50	8300733
Nutrients										
Total Ammonia (N)	mg/L	0.62	8298554	<0.050 (2)	8298550	0.42	0.050	1.5	0.050	8298554
Total Total Kjeldahl Nitrogen	mg/L	1.2	8299062	1.2 (2)	8299062	1.1	0.050	2.6 (3)	0.25	8299062

RDL = Reportable Detection Limit

(1) Sample was received unpreserved. Sample was analyzed after holding time expired.

(2) Sample was received unpreserved.
Sample was analyzed after holding time expired.

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

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OU6451			OU6452			OU6453		
Sampling Date		2016/06/08 09:50			2016/06/08 10:10			2016/06/08 10:00		
COC Number		493715-05-01			493715-05-01			493715-05-01		
	UNITS	MW-35-DEEP	RDL	QC Batch	MW-35A	RDL	QC Batch	MW-35B	RDL	QC Batch
Demand Parameters										
Total Chemical Oxygen Demand	mg/L	110	5.0	8298935	1100 (1)	5.0	8298935	37	5.0	8298935
Misc. Inorganics										
Dissolved Organic Carbon (C)	mg/L	18	0.50	8300733	N/A	0.50	8300733	8.2	0.50	8301403
Lab Filtered Inorganics										
Dissolved Organic Carbon (C)	mg/L	N/A	0.50	8300202	15	0.50	8300202	N/A	0.50	8299096
Nutrients										
Total Ammonia (N)	mg/L	1.1	0.050	8298554	0.83 (2)	0.050	8298550	1.9	0.050	8298554
Total Total Kjeldahl Nitrogen	mg/L	2.2 (3)	0.25	8299062	12 (4)	1.3	8299102	2.7 (3)	0.25	8299102

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Sample was received unpreserved. Sample was analyzed after holding time expired.
(2) Sample was received unpreserved.
Sample was analyzed after holding time expired.
(3) Detection limits raised due to dilution to bring analyte within the calibrated range.
(4) Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample was received unpreserved.
Sample was analyzed after holding time expired.

Maxxam ID		OU6454		
Sampling Date				
COC Number		493715-05-01		
	UNITS	FIELD BLANK	RDL	QC Batch
Demand Parameters				
Total Chemical Oxygen Demand	mg/L	<5.0 (1)	5.0	8298935
Lab Filtered Inorganics				
Dissolved Organic Carbon (C)	mg/L	<0.50	0.50	8299096
Nutrients				
Total Ammonia (N)	mg/L	<0.050 (2)	0.050	8298550
Total Total Kjeldahl Nitrogen	mg/L	<0.050	0.050	8299102

RDL = Reportable Detection Limit
(1) Sample was received unpreserved. Sample was analyzed after holding time expired.
(2) Sample was received unpreserved.
Sample was analyzed after holding time expired.

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		OU6408		
Sampling Date		2016/06/08 11:25		
COC Number		493715-03-01		
	UNITS	MW-25A	RDL	QC Batch
Polycyclic Aromatics				
Benzo[a]pyrene equivalency	ug/L	<0.010	0.010	8295343
Acenaphthene	ug/L	<0.10	0.10	8296676
Acenaphthylene	ug/L	<0.10	0.10	8296676
Acridine	ug/L	<0.20	0.20	8296676
Anthracene	ug/L	<0.010	0.010	8296676
Benzo(a)anthracene	ug/L	<0.0085	0.0085	8296676
Benzo(b&j)fluoranthene	ug/L	<0.0085	0.0085	8296676
Benzo(k)fluoranthene	ug/L	<0.0085	0.0085	8296676
Benzo(g,h,i)perylene	ug/L	<0.0085	0.0085	8296676
Benzo(c)phenanthrene	ug/L	<0.050	0.050	8296676
Benzo(a)pyrene	ug/L	<0.0075	0.0075	8296676
Benzo[e]pyrene	ug/L	<0.050	0.050	8296676
Chrysene	ug/L	<0.0085	0.0085	8296676
Dibenz(a,h)anthracene	ug/L	<0.0075	0.0075	8296676
Fluoranthene	ug/L	<0.010	0.010	8296676
Fluorene	ug/L	<0.050	0.050	8296676
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	0.0085	8296676
2-Methylnaphthalene	ug/L	<0.10	0.10	8296676
Naphthalene	ug/L	<0.10	0.10	8296676
Phenanthrene	ug/L	<0.050	0.050	8296676
Perylene	ug/L	<0.050	0.050	8296676
Pyrene	ug/L	<0.020	0.020	8296676
Quinoline	ug/L	<0.20	0.20	8296676
Surrogate Recovery (%)				
D10-ANTHRACENE (sur.)	%	99	N/A	8296676
D8-ACENAPHTHYLENE (sur.)	%	94	N/A	8296676
D8-NAPHTHALENE (sur.)	%	104	N/A	8296676
TERPHENYL-D14 (sur.)	%	132 (1)	N/A	8296676

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OU6374	OU6375	OU6376	OU6393	OU6394	OU6395		
Sampling Date		2016/06/08	2016/06/08 13:10	2016/06/08 13:25	2016/06/08 13:00	2016/06/08 08:50	2016/06/08 09:00		
COC Number		493715-01-01	493715-01-01	493715-01-01	493715-02-01	493715-02-01	493715-02-01		
	UNITS	DUPLICATE-1	MW-5B	MW-9	MW-24A	MW-20A	MW-20B	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0026	0.0020	8299582
RDL = Reportable Detection Limit									

Maxxam ID		OU6402	OU6403	OU6404	OU6405	OU6406	OU6407		
Sampling Date		2016/06/08 09:15	2016/06/08 09:25	2016/06/08 10:50	2016/06/08 10:30	2016/06/08 11:25	2016/06/08 11:30		
COC Number		493715-03-01	493715-03-01	493715-03-01	493715-03-01	493715-03-01	493715-03-01		
	UNITS	MW-21A	MW-21B	MW-22A	MW-22B	MW-23A	MW-23B	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	8299582
RDL = Reportable Detection Limit									

Maxxam ID		OU6408	OU6409	OU6423	OU6450	OU6451	OU6452		
Sampling Date		2016/06/08 11:25	2016/06/08 11:50	2016/06/08 11:15	2016/06/08 12:40	2016/06/08 09:50	2016/06/08 10:10		
COC Number		493715-03-01	493715-03-01	493715-04-01	493715-05-01	493715-05-01	493715-05-01		
	UNITS	MW-25A	MW-26A	MW-30A	MW-32B	MW-35-DEEP	MW-35A	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020 (1)	<0.0020 (1)	0.0020	N/A	0.0020	8299582
Lab Filtered Elements-Low									
Dissolved Mercury (Hg)	ug/L	N/A	N/A	N/A	N/A	N/A	<0.020 (2)	0.020	8299561
RDL = Reportable Detection Limit									
N/A = Not Applicable									
(1) Client supplied DHG bottle contained particulate.									
(2) Detection limits raised due to sample matrix.									

Maxxam ID		OU6453	OU6454		
Sampling Date		2016/06/08 10:00			
COC Number		493715-05-01	493715-05-01		
	UNITS	MW-35B	FIELD BLANK	RDL	QC Batch
Low Level Elements					
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	8299582
RDL = Reportable Detection Limit					

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
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GENERAL COMMENTS

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

Package 1	11.3°C
Package 2	7.7°C
Package 3	12.0°C
Package 4	10.3°C

Sample OU6374-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU6376-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU6393-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU6395-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU6404-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU6405-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU6407-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU6450-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU6453-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Results relate only to the items tested.

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8296435	SES	Matrix Spike [OU6402-07]	1,4-Difluorobenzene (sur.)	2016/06/12		100	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		100	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		129	%	70 - 130
			Benzene	2016/06/12		100	%	70 - 130
			Toluene	2016/06/12		89	%	70 - 130
			Ethylbenzene	2016/06/12		93	%	70 - 130
			m & p-Xylene	2016/06/12		93	%	70 - 130
			o-Xylene	2016/06/12		96	%	70 - 130
			F1 (C6-C10)	2016/06/12		77	%	70 - 130
8296435	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/06/12		101	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		100	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		122	%	70 - 130
			Benzene	2016/06/12		95	%	70 - 130
			Toluene	2016/06/12		87	%	70 - 130
			Ethylbenzene	2016/06/12		92	%	70 - 130
			m & p-Xylene	2016/06/12		92	%	70 - 130
			o-Xylene	2016/06/12		94	%	70 - 130
			F1 (C6-C10)	2016/06/12		98	%	70 - 130
8296435	SES	Method Blank	1,4-Difluorobenzene (sur.)	2016/06/12		100	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/12		98	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/12		120	%	70 - 130
			Benzene	2016/06/12	<0.00040		mg/L	
			Toluene	2016/06/12	<0.00040		mg/L	
			Ethylbenzene	2016/06/12	<0.00040		mg/L	
			m & p-Xylene	2016/06/12	<0.00080		mg/L	
			o-Xylene	2016/06/12	<0.00040		mg/L	
			Xylenes (Total)	2016/06/12	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2016/06/12	<0.10		mg/L	
			F1 (C6-C10)	2016/06/12	<0.10		mg/L	
8296435	SES	RPD	Benzene	2016/06/12	NC		%	40
			Toluene	2016/06/12	NC		%	40
			Ethylbenzene	2016/06/12	NC		%	40
			m & p-Xylene	2016/06/12	NC		%	40
			o-Xylene	2016/06/12	NC		%	40
			Xylenes (Total)	2016/06/12	NC		%	40
			F1 (C6-C10) - BTEX	2016/06/12	NC		%	40
			F1 (C6-C10)	2016/06/12	NC		%	40
8296514	KD5	Matrix Spike	Dissolved Chloride (Cl)	2016/06/13		NC	%	80 - 120
8296514	KD5	Spiked Blank	Dissolved Chloride (Cl)	2016/06/13		105	%	80 - 120
8296514	KD5	Method Blank	Dissolved Chloride (Cl)	2016/06/13	<1.0		mg/L	
8296514	KD5	RPD	Dissolved Chloride (Cl)	2016/06/13	0.40		%	20
8296515	KD5	Matrix Spike	Dissolved Sulphate (SO4)	2016/06/13		NC	%	80 - 120
8296515	KD5	Spiked Blank	Dissolved Sulphate (SO4)	2016/06/13		109	%	80 - 120
8296515	KD5	Method Blank	Dissolved Sulphate (SO4)	2016/06/13	<1.0		mg/L	
8296515	KD5	RPD	Dissolved Sulphate (SO4)	2016/06/13	0.39		%	20
8296516	KD5	Matrix Spike [OU6402-01]	Dissolved Chloride (Cl)	2016/06/13		101	%	80 - 120
8296516	KD5	Spiked Blank	Dissolved Chloride (Cl)	2016/06/13		105	%	80 - 120
8296516	KD5	Method Blank	Dissolved Chloride (Cl)	2016/06/13	<1.0		mg/L	
8296516	KD5	RPD [OU6402-01]	Dissolved Chloride (Cl)	2016/06/13	1.5		%	20
8296517	KD5	Matrix Spike [OU6402-01]	Dissolved Sulphate (SO4)	2016/06/13		NC	%	80 - 120

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8296517	KD5	Spiked Blank	Dissolved Sulphate (SO4)	2016/06/13		106	%	80 - 120
8296517	KD5	Method Blank	Dissolved Sulphate (SO4)	2016/06/13	<1.0		mg/L	
8296517	KD5	RPD [OU6402-01]	Dissolved Sulphate (SO4)	2016/06/13	0.77		%	20
8296569	SES	Matrix Spike [OU6376-07]	1,4-Difluorobenzene (sur.)	2016/06/13		95	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/13		98	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/13		102	%	70 - 130
			Benzene	2016/06/13		97	%	70 - 130
			Toluene	2016/06/13		87	%	70 - 130
			Ethylbenzene	2016/06/13		92	%	70 - 130
			m & p-Xylene	2016/06/13		89	%	70 - 130
			o-Xylene	2016/06/13		93	%	70 - 130
			F1 (C6-C10)	2016/06/13		71	%	70 - 130
8296569	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/06/13		98	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/13		99	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/13		99	%	70 - 130
			Benzene	2016/06/13		98	%	70 - 130
			Toluene	2016/06/13		82	%	70 - 130
			Ethylbenzene	2016/06/13		96	%	70 - 130
			m & p-Xylene	2016/06/13		93	%	70 - 130
			o-Xylene	2016/06/13		95	%	70 - 130
			F1 (C6-C10)	2016/06/13		99	%	70 - 130
8296569	SES	Method Blank	1,4-Difluorobenzene (sur.)	2016/06/13		106	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/13		98	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/13		111	%	70 - 130
			Benzene	2016/06/13	<0.00040		mg/L	
			Toluene	2016/06/13	<0.00040		mg/L	
			Ethylbenzene	2016/06/13	<0.00040		mg/L	
			m & p-Xylene	2016/06/13	<0.00080		mg/L	
			o-Xylene	2016/06/13	<0.00040		mg/L	
			Xylenes (Total)	2016/06/13	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2016/06/13	<0.10		mg/L	
			F1 (C6-C10)	2016/06/13	<0.10		mg/L	
8296569	SES	RPD [OU6393-07]	Benzene	2016/06/13	NC		%	40
			Toluene	2016/06/13	NC		%	40
			Ethylbenzene	2016/06/13	NC		%	40
			m & p-Xylene	2016/06/13	NC		%	40
			o-Xylene	2016/06/13	NC		%	40
			Xylenes (Total)	2016/06/13	NC		%	40
			F1 (C6-C10) - BTEX	2016/06/13	NC		%	40
			F1 (C6-C10)	2016/06/13	NC		%	40
8296571	SES	Matrix Spike	1,4-Difluorobenzene (sur.)	2016/06/13		93	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/13		103	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/13		121	%	70 - 130
			Benzene	2016/06/13		97	%	70 - 130
			Toluene	2016/06/13		81	%	70 - 130
			Ethylbenzene	2016/06/13		84	%	70 - 130
			m & p-Xylene	2016/06/13		83	%	70 - 130
			o-Xylene	2016/06/13		88	%	70 - 130
			F1 (C6-C10)	2016/06/13		79	%	70 - 130
8296571	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/06/13		101	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/13		103	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/13		106	%	70 - 130

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzene	2016/06/13		99	%	70 - 130
			Toluene	2016/06/13		86	%	70 - 130
			Ethylbenzene	2016/06/13		91	%	70 - 130
			m & p-Xylene	2016/06/13		92	%	70 - 130
			o-Xylene	2016/06/13		94	%	70 - 130
			F1 (C6-C10)	2016/06/13		101	%	70 - 130
8296571	SES	Method Blank	1,4-Difluorobenzene (sur.)	2016/06/13		103	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/13		94	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/13		103	%	70 - 130
			Benzene	2016/06/13	<0.00040		mg/L	
			Toluene	2016/06/13	<0.00040		mg/L	
			Ethylbenzene	2016/06/13	<0.00040		mg/L	
			m & p-Xylene	2016/06/13	<0.00080		mg/L	
			o-Xylene	2016/06/13	<0.00040		mg/L	
			Xylenes (Total)	2016/06/13	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2016/06/13	<0.10		mg/L	
			F1 (C6-C10)	2016/06/13	<0.10		mg/L	
8296571	SES	RPD	Benzene	2016/06/13	NC		%	40
			Toluene	2016/06/13	NC		%	40
			Ethylbenzene	2016/06/13	NC		%	40
			m & p-Xylene	2016/06/13	NC		%	40
			o-Xylene	2016/06/13	NC		%	40
			Xylenes (Total)	2016/06/13	NC		%	40
			F1 (C6-C10) - BTEX	2016/06/13	NC		%	40
			F1 (C6-C10)	2016/06/13	NC		%	40
8296676	RC6	Matrix Spike	D10-ANTHRACENE (sur.)	2016/06/14		102	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2016/06/14		89	%	50 - 130
			D8-NAPHTHALENE (sur.)	2016/06/14		94	%	50 - 130
			TERPHENYL-D14 (sur.)	2016/06/14		105	%	50 - 130
			Acenaphthene	2016/06/14		96	%	50 - 130
			Acenaphthylene	2016/06/14		92	%	50 - 130
			Acridine	2016/06/14		70	%	50 - 130
			Anthracene	2016/06/14		94	%	50 - 130
			Benzo(a)anthracene	2016/06/14		87	%	50 - 130
			Benzo(b&j)fluoranthene	2016/06/14		74	%	50 - 130
			Benzo(k)fluoranthene	2016/06/14		89	%	50 - 130
			Benzo(g,h,i)perylene	2016/06/14		72	%	50 - 130
			Benzo(c)phenanthrene	2016/06/14		105	%	50 - 130
			Benzo(a)pyrene	2016/06/14		71	%	50 - 130
			Benzo[e]pyrene	2016/06/14		86	%	50 - 130
			Chrysene	2016/06/14		100	%	50 - 130
			Dibenz(a,h)anthracene	2016/06/14		69	%	50 - 130
			Fluoranthene	2016/06/14		96	%	50 - 130
			Fluorene	2016/06/14		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2016/06/14		66	%	50 - 130
			2-Methylnaphthalene	2016/06/14		88	%	50 - 130
			Naphthalene	2016/06/14		94	%	50 - 130
			Phenanthrene	2016/06/14		97	%	50 - 130
			Perylene	2016/06/14		84	%	50 - 130
			Pyrene	2016/06/14		95	%	50 - 130
			Quinoline	2016/06/14		101	%	50 - 130
8296676	RC6	Spiked Blank	D10-ANTHRACENE (sur.)	2016/06/14		97	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2016/06/14		81	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D8-NAPHTHALENE (sur.)	2016/06/14		85	%	50 - 130
			TERPHENYL-D14 (sur.)	2016/06/14		123	%	50 - 130
			Acenaphthene	2016/06/14		95	%	50 - 130
			Acenaphthylene	2016/06/14		89	%	50 - 130
			Acridine	2016/06/14		67	%	50 - 130
			Anthracene	2016/06/14		93	%	50 - 130
			Benzo(a)anthracene	2016/06/14		100	%	50 - 130
			Benzo(b&j)fluoranthene	2016/06/14		93	%	50 - 130
			Benzo(k)fluoranthene	2016/06/14		111	%	50 - 130
			Benzo(g,h,i)perylene	2016/06/14		94	%	50 - 130
			Benzo(c)phenanthrene	2016/06/14		108	%	50 - 130
			Benzo(a)pyrene	2016/06/14		90	%	50 - 130
			Benzo[e]pyrene	2016/06/14		107	%	50 - 130
			Chrysene	2016/06/14		119	%	50 - 130
			Dibenz(a,h)anthracene	2016/06/14		89	%	50 - 130
			Fluoranthene	2016/06/14		95	%	50 - 130
			Fluorene	2016/06/14		90	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2016/06/14		84	%	50 - 130
			2-Methylnaphthalene	2016/06/14		82	%	50 - 130
			Naphthalene	2016/06/14		88	%	50 - 130
			Phenanthrene	2016/06/14		97	%	50 - 130
			Perylene	2016/06/14		105	%	50 - 130
			Pyrene	2016/06/14		95	%	50 - 130
			Quinoline	2016/06/14		105	%	50 - 130
8296676	RC6	Method Blank	D10-ANTHRACENE (sur.)	2016/06/14		96	%	50 - 130
			D8-ACENAPHTHYLENE (sur.)	2016/06/14		79	%	50 - 130
			D8-NAPHTHALENE (sur.)	2016/06/14		83	%	50 - 130
			TERPHENYL-D14 (sur.)	2016/06/14		130	%	50 - 130
			Acenaphthene	2016/06/14	<0.10		ug/L	
			Acenaphthylene	2016/06/14	<0.10		ug/L	
			Acridine	2016/06/14	<0.20		ug/L	
			Anthracene	2016/06/14	<0.010		ug/L	
			Benzo(a)anthracene	2016/06/14	<0.0085		ug/L	
			Benzo(b&j)fluoranthene	2016/06/14	<0.0085		ug/L	
			Benzo(k)fluoranthene	2016/06/14	<0.0085		ug/L	
			Benzo(g,h,i)perylene	2016/06/14	<0.0085		ug/L	
			Benzo(c)phenanthrene	2016/06/14	<0.050		ug/L	
			Benzo(a)pyrene	2016/06/14	<0.0075		ug/L	
			Benzo[e]pyrene	2016/06/14	<0.050		ug/L	
			Chrysene	2016/06/14	<0.0085		ug/L	
			Dibenz(a,h)anthracene	2016/06/14	<0.0075		ug/L	
			Fluoranthene	2016/06/14	<0.010		ug/L	
			Fluorene	2016/06/14	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2016/06/14	<0.0085		ug/L	
			2-Methylnaphthalene	2016/06/14	<0.10		ug/L	
			Naphthalene	2016/06/14	<0.10		ug/L	
			Phenanthrene	2016/06/14	<0.050		ug/L	
			Perylene	2016/06/14	<0.050		ug/L	
			Pyrene	2016/06/14	<0.020		ug/L	
			Quinoline	2016/06/14	<0.20		ug/L	
8296676	RC6	RPD	Acenaphthene	2016/06/14	NC		%	40
			Acenaphthylene	2016/06/14	NC		%	40
			Acridine	2016/06/14	NC		%	40

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Anthracene	2016/06/14	NC		%	40
			Benzo(a)anthracene	2016/06/14	NC		%	40
			Benzo(b&j)fluoranthene	2016/06/14	NC		%	40
			Benzo(k)fluoranthene	2016/06/14	NC		%	40
			Benzo(g,h,i)perylene	2016/06/14	NC		%	40
			Benzo(c)phenanthrene	2016/06/14	NC		%	40
			Benzo(a)pyrene	2016/06/14	NC		%	40
			Benzo[e]pyrene	2016/06/14	NC		%	40
			Chrysene	2016/06/14	NC		%	40
			Dibenz(a,h)anthracene	2016/06/14	NC		%	40
			Fluoranthene	2016/06/14	NC		%	40
			Fluorene	2016/06/14	NC		%	40
			Indeno(1,2,3-cd)pyrene	2016/06/14	NC		%	40
			2-Methylnaphthalene	2016/06/14	NC		%	40
			Naphthalene	2016/06/14	NC		%	40
			Phenanthrene	2016/06/14	NC		%	40
			Perylene	2016/06/14	NC		%	40
			Pyrene	2016/06/14	NC		%	40
			Quinoline	2016/06/14	NC		%	40
8296682	KK5	Matrix Spike [OU6376-06]	O-TERPHENYL (sur.)	2016/06/13		102	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/13		103	%	50 - 130
8296682	KK5	Spiked Blank	O-TERPHENYL (sur.)	2016/06/13		105	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/13		106	%	70 - 130
8296682	KK5	Method Blank	O-TERPHENYL (sur.)	2016/06/13		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/13	<0.10		mg/L	
8296682	KK5	RPD [OU6374-06]	F2 (C10-C16 Hydrocarbons)	2016/06/13	NC		%	40
8296688	MA4	Spiked Blank	pH	2016/06/13		100	%	97 - 103
8296688	MA4	RPD	pH	2016/06/13	2.2		%	N/A
8296689	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/13		99	%	80 - 120
8296689	MA4	Method Blank	Alkalinity (PP as CaCO3)	2016/06/13	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/13	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/13	<0.50		mg/L	
			Carbonate (CO3)	2016/06/13	<0.50		mg/L	
			Hydroxide (OH)	2016/06/13	<0.50		mg/L	
8296689	MA4	RPD	Alkalinity (PP as CaCO3)	2016/06/13	NC		%	20
			Alkalinity (Total as CaCO3)	2016/06/13	0.055		%	20
			Bicarbonate (HCO3)	2016/06/13	0.055		%	20
			Carbonate (CO3)	2016/06/13	NC		%	20
			Hydroxide (OH)	2016/06/13	NC		%	20
8296690	MA4	Spiked Blank	Conductivity	2016/06/13		100	%	90 - 110
8296690	MA4	Method Blank	Conductivity	2016/06/13	<1.0		uS/cm	
8296690	MA4	RPD	Conductivity	2016/06/13	1.7		%	20
8296692	MA4	Spiked Blank	pH	2016/06/13		100	%	97 - 103
8296692	MA4	RPD [OU6375-01]	pH	2016/06/13	0.24		%	N/A
8296693	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/13		99	%	80 - 120
8296693	MA4	Method Blank	Alkalinity (PP as CaCO3)	2016/06/13	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/13	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/13	<0.50		mg/L	
			Carbonate (CO3)	2016/06/13	<0.50		mg/L	
			Hydroxide (OH)	2016/06/13	<0.50		mg/L	
8296693	MA4	RPD [OU6376-01]	Alkalinity (PP as CaCO3)	2016/06/14	NC		%	20
			Alkalinity (Total as CaCO3)	2016/06/14	0.37		%	20

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			Bicarbonate (HCO3)	2016/06/14	0.37		%	20
			Carbonate (CO3)	2016/06/14	NC		%	20
			Hydroxide (OH)	2016/06/14	NC		%	20
8296694	MA4	Spiked Blank	Conductivity	2016/06/13		100	%	90 - 110
8296694	MA4	Method Blank	Conductivity	2016/06/13	<1.0		uS/cm	
8296694	MA4	RPD [OU6375-01]	Conductivity	2016/06/13	0.66		%	20
8297237	JPG	Matrix Spike [OU6374-04]	Dissolved Aluminum (Al)	2016/06/14		96	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/14		105	%	80 - 120
			Dissolved Arsenic (As)	2016/06/14		103	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/14		104	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/14		97	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/14		95	%	80 - 120
			Dissolved Copper (Cu)	2016/06/14		92	%	80 - 120
			Dissolved Lead (Pb)	2016/06/14		91	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/14		112	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/14		94	%	80 - 120
			Dissolved Selenium (Se)	2016/06/14		100	%	80 - 120
			Dissolved Silver (Ag)	2016/06/14		94	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/14		92	%	80 - 120
			Dissolved Tin (Sn)	2016/06/14		109	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/14		108	%	80 - 120
			Dissolved Uranium (U)	2016/06/14		96	%	80 - 120
			Dissolved Vanadium (V)	2016/06/14		105	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/14		96	%	80 - 120
8297237	JPG	Spiked Blank	Dissolved Aluminum (Al)	2016/06/14		97	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/14		100	%	80 - 120
			Dissolved Arsenic (As)	2016/06/14		99	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/14		101	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/14		98	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/14		97	%	80 - 120
			Dissolved Copper (Cu)	2016/06/14		96	%	80 - 120
			Dissolved Lead (Pb)	2016/06/14		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/14		102	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/14		97	%	80 - 120
			Dissolved Selenium (Se)	2016/06/14		103	%	80 - 120
			Dissolved Silver (Ag)	2016/06/14		99	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/14		102	%	80 - 120
			Dissolved Tin (Sn)	2016/06/14		103	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/14		96	%	80 - 120
			Dissolved Uranium (U)	2016/06/14		100	%	80 - 120
			Dissolved Vanadium (V)	2016/06/14		99	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/14		98	%	80 - 120
8297237	JPG	Method Blank	Dissolved Aluminum (Al)	2016/06/15	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2016/06/15	<0.00060		mg/L	
			Dissolved Arsenic (As)	2016/06/15	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2016/06/15	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2016/06/15	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2016/06/15	<0.00030		mg/L	
			Dissolved Copper (Cu)	2016/06/15	<0.00020		mg/L	
			Dissolved Lead (Pb)	2016/06/15	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2016/06/15	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2016/06/15	<0.00050		mg/L	

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			Dissolved Selenium (Se)	2016/06/15	<0.00020		mg/L	
			Dissolved Silver (Ag)	2016/06/15	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2016/06/15	<0.00020		mg/L	
			Dissolved Tin (Sn)	2016/06/15	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2016/06/15	<0.0010		mg/L	
			Dissolved Uranium (U)	2016/06/15	<0.00010		mg/L	
			Dissolved Vanadium (V)	2016/06/15	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2016/06/15	<0.0030		mg/L	
8297237	JPG	RPD [OU6374-04]	Dissolved Aluminum (Al)	2016/06/15	NC		%	20
			Dissolved Antimony (Sb)	2016/06/15	NC		%	20
			Dissolved Arsenic (As)	2016/06/15	NC		%	20
			Dissolved Beryllium (Be)	2016/06/15	NC		%	20
			Dissolved Chromium (Cr)	2016/06/15	NC		%	20
			Dissolved Cobalt (Co)	2016/06/15	NC		%	20
			Dissolved Copper (Cu)	2016/06/15	NC		%	20
			Dissolved Lead (Pb)	2016/06/15	NC		%	20
			Dissolved Molybdenum (Mo)	2016/06/15	NC		%	20
			Dissolved Nickel (Ni)	2016/06/15	NC		%	20
			Dissolved Selenium (Se)	2016/06/15	NC		%	20
			Dissolved Silver (Ag)	2016/06/15	NC		%	20
			Dissolved Thallium (Tl)	2016/06/15	NC		%	20
			Dissolved Tin (Sn)	2016/06/15	NC		%	20
			Dissolved Titanium (Ti)	2016/06/15	NC		%	20
			Dissolved Uranium (U)	2016/06/15	0.49		%	20
			Dissolved Vanadium (V)	2016/06/15	NC		%	20
			Dissolved Zinc (Zn)	2016/06/15	NC		%	20
8297284	MA4	Spiked Blank	Conductivity	2016/06/13		101	%	90 - 110
8297284	MA4	Method Blank	Conductivity	2016/06/13	<1.0		uS/cm	
8297284	MA4	RPD	Conductivity	2016/06/13	0.36		%	20
8297909	SB8	Matrix Spike	Dissolved Nitrite (N)	2016/06/14		104	%	80 - 120
			Dissolved Nitrate (N)	2016/06/14		104	%	80 - 120
8297909	SB8	Spiked Blank	Dissolved Nitrite (N)	2016/06/14		99	%	80 - 120
			Dissolved Nitrate (N)	2016/06/14		100	%	80 - 120
8297909	SB8	Method Blank	Dissolved Nitrite (N)	2016/06/14	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/06/14	<0.010		mg/L	
8297909	SB8	RPD	Dissolved Nitrite (N)	2016/06/14	NC		%	20
			Dissolved Nitrate (N)	2016/06/14	NC		%	20
8298550	AF6	Matrix Spike	Total Ammonia (N)	2016/06/14		100	%	80 - 120
8298550	AF6	Spiked Blank	Total Ammonia (N)	2016/06/14		98	%	80 - 120
8298550	AF6	Method Blank	Total Ammonia (N)	2016/06/14	<0.050		mg/L	
8298550	AF6	RPD	Total Ammonia (N)	2016/06/14	NC		%	20
8298554	AF6	Matrix Spike	Total Ammonia (N)	2016/06/14		97	%	80 - 120
8298554	AF6	Spiked Blank	Total Ammonia (N)	2016/06/14		96	%	80 - 120
8298554	AF6	Method Blank	Total Ammonia (N)	2016/06/14	<0.050		mg/L	
8298554	AF6	RPD	Total Ammonia (N)	2016/06/14	NC		%	20
8298597	MRD	Matrix Spike	Total Chemical Oxygen Demand	2016/06/14		99	%	80 - 120
8298597	MRD	Spiked Blank	Total Chemical Oxygen Demand	2016/06/14		103	%	80 - 120
8298597	MRD	Method Blank	Total Chemical Oxygen Demand	2016/06/14	5.0, RDL=5.0		mg/L	
8298597	MRD	RPD	Total Chemical Oxygen Demand	2016/06/14	6.2		%	20
8298698	JK9	Matrix Spike [OU6452-02]	Dissolved Barium (Ba)	2016/06/15		93	%	80 - 120
			Dissolved Boron (B)	2016/06/15		103	%	80 - 120

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Calcium (Ca)	2016/06/15		100	%	80 - 120
			Dissolved Iron (Fe)	2016/06/15		100	%	80 - 120
			Dissolved Lithium (Li)	2016/06/15		98	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/15		101	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/15		97	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/15		105	%	80 - 120
			Dissolved Potassium (K)	2016/06/15		100	%	80 - 120
			Dissolved Silicon (Si)	2016/06/15		98	%	80 - 120
			Dissolved Sodium (Na)	2016/06/15		NC	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/15		93	%	80 - 120
8298698	JK9	Spiked Blank	Dissolved Barium (Ba)	2016/06/15		94	%	80 - 120
			Dissolved Boron (B)	2016/06/15		102	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/15		101	%	80 - 120
			Dissolved Iron (Fe)	2016/06/15		102	%	80 - 120
			Dissolved Lithium (Li)	2016/06/15		99	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/15		103	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/15		99	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/15		106	%	80 - 120
			Dissolved Potassium (K)	2016/06/15		100	%	80 - 120
			Dissolved Silicon (Si)	2016/06/15		99	%	80 - 120
			Dissolved Sodium (Na)	2016/06/15		99	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/15		94	%	80 - 120
			Dissolved Sulphur (S)	2016/06/15		98	%	80 - 120
8298698	JK9	Method Blank	Dissolved Barium (Ba)	2016/06/15	<0.010		mg/L	
			Dissolved Boron (B)	2016/06/15	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/06/15	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/06/15	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/06/15	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/06/15	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/06/15	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/06/15	<0.10		mg/L	
			Dissolved Potassium (K)	2016/06/15	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/06/15	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/06/15	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/06/15	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/06/15	<0.20		mg/L	
8298698	JK9	RPD [OU6452-02]	Dissolved Barium (Ba)	2016/06/15	0.23		%	20
			Dissolved Boron (B)	2016/06/15	0.87		%	20
			Dissolved Calcium (Ca)	2016/06/15	0.49		%	20
			Dissolved Iron (Fe)	2016/06/15	NC		%	20
			Dissolved Lithium (Li)	2016/06/15	NC		%	20
			Dissolved Magnesium (Mg)	2016/06/15	NC		%	20
			Dissolved Manganese (Mn)	2016/06/15	NC		%	20
			Dissolved Phosphorus (P)	2016/06/15	NC		%	20
			Dissolved Potassium (K)	2016/06/15	1.1		%	20
			Dissolved Silicon (Si)	2016/06/15	0.40		%	20
			Dissolved Sodium (Na)	2016/06/15	0.90		%	20
			Dissolved Strontium (Sr)	2016/06/15	NC		%	20
			Dissolved Sulphur (S)	2016/06/15	0.17		%	20
8298719	LMD	Matrix Spike [OU6394-01]	Dissolved Nitrite (N)	2016/06/14		103	%	80 - 120
			Dissolved Nitrate (N)	2016/06/14		NC	%	80 - 120
8298719	LMD	Spiked Blank	Dissolved Nitrite (N)	2016/06/14		100	%	80 - 120

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Nitrate (N)	2016/06/14		102	%	80 - 120
8298719	LMD	Method Blank	Dissolved Nitrite (N)	2016/06/14	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/06/14	<0.010		mg/L	
8298719	LMD	RPD [OU6394-01]	Dissolved Nitrite (N)	2016/06/14	NC		%	20
			Dissolved Nitrate (N)	2016/06/14	0.097		%	20
8298935	MRD	Matrix Spike	Total Chemical Oxygen Demand	2016/06/14		104	%	80 - 120
8298935	MRD	Spiked Blank	Total Chemical Oxygen Demand	2016/06/14		102	%	80 - 120
8298935	MRD	Method Blank	Total Chemical Oxygen Demand	2016/06/14	<5.0		mg/L	
8298935	MRD	RPD	Total Chemical Oxygen Demand	2016/06/14	NC		%	20
8299062	MBB	Matrix Spike [OU6403-03]	Total Total Kjeldahl Nitrogen	2016/06/15		99	%	80 - 120
8299062	MBB	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/15		107	%	80 - 120
8299062	MBB	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/15		106	%	80 - 120
8299062	MBB	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/15	<0.050		mg/L	
8299062	MBB	RPD [OU6403-03]	Total Total Kjeldahl Nitrogen	2016/06/15	NC		%	20
8299096	YY	Matrix Spike [OU6454-01]	Dissolved Organic Carbon (C)	2016/06/14		101	%	80 - 120
8299096	YY	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/14		102	%	80 - 120
8299096	YY	Method Blank	Dissolved Organic Carbon (C)	2016/06/14	<0.50		mg/L	
8299096	YY	RPD [OU6454-01]	Dissolved Organic Carbon (C)	2016/06/14	NC		%	20
8299102	MBB	Matrix Spike	Total Total Kjeldahl Nitrogen	2016/06/15		NC	%	80 - 120
8299102	MBB	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/15		113	%	80 - 120
8299102	MBB	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/15		112	%	80 - 120
8299102	MBB	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/15	<0.050		mg/L	
8299102	MBB	RPD	Total Total Kjeldahl Nitrogen	2016/06/15	9.3		%	20
8299561	JLO	Matrix Spike	Dissolved Mercury (Hg)	2016/06/15		100	%	85 - 115
8299561	JLO	QC Standard	Dissolved Mercury (Hg)	2016/06/15		102	%	85 - 115
8299561	JLO	Spiked Blank	Dissolved Mercury (Hg)	2016/06/15		97	%	85 - 115
8299561	JLO	Method Blank	Dissolved Mercury (Hg)	2016/06/15	<0.0020		ug/L	
8299561	JLO	RPD	Dissolved Mercury (Hg)	2016/06/15	NC		%	20
8299582	JLO	Matrix Spike [OU6375-05]	Dissolved Mercury (Hg)	2016/06/15		99	%	85 - 115
8299582	JLO	QC Standard	Dissolved Mercury (Hg)	2016/06/15		105	%	85 - 115
8299582	JLO	Spiked Blank	Dissolved Mercury (Hg)	2016/06/15		101	%	85 - 115
8299582	JLO	Method Blank	Dissolved Mercury (Hg)	2016/06/15	<0.0020		ug/L	
8299582	JLO	RPD [OU6375-05]	Dissolved Mercury (Hg)	2016/06/15	NC		%	20
8300202	YY	Matrix Spike	Dissolved Organic Carbon (C)	2016/06/15		NC	%	80 - 120
8300202	YY	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/15		100	%	80 - 120
8300202	YY	Method Blank	Dissolved Organic Carbon (C)	2016/06/15	<0.50		mg/L	
8300202	YY	RPD	Dissolved Organic Carbon (C)	2016/06/15	3.2		%	20
8300733	YY	Matrix Spike [OU6374-02]	Dissolved Organic Carbon (C)	2016/06/15		NC	%	80 - 120
8300733	YY	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/15		104	%	80 - 120
8300733	YY	Method Blank	Dissolved Organic Carbon (C)	2016/06/15	<0.50		mg/L	
8300733	YY	RPD [OU6374-02]	Dissolved Organic Carbon (C)	2016/06/15	1.2		%	20
8301403	YY	Matrix Spike [OU6453-02]	Dissolved Organic Carbon (C)	2016/06/16		NC	%	80 - 120
8301403	YY	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/16		102	%	80 - 120
8301403	YY	Method Blank	Dissolved Organic Carbon (C)	2016/06/16	<0.50		mg/L	

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Maxxam Job #: B646208
Report Date: 2016/06/16

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8301403	YY	RPD [OU6453-02]	Dissolved Organic Carbon (C)	2016/06/16	2.4		%	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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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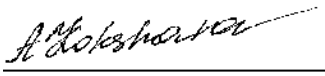
Maxxam Job #: B646208
Report Date: 2016/06/16

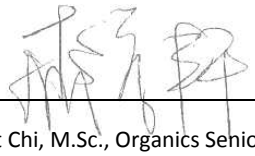
TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: MC

VALIDATION SIGNATURE PAGE

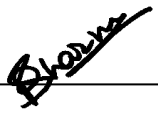
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



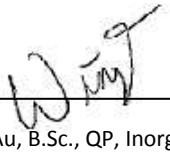
Anna Koksharova, M.Sc., Organics Senior Analyst



Bert Chi, M.Sc., Organics Senior Analyst



Poonam Sharma, cCT, Organics Senior Analyst



Winnie Au, B.Sc., QP, Inorganics Supervisor

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Your Project #: EBA, 704-SWM.SWOP03097-01
Your C.O.C. #: 493715-07-01, 493715-08-01

Attention:MICHELE CRAWFORD

TETRA TECH EBA INC.
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2016/06/17
Report #: R2200255
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B646660
Received: 2016/06/09, 15:15

Sample Matrix: Water
Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	14	N/A	2016/06/15	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	13	N/A	2016/06/15	AB SOP-00039	CCME CWS/EPA 8260c m
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2016/06/16	AB SOP-00039	CCME CWS/EPA 8260c m
Cadmium - low level CCME - Dissolved	11	N/A	2016/06/15	AB WI-00065	Auto Calc
Cadmium - low level CCME - Dissolved	3	N/A	2016/06/17	AB WI-00065	Auto Calc
Chloride by Automated Colourimetry	13	N/A	2016/06/16	AB SOP-00020	SM 22 4500-Cl G m
Chloride by Automated Colourimetry	1	N/A	2016/06/17	AB SOP-00020	SM 22 4500-Cl G m
Chemical Oxygen Demand	11	N/A	2016/06/15	AB SOP-00016	SM 22 5220D m
Chemical Oxygen Demand	3	N/A	2016/06/16	AB SOP-00016	SM 22 5220D m
Carbon (DOC) -Lab Filtered (1)	2	N/A	2016/06/17	EENVSOP-00060	MMCW 119 1996 m
Carbon (DOC) (1)	12	N/A	2016/06/17	EENVSOP-00060	MMCW 119 1996 m
Conductivity @25C	12	N/A	2016/06/15	AB SOP-00005	SM 22 2510 B m
Conductivity @25C	2	N/A	2016/06/17	AB SOP-00004	SM 22 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16)	14	2016/06/15	2016/06/16	AB SOP-00040 / AB SOP-00037	CCME PHC-CWS m
Hardness	11	N/A	2016/06/16	AB WI-00065	Auto Calc
Hardness	3	N/A	2016/06/17	AB WI-00065	Auto Calc
Mercury - Low Level (Dissolved)	11	2016/06/15	2016/06/15	EENVSOP-00031	EPA 1631E/245.1 R3 m
Mercury-Low Level-Dissolved-Lab Filtered	3	2016/06/15	2016/06/15	EENVSOP-00031	EPA 1631E/245.1 R3 m
Elements by ICP - Dissolved	11	N/A	2016/06/16	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP-Dissolved-Lab Filtered	2	N/A	2016/06/16	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP-Dissolved-Lab Filtered	1	N/A	2016/06/17	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved	11	N/A	2016/06/14	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS-Dissolved-Lab Filtered	3	N/A	2016/06/16	AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	11	N/A	2016/06/16	AB WI-00065	Auto Calc
Ion Balance	3	N/A	2016/06/17	AB WI-00065	Auto Calc
Sum of cations, anions	11	N/A	2016/06/16	AB WI-00065	Auto Calc
Sum of cations, anions	3	N/A	2016/06/17	AB WI-00065	Auto Calc
Ammonia-N (Total)	11	N/A	2016/06/14	AB SOP-00007	EPA 350.1 R2.0 m
Ammonia-N (Total)	3	N/A	2016/06/15	AB SOP-00007	EPA 350.1 R2.0 m

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Your Project #: EBA, 704-SWM.SWOP03097-01
Your C.O.C. #: 493715-07-01, 493715-08-01

Attention:MICHELE CRAWFORD

TETRA TECH EBA INC.
14940-123 AVENUE
EDMONTON, AB
CANADA T5V 1B4

Report Date: 2016/06/17
Report #: R2200255
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B646660
Received: 2016/06/09, 15:15

Sample Matrix: Water
Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Nitrate and Nitrite	2	N/A	2016/06/16	AB WI-00065	Auto Calc
Nitrate and Nitrite	12	N/A	2016/06/17	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	2	N/A	2016/06/16	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	12	N/A	2016/06/17	AB WI-00065	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	2	N/A	2016/06/15	AB SOP-00023	SM 22 4110 B m
Nitrogen, (Nitrite, Nitrate) by IC	12	N/A	2016/06/16	AB SOP-00023	SM 22 4110 B m
pH @25°C	12	N/A	2016/06/15	AB SOP-00005	SM 22 4500 H+ B m
pH @25C	2	N/A	2016/06/16	AB SOP-00006	SM 22 4500 H+ B m
Sulphate by Automated Colourimetry	13	N/A	2016/06/16	AB SOP-00018	SM 22 4500-SO4 E m
Sulphate by Automated Colourimetry	1	N/A	2016/06/17	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	11	N/A	2016/06/16	AB WI-00065	Auto Calc
Total Dissolved Solids (Calculated)	3	N/A	2016/06/17	AB WI-00065	Auto Calc
Total Kjeldahl Nitrogen	8	2016/06/15	2016/06/16	AB SOP-00008	EPA 351.1 R 1978 m
Total Kjeldahl Nitrogen	6	2016/06/15	2016/06/17	AB SOP-00008	EPA 351.1 R 1978 m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) DOC present in the sample should be considered as non-purgeable DOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Sherlyne Sim, B.Eng, Project Manager
Email: SSim@maxxam.ca
Phone# (780)577-7113

==========

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		OU9182	OU9183	OU9184	OU9185	OU9186	OU9187		
Sampling Date		2016/06/09 10:15	2016/06/09 10:35	2016/06/09 11:20	2016/06/09 11:35	2016/06/09 11:55	2016/06/09 12:40		
COC Number		493715-07-01	493715-07-01	493715-07-01	493715-07-01	493715-07-01	493715-07-01		
	UNITS	16MW09B	16MW09C	16MW11A	16MW11B	16MW11C	16MW13	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.15	<0.10	<0.10	<0.10	0.10	8300167
Volatiles									
Benzene	mg/L	0.00063	<0.00040	0.00043	<0.00040	<0.00040	<0.00040	0.00040	8300278
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8300278
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8300278
m & p-Xylene	mg/L	<0.00080	<0.00080	0.0051	<0.00080	<0.00080	<0.00080	0.00080	8300278
o-Xylene	mg/L	<0.00040	<0.00040	0.0014	<0.00040	<0.00040	<0.00040	0.00040	8300278
Xylenes (Total)	mg/L	<0.00080	<0.00080	0.0065	<0.00080	<0.00080	<0.00080	0.00080	8300278
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8300278
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8300278
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	97	92	98	96	98	95	N/A	8300278
4-Bromofluorobenzene (sur.)	%	96	96	100	95	96	103	N/A	8300278
D4-1,2-Dichloroethane (sur.)	%	89	81	79	89	91	92	N/A	8300278
O-TERPHENYL (sur.)	%	99	101	97	99	101	101	N/A	8300167

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		OU9188	OU9189	OU9190	OU9191	OU9228	OU9229		
Sampling Date		2016/06/09 12:50	2016/06/09 13:20	2016/06/09 13:35	2016/06/09 11:00	2016/06/09 13:10	2016/06/09 09:55		
COC Number		493715-07-01	493715-07-01	493715-07-01	493715-07-01	493715-08-01	493715-08-01		
	UNITS	16MW14	16MW16	16MW18	16MW04	16MW08A	16MW09A	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	1.2	0.10	8300167
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8300278
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8300278
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8300278
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8300278
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8300278
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8300278
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8300278
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8300278
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	93	96	95	95	95	100	N/A	8300278
4-Bromofluorobenzene (sur.)	%	102	100	104	96	95	95	N/A	8300278
D4-1,2-Dichloroethane (sur.)	%	92	95	92	93	94	86	N/A	8300278
O-TERPHENYL (sur.)	%	100	104	99	97	99	101	N/A	8300167

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		OU9230	OU9231		
Sampling Date		2016/06/09 10:45	2016/06/09		
COC Number		493715-08-01	493715-08-01		
	UNITS	16MW09D	16DUP1	RDL	QC Batch
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.88	0.10	8300167
Volatiles					
Benzene	mg/L	<0.00040	<0.00040	0.00040	8300278
Toluene	mg/L	<0.00040	<0.00040	0.00040	8300278
Ethylbenzene	mg/L	<0.00040	<0.00040	0.00040	8300278
m & p-Xylene	mg/L	<0.00080	<0.00080	0.00080	8300278
o-Xylene	mg/L	<0.00040	<0.00040	0.00040	8300278
Xylenes (Total)	mg/L	<0.00080	<0.00080	0.00080	8300278
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	0.10	8300278
F1 (C6-C10)	mg/L	<0.10	<0.10	0.10	8300278
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	97	98	N/A	8300278
4-Bromofluorobenzene (sur.)	%	96	99	N/A	8300278
D4-1,2-Dichloroethane (sur.)	%	98	96	N/A	8300278
O-TERPHENYL (sur.)	%	98	95	N/A	8300167

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9182		OU9184			OU9185		
Sampling Date		2016/06/09 10:15		2016/06/09 11:20			2016/06/09 11:35		
COC Number		493715-07-01		493715-07-01			493715-07-01		
	UNITS	16MW09B	RDL	16MW11A	RDL	QC Batch	16MW11B	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	21	N/A	100	N/A	8297060	17	N/A	8297060
Cation Sum	meq/L	19	N/A	100	N/A	8297060	16	N/A	8297060
Hardness (CaCO3)	mg/L	28	0.50	250	0.50	8297058	21	0.50	8297058
Ion Balance	N/A	0.94	0.010	1.0	0.010	8297059	0.97	0.010	8297059
Dissolved Nitrate (NO3)	mg/L	<0.044	0.044	<0.044	0.044	8297062	0.064	0.044	8297062
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	<0.020	0.020	8297063	<0.020	0.020	8297063
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	<0.033	0.033	8297062	<0.033	0.033	8297062
Calculated Total Dissolved Solids	mg/L	1100	10	5800	10	8297064	940	10	8297064
Misc. Inorganics									
Conductivity	uS/cm	2000	1.0	10000	1.0	8300242	N/A	1.0	8300242
pH	pH	8.84	N/A	8.11	N/A	8300238	N/A	N/A	8300238
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	0.032	0.020	0.050	0.020	8297056	N/A	0.020	8297056
Anions									
Alkalinity (PP as CaCO3)	mg/L	31	0.50	<0.50	0.50	8300240	<5.0 (1)	5.0	8300268
Alkalinity (Total as CaCO3)	mg/L	600	0.50	820	0.50	8300240	480 (1)	5.0	8300268
Bicarbonate (HCO3)	mg/L	660	0.50	1000	0.50	8300240	590 (1)	5.0	8300268
Carbonate (CO3)	mg/L	37	0.50	<0.50	0.50	8300240	<5.0 (1)	5.0	8300268
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	8300240	<5.0 (1)	5.0	8300268
Dissolved Sulphate (SO4)	mg/L	130	1.0	8.6	1.0	8300962	80	1.0	8300962
Dissolved Chloride (Cl)	mg/L	210 (2)	2.0	3000 (2)	25	8300956	190 (3)	2.0	8300956
Nutrients									
Dissolved Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	8300065	<0.010	0.010	8300065
Dissolved Nitrate (N)	mg/L	<0.010	0.010	<0.010	0.010	8300065	0.015	0.010	8300065
Elements									
Dissolved Aluminum (Al)	mg/L	0.015	0.0030	0.0074	0.0030	8299340	N/A	N/A	N/A
Dissolved Antimony (Sb)	mg/L	0.0020	0.00060	<0.00060	0.00060	8299340	N/A	N/A	N/A
Dissolved Arsenic (As)	mg/L	0.0063	0.00020	0.0024	0.00020	8299340	N/A	N/A	N/A
Dissolved Barium (Ba)	mg/L	0.083	0.010	1.9	0.10	8301117	N/A	N/A	N/A

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9182		OU9184			OU9185		
Sampling Date		2016/06/09 10:15		2016/06/09 11:20			2016/06/09 11:35		
COC Number		493715-07-01		493715-07-01			493715-07-01		
	UNITS	16MW09B	RDL	16MW11A	RDL	QC Batch	16MW11B	RDL	QC Batch
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8299340	N/A	N/A	N/A
Dissolved Boron (B)	mg/L	0.57	0.020	1.0	0.20	8301117	N/A	N/A	N/A
Dissolved Calcium (Ca)	mg/L	9.4	0.30	84	3.0	8301117	N/A	N/A	N/A
Dissolved Chromium (Cr)	mg/L	0.0010	0.0010	<0.0010	0.0010	8299340	N/A	N/A	N/A
Dissolved Cobalt (Co)	mg/L	0.00077	0.00030	0.0021	0.00030	8299340	N/A	N/A	N/A
Dissolved Copper (Cu)	mg/L	0.0015	0.00020	0.00063	0.00020	8299340	N/A	N/A	N/A
Dissolved Iron (Fe)	mg/L	<0.060	0.060	<0.60	0.60	8301117	N/A	N/A	N/A
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8299340	N/A	N/A	N/A
Dissolved Lithium (Li)	mg/L	0.062	0.020	0.45	0.20	8301117	N/A	N/A	N/A
Dissolved Magnesium (Mg)	mg/L	1.1	0.20	9.6	2.0	8301117	N/A	N/A	N/A
Dissolved Manganese (Mn)	mg/L	0.019	0.0040	0.27	0.040	8301117	N/A	N/A	N/A
Dissolved Molybdenum (Mo)	mg/L	0.067	0.00020	0.0077	0.00020	8299340	N/A	N/A	N/A
Dissolved Nickel (Ni)	mg/L	0.0082	0.00050	0.0047	0.00050	8299340	N/A	N/A	N/A
Dissolved Phosphorus (P)	mg/L	0.28	0.10	<1.0	1.0	8301117	N/A	N/A	N/A
Dissolved Potassium (K)	mg/L	2.5	0.30	7.9	3.0	8301117	N/A	N/A	N/A
Dissolved Selenium (Se)	mg/L	0.0018	0.00020	0.00020	0.00020	8299340	N/A	N/A	N/A
Dissolved Silicon (Si)	mg/L	2.0	0.10	4.2	1.0	8301117	N/A	N/A	N/A
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	<0.00010	0.00010	8299340	N/A	N/A	N/A
Dissolved Sodium (Na)	mg/L	430	0.50	2200	5.0	8301117	N/A	N/A	N/A
Dissolved Strontium (Sr)	mg/L	0.12	0.020	2.2	0.20	8301117	N/A	N/A	N/A
Dissolved Sulphur (S)	mg/L	41	0.20	2.4	2.0	8301117	N/A	N/A	N/A
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	<0.00020	0.00020	8299340	N/A	N/A	N/A
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8299340	N/A	N/A	N/A
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	<0.0010	0.0010	8299340	N/A	N/A	N/A
Dissolved Uranium (U)	mg/L	0.012	0.00010	0.0014	0.00010	8299340	N/A	N/A	N/A
Dissolved Vanadium (V)	mg/L	0.0013	0.0010	<0.0010	0.0010	8299340	N/A	N/A	N/A
Dissolved Zinc (Zn)	mg/L	0.013	0.0030	0.0065	0.0030	8299340	N/A	N/A	N/A

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9186			OU9187			OU9188		
Sampling Date		2016/06/09 11:55			2016/06/09 12:40			2016/06/09 12:50		
COC Number		493715-07-01			493715-07-01			493715-07-01		
	UNITS	16MW11C	RDL	QC Batch	16MW13	RDL	QC Batch	16MW14	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	130	N/A	8297060	20	N/A	8297060	17	N/A	8297060
Cation Sum	meq/L	130	N/A	8297060	19	N/A	8297060	17	N/A	8297060
Hardness (CaCO3)	mg/L	900	0.50	8297058	16	0.50	8297058	24	0.50	8297058
Ion Balance	N/A	0.99	0.010	8297059	0.98	0.010	8297059	1.0	0.010	8297059
Dissolved Nitrate (NO3)	mg/L	3.0	0.044	8297062	0.050	0.044	8297062	0.063	0.044	8297062
Nitrate plus Nitrite (N)	mg/L	0.71	0.020	8297063	<0.020	0.020	8297063	<0.020	0.020	8297063
Dissolved Nitrite (NO2)	mg/L	0.10	0.033	8297062	<0.033	0.033	8297062	<0.033	0.033	8297062
Calculated Total Dissolved Solids	mg/L	8900	10	8297064	1000	10	8297064	980	10	8297064
Misc. Inorganics										
Conductivity	uS/cm	10000	1.0	8300236	1700	1.0	8300242	N/A	1.0	8300242
pH	pH	8.03	N/A	8300232	8.66	N/A	8300238	N/A	N/A	8300238
Low Level Elements										
Dissolved Cadmium (Cd)	ug/L	0.063	0.020	8297269	<0.020	0.020	8297269	0.087	0.020	8297269
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8300235	30	0.50	8300240	<5.0 (1)	5.0	8300268
Alkalinity (Total as CaCO3)	mg/L	740	0.50	8300235	950	0.50	8300240	660 (1)	5.0	8300268
Bicarbonate (HCO3)	mg/L	900	0.50	8300235	1100	0.50	8300240	800 (1)	5.0	8300268
Carbonate (CO3)	mg/L	<0.50	0.50	8300235	36	0.50	8300240	<5.0 (1)	5.0	8300268
Hydroxide (OH)	mg/L	<0.50	0.50	8300235	<0.50	0.50	8300240	<5.0 (1)	5.0	8300268
Dissolved Sulphate (SO4)	mg/L	5600 (2)	75	8300962	17	1.0	8300962	190	1.0	8300962
Dissolved Chloride (Cl)	mg/L	1.2	1.0	8300956	10	1.0	8300956	5.1	1.0	8300956
Nutrients										
Dissolved Nitrite (N)	mg/L	0.031	0.010	8300065	<0.010	0.010	8300065	<0.010	0.010	8300065
Dissolved Nitrate (N)	mg/L	0.68	0.010	8300065	0.011	0.010	8300065	0.014	0.010	8300065
Elements										
Dissolved Aluminum (Al)	mg/L	0.0044	0.0030	8299340	0.0098	0.0030	8299340	0.012	0.0030	8299340
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	8299340	0.00085	0.00060	8299340	0.0011	0.00060	8299340
Dissolved Arsenic (As)	mg/L	0.0010	0.00020	8299340	0.0037	0.00020	8299340	0.0041	0.00020	8299340
Dissolved Barium (Ba)	mg/L	<0.10	0.10	8301117	0.036	0.010	8301117	0.027	0.010	8301117
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8299340	<0.0010	0.0010	8299340	<0.0010	0.0010	8299340

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

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9186			OU9187			OU9188		
Sampling Date		2016/06/09 11:55			2016/06/09 12:40			2016/06/09 12:50		
COC Number		493715-07-01			493715-07-01			493715-07-01		
	UNITS	16MW11C	RDL	QC Batch	16MW13	RDL	QC Batch	16MW14	RDL	QC Batch
Dissolved Boron (B)	mg/L	0.22	0.20	8301117	0.74	0.020	8301117	0.24	0.020	8301117
Dissolved Calcium (Ca)	mg/L	170	3.0	8301117	5.3	0.30	8301117	7.4	0.30	8301117
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	8299340	<0.0010	0.0010	8299340	<0.0010	0.0010	8299340
Dissolved Cobalt (Co)	mg/L	0.00070	0.00030	8299340	0.00070	0.00030	8299340	0.00076	0.00030	8299340
Dissolved Copper (Cu)	mg/L	0.0021	0.00020	8299340	0.0018	0.00020	8299340	0.0021	0.00020	8299340
Dissolved Iron (Fe)	mg/L	<0.60	0.60	8301117	<0.060	0.060	8301117	<0.060	0.060	8301117
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	8299340	<0.00020	0.00020	8299340	<0.00020	0.00020	8299340
Dissolved Lithium (Li)	mg/L	0.43	0.20	8301117	0.075	0.020	8301117	0.087	0.020	8301117
Dissolved Magnesium (Mg)	mg/L	110	2.0	8301117	0.58	0.20	8301117	1.3	0.20	8301117
Dissolved Manganese (Mn)	mg/L	0.22	0.040	8301117	0.019	0.0040	8301117	0.045	0.0040	8301117
Dissolved Molybdenum (Mo)	mg/L	0.0017	0.00020	8299340	0.018	0.00020	8299340	0.014	0.00020	8299340
Dissolved Nickel (Ni)	mg/L	0.0053	0.00050	8299340	0.0037	0.00050	8299340	0.0040	0.00050	8299340
Dissolved Phosphorus (P)	mg/L	<1.0	1.0	8301117	0.15	0.10	8301117	<0.10	0.10	8301117
Dissolved Potassium (K)	mg/L	14	3.0	8301117	1.8	0.30	8301117	1.7	0.30	8301117
Dissolved Selenium (Se)	mg/L	0.0038	0.00020	8299340	0.0019	0.00020	8299340	0.00068	0.00020	8299340
Dissolved Silicon (Si)	mg/L	6.4	1.0	8301117	2.6	0.10	8301117	3.1	0.10	8301117
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8299340	<0.00010	0.00010	8299340	<0.00010	0.00010	8299340
Dissolved Sodium (Na)	mg/L	2600	5.0	8301117	430	0.50	8301117	390	0.50	8301117
Dissolved Strontium (Sr)	mg/L	3.0	0.20	8301117	0.061	0.020	8301117	0.067	0.020	8301117
Dissolved Sulphur (S)	mg/L	1900	2.0	8301117	4.7	0.20	8301117	67	0.20	8301117
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8299340	<0.00020	0.00020	8299340	<0.00020	0.00020	8299340
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8299340	<0.0010	0.0010	8299340	<0.0010	0.0010	8299340
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	8299340	<0.0010	0.0010	8299340	<0.0010	0.0010	8299340
Dissolved Uranium (U)	mg/L	0.015	0.00010	8299340	0.0030	0.00010	8299340	0.0050	0.00010	8299340
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	8299340	0.0016	0.0010	8299340	0.0011	0.0010	8299340
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	8299340	<0.0030	0.0030	8299340	0.0054	0.0030	8299340
RDL = Reportable Detection Limit										

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9189			OU9190	OU9191		
Sampling Date		2016/06/09 13:20			2016/06/09 13:35	2016/06/09 11:00		
COC Number		493715-07-01			493715-07-01	493715-07-01		
	UNITS	16MW16	RDL	QC Batch	16MW18	16MW04	RDL	QC Batch
Calculated Parameters								
Anion Sum	meq/L	46	N/A	8297060	19	22	N/A	8297060
Cation Sum	meq/L	46	N/A	8297060	19	20	N/A	8297060
Hardness (CaCO3)	mg/L	610	0.50	8297058	14	18	0.50	8297058
Ion Balance	N/A	0.99	0.010	8297059	0.98	0.93	0.010	8297059
Dissolved Nitrate (NO3)	mg/L	0.27	0.044	8297062	<0.044	0.16	0.044	8297062
Nitrate plus Nitrite (N)	mg/L	0.060	0.020	8297063	<0.020	0.036	0.020	8297063
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	8297062	<0.033	<0.033	0.033	8297062
Calculated Total Dissolved Solids	mg/L	3100	10	8297064	1000	1200	10	8297064
Misc. Inorganics								
Conductivity	uS/cm	3900	1.0	8300211	1700	1900	1.0	8300236
pH	pH	8.02	N/A	8300206	8.61	8.59	N/A	8300232
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	0.028	0.020	8297269	<0.020	<0.020	0.020	8297269
Anions								
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8300210	24	25	0.50	8300235
Alkalinity (Total as CaCO3)	mg/L	380	0.50	8300210	890	940	0.50	8300235
Bicarbonate (HCO3)	mg/L	460	0.50	8300210	1000	1100	0.50	8300235
Carbonate (CO3)	mg/L	<0.50	0.50	8300210	29	30	0.50	8300235
Hydroxide (OH)	mg/L	<0.50	0.50	8300210	<0.50	<0.50	0.50	8300235
Dissolved Sulphate (SO4)	mg/L	1900 (1)	10	8300962	26	130	1.0	8300962
Dissolved Chloride (Cl)	mg/L	3.1	1.0	8300956	28	8.1	1.0	8300956
Nutrients								
Dissolved Nitrite (N)	mg/L	<0.010	0.010	8300065	<0.010	<0.010	0.010	8300065
Dissolved Nitrate (N)	mg/L	0.060	0.010	8300065	<0.010	0.036	0.010	8300065
Elements								
Dissolved Aluminum (Al)	mg/L	0.082	0.0030	8299340	0.0071	0.0072	0.0030	8299340
Dissolved Antimony (Sb)	mg/L	0.0010	0.00060	8299340	0.0010	<0.00060	0.00060	8299340
Dissolved Arsenic (As)	mg/L	0.0019	0.00020	8299340	0.0037	0.0016	0.00020	8299340
Dissolved Barium (Ba)	mg/L	0.12	0.010	8301117	0.043	0.014	0.010	8301117
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8299340	<0.0010	<0.0010	0.0010	8299340
Dissolved Boron (B)	mg/L	0.28	0.020	8301117	0.79	0.79	0.020	8301117

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

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9189			OU9190	OU9191		
Sampling Date		2016/06/09 13:20			2016/06/09 13:35	2016/06/09 11:00		
COC Number		493715-07-01			493715-07-01	493715-07-01		
	UNITS	16MW16	RDL	QC Batch	16MW18	16MW04	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	150	0.30	8301117	4.8	5.9	0.30	8301117
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	8299340	<0.0010	<0.0010	0.0010	8299340
Dissolved Cobalt (Co)	mg/L	0.0017	0.00030	8299340	0.00083	<0.00030	0.00030	8299340
Dissolved Copper (Cu)	mg/L	0.00080	0.00020	8299340	0.00051	0.00079	0.00020	8299340
Dissolved Iron (Fe)	mg/L	0.11	0.060	8301117	<0.060	<0.060	0.060	8301117
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	8299340	<0.00020	<0.00020	0.00020	8299340
Dissolved Lithium (Li)	mg/L	0.25	0.020	8301117	0.070	0.094	0.020	8301117
Dissolved Magnesium (Mg)	mg/L	57	0.20	8301117	0.49	0.82	0.20	8301117
Dissolved Manganese (Mn)	mg/L	0.28	0.0040	8301117	0.026	0.017	0.0040	8301117
Dissolved Molybdenum (Mo)	mg/L	0.015	0.00020	8299340	0.039	0.0052	0.00020	8299340
Dissolved Nickel (Ni)	mg/L	0.0054	0.00050	8299340	0.0039	0.0013	0.00050	8299340
Dissolved Phosphorus (P)	mg/L	0.10	0.10	8301117	0.15	0.12	0.10	8301117
Dissolved Potassium (K)	mg/L	5.3	0.30	8301117	1.6	1.9	0.30	8301117
Dissolved Selenium (Se)	mg/L	0.0015	0.00020	8299340	0.00085	0.00059	0.00020	8299340
Dissolved Silicon (Si)	mg/L	4.4	0.10	8301117	2.5	3.8	0.10	8301117
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8299340	<0.00010	<0.00010	0.00010	8299340
Dissolved Sodium (Na)	mg/L	770 (1)	5.0	8301117	420	460	0.50	8301117
Dissolved Strontium (Sr)	mg/L	1.5	0.020	8301117	0.062	0.047	0.020	8301117
Dissolved Sulphur (S)	mg/L	640 (1)	2.0	8301117	8.4	37	0.20	8301117
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8299340	<0.00020	<0.00020	0.00020	8299340
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8299340	<0.0010	<0.0010	0.0010	8299340
Dissolved Titanium (Ti)	mg/L	0.0024	0.0010	8299340	<0.0010	<0.0010	0.0010	8299340
Dissolved Uranium (U)	mg/L	0.017	0.00010	8299340	0.0053	0.0024	0.00010	8299340
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	8299340	0.0012	<0.0010	0.0010	8299340
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	8299340	<0.0030	<0.0030	0.0030	8299340

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

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9228			OU9229		OU9231		
Sampling Date		2016/06/09 13:10			2016/06/09 09:55		2016/06/09		
COC Number		493715-08-01			493715-08-01		493715-08-01		
	UNITS	16MW08A	RDL	QC Batch	16MW09A	QC Batch	16DUP1	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	45	N/A	8297060	68	8297060	68	N/A	8297272
Cation Sum	meq/L	51	N/A	8297060	72	8297060	69	N/A	8297272
Hardness (CaCO3)	mg/L	110	0.50	8297058	140	8297270	140	0.50	8297270
Ion Balance	N/A	1.1	0.010	8297059	1.1	8297271	1.0	0.010	8297271
Dissolved Nitrate (NO3)	mg/L	3.0	0.044	8297062	<0.044	8297273	<0.044	0.044	8297273
Nitrate plus Nitrite (N)	mg/L	0.72	0.020	8297063	<0.020	8297274	<0.020	0.020	8297274
Dissolved Nitrite (NO2)	mg/L	0.18	0.033	8297062	<0.033	8297273	<0.033	0.033	8297273
Calculated Total Dissolved Solids	mg/L	3100	10	8297064	4000	8297064	4000	10	8297276
Misc. Inorganics									
Conductivity	uS/cm	4000	1.0	8300211	7300	8300211	7200	1.0	8300211
pH	pH	8.28	N/A	8300206	8.31	8300206	8.34	N/A	8300206
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	8297269	0.020	8297269	<0.020	0.020	8297269
Anions									
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8300210	<0.50	8300210	0.91	0.50	8300210
Alkalinity (Total as CaCO3)	mg/L	780	0.50	8300210	210	8300210	200	0.50	8300210
Bicarbonate (HCO3)	mg/L	950	0.50	8300210	250	8300210	240	0.50	8300210
Carbonate (CO3)	mg/L	<0.50	0.50	8300210	<0.50	8300210	1.1	0.50	8300210
Hydroxide (OH)	mg/L	<0.50	0.50	8300210	<0.50	8300210	<0.50	0.50	8300210
Dissolved Sulphate (SO4)	mg/L	1400 (1)	10	8300962	18	8300962	21	1.0	8300962
Dissolved Chloride (Cl)	mg/L	3.3	1.0	8300956	2300 (1)	8300956	2300 (1)	25	8300956
Nutrients									
Dissolved Nitrite (N)	mg/L	0.055	0.010	8300065	<0.010	8300065	<0.010	0.010	8300086
Dissolved Nitrate (N)	mg/L	0.67	0.010	8300065	<0.010	8300065	<0.010	0.010	8300086
Elements									
Dissolved Aluminum (Al)	mg/L	0.0037	0.0030	8299340	0.0052	8299340	0.012	0.0030	8299340
Dissolved Antimony (Sb)	mg/L	0.0013	0.00060	8299340	0.00089	8299340	0.00094	0.00060	8299340
Dissolved Arsenic (As)	mg/L	0.0026	0.00020	8299340	0.0066	8299340	0.0066	0.00020	8299340
Dissolved Barium (Ba)	mg/L	<0.10	0.10	8301117	0.59	8301117	0.56	0.10	8301117
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8299340	<0.0010	8299340	<0.0010	0.0010	8299340
Dissolved Boron (B)	mg/L	0.44	0.20	8301117	0.71	8301117	0.67	0.20	8301117

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

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9228			OU9229		OU9231		
Sampling Date		2016/06/09 13:10			2016/06/09 09:55		2016/06/09		
COC Number		493715-08-01			493715-08-01		493715-08-01		
	UNITS	16MW08A	RDL	QC Batch	16MW09A	QC Batch	16DUP1	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	32	3.0	8301117	46	8301117	48	3.0	8301117
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	8299340	<0.0010	8299340	<0.0010	0.0010	8299340
Dissolved Cobalt (Co)	mg/L	0.00034	0.00030	8299340	0.00037	8299340	0.00039	0.00030	8299340
Dissolved Copper (Cu)	mg/L	0.0015	0.00020	8299340	<0.00020	8299340	0.00028	0.00020	8299340
Dissolved Iron (Fe)	mg/L	<0.60	0.60	8301117	<0.60	8301117	<0.60	0.60	8301117
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	8299340	<0.00020	8299340	<0.00020	0.00020	8299340
Dissolved Lithium (Li)	mg/L	0.28	0.20	8301117	0.29	8301117	0.28	0.20	8301117
Dissolved Magnesium (Mg)	mg/L	6.2	2.0	8301117	5.4	8301117	5.1	2.0	8301117
Dissolved Manganese (Mn)	mg/L	0.044	0.040	8301117	<0.040	8301117	<0.040	0.040	8301117
Dissolved Molybdenum (Mo)	mg/L	0.014	0.00020	8299340	0.081	8299340	0.080	0.00020	8299340
Dissolved Nickel (Ni)	mg/L	0.0020	0.00050	8299340	0.0019	8299340	0.0018	0.00050	8299340
Dissolved Phosphorus (P)	mg/L	<1.0	1.0	8301117	<1.0	8301117	<1.0	1.0	8301117
Dissolved Potassium (K)	mg/L	5.0	3.0	8301117	6.8	8301117	6.2	3.0	8301117
Dissolved Selenium (Se)	mg/L	0.0035	0.00020	8299340	0.00025	8299340	0.00028	0.00020	8299340
Dissolved Silicon (Si)	mg/L	3.3	1.0	8301117	3.5	8301117	3.3	1.0	8301117
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8299340	<0.00010	8299340	<0.00010	0.00010	8299340
Dissolved Sodium (Na)	mg/L	1100	5.0	8301117	1600	8301117	1500	5.0	8301117
Dissolved Strontium (Sr)	mg/L	0.62	0.20	8301117	1.0	8301117	0.93	0.20	8301117
Dissolved Sulphur (S)	mg/L	510	2.0	8301117	6.4	8301117	6.0	2.0	8301117
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8299340	<0.00020	8299340	<0.00020	0.00020	8299340
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8299340	<0.0010	8299340	<0.0010	0.0010	8299340
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	8299340	<0.0010	8299340	<0.0010	0.0010	8299340
Dissolved Uranium (U)	mg/L	0.0079	0.00010	8299340	0.0027	8299340	0.0026	0.00010	8299340
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	8299340	<0.0010	8299340	<0.0010	0.0010	8299340
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	8299340	<0.0030	8299340	<0.0030	0.0030	8299340
RDL = Reportable Detection Limit									

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9183			OU9230		
Sampling Date		2016/06/09 10:35			2016/06/09 10:45		
COC Number		493715-07-01			493715-08-01		
	UNITS	16MW09C	RDL	QC Batch	16MW09D	RDL	QC Batch
Calculated Parameters							
Anion Sum	meq/L	83	N/A	8297060	51	N/A	8297272
Cation Sum	meq/L	91	N/A	8297060	53	N/A	8297272
Hardness (CaCO3)	mg/L	280	0.50	8297058	300	0.50	8297270
Ion Balance	N/A	1.1	0.010	8297059	1.0	0.010	8297271
Dissolved Nitrate (NO3)	mg/L	0.73	0.044	8297062	6.5	0.044	8297273
Nitrate plus Nitrite (N)	mg/L	0.19	0.020	8297063	1.5	0.020	8297274
Dissolved Nitrite (NO2)	mg/L	0.089	0.033	8297062	<0.033	0.033	8297273
Calculated Total Dissolved Solids	mg/L	5900	10	8297064	3600	10	8297276
Misc. Inorganics							
Conductivity	uS/cm	7400	1.0	8300236	4600	1.0	8300242
pH	pH	8.18	N/A	8300232	8.06	N/A	8300238
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	0.090	0.020	8297056	0.046	0.020	8297269
Anions							
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	8300235	<0.50	0.50	8300240
Alkalinity (Total as CaCO3)	mg/L	440	0.50	8300235	210	0.50	8300240
Bicarbonate (HCO3)	mg/L	540	0.50	8300235	260	0.50	8300240
Carbonate (CO3)	mg/L	<0.50	0.50	8300235	<0.50	0.50	8300240
Hydroxide (OH)	mg/L	<0.50	0.50	8300235	<0.50	0.50	8300240
Dissolved Sulphate (SO4)	mg/L	3600 (1)	50	8301616	2200 (1)	20	8300962
Dissolved Chloride (Cl)	mg/L	11	1.0	8301614	9.6	1.0	8300956
Nutrients							
Dissolved Nitrite (N)	mg/L	0.027	0.010	8300065	<0.010	0.010	8300086
Dissolved Nitrate (N)	mg/L	0.16	0.010	8300065	1.5	0.010	8300086
Lab Filtered Elements							
Dissolved Aluminum (Al)	mg/L	0.013	0.0030	8301461	0.21	0.0030	8301461
Dissolved Antimony (Sb)	mg/L	0.0017	0.00060	8301461	<0.00060	0.00060	8301461
Dissolved Arsenic (As)	mg/L	0.0036	0.00020	8301461	0.0016	0.00020	8301461
Dissolved Barium (Ba)	mg/L	<0.10	0.10	8302948	<0.10	0.10	8302038
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8301461	<0.0010	0.0010	8301461
Dissolved Boron (B)	mg/L	0.64	0.20	8302948	<0.20	0.20	8302038

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

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		OU9183			OU9230		
Sampling Date		2016/06/09 10:35			2016/06/09 10:45		
COC Number		493715-07-01			493715-08-01		
	UNITS	16MW09C	RDL	QC Batch	16MW09D	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	88	3.0	8302948	80	3.0	8302038
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	8301461	<0.0010	0.0010	8301461
Dissolved Cobalt (Co)	mg/L	0.00067	0.00030	8301461	0.00058	0.00030	8301461
Dissolved Copper (Cu)	mg/L	0.0030	0.00020	8301461	0.0048	0.00020	8301461
Dissolved Iron (Fe)	mg/L	<0.60	0.60	8302948	<0.60	0.60	8302038
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	8301461	0.00077	0.00020	8301461
Dissolved Lithium (Li)	mg/L	0.50	0.20	8302948	0.29	0.20	8302038
Dissolved Magnesium (Mg)	mg/L	16	2.0	8302948	25	2.0	8302038
Dissolved Manganese (Mn)	mg/L	0.070	0.040	8302948	0.051	0.040	8302038
Dissolved Molybdenum (Mo)	mg/L	0.058	0.00020	8301461	0.0038	0.00020	8301461
Dissolved Nickel (Ni)	mg/L	0.0077	0.00050	8301461	0.0049	0.00050	8301461
Dissolved Phosphorus (P)	mg/L	<1.0	1.0	8302948	<1.0	1.0	8302038
Dissolved Potassium (K)	mg/L	9.5	3.0	8302948	6.5	3.0	8302038
Dissolved Selenium (Se)	mg/L	0.011	0.00020	8301461	0.0070	0.00020	8301461
Dissolved Silicon (Si)	mg/L	2.4	1.0	8302948	4.7	1.0	8302038
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8301461	<0.00010	0.00010	8301461
Dissolved Sodium (Na)	mg/L	2000	5.0	8302948	1100	5.0	8302038
Dissolved Strontium (Sr)	mg/L	2.1	0.20	8302948	1.3	0.20	8302038
Dissolved Sulphur (S)	mg/L	1200	2.0	8302948	760	2.0	8302038
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8301461	<0.00020	0.00020	8301461
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8301461	<0.0010	0.0010	8301461
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	8301461	0.017	0.0010	8301461
Dissolved Uranium (U)	mg/L	0.018	0.00010	8301461	0.012	0.00010	8301461
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	8301461	<0.0010	0.0010	8301461
Dissolved Zinc (Zn)	mg/L	0.0034	0.0030	8301461	<0.0030	0.0030	8301461
RDL = Reportable Detection Limit							

Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		OU9185		
Sampling Date		2016/06/09 11:35		
COC Number		493715-07-01		
	UNITS	16MW11B	RDL	QC Batch
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	0.044	0.020	8298789
Lab Filtered Elements				
Dissolved Aluminum (Al)	mg/L	0.66	0.0030	8301461
Dissolved Antimony (Sb)	mg/L	0.0014	0.00060	8301461
Dissolved Arsenic (As)	mg/L	0.0060	0.00020	8301461
Dissolved Barium (Ba)	mg/L	0.093	0.010	8302038
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	8301461
Dissolved Boron (B)	mg/L	0.56	0.020	8302038
Dissolved Calcium (Ca)	mg/L	6.5	0.30	8302038
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	8301461
Dissolved Cobalt (Co)	mg/L	0.0012	0.00030	8301461
Dissolved Copper (Cu)	mg/L	0.0062	0.00020	8301461
Dissolved Iron (Fe)	mg/L	0.99	0.060	8302038
Dissolved Lead (Pb)	mg/L	0.0015	0.00020	8301461
Dissolved Lithium (Li)	mg/L	0.060	0.020	8302038
Dissolved Magnesium (Mg)	mg/L	1.2	0.20	8302038
Dissolved Manganese (Mn)	mg/L	0.035	0.0040	8302038
Dissolved Molybdenum (Mo)	mg/L	0.024	0.00020	8301461
Dissolved Nickel (Ni)	mg/L	0.0079	0.00050	8301461
Dissolved Phosphorus (P)	mg/L	0.80	0.10	8302038
Dissolved Potassium (K)	mg/L	5.5	0.30	8302038
Dissolved Selenium (Se)	mg/L	0.00058	0.00020	8301461
Dissolved Silicon (Si)	mg/L	3.8	0.10	8302038
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	8301461
Dissolved Sodium (Na)	mg/L	360	0.50	8302038
Dissolved Strontium (Sr)	mg/L	0.13	0.020	8302038
Dissolved Sulphur (S)	mg/L	25	0.20	8302038
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	8301461
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	8301461
Dissolved Titanium (Ti)	mg/L	0.024	0.0010	8301461
Dissolved Uranium (U)	mg/L	0.0036	0.00010	8301461
Dissolved Vanadium (V)	mg/L	0.0052	0.0010	8301461
RDL = Reportable Detection Limit				

Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		OU9185		
Sampling Date		2016/06/09 11:35		
COC Number		493715-07-01		
	UNITS	**16MW11B**	**RDL**	**QC Batch**
Dissolved Zinc (Zn)	mg/L	0.0065	0.0030	8301461
RDL = Reportable Detection Limit				

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Maxxam Job #: B646660
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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OU9182			OU9183		OU9184		
Sampling Date		2016/06/09 10:15			2016/06/09 10:35		2016/06/09 11:20		
COC Number		493715-07-01			493715-07-01		493715-07-01		
	UNITS	16MW09B	RDL	QC Batch	16MW09C	QC Batch	16MW11A	RDL	QC Batch
Demand Parameters									
Total Chemical Oxygen Demand	mg/L	510	5.0	8299809	84	8301861	170	5.0	8299809
Misc. Inorganics									
Dissolved Organic Carbon (C)	mg/L	21 (1)	1.0	8302285	N/A	N/A	8.7 (2)	1.0	8302285
Lab Filtered Inorganics									
Dissolved Organic Carbon (C)	mg/L	N/A	0.50	N/A	8.6	8302974	N/A	0.50	N/A
Nutrients									
Total Ammonia (N)	mg/L	1.4	0.050	8298694	2.4 (1)	8300054	3.1 (1)	0.25	8298694
Total Total Kjeldahl Nitrogen	mg/L	<5.0 (3)	5.0	8300582	5.5 (1)	8300582	4.1 (1)	0.25	8300582

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

Maxxam ID		OU9185		OU9186	OU9187		OU9188		
Sampling Date		2016/06/09 11:35		2016/06/09 11:55	2016/06/09 12:40		2016/06/09 12:50		
COC Number		493715-07-01		493715-07-01	493715-07-01		493715-07-01		
	UNITS	16MW11B	RDL	16MW11C	16MW13	RDL	16MW14	RDL	QC Batch
Demand Parameters									
Total Chemical Oxygen Demand	mg/L	340	5.0	35	100	5.0	230	5.0	8299809
Misc. Inorganics									
Conductivity	uS/cm	1700	1.0	N/A	N/A	1.0	1500	1.0	8301701
Dissolved Organic Carbon (C)	mg/L	24 (1)	1.0	13	12	0.50	5.7	0.50	8302285
pH	pH	8.82	N/A	N/A	N/A	N/A	8.69	N/A	8301699
Nutrients									
Total Ammonia (N)	mg/L	0.96	0.050	0.054	0.64	0.050	0.81	0.050	8298694
Total Total Kjeldahl Nitrogen	mg/L	<5.0 (2)	5.0	0.79	1.4	0.050	<2.5 (2)	2.5	8300589

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

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OU9189		OU9190	OU9191		OU9228		
Sampling Date		2016/06/09 13:20		2016/06/09 13:35	2016/06/09 11:00		2016/06/09 13:10		
COC Number		493715-07-01		493715-07-01	493715-07-01		493715-08-01		
	UNITS	16MW16	RDL	16MW18	16MW04	QC Batch	16MW08A	RDL	QC Batch
Demand Parameters									
Total Chemical Oxygen Demand	mg/L	310	5.0	71	42	8299809	13	5.0	8301861
Misc. Inorganics									
Dissolved Organic Carbon (C)	mg/L	9.6	0.50	15	9.6	8302285	4.9	0.50	8302285
Nutrients									
Total Ammonia (N)	mg/L	1.2	0.050	0.66	0.64	8298694	<0.050	0.050	8300330
Total Total Kjeldahl Nitrogen	mg/L	1.0 (1)	0.25	1.7	1.4	8300589	1.5	0.050	8300589

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

Maxxam ID		OU9229			OU9230		OU9231		
Sampling Date		2016/06/09 09:55			2016/06/09 10:45		2016/06/09		
COC Number		493715-08-01			493715-08-01		493715-08-01		
	UNITS	16MW09A	RDL	QC Batch	16MW09D	RDL	16DUP1	RDL	QC Batch
Demand Parameters									
Total Chemical Oxygen Demand	mg/L	1700 (1)	50	8301861	100	5.0	680	5.0	8299809
Misc. Inorganics									
Dissolved Organic Carbon (C)	mg/L	17	0.50	8302285	N/A	1.0	13 (2)	1.0	8302285
Lab Filtered Inorganics									
Dissolved Organic Carbon (C)	mg/L	N/A	N/A	N/A	8.5	0.50	N/A	0.50	8302974
Nutrients									
Total Ammonia (N)	mg/L	0.89	0.050	8300330	0.095	0.050	3.6 (3)	0.25	8298694
Total Total Kjeldahl Nitrogen	mg/L	8.2 (1)	5.0	8300589	1.3	0.050	14 (1)	5.0	8300589

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

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OU9182		OU9183	OU9184		OU9185		
Sampling Date		2016/06/09 10:15		2016/06/09 10:35	2016/06/09 11:20		2016/06/09 11:35		
COC Number		493715-07-01		493715-07-01	493715-07-01		493715-07-01		
	UNITS	16MW09B	RDL	16MW09C	16MW11A	RDL	16MW11B	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	N/A	N/A	N/A	<0.0020	0.0020	<0.020 (1)	0.020	8299594
Lab Filtered Elements-Low									
Dissolved Mercury (Hg)	ug/L	<0.020 (2)	0.020	0.0020	N/A	0.0020	N/A	N/A	8299561

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Client supplied DHG bottle contained particulate.

Detection limits raised due to sample matrix.
(2) Detection limits raised due to sample matrix.

Maxxam ID		OU9186	OU9187	OU9188	OU9189	OU9190	OU9191		
Sampling Date		2016/06/09 11:55	2016/06/09 12:40	2016/06/09 12:50	2016/06/09 13:20	2016/06/09 13:35	2016/06/09 11:00		
COC Number		493715-07-01	493715-07-01	493715-07-01	493715-07-01	493715-07-01	493715-07-01		
	UNITS	16MW11C	16MW13	16MW14	16MW16	16MW18	16MW04	RDL	QC Batch
Low Level Elements									
Dissolved Mercury (Hg)	ug/L	<0.0020	0.0028	<0.0020	<0.0020	0.0033	0.0020	0.0020	8299594

RDL = Reportable Detection Limit

Maxxam ID		OU9228	OU9229	OU9230	OU9231		
Sampling Date		2016/06/09 13:10	2016/06/09 09:55	2016/06/09 10:45	2016/06/09		
COC Number		493715-08-01	493715-08-01	493715-08-01	493715-08-01		
	UNITS	16MW08A	16MW09A	16MW09D	16DUP1	RDL	QC Batch
Low Level Elements							
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	N/A	<0.0020	0.0020	8299594
Lab Filtered Elements-Low							
Dissolved Mercury (Hg)	ug/L	N/A	N/A	0.020	N/A	0.0020	8299561

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B646660
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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

GENERAL COMMENTS

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

Package 1	11.0°C
Package 2	12.3°C
Package 3	11.7°C

Sample OU9183-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU9184-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU9186-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU9228-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU9229-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU9230-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Sample OU9231-01 : Detection limits raised due to sample matrix. Parameters affected are dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Results relate only to the items tested.

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Maxxam Job #: B646660
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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8298694	AF6	Matrix Spike	Total Ammonia (N)	2016/06/14		89	%	80 - 120
8298694	AF6	Spiked Blank	Total Ammonia (N)	2016/06/14		100	%	80 - 120
8298694	AF6	Method Blank	Total Ammonia (N)	2016/06/14	<0.050		mg/L	
8298694	AF6	RPD	Total Ammonia (N)	2016/06/14	NC		%	20
8299340	APY	Matrix Spike	Dissolved Aluminum (Al)	2016/06/14		96	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/14		100	%	80 - 120
			Dissolved Arsenic (As)	2016/06/14		98	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/14		99	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/14		94	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/14		93	%	80 - 120
			Dissolved Copper (Cu)	2016/06/14		92	%	80 - 120
			Dissolved Lead (Pb)	2016/06/14		92	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/14		103	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/14		91	%	80 - 120
			Dissolved Selenium (Se)	2016/06/14		100	%	80 - 120
			Dissolved Silver (Ag)	2016/06/14		97	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/14		91	%	80 - 120
			Dissolved Tin (Sn)	2016/06/14		102	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/14		94	%	80 - 120
			Dissolved Uranium (U)	2016/06/14		93	%	80 - 120
			Dissolved Vanadium (V)	2016/06/14		98	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/14		93	%	80 - 120
8299340	APY	Spiked Blank	Dissolved Aluminum (Al)	2016/06/14		103	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/14		100	%	80 - 120
			Dissolved Arsenic (As)	2016/06/14		100	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/14		103	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/14		99	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/14		99	%	80 - 120
			Dissolved Copper (Cu)	2016/06/14		100	%	80 - 120
			Dissolved Lead (Pb)	2016/06/14		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/14		102	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/14		98	%	80 - 120
			Dissolved Selenium (Se)	2016/06/14		102	%	80 - 120
			Dissolved Silver (Ag)	2016/06/14		100	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/14		98	%	80 - 120
			Dissolved Tin (Sn)	2016/06/14		103	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/14		99	%	80 - 120
			Dissolved Uranium (U)	2016/06/14		98	%	80 - 120
			Dissolved Vanadium (V)	2016/06/14		100	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/14		100	%	80 - 120
8299340	APY	Method Blank	Dissolved Aluminum (Al)	2016/06/14	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2016/06/14	<0.00060		mg/L	
			Dissolved Arsenic (As)	2016/06/14	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2016/06/14	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2016/06/14	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2016/06/14	<0.00030		mg/L	
			Dissolved Copper (Cu)	2016/06/14	<0.00020		mg/L	
			Dissolved Lead (Pb)	2016/06/14	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2016/06/14	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2016/06/14	<0.00050		mg/L	
			Dissolved Selenium (Se)	2016/06/14	<0.00020		mg/L	
			Dissolved Silver (Ag)	2016/06/14	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2016/06/14	<0.00020		mg/L	

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2016/06/14	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2016/06/14	<0.0010		mg/L	
			Dissolved Uranium (U)	2016/06/14	<0.00010		mg/L	
			Dissolved Vanadium (V)	2016/06/14	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2016/06/14	<0.0030		mg/L	
8299340	APY	RPD	Dissolved Aluminum (Al)	2016/06/14	NC		%	20
			Dissolved Antimony (Sb)	2016/06/14	NC		%	20
			Dissolved Arsenic (As)	2016/06/14	NC		%	20
			Dissolved Beryllium (Be)	2016/06/14	NC		%	20
			Dissolved Chromium (Cr)	2016/06/14	NC		%	20
			Dissolved Cobalt (Co)	2016/06/14	NC		%	20
			Dissolved Copper (Cu)	2016/06/14	2.4		%	20
			Dissolved Lead (Pb)	2016/06/14	NC		%	20
			Dissolved Molybdenum (Mo)	2016/06/14	1.3		%	20
			Dissolved Nickel (Ni)	2016/06/14	NC		%	20
			Dissolved Selenium (Se)	2016/06/14	3.8		%	20
			Dissolved Silver (Ag)	2016/06/14	NC		%	20
			Dissolved Thallium (Tl)	2016/06/14	NC		%	20
			Dissolved Tin (Sn)	2016/06/14	NC		%	20
			Dissolved Titanium (Ti)	2016/06/14	NC		%	20
			Dissolved Uranium (U)	2016/06/14	1.2		%	20
			Dissolved Vanadium (V)	2016/06/14	NC		%	20
			Dissolved Zinc (Zn)	2016/06/14	NC		%	20
8299561	JLO	Matrix Spike	Dissolved Mercury (Hg)	2016/06/15		100	%	85 - 115
8299561	JLO	QC Standard	Dissolved Mercury (Hg)	2016/06/15		102	%	85 - 115
8299561	JLO	Spiked Blank	Dissolved Mercury (Hg)	2016/06/15		97	%	85 - 115
8299561	JLO	Method Blank	Dissolved Mercury (Hg)	2016/06/15	<0.0020		ug/L	
8299561	JLO	RPD	Dissolved Mercury (Hg)	2016/06/15	NC		%	20
8299594	JLO	Matrix Spike	Dissolved Mercury (Hg)	2016/06/15		103	%	85 - 115
8299594	JLO	QC Standard	Dissolved Mercury (Hg)	2016/06/15		104	%	85 - 115
8299594	JLO	Spiked Blank	Dissolved Mercury (Hg)	2016/06/15		100	%	85 - 115
8299594	JLO	Method Blank	Dissolved Mercury (Hg)	2016/06/15	<0.0020		ug/L	
8299594	JLO	RPD	Dissolved Mercury (Hg)	2016/06/15	NC		%	20
8299809	MRD	Matrix Spike	Total Chemical Oxygen Demand	2016/06/15		99	%	80 - 120
8299809	MRD	Spiked Blank	Total Chemical Oxygen Demand	2016/06/15		102	%	80 - 120
8299809	MRD	Method Blank	Total Chemical Oxygen Demand	2016/06/15	8.1, RDL=5.0		mg/L	
8299809	MRD	RPD	Total Chemical Oxygen Demand	2016/06/15	NC		%	20
8300054	MBB	Matrix Spike	Total Ammonia (N)	2016/06/15		89	%	80 - 120
8300054	MBB	Spiked Blank	Total Ammonia (N)	2016/06/15		96	%	80 - 120
8300054	MBB	Method Blank	Total Ammonia (N)	2016/06/15	<0.050		mg/L	
8300054	MBB	RPD	Total Ammonia (N)	2016/06/15	NC		%	20
8300065	LMD	Matrix Spike	Dissolved Nitrite (N)	2016/06/16		102	%	80 - 120
			Dissolved Nitrate (N)	2016/06/16		NC	%	80 - 120
8300065	LMD	Spiked Blank	Dissolved Nitrite (N)	2016/06/16		100	%	80 - 120
			Dissolved Nitrate (N)	2016/06/16		101	%	80 - 120
8300065	LMD	Method Blank	Dissolved Nitrite (N)	2016/06/16	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/06/16	<0.010		mg/L	
8300065	LMD	RPD	Dissolved Nitrite (N)	2016/06/16	NC		%	20
			Dissolved Nitrate (N)	2016/06/16	0.27		%	20
8300086	LMD	Matrix Spike	Dissolved Nitrite (N)	2016/06/15		95	%	80 - 120
			Dissolved Nitrate (N)	2016/06/15		96	%	80 - 120
8300086	LMD	Spiked Blank	Dissolved Nitrite (N)	2016/06/15		100	%	80 - 120

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Maxxam Job #: B646660
Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Nitrate (N)	2016/06/15		102	%	80 - 120
8300086	LMD	Method Blank	Dissolved Nitrite (N)	2016/06/15	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/06/15	<0.010		mg/L	
8300086	LMD	RPD	Dissolved Nitrite (N)	2016/06/15	NC		%	20
			Dissolved Nitrate (N)	2016/06/15	NC		%	20
8300167	AK8	Matrix Spike [OU9185-06]	O-TERPHENYL (sur.)	2016/06/16		102	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/16		104	%	50 - 130
8300167	AK8	Spiked Blank	O-TERPHENYL (sur.)	2016/06/16		107	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/16		112	%	70 - 130
8300167	AK8	Method Blank	O-TERPHENYL (sur.)	2016/06/16		99	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/06/16	<0.10		mg/L	
8300167	AK8	RPD [OU9184-06]	F2 (C10-C16 Hydrocarbons)	2016/06/16	NC		%	40
8300206	MA4	Spiked Blank	pH	2016/06/15		100	%	97 - 103
8300206	MA4	RPD	pH	2016/06/15	0.31		%	N/A
8300210	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/15		101	%	80 - 120
8300210	MA4	Method Blank	Alkalinity (PP as CaCO3)	2016/06/15	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/15	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/15	<0.50		mg/L	
			Carbonate (CO3)	2016/06/15	<0.50		mg/L	
			Hydroxide (OH)	2016/06/15	<0.50		mg/L	
8300210	MA4	RPD	Alkalinity (PP as CaCO3)	2016/06/15	NC		%	20
			Alkalinity (Total as CaCO3)	2016/06/15	0.82		%	20
			Bicarbonate (HCO3)	2016/06/15	0.82		%	20
			Carbonate (CO3)	2016/06/15	NC		%	20
			Hydroxide (OH)	2016/06/15	NC		%	20
8300211	MA4	Spiked Blank	Conductivity	2016/06/15		99	%	90 - 110
8300211	MA4	Method Blank	Conductivity	2016/06/15	<1.0		uS/cm	
8300211	MA4	RPD	Conductivity	2016/06/15	0.18		%	20
8300232	MA4	Spiked Blank	pH	2016/06/15		100	%	97 - 103
8300232	MA4	RPD	pH	2016/06/15	0.022		%	N/A
8300235	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/15		100	%	80 - 120
8300235	MA4	Method Blank	Alkalinity (PP as CaCO3)	2016/06/15	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/15	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/15	<0.50		mg/L	
			Carbonate (CO3)	2016/06/15	<0.50		mg/L	
			Hydroxide (OH)	2016/06/15	<0.50		mg/L	
8300235	MA4	RPD	Alkalinity (PP as CaCO3)	2016/06/15	NC		%	20
			Alkalinity (Total as CaCO3)	2016/06/15	0.29		%	20
			Bicarbonate (HCO3)	2016/06/15	0.29		%	20
			Carbonate (CO3)	2016/06/15	NC		%	20
			Hydroxide (OH)	2016/06/15	NC		%	20
8300236	MA4	Spiked Blank	Conductivity	2016/06/15		100	%	90 - 110
8300236	MA4	Method Blank	Conductivity	2016/06/15	1.5, RDL=1.0		uS/cm	
8300236	MA4	RPD	Conductivity	2016/06/15	0		%	20
8300238	MA4	Spiked Blank	pH	2016/06/15		100	%	97 - 103
8300238	MA4	RPD	pH	2016/06/15	0.054		%	N/A
8300240	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/15		101	%	80 - 120
8300240	MA4	Method Blank	Alkalinity (PP as CaCO3)	2016/06/15	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/15	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/15	<0.50		mg/L	
			Carbonate (CO3)	2016/06/15	<0.50		mg/L	

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Report Date: 2016/06/17

TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Hydroxide (OH)	2016/06/15	<0.50		mg/L	
8300240	MA4	RPD	Alkalinity (PP as CaCO3)	2016/06/15	NC		%	20
			Alkalinity (Total as CaCO3)	2016/06/15	2.1		%	20
			Bicarbonate (HCO3)	2016/06/15	2.1		%	20
			Carbonate (CO3)	2016/06/15	NC		%	20
			Hydroxide (OH)	2016/06/15	NC		%	20
8300242	MA4	Spiked Blank	Conductivity	2016/06/15		99	%	90 - 110
8300242	MA4	Method Blank	Conductivity	2016/06/15	<1.0		uS/cm	
8300242	MA4	RPD	Conductivity	2016/06/15	0.29		%	20
8300268	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2016/06/15		100	%	80 - 120
8300268	MA4	Method Blank	Alkalinity (PP as CaCO3)	2016/06/15	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/06/15	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/06/15	<0.50		mg/L	
			Carbonate (CO3)	2016/06/15	<0.50		mg/L	
			Hydroxide (OH)	2016/06/15	<0.50		mg/L	
8300268	MA4	RPD	Alkalinity (PP as CaCO3)	2016/06/15	NC		%	20
			Alkalinity (Total as CaCO3)	2016/06/15	1.8		%	20
			Bicarbonate (HCO3)	2016/06/15	1.8		%	20
			Carbonate (CO3)	2016/06/15	NC		%	20
			Hydroxide (OH)	2016/06/15	NC		%	20
8300278	SB8	Matrix Spike [OU9191-07]	1,4-Difluorobenzene (sur.)	2016/06/15		89	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/15		97	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/15		87	%	70 - 130
			Benzene	2016/06/15		93	%	70 - 130
			Toluene	2016/06/15		95	%	70 - 130
			Ethylbenzene	2016/06/15		107	%	70 - 130
			m & p-Xylene	2016/06/15		111	%	70 - 130
			o-Xylene	2016/06/15		110	%	70 - 130
			F1 (C6-C10)	2016/06/15		75	%	70 - 130
8300278	SB8	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/06/15		100	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/15		95	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/15		104	%	70 - 130
			Benzene	2016/06/15		104	%	70 - 130
			Toluene	2016/06/15		95	%	70 - 130
			Ethylbenzene	2016/06/15		103	%	70 - 130
			m & p-Xylene	2016/06/15		107	%	70 - 130
			o-Xylene	2016/06/15		107	%	70 - 130
			F1 (C6-C10)	2016/06/15		98	%	70 - 130
8300278	SB8	Method Blank	1,4-Difluorobenzene (sur.)	2016/06/15		94	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/06/15		97	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/06/15		84	%	70 - 130
			Benzene	2016/06/15	<0.00040		mg/L	
			Toluene	2016/06/15	<0.00040		mg/L	
			Ethylbenzene	2016/06/15	<0.00040		mg/L	
			m & p-Xylene	2016/06/15	<0.00080		mg/L	
			o-Xylene	2016/06/15	<0.00040		mg/L	
			Xylenes (Total)	2016/06/15	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2016/06/15	<0.10		mg/L	
			F1 (C6-C10)	2016/06/15	<0.10		mg/L	
8300278	SB8	RPD [OU9190-07]	Benzene	2016/06/15	NC		%	40
			Toluene	2016/06/15	NC		%	40
			Ethylbenzene	2016/06/15	NC		%	40

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			m & p-Xylene	2016/06/15	NC		%	40
			o-Xylene	2016/06/15	NC		%	40
			Xylenes (Total)	2016/06/15	NC		%	40
			F1 (C6-C10) - BTEX	2016/06/15	NC		%	40
			F1 (C6-C10)	2016/06/15	NC		%	40
8300330	MBB	Matrix Spike	Total Ammonia (N)	2016/06/15		87	%	80 - 120
8300330	MBB	Spiked Blank	Total Ammonia (N)	2016/06/15		95	%	80 - 120
8300330	MBB	Method Blank	Total Ammonia (N)	2016/06/15	<0.050		mg/L	
8300330	MBB	RPD	Total Ammonia (N)	2016/06/15	NC		%	20
8300582	AF6	Matrix Spike	Total Total Kjeldahl Nitrogen	2016/06/16		NC	%	80 - 120
8300582	AF6	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/16		115	%	80 - 120
8300582	AF6	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/16		108	%	80 - 120
8300582	AF6	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/16	<0.050		mg/L	
8300582	AF6	RPD	Total Total Kjeldahl Nitrogen	2016/06/16	1.3		%	20
8300589	AF6	Matrix Spike	Total Total Kjeldahl Nitrogen	2016/06/16		NC	%	80 - 120
8300589	AF6	QC Standard	Total Total Kjeldahl Nitrogen	2016/06/16		102	%	80 - 120
8300589	AF6	Spiked Blank	Total Total Kjeldahl Nitrogen	2016/06/16		102	%	80 - 120
8300589	AF6	Method Blank	Total Total Kjeldahl Nitrogen	2016/06/16	<0.050		mg/L	
8300589	AF6	RPD	Total Total Kjeldahl Nitrogen	2016/06/16	8.4		%	20
			Total Total Kjeldahl Nitrogen	2016/06/16	3.3		%	20
8300956	KD5	Matrix Spike [OU9182-01]	Dissolved Chloride (Cl)	2016/06/16		NC	%	80 - 120
8300956	KD5	Spiked Blank	Dissolved Chloride (Cl)	2016/06/16		104	%	80 - 120
8300956	KD5	Method Blank	Dissolved Chloride (Cl)	2016/06/16	<1.0		mg/L	
8300956	KD5	RPD [OU9182-01]	Dissolved Chloride (Cl)	2016/06/16	1.1		%	20
8300962	KD5	Matrix Spike [OU9182-01]	Dissolved Sulphate (SO4)	2016/06/16		NC	%	80 - 120
8300962	KD5	Spiked Blank	Dissolved Sulphate (SO4)	2016/06/16		102	%	80 - 120
8300962	KD5	Method Blank	Dissolved Sulphate (SO4)	2016/06/16	<1.0		mg/L	
8300962	KD5	RPD [OU9182-01]	Dissolved Sulphate (SO4)	2016/06/16	0.34		%	20
8301117	PM5	Matrix Spike	Dissolved Barium (Ba)	2016/06/16		101	%	80 - 120
			Dissolved Boron (B)	2016/06/16		104	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/16		NC	%	80 - 120
			Dissolved Iron (Fe)	2016/06/16		102	%	80 - 120
			Dissolved Lithium (Li)	2016/06/16		98	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/16		NC	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/16		100	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/16		103	%	80 - 120
			Dissolved Potassium (K)	2016/06/16		101	%	80 - 120
			Dissolved Silicon (Si)	2016/06/16		102	%	80 - 120
			Dissolved Sodium (Na)	2016/06/16		NC	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/16		95	%	80 - 120
8301117	PM5	Spiked Blank	Dissolved Barium (Ba)	2016/06/16		99	%	80 - 120
			Dissolved Boron (B)	2016/06/16		101	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/16		100	%	80 - 120
			Dissolved Iron (Fe)	2016/06/16		101	%	80 - 120
			Dissolved Lithium (Li)	2016/06/16		98	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/16		103	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/16		99	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/16		101	%	80 - 120
			Dissolved Potassium (K)	2016/06/16		100	%	80 - 120
			Dissolved Silicon (Si)	2016/06/16		100	%	80 - 120
			Dissolved Sodium (Na)	2016/06/16		100	%	80 - 120

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Strontium (Sr)	2016/06/16		99	%	80 - 120
			Dissolved Sulphur (S)	2016/06/16		101	%	80 - 120
8301117	PM5	Method Blank	Dissolved Barium (Ba)	2016/06/16	<0.010		mg/L	
			Dissolved Boron (B)	2016/06/16	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/06/16	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/06/16	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/06/16	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/06/16	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/06/16	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/06/16	<0.10		mg/L	
			Dissolved Potassium (K)	2016/06/16	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/06/16	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/06/16	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/06/16	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/06/16	<0.20		mg/L	
8301117	PM5	RPD	Dissolved Barium (Ba)	2016/06/16	0.29		%	20
			Dissolved Boron (B)	2016/06/16	NC		%	20
			Dissolved Calcium (Ca)	2016/06/16	0.024		%	20
			Dissolved Iron (Fe)	2016/06/16	NC		%	20
			Dissolved Lithium (Li)	2016/06/16	NC		%	20
			Dissolved Magnesium (Mg)	2016/06/16	0.16		%	20
			Dissolved Manganese (Mn)	2016/06/16	0.24		%	20
			Dissolved Phosphorus (P)	2016/06/16	NC		%	20
			Dissolved Potassium (K)	2016/06/16	0.65		%	20
			Dissolved Silicon (Si)	2016/06/16	0.23		%	20
			Dissolved Sodium (Na)	2016/06/16	2.0		%	20
			Dissolved Strontium (Sr)	2016/06/16	0.31		%	20
			Dissolved Sulphur (S)	2016/06/16	0.27		%	20
8301461	APY	Matrix Spike	Dissolved Aluminum (Al)	2016/06/16		89	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/16		95	%	80 - 120
			Dissolved Arsenic (As)	2016/06/16		97	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/16		96	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/16		94	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/16		94	%	80 - 120
			Dissolved Copper (Cu)	2016/06/16		95	%	80 - 120
			Dissolved Lead (Pb)	2016/06/16		93	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/16		99	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/16		95	%	80 - 120
			Dissolved Selenium (Se)	2016/06/16		97	%	80 - 120
			Dissolved Silver (Ag)	2016/06/16		96	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/16		94	%	80 - 120
			Dissolved Tin (Sn)	2016/06/16		97	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/16		90	%	80 - 120
			Dissolved Uranium (U)	2016/06/16		92	%	80 - 120
			Dissolved Vanadium (V)	2016/06/16		96	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/16		92	%	80 - 120
8301461	APY	Spiked Blank	Dissolved Aluminum (Al)	2016/06/16		94	%	80 - 120
			Dissolved Antimony (Sb)	2016/06/16		95	%	80 - 120
			Dissolved Arsenic (As)	2016/06/16		99	%	80 - 120
			Dissolved Beryllium (Be)	2016/06/16		101	%	80 - 120
			Dissolved Chromium (Cr)	2016/06/16		98	%	80 - 120
			Dissolved Cobalt (Co)	2016/06/16		100	%	80 - 120
			Dissolved Copper (Cu)	2016/06/16		100	%	80 - 120

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Lead (Pb)	2016/06/16		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/06/16		100	%	80 - 120
			Dissolved Nickel (Ni)	2016/06/16		99	%	80 - 120
			Dissolved Selenium (Se)	2016/06/16		98	%	80 - 120
			Dissolved Silver (Ag)	2016/06/16		98	%	80 - 120
			Dissolved Thallium (Tl)	2016/06/16		97	%	80 - 120
			Dissolved Tin (Sn)	2016/06/16		100	%	80 - 120
			Dissolved Titanium (Ti)	2016/06/16		97	%	80 - 120
			Dissolved Uranium (U)	2016/06/16		95	%	80 - 120
			Dissolved Vanadium (V)	2016/06/16		99	%	80 - 120
			Dissolved Zinc (Zn)	2016/06/16		99	%	80 - 120
8301461	APY	Method Blank	Dissolved Aluminum (Al)	2016/06/16	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2016/06/16	<0.00060		mg/L	
			Dissolved Arsenic (As)	2016/06/16	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2016/06/16	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2016/06/16	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2016/06/16	<0.00030		mg/L	
			Dissolved Copper (Cu)	2016/06/16	<0.00020		mg/L	
			Dissolved Lead (Pb)	2016/06/16	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2016/06/16	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2016/06/16	<0.00050		mg/L	
			Dissolved Selenium (Se)	2016/06/16	<0.00020		mg/L	
			Dissolved Silver (Ag)	2016/06/16	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2016/06/16	<0.00020		mg/L	
			Dissolved Tin (Sn)	2016/06/16	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2016/06/16	<0.0010		mg/L	
			Dissolved Uranium (U)	2016/06/16	<0.00010		mg/L	
			Dissolved Vanadium (V)	2016/06/16	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2016/06/16	<0.0030		mg/L	
8301461	APY	RPD	Dissolved Aluminum (Al)	2016/06/16	NC		%	20
			Dissolved Antimony (Sb)	2016/06/16	NC		%	20
			Dissolved Arsenic (As)	2016/06/16	NC		%	20
			Dissolved Beryllium (Be)	2016/06/16	NC		%	20
			Dissolved Chromium (Cr)	2016/06/16	NC		%	20
			Dissolved Cobalt (Co)	2016/06/16	NC		%	20
			Dissolved Copper (Cu)	2016/06/16	5.9		%	20
			Dissolved Lead (Pb)	2016/06/16	NC		%	20
			Dissolved Molybdenum (Mo)	2016/06/16	NC		%	20
			Dissolved Nickel (Ni)	2016/06/16	NC		%	20
			Dissolved Selenium (Se)	2016/06/16	NC		%	20
			Dissolved Silver (Ag)	2016/06/16	NC		%	20
			Dissolved Thallium (Tl)	2016/06/16	NC		%	20
			Dissolved Tin (Sn)	2016/06/16	NC		%	20
			Dissolved Titanium (Ti)	2016/06/16	NC		%	20
			Dissolved Uranium (U)	2016/06/16	NC		%	20
			Dissolved Vanadium (V)	2016/06/16	NC		%	20
			Dissolved Zinc (Zn)	2016/06/16	NC		%	20
8301614	KD5	Matrix Spike	Dissolved Chloride (Cl)	2016/06/17		108	%	80 - 120
8301614	KD5	Spiked Blank	Dissolved Chloride (Cl)	2016/06/17		103	%	80 - 120
8301614	KD5	Method Blank	Dissolved Chloride (Cl)	2016/06/17	<1.0		mg/L	
8301614	KD5	RPD	Dissolved Chloride (Cl)	2016/06/17	NC		%	20
8301616	KD5	Matrix Spike	Dissolved Sulphate (SO4)	2016/06/17		NC	%	80 - 120
8301616	KD5	Spiked Blank	Dissolved Sulphate (SO4)	2016/06/17		103	%	80 - 120

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8301616	KD5	Method Blank	Dissolved Sulphate (SO4)	2016/06/17	<1.0		mg/L	
8301616	KD5	RPD	Dissolved Sulphate (SO4)	2016/06/17	0.13		%	20
8301699	MA4	Spiked Blank	pH	2016/06/16		100	%	97 - 103
8301699	MA4	RPD [OU9185-01]	pH	2016/06/16	0		%	N/A
8301701	MA4	Spiked Blank	Conductivity	2016/06/17		100	%	90 - 110
8301701	MA4	Method Blank	Conductivity	2016/06/17	<1.0		uS/cm	
8301701	MA4	RPD [OU9185-01]	Conductivity	2016/06/17	0.058		%	20
8301861	KPG	Matrix Spike	Total Chemical Oxygen Demand	2016/06/16		101	%	80 - 120
8301861	KPG	Spiked Blank	Total Chemical Oxygen Demand	2016/06/16		103	%	80 - 120
8301861	KPG	Method Blank	Total Chemical Oxygen Demand	2016/06/16	<5.0		mg/L	
8301861	KPG	RPD	Total Chemical Oxygen Demand	2016/06/16	2.8		%	20
8302038	PM5	Matrix Spike	Dissolved Barium (Ba)	2016/06/16		103	%	80 - 120
			Dissolved Boron (B)	2016/06/16		108	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/16		NC	%	80 - 120
			Dissolved Iron (Fe)	2016/06/16		NC	%	80 - 120
			Dissolved Lithium (Li)	2016/06/16		104	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/16		107	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/16		NC	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/16		108	%	80 - 120
			Dissolved Potassium (K)	2016/06/16		106	%	80 - 120
			Dissolved Silicon (Si)	2016/06/16		NC	%	80 - 120
			Dissolved Sodium (Na)	2016/06/16		101	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/16		101	%	80 - 120
8302038	PM5	Spiked Blank	Dissolved Barium (Ba)	2016/06/16		100	%	80 - 120
			Dissolved Boron (B)	2016/06/16		101	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/16		101	%	80 - 120
			Dissolved Iron (Fe)	2016/06/16		102	%	80 - 120
			Dissolved Lithium (Li)	2016/06/16		98	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/16		103	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/16		100	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/16		102	%	80 - 120
			Dissolved Potassium (K)	2016/06/16		100	%	80 - 120
			Dissolved Silicon (Si)	2016/06/16		100	%	80 - 120
			Dissolved Sodium (Na)	2016/06/16		99	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/16		97	%	80 - 120
			Dissolved Sulphur (S)	2016/06/16		96	%	80 - 120
8302038	PM5	Method Blank	Dissolved Barium (Ba)	2016/06/16	<0.010		mg/L	
			Dissolved Boron (B)	2016/06/16	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/06/16	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/06/16	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/06/16	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/06/16	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/06/16	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/06/16	<0.10		mg/L	
			Dissolved Potassium (K)	2016/06/16	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/06/16	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/06/16	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/06/16	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/06/16	<0.20		mg/L	
8302038	PM5	RPD	Dissolved Iron (Fe)	2016/06/16	0.54		%	20
			Dissolved Manganese (Mn)	2016/06/16	0.82		%	20
8302285	YY	Matrix Spike [OU9186-03]	Dissolved Organic Carbon (C)	2016/06/17		NC	%	80 - 120

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8302285	YY	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/17		94	%	80 - 120
8302285	YY	Method Blank	Dissolved Organic Carbon (C)	2016/06/17	<0.50		mg/L	
8302285	YY	RPD [OU9186-03]	Dissolved Organic Carbon (C)	2016/06/17	5.9		%	20
8302948	JK9	Matrix Spike	Dissolved Barium (Ba)	2016/06/17		101	%	80 - 120
			Dissolved Boron (B)	2016/06/17		NC	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/17		100	%	80 - 120
			Dissolved Iron (Fe)	2016/06/17		104	%	80 - 120
			Dissolved Lithium (Li)	2016/06/17		104	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/17		NC	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/17		101	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/17		109	%	80 - 120
			Dissolved Potassium (K)	2016/06/17		113	%	80 - 120
			Dissolved Silicon (Si)	2016/06/17		106	%	80 - 120
			Dissolved Sodium (Na)	2016/06/17		NC	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/17		NC	%	80 - 120
8302948	JK9	Spiked Blank	Dissolved Barium (Ba)	2016/06/17		101	%	80 - 120
			Dissolved Boron (B)	2016/06/17		105	%	80 - 120
			Dissolved Calcium (Ca)	2016/06/17		105	%	80 - 120
			Dissolved Iron (Fe)	2016/06/17		106	%	80 - 120
			Dissolved Lithium (Li)	2016/06/17		100	%	80 - 120
			Dissolved Magnesium (Mg)	2016/06/17		109	%	80 - 120
			Dissolved Manganese (Mn)	2016/06/17		101	%	80 - 120
			Dissolved Phosphorus (P)	2016/06/17		108	%	80 - 120
			Dissolved Potassium (K)	2016/06/17		109	%	80 - 120
			Dissolved Silicon (Si)	2016/06/17		109	%	80 - 120
			Dissolved Sodium (Na)	2016/06/17		106	%	80 - 120
			Dissolved Strontium (Sr)	2016/06/17		103	%	80 - 120
			Dissolved Sulphur (S)	2016/06/17		101	%	80 - 120
8302948	JK9	Method Blank	Dissolved Barium (Ba)	2016/06/17	<0.010		mg/L	
			Dissolved Boron (B)	2016/06/17	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/06/17	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/06/17	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/06/17	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/06/17	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/06/17	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/06/17	<0.10		mg/L	
			Dissolved Potassium (K)	2016/06/17	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/06/17	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/06/17	<0.50		mg/L	
			Dissolved Strontium (Sr)	2016/06/17	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/06/17	<0.20		mg/L	
8302948	JK9	RPD	Dissolved Calcium (Ca)	2016/06/17	0.85		%	20
			Dissolved Magnesium (Mg)	2016/06/17	1.3		%	20
			Dissolved Potassium (K)	2016/06/17	2.6		%	20
			Dissolved Sodium (Na)	2016/06/17	1.2		%	20
8302974	YY	Matrix Spike [OU9183-01]	Dissolved Organic Carbon (C)	2016/06/17		NC	%	80 - 120
8302974	YY	Spiked Blank	Dissolved Organic Carbon (C)	2016/06/17		98	%	80 - 120
8302974	YY	Method Blank	Dissolved Organic Carbon (C)	2016/06/17	<0.50		mg/L	

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TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8302974	YY	RPD [OU9183-01]	Dissolved Organic Carbon (C)	2016/06/17	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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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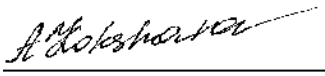
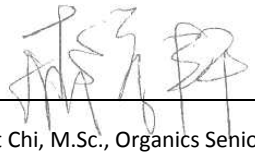
TETRA TECH EBA INC.
Client Project #: EBA, 704-SWM.SWOP03097-01
Sampler Initials: BS, MC

VALIDATION SIGNATURE PAGE

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

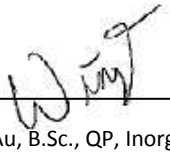


Anna Koksharova, M.Sc., Organics Senior Analyst



Bert Chi, M.Sc., Organics Senior Analyst

Suwan Fock, B.Sc., QP, Inorganics Senior Analyst



Winnie Au, B.Sc., QP, Inorganics Supervisor

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

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APPENDIX D

BOREHOLES LOGS

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 01
NE 1/4, SEC. 10-50-17-W4M	DRILL: HOLLOW STEM AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 683.67 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, organics, damp, very soft, dark brown, (100mm thick)			
	SAND - trace to some silt, trace of organics, fine to medium grained, unstratified, dry, dense, medium to dark brown			683.0
1	- clayey, clay occurs in random 5mm thick layers, medium to coarse grained, moist, compact, light to medium brown		random backfill -	
	SAND AND CLAY - trace of coal crystals, moist, soft, medium to dark brown			682.0
	CLAY - some silt and fine grained sand, bentonitic, moist, very soft			
2	- silty, 1-2mm thick black laminae, damp, stiff, light brown		bentonite -	
	SANDSTONE - silty, bentonitic, weathered, fine to medium grained, matrix supported, very dense, grey		slotted section -	681.0
3			pea gravel -	
	SILTSTONE - clayey, trace of fine to medium grained, sand, damp, dense, grey			680.0
4			bentonite -	
	CLAY SHALE - silty, plated, damp, hard, dark grey to brown			679.0
5			random cuttings -	
	END OF BOREHOLE (5.3 metres) slough - none at 0 hrs. water - 3.19 metres at 6 hrs. - 2.21 metres at 10 days Piezometer installed to 3.5 metres			678.0
6				
				677.0
7				
7.5				

1 | 2 | 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 5.33 m
REVIEWED BY: RJM	COMPLETE: 92/11/13
DRAWING NO: 11099-01	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 02
NE 1/4, SEC. 10-50-17-W4M	DRILL: HOLLOW STEM AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 686.17 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	1	2	3	Elevation (m)
0	TOPSOIL - silty, organics, roots, damp, very soft, dark brown						686.0
	CLAY (TILL) - silty, sandy, trace of subangular gravel, salt inclusions, unstratified, damp, very stiff, low plastic, medium brown						
1			random backfill -				685.0
2							684.0
	- moist, firm						
3	- dry to damp, very stiff, dark brown to black		bentonite -				683.0
	SANDSTONE - silty, bentonitic, weathered, fine to medium grained, dry, very dense, grey		slotted section -				
4			pea gravel -				682.0
	SILTSTONE - clayey, trace of fine to medium grained sand, clay shale stringers, damp, dense, grey						
5			bentonite -				681.0
	END OF BOREHOLE (5.3 metres) slough - none at 0 hrs. water - 3.99 metres at 4 hrs. - 3.92 metres at 10 days Piezometer installed to 4.6 metres						
6							680.0
7							679.0
7.5							

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 5.33 m
REVIEWED BY: RJM	COMPLETE: 92/11/13
DRAWING NO: 11099-02	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 03
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 688.78 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	CLAY (FILL)		grout -	
1	GARBAGE		bentonite -	688.0
2	CLAY (FILL)			687.0
	GARBAGE		slotted section -	
3	CLAY (FILL)		sand filter -	686.0
	GARBAGE			
4	CLAY (TILL) - silty, sandy, gravel sizes, clay shale nodules, sandstone pockets, stiff, medium plastic, brown		random backfill -	685.0
5				684.0
6	END OF BOREHOLE (5.3 metres) slough - none at 0 hrs. water - dry at 0 hrs. - dry at 5 hrs. - dry at 10 days - dry at 25 days Well installed to 3.8 metres Note: Backfilled to 3.8 metres.			683.0
7				682.0
7.5				

1 2 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 5.33 m
REVIEWED BY: RJM	COMPLETE: 92/11/13
DRAWING NO: 11099-03	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 04
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 688.17 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	CLAY (FILL)		grout -	688.0
1	GARBAGE		bentonite -	687.0
2				686.0
3	CLAY (FILL)		slotted section - sand filter -	685.0
4	GARBAGE			684.0
5	END OF BOREHOLE (4.7 metres) slough - none at 0 hrs. water - dry at 3 hrs. - dry at 10 days - dry at 25 days Well installed to 4.7 metres			683.0
6				682.0
7				681.0
7.5				

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 4.72 m
REVIEWED BY: RJM	COMPLETE: 92/11/13
DRAWING NO: 11099-04	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 05
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 688.21 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	CLAY (FILL) - silty, sandy, sandstone inclusions, brown		grout -	688.0
1	GARBAGE			687.0
2			bentonite -	686.0
3				685.0
4				684.0
5			slotted section - sand filter -	683.0
6	SANDSTONE - silty, medium to coarse grained, very dense, grey		slough -	682.0
7	END OF BOREHOLE (6.1 metres) slough - 5.93 metres at 0 hrs. water - 5.3 metres at 2 hrs. - 5.37 metres at 10 days - 5.31 metres at 25 days Well installed to 5.93 metres			681.0
7.5				

1 2 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 6.1 m
REVIEWED BY: RJM	COMPLETE: 92/11/13
DRAWING NO: 11099-05	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 06
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 684.47 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	CLAY (FILL) - silty, sandy, dessicated, low plastic, brown		grout -	684.0
1				
	GARBAGE - metal, cable		bentonite -	683.0
2				682.0
3			sand filter - slotted section -	681.0
4				680.0
	SANDSTONE - silty, coarse grained, dense, grey			
5	CLAY SHALE - silty, hard, high plastic, grey/brown			679.0
	END OF BOREHOLE (5.2 metres) slough - none at 0 hrs. water - 2.55 metres at 1 hr. - 2.17 metres at 10 days Well installed to 5.15 metres			
6				678.0
7				
7.5				677.0

1 2 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 5.15 m
REVIEWED BY: RJM	COMPLETE: 92/11/13
DRAWING NO: 11099-06	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 08
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 685.53 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - organic silt, sandy, some clay, brown to black, frozen, (75mm thick)		grout -	685.0
	CLAY (TILL) - silty, sandy, occasional gravel sizes, low plastic, brown, frozen			
	- end of frost			
1			bentonite -	684.0
2	- coal pockets, moist, very stiff			
				683.0
	- sandstone and clay shale nodules, grey		slotted section -	
3	CLAY SHALE - carbonaceous, friable, very stiff, dark brown			
	SANDSTONE - silty, clayey, clay shale stringers and lenses, medium to coarse grained, moist, grey		sand filter -	682.0
4				
	END OF BOREHOLE (4.3 metres)			681.0
	slough - none at 0 hrs.			
	water - dry at 0 hrs.			
	- dry at 6 hrs.			
5	- 3.26 metres at 11 days			
	Well installed to 4.1 metres			680.0
6				
				679.0
7				
7.5				

1 | 2 | 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 4.26 m
REVIEWED BY: RJM	COMPLETE: 92/11/27
DRAWING NO: 11099-08	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 09
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 685.77 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - organic silt, sandy, some clay, frozen, (100mm thick)		grout -	685.0
	CLAY (TILL) - silty, sandy, occasional gravel sizes, brown, frozen			
1	- end of frost		bentonite -	684.0
2				
	CLAY SHALE - silty, reworked, very stiff, high plastic, brown to grey			683.0
3			slotted section -	
	SANDSTONE AND CLAY SHALE - interbedded, sandstone - silty, clayey, dense, grey, clay shale - silty, very stiff, high plastic, grey/brown		sand filter -	
	SANDSTONE - silty, clayey, medium to coarse grained, damp, dense, grey			682.0
4				
	END OF BOREHOLE (4.4 metres)			681.0
	slough - none at 0 hrs.			
5	water - dry at 0 hrs.			
	- dry at 5 days			
	- 3.33 metres at 11 days			680.0
6	Well installed to 4.4 metres			
				679.0
7				
7.5				

1 | 2 | 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 4.41 m
REVIEWED BY: RJM	COMPLETE: 92/11/27
DRAWING NO: 11099-09	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 10
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 683.96 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - (25mm thick)		grout -	
	CLAY - sandy, silty, white salt deposits, rust specks, dessicated, brown, frozen			
	- end of frost		bentonite -	
1	CLAY (TILL) - silty, sandy, gravel sizes, coal pockets, clay shale and sandstone nodules, damp, stiff, medium plastic, brown			683.0
	SANDSTONE - clayey, silty, clay shale stringers, weathered, medium to coarse grained, moist, brown to grey		slotted section -	
2				682.0
	- bentonitic, occasional clay shale stringers, dense, grey			
			sand filter -	
3				681.0
4				680.0
	END OF BOREHOLE (4.3 metres)			
	slough - none at 0 hrs.			
	water - dry at 0 hrs.			
	- dry at 4 hrs.			
	- dry at 11 days			
5	Well installed to 3.1 metres			679.0
6				678.0
7				677.0
7.5				

1 | 2 | 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 4.26 m
REVIEWED BY: RJM	COMPLETE: 92/11/27
DRAWING NO: 11099-10	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 11
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 683.85 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silt, sandy, frozen, (50mm thick)		grout -	
	CLAY - silty, sandy, white salt stains, dessicated, brown			
	CLAY (TILL) - silty, sandy, gravel sizes, moist, low plastic, brown			
1				683.0
	CLAY SHALE - silty, plated, very stiff, brown		bentonite -	
2				682.0
			slotted section -	
3	- blocky, high plastic, grey			681.0
			sand filter -	
4				680.0
	END OF BOREHOLE (4.3 metres) slough - none at 0 hrs. water - dry at 0 hrs. - dry at 3 hrs. - dry at 11 days Well installed to 4.2 metres			
5				679.0
6				678.0
7				677.0
7.5				

1 2 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 4.26 m
REVIEWED BY: RJM	COMPLETE: 92/11/27
DRAWING NO: 11099-11	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 12
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 684.2 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - organic silt, sandy, frozen, (50mm thick)		grout -	684.0
	CLAY - sandy, silt, white salt stains, rust specks, dessicated, brown			
1	CLAY (TILL) - silty, sandy, gravel sizes, stiff to very stiff, low plastic			683.0
	SANDSTONE - silty, clayey, clay shale stringers, oxidized, weathered, medium to coarse grained, brown		bentonite -	
2	- grey			682.0
3	CLAY SHALE - silty, friable, damp, hard, high plastic, brown		slotted section -	681.0
	- grey/brown		sand filter -	
4				680.0
	END OF BOREHOLE (4.3 metres) slough - none at 0 hrs. water - dry at 0 hrs. - dry at 2 hrs. - 3.54 metres at 11 days Well installed to 4.32 metres			
5				679.0
6				678.0
7				677.0
7.5				

1 | 2 | 3

TETRA TECH EBA

LOGGED BY: RJM	COMPLETION DEPTH: 4.26 m
REVIEWED BY: RJM	COMPLETE: 92/11/27
DRAWING NO: 11099-12	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 13
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 686.66 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT	Elevation (m)
0	TOPSOIL - clayey, silty, organic, peaty, black				686.0
1	CLAY (TILL) - silty, sandy, occasional gravel, damp, stiff to very stiff, low to medium plastic, medium brown		A1		685.0
2	SANDSTONE (BEDROCK) - silty, fine grained, homogeneous, damp, poorly cemented, very low strength, green grey, pale grey speckling, glauconitic, interbedded with shale horizons - clay shale horizons - silty, medium to high plastic, dark grey		A2		684.0
3	END OF BOREHOLE (2.4 metres) Notes: Stopped due to auger refusal (cemented sandstone band) Permanent Monitoring well installed to 2.4 metres				683.0
4					682.0
5					681.0
6					680.0
7					
7.5					

PLASTIC M.C. LIQUID (20 40 60 80)

STANDARD PENETRATION (N) (20 40 60 80)

UNC. COMPRESSIVE STRENGTH (kPa) (50 100 150 200)

POCKET PEN. (kPa) (100 200 300 400)

MW13

TETRA TECH EBA

LOGGED BY: VS/VJ	COMPLETION DEPTH: 2.4 m
REVIEWED BY:	COMPLETE: 91/02/19
DRAWING NO: 11099-12	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 14
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 686.52 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	Elevation (m)
0	TOPSOIL (FILL) - slightly organic, dark brown	686.0
	- clayey	
1	CLAY (TILL) - silty, sandy, stiff to very stiff, medium plastic, grey, pebbles	685.0
2		
	- free water	684.0
	SANDSTONE (BEDROCK) - silty, some clay, fine grained, moist, dense, light grey, occasional shaly inclusion	
3		683.0
4	- clay shale inclusions - grey to brown	682.0
5 ▼ 0 hrs.		681.0
	END OF BOREHOLE (5.4 metres) water - 5.0 metres at 0 hrs. Monitoring well installed to 5.4 metres	
6		680.0
7		
7.5		

SAMPLE TYPE | MOISTURE CONTENT | PLASTIC M.C. LIQUID (20 40 60 80) | STANDARD PENETRATION (N) (20 40 60 80) | UNC. COMPRESSIVE STRENGTH (kPa) (50 100 150 200) | POCKET PEN. (kPa) (100 200 300 400) | MW14 (▼ 0 hrs.)

TETRA TECH EBA

LOGGED BY: VS/VJ	COMPLETION DEPTH: 5.4 m
REVIEWED BY:	COMPLETE: 92/07/22
DRAWING NO: 11099-12	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 01B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 687.85 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - sandy, roots, black, (150mm thick)		Pipe stickup = 0.91 metres	687.0
1	CLAY - silty, some oxide stains, white salt and carbonate pockets, damp, very stiff, medium plastic, grey brown - occasional pebbles, coal pockets, no visible white pockets, olive grey brown			686.0
2				
3	- moist, stiff			685.0
4	CLAY SHALE - silty, some sand, friable, damp, soft, low to medium plastic, dark grey			684.0
5	SANDSTONE - some silt and clay, fine to medium grained, friable, uncemented, blue green grey - clay shale interbeds			683.0
6				682.0
7	CLAY SHALE - sandstone interbeds - siltstone layer - some silt and clay, fine to medium grained, friable, uncemented, blue green grey			681.0
8				680.0
9				679.0
10	END OF BOREHOLE (9.9 metres) slough - none at 0 hrs. water - dry at 0 hrs. - 5.2 metres at 1 day Monitoring well installed to 9.9 metres			678.0
11				677.0
12				676.0

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 9.9 m
REVIEWED BY: SP	COMPLETE: 96/09/30
DRAWING NO: 12416-04	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 05B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 687.41 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, organics, roots, moist, brown black, (150mm thick)		Pipe stickup = 0.91 metres	687.0
1	CLAY - silty, sandy, some salt inclusions, pebbles, coal pockets, oxide stains, very fine grained sand, damp, stiff, medium plastic, grey brown			686.0
	- more silty, less sand, moist			
2				685.0
3	- harder			684.0
	CLAY SHALE - silty, some sand, damp, hard, high plastic, green grey with dark blue pockets			
4	SANDSTONE - some clay, silt, fine to medium grained, friable, hard, low plastic, blue green grey			683.0
5	- clay shale lenses			682.0
6	SILTSTONE - pebbles, strongly cemented, dry, hard, light grey			681.0
	CLAY SHALE - silty, some sand, damp, hard, high plastic, green grey with dark blue pockets			
7	SILTSTONE - pebbles, strongly cemented, dry, hard, light grey			680.0
	CLAY SHALE - silty, some sand, damp, hard, high plastic, green grey with dark blue pockets			
8	- less silt and sand, stronger, dry, dark grey			679.0
9 ▼				678.0
10	END OF BOREHOLE (9.8 metres) slough - none at 0 hrs. water - dry at 0 hrs. - 9.1 metres at 7 days Monitoring well installed to 9.8 metres			677.0
11				676.0
12				

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 9.75 m
REVIEWED BY: SP	COMPLETE: 96/09/23
DRAWING NO: 12416-02	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 12B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 687.09 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, roots, black, (150mm thick)		Pipe stickup = 0.76 metres	687.0
1	CLAY (TILL) - silty, some sand, salt pockets, oxide stains, damp, very stiff, medium plastic, brown			686.0
2	- sand lense - silty, clay, fine to medium grained, firm, medium plastic, mottled brown grey - some pebbles, coal pockets, moist, stiff, green brown			685.0
3	CLAY SHALE - silty, dry to damp, hard, high plastic, dark grey			684.0
4				683.0
5	SANDSTONE - silty, some clay, fine to medium grained, friable, uncemented, damp, soft, low plastic, blue green grey - siltstone layer - strongly cemented, hard, light grey, (100mm thick) - sandier			682.0
6	SILTSTONE - strongly cemented, hard, light grey CLAY SHALE - silty, some sand, glauconitic sand layers, damp to moist, hard, medium plastic, blue green grey to brown grey			681.0
7				680.0
8				679.0
9	- brown grey			678.0
10	END OF BOREHOLE (9.9 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 9.9 metres			677.0
11				676.0
12				

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 9.9 m
REVIEWED BY: SP	COMPLETE: 96/09/30
DRAWING NO: 12416-03	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 18A
	DRILL: HOLLOW STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 687.16 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, organics, roots, soft, low plastic, grey black		Pipe stickup = 0.76 metres	687.0
1	SAND - silty, clayey, some pebbles, orange oxide stains, friable, loose, low plastic, grey brown			686.0
	CLAY (TILL) - silty, orange oxide stains, blocky, very stiff to hard, medium to high plastic, mottled grey brown			
2				685.0
3	CLAY SHALE AND SANDSTONE - interbedded, clay shale - silty, damp, hard, high plastic, mottled brown grey			684.0
4	sandstone - silty, glauconitic, fine to medium grained, friable, uncemented, damp, blue green grey			683.0
	SANDSTONE - with clay shale seams			
5				682.0
	SILTSTONE - some sand, cemented, friable, dry, light grey			
6	SANDSTONE - with clay shale seams 13-25mm thick			681.0
7	CLAY SHALE - with sandstone seams			680.0
8	- no visible sandstone seams			679.0
9	- sandstone seam			678.0
10	SILTSTONE - some clay, cemented, dry, hard, light brown			677.0
	END OF BOREHOLE (9.9 metres) slough - none at 0 hrs. water - dry at 0 hrs.			
11	Monitoring well installed to 9.9 metres			676.0
12				

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 9.9 m
REVIEWED BY: SP	COMPLETE: 96/10/01
DRAWING NO: 12416-05	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 18B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 687.15 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, organics, roots, soft, low plastic, grey black		Pipe stickup = 0.76 metres	687.0
1	SAND - silty, clayey, some pebbles, orange oxide stains, friable, loose, low plastic, grey brown			686.0
	CLAY (TILL) - silty, orange oxide stains, blocky, very stiff to hard, medium to high plastic, mottled grey brown			
2				685.0
3				684.0
4 ▼	CLAY SHALE AND SANDSTONE - interbedded, clay shale - silty, damp, hard, high plastic, mottled brown grey sandstone - silty, glauconitic, fine to medium grained, friable, uncemented, damp, blue green grey			683.0
	SANDSTONE - with clay shale seams			
5				682.0
	END OF BOREHOLE (5.3 metres) slough - none at 0 hrs. water - 4.0 metres at 0 hrs. Monitoring well installed to 5.3 metres			
6				681.0
7				680.0
8				679.0
9				678.0
10				677.0
11				676.0
12				

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 5.33 m
REVIEWED BY: SP	COMPLETE: 96/10/01
DRAWING NO: 12416-06	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 19A
	DRILL: HOLLOW STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 686.46 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	CLAY (FILL) - silty, sandy, moist, soft, medium plastic, yellow brown, (100mm thick)		Pipe stickup = 0.76 metres	686.0
1	CLAY - silty, some sand pockets, salt pockets, damp, stiff, medium plastic, mottled grey brown			685.0
	- moist, softer			
2	- clay layer - oxidized, blocky, (75mm thick)			684.0
3	SANDSTONE - clayey, silty, glauconitic, fine to medium grained, poorly cemented, friable, damp, very stiff, blue green grey			683.0
	- wet			
4	- clay shale seams			682.0
5	SANDSTONE AND CLAY SHALE - interbedded			681.0
6	CLAY SHALE - silty, some sand interbeds, damp, hard, high plastic, dark grey			680.0
	- more frequent sandstone layers			
7	- no visible sandstone layers			679.0
8	- 13-25mm thick sandstone seams			678.0
9				677.0
10	END OF BOREHOLE (9.9 metres) slough - 9.6 metres at 0 hrs. water - 2.1 metres at 0 hrs. Monitoring well installed to 9.9 metres			676.0
11				675.0
12				

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 9.9 m
REVIEWED BY: SP	COMPLETE: 96/10/01
DRAWING NO: 12416-07	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 19B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 686.54 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	CLAY (FILL) - silty, sandy, moist, soft, medium plastic, yellow brown, (100mm thick)		Pipe stickup = 0.76 metres	686.0
1	CLAY - silty, some sand pockets, salt pockets, damp, stiff, medium plastic, mottled grey brown			685.0
	- moist, softer			
2	- clay layer - oxidized, blocky, (75mm thick)			684.0
3	SANDSTONE - clayey, silty, glauconitic, fine to medium grained, poorly cemented, friable, damp, very stiff, blue green grey			683.0
	- wet			
4	- clay shale seams			682.0
5	SANDSTONE AND CLAY SHALE - interbedded			681.0
6	END OF BOREHOLE (5.3 metres) slough - none at 0 hrs. water - 2.1 metres at 0 hrs. Monitoring well installed to 5.3 metres			680.0
7				679.0
8				678.0
9				677.0
10				676.0
11				675.0
12				

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 5.33 m
REVIEWED BY: SP	COMPLETE: 96/10/01
DRAWING NO: 12416-08	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 20A
	DRILL: HOLLOW STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 688.94 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, organics, roots, brown black, (300mm thick)		Pipe stickup = 0.76 metres	
	CLAY (TILL) - silty, sandy, some pebbles, abundant salt pockets, roots to 0.5 metres, dry, hard, medium plastic, grey brown			
1				688.0
2	- 2-4mm thick white carbonate salt seams at 13mm spacing			687.0
3	- orange oxide stains, coal pockets, very stiff			686.0
4				685.0
	CLAY SHALE - silty, some sand lenses, friable, damp, hard, high plastic, dark grey			
5				684.0
	SANDSTONE - silty, clay shale seams, medium grained, friable, uncemented, damp, blue green grey			
	CLAY SHALE AND SANDSTONE - interbedded			
6				683.0
	SANDSTONE - with 25mm thick clay shale layers			
7				682.0
	SILTSTONE - clayey, very fine grained, cemented, dry, hard, light grey			
8	CLAY SHALE AND SANDSTONE - interbedded			681.0
	CLAY SHALE - silty, some sand lenses, friable, damp, hard, high plastic, dark grey			
9				680.0
10	END OF BOREHOLE (9.9 metres) slough - 9.7 metres at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 9.9 metres			679.0
11				678.0
12				677.0

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 9.9 m
REVIEWED BY: SP	COMPLETE: 96/10/01
DRAWING NO: 12416-09	Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 20B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 688.99 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, organics, roots, brown black, (300mm thick)		Pipe stickup = 0.76 metres	
1	CLAY (TILL) - silty, sandy, some pebbles, abundant salt pockets, roots to 0.5 metres, dry, hard, medium plastic, grey brown			688.0
2	- 2-4mm thick white carbonate salt seams at 13mm spacing			687.0
3	- orange oxide stains, coal pockets, very stiff			686.0
4	CLAY SHALE - silty, some sand lenses, friable, damp, hard, high plastic, dark grey			685.0
5	SANDSTONE - silty, clay shale seams, medium grained, friable, uncemented, damp, blue green grey			684.0
	CLAY SHALE AND SANDSTONE - interbedded			
6	END OF BOREHOLE (5.3 metres) slough - none at 0 hrs. water - 5.2 metres at 0 hrs. Monitoring well installed to 5.3 metres			683.0
7				682.0
8				681.0
9				680.0
10				679.0
11				678.0
12				677.0

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 5.33 m
REVIEWED BY: SP	COMPLETE: 96/10/01
DRAWING NO: 12416-10	Page 1 of 1

CELL 3 - CONSTRUCTION	SAFETY KLEEN INC.	BOREHOLE NO: 21A
	DRILL: SOLID STEM AUGER	PROJECT: 0105-98-12892.4
RYLEY, ALBERTA	628.02N; 1001.60E	ELEVATION: 687.65 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, organics, rootlets, dark brown, (50mm thick)		Pipe stickup = 0.73 metres	
	SILT AND CLAY - abundant salt deposits, friable, dry, loose, light brown			
1	CLAY (TILL) - silty, trace of sand, friable, damp to moist, very stiff, low to medium plastic, mottled brown			687.0
2				686.0
	SANDSTONE - interbedded clay seams, silty, some 50mm angular rock, brown nodules, medium grained, uncemented, damp to moist, olive blue			
3	- dry to moist, blue green			685.0
	- free water			684.0
4				
	SILTSTONE - very fine grained, cemented, dry, hard, light grey			683.0
5	- trace of fine gravel to 5mm diameter			
	CLAY SHALE AND SANDSTONE - interbedded, medium grained, uncemented, moist, stiff, medium plastic, grey brown clay shale, blue-green sandstone			682.0
6				
	CLAY SHALE - trace of gravel to 2mm diameter, friable, damp to moist, very stiff to hard, low to medium plastic, grey			681.0
7	SILTSTONE - friable, cemented, dry, grey			
	CLAY SHALE - silty, some sand lenses and brown lenses, friable, damp, hard, low to medium plastic, grey			680.0
8	CLAY SHALE AND SILTSTONE - interbedded			
9				679.0
				678.0
10	END OF BOREHOLE (9.9 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 9.9 metres			
11				677.0
				676.0
12				

TETRA TECH EBA

LOGGED BY: JSF	COMPLETION DEPTH: 9.9 m
REVIEWED BY: RJM	COMPLETE: 98/10/01
DRAWING NO: 12892-01	Page 1 of 1

CELL 3 - CONSTRUCTION	SAFETY KLEEN INC.	BOREHOLE NO: 21B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-98-12892.4
RYLEY, ALBERTA	626.61N; 1001.58E	ELEVATION: 687.55 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, organics, rootlets, dark brown, (50mm thick)		Pipe stickup = 1.04 metres	687.0
	SILT AND CLAY - abundant salt deposits, friable, dry, loose, light brown			
1	CLAY (TILL) - silty, trace of sand, friable, damp to moist, very stiff, low to medium plastic, mottled brown			686.0
2				
	SANDSTONE - interbedded clay seams, silty, some 50mm angular rock, brown nodules, medium grained, uncemented,			685.0
3	damp to moist, olive blue - dry to moist, blue green			
	- free water			684.0
4				
	SILTSTONE - very fine grained, cemented, dry, hard, light grey			683.0
5	- trace of fine gravel to 5mm diameter			
	END OF BOREHOLE (5.0 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 4.9 metres			682.0
6				
				681.0
7				
				680.0
8				
				679.0
9				
				678.0
10				
				677.0
11				
				676.0
12				

TETRA TECH EBA

LOGGED BY: JSF	COMPLETION DEPTH: 5.02 m
REVIEWED BY: RJM	COMPLETE: 98/10/01
DRAWING NO: 12892-02	Page 1 of 1

CELL 3 - CONSTRUCTION	SAFETY KLEEN INC.	BOREHOLE NO: 22A
	DRILL: SOLID STEM AUGER	PROJECT: 0105-98-12892.4
RYLEY, ALBERTA	591.82N; 1069.20E	ELEVATION: 687.86 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	SILT AND CLAY - salt deposits, friable, damp, soft, low plastic, brown		Pipe stickup = 0.88 metres	
1	CLAY (TILL) - silty, moist, stiff, medium plastic, mottled brown - salt streaks			687.0
2	- gypsum, oxide stains			686.0
3	SANDSTONE - some clay, trace of pebbles, medium grained, uncemented, damp to moist, brown - oxide stains, very moist - interbedded clay seams, silty, brown nodules, olive green			685.0
4	- 50mm angular rock			684.0
5	CLAY SHALE - trace of very hard siltstone, friable, cemented, dry to damp, hard, medium plastic, grey - trace of sand, medium grained			683.0
6				682.0
7	- brown nodules			681.0
8				680.0
9	CLAY SHALE AND SANDSTONE - interbedded, medium grained, damp to moist, hard, low to medium plastic, grey mottled brown			679.0
	SILTSTONE - trace of gravel to 5mm diameter, cemented, dry, very hard, light grey			
10	CLAY SHALE AND SILTSTONE - interbedded			678.0
	END OF BOREHOLE (10.1 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 9.8 metres			
11				677.0
12				676.0

TETRA TECH EBA

LOGGED BY: JSF	COMPLETION DEPTH: 10.05 m
REVIEWED BY: RJM	COMPLETE: 98/10/01
DRAWING NO: 12892-03	Page 1 of 1

CELL 3 - CONSTRUCTION	SAFETY KLEEN INC.	BOREHOLE NO: 22B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-98-12892.4
RYLEY, ALBERTA	590.10N; 1069.07E	ELEVATION: 687.8 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	SILT AND CLAY - salt deposits, friable, damp, soft, low plastic, brown		Pipe stickup = 0.97 metres	
1	CLAY (TILL) - silty, moist, stiff, medium plastic, mottled brown - salt streaks			687.0
2	- gypsum, oxide stains			686.0
3	SANDSTONE - some clay, trace of pebbles, medium grained, uncemented, damp to moist, brown - oxide stains, very moist - interbedded clay seams, silty, brown nodules, olive green			685.0
4	- 50mm angular rock			684.0
5	CLAY SHALE - trace of very hard siltstone, friable, cemented, dry to damp, hard, medium plastic, grey			683.0
6	END OF BOREHOLE (5.0 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 4.9 metres			682.0
7				681.0
8				680.0
9				679.0
10				678.0
11				677.0
12				676.0

TETRA TECH EBA

LOGGED BY: JSF	COMPLETION DEPTH: 5.02 m
REVIEWED BY: RJM	COMPLETE: 98/10/01
DRAWING NO: 12892-04	Page 1 of 1

CELL 3 - CONSTRUCTION	SAFETY KLEEN INC.	BOREHOLE NO: 23A
	DRILL: SOLID STEM AUGER	PROJECT: 0105-98-12892.4
RYLEY, ALBERTA	601.96N; 1114.83E	ELEVATION: 686.44 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	CLAY - very silty, disturbed, very moist, soft to firm, high plastic, brown		Pipe stickup = 0.72 metres	686.0
1	SAND - silty, some clay, fine grained, moist, rust colour - some clay and silt, oxide stains, moist to very moist, firm to dense			685.0
2	SANDSTONE - some clay, trace of gravel to 2mm diameter, brown nodules, uncemented, firm to very firm, olive green - free water			684.0
3	- clay shale interbedded, silty, medium grained, uncemented, friable, damp to moist, very stiff to hard, low to medium plastic, grey clay shale, olive green sandstone			683.0
4	- trace of siltstone, hard, medium plastic, brown			682.0
5				681.0
6	SILTSTONE - uncemented, dry to damp, hard, low plastic, brown			680.0
7	CLAY SHALE AND SANDSTONE - interbedded, friable, damp to moist, hard, mottled grey			679.0
8				678.0
9	CLAY SHALE AND SILTSTONE - trace of sand, damp, hard, mottled grey			677.0
10	END OF BOREHOLE (9.9 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 9.9 metres			676.0
11				675.0
12				

TETRA TECH EBA

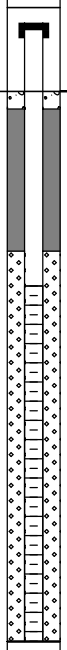
LOGGED BY: JSF	COMPLETION DEPTH: 9.9 m
REVIEWED BY: RJM	COMPLETE: 98/10/01
DRAWING NO: 12892-05	Page 1 of 1

CELL 3 - CONSTRUCTION	SAFETY KLEEN INC.	BOREHOLE NO: 23B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-98-12892.4
RYLEY, ALBERTA	601.22N; 1114.44E	ELEVATION: 686.49 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	CLAY - very silty, disturbed, very moist, soft to firm, high plastic, brown		Pipe stickup = 0.59 metres	686.0
1	SAND - silty, some clay, fine grained, moist, rust colour - some clay and silt, oxide stains, moist to very moist, firm to dense			685.0
2	SANDSTONE - some clay, trace of gravel to 2mm diameter, brown nodules, uncemented, firm to very firm, olive green - free water			684.0
3	- clay shale interbedded, silty, medium grained, uncemented, friable, damp to moist, very stiff to hard, low to medium plastic, grey clay shale, olive green sandstone			683.0
4	- trace of siltstone, hard, medium plastic, brown			682.0
5	END OF BOREHOLE (4.7 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 4.7 metres			681.0
6				680.0
7				679.0
8				678.0
9				677.0
10				676.0
11				675.0
12				



TETRA TECH EBA

LOGGED BY: JSF	COMPLETION DEPTH: 4.72 m
REVIEWED BY: RJM	COMPLETE: 98/10/01
DRAWING NO: 12892-06	Page 1 of 1

WELL INSTALLATION	CLEAN HARBORS INC.	BOREHOLE NO: 24A
	DRILL: SOLID STEM AUGER	PROJECT: 5100812.001
RYLEY, ALBERTA		ELEVATION: 688.68 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	GRAVEL (FILL)		Pipe stickup = 1.04 metres	
1	CLAY (TILL) - silty, trace of oxides, moist, hard, brown			688.0
2				687.0
3				686.0
4	CLAY SHALE - silty, damp, hard, grey			685.0
5				684.0
6	SANDSTONE - silty, very moist, loose, blue grey			683.0
7				682.0
8	SILTSTONE - cemented, loose, light brown grey			681.0
9	SANDSTONE - trace of clay shale			680.0
10	END OF BOREHOLE (9.91 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 9.69m			679.0
11				678.0
12				677.0

TETRA TECH EBA

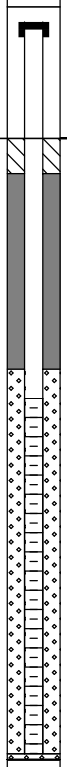
LOGGED BY: DM	COMPLETION DEPTH: 9.91 m
REVIEWED BY: PRM	COMPLETE: 04/08/13
DRAWING NO: 5100812-01	Page 1 of 1

WELL INSTALLATION	CLEAN HARBORS INC.	BOREHOLE NO: 24B
	DRILL: SOLID STEM AUGER	PROJECT: 5100812.001
RYLEY, ALBERTA		ELEVATION: 688.61 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	GRAVEL (FILL)		Pipe stickup = 1.00 metre	688.0
1	CLAY (TILL) - silty, trace of oxides, moist, hard, brown			687.0
2				686.0
3				685.0
4	CLAY SHALE - silty, damp, hard, grey			684.0
5				683.0
6	END OF BOREHOLE (5.33 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 5.28m			682.0
7				681.0
8				680.0
9				679.0
10				678.0
11				677.0
12				



TETRA TECH EBA

LOGGED BY: DM	COMPLETION DEPTH: 5.33 m
REVIEWED BY: PRM	COMPLETE: 04/08/13
DRAWING NO: 5100812-02	Page 1 of 1

WELL INSTALLATION	CLEAN HARBORS INC.	BOREHOLE NO: 25A
	DRILL: SOLID STEM AUGER	PROJECT: 5100812.001
RYLEY, ALBERTA		ELEVATION: 686.55 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - rootlets, moist, soft, grey		Pipe stickup = 1.00 metre	686.0
1	CLAY SHALE - silty, loose, hard, brown			685.0
2	SANDSTONE - silty, moist, loose, blue grey			684.0
3	- wet			683.0
4	CLAY SHALE - moist, loose, brown			682.0
5				681.0
6				680.0
7				679.0
8				678.0
9	- very moist, grey			677.0
10	END OF BOREHOLE (9.91 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 9.91m			676.0
11				675.0
12				

TETRA TECH EBA

LOGGED BY: DM	COMPLETION DEPTH: 9.91 m
REVIEWED BY: PRM	COMPLETE: 04/08/13
DRAWING NO: 5100812-03	Page 1 of 1

WELL INSTALLATION	CLEAN HARBORS INC.	BOREHOLE NO: 25B
	DRILL: SOLID STEM AUGER	PROJECT: 5100812.001
RYLEY, ALBERTA		ELEVATION: 686.71 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - rootlets, moist, soft, dark		Pipe stickup = 0.79 metres	686.0
1	CLAY SHALE - silty, hard, loose, brown			685.0
2	SANDSTONE - silty, moist, loose, blue grey			684.0
3	- wet			683.0
4	CLAY SHALE - moist, loose, brown			682.0
5				681.0
6	END OF BOREHOLE (5.33 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 5.28m			680.0
7				679.0
8				678.0
9				677.0
10				676.0
11				675.0
12				

TETRA TECH EBA

LOGGED BY: DM	COMPLETION DEPTH: 5.33 m
REVIEWED BY: PRM	COMPLETE: 04/08/13
DRAWING NO: 5100812-04	Page 1 of 1

WELL INSTALLATION	CLEAN HARBORS INC.	BOREHOLE NO: 26A
	DRILL: SOLID STEM AUGER	PROJECT: 5100812.001
RYLEY, ALBERTA		ELEVATION: 686.7 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - rootlets, moist, soft, grey		Pipe stickup = 0.92 metres	
1	CLAY SHALE - silty, dry, loose, hard, brown			686.0
2				685.0
3	SANDSTONE - silty, wet, loose, blue grey			684.0
4				683.0
5	SILTSTONE - cemented, loose, light brown			682.0
6	SANDSTONE - silty, moist, loose, blue grey			681.0
7				680.0
8	SILTSTONE - cemented, loose, light brown			679.0
9	CLAY SHALE - silty, hard, brown			678.0
10	END OF BOREHOLE (9.91 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 10.05m			677.0
11				676.0
12				675.0

TETRA TECH EBA

LOGGED BY: DM	COMPLETION DEPTH: 9.91 m
REVIEWED BY: PRM	COMPLETE: 04/08/13
DRAWING NO: 5100812-05	Page 1 of 1

WELL INSTALLATION	CLEAN HARBORS INC.	BOREHOLE NO: 26B
	DRILL: SOLID STEM AUGER	PROJECT: 5100812.001
RYLEY, ALBERTA		ELEVATION: 686.8 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - rootlets, moist, soft, dark		Pipe stickup = 0.85 metres	
1	CLAY SHALE - silty, dry, hard, brown			686.0
2				685.0
3	SANDSTONE - silty, wet, loose, blue grey			684.0
4				683.0
5	SILTSTONE - cemented, loose, light brown SANDSTONE - silty, moist, loose, blue grey			682.0
6	END OF BOREHOLE (5.33 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 5.43m			681.0
7				680.0
8				679.0
9				678.0
10				677.0
11				676.0
12				675.0

TETRA TECH EBA

LOGGED BY: DM	COMPLETION DEPTH: 5.33 m
REVIEWED BY: PRM	COMPLETE: 04/08/13
DRAWING NO: 5100812-06	Page 1 of 1

CLEAN HARBORS 2007 GROUNDWATER MONITORING	CLEAN HARBORS CANADA INC.	BOREHOLE NO: 27A
	DRILL: SOLID STEM AUGER	PROJECT: E22101022
RYLEY, ALBERTA		ELEVATION: 686.91 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - clay, silty, dry, low plastic, black and grey, rootlets, (150mm thick)		Pipe stickup = 0.82 metres	
	CLAY (TILL) - silty, moist, hard, medium plastic, brown, oxide staining			
1	SAND - silty, massive, medium grained, moist, loose, olive green to brown, iron oxide staining			686.0
2	- blue green			685.0
3	- wet, interbedded with siltstone - cemented, dry, hard, grey to light brown			684.0
4				683.0
5				682.0
6	SILTSTONE - cemented, dry, hard, grey to light brown			681.0
7				680.0
8				679.0
9				678.0
10				677.0
11 (0 hrs.)	END OF BOREHOLE (10.67 metres) water - 10.67 metres at 0 hrs. Monitoring well installed to 10.67 metres			676.0 (0 hrs.)
12				675.0

TETRA TECH EBA

LOGGED BY: AS	COMPLETION DEPTH: 10.67 m
REVIEWED BY: AS	COMPLETE: 07/10/01
DRAWING NO: 22101022-01	Page 1 of 1

CLEAN HARBORS 2007 GROUNDWATER MONITORING	CLEAN HARBORS CANADA INC.	BOREHOLE NO: 27B
	DRILL: SOLID STEM AUGER	PROJECT: E22101022
RYLEY, ALBERTA		ELEVATION: 687.01 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - clay, silty, dry, low plastic, black and grey, rootlets, (150mm thick)		Pipe stickup = 0.80 metres	687.0
	CLAY (TILL) - silty, moist, hard, medium plastic, brown, oxide staining			
1	SAND - silty, massive, medium grained, moist, loose, olive green to brown, iron oxide staining			686.0
2	- blue green			685.0
3	- wet, interbedded with siltstone - cemented, dry, hard, grey to light brown			684.0
4				683.0
5	SILTSTONE - cemented, dry, hard, grey to light brown			682.0
6				681.0
7	END OF BOREHOLE (6.65 metres) water - 6.61 metres at 0 hrs. Monitoring well installed to 6.65 metres			680.0
8				679.0
9				678.0
10				677.0
11				676.0
12				

0 hrs.

TETRA TECH EBA

LOGGED BY: AS	COMPLETION DEPTH: 6.65 m
REVIEWED BY: AS	COMPLETE: 07/10/01
DRAWING NO: 22101022-02	Page 1 of 1

2011 GROUNDWATER MONITORING PROGRAM	CLEAN HARBOR	BOREHOLE NO: MW01C
	DRILL: SOLID STEM AUGER	PROJECT: E22101936
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	TOPSOIL - moist, loose, non plastic, black, trace of roots, (300 mm thick)			0
	CLAY - silty, moist, firm, high plastic, light brown			
1	- trace of cobbles, trace of iron			5
2				
2 hrs ▼	- trace of coal			2 hrs ▼ 10
3	CLAY SHALE - moist, hard, low plastic, grey, trace of white precipitates			
4	SANDSTONE - moist, hard, low plastic, dark greenish grey			15
5	END OF BOREHOLE (5.33 metres) water - 2.35 metres at 2 hrs. Monitoring well installed to 5.55 metres			
6				20
7				25
8				
9				30
10				33

TETRA TECH EBA

LOGGED BY: KF/MC	COMPLETION DEPTH: 5.33 m
REVIEWED BY: MH	COMPLETE: 11/06/14
DRAWING NO: 22101936-01	Page 1 of 1

2012 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS CANADA INC.	BOREHOLE NO: MW08A
CLASS I WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	PROJECT: E22103058-01
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	PAVEMENT - (100 mm thick)			0
	GRAVEL AND PEBBLE (FILL) - moist, soft, brown, (300 mm thick)			
1	CLAY - some sand, moist, hard, medium plastic, black, some coal, silt inclusions			5
	- silty, brown, iron and silt inclusions			
2				
	SAND - coarse grained, wet, soft, green grey			10
3	- hard			
4	SILTSTONE - some pebbles, dry, extremely weak, light grey			15
	SAND - some silt and clay, moist, hard, low plastic, grey blue			
5	- siltstone lens - dry, extremely weak, light grey			
6				20
7 ▼ 0 hrs.	- saturated, grey, water lenses			▼ 0 hrs.
	SILTSTONE - some clay, cemented, extremely weak, grey			25
8				
9	CLAY - some silt and sand, dry, hard, grey			30
10	END OF BOREHOLE (10.00 metres)			
	water - 6.91 metres at 0 hrs.			35
11	Monitoring well installed to 10.00 metres			
12				39

TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 10 m
REVIEWED BY: MH	COMPLETE: 12/10/04
DRAWING NO: 22103058-01	Page 1 of 1

2012 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS CANADA INC.	BOREHOLE NO: MW08B
CLASS I WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	PROJECT: E22103058-01
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	PAVEMENT - (100 mm thick)			0
	GRAVEL AND PEBBLE (FILL) - moist, soft, red brown, (300 mm thick)			
1	CLAY - some sand, moist, hard, medium plastic, black, some coal, white silt inclusions			5
	- silty, brown, iron, silt and coal inclusions			
2				
	SAND - some silt, coarse grained, wet, green blue, some silt inclusions			
3	0 hrs.			10 0 hrs.
4				
	END OF BOREHOLE (4.50 metres)			
5	water - 2.76 metres at 0 hrs.			15
	Monitoring well installed to 4.63 metres			
6				20
7				25
8				
9				30
10				
11				35
12				39

TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 4.5 m
REVIEWED BY: MH	COMPLETE: 12/10/04
DRAWING NO: 22103058-02	Page 1 of 1

2012 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS CANADA INC.	BOREHOLE NO: MW28A
CLASS I WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	PROJECT: E22103058-01
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (TILL) - silty, moist, hard, medium plastic, light brown, iron inclusions			0
1	- some sand, loose, brown, coal inclusions			5
2	SAND - coarse grained, moist, loose, brown, iron inclusions - blue green			10
3	SILTSTONE - cemented, dry, extremely weak, grey			15
4	SAND - coarse grained, wet, hard, blue green, some clay pockets, silt inclusions			20
5	- silty, dry, grey, silty inclusions			25
6	SILTSTONE - fine grained, moist, extremely weak, grey blue to light brown, silty inclusions			30
7				
8				
9				
10 (15 min.)	- dry, grey			35
11	END OF BOREHOLE (10.50 metres) water - 9.84 metres at 15 minutes Monitoring well installed to 10.86 metres			
12				39

TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 10.5 m
REVIEWED BY: MH	COMPLETE: 12/10/04
DRAWING NO: 22103058-03	Page 1 of 1

2012 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS CANADA INC.	BOREHOLE NO: MW28B
CLASS I WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	PROJECT: E22103058-01
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (TILL) - silty, sticky, moist, hard, medium plastic, iron inclusions			0
1				5
2	SAND - coarse grained, wet, light brown			
	- blue			10
3	SILTSTONE - cemented, dry, extremely weak, grey			
	SAND - silty, moist, hard, grey, some blue lenses, silty white inclusions			15
4				
5	- some clay			
6 (0 hrs.)	END OF BOREHOLE (6.00 metres) water - 5.83 metres at 0 hrs. Monitoring well installed to 6.19 metres			20 (0 hrs.)
7				25
8				
9				30
10				
11				35
12				39

TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 6 m
REVIEWED BY: MH	COMPLETE: 12/10/04
DRAWING NO: 22103058-04	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW29A
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (FILL) - moist, high plastic, brown, (300 mm thick)		Pipe stickup = 0.81 metres	0
1	SAND (TILL) - fine grained, moist, loose, dark brown - reddish brown			
2	CLAY (TILL) - sandy, moist, firm, brown, silt, iron and coal inclusions - dry, reddish brown, white precipitates			5
3	SAND - medium grained, moist, firm, brown, iron and white precipitates throughout			10
4	- bluish grey, clay seams throughout			15
5	SANDSTONE - medium grained, very firm, grey, dark grey mottles throughout			20
6				
7				25
8				
9	END OF BOREHOLE (9.00 metres) water - 3.28 metres at 0 hrs. Monitoring well installed to 9.41 metres			30
10				
11				35
12				40
13				
14				45
15				49

TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 9 m
REVIEWED BY: TD	COMPLETE: 14/10/06
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW29B
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (FILL) - moist, high plastic, brown, (300 mm thick)		Pipe stickup = 0.79 metres	0
1	SAND (TILL) - fine grained, moist, loose, dark brown - reddish brown			
	CLAY (TILL) - sandy, moist, firm, brown, silt, iron and coal inclusions			5
2	- dry, reddish brown, white precipitates			
3	SAND - medium grained, moist, firm, brown, iron and white precipitates throughout			10
4	- bluish grey, clay seams throughout			
	END OF BOREHOLE (4.50 metres) water - 3.89 metres at 0 hrs. Monitoring well installed to 4.64 metres Note: 1 m east of MW29A			15
5	- sandstone			
6				20
7				
8				25
9				
10				30
11				35
12				
13				40
14				45
15				49

TETRA TECH EBA

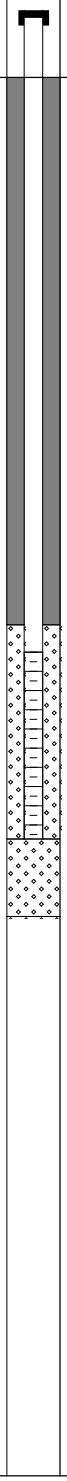
LOGGED BY: MC	COMPLETION DEPTH: 4.5 m
REVIEWED BY: TD	COMPLETE: 14/10/08
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW30A
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (FILL) - gravelly, moist, dark brown		Pipe stickup = 0.72 metres	0
1	CLAY (TILL) - sandy, moist, firm, brown, iron, coal and silt inclusions			5
2	SAND - silty, coarse grained, moist, loose, light brown, white lenses			
	CLAY (TILL) - sandy, moist, firm, brown, iron, coal and silt inclusions			
3	- iron inclusions			10
4	- greyish blue, brown mottles			
5	SANDSTONE - dry, extremely weak, light grey			15
6	- medium grained, moist, dark grey			20
7				
8	- light brown - dry, dark grey			25
9	END OF BOREHOLE (9.00 metres) water - dry at 0 hrs. Monitoring well installed to 8.17 metres			30
10				
11				35
12				40
13				
14				45
15				49



TETRA TECH EBA

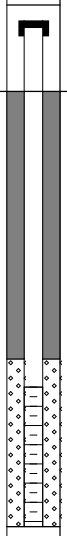
LOGGED BY: MC	COMPLETION DEPTH: 9 m
REVIEWED BY: TD	COMPLETE: 14/10/08
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW30B
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (FILL) - gravelly, moist, dark brown		Pipe stickup = 0.76 metres	0
1	CLAY (TILL) - sandy, moist, firm, brown, iron, coal and silt inclusions			5
2	SAND - silty, coarse grained, moist, loose, light brown, white lenses			
	CLAY (TILL) - sandy, moist, firm, brown, iron, coal and silt inclusions			10
3	- iron inclusions			
4	- greyish blue, brown mottles			15
	END OF BOREHOLE (4.50 metres)			
5	water - dry at 0 hrs.			20
	Monitoring well installed to 4.67 metres			
6	Note: 1 m east of MW30A			
7				25
8				
9				30
10				
11				35
12				40
13				
14				45
15				49



TETRA TECH EBA

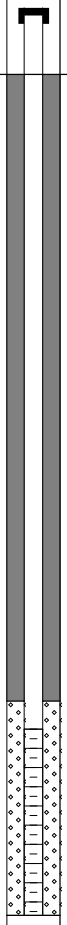
LOGGED BY: MC	COMPLETION DEPTH: 4.5 m
REVIEWED BY: TD	COMPLETE: 14/10/08
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW31A
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (FILL) - gravelly, moist, dark brown, white and orange precipitates, (300 mm thick)		Pipe stickup = 0.71 metres	0
	SAND (TILL) - fine grained, dry, brown, white and red, coal and iron inclusions			
1	CLAY (TILL) - sandy, moist, soft, grey, iron inclusions			5
2	- bluish grey, brown mottles - dry			
	SANDSTONE - medium grained, dark grey clay inclusions throughout			10
3				
	- 200 mm thick sandstone layer - dry, light brown			15
4	- moist, dark grey, light grey and brown silt, shale and sand			
5				
6				20
	- bluish grey, dark brown inclusions			
7	- dark grey			25
8				
9				30
	END OF BOREHOLE (9.00 metres) water - dry at 0 hrs. Monitoring well installed to 9.02 metres			
10				35
11				
12				40
13				
14				45
15				49



TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 9 m
REVIEWED BY: TD	COMPLETE: 14/10/08
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW31B
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (FILL) - gravelly, moist, dark brown, white and orange precipitates, (300 mm thick)		Pipe stickup = 0.72 metres	0
	SAND (TILL) - fine grained, dry, brown, white and red, coal and iron inclusions			
1	CLAY (TILL) - sandy, moist, soft, grey, iron inclusions			5
2	- bluish grey, brown mottles - dry			
	SANDSTONE - medium grained, dark grey clay inclusions throughout			10
3	END OF BOREHOLE (3.00 metres) water - 3.00 metres at 0 hrs. Monitoring well installed to 3.18 metres Note: 1 m west of MW31A			15
4				
5				20
6				
7				25
8				
9				30
10				
11				35
12				40
13				
14				45
15				49

TETRA TECH EBA

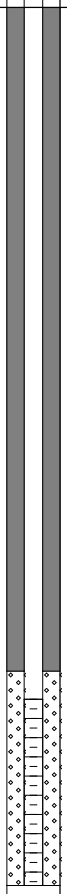
LOGGED BY: MC	COMPLETION DEPTH: 3 m
REVIEWED BY: TD	COMPLETE: 14/10/08
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW32A
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (FILL) - sandy clay mix, bluish grey		Pipe stickup = 0.67 metres	0
1	CLAY (TILL) - sandy, moist, brown, iron inclusions			5
2	SAND - medium grained, dry, loose, light grey			
	CLAY (TILL) - sandy, moist, firm, medium plastic, dark grey			10
3	- loose, bluish grey			
4	SAND - medium grained, dry, light grey - grey, iron inclusions			15
5	CLAY - moist, firm, medium plastic, dark grey			
6	- dark brown			20
7	- sandy, soft, bluish grey, dark grey throughout			
8	- saturated			25
9	- moist			
	END OF BOREHOLE (9.00 metres) water - 8.04 metres at 0 hrs. Monitoring well installed to 9.42 metres			30
10				
11				35
12				40
13				
14				45
15				49



TETRA TECH EBA

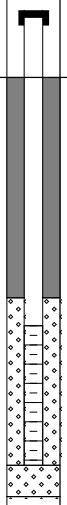
LOGGED BY: MC	COMPLETION DEPTH: 9 m
REVIEWED BY: TD	COMPLETE: 14/10/08
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW32B
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	CLAY (FILL) - sandy clay mix, bluish grey		Pipe stickup = 0.72 metres	0
1	CLAY (TILL) - sandy, moist, brown, iron inclusions			5
2	SAND - medium grained, dry, loose, light grey			10
3	CLAY (TILL) - sandy, moist, firm, medium plastic, dark grey - loose, bluish grey			15
4	SAND - medium grained, dry, light grey - grey, iron inclusions			20
5	END OF BOREHOLE (4.50 metres) water - 4.03 metres at 0 hrs. Monitoring well installed to 4.16 metres Note: 1 m east of MW32A			25
6				30
7				35
8				40
9				45
10				49
11				
12				
13				
14				
15				



TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 4.5 m
REVIEWED BY: TD	COMPLETE: 14/10/08
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW33A
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	SAND (FILL) - some pebbles and gravel, moist, loose, brown, (150 mm thick)		Pipe stickup = 0.94 metres	0
1	CLAY (TILL) - gravelly, some sand, subangular blocky, firm, medium plastic, dark grey, silt inclusions - massive, moist, very firm, high plastic, dark brown, coal, silt and iron inclusions			5
2	SAND - coarse grained, moist, loose, dark brown, iron inclusions - mottles - coarse grained, grey blue			10
3	- 200 mm thick clay layer - siltstone - saturated, silt mottled throughout			
4	SANDSTONE - fine grained, moist, grey blue, silt inclusions throughout			15
5				
6	- siltstone - saturated, water seam - grey, dark grey mottles			20
7	- moist			
8				25
9	- saturated, grey - medium grained, moist			
10	- wet - wet seam			30
11				35
12				40
13	- fractured bedrock, saturated, light grey			
14	END OF BOREHOLE (13.50 metres) water - 6.10 metres at 0 hrs. Monitoring well installed to 13.90 metres			45
15				49

TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 13.5 m
REVIEWED BY: TD	COMPLETE: 14/10/06
DRAWING NO:	Page 1 of 1

2014 GROUNDWATER WELLS INSTALLATION	CLEAN HARBORS	PROJECT NO. - BOREHOLE NO.
CLASS 1 WASTE MANAGEMENT FACILITY	DRILL: SOLID STEM AUGER	ENVSWM03472-01-MW33B
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	SAND (FILL) - some pebbles and gravel, moist, loose, brown, (150 mm thick)		Pipe stickup = 0.83 metres	0
1	CLAY (TILL) - gravelly, some sand, subangular blocky, firm, medium plastic, dark grey, silt inclusions - massive, moist, very firm, high plastic, dark brown, coal, silt and iron inclusions			5
2	SAND - coarse grained, moist, loose, dark brown, iron inclusions - mottles - coarse grained, grey blue			10
3	- 200 mm thick clay layer - siltstone - silt mottled throughout			15
4	SANDSTONE - fine grained, moist, grey blue, silt inclusions throughout			20
5	END OF BOREHOLE (4.50 metres) water - 0.93 metres at 0 hrs. Monitoring well installed to 4.68 metres Note: 1 m east of MW33A			25
6				30
7				35
8				40
9				45
10				49
11				
12				
13				
14				
15				

TETRA TECH EBA

LOGGED BY: MC	COMPLETION DEPTH: 4.5 m
REVIEWED BY: TD	COMPLETE: 14/10/06
DRAWING NO:	Page 1 of 1

Clean Harbors Canada Inc.

Borehole No: **15MW34A**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	Depth (ft)
0								0
1	Solid stem auger	CLAY (FILL) - some silt, some fine to coarse gravel, trace of fine to medium cobbles, trace of fine boulders, damp, hard, non to low plastic, brown, coal and iron stained inclusions		12				2
2		CLAY (TILL) - some silt, trace of gravel, damp, firm, medium plastic, brown, coal and iron stained inclusions		14				4
		- some fine grained brown sand, low plastic, grey blue						6
3		- silty, soft, medium to high plastic, brown		13				8
		- firm						10
4		- silty, firm to very stiff, grey						12
5				71				14
		SANDSTONE - silty, clayey, fine to medium grained, damp to moist, extremely weak, grey						16
		- some silt, some clay, moist to wet						18
6		- wet, grey blue		98		>100		20
7		- silty, clayey, moist to wet, grey		/225mm				22
		CLAY SHALE - trace of fine grained sand, trace of fine gravel, damp, extremely weak, high plastic, grey						24
8								26
								28
9								30
								32
10								34
								36
11								38
		- dark greyish brown						40
12		- some fine grained sand, light grey						42
								44
13								46
		- no visible sand, dark grey						48
14								50
								52
15		END OF BOREHOLE (15.00 metres)						54
		slough - 14.25 metres						56
16		Monitoring well installed to 11.80 metres						58
								60
17								62
								64
18								
19								
20								

TETRA TECH EBA

Contractor: Clean Harbors	Completion Depth: 15 m
Drilling Rig Type:	Start Date: 2015 July 21
Logged By: TH	Completion Date: 2015 July 21
Reviewed By: SS	Page 1 of 1

Clean Harbors Canada Inc.

Borehole No: **15MW34B**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Moisture Content (%)	Pocket Pen. (kPa) / Plastic Limit / Moisture Content / Liquid Limit	Fracture Frequency (#/m) / RQD (%) / Recovery (%)	Depth (ft)
0					100 200 300 400 / 20 40 60 80	2 4 6 8 / 40 60 80 100 / 40 60 80 100	0
1	Solid stem auger	CLAY (FILL) - some silt, some fine to coarse gravel, trace of fine to medium cobbles, trace of fine boulders, damp, hard, non to low plastic, brown, coal and iron stained inclusions					2
2		CLAY (TILL) - some silt, trace of gravel, damp, firm, medium plastic, brown, coal and iron stained inclusions					4
3		- gleying - sand pockets - fine grained sand, damp, very slight gleying - soft, low to medium plastic					6
4		- silty, some fine grained brown sand, medium to high plastic, - firm to very stiff, grey					8
5		SANDSTONE - silty, clayey, fine to medium grained, damp to moist, grey					10
6		END OF BOREHOLE (5.00 metres) Monitoring well installed to 4.80 metres					12
7							14
8							16
9							18
10							20
11							22
12							24
13							26
14							28
15							30
16							32
17							34
18							36
19							38
20							40
							42
							44
							46
							48
							50
							52
							54
							56
							58
							60
							62
							64

0 hrs

0 hrs

TETRA TECH EBA

Contractor: Clean Harbors	Completion Depth: 5 m
Drilling Rig Type:	Start Date: 2015 July 21
Logged By: TH	Completion Date: 2015 July 21
Reviewed By: SS	Page 1 of 1

GEO/ROCK ZONE12.GPJ EBA.GDT 16/3/2

Clean Harbors Canada Inc.

Borehole No: **15MW35A/B/C**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description
0		CLAY (TILL) - sandy, plastic, brown
3		CLAY - trace of sand, high plastic, brown
4		SANDSTONE - weathered, fine grained, blue grey, intermittent clay shale laminations, mechanical fractures
5		- at 4.24 m, 50 mm thick siltstone bed
6		- at 4.94 m, 50 mm thick siltstone bed
8		CLAY SHALE - extremely weak, dark brown
8		- at 8.10 m, 50 mm thick coal seam
9		SANDSTONE - blue green, grey clay shale laminations
11	Wet Rotary/HQ Coring	- at 10.80 m, increasing clay content
12		CLAY SHALE - moist, strong, dark brown, fracturing at interface
13		- at 13.27 m, 1 mm thick tan siltstone lamination
15		- at 15.10 m, minor slickensides, some fracturing, intermittent seashells
16		- at 15.40 m, dark grey
16		- at 16.00 m, 40 mm thick bentonite seam
20		

Sample Type: 14

Sample Number: 1, 2, 3, 4, 5, 6, 7

SPT (N): 20 40 60 80

Moisture Content (%): Plastic Limit | Moisture Content | Liquid Limit (20 40 60 80)

Fracture Frequency (#/m): 2 4 6 8

RQD (%): 40 60 80 100

Recovery (%): 40 60 80 100

15MW35A | 15MW35B | 15MW35C

Elevation (m): 625 624 623 622 621 620 619 618 617 616 615 614 613 612 611 610 609 608 607 606 605

TETRA TECH EBA

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type:	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 1 of 3

Clean Harbors Canada Inc.

Borehole No: **15MW35A/B/C**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW35A	15MW35B	15MW35C	Elevation (m)
20												605
21		- at 21.20 m, increased fractures										604
22				8								603
23		- at 23.30 m, 100 mm thick tan siltstone bed										602
24												601
25												600
26				9								599
27												598
28		- at 27.50 m, intermittent 45-65° fractures										597
29				10								596
30	Wet Rotary/HQ Coring											595
31		SANDSTONE - fine grained, moist, strong, grey, coal laminations										594
32				11								593
33		- from 32.65 to 32.79 m, very fine grained sand, brown bed, 5 mm thick coal seam - at 33.30 m, intermittent siltstone										592
34		- at 34.06 m, 10 mm thick coal seam										591
35		- at 34.07 m, clay shale bed - at 34.15 m, dark grey clay shale laminations		12								590
36		- at 35.30 m, increasing clay content, dark brown - at 35.40 m, 20 mm thick coal seam MUDSTONE - very fine grained, friable, extremely weak, brown to light brownish grey										589
37												588
38				13								587
39		- light brownish grey, trace of coal fragments										586
40		- at 39.40 m, 10 mm thick clay layer - silty, wet, soft, sticky, high plastic, grey										585

TETRA TECH EBA

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type:	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 2 of 3

Clean Harbors Canada Inc.

Borehole No: **15MW35A/B/C**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW35A	15MW35B	15MW35C	Elevation (m)
40												585
41		SANDSTONE - glauconitic, very fine grained, extremely weak, light grey, coal fragments CLAY SHALE - strong, dark brown - at 41.00 m, 10 mm thick coal seam MUDSTONE - very fine grained, brittle, grey grey		14								584
42												583
43		END OF BOREHOLE (42.40 metres) Monitoring well A installed to 12.80 metres Monitoring well B installed to 7.01 metres Monitoring well C installed to 3.05 metres										582
44												581
45												580
46												579
47												578
48												577
49												576
50												575
51												574
52												573
53												572
54												571
55												570
56												569
57												568
58												567
59												566
60												565

TETRA TECH EBA

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type:	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 3 of 3

Clean Harbors Canada Inc.

Borehole No: **15MW35Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0		CLAY (TILL) - sandy, plastic, brown			14	
1						
2		CLAY - trace of sand, high plastic, brown				
3		SANDSTONE - weathered, fine grained, blue grey, intermittent clay shale laminations, mechanical fractures		1		
4						
		- at 4.24 m, 50 mm thick siltstone bed				
5		- at 4.94 m, 50 mm thick siltstone bed				
6						
7						
		CLAY SHALE - strong, dark brown		2		
8		- at 8.10 m, 50 mm thick coal seam				
		SANDSTONE - blue green, grey clay shale laminations				
9						
10				3		
11		- at 10.80 m, increasing clay content				
		CLAY SHALE - moist, strong, dark brown, fracturing at interface		4		
12						
13						
		- at 13.27 m, 1 mm thick tan siltstone lamination		5		
14						
15						
		- at 15.10 m, minor slickensides, some fracturing, intermittent seashells				
16		- at 15.40 m, dark grey				
		- at 16.00 m, 40 mm thick bentonite seam		6		
17						
18						
19						
20				7		

Wet Rotary/HQ Coring

SPT (N) 20 40 60 80

Plastic Limit | Moisture Content | Liquid Limit

20 40 60 80

Fracture Frequency (#/m) 2 4 6 8

RQD (%) 40 60 80 100

Recovery (%) 40 60 80 100

15MW35

Elevation (m): 625, 624, 623, 622, 621, 620, 619, 618, 617, 616, 615, 614, 613, 612, 611, 610, 609, 608, 607, 606, 605

TETRA TECH EBA

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type:	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 1 of 3

Clean Harbors Canada Inc.

Borehole No: **15MW35Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW35	Elevation (m)
20										605
21		- at 21.20 m, increased fractures								604
22				8						603
23		- at 23.30 m, 100 mm thick tan siltstone bed								602
24										601
25				9						600
26										599
27		- at 27.50 m, intermittent 45-65° fractures								598
28				10						597
29										596
30	Wet Rotary/HQ Coring	SANDSTONE - fine grained, moist, strong, grey, coal laminations								595
31				11						594
32										593
33		- from 32.65 to 32.79 m, very fine grained sand, brown bed, 5 mm thick coal seam - at 33.30 m, intermittent siltstone								592
34		- at 34.06 m, 10 mm thick coal seam		12						591
35		- at 34.07 m, clay shale bed - at 34.15 m, dark grey clay shale laminations								590
36		- at 35.30 m, increasing clay content, dark brown - at 35.40 m, 20 mm thick coal seam MUDSTONE - very fine grained, friable, extremely weak, brown to light brownish grey								589
37				13						588
38										587
39		- light brownish grey, trace of coal fragments								586
40		- at 39.40 m, 10 mm thick clay layer - silty, wet, soft, sticky, high plastic, grey								585

TETRA TECH EBA

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type:	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 2 of 3

Clean Harbors Canada Inc.

Borehole No: **15MW35Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	Ground Elev: 625 m
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW35	Elevation (m)
40										585
		SANDSTONE - glauconitic, very fine grained, extremely weak, light grey, coal fragments		14						
41		CLAY SHALE - strong, dark brown - at 41.00 m, 10 mm thick coal seam								584
42		MUDSTONE - very fine grained, brittle, grey grey								583
		END OF BOREHOLE (42.40 metres) Monitoring well installed to 32.77 metres								
43										582
44										581
45										580
46										579
47										578
48										577
49										576
50										575
51										574
52										573
53										572
54										571
55										570
56										569
57										568
58										567
59										566
60										565

TETRA TECH EBA

Contractor: Garritty and Baker	Completion Depth: 42.4 m
Drilling Rig Type:	Start Date: 2015 July 27
Logged By: BS	Completion Date: 2015 July 28
Reviewed By: TH	Page 3 of 3

Clean Harbors Canada Inc.

Borehole No: **15MW36A/Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0		CLAY (TILL) - some silt, moist, plastic, brown			24	
2		SAND - clayey, moist, brown				
3		SANDSTONE - medium grained, blue grey, clay shale interbeds				
5		CLAY SHALE - moist, strong, dark grey, mechanical fractures		1		
7		SANDSTONE - medium grained, strong, light grey, laminated clay shale throughout, mechanical fractures		2		
9	Wet Rotary/HQ Coring	CLAY SHALE - moist, strong, dark grey, mechanical fractures		3		
12		- at 1.220 mm, 200 mm thick siltstone layer - very fine grained, weak, light brown, mechanical fractures				
13		- at 12.80 m, 20 mm thick seashell layer		4		
15		- at 14.70 m, 10 mm thick bentonite lens				
16				5	19	
17		- at 17.00 m, intermittent shells throughout				
18				6		
19		- at 19.00 m, periodic 45-65° fractures				
20						

SPT (N) ■ 20 40 60 80

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

15MW36 | 15MW36A | Depth (ft) 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

TETRA TECH EBA

Contractor: Garritty and Baker	Completion Depth: 38.8 m
Drilling Rig Type:	Start Date: 2015 July 21
Logged By: BS	Completion Date: 2015 July 21
Reviewed By: TH	Page 1 of 2

Clean Harbors Canada Inc.

Borehole No: **15MW36A/Deep**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
20				7		
21	Wet Rotary/HQ Coring	- slight slickensides				
22				8		
23						
24		- at 24.13 m, 10 mm thick coal seam				
25				9		
26						
27						
28				10		
29		- from 28.90 to 29.20 m, transition to siltstone - very fine grained, light grey, coal inclusions - at 29.20 m, strong, light grey		11		
30						
31						
32		SANDSTONE - fine to medium grained, strong, grey - at 32.23 m, clay shale laminations, 20 mm thick clay shale bed		12		
33		SILTSTONE - clay shale interbeds				
34		SANDSTONE - fine grained, light grey, coal laminations - at 33.40 m, coal laminations at 140 mm intervals - at 33.80 m, coal laminations at 500 mm intervals		13		
35		- at 34.29 m, medium grained interbeds with light brown staining - at 34.76 m, coal inclusion				
36		- from 35.16 to 35.41 m, intermitted sandstone at 250 mm intervals - medium grained, light brown staining, coal inclusions, hydrocarbon odour				
37		- from 35.76 to 36.06 m, 300 mm thick sandstone layer - medium grained, coal inclusions, hydrocarbon odour - at 37.00 m, fine grained, intermittent light staining		14		
38		CLAY SHALE - strong, dark grey				
39		END OF BOREHOLE (38.80 metres) Monitoring well installed to 35.36 metres Monitoring well A installed to 14.33 metres				
40						

SPT (N) ■ 20 40 60 80

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

15MW36 | 15MW36A

Depth (ft): 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100 102 104 106 108 110 112 114 116 118 120 122 124 126 128 130

TETRA TECH EBA

Contractor: Garritty and Baker	Completion Depth: 38.8 m
Drilling Rig Type:	Start Date: 2015 July 21
Logged By: BS	Completion Date: 2015 July 21
Reviewed By: TH	Page 2 of 2

GEO/ROCK ZONE12.GPJ EBA.GDT 16/3/2

APPENDIX E

HISTORICAL ANALYTICAL RESULTS

Table E.A: Monitoring Well Construction Details - Decommissioned Monitoring Wells

Well	Date Installed	Surface Elevation (m AMSL)	Top of Casing Elevation (m AMSL)	Measured Well Depth		Screened Interval (m)		Sand Pack Interval (m)		Lithology Screened
				(m BTOC)	(m AMSL)	Top Screen Depth	Bottom Screen Depth	Top Sand Depth	Bottom Sand Depth	
MW 1A	19-Feb-91	688.40	689.08	5.19	683.89	5.28	6.78	3.95	6.10	clay shale/ sandstone
MW 2	19-Feb-91	688.13	688.59	5.96	682.63	4.96	5.96	3.60	5.50	clay shale / sandstone
MW 3	19-Feb-91	686.94	687.42	5.98	681.44	4.48	5.98	3.55	5.50	sandstone
MW 4A	19-Feb-91	688.83	689.54	7.39	682.15	4.71	7.71	3.30	7.00	clay till / clay shale / sandstone
MW 4B	23-Sep-96	688.21	688.97	10.62	678.35	9.17	10.62	7.80	9.90	clay shale / sandstone
MW 6	19-Feb-91	686.96	687.42	4.84	682.58	3.21	4.66	2.40	4.20	clay shale / sandstone
MW 7	n/a	687.30	687.61	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW 8	19-Feb-91	687.36	687.99	5.87	682.12	3.93	5.53	2.35	4.90	clay till / sandstone
MW 13	19-Feb-91	686.66	687.27	2.74	684.53	1.35	2.85	0.60	2.40	clay till / sandstone
MW 15A	23-Jul-93	686.27	687.12	8.71	678.41	7.21	8.71	5.50	7.90	mudstone / sandstone
MW 15B	23-Jul-93	686.26	687.19	5.16	682.03	2.12	5.10	0.60	4.20	clay till / sand / sandstone
MW 16A	23-Jul-93	686.22	687.15	8.98	678.17	7.49	8.98	5.50	8.15	mudstone
MW 16B	23-Jul-93	686.34	687.24	4.82	682.42	1.85	4.82	0.55	3.92	clay till / mudstone / sandstone

Notes:

Metres above mean sea level (m AMSL)

Metres below top of casing (m BTOC)

Information not available (n/a)

Denotes shallow-screened monitoring well

Denotes deep-screened monitoring well

Table E.B: Groundwater Elevation Data - Decommissioned Monitoring Wells

Well	Ground Elevation (m AMSL)	Top of Casing Elevation	Groundwater Elevation (m AMSL)																				
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct 2000	Oct-00	Apr-01	Oct-01
MW 1A	687.90	688.53	685.66	684.6	685.08	685.4	685.13	685.25	684.79	685.56	685.1	685.35	684.81	685.76	685.66	685.76	685.305	685.56	685.46	685.37	685.04	685.57	685.57	685.08	685.33
MW 2	688.13	688.59	685.26	n/a	685.17	685.95	685.33	685.84	685	686.14	685.45	685.97	685.00	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 3	686.94	687.42	685.3	685.14	685.19	685.84	685.31	685.72	684.93	686.05	685.43	685.94	684.95	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 4A	688.83	689.54	685.41	685.01	685.16	685.81	685.21	685.83	685.12	686.05	685.61	686.15	685.35	686.28	686.00	686.64	686	686.79	686.22	686.60	685.95	686.84	686.84	686.09	686.70
MW 4B	688.21	688.97	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	685.30	684.91	685.70	684.995	685.69	685.14	685.63	684.91	685.87	685.87	685.02	685.77
MW 6	686.96	687.42	685.26	685.29	684.94	685.76	685.07	685.8	684.9	686.05	685.35	685.88	684.87	686.26	685.53	686.38	685.685	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 7	687.30	687.61	684.57	n/a	frozen	Aband.	Aband.	Aband.	Aband.	Aband.	Aband.	Aband.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 8	686.711	687.39	685.55	685.04	frozen	685.59	685.58	685.79	685.23	686.09	685.57	685.84	685.32	686.52	686.37	686.10	685.88	686.03	686.2	685.83	685.39	686.13	686.13	685.20	685.82
MW 13	686.16	686.74	685.57	684.86	686.42	685.65	685.01	685.87	684.78	686.43	685.64	686.19	685.40	686.53	frozen	686.07	686.45	686.12	686.46	685.99	685.24	686.25	686.25	685.15	686.10
MW 15A	686.34	687.15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	684.52	685.76	685.64	684.91	685.81	frozen	685.67	684.96	685.4	685.27	684.97	684.59	685.65	685.65	684.61	685.39
MW 15B	686.23	687.32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	684.62	685.79	685.48	684.97	685.81	frozen	685.62	685.59	685.33	685.49	684.88	684.63	685.55	685.55	684.55	685.29
MW 16A	686.22	687.15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	684.46	685.86	685.69	684.43	685.76	frozen	686.09	frozen	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 16B	686.34	687.24	n/a	n/a	n/a	n/a	n/a	n/a	n/a	684.56	685.71	685.51	684.50	685.69	685.16	685.97	685.28	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.

Well	Ground Elevation (m AMSL)	Top of Casing Elevation	Groundwater Elevation (m AMSL)																		
			Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14
MW 1A	687.90	688.53	684.93	685.06	684.66	685.48	685.00	685.63	685.44	685.88	685.35	685.73	685.21	686.07	686.07	#REF!	684.94	Decom.	Decom.	Decom.	Decom.
MW 2	688.13	688.59	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 3	686.94	687.42	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 4A	688.83	689.54	685.97	686.30	685.72	686.68	685.89	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 4B	688.21	688.97	684.95	685.34	684.66	685.70	685	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 6	686.96	687.42	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 7	687.30	687.61	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 8	686.711	687.39	684.88	685.46	685.25	686.05	685.59	686.06	686.09	686.09	685.41	686.35	686.42	685.98	685.98	#REF!	685.60	#REF!	#REF!	Decom.	Decom.
MW 13	686.16	686.74	684.89	685.45	n/a	686.11	686.46	686.14	686.58	686.45	685.39	686.44	686.64	685.88	685.88	#REF!	685.44	#REF!	#REF!	685.98	685.51
MW 15A	686.34	687.15	684.31	684.59	684.20	685.44	684.67	685.62	685.28	685.76	684.70	685.92	685.76	685.39	685.39	#REF!	685.06	Decom.	#REF!	685.83	685.27
MW 15B	686.23	687.32	684.28	684.52	684.21	685.35	684.94	685.54	685.36	685.70	684.65	685.74	685.43	685.25	685.25	#REF!	685.19	Decom.	#REF!	685.74	685.38
MW 16A	686.22	687.15	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.
MW 16B	686.34	687.24	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.	Decom.

Notes:

Metres above mean sea level (m AMSL)

Information not available (n/a)

Abandoned well, (i.e., decommissioned or not in service) (Aband.)

Decommissioned well (i.e., not in service) (Decom.)

Denotes shallow-screened monitoring well

Denotes deep-screened monitoring well

Table E.1A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 1A																			
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																						
Field pH	-	-	7.71	8.4	7.7	8.1	8.4	7.7	8.4	8.29	7.9	7.7	7.7	7.6	7.5	7.7	7.6	7.03	7.58	7.03	7.52	7.2
Routine Water																						
pH	-	6.5 - 8.5	8.0	7.8	7.9	7.5	7.7	7.6	8.2	8.0	7.9	7.7	7.86	7.92	7.68	7.94	7.79	7.72	7.66	7.76	7.80	7.71
Conductivity (EC)	µS/cm	-	4420	4500	5050	5450	5300	5630	5420	5840	5530	5960	5540	5710	5550	5240	5590	6230	5610	6520	6740	5790
Calcium	mg/L	-	96	104	97	115	108	114	109	131	120	134	121	127	101	122	122	75	141	132	169	389
Magnesium	mg/L	-	25	33	27	33.4	31.3	33.7	31.8	37.5	34.1	41	34.8	36.6	30.2	32.8	29.3	40.7	42.4	44.1	47.2	94.1
Sodium	mg/L	200	1150	1160	1140	1260	1240	1360	1260	1230	1360	1394	1350	1330	1360	1460	1360	1590	1360	1590	1570	1520
Potassium	mg/L	-	8.9	8.7	9.9	8.34	7.71	7.74	8.46	7.61	7.94	8	6.73	6.88	5.71	7.26	5.87	8.26	7.56	10.8	7.9	17.9
Iron	mg/L	0.3	0.02	<0.02	0.33	11.3	0.07	2.71	< 0.04	0.04	< 0.04	0.028	0.5	0.07	0.06	0.037	0.134	0.216	0.514	0.024	0.044	< 0.003
Sulphate	mg/L	500	2171	2030	2400	2460	2460	2450	2350	2420	2590	2681	2670	2570	2830	3010	2510	3330	2950	3460	3330	3490
Chloride	mg/L	250	1	10	3	0.6	0.5	0.9	0.8	<0.1	0.6	3	1.4	4.9	0.4	1.4	1.1	<0.5	1.4	0.7	<0.5	<0.5
Bicarbonate	mg/L	-	706	776	788	806	797	802	809	815	814	812	811	820	794	793	792	774	767	768	760	781
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.05	0.16	0.213	<0.04
TDS*	mg/L	500	3704	3760	4330	4270	4240	4360	4160	4220	4500	5075	4590	4480	4720	5020	4410	5430	4880	5620	5510	5700
Water Nutrients																						
Ammonia-N	mg/L	-	3	<1	<1	0.755	0.808	0.85	0.58	0.503	0.58	0.721	0.424	0.538	0.385	0.59	0.58	0.78	0.45	0.54	0.48	0.63
TKN	mg/L	-	3	<1	1.1	1.64	1.1	1.45	1.12	1.13	1.2	1.46	1.81	1.31	2.73	1.12	1.24	1.34	0.97	1.2	1.63	1.16
Organics																						
COD	mg/L	-	18	26	12	64	30	31	26	47	54	26	24	51	22	35	38	63	53	38	36	37
TOC	mg/L	-	9	19	9	11.8	8.3	10.8	9.9	8.5	10.2	8.9	8.9	10.2	12.1	11.4	14.3	14.5	18.2	15.2	14.4	15
Oil & Grease	mg/L	-	<1	<1	<1	<0.2	<0.2	6	0.9	0.4	0.3	<0.2	<0.2	0.4	<0.2	<1	1	1	2	<1	<1	7
Metals																						
Antimony	mg/L	0.006	0.001	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	0.0062	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.006	<0.006
Barium	mg/L	1	0.04	0.022	0.021	0.038	0.005	0.009	<0.004	<0.004	<0.004	0.0102	0.0148	0.0089	0.0093	0.0097	0.0105	0.0097	0.0128	0.008	0.0068	0.007
Cadmium	mg/L	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Chromium	mg/L	0.05	0.02	<0.006	<0.006	<0.006	0.012	<0.005	<0.005	<0.006	<0.006	0.0022	0.0015	0.0009	<0.0008	<0.0008	<0.0008	0.0014	<0.0008	<0.0008	<0.0009	<0.0009
Cobalt	mg/L	-	<0.01	<0.01	<0.01	<0.01	0.01	0.03	<0.01	<0.01	<0.01	0.0012	0.0013	0.0009	0.0009	0.0009	<0.0007	0.0035	0.0042	0.0038	0.0056	0.0048
Copper	mg/L	1	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.608	<0.001
Lead	mg/L	0.010	<0.03	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.007	0.034	<0.002
Mercury	mg/L	0.001	<0.0002	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	0.05	0.03	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.001	0.004	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.003	0.002	0.001	0.002	0.001	<0.001	0.003	0.001	0.007	0.006	0.002
Zinc	mg/L	5.0	0.04	0.019	0.04	0.071	0.021	0.014	< 0.005	< 0.005	< 0.005	0.0031	0.008	0.0282	0.001	0.0261	0.0065	0.0054	0.0088	0.0201	0.11	0.0203

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.1A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 1A																	
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11
Field Measurements																				
Field pH	-	-	7.78	7.1	7.51	7.74	7.75	7.7	7.45	7.66	7.39	7.61	7.53	7.64	7.4	7.83	7.752	7.611	7.7	Decommissioned Replaced by MW-1C
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.17	12.71 (EF)	6.01	5.71	12.49	15.16	4.360	5.740	1.313	
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.5	7.6	10.5	7.1	6.32	9.4	7.1	6.3	6	
Routine Water																				
pH	-	6.5 - 8.5	7.74	7.81	7.76	7.71	7.78	7.92	8.2	8.1	8.1	8.2	8.2	8.2	8.2	8.0	8.2	8.15	8.11	
Conductivity (EC)	µS/cm	-	5730	6020	6150	6050	5560	5880	5740	5660	5630	5030	5740	5790	5600	5810	5570	5730	5770	
Calcium	mg/L	-	153	149	154	152	147	142	151	90.2	141	115	146	126	133	138	137	135	127	
Magnesium	mg/L	-	45.5	46.9	45.4	45.5	47	40.4	45.7	39.7	42	42.2	42.8	40.1	40.2	41.5	42.5	39.5	39.6	
Sodium	mg/L	200	1420	1440	1470	1550	1320	1350	1370	1340	1350	1420	1320	1230	1350	1370	1290	1340	1260	
Potassium	mg/L	-	6	7.7	6.7	5.5	6.6	6	5.2	6.9	6.6	6.7	7.3	6.8	8	6.9	4.2	7.52	7.08	
Iron	mg/L	0.3	0.07	< 0.02	< 0.02	< 0.1	< 0.05	< 0.1	0.205	0.021	<0.005	<0.005	<0.005	<0.005	<0.005	0.021	<0.005	<0.03	0.246	
Sulphate	mg/L	500	3140	3040	3330	3250	2940	2910	2860	2640	2500	2730	2670	2380	2480	2650	2550	2620	2600	
Chloride	mg/L	250	<0.5	<0.5	<0.5	<0.5	1.4	0.6	<1	2	2	2	2	1	2	2	2	0.78	<10 *	
Bicarbonate	mg/L	-	774	788	772	786	784	787	782	784	779	785	774	740	775	772	802	778	758	
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	
Nitrate	mg/L	10	<0.04	0.19	0.16	<0.04	<0.04	0.34	0.7	0.1	0.2	<0.1	0.4	0.2	0.2	0.2	0.2	0.195	<1.0 *	
TDS*	mg/L	500	5150	5080	5380	5390	4860	4830	4820	4500	4430	4700	4570	4150	4400	4590	4420	4530	4410	
Water Nutrients																				
Ammonia-N	mg/L		0.4	0.33	0.39	0.2	< 0.05	0.39	0.06	0.37	0.21	0.52	0.16	0.44	0.25	0.37	0.2	0.294	0.221	
TKN	mg/L	-	1.23	1.07	1.18	1.18	0.81	1.2	0.7	0.8	0.9	1.1	0.7	0.9	0.8	0.8	1.4	1.01	1.11	
Hydrocarbons																				
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	
Organics																				
COD	mg/L	-	49	37	31	35	30	39	30	10	29	29	26	29	25	30	17	30	27.3	
TOC	mg/L	-	14.5	12.8	13.2	12.9	11.9	12.8	10	9	11	11	11	11	10	11	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10	9.9	10.8	
Oil & Grease	mg/L	-	20	45	<5	5	7	7	<1	<1	1	1	<1	<1	<1	<1	n/a	n/a	n/a	
Metals																				
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.002	<0.001	<0.002	0.0009	0.0043	0.0008	<0.0004	0.001	0.0007	0.0004	0.0007	n/a	n/a	<0.00040	
Barium	mg/L	1	0.005	0.0125	0.011	<0.01	0.011	0.01	0.007	0.007	0.01	0.007	0.008	0.006	0.007	0.007	0.007	0.0062	0.0095	
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	<0.0001	<0.00005	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.000050	
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	0.0074	<0.003	0.007	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	
Cobalt	mg/L	-	0.015	0.011	0.0065	<0.001	0.0008	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	
Copper	mg/L	1	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	0.008	0.007	0.006	0.008	0.007	0.006	0.004	0.003	0.007	0.0067	0.0073	
Lead	mg/L	0.010	<0.02	<0.01	0.014	<0.001	<0.0005	<0.001	0.0013	<0.005	0.0001	<0.0001	0.0008	<0.0001	<0.0001	0.0002	<0.005	<0.0050	0.00017	
Mercury	mg/L	0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	
Molybdenum	mg/L	-	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	
Nickel	mg/L	-	<0.01	0.01	0.012	<0.005	<0.0025	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	0.004	0.003	0.0036	0.0042	
Zinc	mg/L	5	0.019	0.0055	0.014	0.012	0.008	0.015	0.012	0.02	0.018	0.011	0.014	<0.002	0.007	0.007	0.007	0.0061	0.0062	

Notes

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Exceeds Regulatory Limit

Table E.1B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 1B																														
			Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	Jun-14	May-15	Jun-16
Field Measurements																																	
Field pH	-	-	n/a	8.4	8.5	n/a	8.3	7.12	7.73	7.2	7.42	7.03	7.51	7.03	7.36	7.72	7.37	7.63	7.67	7.67	7.36	7.31	7.37	7.68	7.59	7.94	7.664	7.800	8.11	7.67	7.61	6.17	9.9	8.4	6.33
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.6	21.5 (EF)	7.93	6.86	13.04	10.24	5.480	3.096	3.3	3.08	2.47	4.11	2.95	3.05	3.67
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.4	3.2	6.8	6.2	8.3	9.11	5.1	11.7	21.9	8	7.7	8.2	7.5	8.3	n/a
Routine Water																																	
pH	-	6.5 - 8.5	n/a	8.38	8.23	8.39	8.47	8.05	8.06	8.16	7.93	7.8	7.93	7.83	7.75	7.88	7.89	7.84	8.1	8.1	8.1	8.1	8.1	8.3	8.3	8.2	8.2	8.29	8.23	8.32	8.44	8.41	8.05	8.24	8.44
Conductivity (EC)	µS/cm	-	n/a	5160	3410	2790	2600	4620	4970	6340	6960	7420	7140	7860	7190	7960	7190	8450	9150	8840	8320	8430	6540	6840	5830	4900	4420	5000	4020	2900	3700	3,200	2800	2900	2700
Calcium	mg/L	-	n/a	72.7	15.3	17.7	10.6	44.2	49.5	72.9	99.9	149	109	152	115	143	124	208	249	172	186	149	105	99.2	67.1	46.4	43.5	43.2	25.3	13	19	14	12	12	10
Magnesium	mg/L	-	n/a	12.7	2.1	5.8	2.9	8.4	7.9	9.3	19.1	31.6	15.5	27.1	17.5	22.3	18	35.7	48.2	35.5	31.9	26.8	15.9	20.8	10.1	6.9	7.9	6.26	3.61	1.9	2.8	2	1.7	1.6	1.3
Sodium	mg/L	200	n/a	1300	819	843	685	1240	1390	1900	1800	2130	1970	2190	2100	2290	1850	2420	2420	2270	2180	2150	1730	1750	1470	1260	1100	1170	941	750	890	730	740	740	680
Potassium	mg/L	-	n/a	7.59	3.32	8.38	4.51	8.98	5.18	5.97	6	7.3	5.1	8.3	7	7.4	7.2	9.6	7.5	8.2	8.4	7.8	6.3	10.1	6.5	3	2.4	3.82	3.51	2.2	3.6	2.6	2.5	2.4	2.1
Iron	mg/L	0.3	n/a	0.08	0.15	5.04	0.268	3.9	0.387	n/a	0.378	0.022	0.067	< 0.02	0.079	< 0.1	< 0.1	< 0.1	0.009	0.061	<0.005	<0.005	0.094	0.010	<0.005	<0.005	<0.005	<0.0050	0.024	<0.06	<0.060	<0.060	0.64	<0.060	<0.060
Sulphate	mg/L	500	n/a	2420	1020	935	573	1950	2430	3620	3590	4410	3860	4480	4350	5050	4030	5240	5320	4880	4240	4540	3240	3220	2360	1830	1590	1960	1270 *	670	1200	860	680	680	540
Chloride	mg/L	250	n/a	4.5	8.2	9.4	12.9	7.5	4.8	8.5	1.5	0.9	< 0.5	0.9	0.5	1.7	1.9	1.3	1	2	1	2	4	4	4	6	6	3.8	<10 *	6	4.8	5.2	5.1	6.1	6.1
Bicarbonate	mg/L	-	n/a	625	880	959	946	862	805	696	737	667	640	634	635	653	684	651	644	673	669	673	780	750	889	984	1030	915	1010	1100	1000	1,000	1100	1100	1100
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	6	<5	<5	<5	<5.0	<5.0	8.4	15	16	<0.50	<0.50	13
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	3.1	3.54	1.92	4.33	2.69	4.75	5.79	2.92	5.86	2.99	4.64	5.1	0.4	0.7	7.4	6.6	3.0	3.3	17.3	4.9	3.81	4.7 *	2.2	5	5.3	3.7	0.89	1.1
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.016	0.019
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.91	1.1
TDS*	mg/L	500	n/a	4120	2300	2300	1790	3680	4280	5950	5880	7700	6280	7160	6910	7840	6360	8230	8390	7700	6980	7240	5510	5490	4370	3710	3280	3650	2670	2000	2700	2,200	2000	2000	1800
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	37	30
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	880	900
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	10
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.0	1.0
Water Nutrients																																	
Ammonia-N	mg/L	-	n/a	1.28	0.831	0.56	0.82	1.17	1.6	1.97	0.93	1.15	0.95	0.7	1.29	0.61	0.85	0.61	0.59	1.56	1.28	1.25	0.57	0.96	0.95	0.23	0.14	0.823	0.43	0.41	0.47	0.36	<0.050	0.26	0.36
TKN	mg/L	-	n/a	9.09	5.77	2.92	2.74	2.44	2.54	3.68	2.65	2.5	2.94	2.53	4.05	2.66	3.79	3.52	2.4	3.2	2.9	4.2	3.0	2.4	2.1	1.6	1.7	2.34	2.63	2.2	2.8	2.4	2.2*	1.6	0.96
Hydrocarbons																																	
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10) - BTEX	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.75	<0.10	<0.10	<0.10	<0.10
Organics																																	
COD	mg/L	-	n/a	295	421	156	147	102	65	17	15	74	83	82	235	84	239	114	100	80	95	73	76	90	49	38	33	44	32.7	33	120	270	98	120	47
TOC	mg/L	-	n/a	38.4	18.1	12.9	31.2	13.1	18.6	19.8	19	30.1	1.2	35	34.4	34.8	25.4	35.9	36	36	35	31	26	20	18	15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	14	15.5	12.6	14	13	11	9.9	10	8.8
Oil & Grease	mg/L	-	n/a	n/a	n/a	n/a	1	n/a	< 1	n/a	1	2	< 5	< 5	6	10	< 1	< 5	< 1	< 1	<1	<1	3	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																																	
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0044	0.061
Antimony	mg/L	0.006	n/a	< 0.005	< 0.005	n/a	< 0.005	n/a	< 0.005	n/a	< 0.006	< 0.006	< 0.03	< 0.02	< 0.005	0.0005	0.0027	0.0003	0.0008	0.0013	0.0011	<0.0004	0.0012	0.0008	0.0008	0.0011	n/a	n/a	0.00047	<0.006	<0.00060	0.00064	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0012	0.0015
Barium	mg/L	1	n/a	0.0343	0.0524	n/a	0.0331	n/a	0.0351	n/a	0.0297	0.0173	0.0717	0.021	0.0147	0.019	0.016	0.016	0.014	0.013	0.015	0.011	0.041	0.011	0.012	0.016	0.016	0.0119	0.0225	0.017	0.015	0.017	0.039	0.017	0.021
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.001	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.63	0.62
Cadmium	mg/L	0.005	n/a	< 0.0005	< 0.0005	n/a	< 0.0005	n/a	< 0.005	n/a	< 0.0006	< 0.0006	< 0.003	< 0.003	< 0.0005	< 0.00001	< 0.0001	0.00003	< 0.001	< 0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.000050	<0.000050	0.000038	0.000057	<0.000025	0.000029	0.000029
Chromium	mg/L	0.05	n/a	0.0012	0.0015	n/a	0.0012	n/a	< 0.0008	n/a	< 0.0009	< 0.0009	< 0.0044	0.005	< 0.0008	0.0012	< 0.005	0.0008	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.0010	<0.0010	0.0034	<0.0010	<0.0010
Cobalt	mg/L	-	n/a	0.0035	0.0031	n/a	< 0.0007	n/a	0.0043	n/a	0.0046	0.0041	0.013	0.012	0.0032	0.0004	< 0.001	0.0007	< 0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	0.00066	0.00068	0.001	0.00058	0.00083
Copper	mg/L	1	n/a	0.002	0.01	n/a	0.006	n/a	0.004	n/a	< 0.001	0.003	< 0.006	< 0.005	0.006	0.009	< 0.01	0.012	0.018	0.021	0.015	0.014	0.008	0.007	0.005	0.003	0.004	0.005	0.0084	<0.002	0.0008	0.0032	0.0057	0.0020	0.0035
Lead	mg/L	0.010	n/a	< 0.002	0.003	n/a	0.003	n/a	< 0.002	n/a	0.005	< 0.002	< 0.01	< 0.01	< 0.002	0.0008	< 0.001	0.0004	< 0.005	< 0.005	<0.0001	<0.0001	0.0005	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	0.0003	<0.002	<0.00020	<0.00020	0.00056	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.14	0.13
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.10	0.057
Mercury	mg/L	0.001	n/a	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	n/a	n/a	< 0.0001	< 0.0001	< 0.0001	< 0.0001	n/a	n/a	< 0.0001	< 0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<3E n/a 06	<3E n/a 07	0.00003	<0.0000050	<0.0000020
Molybdenum	mg/L	-	n/a	0.038	0.023	n/a	0.012	n/a	0.01	n/a	0.006	0.004	0.008	< 0.005	0.004	0.004	< 0.01	0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	0.005	0.006	0.006	0.019	0.0061	0.0062	0.011	0.0095	0.011	0.0085	0.0082	0.0084
Nickel	mg/L	-	n/a	0.017	0.007	n/a	0.004	n/a	0.005	n/a	0.006	0.006	< 0.006	0.01	0.006	0.0022	< 0.005	< 0.0005	< 0.002	0.005	0.005	0.005	0.007	0.006	0.003	0.004	0.004	0.005	0.0072	<0.005	0.004	0.0053	0.0068	0.0038	0.0060
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.13	0.11
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	0.00058
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.5	2.2
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.29	0.25
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	200	150
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.0018
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0019	0.0022
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.0012
Zinc	mg/L	5	n/a	0.0116	0.0013	n/a	0.0017	n/a	0.0018	n/a	0.0159	0.0222	0.017	0.147	0.0146	0.06	0.02	0.015	0.014	0.028	0.026	0.017	0.03	0.003	0.008	0.008	0.01	0.0052	0.0068	<0.03	<0.0030	0.0078	0.0034	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.1C: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 1C					
			Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements								
Field pH	-	-	7.61	6.1	5.41	8.0	8.2	6.43
Field EC	mS	-	5.85	19.99	7.03	6.1	6.42	7.54
Field Temperature	°C	-	11.3	10	6.4	6.7	6.6	8.1
Routine Water								
pH	-	6.5 - 8.5	8.05	8.11	8.26	8.08	7.98	8.18
Conductivity (EC)	µS/cm	-	5800	5800	5900	5900	6100	6100
Calcium	mg/L	-	150	130	130	130	140	140
Magnesium	mg/L	-	37	34	34	33	34	36
Sodium	mg/L	200	1300	1400	1300	1300	1400	1300
Potassium	mg/L	-	7.6	6.7	6.2	4.8	6.6	6.9
Iron	mg/L	0.3	<0.06	<0.060	0.095	<0.60	<0.060	<0.060
Sulphate	mg/L	500	2700	2600	2800	3000	2900	2800
Chloride	mg/L	250	2	1.8	1.3	1.1	1.7	1.4
Bicarbonate	mg/L	-	740	760	760	770	750	710
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.009	0.0078	0.25	0.093	0.080	0.22
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	<0.010	0.018
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	0.080	0.23
TDS*	mg/L	500	4600	4600	4600	4800	4800	4700
Hardness	mg/L	-	n/a	n/a	n/a	n/a	490	510
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	620	580
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	0.99	0.96
Water Nutrients								
Ammonia-N	mg/L	-	0.74	0.66	0.57	0.57	0.60	0.46
TKN	mg/L	-	1.6	1.3	1.2	1.2	1.2	0.58
Hydrocarbons								
Benzene	mg/L	0.005	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics								
COD	mg/L	-	78	56	46	39	42	51
TOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	11	10	12	9.6	11	11
Oil & Grease	mg/L	-	n/a	n/a	n/a	n/a	n/a	
Metals								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	<0.030	0.0079
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	<0.0020	0.0011
Barium	mg/L	1	0.06	0.037	0.035	<0.10	0.025	0.023
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	0.24	0.24
Cadmium	mg/L	0.005	0.00009	<0.050	0.000065	<0.000050	<0.00020	0.000036
Chromium	mg/L	0.05	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00087
Copper	mg/L	1	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00070
Lead	mg/L	0.010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	0.32	0.32
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	0.27	0.28
Mercury	mg/L	0.001	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.003	<0.0020	0.002	<0.0020	<0.0020	0.0013
Nickel	mg/L	-	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0021
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	4.3	4.1
Silver	mg/L	-	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	2.2	2.2
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	920	950
Thallium	mg/L	-	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	<0.0010	0.00036
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	<0.03	<0.030	0.074	<0.030	<0.030	0.0037

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.2: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 2											
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Sep-96
Field Measurements														
Field pH	-	-	7.6	n/a	7.3	7.8	8.1	7.1	8.2	7.85	7.7	7.5	7.4	
Routine Water														
pH	-	6.5 - 8.5	7.6	n/a	7.3	7.3	7.6	7.3	8	7.85	7.87	7.6	7.77	
Conductivity (EC)	µS/cm	-	14410	n/a	16400	16300	16300	16600	15900	17000	16100	17900	15800	
Calcium	mg/L	-	446	n/a	271	263	263	237	237	237	237	290	249	
Magnesium	mg/L	-	99	n/a	127	121	125	138	129	135	133	134	138	
Sodium	mg/L	200	4515	n/a	4370	4390	4400	5000	4420	5000	5050	4444	4810	
Potassium	mg/L	-	23	n/a	19	18.3	17.1	18.4	20.8	19.3	18.9	21	17.3	
Iron	mg/L	0.3	0.03	n/a	<0.02	5.67	0.07	0.35	<0.04	<0.04	<0.04	<0.003	<0.04	
Sulphate	mg/L	500	10020	n/a	9600	9530	9160	9890	9350	10800	10400	9085	10700	
Chloride	mg/L	250	10	n/a	16	1.3	1.1	1.5	1.2	0.5	1	10	1.6	
Bicarbonate	mg/L	-	971	n/a	996	1040	1020	1030	1020	1040	1030	1019	1020	
Carbonate	mg/L	-												
Nitrate (N)	mg/L	10	1	n/a	<1	<0.05	<0.05	0.12	0.15	0.44	0.18	1.1	0.27	
TDS	mg/L	500	14996	n/a	14900	14800	14500	16300	14700	16700	16300	15005	16400	
Water Nutrients														
Ammonia-N	mg/L	-	3.5	n/a	<1	0.75	0.789	0.72	0.268	0.296	0.17	0.346	0.085	Decommissioned
TKN	mg/L	-	2	n/a	<1	1.84	1.28	1.14	1.33	0.83	0.77	0.73	0.8	
Organics														
COD	mg/L	-	23	n/a	20	69	41	91	118	49	44	31	20	
TOC	mg/L	-	11	n/a	11	13.7	10.6	18.3	15	10.4	10.6	10.5	9.6	
Oil & Grease	mg/L	-	<1	n/a	<1	<0.2	<0.2	2	0.5	<0.2	<0.2	<0.2	<0.2	
Metals														
Antimony	mg/L	0.006	<0.0005	n/a	<0.0002	<0.0005	<0.0005	<0.0005	0.0049	<0.0005	<0.0005	<0.005	<0.005	
Barium	mg/L	1	0.02	n/a	0.022	0.038	0.006	0.015	0.006	0.012	<0.004	0.0231	0.0228	
Cadmium	mg/L	0.005	<0.01	n/a	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	
Chromium	mg/L	0.05	<0.01	n/a	<0.006	<0.006	0.006	<0.005	<0.005	<0.006	<0.006	0.001	0.0032	
Cobalt	mg/L	-	0.01	n/a	<0.01	<0.01	<0.01	0.03	0.02	<0.01	<0.01	0.0016	0.0012	
Copper	mg/L	1	0.04	n/a	<0.01	<0.01	<0.01	0.01	<0.02	<0.02	<0.02	0.006	<0.001	
Lead	mg/L	0.010	<0.03	n/a	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.002	<0.002	
Mercury	mg/L	0.001	n/a	n/a	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Molybdenum	mg/L	-	0.02	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.001	<0.001	
Nickel	mg/L	-	<0.01	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.007	0.005	
Zinc	mg/L	5	<0.01	n/a	0.02	0.071	0.01	0.01	<0.005	<0.005	<0.005	0.0024	0.0063	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.3: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 3											
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Sep-96
Field Measurements														
Field pH	-	-	7.7	n/a	7.4	8	8.4	7.6	8.3	8.4	7.7	7.7	7.5	
Routine Water														
pH	-	6.5 - 8.5	7.5	7.8	7.7	7.4	7.5	7.6	7.9	7.82	7.72	7.6	7.75	
Conductivity (EC)	µS/cm	-	5150	5010	6190	5980	5720	5930	6160	5980	5720	6000	5720	
Calcium	mg/L	-	144	86	97	98.7	83.3	79.9	112	75.7	77.2	82	88.7	
Magnesium	mg/L	-	25	21	23	20.5	21	20.1	21.8	20.1	20.8	26	22	
Sodium	mg/L	200	1320	1360	1490	1580	1420	1510	1500	1450	1530	1500	1510	
Potassium	mg/L	-	11	9.1	9.5	7.93	7.98	8.28	9.59	8.71	8.24	8	7.53	
Iron	mg/L	0.3	0.08	< 0.01	0.03	1.9	0.08	0.78	<0.04	<0.04	<0.04	<0.003	<0.04	
Sulphate	mg/L	500	2540	2030	2600	2650	2250	2290	2570	2310	2370	2409	2510	
Chloride	mg/L	250	3	2	12	1.6	1.3	1.6	1.8	0.8	1.4	5	1.7	
Bicarbonate	mg/L	-	1196	1190	1180	1230	1220	1220	1140	1260	1260	1244	1250	
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Nitrate (N)	mg/L	10	1	<1	<1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.05	
TDS	mg/L	500	4376	4200	4300	4960	4390	4510	4770	4480	4630	5276	4750	
Water Nutrients														
Ammonia-N	mg/L	-	3.5	<1	<1	1.08	1.19	1.05	1.32	0.913	0.952	1.24	0.821	Decommissioned
TKN	mg/L	-	<1	<1	<1	1.83	1.65	1.66	1.46	1.31	1.38	1.19	1.52	
Organics														
COD	mg/L	-	25	68	23	30	33	46	33	33	30	57	14	
TOC	mg/L	-	2	19	10	9.2	8.2	11.4	9.4	8.5	7.4	8.9	7.3	
Oil & Grease	mg/L	-	<1	<1	<1	<0.2	<0.2	5	0.8	0.8	<0.2	<0.2	<0.2	
Metals														
Antimony	mg/L	0.006	<0.0005	<0.0005	<0.0002	0.0008	<0.0005	<0.0005	0.0069	<0.0005	<0.0005	<0.005	<0.005	
Barium	mg/L	1	0.03	0.017	0.013	0.104	0.01	0.012	<0.004	0.005	<0.004	0.0091	0.0108	
Cadmium	mg/L	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	
Chromium	mg/L	0.05	<0.01	<0.006	<0.006	<0.006	<0.006	0.008	<0.005	<0.006	<0.006	0.0008	<0.0008	
Cobalt	mg/L	-	0.02	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.0008	0.0018	
Copper	mg/L	1	0.02	<0.01	<0.01	<0.01	<0.01	0.01	<0.02	<0.02	<0.02	0.007	<0.001	
Lead	mg/L	0.010	<0.03	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.003	0.002	
Mercury	mg/L	0.001	n/a	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Molybdenum	mg/L	-	0.08	0.05	0.08	0.02	<0.02	0.05	<0.02	0.02	<0.02	0.01	0.015	
Nickel	mg/L	-	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.002	0.008	
Zinc	mg/L	5	<0.01	0.02	0.029	0.066	0.007	0.018	<0.005	<0.005	<0.005	0.0038	0.0468	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Exceeds Regulatory Limit

Table E.4A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 4A																		
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																						
Field pH	-	-	7.3	n/a	7.3	7.8	8	6.9	8	7.84	7.8	7.5	7.2	7.7	7.6	n/a	7.4	6.89	6.97	6.79	7.36	7.47
Routine Water																						
pH	-	6.5 - 8.5	7.3	7.8	7.6	7.4	7.4	7.4	7.9	7.93	7.81	7.8	7.99	7.76	7.72	7.77	7.58	7.52	7.52	7.57	7.58	7.56
Conductivity (EC)	µS/cm	-	9670	9600	11200	11000	10900	11100	10700	11500	10800	11600	10700	10600	11100	9350	11000	11400	10500	11400	11900	10100
Calcium	mg/L	-	630	415	432	442	429	423	461	430	412	445	451	434	390	450	432	386	415	455	447	143
Magnesium	mg/L	-	76	83	84	92.1	87.9	94.5	92.2	93	91.4	96	92.4	93.1	88.1	91.5	84.9	93.7	94.5	101	85.1	47.1
Sodium	mg/L	200	2575	2620	2600	2630	2660	2970	2640	2810	2870	2812	2770	2710	2810	2960	2740	2920	2600	2870	2830	2910
Potassium	mg/L	-	18	16	17	14.9	15.3	14.7	17	15.2	15.7	16	17.7	13.5	13.1	14.2	11.6	15.6	13.7	15.6	13	8.9
Iron	mg/L	0.3	0.03	<0.02	0.08	3.65	0.05	1.04	<0.04	<0.04	<0.04	<0.003	<0.04	<0.04	<0.04	0.003	0.247	0.185	0.481	0.027	0.056	0.01
Sulphate	mg/L	500	6600	5300	6300	6300	6280	6590	6130	6850	6680	6400	6790	6420	7030	7550	6350	7120	6440	7310	6440	7650
Chloride	mg/L	250	2	< 1	14	1.7	1.5	1.7	2.1	0.8	1.9	8	2.3	62.4	1.5	1.8	3.2	0.7	1.6	<0.5	2.8	<0.5
Bicarbonate	mg/L	-	691	659	648	732	721	715	720	726	750	767	773	775	757	726	737	754	748	733	737	727
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.14	<0.05	0.21	0.19	0.17
TDS*	mg/L	500	9812	9248	9990	9840	9830	10200	9690	10600	10400	10548	10500	10100	10700	11400	9980	10900	9940	11100	10200	10900
Water Nutrients																						
Ammonia-N	mg/L	-	4.5	1.6	<1	1.38	1.94	1.85	1.22	0.288	1.73	1.66	1.27	0.622	1.32	1.06	1.78	1.47	1.55	1.36	1.49	1.3
TKN	mg/L	-	2	<1	<1	2.37	2.4	2.38	2.56	1.83	2.07	1.86	2.36	1.79	2.5	1.58	2.78	2.01	1.97	3.55	2.39	1.34
Organics																						
COD	mg/L	-	20	44	24	60	34	41	51	46	59	60	32	59	48	42	106	60	30	43	19	26
TOC	mg/L	-	9	22	10	12.1	9.2	12	10.5	9.5	11.6	9.1	9.1	10.2	13.2	10.6	19.3	10.4	10.1	11.2	10	11.2
Oil & Grease	mg/L	-	1	<1	<1	<0.2	<0.2	6	0.9	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	2	<1	<1	4	<1	1	10
Metals																						
Antimony	mg/L	0.006	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	0.0058	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.006
Barium	mg/L	1	0.03	<0.001	<0.001	0.056	<0.001	<0.004	<0.004	< 0.004	<0.004	0.0083	0.0083	0.0073	0.0061	0.0071	0.0096	0.0075	0.0111	0.0067	0.005	0.0066
Cadmium	mg/L	0.005	< 0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Chromium	mg/L	0.05	< 0.01	<0.006	<0.006	<0.006	0.021	0.012	<0.005	0.008	<0.006	<0.0008	<0.0008	0.0009	<0.0008	0.001	0.001	<0.0008	<0.0008	<0.0008	<0.0009	<0.0009
Cobalt	mg/L	-	0.02	<0.01	0.02	0.01	0.02	0.04	0.02	0.01	<0.01	0.0017	0.002	0.0014	0.0014	0.0021	0.0021	0.0045	0.0059	0.0042	0.0063	0.0058
Copper	mg/L	1	0.05	<0.01	0.02	<0.01	0.01	0.03	<0.02	<0.02	<0.02	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.011	<0.001
Lead	mg/L	0.010	< 0.03	0.06	0.04	<0.04	< 0.04	< 0.04	0.05	<0.04	<0.04	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.005	0.008	<0.002
Mercury	mg/L	0.001	n/a	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	0.02	<0.02	0.03	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	-	< 0.01	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.015	0.004	0.004	0.005	0.005	<0.005	0.007	0.006	0.01	0.011	0.011
Zinc	mg/L	5	0.02	0.018	0.016	0.062	0.007	0.012	0.005	0.005	<0.005	0.0038	0.0013	0.0086	0.0019	0.0224	0.0109	0.0172	0.0042	0.0178	0.0157	0.0331

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.4A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 4A							
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Fall 2004
Field Measurements										
Field pH	-	-	7.52	7.47	7.1	7.42	7.38	7.35	6.25	
Routine Water										
pH	-	6.5 - 8.5	7.44	7.6	7.41	7.46	7.59	7.66	8.1	
Conductivity (EC)	µS/cm	-	10400	10600	11100	10900	10400	10700	10300	
Calcium	mg/L	-	435	407	443	424	445	400	434	
Magnesium	mg/L	-	97.4	93.8	97.1	93.3	100	86.8	96.5	
Sodium	mg/L	200	2840	2770	2870	2880	2550	2520	2610	
Potassium	mg/L	-	13	15	14	13	13	13	11.4	
Iron	mg/L	0.3	0.14	<0.02	0.016	<0.1	<0.1	<0.1	0.023	
Sulphate	mg/L	500	7120	7070	6840	7520	6780	6630	6330	
Chloride	mg/L	250	<0.5	1.2	1.2	0.7	1.6	0.7	2	
Bicarbonate	mg/L	-	731	734	719	735	739	726	720	
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	<5	
Nitrate (N)	mg/L	10	<0.04	0.22	0.12	<0.04	<0.08	<0.08	0.6	
TDS	mg/L	500	10900	10700	10600	11300	10300	10000	9840	
Water Nutrients										
Ammonia-N	mg/L	-	0.83	0.81	0.71	0.67	0.59	0.71	0.3	Decommissioned
TKN	mg/L	-	1.82	1.36	1.89	1.42	1.4	1.93	0.9	
Organics										
COD	mg/L	-	38	23	19	27	36	40	20	
TOC	mg/L	-	10.2	9.6	9.7	9.9	8.8	9.8	9	
Oil & Grease	mg/L	-	<5	<5	<5	<5	5	6	<1	
Metals										
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.002	<0.002	<0.002	0.0509	
Barium	mg/L	1	0.006	0.0105	0.0065	<0.01	<0.01	<0.01	0.014	
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	<0.0001	<0.0001	<0.0001	0.0001	
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	0.007	0.0056	0.0051	<0.005	
Cobalt	mg/L	-	0.021	0.017	0.016	0.0012	0.0016	0.0014	<0.002	
Copper	mg/L	1	<0.01	<0.005	<0.005	0.013	<0.01	0.0120	0.103	
Lead	mg/L	0.010	< 0.02	<0.01	<0.01	<0.001	<0.001	<0.001	0.0004	
Mercury	mg/L	0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Molybdenum	mg/L	-	<0.01	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	
Nickel	mg/L	-	<0.01	0.043	0.029	<0.005	<0.005	0.0082	0.012	
Zinc	mg/L	5	0.03	0.007	0.005	0.031	<0.01	0.0190	0.0540	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.4B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 4B																
			Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Fall 2004
Field Measurements																				
Field pH	-	-	n/a	8	7.9	n/a	8	7.74	7.34	7.61	7.73	7.76	7.92	7.76	7.53	7.86	7.8	7.71	n/a	
Routine Water																				
pH	-	6.5 - 8.5	n/a	8.09	7.74	8.16	7.98	8.14	7.8	7.87	7.98	7.86	7.85	7.9	7.86	7.83	7.89	7.96	8.2	
Conductivity (EC)	µS/cm	-	n/a	7970	8310	7290	8090	8220	7600	8200	8290	7070	7240	7310	7690	7610	7270	7510	7500	
Calcium	mg/L	-	n/a	159	123	134	135	110	125	146	104	109	114	111	118	125	118	112	119	
Magnesium	mg/L	-	n/a	21.1	14.9	14	13.2	15.2	15.1	19.8	11.8	12.8	12.9	13.2	13	14	12	12	12.7	
Sodium	mg/L	200	n/a	2050	2140	2260	2160	2220	1930	2170	2080	1990	1860	1940	2070	2180	1850	1800	1900	
Potassium	mg/L	-	n/a	9	6.97	8.29	7.01	8.56	7.88	4.19	6.9	9	6.2	7.7	7.3	7.3	5.4	6	4.9	
Iron	mg/L	0.3	n/a	0.09	0.11	0.003	0.65	0.553	0.627	0.031	0.216	0.622	0.397	<0.02	0.06	<0.1	<0.1	0.15	0.205	
Sulphate	mg/L	500	n/a	4180	4440	4870	4160	4580	4310	4670	3930	4460	4040	3960	4360	4700	4050	3890	3780	
Chloride	mg/L	250	n/a	5.4	5.8	4.9	4.8	3.6	3.6	2.8	1.1	1.8	1.3	2.9	2.5	1.3	3.7	3.8	3	
Bicarbonate	mg/L	-	n/a	644	632	632	651	663	656	663	665	662	666	665	649	664	648	659	642	
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
TDS	mg/L	500	n/a	6740	7040	7600	6790	7260	6720	7340	6460	6910	6370	6360	6890	7350	6370	6150	6140	
Water Nutrients																				
Ammonia-N	mg/L	-	n/a	2.46	2.51	2.78	2.3	3.38	2.2	2.33	2.12	2.44	1.29	1.83	1.15	1.47	1.04	1.54	0.92	Decommissioned
TKN	mg/L	-	n/a	3.19	3.34	3.69	3.34	3.12	2.33	3.22	3.02	3.08	2.63	2.96	4.05	3.55	3.51	2.92	1.1	
Organics																				
COD	mg/L	-	n/a	33	38	40	74	58	26	36	33	39	56	50	237	67	220	36	20	
TOC	mg/L	-	n/a	8.2	16.1	7.6	11.6	7.4	8	11.8	6.5	7.6	6.8	5.6	6.1	5.3	6	8.8	7	
Oil & Grease	mg/L	-	n/a	<0.2	<0.2	2	6	1	7	1	<1	10	<5	<5	<5	<5	5	6	<1	
Metals																				
Antimony	mg/L	0.006	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.006	<0.05	<0.02	<0.02	<0.002	<0.002	<0.002	0.0009	
Barium	mg/L	1	n/a	0.0416	0.0283	0.0249	0.0494	0.0269	0.0308	0.0188	0.0153	0.0277	0.03	0.0185	0.019	0.021	0.018	0.022	0.018	
Cadmium	mg/L	0.005	n/a	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	<0.005	<0.003	<0.003	<0.0001	0.00015	<0.0001	<0.0001	
Chromium	mg/L	0.05	n/a	0.0012	<0.0008	<0.0008	0.0021	0.0008	<0.0008	<0.0008	<0.0009	0.0014	<0.008	<0.004	<0.004	0.0051	<0.005	0.028	<0.005	
Cobalt	mg/L	-	n/a	0.0014	0.0013	0.0007	<0.0007	0.0034	0.0042	0.0029	0.0041	0.0047	0.015	0.01	0.016	0.0014	<0.001	0.0012	<0.002	
Copper	mg/L	1	n/a	0.005	0.007	0.002	0.003	0.001	<0.001	0.002	0.007	0.003	< 0.01	<0.005	<0.005	<0.01	<0.01	0.012	0.017	
Lead	mg/L	0.010	n/a	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	0.006	<0.002	<0.002	0.018	< 0.01	<0.001	<0.001	< 0.001	0.0002	
Mercury	mg/L	0.001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Molybdenum	mg/L	-	n/a	0.01	0.006	0.005	0.004	0.004	0.003	0.004	0.003	0.002	<0.01	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	
Nickel	mg/L	-	n/a	0.011	0.005	0.004	0.004	0.004	0.002	0.004	0.004	0.002	<0.01	<0.005	0.009	<0.005	<0.005	0.0085	0.002	
Zinc	mg/L	5	n/a	0.0121	<0.0005	0.0463	0.0108	0.0052	0.0077	0.0186	0.0102	0.0204	0.027	0.0035	0.0075	0.014	<0.01	0.023	0.014	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Exceeds Regulatory Limit

Table E.5A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 5A																	
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00
Field Measurements																					
Field pH	-	-	7.4	n/a	7.5	7.9	8.3	7	8.2	8.34	7.8	7.5	6.6	7.6	7.5	n/a	7.5	6.7	7.51	7.21	7.58
Routine Water																					
pH	-	6.5 - 8.5	7.5	7.9	7.8	7.9	7.5	7.4	8	7.91	7.85	7.6	7.8	7.52	7.69	7.86	7.65	7.61	7.52	7.62	7.66
Conductivity (EC)	µS/cm	-	7150	7260	8480	8180	7940	8000	7490	8450	7600	8240	7580	7870	7930	7180	7800	8140	7280	8080	7950
Calcium	mg/L	-	305	215	205	198	194	160	166	188	169	180	184	187	161	185	179	103	166	207	140
Magnesium	mg/L	-	62	62	60	58.7	60	48.8	47.8	58.6	53.7	59	55.5	57.3	55.5	56.1	54.3	58.3	54.4	57	44.4
Sodium	mg/L	200	1885	1990	1970	1980	1930	2000	1800	2050	1960	1981	1960	1970	2040	2170	2080	2120	1770	2070	1950
Potassium	mg/L	-	13	11	12	10.1	9.64	9.63	10.2	10.2	9.26	10	8.8	8.82	8.37	9.13	7.77	10.4	8.09	9.93	7.5
Iron	mg/L	0.3	0.02	<0.02	0.12	5.21	0.04	0.55	<0.04	<0.04	<0.04	<0.003	<0.04	<0.04	0.04	<0.003	0.252	0.146	0.258	0.037	0.078
Sulphate	mg/L	500	5960	3730	4200	4080	3870	3850	3590	4390	4020	3774	4150	4070	4290	4770	4070	4430	3940	4650	3750
Chloride	mg/L	250	7	<1	26	1	0.9	1.3	1.4	0.4	1.3	8	1.6	38.1	1.3	1.3	1.9	< 0.5	1.5	< 0.5	< 0.5
Bicarbonate	mg/L	-	842	864	874	679	879	864	876	877	870	856	887	872	856	866	874	876	870	866	863
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.05	<0.05	0.27	0.18
TDS*	mg/L	500	6776	6700	7100	6760	6500	6490	6040	7120	6640	6870	6790	6760	6970	7620	6820	7160	6400	7420	6320
Water Nutrients																					
Ammonia-N	mg/L	-	3.5	<1	<1	1.29	1.05	1.35	0.892	0.964	0.732	1.63	0.888	0.769	0.599	0.39	0.81	0.87	0.5	0.79	0.52
TKN	mg/L	-	3	<1	<1	3.21	1.81	1.97	1.85	1.94	1.62	1.25	2.11	2.03	1.42	1.28	1.68	1.71	1.07	2.03	1.51
Organics																					
COD	mg/L	-	45	36	52	138	51	51	85	58	77	45	44	54	104	63	68	50	49	48	34
TOC	mg/L	-	21	36	19	12.1	16.6	15.5	18	17.9	14.8	25.4	15.9	18.4	25.7	18.7	22.6	18.9	18.4	21	18
Oil & Grease	mg/L	-	1	<1	<1	<0.2	<0.2	5	0.4	0.8	0.2	< 0.2	<0.2	0.5	<0.2	9	1	<1	<1	<1	2
Metals																					
Antimony	mg/L	0.006	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	0.0024	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.006
Barium	mg/L	1	0.02	<0.001	0.004	0.01	<0.001	<0.004	<0.004	<0.004	<0.004	0.0078	0.01	0.008	0.007	0.0078	0.0098	0.0075	0.0091	0.0067	0.0058
Cadmium	mg/L	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006
Chromium	mg/L	0.05	<0.01	<0.006	<0.006	<0.006	0.012	<0.005	<0.005	<0.006	<0.006	0.0009	<0.0008	<0.0008	<0.0008	<0.0008	0.0012	0.001	<0.0008	<0.0008	<0.0009
Cobalt	mg/L	-	<0.01	<0.01	<0.01	<0.01	0.01	0.03	0.01	<0.01	<0.01	0.0014	0.002	0.0014	0.0014	0.0014	0.0012	0.0036	0.0047	0.0041	0.0047
Copper	mg/L	1	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.02	<0.02	<0.02	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002
Lead	mg/L	0.010	<0.03	<0.04	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.005	<0.002
Mercury	mg/L	0.001	n/a	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	-	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.004	0.003	0.004	0.004	0.003	0.003	0.005	0.002	0.005	0.005
Zinc	mg/L	5	<0.01	0.02	0.032	0.039	0.016	0.016	0.007	0.007	< 0.005	0.002	0.017	0.0423	0.0101	0.0247	0.0113	0.0232	0.0109	0.0427	0.0183

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.5A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 5A																					
			Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																									
Field pH	-	-	7.11	7.56	7.11	7.55	7.52	7.48	7.44	7.56	7.42	7.21	7.55	7.31	7.36	7.14	7.21	7.48	7.6	8.65	7.63	7.35	6.41	7.8	7.8	6.15
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.13	18.13 (EF)	8.47	8.03	1.77	9.67	7.78	3.695	4.5	9.11	3.86	1.03	9.71	10.05	12.74
Field Temperature	^{o}C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.1	8.3	5.7	9.7	6.2	11.22	5.6	9.5	9.6	11.1	8.3	6.5	6.0	7.1	n/a
Routine Water																										
pH	-	6.5 - 8.5	7.66	7.57	7.65	7.7	7.53	7.93	7.72	8.1	8.0	8.0	8.2	8.0	8.3	8.1	7.9	8	8.17	8.05	7.94	7.97	8.11	8.18	7.83	8.00
Conductivity (EC)	µS/cm	-	7520	7400	8100	7880	8350	7660	8320	7730	8110	7830	7000	8050	8450	8240	8380	7770	7920	8850	8800	8800	9200	9200	9500	9600
Calcium	mg/L	-	179	179	199	187	208	207	203	192	169	215	209	209	221	221	189	195	178	202	200	220	230	260	250	270
Magnesium	mg/L	-	62.9	56.7	70.5	58	66	70.5	67.8	61.5	70.1	71	82.2	66.9	81.8	80.8	71.2	67.7	58.4	70.6	65	73	77	95	100	95
Sodium	mg/L	200	2110	1900	2090	2080	2220	1900	1950	1900	2030	2010	2180	1930	2040	2070	2050	1890	1800	1990	2000	2300	2100	2400	2300	2100
Potassium	mg/L	-	11.6	7.3	9.8	8.3	8.7	6.3	8.5	6.7	9.3	9.4	10.0	9.1	10.5	10.5	6.4	5.5	8.8	9.28	8.2	10	9.1	10	10	11
Iron	mg/L	0.3	0.011	0.11	<0.02	<0.02	<0.1	<0.1	<0.1	0.012	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.005	0.011	<0.005	<0.0050	<0.010	<0.06	<0.060	<0.06	<0.60	<0.60	<0.060
Sulphate	mg/L	500	5010	4220	4640	4580	5060	4480	4600	4060	4420	3960	4650	4100	4290	4220	4220	3890	3900	4540 *	4500	5000	5200	5500	5500	5200
Chloride	mg/L	250	< 0.5	< 0.5	1.0	1.3	< 0.5	1.4	1.6	1.0	2.0	2.0	2.0	2.0	2.0	2.0	<1	3	3.09	<10 *	2	2.4	1.7	2.6	2.4	2.1
Bicarbonate	mg/L	-	863	855	852	829	836	782	819	816	816	809	829	805	767	790	786	837	815	787	750	730	740	740	730	660
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.17	<0.04	0.22	0.046	<0.04	<0.04	0.29	0.7	0.4	0.4	0.2	0.3	0.4	0.5	0.3	0.7	0.56	<1.0 *	0.08	0.34	0.46	0.3	0.058	0.20
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.031	0.069
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.089	0.27
TDS*	mg/L	500	7650	6780	7430	7320	7980	7050	7230	6630	7100	6670	7540	6710	7030	6990	6920	6470	6350	7200	7200	7900	7900	8600	8500	8000
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1000	1100
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	540
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.96	0.93
Water Nutrients		-																								
Ammonia-N	mg/L		0.74	0.29	0.38	0.5	0.25	0.13	0.29	< 0.05	0.33	0.07	0.48	0.26	0.47	0.16	0.17	<0.05	0.053	<0.050	0.64	0.59	0.55	0.52	1.0	0.67
TKN	mg/L	-	1.52	1.31	1.44	1.66	1.39	1.14	1.57	0.9	1.0	1.0	1.6	1.2	1.8	1.3	1.0	1.7	1.77	1.61	1.8	1.7	1.5	1.6	2.2	1.3
Hydrocarbons		-																								
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics		-																								
COD	mg/L	-	50	55	53	39	56	55	53	50	50	59	59	55	59	59	53	46	57	63.4	85	69	75	63	71	64
TOC	mg/L	-	19	20.4	20.8	18.5	19	15.3	23.3	19	23	23	23	22	24	23	22	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	21	19.8	24.4	25	23	25	21	28	24
Oil & Grease	mg/L	-	2	<5	<5	<5	<5	<5	6	<1	<1	<1	<1	4	2	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals		-																								
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	<0.0030
Antimony	mg/L	0.006	<0.006	<0.05	<0.02	<0.02	<0.002	<0.002	<0.002	0.001	0.0013	0.001	<0.0004	0.0009	0.0008	<0.0004	0.0007	n/a	n/a	<0.00040	<0.006	<0.0060	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00058
Barium	mg/L	1	0.0063	0.006	0.012	0.0075	<0.01	<0.01	<0.01	0.007	0.007	0.009	0.007	0.007	0.007	0.008	0.007	0.008	0.0065	0.0072	<0.01	<0.010	<0.010	<0.10	<0.10	<0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.60	0.56
Cadmium	mg/L	0.005	<0.0006	<0.005	<0.003	<0.003	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0010	<0.000050	<0.000050	<0.050	<0.000050	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.0009	<0.008	<0.004	<0.004	0.0055	<0.005	0.0082	<0.005	<0.005	<0.005	0.007	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	0.006	0.016	0.012	0.015	0.0016	0.0015	0.0016	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00086
Copper	mg/L	1	0.001	<0.01	<0.005	<0.005	<0.01	<0.01	0.011	0.02	0.016	0.012	0.013	0.008	0.01	0.005	0.005	0.008	0.0078	0.0105	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.0057
Lead	mg/L	0.010	<0.002	<0.02	0.016	0.01	<0.001	<0.001	<0.001	0.0008	<0.005	<0.0001	<0.0001	0.0002	<0.0001	0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.68	0.63
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.15	0.15
Mercury	mg/L	0.001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.000004	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.001	<0.01	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00080
Nickel	mg/L	-	0.004	<0.01	0.015	0.018	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.007	<0.002	0.007	0.006	0.007	0.0089	<0.005	<0.0050	<0.0050	<0.0050	0.0065	0.0086
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<1.0	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.4	4.6
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.0	4.6
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1700	1800
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.00031
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	0.0332	0.025	0.021	0.005	0.022	<0.01	0.018	0.031	0.028	0.025	0.018	0.015	0.003	0.041	0.013	0.013	0.007	0.0115	<0.03	<0.030	<0.030	<0.030	<0.030	0.0033

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

parameter not reported

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.5B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 5B												
			Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03
Field Measurements															
Field pH	-	-	8.4	n/a	8.1	7.73	7.62	7.97	7.7	7.72	7.67	7.72	7.99	8.15	7.69
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Routine Water															
pH	-	6.5 - 8.5	8.19	8.34	8.38	8.04	8.18	8.27	8.25	8.18	8.18	8.19	8.02	8.05	8.15
Conductivity (EC)	µS/cm	-	3600	3050	3410	3380	3190	3290	3310	3190	3060	3040	2970	3150	3020
Calcium	mg/L	-	16.3	19.2	19.4	31.8	15.6	17.2	14.1	15.4	15.7	14.2	14.7	15.2	14
Magnesium	mg/L	-	2.2	3.7	4.6	1.9	2.3	2.9	2.05	1.55	2.34	1.6	1.9	1.6	<2
Sodium	mg/L	200	827	950	933	897	813	886	777	833	875	775	838	900	800
Potassium	mg/L	-	3.66	5.61	5.63	3.4	4.01	4.29	3.2	5.1	3.7	2.6	2.7	2.8	<4
Iron	mg/L	0.3	0.11	0.308	2.31	0.011	0.567	0.153	n/a	n/a	n/a	<0.02	n/a	<0.05	< 0.1
Sulphate	mg/L	500	1270	1260	1080	1080	984	930	818	861	827	774	812	893	879
Chloride	mg/L	250	14.5	11.7	18.9	15.1	10.2	8.9	9.8	10.4	7.1	6.1	7.2	6.9	7.3
Bicarbonate	mg/L	-	615	765	859	966	1020	1030	1100	1080	1140	1130	1160	1160	1160
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6	<6	<6	<6	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	12.6	10.7	12.5	10.7	11.1	8.87	9.72	8.62	11.4	10.4
TDS*	mg/L	500	2430	2630	2510	2500	2330	2360	2160	2260	2290	2130	2250	2390	2270
Water Nutrients															
Ammonia-N	mg/L	-	1.02	< 0.05	0.33	0.46	0.68	0.54	0.63	0.66	0.4	0.39	0.46	0.25	0.37
TKN	mg/L	-	3.95	1.7	2.74	1.74	1.43	1.89	1.83	1.4	1.46	1.12	1.66	1.9	1.4
Organics															
COD	mg/L	-	328	113	208	101	n/a	61	<5	33	34	22	31	65	41
TOC	mg/L	-	13.9	12.2	13.7	9.4	n/a	7.7	9.5	9.8	11.6	9.3	9.4	9.1	10
Oil & Grease	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	3	n/a	n/a	<5	10	n/a	2
Metals															
Antimony	mg/L	0.006	n/a	<0.005	<0.005	<0.005	<0.005	0.005	n/a	n/a	n/a	n/a	n/a	0.0006	0.0053
Barium	mg/L	1	n/a	0.0289	0.0736	0.0219	0.0288	0.0291	n/a	n/a	n/a	n/a	n/a	0.026	0.045
Cadmium	mg/L	0.005	n/a	<0.0005	0.001	<0.0005	<0.005	<0.0005	n/a	n/a	n/a	n/a	n/a	<0.00001	<0.00001
Chromium	mg/L	0.05	n/a	0.0008	0.0018	0.0008	<0.0008	<0.0008	n/a	n/a	n/a	n/a	n/a	<0.0005	<0.005
Cobalt	mg/L	-	n/a	<0.0007	0.0036	0.0031	0.003	0.0019	n/a	n/a	n/a	n/a	n/a	0.0003	<0.001
Copper	mg/L	1	n/a	0.003	0.014	0.003	0.002	0.003	n/a	n/a	n/a	n/a	n/a	0.004	<0.01
Lead	mg/L	0.010	n/a	<0.002	0.005	<0.002	<0.002	<0.002	n/a	n/a	n/a	n/a	n/a	0.0002	< 0.001
Mercury	mg/L	0.001	n/a	<0.0001	<0.0001	<0.0001	n/a	<0.0001	n/a	n/a	n/a	n/a	n/a	n/a	<0.00001
Molybdenum	mg/L	-	n/a	0.024	0.01	0.013	0.01	0.01	n/a	n/a	n/a	n/a	n/a	0.008	<0.01
Nickel	mg/L	-	n/a	0.005	0.01	0.003	0.002	0.003	n/a	n/a	n/a	n/a	n/a	0.0018	0.0072
Zinc	mg/L	5	n/a	0.009	0.0216	0.009	0.0008	0.0056	n/a	n/a	n/a	n/a	n/a	0.073	<0.01

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Exceeds Regulatory Limit

Table E.5B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 5B																	
			Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Jan-07	Apr-07	Oct-07	May-08	May-09	10-Jun	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																					
Field pH	-	-	7.95	7.47	7.96	7.56	7.64	7.73	8.10	n/a[1]	7.84	7.78	7.88	n/a[1]	7.93	8.45	7.91	6.9	8.3	8.3	n/a
Field EC	mS	-	n/a	n/a	n/a	3.9	6.99[(EF)]	3.36	9.47	n/a[1]	6.82	6.94	3.16	n/a[1]	11.6	1.25	2.65	2.53	2.43	2.89	n/a
Field Temperature	°C	-	n/a	n/a	n/a	10.1	3.3	9.6	5.9	n/a[1]	9.2	9.52	9	n/a[1]	6.1	11.4	12.5	10.7	10.0	9.3	n/a
Routine Water																					
pH	-	6.5 - 8.5	8.16	8.4	8.3	8.3	8.4	8.4	8.3	8.2	8.6	8.1	8.4	8.29	7.55	8.26	8.01	8.37	8.56	8.28	8.34
Conductivity (EC)	µS/cm	-	3720	3430	3430	3320	3310	3260	7760	3220	3260	3350	3190	2550	423	1000	2200	2200	2700	2700	3000
Calcium	mg/L	-	25.2	17.9	8.2	18.3	16.4	16.9	191	16.3	15.8	16.4	14.8	13.3	55.3	23	67	61	23	13	13
Magnesium	mg/L	-	2.7	2.1	2.2	2.2	2.2	1.7	189	1.7	1.4	1.2	1.8	1.59	8.18	5.7	25	26	11	16	3.2
Sodium	mg/L	200	982	918	863	837	832	807	3780	822	826	839	736	594	17.6	210	430	390	570	600	750
Potassium	mg/L	-	3.7	3.2	3.1	2.7	3.2	3.5	12.3	3.2	4.1	2.3	2.4	3.48	2.59	2.4	2.8	2.6	3.7	3.6	4.2
Iron	mg/L	0.3	<0.05	0.019	0.008	0.037	<0.005	0.010	<0.005	n/a[1]	0.103	0.022	0.026	0.0802	<0.010	<0.06	<0.060	<0.060	0.13	<0.060	<0.060
Sulphate	mg/L	500	1260	1000	939	824	890	789	7040	744	745	779	675	527	158	270	600	560	630	600	650
Chloride	mg/L	250	7	8	9	9	9	10	241	8	8	9	12	10.5	2.05	17	61	45	30	24	16
Bicarbonate	mg/L	-	1030	1070	1100	1160	1150	1160	1440	1190	1160	1250	1210	972	41.9	290	660	690	950	1000	1200
Carbonate	mg/L	-	<6	19	14	7	20	26	7	<5	39	<5	27	<5.0	<5.0	<0.5	<0.50	9	36	<0.50	5
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	8.56	10	7.9	3.4	0.7	1.5	0.2	3.5	5.7	9.8	4.4	4.75	0.209	0.55	0.43	0.29	0.93	1.1	0.36
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.082	0.051
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.2	0.41
TDS*	mg/L	500	2780	2540	2420	2290	2340	2230	12200	2200	2230	2310	2090	1650	265	670	1500	1400	1800	1800	2000
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	97	45
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	840	970
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	4.2
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.93	1.0
Water Nutrients																					
Ammonia-N	mg/L	-	0.49	0.54	0.43	0.09	0.81	0.24	<0.05	n/a	0.15	0.49	0.59	0.292	<0.050	0.19	0.29	0.2	0.36	0.50	0.10
TKN	mg/L	-	0.79	5.5	1.3	0.9	1.1	0.7	1.8	n/a	1.1	1.1	0.1	3.51	0.64	0.66	0.87	0.65	1.1	1.4	0.49
Hydrocarbons																					
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.1	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.05	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																					
COD	mg/L	-	47	30	20	35	19	26	70	n/a	25	45	24	25.6	12.4	37	39	25	52	56	23
TOC	mg/L	-	8.5	9	9	9	8	10	16	n/a	9	9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10	7.9	2.2	6.7	4.7	3.9	5.2	6.1	7.2
Oil & Grease	mg/L	-	n/a	<1	<1	<1	<1	<1	<1	n/a	<1	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																					
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0049	0.0062
Antimony	mg/L	0.006	<0.002	0.0011	0.0014	0.0012	0.0006	0.0012	0.0008	n/a	0.0028	0.0010	n/a	n/a	0.00553	<0.006	0.00074	0.00075	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00068	0.00094
Barium	mg/L	1	0.02	0.026	0.026	0.024	0.034	0.027	0.014	n/a	0.106	0.024	0.062	0.0339	0.0369	0.025	0.034	0.022	0.027	0.016	0.018
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.53	0.84
Cadmium	mg/L	0.005	0.0004	<0.001	<0.001	<0.00001	<0.00001	<0.00001	<0.00001	n/a	<0.0001	<0.0001	<0.001	<0.0010	0.000078	<0.000050	0.000095	0.000053	<0.000025	<0.00002	<0.000020
Chromium	mg/L	0.05	<0.005	<005	< 0.005	<0.005	<0.005	<0.005	0.012	n/a	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.0010	0.01	0.011	0.0082	0.010
Cobalt	mg/L	-	<0.001	<0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	n/a	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	0.00065	0.0003	<0.0003	<0.00030	0.00040
Copper	mg/L	1	<0.01	0.008	0.01	0.008	0.006	0.005	0.02	n/a	0.009	0.002	0.002	0.006	0.0011	<0.002	0.0026	0.0051	0.0033	0.0015	0.0033
Lead	mg/L	0.010	<0.001	<0.005	< 0.005	<0.0001	<0.0001	0.0004	<0.00001	n/a	0.0002	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.15	0.16
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.024	0.026
Mercury	mg/L	0.001	<0.00001	<0.0002	< 0.0002	<0.00001	<0.00001	<0.00001	<0.00001	n/a	<0.0001	<0.0001	0.0001	<0.0001	<0.00010	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.01	0.006	0.005	0.006	0.005	0.005	<0.005	n/a	0.021	<0.005	0.014	0.0098	0.0233	0.02	0.0059	0.0037	0.0061	0.0059	0.010
Nickel	mg/L	-	<0.005	0.003	0.004	0.004	0.004	0.004	0.014	n/a	0.008	0.003	<0.002	0.0052	0.0165	<0.005	0.021	0.013	0.0077	0.0077	0.013
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.7	3.1
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.41	0.28
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	180	210
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.011	0.0041
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0045	0.0069
Zinc	mg/L	5	0.019	0.021	0.018	0.011	0.008	0.01	0.008	n/a	0.019	0.012	0.005	0.0168	0.0068	<0.03	0.01	0.01	0.0033	<0.0030	0.0033

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Insufficient amount of water available during time of sampling for routine analysis (n/a[1])

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Field Data - May 2015

Date	28-May-15
Well Depth (mbtoc)	4.828
Volume Purged (L)	18 (dry)
Sampling Date	28-May-15
Static Water Level (mbtoc)	4.828

Table E.6: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 6														
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Summer 1998
Field Measurements																		
Field pH	-	-	7.6	n/a	7.7	8	8.2	7.7	8.3	8.52	7.8	7.8	7.1	7.6	7.65	n/a	7.6	
Routine Water																		
pH	-	6.5 - 8.5	7.6	8.1	8.1	7.8	7.6	7.6	8	8.1	7.88	7.7	7.91	7.72	7.85	7.9	7.77	
Conductivity (EC)	µS/cm	-	7970	7690	4400	8950	8710	8980	8600	9010	8340	9000	8600	8420	8540	7690	8250	
Calcium	mg/L	-	144	89	92	81.3	81.6	69.7	73.8	72.4	70.8	80	76.7	71.6	67.5	68.6	72.4	
Magnesium	mg/L	-	34	30	31	30.7	29.3	23.4	28.2	27.7	27.5	34	28.1	26.9	27.5	25.3	24.4	
Sodium	mg/L	200	2275	2330	2340	2310	2260	2240	2210	2350	2350	2282	2340	2280	2330	2430	2440	
Potassium	mg/L	-	15	13	13	10.4	11.1	10.8	11.6	11.9	10.8	11	9.84	9.64	9.63	10.6	8.25	
Iron	mg/L	0.3	0.04	<0.02	0.11	1.28	0.24	0.49	<0.04	<0.04	<0.04	0.067	<0.04	<0.04	<0.04	0.021	0.089	
Sulphate	mg/L	500	4060	3710	5200	4120	3980	4020	3870	4300	4080	4144	4350	3990	4200	4560	3920	
Chloride	mg/L	250	1	<1	13	1.2	1.3	1.7	1.4	0.9	1.2	5	1.8	21.8	0.9	1.6	1.6	
Bicarbonate	mg/L	-	1181	1130	1240	1250	1230	1220	1230	1250	1240	1238	1230	1240	1230	1250	1240	
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Nitrate (N)	mg/L	10	<1	<1	<1	<0.05	0.12	0.09	0.16	0.06	0.17	<1	0.34	<0.05	0.22	0.12	0.06	
TDS	mg/L	500	7308	7100	7364	7170	6970	6960	6800	7380	7140	7795	7410	7010	7240	7720	7080	
Water Nutrients																		
Ammonia-N	mg/L	-	3.5	<1	<1	0.923	0.918	0.99	0.521	0.601	0.664	0.956	0.301	0.472	0.216	0.52	0.58	Decommissioned
TKN	mg/L	-	1	<1	<1	1.55	1.26	1.35	0.8	1.26	0.94	0.9	0.97	1.22	0.45	0.8	0.99	
Organics																		
COD	mg/L	-	15	36	14	39	33	36	47	29	38	23	14	20	16	38	30	
TOC	mg/L	-	8	22	7	8.9	7.3	7.6	8.5	8.7	7.7	8.1	7.8	7.9	12.2	8.7	10.5	
Oil & Grease	mg/L	-	1	<1	<1	<0.2	<0.2	1	1.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	2	10	
Metals																		
Antimony	mg/L	0.006	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	0.0069	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Barium	mg/L	1	0.03	0.013	0.008	0.014	0.004	0.008	<0.004	<0.004	<0.004	0.0057	0.009	0.0055	0.0055	0.0063	0.0068	
Cadmium	mg/L	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chromium	mg/L	0.05	<0.01	<0.006	<0.006	<0.006	0.011	<0.005	<0.005	<0.006	<0.006	0.0013	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	
Cobalt	mg/L	-	<0.01	<0.01	0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.001	<0.0008	<0.0007	<0.0007	<0.0007	<0.0007	
Copper	mg/L	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	0.002	0.001	<0.001	<0.001	<0.001	<0.001	
Lead	mg/L	0.010	<0.03	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.002	<0.002	<0.002	<0.002	<0.002	0.004	
Mercury	mg/L	0.001	n/a	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Molybdenum	mg/L	-	<0.01	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.001	0.001	0.001	<0.001	<0.001	<0.001	
Nickel	mg/L	-	0.09	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	
Zinc	mg/L	5	<0.01	0.019	0.017	0.046	0.014	0.011	<0.005	<0.005	<0.005	0.0015	0.0087	0.0199	0.0018	0.0184	0.0112	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Exceeds Regulatory Limit

Table E.7: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 7	
			Apr-91	
Field Measurements				
Field pH	-	-	7.4	
Routine Water				
pH	-	6.5 - 8.5	7.5	
Conductivity (EC)	µS/cm	-	3260	
Calcium	mg/L	-	64	
Magnesium	mg/L	-	19	
Sodium	mg/L	200	805	
Potassium	mg/L	-	13	
Iron	mg/L	0.3	0.34	
Sulphate	mg/L	500	840	
Chloride	mg/L	250	5	
Bicarbonate	mg/L	-	1584	
Carbonate	mg/L	-	n/a	
Nitrate (N)	mg/L	10	<1	**Decommissioned Replaced by MW-14 in August 1992**
TDS	mg/L	500	2660	
Total Kjeldahl Nitrogen				
Ammonia-N	mg/L	-	2.8	
TKN	mg/L	-	2	
Organics				
COD	mg/L	-	40	
TOC	mg/L	-	19	
Oil & Grease	mg/L	-	1	
Metals				
Antimony	mg/L	0.006	<0.0005	
Barium	mg/L	1	0.1	
Cadmium	mg/L	0.005	<0.01	
Chromium	mg/L	0.05	<0.01	
Cobalt	mg/L	-	<0.01	
Copper	mg/L	1	<0.01	
Lead	mg/L	0.010	<0.03	
Mercury	mg/L	0.001	<0.01	
Molybdenum	mg/L	-	<0.01	
Nickel	mg/L	-	<0.01	
Zinc	mg/L	5		

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Exceeds Regulatory Limit

Table E.8: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 8																		
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																						
Field pH	-	-	7.8	n/a	n/a	8.1	8.5	7.2	8.3	8.47	7.8	7.6	7.3	7.7	7.7	7.7	7.6	7.09	7.1	7.23	7.48	7.64
Routine Water																						
pH	-	6.5 - 8.5	7.8	n/a	n/a	7.5	7.7	7.6	8	7.96	7.92	7.7	7.96	7.74	7.74	7.99	7.85	7.77	7.72	7.78	7.81	7.79
Conductivity (EC)	µS/cm	-	5870	5570	n/a	6530	6540	6550	6490	6670	6360	6760	6300	6210	6320	5690	5970	6110	5630	5920	6120	5340
Calcium	mg/L	-	158	89	n/a	88.5	94.7	72.1	86.7	81.9	80.5	84	84.8	76.7	72	71	73.9	26.3	69.3	73.4	60.3	56.9
Magnesium	mg/L	-	48	38	n/a	41.1	43.5	34.1	39.9	37.3	36.1	44	38.4	36	35.7	31.6	31.7	32.8	33.8	28.9	27.3	28.7
Sodium	mg/L	200	1445	1590	n/a	1590	1630	1710	1570	1690	1520	1641	1630	1520	1600	1630	1550	1630	1420	1510	1500	1510
Potassium	mg/L	-	8.3	7.6	n/a	6.35	6.2	6.29	7.16	6.69	6.28	6	5.56	5.42	3.8	6.91	4.3	6.31	5.03	6.26	4.4	6.2
Iron	mg/L	0.3	0.06	<0.02	n/a	4.54	0.07	0.83	<0.04	<0.04	0.06	<0.003	<0.04	0.09	<0.04	0.016	0.425	0.52	0.799	0.015	0.266	0.021
Sulphate	mg/L	500	4906	2470	n/a	2770	2880	2800	2750	3040	2660	2921	2920	2570	2820	2900	2460	2790	2560	2640	2250	2700
Chloride	mg/L	250	1	4	n/a	3.8	4.1	4.5	5.4	5.4	7.8	< 1	14.1	29	19.9	21.5	23.7	26.1	27.5	30	30.5	33
Bicarbonate	mg/L	-	1069	1080	n/a	1110	1100	1100	1090	1100	1100	1074	1100	1110	1090	1120	1120	1150	1140	1140	1130	1150
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.2	<0.05	0.19	0.302	<0.04
TDS*	mg/L	500	5144	4900	n/a	5050	5190	5160	4990	5400	4850	5771	5230	4780	5080	5200	4700	5070	4650	4850	4430	4870
Total Kjeldahl Nitrogen																						
Ammonia-N	mg/L	-	2.7	<1	n/a	0.607	0.399	0.88	0.577	0.529	0.642	0.792	0.361	0.279	0.239	0.26	0.49	0.45	0.41	0.31	0.19	0.38
TKN	mg/L	-	1	<1	n/a	1.73	1.35	1.45	1.35	1.22	1.22	1.11	1.17	1.25	0.94	0.77	1.06	1	0.89	1.01	1.03	0.99
Organics																						
COD	mg/L	-	17	36	n/a	64	36	31	41	33	46	33	28	37	25	33	40	55	36	35	24	29
TOC	mg/L	-	12	25	n/a	4.1	10.5	12.2	10.4	10.5	10.9	9.9	10.2	11.2	13	12.5	14.7	12.5	12.9	13.7	12.8	14
Oil & Grease	mg/L	-	1	<1	n/a	<0.2	<0.2	5	<0.3	0.4	0.4	0.4	0.3	<0.2	<0.2	24	<1	<1	1	1	2	6
Metals																						
Antimony	mg/L	0.006	<0.0005	<0.0005	n/a	<0.0005	<0.0005	<0.0005	0.0088	<0.0005	<0.0005	< 0.005	<0.005	0.028	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.006
Barium	mg/L	1	0.03	0.016	n/a	0.024	0.006	0.01	<0.004	0.005	<0.004	0.0088	0.0071	0.008	0.0059	0.0078	0.0134	0.0133	0.0147	0.0063	0.0059	0.0067
Cadmium	mg/L	0.005	<0.01	<0.003	n/a	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Chromium	mg/L	0.05	<0.01	<0.006	n/a	<0.006	0.012	<0.005	<0.005	<0.006	<0.006	< 0.0008	<0.0008	0.0009	<0.0008	0.002	0.0013	0.0008	<0.0008	<0.0008	<0.0009	<0.0009
Cobalt	mg/L	-	<0.01	<0.01	n/a	<0.01	0.01	0.03	<0.01	<0.01	<0.01	0.0009	0.0008	0.001	0.001	<0.0007	0.001	0.0037	0.004	0.0034	0.0046	0.0041
Copper	mg/L	1	0.02	<0.01	n/a	<0.01	<0.01	0.02	<0.02	<0.02	<0.02	0.008	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
Lead	mg/L	0.010	<0.03	<0.04	n/a	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.002	<0.002	<0.002	<0.002	<0.002	0.004	0.003	<0.002	0.004	0.009	<0.002
Mercury	mg/L	0.001	n/a	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	<0.01	<0.02	n/a	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	-	<0.01	<0.02	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.002	0.001	0.002	0.002	0.002	0.002	0.004	0.002	0.005	0.005	0.002
Zinc	mg/L	5	<0.01	0.015	n/a	0.037	0.014	0.014	<0.005	<0.005	<0.005	0.0033	0.0083	0.0121	0.001	0.0127	0.0091	0.0182	0.0174	0.0444	0.0352	0.0227

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.8: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 8																		
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	June-10	Jun-11	May-12	Jun-12
Field Measurements																						
Field pH	-	-	7.99	7.64	7.95	7.72	7.71	7.73	7.13	7.65	7.25	7.54	7.49	7.66	7.59	7.51	7.66	7.618	7.9	7.8	7.5	
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.8	22 (EF)	5.77	5.69	14	14	5.62	5.950	2.6	6.33	2.65	
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.7	6.2	2.9	8.4	7.9	11.22	10.7	6.7	16.6	13.2	9.9	
Routine Water																						
pH	-	6.5 - 8.5	7.8	7.78	7.79	7.82	8.02	8.0	8.3	8.2	8.2	8.3	8.1	8.4	8.3	8.0	8.2	8.19	8.2	8.1	8.19	
Conductivity (EC)	µS/cm	-	5200	5570	5620	5630	5490	5630	5620	5570	5460	7420	5720	5840	6070	6030	5840	5920	6020	6200	6200	
Calcium	mg/L	-	61.1	55.8	62.3	59.2	67.7	57.3	65.7	28.6	64.1	85.9	68.8	65.9	69.2	70.6	70.4	67.5	69.8	73	74	
Magnesium	mg/L	-	28.1	26.3	30.2	27.6	29.9	25.1	29.3	26.2	28	61.9	28.3	30.5	32.0	31.4	33.1	28.7	30.7	32	33	
Sodium	mg/L	200	1340	1320	1520	1470	1330	1350	1400	1400	1370	2350	1400	1450	1490	1580	1430	1410	1420	1500	1600	
Potassium	mg/L	-	<4	4.9	4.7	5.1	3.3	<4	2.4	5.2	4.6	10.3	4.7	5.8	6.0	4.4	2.2	5.14	5.33	5.5	5.1	
Iron	mg/L	0.3	0.052	<0.02	<0.02	<0.05	<0.05	<0.1	0.25	0.276	0.008	<0.005	<0.005	<0.005	0.005	0.021	<0.005	<0.03	0.014	<0.06	<0.060	
Sulphate	mg/L	500	2270	2290	2510	2510	2460	2330	2260	2270	2100	4100	2310	2300	2250	2510	2260	2360	2320	2500	2600	
Chloride	mg/L	250	30.4	35	35.5	33.7	31.1	36.8	32	37	38	2	39	41	46	43	48	44.8	38 *	54	48	
Bicarbonate	mg/L	-	1160	1160	1130	1150	1140	1140	1130	1150	1110	1390	1120	1060	1140	1140	1200	1180	1170	1100	1200	
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	<5	<5	<5	6	5230	24	9	<5	<5	<5.0	<5.0	<0.5	<0.50	
Nitrate (N)	mg/L	10	<0.04	0.237	0.029	<0.04	<0.04	<0.04	0.4	0.2	<0.1	<0.1	0.2	0.2	0.3	0.2	0.3	0.067	<1.0 *	0.1	0.091	
TDS*	mg/L	500	4300	4300	4720	4670	4490	4370	4350	4330	4150	7300	4400	4440	4460	4800	4430	4500	4460	4700	5000	
Water Nutrients																						
Ammonia-N	mg/L	-	0.15	0.14	0.47	0.14	0.25	0.34	0.14	0.26	0.18	1.16	0.38	0.35	<0.05	0.19	<0.05	0.256	<0.050	0.34	0.33	
TKN	mg/L	-	0.84	0.92	1.45	1.12	1.27	1.37	0.8	0.8	0.8	2.0	1.0	1.1	0.8	0.9	1.3	1.33	1.28	1.3	1.2	
Hydrocarbons																						
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	
Organics																						
COD	mg/L	-	32	26	42	30	71	33	30	20	33	30	33	30	34	34	31	30.1	31.6	51	44	
TOC	mg/L	-	12.9	12.4	11.4	12.2	12.4	12.3	11	10	13	13	12	12	12	13	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	11.4	12.3	14	12	
Oil & Grease	mg/L	-	<5	<5	<5	<5	<5	6	<1	<1	<1	<1	<1	1	<1	<1	n/a	n/a	n/a	n/a	n/a	
Metals																						
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.001	<0.001	<0.002	0.0008	0.0009	0.0008	<0.0004	0.0006	0.0007	<0.0004	0.0009	-	-	<0.00040	<0.006	<0.0060	
Barium	mg/L	1	0.008	0.0085	0.0055	0.009	0.007	0.014	0.006	0.017	0.01	0.023	0.009	0.005	0.009	0.007	0.01	0.0054	0.0073	<0.01	<0.010	
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	0.0101	<0.00005	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0010	<0.000050	<0.000050	0.000071	
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	0.0067	0.0066	0.0089	<0.005	<0.005	<0.005	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	
Cobalt	mg/L	-	0.013	0.01	0.012	0.0013	0.0024	0.0028	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	
Copper	mg/L	1	<0.01	<0.005	0.008	0.006	0.005	<0.01	0.017	0.017	0.01	0.010	0.005	0.007	0.005	0.003	0.005	0.0057	0.0064	<0.002	<0.0020	
Lead	mg/L	0.010	< 0.02	<0.01	<0.01	<0.0005	<0.0005	<0.001	0.0001	<0.005	0.0005	<0.0001	0.0006	<0.0001	0.0002	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	
Mercury	mg/L	0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0002	<0.00010	<0.00010	<0.000005	<0.0020	
Molybdenum	mg/L	-	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.0050	<0.0050	<0.002	<0.0020	
Nickel	mg/L	-	<0.01	0.006	0.01	0.0282	<0.003	0.0065	0.005	0.003	0.002	0.005	<0.002	0.004	0.002	0.005	0.006	0.0052	0.0063	<0.005	<0.0050	
Zinc	mg/L	5	0.025	0.0065	<0.003	0.047	<0.005	0.016	0.018	0.016	0.019	0.011	0.01	0.004	0.008	0.024	0.007	0.005	0.003	<0.03	<0.030	

Decommissioned - Spring 2012 (Replaced by MW-8A and 8B in Fall 2012)

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.8A: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 8A			
			Jun-13	May-14	May-15	Jun-16
Field Measurements						
Field pH	-	-	7.14	8.5	8.5	8.51
Field EC	mS	-	4.92	2.56	2.91	2.51
Field Temperature	°C	-	6.1	5.4	6.0	8.7
Routine Water						
pH	-	6.5 - 8.5	8.45	8.67	8.32	8.49
Conductivity (EC)	µS/cm	-	4100	2400	2700	2400
Calcium	mg/L	-	25	7.7	7.6	7.8
Magnesium	mg/L	-	7.3	1.7	1.5	1.3
Sodium	mg/L	200	930	610	670	600
Potassium	mg/L	-	3.7	2.2	2.1	2.3
Iron	mg/L	0.3	<0.060	0.31	<0.060	<0.060
Sulphate	mg/L	500	1300	300	450	290
Chloride	mg/L	250	9.8	8.0	7.6	7.4
Bicarbonate	mg/L	-	1200	1300	1300	1200
Carbonate	mg/L	-	26	49	3.0	25
Hydroxide	mg/L	-	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.017	<0.010	<0.010	<0.010
Nitrite (N)	mg/L	-	n/a	n/a	0.012	<0.010
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	0.012	<0.020
TDS*	mg/L	500	2900	1600	1800	1500
Hardness	mg/L	-	n/a	n/a	25	25
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	1100	1000
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	2.5	21
Ionic Balance	N/A	-	n/a	n/a	0.97	1.0
Water Nutrients						
Ammonia-N	mg/L	-	1.1	0.89	0.96	0.81
TKN	mg/L	-	1.9	1.5	1.6	1.1
Hydrocarbons						
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10
Organics						
COD	mg/L	-	79	68	71	36
TOC	mg/L	-	n/a	n/a	n/a	
DOC	mg/L	-	11	9	10	11
Oil & Grease	mg/L	-	n/a	n/a	n/a	
Metals						
Aluminum	mg/L	0.1	n/a	n/a	0.0043	0.0093
Antimony	mg/L	0.006	0.00081	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	0.0014	0.0021
Barium	mg/L	1	0.04	0.041	0.025	0.045
Beryllium	mg/L	-	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	0.68	0.72
Cadmium	mg/L	0.005	0.000035	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	-	0.0012	0.0014	0.00033	0.00046
Copper	mg/L	1	0.0017	0.00047	0.00064	0.00042
Lead	mg/L	0.01	<0.00020	<0.0002	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	0.12	0.11
Manganese	mg/L	0.05	n/a	n/a	0.017	0.015
Mercury	mg/L	0.001	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.012	0.00036	0.0057	0.0070
Nickel	mg/L	-	0.005	0.0023	0.0020	0.0023
Phosphorus	mg/L	-	n/a	n/a	0.19	0.10
Selenium	mg/L	0.05	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	3.4	3.6
Silver	mg/L	-	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	0.20	0.17
Sulphur	mg/L	-	n/a	n/a	120	100
Thallium	mg/L	-	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	0.00071	0.00092
Vanadium	mg/L	-	n/a	n/a	0.0042	0.0028
Zinc	mg/L	5	0.012	0.007	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.8B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 8B			
			Jun-13	May-14	May-15	Jun-16
Field Measurements						
Field pH	-	-	6.57	7.6	8	7.73
Field EC	mS	-	10.05	8.96	9.28	8.94
Field Temperature	°C	-	7.4	4.0	6.6	6.8
Routine Water						
pH	-	6.5 - 8.5	8.31	8.37	7.95	8.19
Conductivity (EC)	µS/cm	-	8800	8500	8700	8700
Calcium	mg/L	-	92	110	90	97
Magnesium	mg/L	-	48	62	56	54
Sodium	mg/L	200	2100	2300	2200	2000
Potassium	mg/L	-	5.8	5.4	6.2	6.7
Iron	mg/L	0.3	<0.060	<0.60	<0.60	<0.060
Sulphate	mg/L	500	4300	4500	4200	3900
Chloride	mg/L	250	23	23	26	28
Bicarbonate	mg/L	-	1100	1100	1100	1100
Carbonate	mg/L	-	7.2	18	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.022	0.074	0.12	0.10
Nitrite (N)	mg/L	-	n/a	n/a	<0.010	<0.050
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	0.12	0.10
TDS*	mg/L	500	7100	7600	7100	6600
Hardness	mg/L	-	n/a	n/a	460	460
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	910	870
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	1.0	0.97
Water Nutrients						
Ammonia-N	mg/L	-	0.61	0.57	0.69	0.62
TKN	mg/L	-	1.7	1.4	1.6	1.3
Hydrocarbons						
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10
Organics						
COD	mg/L	-	75	39	48	47
TOC	mg/L	-	n/a	n/a	n/a	
DOC	mg/L	-	13	13	14	15
Oil & Grease	mg/L	-	n/a	n/a	n/a	
Metals						
Aluminum	mg/L	0.1	n/a	n/a	<0.030	0.0050
Antimony	mg/L	0.006	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	0.0021	0.0015
Barium	mg/L	1	0.025	<0.10	<0.10	0.013
Beryllium	mg/L	-	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	0.41	0.41
Cadmium	mg/L	0.005	0.000096	<0.000050	<0.00020	0.00003
Chromium	mg/L	0.05	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.0030	<0.0030	<0.0030	0.0011
Copper	mg/L	1	<0.0020	0.0031	<0.0020	0.00034
Lead	mg/L	0.01	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	0.34	0.30
Manganese	mg/L	0.05	n/a	n/a	0.18	0.18
Mercury	mg/L	0.001	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0021	0.0023	<0.0020	0.0016
Nickel	mg/L	-	0.0052	0.006	<0.0050	0.0035
Phosphorus	mg/L	-	n/a	n/a	<1.0	<0.10
Selenium	mg/L	0.05	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	4.3	4.3
Silver	mg/L	-	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	2.4	2.1
Sulphur	mg/L	-	n/a	n/a	1300	1400
Thallium	mg/L	-	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	<0.010	0.0011
Uranium	mg/L	0.02	n/a	n/a	0.0022	0.0024
Vanadium	mg/L	-	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.9: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 9																		
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																						
Field pH	-	-	7.5	n/a	7.6	7.9	8.3	7.3	8.5	7.72	7.9	7.8	7.6	7.7	8	n/a	8.3	7.75	8	8.49	7.58	8.4
Routine Water																						
pH	-	6.5 - 8.5	7.6	8	8	7.4	7.6	7.6	8.2	8.08	7.96	7.8	8.03	7.95	7.97	8.3	8.35	8.34	8.1	8.53	8.22	8.1
Conductivity (EC)	µS/cm	-	5690	6010	6960	6810	6670	6860	6730	3060	5790	6650	6530	6700	7070	6420	6560	7060	7100	5730	7490	4290
Calcium	mg/L	-	127	77	81	75.1	77.9	64.5	73.9	19.1	62.1	76	80.4	74.5	66.5	70.5	64.8	16.9	68.6	50.4	70.5	36.4
Magnesium	mg/L	-	41	50	46	52.8	46.3	43.4	46.3	9.8	34.5	48	43.1	44.8	46.7	48.5	42.9	50.2	53.3	33	52.7	20.7
Sodium	mg/L	200	1460	1710	1630	1700	1670	1830	1650	724	1510	1655	1690	1710	1820	1890	1690	1900	1710	1480	1930	1130
Potassium	mg/L	-	18	19	17	15.1	14.8	14.9	16.7	8.88	15.8	17	14.5	14.1	14	16.9	13.5	20.2	16.1	17	18.5	10.2
Iron	mg/L	0.3	0.14	<0.02	0.18	0.82	0.09	0.96	< 0.04	0.35	< 0.04	0.9	<0.04	<0.04	<0.04	0.01	0.503	0.075	0.221	0.042	0.352	0.049
Sulphate	mg/L	500	2753	2700	2900	2930	2840	2910	2790	980	2490	2886	3040	2960	3360	3510	2920	3370	3320	2660	3500	1910
Chloride	mg/L	250	4	1.2	15	1.4	<0.1	1	0.7	6.2	1.8	12	1	9.5	0.4	1.2	5.4	0.9	0.6	0.8	<0.5	1.7
Bicarbonate	mg/L	-	1120	1240	1200	1270	1230	1230	1260	728	1110	1155	1190	1200	1190	1240	1040	1210	1200	913	1200	780
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	19.5	n/a	53.4	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.05	<0.05	<0.02	0.076
TDS*	mg/L	500	5000	5290	5476	5400	5250	5470	5200	2110	4660	5865	5450	5410	5900	6140	5280	5970	5760	4740	6160	3770
Total Kjeldahl Nitrogen																						
Ammonia-N	mg/L	-	1	<1	<1	0.472	0.742	0.74	0.492	0.313	0.847	0.993	0.792	0.776	0.715	0.66	0.74	0.81	0.85	0.67	0.77	0.67
TKN	mg/L	-	1	<1	<1	1.02	1.02	1.45	1.12	2.79	2.21	2.27	1.51	1.46	1.09	1.01	1.62	1.21	1.13	1.32	1.66	1.02
Organics																						
COD	mg/L	-	16	52	8	39	32	41	58	97	57	36	18	23	15	24	46	23	21	31	22	19
TOC	mg/L	-	7	17	7	7.8	6.3	6.3	8	16.9	11.6	7.7	6.2	7.3	10.6	7.6	15.9	8	8.6	10.6	7.4	11.3
Oil & Grease	mg/L	-	1	<1	<1	<0.2	<0.2	6	0.5	1.1	0.6	0.5	<0.2	<0.2	<0.2	<1	<1	1	1	<1	<1	2
Metals																						
Antimony	mg/L	0.006	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	0.0063	<0.0005	<0.0005	<0.005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.006	<0.006
Barium	mg/L	1	0.05	0.031	0.015	0.022	0.015	0.022	0.0009	0.081	0.05	0.0325	0.0217	0.0176	0.0174	0.0205	0.0175	0.018	0.0167	0.0229	0.0197	0.0344
Cadmium	mg/L	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Chromium	mg/L	0.05	<0.01	<0.006	<0.006	<0.006	0.007	<0.005	<0.005	<0.006	<0.006	0.0032	0.0011	0.0011	<0.0008	<0.0008	0.0009	<0.0008	<0.0008	<0.0008	<0.0006	<0.0009
Cobalt	mg/L	-	<0.02	<0.01	0.01	<0.01	0.01	0.02	<0.01	<0.01	<0.01	0.0025	0.002	<0.0007	0.0012	0.0011	0.0009	0.0038	0.0033	0.0028	0.0042	0.0038
Copper	mg/L	1	0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.02	<0.02	<0.02	0.003	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001
Lead	mg/L	0.010	<0.03	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	0.005	0.003	<0.002
Mercury	mg/L	0.001	n/a	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	< 0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.001	0.001	0.001	<0.001	<0.001	<0.001	0.003	<0.001	0.006	0.004	0.006
Nickel	mg/L	-	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.003	0.005	0.002	0.002	0.003	0.004	0.006	0.001	0.006	0.006	0.006
Zinc	mg/L	5	< 0.01	0.028	0.026	0.062	0.012	0.011	< 0.005	0.009	<0.005	0.0011	0.004	0.0107	<0.0005	0.0095	0.0055	0.0008	0.0041	0.03	0.0118	0.0287

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.9: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 9																					
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																									
Field pH	-	-	8.16	8.4	7.64	7.63	7.66	7.52	7.14	7.48	6.84	7.44	7.35	7.5	7.68	7.86	8.051	8.100	n/a	7.53	7.37	6.17	7.7	7.9	7.59
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7.77	15.74 (EF)	7.30	6.91	18	9.4	5.780	3.192	n/a	7.53	7.775	8.86	8.1	8.26	8.32
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.4	7.0	5.9	9.3	4.1	10.54	4.6	9.1	n/a	19.8	11.6	7.2	5.3	5.5	8.0
Routine Water																									
pH	-	6.5 - 8.5	7.85	8.5	8.24	7.76	7.77	7.8	8.2	8.1	8.0	8.2	8.0	8.4	8.1	8.0	8.3	8.26	8.16	7.99	7.76	8.21	8.27	7.81	7.96
Conductivity (EC)	µS/cm	-	5730	2580	5460	6680	6880	7250	7110	7010	6940	6370	7160	7220	8020	4620	5880	6900	7290	7600	7500	7700	7800	7800	7800
Calcium	mg/L	-	66.2	21.7	61.4	90.3	107	93.3	101	66.1	99.9	86.9	101	98.2	297	60.2	92.8	102	108	98	110	110	120	110	120
Magnesium	mg/L	-	41.6	9.95	33.8	51.5	62.8	53.6	59.5	55	57.4	58.6	57.9	58	175	38.8	58.7	61.2	64.3	51	60	59	66	56	66
Sodium	mg/L	200	1440	570	1390	1800	1690	1710	1780	1760	1770	1850	1740	1790	1730	1060	1400	1590	1700	1800	1900	1800	1800	1900	1900
Potassium	mg/L	-	13	8.3	14	17	13	16	13	16.4	14.6	17	15.3	16.3	8.7	10.2	10.5	12.4	15	13	15	14	15	15	15
Iron	mg/L	0.3	0.08	0.711	0.019	<0.05	<0.1	<0.1	<5	<0.005	0.007	<0.005	<0.005	<0.005	0.076	0.029	0.011	<0.0050	0.02	1.2	0.79	0.33	<0.60	<0.060	<0.60
Sulphate	mg/L	500	2820	947	2600	3620	3600	3420	3370	3280	3030	3360	3330	3110	3940	1750	2460	3050	3280	3500	3700	3900	4000	3800	4000
Chloride	mg/L	250	<0.5	2.5	0.9	<0.5	<0.5	1.2	1	2	2	5	2	2	114	52	48	17.7	<10 *	3	2.6	1.9	2.1	1.6	1.2
Bicarbonate	mg/L	-	1050	502	966	1090	1150	1150	1140	1160	1160	1240	1170	1070	746	762	966	1070	1120	1100	1100	1100	1100	1100	1100
Carbonate	mg/L	-	<6	29	<6	<6	<6	<6	<5	<5	<5	<5	<5	20	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.04	0.205	0.237	<0.04	<0.04	<0.04	0.5	0.3	0.2	<0.1	0.3	0.2	0.2	0.1	<0.1	<0.050	<1.0 *	0.09	<0.0030	0.11	0.079	0.17	0.081
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.033	<0.050
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.21	0.081
TDS*	mg/L	500	4900	1840	4570	6110	6030	5860	5890	5750	5540	5950	5820	5620	6630	3350	4550	5360	5720	6100	6300	6400	6600	6400	6500
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	510	560
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	860	890
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.96	0.92
Water Nutrients		-																							
Ammonia-N	mg/L		0.5	0.27	0.45	0.31	0.47	0.31	0.44	0.52	0.42	0.41	0.54	0.59	0.07	0.16	0.61	0.826	0.812	0.86	1.4	0.85	0.81	0.53	0.32
TKN	mg/L	-	1.33	1.18	2.03	1.28	1.36	1.04	0.9	0.6	0.8	1.2	1.3	0.9	6.1	1.7	2.1	2.87	2.13	3.1	1.6	1.4	1.6	1.3	0.77
Hydrocarbons		-																							
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics		-																							
COD	mg/L	-	24	45	112	22	13	17	20	< 10	14	29	14	11	287	63	77	55.7	39.8	26	460	46	42	62	21
TOC	mg/L	-	8.7	9.7	7.5	6.3	5.4	6.3	5	6	8	11	6	5	112	24	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	28	18.3	14.2	9.8	8.3	7.8	5.5	6.9	5.9
Oil & Grease	mg/L	-	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	1	<1	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals		-																							
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	0.011
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.001	< 0.002	<0.002	0.01	0.001	0.0006	<0.0004	0.0006	0.0006	<0.0004	0.0009	n/a	n/a	<0.00040	<0.006	<0.0060	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00036
Barium	mg/L	1	0.028	0.055	0.063	0.042	0.021	0.026	0.016	0.015	0.014	0.108	0.011	0.011	0.069	0.019	0.03	0.019	0.0172	0.015	0.016	0.014	<0.10	0.010	<0.10
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.29	0.31
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	<0.00005	< 0.0001	0.00014	0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.001	<0.0010	<0.000050	<0.000050	0.000061	0.000051	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	0.0055	0.0061	0.0069	0.005	<0.005	<0.005	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	0.014	0.0055	0.01	0.0014	< 0.001	0.0016	<0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.0030	0.003	<0.0030	0.00069
Copper	mg/L	1	<0.01	<0.005	0.005	0.007	< 0.01	0.014	0.033	0.024	0.015	0.004	0.006	0.007	0.013	0.003	0.006	0.0052	0.0076	<0.002	0.0054	<0.0020	<0.0020	<0.0020	0.0013
Lead	mg/L	0.01	<0.002	0.018	0.01	<0.0005	< 0.001	<0.001	0.0003	<0.005	0.0001	<0.0001	0.0002	<0.0001	<0.0001	0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00027
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.33	0.38
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.22	0.21
Mercury	mg/L	0.001	<0.001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000042	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.01	0.019	<0.005	<0.005	< 0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.010	0.016	0.014	<0.0050	<0.0050	0.004	<0.0020	0.0023	0.0033	0.0022	0.0017
Nickel	mg/L	-	<0.01	0.008	0.01	< 0.003	<0.005	0.0066	0.003	<0.002	<0.002	0.004	<0.002	0.003	0.029	0.013	0.016	0.0075	0.0061	<0.005	0.007	<0.0050	0.0061	<0.0050	0.0020
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<1.0
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00023
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.4	4.6
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.0	2.2
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1200	1200
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0037	0.004
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	0.015	0.01	0.008	0.013	<0.01	0.022	0.031	0.025	0.023	0.004	0.011	<0.002	0.044	0.030	0.011	0.0086	0.0061	<0.03	<0.030	<0.030	<0.030	<0.030	0.0034

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.10: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 10																		
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																						
Field pH	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.26	n/a	8.4	n/a	8.2	8.1	n/a	8.1	7.71	7.9	7.69	n/a	8.27
Routine Water																						
ph	-	6.5 - 8.5	8.9	n/a	n/a	n/a	n/a	n/a	n/a	8.35	n/a	n/a	n/a	8.26	8.05	8.32	8.16	8.08	8.14	8.21	n/a	8.31
Conductivity (EC)	µS/cm	-	1919	n/a	n/a	n/a	n/a	n/a	n/a	2420	n/a	n/a	n/a	2470	2560	2300	2720	2700	2570	2770	n/a	2690
Calcium	mg/L	-	14	n/a	n/a	n/a	n/a	n/a	n/a	19.2	n/a	n/a	n/a	22.3	22.3	26.4	28.6	16.2	30.8	34.4	n/a	30
Magnesium	mg/L	-	5	n/a	n/a	n/a	n/a	n/a	n/a	10	n/a	n/a	n/a	10.3	9.9	11.3	11.9	16	14.6	15.5	n/a	15.1
Sodium	mg/L	200	505	n/a	n/a	n/a	n/a	n/a	n/a	542	n/a	n/a	n/a	592	621	632	663	662	720	675	n/a	678
Potassium	mg/L	-	5.6	n/a	n/a	n/a	n/a	n/a	n/a	4.1	n/a	n/a	n/a	3.38	1.92	3.71	3.16	4.16	3.36	9.42	n/a	3.5
Iron	mg/L	0.3	0.02	< 0.02	n/a	n/a	n/a	n/a	n/a	<0.04	n/a	0.011	n/a	0.26	0.05	<0.003	0.79	4.19	0.247	0.007	n/a	n/a
Sulphate	mg/L	500	617	n/a	n/a	n/a	n/a	n/a	n/a	701	n/a	n/a	n/a	771	744	872	859	878	1000	968	n/a	934
Chloride	mg/L	250	4	n/a	n/a	n/a	n/a	n/a	n/a	1.5	n/a	n/a	n/a	8.2	2.1	1.9	2.7	0.9	3.9	< 0.5	n/a	2.7
Bicarbonate	mg/L	-	462	n/a	n/a	n/a	n/a	n/a	n/a	657	n/a	n/a	n/a	669	661	682	674	710	681	682	n/a	644
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	< 6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.44	0.24	0.76	n/a	0.935
TDS*	mg/L	500	1448	n/a	n/a	n/a	n/a	n/a	n/a	1600	n/a	n/a	n/a	1740	1730	1880	1900	1930	2110	2040	n/a	1980
Total Kjeldahl Nitrogen																						
Ammonia-N	mg/L	-	<1	n/a	n/a	n/a	n/a	n/a	n/a	0.253	n/a	< 0.005	n/a	<0.005	<0.005	<0.05	<0.05	0.11	<0.05	0.09	n/a	<0.05
TKN	mg/L	-	1	n/a	n/a	n/a	n/a	n/a	n/a	1.05	n/a	0.7	n/a	0.48	0.27	<0.05	0.41	0.26	0.3	0.45	n/a	0.41
Organics																						
COD	mg/L	-	12	n/a	n/a	n/a	n/a	n/a	n/a	51	n/a	46	n/a	22	24	15	36	17	19	43	n/a	25
TOC	mg/L	-	6	n/a	n/a	n/a	n/a	n/a	n/a	9	n/a	8.4	n/a	5.6	5	7	5.3	5.8	6	7.1	n/a	7.2
Oil & Grease	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.8	n/a	0.7	n/a	<0.2	<0.2	<1	n/a	n/a	2	3	n/a	7
Metals																						
Antimony	mg/L	0.006	0.0007	<0.0005	n/a	n/a	n/a	n/a	n/a	<0.0005	n/a	<0.005	n/a	<0.005	<0.005	<0.005	n/a	<0.005	<0.005	0.006	n/a	n/a
Barium	mg/L	1	0.04	0.034	n/a	n/a	n/a	n/a	n/a	0.031	n/a	0.0284	n/a	0.025	0.023	0.0259	n/a	0.0456	0.0241	0.0247	n/a	n/a
Cadmium	mg/L	0.005	<0.01	<0.003	n/a	n/a	n/a	n/a	n/a	<0.003	n/a	<0.0005	n/a	<0.0005	<0.0005	<0.0005	n/a	<0.0005	<0.005	<0.0005	n/a	n/a
Chromium	mg/L	0.05	<0.01	<0.006	n/a	n/a	n/a	n/a	n/a	<0.006	n/a	<0.0008	n/a	<0.0008	0.013	0.0148	n/a	0.0074	0.0028	0.016	n/a	n/a
Cobalt	mg/L	-	<0.01	<0.01	n/a	n/a	n/a	n/a	n/a	<0.01	n/a	<0.0007	n/a	<0.0007	<0.0007	<0.0007	n/a	0.0025	0.0041	0.0017	n/a	n/a
Copper	mg/L	1	0.01	<0.01	n/a	n/a	n/a	n/a	n/a	<0.02	n/a	0.002	n/a	<0.001	<0.001	<0.001	n/a	0.002	0.002	0.002	n/a	n/a
Lead	mg/L	0.010	<0.03	<0.04	n/a	n/a	n/a	n/a	n/a	<0.04	n/a	<0.002	n/a	<0.002	<0.002	<0.002	n/a	<0.002	<0.002	0.002	n/a	n/a
Mercury	mg/L	0.001	<0.0002	<0.0001	n/a	n/a	n/a	n/a	n/a	<0.0001	n/a	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	n/a	n/a
Molybdenum	mg/L	-	0.02	<0.02	n/a	n/a	n/a	n/a	n/a	<0.02	n/a	0.007	n/a	0.006	<0.001	0.001	n/a	0.003	0.002	0.003	n/a	n/a
Nickel	mg/L	-	<0.01	<0.02	n/a	n/a	n/a	n/a	n/a	<0.02	n/a	<0.001	n/a	0.002	0.006	0.005	n/a	0.003	0.003	0.005	n/a	n/a
Zinc	mg/L	5	<0.01	0.014	n/a	n/a	n/a	n/a	n/a	<0.005	n/a	0.0087	n/a	0.0102	0.0046	0.0167	n/a	0.0108	0.0012	0.0078	n/a	n/a

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.10: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 10																					
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																									
Field pH	-	-	n/a	8.27	n/a	8.39	8.42	8.11	7.54	7.63	7.54	7.68	7.52	7.93	7.99	8.03	7.86	7.870	8.26	7.92	7.69	7.77	8.3	8.3	8.06
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.23	9.72 (EF)	4.39	3.79	9.20	9.06	3.98	4.250	5.7	4.52	2.03	4.52	4.92	4.98	4.42
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.7	4.9	4.6	10.2	3.5	11.55	8	4.3	16.4	17	8.6	11.5	4.2	7.5	9.8
Routine Water																									
pH	-	6.5 - 8.5	n/a	8.31	n/a	8.43	8.57	8.25	8.4	8.3	8.2	8.4	8.2	8.4	8.3	8.1	8.2	8.16	8.32	8.18	8.1	8.33	8.12	7.79	8.26
Conductivity (EC)	µS/cm	-	n/a	2570	n/a	2640	2700	3090	3450	3330	3710	3370	3980	3910	4320	4300	4210	4440	4460	4600	4900	4600	4600	4700	4500
Calcium	mg/L	-	n/a	28.3	n/a	25.8	29.7	34.8	52.8	34.9	65.3	62.5	72.3	65.2	86	78.4	79.6	82.2	78.4	72	91	83	68	140	60
Magnesium	mg/L	-	n/a	14.9	n/a	15.1	16.6	16.1	21.7	20.5	25.2	26.7	27.0	29.4	35.9	31.6	31.4	28.2	34.1	34	33	34	35	44	31
Sodium	mg/L	200	n/a	593	n/a	687	659	678	798	732	836	887	906	888	1010	1000	969	971	929	990	1200	1100	990	910	840
Potassium	mg/L	-	n/a	3	n/a	2.7	3.3	2.7	1.4	2.4	4.5	4.2	4.5	4.9	5.3	4.9	2.9	5.23	4.72	4.2	5	4.4	4	4.5	4.4
Iron	mg/L	0.3	n/a	<0.02	n/a	<0.05	0.19	<0.05	0.329	0.006	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.033	0.012	<0.06	<0.060	<0.060	<0.060	8.3	<0.060
Sulphate	mg/L	500	n/a	915	n/a	1080	1130	1160	1440	1250	1450	1560	1690	1560	1830	1850	1750	1950	1870	1900	2200	2200	2100	1900	1700
Chloride	mg/L	250	n/a	3.2	n/a	1.4	2.1	4.8	8	8	13	12	14	12	15	16	19	19.4	16 *	23	25	23	26	140	60
Bicarbonate	mg/L	-	n/a	640	n/a	539	467	614	571	578	579	581	579	559	591	595	613	599	579	590	600	580	600	590	620
Carbonate	mg/L	-	n/a	< 6	n/a	26	46	< 6	7	< 5	<5	6	<5	12	<5	<5	<5	<5.0	5.7	<0.5	<0.50	4.6	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	n/a	1.04	n/a	0.771	0.436	< 0.04	0.2	0.4	0.1	0.2	0.2	0.2	0.2	0.3	0.1	<0.050	<1.0 *	0.14	0.019	0.13	0.079	0.014	0.04
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.01
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.014	0.05
TDS*	mg/L	500	n/a	1870	n/a	2100	2120	2200	2610	2340	2680	2840	3000	2850	3270	3280	3150	3350	3220	3300	3900	3700	3500	3400	3000
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	520	280
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	490	500
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.95	0.9
Water Nutrients		-																							
Ammonia-N	mg/L		n/a	<0.05	n/a	<0.05	<0.05	<0.05	0.07	0.1	<0.05	0.16	0.17	0.10	<0.05	0.13	0.06	0.111	<0.050	0.07	0.31	0.094	0.17	0.23	0.16
TKN	mg/L	-	n/a	0.32	n/a	0.41	0.06	0.42	0.7	0.4	0.9	0.7	1.1	0.7	0.6	0.5	1.2	0.96	1.09	0.61	0.86	0.69	0.68	0.68	0.57
Hydrocarbons		-																							
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																									
COD	mg/L	-	n/a	5	n/a	13	18	14	20	20	24	24	23	22	26	26	23	25.6	15.5	32	33	43	33	35	32
TOC	mg/L	-	n/a	6.9	n/a	7.8	6.7	6.6	7	7	8	8	9	9	9	9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8	8.3	9.2	11	10	11	9.6	11	9.7
Oil & Grease	mg/L	-	n/a	<5	n/a	7	n/a	<5	<1	2	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																									
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0030	0.0091
Antimony	mg/L	0.006	n/a	<0.02	n/a	<0.001	n/a	<0.001	0.0209	0.0011	0.0007	<0.0004	0.0004	0.0008	<0.0004	0.0009	n/a	n/a	<0.00040	<0.0006	<0.0030	0.00073	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00049	0.0006
Barium	mg/L	1	n/a	0.022	n/a	0.017	n/a	0.026	0.026	0.024	0.025	0.024	0.018	0.020	0.023	0.017	0.018	0.0121	0.0184	0.018	0.015	0.015	0.016	0.087	0.023
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	0.12
Cadmium	mg/L	0.005	n/a	<0.003	n/a	<0.00005	n/a	<0.00005	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.000050	<0.000025	0.000047	0.000045	<0.000025	0.000049	0.000023
Chromium	mg/L	0.05	n/a	0.0075	n/a	0.015	n/a	0.011	0.008	0.006	<0.005	<0.005	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.0050	<0.0050	0.002	<0.0050	<0.0010	0.0014	<0.0010	0.0021
Cobalt	mg/L	-	n/a	0.0035	n/a	<0.0005	n/a	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0003	<0.0015	0.00059	0.00042	0.014	0.00057
Copper	mg/L	1	n/a	0.068	n/a	<0.005	n/a	0.005	0.029	0.012	0.011	0.005	0.004	0.005	0.003	0.003	0.005	0.004	0.0055	0.0014	0.0012	0.0025	0.17	0.0079	0.0035
Lead	mg/L	0.01	n/a	<0.01	n/a	<0.0005	n/a	<0.0005	0.0002	<0.005	0.0003	<0.0001	0.003	0.0001	0.0001	0.0002	<0.005	<0.0050	<0.00010	<0.0002	<0.0010	<0.00020	0.009	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.24	0.23
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.8	0.094
Mercury	mg/L	0.001	n/a	<0.0001	n/a	<0.0001	n/a	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.00010	<0.00010	<0.000005	0.0000056	<0.000010	<0.0000050	<0.0000050	0.0000034
Molybdenum	mg/L	-	n/a	<0.005	n/a	<0.005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	0.0019	0.0012	0.0015	0.0022	0.0017	0.0038
Nickel	mg/L	-	n/a	0.007	n/a	<0.003	n/a	0.0051	0.005	0.003	0.004	0.003	0.003	0.005	0.003	0.010	0.005	0.0082	0.0081	0.0059	0.0094	0.0088	0.0078	1.5	0.059
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0003	0.00052
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.9	4.7
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.4	0.92
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	550	510
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0048	0.0093
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	n/a	0.184	n/a	0.007	n/a	0.006	0.018	0.018	0.015	0.006	0.009	0.003	0.011	0.018	0.01	0.0111	0.0031	0.009	0.018	0.0063	0.11	0.0038	0.0065

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.11: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 11																		
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																						
Field pH	-	-	8	n/a	7.9	8.5	8.7	7.2	8.4	8.63	8.2	8.9	7.8	n/a	7.8	n/a	7.7	7.66	7.47	7.3	7.66	7.64
Routine Water																						
pH	-	6.5 - 8.5	8.1	8.3	8.2	7.8	8	7.8	8.2	8.09	8.09	7.9	8.42	n/a	7.64	8.06	7.93	7.76	7.79	7.84	7.87	7.85
Conductivity (EC)	µS/cm	-	1789	2220	2230	2320	2090	5810	4340	3690	3080	9850	5300	n/a	6430	5130	4970	8320	5820	10300	6910	6590
Calcium	mg/L	-	19	25	12	10.2	10.6	67.4	44.9	28.2	20.7	238	63.9	n/a	103	73	56.3	116	79.4	242	111	107
Magnesium	mg/L	-	3	7.1	4.3	3.1	4.2	43.2	19.3	12.9	10.2	137	35.4	n/a	53.5	39	31.7	97.3	50.9	157	61.9	70.8
Sodium	mg/L	200	467	629	514	469	548	1440	1030	842	743	2387	1240	n/a	1580	1460	1260	2440	1310	2650	1700	1790
Potassium	mg/L	-	4.7	8.6	3.5	4.55	3.57	6.15	5.53	5.9	3.73	12	4.69	n/a	6.05	6.25	4.27	9.2	5.14	9.4	6.4	8.6
Iron	mg/L	0.3	0.06	<0.02	0.27	29.8	1.75	0.54	<0.04	<0.04	<0.04	< 0.003	<0.04	n/a	0.04	0.004	0.016	0.228	0.213	0.078	0.063	0.034
Sulphate	mg/L	500	510	794	480	432	472	2630	1650	1240	1020	5401	2410	n/a	3310	2860	2230	5350	2840	6260	3480	4100
Chloride	mg/L	250	2	2.5	8	3.2	0.2	1.8	1.4	0.7	1.3	5	1.8	n/a	2.1	1.7	2	2.8	2.2	6.3	0.8	0.9
Bicarbonate	mg/L	-	698	749	769	862	813	789	772	771	776	785	727	n/a	736	744	750	826	775	938	763	769
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	0.24	0.56	0.587	0.452
TDS*	mg/L	500	1384	2120	1484	1350	1440	4620	3130	2510	2180	8969	4130	n/a	5420	4810	3960	8410	4670	9780	5740	6420
Total Kjeldahl Nitrogen																						
Ammonia-N	mg/L	-	1.8	<1	<1	0.327	0.193	0.43	0.141	<0.005	0.114	0.663	0.044	n/a	0.012	<0.05	0.08	0.28	0.09	0.21	0.08	0.44
TKN	mg/L	-	<1	<1	<1	2.39	0.72	1.86	1.93	0.72	0.58	0.59	1.46	n/a	2.17	1.44	1.01	1.97	1.08	2.6	1.16	2.5
Organics																						
COD	mg/L	-	7	36	23	96	22	76	78	57	42	207	66	n/a	179	85	68	116	68	155	56	97
TOC	mg/L	-	5	35	5	22.6	4.8	22.3	25.7	14.7	10.1	100	32.5	n/a	47.9	30.6	23.8	43.8	21.4	52.8	6.5	37
Oil & Grease	mg/L	-	<1	<1	<1	<0.2	<0.2	3	0.8	0.8	0.3	0.5	<0.2	n/a	<0.2	<1	2	<1	2	<1	2	6
Metals																						
Antimony	mg/L	0.006	0.002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	0.0063	0.0005	<0.0005	<0.005	<0.0005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.006	<0.006
Barium	mg/L	1	0.05	0.022	0.037	0.099	0.03	0.029	0.018	0.016	0.011	0.0196	0.0097	n/a	0.0092	0.0125	0.0097	0.0139	0.0106	0.0124	0.0058	0.0187
Cadmium	mg/L	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	n/a	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Chromium	mg/L	0.05	<0.01	<0.006	<0.006	<0.006	<0.006	<0.005	<0.005	<0.006	<0.006	0.0014	0.0012	n/a	<0.0008	<0.0008	0.0008	0.0013	<0.0008	<0.0008	<0.0009	<0.0009
Cobalt	mg/L	-	<0.01	<0.01	0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.0014	0.001	n/a	0.0013	<0.0007	0.001	0.0037	0.0036	0.0038	0.0057	0.0064
Copper	mg/L	1	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	0.006	0.002	n/a	0.001	<0.001	<0.001	0.001	<0.001	0.003	0.002	0.002
Lead	mg/L	0.010	<0.03	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	< 0.002	<0.002	n/a	<0.002	<0.002	0.002	0.002	<0.002	0.004	<0.002	<0.002
Mercury	mg/L	0.001	<0.0002	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.001	0.003	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001
Nickel	mg/L	-	<0.01	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.009	0.003	n/a	0.006	0.002	0.002	0.01	0.004	0.013	0.01	0.007
Zinc	mg/L	5	0.01	0.026	0.017	0.13	0.009	0.013	<0.005	<0.005	<0.005	0.0022	0.0062	n/a	0.0015	0.019	0.0019	0.0147	0.0236	0.0394	0.0138	0.0167

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.11: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 11																					
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																									
Field pH	-	-	7.73	7.64	7.62	7.69	8.02	7.72	7.47	7.01	6.83	7.33	7.29	7.62	7.55	6.98	7.656	7.477	7.55	7.73	7.41	7.31	7.5	7.8	7.61
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.65	27.2 (EF)	9.4	7.7	21.50	19.16	8.550	9.380	38.0	9.6	4.31	9.67	10.02	10.14	9.90
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.0	5.0	4.4	9.6	4.8	11.25	7.1	7.0	24.1	9.9	8.8	10.5	6.2	6.4	8.6
Routine Water																									
pH	-	6.5 - 8.5	7.83	7.75	7.79	7.78	8.09	7.95	8.2	8.1	8.0	8.2	8.0	8.2	8.2	7.9	8.2	8.01	7.98	8.04	7.98	8.06	8.19	7.79	8.03
Conductivity (EC)	µS/cm	-	5900	7930	6680	7360	6040	8570	7770	8020	7710	8430	8900	10700 (EF)	8790	9370	8760	9420	8760	9800	9900	9300	9500	9500	9600
Calcium	mg/L	-	104	152	114	146	105	175	165	151	169	231	218	271	201	219	195	220	175	190	240	220	240	210	230
Magnesium	mg/L	-	56.1	93.7	60.4	79.3	56.9	101	92.5	92.6	94.5	150	120	184	124	132	117	120	94.5	110	130	110	130	110	120
Sodium	mg/L	200	1560	1990	1710	2110	1440	2000	1930	2020	1960	2540	2180	2820 (EF)	2210	2320	2130	2220	1920	2200	2600	2100	2300	2200	2100
Potassium	mg/L	-	4.6	8.4	6	8.8	< 4	6.6	5.5	8.2	7.3	9	8.3	11.1	9.2	6.1	3	9.25	7.69	7.1	9.1	7.1	7.6	8.4	9.1
Iron	mg/L	0.3	0.093	<0.02	0.019	<0.1	<0.1	<0.1	0.022	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.019	<0.005	<0.05	<0.010	<0.06	<0.060	<0.060	<0.60	<0.060	<0.060
Sulphate	mg/L	500	3140	4390	3660	4720	3280	4720	4280	4380	3950	5550	4750	5710	4450	5190	4440	5020	4170	5300	5600	5400	5600	5100	4800
Chloride	mg/L	250	1.7	4.3	2.7	2.7	2.4	5.4	5	5	5	9	7	17	8	16	10	9.17	<10 *	16	14	14	14	20	32
Bicarbonate	mg/L	-	735	851	747	793	769	864	747	756	751	936	808	1170	913	870	882	839	813	920	880	890	840	900	930
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.583	0.488	0.345	<0.04	<0.04	0.36	0.5	0.4	0.3	0.4	0.5	0.5	0.4	0.4	0.4	0.282	<1.0 *	0.49	0.27	0.37	0.27	0.19	0.23
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.015
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.19	0.25
TDS*	mg/L	500	5230	7060	5920	7450	5270	7430	6850	7030	6560	8950	7680	9590	7450	8310	7330	8010	6770	8300	9000	8300	8800	8200	7800
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	980	1100
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	740	770
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.96	0.97
Water Nutrients																									
Ammonia-N	mg/L		0.11	0.28	0.13	0.14	0.12	0.09	<0.05	0.12	<0.05	0.17	<0.05	0.07	<0.05	0.06	<0.05	0.088	<0.050	<0.05	0.14	0.081	0.14	0.17	0.15
TKN	mg/L	-	1.77	2.95	2.63	2.28	1.6	2.12	1.6	1.4	1.7	2	1.7	2.4	1.7	1.8	1.4	2.31	2.08	1.8	1.8	1.5	1.7	1.7	0.81
Hydrocarbons																		2.31							
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																									
COD	mg/L	-	103	116	167	108	84	104	100	100	99	118	105	119	92	98	80	101	90.7	110	100	95	96	100	100
TOC	mg/L	-	34.5	45	36.6	39.8	25.9	40.4	38	39	40	45	42	48	33	39	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	34	36.4	34.7	36	36	33	29	34	36
Oil & Grease	mg/L	-	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																									
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	0.0060
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.002	<0.002	< 0.002	0.0474	0.0011	0.0009	<0.0004	0.0008	0.0012	<0.0004	0.001	n/a	n/a	0.00061	<0.006	<0.0060	0.001	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.0011
Barium	mg/L	1	0.01	0.0315	0.012	0.017	0.01	0.014	0.019	0.011	0.012	0.014	0.010	0.009	0.009	0.010	0.008	0.0074	0.0084	<0.01	<0.010	<0.010	<0.10	<0.010	<0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.19	0.20
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	0.00013	< 0.0001	0.00015	0.0002	<0.001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.000050	<0.000050	0.000055	0.000084	<0.000050	<0.00020	0.000024
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	<0.005	< 0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.0010	<0.010	<0.010	0.0011
Cobalt	mg/L	-	0.014	0.015	0.014	0.0019	0.0011	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.00030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	<0.01	<0.005	<0.005	<0.01	< 0.01	0.012	0.068	0.033	0.025	0.014	0.010	0.014	0.008	0.007	0.012	0.0097	0.011	0.003	0.0032	0.0031	0.0024	<0.0020	0.0025
Lead	mg/L	0.01	<0.02	< 0.01	<0.01	<0.001	<0.001	<0.001	0.0004	<0.005	0.0002	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.00020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.54	0.55
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.015	0.0081
Mercury	mg/L	0.001	<.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000038	<0.000010	<0.0000050	<0.0000050	0.0000022
Molybdenum	mg/L	-	<0.01	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.002	<0.0020	0.0017	<0.0020	<0.0020	0.0009
Nickel	mg/L	-	<0.01	0.026	0.021	<0.005	<0.005	<0.005	0.012	0.006	0.005	0.004	0.004	0.012	<0.002	0.012	0.009	0.0103	0.0109	0.008	0.0064	0.0062	0.006	0.0058	0.0060
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.0011
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.8	4.9
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.7	4.0
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1700	1700
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.024	0.030
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	0.018	0.017	0.007	0.03	<0.01	0.017	0.042	0.037	0.025	0.017	0.019	<0.002	0.035	0.015	0.014	0.0147	0.0113	<0.03	<0.030	0.0098	<0.030	<0.030	0.0077

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.12A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 12A																		
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																						
Field pH	-	-	7.7	n/a	7.4	8	8.2	7.1	8.4	7.91	7.6	7.6	7.5	7.6	7.3	n/a	7.5	6.79	7.43	5.34	7.27	7.02
Routine Water																						
pH	-	6.5 - 8.5	7.5	8.2	7.8	7.4	7.5	7.5	8	7.91	7.81	7.6	7.88	7.72	7.62	7.81	7.65	7.58	7.46	7.73	7.6	7.55
Conductivity (EC)	µS/cm	-	10220	9610	11300	11100	11000	12800	11900	12100	10500	13100	11700	10800	10900	9150	10400	10700	10000	10800	11100	10000
Calcium	mg/L	-	261	152	154	96.5	152	159	152	142	124	182	159	133	115	121	133	68	122	216	135	113
Magnesium	mg/L	-	81	76	76	48.8	77.3	110	99.3	93.3	79.4	122	113	89.8	77.7	70.9	68.2	72.7	72.6	120	72.7	72.3
Sodium	mg/L	200	2910	2870	2820	2880	2900	3640	3090	3290	2970	3404	3330	2980	2910	3010	2880	2990	2890	4480	2870	2910
Potassium	mg/L	-	17	15	14	11.4	11.6	13.7	14.4	12.9	12	16	12.1	11.3	9.01	12	9.08	12.1	10	12.5	9.9	13.8
Iron	mg/L	0.3	0.04	<0.02	0.03	1.81	0.1	0.4	<0.04	<0.04	<0.04	0.03	<0.04	<0.04	<0.04	<0.003	0.625	0.326	0.555	0.022	0.038	0.015
Sulphate	mg/L	500	2139	5200	5800	5870	5830	7260	6140	6900	5750	6621	7320	6010	6180	6480	5590	6130	5820	9630	6040	6830
Chloride	mg/L	250	1	5.4	15	0.7	67.7	1.1	0.8	0.3	0.9	8	1	4.6	0.7	1.2	1.6	<0.5	0.8	0.9	<0.5	<0.5
Bicarbonate	mg/L	-	996	1060	1060	1110	1090	1070	1060	1080	1050	1066	1050	1040	966	971	975	985	949	959	938	949
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.05	<0.05	<0.02	<0.04
TDS*	mg/L	500	9936	8970	9440	9450	9570	11700	10000	11000	9450	11419	11500	9740	9770	10200	9160	9750	9380	14900	9590	10000
Total Kjeldahl Nitrogen																						
Ammonia-N	mg/L	-	4.1	<1	<1	0.593	0.948	0.64	0.347	0.275	0.413	0.301	0.109	0.134	0.122	0.35	0.59	0.5	0.51	0.63	0.46	0.52
TKN	mg/L	-	2	<1	<1	1.2	1.53	1.14	1.25	0.87	0.96	0.89	0.8	1.25	0.85	0.88	1.49	0.95	1.04	1.2	1.36	1.11
Organics																						
COD	mg/L	-	35	44	30	60	86	71	34	58	52	53	37	61	56	48	92	54	45	38	30	36
TOC	mg/L	-	13	55	32	14.6	13.4	13.4	15.8	14.8	15	22.4	13.9	15.2	19	17.3	21.4	16.4	16.6	16.7	16.6	17.5
Oil & Grease	mg/L	-	1	<1	1.1	<0.2	<0.2	5	<0.3	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3	<1	<1	2	<1	4	5
Metals																						
Antimony	mg/L	0.006	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	0.0063	<0.0005	<0.0005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.006
Barium	mg/L	1	0.03	0.012	0.011	0.016	0.007	0.009	<0.004	0.005	< 0.004	0.0109	0.0094	0.0088	0.0076	0.0102	0.0175	0.0133	0.0167	0.0091	0.007	0.0086
Cadmium	mg/L	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Chromium	mg/L	0.05	<0.01	<0.006	<0.006	<0.006	<0.006	<0.005	0.005	<0.006	<0.006	0.001	0.0009	0.0014	0.0008	0.0008	0.0018	0.0009	<0.0008	<0.0008	<0.0009	<0.0009
Cobalt	mg/L	-	<0.01	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	0.0012	<0.0007	0.0012	0.001	<0.0007	0.0021	0.0035	0.0043	0.0039	0.0043	0.005
Copper	mg/L	1	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.02	<0.02	<0.02	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001
Lead	mg/L	0.010	<0.03	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.006	0.003	<0.002
Mercury	mg/L	0.001	n/a	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	-	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.004	0.004	0.004	0.004	0.002	0.009	0.007	0.006	0.007	0.008	0.005
Zinc	mg/L	5	0.01	0.015	0.025	0.029	0.019	0.018	<0.005	<0.005	<0.005	0.0024	0.0153	0.0287	0.0033	1.03	0.216	0.0571	0.0666	0.0392	0.0544	0.0571

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.12A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 12A																				
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																									
Field pH	-	-	7.3	7.02	7.3	7.71	7.78	7.85	7.13	7.61	6.97	7.57	7.67	7.5	7.45	7.52	7.490	7.380	7.79	7.66	7.33	6	7.8	7.6	6.15
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	11.8	26.8 (EF)	9.81	6.98	26.5	27.02	10.670	10.780	2.4	10.84	4.75	13.32	11.38	11.13	15.40
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.2	7.6	4.3	6.5	6.5	9.95	5.5	5.8	14.1	9.7	6.1	6.2	8.7	5.7	n/a
Routine Water																									
pH	-	6.5 - 8.5	7.49	7.68	7.67	7.75	7.99	7.87	8.1	8.00	8.00	8.20	8.00	8.30	8.20	7.90	8.1	8.03	8	7.98	8	8.15	8.25	7.75	8.00
Conductivity (EC)	µS/cm	-	9630	10600	10600	11500	10400	11600	10500	11300	11000	9570	10500	10900	11400	10900	10900	10700	11300	11000	11000	11000	11,000	11,000	11,000
Calcium	mg/L	-	129	129	137	160	153	154	143	131	158	153	140	143	157	136	150	135	143 *	140	140	130	150	120	150
Magnesium	mg/L	-	72.9	80.1	77	94.4	86.5	90.3	84.6	98.7	99.9	95.3	78.8	87	98.5	81.8	91.3	76.7	81.8 *	75	71	72	86	64	82
Sodium	mg/L	200	2660	3060	2910	3410	2650	2940	2810	3210	3120	3090	2690	2810	3110	2820	2830	2750	2810 *	2700	3000	2700	3000	2600	2600
Potassium	mg/L	-	8.6	12	9.5	12	8.4	11	8.7	12.8	11.6	11.6	10.7	12.2	13	8.6	5.6	11.6	10.4 *	11	11	9.7	10	10	11
Iron	mg/L	0.3	0.14	<0.02	0.02	<0.1	<0.1	<0.1	0.141	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.021	<0.005	<0.050	<0.050 *	<0.06	<0.060	<0.060	<0.60	0.75	<0.060
Sulphate	mg/L	500	6020	6250	6580	7840	6360	6630	5970	5970	6350	6240	5690	5570	6010	5760	5700	5680	5470 *	5800	5900	6100	6700	5600	6300
Chloride	mg/L	250	<0.5	0.6	0.8	<0.5	0.8	1.1	1	1	1	2	1	1	3	3	3	1.14	<10 *	3	1.8	1.8	1.9	2.2	1.6
Bicarbonate	mg/L	-	948	990	938	1020	969	1020	934	1020	976	958	881	904	981	893	965	919	906	850	860	910	900	900	880
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.04	<0.04	0.08	<0.04	<0.08	<0.08	0.2	0.1	<0.1	<0.1	0.1	<0.1	0.3	<0.1	0.3	0.06	<1.0 *	0.067	0.095	0.15	0.11	0.082	0.082
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.05	0.04
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.13	0.12
TDS*	mg/L	500	9360	10000	10200	12000	9730	10300	9480	9930	10200	10100	9040	9070	9880	9250	9260	9110	8960	9200	9500	9600	10,000	8900	9600
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	580	710
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	730	720
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.96	0.89
Water Nutrients																									
Ammonia-N	mg/L	-	0.31	0.11	0.41	0.18	0.35	0.41	0.11	0.12	0.09	0.19	0.27	0.15	<0.05	0.29	<0.05	0.308	<0.050	0.37	0.46	0.27	0.26	0.38	0.21
TKN	mg/L	-	1.02	0.8	2.31	2.08	2.88	4.22	0.9	0.4	0.8	0.9	1.0	0.8	0.9	0.9	1.6	1.54	1.29	1.2	1.2	0.87	0.89	1.3	0.45
Hydrocarbons																									
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																									
COD	mg/L	-	44	35	161	98	305	421	30	40	38	39	41	43	39	43	30	35.6	39.8	78	61	53	41	68	48
TOC	mg/L	-	16.1	15	14.8	14.9	15	15.3	16	17	14	16	16	15	15	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	14	13.8	14.8	14	15	14	15	16	17
Oil & Grease	mg/L	-	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																									
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.19	0.0087
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.002	<0.002	<0.002	0.0389	0.0008	0.0007	<0.0004	0.0007	0.0006	<0.0004	0.0010	n/a	n/a	<0.0016 *	<0.01	<0.012	0.00074	<0.0060	<0.012	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	0.00097
Barium	mg/L	1	0.007	0.0095	0.01	0.014	0.0100	0.0160	0.0130	0.0110	0.0110	0.011	0.013	0.010	0.014	0.009	0.009	0.007	0.0096 *	<0.01	<0.010	<0.010	<0.10	<0.010	<0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.44	0.42
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	<0.0001	<0.0001	<0.0001	0.0002	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.001	<0.0010	<0.00020 *	0.0001	<0.10	<0.0001	<0.000050	<0.00040	0.000042
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	0.0051	<0.005	<0.005	0.0090	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050 *	<0.02	<0.020	<0.020	<0.010	<0.020	<0.0010
Cobalt	mg/L	-	0.02	0.012	0.017	0.0042	0.0044	0.0077	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020 *	<0.006	<0.0060	<0.0060	<0.0030	<0.0060	0.00048
Copper	mg/L	1	<0.01	<0.005	<0.005	0.013	0.0120	0.0140	0.0720	0.0440	0.0300	0.016	0.010	0.011	0.009	0.007	0.014	0.0111	0.0162 *	<0.004	<0.0040	<0.0040	<0.0020	<0.0040	0.0028
Lead	mg/L	0.01	<0.02	0.012	<0.01	<0.001	<0.001	<0.001	0.0004	<0.005	0.0001	<0.0001	0.0004	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	<0.00040 *	<0.004	<0.0040	<0.0040	<0.0020	<0.0040	0.00022
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.59	0.59
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.087	0.055
Mercury	mg/L	0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.00010	<0.00010	<0.000005	0.0000062	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.01	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050 *	<0.004	<0.0040	<0.0040	<0.0020	<0.0040	0.00071
Nickel	mg/L	-	<0.01	0.017	0.025	0.0066	<0.005	0.015	0.007	<0.002	<0.002	<0.002	0.003	0.006	<0.002	0.008	0.007	0.0067	0.0090 *	<0.01	<0.010	<0.010	<0.0050	<0.010	0.0035
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	0.00023
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.1	4.5
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.7	3.0
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1800	2100
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.0021
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Zinc	mg/L	5	0.034	0.024	<0.003	0.027	<0.01	0.023	0.059	0.051	0.039	0.034	0.020	0.016	0.042	0.031	0.033	0.0153	0.0176 *	<0.06	<0.060	<0.060	<0.030	<0.060	0.010
Polycyclic Aromatic Hydrocarbons (PAHs)																									
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010	n/a
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	n/a
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	n/a
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	n/a
Acridine	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	n/a
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010	n/a
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085	n/a
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000075	n/a
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085	n/a
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050	n/a
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050	n/a
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085	n/a
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085	n/a
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085	n/a
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000075	n/a
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010	n/a
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050	n/a
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085	n/a
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	n/a
Perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050	n/a
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050	n/a
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000020	n/a
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	n/a

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)
Information not available (n/a)
Total Dissolved Solids, not a measured value (TDS)
Equipment Failure, parameter not reported (EF)
Detection limit adjusted (*)
Exceeds Regulatory Limit

Table E.12B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 12B												
			Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02
Field Measurements															
Field pH	-	-	8.4	8.1	8	7.8	7.04	7.52	7.07	7.56	7.54	7.47	7.54	8.03	7.7
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Routine Water															
pH	-	6.5 - 8.5	8.34	8.02	8.07	7.71	7.62	7.48	7.66	7.75	7.93	7.81	7.86	7.96	7.76
Conductivity (EC)	µS/cm	-	7540	9110	9470	8880	8980	7890	8430	8570	13400	7640	7730	7890	7940
Calcium	mg/L	-	119	150	241	171	122	137	248	117	92.6	127	121	112	151
Magnesium	mg/L	-	18.3	25.6	39.5	38.2	41.4	36	68.6	27.2	29.7	27.9	28.1	18.8	32.2
Sodium	mg/L	200	1860	2450	3100	2340	2400	2210	3750	2180	2170	1930	2030	2230	2500
Potassium	mg/L	-	15.3	9.28	11	6.86	8.91	7.34	11.2	6.8	9.3	6.2	7.8	7.6	5.6
Iron	mg/L	0.3	0.1	0.99	0.027	0.144	0.159	0.129	0.067	0.048	<0.003	0.05	<0.02	<0.02	<0.1
Sulphate	mg/L	500	3790	5010	7000	4710	5070	4450	8070	4070	4920	4270	4190	4490	5630
Chloride	mg/L	250	11.3	2.3	1.8	1.2	<0.5	1	<0.5	< 0.5	<0.5	<0.5	1.3	1	<0.5
Bicarbonate	mg/L	-	491	705	768	791	796	777	768	778	<5	774	776	753	759
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6	<6	<6	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	<0.05	0.08	<0.05	0.2	n/a	<0.04	0.16	1.11	<0.04
TDS*	mg/L	500	6050	7990	10800	7660	8030	7350	12500	6780	7110	6740	6760	7230	8700
Water Nutrients															
Ammonia-N	mg/L	-	n/a	2.28	2.93	1.23	1.46	1.25	1.39	1.4	1.52	1.06	1.2	1.24	1.19
TKN	mg/L	-	n/a	4.05	5.05	1.9	1.75	1.52	1.92	2.27	1.76	1.76	1.55	2.24	1.72
Organics															
COD	mg/L	-	n/a	385	104	34	36	21	29	101	18	22	18	16	18
TOC	mg/L	-	n/a	17.4	24.8	13.8	11.2	8.9	9.2	8.4	9.1	8.2	7.5	8.2	7.7
Oil & Grease	mg/L	-	n/a	n/a	<1	<1	<1	1	<1	2	27	<5	<5	<5	<5
Metals															
Antimony	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.006	<0.05	<0.02	<0.02	<0.002
Barium	mg/L	1	0.0386	0.0431	0.0226	0.0046	0.0036	0.0048	0.0049	0.0059	0.007	0.007	0.0085	0.015	0.012
Cadmium	mg/L	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	<0.005	<0.003	<0.003	<0.0001
Chromium	mg/L	0.05	0.0015	0.0009	<0.0008	0.0008	<0.0008	<0.0008	<0.0008	<0.0009	<0.0009	<0.008	<0.004	<0.004	<0.005
Cobalt	mg/L	-	0.0058	0.0014	0.0014	<0.0007	0.0031	0.0043	0.0028	0.0039	0.0038	0.015	0.0095	0.014	<0.001
Copper	mg/L	1	0.001	0.007	0.004	<0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.01	<0.005	0.009	<0.01
Lead	mg/L	0.010	0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	0.003	0.004	< 0.002	<0.02	0.014	<0.01	<0.001
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	0.04	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	< 0.001	<0.01	<0.005	<0.005	<0.01
Nickel	mg/L	-	0.011	0.01	0.009	<0.001	0.002	<0.001	0.002	0.003	0.001	<0.01	0.006	0.008	<0.005
Zinc	mg/L	5	0.0162	0.001	0.021	0.005	0.0023	0.0116	0.0151	0.0136	0.0169	0.021	0.0085	0.008	0.017

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Exceeds Regulatory Limit

Table E.12B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 12B																	
			Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun -10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																					
Field pH	-	-	7.63	7.5	7.48	7.64	6.87	7.51	7.51	7.79	7.45	7.69	7.520	7.606	7.76	7.62	7.52	6.17	7.3	7.7	6.28
Field EC	mS	-	n/a	n/a	n/a	n/a	8.83	18.42 (EF)	7.64	7.78	17.93	18.76	7.600	7.830	3	10.85	4.29	11.9	11.87	11.50	13.83
Field Temperature	°C	-	n/a	n/a	n/a	n/a	9.4	3.0	8.1	6.7	5.7	10.94	6.4	9.6	8.9	10.2	7.5	7.1	6.9	7.5	n/a
Routine Water																					
pH	-	6.5 - 8.5	7.82	7.88	8.2	8.2	8.1	8.1	8.2	8.4	8.3	8.0	8.1	8.16	7.95	7.96	7.97	8.14	8.17	7.71	8.00
Conductivity (EC)	µS/cm	-	7820	8280	8090	7800	7650	7860	7760	7760	7850	7920	7720	7740	11200	11000	9700	10000	11,000	11,000	11,000
Calcium	mg/L	-	138	139	142	99.4	129	118	113	114	123	120	123	103	248 *	250	160	210	380	260	270
Magnesium	mg/L	-	25.3	28	29.2	23.3	23.9	21.8	14.8	20.6	22	21.6	22.1	14.5	38.9 *	40	29	37	78	60	54
Sodium	mg/L	200	1920	1990	2040	2040	2010	2020	1970	1990	2030	2080	1980	1850	2970 *	2600	2500	2400	3400	2800	2500
Potassium	mg/L	-	4.2	6.6	5.9	7.6	7.2	7.7	7.0	7.8	8.6	5.0	4.2	7.43	10.2 *	10	8	8.2	11	10	11
Iron	mg/L	0.3	<0.1	<0.1	0.008	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.050	<0.050 *	<0.06	<0.060	<0.060	<0.60	<0.60	0.13
Sulphate	mg/L	500	4410	4390	4290	4030	3650	4020	3920	3720	3760	3850	3760	3730	5710 *	6100	5300	5600	6800	6100	5600
Chloride	mg/L	250	1.1	1.6	2	2	2	3	3	3	2	3	3	1.93	<10 *	6	4	3.7	6.2	5.6	6.0
Bicarbonate	mg/L	-	755	756	739	750	740	741	739	696	748	786	762	738	808	770	760	790	870	850	820
Carbonate	mg/L	-	<6	<6	<5	<5	<6	<5	<5	9	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	1	< 0.04	1.3	0.3	0.8	3.4	2.5	1.8	1.8	0.8	2	2.53	1.3 *	1.4	1.8	0.58	0.2	0.12	0.19
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.038	0.053
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.16	0.25
TDS*	mg/L	500	6880	6930	6880	6570	6190	6570	6400	6210	6320	6470	6280	6080	9380	9400	8400	8700	11,000	9700	8900
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	890	900
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	700	670
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.98	0.99
Water Nutrients																					
Ammonia-N	mg/L	-	1.16	1.3	1.05	1.4	1.24	0.48	1.56	1.36	0.90	1.46	0.82	0.833	2.23	2.1	1.6	1.7	2.1	2.2	2.1
TKN	mg/L	-	1.77	2.12	1.4	1.7	1.7	1	2.2	1.5	1.3	1.6	2.1	1.66	3.9	3.5	2.2	2.7	3.3	3.4	2.8
Hydrocarbons																					
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																					
COD	mg/L	-	22	25	20	20	18	17	19	30	19	21	21	14.9	79.2	98	37	56	71	61	71
TOC	mg/L	-	7.2	8.8	8	7	7	7	7	6	8	8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7	6.5	25.4	26	14	20	21	22	24
Oil & Grease	mg/L	-	6	<5	<1	<1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																					
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.060	<0.0030
Antimony	mg/L	0.006	<0.002	<0.002	0.0094	0.0009	0.0007	<0.0004	0.0006	0.0007	n/a	0.0007	n/a	n/a	<0.0016 *	<0.01	<0.0060	0.00084	<0.0060	<0.012	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	0.00088
Barium	mg/L	1	0.015	<0.01	0.011	0.012	0.009	0.013	0.018	0.011	0.015	0.011	0.015	0.0137	0.0199 *	0.01	<0.010	<0.010	<0.10	<0.10	<0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.56	0.57
Cadmium	mg/L	0.005	<0.0001	<0.0001	0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.001	<0.0010	<0.00020 *	0.0001	<0.050	<0.00010	<0.000050	<0.00040	0.000027
Chromium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050 *	<0.02	<0.010	<0.020	<0.010	<0.020	<0.0010
Cobalt	mg/L	-	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020 *	<0.006	<0.0030	<0.0060	<0.0030	<0.0060	0.00050
Copper	mg/L	1	<0.01	<0.01	0.038	0.033	0.024	0.013	0.009	0.007	0.006	0.005	0.009	0.0099	0.0210 *	<0.004	0.0028	<0.0040	<0.0020	<0.0040	0.0023
Lead	mg/L	0.01	<0.001	<0.001	0.0025	<0.005	0.0002	0.0001	0.0004	0.0001	<0.0001	0.0004	<0.005	<0.0050	<0.00040 *	<0.004	<0.0020	<0.0040	<0.0020	<0.0040	0.00021
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.59	0.56
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.43	0.36
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0000021	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050 *	<0.004	<0.0020	<0.0040	<0.0020	<0.0040	0.00077
Nickel	mg/L	-	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	0.004	0.004	0.0039	0.0089 *	<0.01	<0.0050	<0.010	<0.0050	<0.010	0.0030
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<1.0	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	0.00029
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.7	4.5
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.8	5.2
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1900	2000
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.019	0.021
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Zinc	mg/L	5	<0.01	0.017	0.029	0.025	0.025	0.018	0.017	0.003	0.032	0.049	0.008	0.014	0.0464 *	<0.06	0.037	<0.060	<0.030	<0.060	0.0061

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.13: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 13																		
			Apr-91	Oct-91	Apr-92	Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																						
Field pH	-	-	n/a	n/a	8.2	8	8.4	7.3	8.2	8.33	7.7	7.6	7	7.4	n/a	7.4	7.4	6.86	7.44	7.07	7.81	7.02
Routine Water																						
pH	-	6.5 - 8.5	8.4	8.4	8.3	7.5	8	7.6	8	7.92	7.87	7.6	7.67	7.76	n/a	7.83	7.53	7.71	7.67	7.82	7.94	7.9
Conductivity (EC)	µS/cm	-	9850	12300	14500	13400	13100	14600	13400	15000	14400	16290	15000	14600	n/a	11200	15000	14200	13300	12800	13200	11400
Calcium	mg/L	-	68	126	277	93.2	117	152	118	266	179	317	216	228	n/a	149	249	86.9	158	175	105	93.4
Magnesium	mg/L	-	88	151	239	86.3	133	155	141	260	184	265	239	236	n/a	152	250	174	178	132	132	108
Sodium	mg/L	200	2910	4050	3440	3570	3640	4230	3560	4070	4210	4208	4420	4280	n/a	3880	4170	4190	3380	3700	3610	3420
Potassium	mg/L	-	14.1	18	15	12.1	11.9	14.1	14	12.7	14.8	18	13.7	13.8	n/a	14	10.5	14.8	11.4	7.36	10.9	14.4
Iron	mg/L	0.3	0.06	0.02	0.16	4.61	1.12	1.1	<0.04	<0.04	<0.04	<0.003	<0.04	<0.04	n/a	0.024	0.005	0.286	0.65	0.027	n/a	0.086
Sulphate	mg/L	500	5277	6940	7800	7260	7110	7920	7140	9150	8400	8159	9260	8620	n/a	7990	8450	8410	7640	7550	7150	7530
Chloride	mg/L	250	54	80	399	117	60.7	384	109	132	163	214	157	176	n/a	112	181	111	121	132	109	99.9
Bicarbonate	mg/L	-	548	1374	498	1270	1330	933	1110	1250	1130	751	1620	1820	n/a	1660	1760	1690	1420	1540	1200	1400
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1	0.09	<0.05	0.067	<0.04
TDS*	mg/L	500	n/a	12300	12900	11800	11700	12800	11600	14500	13700	13933	15100	14500	n/a	13100	14200	13800	12100	12400	11800	11500
Total Kjeldahl Nitrogen																						
Ammonia-N	mg/L	-	1.2	<1	<1	<0.005	0.062	0.09	<0.005	<0.005	0.036	0.079	<0.005	13.8	n/a	0.1	0.24	0.13	0.09	0.07	0.09	<0.05
TKN	mg/L	-	<1	<1	1.3	1.97	1.79	1.45	1.88	2.26	2.16	2.51	2.41	2.51	n/a	2.04	2.82	1.9	2.84	1.89	2.27	1.52
Organics																						
COD	mg/L	-	63	64	77	86	72	71	106	101	124	84	72	78	n/a	114	129	140	79	57	109	48
TOC	mg/L	-	23	33	3	27.8	20.5	18.7	25.5	29.5	24	47.2	40.5	38.6	n/a	25.5	46.3	27.1	25.8	24	15	19
Oil & Grease	mg/L	-	n/a	n/a	<1	n/a	n/a	4	<0.3	0.4	3.7	<0.2	<0.2	<0.2	n/a	3	3	<1	1	<1	n/a	10
Metals																						
Antimony	mg/L	0.006	<0.0005	<0.0005	< 0.0002	<0.0005	<0.0005	<0.0005	0.0065	0.0007	<0.0005	< 0.005	<0.005	<0.005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	n/a	<0.006
Barium	mg/L	1	0.04	0.035	0.009	0.016	0.013	0.013	<0.004	<0.004	<0.004	0.0114	0.0108	0.0121	n/a	0.0113	0.0099	0.0131	0.0224	0.0091	n/a	0.0099
Cadmium	mg/L	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	<0.0005	n/a	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	n/a	<0.0006
Chromium	mg/L	0.05	<0.01	<0.006	<0.006	<0.006	<0.006	<0.005	0.007	<0.006	<0.006	0.0019	0.0011	0.0016	n/a	0.0011	0.0022	0.0019	0.0037	<0.0008	n/a	0.0013
Cobalt	mg/L	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.0013	<0.0007	0.0058	n/a	0.0012	<0.0007	0.0032	0.0041	0.0033	n/a	0.0044
Copper	mg/L	1	0.01	0.09	<0.01	<0.01	<0.01	0.01	<0.02	<0.02	<0.02	0.01	0.004	0.002	n/a	0.003	0.004	0.002	<0.001	0.002	n/a	0.003
Lead	mg/L	0.010	<0.03	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.002	<0.002	<0.002	n/a	<0.002	0.005	<0.002	<0.002	0.006	n/a	<0.002
Mercury	mg/L	0.001	<0.0002	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	0.0001	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001
Molybdenum	mg/L	-	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.001	0.001	0.002	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	n/a	<0.001
Nickel	mg/L	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.014	0.007	0.016	n/a	0.01	0.011	0.014	0.006	0.01	n/a	0.007
Zinc	mg/L	5	0.04	0.55	0.042	0.059	0.008	0.012	<0.005	0.005	<0.005	0.0016	0.009	0.0126	n/a	0.0161	0.0052	0.0059	0.0065	0.0229	n/a	0.0167

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.13: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 13																				
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-14
Field Measurements																								
Field pH	-	-	7.81	7.46	7.44	7.81	n/a	7.72	7.7	7.68	7.51	7.67	7.28	7.79	7.32	7.27	7.617	7.6	8.032	7.64	7.75	7.78	7.8	
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	15.2	11.2 (EF)	14.11	9.09	3.68	3.15	14.380	>3.999[1]	2.92	18.36	13.45	15.64	15.05	
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	33.4	6.3	4.4	8.4	7.7	9.34	8.5	10.5	15.6	14.7	11.3	15.9	7.3	
Routine Water																								
pH	-	6.5 - 8.5	7.9	7.89	7.79	8.06	n/a	8.17	8.2	8.2	8	8.3	8.1	8.3	8.2	8.1	8.2	8.06	8.18	7.98	8.02	8.07	8.17	
Conductivity (EC)	µS/cm	-	11500	10900	11800	11900	n/a	12500	15200	12500	13400	11200	13400	14300	16300	13300	14800	16800	17200	19000	13000	17000	15000	
Calcium	mg/L	-	114	97.2	111	100	n/a	132	255	128	200	134	154	187	240	142	204	237	248 *	260	120	210	130	
Magnesium	mg/L	-	118	102	107	105	n/a	135	256	140	194	156	160	186	239	149	205	247	281 *	260	120	210	150	
Sodium	mg/L	200	3400	3210	3480	3520	n/a	3260	4160	3500	3910	3660	3560	3690	4280	3850	3920	4100	4500 *	4300	3300	4500	3900	
Potassium	mg/L	-	9.9	13	12	11	n/a	11	10.4	12.8	12	12.2	11.2	12.7	14.0	7.0	4.5	12.2	16.2 *	15	12	14	11	
Iron	mg/L	0.3	n/a	<0.02	n/a	<0.1	n/a	<0.1	0.078	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.10 *	0.1	0.68	<0.060	0.17	
Sulphate	mg/L	500	6490	6300	6280	7400	n/a	7440	9100	6650	7460	6980	7110	6900	8030	6630	7560	9360	9000 *	11000	6800	10000	8200	
Chloride	mg/L	250	86.1	90.4	93	91.7	n/a	233	354	223	268	199	199	238	278	173	253	436	460 *	550	200	360	240	
Bicarbonate	mg/L	-	1420	1490	1430	1430	n/a	991	976	1210	1200	1410	1430	1460	1720	1640	1470	756	726	1200	1200	1100	1200	
Carbonate	mg/L	-	<6	<6	<6	<6	n/a	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	
Nitrate (N)	mg/L	10	0.23	<0.04	0.27	<0.04	n/a	<0.08	0.6	0.1	<0.1	<0.1	0.2	0.1	0.2	0.1	1.3	0.076	<1.0 *	0.12	0.011	0.099	0.079	
TDS*	mg/L	500	10900	10500	10800	11900	n/a	11700	14600	11200	12600	11800	11900	11900	13900	11800	12900	14800	14900	17000	11000	16000	13000	
Water Nutrients																								
Ammonia-N	mg/L	-	<0.05	<0.05	0.05	<0.05	n/a	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	0.16	<0.050	0.11	0.076	
TKN	mg/L	-	1.51	1.22	1.43	1.28	n/a	2.49	2	0.8	1.6	1.7	0.6	1.5	1.6	1.1	1.4	2.27	4.2	2.8	1.9	1.6	1.8	
Hydrocarbons																								
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	Decommissioned
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.31 *	<0.1	<0.10	<0.10	<0.10	
Organics																								
COD	mg/L	-	40	22	42	45	n/a	75	60	60	66	61	55	60	57	55	40	81.3	95.6	110	78	130	75	
TOC	mg/L	-	22.2	19.8	19.8	20.3	n/a	27.5	25	9	27	22	22	17	13	21	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20	26.5	37.3	40	24	30	25	
Oil & Grease	mg/L	-	n/a	<5	n/a	<5	n/a	<5	<1	<1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																								
Antimony	mg/L	0.006	n/a	<0.02	n/a	0.0003	n/a	<0.002	0.0007	0.0013	0.0008	<0.0004	0.0007	0.0008	0.0004	0.0011	n/a	n/a	<0.0016 *	<0.01	<0.012	0.00081	<0.012	
Barium	mg/L	1	n/a	0.013	n/a	0.011	n/a	0.016	0.01	0.016	0.013	0.015	0.011	0.013	0.008	0.010	0.01	0.009	0.0152 *	<0.01	0.011	0.011	<0.010	
Cadmium	mg/L	0.005	n/a	<0.003	n/a	<0.00001	n/a	<0.0001	0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.00020 *	<0.0001	<0.10	0.000069	<0.00010	
Chromium	mg/L	0.05	n/a	<0.004	n/a	0.0053	n/a	<0.005	0.008	0.005	<0.005	<0.005	<0.005	0.013	0.005	0.006	<0.005	0.0079	0.0126 *	<0.02	<0.020	0.0012	<0.020	
Cobalt	mg/L	-	n/a	0.011	n/a	0.0003	n/a	0.0025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020 *	<0.006	<0.0060	0.0003	<0.0060	
Copper	mg/L	1	n/a	<0.005	n/a	0.015	n/a	0.016	0.049	0.046	0.038	0.019	0.015	0.018	0.017	0.008	0.02	0.0245	0.0292 *	0.007	0.006	0.0042	<0.0040	
Lead	mg/L	0.010	n/a	<0.01	n/a	0.0006	n/a	<0.001	0.0004	<0.005	<0.0001	<0.0001	0.0002	0.0001	<0.0001	0.0002	<0.005	<0.0050	<0.00040 *	<0.004	<0.0040	<0.00020	<0.0040	
Mercury	mg/L	0.001	n/a	<0.0001	n/a	n/a	n/a	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.00010	<0.00010	<0.000005	0.000008	<0.000010	<0.0000050	
Molybdenum	mg/L	-	n/a	<0.005	n/a	0.005	n/a	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050 *	0.005	<0.0040	0.0044	<0.0040	
Nickel	mg/L	-	n/a	0.025	n/a	0.0029	n/a	0.0091	0.008	0.006	0.005	0.005	0.004	0.013	0.009	0.011	0.009	0.0136	0.0183 *	0.01	<0.010	0.008	<0.010	
Zinc	mg/L	5	n/a	0.0695	n/a	0.051	n/a	0.023	0.037	0.042	0.036	0.02	0.021	0.008	0.004	0.113	0.009	0.0169	<0.0040 *	<0.06	<0.060	0.0037	<0.060	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

1 - field measured value exceeded EC reading range of equipment

Exceeds Regulatory Limit

Table E.14: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 14																
			Oct-92	Apr-93	Oct-93	Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																			
Field pH	-	-	7.9	7.9	7.2	8	8.64	7.6	7.4	7.1	7.3	7.2	n/a	7.3	6.85	6.83	6.73	7.7	7.23
Routine Water																			
pH	-	6.5 - 8.5	7.3	7.3	7.4	7.9	7.63	7.61	7.3	7.71	7.46	7.42	7.63	7.56	7.51	7.31	7.6	7.62	7.51
Conductivity (EC)	µS/cm	-	2980	2660	2910	2710	2740	2560	2690	2650	2990	2930	2240	2840	2770	2670	2840	2870	2670
Calcium	mg/L	-	63.7	178	144	132	171	156	152	171	228	209	192	209	34.8	188	167	135	152
Magnesium	mg/L	-	40.5	111	104	97.8	118	102	116	119	163	146	136	125	120	130	122	96	123
Sodium	mg/L	200	460	351	439	408	328	370	385	376	344	334	360	600	402	375	452	413	404
Potassium	mg/L	-	16.7	19.3	19.1	19.4	23.2	19.7	25	20.4	26.2	20.7	24.6	19.2	25.9	21.9	26.2	18.7	25.5
Iron	mg/L	0.3	8.51	0.02	0.34	<0.04	0.08	<0.04	0.358	0.14	0.08	0.41	0.033	0.122	0.081	0.156	0.051	0.071	0.376
Sulphate	mg/L	500	383	767	757	635	697	671	754	713	961	820	764	1260	692	814	861	607	810
Chloride	mg/L	250	78.3	1.7	68.9	61.1	79.8	64.6	57	50.7	39.9	32.4	24.4	28.8	17.5	22.7	18.2	14.5	10.8
Bicarbonate	mg/L	-	1020	1040	1010	1050	991	1010	1011	1110	1130	1120	1200	1170	1260	1180	1230	1320	1260
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.47	<0.05	<0.05	<0.02	<0.02
TDS*	mg/L	500	1540	1940	2030	1870	1900	1880	2502	2000	2320	2110	2090	2820	1910	2250	2250	1940	2160
Total Kjeldahl Nitrogen																			
Ammonia-N	mg/L	-	0.721	0.83	0.95	0.547	0.365	0.651	0.806	0.333	0.46	0.345	0.42	0.62	0.63	0.54	0.67	0.39	0.59
TKN	mg/L	-	2.56	1.91	1.86	2.06	1.35	1.57	1.45	1.44	1.44	1.12	1.28	1.93	1.44	1.12	1.43	1.6	1.25
Organics																			
COD	mg/L	-	106	34	51	110	58	59	41	35	27	39	63	64	85	32	30	30	28
TOC	mg/L	-	20.7	14.8	13.8	15.6	15	15.8	14.1	13.5	14.8	16.6	14.2	19.1	13.2	13.6	13.4	12.9	14
Oil & Grease	mg/L	-	<0.2	<0.2	2	< 0.3	0.3	0.4	<0.2	<0.2	<0.2	<0.2	< 1	<1	<1	<1	<1	2	7
Metals																			
Antimony	mg/L	0.006	<0.0005	<0.0005	<0.0005	0.0062	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.006	<0.006
Barium	mg/L	1	0.173	0.133	0.152	0.126	0.137	0.105	0.183	0.177	0.101	0.0794	0.0785	0.0752	0.0678	0.0754	0.0636	0.0646	0.0807
Cadmium	mg/L	0.005	<0.003	0.004	<0.005	<0.005	<0.003	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Chromium	mg/L	0.05	<0.006	<0.006	<0.005	<0.005	<0.006	<0.006	0.0009	0.002	0.0012	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.0028	<0.0009	<0.0009
Cobalt	mg/L	-	<0.01	0.01	0.03	<0.01	<0.01	<0.01	0.0025	0.0023	0.0023	0.002	0.0011	0.0013	0.0036	0.0033	0.0032	0.0039	0.0034
Copper	mg/L	1	<0.01	<0.01	0.02	<0.02	<0.02	<0.02	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002
Lead	mg/L	0.010	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.002	<0.002	<0.002	0.002	<0.002	0.005	<0.002	<0.002	0.006	<0.002	<0.002
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	-	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.004	0.007	0.007	0.005	0.002	0.004	0.005	<0.001	0.005	0.005	0.004
Zinc	mg/L	5	0.029	0.009	0.011	<0.005	<0.005	<0.005	0.0025	0.0089	0.0182	0.0009	0.0228	0.0149	0.0042	0.0072	0.0209	0.0178	0.0111

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.14: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 14																					
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																									
Field pH	-	-	7.7	7.23	7.55	7.46	7.55	7.4	7.45	7.39	6.91	7.29	7.14	7.34	7.21	7.12	7.819	7.454	9.37	7.46	7.4	6	7.5	7.8	7.61
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.9	6.91 (EF)	2.68	2.79	1.25	6.03	2.650	2.770	5.1	3.08	1.47	4.05	3.81	4.30	4.73
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.2	7.3	4.5	6.1	4.6	10.88	6.5	5.6	13.5	12.3	7.5	9.4	5.6	7.0	8.5
Routine Water																									
pH	-	6.5 - 8.5	7.54	7.71	7.84	7.7	7.9	7.79	8.1	8.1	7.9	8.1	8.0	8.1	8.0	7.9	8.1	8.09	8.02	8.05	8.04	8.13	8.14	7.78	8.05
Conductivity (EC)	µS/cm	-	2610	2670	2820	2790	2640	2590	2630	2750	2460	2220	2560	2580	2720	2770	2670	2760	2710	3000	3300	3400	3500	4000	4600
Calcium	mg/L	-	140	147	99.7	144	129	132	151	106	152	124	144	141	158	145	132	114	116	120	160	150	160	190	230
Magnesium	mg/L	-	104	110	81.6	105	86.6	92.2	106	97.6	85.5	101	103	109	120	115	107	86.7	92.4	86	130	130	130	140	190
Sodium	mg/L	200	414	408	555	479	470	428	426	419	383	403	390	404	422	435	436	454	413	400	580	490	550	630	690
Potassium	mg/L	-	18	24.6	18	23	17	20	17	22	14.6	19.8	19.4	21.7	20.7	21.2	16.3	16.8	18.9	17	22	22	21	22	25
Iron	mg/L	0.3	0.16	<0.02	0.04	<0.05	<0.05	<0.05	0.017	0.346	0.009	<0.005	<0.005	<0.0058	0.008	0.012	0.008	<0.0050	<0.010	0.11	<0.060	<0.060	<0.060	<0.060	<0.060
Sulphate	mg/L	500	622	674	626	771	755	730	698	661	553	578	546	566	607	664	635	612	601	790	1000	1100	1300	1500	1900
Chloride	mg/L	250	8.4	7.2	7.2	8	10.4	8.1	8	8	9	5	5	4	4	3	4	2.74	2.64	5	2.5	2.1	2.7	1.7	1.6
Bicarbonate	mg/L	-	1320	1310	1340	1300	1090	1170	1220	1220	1180	1240	1270	1160	1290	1280	1310	1310	1240	1200	1200	1200	1200	1200	1100
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.04	<0.02	0.052	<0.04	<0.02	<0.02	<0.1	<0.1	<0.5	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.050	<0.050	0.072	0.024	0.082	0.09	0.091	0.19
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.015	0.025
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	0.22
TDS*	mg/L	500	1960	2020	2050	2170	2000	1990	2010	1910	1780	1840	1830	1820	1970	2010	1970	1930	1850	2000	2500	2500	2700	3100	3600
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1000	1400
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1000	940
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.95	1.0
Water Nutrients																									
Ammonia-N	mg/L	-	0.42	0.32	0.65	0.35	0.56	0.45	0.39	0.42	0.26	0.41	0.31	0.40	0.29	0.41	0.3	0.42	0.454	0.29	0.4	0.37	0.37	0.53	0.35
TKN	mg/L	-	1.3	1.13	1.88	1.14	2.93	2.34	1.2	0.8	1.1	1.2	1.1	1	0.9	1	1	1.39	1.58	1.7	1.1	1	1.1	1.1	0.91
Hydrocarbons																									
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																									
COD	mg/L	-	35	25	36	30	146	50	30	20	30	29	31	28	27	29	25	24.3	27.8	54	37	52	37	34	34
TOC	mg/L	-	12.4	11.4	12	12.7	12.2	12	11	11	11	11	11	11	11	11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10	9.2	10.5	11	9.8	9.7	8.6	9.6	11
Oil & Grease	mg/L	-	<5	<5	<5	8	7	<5	<1	<1	<1	<1	<1	2	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																									
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0030	<0.0030
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.001	0.0014	<0.001	0.0015	0.0014	0.0007	<0.0004	0.0010	0.0011	<0.0004	0.0008	n/a	n/a	<0.00040	<0.0006	<0.0030	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00077	0.00069
Barium	mg/L	1	0.064	0.0645	0.085	0.064	0.1	0.066	0.055	0.058	0.19	0.108	0.109	0.062	0.094	0.078	0.105	0.0664	0.0829	0.084	0.1	0.087	0.066	0.052	0.042
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.12	0.13
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	<0.00005	<0.00005	< 0.00005	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.000050	<0.000025	<0.	0.000068	0.00003	<0.000020	0.000025
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	0.0049	0.006	< 0.002	<0.005	<0.005	<0.005	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.001	<0.025	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	0.007	0.0045	0.006	0.0006	<0.0005	< 0.0005	<0.002	<0.002	0.003	<0.002	0.002	0.002	<0.002	<0.002	0.002	<0.0020	0.0032	0.003	0.0021	0.002	0.0018	0.0017	0.0019
Copper	mg/L	1	<0.01	<0.005	0.008	<0.005	<0.005	< 0.005	0.004	0.013	0.005	0.004	0.003	0.003	0.001	0.002	0.002	0.0024	0.002	0.0003	<0.0010	0.0014	0.00087	<0.00020	0.00045
Lead	mg/L	0.01	<0.02	<0.01	< 0.01	<0.0005	<0.0005	< 0.0005	<0.0001	<0.005	<0.0001	<0.0001	0.0005	<0.0001	<0.0001	0.0001	<0.005	<0.0050	<0.00010	<0.0002	<0.0010	0.0005	<0.0002	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.32	0.36
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.62	0.63
Mercury	mg/L	0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000049	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.01	<0.005	0.005	<0.005	<0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.0050	<0.0050	0.0006	<0.0010	0.0008	0.0016	0.00068	0.00074
Nickel	mg/L	-	<0.01	0.014	0.015	<0.003	<0.0025	< 0.0025	<0.002	0.002	0.005	0.004	0.005	0.006	0.005	0.007	0.007	0.0061	0.0084	0.0062	0.0042	0.0047	0.0044	0.0033	0.0031
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.8	7.2
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.8	3.4
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	450	640
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0008	0.0011
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	0.024	0.0315	<0.003	0.007	<0.005	< 0.005	0.006	0.012	0.011	0.004	0.009	<0.002	0.008	0.009	0.009	0.013	0.0048	0.005	<0.015	0.01	0.0059	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.15A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 15A													
			Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																
Field pH	-	-	8.6	8.84	8	8.1	7.4	7.8	n/a	8	7.8	7.26	8.01	7.18	7.4	7.91
Routine Water																
pH	-	6.5 - 8.5	8.2	8.18	8.17	7.8	8.08	8.07	n/a	8.13	7.89	7.95	7.87	8	8.07	7.94
Conductivity (EC)	µS/cm	-	6260	6430	6180	6450	6060	6100	n/a	5690	6310	6260	5830	6130	6170	5760
Calcium	mg/L	-	56.5	56.3	55.1	61	56.3	55.4	n/a	55.4	56.8	18.6	54.1	58	52.7	50.6
Magnesium	mg/L	-	6	5.9	5.7	14	5.7	5.8	n/a	5.6	5.8	6.2	6.3	16.8	6.35	5.89
Sodium	mg/L	200	1540	1620	1630	1723	1590	1490	n/a	1680	1690	1690	1470	1770	1740	1650
Potassium	mg/L	-	8.59	6.86	6.26	7	5.51	5.14	n/a	6.19	5.32	5.87	5.49	10.5	5.7	6.6
Iron	mg/L	0.3	< 0.04	< 0.04	< 0.04	0.63	<0.04	<0.04	n/a	0.005	0.098	0.07	0.44	0.008	0.093	0.006
Sulphate	mg/L	500	2760	2990	2830	2723	3020	2620	n/a	3200	2980	3090	2870	3360	3100	3350
Chloride	mg/L	250	0.7	2	2	5	1.9	2	n/a	2.5	1.7	0.8	1.8	0.6	1	<0.5
Bicarbonate	mg/L	-	795	796	797	795	802	809	n/a	800	799	821	818	815	816	810
Carbonate	mg/L	-					n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate (N)	mg/L	10					n/a	n/a	n/a	n/a	n/a	0.08	0.26	0.16	0.355	<0.04
TDS*	mg/L	500	4760	5070	4930	5328	5070	4580	n/a	5340	5140	5210	4800	5620	5310	5260
Total Kjeldahl Nitrogen																
Ammonia-N	mg/L	-	1.9	2.11	3.05	2.75	2.16	2.05	n/a	2.13	2.25	2.29	2.25	2.01	1.97	2.4
TKN	mg/L	-	3.04	2.57	3.38	2.24	2.79	2.65	n/a	2.74	2.54	2.53	2.29	2.45	2.6	2.6
Organics																
COD	mg/L	-	43	31	40	28	24	20	n/a	24	27	24	21	21	< 5	19
TOC	mg/L	-	12.1	9.5	10.1	9.7	9.4	9.5	n/a	10.9	10.5	9.9	9.8	10.1	10.5	10.5
Oil & Grease	mg/L	-	< 0.3	0.3	< 0.2	< 0.2	<0.2	<0.2	n/a	<1	1	<1	1	<1	2	12
Metals																
Antimony	mg/L	0.006	0.0073	< 0.0005	< 0.0005	< 0.005	<0.005	<0.005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.006
Barium	mg/L	1	0.01	0.006	< 0.004	0.0058	0.0079	0.0049	n/a	0.0056	0.0059	0.0049	0.0084	0.0058	0.0057	0.0048
Cadmium	mg/L	0.005	< 0.005	< 0.003	< 0.003	< 0.0005	<0.0005	<0.0005	n/a	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006
Chromium	mg/L	0.05	< 0.005	< 0.006	< 0.006	< 0.0008	<0.0008	<0.0008	n/a	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0009	<0.0009
Cobalt	mg/L	-	< 0.01	< 0.01	< 0.01	< 0.0007	<0.0007	<0.0007	n/a	<0.0007	<0.0007	0.0031	0.0031	0.002	0.0031	0.0034
Copper	mg/L	1	< 0.02	< 0.02	< 0.02	0.006	0.001	<0.001	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Lead	mg/L	0.010	< 0.04	< 0.04	< 0.04	< 0.002	<0.002	<0.002	n/a	<0.002	<0.002	<0.002	<0.002	0.002	0.004	<0.002
Mercury	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	< 0.02	< 0.02	< 0.02	< 0.001	<0.001	0.002	n/a	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001
Nickel	mg/L	-	< 0.02	< 0.02	< 0.02	< 0.001	<0.001	<0.001	n/a	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001
Zinc	mg/L	5	< 0.005	< 0.005	< 0.005	0.0016	0.0084	0.009	n/a	0.0164	0.0093	0.0037	0.0117	0.0222	0.0152	0.0162

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.15A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 15A																				
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	May-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-14
Field Measurements																								
Field pH	-	-	7.95	7.91	7.68	7.87	7.85	7.87	7.98	7.84	7.89	7.93	7.66	8.61	NM	8.18	8.107	8.2	8.03	7.98	7.2	7.93	8.1	
Field EC	m/S	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.7	14.12 (EF)	6.39	6.26	NM	13.96	5.910	3.567	2.2	6.22	1.9	6.6	6.58	
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.7	6.9	2.7	8.5	NM	9.74	5.8	13.0	14.1	12.3	10.5	11.1	7.0	
Routine Water																								
pH	-	6.5 - 8.5	7.93	8.05	7.9	8	8	8.29	8.3	8.2	8.2	8.4	8.3	8.5	8.2	8.3	8.4	8.43	8.05	8.18	8.28	8.28	8.36	
Conductivity (EC)	µS/cm	-	5810	5920	6220	6050	5520	5750	6180	6120	6000	5480	6200	6210	6290	6220	6100	6370	4020	6200	6300	6200	6300	
Calcium	mg/L	-	56	53.1	55.2	56.1	53	52.1	59.8	41.1	58.1	44.9	60.1	49.8	58.7	56.6	53	54.6	62.5	55	52	57	52	
Magnesium	mg/L	-	6.58	6.25	6.51	6.5	5.5	5.2	6.6	6.2	6.4	6.6	6.3	7.1	6.1	5.3	6.3	6.09	31.8	6	5.4	5.9	5.8	
Sodium	mg/L	200	1490	1510	1700	1600	1460	1490	1580	1520	1550	1610	1500	1560	1530	1610	1440	1460	823	1500	1600	1700	1600	
Potassium	mg/L	-	4.3	5.5	5.3	5	4.7	<4	4.8	5.6	5.5	5.2	5.5	6.3	6.6	5.6	3.2	4.86	7.13	5.7	5.1	5.2	5.4	
Iron	mg/L	0.3	<0.03	<0.02	<0.02	<0.05	<0.05	< 0.1	<0.005	<0.005	0.006	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.0050	0.019	<0.06	<0.060	<0.060	<0.060	
Sulphate	mg/L	500	2960	2890	3110	3140	2830	2780	2750	2820	2540	2820	2690	2720	2550	2770	2460	2720	1400 *	2800	3300	3000	2900	
Chloride	mg/L	250	0.8	1.4	1.6	0.6	2.2	1.5	2	3	2	3	3	3	4	2	4	1.91	121 *	3	2.5	2.1	2.3	
Bicarbonate	mg/L	-	817	818	799	812	808	807	772	811	826	773	814	740	861	805	806	787	656	780	800	800	760	
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	8	<5	<5	16	<5	19	<5	<5	15	19	<5.0	<0.5	<0.50	<0.50	9.3	
Nitrate (N)	mg/L	10	<0.04	0.17	0.19	<0.04	<0.04	<0.04	0.2	0.2	<0.1	<0.1	0.1	0.4	1.1	<0.1	0.1	0.155	<1.0 *	0.13	0.31	0.39	0.09	
TDS*	mg/L	500	4930	4860	5280	5210	4750	4720	4790	4800	4570	4890	4670	4730	4580	4850	4380	4650	2770	4800	5300	5100	4900	
Water Nutrients																								
Ammonia-N	mg/L	-	1.55	1.84	1.57	1.62	1.33	1.86	1.68	1.69	1.99	2.28	2.19	1.98	2.09	2.39	2.14	1.93	<0.050	1.8	1.9	1.8	2.3	
TKN	mg/L	-	2.58	2.3	1.94	2.43	2.27	2.63	2.4	2.3	2.7	2.6	2.5	2.2	2.8	2.8	2.5	2.72	3.43	2.9	2.8	2.3	2.7	
Hydrocarbons																								
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	Decomissioned
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.37 *	<0.1	<0.10	<0.10	<0.10	
Organics																								
COD	mg/L	-	31	17	14	19	24	19	20	20	24	25	26	30	40	17	15	26.3	30.2	51	25	38	25	
TOC	mg/L	-	9.6	9	9.4	9.9	8.6	9.2	8	8	9	9	10	7	12	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	15	9.5	13.1	11	9.7	9.7	7.9	
Oil & Grease	mg/L	-	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																								
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.001	<0.001	<0.002	0.0006	0.0009	0.0006	<0.0004	0.0009	0.0005	0.0006	0.0006	n/a	n/a	<0.00040	<0.006	<0.0060	<0.00060	<0.0060	
Barium	mg/L	1	0.004	0.0045	0.0055	0.006	0.006	<0.01	0.006	0.006	0.008	0.008	0.008	0.006	0.012	0.007	0.006	0.0051	0.055	<0.01	<0.010	<0.010	<0.010	
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	<0.00005	<0.00005	<0.0001	0.0006	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.000050	<0.000050	<0.050	0.00003	<0.000050	
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	0.0034	<0.003	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.0010	<0.010	
Cobalt	mg/L	-	0.012	0.009	0.011	<0.0005	<0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.00030	<0.0030	
Copper	mg/L	1	<0.01	<0.005	0.006	0.006	<0.005	<0.01	0.011	0.021	0.013	0.008	0.009	0.007	0.007	0.004	0.007	0.0068	0.0079	<0.002	<0.0020	0.0012	<0.0020	
Lead	mg/L	0.010	<0.02	0.022	< 0.01	<0.0005	<0.0005	<0.001	0.0003	<0.005	<0.0001	<0.0001	0.004	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.00020	<0.0020	
Mercury	mg/L	0.001	< 0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.000010	<0.0000050	
Molybdenum	mg/L	-	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.002	<0.0020	0.00045	<0.0020	
Nickel	mg/L	-	<0.01	<0.005	<0.005	<0.003	<0.0025	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.002	<0.002	<0.002	<0.0020	0.0064	<0.005	<0.0050	<0.0005	<0.0050	
Zinc	mg/L	5	0.012	0.0035	<0.003	0.012	0.007	0.012	0.015	0.025	0.017	0.012	0.013	0.004	0.032	0.004	0.004	0.0055	0.0036	<0.03	<0.030	<0.003	<0.030	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

May 07 - groundwater contained in well was frozen in April 2007

Not measured (NM)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.15B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 15B													
			Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00
Field Measurements																
Field pH	-	-	7.89	8.04	7.38	7.3	6.8	7.1	n/a	7.2	6.8	6.63	7.07	7.24	7.12	7.24
Routine Water																
pH	-	6.5 - 8.5	7.8	7.53	7.57	7.3	7.45	7.23	n/a	7.45	7.16	7.34	7.15	7.42	7.45	7.43
Conductivity (EC)	µS/cm	-	4720	5480	4870	7240	5790	7050	n/a	6430	9950	7080	5800	5900	5560	4800
Calcium	mg/L	-	38.4	52.5	43.4	116	71	111	n/a	108	242	19.7	79.2	39	46.4	43.9
Magnesium	mg/L	-	18.5	25.3	20.5	68	35.7	61.3	n/a	56.3	143	52.2	44.3	22.9	34.6	24.3
Sodium	mg/L	200	1140	1330	1300	1802	1470	1740	n/a	1910	2540	1880	1410	1550	1520	1330
Potassium	mg/L	-	9.22	9.36	8.2	13	8.27	10.9	n/a	12.4	10.4	12	8.2	7.46	8	8.7
Iron	mg/L	0.3	0.08	0.04	<0.04	1.17	0.1	<0.04	n/a	0.02	5.77	0.996	0.398	0.027	0.247	0.012
Sulphate	mg/L	500	827	1370	1070	2631	1890	2860	n/a	3210	5700	3010	2150	2030	1820	1450
Chloride	mg/L	250	181	136	191	183	163	148	n/a	141	140	112	127	120	143	130
Bicarbonate	mg/L	-	1880	1710	1910	1590	1720	1490	n/a	1510	737	1490	1620	1680	1700	1790
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.13	0.08	0.16	0.496	0.38
TDS*	mg/L	500	3130	3760	3560	6410	4490	5660	n/a	6190	9130	5820	4620	4600	4410	3970
Total Kjeldahl Nitrogen																
Ammonia-N	mg/L	-	0.315	0.413	0.598	0.789	0.511	0.623	n/a	0.58	1.24	0.98	0.6	0.71	0.3	0.41
TKN	mg/L	-	2.48	1.92	1.97	2.3	2.1	2.33	n/a	2.82	4.12	2.6	2.29	2.16	1.82	2
Organics																
COD	mg/L	-	103	97	101	61	56	58	n/a	97	106	133	63	56	<5	58
TOC	mg/L	-	23.8	26.2	23.3	38.7	28.5	16.5	n/a	31.3	39.5	25.7	24.2	25.1	19	23.6
Oil & Grease	mg/L	-	<0.3	0.4	0.7	0.5	<0.2	<0.2	n/a	1	<1	<1	<1	<1	2	4
Metals																
Antimony	mg/L	0.006	0.007	<0.0005	<0.0005	<0.005	<0.005	<0.005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.006
Barium	mg/L	1	0.027	0.02	0.01	0.0153	0.0125	0.0107	n/a	0.0102	0.0103	0.0181	0.0113	0.0114	0.0076	0.0104
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	0.538	<0.0005	<0.0005	n/a	<0.0005	0.0007	<0.0005	<0.0005	<0.0005	<0.0006	<0.000050
Chromium	mg/L	0.05	<0.005	<0.006	<0.006	0.0013	<0.0008	0.0008	n/a	<0.0005	0.0015	<0.0008	<0.0008	<0.0008	<0.0009	<0.0009
Cobalt	mg/L	-	<0.01	<0.01	<0.01	0.0042	0.0015	0.0046	n/a	0.0041	0.0606	0.0063	0.0066	0.0052	0.0057	0.0046
Copper	mg/L	1	<0.02	<0.02	<0.02	0.007	0.002	<0.001	n/a	<0.001	0.002	0.002	<0.001	<0.001	<0.001	0.002
Lead	mg/L	0.010	<0.04	<0.04	<0.04	<0.002	0.003	<0.002	n/a	0.002	<0.002	<0.002	<0.002	0.006	0.003	<0.002
Mercury	mg/L	0.001	<0.0001	0.0003	<0.0001	<0.0001	0.0002	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	<0.02	<0.02	<0.02	<0.001	<0.001	<0.001	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	-	<0.02	<0.02	<0.02	0.014	0.01	0.015	n/a	0.013	0.048	0.012	0.01	0.011	0.011	0.009
Zinc	mg/L	5	0.007	0.013	<0.005	0.0014	0.0051	0.0133	n/a	0.0263	0.0299	0.0129	0.0083	0.0182	0.0159	0.0281

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.15B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 15B																			
			Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	May-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	14-May
Field Measurements																							
Field pH	-	-	7.74	7.24	7.4	7.55	7.5	7.5	7.18	7.26	7.14	7.68	7.07	8.84	NM	6.82	7.315	7.3	7.78	7.26	7.45	7.47	
Field EC	m/S	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.46	14.73 (EF)	7.05	6.91	NM	12.96	5.430	3.469	3.9	5.93	1.999	5.75	
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.4	6.2	7.7	7.9	NM	9.66	7.0	13.5	12.9	13.3	10.5	9.8	
Routine Water																							
pH	-	6.5 - 8.5	7.47	7.65	7.56	7.64	7.67	7.85	8.1	8	7.9	8.1	7.9	8.3	8.0	8.1	8.1	8.2	8.38	7.88	8.04	8.08	
Conductivity (EC)	µS/cm	-	4790	4870	4720	4700	4300	5260	6450	5630	6750	5660	7110	6780	6380	5400	5980	6680	6240	5900	6500	5500	
Calcium	mg/L	-	47.9	41.3	48.5	41.6	41.2	61.4	114	38.9	133	81.9	145	108	105	59.3	105	108	54.2	90	100	69	
Magnesium	mg/L	-	23.8	21.3	26.1	19.5	21.6	29.2	61	32.8	73.2	48.7	75.6	60.7	53.1	29.8	54.1	52.8	5.96	42	46	31	
Sodium	mg/L	200	1210	1190	1370	1310	1170	1350	1580	1360	1690	1630	1660	1660	1560	1370	1430	1430	1400	1400	1500	1300	
Potassium	mg/L	-	5.6	7.1	7.3	6.4	5.8	6.6	6.6	8.7	8.8	9.5	9.3	11	10.1	7.9	5.5	9.1	5.6	8.5	8.7	6.3	
Iron	mg/L	0.3	0.097	<0.02	<0.02	<0.05	<0.05	<0.1	0.139	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.004	<0.0050	0.011	<0.06	<0.060	<0.060	
Sulphate	mg/L	500	1300	1200	1400	1260	1190	1690	2530	1770	2620	2380	2870	2590	2170	1520	2020	2420	2680 *	2100	3000	1800	
Chloride	mg/L	250	135	132	127	136	124	150	175	159	195	169	188	172	145	135	150	153	<10 *	190	200	150	
Bicarbonate	mg/L	-	1770	1820	1750	1830	1790	1610	1310	1620	1340	1510	1260	1260	1500	1740	1550	1380	768	1200	1100	1400	
Carbonate	mg/L	-	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	8	<5	<5	<4	<5.0	14.5	<0.5	<0.50	<0.50	
Nitrate (N)	mg/L	10	<0.04	0.349	0.325	<0.04	0.477	0.34	0.7	0.4	0.4	0.2	0.4	0.6	0.4	0.1	0.6	0.873	<1.0 *	0.21	0.78	0.65	
TDS*	mg/L	500	3600	3490	3840	3680	3430	4080	5110	4170	5380	5060	5570	5230	4780	3970	4530	4850	4540	4400	5400	4100	
Water Nutrients																							
Ammonia-N	mg/L	-	0.28	<0.05	0.29	<0.05	<0.05	0.19	0.06	0.33	0.12	0.61	0.40	0.20	0.69	0.56	0.35	0.1	1.54	0.51	<0.050	0.17	
TKN	mg/L	-	1.91	1.56	1.94	1.5	1.63	2.09	1.6	1.4	2.2	2.1	2.5	1.7	3.3	2.0	1.7	2.27	2.61	2.8	2	1.6	
Hydrocarbons																							
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	Decommissioned
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	
Organics																							
COD	mg/L	-	52	42	43	47	49	56	50	50	60	58	68	70	59	49	43	53.2	20.3	98	120	61	
TOC	mg/L	-	20.9	18.7	18.7	65.5	15.3	22	17	15	21	21	29	17	22	22	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	23	20.4	9	21	18	19	
Oil & Grease	mg/L	-	<5	<5	<5	7	7	<5	<1	<1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																							
Antimony	mg/L	0.006	<0.05	<0.02	<0.02	<0.001	<0.001	<0.002	0.0006	0.001	0.0008	<0.0004	0.0008	0.0005	0.0007	0.0009	-	-	<0.00040	<0.006	<0.0060	<0.00060	
Barium	mg/L	1	0.009	0.011	0.0125	0.011	0.012	0.013	0.011	0.012	0.01	0.007	0.009	0.006	0.007	0.007	0.014	0.008	0.0059	0.02	0.01	<0.010	
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	<0.00005	<0.00005	<0.0001	0.0002	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.000050	0	<0.050	<0.000025	
Chromium	mg/L	0.05	<0.008	<0.004	<0.004	0.011	0.0087	0.0078	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	0.006	<0.0050	<0.0050	<0.01	<0.010	<0.0010	
Cobalt	mg/L	-	0.012	0.0085	0.01	0.0006	0.0006	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.0020	<0.0020	<0.003	<0.0030	0.00032	
Copper	mg/L	1	<0.01	<0.005	0.009	<0.005	<0.005	<0.01	0.016	0.016	0.015	0.008	0.010	0.007	0.005	0.003	0.005	0.0075	0.0066	<0.002	0.0022	0.0022	
Lead	mg/L	0.010	<0.02	0.015	< 0.01	<0.0005	<0.0005	<0.001	0.0001	<0.005	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.00020	
Mercury	mg/L	0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.000010	
Molybdenum	mg/L	-	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.002	<0.0020	0.00059	
Nickel	mg/L	-	<0.01	0.013	0.013	0.0052	<0.003	0.0074	0.007	0.008	0.009	0.007	0.017	0.013	0.014	0.009	0.011	0.01	<0.0020	0.01	0.0053	0.0068	
Zinc	mg/L	5	0.04	0.0035	<0.003	0.005	<0.005	<0.01	0.015	0.02	0.017	0.009	0.011	0.005	0.015	0.014	0.004	0.007	0.0033	<0.03	<0.030	<0.0030	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

May 07 - groundwater contained in well was frozen in April 2007

Not measured (NM)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.16A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 16A								
			Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Summer 1998
Field Measurements											
Field pH	-	-	8.23	8.74	8.36	8.1	7.4	8	n/a	n/a	
Routine Water											
pH	-	6.5 - 8.5	8.1	8.33	8.31	8.1	8.29	8.08	n/a	8.18	
Conductivity (EC)	µS/cm	-	12200	7200	6680	6810	6280	6210	n/a	5820	
Calcium	mg/L	-	129	72.9	52.9	64	56.1	53.8	n/a	54.2	
Magnesium	mg/L	-	73.6	12.6	10.4	16	6.8	6.4	n/a	5.9	
Sodium	mg/L	200	3230	1680	1810	1659	1660	1610	n/a	1710	
Potassium	mg/L	-	19.2	9.58	10.7	7	6.19	5.78	n/a	6.42	
Iron	mg/L	0.3	< 0.04	10.8	0.04	3.51	0.1	< 0.04	n/a	0.009	
Sulphate	mg/L	500	6400	3140	3210	3121	3150	2920	n/a	3290	
Chloride	mg/L	250	3.3	7.7	9.5	12	9.4	8.9	n/a	9.1	
Bicarbonate	mg/L	-	1070	711	718	727	720	744	n/a	737	
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Nitrate (N)	mg/L	10	< 0.05	0.08	0.72	2	1.16	0.05	n/a	0.13	
TDS	mg/L	500	10400	5270	5460	5611	5240	4970	n/a	5440	
Total Kjeldahl Nitrogen											
Ammonia-N	mg/L	-	0.651	2.6	2.02	2.33	0.766	1.7	n/a	2	Decommissioned
TKN	mg/L	-	1.54	4.33	7.23	2.62	1.44	2.35	n/a	2.59	
Organics											
COD	mg/L	-	55	292	327	28	n/a	24	n/a	25	
TOC	mg/L	-	10.3	9.9	26.3	6.9	5.4	7	n/a	8.3	
Oil & Grease	mg/L	-	<0.3	0.7	1	0.8	n/a	1.5	n/a	3	
Metals											
Antimony	mg/L	0.006	0.0066	0.0011	<0.0005	<0.005	<0.005	<0.005	n/a	<0.005	
Barium	mg/L	1	<0.004	0.016	<0.004	0.007	0.0095	0.0043	n/a	0.0045	
Cadmium	mg/L	0.005	<0.005	<0.003	<0.003	<0.0005	0.0006	0.0009	n/a	<0.0005	
Chromium	mg/L	0.05	<0.005	<0.006	<0.006	0.0011	<0.0008	<0.0008	n/a	<0.0008	
Cobalt	mg/L	-	<0.01	<0.01	<0.01	0.0007	<0.0007	<0.0007	n/a	<0.0007	
Copper	mg/L	1	<0.02	<0.02	<0.02	0.006	0.001	<0.001	n/a	<0.001	
Lead	mg/L	0.010	<0.04	<0.04	<0.04	<0.002	<0.002	<0.002	n/a	<0.002	
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	
Molybdenum	mg/L	-	<0.02	<0.02	<0.02	0.003	0.001	0.001	n/a	< 0.001	
Nickel	mg/L	-	<0.02	<0.02	<0.02	0.002	<0.001	<0.001	n/a	<0.001	
Zinc	mg/L	5	<0.005	0.033	< 0.005	0.0035	0.0097	0.038	n/a	0.0259	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Exceeds Regulatory Limit

Table E.16B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 16B									
			Apr-94	Oct-94	Apr-95	Oct-95	Apr-96	Oct-96	Apr-97	Oct-97	Apr-98	Summer 1998
Field Measurements												
Field pH	-	-	8.3	8.2	7.74	7.6	6.8	7.5	7.8	n/a	7.4	
Routine Water												
pH	-	6.5 - 8.5	8.4	7.95	7.94	7.6	7.92	7.78	8.09	8.19	7.77	
Conductivity (EC)	µS/cm	-	7320	12900	12000	12650	12000	12300	15500	8780	11100	
Calcium	mg/L	-	58.8	122	121	138	127	118	166	84.9	115	
Magnesium	mg/L	-	12.9	78	75.8	82	78.4	87.2	206	60.5	65.9	
Sodium	mg/L	200	1790	3410	3540	3252	3400	3520	4320	1420	3140	
Potassium	mg/L	-	13	19.2	17.9	20	16.4	18.4	25.5	17.8	12.9	
Iron	mg/L	0.3	0.71	<0.04	<0.04	0.92	<0.04	<0.04	<0.04	0.006	0.511	
Sulphate	mg/L	500	3380	7270	6800	6283	7200	7160	9630	2990	6120	
Chloride	mg/L	250	8.4	11.8	3.4	12	6	11.7	49.4	19.1	5.7	
Bicarbonate	mg/L	-	670	1050	1060	1032	1040	981	617	859	1060	
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Nitrate (N)	mg/L	10	0.05	0.21	0.15	<1	0.2	0.08	0.18	0.09	0.11	
TDS	mg/L	500	5600	11400	11100	10820	11300	11400	14700	5010	9970	
Total Kjeldahl Nitrogen												
Ammonia-N	mg/L	-	1.99	0.602	0.574	0.66	0.264	0.106	< 0.005	0.31	0.47	Decommissioned
TKN	mg/L	-	3.43	1.15	1.12	1.09	1.11	0.83	2.06	1	0.91	
Organics												
COD	mg/L	-	97	51	56	42	23	39	72	66	38	
TOC	mg/L	-	8.3	9.4	10.1	8.6	8.1	10.1	29.9	20.1	10	
Oil & Grease	mg/L	-	0.7	0.5	0.7	0.6	<0.2	<0.2	<0.2	1	<1	
Metals												
Antimony	mg/L	0.006	n/a	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Barium	mg/L	1	n/a	0.005	<0.004	0.0077	0.0099	0.0082	0.0059	0.0573	0.0149	
Cadmium	mg/L	0.005	n/a	0.013	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chromium	mg/L	0.05	n/a	<0.006	<0.006	0.0011	<0.0008	0.0015	0.0016	<0.0008	0.001	
Cobalt	mg/L	-	n/a	<0.01	<0.01	0.0014	0.0016	0.0016	0.0041	0.0049	0.0023	
Copper	mg/L	1	n/a	<0.02	<0.02	0.002	<0.001	<0.001	0.002	<0.001	<0.001	
Lead	mg/L	0.010	n/a	<0.04	<0.04	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	
Mercury	mg/L	0.001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Molybdenum	mg/L	-	n/a	<0.02	<0.02	<0.001	0.002	0.004	0.006	0.006	<0.001	
Nickel	mg/L	-	n/a	<0.02	<0.02	0.002	0.003	0.005	0.017	0.009	0.004	
Zinc	mg/L	5	n/a	0.009	<0.005	0.0009	0.0095	0.0292	0.0014	0.014	0.0102	

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Exceeds Regulatory Limit

Table E.18A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 18A																					
			Oct-1996	Apr-1997	Oct-1997	Apr-1998	Oct-1998	Apr-1999	Oct-1999	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07
Field Measurements																									
Field pH	-	-	8.6	8.5	8.7	8.5	8.15	8.27	8.26	8.92	8.6	8.27	8.6	7.88	8.72	8.69	8.59	8.14	8.36	7.47	8.63	8.15	8.36	7.6	7.08
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.3	13.82 (EF)	1.55	1.5	3.63	13.86
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.4	5.7	8.02	7.4	6.1	10.03
Routine Water																									
pH	-	6.5 - 8.5	8.6	8.43	8.54	8.65	8.38	8.51	8.58	8.55	8.34	8.79	8.52	8.48	8.62	8.65	8.59	8.5	8.5	8.4	8.5	8.5	8.7	8.6	8.4
Conductivity (EC)	µS/cm	-	1530	1550	1410	1480	1490	1390	1480	1540	1410	1380	1430	1490	1480	1470	1380	1490	1530	1470	1430	1490	1490	1480	1470
Calcium	mg/L	-	12.3	5.5	8.8	5.1	3.7	4.6	5.6	4.3	3.5	2.9	3.4	3.2	4	6.1	2.9	4.2	3.9	4.1	4.2	3.8	3.8	3.4	2.5
Magnesium	mg/L	-	6.3	0.9	6.1	0.7	0.5	0.9	5.4	2.09	0.53	1.4	0.68	0.42	0.6	<1	0.3	0.5	0.4	0.6	0.7	0.3	0.6	<0.1	<0.1
Sodium	mg/L	200	407	398	419	435	387	424	407	359	365	422	407	407	404	376	359	387	384	381	400	387	380	391	391
Potassium	mg/L	-	6.12	1.2	6.92	2.62	1.75	2.12	5.03	2.7	1.7	<4	1.6	1.8	1.7	< 2	1.3	1.2	1.5	1.7	1.6	1.9	1.9	2.5	2.4
Iron	mg/L	0.3	16.3	1	0.399	0.313	0.006	0.282	0.007	6.32	0.307	n/a	0.172	0.158	0.12	0.22	0.07	0.635	0.021	0.054	0.440	0.053	0.027	0.056	0.101
Sulphate	mg/L	500	44.1	17.1	12.7	6.2	6.1	5.4	5.6	2.76	15.3	40.3	6.16	2.87	4.4	44.4	1.4	3.4	2.7	10.3	3.9	3.2	10.7	5.1	5.0
Chloride	mg/L	250	8.1	9.8	7.6	10.4	12.3	9.4	10.6	8.5	3.6	6.3	5.9	5.7	6.2	5.3	5.4	7	8	7	8	8	7	6	9
Bicarbonate	mg/L	-	948	995	980	909	1020	946	945	947	1030	743	969	952	939	955	935	955	997	1020	985	982	928	990	990
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	18.6	53.7	52.7	56	13	74	43	45	64	55	52	29	24	8	27	23	38	36	19
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	0.1	<0.05	0.09	<0.02	<0.004	<0.04	0.037	<0.02	<0.004	<0.004	0.218	0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TDS*	mg/L	500	981	934	976	984	930	965	957	902	945	913	945	935	948	957	884	902	916	915	930	911	898	930	916
Water Nutrients																									
Ammonia-N	mg/L	-	0.482	0.221	0.17	0.22	0.68	0.67	0.79	0.64	0.89	0.78	0.46	0.68	0.76	0.8	0.61	0.56	0.55	0.1	0.59	0.65	0.57	0.61	0.63
TKN	mg/L	-	6.14	1.53	1.28	2.45	0.97	1.14	1.05	1.54	2.93	3.73	1.13	3	3.69	2.86	1.95	0.9	0.7	1	0.9	0.8	0.9	0.7	0.8
Hydrocarbons																									
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Organics																									
COD	mg/L	-	130	166	71	244	92	43	32	33	288	382	48	395	240	413	132	< 10	10	22	20	22	29	22	22
TOC	mg/L	-	25.1	44.1	11.6	42	8.1	9.8	12.9	7.5	8.2	26.4	7.3	6.8	6.5	12.5	13.1	6	7	8	7	8	8	8	8
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Oil & Grease	mg/L	-	<0.2	<0.2	31	<1	1	9	1	3	3	44	<5	<5	6	<5	<5	<1	<1	<1	<1	<1	1	<1	<1
Metals																									
Antimony	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.006	<0.006	n/a	<0.005	<0.01	0.0005	<0.001	<0.0002	0.0008	0.0008	0.0009	<0.0004	0.0008	0.0008	0.0005	0.0010
Barium	mg/L	1	0.0916	0.0707	0.0645	0.0149	0.0569	0.0326	0.0508	0.0636	0.0613	n/a	0.033	0.067	0.054	0.042	0.069	0.06	0.058	0.045	0.056	0.064	0.061	0.067	0.63
Cadmium	mg/L	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	n/a	<0.0005	<0.001	< 0.00001	<0.00005	<0.00001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.05	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0009	<0.0009	n/a	<0.0008	<0.002	0.004	0.0056	0.0039	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	0.0025	0.0017	0.0009	<0.0007	0.0025	0.0025	0.0012	0.0024	0.0088	n/a	0.0022	0.0034	0.0004	<0.0005	0.0004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Copper	mg/L	1.00	<0.001	0.002	<0.001	0.004	0.001	0.001	0.006	0.002	0.003	n/a	<0.001	0.006	0.002	<0.005	0.006	0.002	0.004	0.004	0.002	0.003	0.001	<0.001	0.002
Lead	mg/L	0.010	<0.002	<0.002	<0.002	0.002	<0.002	0.002	0.002	0.002	<0.002	n/a	0.003	<0.004	< 0.0001	<0.0005	0.0003	0.0006	<0.005	0.0002	<0.0001	0.0016	0.0002	0.0003	0.0002
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	1.73	0.005	0.004	0.003	0.005	0.005	0.005	0.004	0.008	n/a	0.003	0.005	0.005	0.006	0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel	mg/L	-	0.008	0.004	0.003	0.006	0.002	0.002	0.003	0.003	0.006	n/a	0.003	0.002	0.0021	<0.0025	0.0029	0.005	0.004	0.003	0.003	0.003	0.003	<0.002	0.003
Zinc	mg/L	5	0.0141	<0.0005	0.0151	0.0067	0.006	0.0099	0.0117	0.0236	0.0148	n/a	0.0035	0.001	0.002	< 0.005	0.005	0.006	0.005	0.009	0.005	0.031	0.003	0.005	0.004

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Exceeds Regulatory Limit

Table E.18A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 18A								
			May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements											
Field pH	-	-	8.5	8.377	8.21	8.34	8.31	6.09	8.4	8.8	7.61
Field EC	mS	-	1.386	1.500	13.4	1.56	1.614	1.80	15.82	1.64	4.73
Field Temperature	°C	-	6.6	8.0	14.1	10.9	7.6	6.79	6.4	6.6	8.5
Routine Water											
pH	-	6.5 - 8.5	8.5	8.51	8.39	8.45	8.52	8.58	8.61	8.39	8.05
Conductivity (EC)	µS/cm	-	1470	1500	1490	1500	1500	1,500	1500	1500	4600
Calcium	mg/L	-	4.1	4	4.43	3.8	3.8	3.1	3	2.7	230
Magnesium	mg/L	-	0.9	0.52	0.58	0.4	0.39	0.36	<2.0	0.30	190
Sodium	mg/L	200	375	380	389	400	380	360	390	360	690
Potassium	mg/L	-	1.2	1.45	1.46	1.5	1.4	1.3	<3.0	1.3	25
Iron	mg/L	0.3	0.108	0.0364	0.045	<0.06	<0.060	<0.060	<0.60	<0.060	<0.060
Sulphate	mg/L	500	5.7	1.42	<0.50	2	<1.0	2.0	2.4	1.4	1900
Chloride	mg/L	250	8	6.18	5.75	7	6.7	6.2	7.3	7.2	1.6
Bicarbonate	mg/L	-	1010	1000	991	960	960	980	970	1000	1100
Carbonate	mg/L	-	29	28.1	18.9	17	26	30	38	8.9	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.1	<0.050	<0.050	0.12	<0.0030	<0.003	<0.010	<0.010	0.19
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.025
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.22
TDS*	mg/L	500	922	914	908	910	900	890	920	880	3600
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.1	1400
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	840	940
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7.4	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.95	1.0
Water Nutrients											
Ammonia-N	mg/L	-	0.54	0.598	0.231	0.64	0.64	0.62	0.62	0.64	0.35
TKN	mg/L	-	0.9	1.13	1.28	1.1	1	1.1	1.1	0.98	0.91
Hydrocarbons											
Benzene	mg/L	0.005	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics											
COD	mg/L	-	6	18.4	22.4	34	24	34	29	28	34
TOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	8	6.7	8.5	7.9	7.2	6.5	5.2	6.9	11
Oil & Grease	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals											
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0046	<0.0030
Antimony	mg/L	0.006	n/a	n/a	0.0004	<0.006	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0010	0.00069
Barium	mg/L	1	0.124	0.0834	0.117	0.1	0.095	0.098	<0.10	0.089	0.042
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.78	0.13
Cadmium	mg/L	0.005	<0.001	<0.0010	0.00007	<0.00005	0.000024	<0.000025	<0.000025	<0.000020	0.000025
Chromium	mg/L	0.05	<0.005	<0.0050	<0.0050	<0.01	<0.0010	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	<0.002	<0.0020	<0.0020	<0.003	0.00056	0.00045	0.00067	0.00031	0.0019
Copper	mg/L	1	<0.001	0.0015	0.0032	<0.002	0.00059	0.00039	0.00057	0.00025	0.00045
Lead	mg/L	0.01	<0.005	<0.0050	0.00013	<0.002	<0.00020	<0.00020	0.00033	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.066	0.36
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.045	0.63
Mercury	mg/L	0.001	n/a	<0.00010	<0.00010	<0.000005	<0.002	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.026	0.0058	0.0088	0.004	0.0046	0.0047	0.0048	0.0043	0.00074
Nickel	mg/L	-	0.003	0.01	0.0121	0.006	0.0043	0.0036	0.0044	0.0039	0.0031
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.21	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.2	7.2
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.064	3.4
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.22	640
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00026	0.0011
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	0.003	0.0111	0.0079	<0.03	0.0038	<0.0030	0.0033	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.18B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 18B																					
			Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07
Field Measurements																								
Field pH	-	-	7.6	7.8	7.6	7.4	6.61	7.46	7.28	7.42	6.99	6.91	6.99	7.26	7.32	7.5	7.31	8.17	7.25	6.91	7.3	7.05	7.2	7.11	8.04
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.34	14.12 (EF)	6.51	6.04	12.19	3.40
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.7	6.2	4.5	8.6	5.4	9.91
Routine Water																									
pH	-	6.5 - 8.5	7.72	7.7	7.77	7.69	7.53	7.38	7.54	7.61	7.54	7.4	7.7	7.54	7.61	7.75	7.67	8.0	8.0	7.9	8.0	7.9	8.0	8.1	7.7
Conductivity (EC)	µS/cm	-	4660	2860	3210	4940	5370	5630	5900	5670	5460	5870	5960	6410	6420	6170	6300	5660	6090	5940	5200	6390	6350	5310	6620
Calcium	mg/L	-	321	113	278	366	424	428	481	372	449	499	480	489	504	491	457	556	447	553	572	581	583	381	568
Magnesium	mg/L	-	75.8	30.3	67.4	83.3	109	113	131	100	121	129	126	127	125	126	112	141	129	136	149	145	155	98.8	147
Sodium	mg/L	200	902	536	809	984	901	962	1120	1080	933	1030	1090	1340	1410	1180	1190	1070	1110	1140	1240	1160	1140	1030	1180
Potassium	mg/L	-	7.71	3.95	5.48	5.9	7.93	6.85	5.9	5.7	8.8	5.8	8	8.4	8	6.5	7.6	5.3	7.1	7.1	7.6	7.9	8.5	7.1	6.3
Iron	mg/L	0.3	<0.04	<0.04	0.003	0.187	0.11	0.255	0.032	0.041	0.315	0.15	<0.02	0.061	<0.1	<0.1	< 0.1	0.112	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.015
Sulphate	mg/L	500	2340	1360	2370	2620	3180	3060	3580	2920	3710	3410	3500	3900	4180	3590	3600	3420	3440	3230	3620	3540	3440	2790	3630
Chloride	mg/L	250	6.1	8.2	6.5	4	1.2	1.3	3.2	<0.5	2.7	<0.5	0.8	0.9	<0.5	1.2	1.1	1	2	2	2	3	2	11	3
Bicarbonate	mg/L	-	612	340	508	672	693	785	789	713	786	824	833	850	868	861	874	780	843	859	865	885	814	633	885
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	<0.05	<0.05	0.09	0.319	0.15	< 0.04	0.098	<0.02	<0.04	1.48	< 0.04	0.1	0.2	<0.5	<0.1	0.1	<0.1	2	0.2
TDS*	mg/L	500	3950	2220	3790	4390	4970	4960	5710	4820	5880	5480	5620	6280	6650	5810	5800	5580	5550	5490	6020	5870	5730	4640	5970
Water Nutrients																									
Ammonia-N	mg/L	-	0.363	0.517	0.35	0.69	0.45	0.68	0.78	0.36	0.47	0.52	0.26	0.9	0.83	0.91	1.09	0.4	0.29	0.38	0.47	0.55	0.35	0.43	0.31
TKN	mg/L	-	1.97	1.05	1.14	1.84	1.21	1.64	1.76	1.91	1.58	1.83	2.96	5.19	2.29	2.25	3.29	1.3	0.6	0.9	1.5	0.9	0.8	1.2	0.8
Hydrocarbons																									
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Organics																									
COD	mg/L	-	76	29	68	76	69	47	53	20	41	36	66	231	104	103	80	20	20	24	25	27	24	28	28
TOC	mg/L	-	24.1	12.4	11.7	14.2	14.1	14.4	13.4	11.3	14	11.1	11.4	10.7	11.3	9.6	10.1	9	10	9	10	11	11	10	11
DOC	mg/L	-																							
Oil & Grease	mg/L	-	<0.2	<0.2	<1	<1	<1	1	<1	8	34	11	<5	<5	8	<5	<5	<1	<1	<1	<1	<1	1	1	<1
Metals																									
Antimony	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.006	<0.006	<0.05	<0.02	<0.02	<0.002	<0.002	<0.002	0.0005	0.001	0.0006	<0.0004	0.0007	0.0007	<0.0004	0.0007
Barium	mg/L	1	0.0826	0.0212	0.0557	0.0564	0.0483	0.0367	0.0299	0.0218	0.0326	0.024	0.0245	0.0255	0.024	0.022	0.027	0.021	0.021	0.019	0.014	0.017	0.01	0.014	0.017
Cadmium	mg/L	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	<0.005	<0.003	<0.003	<0.0001	<0.0001	<0.0001	0.0002	< 0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.05	0.0009	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0009	<0.0009	<0.008	<0.004	<0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	0.001	0.0012	<0.0007	0.0015	0.0038	0.0039	0.0044	0.0052	0.0046	0.011	0.0085	0.02	0.0021	0.0025	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Copper	mg/L	1.00	0.014	0.002	<0.001	0.002	<0.001	<0.001	0.001	0.003	0.002	<0.01	<0.005	0.008	<0.01	<0.01	<0.01	0.011	0.02	0.014	0.010	0.008	0.008	0.006	0.005
Lead	mg/L	0.010	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.006	0.002	<0.002	<0.02	0.01	<0.01	<0.001	<0.001	<0.001	0.0002	<0.005	0.0002	<0.0001	<0.0001	0.0002	<0.0001	<0.0001
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001
Molybdenum	mg/L	-	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	0.005	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel	mg/L	-	0.01	0.007	0.005	0.008	0.009	0.006	0.01	0.009	0.005	<0.01	0.028	0.04	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.012	0.009	0.016
Zinc	mg/L	5	0.0188	0.001	0.0442	0.0146	0.0186	0.0151	0.0242	0.0207	0.0316	0.03	0.014	0.008	0.024	<0.01	0.011	0.012	0.025	0.021	0.011	0.015	0.003	0.003	0.012

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Exceeds Regulatory Limit

Table E.18B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 18B								
			May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements											
Field pH	-	-	7.302	7.263	7.21	7.34	7.06	6.04	7.6	8.0	6
Field EC	mS	-	6.08	6.04	1.05	6.33	3.10	4.92	2.92	3.80	4.24
Field Temperature	°C	-	5.7	6.9	7	7	7.2	11.6	8.9	5.9	8.3
Routine Water											
pH	-	6.5 - 8.5	8	7.9	7.93	7.8	7.92	8.11	8.27	7.79	7.96
Conductivity (EC)	µS/cm	-	6020	6270	6460	6200	6900	4200	2900	3600	3400
Calcium	mg/L	-	511	524	519	450	540	230	120	190	180.0
Magnesium	mg/L	-	134	116	135	120	150	57	33	47	45
Sodium	mg/L	200	1110	1250	1020	1100	1300	690	510	670	570
Potassium	mg/L	-	3.6	8.42	7.08	7.4	8.4	4.9	3.7	4.6	4.5
Iron	mg/L	0.3	0.007	0.0177	0.021	<0.06	<0.060	<0.060	<0.060	<0.060	0.25
Sulphate	mg/L	500	3230	3380	3420 *	3300	3700	2200	1400	1700	1500
Chloride	mg/L	250	22	19.5	<10 *	48	3.5	17	14	17	22
Bicarbonate	mg/L	-	846	838	880	780	980	400	350	410	390
Carbonate	mg/L	-	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.1	<0.050	<1.0 *	0.23	0.016	0.2	0.2	0.13	0.089
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.011	0.015
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.14	0.1
TDS*	mg/L	500	5430	5710	5530	5400	6200	3400	2300	2800	2600
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	670	630
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	330	320
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.0	1.0
Water Nutrients											
Ammonia-N	mg/L	-	0.16	0.507	0.052	0.63	0.48	0.23	0.09	0.14	0.1
TKN	mg/L	-	1.2	1.38	1.96	1.3	1.2	1.1	0.68	1.5	0.32
Hydrocarbons											
Benzene	mg/L	0.005	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics											
COD	mg/L	-	28	27.6	21.4	60	53	34	27	64	30
TOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	11	11.3	9.3	11	8.9	9.3	7.3	9.2	8.2
Oil & Grease	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals											
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0034	0.11
Antimony	mg/L	0.006	n/a	n/a	<0.00040	<0.006	<0.0060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0004	0.00041
Barium	mg/L	1	0.016	0.0117	0.0173	0.01	0.012	0.011	0.017	0.012	0.014
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.071	0.075
Cadmium	mg/L	0.005	<0.001	<0.0010	<0.000050	<0.000050	0.000053	0.00004	<0.000025	<0.00002	<0.000020
Chromium	mg/L	0.05	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	<0.002	<0.0020	<0.0020	<0.003	<0.0030	0.0005	0.00039	0.00041	0.00031
Copper	mg/L	1	0.009	0.0072	0.009	0.003	<0.0020	0.0014	0.0012	0.0007	0.0013
Lead	mg/L	0.01	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.00020	<0.0002	<0.00020	0.00037
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.17	0.17
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.15	0.046
Mercury	mg/L	0.001	n/a	<0.00010	<0.00010	<0.000005	0.0000033	<0.0000050	<0.0000050	<0.0000050	0.0000068
Molybdenum	mg/L	-	<0.005	<0.0050	<0.0050	<0.002	<0.0020	0.0009	0.0011	0.00074	0.00072
Nickel	mg/L	-	0.015	0.0136	0.0123	0.005	0.0053	0.0039	0.0035	0.0039	0.0044
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.1	4.1
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.6	1.5
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	550	510
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.0011
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0011	0.00091
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	0.011	0.0102	0.0041	<0.03	<0.030	0.005	<0.0030	<0.0030	0.0047

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.19A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 19A																														
			Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																																	
Field pH	-	-	8.6	8.8	n/a	8.1	7.11	7.95	7.25	7.96	n/a	n/a	8	n/a	8.14	8.14	8.18	7.57	7.94	7.18	7.29	7.13	7.83	7.61	7.88	7.633	7.622	7.68	7.8	7.47	5.23	8.2	7.7	7.97
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.83	13.76 (EF)	5.33	5.1	16.05	15.29	7.140	7.360	1.444	8.19	3.67	7.94	6.35	7.87	8.51
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.9	2.9	9.2	6.3	6.3	9.46	6.1	8.1	9.8	9.3	7.5	8.2	8.7	6.3	n/a
Routine Water																																	
pH	-	6.5 - 8.5	8.46	8.42	8.42	8.44	8.13	7.99	8.51	8.65	n/a	n/a	8.12	n/a	8.13	8.19	8.17	8.3	8.3	8.2	8.2	8.2	8.5	8.4	8.1	8.2	8.18	8.26	8.07	8.11	8.45	8.09	7.99	8.25
Conductivity (EC)	µS/cm	-	4310	3060	2570	3120	5310	4470	4690	3320	n/a	n/a	4370	n/a	4700	3570	4880	5940	5640	5730	6080	5700	6240	7070	7250	7270	7200	7750	8100	8300	6200	7900	7500	6900
Calcium	mg/L	-	33.2	10.9	21	19	36.7	26.7	36.9	16.1	n/a	n/a	25.6	n/a	28	15	36.3	47.5	18.7	49.8	35.9	49.6	52.0	68.1	69.8	78.4	67.1	83.4	78	85	32	90	62	55
Magnesium	mg/L	-	17.5	1.5	19.8	12.4	12.5	6.4	19.2	8.27	n/a	n/a	4.31	n/a	4.2	2.4	5.6	16.9	7.4	13.2	10.5	8.2	17.9	27.2	30.0	32.8	34.2	25.4	44	46	20	42	37	32
Sodium	mg/L	200	1080	729	785	776	1470	1360	1390	839	n/a	n/a	1090	n/a	1200	1050	1320	1590	1440	1490	1500	1470	1530	1800	1830	1860	1740	1810	2000	2300	1500	2200	1900	1500
Potassium	mg/L	-	13.6	4.68	22.5	9.12	6.92	5.22	10.3	5.7	n/a	n/a	4.3	n/a	4	2.9	5.2	4.3	5.2	5.7	6.2	6.1	7.1	8.7	7.2	5.2	8.6	7.54	11	11	7.7	8.9	9.4	8.9
Iron	mg/L	0.3	37.3	0.26	20.5	66.9	1.76	0.166	n/a	n/a	n/a	n/a	0.057	n/a	<0.05	0.07	<0.1	0.105	<0.005	0.011	0.006	0.018	0.025	0.006	0.011	<0.005	<0.050	<0.030 *	<0.06	<0.060	0.13	<0.60	<0.060	<0.060
Sulphate	mg/L	500	1660	867	655	633	2200	1750	1880	728	n/a	n/a	1480	n/a	1720	1060	1870	2470	2240	2170	2480	2340	2410	2930	3230	3150	3180	3360	3900	3900	2600	3700	3400	3000
Chloride	mg/L	250	11.8	10.9	9.9	36.5	1.8	10.8	5.4	7.8	n/a	n/a	4.7	n/a	3.4	5.5	4.1	6	6	7	8	7	8	7	9	9	8.32	<10 *	11	10	3.1	8.8	8.9	6.7
Bicarbonate	mg/L	-	749	887	1150	1230	1250	1200	1100	1080	n/a	n/a	1250	n/a	1190	1300	1200	1160	1170	1170	1150	1190	1100	1160	1170	1210	1190	1160	1100	1200	1100	1200	1200	1100
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	57	79	n/a	n/a	<6	n/a	<6	<6	<6	<5	<5	<5	<5	<5	31	21	<5	<5	<5.0	<5.0	<0.5	<0.50	25	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50	<0.50
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	1.55	1.26	1.02	9.04	n/a	n/a	3.01	n/a	1.43	4.93	2.36	1.2	0.2	0.4	5.1	<0.1	0.2	0.6	0.9	0.9	<0.050	<1.0 *	0.15	0.2	0.02	0.15	0.023	<0.050
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.015	<0.050
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.038	<0.020
TDS*	mg/L	500	3210	2070	2100	2140	4340	3740	3940	2220	n/a	n/a	3230	n/a	3540	2770	3840	4710	4290	4310	4630	4470	4600	5440	5760	5740	5620	5620	6600	6900	4700	6700	6000	5200
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	310	270
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	950	880
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.96	0.91
Water Nutrients																																	
Ammonia-N	mg/L	-	1.62	1.58	0.23	0.78	0.88	1.1	1.39	0.71	n/a	n/a	0.32	n/a	0.8	0.22	0.18	0.57	0.88	0.86	0.43	1.25	1.11	0.78	0.69	0.46	0.736	0.982	0.66	0.69	0.82	0.98	0.43	0.49
TKN	mg/L	-	25.8	9.91	5.66	2.72	1.28	2.21	1.97	2.16	n/a	n/a	1.11	n/a	2.12	2.52	1.05	0.8	1.3	1.4	2.1	1.4	1.7	1.1	1.3	1.1	1.31	1.93	1.1	1.2	1	1.4	0.80	0.96
Hydrocarbons																																	
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																																	
COD	mg/L	-	3580	1660	526	402	71	180	131	114	n/a	n/a	22	n/a	171	227	146	20	10	25	18	18	20	20	16	14	13.7	20	25	28	22	20	25	19
TOC	mg/L	-	214	10.8	11.6	17.5	8.1	13.6	5.6	10.8	n/a	n/a	7.2	n/a	7.5	14.2	7.4	7	6	7	7	8	8	8	9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7	6.8	7.7	8.1	7.3	6.8	6	7.5	7.1
Oil & Grease	mg/L	-	n/a	n/a	n/a	n/a	<1	2	n/a	n/a	n/a	n/a	<5	n/a	7	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																																	
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	0.0072
Antimony	mg/L	0.006	<0.005	n/a	n/a	n/a	<0.005	<0.005	n/a	n/a	n/a	n/a	<0.02	n/a	0.001	0.0012	0.0012	0.001	0.0018	0.001	0.0008	0.0008	0.0007	0.0006	0.0012	n/a	n/a	0.00068	<0.006	<0.0060	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00065
Barium	mg/L	1	0.0625	n/a	n/a	n/a	0.0858	0.0377	n/a	n/a	n/a	n/a	0.0225	n/a	0.023	0.019	0.021	0.031	0.029	0.026	0.026	0.027	0.021	0.037	0.023	0.035	0.0155	0.0387	0.02	0.013	0.028	<0.10	<0.010	<0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.40	0.41
Cadmium	mg/L	0.005	<0.0005	n/a	n/a	n/a	<0.0005	<0.005	n/a	n/a	n/a	n/a	<0.003	n/a	<0.00005	<0.00005	0.0000	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.001	<0.0010	0.000115	0.00008	0.000092	<0.000050	0.000055	<0.00020	0.000039
Chromium	mg/L	0.05	0.0024	n/a	n/a	n/a	0.0033	<0.0008	n/a	n/a	n/a	n/a	<0.004	n/a	0.0043	0.0065	0.0018	<0.005	<0.005	<0.005	0.007	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	0.0012	n/a	n/a	n/a	0.003	0.0059	n/a	n/a	n/a	n/a	0.0085	n/a	0.0009	<0.0005	0.0012	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.0020	0.0026	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00042
Copper	mg/L	1	<0.001	n/a	n/a	n/a	0.002	0.001	n/a	n/a	n/a	n/a	<0.005	n/a	0.005	< 0.005	0.005	0.014	0.017	0.015	0.011	0.006	0.007	0.006	0.006	0.006	0.0056	0.0087	<0.002	0.0043	<0.0020	<0.0020	<0.0020	0.0014
Lead	mg/L	0.01	<0.002	n/a	n/a	n/a	<0.002	<0.002	n/a	n/a	n/a	n/a	<0.01	n/a	<0.0005	<0.0005	0.0003	<0.005	<0.005	0.0002	<0.0001	<0.0001	0.0003	0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.56	0.51
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.39	0.36
Mercury	mg/L	0.001	n/a	n/a	<0.0001	<0.0001	<0.0001	n/a	n/a	n/a	n/a	n/a	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	0.0016	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	0.0000082	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.082	n/a	n/a	n/a	0.005	0.005	n/a	n/a	n/a	n/a	0.005	n/a	0.007	0.009	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.021	<0.0050	<0.0050	<0.002	<0.0020	0.0037	0.0022	<0.0020	0.0016
Nickel	mg/L	-	0.008	n/a	n/a	n/a	0.004	0.002	n/a	n/a	n/a	n/a	0.008	n/a	0.0039	<0.0025	0.0072	<0.002	0.003	0.003	0.007	0.003	0.005	0.008	0.008	0.009	0.005	0.0111	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0028
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.9	4.5
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.4	1.3
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1100	980
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.005	0.006
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	0.0013	n/a	n/a	n/a	0.0039	0.0021	n/a	n/a	n/a	n/a	0.022	n/a	0.008	0.007	0.009	0.02	0.018	0.019	0.012	0.019	0.023	0.014	0.019	0.006	0.0078	0.017	<0.03	<0.030	<0.030	<0.030	<0.030	0.0082

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.19B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW19B																					
			Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07
Field Measurements																								
Field pH	-	-	7.9	7.9	n/a	7.8	7.22	7.8	7.32	7.51	7.47	n/a	7.47	7.7	7.67	7.65	7.64	7.8	7.53	7.07	7.55	7.56	7.56	7.44	8.25
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.1	13.04	5.95	6.07	14.47	14.31
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.7	8.8	12.8	7.3	6.3	9.6
Routine Water																									
pH	-	6.5 - 8.5	7.95	8.06	8.22	7.97	7.84	7.78	7.96	8.6	7.97	n/a	7.95	7.73	7.9	7.84	8.15	8.2	8.2	8.1	8.3	8.1	8.4	8.2	8.0
Conductivity (EC)	µS/cm	-	4810	4540	3790	4500	4570	4210	4310	4540	4210	n/a	4710	5270	5250	5350	5370	5480	5690	5720	5270	5830	6190	6190	6320
Calcium	mg/L	-	50.3	29.5	31.9	36.7	14.1	30.4	35.3	33.5	26.8	n/a	33.5	44.5	43.4	52.7	42	48.6	37.1	57.7	38.7	61.5	61.0	62.9	63.5
Magnesium	mg/L	-	13.9	9.8	9.2	10.1	11.1	11	10.4	11.8	9.77	n/a	12.1	17.7	15.1	20.4	16	18.8	18.3	21	21.4	23.4	24.3	24.1	24.3
Sodium	mg/L	200	1200	1150	1270	1200	1220	1010	1140	1240	1160	n/a	1120	1400	1410	1360	1260	1410	1410	1450	1520	1500	1540	1570	1560
Potassium	mg/L	-	7.21	6.01	7.62	5.64	7.42	6.07	10	6.4	7.3	n/a	6.5	7.2	8.1	6.8	6.6	5.2	8.8	8	7.9	7.9	9.5	9.9	9.1
Iron	mg/L	0.3	0.77	0.82	0.021	0.667	1	1.16	0.028	0.013	<0.003	n/a	<0.02	0.14	<0.05	<0.05	<0.1	0.208	<0.005	0.011	<0.005	0.016	<0.005	0.016	0.034
Sulphate	mg/L	500	1740	1560	1810	1600	1770	1550	1690	1820	1860	n/a	1810	2310	2400	2390	2180	2320	2300	2210	2480	2610	2520	2480	2700
Chloride	mg/L	250	3.7	2.2	1.8	3.3	0.9	1.7	0.6	< 0.5	2.5	n/a	1.9	2	0.7	2.1	2	3	4	4	4	4	4	5	
Bicarbonate	mg/L	-	1180	1200	1230	1200	1180	1110	1110	874	1090	n/a	1100	1080	1090	1080	1090	1080	1090	1080	1090	1080	1030	1100	1080
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	53	<6	n/a	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	14	<5	<5
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	0.5	0.23	<0.05	<0.04	<0.04	n/a	<0.02	0.043	<0.04	<0.04	<0.04	0.2	0.1	0.2	0.1	<0.1	0.1	0.1	0.1
TDS*	mg/L	500	3590	3360	3740	3450	3600	3160	3430	3120	3600	n/a	3530	4310	4410	4360	4040	4340	4320	4280	4610	4740	4680	4690	4890
Water Nutrients																									
Ammonia-N	mg/L	-	0.664	0.665	0.63	0.74	0.73	0.56	0.73	0.64	0.94	n/a	0.45	0.49	0.52	0.47	0.55	0.53	0.61	0.44	0.64	0.65	0.70	0.72	0.71
TKN	mg/L	-	<0.05	0.79	1.07		0.9	0.74	0.97	1.36	0.99	n/a	0.92	1.4	1.72	1.83	1.78	0.6	0.8	0.7	1	0.9	1.0	1.3	1.3
Hydrocarbons																									
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Organics																									
COD	mg/L	-	33	17	23		17	24	17	14	7	n/a	6	24	98	128	72	10	10	17	11	9	17	17	15
TOC	mg/L	-	8.3	8.8	8.7	9.9	7.4	8	7	6.4	7	n/a	6	6.4	6	7.1	6.3	5	6	5	6	6	6	6	7
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Oil & Grease	mg/L	-	<0.2	<0.2	4	4	<1	<1	<1	1	6	n/a	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	1
Metals																									
Antimony	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.006	n/a	<0.02	<0.02	<0.001	<0.001	<0.002	0.0008	0.0021	0.0008	<0.0004	0.0009	0.0008	0.0005	0.0012
Barium	mg/L	1	0.0854	0.051	0.0475	0.0656	0.0476	0.0472	0.0306	0.0293	0.0284	n/a	0.0305	0.028	0.025	0.025	0.025	0.027	0.025	0.023	0.022	0.03	0.022	0.024	0.020
Cadmium	mg/L	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	n/a	<0.003	<0.003	<0.00005	<0.00005	<0.0001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.05	<0.0008	<0.0008	<0.0008	0.0015	0.0022	0.0018	<0.0008	<0.0009	<0.0009	n/a	<0.004	<0.004	0.0043	0.0056	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	-	0.0008	0.0007	0.0012	0.0027	0.0038	0.0035	0.0023	0.0081	0.004	n/a	0.0095	0.013	0.0008	0.0009	0.0024	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.006
Copper	mg/L	1.00	<0.001	0.003	<0.001	0.006	0.001	<0.001	<0.001	0.001	0.002	n/a	<0.005	0.006	0.005	0.005	<0.01	0.014	0.018	0.015	0.008	0.006	0.006	0.004	0.004
Lead	mg/L	0.010	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	0.003	<0.002	<0.002	n/a	0.019	<0.01	<0.0005	<0.0005	0.0014	<0.005	<0.005	<0.0001	<0.0001	0.0005	<0.0001	<0.0001	<0.0001
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	-	13.3	<0.001	0.004	<0.001	<0.001	<0.001	0.002	0.002	0.001	n/a	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel	mg/L	-	0.004	0.003	0.019	0.031	0.007	0.006	0.003	0.043	0.009	n/a	0.005	0.013	<0.003	<0.0025	0.0059	0.004	0.004	0.003	0.005	0.003	0.006	0.007	0.016
Zinc	mg/L	5	0.0076	0.0006	0.0119	0.0066	0.0094	0.0051	0.0116	0.0134	0.0397	n/a	<0.003	<0.003	0.008	<0.005	0.013	0.023	0.02	0.02	0.014	0.013	0.005	0.012	0.014

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.19B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW19B								
			May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements											
Field pH	-	-	7.453	7.514	bent	7.65	7.75	5.32	7.5	8.4	8.09
Field EC	mS	-	6.390	6.480	bent	6.24	2.81	7.51	8.08	6.26	7.17
Field Temperature	^{o}C	-	6.2	7.9	bent	10.7	7.9	8	8.3	6.5	n/a
Routine Water											
pH	-	6.5 - 8.5	8.2	8.13	8.08	8.1	8.4	8.27	8.33	8.26	8.43
Conductivity (EC)	µS/cm	-	6290	6430	6370	6200	6500	8200	6000	5900	5700
Calcium	mg/L	-	68.6	62.6	63.2	62	61	77	29	32	31
Magnesium	mg/L	-	27.7	25.1	23.3	23	25	35	20	17	17
Sodium	mg/L	200	1580	1470	1440	1500	1800	2000	1500	1500	1300
Potassium	mg/L	-	6.3	8	8.35	8.9	8.8	8.7	6.7	7.4	7.6
Iron	mg/L	0.3	<0.005	<0.050	0.022	<0.06	0.26	<0.060	<0.60	0.36	0.21
Sulphate	mg/L	500	2630	2700	2530	2600	2800	3700	2600	2400	2200
Chloride	mg/L	250	5	3.64	<10 *	4	4.2	9.8	2.6	3.1	3.1
Bicarbonate	mg/L	-	1140	1130	1110	1100	1100	1200	1100	1100	1000
Carbonate	mg/L	-	<5	<5.0	<5.0	<0.5	19	<0.50	5	<0.50	13
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.1	0.279	<1.0 *	0.032	0.015	0.21	<0.010	<0.010	0.015
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.013
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.028
TDS*	mg/L	500	4880	4830	4610	4800	5200	6500	4700	4500	4100
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	150	150
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	900	860
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	11
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.98	0.96
Water Nutrients											
Ammonia-N	mg/L	-	0.64	0.382	0.569	0.64	0.73	1	0.76	0.76	0.73
TKN	mg/L	-	1	0.8	1.51	1.6	1.1	1.6	1.1	1.1	1.1
Hydrocarbons											
Benzene	mg/L	0.005	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.0006
Ethylbenzene	mg/L	0.0016	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics											
COD	mg/L	-	n/a	13.7	10.8	86	22	27	28	17	17
TOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	5.2	6.1	6.1	5.9	8.2	5	5.7	6.0
Oil and Grease	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals											
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	<0.0030
Antimony	mg/L	0.006	n/a	n/a	<0.00040	<0.006	<0.0060	<0.006	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0021	0.0025
Barium	mg/L	1	n/a	0.0148	0.0188	0.02	0.019	0.02	<0.10	0.027	0.029
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.47	0.48
Cadmium	mg/L	0.005	<0.001	<0.0010	<0.000050	<0.00005	<0.050	0.00011	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	0.0010
Cobalt	mg/L	-	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.0003
Copper	mg/L	1	0.005	0.0062	0.0071	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00023
Lead	mg/L	0.01	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.48	0.47
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.21	0.21
Mercury	mg/L	0.001	n/a	<0.00010	<0.00010	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.007	<0.0050	<0.0050	<0.002	<0.0020	0.0021	0.0029	<0.0020	0.0020
Nickel	mg/L	-	0.005	0.0041	0.0057	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0025
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.5	4.4
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.1	1.1
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	770	750
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.00021
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	0.012	0.0094	0.0046	<0.030	<0.030	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Detection limit adjusted (*)

Pipe is bent and was unable to measure water elevation (bent)

Exceeds Regulatory Limit

Table E.20A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 20A																														
			Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements																																	
Field pH	-	-	8.1	8.3	n/a	8.1	7.5	7.91	7.63	7.62	7.8	7.93	7.8	7.98	8.04	7.85	7.78	7.74	7.67	7.67	7.61	7.38	7.73	7.5	8.09	7.747	7.400	8.250	7.710	7.63	n/a	8.0	8.2	8.6
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.28	9.81 (EF)	4.27	3.62	7.94	7.74	4.050	2	2.9	3.4	1.999	3.98	3.5	3.31	3.57
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12.3	3.7	7.5	6.4	7.7	11.46	7.9	11.2	15.5	10	8.7	8.4	7.8	7.9	8.1
Routine Water																																	
pH	-	6.5 - 8.5	8.26	8.07	8.24	8.43	8.36	8.25	8.17	8.46	8.12	7.96	8.1	7.95	8.08	8.11	8.28	8.3	8.3	8.2	8.2	8.3	8.4	8.4	8.2	8.3	8.38	8.25	8.25	8.37	8.4	8.05	8.03	8.15
Conductivity (EC)	µS/cm	-	3660	3730	2950	3210	3160	3510	3410	3250	3290	3320	3330	3210	3230	3480	3670	3880	3920	3840	3900	3480	3500	3310	3310	4110	3650	3440	3400	3400	3400	3300	3100	3300
Calcium	mg/L	-	71.5	34.3	28.3	20.7	16.7	17.1	24.9	19.3	21.3	23.9	18.7	20.5	17	25.1	30.5	42.4	11.5	42	14.7	26.2	25.6	20.6	20.6	48.6	27.1	23.5	18	22	19	19	18	19
Magnesium	mg/L	-	13.8	8	6.6	5	2.6	2.9	7.3	6.29	3.44	4.25	3.2	3.49	2.9	3.5	5.2	8.4	6.3	6.8	10.2	4.0	4.4	2.6	2.2	13.8	5.01	3.66	2.5	2.9	2.6	2.7	2.4	2.5
Sodium	mg/L	200	870	924	912	773	797	798	908	775	753	933	714	903	748	879	934	984	934	944	966	862	870	824	866	980	841	792	850	930	800	800	750	830
Potassium	mg/L	-	8.93	8.67	8.88	8.35	4.39	5.29	8.73	7.3	3.5	4.8	3.6	3.9	2.6	3	4	4.3	4.7	4.5	6.1	3.9	4.4	4.7	3.4	3.8	2.86	3.71	3	3.8	3.3	3.3	3.5	3.3
Iron	mg/L	0.3	0.16	6.73	43.9	1.65	0.026	n/a	2.2	n/a	0.022	1.02	0.059	0.908	<0.05	0.06	<0.05	0.097	<0.005	0.011	<0.005	0.014	0.011	<0.005	0.006	<0.005	<0.0050	0.017	<0.06	<0.060	<0.060	0.44	<0.060	<0.060
Sulphate	mg/L	500	1450	1360	1110	830	749	849	960	784	945	1030	804	957	784	1140	1290	1220	1150	1200	1300	1040	900	772	789	1340	1040	835	830	830	800	800	680	740
Chloride	mg/L	250	14	8.6	8.2	22.6	11.1	12.1	6.7	11.7	8.4	5.2	4.6	6.3	5.9	4.5	2.4	3	4	4	4	6	6	7	8	8	6.22	5.6	8	6.9	6.7	6.9	8.3	7.0
Bicarbonate	mg/L	-	612	797	997	1030	1090	1140	1120	1050	1140	1120	1150	1160	1190	1130	1100	1130	1130	1130	1110	1140	1120	1210	1260	1110	1150	1180	1200	1200	1200	1300	1200	1300
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	17.9	n/a	n/a	46	<6	<6	<6	<6	<6	<6	<6	<5	7	<5	<5	<5	24	16	<5	<5	17.5	<5.0	<0.5	15	18	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	2.31	1.88	4.02	3.36	3.9	4.4	3.92	3.89	3.06	3.82	2.56	1.9	1.1	0.8	3	4.4	1.9	4.3	4.1	6.1	3.27	6.28	6.9	1.8	3.4	1.8	6.6	3.1
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.061	0.041
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.7	3.1
TDS*	mg/L	500	2720	2740	2560	2200	2130	2240	2470	2170	2270	2550	2110	2470	2150	2610	2800	2830	2680	2760	2860	2520	2400	2260	2330	2970	2520	2270	2300	2400	2300	2300	2100	2200
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	54	58
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1000	1100
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.96	1.0
Water Nutrients																																	
Ammonia-N	mg/L	-	0.788	1.05	1.4	1.16	0.92	1.59	0.75	0.95	0.58	0.12	0.32	0.3	0.34	0.24	0.28	0.08	0.5	0.36	0.15	0.14	0.57	0.5	0.28	0.38	0.151	0.22	0.41	0.49	0.55	0.33	0.23	0.53
TKN	mg/L	-	5.53	6.08	2.34	4.22	1.71	2.44	1.92	2.8	1.87	1.09	0.19	1.18	2.24	1.29	1.28	< 0.2	0.7	0.7	0.4	0.4	0.6	1.2	0.8	1.1	n/a	0.87	1.1	1	1.3	1	0.93	1.2
Hydrocarbons																																	
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																																	
COD	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<5.0	38	45	75	66	28	19
TOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	11	6.8	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.5	9.6	5.9	5.2	4.4	5.7	4.3
Oil & Grease	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																																	
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0052	0.0040
Antimony	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.006	<0.006	<0.05	<0.02	<0.02	<0.001	<0.001	<0.002	0.0007	0.0026	0.0009	<0.0004	0.0006	0.0006	<0.0004	0.0007	n/a	n/a	<0.00040	<0.0006	<0.0030	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00037	0.00051
Barium	mg/L	1	0.0848	0.0465	0.0337	0.0642	0.0417	0.04	0.0309	0.0249	0.0243	0.024	0.0335	0.023	0.025	0.021	0.024	0.024	0.025	0.021	0.028	0.022	0.016	0.017	0.018	0.045	0.0252	0.0245	0.018	0.022	0.021	0.025	0.015	0.018
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.80	0.92
Cadmium	mg/L	0.005	<0.0005	<0.0005	n/a	<0.0005	<0.0005	n/a	<0.0005	n/a	<0.0006	<0.003	<0.003	<0.0005	<0.00005	<0.00005	<0.00005	<0.001	< 0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.000050	0.00005	0.000066	0.000031	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	0.001	0.0009	n/a	0.0009	0.0017	n/a	0.0014	n/a	<0.0009	<0.004	<0.004	<0.0008	0.0044	0.0059	<0.002	<0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.001	<0.0050	<0.0010	0.0019	<0.0010	<0.0010
Cobalt	mg/L	-	0.0021	0.0018	n/a	0.0011	0.0029	n/a	0.0028	n/a	0.0032	0.0072	0.006	0.0027	0.0014	0.0018	0.0029	<0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0003	<0.0015	<0.00030	0.00057	<0.00030	<0.00030
Copper	mg/L	1	0.001	0.004	n/a	0.003	0.004	n/a	0.005	n/a	0.002	<0.006	0.005	0.004	<0.005	<0.005	<0.005	0.008	0.012	0.009	0.005	0.006	0.003	0.002	0.002	0.003	0.0043	0.0039	0.0023	0.0025	0.0016	0.0036	0.00075	0.00038
Lead	mg/L	0.01	<0.002	<0.002	n/a	0.006	0.002	n/a	0.002	n/a	<0.002	<0.01	<0.01	<0.002	<0.0005	<0.0005	<0.0005	<0.005	< 0.005	0.0002	<0.0001	0.0062	<0.0001	<0.0001	0.0002	<0.005	<0.0050	<0.00010	<0.0002	<0.0010	<0.00020	0.0003	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.20	0.23
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.026	0.026
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	n/a	<0.0001	<0.0001	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.0002	< 0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	14.5	0.024	n/a	0.005	0.009	n/a	0.006	n/a	0.004	0.006	<0.005	0.003	<0.005	<0.005	<0.005	<0.005	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.014	<0.0050	<0.0050	0.0017	0.0018	0.0018	0.0016	0.0016	0.0014
Nickel	mg/L	-	0.011	0.011	n/a	0.008	0.004	n/a	0.006	n/a	0.003	<0.006	0.009	0.003	0.0041	<0.003	0.0097	<0.002	< 0.002	<0.002	<0.002	0.003	0.002	<0.002	0.002	0.003	0.0047	<0.0020	0.0017	<0.0025	0.0016	0.0031	0.0015	0.0011
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	0.0014
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.0	3.1
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.37	0.39
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	210	240
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0015	0.0016
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	0.0068	0.0272	n/a	0.0131	0.0218	n/a	0.0249	n/a	0.0241	0.029	0.026	0.0128	0.008	<0.005	0.008	0.02	0.019	0.013	0.01	0.030	<0.002	0.010	0.031	0.009	0.0496	0.0039	0.014	0.017	0.0084	0.0036	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.20B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 20B																														
			Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																																	
Field pH	-	-	7.6	7.4	n/a	7.6	7.11	7.28	7.22	7.66	7.49	7.52	7.49	7.54	7.65	7.63	7.75	7.81	7.49	7.33	7.23	7.33	7.47	7.56	7.55	7.631	7.487	8.9	7.54	7.41	5.32	7.9	7.9	7.64
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.41	10.55 (EF)	4.51	4.29	10.49	10.94	4.570	4.400	2.7	4.59	1.97	5.35	5.32	5.03	4.97
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10.4	7.5	5.80	8.90	6.0	11.60	6.8	8.7	12	10.1	6.9	7.1	7.9	5.5	7.3
Routine Water																																	
pH	-	6.5 - 8.5	7.79	7.8	7.87	7.71	7.71	7.63	7.8	7.84	7.78	7.76	7.8	7.68	7.81	7.84	7.99	8.2	8.2	8.1	8.2	8.1	8.2	8.1	8.0	8.2	8.13	8.22	8.13	8.14	8.19	8.02	8.04	8.04
Conductivity (EC)	µS/cm	-	4150	4220	3380	4130	4310	4000	4180	4420	4050	4050	4160	4260	4220	4150	4010	4270	4320	4160	3910	4290	4370	4700	4480	4660	4450	4620	4700	4600	4600	4900	4700	4700
Calcium	mg/L	-	91.1	54.8	91.6	90.7	21.8	90.8	95.1	102	84.4	94.2	90.2	95.1	94.6	102	89.9	79.5	43.8	100	81.6	105	104	130	109	138	108	116	100	110	110	130	120	110
Magnesium	mg/L	-	29	29.9	27.9	27	33.7	29.5	30.8	31.1	29.5	31.1	31.2	32.5	31.4	34.7	27.6	34.4	32.3	31.5	35	33.2	9.4	46.5	37.2	50.6	35.3	39.6	36	34	39	47	39	37
Sodium	mg/L	200	975	1020	1080	975	1080	967	1030	1080	926	929	924	1020	1110	959	943	1010	1000	978	1060	975	995	1050	1040	1030	1070	936	1000	1100	960	1000	1000	1000
Potassium	mg/L	-	9.34	8.43	8.9	7.43	9.86	8.08	12.8	8.7	9.8	7.1	8.7	8.7	9.2	7.6	7.6	6.9	9.3	7.6	9.5	8.4	9.4	10.2	9.6	7.4	10.3	9.17	8	9.2	8.7	9.4	9.0	9.0
Iron	mg/L	0.3	<0.04	0.15	0.004	0.387	0.088	0.623	0.019	0.047	<0.003	0.055	<0.02	0.072	<0.05	<0.05	<0.1	0.183	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	0.013	<0.005	0.0216	0.018	<0.06	<0.060	<0.060	0.24	<0.060	<0.60
Sulphate	mg/L	500	1520	1580	1770	1450	1750	1570	1730	1720	1860	1590	1590	1720	1820	1710	1670	1630	1610	1560	1610	1580	1600	1790	1710	1890	1680	1780 *	1800	1800	1900	2200	1900	1800
Chloride	mg/L	250	1.7	0.4	1	1.3	<0.5	0.7	<0.5	<0.5	1.7	<0.5	0.8	0.8	<0.5	0.8	<0.5	1	2	2	3	2	2	2	2	4	0.82	<10 *	2	1.6	1.6	1.3	1.5	1.4
Bicarbonate	mg/L	-	1080	1060	1090	1080	1100	1090	1090	1080	1080	1080	1100	1060	1080	1070	1040	1030	1060	1060	1070	1060	1030	962	1050	986	1060	976	990	1000	960	950	990	1100
Carbonate	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	n/a	n/a	n/a	n/a	<0.05	<0.05	<0.05	0.505	<0.04	<0.04	0.058	0.045	<0.04	<0.02	<0.02	0.1	0.2	<0.1	<0.1	0.2	0.2	0.6	0.1	0.4	0.102	<1.0 *	0.11	0.052	0.28	0.27	0.17	0.14
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.17	0.14
TDS*	mg/L	500	3150	3220	3520	3090	3430	3200	3440	3460	3520	3180	3190	3400	3590	3340	3250	3270	3220	3200	3320	3230	3250	3500	3420	3610	3430	3360	3400	3600	3500	3800	3600	3500
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	450	430
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	810	880
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.98	0.96
Water Nutrients																																	
Ammonia-N	mg/L	-	0.183	0.163	0.23	0.15	0.26	0.27	0.15	< 0.05	0.09	0.1	< 0.05	0.12	< 0.05	< 0.05	0.06	< 0.05	0.08	<0.05	0.12	0.10	0.11	<0.05	0.06	<0.05	<0.050	<0.050	<0.05	0.13	<0.05	0.058	<0.050	<0.050
TKN	mg/L	-	0.97	0.43	0.32	1.01	0.47	0.35	0.52	0.89	0.46	0.55	0.44	1.91	2.22	1.7	0.85	< 0.2	< 0.2	<0.2	1.5	1.5	0.4	0.4	0.8	0.5	0.57	1.57	0.32	1.3	2.9	3	3.7	0.29
Hydrocarbons																																	
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																																	
COD	mg/L	-	45	33	48	43	102	12	18	< 5	13	16	< 5	127	119	138	32	< 10	< 10	16	17	14	14	24	11	13	10.6	9.4	58	91	63	96	120	15
TOC	mg/L	-	6.8	8.2	6.8	6.8	6.2	5.8	6.4	5.4	6.8	5.6	5.6	5.3	5.2	5.2	5	4	5	5	5	5	6	6	6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6	4.7	6	6.9	5.9	5.6	7.2	6.4	4.3
Oil & Grease	mg/L	-	0.3	<0.2	10	<1	<1	2	<1	<1	5	<5	<5	6	10	<5	6	<1	<1	<1	<1	<1	1	1	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																																	
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0035	<0.0030
Antimony	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.006	<0.006	<0.05	<0.02	<0.02	<0.001	<0.001	<0.002	0.0007	0.0026	0.0009	<0.0004	0.0006	0.0006	<0.0004	0.0007	n/a	n/a	<0.00040	<0.0006	<0.0030	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00032	0.00030
Barium	mg/L	1	0.0848	0.0465	0.0337	0.0642	0.0417	0.04	0.0309	0.0249	0.0243	0.024	0.0335	0.023	0.025	0.021	0.024	0.024	0.025	0.021	0.028	0.022	0.016	0.017	0.018	0.021	0.0156	0.0223	0.018	0.015	0.017	0.022	0.014	<0.10
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.33	0.38
Cadmium	mg/L	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	<0.005	<0.003	<0.003	<0.00005	<0.00005	<0.0001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.000050	<0.000025	0.000051	0.00018	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0008	<0.0008	<0.0008	0.0012	<0.0008	<0.0008	<0.0008	<0.0009	<0.0009	<0.008	<0.004	<0.004	0.0046	0.0053	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	0.003	<0.0050	0.0033	0.0036	0.0029	0.0035
Cobalt	mg/L	-	0.0009	0.0007	0.0011	<0.0007	0.0032	0.0038	0.0029	0.0039	0.0036	0.009	0.007	0.008	<0.0005	0.0006	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0003	<0.0015	<0.00030	<0.0003	<0.00030	<0.00030
Copper	mg/L	1	<0.001	0.003	<0.001	0.002	<0.001	<0.001	0.001	0.001	0.002	<0.01	<0.005	0.006	<0.005	<0.005	<0.01	0.012	0.014	0.011	0.005	0.005	0.003	0.003	0.003	0.004	0.0046	0.0052	0.0014	0.0025	0.0012	0.002	0.0013	0.00053
Lead	mg/L	0.01	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	0.005	<0.002	<0.002	<0.02	<0.01	<0.01	<0.0005	<0.0005	<0.001	<0.005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.005	<0.0050	<0.00010	<0.0002	<0.0010	<0.00020	0.00036	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.47	0.49
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	<0.040
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000032	<0.0000050	<0.0000050	<0.0000050	0.0000026
Molybdenum	mg/L	-	27.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.0002	<0.0002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	0.0009	<0.0010	0.00096	0.00094	0.00083	0.00076
Nickel	mg/L	-	0.006	0.004	0.002	0.002	0.004	0.003	0.004	0.004	0.003	<0.01	0.006	0.009	<0.003	<0.0025	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	0.004	0.003	0.0029	0.0026	0.0013	<0.0025	0.0013	0.0023	0.0011	0.0016
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<1.0
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0031	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.6	4.5
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.7	1.6
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	610	580
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0033	0.0013
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	0.0079	0.001	0.0105	0.002	0.0115	0.0065	0.0251	0.0144	0.023	0.016	<0.003	<0.003	0.007	<0.005	<0.01	0.021	0.016	0.011	0.006	0.006	<0.002	0.006	0.004	0.004	0.0054	<0.0020	0.013	<0.015	0.0037	0.0045	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.21A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 21A																												
			Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	Jun-14	Jun-15	Jun-16
Field Measurements																															
Field pH	-	-	7.7	n/a	8.17	7.86	7.52	7.81	8.06	8	8.06	7.98	8.16	8.07	8.09	7.76	7.04	7.69	7.73	7.56	7.42	7.5	7.72	7.847	8.400	8.17	7.94	8.2	7.79	9.9	8.3	7.88
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.15	4.4	2.40	2.25	4.59	4.44	1.959	2.760	2.4	2.16	1.5	2.38	2.12	2.11	2.14
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10.3	4.1 (EF)	9.6	5.7	8.3	6.62	8.5	13.0	9.5	8.7	8.9	10.2	8.3	8.4	7.9
Routine Water																															
pH	-	6.5 - 8.5	8.07	n/a	8.81	8.45	8.29	8.56	8.29	8.28	8.14	7.99	8.27	8.19	8.2	8.3	8.4	8.3	8.4	8.3	8.5	8.6	8.3	8.3	8.38	8.47	8.28	8.59	8.33	8.18	8.19	8.29
Conductivity (EC)	µS/cm	-	5630	n/a	3050	2240	2320	2310	2220	2090	2090	2180	2150	1970	2050	2110	2160	2030	2110	2070	2100	2450	2110	2030	2070	2060	2100	2100	2000	2000	2000	2000
Calcium	mg/L	-	70.2	n/a	28.1	6.4	14.4	7.7	6.2	4.6	5.3	5.1	4.9	2.6	5	5.8	5.1	5.4	5.7	5.4	5.3	6.9	4.8	6.2	4.24	4.85	4.6	4.1	4.8	4.4	4.4	4.7
Magnesium	mg/L	-	31	n/a	6.4	1.3	16	5.47	0.72	0.52	0.6	0.82	< 1	< 1	< 1	0.6	0.5	<0.1	0.8	0.6	0.6	0.7	<0.1	1.4	0.36	0.54	0.5	0.47	0.53	0.47	0.44	0.45
Sodium	mg/L	200	1660	n/a	802	595	597	536	602	613	565	629	600	590	582	562	552	536	547	553	534	630	581	527	496	514	440	540	460	470	490	490
Potassium	mg/L	-	5.68	n/a	8.88	2.79	16.4	6.2	2.5	1.7	<2	2.4	<2	<2	<2	0.7	1.7	1.5	2.2	2.1	2.2	3.2	1.5	2.4	1.28	1.95	1.5	2	1.6	1.8	1.9	1.7
Iron	mg/L	0.3	0.028	n/a	86	n/a	34.2	n/a	n/a	0.02	0.024	n/a	<0.05	0.09	<0.05	1.06	0.021	0.041	0.169	0.096	0.092	0.106	0.015	0.046	<0.0050	0.059	<0.06	<0.060	<0.060	0.22	<0.060	<0.060
Sulphate	mg/L	500	2960	n/a	1490	352	232	156	126	93.5	93.9	96.9	89.9	76.6	83.2	75.4	70.4	54.5	77.4	79.9	68.5	258	75.9	59.5	62.1	83.1	81	91	82	90	72	71
Chloride	mg/L	250	21.4	n/a	23.9	18.9	16.8	14.2	15.6	8.9	7.7	8.5	7.7	8.4	6.9	9	10	11	15	10	10	16	11	15	8.35	7.95	9	8.9	8.4	9.3	9.4	8.7
Bicarbonate	mg/L	-	1110	n/a	470	1050	1280	1150	1340	1360	1340	1340	1330	1330	1310	1270	1270	1320	1260	1300	1210	1240	1350	1340	1310	1220	1300	1200	1300	1300	1300	1300
Carbonate	mg/L	-	n/a	n/a	65.4	49.7	n/a	61	< 6	< 6	< 6	< 6	< 6	< 6	< 6	14	19	10	25	<5	31	43	<5	13	17.3	31.7	<0.5	38	8.5	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	n/a	n/a	18.1	7.26	11.3	11.5	14.7	13.4	17.7	17	17	17.4	19.7	14.9	16.9	6.3	12.5	14.6	13.9	<0.1	30.1	9.6	6.84	9.3	1.8	1.8	1.8	2.3	1.2	1.3
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.012	0.023
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.2	1.3
TDS*	mg/L	500	5300	n/a	2650	1540	1520	1360	1410	1390	1330	1400	1360	1330	1320	1360	1360	1300	1350	1360	1310	1570	1470	1330	1260	1280	1200	1300	1200	1200	1200	1200
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	13	14
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1100	1100
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.92	0.93
Water Nutrients																															
Ammonia-N	mg/L	-	0.25	n/a	2.24	1.49	0.89	0.67	0.71	0.34	0.31	0.42	0.22	0.08	0.35	0.36	0.27	0.17	0.16	0.34	0.37	0.32	0.35	0.34	0.352	0.275	0.13	0.065	0.24	0.068	0.12	0.12
TKN	mg/L	-	0.7	n/a	20.1	5.62	2.32	2.43	2.31	1.76	2.65	1.96	1.91	1.63	3	2.2	<0.2	1.7	1.9	1.3	2	1.4	1.9	2.7	1.66	2.31	1.5	0.95	2.2	1.4	1.7	0.81
Hydrocarbons																															
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	0.00074
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	0.156	<0.48 *	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																															
COD	mg/L	-	34	n/a	1190	450	91	105	132	53	158	73	135	72	134	20	<10	27	24	19	22	42	21	19	24.8	18.7	29	41	110	96	74	28
TOC	mg/L	-	13.3	n/a	62.5	85.1	7.5	0.9	1.7	15.7	1.1	8.4	8.3	11.3	17	7	6	10	9	7	8	15	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8	7.7	8.6	9.5	9.8	10	7	8.4	7.1
Oil & Grease	mg/L	-	<1	n/a	n/a	1	2	n/a	10	<5	<5	31	23	<1	6	<1	<1	<1	<1	<1	1	<1	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																															
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0058	0.0047
Antimony	mg/L	0.006	<0.005	n/a	n/a	n/a	0.006	n/a	n/a	<0.006	<0.02	n/a	0.0022	0.0014	0.0015	0.0019	0.002	0.0022	0.0011	0.0020	0.0016	0.0007	0.0014	n/a	n/a	0.00082	<0.0006	<0.00060	0.0011	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00093	0.0010
Barium	mg/L	1	0.0181	n/a	n/a	n/a	0.541	n/a	n/a	0.0533	0.054	n/a	0.105	0.058	0.07	0.081	0.073	0.059	0.086	0.077	0.082	0.037	0.081	0.185	0.0849	0.103	0.084	0.085	0.084	0.073	0.062	0.073
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.83	0.93
Cadmium	mg/L	0.005	<0.0005	n/a	n/a	n/a	0.002	n/a	n/a	<0.0006	<0.003	n/a	<0.00001	<0.00005	0.00012	<0.001	<0.001	<0.0001	<0.0001	<0.0001	0.0002	0.0002	0.0002	<0.001	<0.0010	0.00009	0.00024	0.000062	0.0001	0.000034	0.000067	0.000079
Chromium	mg/L	0.05	0.002	n/a	n/a	n/a	0.0287	n/a	n/a	<0.0009	<0.004	n/a	0.0006	0.0031	0.0027	<.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.001	<0.0010	<0.0010	0.0014	<0.0010	<0.0010
Cobalt	mg/L	-	<0.0007	n/a	n/a	n/a	0.0128	n/a	n/a	0.0031	0.0045	n/a	0.0013	<0.0005	0.0003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0003	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper	mg/L	1	<0.001	n/a	n/a	n/a	0.059	n/a	n/a	0.004	0.006	n/a	0.011	0.023	0.003	0.004	0.005	0.004	0.003	0.003	0.002	0.001	0.002	0.001	0.0017	0.0022	0.002	0.0009	0.003	0.0015	0.0012	0.0025
Lead	mg/L	0.01	<0.002	n/a	n/a	n/a	0.019	n/a	n/a	<0.002	<0.01	n/a	0.0026	<0.0005	0.0001	< 0.005	<0.005	0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.005	<0.0050	<0.00010	<0.0002	<0.00020	<0.00020	0.00024	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.10	0.12
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	<0.0040
Mercury	mg/L	0.001	<0.0001	n/a	<0.0001	n/a	< 0.0001	n/a	n/a	<0.0001	<0.0001	n/a	n/a	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.000010	0.0000058	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.001	n/a	n/a	n/a	0.035	n/a	n/a	0.018	0.02	n/a	0.023	0.017	0.018	0.016	0.014	0.012	0.010	0.010	0.010	0.008	0.009	0.019	0.0085	0.0075	0.0076	0.0071	0.0069	0.0065	0.0058	0.0062
Nickel	mg/L	-	0.002	n/a	n/a	n/a	0.038	n/a	n/a	0.002	0.005	n/a	0.0092	<0.0025	0.0026	0.003	0.003	0.003	0.002	0.002	0.003	0.009	0.003	<0.002	0.0031	0.0023	0.0031	0.0025	0.0027	0.0027	0.0029	0.0031
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00022	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.7	2.8
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	0.11
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	22	23
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0034	0.0033
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	0.0144	n/a	n/a	n/a	0.146	n/a	n/a	0.0299	0.023	n/a	0.061	0.012	0.007	0.015	0.007	0.009	0.004	0.01	0.003	0.004	0.008	0.004	0.0061	0.0047	0.014	<0.0030	0.005	<0.0030	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.21B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 21B																										
			Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements																													
Field pH	-	-	7.37	7.47	7.44	7.37	8	7.75	8	8.15	8.24	8.22	8.1	8.21	7.75	7.73	7.54	7.55	7.64	7.59	8.66	7.851	7.803	8.08	7.83	7.68	5.6	8.0	8.3	7.89
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.79	5.99 (EF)	2.68	2.77	6.27	6.12	2.420	2.640	15.3	2.78	1.18	2.99	2.87	2.82	2.84
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10.8	8.9	6.5	9.3	4.6	10.87	5.2	6.2	15.7	12.3	6.9	n/a	6.6	6.9	6.5
Routine Water																														
pH	-	6.5 - 8.5	7.93	7.82	7.97	8.04	8.01	7.94	8.12	8.02	8.25	8.27	8.45	8.4	8.4	8.3	8.3	8.3	8.4	8.5	8.3	8.4	8.35	8.38	8.27	8.33	8.43	8.21	8.16	8.25
Conductivity (EC)	µS/cm	-	2490	2370	2510	2650	2380	2370	2440	2460	2500	2450	2470	2560	2660	2510	2490	2670	2770	2610	2560	2530	2660	2700	2700	2700	2700	2700	2700	2600
Calcium	mg/L	-	6.2	17.6	18.8	17.1	13.8	15	14.3	14.9	15.1	13.4	13.7	17.3	7.6	17.1	15	19	18.9	2.5	16.5	17.2	19.5	17.6	17	17	16	17	16	16
Magnesium	mg/L	-	5.2	5.3	5.8	5.04	4.58	5.13	4.67	3.96	4.1	3.2	3.6	5.1	5.2	4.2	5.0	5.8	6.2	1.0	4.3	5.6	6.3	5.41	5.4	5.6	5.4	5.6	4.9	5.0
Sodium	mg/L	200	643	587	665	710	557	587	573	692	720	603	632	624	627	625	638	648	670	131	641	603	679	600	650	700	620	610	630	630
Potassium	mg/L	-	6	4.46	1.17	4	4.4	< 4	3.6	3.7	3.5	2.3	3.2	3.9	4.4	3.8	3.2	4.4	4.7	0.8	5.7	3.2	4.4	4.12	4.2	4.3	3.9	4	4.2	3.9
Iron	mg/L	0.3	1.87	1.38	0.035	0.046	<0.003	0.056	<0.02	0.073	<0.05	<0.05	<0.05	0.408	<0.005	0.006	0.104	0.005	0.019	0.017	0.013	0.028	0.113	<0.010	<0.06	<0.060	<0.060	0.071	<0.060	<0.060
Sulphate	mg/L	500	563	561	644	618	600	545	549	606	630	592	604	566	590	550	524	619	613	123	564	532	588	579	600	590	590	650	570	530
Chloride	mg/L	250	0.9	0.9	<0.5	0.7	2.4	<0.5	0.6	0.5	<0.5	<0.5	<0.5	1	2	2	2	3	2	2	2	3	0.74	0.66	2	1.1	1.7	1.5	1.6	1.1
Bicarbonate	mg/L	-	995	1010	1020	1030	1020	1030	1030	1080	1070	1090	1000	994	1010	1010	1000	1030	1000	980	1030	1040	1040	996	1000	1000	1000	1000	1000	1000
Carbonate	mg/L	-	n/a	n/a	n/a	<6	<6	<6	<6	<6	<6	<6	33	17	13	<5	8	8	21	0.1	<5	14	11.9	24.5	<0.5	8.3	19	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.17	<0.05	0.12	0.17	0.14	<0.04	0.11	0.073	<0.02	0.284	<0.02	0.2	0.4	<0.1	<0.1	0.2	0.2	0.1	<0.1	<0.1	<0.050	<0.050	0.052	0.022	0.045	<0.010	0.11	0.11
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	0.11
TDS*	mg/L	500	1710	1670	1830	1860	1810	1660	1650	1850	1900	1750	1780	1720	1750	1700	1690	1810	1830	773	1740	1690	1820	1720	1800	1800	1800	1800	1800	1700
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	61	61
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	860	850
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.99	1.0
Water Nutrients																														
Ammonia-N	mg/L	-	0.23	0.17	0.2	0.14	0.35	0.09	<0.05	0.28	<0.05	0.14	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	<0.05	<0.050	<0.05	<0.050	<0.050	<0.050
TKN	mg/L	-	0.56	0.46	0.54	0.67	0.48	0.35	0.19	0.86	0.5	0.86	0.87	0.4	<0.2	0.3	0.4	0.3	<0.2	0.3	0.3	0.6	0.43	0.54	0.45	0.4	0.36	0.34	0.28	<0.05
Hydrocarbons																														
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																														
COD	mg/L	-	45	21	17	9	22	19	8	68	6	29	22	< 10	< 10	17	16	15	14	17	9	12	45.7	11.8	32	34	23	31	20	20
TOC	mg/L	-	6.3	7.1	6.2	5.9	7	6.1	5.8	5.8	5.3	7.1	5.1	5	5	5	5	6	6	5	7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5	4.4	5.2	4.6	5.5	4.7	3.8	4.2	4.4
Oil & Grease	mg/L	-	< 1	1	< 1	< 1	3	6	< 5	< 5	9	< 5	6	< 1	< 1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																														
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0042	<0.0030
Antimony	mg/L	0.006	<0.005	<0.005	<0.005	<0.006	<0.006	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	0.0007	0.001	0.0008	<0.0004	0.0008	0.0006	0.0005	0.0006	n/a	n/a	<0.00040	<0.006	<0.0030	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00053	0.00064
Barium	mg/L	1	0.053	0.0369	0.0149	0.0118	0.0104	0.011	0.0125	0.013	0.011	0.012	0.015	0.011	0.011	0.011	0.011	0.017	0.01	0.01	0.009	0.018	0.009	0.0102	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.22	0.25
Cadmium	mg/L	0.005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	<0.005	<0.003	<0.003	<0.00005	<0.00005	<0.00005	<0.0001	<0.001	<0.0001	<0.0001	0.0001	0.0007	0.0002	0.0001	<0.001	<0.0010	0.000225	<0.00005	0.000057	0.000038	0.000042	<0.000020	<0.000020
Chromium	mg/L	0.05	0.0049	0.002	<0.0008	<0.0009	<0.0009	<0.008	< .004	<0.004	0.0043	0.0051	0.0026	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.0050	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	0.0029	0.0029	0.0021	0.0023	0.0024	<0.007	0.0035	0.0085	<0.0005	< 0.0005	0.0006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0015	<0.00030	<0.0003	<0.00030	<0.00030
Copper	mg/L	1	0.002	0.003	0.002	0.003	0.004	<0.01	<0.005	0.007	<0.005	<0.005	0.007	0.006	0.007	0.007	0.004	0.004	0.003	0.002	0.002	0.001	0.003	0.0028	<0.002	0.0011	0.0014	0.0014	0.0008	0.00066
Lead	mg/L	0.01	0.002	< 0.002	0.003	<0.002	<0.002	<0.02	0.012	<0.01	<0.0005	<0.0005	<0.0005	0.0001	<0.005	0.0002	<0.0001	0.0007	0.0001	0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0010	<0.00020	<0.0002	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.22	0.24
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.004	<0.0040
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.001	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.0050	<0.0050	<0.002	0.0011	0.002	0.0063	0.0051	0.0027
Nickel	mg/L	-	0.007	0.002	0.002	0.002	0.002	<0.01	<0.005	<0.005	<0.003	<0.0025	0.0028	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.005	<0.0025	0.001	0.0015	0.0013	0.0013
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.8	3.9
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.27	0.26
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	170	180
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0016	0.0017
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	0.0131	0.0075	0.0084	0.0087	0.0186	0.014	<0.003	<0.003	<0.005	<0.005	0.009	0.007	0.01	0.043	0.006	0.008	0.004	0.008	0.005	0.005	0.007	<0.0020	<0.03	0.016	0.0051	0.003	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.22A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 22A																										
			Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	May-10	Jun-11	May-12	Jun-13	Jun-14	Jun-15	Jun-16
Field Measurements																													
Field pH	-	-	8.06	8.12	7.74	7.62	7.54	7.7	7.54	7.15	7.9	7.81	7.81	7.75	7.63	7.46	7.97	7.32	7.73	7.45	7.73	7.639	7.900	8.12	7.71	7.9	7.45	9.9	n/a	7.76
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.47	12.89 (EF)	5.70	5.51	12.66	12.26	5.130	3.450	3	5.27	1.34	4.78	5.64	n/a	5.60
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12.2	4.2	10.4	6.1	7.5	8.0	8.8	10.0	11.4	11	9.6	10.9	7.4	n/a	10.0
Routine Water																													
pH	-	6.5 - 8.5	8.78	8.27	8.23	8.4	7.94	8.02	7.94	7.84	8.02	8.01	8.11	8.3	8.3	8.1	8.2	8.0	8.5	8.3	8.2	8.2	8.2	8.26	8.19	8.33	8.18	7.83	8.08	8.09
Conductivity (EC)	µS/cm	-	6260	5240	5510	5390	5440	5310	5290	5090	5480	5120	5280	5500	5530	7630	5540	7470	5600	5640	5660	5320	5350	5360	5400	5500	5300	5300	5300	5300
Calcium	mg/L	-	46.6	33.8	42.2	36.5	39.8	39.4	39.4	40	41.4	34.7	46.2	44.7	18.5	116	41.5	117	48.9	42.5	43.8	41.1	36.4	37	33	35	36	36	36	35
Magnesium	mg/L	-	10.6	5.4	6.2	4.18	4.43	4.3	4.31	4.62	4.3	3.4	4.3	4.5	4.6	55.5	5.3	56.5	6.7	4.3	4.0	4.6	3.73	3.98	3.5	3.8	3.6	3.7	3.6	3.4
Sodium	mg/L	200	1580	1450	1660	1460	1510	1450	1310	1460	1510	1190	1440	1320	1340	2020	1390	2000	1460	1390	1490	1330	1200	1220	1200	1300	1300	1300	1200	1200
Potassium	mg/L	-	10.6	5.75	6.07	4.5	4.1	4.7	4.7	4.3	4.8	3.7	4.9	4	4.9	8.9	4.8	9.0	5.3	5.6	3.6	2.5	3.22	4.33	3.8	4.9	3.9	4.1	4.7	4.1
Iron	mg/L	0.3	62.6	n/a	0.004	n/a	0.022	n/a	<0.02	2.42	<0.05	<0.05	<0.1	0.661	<0.005	0.013	<0.005	<0.005	0.212	0.061	<0.005	0.074	<0.0050	0.013	<0.06	0.083	<0.060	0.065	<0.060	<0.60
Sulphate	mg/L	500	2950	2380	2750	2380	2450	2260	2190	2370	2560	2000	2360	2180	2170	3520	2340	3770	2250	2030	2180	2020	2040	2040 *	1900	2500	2200	2200	2000	2000
Chloride	mg/L	250	16.2	16.4	10.3	15.7	11.2	8.1	6.4	10.2	9.3	10.4	9.8	11	10	2	12	3	12	13	11	11	10.6	<10 *	12	11	11	11	12	11
Bicarbonate	mg/L	-	492	841	908	832	939	937	935	927	957	974	959	948	963	1210	932	1210	867	956	957	973	986	951	950	940	950	940	960	960
Carbonate	mg/L	-	74.1	n/a	n/a	24	<6	<6	<6	<6	<6	<6	<6	7	<5	<5	<5	<5	20	<5	<5	<5	<5.0	<5.0	<0.5	4.8	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	1.83	3.41	4.43	6.83	7.56	9.36	11.8	10.9	12.2	12.2	13.3	12.8	11.2	<0.1	12.5	0.1	11.8	13.3	27.5	16.2	11.1	6.4 *	7	16	15	16	16	17
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.011	<0.010
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	16	17
TDS*	mg/L	500	4930	4300	4920	4330	4870	4220	4010	4350	4590	3720	4330	4090	4070	6320	4310	6550	4280	4020	4320	3960	3830	3800	3700	4400	4100	4100	3800	3800
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	100
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	790	790
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.93	0.93
Water Nutrients																													
Ammonia-N	mg/L	-	1.95	2.1	<0.05	1.5	1.32	0.23	0.39	0.42	0.4	0.36	0.17	0.32	0.39	<0.05	0.25	<0.05	0.12	0.15	<0.05	0.31	0.196	0.224	0.1	0.34	0.18	<0.050	0.11	<0.050
TKN	mg/L	-	4.11	2.37	3.14	2.63	1.49	0.93	1.25	1.52	1.31	1.42	2.5	1.5	0.4	0.4	1.5	<0.2	1.2	1.1	1.3	2.1	1.46	1.13	0.83	0.74	0.83	1.2	0.99	0.070
Hydrocarbons																													
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.75	<0.10	<0.10	<0.10	<0.10
Organics																													
COD	mg/L	-	421	78	154	102	46	16	27	52	31	51	59	<10	<10	19	21	10	70	15	14	21	17.3	11.8	100	56	49	92	49	21
TOC	mg/L	-	13.9	10.5	18	6.2	6	7.2	5.7	5.9	5.8	7.3	10.4	5	4	5	6	6	4	5	6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6	5.6	6.2	8.3	6.2	7.4	5.1	7.0	5.4
Oil & Grease	mg/L	-	n/a	<1	1	2	2	<5	<5	10	n/a	<1	<5	<1	1	<1	<1	<1	<1	<1	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																													
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	0.0047
Antimony	mg/L	0.006	n/a	n/a	0.006	n/a	<0.006	n/a	n/a	<0.005	0.001	< 0.001	0.0008	0.0012	0.0014	0.0014	0.0004	0.0007	0.0010	0.0010	0.0008	n/a	n/a	0.00046	<0.006	<0.0060	0.00091	<0.00060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00033
Barium	mg/L	1	n/a	n/a	0.0173	n/a	0.0136	n/a	n/a	0.0182	0.015	0.015	0.016	0.018	0.011	0.013	0.02	0.011	0.020	0.015	0.011	0.014	0.0109	0.0105	0.011	0.011	0.01	0.014	<0.010	<0.10
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.82	0.85
Cadmium	mg/L	0.005	n/a	n/a	<0.0005	n/a	<0.0006	n/a	n/a	0.0005	<0.00001	<0.00005	0.00021	0.0003	<0.001	0.0003	<0.0001	0.0001	0.0003	<0.0001	0.0003	<0.001	<0.0010	0.000405	0.00012	0.00022	0.00012	0.000059	<0.00020	0.000026
Chromium	mg/L	0.05	n/a	n/a	<0.0008	n/a	<0.0009	n/a	n/a	<0.0008	<0.0005	<0.003	0.0013	<0.005	0.015	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.0010	<0.0010	<0.010	<0.0010
Cobalt	mg/L	-	n/a	n/a	0.0029	n/a	0.0039	n/a	n/a	0.0033	0.0005	0.001	0.0008	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.00030	<0.00030	<0.0030	<0.00030
Copper	mg/L	1	n/a	n/a	0.006	n/a	0.003	n/a	n/a	0.012	0.005	<0.005	0.006	0.015	0.019	0.012	0.008	0.007	0.007	0.004	0.003	0.007	0.0047	0.0057	<0.002	<0.0020	0.0024	0.00084	<0.0020	0.0024
Lead	mg/L	0.01	n/a	n/a	<0.002	n/a	<0.002	n/a	n/a	0.003	0.0003	<0.0005	<0.0001	<0.0001	<0.005	0.00021	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.00020	<0.00020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.29	0.32
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.018	<0.040
Mercury	mg/L	0.001	<0.0001	n/a	<0.0001	n/a	<0.0001	n/a	n/a	n/a	n/a	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	n/a	n/a	0.023	n/a	0.015	n/a	n/a	0.011	0.013	0.01	0.01	0.008	0.008	0.007	0.006	<0.005	0.006	0.009	0.008	0.007	0.0065	0.0072	0.01	0.006	0.0062	0.0054	0.0056	0.0057
Nickel	mg/L	-	n/a	n/a	0.011	n/a	0.007	n/a	n/a	0.007	0.0039	<0.003	0.0032	0.004	0.004	0.004	0.004	<0.002	0.004	<0.002	0.004	0.004	0.0042	0.0037	<0.005	<0.0050	0.0028	0.0024	<0.0050	0.0051
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<1.0
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.9	2.8
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.85	0.85
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	640	630
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.004	0.0042
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	n/a	n/a	0.0201	n/a	0.0298	n/a	n/a	0.0271	0.066	0.011	0.013	0.015	0.024	0.022	0.009	0.014	0.004	0.015	0.012	0.015	0.0064	0.0743	<0.03	<0.030	0.0052	<0.0030	<0.030	0.0033

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.22B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 22B																												
			Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Jan-07	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements																															
Field pH	-	-	6.97	7.45	7.13	7.12	7.43	7.77	7.43	7.8	7.51	7.51	7.65	7.71	7.46	7.18	6.96	7.2	7.4	n/a	7.44	7.56	7.569	7.300	7.84	7.71	7.35	5.5	7.7	7.8	7.57
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7.96	18.78 (EF)	8.07	7.26	n/a	17.20	19.83	7.270	>3.999	3.1	8.11	3.5	8.25	8.56	8.25	8.78
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.6	8.5	6.9	7.2	n/a	4.8	10.08	14.9	11.5	11.6	9.6	6.8	10.3	6.4	8.4	9.7
Routine Water																															
pH	-	6.5 - 8.5	7.97	7.5	7.64	7.7	7.66	7.61	7.76	7.69	7.72	7.81	8.06	8.2	8.1	8.2	8.1	8.1	8.2	8.0	8.2	8.1	8.1	8.18	8.14	8.03	8.18	8.24	8.07	7.86	7.97
Conductivity (EC)	µS/cm	-	8110	7850	8400	8610	7590	7750	7870	7900	7940	7890	7420	7890	8010	5420	7460	8020	9950	8280	8040	8240	7930	8320	8200	8100	8100	8200	8100	8200	8200
Calcium	mg/L	-	42.5	119	140	127	98.4	119	106	125	123	128	105	118	70.8	44.9	71.9	126	187	135	109	117	113	112	109	110	120	100	110	120	110
Magnesium	mg/L	-	53	57.5	61.8	58.9	53.1	57.7	55.5	58.2	59.2	58.7	46.6	54.7	57.2	3.6	57.8	61.4	73.2	60.9	55.1	61.4	58	53.9	53.1	52	52	49	51	55	55
Sodium	mg/L	200	2180	1900	2250	2160	2150	1900	2020	2340	2450	1960	1910	2000	2010	1420	2120	2030	2530	2230	2000	2100	2000	1910	1860	2000	2100	2000	2100	1900	2000
Potassium	mg/L	-	13.5	9.97	17.1	10.1	12.8	8.2	11	11	11	7.4	9	7.3	10.7	4.6	10.2	9.5	13.9	12.0	10.7	9.2	5.8	9.61	8.79	9.9	9.8	9	8.5	10	10
Iron	mg/L	0.3	1.37	1.13	0.025	0.026	0.014	0.1	<0.02	0.018	<0.1	<0.1	<0.1	0.243	<0.005	0.005	<0.005	<0.005	0.005		0.012	<0.005	<0.005	<0.0050	0.015	<0.06	<0.060	<0.060	0.075	<0.60	<0.60
Sulphate	mg/L	500	4140	4020	4540	4070	4480	4000	3880	4570	4890	4120	3800	3750	3800	2170	3590	3890	4970	3820	3440	3840	3470	3730	3590 *	3900	3800	3800	3900	3900	3900
Chloride	mg/L	250	1	1	<0.5	0.8	4.5	0.5	0.6	0.9	<0.5	3	<0.5	1	2	11	3	3	3	3	2	2	3	1.21	<10 *	3	1.5	1.8	1.3	1.8	1.4
Bicarbonate	mg/L	-	1210	1230	1230	1230	1240	1230	1260	1190	1250	1220	1210	1180	1220	962	1230	1200	992	1180	1230	1240	1260	1240	1210	1200	1200	1200	1200	1200	1300
Carbonate	mg/L	-	n/a	n/a	n/a	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.28	< 0.05	0.17	0.12	0.14	< 0.04	0.083	0.218	0.063	< 0.04	< 0.04	0.5	0.2	7.6	0.1	0.2	0.3	0.3	0.2	0.1	0.3	0.09	<1.0 *	0.14	0.18	0.11	0.11	0.16	<0.010
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.16	<0.020
TDS*	mg/L	500	7030	6710	7620	7030	7430	6690	6700	7680	8150	6870	6470	6510	6550	4160	6460	6710	8270	6840	6220	6740	6270	6430	6220	6600	6700	6600	6800	6600	6600
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	520	510
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1000	1000
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.92	0.95
Water Nutrients																															
Ammonia-N	mg/L	-	0.47	0.29	0.3	0.41	0.11	0.12	<0.05	0.34	<0.05	<0.05	0.23	<0.05	<0.05	0.1	<0.05	<0.05	0.27	n/a	<0.05	<0.05	<0.05	<0.050	<0.050	<0.05	<0.050	<0.05	<0.050	<0.050	<0.050
TKN	mg/L	-	1	0.8	0.7	0.91	0.76	0.57	0.28	1.84	0.38	0.49	2.08	0.6	< 0.2	0.5	0.5	<0.2	0.6	n/a	0.5	0.3	0.4	0.58	0.88	0.51	0.36	0.46	0.36	0.52	0.27
Hydrocarbons																															
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	0.118	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																															
COD	mg/L	-	69	30	22	<5	28	24	12	98	12	14	74	10	< 10	18	20	14	20	n/a	15	17	22	20.8	12.9	41	19	37	15	51	18
TOC	mg/L	-	8.1	8.8	8.2	6.6	7.8	7.1	6.4	6.7	6.6	6.2	6.7	5	5	5	6	5	8	n/a	6	7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6	6.1	6.2	8	5.9	6	5.3	5.7	4.7
Oil & Grease	mg/L	-	<1	2	<1	<1	9	<5	<5	<5	10	6	7	<1	<1	<1	<1	<1	<1	n/a	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																															
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	<0.0030
Antimony	mg/L	0.006	<0.005	<0.005	<0.005	<0.006	<0.006	<0.05	<0.02	<0.02	<0.002	<0.002	<0.002	0.0007	0.0009	0.001	<0.0004	0.0008	0.006	n/a	<0.0004	0.0009	n/a	n/a	<0.00040	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00035
Barium	mg/L	1	0.0591	0.0293	0.0123	0.0074	0.0101	0.007	0.0125	0.0115	0.011	<0.01	0.014	0.009	0.012	0.01	0.012	0.01	0.013	n/a	0.01	0.008	0.008	0.0067	0.0101	<0.01	<0.010	<0.010	<0.010	<0.10	<0.10
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.25	0.25
Cadmium	mg/L	0.005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0006	<0.005	<0.003	<0.003	<0.0001	<0.0001	<0.0001	0.0003	<0.001	0.0001	0.0004	0.0002	0.0002	n/a	<0.0001	0.0020	<0.001	<0.0010	0.00021	0.00013	0.000096	0.000082	0.00018	<0.00020	<0.000020
Chromium	mg/L	0.05	0.0022	0.0016	<0.0008	<0.0009	<0.0009	<0.008	<0.004	<0.004	<0.005	0.0062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	n/a	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	0.0015
Cobalt	mg/L	-	0.0046	0.0044	0.0037	0.0048	0.0044	0.016	0.012	0.018	<0.001	<0.001	0.0022	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	n/a	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	0.007	0.005	0.003	0.002	0.003	<0.01	<0.005	0.008	<0.01	<0.01	<0.01	0.019	0.029	0.016	0.009	0.009	0.009	n/a	0.006	0.005	0.009	0.0076	0.0093	<0.002	0.0046	<0.0020	<0.0020	<0.0020	0.0012
Lead	mg/L	0.01	<0.002	<0.002	0.005	0.003	<0.002	<0.02	0.017	<0.01	<0.001	<0.001	<0.001	<0.0001	<0.005	<0.0001	<0.0001	0.0002	<0.0001	n/a	<0.0001	0.0002	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.64	0.74
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.040	<0.040
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	n/a	<0.005	,0.005	<0.005	<0.0050	<0.0050	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00081
Nickel	mg/L	-	0.017	0.005	0.007	0.005	0.004	<0.01	0.014	0.029	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.0069	n/a	<0.002	0.005	0.004	0.0047	0.0044	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0020
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<1.0	<1.0
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00036
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.7	4.8
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.5	2.4
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1200	1200
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0073	0.0079
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	0.0261	0.0165	0.0191	0.0136	0.0169	0.015	0.0045	0.013	0.016	< 0.01	0.018	0.022	0.031	0.025	0.011	0.013	0.003	n/a	0.005	0.020	0.024	0.006	0.0026	<0.03	<0.030	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Insufficient amount of water available during time of sampling (n/a[1])

Exceeds Regulatory Limit

Table E.23A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 23A																											
			Oct-97	Oct-98	Apr-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements																														
Field pH	-	-	n/a	7.11	8.54	7.69	8.26	9.07	8.78	9.07	8.46	8.81	8.75	8.73	7.76	8.49	8.04	8.19	8.05	8.36	8.15	7.89	8.529	7.5	8.3	8.63	7.85	6.08	8.5	8.8	8.65
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.9	6.04 (EF)	2.56	2.73	5.78	5.73	2.190	2.632	1.935	2.52	3.5	2.81	2.25	2.24	2.24
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12.4	4.3	8.1	5.3	7.4	9.2	9.0	11.2	10.2	11.3	12	9.1	7.9	8.9	8.6
Routine Water																														
pH	-	6.5 - 8.5	8.22	8.35	8.54	8.67	8.72	8.73	8.61	8.7	8.48	8.72	8.57	8.63	8.5	8.5	8.5	8.5	8.5	8.6	8.5	8.5	8.5	8.57	8.57	8.63	8.57	8.63	8.48	8.44	8.53
Conductivity (EC)	µS/cm	-	3740	9620	5490	3820	3260	3160	2990	2750	2740	2640	2420	2590	2340	2610	2440	2430	2450	2440	2090	2450	2290	2320	2220	2400	2300	2200	2200	2100	2100
Calcium	mg/L	-	32.2	109	22.2	20.6	13.7	7.7	8.9	6.7	8	6.4	3.7	7.6	6.5	7.4	7.2	7.1	9	7.6	4.8	6.5	6.6	5.7	5.5	6	4.7	4.8	5.4	4.1	4.1
Magnesium	mg/L	-	9.2	30.1	5.5	14.8	7.32	1.81	1.88	1.4	1.16	<1	<1	1.1	1	1.2	<0.1	1.5	1.1	1.3	0.2	0.2	1.1	0.8	0.74	0.8	0.62	0.6	0.63	0.48	0.49
Sodium	mg/L	200	1260	2620	1400	978	897	830	840	685	762	706	678	730	631	672	628	631	633	633	536	656	601	578	519	600	580	550	570	500	560
Potassium	mg/L	-	6.71	13.8	6.24	14.6	8.7	3.2	3.2	2.5	2.3	<2	<2	2.3	1.8	1.4	1.7	2.3	2.4	2.5	2.3	1.9	1.4	2	2.01	2.2	2.2	1.9	1.8	2.2	2.0
Iron	mg/L	0.3	0.017	102	n/a	< 0.003	n/a	n/a	n/a	0.021	< 0.003	<0.05	0.09	<0.05	0.254	0.011	0.046	0.009	0.073	0.260	0.098	0.029	0.032	0.0698	0.02	<0.06	<0.060	<0.060	0.38	<0.060	<0.060
Sulphate	mg/L	500	1780	5540	2390	1510	1110	768	836	635	679	509	380	537	281	413	318	301	329	280	60.6	284	232	193	155	190	190	160	110	90	85
Chloride	mg/L	250	1.9	5.6	16.8	18.5	18.6	18.5	< 0.5	14.1	14.4	13.4	15.7	15.8	17	18	18	19	20	19	9	18	18	16.7	16.1	18	19	19	17	20	18
Bicarbonate	mg/L	-	1230	509	648	821	659	842	956	1020	1010	1020	1120	1080	1190	1170	1200	1220	1210	1190	1290	1260	1290	1250	1200	1200	1300	1200	1300	1300	1300
Carbonate	mg/L	-	n/a	8.12	54.3	67.7	60	91	56	50	56	87	58	65	32	32	33	34	28	43	36	31	29	41.2	45.3	44	35	55	28	17	26
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	n/a	<0.05	<0.05	0.09	0.055	<0.02	<0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9.7	<0.1	0.7	<0.050	<0.050	0.016	0.005	<0.003	<0.010	<0.010	<0.010
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.01	<0.020
TDS*	mg/L	500	3700	8570	4210	3030	n/a	2140	2220	1900	2020	1830	1690	1890	1560	1720	1600	1590	1620	1570	1330	1610	1520	1450	1330	1500	1500	1400	1400	1300	1300
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	12
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1100	1100
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	14	22
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.90	1.0
Water Nutrients																														
Ammonia-N	mg/L	-	0.63	2.75	2.04	0.84	3.21	1.66	0.81	1.03	0.85	0.76	0.69	0.98	0.79	0.7	0.42	0.68	1.03	0.94	0.44	0.78	0.85	0.785	0.426	1.1	0.86	0.79	0.6	0.76	0.76
TKN	mg/L	-	0.94	26.7	2.52	11.9	5.42	2.08	1.7	1.49	2.31	1.7	1.82	4.94	1.1	1.3	1.9	1.7	3.6	2.7	2.9	1.5	1.5	1.71	2.01	3.2	1.7	2	1.5	1.4	1.5
Hydrocarbons																														
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	0.12	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	0.095	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																														
COD	mg/L	-	18	1650	95	937	65	85	62	50	99	67	72	187	40	10	48	51	42	44	21	39	49	46.5	44.9	190	78	78	81	55	55
TOC	mg/L	-	7.8	25.6	16.5	11.5	14	2.9	20.8	15.8	14.5	14.5	20.8	31.6	14	13	17	16	16	14	8	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	14	15.2	16.8	16	19	18	16	16	16
Oil & Grease	mg/L	-	<1	n/a	<1	16	1	2	<5	<5	7	11	<1	5	<1	<1	<1	<1	<1	1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																														
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0043	0.0049
Antimony	mg/L	0.006	<0.005	n/a	n/a	0.008	n/a	n/a	n/a	n/a	<0.005	0.0015	0.007	0.0028	0.0007	0.0009	0.0015	<0.0004	0.0018	0.0017	0.0016	0.0008	n/a	n/a	<0.00040	<0.006	<0.00060	0.0012	0.00082	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0065	0.0058
Barium	mg/L	1	0.0463	n/a	n/a	0.0149	n/a	n/a	n/a	n/a	0.0227	0.057	0.017	0.032	0.027	0.022	0.023	0.029	0.033	0.036	0.097	0.032	0.032	0.0331	0.0356	0.04	0.037	0.043	0.040	0.038	0.050
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.77	0.88
Cadmium	mg/L	0.005	<0.0005	n/a	n/a	<0.0005	n/a	n/a	n/a	n/a	<0.0005	0.00002	<0.0001	0.00009	<0.001	<0.001	<0.0001	<0.0001	0.0002	0.0003	0.0002	0.0001	<0.001	<0.0010	0.000085	0.00006	0.00011	0.000066	0.000075	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0008	n/a	n/a	<0.0008	n/a	n/a	n/a	n/a	<0.0008	0.0024	<0.005	0.0029	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	-	0.0015	n/a	n/a	0.0019	n/a	n/a	n/a	n/a	0.0023	0.0052	<0.001	0.0011	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	0.00036	0.0003	0.0007	<0.00030	<0.00030
Copper	mg/L	1	<0.001	n/a	n/a	0.002	n/a	n/a	n/a	n/a	0.004	0.036	<0.01	0.004	0.004	0.004	0.004	0.003	0.005	0.004	0.002	0.001	0.004	0.0016	0.0014	<0.002	0.00059	0.00026	0.0028	0.00042	0.00049
Lead	mg/L	0.01	0.002	n/a	n/a	0.002	n/a	n/a	n/a	n/a	<0.002	0.0083	<0.001	0.0003	<0.005	<0.005	0.0002	<0.0001	0.0003	0.0007	<0.0001	0.0003	<0.005	<0.0050	0.00016	<0.002	<0.00020	<0.00020	0.00088	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.098	0.11
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0071	0.0079
Mercury	mg/L	0.001	<0.0001	<0.0001	n/a	<0.0001	n/a	n/a	n/a	n/a	n/a	n/a	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.003	n/a	n/a	0.035	n/a	n/a	n/a	n/a	0.031	0.025	0.019	0.02	0.01	0.012	0.01	0.011	0.011	0.009	0.01	0.009	0.006	0.0065	0.0059	0.006	0.0058	0.0055	0.0050	0.0042	0.0046
Nickel	mg/L	-	0.019	n/a	n/a	0.011	n/a	n/a	n/a	n/a	0.011	0.0276	0.015	0.0261	0.014	0.005	0.018	0.013	0.017	0.019	0.002	0.009	0.01	0.0079	0.0054	0.011	0.0069	0.0069	0.0097	0.0032	0.0031
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.18	0.12
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.9	3.1
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	0.11
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	26	28
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0032	0.0027
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Zinc	mg/L	5	0.0096	n/a	n/a	0.0067	n/a	n/a	n/a	n/a	0.0107	0.053	<0.01	0.007	0.029	0.009	0.009	0.004	0.005	0.005	0.005	0.036	0.016	0.0093	0.0033	<0.03	0.0071	<0.0030	0.0031	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.23B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 23B																									
			Oct-98	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Apr-05	Oct-05	May-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements																												
Field pH	-	-	6.98	n/a	7.18	7.71	7.33	7.71	7.5	7.51	7.52	7.58	7.51	7.36	7.2	6.87	7.11	7.27	7.14	7.19	7.437	8.3	n/a	7.43	7.17	5.77	7.5	7.8	7.45
Field EC	mS	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.44	24.7 (EF)	11.1	7.19	23.8	21.1	8.730	1.816	n/a	9.39	4.38	10.67	9.8	9.75	10.17
Field Temperature	°C	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.8	8.2	5.9	6.6	6.0	7.2	9.0	13.2	n/a	12.9	8.8	9.5	9.9	9.8	10.3
Routine Water																												
pH	-	6.5 - 8.5	7.69	7.68	7.67	7.67	7.54	7.67	7.59	7.8	7.75	7.95	8.1	8.1	8	8	8	8.3	8.2	8.0	8	8.19	8.16	7.94	8.07	8.24	8.06	7.76	7.89
Conductivity (EC)	µS/cm	-	8760	9560	10000	8950	9280	9590	9140	9480	9220	8970	9870	9580	9660	8940	10200	8250	10100	9790	9490	9710	9530	9400	9400	9700	9600	9700	9900
Calcium	mg/L	-	113	181	162	147	192	172	191	193	191	168	201	169	209	158	163	121	184	171	173	160	178 *	160	160	150	170	170	170
Magnesium	mg/L	-	49.4	51.7	48.2	39.9	51.8	50.3	43.3	41.6	45.1	35.6	64	54.6	71.2	63.7	66.1	64.8	71.5	65.3	65.9	59.7	64.2 *	56	56	55	64	62	63
Sodium	mg/L	200	2290	2540	2560	2560	2460	2610	2620	2730	2280	2330	2660	2610	2610	2690	2660	2070	2540	2490	2360	2200	2440 *	2300	2500	2300	2400	2300	2400
Potassium	mg/L	-	14.6	10.4	10.3	13.8	10	13	12	11	8.1	10	10.9	12.8	11.3	13.1	11.9	11.4	13	11.0	7.2	11.7	11.4 *	12	11	11	11	13	12
Iron	mg/L	0.3	0.46	0.02	0.064	<0.003	0.086	< 0.02	0.066	<0.1	<0.1	<0.1	0.69	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	0.035	<0.005	<0.0050	1.63 *	0.07	0.07	<0.060	<0.60	<0.60	<0.60
Sulphate	mg/L	500	4770	5520	4990	5880	5450	5410	5240	6280	5420	5000	5490	5370	5050	5450	4960	3730	4850	4970	4480	4700	4550 *	5000	4900	5400	5200	4900	4900
Chloride	mg/L	250	3.8	2.5	5.2	3.6	4	3.8	3.4	3.1	3.3	2.7	3	4	3	3	4	3	3	3	4	2.33	<10 *	3	2.2	2.6	2.2	2.6	1.9
Bicarbonate	mg/L	-	842	930	938	926	933	939	897	930	917	910	915	963	968	977	969	1200	1040	1050	1080	1070	1040	1000	1000	1100	1100	1000	1100
Carbonate	mg/L	-	n/a	n/a	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.24	0.09	0.225	0.25	< 0.04	0.33	0.066	0.159	< 0.04	< 0.04	0.6	0.2	<0.5	0.2	0.2	0.2	0.3	0.1	<0.1	0.147	<1.0 *	0.24	0.073	0.26	0.36	0.072	0.32
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.015	<0.010
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.087	0.32
TDS*	mg/L	500	7650	8760	8230	9070	8630	8720	8550	9710	8410	7990	8880	8700	8430	8860	8340	6590	8170	8230	7620	7660	7760	8100	8200	8500	8400	7900	8000
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	670	670
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	860	860
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.94	0.98
Water Nutrients																													
Ammonia-N	mg/L	-	0.91	1.91	1.69	1.55	0.8	1.15	1.56	1.56	1.23	1.79	0.1	1.12	0.46	1.30	1.10	<0.05	0.32	0.52	0.56	0.652	0.311	0.42	0.3	0.39	0.18	0.42	<0.050
TKN	mg/L	-	1.45	2.36	2.39	1.8	1.59	1.25	2.78	1.9	1.64	3.12	<0.2	1.2	0.7	1.6	1.3	0.4	0.6	0.9	1.2	1.37	1.37	0.91	0.76	1.1	0.56	0.76	0.46
Hydrocarbons																													
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	0.061	<0.25	<0.1	0.23	<0.10	<0.10	<0.10	<0.10
Organics																													
COD	mg/L	-	69	30	17	20	19	16	71	14	19	46	< 10	< 10	19	20	23	19	19	18	27	18.8	12.6	37	30	45	47	23	22
TOC	mg/L	-	8.5	9.4	7.8	9.4	8.4	8.3	7.5	7.7	7.6	7.5	7	7	7	7	8	6	7	8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7	6.8	7.2	9.6	6.5	7.1	5.8	7.4	5.5
Oil & Grease	mg/L	-	<1	<1	2	12	<5	<5	<5	11	<5	6	<1	<1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																													
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	0.0081
Antimony	mg/L	0.006	<0.005	0.007	<0.006	<0.006	<0.05	<0.02	<0.02	<0.002	<0.002	<0.002	0.006	0.0011	0.0008	<0.0004	0.0007	0.0005	<0.0004	0.0007	n/a	n/a	<0.00040	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00024
Barium	mg/L	1	0.0741	0.0184	0.0118	0.0121	0.01	0.02	0.0095	0.011	<0.01	0.012	0.012	0.012	0.012	0.014	0.011	0.011	0.012	0.009	0.012	0.0111	0.0159	<0.01	<0.010	<0.010	<0.10	<0.10	<0.10
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.35	0.40
Cadmium	mg/L	0.005	0.0007	<0.0005	<0.0006	<0.0006	<0.005	<0.003	<0.003	<0.0001	<0.0001	0.00011	<0.001	<0.001	0.0007	<0.0001	0.0001	<0.0001	<0.0001	0.0003	<0.001	<0.0010	0.000335	0.00014	0.000083	0.00062	0.00005	<0.00020	0.00028
Chromium	mg/L	0.05	0.0018	<0.0008	<0.0009	<0.0009	<0.008	<0.004	<0.004	<0.005	< 0.005	<0.005	<0.005	0.014	<0.005	0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	0.0032	0.0041	0.0058	0.005	0.019	0.014	0.018	0.0019	<0.001	0.0013	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	0.0023	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	0.005	0.009	0.006	0.005	<0.01	<0.005	0.006	0.011	<0.01	0.016	0.032	0.039	0.024	0.010	0.009	0.008	0.005	0.005	0.01	0.0092	0.0168	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.0013
Lead	mg/L	0.01	<0.002	0.005	<0.002	<0.002	<0.02	0.012	<0.01	<0.001	<0.001	<0.001	<0.005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	0.00236	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.75	0.86
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.14	0.065
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000025	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.003	0.004	0.002	< 0.001	<0.01	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.0005
Nickel	mg/L	-	0.016	0.042	0.014	0.009	<0.01	0.016	0.026	<0.005	<0.005	<0.005	<0.002	0.002	<0.002	<0.002	<0.002	0.004	<0.002	0.005	0.005	0.0054	0.0072	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0028
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<1.0	<1.0
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.4	5.5
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.6	3.7
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1600	1600
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0023	0.0020
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	0.0354	0.0314	0.016	0.0208	0.02	0.014	0.0035	0.02	<0.01	0.016	0.04	0.038	0.033	0.016	0.016	<0.002	0.034	0.023	0.016	0.0076	0.0099	<0.03	<0.030	<0.030	<0.030	<0.030	0.0039

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.24A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 24A															
			Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																		
Field pH	-	-	7.95	7.59	7.69	7.63	8.26	7.73	7.72	7.85	7.783	8.03	7.9	7.69	6.74	7.9	8.1	7.85
Field EC	mS	-	n/a	6.55	19.95 (EF)	6.32	2.22	14.86	14.62	5.8	6.040	15.4	6.5	2.66	7.17	6.24	6.57	6.91
Field Temperature	°C	-	n/a	9.5	8.4	8.0	6.0	4.3	10.83	5.10	6.40	18.3	9.3	8.7	10.1	9.9	8.0	8.5
Routine Water																		
pH	-	6.5 - 8.5	8.3	8.3	8.3	8.2	8.4	8.3	8.1	8.2	8.24	8.13	8.13	8.21	8.24	8.28	7.98	8.08
Conductivity (EC)	µS/cm	-	6110	6100	5600	6210	6210	6350	6310	5.97	6150	6140	6300	6200	6300	6200	6200	6100
Calcium	mg/L	-	74.7	88.4	91.1	87.4	84.1	79.1	82.7	77.4	71.2	68.5	71	73	64	80	67	69
Magnesium	mg/L	-	12.6	10.3	11.6	10.3	11.2	9.7	9.5	9.9	8.59	8.37	8.7	8.1	7.3	9.7	7.5	7.9
Sodium	mg/L	200	1530	1520	1620	1520	1510	1520	1570	1490	1450	1410	1700	1600	1400	1500	1500	1400
Potassium	mg/L	-	6.9	6.2	6.4	6.6	6.8	6.8	6.6	3.9	6.29	5.8	5.2	5.8	5.3	5.2	5.6	5.6
Iron	mg/L	0.3	<0.005	0.013	0.184	<0.005	<0.005	0.007	0.113	<0.005	<0.05	0.017	<0.06	<0.060	<0.060	1.1	<0.060	<0.60
Sulphate	mg/L	500	2970	2720	3010	2910	2790	2730	2910	2670	2740	2730 *	2800	2900	3000	3100	2900	2800
Chloride	mg/L	250	5	4	5	6	5	5	4	5	4.02	<10 *	4	4	3.9	4.3	5.0	4.0
Bicarbonate	mg/L	-	n/a	716	701	701	662	708	710	737	728	706	700	700	720	720	710	710
Carbonate	mg/L	-	<5	<5	5	<5	16	6	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.1	<0.1	<0.1	0.5	0.2	0.6	0.3	0.5	0.261	<1.0 *	1.8	0.91	1.5	1.1	1.2	1.2
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.086	<0.050
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.3	1.2
TDS*	mg/L	500	4950	4700	5090	4890	4750	4710	4930	4620	4640	4570	4900	5000	4900	5100	4800	4700
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	200	200
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	580	580
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.95	0.95
Water Nutrients																		
Ammonia-N	mg/L	-	1.65	0.09	2.15	1.91	1.96	1.67	1.88	1.7	1.59	0.815	1.5	1.5	1.2	0.84	1.1	0.061
TKN	mg/L	-	1.9	0.7	2.6	2.2	2.3	2.1	1.6	2.2	2.25	1.5	1.8	1.9	1.8	1.4	1.5	0.45
Hydrocarbons																		
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																		
COD	mg/L	-	<10	20	18	19	10	15	15	19	15.3	15.6	37	41	23	27	37	16
TOC	mg/L	-	5	6	6	6	6	13	6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5	4.9	5.5	5.7	5	5.2	4.5	5.3	4.3
Oil & Grease	mg/L	-	<1	<1	<1	2	2	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																		
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	0.0049
Antimony	mg/L	0.006	0.0012	0.0009	0.0005	0.0013	0.0010	0.0006	0.0009	n/a	n/a	<0.00040	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00045
Barium	mg/L	1	0.045	0.04	0.043	0.041	0.033	0.032	0.027	0.028	0.0249	0.025	0.02	0.021	0.02	<0.10	0.018	<0.10
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.79	0.84
Cadmium	mg/L	0.005	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	<0.000050	<0.000050	<0.050	0.000076	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	0.024	0.019	0.009	0.006	0.007	0.006	0.003	0.007	0.0066	0.0076	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00069
Lead	mg/L	0.01	<0.005	0.0003	0.0002	0.0009	0.0002	<0.0001	<0.0001	<0.005	<0.0050	0.00011	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.34	0.38
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.055	0.065
Mercury	mg/L	0.001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000022	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	0.003	0.0028	0.0027	<0.0020	0.0021	0.0025
Nickel	mg/L	-	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	0.004	0.003	0.0027	0.0034	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0019
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<1.0
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.1	3.2
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.5	1.5
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	890	900
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.00090
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.0016
Zinc	mg/L	5	0.023	0.449	0.012	0.016	0.006	0.028	0.007	0.006	0.011	0.0075	<0.03	<0.030	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.24B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 24B																
			Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Jan-07	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	May-15	Jun-16
Field Measurements																			
Field pH	-	-	7.64	7.35	7.58	7.22	7.4	n/a[1]	7.51	7.08	7.87	7.48	7.66	7.45	7.33	6.22	7.8	7.5	6.15
Field EC	mS	-	n/a	10.3	24.4 (EF)	9.35	8.31	n/a[1]	9.87	21.97	8680	9.570	19.2	9.21	3.89	9.92	10.01	9.48	11.85
Field Temperature	°C	-	n/a	7.2	7.6	5.4	7.7	n/a[1]	4.2	10.57	4.5	4	16.1	10.5	8.2	10.1	4.9	7.8	n/a
Routine Water																			
pH	-	6.5 - 8.5	8.2	8.1	8.2	8	8.2	8.0	8.2	7.9	8.1	8.08	7.94	8.02	8.07	8.1	8.15	7.74	7.96
Conductivity (EC)	µS/cm	-	10300	9150	8200	8860	9860	9440	10000	9570	8860	9560	9390	9500	9200	9000	9100	9000	9100
Calcium	mg/L	-	240	257	241	240	256	261	247	241	225	234	203 *	190	240	240	270	280	320
Magnesium	mg/L	-	151	125	139	113	154	135	135	130	128	127	126 *	110	130	130	160	140	170
Sodium	mg/L	200	2700	2420	2520	2120	2450	2460	2440	2270	2140	2140	200 *	2300	2300	1900	2000	2000	1900
Potassium	mg/L	-	14.4	10.3	12.3	10.1	13.2	12.8	11.9	8.5	4.7	10.7	10.5 *	9	10	9.4	9.1	10	12
Iron	mg/L	0.3	<0.005	<0.005	<0.005	<0.005	<0.005	n/a[1]	<0.005	0.007	<0.005	<0.050	<0.050 *	<0.06	<0.060	<0.060	<0.60	<0.060	<0.060
Sulphate	mg/L	500	6210	5210	5300	4590	4980	4920	4820	4730	4280	4720	4310 *	4200	4700	4700	5100	4700	4400
Chloride	mg/L	250	6	9	35	40	76	77	70	108	99	115	125 *		100	93	82	81	72
Bicarbonate	mg/L	-	961	941	1070	1030	1080	1090	1080	1150	1170	1150	1170	1200	1200	1200	1100	1100	1000
Carbonate	mg/L	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.1	<0.5	<0.1	<0.1	0.4	<0.1	0.2	<0.1	<0.1	<0.050	<1.0 *	0.09	0.0055	0.022	0.013	0.014	<0.010
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.014	<0.020
TDS*	mg/L	500	9790	8490	8770	7620	8460	8400	8250	8050	7450	7910	7500	7500	8000	7600	8100	7700	7300
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1300	1500
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	890	820
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.97	1.0
Water Nutrients																			
Ammonia-N	mg/L	-	0.05	<0.05	<0.05	<0.05	<0.05	n/a	<0.05	<0.05	<0.05	<0.050	<0.050	0.07	<0.050	<0.05	0.064	0.094	0.11
TKN	mg/L	-	1.2	1.4	1.3	1.4	1.8	n/a	1.4	1.2	2	2.21	1.81	1.4	1.3	1.3	1.2	1.1	0.75
Hydrocarbons																			
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																			
COD	mg/L	-	50	78	85	78	87	n/a	79	77	69	75.5	74.8	98	73	68	58	62	47
TOC	mg/L	-	30	29	31	31	34	n/a	6	32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	28	27.5	29	25	22	24	19	19	19
Oil & Grease	mg/L	-	<1	<1	<1	<1	2	n/a	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																			
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	<0.0030
Antimony	mg/L	0.006	0.0013	0.0008	<0.0004	0.0010	0.0008	n/a	<0.0004	0.0008	n/a	n/a	<0.00040	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00085
Barium	mg/L	1	0.047	0.026	0.023	0.022	0.017	n/a	0.017	0.021	0.023	0.0109	0.0215	0.012	0.011	0.012	<0.10	<0.010	<0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.24	0.26
Cadmium	mg/L	0.005	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	<0.0001	0.001	<0.0010	<0.000050	<0.000050	<0.050	0.000066	0.000064	<0.00020	0.000047
Chromium	mg/L	0.05	0.013	<0.005	0.008	<0.005	0.032	n/a	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0010
Cobalt	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	n/a	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030
Copper	mg/L	1	0.044	0.03	0.016	0.011	0.014	n/a	0.011	0.008	0.01	0.0121	0.013	0.004	0.0044	0.0036	0.0042	0.0036	0.0041
Lead	mg/L	0.01	<0.005	<0.0001	<0.0001	0.0003	<0.0001	n/a	<0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.82	0.86
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0041	<0.0040
Mercury	mg/L	0.001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000024	<0.0000050	<0.0000050	<0.0000050	0.0000029
Molybdenum	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	n/a	<0.005	<0.005	0.023	<0.0050	<0.0050	0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.0023
Nickel	mg/L	-	0.004	0.005	0.003	<0.002	0.032	n/a	0.009	0.017	0.014	0.0206	0.0358	0.05	0.049	0.055	0.06	0.06	0.071
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.10	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00035
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.2	9.7
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.1	4.6
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1500	1600
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.18	0.20
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.0038
Zinc	mg/L	5	0.041	0.027	0.015	0.015	0.004	n/a	0.002	0.019	0.006	0.0041	0.0028	<0.03	<0.030	<0.030	<0.030	<0.030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Insufficient amount of water available during time of sampling (n/a[1])

Exceeds Regulatory Limit

Table E.25A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 25A															
			Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	Jun-14	Jun-15	Jun-16
Field Measurements																		
Field pH	-	-	7.95	7.82	8.13	7.62	8.02	8.21	7.71	8.274	8.900	8.41	8.4	8.42	8.02	10	8.6	8.39
Field EC	mS	-	n/a	2.54	5.33 (EF)	2.90	6.29	4.83	4.62	1.926	1.667	2.1	2.16	0.93	2.29	2.22	2.19	2.13
Field Temperature	°C	-	n/a	11.1	3.8	9.2	7.1	8.8	9.88	7.7	13.1	11.7	10.7	8.6	10.1	7.1	8.3	9.4
Routine Water																		
pH	-	6.5 - 8.5	8.5	8.4	8.5	8.4	8.7	8.7	8.5	8.4	8.59	8.59	8.56	8.67	8.53	8.28	8.39	8.45
Conductivity (EC)	µS/cm	-	4660	2380	2120	2110	2070	2070	2080	2000	2100	2050	2100	2200	2100	2000	2100	2100
Calcium	mg/L	-	43	10.7	7.2	6.8	7.2	5.3	5.3	5.6	5.02	5.01	4.7	5.4	4.7	4.7	4.6	5.1
Magnesium	mg/L	-	21.8	0.4	1.1	0.9	1.1	0.2	<0.1	0.7	0.51	0.57	0.5	0.59	0.5	0.49	0.44	0.47
Sodium	mg/L	200	1270	625	558	557	539	553	585	543	511	436	450	490	570	480	490	540
Potassium	mg/L	-	9.3	2.7	2.5	1.9	2.5	2.9	1.7	1.3	1.74	1.9	1.8	2	1.9	1.9	2.3	1.8
Iron	mg/L	0.3	3.32	0.358	0.516	0.0186	0.112	0.175	0.057	0.068	0.0525	0.095	<0.06	<0.060	<0.060	<0.060	<0.060	<0.060
Sulphate	mg/L	500	2090	323	60.7	102	52.1	36.2	21.3	24.7	19.8	13.2	n/a	3.2	7.1	14	13	4.3
Chloride	mg/L	250	30	14	11	3	10	9	10	10	7.74	7.24	10	8.3	8.5	8	9.2	8.4
Bicarbonate	mg/L	-	812	1220	1350	1350	1260	1330	1400	1430	1360	1320	1300	1300	1400	1400	1400	1400
Carbonate	mg/L	-	31	25	42	25	53	55	38	26	50.7	49	38	62	39	<0.50	11	19
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.050	<0.050	0.065	0.031	0.32	0.97	0.85	0.18
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.21	0.029
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.1	0.21
TDS*	mg/L	500	3900	1600	1340	1360	1280	1310	1350	1310	1270	1220	1200	1200	1300	1200	1200	1300
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	13	15
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1200	1200
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9.0	16
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.91	1.0
Water Nutrients									y									
Ammonia-N	mg/L	-	0.68	0.42	0.54	0.83	0.85	0.62	0.68	0.68	0.68	0.281	0.67	1.2	0.59	0.42	0.41	0.62
TKN	mg/L	-	3.5	2.8	1.6	1.8	2.3	1	0.9	1.1	1.16	1.67	1.1	3.9	1.2	1.1	1.1	1.2
Hydrocarbons																		
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	n/a	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																		
COD	mg/L	-	40	35	15	24	21	23	18	28	21.7	19.6	40	190	29	32	35	29
TOC	mg/L	-	8	13	8	9	9	9	9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7	9	9.7	14	9.8	9.3	7.9	8.1	7.9
Oil & Grease	mg/L	-	<1	1	<1	3	1	<1	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																		
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0051	0.0046
Antimony	mg/L	0.006	0.001	0.0114	0.0012	0.0018	0.0015	0.0012	0.0011	n/a	n/a	0.00086	0.0011	0.0033	0.0012	0.00078	0.0011	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0021	0.0019
Barium	mg/L	1	0.03	0.051	0.063	0.041	0.045	0.062	0.051	0.051	0.0547	0.0622	0.074	0.11	0.085	0.081	0.081	0.088
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.81	0.94
Cadmium	mg/L	0.005	<0.001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.001	<0.0010	0.000175	0.00011	0.000041	0.000033	<0.000025	0.000022	<0.000020
Chromium	mg/L	0.05	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	0.0006	0.00068	0.00037	0.00046	<0.00030	0.00034
Copper	mg/L	1	0.012	0.01	0.003	0.003	0.003	0.001	0.002	0.004	<0.0010	0.0012	0.0018	0.0014	0.0022	0.0009	0.0009	0.00045
Lead	mg/L	0.01	<0.005	0.0029	<0.0001	0.0003	0.0012	0.0004	0.0002	<0.005	<0.0050	0.0003	0.0002	0.00029	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.10	0.11
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.051	0.10
Mercury	mg/L	0.001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000059	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.008	0.021	0.008	0.011	0.007	0.007	<0.005	<0.005	<0.0050	0.0052	0.005	0.013	0.0044	0.0039	0.0051	0.0064
Nickel	mg/L	-	0.003	0.01	0.003	0.007	0.005	0.003	0.003	0.003	0.0033	0.003	0.0041	0.0054	0.0025	0.0025	0.0032	0.0023
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00041	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.7	3.4
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	0.11
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.2	2.4
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0015	0.00074
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0021	0.0013
Zinc	mg/L	5	0.022	0.064	0.004	0.023	0.011	0.005	0.017	0.026	0.0395	0.0048	0.011	0.005	0.0033	<0.0030	<0.0030	<0.0030
Polycyclic Aromatic Hydrocarbons (PAHs)																		
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acridine	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000075
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000075
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
Perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000020
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.25B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 25B															
			Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements																		
Field pH	-	-	7.49	7.36	7.35	7.3	7.49	7.59	7.44	7.444	7.410	7.58	7.5	7.3	5.91	7.4	7.8	7.56
Field EC	mS	-	n/a	8.38	18.83 (EF)	7.66	9.12	19.39	20.36	8.560	8.880	2.4	9.03	3.98	10.59	9.91	10.02	9.51
Field Temperature	°C	-	n/a	6.9	5.9	6.1	9.9	6.8	10.09	8.8	7.9	11.6	11.9	8.3	10.1	7.2	8.2	8.6
Routine Water																		
pH	-	6.5 - 8.5	8.4	8.2	8.3	8.0	8.3	8.2	8.0	8.1	8.09	8.11	8.05	7.84	8.19	8.12	7.85	8.09
Conductivity (EC)	µS/cm	-	4860	8300	7490	8100	8660	8970	9120	8790	8900	9200	9200	9200	9400	9400	9500	9500
Calcium	mg/L	-	52.7	172	145	172	168	172	175	174	175	181 *	180	190	170	190	190	190
Magnesium	mg/L	-	44.8	42.2	43.4	42.3	45.7	50.4	51.6	50.8	47.9	48.2 *	48	50	47	54	53	51
Sodium	mg/L	200	1520	2150	2310	2170	2190	2260	2300	2180	2160	2180 *	2200	2500	2200	2300	2200	2100
Potassium	mg/L	-	7	10.1	11.8	10.1	12.1	12.2	10.9	7.6	11.8	10.8 *	12	12	11	11	12	12
Iron	mg/L	0.3	0.266	0.009	<0.005	0.010	<0.005	0.006	<0.005	<0.005	<0.050	<0.050 *	<0.06	<0.060	<0.060	<0.60	<0.60	<0.060
Sulphate	mg/L	500	2720	3880	4420	4290	4210	4140	4480	4090	4350	4370 *	4800	4700	5100	5200	4600	4500
Chloride	mg/L	250	2	2	3	10	2	3	2	3	1.69	<10 *	3	1.4	2	1.9	2.2	2.5
Bicarbonate	mg/L	-	973	1050	1060	1040	988	1030	1070	1080	1060	1040	1000	1000	1000	1100	1000	970
Carbonate	mg/L	-	21	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	< 0.1	<0.5	<0.1	0.3	0.3	0.3	<0.1	0.8	0.187	<1.0 *	0.12	0.09	0.5	0.42	0.77	0.62
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.016	0.019
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.78	0.64
TDS*	mg/L	500	4850	6770	7450	7210	7120	7140	7550	7040	7270	7300	7800	8000	8000	8300	7600	7300
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	690	680
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850	790
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.97	0.95
Water Nutrients																		
Ammonia-N	mg/L	-	0.45	1.21	1.44	0.95	1.37	0.79	1.08	0.42	0.637	0.224	0.77	0.82	0.56	0.59	0.29	0.58
TKN	mg/L	-	1	1.6	1.9	1.4	1.8	1	1.3	0.8	1.43	1.44	1.3	1.2	0.53	0.84	0.86	1.2
Hydrocarbons																		
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																		
COD	mg/L	-	30	25	26	26	27	25	19	34	22.6	19	42	36	42	35	29	30
TOC	mg/L	-	8	10	10	10	10	10	11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9	8.9	9.8	9.3	9.2	8.4	9	9.9	10
Oil & Grease	mg/L	-	< 1	<1	<1	<1	<1	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																		
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	0.0084
Antimony	mg/L	0.006	0.0008	0.0014	0.0004	0.0008	0.0010	<0.0004	0.0006	n/a	n/a	<0.00040	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00055
Barium	mg/L	1	0.056	0.038	0.031	0.025	0.027	0.018	0.019	0.02	0.0157	0.0217	0.01	0.012	0.015	<0.10	<0.10	0.011
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.46	0.46
Cadmium	mg/L	0.005	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.001	<0.0010	<0.000050	0.00009	<0.050	0.000069	0.00021	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	0.0016
Cobalt	mg/L	-	0.004	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00075
Copper	mg/L	1	0.01	0.021	0.01	0.007	0.009	0.005	0.005	0.01	0.0085	0.0098	<0.002	0.0036	<0.0020	<0.0020	<0.0020	0.00081
Lead	mg/L	0.01	<0.005	0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	<0.00010	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.62	0.64
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.17	0.18
Mercury	mg/L	0.001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.00010	<0.00010	<0.0000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.00072
Nickel	mg/L	-	0.006	0.005	0.004	0.002	0.008	<0.002	0.006	0.008	0.0058	0.0065	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0031
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<1.0	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.6	4.5
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.0	3.7
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1500	1600
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.0011
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.00033
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	0.016	0.028	0.013	0.024	0.005	0.264	0.016	0.018	0.0042	0.0074	<0.03	<0.030	<0.030	<0.030	<0.030	<0.0030
Polycyclic Aromatic Hydrocarbons (PAHs)																		
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acridine	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000075
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000075
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000020
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.26A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 26A																
			Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Jan-07	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	Jun-14	Jun-15	Jun-16
Field Measurements																			
Field pH	-	-	8.11	7.01	8.1	8.2	7.7	n/a	NM	8.62	n/a	8.4	8.51	8.48	8.1	8.31	9.9	n/a	n/a
Field EC	mS	-	n/a	n/a	8.18 (EF)	3.51	6.53	n/a	4.26	6.54	n/a	2.162	2.4	2.94	2.15	2.97	2.91	n/a	n/a
Field Temperature	°C	-	n/a	n/a	2.9	7.8	7.9	n/a	8.5	8.32	n/a	12.3	10.7	10.5	8.6	9.4	6.7	n/a	n/a
Routine Water																			
pH	-	6.5 - 8.5	8.5	8.5	8.5	8.6	8.4	8.4	8.4	8.5	8.5	8.61	8.57	8.58	8.68	8.58	8.45	8.38	8.53
Conductivity (EC)	µS/cm	-	2640	3930	3310	3010	6550	2980	2970	3020	2850	2900	2890	2900	2800	2,700	2700	2700	2600
Calcium	mg/L	-	20.4	25.7	15.4	14.5	82.5	13.2	12.9	12.1	11.2	10	10.9	9.6	7.5	9.5	9.5	9.1	8.7
Magnesium	mg/L	-	3	9	5.0	3.5	52.9	3.0	2.6	1.8	2.3	1.84	1.88	1.6	1.1	1.4	1.4	1.2	1.1
Sodium	mg/L	200	769	938	798	750	1640	759	771	787	674	650	672	770	680	690	680	650	640
Potassium	mg/L	-	3.8	4.2	4.2	2.9	7.7	3.2	3.4	3.0	1.6	2.27	2.58	2.2	2.3	2.3	2.4	2.7	2.5
Iron	mg/L	0.3	3.77	0.09	0.239	0.043	0.011		0.083	0.059	0.017	<0.0050	0.026	<0.06	<0.060	<0.060	0.15	<0.060	0.084
Sulphate	mg/L	500	812	1240	948	783	2970	720	731	756	629	633	651	680	730	610	610	520	490
Chloride	mg/L	250	15	5	9	6	2	6	6	6	5	4.89	3.75	6	5.4	5.8	5.9	5.3	5.0
Bicarbonate	mg/L	-	968	930	965	989	907	1010	1020	988	1030	999	967	1000	970	1,000	1000	1100	1100
Carbonate	mg/L	-	31	22	38	32	20	16	12	31	24	43.4	40.3	29	41	34	15	8.6	23
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.2	1.2	0.4	1.1	0.1	1.2	1.6	1.5	1.7	1.29	1.01	3.4	1.5	1.8	1.6	0.94	1.0
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	0.075
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.94	1.1
TDS*	mg/L	500	2130	2710	2290	2080	5220	2020	2050	2090	1860	1840	1860	2000	2000	1,900	1800	1700	1700
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	28	26
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	900	910
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7.1	19
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.0	1.0
Water Nutrients										.									
Ammonia-N	mg/L	-	0.75	0.2	0.96	0.27	0.58	n/a	<0.05	<0.05	<0.05	<0.050	0.209	<0.05	<0.050	<0.05	<0.050	<0.050	<0.050
TKN	mg/L	-	1.8	4.4	2.3	1.0	0.9	n/a	0.8	0.6	0.7	0.49	1.34	0.58	0.89	1.2	0.78	1.7	1.2
Hydrocarbons																			
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	0.071	<0.25	<0.1	<0.10	<0.21	<0.10	<0.26	<0.10
Organics																			
COD	mg/L	-	40	37	25	24	30	n/a	24	25	24	20.9	15.8	33	50	77	29	n/a	51
TOC	mg/L	-	10	212	8	9	7	n/a	9	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8	8.7	8.9	9.9	9.8	9.8	7.8	9.3	10
Oil & Grease	mg/L	-	< 1	<1	<1	3	<1	n/a	<3	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																			
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0049	0.15
Antimony	mg/L	0.006	0.002	0.0018	0.0013	0.0014	0.0005	n/a	0.0011	0.0008	n/a	n/a	<0.00040	<0.0006	<0.00060	0.00061	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0021	0.0024
Barium	mg/L	1	0.096	0.018	0.015	0.029	0.017	n/a	0.034	0.029	0.031	0.036	0.0397	0.041	0.039	0.041	0.045	0.033	0.047
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.74	0.85
Cadmium	mg/L	0.005	< 0.001	<0.0001	<0.0001	0.0001	0.0001	n/a	<0.0001	<0.0001	<0.001	<0.0010	0.00005	0.000076	<0.050	0.00021	0.000034	<0.000020	<0.000020
Chromium	mg/L	0.05	0.006	0.007	<0.005	0.006	<0.005	n/a	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.001	<0.0010	0.0015	0.0012	<0.0010	<0.0010
Cobalt	mg/L	-	0.004	<0.002	<0.002	<0.002	<0.002	n/a	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0003	<0.00030	0.00032	0.00034	<0.00030	<0.00030
Copper	mg/L	1	0.011	0.006	0.007	0.007	0.006	n/a	0.003	0.002	0.016	0.0028	0.0031	0.0016	0.00068	0.0020	0.0018	0.0015	0.0058
Lead	mg/L	0.01	< 0.005	0.0004	<0.0001	0.0052	<0.0001	n/a	0.0004	0.0010	<0.005	<0.0050	0.00017	<0.0002	0.00022	<0.00020	0.0012	<0.00020	0.00083
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.12	0.14
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0098	<0.0040
Mercury	mg/L	0.001	< 0.0002	<0.0001	<0.0001	<0.0001	<0.0001	n/a	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000021	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.025	0.008	0.008	0.005	<0.005	n/a	<0.005	<0.005	<0.005	<0.0050	<0.0050	0.0034	0.0036	0.0034	0.0029	0.0020	0.0035
Nickel	mg/L	-	0.016	0.004	0.010	0.003	0.004	n/a	<0.002	<0.002	<0.002	<0.0020	<0.0020	0.0015	0.0029	0.0019	0.0024	0.0017	0.0039
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.13	0.21
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.9	4.1
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.21	0.19
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	160	160
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.0029
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00063	0.00065
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0053	0.014
Zinc	mg/L	5	0.013	0.011	0.005	0.010	0.008	n/a	0.015	0.037	0.022	0.0433	0.0079	0.014	0.0039	0.0064	0.013	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Not measured (NM)

Exceeds Regulatory Limit

Table E.26B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 26B															
			Oct-03	Oct-04	Apr-05	Oct-05	Apr-06	Oct-06	Apr-07	Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements																			
Field pH	-	-	n/a	7.46	7.05	7.37	7.26	7.44	7.38	7.98	8.060	7.382	7.9	7.67	7.35	5.62	7.7	7.5	7.63
Field EC	mS	-	n/a	n/a	6.92	15.11 (EF)	6.48	6.35	15.33	15.28	6.520	6.530	2.3	6.54	2.79	7.14	5.28	7.45	6.45
Field Temperature	°C	-	n/a	n/a	7.7	6.3	5.7	8.3	6.0	9.68	6.6	7.0	11.8	9.1	9.2	8.1	5.8	9.1	8.9
Routine Water																			
pH	-	6.5 - 8.5	n/a	8.3	8.1	8.3	8.1	8.4	8.3	8.1	8.1	8.11	8.16	8.1	8.05	8.37	8.09	7.93	8.15
Conductivity (EC)	µS/cm	-	n/a	5980	6130	5520	6360	6440	6710	6660	6510	6560	6470	6400	6300	6400	6100	7100	7400
Calcium	mg/L	-	n/a	102	89.2	83.3	91.6	87.5	88.1	89.1	90.9	88.1	78.4	78	89	74	73	100	110
Magnesium	mg/L	-	n/a	41.6	47.1	48.4	50.1	52.3	50.7	50.6	53.2	48.2	43.2	41	44	40	36	56	58
Sodium	mg/L	200	n/a	2200	1560	1620	1560	1600	1610	1640	1540	1560	1370	1500	1700	1500	1400	1600	1600
Potassium	mg/L	-	n/a	12.2	5.6	6.4	6.4	7.5	8.0	6.5	3.8	6.97	6.42	6.4	6.4	5.9	5	8.3	7.7
Iron	mg/L	0.3	n/a	0.113	0.029	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.050	<0.010	<0.06	<0.060	<0.060	<0.060	<0.60	<0.060
Sulphate	mg/L	500	n/a	4180	2690	2820	2870	2810	2740	2960	2820	2890	2480 *	2600	2900	3000	3000	3300	3400
Chloride	mg/L	250	n/a	4	2	2	2	1	2	2	2	0.62	<10 *	2	<1.0	1.6	1.7	3.5	3.9
Bicarbonate	mg/L	-	n/a	973	1000	998	993	926	1010	1010	1040	1030	1000	980	1000	1000	960	1000	990
Carbonate	mg/L	-		11	<5	<5	<5	18	<5	<5	<5	<5.0	<5.0	<0.5	<0.50	15	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	n/a	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.050	<1.0 *	0.081	0.043	0.14	0.052	0.23	0.19
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.039	0.036
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.27	0.23
TDS*	mg/L	500	n/a	7030	4890	5070	5070	5030	5000	5250	5020	5100	4470	4700	5200	5100	4900	5600	5600
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	490	500
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	830	810
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.95	0.91
Water Nutrients																			
Ammonia-N	mg/L	-	n/a	1.03	0.54	0.66	0.60	0.62	0.59	0.67	0.45	0.535	0.552	0.6	0.54	0.51	0.52	0.43	0.43
TKN	mg/L	-	n/a	1.6	1.1	1.0	1.0	1.1	1.0	1.0	0.9	1.28	1.57	1.3	0.98	1.1	0.89	0.86	0.73
Hydrocarbons																			
Benzene	mg/L	0.005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics																			
COD	mg/L	-	n/a	50	28	22	22	22	21	21	29	20.3	19.2	46	29	59	49	24	35
TOC	mg/L	-	n/a	11	9	9	9	10	9	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9	8.2	8.9	8.6	8.3	8.7	7.3	9.0	10
Oil & Grease	mg/L	-	n/a	< 1	<1	<1	<1	2	<1	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals																			
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.030	0.0095
Antimony	mg/L	0.006	n/a	0.0012	0.0006	<0.0004	0.0010	0.0007	<0.0004	0.0007	n/a	n/a	<0.00040	<0.006	<0.0060	<0.0060	<0.0060	<0.0060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	0.00081
Barium	mg/L	1	n/a	0.071	0.031	0.025	0.019	0.018	0.015	0.013	0.011	0.0093	0.0146	0.01	0.01	0.01	0.01	<0.10	0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.30	0.32
Cadmium	mg/L	0.005	n/a	< 0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0010	0.00005	0.00007	0.0037	0.000056	<0.000050	<0.00020	<0.000020
Chromium	mg/L	0.05	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.010	<0.010	<0.010	<0.010	0.0017
Cobalt	mg/L	-	n/a	0.003	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	0.0025	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	0.00087
Copper	mg/L	1	n/a	0.023	0.01	0.008	0.006	0.007	0.005	0.003	0.007	0.0063	0.0073	0.11	0.0049	<0.0020	<0.0020	<0.0020	0.0014
Lead	mg/L	0.01	n/a	<0.005	0.0002	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.005	<0.0050	<0.00010	0.004	<0.0020	<0.0020	<0.0020	<0.0020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.38	0.38
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.20	0.20
Mercury	mg/L	0.001	n/a	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.00010	<0.00010	<0.000005	0.0000038	<0.0000050	<0.0000050	<0.0000050	0.0000040
Molybdenum	mg/L	-	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.002	0.0022	<0.0020	<0.0020	0.0024	0.0013
Nickel	mg/L	-	n/a	0.012	0.003	0.002	<0.002	0.004	<0.002	0.003	0.004	0.0027	0.0056	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0029
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<1.0	<0.10
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.3	4.4
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.0	2.0
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1000	1100
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.001	0.0012
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	<0.0010
Zinc	mg/L	5	n/a	0.02	0.019	0.012	0.012	0.005	0.004	0.015	0.013	0.0105	0.0047	0.07	<0.030	<0.030	<0.030	<0.030	0.0084
Polycyclic Aromatic Hydrocarbons (PAHs)																			
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0037	<0.000010
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0019	<0.00010
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0019	<0.00010
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0020	<0.00010
Acridine	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0014	<0.00020
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0020	<0.000010
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0016	<0.0000085
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0015	<0.0000075
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0026	<0.0000085
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0017	<0.000050
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0014	<0.000050
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0014	<0.0000085
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0015	<0.0000085
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0015	<0.0000085
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0014	<0.0000075
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0018	<0.000010
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0018	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0014	<0.0000085
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0020	<0.00010
Perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0015	<0.000050
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0019	<0.000050
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0019	<0.000020
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0019	<0.00020

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.27A: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 27A									
			Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements												
Field pH	-	-	8.09	8.479	8.3	8.5	8.52	8.35	6.03	8.3	8.9	8.62
Field EC	mS	-	15.95	2.890	1.125	2.8	2.98	1.3	3.66	2.89	2.88	2.86
Field Temperature	°C	-	9.44	5.5	9.0	10.7	10.6	8.1	6.3	7.0	10.3	6.2
Routine Water												
pH	-	6.5 - 8.5	8.5	8.5	8.64	8.59	8.53	8.45	8.64	8.52	8.38	8.57
Conductivity (EC)	µS/cm	-	3960	2990	2940	2790	2800	2700	2800	2800	2900	2800
Calcium	mg/L	-	18.1	9.9	8.43	8.19	8.5	9.7	8.2	9.0	8.5	8.5
Magnesium	mg/L	-	10.3	4.1	2.66	1.79	1.5	1.5	1.4	1.2	1.1	1.0
Sodium	mg/L	200	1030	756	678	668	700	740	670	730	690	620
Potassium	mg/L	-	2.9	2.1	2.98	2.52	2.3	2.3	2.3	2.1	2.5	2.2
Iron	mg/L	0.3	0.012	0.057	1.09	0.112	<0.06	1.1	<0.060	0.46	<0.060	<0.060
Sulphate	mg/L	500	1260	775	681	630	710	630	730	770	730	710
Chloride	mg/L	250	10	7	5.26	4.42	8	4.4	5.8	6.2	5.2	5.0
Bicarbonate	mg/L	-	1010	992	924	898	900	940	910	920	930	850
Carbonate	mg/L	-	35	24	48.2	37.6	24	14	35	27	7.5	21
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.1	0.1	0.273	0.419	0.21	0.093	0.14	0.11	0.046	0.21
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.17	0.071
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.22	0.28
TDS*	mg/L	500	2860	2070	1880	1800	1900	1900	1900	2000	1900	1800
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	26	25
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	780	730
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.3	17
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.99	0.94
Water Nutrients												
Ammonia-N	mg/L	-	0.50	0.89	0.499	0.456	0.89	0.87	0.85	0.97	0.63	0.86
TKN	mg/L	-	1.1	1.3	1.08	1.57	1.5	1.4	1.4	1.2	1.2	0.76
Hydrocarbons												
Benzene	mg/L	0.005	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics												
COD	mg/L	-	34	41	35.1	30.4	40	48	49	43	34	39
TOC	mg/L	-	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	11	201	11.5	12	9.5	10	11	11	11
Oil & Grease	mg/L	-	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals												
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0043	0.073
Antimony	mg/L	0.006	0.0014	n/a	n/a	<0.00040	<0.006	<0.0030	0.0017	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0024	0.0028
Barium	mg/L	1	0.014	0.01	0.0163	0.0132	0.01	0.044	0.013	0.025	0.011	0.014
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.77	0.75
Cadmium	mg/L	0.005	<0.0001	<0.001	<0.0010	<0.000050	<0.000050	0.000027	0.000026	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.0050	<0.0010	0.0031	<0.0010	<0.0010
Cobalt	mg/L	-	<0.002	<0.002	<0.0020	<0.0020	<0.003	<0.0015	<0.00030	0.00066	<0.00030	0.00043
Copper	mg/L	1	0.002	0.004	0.0026	0.0027	<0.002	0.0038	0.0014	0.0019	0.00053	0.00098
Lead	mg/L	0.01	<0.0001	<0.005	<0.0050	0.00012	<0.002	0.0015	<0.00020	0.00077	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.11	0.12
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.013	0.011
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000005	0.0000022	<0.0000050	<0.0000050	<0.0000050	0.0000021
Molybdenum	mg/L	-	0.010	0.005	<0.0050	<0.0050	0.003	0.0031	0.0028	0.0019	0.0013	0.0023
Nickel	mg/L	-	0.003	<0.002	0.0027	<0.0020	<0.005	0.0068	0.002	0.003	0.0012	0.0033
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.23	0.28
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.9	3.5
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.20	0.21
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	220	200
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0010	0.0017
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00055	0.00065
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0020	0.020
Zinc	mg/L	5	0.011	0.008	0.0217	0.0045	<0.03	<0.015	0.0057	0.0049	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.27B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 27B									
			Oct-07	May-08	May-09	Jun-10	Jun-11	May-12	Jun-13	May-14	Jun-15	Jun-16
Field Measurements												
Field pH	-	-	7.23	7.818	7.6	7.96	7.86	7.62	6.2	7.5	8.1	7.74
Field EC	mS	-	20.75	8.250	>3.999	2.4	10.47	4.53	12.45	11.56	11.53	11.53
Field Temperature	°C	-	9.66	4.7	10.5	13.4	13	10.9	10.1	9.8	9.1	7.8
Routine Water												
pH	-	6.5 - 8.5	8.2	8.2	8.4	8.33	8.15	8.07	8.38	8.14	7.97	8.19
Conductivity (EC)	µS/cm	-	9620	8440	8320	8240	10000	10000	11000	11,000	11,000	11,000
Calcium	mg/L	-	91.5	83.4	74.4	71.2	100	130	110	130	130	140
Magnesium	mg/L	-	85.6	53	45.8	40.7	82	96	96	110	100	100
Sodium	mg/L	200	2530	2170	1980	1930	2600	2900	2900	2800	2700	2700
Potassium	mg/L	-	8.6	4.1	9.01	8.13	9.1	9.5	9.3	9.2	11	11
Iron	mg/L	0.3	<0.005	<0.005	<0.0050	0.048	<0.06	0.088	<0.060	<0.60	<0.60	<0.060
Sulphate	mg/L	500	4520	3610	3580	3280 *	4700	5600	6000	6100	5100	5300
Chloride	mg/L	250	41	41	35.6	28 *	37	36	37	40	35	42
Bicarbonate	mg/L	-	1420	1380	1270	1250	1400	1500	1600	1700	1700	1600
Carbonate	mg/L	-	<5	<5	25.7	12.5	<0.5	<0.50	27	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.1	0.1	0.448	<1.0 *	0.11	0.11	0.35	0.29	1.1	0.91
Nitrite (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.01	0.014
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.1	0.92
TDS*	mg/L	500	7970	6640	6370	5990	8200	9500	9900	10,000	9000	9100
Hardness	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	740	770
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1400	1300
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.99	0.97
Water Nutrients												
Ammonia-N	mg/L	-	0.63	0.98	0.571	0.625	0.72	0.6	0.53	0.51	0.15	0.42
TKN	mg/L	-	1.3	1.5	1.33	1.71	1.7	1.4	0.49	1.5	1.0	0.55
Hydrocarbons												
Benzene	mg/L	0.005	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	n/a	<0.00050	<0.00050	<0.00050	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	n/a	<0.00050	<0.00050	<0.0010	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	n/a	<0.1	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	n/a	<0.05	<0.050	<0.25	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Organics												
COD	mg/L	-	33	31	37.6	20.9	45	43	42	64	35	37
TOC	mg/L	-	15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
DOC	mg/L	-	n/a	11	253	10.2	12	12	14	13	13	15
Oil & Grease	mg/L	-	<1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Metals												
Aluminum	mg/L	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.060	0.0056
Antimony	mg/L	0.006	0.0013	n/a	n/a	0.00049	<0.006	<0.012	<0.012	<0.012	<0.012	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	0.0020
Barium	mg/L	1	0.040	0.02	0.019	0.0194	0.02	0.013	0.013	<0.10	<0.10	<0.010
Beryllium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Boron	mg/L	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.42	0.43
Cadmium	mg/L	0.005	0.0001	<0.001	<0.0010	0.00013	0.00006	<0.10	0.00011	<0.0001	<0.00040	0.00004
Chromium	mg/L	0.05	<0.005	<0.005	<0.0050	<0.0050	<0.01	<0.020	<0.020	<0.020	<0.020	0.0011
Cobalt	mg/L	-	0.006	<0.002	<0.0020	<0.0020	<0.003	<0.0060	<0.0060	<0.0060	<0.0060	0.0011
Copper	mg/L	1	0.006	0.009	0.0079	0.0089	<0.002	0.0073	<0.0040	<0.0040	<0.0040	0.0010
Lead	mg/L	0.01	<0.0001	<0.005	<0.0050	0.00075	<0.002	<0.0040	<0.0040	<0.0040	<0.0040	<0.00020
Lithium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.48	0.49
Manganese	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.052	0.052
Mercury	mg/L	0.001	0.0002	<0.0001	<0.00010	<0.00010	<0.000005	<0.0020	<0.0000050	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.005	0.007	0.0057	<0.0050	0.002	<0.0040	<0.0040	<0.0040	<0.0040	0.0022
Nickel	mg/L	-	0.019	0.009	0.0068	0.006	<0.005	<0.010	<0.010	<0.010	<0.010	0.0077
Phosphorus	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<1.0	0.14
Selenium	mg/L	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	0.00039
Silicon	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.2	4.2
Silver	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0020	<0.00010
Strontium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.0	3.8
Sulphur	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1700	1900
Thallium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0040	<0.00020
Tin	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Titanium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	<0.0010
Uranium	mg/L	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0021	0.0025
Vanadium	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.020	0.0070
Zinc	mg/L	5	0.018	0.01	0.007	0.0096	<0.03	<0.060	<0.060	<0.060	<0.060	0.0048
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo[a]pyrene equivalency	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
2-methylnaphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acenaphthylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Acridine	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020
Anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
Benz(a)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(a) pyrene	mg/L	0.00001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000075
Benzo(b+j)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(c)phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(e)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Benzo(g,h,i)perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Benzo(k)fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Chrysene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Dibenz(a,h)anthracene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000075
Fluoranthene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000010
Fluorene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.0000085
Naphthalene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00010
Perylene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Phenanthrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000050
Pyrene	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.000020
Quinoline	mg/L	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.00020

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.28A: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 28A			
			Jun-13	May-14	Jun-15	Jun-16
Field Measurements						
Field pH	-	-	8.28	8.4	8.4	8.51
Field EC	mS	-	3.66	3.63	3.59	3.38
Field Temperature	°C	-	10	6.2	8.5	7.7
Routine Water						
pH	-	6.5 - 8.5	8.48	8.46	8.34	8.54
Conductivity (EC)	µS/cm	-	3400	3400	3400	3300
Calcium	mg/L	-	14	13	13	12
Magnesium	mg/L	-	1.5	1.4	1.3	1.1
Sodium	mg/L	200	820	850	870	800
Potassium	mg/L	-	2.6	2.5	3.1	2.6
Iron	mg/L	0.3	<0.060	0.29	<0.060	<0.060
Sulphate	mg/L	500	1200	1200	1100	1000
Chloride	mg/L	250	5	5.3	5.0	5.2
Bicarbonate	mg/L	-	820	830	850	780
Carbonate	mg/L	-	18	19	3.4	16
Hydroxide	mg/L	-	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.037	0.027	<0.010	0.066
Nitrite (N)	mg/L	-	n/a	n/a	0.012	0.030
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	0.012	0.096
TDS*	mg/L	500	2400	2500	2400	2200
Hardness	mg/L	-	n/a	n/a	38	35
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	710	660
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	2.8	13
Ionic Balance	N/A	-	n/a	n/a	1.1	1.0
Water Nutrients						
Ammonia-N	mg/L	-	1.2	1.3	1.1	1.2
TKN	mg/L	-	1.6	1.6	1.6	1.7
Hydrocarbons						
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10
Organics						
COD	mg/L	-	47	42	39	31
TOC	mg/L	-	n/a	n/a	n/a	
DOC	mg/L	-	11	9.6	8.5	10
Oil & Grease	mg/L	-	n/a	n/a	n/a	
Metals						
Aluminum	mg/L	0.1	n/a	n/a	0.0046	0.012
Antimony	mg/L	0.006	0.00061	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	0.001	0.00084
Barium	mg/L	1	0.013	0.015	<0.010	<0.010
Beryllium	mg/L	-	n/a	n/a	<0.0010	<0.0010
Boron	mg/L	5	n/a	n/a	0.74	0.77
Cadmium	mg/L	0.005	<0.000025	<0.000025	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.001	<0.0010	<0.0010
Cobalt	mg/L	-	0.00069	0.00062	<0.00030	0.00039
Copper	mg/L	1	0.0013	0.0021	0.00044	0.00085
Lead	mg/L	0.01	<0.00020	0.00022	<0.00020	<0.00020
Lithium	mg/L	-	n/a	n/a	0.13	0.14
Manganese	mg/L	0.05	n/a	n/a	0.029	<0.0040
Mercury	mg/L	0.001	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0035	0.0026	0.0021	0.0017
Nickel	mg/L	-	0.0027	0.0024	0.0014	0.0018
Phosphorus	mg/L	-	n/a	n/a	<0.10	0.12
Selenium	mg/L	0.05	n/a	n/a	<0.00020	<0.00020
Silicon	mg/L	-	n/a	n/a	3.6	3.3
Silver	mg/L	-	n/a	n/a	<0.00010	<0.00010
Strontium	mg/L	-	n/a	n/a	0.29	0.31
Sulphur	mg/L	-	n/a	n/a	330	300
Thallium	mg/L	-	n/a	n/a	<0.00020	<0.00020
Tin	mg/L	-	n/a	n/a	<0.0010	<0.0010
Titanium	mg/L	-	n/a	n/a	<0.0010	<0.0010
Uranium	mg/L	0.02	n/a	n/a	0.00056	0.00031
Vanadium	mg/L	-	n/a	n/a	<0.0010	0.0029
Zinc	mg/L	5	<0.0030	0.0039	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.28B: Chemical Analysis Results - Ryley Integrated Waste Management Facility

Parameter ID	Units	Regulatory Limits[1]	MW 28B			
			Jun-13	May-14	Jun-15	Jun-16
Field Measurements						
Field pH	-	-	7.55	7.4	7.8	7.58
Field EC	mS	-	11.63	12.78	13.02	12.86
Field Temperature	°C	-	9.1	6.5	7.2	7.8
Routine Water						
pH	-	6.5 - 8.5	8.07	8.08	7.9	8.14
Conductivity (EC)	µS/cm	-	12000	12000	12,000	13,000
Calcium	mg/L	-	210	230	220	210
Magnesium	mg/L	-	60	89	95	93
Sodium	mg/L	200	2700	3200	3000	2800
Potassium	mg/L	-	9.4	11	13	13
Iron	mg/L	0.3	<0.060	<0.60	<0.60	<0.060
Sulphate	mg/L	500	6500	6900	6500	6700
Chloride	mg/L	250	34	37	35	33
Bicarbonate	mg/L	-	1000	1100	1100	1000
Carbonate	mg/L	-	<0.5	<0.50	<0.50	<0.50
Hydroxide	mg/L	-	n/a	n/a	<0.50	<0.50
Nitrate (N)	mg/L	10	0.16	0.075	0.24	0.31
Nitrite (N)	mg/L	-	n/a	n/a	0.094	0.038
Nitrate and Nitrate (N)	mg/L	-	n/a	n/a	0.34	0.35
TDS*	mg/L	500	10000	11000	10000	10,000
Hardness	mg/L	-	n/a	n/a	940	920
Alkalinity (total as CaCO3)	mg/L	-	n/a	n/a	900	840
Alkalinity (pp as CaCO3)	mg/L	-	n/a	n/a	<0.50	<0.50
Ionic Balance	N/A	-	n/a	n/a	0.95	0.91
Water Nutrients						
Ammonia-N	mg/L	-	2	1.6	1.2	1.4
TKN	mg/L	-	2.8	2.5	2.0	2.1
Hydrocarbons						
Benzene	mg/L	0.005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10	<0.10	<0.10
Organics						
COD	mg/L	-	45	61	45	48
DOC	mg/L	-	19	15	16	17
Oil & Grease	mg/L	-	n/a	n/a	n/a	
Metals						
Aluminum	mg/L	0.1	n/a	n/a	<0.060	0.011
Antimony	mg/L	0.006	0.00091	<0.012	<0.012	<0.00060
Arsenic	mg/L	0.01	n/a	n/a	<0.0040	0.00044
Barium	mg/L	1	0.033	<0.10	<0.10	0.010
Beryllium	mg/L	-	n/a	n/a	<0.020	<0.0010
Boron	mg/L	5	n/a	n/a	0.44	0.45
Cadmium	mg/L	0.005	0.00027	<0.00010	<0.00040	0.000034
Chromium	mg/L	0.05	<0.0010	<0.020	<0.020	0.0012
Cobalt	mg/L	-	0.0051	<0.0060	<0.0060	0.0019
Copper	mg/L	1	0.0021	<0.0040	<0.0040	0.0015
Lead	mg/L	0.01	<0.00020	<0.0040	<0.0040	<0.00020
Lithium	mg/L	-	n/a	n/a	0.58	0.61
Manganese	mg/L	0.05	n/a	n/a	0.27	0.25
Mercury	mg/L	0.001	<0.000010	<0.0000050	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0029	<0.0040	<0.0040	0.0009
Nickel	mg/L	-	0.012	<0.010	<0.010	0.0049
Phosphorus	mg/L	-	n/a	n/a	<1.0	<0.10
Selenium	mg/L	0.05	n/a	n/a	<0.0040	<0.00020
Silicon	mg/L	-	n/a	n/a	4.8	4.8
Silver	mg/L	-	n/a	n/a	<0.0020	<0.00010
Strontium	mg/L	-	n/a	n/a	5.0	4.7
Sulphur	mg/L	-	n/a	n/a	2100	2200
Thallium	mg/L	-	n/a	n/a	<0.0040	<0.00020
Tin	mg/L	-	n/a	n/a	<0.020	<0.0010
Titanium	mg/L	-	n/a	n/a	<0.020	<0.0010
Uranium	mg/L	0.02	n/a	n/a	<0.0020	0.00062
Vanadium	mg/L	-	n/a	n/a	<0.020	0.0013
Zinc	mg/L	5	0.0037	<0.060	<0.060	0.0052

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Equipment Failure, parameter not reported (EF)

Detection limit adjusted (*)

Exceeds Regulatory Limit

Table E.29A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 29A	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.5	8.15
Field EC	mS	-	4.74	3.44
Field Temperature	°C	-	6.7	7.0
Routine Water				
pH	-	6.5 - 8.5	8.28	8.41
Conductivity (EC)	µS/cm	-	4900	3400
Calcium	mg/L	-	72	33
Magnesium	mg/L	-	9.9	5.1
Sodium	mg/L	200	1200	810
Potassium	mg/L	-	7.4	4.1
Iron	mg/L	0.3	<0.060	<0.060
Sulphate	mg/L	500	2000	1200
Chloride	mg/L	250	7.3	3.3
Bicarbonate	mg/L	-	680	710
Carbonate	mg/L	-	<0.50	7.7
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.054	0.063
Nitrite (N)	mg/L	-	0.084	0.014
Nitrate and Nitrate (N)	mg/L	-	0.14	0.077
TDS*	mg/L	500	3600	2400
Hardness	mg/L	-	220	100
Alkalinity (total as CaCO3)	mg/L	-	560	590
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	6.4
Ionic Balance	N/A	-	1.0	1.0
Water Nutrients				
Ammonia-N	mg/L	-	4.3	1.2
TKN	mg/L	-	16	1.3
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	1100	55
DOC	mg/L	-	13	8.3
Metals				
Aluminum	mg/L	0.1	0.0048	0.0067
Antimony	mg/L	0.006	0.0012	<0.00060
Arsenic	mg/L	0.01	0.0030	0.0011
Barium	mg/L	1	0.021	0.015
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.50	0.75
Cadmium	mg/L	0.005	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.0010
Cobalt	mg/L	-	0.00044	0.00061
Copper	mg/L	1	0.0012	0.0020
Lead	mg/L	0.01	<0.00020	<0.00020
Lithium	mg/L	-	0.26	0.22
Manganese	mg/L	0.05	0.081	0.064
Mercury	mg/L	0.001	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0091	0.0017
Nickel	mg/L	-	0.0036	0.0020
Phosphorus	mg/L	-	<0.10	<0.10
Selenium	mg/L	0.05	0.00039	0.00022
Silicon	mg/L	-	1.7	3.6
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	1.4	0.67
Sulphur	mg/L	-	740	400
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	<0.0010
Uranium	mg/L	0.02	0.0093	0.0006
Vanadium	mg/L	-	<0.0010	0.0011
Zinc	mg/L	5	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.29B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 29B	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	7.4	7.21
Field EC	mS	-	8.67	8.80
Field Temperature	°C	-	7.1	7.7
Routine Water				
pH	-	6.5 - 8.5	7.62	7.85
Conductivity (EC)	µS/cm	-	8200	8400
Calcium	mg/L	-	520	560
Magnesium	mg/L	-	260	230
Sodium	mg/L	200	1400	1600
Potassium	mg/L	-	12	11
Iron	mg/L	0.3	<0.60	0.54
Sulphate	mg/L	500	4700	5100
Chloride	mg/L	250	5.7	5.2
Bicarbonate	mg/L	-	570	520
Carbonate	mg/L	-	<0.50	<0.50
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.39	0.11
Nitrite (N)	mg/L	-	0.027	0.025
Nitrate and Nitrate (N)	mg/L	-	0.42	0.13
TDS*	mg/L	500	7200	7700
Hardness	mg/L	-	2300	2400
Alkalinity (total as CaCO3)	mg/L	-	470	420
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	<0.50
Ionic Balance	N/A	-	1.0	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.72	1.1
TKN	mg/L	-	4.5	0.96
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	150	41
DOC	mg/L	-	17	15
Metals				
Aluminum	mg/L	0.1	0.0041	0.022
Antimony	mg/L	0.006	0.0017	<0.00060
Arsenic	mg/L	0.01	0.0077	0.00054
Barium	mg/L	1	<0.10	0.019
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	<0.20	0.20
Cadmium	mg/L	0.005	0.00017	0.000082
Chromium	mg/L	0.05	<0.0010	0.0014
Cobalt	mg/L	-	0.018	0.0056
Copper	mg/L	1	0.0019	0.0019
Lead	mg/L	0.01	<0.00020	<0.00020
Lithium	mg/L	-	0.55	0.65
Manganese	mg/L	0.05	0.77	0.85
Mercury	mg/L	0.001	<0.0000050	0.0000043
Molybdenum	mg/L	-	0.016	0.00045
Nickel	mg/L	-	0.048	0.0099
Phosphorus	mg/L	-	<1.0	<0.10
Selenium	mg/L	0.05	0.001	<0.00020
Silicon	mg/L	-	4.4	5.3
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	6.9	7.9
Sulphur	mg/L	-	1600	1800
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	<0.0010
Uranium	mg/L	0.02	0.019	0.0042
Vanadium	mg/L	-	<0.0010	0.0015
Zinc	mg/L	5	0.014	0.0051

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.30A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 30A	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.5	8.29
Field EC	mS	-	2.40	2.32
Field Temperature	°C	-	7.5	8.7
Routine Water				
pH	-	6.5 - 8.5	8.34	8.37
Conductivity (EC)	µS/cm	-	2300	2200
Calcium	mg/L	-	16	12
Magnesium	mg/L	-	2.2	1.6
Sodium	mg/L	200	540	540
Potassium	mg/L	-	2.9	2.4
Iron	mg/L	0.3	0.44	0.63
Sulphate	mg/L	500	510	510
Chloride	mg/L	250	5.3	3.0
Bicarbonate	mg/L	-	770	780
Carbonate	mg/L	-	3.5	5.3
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.013	0.16
Nitrite (N)	mg/L	-	<0.033	0.046
Nitrate and Nitrate (N)	mg/L	-	0.023	0.21
TDS*	mg/L	500	1500	1500
Hardness	mg/L	-	48	36
Alkalinity (total as CaCO3)	mg/L	-	640	650
Alkalinity (pp as CaCO3)	mg/L	-	2.9	4.5
Ionic Balance	N/A	-	1.0	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.78	0.42
TKN	mg/L	-	2.6	1.1
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	130	43
DOC	mg/L	-	15	9.9
Metals				
Aluminum	mg/L	0.1	1.0	3.8
Antimony	mg/L	0.006	0.0008	<0.00060
Arsenic	mg/L	0.01	0.0037	0.0030
Barium	mg/L	1	0.028	0.025
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.43	0.52
Cadmium	mg/L	0.005	0.00004	0.000026
Chromium	mg/L	0.05	0.0016	0.0045
Cobalt	mg/L	-	0.0012	0.0012
Copper	mg/L	1	0.0056	0.0075
Lead	mg/L	0.01	0.00077	0.00054
Lithium	mg/L	-	0.11	0.13
Manganese	mg/L	0.05	0.081	0.059
Mercury	mg/L	0.001	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.013	0.0082
Nickel	mg/L	-	0.013	0.010
Phosphorus	mg/L	-	<0.10	0.11
Selenium	mg/L	0.05	0.0012	0.00064
Silicon	mg/L	-	3.4	3.7
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	0.15	0.13
Sulphur	mg/L	-	190	170
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	0.033	0.084
Uranium	mg/L	0.02	0.0063	0.0035
Vanadium	mg/L	-	0.0034	0.0090
Zinc	mg/L	5	0.0034	0.0037

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.30B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 30B	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.1	8.19
Field EC	mS	-	2.83	2.65
Field Temperature	°C	-	6.5	7.4
Routine Water				
pH	-	6.5 - 8.5	8.06	8.44
Conductivity (EC)	µS/cm	-	2700	2600
Calcium	mg/L	-	29	26
Magnesium	mg/L	-	9.1	9.5
Sodium	mg/L	200	680	610
Potassium	mg/L	-	3.3	3.2
Iron	mg/L	0.3	<0.060	<0.060
Sulphate	mg/L	500	830	830
Chloride	mg/L	250	1.4	1.5
Bicarbonate	mg/L	-	670	610
Carbonate	mg/L	-	<0.50	8.0
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	1.3	0.12
Nitrite (N)	mg/L	-	<0.010	0.012
Nitrate and Nitrate (N)	mg/L	-	1.3	0.13
TDS*	mg/L	500	1900	1800
Hardness	mg/L	-	110	100
Alkalinity (total as CaCO3)	mg/L	-	550	520
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	6.7
Ionic Balance	N/A	-	1.1	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.16	<0.050
TKN	mg/L	-	0.49	0.40
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	110	44
DOC	mg/L	-	8.4	9.1
Metals				
Aluminum	mg/L	0.1	<0.030	0.011
Antimony	mg/L	0.006	<0.0060	<0.00060
Arsenic	mg/L	0.01	0.0024	0.0010
Barium	mg/L	1	0.022	0.022
Beryllium	mg/L	-	<0.010	<0.0010
Boron	mg/L	5	0.11	0.14
Cadmium	mg/L	0.005	<0.00020	<0.000020
Chromium	mg/L	0.05	<0.010	0.0012
Cobalt	mg/L	-	<0.0030	<0.00030
Copper	mg/L	1	0.0035	0.0024
Lead	mg/L	0.01	<0.0020	<0.00020
Lithium	mg/L	-	0.21	0.24
Manganese	mg/L	0.05	0.068	<0.0040
Mercury	mg/L	0.001	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0028	0.0011
Nickel	mg/L	-	0.0053	0.0023
Phosphorus	mg/L	-	<0.10	<0.10
Selenium	mg/L	0.05	<0.0020	0.00024
Silicon	mg/L	-	4.6	4.7
Silver	mg/L	-	<0.0010	<0.00010
Strontium	mg/L	-	0.37	0.33
Sulphur	mg/L	-	260	290
Thallium	mg/L	-	<0.0020	<0.00020
Tin	mg/L	-	<0.010	<0.0010
Titanium	mg/L	-	<0.010	<0.0010
Uranium	mg/L	0.02	0.0053	0.0032
Vanadium	mg/L	-	<0.010	0.0019
Zinc	mg/L	5	<0.030	0.0064

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.31A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 31A	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.6	8.53
Field EC	mS	-	1.98	1.72
Field Temperature	°C	-	10.5	9.5
Routine Water				
pH	-	6.5 - 8.5	8.57	8.53
Conductivity (EC)	µS/cm	-	1900	1800
Calcium	mg/L	-	7.8	4.5
Magnesium	mg/L	-	3.1	<2.0
Sodium	mg/L	200	420	430
Potassium	mg/L	-	3.2	<3.0
Iron	mg/L	0.3	9.0	<0.60
Sulphate	mg/L	500	220	120
Chloride	mg/L	250	12	6.7
Bicarbonate	mg/L	-	920	940
Carbonate	mg/L	-	22	18
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.017	2.0
Nitrite (N)	mg/L	-	0.013	0.028
Nitrate and Nitrate (N)	mg/L	-	0.03	2.0
TDS*	mg/L	500	1100	1000
Hardness	mg/L	-	32	11
Alkalinity (total as CaCO3)	mg/L	-	790	800
Alkalinity (pp as CaCO3)	mg/L	-	19	15
Ionic Balance	N/A	-	0.94	1.0
Water Nutrients				
Ammonia-N	mg/L	-	1.1	1.1
TKN	mg/L	-	5.2	1.0
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	560	380
DOC	mg/L	-	19	17
Metals				
Aluminum	mg/L	0.1	1.5	0.31
Antimony	mg/L	0.006	0.0013	<0.00060
Arsenic	mg/L	0.01	0.0069	0.00088
Barium	mg/L	1	0.097	<0.10
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.58	0.66
Cadmium	mg/L	0.005	0.000048	<0.000020
Chromium	mg/L	0.05	0.0017	<0.0010
Cobalt	mg/L	-	0.0034	0.00039
Copper	mg/L	1	0.0093	0.00093
Lead	mg/L	0.01	0.0021	0.00043
Lithium	mg/L	-	0.064	<0.20
Manganese	mg/L	0.05	0.068	<0.040
Mercury	mg/L	0.001	0.000008	0.000043
Molybdenum	mg/L	-	0.023	0.0021
Nickel	mg/L	-	0.020	0.0026
Phosphorus	mg/L	-	0.12	<1.0
Selenium	mg/L	0.05	0.0013	<0.00020
Silicon	mg/L	-	55	2.7
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	0.10	<0.20
Sulphur	mg/L	-	75	40
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	0.030	0.0032
Uranium	mg/L	0.02	0.0095	0.00054
Vanadium	mg/L	-	0.0028	<0.0010
Zinc	mg/L	5	0.0051	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.31B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 31B	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	8.4	8.33
Field EC	mS	-	2.53	2.50
Field Temperature	°C	-	8.0	9.4
Routine Water				
pH	-	6.5 - 8.5	8.29	8.56
Conductivity (EC)	µS/cm	-	2400	2500
Calcium	mg/L	-	15	15
Magnesium	mg/L	-	4.3	5.4
Sodium	mg/L	200	550	590
Potassium	mg/L	-	3.7	3.6
Iron	mg/L	0.3	0.75	0.26
Sulphate	mg/L	500	670	750
Chloride	mg/L	250	1.1	1.4
Bicarbonate	mg/L	-	690	610
Carbonate	mg/L	-	<0.50	13
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	0.046	<0.010
Nitrite (N)	mg/L	-	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	0.046	<0.020
TDS*	mg/L	500	1600	1700
Hardness	mg/L	-	55	59
Alkalinity (total as CaCO3)	mg/L	-	570	520
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	11
Ionic Balance	N/A	-	0.99	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.59	0.13
TKN	mg/L	-	2.2	0.38
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	0.12	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	140	28
DOC	mg/L	-	9	8.2
Metals				
Aluminum	mg/L	0.1	0.70	0.084
Antimony	mg/L	0.006	0.00095	<0.00060
Arsenic	mg/L	0.01	0.0094	0.0017
Barium	mg/L	1	0.024	0.023
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.16	0.20
Cadmium	mg/L	0.005	<0.00002	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.0010
Cobalt	mg/L	-	0.0021	0.00053
Copper	mg/L	1	0.0022	0.0022
Lead	mg/L	0.01	0.00048	<0.00020
Lithium	mg/L	-	0.12	0.16
Manganese	mg/L	0.05	0.061	0.041
Mercury	mg/L	0.001	<0.0000050	0.0000027
Molybdenum	mg/L	-	0.0058	0.0015
Nickel	mg/L	-	0.0086	0.0033
Phosphorus	mg/L	-	<0.10	<0.10
Selenium	mg/L	0.05	0.00064	<0.00020
Silicon	mg/L	-	5.2	3.9
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	0.17	0.23
Sulphur	mg/L	-	220	270
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	0.018	<0.0010
Uranium	mg/L	0.02	0.0034	0.00099
Vanadium	mg/L	-	0.0024	0.0011
Zinc	mg/L	5	<0.0030	0.0078

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.32B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 32B	
			Jun-15	Jun-16
Field Measurements				
Field pH	-	-	7.7	7.69
Field EC	mS	-	12.55	13.26
Field Temperature	°C	-	7.6	9.1
Routine Water				
pH	-	6.5 - 8.5	7.73	7.97
Conductivity (EC)	µS/cm	-	12,000	13,000
Calcium	mg/L	-	210	230
Magnesium	mg/L	-	100	120
Sodium	mg/L	200	2800	3200
Potassium	mg/L	-	18	17
Iron	mg/L	0.3	<0.60	<0.60
Sulphate	mg/L	500	6300	6800
Chloride	mg/L	250	110	120
Bicarbonate	mg/L	-	1300	1300
Carbonate	mg/L	-	<0.50	<0.50
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.050	<0.050
Nitrite (N)	mg/L	-	<0.050	<0.050
Nitrate and Nitrate (N)	mg/L	-	<0.050	<0.020
TDS*	mg/L	500	10000	11,000
Hardness	mg/L	-	930	1100
Alkalinity (total as CaCO3)	mg/L	-	1100	1100
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	<0.50
Ionic Balance	N/A	-	0.91	0.97
Water Nutrients				
Ammonia-N	mg/L	-	1.3	1.5
TKN	mg/L	-	3.5	2.6
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	210	78
TOC	mg/L	-	n/a	
DOC	mg/L	-	18	15
Oil & Grease	mg/L	-	n/a	
Metals				
Aluminum	mg/L	0.1	0.0045	0.0038
Antimony	mg/L	0.006	0.0016	<0.00060
Arsenic	mg/L	0.01	0.012	0.0016
Barium	mg/L	1	<0.10	<0.10
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.40	0.48
Cadmium	mg/L	0.005	0.00011	0.00046
Chromium	mg/L	0.05	<0.0010	<0.0010
Cobalt	mg/L	-	0.0093	0.0054
Copper	mg/L	1	0.0012	0.0036
Lead	mg/L	0.01	<0.00020	<0.00020
Lithium	mg/L	-	0.43	0.54
Manganese	mg/L	0.05	0.68	0.85
Mercury	mg/L	0.001	<0.0000050	<0.0000020
Molybdenum	mg/L	-	0.0089	0.0016
Nickel	mg/L	-	0.031	0.013
Phosphorus	mg/L	-	<1.0	<1.0
Selenium	mg/L	0.05	0.00079	0.00046
Silicon	mg/L	-	3.9	4.7
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	4.3	5.1
Sulphur	mg/L	-	2000	2300
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	<0.0010
Uranium	mg/L	0.02	0.0027	0.00085
Vanadium	mg/L	-	<0.0010	<0.0010
Zinc	mg/L	5	0.0055	0.0040

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.33A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 33A	
			May-15	Jun-16
Field Measurements				
Field pH	-	-	8.6	8.66
Field EC	mS	-	2.54	2.01
Field Temperature	°C	-	6.9	7.0
Routine Water				
pH	-	6.5 - 8.5	8.32	8.52
Conductivity (EC)	µS/cm	-	3300	2100
Calcium	mg/L	-	35	7.4
Magnesium	mg/L	-	10	1.4
Sodium	mg/L	200	930	480
Potassium	mg/L	-	5.8	2.2
Iron	mg/L	0.3	<0.060	0.60
Sulphate	mg/L	500	860	230
Chloride	mg/L	250	28	27
Bicarbonate	mg/L	-	1100	990
Carbonate	mg/L	-	2.6	16
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.010	<0.010
Nitrite (N)	mg/L	-	<0.010	<0.010
Nitrate and Nitrate (N)	mg/L	-	<0.010	<0.020
TDS*	mg/L	500	2400	1200
Hardness	mg/L	-	130	24
Alkalinity (total as CaCO3)	mg/L	-	870	840
Alkalinity (pp as CaCO3)	mg/L	-	2.2	13
Ionic Balance	N/A	-	1.2	0.96
Water Nutrients				
Ammonia-N	mg/L	-	1.3	0.89
TKN	mg/L	-	8.0	2.6
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	460	140
DOC	mg/L	-	39	33
Metals				
Aluminum	mg/L	0.1	0.0044	0.66
Antimony	mg/L	0.006	0.00076	<0.00060
Arsenic	mg/L	0.01	0.0089	0.0042
Barium	mg/L	1	0.070	0.080
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.50	0.71
Cadmium	mg/L	0.005	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	<0.0010
Cobalt	mg/L	-	0.0032	0.0016
Copper	mg/L	1	0.0017	0.028
Lead	mg/L	0.01	<0.00020	0.00094
Lithium	mg/L	-	0.20	0.089
Manganese	mg/L	0.05	0.13	0.058
Mercury	mg/L	0.001	<0.0000050	<0.0000060
Molybdenum	mg/L	-	0.023	0.018
Nickel	mg/L	-	0.016	0.0083
Phosphorus	mg/L	-	<0.10	0.17
Selenium	mg/L	0.05	0.00058	<0.00020
Silicon	mg/L	-	3.5	3.9
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	0.7	0.16
Sulphur	mg/L	-	360	64
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	0.0095
Uranium	mg/L	0.02	0.0096	0.0035
Vanadium	mg/L	-	0.0015	0.0040
Zinc	mg/L	5	<0.0030	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.33B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW 33B	
			May-15	Jun-16
Field Measurements				
Field pH	-	-	7.5	7.48
Field EC	mS	-	5.18	5.34
Field Temperature	°C	-	6.0	6.9
Routine Water				
pH	-	6.5 - 8.5	7.89	8.15
Conductivity (EC)	µS/cm	-	5000	5400
Calcium	mg/L	-	91	110
Magnesium	mg/L	-	26	38
Sodium	mg/L	200	1200	1300
Potassium	mg/L	-	6.9	6.9
Iron	mg/L	0.3	<0.060	0.35
Sulphate	mg/L	500	1900	2000
Chloride	mg/L	250	21	20
Bicarbonate	mg/L	-	1000	1100
Carbonate	mg/L	-	<0.50	<0.50
Hydroxide	mg/L	-	<0.50	<0.50
Nitrate (N)	mg/L	10	<0.010	<0.050
Nitrite (N)	mg/L	-	<0.010	<0.050
Nitrate and Nitrate (N)	mg/L	-	<0.010	<0.020
TDS*	mg/L	500	3700	4000
Hardness	mg/L	-	340	440
Alkalinity (total as CaCO3)	mg/L	-	850	920
Alkalinity (pp as CaCO3)	mg/L	-	<0.50	<0.50
Ionic Balance	N/A	-	1.0	1.0
Water Nutrients				
Ammonia-N	mg/L	-	0.83	0.78
TKN	mg/L	-	5.3	2.6
Hydrocarbons				
Benzene	mg/L	0.005	<0.00040	<0.00040
Toluene	mg/L	0.024	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00040
Xylene	mg/L	0.02	<0.00080	<0.00080
F1 (C6-C10)	mg/L	-	<0.10	<0.10
F2 (>C10-C16)	mg/L	-	<0.10	<0.10
Organics				
COD	mg/L	-	280	140
DOC	mg/L	-	45	44
Metals				
Aluminum	mg/L	0.1	0.0056	0.060
Antimony	mg/L	0.006	0.0013	<0.00060
Arsenic	mg/L	0.01	0.0065	0.0013
Barium	mg/L	1	0.038	0.031
Beryllium	mg/L	-	<0.0010	<0.0010
Boron	mg/L	5	0.23	0.28
Cadmium	mg/L	0.005	<0.000020	<0.000020
Chromium	mg/L	0.05	<0.0010	0.0020
Cobalt	mg/L	-	0.0030	0.0020
Copper	mg/L	1	0.00037	0.0027
Lead	mg/L	0.01	<0.00020	0.00024
Lithium	mg/L	-	0.30	0.35
Manganese	mg/L	0.05	0.19	0.24
Mercury	mg/L	0.001	<0.0000050	0.00023
Molybdenum	mg/L	-	0.0070	0.00038
Nickel	mg/L	-	0.015	0.0096
Phosphorus	mg/L	-	<0.10	<0.10
Selenium	mg/L	0.05	0.00064	0.00038
Silicon	mg/L	-	3.9	5.0
Silver	mg/L	-	<0.00010	<0.00010
Strontium	mg/L	-	1.6	2.1
Sulphur	mg/L	-	610	720
Thallium	mg/L	-	<0.00020	<0.00020
Tin	mg/L	-	<0.0010	<0.0010
Titanium	mg/L	-	<0.0010	0.0033
Uranium	mg/L	0.02	0.0021	0.00016
Vanadium	mg/L	-	<0.0010	<0.0010
Zinc	mg/L	5	<0.0030	0.0056

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (October 2014)

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.34A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-34A Jun-16
Field Measurements			
Field pH	-	-	8.66
Field EC	mS	-	3.02
Field Temperature	°C	-	8.1
Routine Water			
pH	-	6.5 - 8.5	8.57
Conductivity (EC)	µS/cm	-	3000
Calcium	mg/L	-	19
Magnesium	mg/L	-	4.5
Sodium	mg/L	200	710
Potassium	mg/L	-	4.1
Iron	mg/L	0.3	0.13
Sulphate	mg/L	500	510
Chloride	mg/L	250	51
Bicarbonate	mg/L	-	1200
Carbonate	mg/L	-	25
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	<0.050
Nitrite (N)	mg/L	-	<0.050
Nitrate and Nitrate (N)	mg/L	-	<0.020
TDS*	mg/L	500	1900
Hardness	mg/L	-	67
Alkalinity (total as CaCO3)	mg/L	-	990
Alkalinity (pp as CaCO3)	mg/L	-	21
Ionic Balance	N/A	-	1.0
Water Nutrients			
Ammonia-N	mg/L	-	1.1
TKN	mg/L	-	2.6
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	470
DOC	mg/L	-	72
Metals			
Aluminum	mg/L	0.1	0.036
Antimony	mg/L	0.006	0.00078
Arsenic	mg/L	0.01	0.0030
Barium	mg/L	1	0.030
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.80
Cadmium	mg/L	0.005	<0.000020
Chromium	mg/L	0.05	0.0010
Cobalt	mg/L	-	0.0010
Copper	mg/L	1	0.0019
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.14
Manganese	mg/L	0.05	0.14
Mercury	mg/L	0.001	0.000044
Molybdenum	mg/L	-	0.042
Nickel	mg/L	-	0.0074
Phosphorus	mg/L	-	<0.10
Selenium	mg/L	0.05	0.00029
Silicon	mg/L	-	3.2
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.30
Sulphur	mg/L	-	170
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.018
Vanadium	mg/L	-	0.0023
Zinc	mg/L	5	0.011

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.34B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-34B Jun-16
Field Measurements			
Field pH	-	-	7.05
Field EC	mS	-	2.49
Field Temperature	°C	-	7.9
Routine Water			
pH	-	6.5 - 8.5	7.65
Conductivity (EC)	µS/cm	-	2400
Calcium	mg/L	-	180
Magnesium	mg/L	-	55
Sodium	mg/L	200	320
Potassium	mg/L	-	11
Iron	mg/L	0.3	<0.060
Sulphate	mg/L	500	510
Chloride	mg/L	250	39
Bicarbonate	mg/L	-	1000
Carbonate	mg/L	-	<0.50
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	0.014
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	<0.020
TDS*	mg/L	500	1600
Hardness	mg/L	-	670
Alkalinity (total as CaCO3)	mg/L	-	840
Alkalinity (pp as CaCO3)	mg/L	-	<0.50
Ionic Balance	N/A	-	0.96
Water Nutrients			
Ammonia-N	mg/L	-	0.16
TKN	mg/L	-	0.89
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	81
DOC	mg/L	-	14
Metals			
Aluminum	mg/L	0.1	0.0064
Antimony	mg/L	0.006	<0.00060
Arsenic	mg/L	0.01	0.00054
Barium	mg/L	1	0.054
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.060
Cadmium	mg/L	0.005	0.00010
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.0015
Copper	mg/L	1	0.0041
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.12
Manganese	mg/L	0.05	0.11
Mercury	mg/L	0.001	0.0000025
Molybdenum	mg/L	-	0.0012
Nickel	mg/L	-	0.0096
Phosphorus	mg/L	-	0.26
Selenium	mg/L	0.05	<0.00020
Silicon	mg/L	-	5.6
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	1.2
Sulphur	mg/L	-	140
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.0050
Vanadium	mg/L	-	0.0031
Zinc	mg/L	5	0.0073

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.35-Deep: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-35-DEEP Jun-16
Field Measurements			
Field pH	-	-	8.22
Field EC	mS	-	4.90
Field Temperature	°C	-	8.9
Routine Water			
pH	-	6.5 - 8.5	8.19
Conductivity (EC)	µS/cm	-	4700
Calcium	mg/L	-	18
Magnesium	mg/L	-	2.1
Sodium	mg/L	200	970
Potassium	mg/L	-	3.3
Iron	mg/L	0.3	<0.060
Sulphate	mg/L	500	25
Chloride	mg/L	250	1100
Bicarbonate	mg/L	-	560
Carbonate	mg/L	-	<0.50
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	0.25
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	0.25
TDS*	mg/L	500	2400
Hardness	mg/L	-	53
Alkalinity (total as CaCO3)	mg/L	-	460
Alkalinity (pp as CaCO3)	mg/L	-	<0.50
Ionic Balance	N/A	-	1.0
Water Nutrients			
Ammonia-N	mg/L	-	1.1
TKN	mg/L	-	2.2
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	110
DOC	mg/L	-	18
Metals			
Aluminum	mg/L	0.1	0.017
Antimony	mg/L	0.006	<0.00060
Arsenic	mg/L	0.01	0.0018
Barium	mg/L	1	0.27
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.69
Cadmium	mg/L	0.005	0.000040
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00069
Copper	mg/L	1	0.00094
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.15
Manganese	mg/L	0.05	0.048
Mercury	mg/L	0.001	0.0000020
Molybdenum	mg/L	-	0.021
Nickel	mg/L	-	0.0038
Phosphorus	mg/L	-	<0.10
Selenium	mg/L	0.05	0.00020
Silicon	mg/L	-	3.5
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.36
Sulphur	mg/L	-	9.2
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.0023
Vanadium	mg/L	-	<0.0010
Zinc	mg/L	5	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.35A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-35A Jun-16
Field Measurements			
Field pH	-	-	n/a
Field EC	mS	-	n/a
Field Temperature	°C	-	n/a
Routine Water			
pH	-	6.5 - 8.5	8.60
Conductivity (EC)	µS/cm	-	1500
Calcium	mg/L	-	3.8
Magnesium	mg/L	-	0.36
Sodium	mg/L	200	370
Potassium	mg/L	-	2.2
Iron	mg/L	0.3	0.11
Sulphate	mg/L	500	41
Chloride	mg/L	250	36
Bicarbonate	mg/L	-	900
Carbonate	mg/L	-	26
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	<0.010
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	<0.020
TDS*	mg/L	500	930
Hardness	mg/L	-	11
Alkalinity (total as CaCO3)	mg/L	-	780
Alkalinity (pp as CaCO3)	mg/L	-	22
Ionic Balance	N/A	-	0.95
Water Nutrients			
Ammonia-N	mg/L	-	0.83
TKN	mg/L	-	12
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.27
Organics			
COD	mg/L	-	1100
DOC	mg/L	-	15
Metals			
Aluminum	mg/L	0.1	0.092
Antimony	mg/L	0.006	<0.00060
Arsenic	mg/L	0.01	0.0035
Barium	mg/L	1	0.080
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.75
Cadmium	mg/L	0.005	<0.000020
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00042
Copper	mg/L	1	0.0011
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.068
Manganese	mg/L	0.05	0.012
Mercury	mg/L	0.001	<0.000020
Molybdenum	mg/L	-	0.020
Nickel	mg/L	-	0.0053
Phosphorus	mg/L	-	0.15
Selenium	mg/L	0.05	<0.00020
Silicon	mg/L	-	3.7
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.076
Sulphur	mg/L	-	11
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	0.0015
Uranium	mg/L	0.02	0.0013
Vanadium	mg/L	-	0.0014
Zinc	mg/L	5	0.0035

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.35B: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-35B
			Jun-16
Field Measurements			
Field pH	-	-	7.83
Field EC	mS	-	8.08
Field Temperature	°C	-	7.6
Routine Water			
pH	-	6.5 - 8.5	8.16
Conductivity (EC)	µS/cm	-	7700
Calcium	mg/L	-	99
Magnesium	mg/L	-	14
Sodium	mg/L	200	1800
Potassium	mg/L	-	7.8
Iron	mg/L	0.3	<0.60
Sulphate	mg/L	500	3700
Chloride	mg/L	250	5.2
Bicarbonate	mg/L	-	790
Carbonate	mg/L	-	<0.50
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	0.42
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	0.42
TDS*	mg/L	500	6000
Hardness	mg/L	-	300
Alkalinity (total as CaCO3)	mg/L	-	650
Alkalinity (pp as CaCO3)	mg/L	-	<0.50
Ionic Balance	N/A	-	0.95
Water Nutrients			
Ammonia-N	mg/L	-	1.9
TKN	mg/L	-	2.7
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	37
DOC	mg/L	-	8.2
Metals			
Aluminum	mg/L	0.1	0.012
Antimony	mg/L	0.006	0.00069
Arsenic	mg/L	0.01	0.0019
Barium	mg/L	1	<0.10
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.70
Cadmium	mg/L	0.005	<0.000020
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00065
Copper	mg/L	1	0.0018
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.50
Manganese	mg/L	0.05	0.066
Mercury	mg/L	0.001	<0.0000020
Molybdenum	mg/L	-	0.0055
Nickel	mg/L	-	0.0041
Phosphorus	mg/L	-	<1.0
Selenium	mg/L	0.05	0.00082
Silicon	mg/L	-	3.1
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	2.2
Sulphur	mg/L	-	1200
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.0023
Vanadium	mg/L	-	<0.0010
Zinc	mg/L	5	<0.0030

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.36-Deep: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-36-DEEP Jun-16
Field Measurements			
Field pH	-	-	8.52
Field EC	mS	-	3.83
Field Temperature	°C	-	7.7
Routine Water			
pH	-	6.5 - 8.5	8.51
Conductivity (EC)	µS/cm	-	3600
Calcium	mg/L	-	17
Magnesium	mg/L	-	2.4
Sodium	mg/L	200	800
Potassium	mg/L	-	5.4
Iron	mg/L	0.3	0.41
Sulphate	mg/L	500	46
Chloride	mg/L	250	770
Bicarbonate	mg/L	-	650
Carbonate	mg/L	-	13
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	0.018
Nitrite (N)	mg/L	-	0.043
Nitrate and Nitrate (N)	mg/L	-	0.061
TDS*	mg/L	500	2000
Hardness	mg/L	-	52
Alkalinity (total as CaCO3)	mg/L	-	550
Alkalinity (pp as CaCO3)	mg/L	-	11
Ionic Balance	N/A	-	1.1
Water Nutrients			
Ammonia-N	mg/L	-	0.92
TKN	mg/L	-	1.9
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	99
DOC	mg/L	-	12
Metals			
Aluminum	mg/L	0.1	0.19
Antimony	mg/L	0.006	0.0030
Arsenic	mg/L	0.01	0.0088
Barium	mg/L	1	0.23
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.71
Cadmium	mg/L	0.005	0.000070
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00082
Copper	mg/L	1	0.011
Lead	mg/L	0.01	0.00094
Lithium	mg/L	-	0.11
Manganese	mg/L	0.05	0.030
Mercury	mg/L	0.001	0.00019
Molybdenum	mg/L	-	0.041
Nickel	mg/L	-	0.0086
Phosphorus	mg/L	-	0.13
Selenium	mg/L	0.05	0.00096
Silicon	mg/L	-	2.6
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.34
Sulphur	mg/L	-	17
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	0.0030
Uranium	mg/L	0.02	0.0066
Vanadium	mg/L	-	0.0078
Zinc	mg/L	5	0.0068

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

Table E.36A: Field Data and Chemical Analysis Results

Parameter ID	Units	Regulatory Limits[1]	MW-36A Jun-16
Field Measurements			
Field pH	-	-	8.87
Field EC	mS	-	1.588
Field Temperature	°C	-	9.1
Routine Water			
pH	-	6.5 - 8.5	8.66
Conductivity (EC)	µS/cm	-	1600
Calcium	mg/L	-	3.9
Magnesium	mg/L	-	0.41
Sodium	mg/L	200	390
Potassium	mg/L	-	1.4
Iron	mg/L	0.3	<0.060
Sulphate	mg/L	500	<1.0
Chloride	mg/L	250	7.4
Bicarbonate	mg/L	-	970
Carbonate	mg/L	-	25
Hydroxide	mg/L	-	<0.50
Nitrate (N)	mg/L	10	<0.010
Nitrite (N)	mg/L	-	<0.010
Nitrate and Nitrate (N)	mg/L	-	<0.020
TDS*	mg/L	500	900
Hardness	mg/L	-	12
Alkalinity (total as CaCO3)	mg/L	-	830
Alkalinity (pp as CaCO3)	mg/L	-	21
Ionic Balance	N/A	-	1.0
Water Nutrients			
Ammonia-N	mg/L	-	0.60
TKN	mg/L	-	1.3
Hydrocarbons			
Benzene	mg/L	0.005	<0.00040
Toluene	mg/L	0.024	<0.00040
Ethylbenzene	mg/L	0.0016	<0.00040
Xylene	mg/L	0.02	<0.00080
F1 (C6-C10)	mg/L	-	<0.10
F2 (>C10-C16)	mg/L	-	<0.10
Organics			
COD	mg/L	-	55
DOC	mg/L	-	13
Metals			
Aluminum	mg/L	0.1	0.015
Antimony	mg/L	0.006	<0.00060
Arsenic	mg/L	0.01	0.0012
Barium	mg/L	1	0.031
Beryllium	mg/L	-	<0.0010
Boron	mg/L	5	0.82
Cadmium	mg/L	0.005	<0.000020
Chromium	mg/L	0.05	<0.0010
Cobalt	mg/L	-	0.00056
Copper	mg/L	1	0.0026
Lead	mg/L	0.01	<0.00020
Lithium	mg/L	-	0.064
Manganese	mg/L	0.05	0.022
Mercury	mg/L	0.001	0.000017
Molybdenum	mg/L	-	0.010
Nickel	mg/L	-	0.0019
Phosphorus	mg/L	-	0.13
Selenium	mg/L	0.05	0.00023
Silicon	mg/L	-	3.4
Silver	mg/L	-	<0.00010
Strontium	mg/L	-	0.045
Sulphur	mg/L	-	1.0
Thallium	mg/L	-	<0.00020
Tin	mg/L	-	<0.0010
Titanium	mg/L	-	<0.0010
Uranium	mg/L	0.02	0.00037
Vanadium	mg/L	-	0.0028
Zinc	mg/L	5	0.0033

Notes:

[1] Guidelines for Canadian Drinking Water Quality Summary Table, Health Canada (Octob

Information not available (n/a)

Total Dissolved Solids, not a measured value (TDS)

Exceeds Regulatory Limit

APPENDIX F

TETRA TECH'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.1 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of TETRA TECH’s client. TETRA TECH does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than TETRA TECH’s Client unless otherwise authorized in writing by TETRA TECH. Any unauthorized use of the report is at the sole risk of the user.

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1.2 ALTERNATE REPORT FORMAT

Where TETRA TECH submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed TETRA TECH’s instruments of professional service); only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by TETRA TECH shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of TETRA TECH’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except TETRA TECH. The Client warrants that TETRA TECH’s instruments of professional service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

1.1 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

1.2 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of the report, TETRA TECH may rely on information provided by persons other than the Client. While TETRA TECH endeavours to verify the accuracy of such information when instructed to do so by the Client, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX K

PROPOSED GROUNDWATER MONITORING PROGRAM

1.0 PROPOSED GROUNDWATER MONITORING PROGRAM

This section describes the proposed groundwater monitoring program for the site. The program will include a period of baseline monitoring prior to site operation, followed by monitoring during the site's operational phase. The site development timeline will be determined by ongoing operations at the existing Ryley Facility, therefore, the timing of baseline and operational monitoring is not yet established.

This proposed program has been developed based on the requirements set out by Section 5 of the *Standards for Landfills in Alberta* (the Standards; Alberta Environment and Parks [AEP] 2010).

1.1 Groundwater Monitoring Well Network

Section 5.5 of the Standards identifies that a compliance boundary shall be at least 20 m inside the property boundary and at least 10 m, but not more than 60 m, from the waste footprint. Within this compliance boundary, Section 5.6 of the Standards requires that groundwater monitoring wells must be at a spacing of not more than 200 m, at locations that provide an accurate representation of upgradient and downgradient groundwater quality, and where at least one well at each compliance location is designed to allow for collection of groundwater samples from the uppermost geologic formation.

As part of the detailed technical investigation program (Tetra Tech 2017), 15 groundwater monitoring wells were installed at the site. These wells are shown on Figure 1, and include:

- Perimeter wells:
  - 16MW09A,B,C,D (nest of 4 wells in northeast corner of site);
  - 16MW04 (north perimeter);
  - 16MW11A,B,C,D (nest of 4 wells in northwest corner of site);
  - 16MW16 (west perimeter); and
  - 16MW18 (east perimeter).
- Interior wells:
  - 16MW08A,B (nest of 2 wells centrally on site);
  - 16MW13 (northwest portion of site); and
  - 16MW14 (northeast portion of site).

A baseline groundwater monitoring and sampling program was initiated at these wells in 2016 for the purposes of the technical investigation. Along the southern edge of the site, there are several monitoring wells at the existing Ryley Facility that will be used as part of the network of wells along the compliance boundary, and which are included in the ongoing monitoring program for the facility (in accordance with Approval 10348-03-00). These wells are shown on Figure 1, and include:

- South perimeter wells (at existing Ryley Facility):
  - MW12A,B (southwest perimeter);
  - MW14 (south central perimeter);
  - MW11 (southeast perimeter);

- MW01B,C (southwest perimeter);
- MW10 (south central perimeter);
- 15MW34A,B (south central perimeter); and
- MW14 (south central perimeter).

The existing network was designed to address the requirements for landfill siting in support of the detailed technical investigation program reporting, and several wells do not satisfy the requirement of compliance wells (e.g., several interior well locations). Additional wells will be required to be installed to fulfill the compliance boundary spacing requirements described in the Standards. These proposed additional wells are shown on Figure 1. The proposed locations are approximate, and need to be refined as the detailed design for the facility is prepared to ensure that they are in secure locations that will allow a long term water quality trends to be established. The network along the northern boundary will be set to satisfy the 200 m spacing requirement along the landfill's perimeter, with installation sequenced to address expansion of landfill operations into this area.

Details of the existing wells are provided in a summary table and borehole logs in Attachment 1 (excerpted from the 2017 Detailed Site Investigation Program Report). These well locations include wells on all sides of the proposed development, and include upgradient and downgradient locations. Given the spacing requirements of the landfill regulations, as much as possible the interior wells will be incorporated into the compliance network; however, some will need to be abandoned.

At several of these existing wells locations the monitoring wells are nested, including wells in the unconsolidated sediments and in the underlying bedrock. As indicated above, based on the staging of development, it will be necessary to install additional wells as the landfill footprint progresses to ensure that the requirements of the Standards continue to be met. These new wells will be installed using a similar construction to those shown in Attachment 1, and a recommended installation timeframe is described in Section 4.0 of the Standards.

All wells will be protected from damage and will be locked, except when being sampled. If a groundwater sample cannot be collected because the monitoring well is damaged or is no longer capable of producing a representative sample, the well will be cleaned, repaired or replaced.

1.2 Water Quality Assessment Methods

This section describes the chemical parameters to be used to identify water quality changes (Section 3.1 of the Standards) and the method used to establish control limits and concentration trends (Section 4.2 of the Standards).

1.2.1 Water Quality Parameters

The Standards characterize the water quality parameters to be used to identify water quality changes that may result from landfilling operations. Within the Standards, two types of monitoring programs are defined: background level and detection level. As defined by the Standards, background level monitoring entails a sampling and analysis program that establishes water quality representative of pre-development conditions, and detection level monitoring entails a monitoring program that is undertaken during the active landfill life, final landfill closure, and post-closure for purpose of detecting the migration of a contaminant constituent from the landfill to the surrounding environment.

For background level monitoring (referred to hereafter as baseline monitoring), the selection of parameters has been based on the Approval for the existing Ryley Facility (10348-03-00) and the Standards, and includes a combination of naturally occurring and non-naturally occurring parameters:

- The naturally occurring compounds and elements:

  - Routine water analysis (pH, electrical conductivity, and Major ions);
  - Dissolved metals – (e.g., iron, manganese, arsenic);
  - Nutrients (Total Kjeldahl Nitrogen and Ammonia-N);
  - Dissolved Organic Carbon (DOC);
  - Petroleum hydrocarbons (PHCs): benzene, toluene, ethylbenzene, and xylenes, and Fractions F1 and F2; and
  - Phenols.
- And the non-naturally occurring compounds:
  - Dissolved metals – Canadian Council of Ministers of the Environment package plus mercury; and
  - Volatile organic compounds (VOCs) – methylene chloride, vinyl chloride, trichloroethylene (TCE) and tetrachloroethylene (PCE).

PHCs and Phenols could be both naturally and non-naturally occurring at this site, and the baseline level monitoring program (Section 3.2.3) will be used to establish baseline levels of these parameters, if any.

The detection level program will be developed based on the results of the baseline program, with the intent of reducing the suite to key indicator parameters for the detection level program. Any consideration of modification of parameters for the detection level program will be verified with AEP prior to initiation of the detection level program (the frequency of the baseline and detection level monitoring programs is described in Section 3.3).

1.2.2 Sampling Methods

During each monitoring event, a strict monitoring and sampling protocol will be maintained, including:

- Recording the static elevations, above sea level, of fluid phases in the groundwater monitoring well prior to purging;
- Following defined methods for monitoring well purging and sample collection, under the direct supervision of a qualified member of APEGA;
- Recording field measurements including temperature, pH, and electrical conductivity of each sample at the time of sampling;
- Collecting samples in laboratory supplied containers, appropriately preserved and kept cool for delivery to a certified analytical laboratory; and
- Following quality control protocols for field sampling and collecting additional laboratory samples for quality assurance/quality control (QA/QC).

1.2.3 Background Level Monitoring

Section 5.2(a) of the Standards states:

> The person responsible for a landfill shall develop the Groundwater Monitoring Program to include, at a minimum all of the following:

1) Background groundwater quality of each monitoring well.

    a) Existing landfill or landfill cells may establish background levels after the start of landfilling operations by:

        i) Using historical data; or

        ii) Obtaining groundwater samples from monitoring wells established in nearby areas not affected by landfilling activity.

    b) Establish groundwater quality control limits for each naturally occurring parameter.

A baseline monitoring program was initiated in 2016 at the newly installed wells (two events, spring and fall) and continued in spring 2017 (one event). One additional event will be undertaken during the fall of 2017. Once the timing of site development is known, we propose one additional year of baseline data collection prior to operations.

This data will be used to establish the pre-development background groundwater quality at the site. This will include statistical calculations of the maximum and minimum concentrations, the mean and standard deviation for each of the naturally occurring water quality parameters. These limits will be updated over time through ongoing analysis of the groundwater monitoring program (background level monitoring program) as recommended within the Standards. Groundwater quality control limits will be set for each naturally occurring parameter, following the methodology described in Section 1.2.3.

Sampling frequency for background level monitoring is further described in Section 1.3.

1.2.4 Groundwater Performance Standards

The groundwater monitoring data will be presented on a set of control charts and will be interpreted by a professional registered with APEGA to determine any groundwater quality impacts as a result of the landfill operations. The detection level groundwater monitoring program will be evaluated based upon the groundwater performance standard specified by Item 5.3 of the Standards, specifically:

a) Throughout the active landfill life, final landfill closure, and post-closure of the landfill, the groundwater quality within the compliance boundary shall meet all of the following performance standards:

    i) groundwater quality of one or more parameters shall not display an increasing trend;

    ii) groundwater parameter shall not exceed the corresponding groundwater quality control limit; and

    iii) any parameters not naturally present in the groundwater is not detected in three consecutive sampling events.

Statistical analysis for trends and control limits will only be run on a list of indicator compounds or elements segregated from the naturally occurring water quality parameters analyzed on each well, as recommended by AEP (ESRD 2011). Further, the statistical analysis for trend and control limits will be an intra-well assessment using the water quality parameter concentrations for each well and updated as new analyses are received.

The lower control limit (LCL) and upper control limit (UCL) will be calculated for each indicator compound or element using the following formulae:

- LCL = Mean – 4.5 X Standard Deviation; and
- UCL = Mean + 4.5 X Standard Deviation.

The results will be plotted to confirm they are within the control limits.

1.2.4.1 Non-Naturally Occurring Compounds and Elements

As stated by the performance standards any three consecutive events showing a detectable concentration of any non- naturally occurring compound will trigger a groundwater response plan. However, the Standards do not define "detectable" and this definition differs from compound to compound and the type of chemical analysis performed. Terms like method detection limit (MDL) or preliminary quantification limit (PQL) are frequently used when the analysis of non-naturally occurring compounds is needed.

Both "practical quantification limit" and "MDL" are used by chemical laboratories to describe very low concentrations of chemical in groundwater and particularly for those chemicals that would not naturally occur in groundwater. These chemicals are for the most part man-made compounds, either organic or chlorinated compounds (halogenated compounds also).

The MDL is the limit of the analytical methods applied to the water sample that chemists can say the compound is present or absent (i.e., can be detected). However, at this limit of detection the concentration cannot be determined. Chemists use the term PQL to determine the concentration that can be calculated from the analytical method. The universal agreement by chemists is that the PQL is generally taken to be 5 times the MDL.

The PQL will be used for this water quality monitoring program as a conservative measure of the control limits. Detection of a non-natural compound at concentrations greater than the PQL on three consecutive monitoring occasions would be the level at which the groundwater response plan should come into effect.

We note also that as part of overall data evaluation, leachate samples will be periodically collected from within the cells, and the chemical characteristics of leachate will be used in support of evaluation of various parameters in the groundwater data.

1.3 Sampling Frequency

Table 5.1 of the Standards specifies the required frequency for groundwater sampling and analysis. We suggest the following sampling frequency for this site:

- Baseline monitoring:
  - Twice per year for the first four years of operations; and
  - Once per year every third year after baseline levels have been established.
- Detection level monitoring:
  - Once per year during the years when the baseline monitoring is not being undertaken.

1.4 Groundwater Contingency Plan

There will be three general stages of activity that will be undertaken during each and every monitoring event:

- **Data Gathering:** Involving the systematic and periodic collection of water quality samples from the network of monitoring wells and incorporation of the results into the existing database of water quality for comparison purposes.
- **Data Evaluation:** Involving the comparison of the new analytical results to the historical results and deciding whether a changed environmental condition has been reached.
- **Groundwater Contingency Plan:** Involving either a continuation of the plan status quo or implementation of a remedial investigation/feasibility study if a changed environmental condition is indicated by the analytical results.

If the groundwater monitoring program identifies water quality changes that are related to landfilling operations, the results will be verified, the groundwater contingency plan implemented and AEP notified. The groundwater contingency plan is built around a key element, the outlier. As defined by Sara and Gibbons (1991), an outlier is an "unusually high or low or otherwise unexpected data value". Outliers occur from several sources including:

- Sampling errors (including field contamination);
- Analytical, laboratory or transcription errors; or
- A changed, but accurate, environmental condition (i.e., in this case the migration of leachate from the landfill to mix with the groundwater).

The plan is shown schematically on the flow chart provided as Figure 2. Identification of this changed environmental condition is the principal objective of the groundwater monitoring program.

The plan consists of the tasks and decisions to be undertaken and the resultant outcomes. Within this flow chart there are four symbols used to identify tasks, decisions, and outcomes. Tasks are shown in blue rectangles: dark blue identifies definite tasks and light blue represents examples of tasks that might be needed. The green trapezoids identify yes or no decisions. Outcomes (red octagons) refer to external communications to AEP.

If the condition is a result of one of the first two outlier sources (i.e., sampling or analytical error), the issue would be resolved within the monitoring program framework, with the outcome described in the annual groundwater monitoring report. If the condition represents a changed, but accurate environmental condition (i.e., the third outlier source), a hazard evaluation would be undertaken; this evaluation would consider the mechanism of release, the presence of pathways and/or receptors (such as an off-site water resource), and present an evaluation of whether there is a risk present. The outcome would be a remedial investigation or feasibility study, to evaluate one or a combination of source control, delineation, and/or contaminant management.

In all cases, reporting of outliers will describe the outlier (when identified, associated parameters), actions taken, and follow-up planned.

GROUNDWATER MONITORING PROGRAM FIGURES

16MW11 A
16MW11 B
16MW11 C
16MW11 D
16MW09 D
16MW09 C
16MW09 B
16MW09 A
16MW04
16MW13
16MW14
NE 9-50-17-4
16MW08A
16MW08B
16MW18
16MW06
16MW02
PROPOSED CELL 5
MW1B
MW1C
MW12B
MW12A
MW34A
MW34B
MW14
MW9
MW11
EXISTING FACILITY

LEGEND

- EXISTING MONITORING WELL LOCATION (2016)
- EXISTING MONITORING WELL LOCATION (AT RYLEY FACILITY)
- PROPOSED MONITORING WELL LOCATION
- PROPOSED EXPANSION SITE BOUNDARY
- FENCE

0 250m

Scale: 1:5,000 @ 11"x17"

CLIENT

Clean Harbors

TETRA TECH

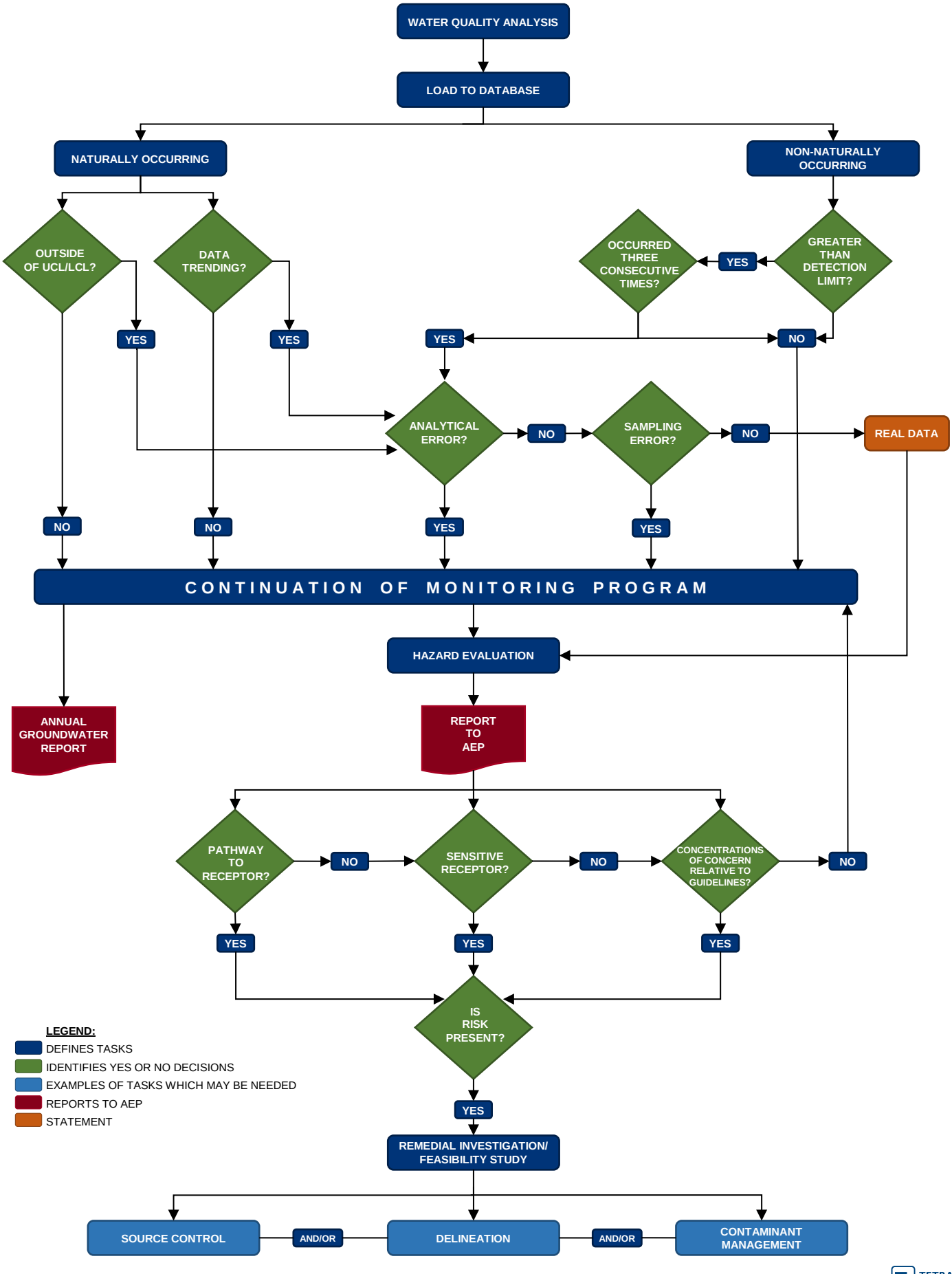
RYLEY FACILITY LATERAL EXPANSION

SITE PLAN SHOWING PROPOSED COMPLIANCE MONITORING NETWORK

PROJECT NO.	DWN	CKD	REV
ENVSWM03011-05	DBD	SB	0
OFFICE: EDM	DATE: July 2017		

Figure K1

Figure K2: Groundwater Contingency Plan Flow Chart



ATTACHMENT K1

WELL INSTALLATION DETAILS AND BOREHOLE RECORDS

Table 2: Well Construction Details and Groundwater Levels

Location	Date Installed	Coordinates		TOC Elevation (masl)	Ground Elevation (masl)	Screen Interval		Screen Interval		Screened Material	Borehole Depth (mbg)	Well Depth (mbg)	Well Diameter (mm)	Stick-Up (m) (Calculated)	Stick-Up (m) [1]	May 2016 Monitoring			June 2016 Monitoring		
		Easting	Northing			Top Elevation (masl)	Bottom Elevation (masl)	Top Depth (mbg)	Bottom Depth (mbg)							Date	Water Depth (mbTOC)	Groundwater Elevation (masl)	Date	Water Depth (mbTOC)	Groundwater Elevation (masl)
Expansion Area Wells																					-
16MW04	3/19/2016	405394	5907530	687.17	686.35	675.77	674.77	10.58	11.58	Clay Shale	15.24	11.58	51	0.82	0.82	5/11/2016	4.34	682.83	6/2/2016	3.98	683.20
16MW08A	3/17/2016	405193	5907134	685.9	686.94	681.84	680.84	5.10	6.1	Sandstone	15.24	6.10	102	-	1.03	5/11/2016	6.54	679.37	6/2/2016	5.23	680.68
16MW08B	3/17/2016	405193	5907134	688.01	686.93	684.99	683.99	1.94	2.94	Clay	3.00	3.00	51	1.08	1.02	5/11/2016	Dry	-	6/10/2016	Dry	-
16MW09A	2/24/2016	405586	5907524	686.20	685.16	649.43	648.43	35.73	36.73	Sandstone	41.15	36.73	51	1.04	0.89	5/11/2016	6.72	679.48	6/10/2016	6.64	679.56
16MW09B	2/24/2016	405589	5907523	686.11	685.17	668.11	667.11	17.06	18.06	Clay Shale	18.06	18.06	51	0.94	0.83	5/11/2016	12.27	673.84	6/10/2016	11.25	674.86
16MW09C	3/19/2016	405591	5907525	686.34	685.24	680.60	679.60	4.64	5.64	Sandstone	6.10	5.64	102	1.10	1.01	5/11/2016	6.22	680.12	6/10/2016	6.14	680.20
16MW09D	3/19/2016	405587	5907526	686.28	685.24	683.80	682.80	1.44	2.44	Clay	2.44	2.44	102	1.04	0.95	5/4/2016	Dry	-	6/10/2016	0.17	686.11
16MW11A	2/26/2016	404816	5907540	686.89	685.96	650.08	649.08	35.88	36.88	Sandstone	41.15	36.88	51	0.93	0.92	5/11/2016	27.37	659.53	6/10/2016	15.04	671.85
16MW11B	2/26/2016	404817	5907539	687.00	685.95	667.90	666.90	18.05	19.05	Clay Shale	19.05	19.05	51	1.05	1.01	5/11/2016	12.26	674.74	6/10/2016	11.17	675.83
16MW11C	3/16/2016	404814	5907539	686.89	685.92	683.57	682.57	2.35	3.35	Sandstone	7.62	3.35	51	0.97	0.90	5/11/2016	2.91	683.98	6/10/2016	2.54	684.35
16MW11D	3/16/2016	404816	5907538	686.84	685.93	684.80	683.80	1.13	2.13	Clay	2.15	2.13	51	0.91	0.85	5/11/2016	Dry	-	6/10/2016	Dry	-
16MW13	2/26/2016	404999	5907333	688.21	687.21	674.49	673.49	12.72	13.72	Clay Shale	19.81	13.72	51	1.00	0.95	5/4/2016	5.96	682.25	6/10/2016	5.19	683.02
16MW14	2/23/2016	405394	5907327	687.28	686.47	683.20	682.20	3.27	4.27	Clay Shale	15.09	4.27	51	0.81	0.77	5/4/2016	3.70	683.57	6/10/2016	3.44	683.84
16MW16	2/25/2016	404796	5906940	688.58	687.57	684.61	683.61	2.96	3.96	Clay	15.24	3.96	51	1.00	0.84	5/11/2016	4.23	684.34	6/10/2016	4.12	684.45
16MW18	2/29/2016	405583	5907120	687.04	686.20	667.39	666.39	18.81	19.81	Clay Shale	19.81	19.81	51	0.83	0.75	5/11/2016	4.00	683.04	6/10/2016	3.58	683.46
Expansion Area Boreholes																					
16BH01	3/15/2016	404994	5906898	-	688.24	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH02	3/15/2016	405385	5906929	-	686.93	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH03	3/16/2016	405588	5907324	-	686.50	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH05	3/19/2016	405196	5907332	-	686.30	-	-	-	-	-	12.19	-	-	-	-		-	-	-	-	-
16BH06	3/17/2016	405003	5907536	-	685.81	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH07	3/17/2016	404809	5907138	-	687.57	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH10	2/23/2016	405199	5907532	-	686.44	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH12	2/27/2016	404803	5907341	-	685.88	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH15	2/27/2016	404998	5907136	-	686.81	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH17	2/28/2016	405391	5907127	-	686.74	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH19	2/29/2016	405581	5906924	-	687.13	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-
16BH20	2/28/2016	405192	5906930	-	686.44	-	-	-	-	-	15.24	-	-	-	-		-	-	-	-	-

Notes:

masl - metres above sea level

TOC - Top of Casing

mbTOC - metres below Top of Casing

mbg - Metres below ground

1 - Field Measurement

NC - Not calculated

Borehole No: **15MW34A**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	SPT (N)	Moisture Content (%)
0					
1	Solid stem auger	CLAY (FILL) - some silt, some fine to coarse gravel, trace of fine to medium cobbles, trace of fine boulders, damp, hard, non to low plastic, brown, coal and iron stained inclusions		12	
2		CLAY (TILL) - some silt, trace of gravel, damp, firm, medium plastic, brown, coal and iron stained inclusions		14	
		- some fine grained brown sand, low plastic, grey blue			
3		- silty, soft, medium to high plastic, brown		13	
4		- firm			
		- silty, firm to very stiff, grey			
5				71	
		SANDSTONE - silty, clayey, fine to medium grained, damp to moist, extremely weak, grey			
		- some silt, some clay, moist to wet			
6		- wet, grey blue		98 /225mm	
7		- silty, clayey, moist to wet, grey			
8		CLAY SHALE - trace of fine grained sand, trace of fine gravel, damp, extremely weak, high plastic, grey			
9					
10					
11					
12		- dark greyish brown			
		- some fine grained sand, light grey			
13					
14		- no visible sand, dark grey			
15					
16		END OF BOREHOLE (15.00 metres)			
		slough - 14.25 metres			
		water - 3.91 metres on July 21, 2015			
		Monitoring well installed to 11.80 metres			
		Stickup = 1.05 metres			
17					
18					
19					
20					

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

15MW34A

Depth (ft)

July21/15

>100

Contractor: Clean Harbors	Completion Depth: 15 m
Drilling Rig Type: Auger Rig	Start Date: 2015 July 21
Logged By: TH	Completion Date: 2015 July 21
Reviewed By: SS	Page 1 of 1

TETRA TECH

Borehole No: **15MW34B**

Project: Ryley Renewal Monitoring Well Installations	Project No: ENVSWM03011-04.003
Location: Ryley Facility	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Moisture Content (%)	Pocket Pen. (kPa) / Plastic Limit / Moisture Content / Liquid Limit	Fracture Frequency (#/m) / RQD (%) / Recovery (%)	15WM34B	Depth (ft)
0								0
1	Solid stem auger	CLAY (FILL) - some silt, some fine to coarse gravel, trace of fine to medium cobbles, trace of fine boulders, damp, hard, non to low plastic, brown, coal and iron stained inclusions						2
		CLAY (TILL) - some silt, trace of gravel, damp, firm, medium plastic, brown, coal and iron stained inclusions						
2								4
								6
3		- gleying						8
		- sand pockets - fine grained sand, damp, very slight gleying						10
4		- soft, low to medium plastic						12
		- silty, some fine grained brown sand, medium to high plastic,						14
5		- firm to very stiff, grey						16
		SANDSTONE - silty, clayey, fine to medium grained, damp to moist, grey						
0 hrs		END OF BOREHOLE (5.00 metres)						0 hrs
6		Monitoring well installed to 4.80 metres						18
		Stickup = 1.01 metres						20
7								22
								24
8								26
								28
9								30
								32
10								34
								36
11								38
								40
12								42
								44
13								46
								48
14								50
								52
15								54
								56
16								58
								60
17								62
								64
18								
19								
20								

Contractor: Clean Harbors	Completion Depth: 5 m
Drilling Rig Type: Auger Rig	Start Date: 2015 July 21
Logged By: TH	Completion Date: 2015 July 21
Reviewed By: SS	Page 1 of 1

Borehole No: **16MW04**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - organic, silty, sandy, trace gravel, trace cobbles, moist, black, (150 mm thick)				
1	Solid stem auger	CLAY AND TOPSOIL - silty, sandy, trace gravel, trace cobbles, moist, black, (150 mm thick)		Bulk1		16.1
2		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, stiff, low to medium plastic, light brown, trace dark brown streaks, some white precipitates, trace iron pockets, sand pockets		Bulk2		
3		- sand seam - moist, very loose, brown, fine to medium sand		B1		
		- trace sandstone fragments		S1	25	
				B2		
4		SANDSTONE - clayey, moderately weathered, moist, extremely weak, blue grey, fine sand		B3		18.6
		- interbedded brown clay shale				
5		CLAY SHALE - moderately weathered, damp to moist, weak, interbedded brown sandstone		B4		
				ST1		
		- trace interbedded blue grey sandstone		B5		24
6		- some interbedded blue grey sandstone		S2	74	
				B6		23.7
7				B7		
				ST2		
8				B8		
		- medium strong brown shale layer				
9				B9		
		- trace interbedded sandstone				
		- no visible sandstone, dry to damp, brown		S3	50 /150mm	
10				B10		
				B11		
				B12		
11				ST3		
		- wet, extremely weak		B13		
		- dry to damp, weak, grey				
12				S4	50 /150mm	
		- wet, extremely weak		B14		
13				B15		
		- damp, medium strong				
14		- dry to damp, weak				
15						
16		END OF BOREHOLE (15.24 metres)				
		water - 14.94 metres at 0 hrs.				
		- 3.52 metres on May 11, 2016				
		50 mm Monitoring well installed to 11.58 metres				
		Stickup = 0.82 metres				
17						
18						
19						
20						

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

>100

>100

May 11/16 ▼ 0 hrs.

16MW04

Depth (ft) 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

Contractor: Clean Harbors	Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 19
Logged By: JD	Completion Date: 2016 March 19
Reviewed By: CS	Page 1 of 1

TETRA TECH

Borehole No: **16MW08A/B**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - organic, silty, some clay, trace gravel, trace cobbles, damp, brown, (150 mm thick)				
1		CLAY - silty, sandy, some gravel, trace cobbles, damp, very stiff, medium plastic, brown, iron oxide inclusions, trace sand pockets, trace white precipitates		Bulk1		
2		- some sand, moist, medium plastic, dark brown		Bulk2		11.8
3		- trace interbedded sand layers - loose, brown, fine sand		B1		
		SANDSTONE - clayey, completely weathered, moist, extremely weak, brown, iron oxide staining, fine sand		S1	43	
				B2		
4		- blue grey		B3		14.9
		- medium strong				
5		- moderately weathered, damp to moist, extremely weak, no visible iron oxide staining		ST1		
				B4		
				B5		16.3
6		- moist to wet, trace interbedded brown clay shale		S2	50 /150mm	
				B6		
7		- damp to moist, medium strong		B7		20.4
		- moist, extremely weak		B8		19.3
8		- some interbedded clay shale		ST2		
				B9		
9		- trace interbedded clay shale		S3	50 /150mm	
		- no visible clay shale, trace interbedded layers of brown sandstone		B10		
10				B11		
		CLAY SHALE - moderately weathered, damp to moist, extremely weak, grey		B12		16.4
11				ST3		
				B13		
12				S4	50 /150mm	
				B14		
13				B15		
14		- dry to damp, medium strong		B16		
				B17		
15						
16		END OF BOREHOLE (15.24 metres) 100 mm MW08A installed to 6.10 metres Stickup = 1.03 metres water - 5.51 metres on May 11, 2016 50 mm MW08B installed to 2.94 metres Stickup = 1.02 metres water - dry on May 11, 2016				
17						
18						
19						
20						

SPT (N) ■ 20 40 60 80

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8

▲ RQD (%) ▲ 40 60 80 100

■ Recovery (%) ■ 40 60 80 100

>100

May11/16

Solid stem auger

16MW08A

16MW08B

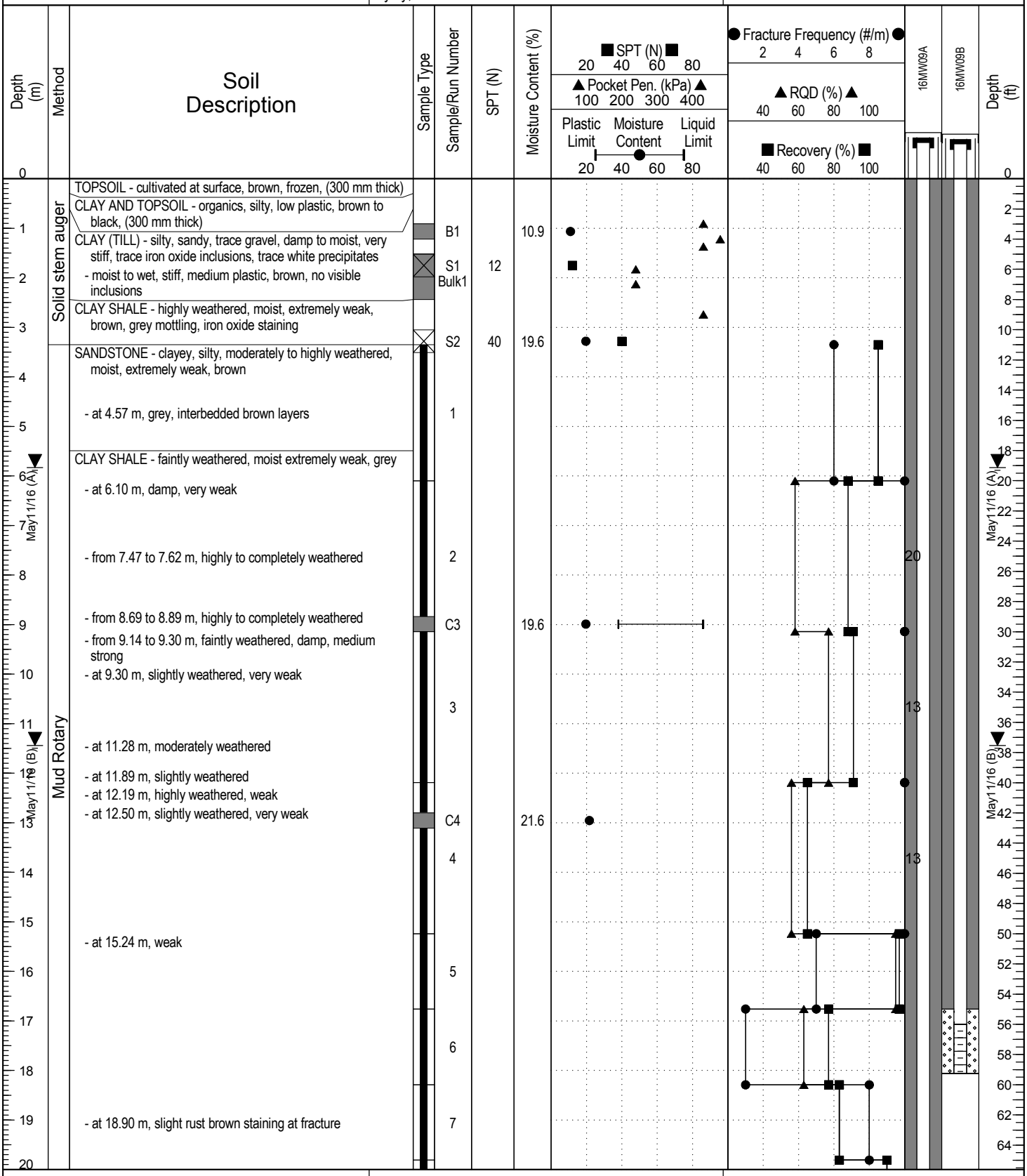
Depth (ft)

Contractor: Clean Harbors		Completion Depth: 15.24 m
Drilling Rig Type: Auger Rig		Start Date: 2016 March 17
Logged By: JD/LQ		Completion Date: 2016 March 17
Reviewed By: CS		Page 1 of 1

TETRA TECH

Borehole No: **16MW09**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	



Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 24
Logged By: LQ	Completion Date: 2016 February 24
Reviewed By: CS	Page 1 of 3

TETRA TECH

Borehole No: **16MW09**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	16MW09A	16MW09B	Depth (ft)
20											66
21				8							68
		- at 21.34 m, faintly weathered									70
22				9							72
23											74
				10							76
24											78
25											80
											82
26				11							84
27		- at 26.67 m, slightly weathered, damp, brown									86
		- from 27.13 to 27.43 m, blue grey staining									88
		- from 27.43 to 27.73 m, possible hydrocarbon staining		J1							90
28		- at 27.58 mn, thin coal layers		J2							92
		- at 27.73 m, light grey		12							94
29		- from 28.65 to 29.34 m, blue grey									96
		- at 29.34 m, grey, brown to black staining, faint hydrocarbon odour									98
30				13							100
											102
31		- at 30.73 m, faintly weathered, brown									104
		- at 31.04 m, grey, no discernible odour		14							106
32											108
		SANDSTONE - silty, some clay, slightly weathered, weak, grey, brown staining around fractures, fine sand									110
33		- at 32.92 m, no visible staining		15							112
		- at 33.53 m, trace iron oxide staining									114
34		CLAY SHALE - slightly weathered, weak, grey									116
		SANDSTONE - silty, some clay, slightly weathered, grey, fine sand		16							118
35		- from 34.44 to 35.19 m, completely weathered									120
		- from 35.66 to 35.76 m, interbedded clay shale - faintly weathered, weak, brown		17							122
36		- from 35.97 to 36.02 m, interbedded clay shale									124
		- at 36.02 m, slightly weathered, weak, grey, fine to medium sand									126
37		- from 36.27 to 36.37 m, interbedded clay shale		18							128
		- from 36.93 to 36.98 m, interbedded clay shale									130
38		- at 37.08 m, completely weathered, extremely weak, brown									
		CLAY SHALE - slightly weathered, weak, grey brown		19							
39		- from 38.50 to 38.55 m, grey									
		- at 39.32 m, gey, faint black staining in fractures									
40											

Mud Rotary

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 24
Logged By: LQ	Completion Date: 2016 February 24
Reviewed By: CS	Page 2 of 3

Borehole No: **16MW09**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	16MW09A	16MW09B	Depth (ft)
40											132
		- at 39.34 m, grey, black and black staining, faint hydrocarbon odour		20							134
41		SANDSTONE - silty, faintly weathered, damp, weak to medium strong, grey, fine sand									136
		CLAY SHALE - faintly weathered, moist, weak, grey									138
42		END OF BOREHOLE (41.15 metres)									140
		50 mm Monitoring well A installed to 36.73 metres									142
43		Stickup = 0.89 metres									144
		water - 5.83 metres on May 11, 2016									146
		Monitoring well B installed to 18.06 metres									148
44		Stickup = 0.83 metres									150
		water - 11.44 metres on May 11, 2016									152
45											154
											156
46											158
											160
47											162
											164
48											166
											168
49											170
											172
50											174
											176
51											178
											180
52											182
											184
53											186
											188
54											190
											192
55											194
											196
56											
57											
58											
59											
60											

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 24
Logged By: LQ	Completion Date: 2016 February 24
Reviewed By: CS	Page 3 of 3

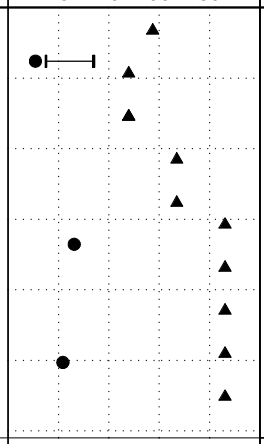
TETRA TECH

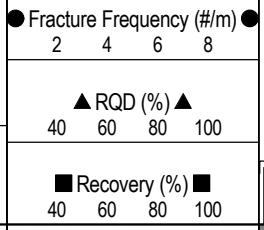
Borehole No: **16MW09C/D**

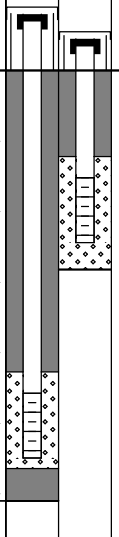
Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	Moisture Content (%)
0					
0 – 1	Solid stem auger	TOPSOIL - cultivated at surface, brown, frozen, (300 mm thick)			
		CLAY AND TOPSOIL - organics, silty, low plastic, brown to black, (300 mm thick)		Bulk1	10.8
1 – 2		CLAY (TILL) - silty, sandy, trace gravel, damp to moist, very stiff, trace iron oxide inclusions, trace white precipitates			
2 – 3		- moist to wet, stiff, medium plastic, brown, no visible inclusions		Bulk2	
3 – 4		CLAY SHALE - highly weathered, moist, extremely weak, brown, grey mottling, iron oxide staining		B1	26.2
4 – 5		SANDSTONE - clayey, silty, moderately to highly weathered, moist, extremely weak, brown		B2	
5 – 6		- at 4.57 m, grey, interbedded brown layers		ST1 B3	21.7
		CLAY SHALE - faintly weathered, moist extremely weak, grey		B4	
6 – 20		END OF BOREHOLE (6.10 metres) water - dry at 0 hrs. 100 mm Monitoring well C installed to 5.64 metres Stickup = 1.01 metres water - 5.21 metres on May 11, 2016 50 mm Monitoring well D installed to 2.44 metres Stickup - 0.95 metres water - dry on May 11, 2016			

May 11/16







Depth (ft): 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

May 11/16

TETRA TECH

Contractor: Clean Harbors	Completion Depth: 6.1 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 19
Logged By: JD	Completion Date: 2016 March 19
Reviewed By: CS	Page 1 of 1

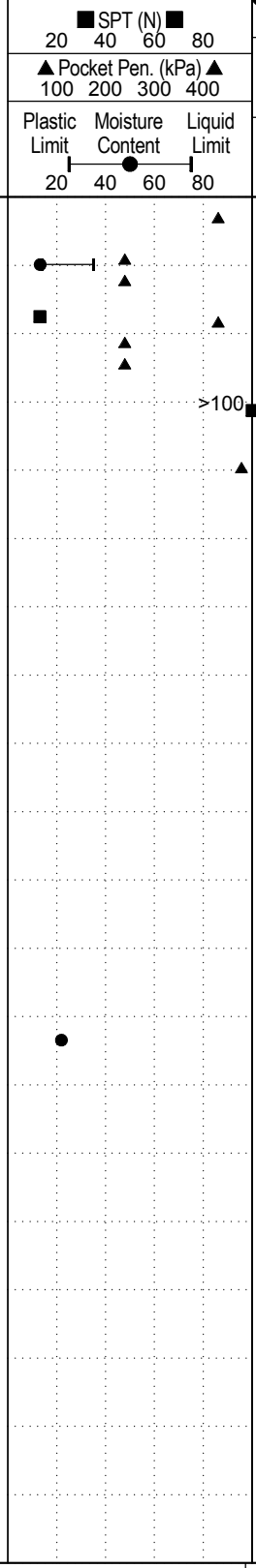
Borehole No: **16MW11**

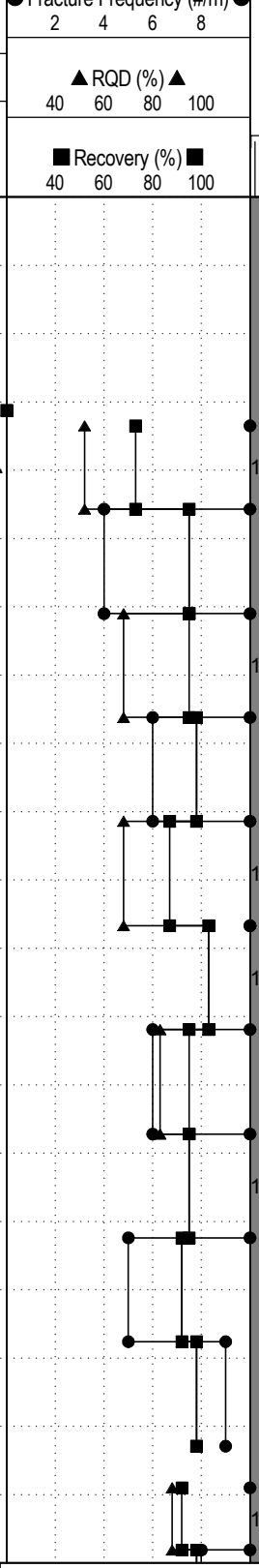
Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0						
	Solid stem auger	TOPSOIL - cultivated at surface, organic, moist, brown to black, trace sand pockets, (200 mm thick)				
1		CLAY AND TOPSOIL - sandy, silty, trace gravel, moist, very stiff, low plastic, brown to black, (260 mm thick)		Bulk1		13.2
2		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, moist to wet, stiff, medium plastic, brown, iron oxide inclusions, coal inclusions, trace sand pockets, frozen to 0.61 metres		S1 Bulk2	13	
3		SANDSTONE - silty, clayey, completely weathered, damp, extremely weak, fine sand		B1 B2 S2	50/150mm	
		- at 2.59 m, moist				
4		- at 3.35 m, moderately weathered, medium strong, grey, brown and iron oxide staining, thin interbedded shale layer		1		
		- at 4.27 m, blue grey				
5		- at 4.72 m, very weak, grey, interbedded 50 mm thick shale - completely weathered, moist, extremely weak		2		
6		- at 4.88 m, interbedded 50 mm thick shale - moderately weathered, medium strong, brown				
		- from 5.03 to 6.10 m, thin shale layers - highly weathered, extremely weak				
7		CLAY SHALE - moderately weathered, moist, very weak, grey		3		
		- at 7.29 m, 25 mm thick sandstone layer - completely weathered, extremely weak, grey, fine sand				
8		- at 7.34 m, 50 mm thick sandstone layer - completely weathered, extremely weak, grey, fine sand		J1 4		
		- at 7.39 m, brown				
9		SANDSTONE - clayey, highly weathered, very weak, grey, black and brown staining, trace shell fragments, faint hydrocarbon odour				
10		CLAY SHALE - moderately weathered, brittle, weak, brown, black and brown staining, hydrocarbon odour		5		
		- from 10.36 to 10.52 m, interbedded sandstone				
11		- at 10.67 m, slightly weathered, weak, brown, grey mottling		J2 6		
		- at 11.58 m, grey				
12				C7		21.9
13		- at 13.11 m, many small fractures at 90°		7		
14		- at 13.72 m, faintly weathered				
15				8		
16				9		
17						
18				10		
19		- at 19.05 m, 25 mm fractured material, 75°		11		
20						

May11/16 (B)

May11/16 (B)





16MW11A

16MW11B

Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 26
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 1 of 3

Borehole No: **16MW11**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
20						
21		- at 20.42 m, 6 mm fractured material, 90°		12		
22		- from 21.79 to 22.10 m, interbedded grey - from 22.30 to 22.35 m, weak sandstone layer		13		
23						
24				14		
25		- at 24.94 m, 6 mm fractured material, 75°		15		
26						
27		- at 26.37 m, 6 mm fractured material, 80° - at 26.75 m, 6 mm fractured material, 90°		16		
28						
29				17		
30	Mud Rotary	SANDSTONE - clayey, silty, faintly weathered, damp, weak, grey - at 29.64 m, 30 mm diameter coal fragment, iron oxide inclusions				
31		CLAY SHALE - faintly weathered, damp, weak, grey, coal inclusions, concretions				
32		SANDSTONE - silty, clayey, slighty weathered, damp to moist, weak, blue grey, fine sand - from 32.00 to 32.15 m, interbedded clay shale layers - from 32.30 to 33.53 m, interbedded clay shale layers, brown		18		
33						
34		- at 33.53 m, grey, fine to medium sand				
35		- at 34.44 m, fracture, black staining - from 34.44 to 34.47 m, interbedded medium strong brown shale		19		
36		- from 35.70 to 34.77 m, interbedded thin shale layers - at 34.77 m, 80° fracture				
37		- from 34.77 to 34.90 m, hydrocarbon staining - from 34.90 to 35.03 m, medium strong, light brown sandstone pieces, coal inclusions				
38		- at 35.05 m, moderately weathered - from 35.05 to 35.20 m, 90° fractures - at 35.38 m, black staining		20		
39		- at 35.74 m, 6 mm interbedded shale - at 36.58 m, very weak				
40		- at 36.73 m, brown - from 36.73 to 36.88 m, brown and grey layers		J3		

SPT (N) ■ 20 40 60 80
▲ Pocket Pen. (kPa) ▲ 100 200 300 400
Plastic Limit — Moisture Content — Liquid Limit 20 40 60 80

● Fracture Frequency (#/m) ● 2 4 6 8
▲ RQD (%) ▲ 40 60 80 100
■ Recovery (%) ■ 40 60 80 100

16MW11A 16MW11B

18

May11/16 (A)

Depth (ft)
66
68
70
72
74
76
78
80
82
84
86
88
90
92
94
96
98
100
102
104
106
108
110
112
114
116
118
120
122
124
126
128
130

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 26
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 2 of 3

Borehole No: **16MW11**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	16MW11A	16MW11B	Depth (ft)
40											132
41		- from 37.19 to 37.49 m, interbedded clay shale - highly weathered, weak - at 38.10 m, grey, coal inclusions - at 39.62 m, black stained layers, strong hydrocarbon odour to 40.23 metres - at 40.84 m, brown		21							134
42		END OF BOREHOLE (41.15 metres) Monitoring well A installed to 36.88 metres on February 27, 2016 Stickup = 0.92 metres water - 26.45 metres on May 11, 2016 Monitoring well B installed to 19.05 metres on February 27, 2016 Stickup = 1.01 metres water - 11.25 metres on May 11, 2016									136
43											138
44											140
45											142
46											144
47											146
48											148
49											150
50											152
51											154
52											156
53											158
54											160
55											162
56											164
57											166
58											168
59											170
60											172
											174
											176
											178
											180
											182
											184
											186
											188
											190
											192
											194
											196

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 41.15 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 26
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 3 of 3

Borehole No: **16MW11C/D**

Project: Clean Harbors Ryley	Project No: ENVSWM03011-05
Location: NW 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample Number	SPT (N)	Moisture Content (%)	SPT (N) / Pocket Pen. (kPa) / Plastic Limit – Moisture Content – Liquid Limit	Fracture Frequency (#/m) / RQD (%) / Recovery (%)	16MW11C	16MW11D	Depth (ft)
0							SPT (N) 20 40 60 80 Pocket Pen. (kPa) 100 200 300 400 Plastic Limit – Moisture Content – Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 RQD (%) 40 60 80 100 Recovery (%) 40 60 80 100			0
0	Solid stem auger	TOPSOIL - cultivated at surface, organic, moist, brown to black, trace sand pockets, (200 mm thick)									
1		CLAY AND TOPSOIL - sandy, silty, trace gravel, moist, very stiff, low plastic, brown to black, (260 mm thick)		Bulk1							
2		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, moist to wet, stiff, medium plastic, brown, iron oxide inclusions, coal inclusions, trace sand pockets, frozen to 0.61 metres		S1 Bulk2	18	16.6					
3		SANDSTONE - silty, clayey, completely weathered, damp, extremely weak, fine sand		B1							
		- at 2.59 m, moist		ST1							
4		- at 3.35 m, moderately weathered, medium strong, grey, brown and iron oxide staining, thin interbedded shale layer		B2							
		- at 4.27 m, blue grey		B3							
5		- at 4.72 m, very weak, grey, interbedded 50 mm thick shale - completely weathered, moist, extremely weak		S2 B4	50 /150mm		>400				
		- at 4.88 m, interbedded 50 mm thick shale - moderately weathered, medium strong, brown		B5							
6		- from 5.03 to 6.10 m, thin shale layers - highly weathered, extremely weak		ST2 B6							
7		CLAY SHALE - moderately weathered, moist, very weak, grey		B7							
		- at 7.29 m, 25 mm thick sandstone layer - completely weathered, extremely weak, grey, fine sand									
8		- at 7.34 m, 50 mm thick sandstone layer - completely weathered, extremely weak, grey, fine sand									
		- at 7.39 m, brown									
9		END OF BOREHOLE (7.62 metres)									
		slough - 7.52 metres at 0 hrs.									
10		50 mm Monitoring well C installed to 3.35 metres									
		Stickup = 0.90 metres									
11		water - 2.01 metres on May 11, 2016									
		50 mm Monitoring well D installed to 2.13 metres									
12		Stickup = 0.85 metres									
		water- dry on May 11, 2016									
13											
14											
15											
16											
17											
18											
19											
20											

May11/16 (C)

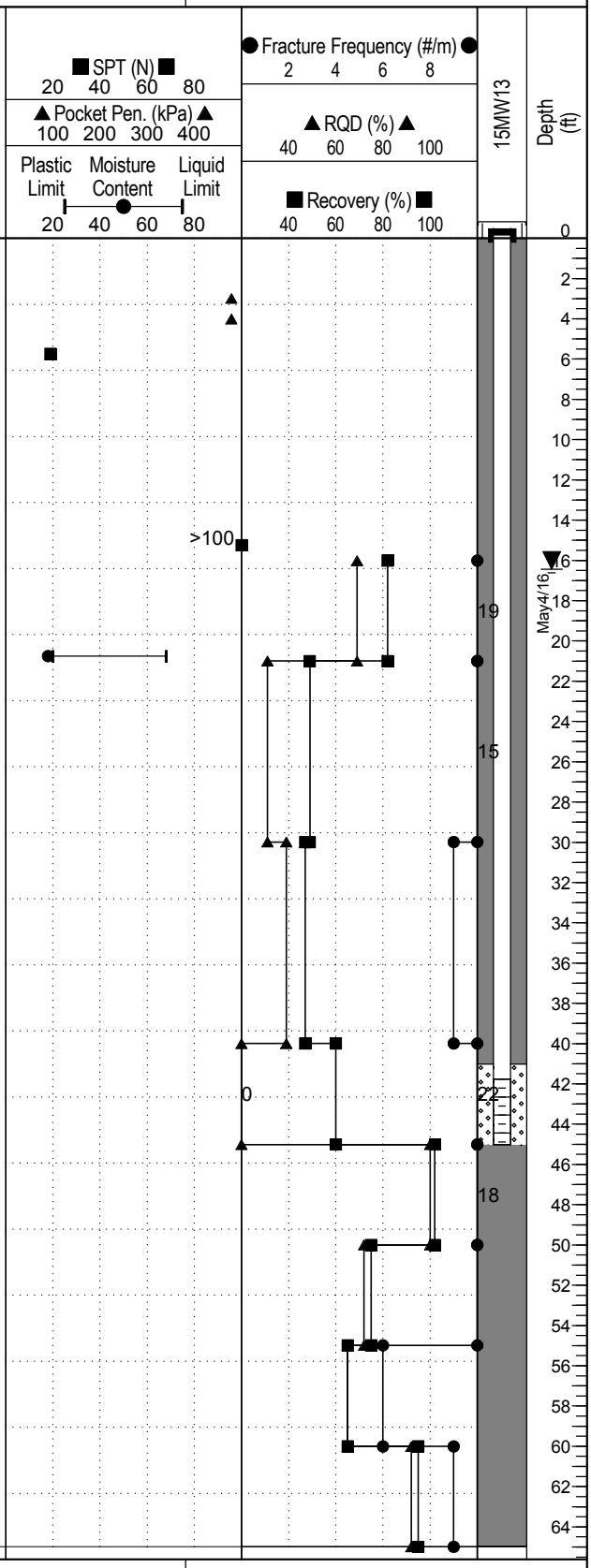
Contractor: Clean Harbors	Completion Depth: 7.62 m
Drilling Rig Type: Auger Rig	Start Date: 2016 March 16
Logged By: JD/LQ	Completion Date: 2016 March 16
Reviewed By: CS	Page 1 of 1

TETRA TECH

Borehole No: **16MW13**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - cultivated at surface, rootlets, damp, brown to black, frozen, (150 mm thick)				
0.3		CLAY AND TOPSOIL - silty, some sand, low plastic, brown, frozen, (300 mm thick)		B1		
0.6	Solid stem auger	CLAY (TILL) - silty, sandy, some gravel, trace cobbles, trace coal, damp to moist, low plastic, brown, trace iron oxide, trace pink inclusions, frozen to 0.80 metres		B2		
0.8		- trace gravel, moist		S1	19	
1.5		- medium plastic		Bulk1		
2.5				B3		
3.0		SANDSTONE - clayey, silty, completely weathered to residual soil, moist, extremely weak, brown, fine sand		B4		
3.7		- at 3.66 m, grey mottling, rust staining		ST1		
4.0		- at 3.96 m, blue grey		B5		
4.6		CLAY SHALE - completely weathered, extremely weak, grey		S2	50/150mm	
5.0		SANDSTONE - clayey, completely weathered, moist, extremely weak, fine to medium sand, interbedded medium strong sandstone, interbedded clay shale - slightly weathered, weak, brown		1		
6.0				C2		17.9
7.6		CLAY SHALE - slightly weathered, very weak, brown		2		
8.5		SANDSTONE - weak, brown, grey mottling, fine sand				
9.1		- at 9.14 m, highly weathered, extremely weak, fine to medium sand, interbedded layers of clay shale - moderately weathered, very weak				
10.5				3		
11.0	Mud Rotary	CLAY SHALE - moderately weathered, moist, weak, grey				
13.0				4		
13.7		- faintly weathered				
14.5				5		
16.0				6		
17.0						
17.5				7		
18.0						
19.0				8		
20						



Contractor: Garritty and Baker	Completion Depth: 19.81 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 25
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 1 of 2

TETRA TECH

Borehole No: **16MW13**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	15MW13	Depth (ft)
20		END OF BOREHOLE (19.81 metres) 50 mm Monitoring well installed to 13.72 metres Stickup = 0.95 metres water - 4.20 metres on May 4, 2016								66
21										68
22										70
23										72
24										74
25										76
26										78
27										80
28										82
29										84
30										86
31										88
32										90
33										92
34										94
35										96
36										98
37										100
38										102
39										104
40										106
										108
										110
										112
										114
										116
										118
										120
										122
										124
										126
										128
										130

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 19.81 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 25
Logged By: LQ	Completion Date: 2016 February 26
Reviewed By: CS	Page 2 of 2

Borehole No: **16MW14**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - cultivated at surface, organics, damp, brown to black, white precipitates, frozen, (300 mm thick)				
1	Solid stem auger	CLAY AND TOPSOIL - damp, low plastic, oxide inclusions, white precipitates, frozen, (300 mm thick)				
		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, damp to moist, very stiff, low to medium plastic brown, iron oxide inclusions		B1		
2		- some sand to sandy, moist, medium plastic		B2		
		SILT - sandy, some clay, moist, stiff, brown		Bulk1		
3		CLAY (TILL) - silty, sandy, trace gravel, trace cobbles, moist, very stiff, low to medium plastic, brown, grey mottling, iron oxide staining, trace coal inclusions, trace 50 mm diameter silty sand pockets - moist to wet, grey, fine sand		S1	55	
		CLAY SHALE - completely weathered, damp, extremely weak, brown, iron oxide staining		1		
4		SANDSTONE - completely weathered to residual soil, damp to moist, extremely weak, grey, fine to medium sand				
5		CLAY SHALE - slightly weathered, damp to moist, extremely weak, grey, concretions, fossil fragments		C2		13.9
6		- at 5.64 m, weak, dark grey				
7	Mud Rotary	- at 6.25 m, moderately weathered, extremely weak, brown, interbedded layers of sandstone - moderately weathered, extremely weak, grey		2		
8		SANDSTONE - clayey, highly weathered, moist, extremely weak, grey, fine to medium sand, interbedded layers of brown shale to 7.92 metres				
9		CLAY SHALE - highly weathered, extremely weak, grey				
		- at 8.84 m, completely weathered, weak, interbedded light grey				
10				3		
11						
12		- from 12.19 to 12.50 m, damp, medium strong, light grey				
		- at 12.50 m, grey				
13				4		
14						
15		END OF BOREHOLE (15.09 metres)				
		50 mm Monitoring well installed to 4.27 metres				
16		Stickup = 0.77 metres				
		water - 2.93 metres on May 4, 2016				
17						
18						
19						
20						

SPT (N) 20 40 60 80

Pocket Pen. (kPa) 100 200 300 400

Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80

Fracture Frequency (#/m) 2 4 6 8

RQD (%) 40 60 80 100

Recovery (%) 40 60 80 100

16MW14

May4/16

12

Depth (ft)

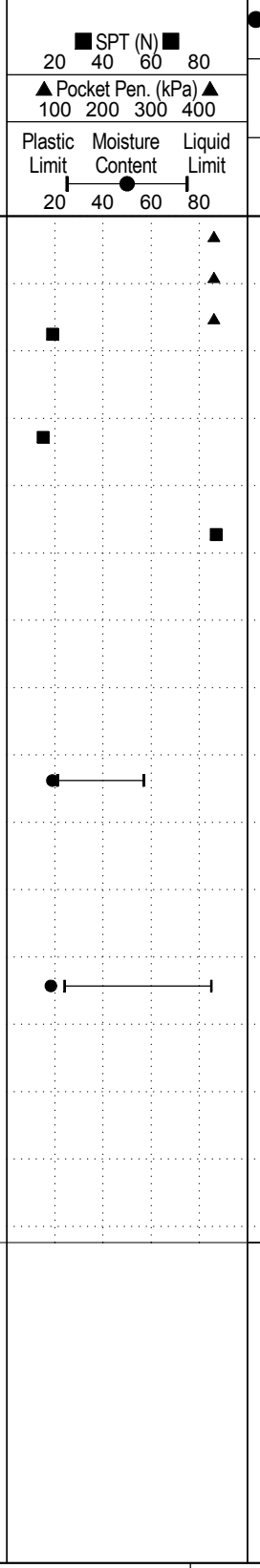
Contractor: Garritty and Baker	Completion Depth: 14.94 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 23
Logged By: LQ	Completion Date: 2016 February 23
Reviewed By: CS	Page 1 of 1

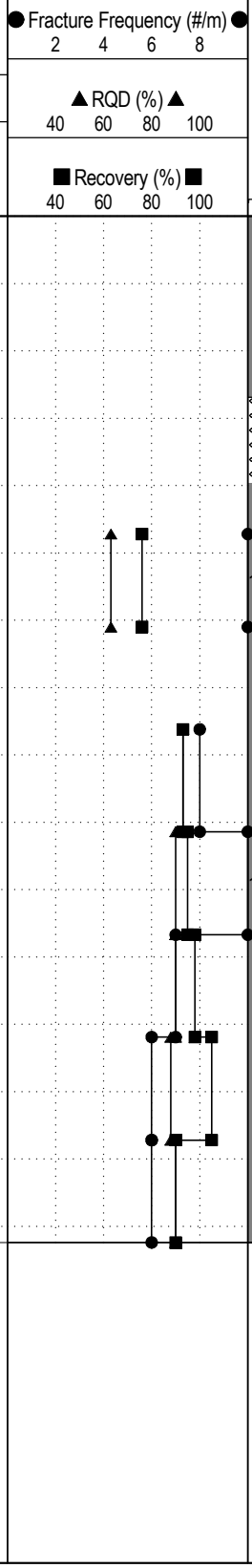
TETRA TECH

Borehole No: **16MW16**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)
0		TOPSOIL - grass covered, roots, damp, brown to black				
1	Solid stem auger	CLAY (TILL) - silty, sandy, some gravel, trace cobbles, damp to moist, low plastic, brown, coal inclusions, iron oxide inclusions, white precipitates, frozen to 0.80 metres		Bulk1		
2		- moist, medium plastic		S1	19	
				Bulk2		
3		- moist to wet				
				S2	15	
4				Bulk3		
		SANDSTONE - clayey, silty, highly to completely weathered, moist to wet, extremely weak, fine sand		B1		
5				S3	87	
		- at 4.88 m, 12 mm thick interbedded clay shale - moderately weathered, medium strong, brown		1		
6		- at 4.98 m, 100 mm thick concretionary layer - at 5.49 m, 50 mm thick interbedded clay shale - brown - at 5.54 m, medium strong, grey, fine to medium sand				
7		- at 6.03 m, 25 mm thick fractured highly weathered clay shale - at 6.10 m, weak, interbedded clay shale layers		2		
8		- at 6.15 m, interbedded highly weathered clay shale at 90° - at 6.71 m, 150 mm thick interbedded clay shale - highly weathered, very weak, thin fracture at 90°		3		18.9
9	Mud Rotary	- at 7.47 m, 50 mm clay shale - medium strong, brown - at 7.62 m, weak, grey - at 9.07 m, 6 mm thick coal seam				
10		CLAY SHALE - slightly weathered, damp, weak, brown - at 9.63 m, 6 m thick coal seam		4-1		
11		SANDSTONE - clayey, silty, moderately weathered, damp, very weak, blue grey, interbedded clay shale layers - completely weathered, moist, extremely weak, brown				
		- at 10.16 m, 6 mm thick highly weathered sandstone fracture at 90°		4-2		18.3
12		- at 10.56 m, 6 mm fracture at 90°, clay shale in fracture - at 10.82 m, 6 mm fracture filled with sand and clay at 85°				
13		- at 11.20 m, 6 mm thick fracture filled with highly weathered sandstone at 70° - at 11.79 m, 50 mm thick interbedded clay shale - weak, grey		5-1		
14		CLAY SHALE - slightly weathered, moist, weak, grey - from 12.80 to 13.00 m, highly weathered				
15		- at 13.57 m, 25 mm thick highly weathered fracture at 90°		5-2		
16		END OF BOREHOLE (15.24 metres) 51 mm Monitoring well installed to 3.96 metres Stickup - 0.84 metres water - 3.39 metres on May 11, 2016				
17						
18						
19						
20						





May 11/16

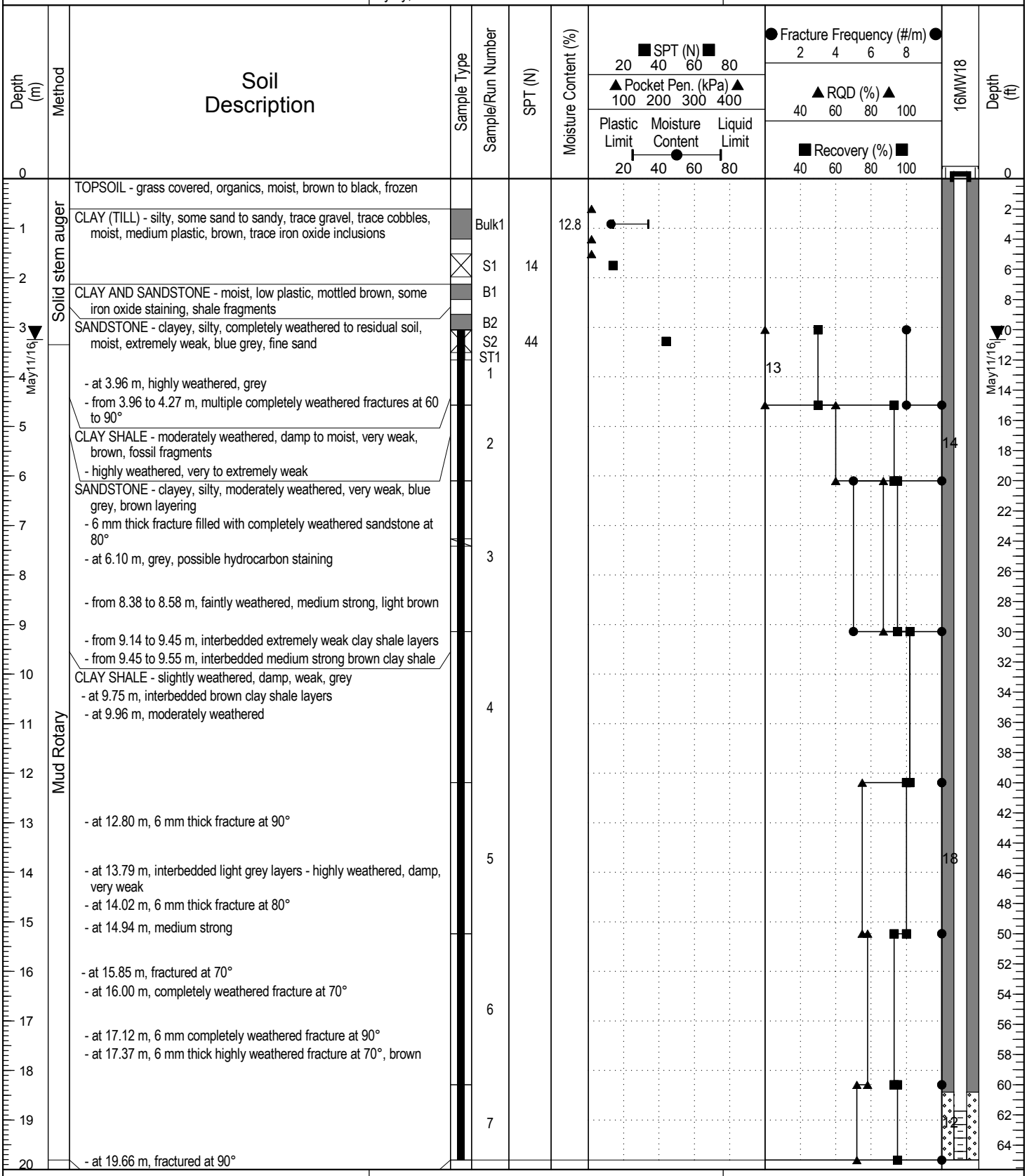
Depth (ft): 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 15.24 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 25
Logged By: LQ	Completion Date: 2016 February 25
Reviewed By: CS	Page 1 of 1

Borehole No: **16MW18**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	



Contractor: Garritty and Baker	Completion Depth: 19.81 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 29
Logged By: LQ	Completion Date: 2016 February 29
Reviewed By: CS	Page 1 of 2

TETRA TECH

Borehole No: **16MW18**

Project: Clean Harbors Ryley Landfill Expansion	Project No: ENVSWM03011-05
Location: NE 1/4, Sec. 9-50-17 W4M	
Ryley, Alberta	

Depth (m)	Method	Soil Description	Sample Type	Sample/Run Number	SPT (N)	Moisture Content (%)	SPT (N) 20 40 60 80 / Pocket Pen. (kPa) 100 200 300 400 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Fracture Frequency (#/m) 2 4 6 8 / RQD (%) 40 60 80 100 / Recovery (%) 40 60 80 100	16MW18	Depth (ft)
20		END OF BOREHOLE (19.81 metres) 51 mm Monitoring well installed to 19.81 metres Stickup = 0.75 metres water - 3.25 metres on May 11, 2016								66
21										68
22										70
23										72
24										74
25										76
26										78
27										80
28										82
29										84
30										86
31										88
32										90
33										92
34										94
35										96
36										98
37										100
38										102
39										104
40										106
										108
										110
										112
										114
										116
										118
										120
										122
										124
										126
										128
										130

TETRA TECH

Contractor: Garritty and Baker	Completion Depth: 19.81 m
Drilling Rig Type: Coring Rig	Start Date: 2016 February 29
Logged By: LQ	Completion Date: 2016 February 29
Reviewed By: CS	Page 2 of 2

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 01B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 687.85 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - sandy, roots, black, (150mm thick)		Pipe stickup = 0.91 metres	
1	CLAY - silty, some oxide stains, white salt and carbonate pockets, damp, very stiff, medium plastic, grey brown			687.0
	- occasional pebbles, coal pockets, no visible white pockets, olive grey brown			
2				686.0
	- moist, stiff			
3				685.0
	CLAY SHALE - silty, some sand, friable, damp, soft, low to medium plastic, dark grey			
4				684.0
	SANDSTONE - some silt and clay, fine to medium grained, friable, uncemented, blue green grey			
	- clay shale interbeds			683.0
5 ▼				
6				682.0
	CLAY SHALE - sandstone interbeds			
7				681.0
	- siltstone layer - some silt and clay, fine to medium grained, friable, uncemented, blue green grey			
8				680.0
9				679.0
10	END OF BOREHOLE (9.9 metres)			678.0
	slough - none at 0 hrs.			
	water - dry at 0 hrs.			
	- 5.2 metres at 1 day			
11	Monitoring well installed to 9.9 metres			677.0
12				676.0

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 9.9 m
REVIEWED BY: SP	COMPLETE: 96/09/30
DRAWING NO: 12416-04	Page 1 of 1

2011 GROUNDWATER MONITORING PROGRAM	CLEAN HARBOR	BOREHOLE NO: MW01C
	DRILL: SOLID STEM AUGER	PROJECT: E22101936
RYLEY, ALBERTA		

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Depth (ft)
0	TOPSOIL - moist, loose, non plastic, black, trace of roots, (300 mm thick)			0
	CLAY - silty, moist, firm, high plastic, light brown			
1	- trace of cobbles, trace of iron			5
2				
2 hrs ▼	- trace of coal			2 hrs ▼ 10
3	CLAY SHALE - moist, hard, low plastic, grey, trace of white precipitates			
4	SANDSTONE - moist, hard, low plastic, dark greenish grey			15
5				
	END OF BOREHOLE (5.33 metres) water - 2.35 metres at 2 hrs. Monitoring well installed to 5.55 metres			
6				20
7				25
8				
9				30
10				33

TETRA TECH EBA

LOGGED BY: KF/MC	COMPLETION DEPTH: 5.33 m
REVIEWED BY: MH	COMPLETE: 11/06/14
DRAWING NO: 22101936-01	Page 1 of 1

PROJECT: RYLEY WASTE MANAGEMENT SITE	CONTRACTOR: MOBILE AUGERS AND RESEARCH	BOREHOLE No. MW9
CLIENT: NEWALTA CORPORATION	METHOD: SOLID STEM AUGER	Project No: CG19073
DATE: FEBRUARY 19, 1991	DATUM: LOCAL	ELEVATION 686.69 (m)

SAMPLE TYPE ■ DISTURBED ⊘ SHELBY TUBE ⊠ SPT SAMPLE ▤ A-CASING ▯ NO RECOVERY ▯ CORE

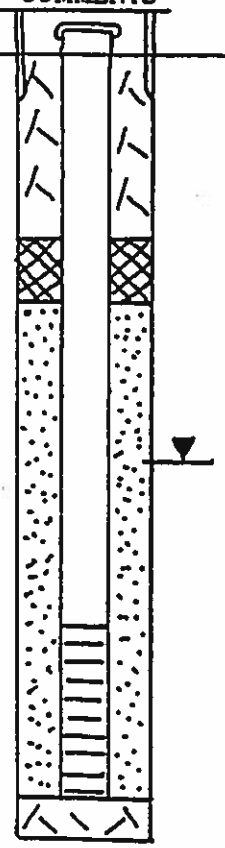
DEPTH (m)	PLASTIC — M.C. — LIQUID (20 40 60 80)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	OTHER TEST COMMENTS	DEPTH (m)
0.0			TOPSOIL – silty, organic, black.				0.0
			0.1m CLAY – silty, sandy, occasional gravel and cobbles, stiff to very stiff, low to medium plastic, dark to medium brown, damp (TILL).	■	A1		
1.0							1.0
2.0							2.0
			2.3m SANDSTONE – fine, silty, slightly clayey, very low strength, poorly cemented, friable, homgeneous, dark blue grey to dark green grey with pale grey speckling, glauconitic, interbedded with occasional shale horizons, moist(BEDROCK).				
3.0							3.0
			4.0m SANDSTONE and CLAY SHALE – sandstones as above, interbedded with clay shales, silty, slightly sandy, very low strength, medium to high plastic, fissured, dark green grey, damp, occasional thin stronger cemented bands of siltstone.	■	A2		
4.0							4.0
5.0							5.0
			5.5m End of hole at 5.5m. Permanent Monitoring Well installed to 3.9m.	■	A3		
6.0							6.0
7.0							7.0
8.0							8.0
9.0							9.0
10.0							10.0

Hardy BBT Limited Calgary, Alberta	COMPLETION DEPTH 5.5 m		COMPLETE
	LOGGED BY VS VJ	DWG NO.	Page 1 of 1

PROJECT: RYLEY WASTE MANAGEMENT SITE	CONTRACTOR: MOBILE AUGERS AND RESEARCH	BOREHOLE No. MW11
CLIENT: NEWALTA CORPORATION	METHOD: SOLID STEM AUGER	Project No: CG19073
DATE: FEBRUARY 19, 1991	DATUM: LOCAL	ELEVATION 687.98 (m)

SAMPLE TYPE: DISTURBED | SHELBY TUBE | SPT SAMPLE | A-CASING | NO RECOVERY | CORE

DEPTH (m)	PLASTIC / M.C. / LIQUID (20 40 60 80)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	OTHER TEST COMMENTS	DEPTH (m)
0.0			TOPSOIL – silty, organic, black.				0.0
			0.1m CLAY – silty, sandy, occasional fine to coarse sand, stiff to very stiff, low to medium plastic, friable, medium brown with white salt mottling, dry to damp (TILL).		A1		
1.0			...at 1.5m base of salt inclusions.				1.0
			2.0 SANDSTONE – fine, silty, very clayey, very low strength, poorly cemented, homogeneous, dark green grey with pale grey speckling, glauconitic, interbedded with shale horizons, damp (BEDROCK).		A2		
3.0			...at 3.0m becoming dark blue grey.				3.0
			4.0m CLAY SHALE and SANDSTONE – clay shale, silty, sandy, very low strength, medium to high plastic, dark blue grey, damp, interbedded with thin sandstone horizons, as above.		A3		
5.0			5.5m		A4		5.0
			End of hole at 5.5m. Permanent Monitoring Well installed to 5.3m.				
7.0							7.0
8.0							8.0
9.0							9.0
10.0							10.0



Hardy BBT Limited Calgary, Alberta	COMPLETION DEPTH 5.5 m	COMPLETE
	LOGGED BY VS VJ	DWG NO.
		Page 1 of 1

RYLEY - CELL 2 MONITORING WELLS	LAIDLAW ENVIRONMENTAL SERVICES LTD.	BOREHOLE NO: 12B
	DRILL: SOLID STEM AUGER	PROJECT: 0105-96-12416
RYLEY, ALBERTA		ELEVATION: 687.09 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	NOTES & COMMENTS	Elevation (m)
0	TOPSOIL - silty, sandy, roots, black, (150mm thick)		Pipe stickup = 0.76 metres	687.0
1	CLAY (TILL) - silty, some sand, salt pockets, oxide stains, damp, very stiff, medium plastic, brown			686.0
2	- sand lense - silty, clay, fine to medium grained, firm, medium plastic, mottled brown grey - some pebbles, coal pockets, moist, stiff, green brown			685.0
3	CLAY SHALE - silty, dry to damp, hard, high plastic, dark grey			684.0
4				683.0
5	SANDSTONE - silty, some clay, fine to medium grained, friable, uncemented, damp, soft, low plastic, blue green grey - siltstone layer - strongly cemented, hard, light grey, (100mm thick) - sandier			682.0
6	SILTSTONE - strongly cemented, hard, light grey CLAY SHALE - silty, some sand, glauconitic sand layers, damp to moist, hard, medium plastic, blue green grey to brown grey			681.0
7				680.0
8				679.0
9	- brown grey			678.0
10	END OF BOREHOLE (9.9 metres) slough - none at 0 hrs. water - dry at 0 hrs. Monitoring well installed to 9.9 metres			677.0
11				676.0
12				

TETRA TECH EBA

LOGGED BY: SP	COMPLETION DEPTH: 9.9 m
REVIEWED BY: SP	COMPLETE: 96/09/30
DRAWING NO: 12416-03	Page 1 of 1

RYLEY REGIONAL LANDFILL ASSESSMENT	LAIDLAW WASTE SYSTEMS LTD.	BOREHOLE NO: 14
NE 1/4, SEC. 10-50-17-W4M	DRILL: SOLID FLIGHT AUGER	PROJECT: 0105-11099
RYLEY, ALBERTA		ELEVATION: 686.52 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	Elevation (m)
0	TOPSOIL (FILL) - slightly organic, dark brown	686.0
	- clayey	
1	CLAY (TILL) - silty, sandy, stiff to very stiff, medium plastic, grey, pebbles	685.0
2	- free water	684.0
	SANDSTONE (BEDROCK) - silty, some clay, fine grained, moist, dense, light grey, occasional shaly inclusion	
3		683.0
4	- clay shale inclusions - grey to brown	682.0
5	0 hrs.	681.0
	END OF BOREHOLE (5.4 metres) water - 5.0 metres at 0 hrs. Monitoring well installed to 5.4 metres	
6		680.0
7		
7.5		

SAMPLE TYPE | MOISTURE CONTENT (PLASTIC, M.C., LIQUID; 20 40 60 80) | STANDARD PENETRATION (N) 20 40 60 80 | UNC. COMPRESSIVE STRENGTH (kPa) 50 100 150 200 | POCKET PEN. (kPa) 100 200 300 400 | MW14

TETRA TECH EBA

LOGGED BY: VS/VJ	COMPLETION DEPTH: 5.4 m
REVIEWED BY:	COMPLETE: 92/07/22
DRAWING NO: 11099-12	Page 1 of 1