Lincoln Ranch
Hydrogeological Baseline Conditions Assessment

Final Report

Prepared for:
Riser Developments Ltd.

Prepared by:
Stantec Consulting Ltd.

113929369
May 2015

Sign-off Sheet

This document entitled Lincoln Ranch Hydrogeological Baseline Conditions Assessment was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Riser Developments Ltd. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____ (signature)

Christian Nägeli, M.Sc., P.Geol.
Senior Hydrogeologist

_____ (signature)

Joe Riddell, M.Sc., P.Geol.
Hydrogeologist

PERMIT TO PRACTICE
STANTEC CONSULTING LTD.
Signature _____
Date 19 JUNE, 2015
PERMIT NUMBER: P 0258
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Reviewed by _____ (signature)

Dan Yoshisaka, M.Sc., P.Eng.
Principal, Senior Hydrogeologist

Stantec

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by the land-owners of the proposed Lincoln Ranch Development (Riser Developments Ltd., represented by Mr. Glenn Fraser) to assess the baseline hydrogeological conditions, specifically the nutrient concentrations of the soil and groundwater, prior to development. This report is intended to address the physical hydrogeological characteristics and the baseline groundwater chemistry on site. A separate field program and associated report will address the baseline soil nutrient conditions.

The development intends to use part of the domestic wastewater stream as irrigation water for the golf course. As such, the baseline hydrogeologic conditions need to be established such that the concentrations of nutrients (the principal contaminants of concern within typical domestic wastewater), can be monitored over time. Further any potential impacts to soil, shallow groundwater on site were required to be evaluated for other contaminants of concern based on former land uses (oil well sites) including hydrocarbons/BTEX and salts were assessed for potential indicators of existing environmental impacts.

The groundwater characterization program provided sufficient data to characterize the geological and hydrogeological framework across the project site. The groundwater flow pattern on site is locally controlled by recharge and the topographic ridge that is oriented from the northwest to the southeast across the site. A groundwater monitoring network consisting of six monitoring wells was established. Five of the monitoring wells were completed to instrument a shallow unconfined silty-sand aquifer, and one monitoring well was completed in a down-gradient area of the site to monitor deeper groundwater quality in a lower sandy hydrostratigraphic unit.

Groundwater quality is at the site generally fresh, with low total dissolved solids (TDS) concentrations (<810 mg/L) over most of the site. The east part of the site has higher TDS concentrations of 1,700 mg/L. Nutrient concentrations in groundwater were low given the traditional agricultural use of the land. Other possible contaminants of concern were assessed and results did not indicate impacts from the other previous land uses (oil and gas activity).

The assessment of the hydrogeological framework shows that the groundwater flow system is hosted by relatively low permeability lacustrine sediments and local groundwater flow velocities and flow direction present low potential for the transport of contaminants and subsequent impact to the surface water quality in Gull Lake. Further, the groundwater monitoring network and three-dimensional conceptual site model provide a framework to monitor groundwater conditions and chemistry effectively going forward.

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

Stantec Consulting Ltd. (Stantec) was retained by the land-owners of the proposed Lincoln Ranch Development (Riser Developments Ltd., represented by Mr. Glenn Fraser) to assess the baseline hydrogeological conditions, specifically the nutrient concentrations of the soil and groundwater prior to development. The Lincoln Ranch Development is located in the NW 1/4 of 14-41-28-W4M, Lacombe County, near Gull Lake, Alberta (Figure 1). The development intends to use part of the domestic wastewater stream as irrigation water for the golf course. As such, the baseline hydrogeologic conditions need to be established such that the concentrations of nutrients (the principal contaminants of concern within typical domestic wastewater), can be monitored over time and potential impacts to soil, shallow groundwater, and the water quality of Gull Lake can be mitigated.

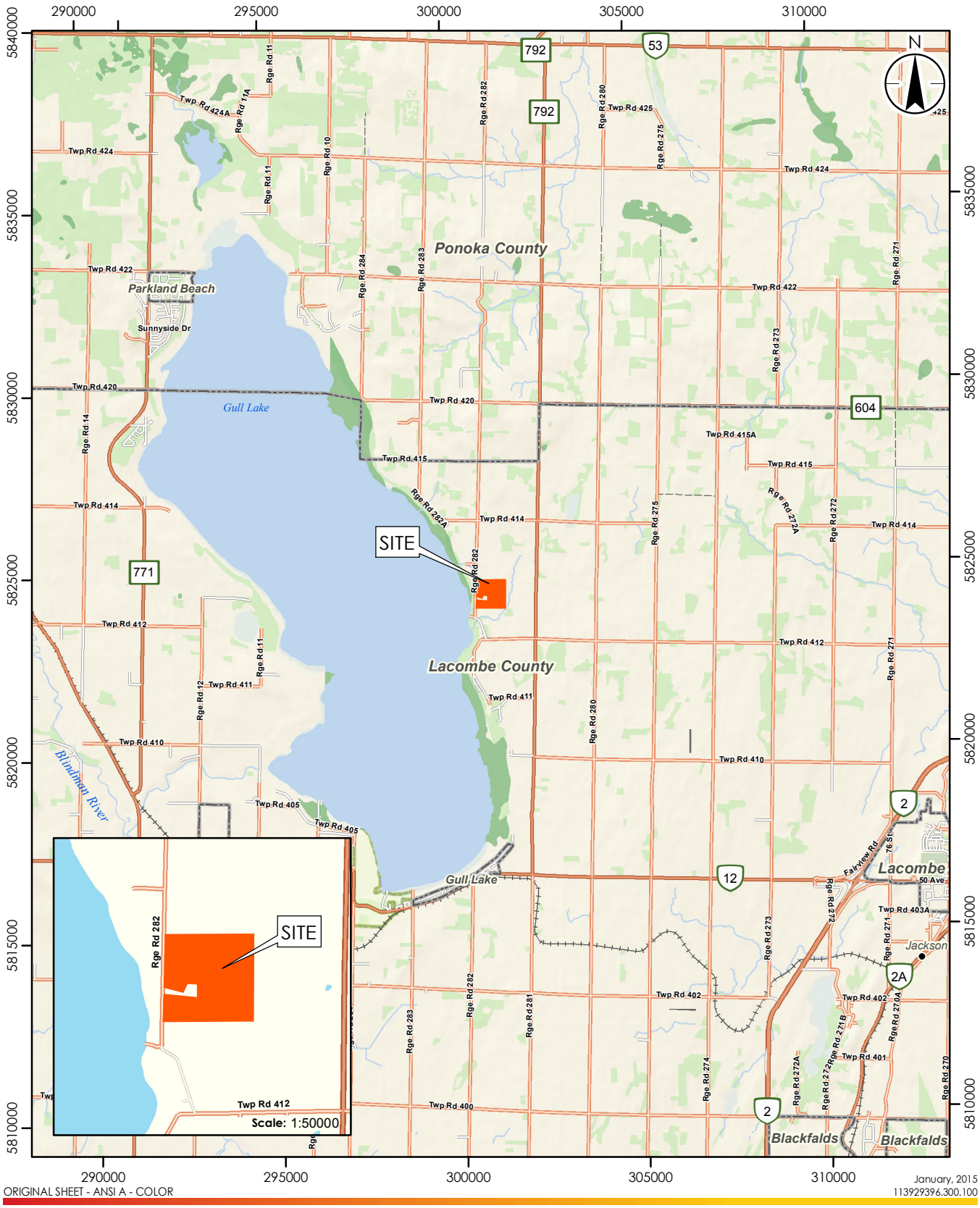
The soil and groundwater resources are being characterized at different stages in the project. The groundwater monitoring network was been established prior to development and is to be maintained throughout the two month monitoring period. The soil will be characterized after site grading activities, as it will be disturbed during development. Soil monitoring locations will be established after the site is developed and prior to application of any domestic wastewater to the land surface for irrigation. The content of this report deals exclusively with groundwater characterization and the baseline soil conditions will be reported on under separate cover.

1.2 PROJECT OBJECTIVES

The project objectives are to establish a groundwater monitoring network such that the baseline concentrations of nutrients in groundwater can be characterized and monitored over time. While previous field characterization activities had been completed at the project site, it was considered insufficient to assess the hydrogeological framework and groundwater chemistry. The objectives of the field characterization program were to:

- Improve the understanding of the near-surface geology and hydrogeology through borehole drilling;
- Supplement the existing monitoring well network (3 wells) with additional wells to refine the groundwater flow direction interpretation (previously made with three water level measurements), determine a representative vertical hydraulic gradient, determine the hydraulic conductivity of geological media and to collect appropriate data to build a conceptual site model;
- Conduct groundwater chemistry sampling of shallow groundwater to determine groundwater nutrient concentrations and concentrations of other potential contaminants of concern; and to

- Gain an understanding of the location and depth of nearby groundwater wells and to assess the potential for project interactions that may result from the development.



\\cd1044-f06\shared_projects\113929396\05c_drawings\Figure_1.mxd
1/7/2015 10:39 AM By: caloewen

ORIGINAL SHEET - ANSI A - COLOR

January, 2015
113929396.300.100

Stantec

1:150000 0 2 4 6 8km

200 - 325 25th St. SE Calgary, AB T2A 7H8
Stantec does not certifythe accuracy of the data.
This map is for reference only and should not be used for construction.

Client/Project
RISER DEVELOPMENT LTD.
LINCOLN RANCH
NW 1/4 14-41-28-W4M, LACOMBE COUNTY
NEAR GULL LAKE, ALBERTA

Figure No.
1.0

Title
Site Location Plan

2.0 METHODS

2.1 PREVIOUS INVESTIGATIONS AND DATA SOURCES

2.1.1 Previous Environmental and Hydrogeological Characterization Reports

Riser Developments Ltd. provided Stantec with a number of reports completed by other consultants characterizing the project site and nearby properties. The reports provided for review and incorporation into the hydrogeological characterization presented herein included:

1. Waterline Resources Inc., June 29, 2007: Groundwater Diversion License Application, DeGraff Built Green Resort, SE-22-041-28-W4M, Gull Lake, AB.
2. Klohn Crippen Berger, Jan. 31, 2011: Level II Land Classification, Soil Survey and Groundwater Assessment Report, NW-14-041-28- W4M: Lacombe County, AB
3. Parkland Geo for Stantec Consulting Ltd., 2014: Phase I Environmental Site Assessment (ESA) Proposed Development near Gull Lake, (NW 1/4 14-41-28-W4M Lacombe County, AB. Note that this report contains a review of other environmental assessment work and related reports assessing decommissioned well pads located on the property shown on Figure 2.
4. Stantec, July 2014, Lincoln Ranch Development Outline Plan.

The content and data contained within these reports was reviewed, interpreted and incorporated into the hydrogeological assessment presented below.

2.1.2 Surface Water, Geological, and Hydrogeological Data

A variety of data was used to complete the hydrogeological characterization. In order to understand the physical controls on groundwater flow and groundwater chemistry, an understanding of the regional hydrogeological setting is required in addition to site specific characterization. Further, given that the project objectives includes mitigating potential impact to Gull Lake, water chemistry data and lake levels were also considered. The various data resources consulted in this interpretation are presented in Table 1.

Table 1 Data Sources for the Hydrogeological Characterization

Data Theme	Description	Source
Geological Mapping	Bedrock Topography of the Edmonton-Calgary Corridor	Alberta Geological Survey http://www.ags.gov.ab.ca/publications/MAP/PDF/MAP_548.PDF
Geological Mapping	Map 213: Quaternary Geology, Central Alberta	Alberta Geological Survey http://www.ags.gov.ab.ca/publications/MAP/PDF/MAP_213.PDF
Hydrogeological Mapping	Map 098: Hydrogeological map of the Red Deer area, Alberta, NTS 83A	Alberta Geological Survey http://www.ags.gov.ab.ca/publications/MAP/PDF/MAP_098.PDF
Hydrogeological Mapping	Map 099: Hydrogeological map of the Rocky Mountain House area, Alberta, NTS 83B	Alberta Geological Survey http://www.ags.gov.ab.ca/publications/abstracts/MAP_099.html
Topography	Digital Elevation Model (DEM)	Geogratis, ©Department of Natural Resources Canada, All rights reserved.
Water Well Records	ESRD Alberta Water Well Information Database (AWWID)	Alberta Environment and Sustainable Resource Development (ESRD) http://groundwater.alberta.ca/WaterWells/d/
Surface Water Quality	An Assessment of Water Quality in Gull Lake (1999-2000)	Alberta Environment and Sustainable Resource Development (ESRD) Environmental Monitoring and Evaluation (Alberta Environment)

2.2 DESKTOP ANALYSIS

2.2.1 Review of Existing Site Monitoring Network

Previous field characterization (Klohn Crippen Berger, 2011) included a field program that completed nine shallow test pits and installed three shallow monitoring wells on site. This field characterization program allowed the upper 3.4 m of soil/geological media to be assessed across the project site with good spatial distribution across the site. However, with only three shallow (maximum depth of 3.4 m below ground surface [BGS]) monitoring wells, the groundwater flow patterns could only be assessed as a planar surface using a three-point interpolation. In order to adequately characterize groundwater nutrient concentrations, and in consideration of the undulating topography of the project site, there was a need to supplement the monitoring well network. The addition of monitoring wells allowed for more accurate interpretation of groundwater flow patterns, lateral and vertical hydraulic gradients. Further, additional monitoring wells were installed in locations that would more likely intercept lateral migration of groundwater with potentially elevated nutrient concentrations.

299,900 300,000 300,250 300,500 300,750 301,000 301,250 301,500 301,750

5,824,850 5,824,750 5,824,500 5,824,250 5,824,000 5,823,750

N

102 2165

1 902 1754 1

NE15 41-28-4

GULL LAKE

HIGH PRESSURE ATCO GAS PIPELINE APPROXIMATE LOCATION

MW15-01

MW10-01
TOP OF PIPE = 913.41m
GROUND =912.68m
WATER LEVEL =3.14mbtp = 910.27m

Highpine Morningside 13-14

EFFLUENT POND

KEYERA CORP. OIL GAS PIPELINE APPROXIMATE LOCATION

MOSAIC ENERGY LTD. OIL/GAS PIPELINE APPROXIMATE LOCATION

BARBED WIRE GATE ENTRANCE

HIGH PRESSURE ATCO GAS PIPELINE APPROXIMATE LOCATION

MW14-04
TOP OF PIPE = 911.00m
GROUND =909.94m
WATER LEVEL =2.87mbtp = 908.13m

NW14 41-28-4

MW14-05b
TOP OF PIPE = 915.53m
GROUND =914.41m
WATER LEVEL =3.76mbtp = 911.77m

MW14-05a
TOP OF PIPE = 915.42m
GROUND =914.47m
WATER LEVEL =3.437mbtp = 911.983m

MW10-02
TOP OF PIPE = 913.83m
GROUND =912.88m
WATER LEVEL =3.74BTmbtp = 910.09m

MW15-02

NE14 41-28-4

BUILDING

952 4452 ACREAGE

GRAIN BINS

BUILDING

MW15-03

MW10-03
TOP OF PIPE = 909.16m
GROUND =908.42m
WATER LEVEL =3.27mbtp = 905.89m

POWER POLE & OVERHEAD POWER LINE

Husky 06-14

A
B
5254 TR

EXISTING
MW10-01 X=300658.026 Y=5823933.052 Z=908.479
MW10-02 X=301421.038 Y=5824303.227 Z=912.843
MW10-03 X=300824 Y=5824631
PROPOSED
MW14-04 X = 300676 Y = 5824363
MW14-05a X = 301025 Y = 5824254
MW14-05b X = 301025 Y = 5824254
REPLACEMENT
MW14-01 X = 300820.8 Y = 5824697.3
MW14-02 X = 301418.3 Y = 5824277.0
MW14-03 X = 300609.3 Y = 5823978.1

\\Cd1044-f06\shared_projects\113929396\05c_drawings\Fig 2.0_.dwg
2015/04/24 2:19 PM By: Kuhl, Melanie

Apr 2015
113929396

Stantec

LEGEND

1:5000 0 50 150 250m
UTM NAD 83 ZONE 12

- Abandoned Monitoring Well Location (2010)
- Monitoring Well Location (2014)
- Monitoring Well Location (2015)
- Fence Perimeter Line
- Former Lease Boundary
- Oil Well Location

RISER DEVELOPMENTS LTD. - LINCOLN RANCH
LACOMBE COUNTY NEAR GULL LAKE, ALBERTA
FIGURE 2.0
SITE PLAN

2.2.2 Former Land Use and Environmental Liability

Two decommissioned well pads including the Husky Oil 06-14 pad on the south property margin, and the Highpine-Moriningside pad (later Vesta Energy Ltd.'s pad) in the northwest of the quarter section (Figure 2).

Information contained in the Parkland Geo (2014) Phase 1 Environmental Site Assessment report summarized previous characterization of the shallow soil in the vicinity of the decommissioned Husky 06-14 well pad, located near the southern margin of the project site. The shallow soil investigation was intended to evaluate the presence of contaminants of concern for a well pad, including total petroleum hydrocarbons and salinity parameters. The borehole logs for this assessment were included in the review and incorporation of historical data. This data is clustered in a small area providing good borehole data control in the southern portion of the project site.

Another abandoned well pad (Highpine-Morningside as shown on Figure 2), last operated by Vesta Energy Ltd., was also investigated in the past. According to the excerpt below from the ParklandGeo (2014) report, the Riser Developments Ltd. had contacted Mr. Lance Chorney, Senior Exploitation Engineer with Vesta Energy Ltd. to enquire about the work done to characterize the decommissioned well pad. Mr. Chorney provided the following information from two separate reports including a drilling fluid disposal report and a limited soil investigation report.

The and excerpt from the drilling fluids disposal report Drilling Fluids Disposal Report: 13-14-41-28-W4M. Prepared for Highpine Oil and Gas Limited. Prepared by VegTec Inc. September 25, 2005, indicated that there was little potential for environmental impacts associated with the well pad. The excerpt reads;

"The VegTech report included a diagram that showed cement and shale pits in the northwest corner of the fenced lease site, a shale tank near the well centre and a flare tank near the east boundary of the lease. The water table was found to be deeper than 4 m below grade as determine by lease construction. Drilling waste samples were collected from the surface, floc and main hole as per EUB Directive 50."

Further, the soil investigation report Potential Cement Pit Search: 13-14-41-28-W4M. Prepared for Daylight Energy Ltd. Prepared by SNL Consulting Ltd. June 24, 2010.

"A site investigation was conducted on September 18, 2009 to determine if 1 m of sufficient cover was located over the potential cement pit area on the lease site. Six boreholes (S09-01 to S09-06) were drilled to depths of 1.5 or 3.0 m on the lease and one borehole (S09-C1) was drilled to represent background conditions off-lease. Soil samples were collected for analysis of detailed salinity, metals and hydrocarbon parameters. No hydrocarbon odours were noted and field hydrocarbon vapours were less than 100 ppm, therefore only two samples were submitted

for hydrocarbon analysis. SNL concluded that no cement pit was identified on the site and samples met the respective regulatory guidelines for all parameters."

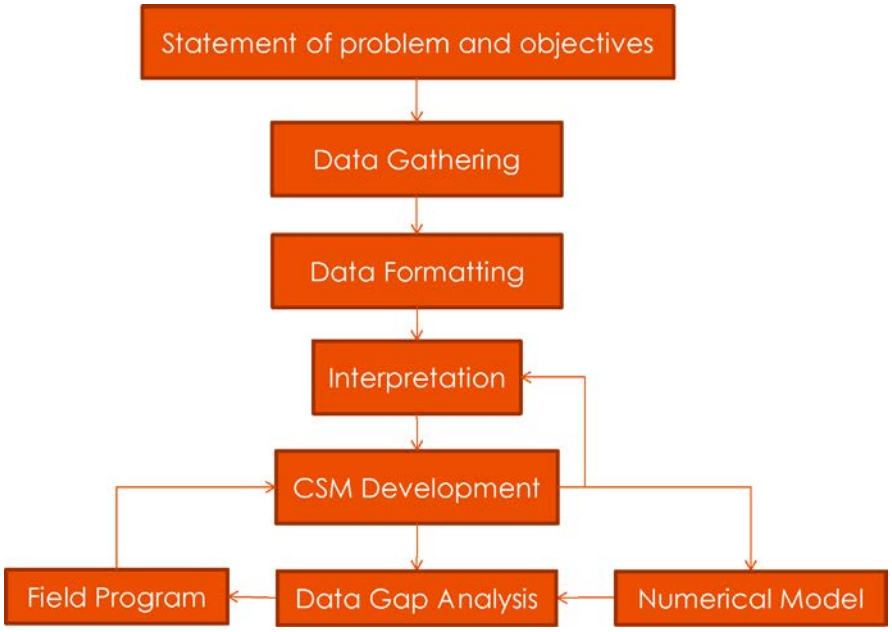
The Phase I Environmental Site Assessment (Parkland Geo, 2014) indicates that the pad investigated above (owned and operated by Husky Oil Operations Ltd.) was issued a reclamation certificate on November 1, 2010. The Development Outline Plan (Stantec, 2014), specifically the proposed development layout plan was used to place the new monitoring wells in areas that are unlikely to be altered based on the current development plan so that the same sample collection points can be ideally be resampled as the development proceeds and becomes operational.

2.2.3 Development of the 3D Conceptual Site Model

The project objectives necessitate a sound understanding of the near-surface geology and hydrogeology in order to effectively establish baseline groundwater nutrient concentrations and monitor how they may change over time. To facilitate a sound understanding of the hydrogeology of the project site, Stantec developed a three-dimensional (3D) Conceptual Site Model (CSM) of the site. The 3D CSM provides a visual platform to synthesize data collected from the site, and to rationalize the monitoring network, design, and identify potential data gaps in the monitoring program. A preliminary model was developed prior to the field characterization program to leverage the existing site information and to site supplementary monitoring wells in areas that would add the most value to the network.

The development of the 3D CSM followed a workflow that included data compilation, data normalization (reformatting), and finally import into a 3D geological modelling environment. Once the data was imported and a preliminary 3D CSM was generated, an iterative approach was used to refine the geological and hydrogeological characteristics based on the available data. The workflow is summarized in the flow chart below (Figure 3), which also shows the capacity of the 3D CSM to provide the foundation of a numerical flow model if required in the future.

Figure 3 3D CSM Development Workflow



The end result of the 3D CSM development is to have an interactive 3D geological model of the site, including the subsurface characteristics (soil and geological layers), monitoring well locations, screened intervals, and water table position.

2.2.4 Updating the 3D Conceptual Site Model

The preliminary 3D CSM was developed prior to the field characterization program as described below in order to identify potential data gaps in the previous soil and groundwater characterization efforts. The CSM allowed the near surface geology to be interpreted such that the screened interval depth of the new monitoring wells could be carefully chosen to monitor pertinent, near surface hydrostratigraphic layers.

The 3D CSM is a dynamic tool that allows iterative improvements to the model based on new field data as it is collected. After collection of new borehole data from the drilling program, it was added to the 3D CSM, providing control on geological material properties up to 10 m BGS, deeper than previous field characterization data which were limited to depths shallower than 3.4 m BGS.

2.3 FIELD CHARACTERIZATION PROGRAM

2.3.1 Utility Locates and Ground Disturbance Clearance

Prior to the initiation of borehole drilling, Stantec conducted ground disturbance clearance activities. Alberta OneCall was contacted prior to commencing ground disturbance activities.

Alberta OneCall contacted the registered owners of the utilities present on site. Stantec contracted Cam-Tel Communications Ltd. to independently identify and clearly mark all private underground utilities/infrastructure within the proposed work area.

Stantec personnel were in attendance when the utilities were located and marked the area in which the monitoring wells were to be drilled based on establishing a safe distance away from underground utilities that included a high pressure gas line oriented north-south along Range Road No. 282. Though the location of the replacement well for MW10-03 (MW15-02) had to be slightly modified, none of the five planned borehole locations conflicted with the location of above-ground or underground utilities. Once the private utility locate report was issued, it was reviewed to verify that the proposed drilling location was clear of all known utilities. Stantec prepared crossing agreements with ATCO Pipelines, Keyera Energy Ltd., and Mosaic Energy Ltd. such that the drilling rig could cross the pipelines safely and in accordance with their respective requirements.

2.3.2 Borehole Drilling and Lithological Characterization

Based on the availability of previously collected hydrogeologic data, it was initially thought that the field program could be constrained to drilling three boreholes in two different locations. The two supplementary well locations initially planned included 3 monitoring wells, one at MW14-04 and a nested pair of monitoring wells (MW14-5a MW14-5b). MW14-04 was installed to a total depth of 5.1 m BGS. Total depth of monitoring wells MW14-5a and MW14-5b were 5.1 m BGS and 10.2 m BGS, respectively.

However, while in the field during installation of MW14-04 and MW14-5a/b, inspection of the previously existing monitoring wells (i.e., MW10-1, MW10-2, and MW10-3) revealed that the wells were completed too shallow to obtain representative groundwater samples and year-round water level data. As such, an additional drilling program was conducted to install three deeper replacement monitoring wells (MW15-01, MW15-02, and MW15-03) adjacent to the existing monitoring wells. The three previously existing monitoring wells (MW10-1, MW10-2, and MW10-3) were also decommissioned at that time. The replacement wells were also located in areas unlikely to interfere with development plans such that they can continue to be used as monitoring wells over the development period.

Each of the five new boreholes was drilled by Calibre Drilling Ltd. (Calibre) using a solid stem auger rig equipped with 4” (100 mm) augers. The augers were slowly advanced and regularly retracted after drilling into native material such that representative samples could be collected at different depths for lithological logging. Samples were also retained in the event that future analysis of physical properties is required (such as grain size analysis). Photographs of the geological media were also taken such that the representative intervals could be visually characterized and the near surface geology could be visually represented.

The locations of the boreholes are presented in Figure 2 and borehole coordinates are provided in Table 2 below. Note that the boreholes completed for the monitoring well nest of MW14-5a

and MW14-5b are nearly co-located to facilitate determination of vertical hydraulic gradient as discussed below in Section 2.3.3.

Table 2 Monitoring Well Locations

Borehole ID	UTM Zone (NAD83)	UTM Easting (m)	UTM Northing (m)
MW10-01 (decommissioned April 2015)	Z 12	300,821	5,824,630
MW10-02 (decommissioned April 2015)	Z 12	301,419	5,824,303
MW10-03 (decommissioned April 2015)	Z 12	300,656	5,823,935
MW14-4	Z 12	300,676	5,824,363
MW14-5a	Z 12	301,025	5,824,254
MW14-5b	Z 12	301,025	5,824,253
MW15-01	Z 12	300,820	5,824,697
MW15-02	Z 12	301,418	5,824,277
MW15-03	Z 12	300,609	5,823,978

2.3.3 Monitoring Well Network

As mentioned above in the review of historical studies, there were 3 monitoring wells previously installed on site in 2011. However, given the variable site topography, there was a need to supplement the groundwater monitoring network for two reasons. Firstly to further evaluate the groundwater flow direction beyond the planar interpolation previously completed, and secondly, to ensure representative groundwater chemistry samples could be collected from both up-gradient and down-gradient positions within the local groundwater flow system prior to the initiation of site development and operational activities. For the same reasons, when the previously existing wells were determined to yield unreliable groundwater samples, they were replaced as mentioned above.

Table 3 below summarizes the completion details of each of the six new monitoring wells including stick-up height, total depth, and the screened interval. The new monitoring wells contain the year (2014) in the monitoring well names to maintain the well naming convention previously established by Klohn Crippen Berger. The newly installed wells (2014 and 2015 wells) are labeled with MW14/MW15 prefix.

The 2010 wells were deemed too shallow and unsuitable for long-term monitoring due to their inability to measure water levels during low level periods (i.e. they were completed too shallow). As such final water levels were taken after drilling the MW15 replacement wells and MW10-01, MW10-02, and MW10-03 were abandoned by extracting the PVC casing from the original

borehole and the open annular space was backfilled with hydrated bentonite to seal the borehole to surface.

Table 3 Current Groundwater Monitoring Network Well Characteristics

Well	Total Depth (m BGS)	Stick-up (m)	Top of Casing Elev. (m asl)	Screen Length (m)	Screen From (m BGS)	Screen To (m BGS)
MW15-01	5.18	1.01	914.56	1.54	3.66	5.18
MW15-02	5.18	0.89	913.86	1.54	3.66	5.18
MW15-03	5.49	0.80	907.23	1.53	3.35	4.88
MW14-04	5.14	1.04	911.00	1.50	3.64	5.14
MW14-5a	5.18	1.11	915.42	1.50	3.53	5.03
MW14-5b	9.90	0.93	915.53	1.50	8.4	9.90

2.3.4 Groundwater Sampling Program

All monitoring wells on site including the new 2014/2015 wells and the 2010 wells were first purged dry of any stagnant groundwater. The new monitoring wells were given time to equilibrate with ambient groundwater levels prior to purging such that a representative static water level could be measured. The wells were all installed in relatively low permeability glaciolacustrine sediments so the water levels generally recovered slowly. Groundwater sampling was conducted in two phases to conduct the sampling activities on the existing wells and the first round of newly installed wells, and a second round of sampling to obtain samples from the replacement wells drilled in 2015 (Mw15-01, MW15-02, and MW15-02). The first round of sampling consisted of purging the wells dry on December 8, 2014, and sampling the following day after recovering from purging to obtain as representative a sample as possible. MW15-03 was sampled on April 14, 2015 just after well installation as it recovered quickly after purging. MW15-01, and MW15-02 water levels recovered very slowly after their installation and were sampled on April 23, 2015, after being purged.

Samples for laboratory analysis were collected in pre-cleaned bottles with preservatives (where required) provided by Maxxam Analytics. Samples were kept in coolers with ice to regulate their temperature and delivered to the lab in Edmonton the day the samples were collected. Groundwater samples were submitted for analyses including major ions, nutrients, trace dissolved metals, total metals, total petroleum hydrocarbons and BTEX (benzene, toluene, ethylbenzene, and xylenes). Total petroleum hydrocarbons and BTEX were included as due diligence given the one on-site, and two nearby reclaimed oil wells. Salt impacts common at well sites were also considered by interpreting the general chemistry analysis (TDS and chloride concentrations) of the groundwater samples.

2.3.5 In-situ Hydraulic Response Testing

Single well hydraulic response testing was conducted on the new MW14- and MW15- monitoring wells installed by Stantec. The procedure followed standard protocols for the rising head, single well hydraulic response testing.

The procedure involved recording the static water level and date/time, deploying data logging pressure transducers to measure the water pressure exerted by the water column in the well, and to measuring the barometric pressure when using un-vented pressure transducers.

The pressure transducers were deployed within the water column in the well, at least 1 m below the expected drawdown level, and the barometric logger was deployed to measure barometric pressure changes over the duration of the response test. After the water level in the well recovered to the original static level measured, the bailer was removed to drop the static water level so that the change in the height of the water column was nearly instantaneous.

The recovery of the water level was then observed and recorded both by the data logging pressure transducers and using manual water level measurements. Manual measurements were obtained every minute for the first 10 minutes, then every 5 minutes until about 20 minutes. The rising head response testing was completed when the water level had recovered to at least 90% of the pre-test static water level.

3.0 RESULTS

3.1 SUMMARY OF PREVIOUS WORK

The previous field characterization completed on site provided a baseline level of information to effectively fill data gaps related to evaluating baseline nutrient concentrations in groundwater. The most pertinent data in the context of this project was the 2011 Klohn Crippen Berger Level II Land Classification, Soil Survey and Groundwater Assessment report that characterized the upper 3 m of geological media across the footprint of the proposed golf course development. This report also provided a preliminary assessment of groundwater flow direction, depth to groundwater and shallow lithological attributes of the project site.

The report concluded that the upper geological media is composed of topsoil underlain by sand and/or clay rich loam across the site. The loam descriptor used indicates a mix of grain size within the material ranging from sand to silt to clay that contains organic material. The proportions of each grain-size can be used to infer the permeability in the absence of physical permeability testing and supplementary information on the compaction (density), packing and degree of weathering a material has experienced. These data were later incorporated into the hydrogeological framework presented below.

The geotechnical report also concluded that the groundwater flow direction was generally towards the southwest corner of the project site, while trending due west in the northeast portion of the project site. However, the undulating site topography and relatively low permeability of the upper substrate would imply some degree of groundwater mounding and radial flow of groundwater from the topographically elevated areas superimposed on the generally southwest direction of groundwater flow.

The Phase I ESA completed by Stantec also identified that the decommissioned well pad located on the property as well as nearby (i.e., 500 m away) decommissioned well pads have been granted reclamation certificates by the Regulator (ESRD) indicating there is limited potential for impacts related to on-site or off-site areas of potential concern.

While the water supply evaluation for DeGraff's RV Park (as well as other public water well records) provided useful information about depth to bedrock, the depth of completion of potable water supply wells, and deeper aquifer water chemistry, the scale of observations and deep bedrock wells do not apply to the project objective of establishing baseline nutrient concentrations in the relatively shallow groundwater flow system in the unconsolidated sediment above bedrock.

3.2 HYDROGEOLOGICAL FRAMEWORK

3.2.1 Site Description and Regional Hydrogeology

The quarter section of the proposed project site, NW-14-041-28 W4M is located on the east side of Gull Lake, on the east side of Range Road 282. The quarter section has gentle topography with approximately 11 m of relief from 920 m asl in the northeast corner to 909 m asl in the southwest corner. Topographic features include an elevated ridge that trends across the site from the northeast to the southwest. The land surface drops steeply down to Gull Lake just west of Range Road 282, across from the project site. Average lake levels in Gull Lake are approximately 898 m asl (Prepas and Mitchell, 1990).

The surficial geology is mapped as coarse-grained lacustrine sediment including stratified sand and silt with gently undulating topography on the west half and draped moraine sediment with bedrock controlled topography on the east side (Shetsen, 1990). However, more recent mapping of the bedrock surface (Slattery and Barker, 2010) indicates that the entire site is composed of lacustrine sediment as the bedrock is covered by a relatively consistent thickness (13 -17 m) of unconsolidated sediments. The bedrock is composed of the Paskapoo Formation which is a Tertiary-aged, non-marine, calcareous, cherty sandstone formation with siltstone and mudstone beds. The Paskapoo Formation is generally a coarse-grained formation, and widely used as an aquifer in the region.

Regional hydrogeological mapping (Labreton and Green, 1970; Tokarsky, 1970; and Barker et al., 2011) indicates that Gull Lake receives local scale and intermediate scale groundwater flow system discharge from bedrock aquifers and the unconsolidated material above bedrock. The Edmonton-Calgary Corridor Atlas (Barer et al., 2011) shows the east shore of Gull Lake, where the project site is located, to be a recharge area for both local- and regional-scale flow systems. However, given the relatively subdued topography of the area surrounding the lake, the vertical gradient mapping (Barker et al., 2011) indicates that the gradients are near neutral to weak recharge conditions. This is related to the how close the midline of the flow system is to the shore of Gull Lake, where the project site is situated. The regional mapping indicates reasonably high potential yield from the Paskapoo Formation, and no wells were mapped as having been completed in unconsolidated Neogene sediments above bedrock in the vicinity of the project site. The closest bedrock well is greater than 60 m deep (Well ID 2085459), just west of the project site. The shallowest well in the area is reported to be approximately 20 m deep in the upper bedrock (Well ID's 1065774 and 1065732) located approximately 300 m northwest of the project site.

3.2.2 Lithology and 3D Conceptual Site Model

Borehole drilling was completed to log the lithological characteristics of the near-surface sediments and to facilitate installation of monitoring wells. The uppermost two metres of the sediment were biologically active topsoil and loam layers. On the elevated topographic ridge,

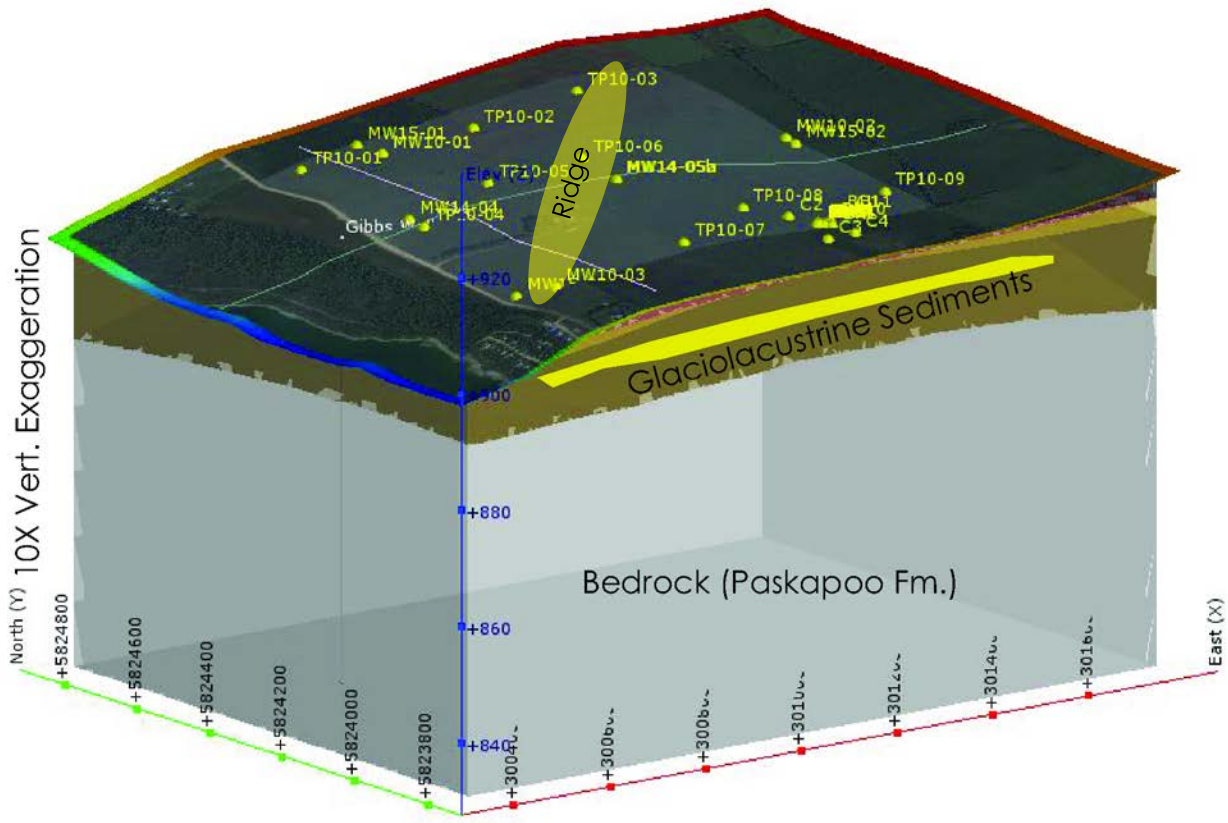
the loam was deeper, with a thickness up to approximately 4.5 m, likely due to increased depth to water table and deeper soil development.

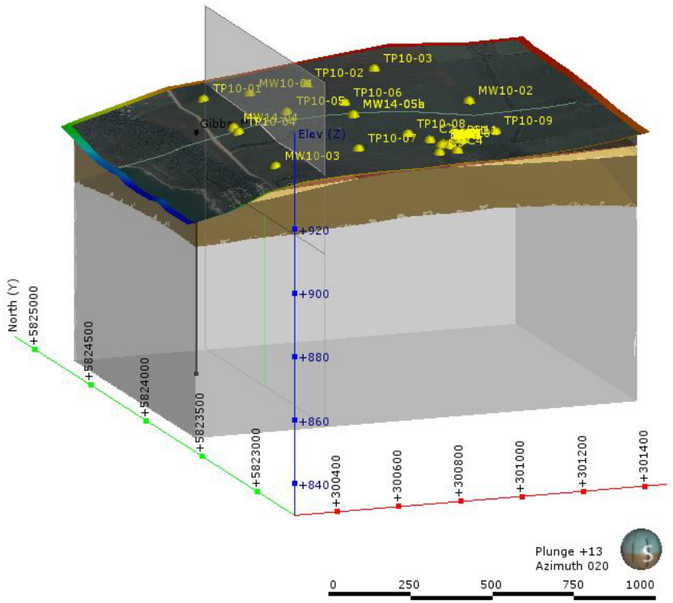
As per the description of the geology above, the mineral soil sediments beneath the active soil zone were of lacustrine origin, with a mix of grain size ranging from clay rich low permeability layers with variable fractions of sand and silt, to sand rich layers with higher permeability. An alternating sequence of sand and clay dominated layers creates a fairly simple hydrostratigraphic framework that in conjunction with the topography governs the flow of shallow groundwater on the project site.

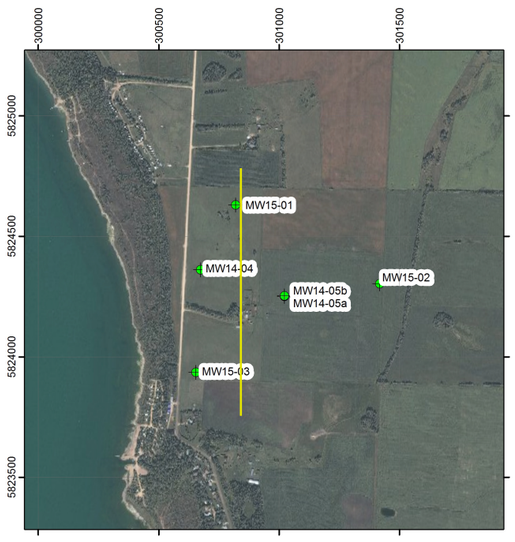
The majority of the historical borehole information only allowed characterization of the upper 3 m BGS. However, augmentation of the geologic data by the current field program allowed characterization of the sediments to depths of 10 m BGS. Five of the boreholes were just over 5 m BGS, and MW14-5b was drilled to 10.06 m BGS. As such, the deeper lithology and hydrostratigraphy is inferred and the lateral continuity of these layers is uncertain without additional deep borehole data. Figure 4 below shows the site and surrounding area with the yellow annotation indicating points with sub-surface data, and the general geological framework with Glaciolacustrine sediments of variable grain-size overlying bedrock.

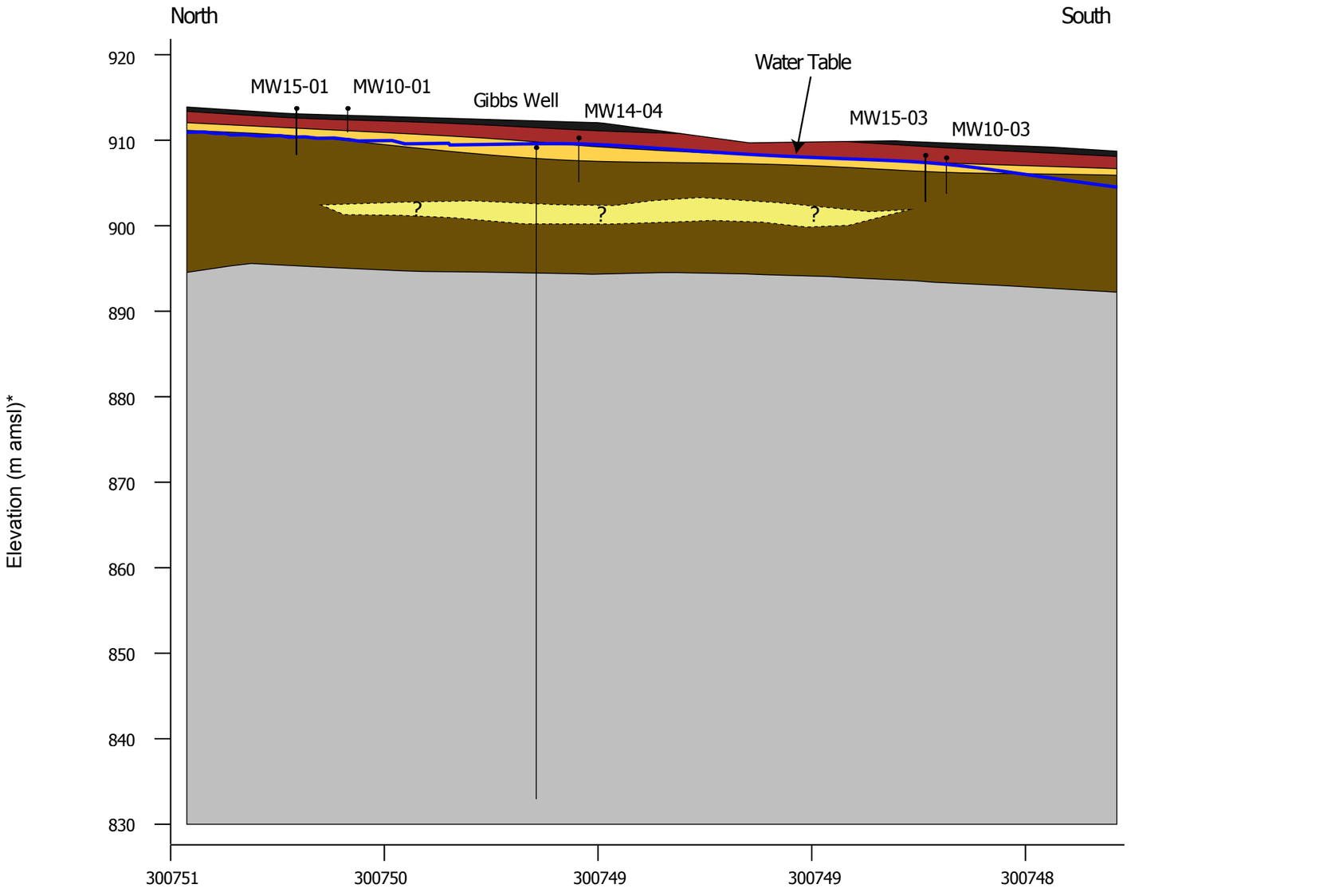
Figures 5 and 6 are geological/hydrogeological cross-sections cut though the geological model in areas selected to demonstrate the hydrostratigraphic layers and water table configuration observed on the site. Figure 5 is oriented north to south through the site and Figure 6 is roughly perpendicular oriented west to east. The water table position is shown in blue and boreholes and wells nearby the section line are projected on to the section line to demonstrate the data control points supporting the geological interpretation.

Figure 4 Three-Dimensional (3D) Geomodel Model









Vertical exaggeration: 10x

North: 300751, 5824838
South: 300748, 5823722

0 m 300 m

Stantec

Key Plan Legend
- Site Boundary
- Section Line

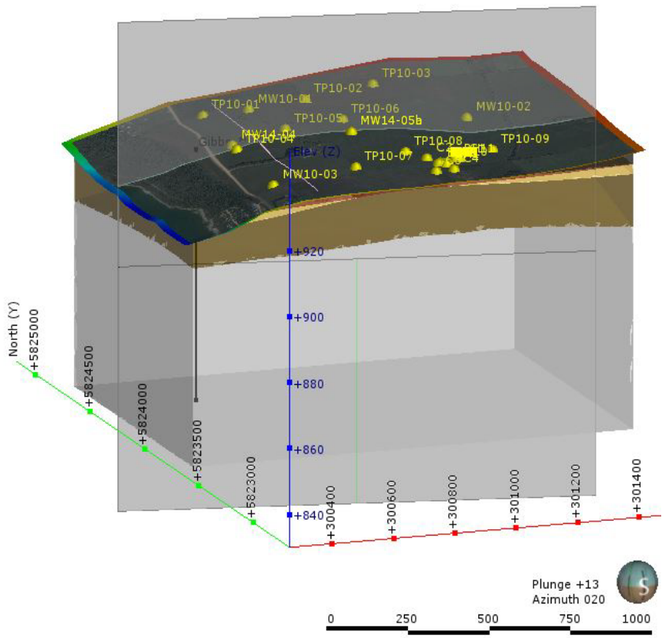
Projection: 10TM Resource Datum: NAD83
Imagery obtained from Imagery obtained from Esri, DigitalGlobe, GeoEye,USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community .

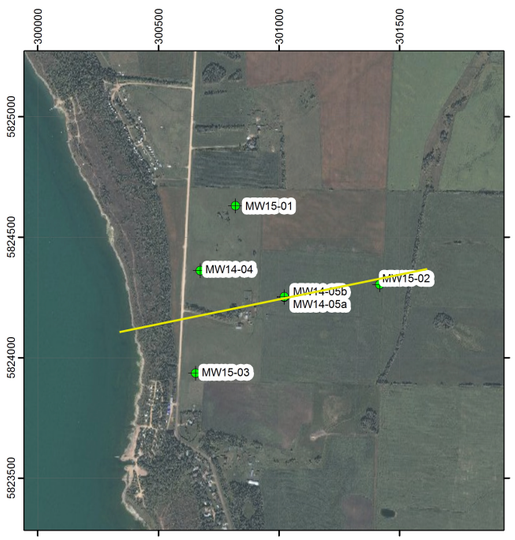
- Topsoil
- Loam
- Upper Lacustrine Sand
- Lacustrine Clay
- Lower Lacustrine Sand (inferred from MW14-5b and Gibbs Well)
- Bedrock (paskapoo Formation (alternating sandstone, and mudstones)

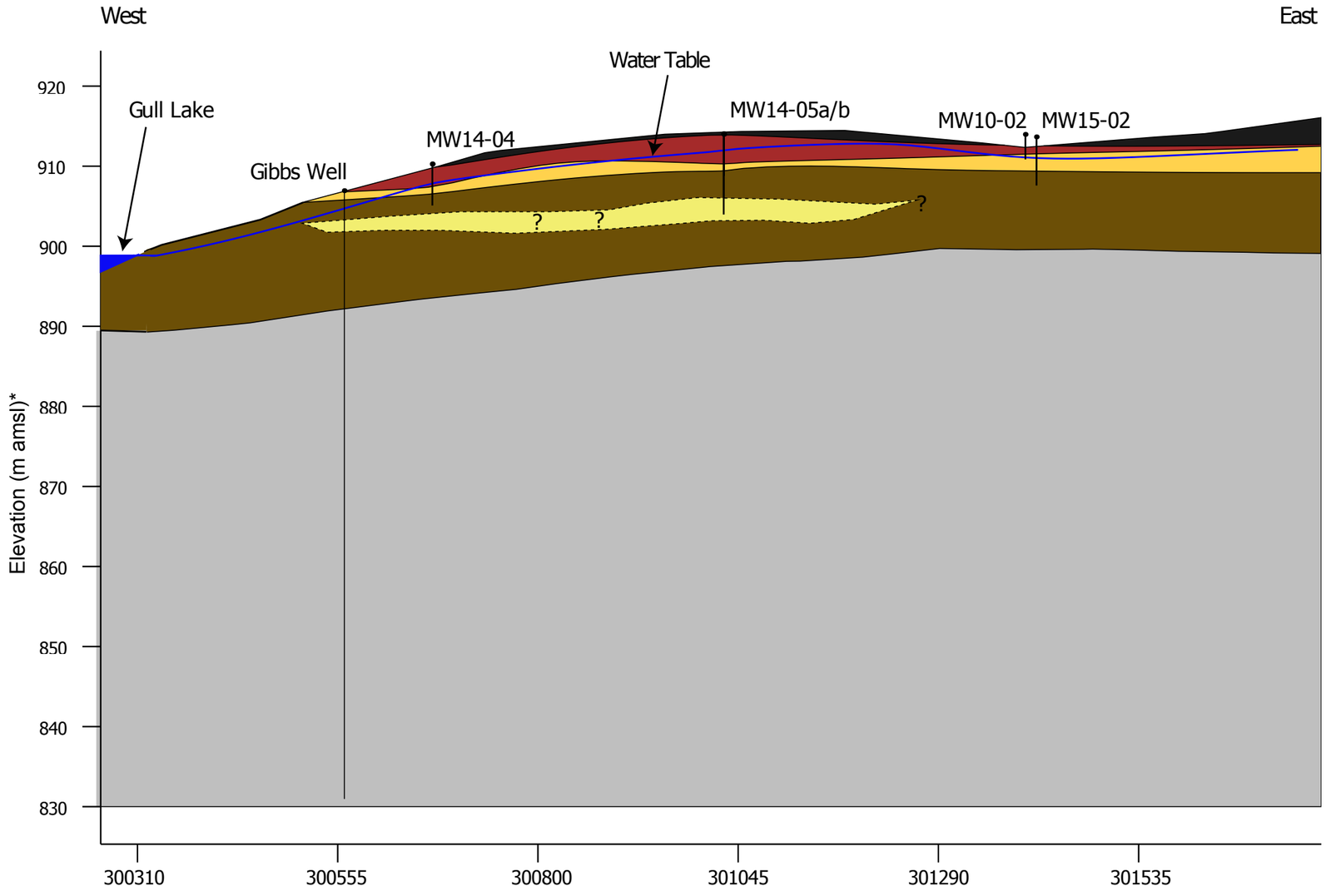
Client/Project
Lincoln Ranch, Gull Lake, Alberta, Assessment of Baseline Hydrogeological Conditions

Figure No.
5

Title
HYDROGEOLOGIC CROSS SECTION







Vertical exaggeration: 10x

West: 300310, 5824414
East: 301758, 5824119

0m 250m

Stantec

Key Plan Legend
- Site Boundary
- Section Line

Projection: 10TM Resource Datum: NAD83
Imagery obtained from Imagery obtained from Esri, DigitalGlobe, GeoEye,USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community .

- Topsoil
- Loam
- Upper Lacustrine Sand
- Lacustrine Clay
- Lower Lacustrine Sand (inferred from MW14-5b and Gibbs Well)
- Bedrock (paskapoo Formation (alternating sandstone, and mudstones)

Client/Project
Lincoln Ranch, Gull Lake, Alberta, Assessment of Baseline Hydrogeological Conditions

Figure No.
6

Title
HYDROGEOLOGIC CROSS SECTION

3.2.3 Groundwater Flow Direction, Gradients and Flow Velocity

The topographic ridge oriented from the northeast to southwest across the project site (shown on Figure 4 above, and in-line with the Figure 5 cross-section creates groundwater mounding in the relatively low-permeability sediments observed on site. The ridge creates a subtle groundwater flow divide with flow directions west of the ridge to the west-southwest and flow directions east of the ridge to the south-southeast. There is also flow towards the southeast oriented in the same direction as the ridge (Figure 6).

Horizontal gradients are small ranging from 0.013 to 0.009 across the site. Given the hydraulic conductivity values presented above, the groundwater flow velocities range from a maximum of 5.3 m/year to a minimum of 0.005 m/year using the maximum and minimum gradients and conductivity values to bracket the possible range.

The vertical hydraulic gradient at monitoring well nest MW14-5a and MW14-5b was 0.043 (downward directed), indicating recharge conditions. This is expected given Gull Lake is the groundwater sink for the region, located well below the groundwater elevation on site.

3.2.4 Hydrostratigraphy

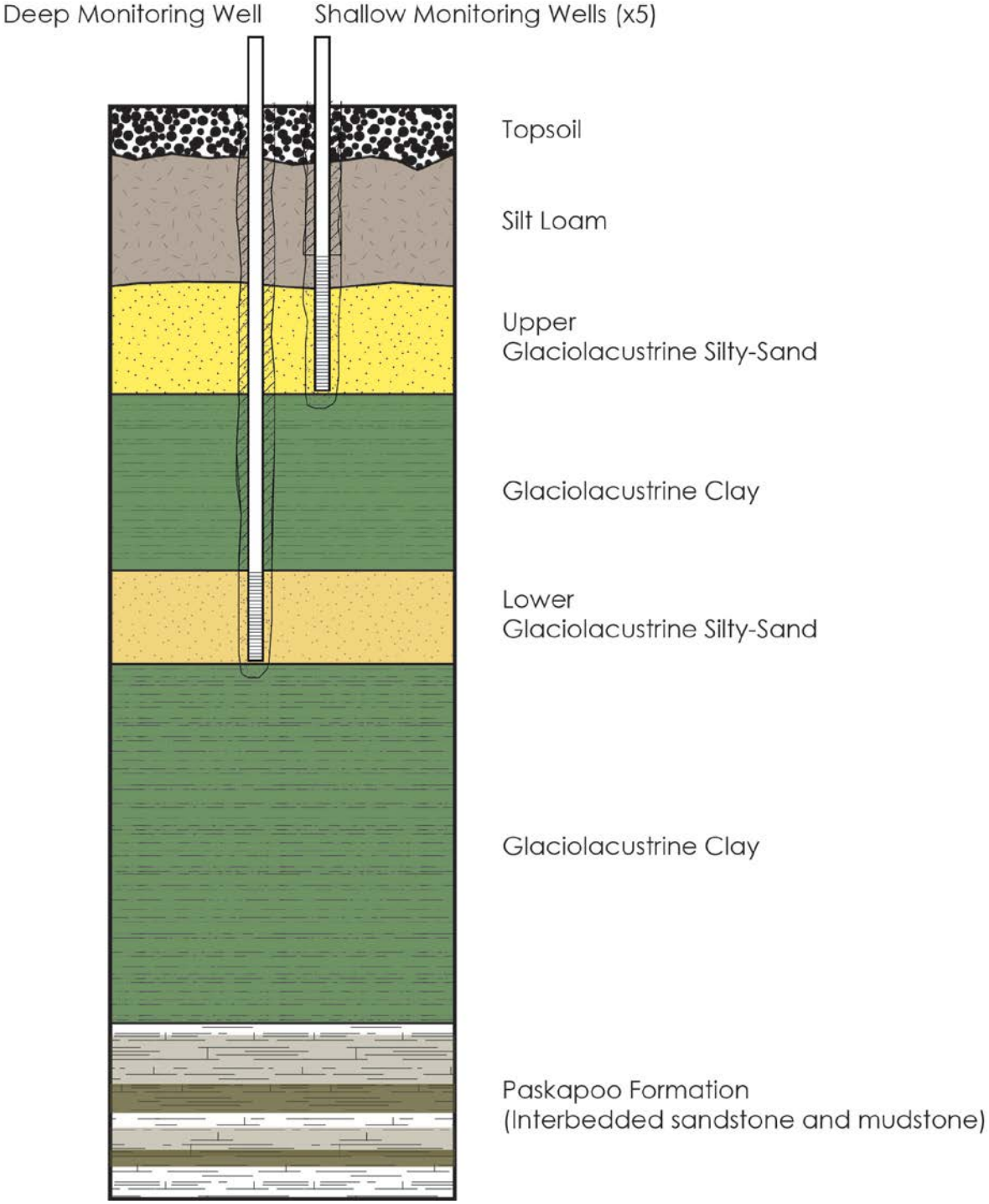
The lacustrine sediments that compose the near surface geology of the project site are heterogeneous in nature with grain-size variation. Despite the heterogeneous nature of the sediments, there are distinct hydrostratigraphic layers that can be correlated across the project site. The sediments indicate that the lacustrine sediments are layered with alternating sand-rich and clay rich beds reflecting seasonal or inter-annual variation in depositional environment associated with lake sediments.

Superimposed on the interbedded lacustrine sediments is the topography, as an erosional surface, and soil development in the upper two to five metres of the geological material. The biological content present in the upper 40 cm exhibits a characteristic black colour and loose, organic rich texture of a topsoil layer. The material beneath the topsoil layer contains less organic material, a loamy texture from a mix of grain sizes, and is biologically active.

Beneath the Topsoil and Loam layers, there is an alternating sequence of lacustrine layers dominated by clay or sand with varying proportions of silt. The topographic ridge has an additional cycle of lacustrine sand and clay that has not been eroded. The monitoring well network instruments the two critical hydrostratigraphic layers identified during the borehole drilling program. The upper lacustrine silty-sand layer is instrumented with five monitoring wells installed up to 5 m BGS, and the lower glaciolacustrine sand is also instrumented with one deeper monitoring well beneath the lacustrine clay layer that separates the two aquifer layers. The one deep well (MW14-5b) is situated in a down-gradient positon to monitor potential water quality changes in the deeper aquifer unit prior to leaving the site. The flow in both hydrostratigraphic units is dominated by horizontal flow based due to the permeability contrast

between the aquitard and the upper and lower sand units. Figure 7 below shows the hydrostratigraphy and monitoring well installations within the hydrostratigraphic framework.

Figure 7 Hydrostratigraphic Column and Monitoring Wells



3.2.5 Hydraulic Conductivity Testing

The results of the in-situ hydraulic conductivity testing is summarized below in Table 4 with the monitoring well, the representative hydrostratigraphic layer from the layers described above, and the hydraulic conductivity calculated from the test. The detailed analysis of the in-situ hydraulic response tests are contained in Appendix C. Commonly applied analytical solutions were used to analyze the response data including Bouwer-Rice (Bouwer-Rice, 1976), Hvorslev (Hvorslev, 1951), and Kansas Geological Survey (Hyder et al., 1994) solutions. The results of each analysis as well as the average value are presented below.

Table 4 Hydraulic Conductivity of Near Surface Sediments

Well and Hydrostrat. Unit	Analytical Method	Average Hydraulic Conductivity (m/s)	Static Water Level (m bTOC)	Initial Water Level Displacement (m)
MW14-04 Upper Silty-Sand Aquifer	Bouwer-Rice	6.82E-08	2.81	0.58
	KGS	7.05E-08	2.81	0.58
	Average	6.93E-08		
MW14-05A Upper Silty-Sand Aquifer	Bouwer-Rice	4.67E-07	3.42	0.55
	KGS	5.18E-07	3.42	0.55
	Average	4.92E-07		
MW14-05B Lower Silty-Sand Aquifer	Hvorslev	1.08E-08	3.69	0.55
	KGS	7.14E-09	3.69	0.55
	Average	8.95E-09		
MW15-03 Upper Silty-Sand Aquifer	Bouwer-Rice	3.54E-06	1.03	0.55
	KGS	3.23E-06	1.03	0.55
	Average	3.39E-05		

3.3 BASELINE GROUNDWATER CHEMISTRY

Groundwater samples were submitted for analyses including major ions, dissolved and total metals, nutrients, BTEX, and petroleum hydrocarbon fractions F1 (C1-C6) and F2 (C6-10) to determine if pre-existing impacts to groundwater from previous land uses were present (Appendix E).

3.3.1 General Chemistry and Nutrients

Table 6 shows the laboratory results of the groundwater analysis of general chemistry and nutrient concentrations. The groundwater samples collected from the project site indicates that the general chemistry of this water is relatively fresh with relatively low total dissolved solids (TDS) concentrations, with the exception of MW15-02. MW15-02 had a TDS concentration of 1,700

mg/L with elevated sulphate and sodium concentrations at 730 mg/L and 430 mg/L respectively. However, the remaining five monitoring wells had TDS concentrations ranging from 390 mg/L (MW10-1) to 810 mg/L (MW14-5b). Alkalinity concentrations fell within a small range from 310 mg/L (MW10-3) to 520 mg/L (MW14-5b). Chloride concentrations are low (3.9 – 33 mg/L) which is an indication that significant salt impacts from the former oil well sites are not broadly present over most of the footprint of the site.

Nutrient concentrations are generally low, with non-detectable concentrations of orthophosphate except for MW15-02 (0.077 mg/L) and MW15-03 (0.23 mg/L). Total phosphorous ranges from 0.021mg/L at MW14-5b to 16 mg/L at MW10-3. Nitrite concentrations are non-detectable, and nitrate concentrations are generally very low except for MW10-1 and MW10-3 that have nitrate concentrations of 1.3 mg/L and 8.1 mg/L respectively. The concentration of nitrate measured at MW10-3 is in exceedance of the respective Alberta ESRD guideline. However, the nitrate concentration measured at MW15-03 (the replacement well for MW10-3), is 0.033, well below the guideline. Total Kjeldahl Nitrogen (TKN) concentrations mimic the nitrate concentrations being low for all wells except for MW10-3 with a TKN concentration of 13 mg/L. It is suspected that there was leakage from surface into the well bore causing an unrepresentative groundwater quality sample.

The elevated concentrations of nutrients (phosphorous and nitrate) in MW10-3 may indicate that the well was too shallow and poorly sealed or that there is some recharge of runoff potentially elevating the nutrient concentrations. Given the well is installed in a pasture the elevated nitrate concentration may be due to surface leakage along the well casing.

3.3.2 Metals

The laboratory analysis of five groundwater samples and one duplicate for dissolved and total metals are presented in Table 7. Though both dissolved and total metals were analyzed, the dissolved concentrations are more applicable in this case to determine representative baseline metal concentrations in the groundwater. There are guideline exceedances for some metals described below that are likely related to sediment in the groundwater samples given the large difference between the dissolved and total metals concentrations. The relatively fine-grained geological media does not allow for flow of fine suspended solids and the dissolved concentrations are thus considered more relevant. The relatively high total metals concentrations in the older 2010 monitoring wells indicate that they were not properly constructed, and allow excessive fine sediment into the well screens.

The dissolved metals concentrations were generally low, with all metals below the applicable Alberta ESRD guidelines except for cadmium (MW14-04), selenium (MW10-01 and MW10-03), and uranium (MW10-01 and MW14-5a). The dissolved cadmium concentration of 1.5 µg/L is greater than the criteria of 0.02 µg/L. This concentration is anomalously high relative to the other samples collected and should be investigated further next sample collection event. The other metal exceedances for selenium and uranium are common in Alberta resulting from the parent minerals that compose the local till materials and recent sediments such as lacustrine and

colluvial materials. Minor exceedances of manganese, selenium and uranium are also indicated by the analytical data. However, exceedances are common for these parameters in Alberta and considered to be representative of elevated natural background concentrations.

There were more exceedances for total metals including aluminum, arsenic, cadmium, chromium, copper, lead, selenium, silver, and zinc. The source of these elevated total metals concentrations is not known. However, these elevated concentrations are thought to be related to sediments suspended in the groundwater samples and are unlikely to be mobile in the groundwater environment. While the concentrations of the aforementioned metals are elevated, there is no reason to believe these exceedances are related to anthropogenic sources and they are likely to be naturally occurring given the low solubility and relatively low concentrations despite the guideline exceedances. The baseline soil characterization program should analyze for metals providing additional data to interpret these elevated total metal concentrations.

3.3.3 Petroleum Hydrocarbons and BTEX

Given the presence of two reclaimed oil well sites on the subject property, the groundwater was also analyzed for BTEX and petroleum hydrocarbon fractions F1 (C1-C6) and F2 (C6-10) to determine if pre-existing impacts to groundwater from previous land uses were present.

Table 8 shows the analytical results from ten samples and duplicated analyzed to date from all monitoring wells. In all samples analyzed the lab results indicate non-detectable concentrations of BTEX and F1/F2 hydrocarbons. This provides reasonable evidence to suggest there are no hydrocarbon impacts to groundwater from the reclaimed well pads evident at the monitoring well locations.

3.3.4 Geochemical Facies

The major ion water chemistry data from the ten monitoring wells are plotted on the Piper Diagram below (Figure 8). The relatively low total dissolved solids content of the water indicates that the groundwater flow across the site is local-scale, resulting from recharging atmospheric water input (recharge) on the subdued topographic features found in the vicinity of the project site. The low concentrations of dissolved solids results in some variability in the geochemical groundwater facies of the groundwater across the site. There appears to be a correlation between the shallow wells (i.e., <3 m BGS) having calcium-bicarbonate dominated geochemistry, while the deeper wells (approximately 5-10 m BGS) are dominated by sodium and sulphate ions. This change in chemistry correlates to the geology as the base of the loam layer as modeled in the 3D CSM is approximately 3 m deep over most of the site.

Table 5 Geochemical Groundwater Facies

Monitoring Well	Water Type
MW10-01	Ca-Mg-HCO_3
MW10-02	
MW10-03	Ca-Mg-HCO_3
MW14-04	Ca-Na-Mg-HCO_3
MW14-05A	Na-Ca-HCO_3
MW14-05B	Na-HCO_3-SO_4
MW14-10	Na-HCO_3-SO_4
MW15-01	Ca-Mg-Na-HCO_3
MW15-02	Na-Ca-SO_4-HCO_3
MW15-03	Na-Ca-HCO_3

Figure 8 Piper Diagram of Groundwater

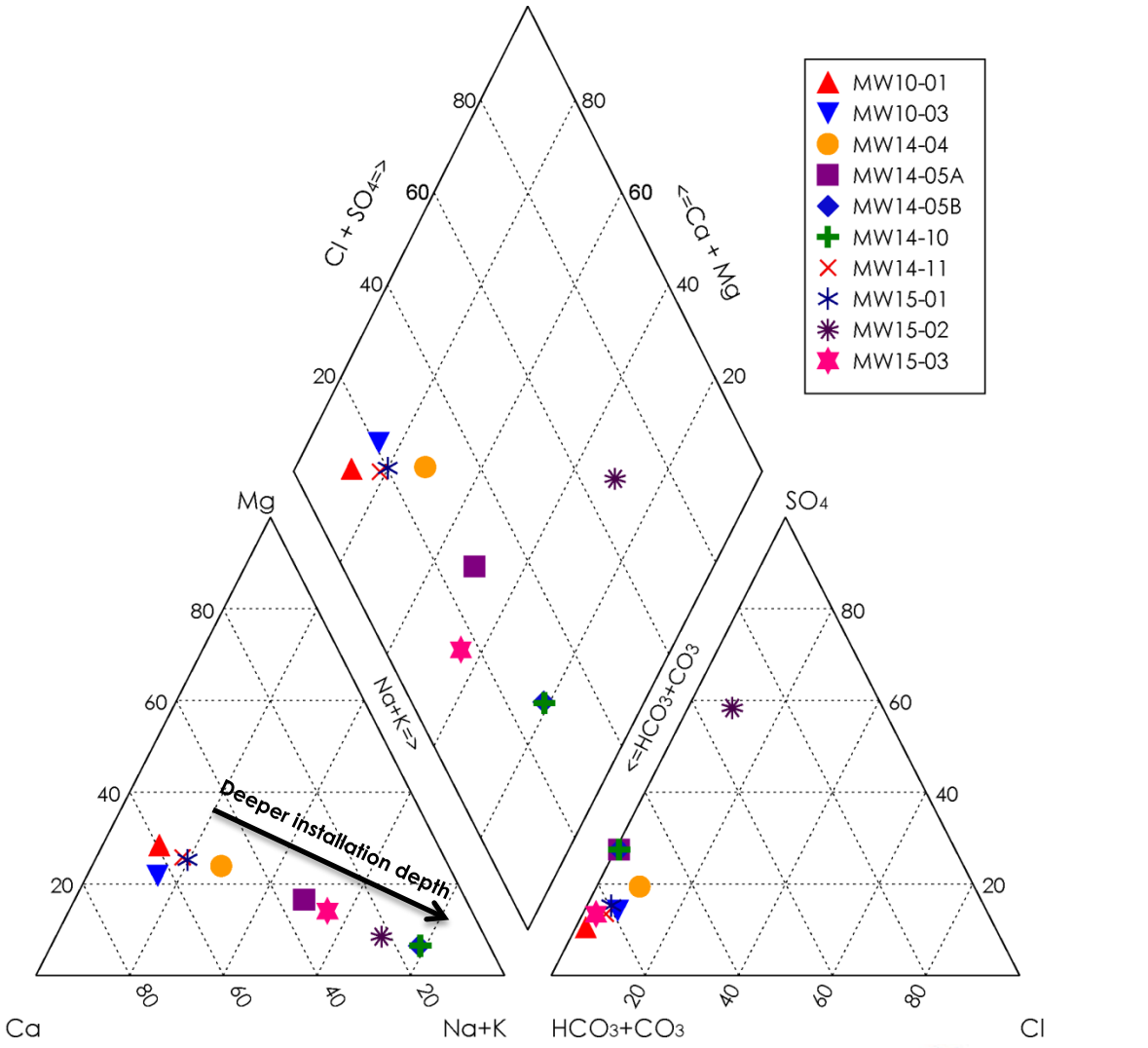


Table 6 - Groundwater Analytical Results - Routine Water Analysis and Nutrients
Lincon Ranch, Gull Lake, Alberta

Parameter	Units	RDL	ESRD 2014 [1]	Sample No. / Date		QA/QC		Sample No. / Date				Sample No. / Date	Sample No. / Date		QA/QC		Sample No. / Date	
				MW14-05B	MW14-10 (Duplicate)			MW14-04	MW14-05A	MW10-01	MW10-03	MW10-02	MW15-01	MW14-11 (Duplicate)			MW15-02	MW15-03
				9-Dec-14	9-Dec-14	RPD/AD	Method	9-Dec-14	9-Dec-14	9-Dec-14	9-Dec-14	19-Feb-15	23-Apr-15	23-Apr-15	RPD/AD	Method	23-Apr-15	14-Apr-15
Anion Sum	meq/L	N/A	NG	14	14	NA	NA	10	14	7.5	8.5	11	7.7	7.5	3%	RPD	26	9.1
Cation Sum	meq/L	N/A	NG	14	14	NA	NA	10	14	7.8	8.5	13	8.8	9.1	3%	RPD	27	9.0
Hardness (CaCO3)	mg/L	0.50	NG	150	150	0%	RPD	360	370	340	360	320	360	370	3%	RPD	410	200
Ion Balance	N/A	0.010	NG	0.97	0.98	1%	RPD	0.99	1.0	1.0	1.0	1.2	1.2	1.2	0%	RPD	1.0	0.99
Dissolved Nitrate (NO3)	mg/L	0.044	NG	0.64	0.61	5%	RPD	0.067	1.3	5.8	36	0.48	0.72	0.71	1%	RPD	0.26	0.16
Nitrate plus Nitrite (N)	mg/L	0.010	NG	0.14	0.14	0%	RPD	0.015	0.34	1.3	8.1	0.12	0.18	0.18	0%	RPD	0.077	0.037
Dissolved Nitrite (NO2)	mg/L	0.033	NG	<0.033	<0.033	NC	NA	<0.033	0.13	<0.033	<0.033	0.036	0.057	0.059	0.002	AD	0.063	<0.033
Total Dissolved Solids	mg/L	10	500	**810**	**810**	0%	RPD	**530**	**800**	390	460	**650**	420	420	0%	RPD	**1700**	480
Conductivity	uS/cm	1.0	NG	1300	1300	0%	RPD	890	1300	660	770	950	670	650	3%	RPD	2300	820
pH	pH	N/A	6.5-8.5	8.08	8.09	NA	NA	7.91	7.80	8.18	7.86	8.08	7.59	7.64	1%	RPD	7.73	7.89
Alkalinity (PP as CaCO3)	mg/L	0.50	NG	<0.50	<0.50	NC	NC	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NC	NA	<0.50	<0.50
Alkalinity (Total as CaCO3)	mg/L	0.50	NG	520	510	2%	RPD	360	520	320	310	400	310	310	0%	RPD	410	380
Bicarbonate (HCO3)	mg/L	0.50	NG	630	630	0%	RPD	440	630	400	380	490	370	370	0%	RPD	510	460
Carbonate (CO3)	mg/L	0.50	NG	<0.50	<0.50	NC	NA	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NC	NA	<0.50	<0.50
Hydroxide (OH)	mg/L	0.50	NG	<0.50	<0.50	NC	NA	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NC	NA	<0.50	<0.50
Dissolved Sulphate (SO4)	mg/L	1.0	500	190	190	0%	RPD	94	190 (1)	38	54	110	56	48	15%	RPD	**730 (1)**	58
Dissolved Chloride (Cl)	mg/L	1.0	100	3.9	4.0	3%	RPD	33	3.9	5.6	20	23	14	13	7%	RPD	87	9.1
Dissolved Nitrite (N)	mg/L	0.010	1.0	<0.010	<0.010	NC	NA	<0.010	0.040	<0.010	<0.010	0.011	0.017	0.018	0.001	AD	0.019	<0.010
Dissolved Nitrate (N)	mg/L	0.010	3.0	0.14	0.14	0%	RPD	0.015	0.30	**1.3**	**8.1**	0.11	0.16	0.16	0%	RPD	0.058	0.037
Nutrients																		
Orthophosphate (P)	mg/L	0.0030	NG	<0.0030	0.0030	0%	AD	<0.0030	<0.0030	0.0090	0.0040	0.0050	0.0030	0.0030	0.00	AD	0.077	0.0070
Total Phosphorus (P)	mg/L	0.0030	NG	0.021	0.019	10%	RPD	0.041	0.50 (1)	7.7 (1)	16 (1)	4.6 (1)	0.026	0.021	***21%***	RPD	1.0 (1)	0.23
Total Total Kjeldahl Nitrogen	mg/L	0.05	NG	0.59	0.61	0	AD	0.60	0.80	3.9 (1)	13 (1)	85 (1)	0.36	0.42	15%	RPD	1.9	0.58

Notes:
NA-Not Applicable
NG - No guideline established
NC - Not calculated
RPD - Relative Percent Difference
AD - Absolute Difference (used when concentrations are less than 5 times the RDL)
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
Bold - Exceeds applicable guideline
1 - Alberta Environment and Sustainable Resource Development (2014) *Alberta Tier 1 Soil and Groundwater Guidelines* for Fine Grained Soil with Agricultural land use
0.2 - Parameter exceeds QA/QC reproducibility criteria

Table 7 - Groundwater Analytical Results - Dissolved and Total Metals
Lincon Ranch, Gull Lake, Alberta

Parameter	Units	RDL	ESRD 2014 [1]	Sample No. / Date		QA/QC		Sample No. / Date				Sample No. / Date	Sample No. / Date		QA/QC			
				MW14-05B	MW14-10 (Duplicate)			MW14-04	MW14-05A	MW10-01	MW10-03	MW10-02	MW15-01	MW14-11 (Duplicate)			MW15-02	MW15-03
				9-Dec-14	9-Dec-14	RPD/AD	Method	9-Dec-14	9-Dec-14	9-Dec-14	9-Dec-14	19-Feb-15	23-Apr-15	23-Apr-15	RPD/AD	Method	23-Apr-15	14-Apr-15
Dissolved Cadmium (Cd)	ug/L	0.020	0.2	0.024	0.024	0	AD	1.5	0.095	0.021	<0.020	<0.020	0.042	0.024	0.018	AD	0.024	0.028
Dissolved Aluminum (Al)	mg/L	0.0030	0.05	0.0043	0.0041	0.0002	AD	0.0038	0.0046	0.0099	0.0038	<0.030	0.12	0.0045	0.12	AD	0.0088	0.0043
Dissolved Antimony (Sb)	mg/L	0.00060	0.006	<0.00060	<0.00060	NC	NA	<0.00060 (2)	<0.00060	<0.00060	<0.00060	<0.0060	<0.00060	<0.00060	NC	NA	0.00071	<0.00060
Dissolved Arsenic (As)	mg/L	0.00020	0.01	0.0039	0.0037	5.26%	RPD	0.0013	0.0010	0.00033	0.00023	<0.0020	0.00081	0.00074	0.00007	AD	0.0018	0.0031
Dissolved Barium (Ba)	mg/L	0.010	1	0.038	0.038	0	AD	0.16	0.092	0.17	0.25	0.14	0.11	0.10	9.52%	RPD	0.14	0.15
Dissolved Beryllium (Be)	mg/L	0.0010	NG	<0.0010	<0.0010	NC	NA	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.0010	NC	NC	<0.0010	<0.0010
Dissolved Boron (B)	mg/L	0.020	0.5	0.25	0.25	FALSE	NC	0.064	0.21	0.028	0.031	0.078	0.066	0.068	0.002	AD	0.21	0.14
Dissolved Calcium (Ca)	mg/L	0.30	NG	42	41	0%	RPD	97	100	93	110	86	97	100	3.05%	RPD	120	54
Dissolved Chromium (Cr)	mg/L	0.0010	0.0049	<0.0010	<0.0010	NC	NA	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.0010	NC	NA	<0.0010	<0.0010
Dissolved Cobalt (Co)	mg/L	0.00030	NG	0.00033	0.00035	0.00002	AD	0.00054	0.00078	<0.00030	<0.00030	<0.0030	0.00096	0.00083	0.00013	AD	0.00052	0.00052
Dissolved Copper (Cu)	mg/L	0.00020	0.007	0.0027	0.0024	11.76%	RPD	0.0016	0.00075	0.0038	0.0011	0.0025	0.00140	0.00065	0.0008	AD	0.0024	0.00057
Dissolved Iron (Fe)	mg/L	0.060	0.3	<0.060	<0.060	NC	NA	<0.060	<0.060	<0.060	<0.060	<0.12	0.19	<0.060	0.1300	AD	<0.060	<0.060
Dissolved Lead (Pb)	mg/L	0.00020	5.3	<0.00020	<0.00020	NC	NC	<0.00020	<0.00020	<0.00020	<0.00020	<0.0020	0.00038	<0.00020	0.00018	AD	<0.00020	<0.00020
Dissolved Lithium (Li)	mg/L	0.020	NG	0.035	0.036	0.001	AD	0.035	0.062	0.024	<0.020	<0.040	0.025	0.026	0.001	AD	0.051	0.039
Dissolved Magnesium (Mg)	mg/L	0.20	NG	11	11	0%	RPD	29	29	27	23	25	27	28	3.64%	RPD	28	15
Dissolved Manganese (Mn)	mg/L	0.0040	0.05	0.17	0.17	0%	RPD	0.44	0.25	<0.0040	<0.0040	2.3	0.30	0.29	3.39%	RPD	0.27	0.14
Dissolved Molybdenum (Mo)	mg/L	0.00020	NG	0.016	0.016	0%	RPD	0.0080	0.0051	0.0017	0.0014	0.0029	0.0029	0.0034	15.87%	RPD	0.015	0.0043
Dissolved Nickel (Ni)	mg/L	0.00050	NG	0.0017	0.0016	6.06%	RPD	0.0017	0.0023	0.0015	0.0012	0.0072	0.0034	0.0031	9.23%	RPD	0.0027	0.0017
Dissolved Phosphorus (P)	mg/L	0.10	NG	<0.10	<0.10	NC	NA	<0.10	0.14	<0.10	<0.10	<0.20	0.11	0.22	0.11	AD	0.12	0.17
Dissolved Potassium (K)	mg/L	0.30	NG	3.8	3.8	0%	RPD	4.2	4.6	1.2	1.7	1.5	3.2	3.3	3.08%	RPD	5.7	1.9
Dissolved Selenium (Se)	mg/L	0.00020	0.001	0.00040	0.00039	0.00001	AD	<0.00020	0.00058	0.0038	0.0016	<0.0020	0.00075	0.00089	0.00014	AD	0.0043	<0.00020
Dissolved Silicon (Si)	mg/L	0.10	NG	6.7	6.7	0%	RPD	6.4	6.9	6.0	7.2	10	6.70	6.4	4.58%	RPD	4.7	5.8
Dissolved Silver (Ag)	mg/L	0.00010	NG	<0.00010	<0.00010	NC	NA	<0.00010	<0.00010	<0.00010	<0.00010	<0.0010	<0.00010	<0.00010	NC	NA	<0.00010	<0.00010
Dissolved Sodium (Na)	mg/L	0.50	NG	250	250	0%	RPD	61	160	21	29	160	38	36	5.41%	RPD	430.00	110
Dissolved Strontium (Sr)	mg/L	0.020	NG	0.42	0.42	0%	RPD	0.74	0.85	0.55	0.58	0.54	0.54	0.55	1.83%	RPD	0.91	0.38
Dissolved Sulphur (S)	mg/L	0.20	NG	59	59	0%	RPD	30	66	12	18	41	32	35	8.96%	RPD	260.00	19
Dissolved Thallium (Tl)	mg/L	0.00020	NG	<0.00020	<0.00020	NC	NA	<0.00020	<0.00020	<0.00020	<0.00020	<0.0020	<0.00020	<0.00020	NC	NC	<0.00020	<0.00020
Dissolved Tin (Sn)	mg/L	0.0010	NG	<0.0010	<0.0010	NC	NA	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	0.00230	0.0017	0.0006	AD	0.0039	<0.0010
Dissolved Titanium (Ti)	mg/L	0.0010	NG	<0.0010	<0.0010	NC	NA	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	0.00410	<0.0010	0.0031	AD	<0.0010	<0.0010
Dissolved Uranium (U)	mg/L	0.00010	0.01	0.0058	0.0057	NC	NC	0.0063	0.026	0.014	0.0045	0.0065	0.012	0.011	0.001	AD	0.048	0.0040
Dissolved Vanadium (V)	mg/L	0.0010	NG	<0.0010	<0.0010	NC	NA	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.0010	NC	NA	<0.0010	0.0015
Dissolved Zinc (Zn)	mg/L	0.0030	0.03	0.0053	<0.0030	0.0023	AD	0.0073	0.0046	0.017	<0.0030	<0.030	0.00640	<0.0030	0.0034	AD	0.0040	<0.0030
Total Metals																		
Total Cadmium (Cd)	ug/L	0.020	0.2	0.053	0.040	0.013	AD	2.0	0.24	3.2	9.4	45	0.027	0.040	0.013	AD	1.7	0.12
Total Aluminum (Al)	mg/L	0.0030	0.05	0.17	0.36	71.70%	RPD	0.82	1.2	96 (1)	130 (1)	670 (1)	0.013	0.40	187.41%	RPD	33	2.9
Total Antimony (Sb)	mg/L	0.00060	0.006	<0.00060	<0.00060	NC	NA	<0.00060	<0.00060	0.0017	0.0015	<0.060	<0.00060	<0.00060	NC	NA	0.00088	<0.00060
Total Arsenic (As)	mg/L	0.00020	0.01	0.0048	0.0047	2.11%	RPD	0.0022	0.0027	0.14	0.29	0.70	0.00059	0.00092	0.0003	AD	0.036	0.0053
Total Barium (Ba)	mg/L	0.010	1	0.052	0.045	0.007	AD	0.18	0.14	4.2	8.1 (1)	33 (1)	0.099	0.12	19.18%	RPD	1.3	0.29
Total Beryllium (Be)	mg/L	0.0010	NG	<0.0010	<0.0010	NC	NC	<0.0010	<0.0010	0.0082	0.015	<0.10	<0.0010	<0.0010	NC	NA	0.0029	<0.0010
Total Boron (B)	mg/L	0.020	0.5	0.26	0.25	4%	RPD	0.071	0.21	0.057	0.089	0.57	0.070	0.059	0.011	AD	0.22	0.14
Total Calcium (Ca)	mg/L	0.30	NG	48	47	2%	RPD	110	130	340	740 (1)	3000 (1)	100	97	3.05%	RPD	210	58
Total Chromium (Cr)	mg/L	0.0010	0.0049	<0.0010	0.0012	0.0002	AD	0.0017	0.0030	0.37	1.1	1.3	<0.0010	<0.0010	NC	NA	0.062	0.0052
Total Cobalt (Co)	mg/L	0.00030	NG	0.00060	0.00058	2E-05	AD	0.00098	0.0030	0.12	0.21	1.0	0.00080	0.0012	0.0004	AD	0.043	0.0031
Total Copper (Cu)	mg/L	0.00020	0.007	0.0044	0.0041	7%	RPD	0.0031	0.0042	0.30	0.44	1.6	0.0013	0.0017	26.67%	RPD	0.12	0.0081
Total Iron (Fe)	mg/L	0.060	0.3	0.39	0.39	0%	RPD	1.0	3.2	290 (1)	470 (1)	1700 (1)	<0.060	0.77	0.1700	AD	88	6.5
Total Lead (Pb)	mg/L	0.00020	5.3	0.00049	0.00053	0.00004	AD	0.00076	0.0030	0.16	0.28	0.95	<0.00020	0.00047	0.0003	AD	0.056	0.0035
Total Lithium (Li)	mg/L	0.020	NG	0.036	0.036	0	AD	0.036	0.066	0.19	0.22	1.1	0.024	0.025	0.001	AD	0.11	0.044
Total Magnesium (Mg)	mg/L	0.20	NG	13	12	8%	RPD	30	32	130	200	740	27	27	0.00%	RPD	62	17
Total Manganese (Mn)	mg/L	0.0040	0.05	0.20	0.20	0%	RPD	0.49	0.49	5.7	17	100 (1)	0.28	0.33	16.39%	RPD	2.4	0.27
Total Molybdenum (Mo)	mg/L	0.00020	NG	0.019	0.018	5%	RPD	0.0089	0.0056	0.025	0.074	0.043	0.0035	0.0035	0.00%	RPD	0.015	0.0047
Total Nickel (Ni)	mg/L	0.00050	NG	0.0028	0.0028	0%	RPD	0.0039	0.0077	0.38	1.0	3.2	0.0031	0.0036	14.93%	RPD	0.12	0.011
Total Phosphorus (P)	mg/L	0.10	NG	<0.10	<0.10	NC	NA	<0.10	0.55	8.7	17	81	0.16	0.16	0.00	AD	3.6	0.22
Total Potassium (K)	mg/L	0.30	NG	4.0	3.9	3%	RPD	4.4	5.1	15	21	76	3.2	3.1	3.17%	RPD	11	2.8
Total Selenium (Se)	mg/L	0.00020	0.001	0.00047	0.00047	0	AD	<0.00020	0.00068	0.0064	0.0065	0.030	0.00081	0.00072	0.00009	AD	0.0068	<0.00020
Total Silicon (Si)	mg/L	0.10	NG	7.8	7.6	3%	RPD	7.8	11	130 (1)	170 (1)	660 (1)	6.4	7.4	14.49%	RPD	48	15
Total Silver (Ag)	mg/L	0.00010	NG	0.00054	0.00069	24%	RPD	0.0016	0.00038	0.0028	0.0059	0.015	<0.00010	<0.00010	NC	NA	0.00058	<0.00010
Total Sodium (Na)	mg/L	0.50	NG	250	250	0%	RPD	62	160	24	30	210	35	34	2.90%	RPD	400	120
Total Strontium (Sr)	mg/L	0.020	NG	0.47	0.46	2%	RPD	0.79	0.92	1.3	2.0	8.1	0.54	0.55	1.83%	RPD	0.97	0.41
Total Sulphur (S)	mg/L	0.20	NG	65	64	2%	RPD	32	70	13	21	60	35	29	18.75%	RPD	240	19
Total Thallium (Tl)	mg/L	0.00020	NG	<0.00020	<0.00020	NC	NA	<0.00020	<0.00020	0.0043	0.0065	0.026	<0.00020	<0.00020	NC	NA	0.0011	<0.00020
Total Tin (Sn)	mg/L	0.0010	NG	0.0025	0.0022	0	AD	0.0013	<0.0010	0.0064	0.012	<0.10	0.0017	0.0033	0.0016	AD	0.0083	0.0013
Total Titanium (Ti)	mg/L	0.0010	NG	0.0062	0.016	88%	RPD	0.028	0.041	2.0	1.1	2.6	<0.0010	0.0080	0.0070	AD	0.48	0.098
Total Uranium (U)	mg/L	0.00010	0.01	0.0066	0.0062	6%	RPD	0.0070	0.027	0.027	0.022	0.12	0.012	0.011	8.70%	RPD	0.056	0.0044
Total Vanadium (V)	mg/L	0.0010	NG	<0.0010	0.0012	0.0002	AD	0.0025	0.0049	0.33	0.46	1.9	<0.0010	0.0014	0.0004	AD	0.095	0.0095
Total Zinc (Zn)	mg/L	0.0030	0.03	0.0082	0.0063	0.0019	AD	0.010	0.021	0.91	1.5	5.3	0.0050	0.0082	0.003	AD	0.36	0.028

Notes:
NA-Not Applicable
NG - No guideline established
NC - Not calculated
RPD - Relative Percent Difference
AD - Absolute Difference (used when concentrations are less than 5 times the RDL)
Bold - Exceeds applicable guideline
1 - Alberta Environment and Sustainable Resource Development (2014) *Alberta Tier 1 Soil and Groundwater Guidelines* for Fine Grained Soil with Agricultural land use
2 - Dissolved greater than total. Results within acceptable limits of precision.
3 - Dissolved greater than total. Results are within limits of uncertainty.
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.
(2) Matrix Spike exceeds acceptance limits due to matrix interference. Reanalysis yields similar results.
Bold - Parameter exceeds QA/QC reproducibility criteria

	Dissolved greater than total. Results within acceptable limits of precision.
	Dissolved greater than total. Reanalysis yields similar results.
	Dissolved greater than total. Results are within limits of uncertainty(MU).

Table 8 - Groundwater Analytical Results - Contaminants of Concern (PAHs, BTEX and TPH F1 - F4)
Lincon Ranch, Gull Lake, Alberta

Parameter	Units	RDL	ESRD 2014 [1]	Sample No. / Date		QA/QC		Sample No. / Date			Sample No. / Date	Sample No. / Date		QA/QC		Sample No. / Date	
				MW14-05B	MW14-10 (Duplicate)			MW14-04	MW14-05A	MW10-03	MW10-02	MW15-01	MW14-11 (Duplicate)			MW15-02	MW15-03
				9-Dec-14	9-Dec-14	RPD/AD	Method	9-Dec-14	9-Dec-14	9-Dec-14	19-Feb-15	23-Apr-15	23-Apr-15	RPD/AD	Method	23-Apr-15	14-Apr-15
BTEX																	
Benzene	mg/L	0.00040	0.005	<0.00040	<0.00040	NC	NA	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	NC	NA	<0.00040	<0.00040
Toluene	mg/L	0.00040	0.024	<0.00040	<0.00040	NC	NA	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	NC	NA	<0.00040	<0.00040
Ethylbenzene	mg/L	0.00040	0.0024	<0.00040	<0.00040	NC	NA	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	NC	NA	<0.00040	<0.00040
m & p-Xylene	mg/L	0.00080	NG	<0.00080	<0.00080	NC	NA	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	NC	NA	<0.00080	<0.00080
o-Xylene	mg/L	0.00040	NG	<0.00040	<0.00040	NC	NA	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	NC	NA	<0.00040	<0.00040
Xylenes (Total)	mg/L	0.00080	0.3	<0.00080	<0.00080	NC	NA	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	NC	NA	<0.00080	<0.00080
(C6-C10)	mg/L	0.10	NG	<0.10	<0.10	NC	NA	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	NC	NA	<0.10	<0.10
Total Petroleum Hydrocarbons																	
F1 (C6-C10) - BTEX	mg/L	0.10	2.2	<0.10	<0.10	NC	NA	<0.10	<0.10	<0.10	Not enough sample	<0.10	<0.10	NC	NA	<0.10	<0.10
F2 (C10-C16 Hydrocarbons)	mg/L	0.10	1.1	<0.10	<0.10	NC	NA	<0.10	<0.10	<0.10	Not enough sample	<0.10	<0.10	NC	NA	<0.10	<0.10
F3 (C16-C34 Hydrocarbons)	mg/L	0.20	NG	<0.20	<0.20	NC	NA	<0.20	<0.20	<0.20	Not enough sample	<0.20	<0.20	NC	NA	<0.20	<0.20
F4 (C34-C50 Hydrocarbons)	mg/L	0.20	NG	<0.20	<0.20	NC	NA	<0.20	<0.20	<0.20	Not enough sample	<0.20	<0.20	NC	NA	<0.20	<0.20

Notes:
NA-Not Applicable
NG - No guideline established
NC - Not calculated
RPD - Relative Percent Difference
AD - Absolute Difference (used when concentrations are less than 5 times the RDL)
Bold **-** Exceeds applicable guideline
1 - Alberta Environment and Sustainable Resource Development (2014) *Alberta Tier 1 Soil and Groundwater Guidelines* for Fine Grained Soil with Agricultural land use

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CURRENT MONITORING NETWORK

The spatial distribution of monitoring wells provides adequate coverage to assess the current groundwater flow system characteristics and geochemistry. The pair of nested shallow and deep wells recently installed (MW14-5a and MW14-5b) allow the characterization of vertical gradient and vertical component of groundwater flow, and the wells allow for monitoring of the shallow and deep hydrostratigraphic layers identified through the geomodel development.

The non-point source nature of the planned application of waste products requires that the groundwater flow direction be well understood to have monitoring wells in positions to facilitate on-going sampling of groundwater in down-gradient locations. The monitoring network as it stands does this, with wells in critical locations particularly now that the older 2010 monitoring wells have been replaced in areas likely to be un-impacted by development activities.

Site topography and groundwater patterns suggest that MW15-02 may be a stagnation point in the local groundwater flow systems as the ridge running across the project site focuses some local-scale flow away from the lake, counter to the overall flow direction towards the lake. This may explain its high TDS and sulphate concentration in this area. Alternatively, the lacustrine material may have different geochemical properties in the area in which MW15-02 is installed.

4.2 WATER CHEMISTRY AND BASELINE NUTRIENT SUMMARY

A report completed by Alberta Environment entitled *An Assessment of Water Quality in Gull Lake (1999-2000)*, describes the general chemical characteristics of Gull Lake as slightly saline with a TDS concentration of approximately 750 mg/L. The dissolved solids content is dominated by bicarbonate (637 mg/L), sodium (194 mg/L), and sulphate (76 mg/L). This general chemistry has a similar overall geochemical make-up to the groundwater. However, the nutrient concentrations in Gull Lake suggest surface water and runoff processes are the primary contributors of nutrient loading as the concentrations are far higher in the surface water than the groundwater. Phosphorous concentration was documented to be 45.1 mg/L in Gull Lake. Excluding the measured concentration of 16 mg/L at MW10-3 which was thought to be influenced by surface water, the maximum phosphorous concentrations was 1 mg/L at MW15-02. The report cites runoff, sewage, and precipitation and dust-fall as the main phosphorous sources (and presumably other nutrient as well) rather than groundwater flow (base flow) into the lake.

The cursory comparison of water chemistry is not exhaustive but serves to highlight that the current groundwater geochemistry would have to be significantly altered from its current state to negatively impact the water quality of Gull Lake.

4.3 POTENTIAL IMPACTS TO SURFACE WATER (GULL LAKE)

Currently, the groundwater chemistry from the samples collected indicate that in general, the groundwater on the project site is low TDS, local groundwater with limited potential to impact the water quality of Gull Lake. Contaminants of concern from previous land use have been assessed and limited potential for salt and/or hydrocarbon impacts was indicated from the drilling and sampling program. Based on the generally low nutrient concentrations other than those identified at MW10-3, there is little concern with initial nutrient concentrations reducing the potential for nutrient loading associated with application of waste water to impact the lake. The shallow monitoring wells installed in 2010 have been replaced with deeper (5 m BGS), properly installed wells in analogous positions to re-evaluate shallow groundwater chemistry at these locations.

The physical hydrogeological conditions on site also indicate that there is limited potential to impact the water quality of Gull Lake based on the following observations:

- Subdued, undulating topography and low-permeability sediments result in relatively slow groundwater flow velocities on the project site. Horizontal gradients are small ranging from 0.013 to 0.009 across the site. Given the hydraulic conductivity values presented above, the groundwater flow velocities range from a maximum of 5.3 m/year to a minimum of 0.005 m/year using the maximum and minimum gradients and conductivity values to bracket the possible range. Small vertical gradients were observed and low permeability lacustrine clay layers indicate groundwater flow is likely dominated by lateral flow.
- Groundwater flow direction is not consistent across the site, with some degree of radial flow off of the topographic ridge oriented in a northeast to southwest direction. This results in some groundwater flow to the south, southwest and west towards Gull Lake. This means that some of the groundwater flow will take longer to reach the lake due to a convoluted flow path and longer attenuation periods for groundwater constituents such as dissolved nutrient concentrations.
- Given the elevation of the stage of Gull Lake, it is intuitive that there is a strong vertical component of downward groundwater flow. This agrees with the interpretation that the project site is in a recharge area for a local-scale flow system as the vertical gradient of 0.15 indicates recharge conditions. This also indicates that the flow across the low-permeability lacustrine clay materials further retard the rate of migration of dissolved constituents in groundwater towards the lake.
- Continued monitoring and evaluation of seasonal groundwater chemistry trends will increase the understanding of how shallow groundwater from the site may interact with Gull Lake surface water. The physical site characteristics are such that any potential impacts to the lake could be recognized on-site by the monitoring network through early detection of changes to local-scale groundwater chemistry.

4.4 FUTURE MONITORING AND RECOMMENDATIONS

The following recommendations are made to monitor and mitigate potential quality impacts to surface water resources:

- Monitor groundwater levels and groundwater chemistry including, general chemistry parameters, nutrients, and metals in the spring, summer, and fall periods for a minimum of two years to determine seasonal variation in the groundwater chemistry.
- Seasonal sampling may also indicate the current agricultural land use has contributed to the nutrient levels currently observed. As project site land use transitions from agricultural to the proposed land use (golf course) a trend indicating a reduction in groundwater nutrient concentrations may be observed prior to initiation of wastewater application.
- After seasonal variation is assessed (two year period), select one monitoring event with highest potential to observe nutrient mobilization and monitor for general chemistry, nutrients and metals annually thereafter. BTEX and hydrocarbon analysis are no longer required to assess any impacts from previous land use.
- Once seasonal variation in groundwater chemistry is understood, utilize trend analysis and establish trigger concentrations to initiate some additional mitigation measures if necessary.
- Once wastewater application begins after the site is developed, monitor the volumes of added waste material applied to the land surface and follow the elements of the Guidelines for Municipal Wastewater Irrigation (Alberta Environment, 2000)
- Update the 3D CSM with new water table contours, topography and landscape alteration when the final development and site grading is completed. Groundwater flow should be re-evaluated as well. As the data from the soil monitoring program is collected, tie the data in with the 3D CSM to facilitate integrated analysis.
- Produce and issue an annual report documenting the groundwater conditions in support of the wastewater license requirements including analysis of nutrient concentrations over time in the shallow groundwater as determined from monitoring network established to present the baseline conditions.

5.0 REFERENCES

Alberta Environment, 2000. Guidelines for Municipal Wastewater Irrigation (http://environment.gov.ab.ca/info/library/7268.pdf)

Fenton, M.M., Waters, E.J., Pawley, S.M., Atkinson, N., Utting, D.J. and Mckay, K. (2013): Surficial geology of Alberta; Alberta Energy Regulator, AER/AGS Map 601, scale 1:1 000 000.

Klohn Crippen Berger, Jan. 31, 2011: Level II Land Classification, Soil Survey and Groundwater Assessment Report, NW-14-041-28- W4M: Lacombe County, AB

LaBreton, E., and Green, R., 1970. Hydrogeological Map of the Red Deer Area, Alberta. NTS 83A, Alberta Research Council.

Mitchell, P. and LeCLair, D., 2003. An Assessment of Water Quality in Gull Lake (1999-2000). Environmental Monitoring and Evaluation Alberta Environment. 19 p.

Mitchell P. and Prepas, E., 1990. Atlas of Alberta Lakes. University of Alberta Press, Edmonton, Alberta.

Prior, G.J., Hathway, B., Glombick, P.M., Pană, D.I., Banks, C.J., Hay, D.C., Schneider,

C.L., Grobe, M., Elgr, R. and Weiss, J.A. (2013): Bedrock geology of Alberta; Alberta

Energy Regulator, AER/AGS Map 600, scale 1:1 000 000.

Shetsen, I. 1990. Quaternary Geology, Central Alberta. Natural Resource Division, Terrain Sciences Department, Alberta Research Council.

Slattery, S.R., and Barker, A.A., 2010. Neogene Sediment Thickness of the Edmonton-Calgary Corridor, Alberta (NTS 82O, 82P, 83A, 83B, 83G, and 83H); Energey Resource Conservation Board, ERCB/AGS Map 549, scale 1:500 000.

Stantec, July 2014, Lincoln Ranch Outline Plan.

Parkland Geo for Stantec Consulting Ltd., 2014. Phase I Environmental Site Assessment (ESA) Proposed Development near Gull Lake, (NW 1/4 14-41-28-W4M Lacombe County, AB.

Waterline Resources Inc., June 29, 2007: Groundwater Diversion License Application, DeGraff Built Green Resort, SE-22-041-28-W4M, Gull Lake, AB.

Tokarsky, O. 1971. Hydrogeological Map of the Rocky Mountain House Area, Alberta. NTS 83B, Alberta Research Council.

APPENDIX A
BOREHOLE LOGS

Stantec

BOREHOLE RECORD

MW14-04

CLIENT **Riser Developments Ltd.**

PROJECT No. **113929396**

LOCATION **Lincon Ranch, Gull Lake Alberta**

Borehole Coordinates
N: 5824361
E: 300675

DATES (mm/dd/yyyy): BORING **01/12/2014** WATER LEVEL **1.83 m BGS 01/012/2014**

Datum: Nad 83 UTM Zone 12

Drilling Contractor : **Calibre Drilling** Drilling Method : **Solid Stem Auger** Logged By : **Stantec: S.Cairns**

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
0		@ 0m BGS TOP SOIL: Dark brown and organic rich	0.00 - 0.46m					Stick up: 1.04 m Protective casing
		@ 0.46m BGS SILT: Soft brown grey sandy silt with clumps of grey brown clay and ocasional fine gravel.	0.46 - 3.05m				▼	Borehole: 0 to 5.18m BGS with a diameter of 0.10 m (4"). Well Pipe: Sch 40 PVC Pipe with a diameter of 0.05 m (2"). Static Water Level: 1.83m BGS. Bentonite: From 0 to 3.19m bgs.
3		@ 3.05m BGS SAND AND SILT: Very soft and saturated sediment with a composition of 50% fine sand and 50% silt with some clay.	3.05 - 3.81m					Sand Pack: From 3.19 to 5.14m BGS. Screen: From 3.64 to 5.14m BGS. -1.5m x 0.05 m (2") diameter, Sch 40 PCV pipe with size 010 slots.
4		@3.81m BGS SAND AND SILT: Very hard grey silt and sand with grey clay nodules and multilithic fine gravel. There are patches of oxidation and light green weathering.	3.81 - 5.18m					
5								Slough: From 5.14 to 5.8m BGS.
		End of Hole @ 5.18 m bgs						

▼ **Groundwater level measured on date indicated.

Printed: May 6 2015 15:57:16

Figure No.

Stantec

BOREHOLE RECORD

MW14-05a

CLIENT Riser Developments Ltd.

PROJECT No. 113929396

LOCATION Lincon Ranch, Gull Lake Alberta

Borehole Coordinates
N: 5824250
E: 301024

DATES (mm/dd/yyyy): BORING 01/12/2014 WATER LEVEL 2.35 m BGS 08/12/2014

Datum: Nad 83 UTM Zone 12

Drilling Contractor : Calibre Drilling Drilling Method : Solid Stem Auger Logged By : Stantec: S.Cairns

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
0		@ 0m BGS TOP SOIL: Dark brown organic rich material.	0.00 - 0.15m					Stick up: 1.11 m Protective casing
		@ 0.15m BGS CLAY AND SILT: Dark brown, sticky clay and silt with 20% fine sand. Contains some organics and patchy iron oxidation.	0.15 - 0.61m					Borehole: From 0 to 5.18m BGS with a diameter of 0.10 m (4").
1		@ 0.61m BGS SILTY CLAY: Dark grey brown silty clay containing fine sand with rare fine gravel. it is moderately hard and has high plasticity.	0.61 - 2.13m					Bentonite From 0 to 3.08m BGS.
2		@ 2.13m BGS SAND AND SILT: Dark green to grey very hard sand and silt with some clay. The sand is fine to medium and comprised 40-50 % of the interval. Fine gravel including coal fragments was observed through the matrix. Oxidation patches were also observed.	2.13 - 2.74m				▼	Well Pipe: Sch 40 PVC that has a diameter of 0.05 m (2"). Static Water Level: 2.35m BGS.
3		@ 2.74m BGS SAND AND SILT: Soft grey saturated fine sand and silt.	2.74 - 3.05m					Sand Pack: From 3.08 to 5.03m BGS.
		@ 3.05m BGS SAND AND SILTY SAND: Interbedded brown clumpy fine to medium sand with narrow intervals of the hard sand and silt as described from 2.13 to 2.74 m bgs.	3.05 - 4.27m					
4		@ 4.27m BGS SILTY SAND: Grey brown saturated sediment composed of 70% fine sand with silt and minor clay.	4.27 - 5.18m					Screen: From 3.53 to 5.03m BGS. -1.5m x 0.05 m (2") diameter, Sch 40 PCV pipe with size 010 slots.
5		End of Hole @ 5.18 m bgs						Slough: From 5.03 to 5.18m BGS.

▼ **Groundwater level measured on date indicated.

Figure No.

Printed: May 6 2015 15:57:16

STANTEC DEEP MW FOR CHRISTIAN NAGELI LINCON RANCH BH LOGS.GPJ MASTER1.GDT 6/5/15

Stantec

BOREHOLE RECORD

MW14-05b

CLIENT **Riser Developments Ltd.**

PROJECT No. **113929396**

LOCATION **Lincon Ranch, Gull Lake Alberta**

Borehole Coordinates
N: 5824252
E: 301024

DATES (mm/dd/yyyy): BORING **01/12/2014** WATER LEVEL **2.83 m BGS 08/12/2014**

Datum: Nad 83 UTM Zone 12

Drilling Contractor : **Calibre Drilling** Drilling Method : **Solid Stem Auger** Logged By : **Stantec:S. Cairns**

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
0		@ 0m BGS TOP SOIL: Black organic rich soil	0.00 - 0.15m					Stick up: 0.93 m.
		@ 0.15m BGS CLAY AND SILT: Dry, brown clay and silt with 30% sand. Soil becomes wet at 3 m bgs.	0.15 - 3.96m					Protective casing
1								Borehole: From 0 to 9.75m BGS with a diameter of 0.10 m (4").
2								Bentonite: From 0 to 7.95 m bgs.
3							▼	Static Water Level: At 2.83 m bgs
4		@ 3.96m BGS SAND AND SILT: Dark grey sediment with 40-50% sand and abundant clay and silt.	3.96 - 4.27m					
		@ 4.27m BGS CLAY: Hard grey clay with some fine gravel.	4.27 - 5.03m					
5		@5.03m BGS SAND AND CLAY: Grey, Very hard, poorly sorted sediment composed majorly of sand and clay with some silt. There is also abundant fine gravel including coal fragments and patches of oxidized material.	5.03 - 5.79m					Well Pipe: Sch 40 PVC Pipe with a diameter of 0.05 m (2').
6			5.79 - 7.32m					
7		@ 5.79m BGS SAND, SILT AND CLAY: Soft brown grey silt and clay and sand. About 50% of the material is comprised of sand.						
8		@ 7.32m BGS SANDY SILT: Saturated grey silt with some sand.	7.32 - 9.14m					Sand Pack: from 7.95 to 9.9m BGS.
9								Screen: From 8.4 to 9.9 m BGS.
								-1.5m x 0.05 m (2") diameter, Sch 40 PCV pipe with size 010 slots.
		@ 9.14m BGS SAND AND CLAY: Hard dark grey poorly sorted sediment composed of sand with clay and some silt. There is fine gravel distributed throughout as well as patches of oxidized material.	9.14 - 9.75m					
10			9.75 - 10.06m					~~Slough: From 9.9 to 10.06~~
		@ 9.75m BGS UNKNOWN: No sample						
11								

▼ **Groundwater level measured on date indicated.

Figure No.

Printed: May 6 2015 15:57:16

STANTEC DEEP MW FOR CHRISTIAN NAGELI LINCON RANCH BH LOGS.GPJ MASTER1.GDT 6/5/15

Stantec

BOREHOLE RECORD

MW14-05b

CLIENT **Riser Developments Ltd.**

PROJECT No. **113929396**

LOCATION **Lincon Ranch, Gull Lake Alberta**

Borehole Coordinates
N: 5824252
E: 301024

DATES (mm/dd/yyyy): BORING **01/12/2014** WATER LEVEL **2.83 m BGS 08/12/2014**

Datum: Nad 83 UTM Zone 12

Drilling Contractor : **Calibre Drilling** Drilling Method : **Solid Stem Auger** Logged By : **Stantec:S. Cairns**

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
		came up on the auger.						
		End of Hole @ 10.06 m bgs						
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

▼ **Groundwater level measured on date indicated.

Printed: May 6 2015 15:57:16

Figure No.

STANTEC DEEP MW FOR CHRISTIAN NAGELI LINCON RANCH BH LOGS.GPJ MASTER1.GDT 6/5/15

Stantec

BOREHOLE RECORD

MW15-01

CLIENT **Riser Developments Ltd.**

PROJECT No. **113929396**

LOCATION **Lincon Ranch, Gull Lake Alberta**

Borehole Coordinates
N: 5824697.3
E: 300820.8

DATES (mm/dd/yyyy): BORING **14/04/2015** WATER LEVEL **1.80 m BGS 23/04/2015**

Datum: Nad 83 UTM Zone 12

Drilling Contractor : **Calibre Drilling** Drilling Method : **Solid Stem Auger** Logged By : **Stantec:D. Nisbet**

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
0		@ 0m BGS SOIL: Black soil with some brown silt. Moist.						Stick up: 1.01 m. Protective casing.
		@ 0.3m BGS SILT: Brown to dark brown silt with minor very fine sand and minor clay. Soft and moist.						Borehole: 0.1 m (4") diameter.
1								Well Pipe: Sch 40 PVC that has a diameter of 0.05 m (2").
							▼	Static Water Level: At 1.80m BGS.
2								Bentonite: From 0 to 3.05m BGS.
		@ 2.44m BGS SILT: Light brown to yellow-brown silt with minor fine sand and ocasional gravel throughout. Texture is very, friable, dry, and powdery.						
3								Bentonite Pellets: From 3.05 to 3.35 m BGS.
4		@ 3.96m BGS CLAY: Brown to dark brown clay with some silt and minor fine sand and gravel. Moist and plastic.						Sand Pack: From 3.35 to 5.18m BGS. Screen: From 3.66 to 5.18m BGS. -1.5m x 0.05 m (2") diameter, Sch 40 PCV pipe with size 010 slots.
5		End of Hole at 5.18 m BGS.						

▼ **Groundwater level measured on date indicated.

Figure No.

Printed: May 6 2015 15:57:16

STANTEC DEEP MW FOR CHRISTIAN NAGELI LINCON RANCH BH LOGS.GPJ MASTER1.GDT 6/5/15

Stantec

BOREHOLE RECORD

MW15-02

CLIENT Riser Developments Ltd.

PROJECT No. 113929396

LOCATION Lincon Ranch, Gull Lake Alberta

Borehole Coordinates
N: 5824277
E: 301418.3

DATES (mm/dd/yyyy): BORING 14/04/2015 WATER LEVEL 4.26 m BGS 23/04/2015

Datum: Nad 83 UTM Zone 12

Drilling Contractor : Calibre Drilling Drilling Method : Solid Stem Auger Logged By : Stantec:D. Nisbet

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
0		@ 0m BGS SOIL: Black soil with some brown silt. Moist.						Stick up: 0.89 m Protective casing
		@ 0.3m BGS SILT: Brown silt and very fine sand with minor gravel.						Borehole: From 0 to 5.18m BGS with a diameter of 0.1 m (4").
1								Well Pipe: Sch 40 PVC pipe with a diameter of 0.05 m (2").
		@ 1.22m BGS SILT: Brown to grey, mottled silt with some clay and minor very fine to fine sand. Cohesive.						
2		@ 2.13 m silt becomes moist						Bentonite: From 0 to 3.05m BGS.
3								Bentonite Pellets: From 3.05 too 3.35m BGS.
		@ 3.35m BGS CLAY: Grey silty clay with some fine sand and gravel dispersed throughout. Dry and friable.						
4							▼	Sand Pack: From 3.35 to 5.18m BGS. Static Water Level: At 4.26m BGS. Screen: From 3.66 to 5.18m BGS. -1.5m x 0.05 m (2") diameter, Sch 40 PCV pipe with size 010 slots.
5		End of Hole @ 5.18 m BGS.						

▼ **Groundwater level measured on date indicated.

Figure No.

Printed: May 6 2015 15:57:16

STANTEC DEEP MW FOR CHRISTIAN NAGELI LINCON RANCH BH LOGS.GPJ MASTER1.GDT 6/5/15

Stantec

BOREHOLE RECORD

MW15-03

CLIENT Riser Developments Ltd.

PROJECT No. 113929396

LOCATION Lincon Ranch, Gull Lake Alberta

Borehole Coordinates
N: 5823978.1
E: 300609.3

DATES (mm/dd/yyyy): BORING 14/04/2015 WATER LEVEL 1.03 m BGS 14/04/2015

Datum: Nad 83 UTM Zone 12

Drilling Contractor : Calibre Drilling Drilling Method : Solid Stem Auger Logged By : Stantec:D. Nisbet

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
0		@ 0m BGS Soil: Black soil with some brown silt. Moist.						Stick up: 0.80 m Protective casing
		@ 0.3m BGS Silt: dark brown to brown silt with very fine sand. Soft and saturated.						Borehole: From 0 to 4.49m BGS with a diameter of 0.15 m (6"). Bentonite: From 0 to 3.05m BGS.
1							▼	Static Water Level: 1.03m BGS.
		@ 1.22m BGS Silt: Light to medium grey and brown mottled silt with some fine to very fine sand distributed throughout. There are also some fine sand stringers present.						Well Pipe: Sch 40 PVC pipe with a diameter of 0.05 m (2").
2								Bentonite Pellets: From 2.65 to 2.96m BGS.
3		@ 3.05m BGS SAND: Fine grey to brown silty sand with some clay present.						
4								Screen: From 3.35 to 4.88m BGS. -1.5m x 0.05 m (2") diameter, Sch 40 PCV pipe with size 010 slots. Slough: From 2.96 to 4.88m BGS.
5								Sand Pack: From 4.88 to 5.49m BGS.
		End of hole @ 5.49 m BGS						
6								

▼ **Groundwater level measured on date indicated.

Figure No.

Printed: May 6 2015 15:57:17

STANTEC DEEP MW FOR CHRISTIAN NAGELI LINCON RANCH BH LOGS.GPJ MASTER1.GDT 6/5/15

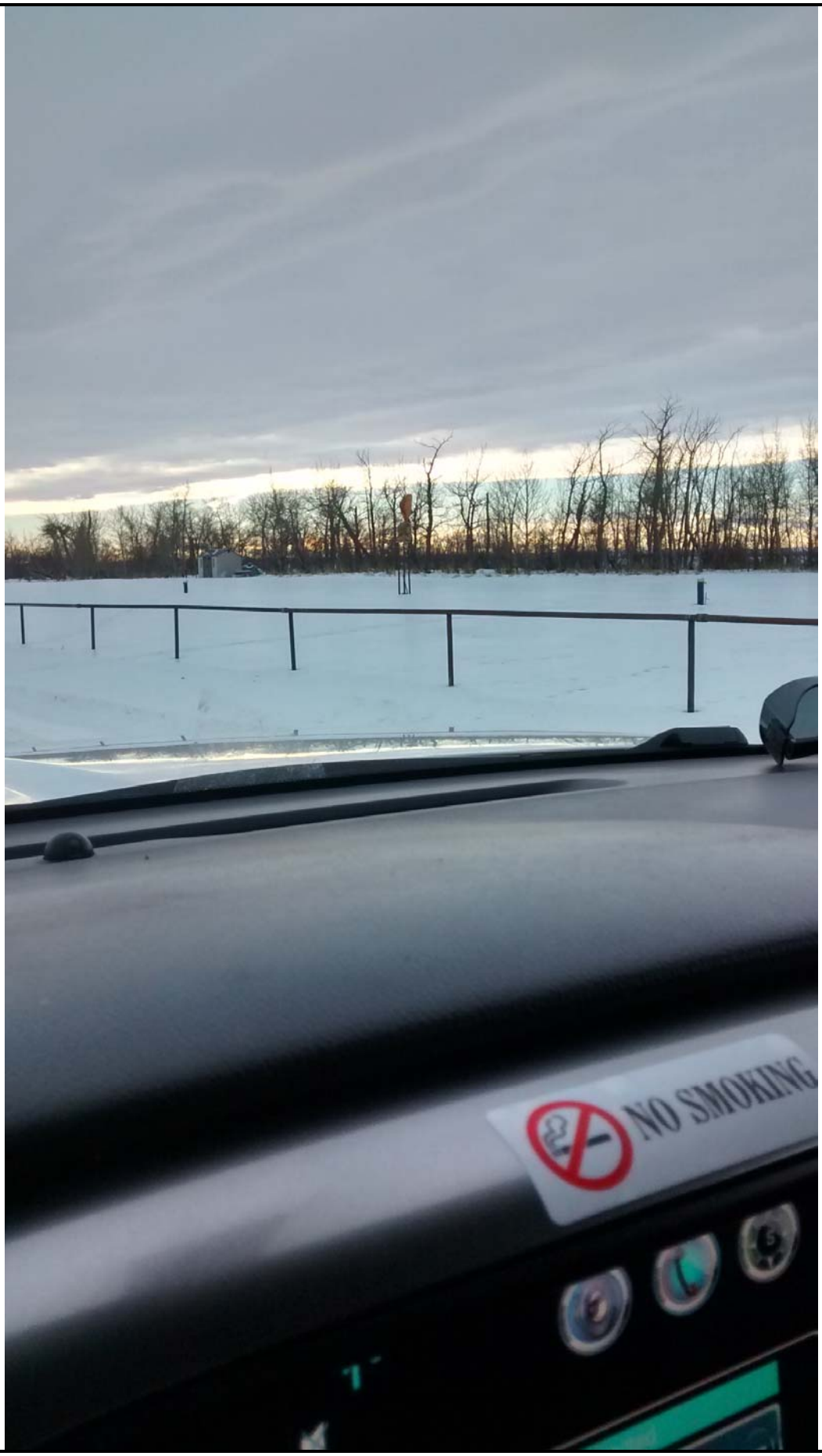
APPENDIX B
PHOTO LOG

Drilling borehole at MW14-5a

Nested monitoring wells at MW14-5

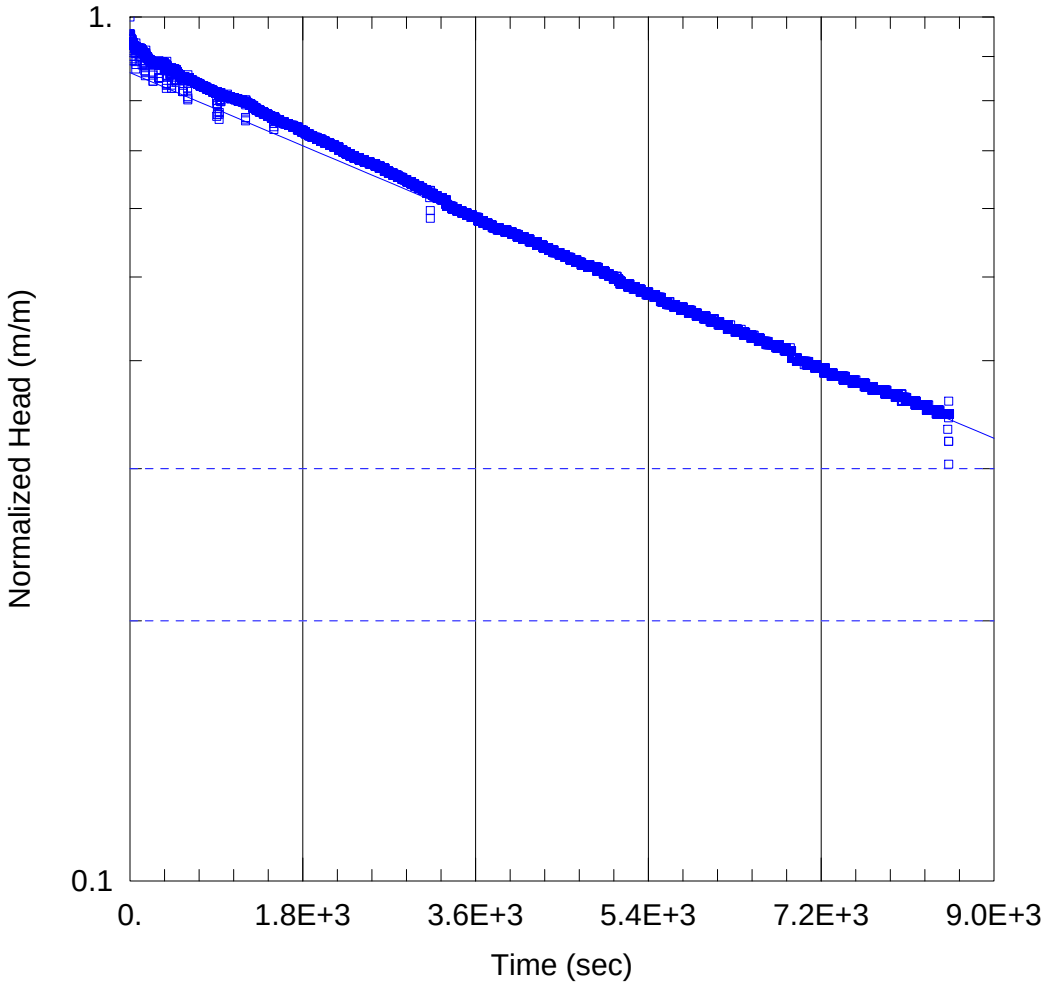
Bailer showing siltation present in MW10-02

Taking measurements at MW14-5a



Blue steel-cased Groundwater wells located west of Lincoln Ranch

APPENDIX C
KTEST ANALYSIS



HYDRAULIC CONDUCTIVITY TEST

Data Set: W:\04_field\Ktest\Appias processed\MW14-04\MW14-04.aqt
Date: 02/13/15 Time: 12:34:11

PROJECT INFORMATION

Company: Stantec Consulting Ltd.
Client: Riser Developments Ltd.
Project: 113929396
Location: Alberta, Canada
Test Well: MW14-04
Test Date: Dec. 9, 2014

AQUIFER DATA

Saturated Thickness: 3.41 m
Anisotropy Ratio (Kz/Kr): 1.

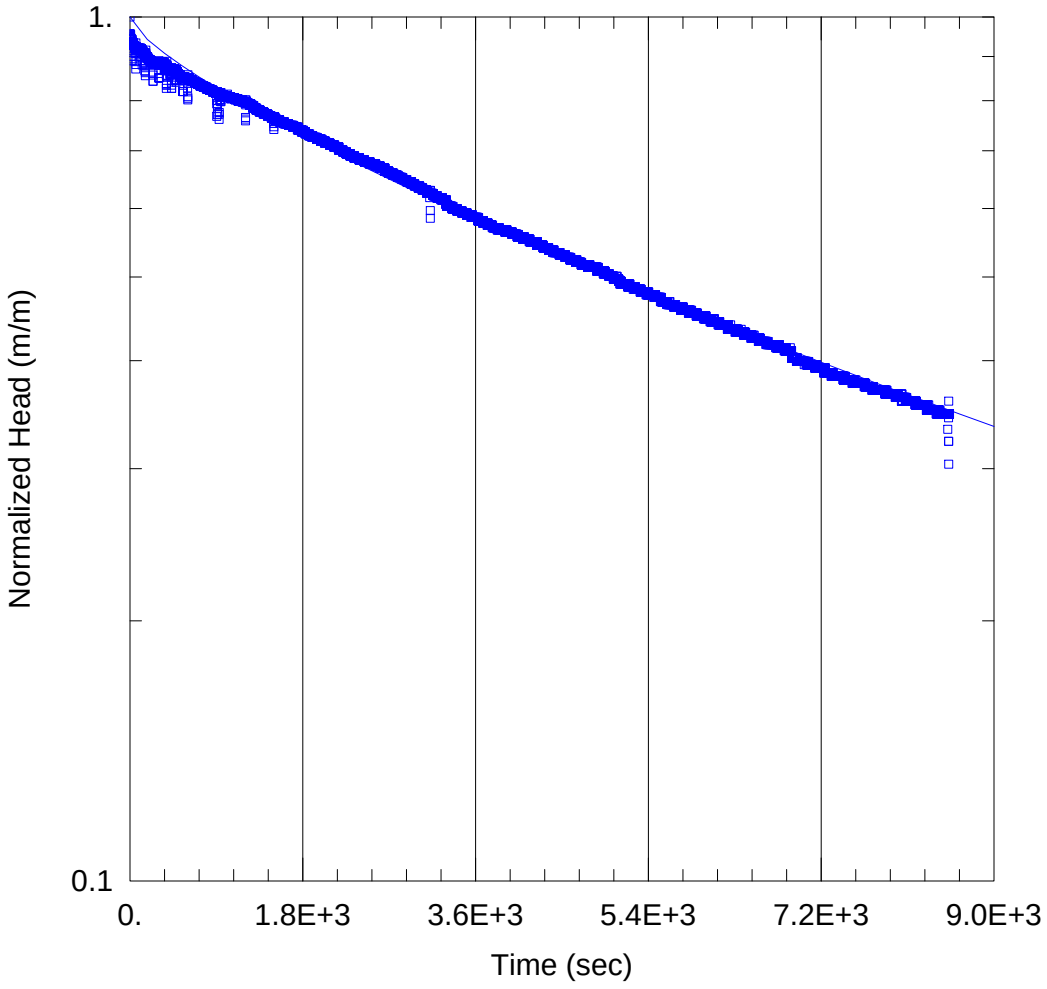
WELL DATA (MW14-04)

Initial Displacement: 0.5763 m
Total Well Penetration Depth: 3.37 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.41 m
Screen Length: 1.5 m
Well Radius: 0.0508 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.821E-8 m/sec
y0 = 0.4967 m

Fig. C-1



HYDRAULIC CONDUCTIVITY TEST

Data Set: W:\04_field\Ktest\Appias processed\MW14-04\MW14-04.aqt
Date: 02/13/15 Time: 13:50:41

PROJECT INFORMATION

Company: Stantec Consulting Ltd.
Client: Riser Developments Ltd.
Project: 113929396
Location: Alberta, Canada
Test Well: MW14-04
Test Date: Dec. 9, 2014

AQUIFER DATA

Saturated Thickness: 3.41 m

WELL DATA (MW14-04)

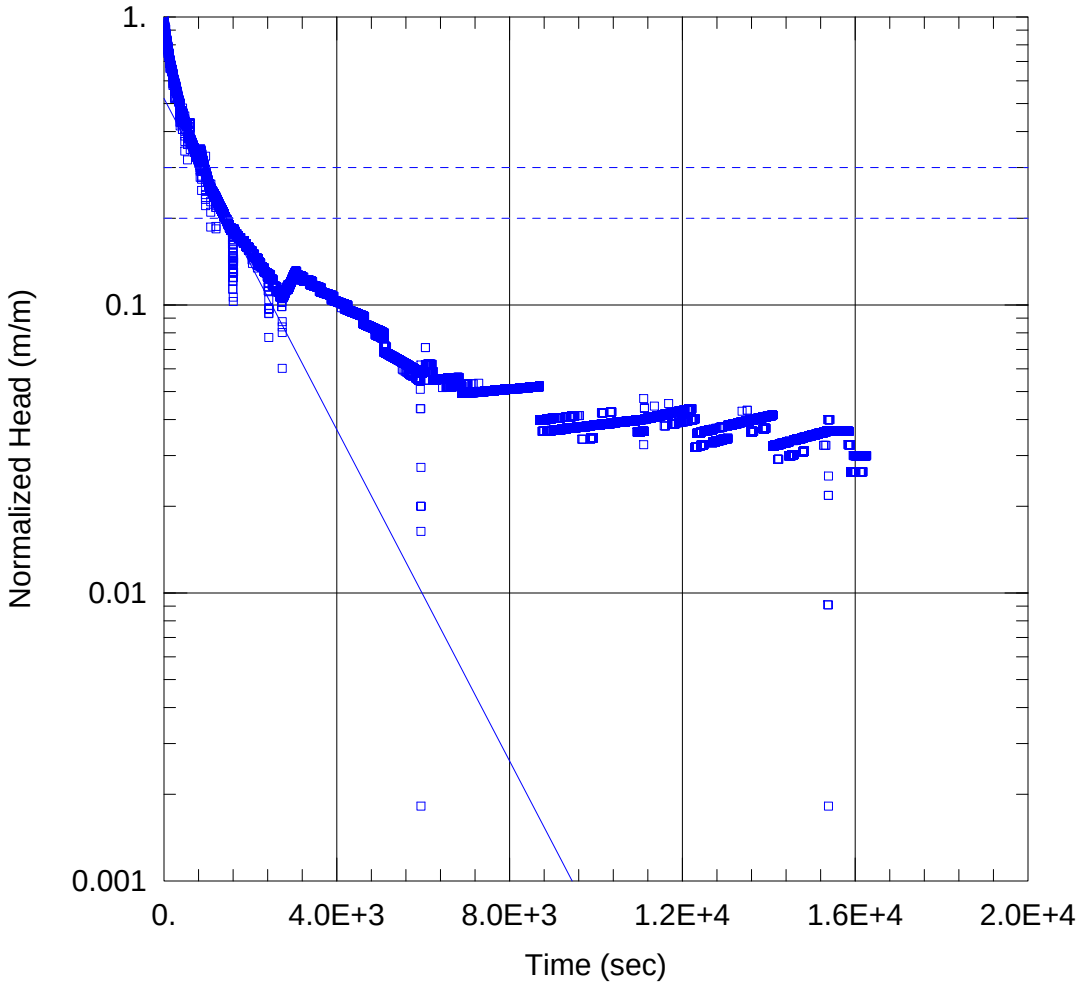
Initial Displacement: 0.5763 m
Total Well Penetration Depth: 3.37 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.41 m
Screen Length: 1.5 m
Well Radius: 0.0508 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 7.046E-8 m/sec
Kz/Kr = 1.
Ss = 0.001347 m^{-1}

Fig. C-2



HYDRAULIC CONDUCTIVITY TEST

Data Set: W:\04_field\Ktest\Appias processed\MW14-05a\ME14-5A.aqt
Date: 02/13/15 Time: 16:35:46

PROJECT INFORMATION

Company: Stantec Consulting Ltd.
Client: Riser Developments Ltd.
Project: 113929396
Location: Alberta, Canada
Test Well: MW14-05A
Test Date: Dec. 8, 2014

AQUIFER DATA

Saturated Thickness: 2.87 m
Anisotropy Ratio (Kz/Kr): 1.

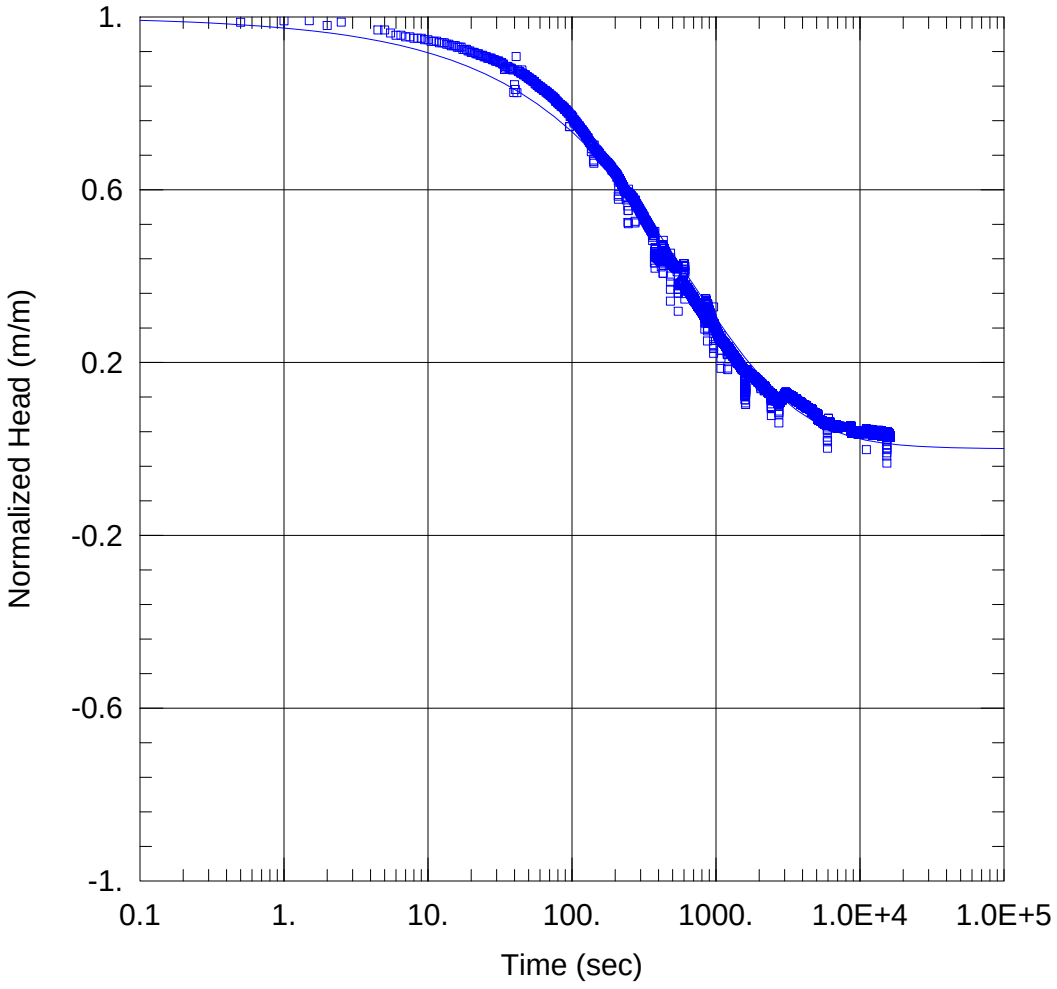
WELL DATA (MW14-05A)

Initial Displacement: 0.55 m
Total Well Penetration Depth: 2.27 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.87 m
Screen Length: 1.05 m
Well Radius: 0.0508 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.674E-7 m/sec
y0 = 0.2867 m

Fig. C-3



HYDRAULIC CONDUCTIVITY TEST

Data Set: W:\04_field\Ktest\Appias processed\MW14-05a\MW14-5A.aqt
Date: 02/13/15 Time: 16:43:36

PROJECT INFORMATION

Company: Stantec Consulting Ltd.
Client: Riser Developments Ltd.
Project: 113929396
Location: Alberta, Canada
Test Well: MW14-05A
Test Date: Dec. 8, 2014

AQUIFER DATA

Saturated Thickness: 2.87 m

WELL DATA (MW14-05A)

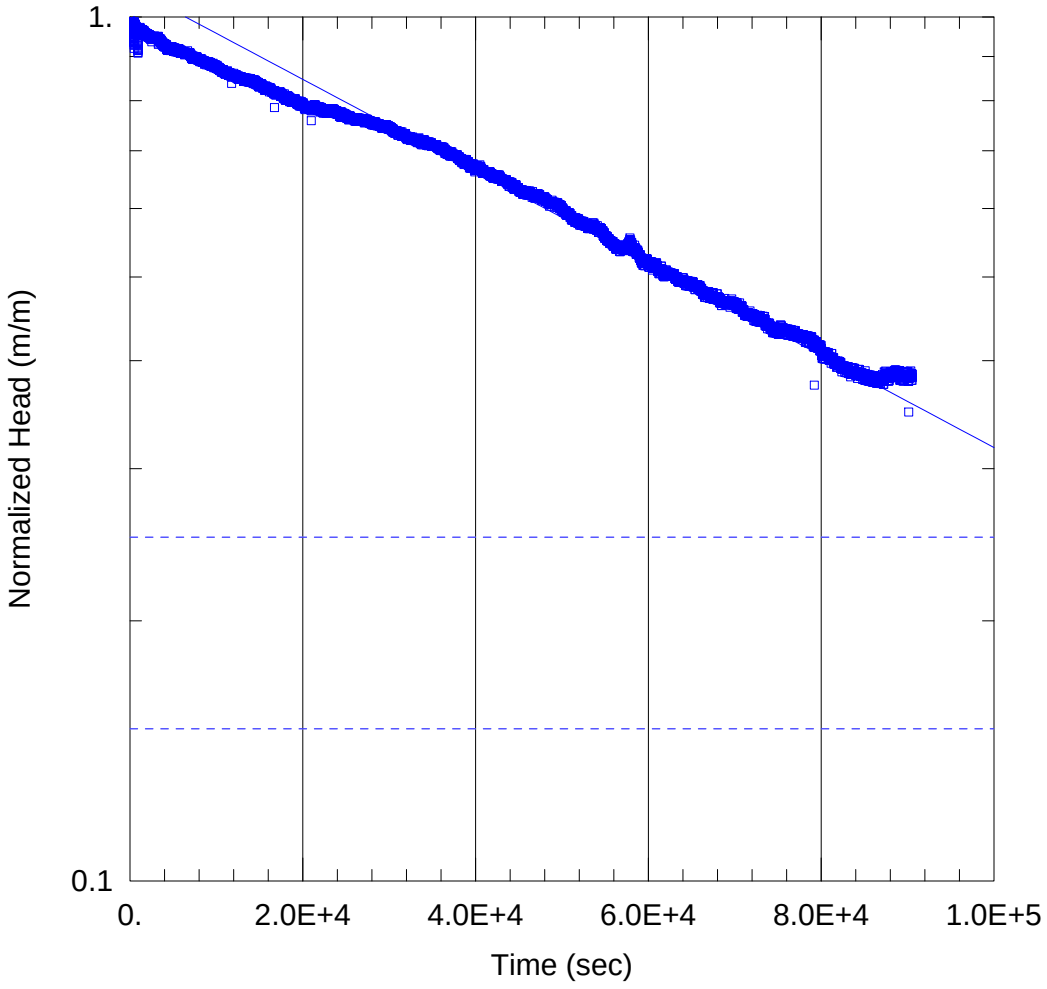
Initial Displacement: 0.55 m
Total Well Penetration Depth: 2.27 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.87 m
Screen Length: 1.05 m
Well Radius: 0.0508 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 5.175E-7 m/sec
Kz/Kr = 1.
Ss = 0.03484 m^{-1}

Fig. C-4



HYDRAULIC CONDUCTIVITY TEST

Data Set: W:\04_field\Ktest\Appias processed\MW14-05b\MW14-05B.aqt
Date: 02/13/15 Time: 17:26:39

PROJECT INFORMATION

Company: Stantec Consulting Ltd.
Client: Riser Developments Ltd.
Project: 113929396
Location: Alberta, Canada
Test Well: MW14-05B
Test Date: Dec. 8, 2014

AQUIFER DATA

Saturated Thickness: 5.03 m
Anisotropy Ratio (Kz/Kr): 1.

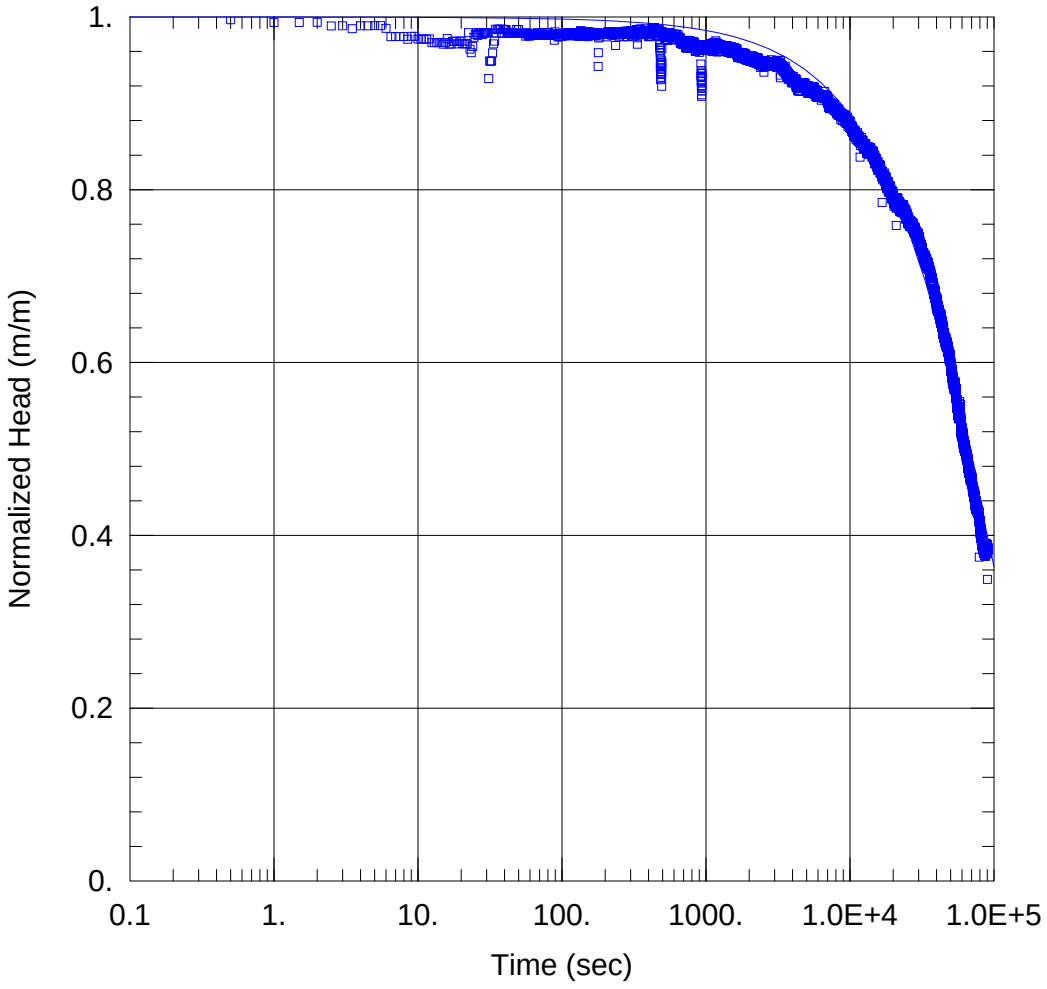
WELL DATA (MW14-05B)

Initial Displacement: 0.55 m
Total Well Penetration Depth: 7.14 m
Casing Radius: 0.0254 m
Static Water Column Height: 7.3 m
Screen Length: 1.5 m
Well Radius: 0.0508 m

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 1.076E-8 m/sec
y0 = 0.5951 m

Fig. C-5



HYDRAULIC CONDUCTIVITY TEST

Data Set: W:\04_field\Ktest\Appias processed\MW14-05b\MW14-05B.aqt
Date: 02/13/15 Time: 17:35:40

PROJECT INFORMATION

Company: Stantec Consulting Ltd.
Client: Riser Developments Ltd.
Project: 113929396
Location: Alberta, Canada
Test Well: MW14-05B
Test Date: Dec. 8, 2014

AQUIFER DATA

Saturated Thickness: 5.03 m

WELL DATA (MW14-05B)

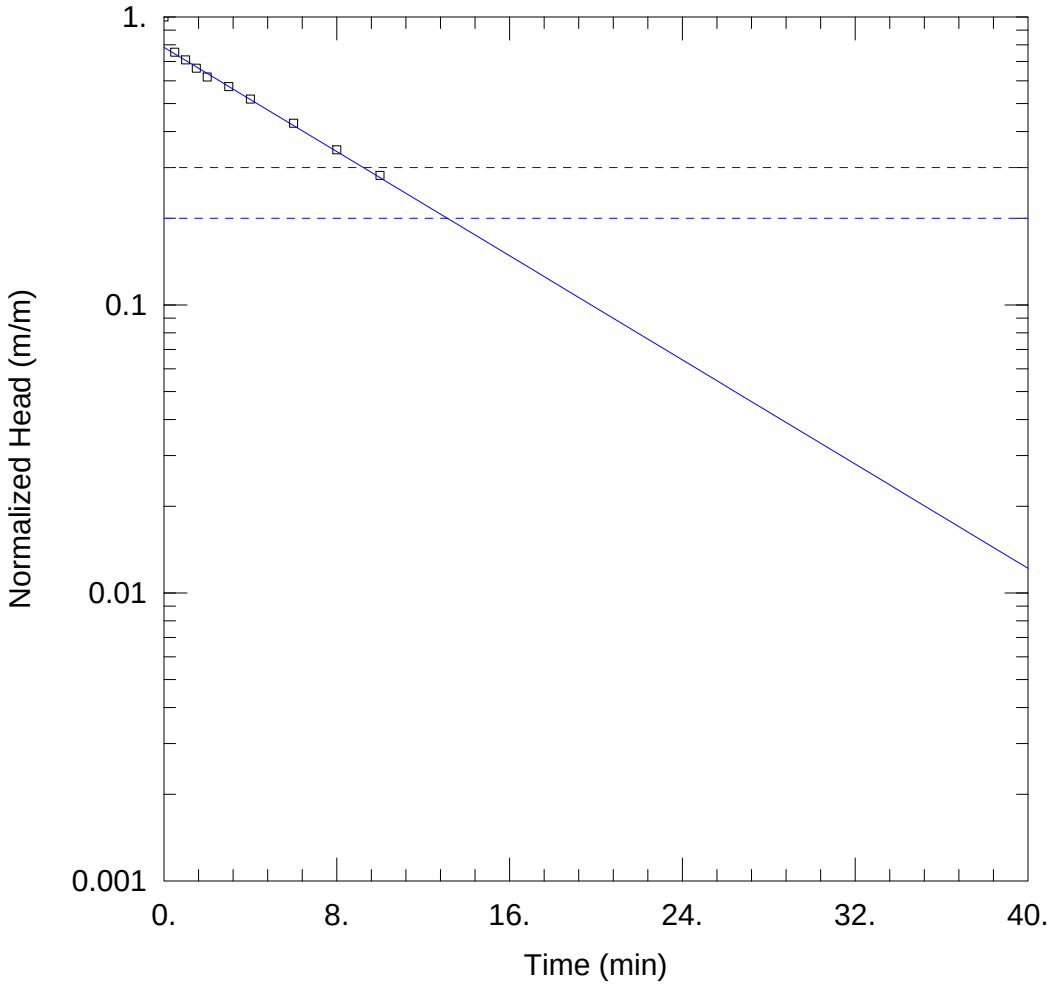
Initial Displacement: 0.55 m
Total Well Penetration Depth: 7.14 m
Casing Radius: 0.0254 m
Static Water Column Height: 7.3 m
Screen Length: 1.5 m
Well Radius: 0.0508 m

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 7.142E-9 m/sec
Kz/Kr = 1.
Ss = 2.767E-5 m^{-1}

Fig. C-6



HYDRAULIC CONDUCTIVITY TEST

Data Set: W:\04_field\Analysis KTest\MW15-03.aqt
Date: 05/06/15 Time: 15:08:22

PROJECT INFORMATION

Company: Stantec Consulting Ltd.
Client: Riser Developments Ltd.
Project: 113929396
Location: Alberta, Canada
Test Well: MW15-03
Test Date: Apr. 14, 2015

AQUIFER DATA

Saturated Thickness: 2.44 m
Anisotropy Ratio (Kz/Kr): 1.

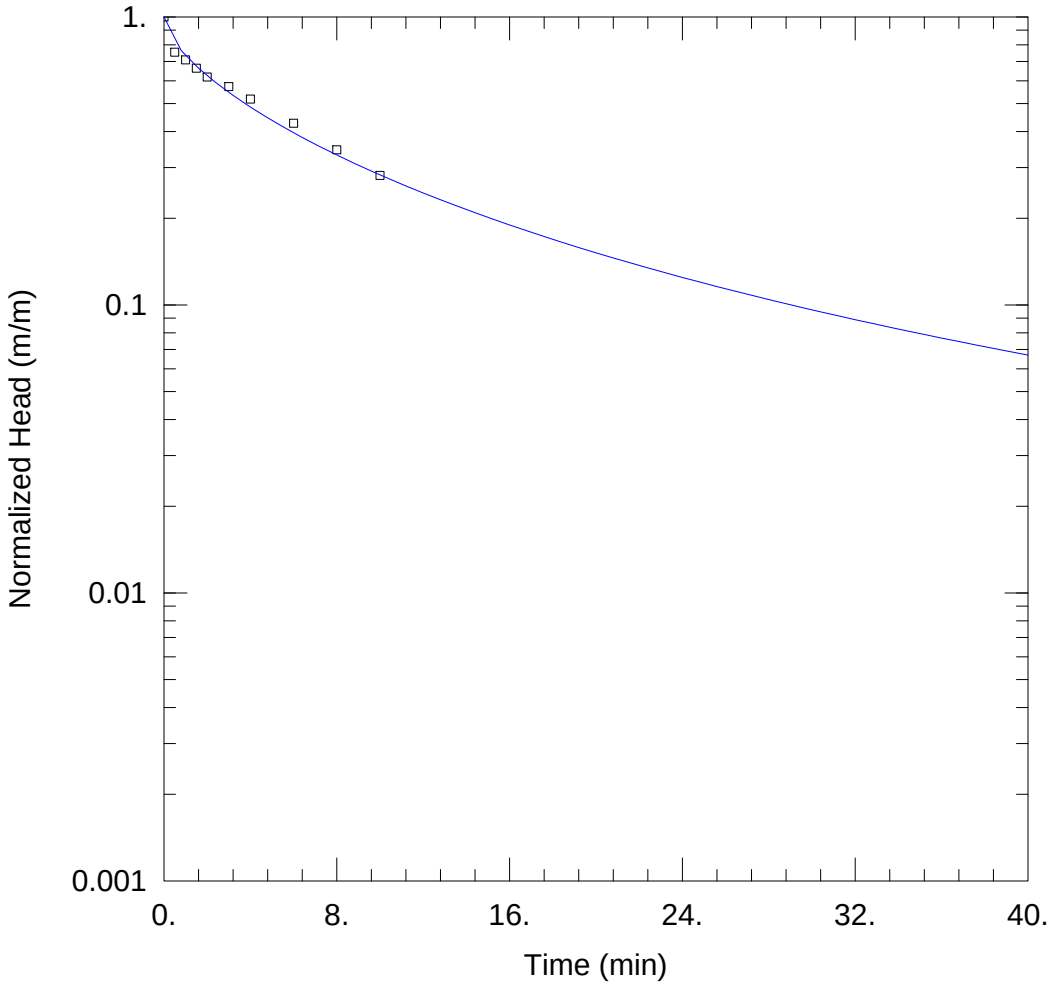
WELL DATA (MW15-03)

Initial Displacement: 0.55 m
Total Well Penetration Depth: 3.85 m
Casing Radius: 0.05 m
Static Water Column Height: 4.46 m
Screen Length: 1.53 m
Well Radius: 0.1 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.544E-6 m/sec
y0 = 0.431 m

Fig. C-7



HYDRAULIC CONDUCTIVITY TEST

Data Set: W:\04_field\Analysis KTest\MW15-03.aqt
Date: 05/06/15 Time: 15:09:07

PROJECT INFORMATION

Company: Stantec Consulting Ltd.
Client: Riser Developments Ltd.
Project: 113929396
Location: Alberta, Canada
Test Well: MW15-03
Test Date: Apr. 14, 2015

AQUIFER DATA

Saturated Thickness: 2.44 m

WELL DATA (MW15-03)

Initial Displacement: 0.55 m
Total Well Penetration Depth: 3.85 m
Casing Radius: 0.05 m
Static Water Column Height: 4.46 m
Screen Length: 1.53 m
Well Radius: 0.1 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.225E-6 m/sec
Kz/Kr = 1.
Ss = 0.01944 m^{-1}

Fig. C-8

APPENDIX D
SAMPLING PROTOCOL

Appendix D GROUNDWATER SAMPLING PROTOCOLS

D.1 GROUNDWATER SAMPLING

- All wells (including those that were decommissioned) were sampled.
- The following procedures were followed during sampling of the monitoring wells.
- A hand-held pH and conductivity water quality meter (Oakton PCSTestr 35) were used to take field parameters of the groundwater during sampling. The instrument was calibrated using factory calibration solutions prior to being acquired for use on site.
- The wells were initially developed after installation and purged dry and left to recover prior to sampling given the relatively low recovery rates and hydraulic conductivities encountered.
- Sampling was conducted using disposable bailers.
- Sample bottles were rinsed with formation water prior to sample collection.
- Sterilized nitrile gloves were worn during sampling to minimize the risk of sample contamination.
- Groundwater samples were collected into designated HDPE plastic, glass, or amber glass bottles and were stored in a cooler on ice until submission to the laboratory.
- Upon completion of sampling all equipment was thoroughly rinsed with distilled water.
- Samples were promptly delivered to the Maxxam Analytics Laboratory (Edmonton, Alberta) for regular turnaround analysis.

D.2 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control procedures included:

- thorough rinsing with distilled water of all equipment entering a well or in contact with the pumped water (e.g. datalogger, water level probe, and YSI);
- use of disposable, nitrile gloves, which were discarded between samples;
- use of sample containers provided by the laboratory;
- labelling of samples with company name, project number, sample number, date, and sampler initials;
- collecting of duplicate samples;
- storing of samples in ice chests cooled to approximately 4°C and transportation to the laboratory within 24 hours of collection;
- documentation of sample handling, transport, and delivery to the laboratory using appropriate chain-of-custody procedures and documentation; and
- data tracking and management.

APPENDIX E
ANALYTICAL RESULTS

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 16300R-20
Your Project #: 113929396
Site Location: GULL LAKE
Your C.O.C. #: A122115

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
EDMONTON-NATIONAL CONTRACT
10160 112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2014/12/17
Report #: R1718125
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4B1931
Received: 2014/12/09, 17:22

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	6	N/A	2014/12/11	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	5	N/A	2014/12/15	AB SOP-00039	CCME CWS/EPA 8260C m
Cadmium - low level CCME - Dissolved (1)	1	N/A	2014/12/16	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME - Dissolved	5	N/A	2014/12/16	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME (Total) (1)	1	2014/12/10	2014/12/16	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME (Total)	5	2014/12/10	2014/12/16	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4m
Chloride by Automated Colourimetry	6	N/A	2014/12/14	AB SOP-00020	SM 22 4500-Cl G m
Conductivity @25C	6	N/A	2014/12/11	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16)	5	2014/12/12	2014/12/13	AB SOP-00040 AB SOP-00037	CCME PHC-CWS m
Hardness	1	N/A	2014/12/14	AB WI-00065	Auto Calc
Hardness	5	N/A	2014/12/17	AB WI-00065	Auto Calc
Elements by ICP - Dissolved (1)	1	N/A	2014/12/13	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Dissolved	5	N/A	2014/12/17	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total (1)	6	2014/12/12	2014/12/13	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved (1)	4	N/A	2014/12/13	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Dissolved (1)	2	N/A	2014/12/15	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total (1)	4	2014/12/12	2014/12/13	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total (1)	2	2014/12/12	2014/12/15	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	1	N/A	2014/12/14	AB WI-00065	SM 1030E
Ion Balance	5	N/A	2014/12/17	AB WI-00065	SM 1030E
Sum of cations, anions	1	N/A	2014/12/14	AB WI-00065	SM 1030E
Sum of cations, anions	5	N/A	2014/12/17	AB WI-00065	SM 1030E
Nitrate and Nitrite	6	N/A	2014/12/16	AB SOP-00023	Auto Calc
Nitrate + Nitrite-N (calculated)	6	N/A	2014/12/16	AB SOP-00023	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 P.O. #: 16300R-20
Your Project #: 113929396
Site Location: GULL LAKE
Your C.O.C. #: A122115

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
EDMONTON-NATIONAL CONTRACT
10160 112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2014/12/17
Report #: R1718125
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4B1931
Received: 2014/12/09, 17:22

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Nitrogen, (Nitrite, Nitrate) by IC	6	N/A	2014/12/15	AB SOP-00023	SM 22 4110 B m
pH @25°C (Alkalinity titrator)	6	N/A	2014/12/11	AB SOP-00005	SM 22 4500 H+ B m
Orthophosphate by Konelab	6	N/A	2014/12/11	AB SOP-00025	SM 22 4500-P A,B,F m
Sulphate by Automated Colourimetry	6	N/A	2014/12/14	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	1	N/A	2014/12/14	AB WI-00065	SM 1030E
Total Dissolved Solids (Calculated)	5	N/A	2014/12/17	AB WI-00065	SM 1030E
Total Kjeldahl Nitrogen	6	2014/12/11	2014/12/12	AB SOP-00008	EPA 351.1 R 1978 m
Total Phosphorus	6	2014/12/11	2014/12/12	AB SOP-00024	SM 22 4500-P A,B,F m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Calgary Environmental

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780)577-7105 Ext:7105

==========

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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		LI5749	LI5750	LI5751	LI5752	LI5754		
Sampling Date		2014/12/09 12:00	2014/12/09 10:00	2014/12/09 13:30	2014/12/09 13:30	2014/12/09 11:00		
COC Number		A122115	A122115	A122115	A122115	A122115		
	Units	MW14-04	MW14-05A	MW14-05B	MW14-10	MW10-03	RDL	QC Batch
Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7752147
Volatiles								
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7751194
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7751194
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7751194
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	7751194
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7751194
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	7751194
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7751194
(C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7751194
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	97	98	96	97	98	N/A	7751194
4-Bromofluorobenzene (sur.)	%	102	101	101	102	101	N/A	7751194
D4-1,2-Dichloroethane (sur.)	%	101	100	102	101	101	N/A	7751194
O-TERPHENYL (sur.)	%	109	123	107	108	108	N/A	7752147

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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

ROUTINE WATER (WATER)

Maxxam ID		LI5749		LI5750		LI5751	LI5752	LI5753		
Sampling Date		2014/12/09 12:00		2014/12/09 10:00		2014/12/09 13:30	2014/12/09 13:30	2014/12/09 10:32		
COC Number		A122115		A122115		A122115	A122115	A122115		
	Units	**MW14-04**	**RDL**	**MW14-05A**	**RDL**	**MW14-05B**	**MW14-10**	**MW10-01**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	meq/L	10	N/A	14	N/A	14	14	7.5	N/A	7749703
Cation Sum	meq/L	10	N/A	14	N/A	14	14	7.8	N/A	7749703
Hardness (CaCO3)	mg/L	360	0.50	370	0.50	150	150	340	0.50	7749701
Ion Balance	N/A	0.99	0.010	1.0	0.010	0.97	0.98	1.0	0.010	7749702
Dissolved Nitrate (NO3)	mg/L	0.067	0.044	1.3	0.044	0.64	0.61	5.8	0.044	7749704
Nitrate plus Nitrite (N)	mg/L	0.015	0.010	0.34	0.010	0.14	0.14	1.3	0.010	7749705
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	0.13	0.033	<0.033	<0.033	<0.033	0.033	7749704
Total Dissolved Solids	mg/L	530	10	800	10	810	810	390	10	7749706
Misc. Inorganics										
Conductivity	uS/cm	890	1.0	1300	1.0	1300	1300	660	1.0	7751219
pH	pH	7.91	N/A	7.80	N/A	8.08	8.09	8.18	N/A	7751213
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	<0.50	0.50	7751217
Alkalinity (Total as CaCO3)	mg/L	360	0.50	520	0.50	520	510	320	0.50	7751217
Bicarbonate (HCO3)	mg/L	440	0.50	630	0.50	630	630	400	0.50	7751217
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	<0.50	0.50	7751217
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	<0.50	0.50	7751217
Dissolved Sulphate (SO4)	mg/L	94	1.0	190 (1)	2.0	190	190	38	1.0	7751227
Dissolved Chloride (Cl)	mg/L	33	1.0	3.9	1.0	3.9	4.0	5.6	1.0	7751223
Nutrients										
Dissolved Nitrite (N)	mg/L	<0.010	0.010	0.040	0.010	<0.010	<0.010	<0.010	0.010	7754422
Dissolved Nitrate (N)	mg/L	0.015	0.010	0.30	0.010	0.14	0.14	1.3	0.010	7754422

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) 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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

ROUTINE WATER (WATER)

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	MW10-03	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	8.5	N/A	7749703
Cation Sum	meq/L	8.5	N/A	7749703
Hardness (CaCO3)	mg/L	360	0.50	7750392
Ion Balance	N/A	1.0	0.010	7750393
Dissolved Nitrate (NO3)	mg/L	36	0.044	7750394
Nitrate plus Nitrite (N)	mg/L	8.1	0.010	7750395
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	7750394
Total Dissolved Solids	mg/L	460	10	7750396
Misc. Inorganics				
Conductivity	uS/cm	770	1.0	7751219
pH	pH	7.86	N/A	7751213
Anions				
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	7751217
Alkalinity (Total as CaCO3)	mg/L	310	0.50	7751217
Bicarbonate (HCO3)	mg/L	380	0.50	7751217
Carbonate (CO3)	mg/L	<0.50	0.50	7751217
Hydroxide (OH)	mg/L	<0.50	0.50	7751217
Dissolved Sulphate (SO4)	mg/L	54	1.0	7751227
Dissolved Chloride (Cl)	mg/L	20	1.0	7751223
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.010	0.010	7754422
Dissolved Nitrate (N)	mg/L	8.1	0.010	7754422

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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		LI5749	LI5750	LI5751	LI5752		LI5753		
Sampling Date		2014/12/09 12:00	2014/12/09 10:00	2014/12/09 13:30	2014/12/09 13:30		2014/12/09 10:32		
COC Number		A122115	A122115	A122115	A122115		A122115		
	Units	MW14-04	MW14-05A	MW14-05B	MW14-10	QC Batch	MW10-01	RDL	QC Batch
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	1.5	0.095	0.024	0.024	7750025	0.021	0.020	7750025
Elements									
Dissolved Aluminum (Al)	mg/L	0.0038	0.0046	0.0043	0.0041	7753491	0.0099	0.0030	7753491
Dissolved Antimony (Sb)	mg/L	<0.00060 (1)	<0.00060	<0.00060	<0.00060	7753491	<0.00060	0.00060	7753491
Dissolved Arsenic (As)	mg/L	0.0013	0.0010	0.0039	0.0037	7753491	0.00033	0.00020	7753491
Dissolved Barium (Ba)	mg/L	0.16	0.092	0.038	0.038	7757557	0.17	0.010	7753535
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Boron (B)	mg/L	0.064	0.21	0.25	0.25	7757557	0.028	0.020	7753535
Dissolved Calcium (Ca)	mg/L	97	100	42	41	7757557	93	0.30	7753535
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Cobalt (Co)	mg/L	0.00054	0.00078	0.00033	0.00035	7753491	<0.00030	0.00030	7753491
Dissolved Copper (Cu)	mg/L	0.0016	0.00075	0.0027	0.0024	7753491	0.0038	0.00020	7753491
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	<0.060	<0.060	7757557	<0.060	0.060	7753535
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	7753491	<0.00020	0.00020	7753491
Dissolved Lithium (Li)	mg/L	0.035	0.062	0.035	0.036	7757557	0.024	0.020	7753535
Dissolved Magnesium (Mg)	mg/L	29	29	11	11	7757557	27	0.20	7753535
Dissolved Manganese (Mn)	mg/L	0.44	0.25	0.17	0.17	7757557	<0.0040	0.0040	7753535
Dissolved Molybdenum (Mo)	mg/L	0.0080	0.0051	0.016	0.016	7753491	0.0017	0.00020	7753491
Dissolved Nickel (Ni)	mg/L	0.0017	0.0023	0.0017	0.0016	7753491	0.0015	0.00050	7753491
Dissolved Phosphorus (P)	mg/L	<0.10	0.14	<0.10	<0.10	7757557	<0.10	0.10	7753535
Dissolved Potassium (K)	mg/L	4.2	4.6	3.8	3.8	7757557	1.2	0.30	7753535
Dissolved Selenium (Se)	mg/L	<0.00020	0.00058	0.00040	0.00039	7753491	0.0038	0.00020	7753491
Dissolved Silicon (Si)	mg/L	6.4	6.9	6.7	6.7	7757557	6.0	0.10	7753535
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	7753491	<0.00010	0.00010	7753491
Dissolved Sodium (Na)	mg/L	61	160	250	250	7757557	21	0.50	7753535
Dissolved Strontium (Sr)	mg/L	0.74	0.85	0.42	0.42	7757557	0.55	0.020	7753535
Dissolved Sulphur (S)	mg/L	30	66	59	59	7757557	12	0.20	7753535
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	7753491	<0.00020	0.00020	7753491
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Uranium (U)	mg/L	0.0063	0.026	0.0058	0.0057	7753491	0.014	0.00010	7753491
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Zinc (Zn)	mg/L	0.0073	0.0046	0.0053	<0.0030	7753491	0.017	0.0030	7753491

RDL = Reportable Detection Limit

(1) Matrix Spike exceeds acceptance limits due to matrix interference. Reanalysis yields similar results.

Maxxam Job #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	MW10-03	RDL	QC Batch
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	7750025
Elements				
Dissolved Aluminum (Al)	mg/L	0.0038	0.0030	7753491
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	7753491
Dissolved Arsenic (As)	mg/L	0.00023	0.00020	7753491
Dissolved Barium (Ba)	mg/L	0.25	0.010	7757557
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	7753491
Dissolved Boron (B)	mg/L	0.031	0.020	7757557
Dissolved Calcium (Ca)	mg/L	110	0.30	7757557
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	7753491
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	7753491
Dissolved Copper (Cu)	mg/L	0.0011	0.00020	7753491
Dissolved Iron (Fe)	mg/L	<0.060	0.060	7757557
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	7753491
Dissolved Lithium (Li)	mg/L	<0.020	0.020	7757557
Dissolved Magnesium (Mg)	mg/L	23	0.20	7757557
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	7757557
Dissolved Molybdenum (Mo)	mg/L	0.0014	0.00020	7753491
Dissolved Nickel (Ni)	mg/L	0.0012	0.00050	7753491
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	7757557
Dissolved Potassium (K)	mg/L	1.7	0.30	7757557
Dissolved Selenium (Se)	mg/L	0.0016	0.00020	7753491
Dissolved Silicon (Si)	mg/L	7.2	0.10	7757557
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	7753491
Dissolved Sodium (Na)	mg/L	29	0.50	7757557
Dissolved Strontium (Sr)	mg/L	0.58	0.020	7757557
Dissolved Sulphur (S)	mg/L	18	0.20	7757557
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	7753491
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	7753491
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	7753491
Dissolved Uranium (U)	mg/L	0.0045	0.00010	7753491
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	7753491
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	7753491
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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		LI5749	LI5750	LI5751	LI5752		LI5753		
Sampling Date		2014/12/09 12:00	2014/12/09 10:00	2014/12/09 13:30	2014/12/09 13:30		2014/12/09 10:32		
COC Number		A122115	A122115	A122115	A122115		A122115		
	Units	MW14-04	MW14-05A	MW14-05B	MW14-10	RDL	MW10-01	RDL	QC Batch
Low Level Elements									
Total Cadmium (Cd)	ug/L	2.0	0.24	0.053	0.040	0.020	3.2	0.020	7749379
Elements									
Total Aluminum (Al)	mg/L	0.82	1.2	0.17	0.36	0.0030	96 (1)	0.015	7752382
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	0.0017	0.00060	7752382
Total Arsenic (As)	mg/L	0.0022	0.0027	0.0048	0.0047	0.00020	0.14	0.00020	7752382
Total Barium (Ba)	mg/L	0.18	0.14	0.052	0.045	0.010	4.2	0.010	7752384
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0082	0.0010	7752382
Total Boron (B)	mg/L	0.071	0.21	0.26	0.25	0.020	0.057	0.020	7752384
Total Calcium (Ca)	mg/L	110	130	48	47	0.30	340	0.30	7752384
Total Chromium (Cr)	mg/L	0.0017	0.0030	<0.0010	0.0012	0.0010	0.37	0.0010	7752382
Total Cobalt (Co)	mg/L	0.00098	0.0030	0.00060	0.00058	0.00030	0.12	0.00030	7752382
Total Copper (Cu)	mg/L	0.0031	0.0042	0.0044	0.0041	0.00020	0.30	0.00020	7752382
Total Iron (Fe)	mg/L	1.0	3.2	0.39	0.39	0.060	290 (1)	0.30	7752384
Total Lead (Pb)	mg/L	0.00076	0.0030	0.00049	0.00053	0.00020	0.16	0.00020	7752382
Total Lithium (Li)	mg/L	0.036	0.066	0.036	0.036	0.020	0.19	0.020	7752384
Total Magnesium (Mg)	mg/L	30	32	13	12	0.20	130	0.20	7752384
Total Manganese (Mn)	mg/L	0.49	0.49	0.20	0.20	0.0040	5.7	0.0040	7752384
Total Molybdenum (Mo)	mg/L	0.0089	0.0056	0.019	0.018	0.00020	0.025	0.00020	7752382
Total Nickel (Ni)	mg/L	0.0039	0.0077	0.0028	0.0028	0.00050	0.38	0.00050	7752382
Total Phosphorus (P)	mg/L	<0.10	0.55	<0.10	<0.10	0.10	8.7	0.10	7752384
Total Potassium (K)	mg/L	4.4	5.1	4.0	3.9	0.30	15	0.30	7752384
Total Selenium (Se)	mg/L	<0.00020	0.00068	0.00047	0.00047	0.00020	0.0064	0.00020	7752382
Total Silicon (Si)	mg/L	7.8	11	7.8	7.6	0.10	130 (1)	0.50	7752384
Total Silver (Ag)	mg/L	0.0016	0.00038	0.00054	0.00069	0.00010	0.0028	0.00010	7752382
Total Sodium (Na)	mg/L	62	160	250	250	0.50	24	0.50	7752384
Total Strontium (Sr)	mg/L	0.79	0.92	0.47	0.46	0.020	1.3	0.020	7752384
Total Sulphur (S)	mg/L	32	70	65	64	0.20	13	0.20	7752384
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.0043	0.00020	7752382
Total Tin (Sn)	mg/L	0.0013	<0.0010	0.0025	0.0022	0.0010	0.0064	0.0010	7752382
Total Titanium (Ti)	mg/L	0.028	0.041	0.0062	0.016	0.0010	2.0	0.0010	7752382
Total Uranium (U)	mg/L	0.0070	0.027	0.0066	0.0062	0.00010	0.027	0.00010	7752382
Total Vanadium (V)	mg/L	0.0025	0.0049	<0.0010	0.0012	0.0010	0.33	0.0010	7752382
Total Zinc (Zn)	mg/L	0.010	0.021	0.0082	0.0063	0.0030	0.91	0.0030	7752382

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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	MW10-03	RDL	QC Batch
Low Level Elements				
Total Cadmium (Cd)	ug/L	9.4	0.020	7749379
Elements				
Total Aluminum (Al)	mg/L	130 (1)	0.015	7752382
Total Antimony (Sb)	mg/L	0.0015	0.00060	7752382
Total Arsenic (As)	mg/L	0.29	0.00020	7752382
Total Barium (Ba)	mg/L	8.1 (1)	0.050	7752384
Total Beryllium (Be)	mg/L	0.015	0.0010	7752382
Total Boron (B)	mg/L	0.089	0.020	7752384
Total Calcium (Ca)	mg/L	740 (1)	1.5	7752384
Total Chromium (Cr)	mg/L	1.1	0.0010	7752382
Total Cobalt (Co)	mg/L	0.21	0.00030	7752382
Total Copper (Cu)	mg/L	0.44	0.00020	7752382
Total Iron (Fe)	mg/L	470 (1)	0.30	7752384
Total Lead (Pb)	mg/L	0.28	0.00020	7752382
Total Lithium (Li)	mg/L	0.22	0.020	7752384
Total Magnesium (Mg)	mg/L	200	0.20	7752384
Total Manganese (Mn)	mg/L	17	0.0040	7752384
Total Molybdenum (Mo)	mg/L	0.074	0.00020	7752382
Total Nickel (Ni)	mg/L	1.0	0.00050	7752382
Total Phosphorus (P)	mg/L	17	0.10	7752384
Total Potassium (K)	mg/L	21	0.30	7752384
Total Selenium (Se)	mg/L	0.0065	0.00020	7752382
Total Silicon (Si)	mg/L	170 (1)	0.50	7752384
Total Silver (Ag)	mg/L	0.0059	0.00010	7752382
Total Sodium (Na)	mg/L	30	0.50	7752384
Total Strontium (Sr)	mg/L	2.0	0.020	7752384
Total Sulphur (S)	mg/L	21	0.20	7752384
Total Thallium (Tl)	mg/L	0.0065	0.00020	7752382
Total Tin (Sn)	mg/L	0.012	0.0010	7752382
Total Titanium (Ti)	mg/L	1.1	0.0010	7752382
Total Uranium (U)	mg/L	0.022	0.00010	7752382
Total Vanadium (V)	mg/L	0.46	0.0010	7752382

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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	**MW10-03**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/L	1.5	0.0030	7752382
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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		LI5749		LI5750		LI5751	LI5752		LI5753		
Sampling Date		2014/12/09 12:00		2014/12/09 10:00		2014/12/09 13:30	2014/12/09 13:30		2014/12/09 10:32		
COC Number		A122115		A122115		A122115	A122115		A122115		
	Units	MW14-04	RDL	MW14-05A	RDL	MW14-05B	MW14-10	RDL	MW10-01	RDL	QC Batch
Nutrients											
Orthophosphate (P)	mg/L	<0.0030	0.0030	<0.0030	0.0030	<0.0030	0.0030	0.0030	0.0090	0.0030	7751175
Total Phosphorus (P)	mg/L	0.041	0.0030	0.50 (1)	0.0060	0.021	0.019	0.0030	7.7 (1)	0.15	7751129
Total Total Kjeldahl Nitrogen	mg/L	0.60	0.050	0.80	0.050	0.59	0.61	0.050	3.9 (1)	0.50	7751231

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	MW10-03	RDL	QC Batch
Nutrients				
Orthophosphate (P)	mg/L	0.0040	0.0030	7751175
Total Phosphorus (P)	mg/L	16 (1)	0.15	7751129
Total Total Kjeldahl Nitrogen	mg/L	13 (1)	0.50	7751231

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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

GENERAL COMMENTS

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

Package 1	5.7°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 #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7751129	AL2	Matrix Spike [LI5749-03]	Total Phosphorus (P)	2014/12/12		97	%	80 - 120
7751129	AL2	Spiked Blank	Total Phosphorus (P)	2014/12/12		94	%	80 - 120
7751129	AL2	Method Blank	Total Phosphorus (P)	2014/12/12	<0.0030		mg/L	
7751129	AL2	RPD [LI5749-03]	Total Phosphorus (P)	2014/12/12	5.0		%	20
7751175	MBB	Matrix Spike [LI5750-01]	Orthophosphate (P)	2014/12/11		96	%	80 - 120
7751175	MBB	Spiked Blank	Orthophosphate (P)	2014/12/11		99	%	80 - 120
7751175	MBB	Method Blank	Orthophosphate (P)	2014/12/11	<0.0030		mg/L	
7751175	MBB	RPD [LI5750-01]	Orthophosphate (P)	2014/12/11	NC		%	20
7751194	SES	Matrix Spike	1,4-Difluorobenzene (sur.)	2014/12/15		95	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/12/15		103	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/12/15		104	%	70 - 130
			Benzene	2014/12/15		103	%	70 - 130
			Toluene	2014/12/15		102	%	70 - 130
			Ethylbenzene	2014/12/15		102	%	70 - 130
			m & p-Xylene	2014/12/15		103	%	70 - 130
			o-Xylene	2014/12/15		106	%	70 - 130
			(C6-C10)	2014/12/15		79	%	70 - 130
7751194	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/12/15		96	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/12/15		102	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/12/15		99	%	70 - 130
			Benzene	2014/12/15		99	%	70 - 130
			Toluene	2014/12/15		99	%	70 - 130
			Ethylbenzene	2014/12/15		100	%	70 - 130
			m & p-Xylene	2014/12/15		101	%	70 - 130
			o-Xylene	2014/12/15		103	%	70 - 130
			(C6-C10)	2014/12/15		113	%	70 - 130
7751194	SES	Method Blank	1,4-Difluorobenzene (sur.)	2014/12/15		97	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/12/15		101	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/12/15		97	%	70 - 130
			Benzene	2014/12/15	<0.00040		mg/L	
			Toluene	2014/12/15	<0.00040		mg/L	
			Ethylbenzene	2014/12/15	<0.00040		mg/L	
			m & p-Xylene	2014/12/15	<0.00080		mg/L	
			o-Xylene	2014/12/15	<0.00040		mg/L	
			Xylenes (Total)	2014/12/15	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2014/12/15	<0.10		mg/L	
			(C6-C10)	2014/12/15	<0.10		mg/L	
7751194	SES	RPD	Benzene	2014/12/15	NC		%	40
			Toluene	2014/12/15	NC		%	40
			Ethylbenzene	2014/12/15	NC		%	40
			m & p-Xylene	2014/12/15	NC		%	40
			o-Xylene	2014/12/15	NC		%	40
			Xylenes (Total)	2014/12/15	NC		%	40
			F1 (C6-C10) - BTEX	2014/12/15	NC		%	40
			(C6-C10)	2014/12/15	NC		%	40
7751213	MA4	Spiked Blank	pH	2014/12/11		100	%	97 - 103
7751213	MA4	RPD [LI5749-01]	pH	2014/12/11	0.34		%	N/A
7751217	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2014/12/11		100	%	80 - 120
7751217	MA4	Method Blank	Alkalinity (PP as CaCO3)	2014/12/11	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2014/12/11	<0.50		mg/L	
			Bicarbonate (HCO3)	2014/12/11	<0.50		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Carbonate (CO3)	2014/12/11	<0.50		mg/L	
			Hydroxide (OH)	2014/12/11	<0.50		mg/L	
7751217	MA4	RPD [LI5749-01]	Alkalinity (PP as CaCO3)	2014/12/11	NC		%	20
			Alkalinity (Total as CaCO3)	2014/12/11	0.13		%	20
			Bicarbonate (HCO3)	2014/12/11	0.11		%	20
			Carbonate (CO3)	2014/12/11	NC		%	20
			Hydroxide (OH)	2014/12/11	NC		%	20
7751219	MA4	Spiked Blank	Conductivity	2014/12/11		102	%	90 - 110
7751219	MA4	Method Blank	Conductivity	2014/12/11	<1.0		uS/cm	
7751219	MA4	RPD [LI5749-01]	Conductivity	2014/12/11	0.11		%	20
7751223	LMD	Matrix Spike [LI5749-01]	Dissolved Chloride (Cl)	2014/12/14		NC	%	80 - 120
7751223	LMD	Spiked Blank	Dissolved Chloride (Cl)	2014/12/14		103	%	80 - 120
7751223	LMD	Method Blank	Dissolved Chloride (Cl)	2014/12/14	<1.0		mg/L	
7751223	LMD	RPD [LI5749-01]	Dissolved Chloride (Cl)	2014/12/14	1.5		%	20
7751227	LMD	Matrix Spike [LI5749-01]	Dissolved Sulphate (SO4)	2014/12/14		NC	%	80 - 120
7751227	LMD	Spiked Blank	Dissolved Sulphate (SO4)	2014/12/14		105	%	80 - 120
7751227	LMD	Method Blank	Dissolved Sulphate (SO4)	2014/12/14	<1.0		mg/L	
7751227	LMD	RPD [LI5749-01]	Dissolved Sulphate (SO4)	2014/12/14	0.20		%	20
7751231	AL2	Matrix Spike [LI5751-03]	Total Total Kjeldahl Nitrogen	2014/12/12		NC	%	80 - 120
7751231	AL2	QC Standard	Total Total Kjeldahl Nitrogen	2014/12/12		113	%	80 - 120
7751231	AL2	Spiked Blank	Total Total Kjeldahl Nitrogen	2014/12/12		111	%	80 - 120
7751231	AL2	Method Blank	Total Total Kjeldahl Nitrogen	2014/12/12	<0.050		mg/L	
7751231	AL2	RPD [LI5751-03]	Total Total Kjeldahl Nitrogen	2014/12/12	1.8		%	20
7752147	GG3	Matrix Spike [LI5750-06]	O-TERPHENYL (sur.)	2014/12/13		109	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/12/13		92	%	50 - 130
7752147	GG3	Spiked Blank	O-TERPHENYL (sur.)	2014/12/13		121	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/12/13		103	%	70 - 130
7752147	GG3	Method Blank	O-TERPHENYL (sur.)	2014/12/13		108	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/12/13	<0.10		mg/L	
7752147	GG3	RPD [LI5749-06]	F2 (C10-C16 Hydrocarbons)	2014/12/13	NC		%	40
7752382	HC7	Matrix Spike	Total Aluminum (Al)	2014/12/13		101	%	80 - 120
			Total Antimony (Sb)	2014/12/13		103	%	80 - 120
			Total Arsenic (As)	2014/12/13		101	%	80 - 120
			Total Beryllium (Be)	2014/12/13		101	%	80 - 120
			Total Chromium (Cr)	2014/12/13		100	%	80 - 120
			Total Cobalt (Co)	2014/12/13		102	%	80 - 120
			Total Copper (Cu)	2014/12/13		99	%	80 - 120
			Total Lead (Pb)	2014/12/13		101	%	80 - 120
			Total Molybdenum (Mo)	2014/12/13		103	%	80 - 120
			Total Nickel (Ni)	2014/12/13		101	%	80 - 120
			Total Selenium (Se)	2014/12/13		100	%	80 - 120
			Total Silver (Ag)	2014/12/13		99	%	80 - 120
			Total Thallium (Tl)	2014/12/13		100	%	80 - 120
			Total Tin (Sn)	2014/12/13		105	%	80 - 120
			Total Titanium (Ti)	2014/12/13		97	%	80 - 120
			Total Uranium (U)	2014/12/13		103	%	80 - 120
			Total Vanadium (V)	2014/12/13		104	%	80 - 120
			Total Zinc (Zn)	2014/12/13		97	%	80 - 120
7752382	HC7	Spiked Blank	Total Aluminum (Al)	2014/12/13		90	%	80 - 120
			Total Antimony (Sb)	2014/12/13		103	%	80 - 120
			Total Arsenic (As)	2014/12/13		101	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Beryllium (Be)	2014/12/13		102	%	80 - 120
			Total Chromium (Cr)	2014/12/13		102	%	80 - 120
			Total Cobalt (Co)	2014/12/13		103	%	80 - 120
			Total Copper (Cu)	2014/12/13		103	%	80 - 120
			Total Lead (Pb)	2014/12/13		101	%	80 - 120
			Total Molybdenum (Mo)	2014/12/13		104	%	80 - 120
			Total Nickel (Ni)	2014/12/13		100	%	80 - 120
			Total Selenium (Se)	2014/12/13		100	%	80 - 120
			Total Silver (Ag)	2014/12/13		100	%	80 - 120
			Total Thallium (Tl)	2014/12/13		103	%	80 - 120
			Total Tin (Sn)	2014/12/13		102	%	80 - 120
			Total Titanium (Ti)	2014/12/13		95	%	80 - 120
			Total Uranium (U)	2014/12/13		102	%	80 - 120
			Total Vanadium (V)	2014/12/13		104	%	80 - 120
			Total Zinc (Zn)	2014/12/13		99	%	80 - 120
7752382	HC7	Method Blank	Total Aluminum (Al)	2014/12/13	<0.0030		mg/L	
			Total Antimony (Sb)	2014/12/13	<0.00060		mg/L	
			Total Arsenic (As)	2014/12/13	<0.00020		mg/L	
			Total Beryllium (Be)	2014/12/13	<0.0010		mg/L	
			Total Chromium (Cr)	2014/12/13	<0.0010		mg/L	
			Total Cobalt (Co)	2014/12/13	<0.00030		mg/L	
			Total Copper (Cu)	2014/12/13	<0.00020		mg/L	
			Total Lead (Pb)	2014/12/13	<0.00020		mg/L	
			Total Molybdenum (Mo)	2014/12/13	<0.00020		mg/L	
			Total Nickel (Ni)	2014/12/13	<0.00050		mg/L	
			Total Selenium (Se)	2014/12/13	<0.00020		mg/L	
			Total Silver (Ag)	2014/12/13	<0.00010		mg/L	
			Total Thallium (Tl)	2014/12/13	<0.00020		mg/L	
			Total Tin (Sn)	2014/12/13	<0.0010		mg/L	
			Total Titanium (Ti)	2014/12/13	<0.0010		mg/L	
			Total Uranium (U)	2014/12/13	<0.00010		mg/L	
			Total Vanadium (V)	2014/12/13	<0.0010		mg/L	
			Total Zinc (Zn)	2014/12/13	<0.0030		mg/L	
7752382	HC7	RPD	Total Aluminum (Al)	2014/12/15	NC		%	20
			Total Antimony (Sb)	2014/12/15	NC		%	20
			Total Arsenic (As)	2014/12/15	NC		%	20
			Total Beryllium (Be)	2014/12/15	NC		%	20
			Total Chromium (Cr)	2014/12/15	NC		%	20
			Total Cobalt (Co)	2014/12/15	NC		%	20
			Total Copper (Cu)	2014/12/15	2.0		%	20
			Total Lead (Pb)	2014/12/15	NC		%	20
			Total Molybdenum (Mo)	2014/12/15	NC		%	20
			Total Nickel (Ni)	2014/12/15	NC		%	20
			Total Selenium (Se)	2014/12/15	NC		%	20
			Total Silver (Ag)	2014/12/15	NC		%	20
			Total Thallium (Tl)	2014/12/15	NC		%	20
			Total Tin (Sn)	2014/12/15	NC		%	20
			Total Titanium (Ti)	2014/12/15	NC		%	20
			Total Uranium (U)	2014/12/15	NC		%	20
			Total Vanadium (V)	2014/12/15	NC		%	20
			Total Zinc (Zn)	2014/12/15	NC		%	20

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7752384	STI	Matrix Spike	Total Barium (Ba)	2014/12/13		96	%	80 - 120
			Total Boron (B)	2014/12/13		NC	%	80 - 120
			Total Calcium (Ca)	2014/12/13		103	%	80 - 120
			Total Iron (Fe)	2014/12/13		100	%	80 - 120
			Total Lithium (Li)	2014/12/13		98	%	80 - 120
			Total Magnesium (Mg)	2014/12/13		100	%	80 - 120
			Total Manganese (Mn)	2014/12/13		104	%	80 - 120
			Total Phosphorus (P)	2014/12/13		96	%	80 - 120
			Total Potassium (K)	2014/12/13		96	%	80 - 120
			Total Silicon (Si)	2014/12/13		104	%	80 - 120
			Total Sodium (Na)	2014/12/13		NC	%	80 - 120
			Total Strontium (Sr)	2014/12/13		103	%	80 - 120
7752384	STI	Spiked Blank	Total Barium (Ba)	2014/12/13		95	%	80 - 120
			Total Boron (B)	2014/12/13		99	%	80 - 120
			Total Calcium (Ca)	2014/12/13		102	%	80 - 120
			Total Iron (Fe)	2014/12/13		101	%	80 - 120
			Total Lithium (Li)	2014/12/13		97	%	80 - 120
			Total Magnesium (Mg)	2014/12/13		98	%	80 - 120
			Total Manganese (Mn)	2014/12/13		103	%	80 - 120
			Total Phosphorus (P)	2014/12/13		95	%	80 - 120
			Total Potassium (K)	2014/12/13		95	%	80 - 120
			Total Silicon (Si)	2014/12/13		100	%	80 - 120
			Total Sodium (Na)	2014/12/13		99	%	80 - 120
			Total Strontium (Sr)	2014/12/13		102	%	80 - 120
7752384	STI	Method Blank	Total Barium (Ba)	2014/12/13	<0.010		mg/L	
			Total Boron (B)	2014/12/13	<0.020		mg/L	
			Total Calcium (Ca)	2014/12/13	<0.30		mg/L	
			Total Iron (Fe)	2014/12/13	<0.060		mg/L	
			Total Lithium (Li)	2014/12/13	<0.020		mg/L	
			Total Magnesium (Mg)	2014/12/13	<0.20		mg/L	
			Total Manganese (Mn)	2014/12/13	<0.0040		mg/L	
			Total Phosphorus (P)	2014/12/13	<0.10		mg/L	
			Total Potassium (K)	2014/12/13	<0.30		mg/L	
			Total Silicon (Si)	2014/12/13	<0.10		mg/L	
			Total Sodium (Na)	2014/12/13	<0.50		mg/L	
			Total Strontium (Sr)	2014/12/13	<0.020		mg/L	
			Total Sulphur (S)	2014/12/13	<0.20		mg/L	
7752384	STI	RPD	Total Barium (Ba)	2014/12/13	NC		%	20
			Total Boron (B)	2014/12/13	0.59		%	20
			Total Calcium (Ca)	2014/12/13	NC		%	20
			Total Iron (Fe)	2014/12/13	NC		%	20
			Total Lithium (Li)	2014/12/13	NC		%	20
			Total Magnesium (Mg)	2014/12/13	NC		%	20
			Total Manganese (Mn)	2014/12/13	NC		%	20
			Total Phosphorus (P)	2014/12/13	NC		%	20
			Total Potassium (K)	2014/12/13	NC		%	20
			Total Silicon (Si)	2014/12/13	NC		%	20
			Total Sodium (Na)	2014/12/13	0.76		%	20
			Total Strontium (Sr)	2014/12/13	NC		%	20
			Total Sulphur (S)	2014/12/13	NC		%	20
7753491	HC7	Matrix Spike [LI5749-05]	Dissolved Aluminum (Al)	2014/12/13		105	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Antimony (Sb)	2014/12/13		61 (1)	%	80 - 120
			Dissolved Arsenic (As)	2014/12/13		98	%	80 - 120
			Dissolved Beryllium (Be)	2014/12/13		98	%	80 - 120
			Dissolved Chromium (Cr)	2014/12/13		91	%	80 - 120
			Dissolved Cobalt (Co)	2014/12/13		92	%	80 - 120
			Dissolved Copper (Cu)	2014/12/13		90	%	80 - 120
			Dissolved Lead (Pb)	2014/12/13		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2014/12/13		105	%	80 - 120
			Dissolved Nickel (Ni)	2014/12/13		91	%	80 - 120
			Dissolved Selenium (Se)	2014/12/13		97	%	80 - 120
			Dissolved Silver (Ag)	2014/12/13		98	%	80 - 120
			Dissolved Thallium (Tl)	2014/12/13		97	%	80 - 120
			Dissolved Tin (Sn)	2014/12/13		101	%	80 - 120
			Dissolved Titanium (Ti)	2014/12/13		91	%	80 - 120
			Dissolved Uranium (U)	2014/12/13		95	%	80 - 120
			Dissolved Vanadium (V)	2014/12/13		99	%	80 - 120
			Dissolved Zinc (Zn)	2014/12/13		100	%	80 - 120
7753491	HC7	Spiked Blank	Dissolved Aluminum (Al)	2014/12/13		109	%	80 - 120
			Dissolved Antimony (Sb)	2014/12/13		101	%	80 - 120
			Dissolved Arsenic (As)	2014/12/13		97	%	80 - 120
			Dissolved Beryllium (Be)	2014/12/13		93	%	80 - 120
			Dissolved Chromium (Cr)	2014/12/13		90	%	80 - 120
			Dissolved Cobalt (Co)	2014/12/13		95	%	80 - 120
			Dissolved Copper (Cu)	2014/12/13		93	%	80 - 120
			Dissolved Lead (Pb)	2014/12/13		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2014/12/13		97	%	80 - 120
			Dissolved Nickel (Ni)	2014/12/13		93	%	80 - 120
			Dissolved Selenium (Se)	2014/12/13		94	%	80 - 120
			Dissolved Silver (Ag)	2014/12/13		95	%	80 - 120
			Dissolved Thallium (Tl)	2014/12/13		97	%	80 - 120
			Dissolved Tin (Sn)	2014/12/13		99	%	80 - 120
			Dissolved Titanium (Ti)	2014/12/13		89	%	80 - 120
			Dissolved Uranium (U)	2014/12/13		91	%	80 - 120
			Dissolved Vanadium (V)	2014/12/13		97	%	80 - 120
			Dissolved Zinc (Zn)	2014/12/13		99	%	80 - 120
7753491	HC7	Method Blank	Dissolved Aluminum (Al)	2014/12/13	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2014/12/13	<0.00060		mg/L	
			Dissolved Arsenic (As)	2014/12/13	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2014/12/13	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2014/12/13	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2014/12/13	<0.00030		mg/L	
			Dissolved Copper (Cu)	2014/12/13	<0.00020		mg/L	
			Dissolved Lead (Pb)	2014/12/13	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2014/12/13	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2014/12/13	<0.00050		mg/L	
			Dissolved Selenium (Se)	2014/12/13	<0.00020		mg/L	
			Dissolved Silver (Ag)	2014/12/13	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2014/12/13	<0.00020		mg/L	
			Dissolved Tin (Sn)	2014/12/13	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2014/12/13	<0.0010		mg/L	
			Dissolved Uranium (U)	2014/12/13	<0.00010		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Vanadium (V)	2014/12/13	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2014/12/13	<0.0030		mg/L	
7753491	HC7	RPD [LI5749-05]	Dissolved Aluminum (Al)	2014/12/13	NC		%	20
			Dissolved Antimony (Sb)	2014/12/13	NC		%	20
			Dissolved Arsenic (As)	2014/12/13	3.3		%	20
			Dissolved Beryllium (Be)	2014/12/13	NC		%	20
			Dissolved Chromium (Cr)	2014/12/13	NC		%	20
			Dissolved Cobalt (Co)	2014/12/13	NC		%	20
			Dissolved Copper (Cu)	2014/12/13	6.5		%	20
			Dissolved Lead (Pb)	2014/12/13	NC		%	20
			Dissolved Molybdenum (Mo)	2014/12/13	2.1		%	20
			Dissolved Nickel (Ni)	2014/12/13	NC		%	20
			Dissolved Selenium (Se)	2014/12/13	NC		%	20
			Dissolved Silver (Ag)	2014/12/13	NC		%	20
			Dissolved Thallium (Tl)	2014/12/13	NC		%	20
			Dissolved Tin (Sn)	2014/12/13	NC		%	20
			Dissolved Titanium (Ti)	2014/12/13	NC		%	20
			Dissolved Uranium (U)	2014/12/13	0.56		%	20
			Dissolved Vanadium (V)	2014/12/13	NC		%	20
			Dissolved Zinc (Zn)	2014/12/13	NC		%	20
7753535	STI	Matrix Spike	Dissolved Barium (Ba)	2014/12/13		100	%	80 - 120
			Dissolved Boron (B)	2014/12/13		103	%	80 - 120
			Dissolved Calcium (Ca)	2014/12/13		NC	%	80 - 120
			Dissolved Iron (Fe)	2014/12/13		103	%	80 - 120
			Dissolved Lithium (Li)	2014/12/13		101	%	80 - 120
			Dissolved Magnesium (Mg)	2014/12/13		104	%	80 - 120
			Dissolved Manganese (Mn)	2014/12/13		105	%	80 - 120
			Dissolved Phosphorus (P)	2014/12/13		110	%	80 - 120
			Dissolved Potassium (K)	2014/12/13		102	%	80 - 120
			Dissolved Silicon (Si)	2014/12/13		101	%	80 - 120
			Dissolved Sodium (Na)	2014/12/13		NC	%	80 - 120
			Dissolved Strontium (Sr)	2014/12/13		100	%	80 - 120
7753535	STI	Spiked Blank	Dissolved Barium (Ba)	2014/12/13		98	%	80 - 120
			Dissolved Boron (B)	2014/12/13		102	%	80 - 120
			Dissolved Calcium (Ca)	2014/12/13		104	%	80 - 120
			Dissolved Iron (Fe)	2014/12/13		102	%	80 - 120
			Dissolved Lithium (Li)	2014/12/13		100	%	80 - 120
			Dissolved Magnesium (Mg)	2014/12/13		104	%	80 - 120
			Dissolved Manganese (Mn)	2014/12/13		105	%	80 - 120
			Dissolved Phosphorus (P)	2014/12/13		104	%	80 - 120
			Dissolved Potassium (K)	2014/12/13		101	%	80 - 120
			Dissolved Silicon (Si)	2014/12/13		104	%	80 - 120
			Dissolved Sodium (Na)	2014/12/13		100	%	80 - 120
			Dissolved Strontium (Sr)	2014/12/13		104	%	80 - 120
7753535	STI	Method Blank	Dissolved Barium (Ba)	2014/12/13	<0.010		mg/L	
			Dissolved Boron (B)	2014/12/13	<0.020		mg/L	
			Dissolved Calcium (Ca)	2014/12/13	<0.30		mg/L	
			Dissolved Iron (Fe)	2014/12/13	<0.060		mg/L	
			Dissolved Lithium (Li)	2014/12/13	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2014/12/13	<0.20		mg/L	
			Dissolved Manganese (Mn)	2014/12/13	<0.0040		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Phosphorus (P)	2014/12/13	<0.10		mg/L	
			Dissolved Potassium (K)	2014/12/13	<0.30		mg/L	
			Dissolved Silicon (Si)	2014/12/13	<0.10		mg/L	
			Dissolved Sodium (Na)	2014/12/13	<0.50		mg/L	
			Dissolved Strontium (Sr)	2014/12/13	<0.020		mg/L	
			Dissolved Sulphur (S)	2014/12/13	<0.20		mg/L	
7753535	STI	RPD	Dissolved Barium (Ba)	2014/12/13	NC		%	20
			Dissolved Boron (B)	2014/12/13	0.96		%	20
			Dissolved Calcium (Ca)	2014/12/13	0.14		%	20
			Dissolved Iron (Fe)	2014/12/13	NC		%	20
			Dissolved Lithium (Li)	2014/12/13	0.15		%	20
			Dissolved Magnesium (Mg)	2014/12/13	0.36		%	20
			Dissolved Manganese (Mn)	2014/12/13	0.21		%	20
			Dissolved Phosphorus (P)	2014/12/13	NC		%	20
			Dissolved Potassium (K)	2014/12/13	0.35		%	20
			Dissolved Silicon (Si)	2014/12/13	0.50		%	20
			Dissolved Sodium (Na)	2014/12/13	0.42		%	20
			Dissolved Strontium (Sr)	2014/12/13	0.30		%	20
			Dissolved Sulphur (S)	2014/12/13	0.41		%	20
7754422	SB8	Matrix Spike	Dissolved Nitrite (N)	2014/12/16		94	%	80 - 120
			Dissolved Nitrate (N)	2014/12/16		101	%	80 - 120
7754422	SB8	Spiked Blank	Dissolved Nitrite (N)	2014/12/15		100	%	80 - 120
			Dissolved Nitrate (N)	2014/12/15		99	%	80 - 120
7754422	SB8	Method Blank	Dissolved Nitrite (N)	2014/12/15	<0.010		mg/L	
			Dissolved Nitrate (N)	2014/12/15	<0.010		mg/L	
7754422	SB8	RPD	Dissolved Nitrite (N)	2014/12/16	NC		%	20
			Dissolved Nitrate (N)	2014/12/16	NC		%	20
7757557	JK9	Matrix Spike	Dissolved Barium (Ba)	2014/12/17		101	%	80 - 120
			Dissolved Boron (B)	2014/12/17		104	%	80 - 120
			Dissolved Calcium (Ca)	2014/12/17		94	%	80 - 120
			Dissolved Iron (Fe)	2014/12/17		98	%	80 - 120
			Dissolved Lithium (Li)	2014/12/17		93	%	80 - 120
			Dissolved Magnesium (Mg)	2014/12/17		98	%	80 - 120
			Dissolved Manganese (Mn)	2014/12/17		98	%	80 - 120
			Dissolved Phosphorus (P)	2014/12/17		105	%	80 - 120
			Dissolved Potassium (K)	2014/12/17		101	%	80 - 120
			Dissolved Silicon (Si)	2014/12/17		105	%	80 - 120
			Dissolved Sodium (Na)	2014/12/17		NC	%	80 - 120
			Dissolved Strontium (Sr)	2014/12/17		95	%	80 - 120
7757557	JK9	Spiked Blank	Dissolved Barium (Ba)	2014/12/17		103	%	80 - 120
			Dissolved Boron (B)	2014/12/17		105	%	80 - 120
			Dissolved Calcium (Ca)	2014/12/17		99	%	80 - 120
			Dissolved Iron (Fe)	2014/12/17		99	%	80 - 120
			Dissolved Lithium (Li)	2014/12/17		94	%	80 - 120
			Dissolved Magnesium (Mg)	2014/12/17		103	%	80 - 120
			Dissolved Manganese (Mn)	2014/12/17		101	%	80 - 120
			Dissolved Phosphorus (P)	2014/12/17		103	%	80 - 120
			Dissolved Potassium (K)	2014/12/17		104	%	80 - 120
			Dissolved Silicon (Si)	2014/12/17		108	%	80 - 120
			Dissolved Sodium (Na)	2014/12/17		106	%	80 - 120
			Dissolved Strontium (Sr)	2014/12/17		98	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/17

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Sulphur (S)	2014/12/17		95	%	80 - 120
7757557	JK9	Method Blank	Dissolved Barium (Ba)	2014/12/17	<0.010		mg/L	
			Dissolved Boron (B)	2014/12/17	<0.020		mg/L	
			Dissolved Calcium (Ca)	2014/12/17	<0.30		mg/L	
			Dissolved Iron (Fe)	2014/12/17	<0.060		mg/L	
			Dissolved Lithium (Li)	2014/12/17	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2014/12/17	<0.20		mg/L	
			Dissolved Manganese (Mn)	2014/12/17	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2014/12/17	<0.10		mg/L	
			Dissolved Potassium (K)	2014/12/17	<0.30		mg/L	
			Dissolved Silicon (Si)	2014/12/17	<0.10		mg/L	
			Dissolved Sodium (Na)	2014/12/17	<0.50		mg/L	
			Dissolved Strontium (Sr)	2014/12/17	<0.020		mg/L	
			Dissolved Sulphur (S)	2014/12/17	<0.20		mg/L	
7757557	JK9	RPD	Dissolved Barium (Ba)	2014/12/17	NC		%	20
			Dissolved Boron (B)	2014/12/17	NC		%	20
			Dissolved Calcium (Ca)	2014/12/17	0.99		%	20
			Dissolved Iron (Fe)	2014/12/17	NC		%	20
			Dissolved Lithium (Li)	2014/12/17	2.1		%	20
			Dissolved Magnesium (Mg)	2014/12/17	0.53		%	20
			Dissolved Manganese (Mn)	2014/12/17	1.1		%	20
			Dissolved Phosphorus (P)	2014/12/17	NC		%	20
			Dissolved Potassium (K)	2014/12/17	2.1		%	20
			Dissolved Silicon (Si)	2014/12/17	0.28		%	20
			Dissolved Sodium (Na)	2014/12/17	2.2		%	20
			Dissolved Strontium (Sr)	2014/12/17	0.11		%	20
			Dissolved Sulphur (S)	2014/12/17	0.76		%	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.

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

12/353[1]

Chain of Custody A122115

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☑
Company:	Stantec	
Contact:	Christian Nageli	
Address:	10160 112 St Edmonton	
	Prov: AB PC: T5K2L6.	Prov: PC:
Contact #s:	Ph: Cell: 780-233-4206.	Ph: Cell:

Report Distribution (E-Mail):
Christian.Nageli@Stantec.com
Shayanne.Cairns@stantec.com.
Suzanne.Musolino@Stantec.com

REGULATORY GUIDELINES:
☑ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:
Project # / Name:
Site Location: Gull Lake
Quote #:
Sampled By: S. Cairns

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	WATER: ☐BTEX F1 ☐BTEX F1-F2 ☑BTEX F1-F4 ☐VOCs ☐Routine Water ☐Turb ☐F ☐TOC ☐DOC	Regulated Metals (CCME / AT1) Total	Regulated Metals (CCME / AT1) Dissolved	☐Total ☐Dissolved Mercury	Other Analysis: TKN	Orthophosphate (See Note)	Total phosphorus	Nitrite, nitrate, nitrite	HOLD - Do not Analyze	# of Containers Submitted
1	MW14-04	N/A	GW	14/12/09 12:00							✓ ✓	✓	✓		✓	✓	✓	✓		10
2	MW14-05a			10:00							✓ ✓	✓	✓		✓	✓	✓	✓		10
3	MW14-05b			13:00							✓ ✓	✓	✓		✓	✓	✓	✓		10
4	MW14-10			13:30							✓ ✓	✓	✓		✓	✓	✓	✓		10
5	MW10-01			10:32							✓	✓	✓		✓	✓	✓	✓		5
6	~~MW10-02~~																	✓		
7	MW10-03.			11:00							✓ ✓	✓	✓		✓	✓	✓	✓		10.
8																				
9																				
10																				
11																				
12																				

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print): Shayanne Cairns.	Date (YY/MM/DD): 14/12/09	Time (24:00): 17:15.
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:
~~Christian requested orthophosphate. Not orthophosphate~~
~~Please Contact him before Proceeding~~

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:
Shaun Bale	2014/12/09	1722	B413131 NFA/KDH

Custody Seal	Temperature	Ice
Absent	7.5,5	Present

Lab Comments:

AB FCD-00331 Rev3 2010/05

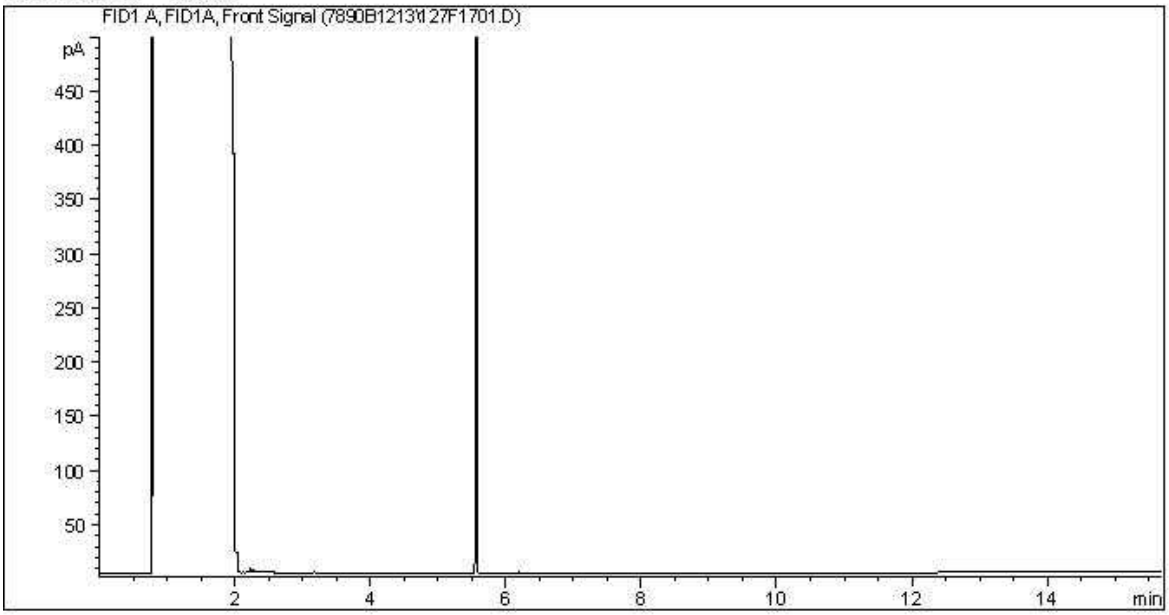
Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B4B1931
Report Date: 2014/12/17
Maxxam Sample: LI5749

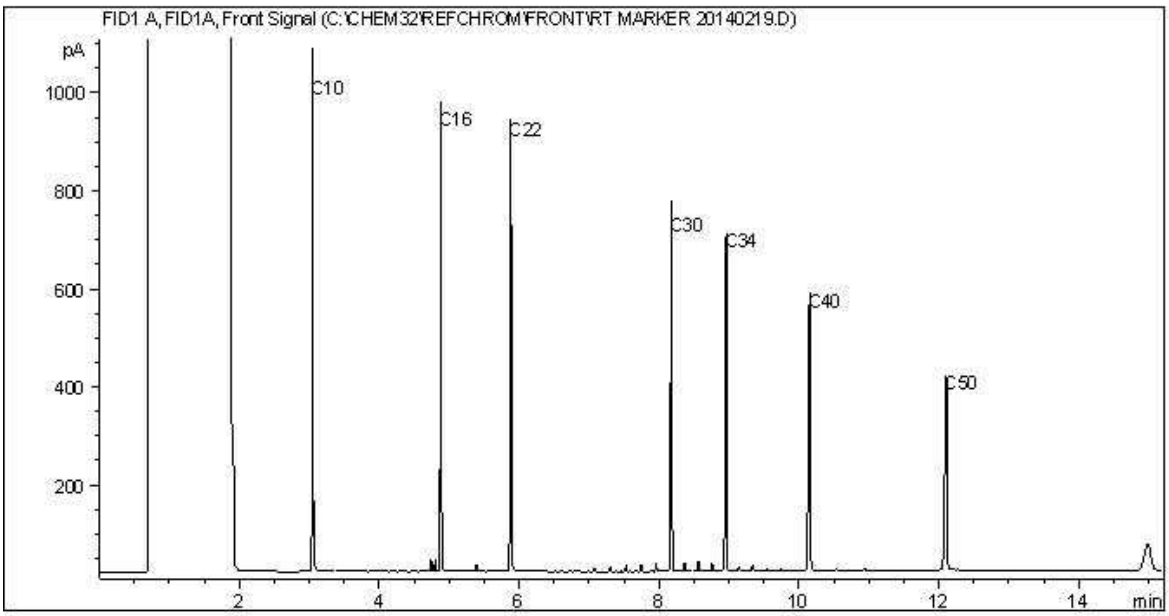
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-04

CCME Hydrocarbons in Water (F2; C10-C16) 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+	

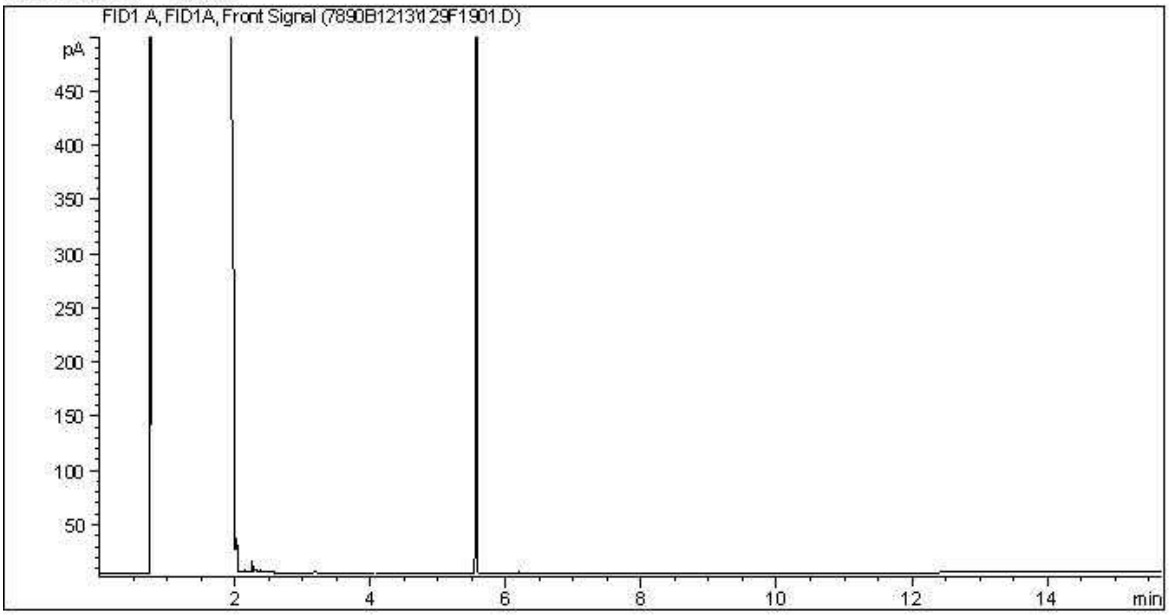
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/17
Maxxam Sample: LI5750

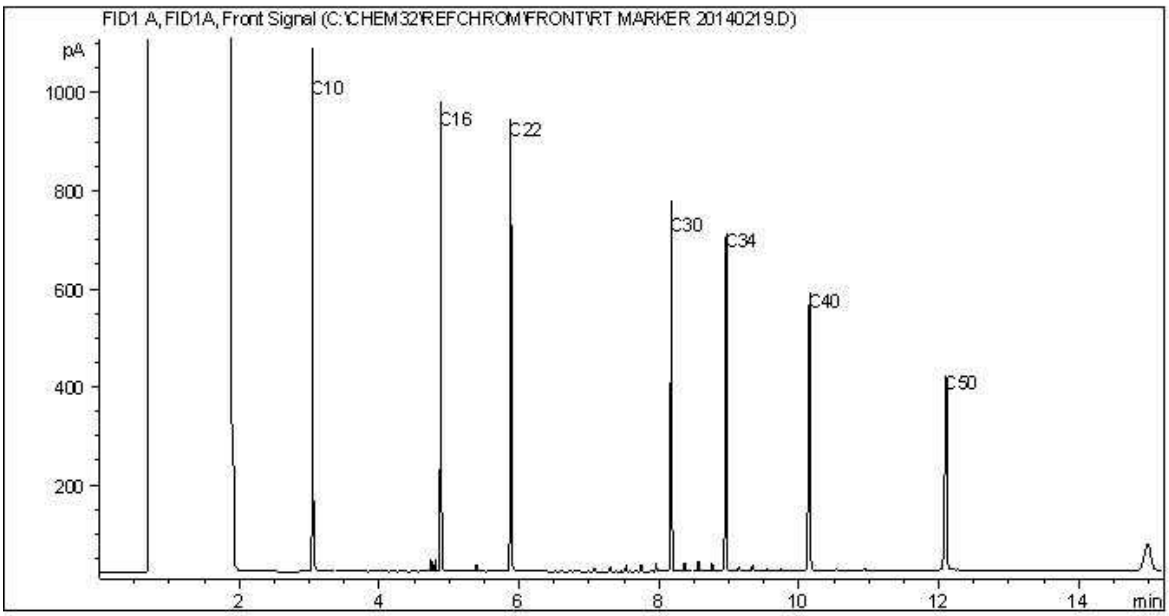
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-05A

CCME Hydrocarbons in Water (F2; C10-C16) 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+	

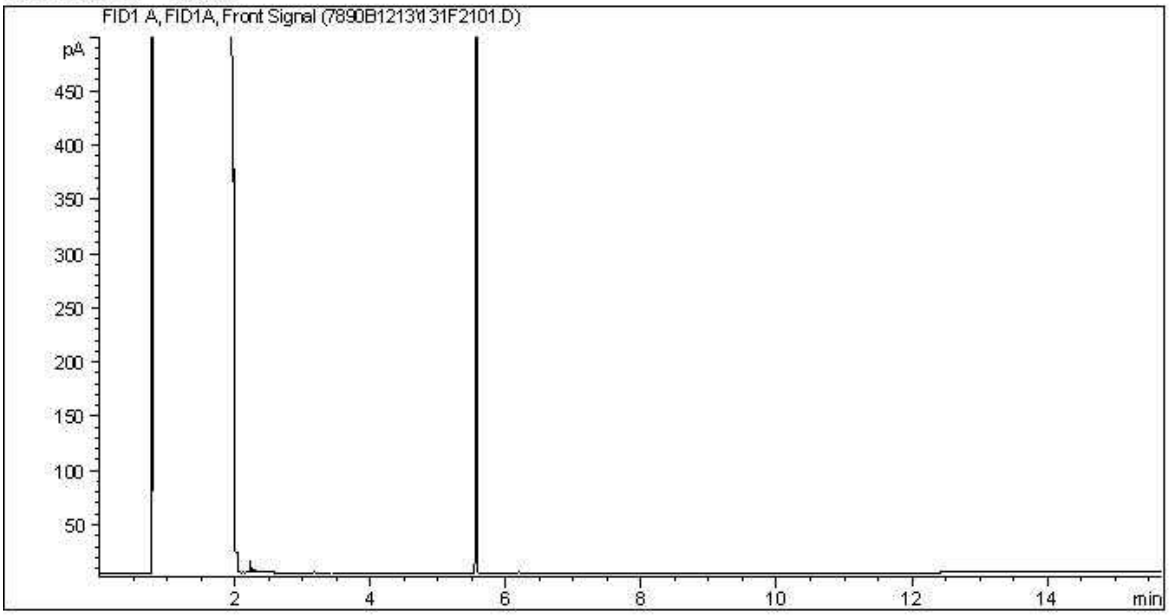
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/17
Maxxam Sample: LI5751

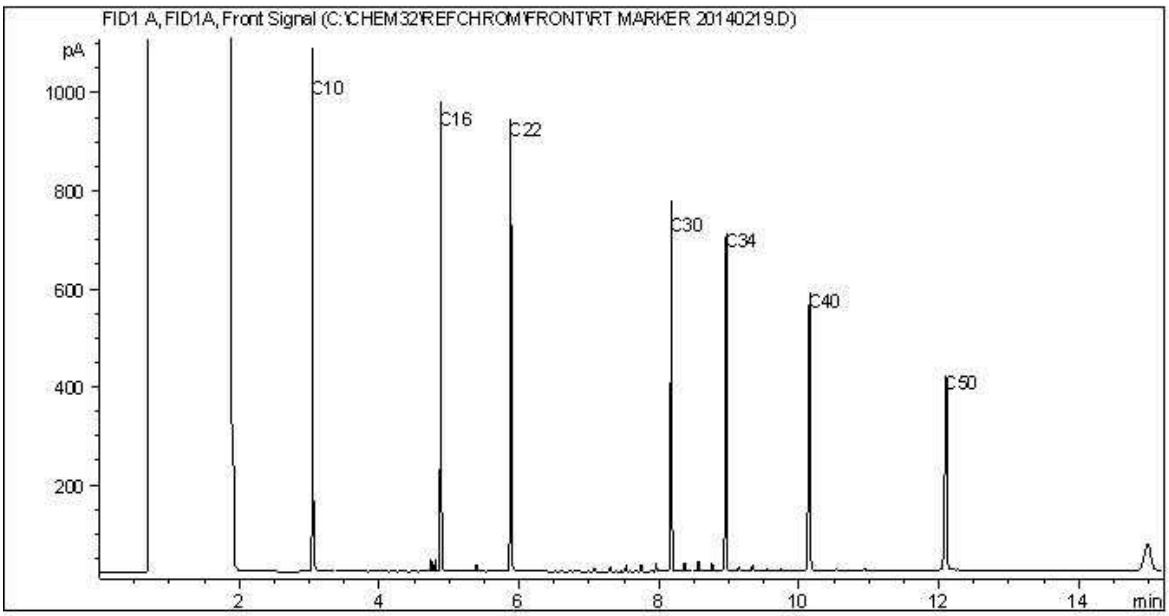
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-05B

CCME Hydrocarbons in Water (F2; C10-C16) 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+	

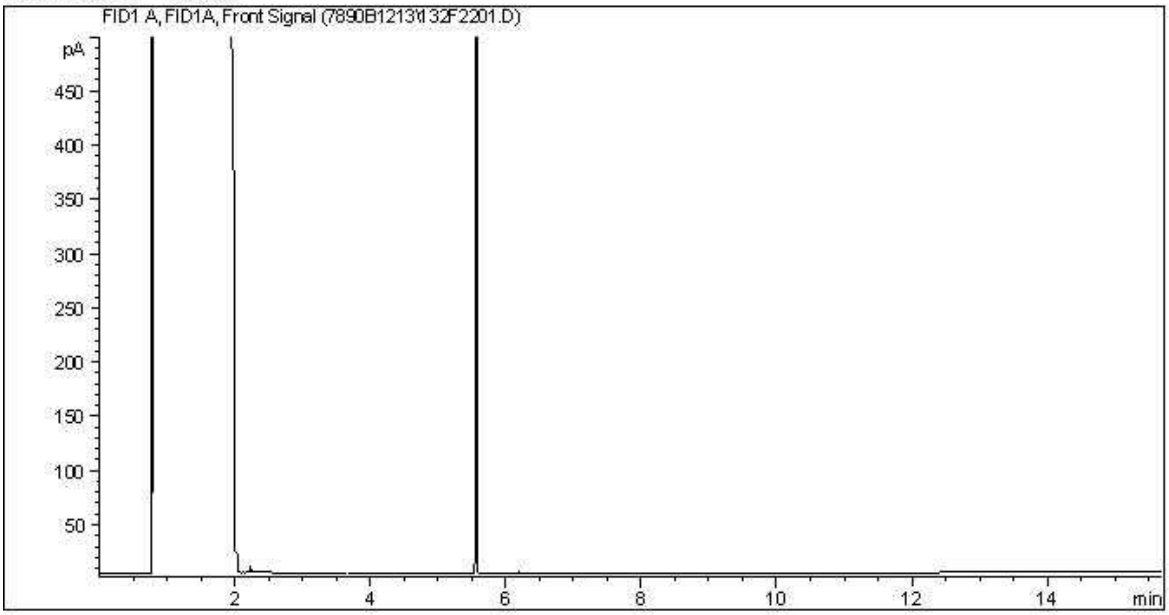
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/17
Maxxam Sample: LI5752

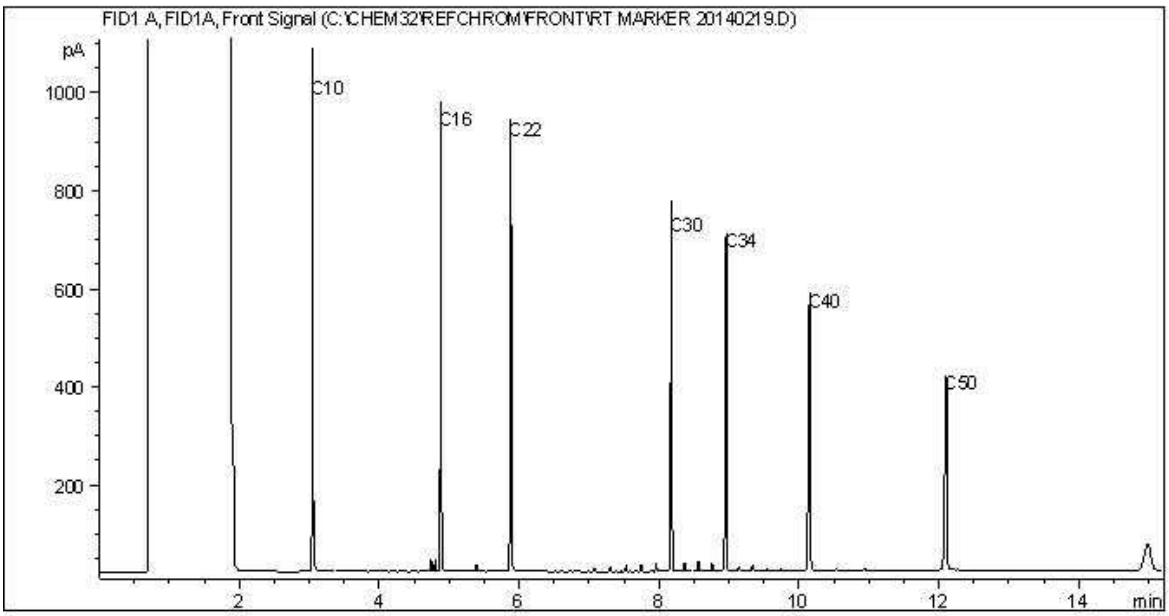
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-10

CCME Hydrocarbons in Water (F2; C10-C16) 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

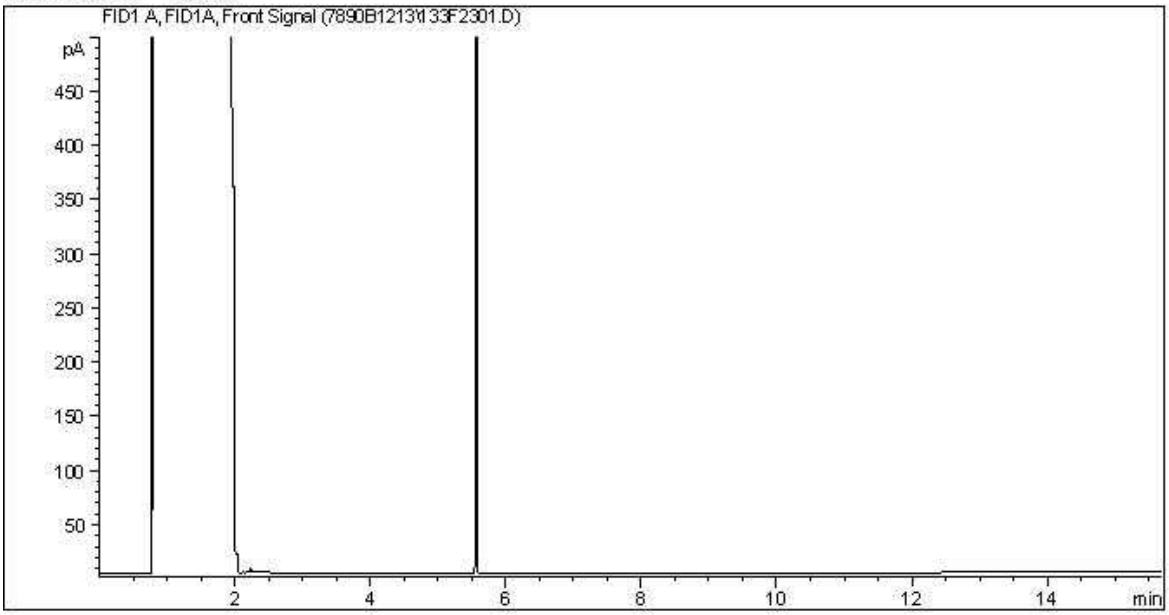
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/17
Maxxam Sample: LI5754

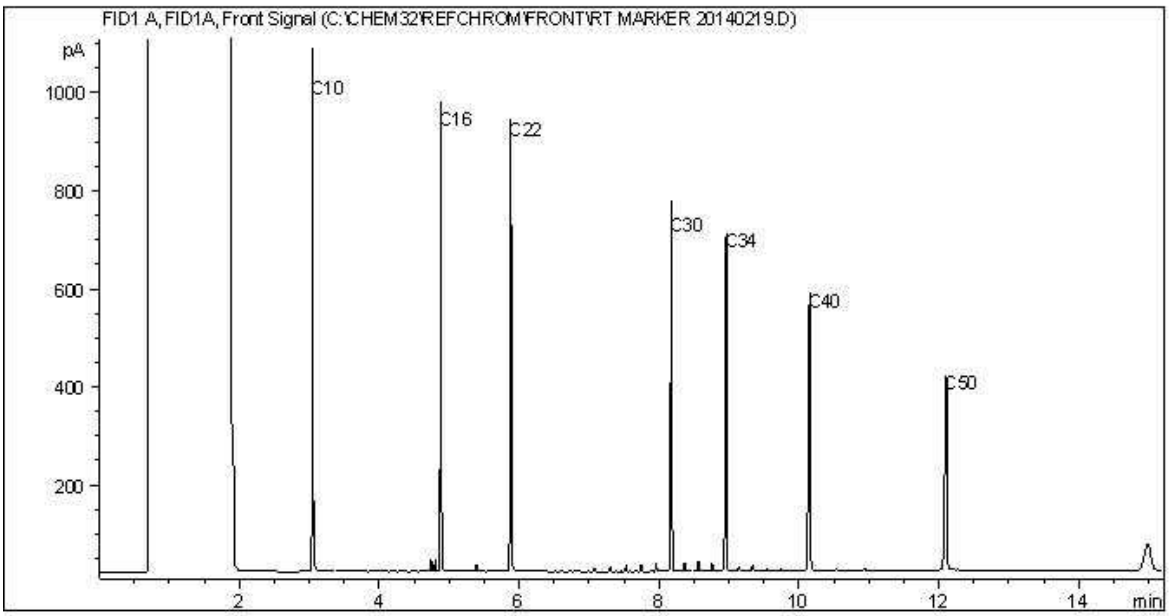
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW10-03

CCME Hydrocarbons in Water (F2; C10-C16) 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 P.O. #: 16300R-20
Your Project #: 113929396
Site Location: GULL LAKE
Your C.O.C. #: A122115

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
EDMONTON-NATIONAL CONTRACT
10160 112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2014/12/19
Report #: R1722629
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B4B1931
Received: 2014/12/09, 17:22

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	6	N/A	2014/12/11	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	5	N/A	2014/12/15	AB SOP-00039	CCME CWS/EPA 8260C m
Cadmium - low level CCME - Dissolved (1)	1	N/A	2014/12/16	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME - Dissolved	5	N/A	2014/12/16	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME (Total) (1)	1	2014/12/10	2014/12/16	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME (Total)	5	2014/12/10	2014/12/16	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4m
Chloride by Automated Colourimetry	6	N/A	2014/12/14	AB SOP-00020	SM 22 4500-Cl G m
Conductivity @25C	6	N/A	2014/12/11	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in water)	5	2014/12/12	2014/12/13	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	1	N/A	2014/12/14	AB WI-00065	Auto Calc
Hardness	5	N/A	2014/12/17	AB WI-00065	Auto Calc
Elements by ICP - Dissolved (1)	1	N/A	2014/12/13	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Dissolved	5	N/A	2014/12/17	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total (1)	6	2014/12/12	2014/12/13	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved (1)	4	N/A	2014/12/13	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Dissolved (1)	2	N/A	2014/12/15	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total (1)	4	2014/12/12	2014/12/13	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total (1)	2	2014/12/12	2014/12/15	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	1	N/A	2014/12/14	AB WI-00065	SM 1030E
Ion Balance	5	N/A	2014/12/17	AB WI-00065	SM 1030E
Sum of cations, anions	1	N/A	2014/12/14	AB WI-00065	SM 1030E
Sum of cations, anions	5	N/A	2014/12/17	AB WI-00065	SM 1030E
Nitrate and Nitrite	6	N/A	2014/12/16	AB SOP-00023	Auto Calc
Nitrate + Nitrite-N (calculated)	6	N/A	2014/12/16	AB SOP-00023	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 P.O. #: 16300R-20
Your Project #: 113929396
Site Location: GULL LAKE
Your C.O.C. #: A122115

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
EDMONTON-NATIONAL CONTRACT
10160 112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2014/12/19
Report #: R1722629
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B4B1931
Received: 2014/12/09, 17:22

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Nitrogen, (Nitrite, Nitrate) by IC	6	N/A	2014/12/15	AB SOP-00023	SM 22 4110 B m
pH @25°C (Alkalinity titrator)	6	N/A	2014/12/11	AB SOP-00005	SM 22 4500 H+ B m
Orthophosphate by Konelab	6	N/A	2014/12/11	AB SOP-00025	SM 22 4500-P A,B,F m
Sulphate by Automated Colourimetry	6	N/A	2014/12/14	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	1	N/A	2014/12/14	AB WI-00065	SM 1030E
Total Dissolved Solids (Calculated)	5	N/A	2014/12/17	AB WI-00065	SM 1030E
Total Kjeldahl Nitrogen	6	2014/12/11	2014/12/12	AB SOP-00008	EPA 351.1 R 1978 m
Total Phosphorus	6	2014/12/11	2014/12/12	AB SOP-00024	SM 22 4500-P A,B,F m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Calgary Environmental

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780)577-7105 Ext:7105

==========

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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		LI5749	LI5750	LI5751	LI5752	LI5754		
Sampling Date		2014/12/09 12:00	2014/12/09 10:00	2014/12/09 13:30	2014/12/09 13:30	2014/12/09 11:00		
COC Number		A122115	A122115	A122115	A122115	A122115		
	Units	MW14-04	MW14-05A	MW14-05B	MW14-10	MW10-03	RDL	QC Batch
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7760110
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7760110
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7760110
Volatiles								
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7751194
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7751194
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7751194
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	7751194
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7751194
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	7751194
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7751194
(C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7751194
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	97	98	96	97	98	N/A	7751194
4-Bromofluorobenzene (sur.)	%	102	101	101	102	101	N/A	7751194
D4-1,2-Dichloroethane (sur.)	%	101	100	102	101	101	N/A	7751194
O-TERPHENYL (sur.)	%	109	123	107	108	108	N/A	7760110

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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

ROUTINE WATER (WATER)

Maxxam ID		LI5749		LI5750		LI5751	LI5752	LI5753		
Sampling Date		2014/12/09 12:00		2014/12/09 10:00		2014/12/09 13:30	2014/12/09 13:30	2014/12/09 10:32		
COC Number		A122115		A122115		A122115	A122115	A122115		
	Units	**MW14-04**	**RDL**	**MW14-05A**	**RDL**	**MW14-05B**	**MW14-10**	**MW10-01**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	meq/L	10	N/A	14	N/A	14	14	7.5	N/A	7749703
Cation Sum	meq/L	10	N/A	14	N/A	14	14	7.8	N/A	7749703
Hardness (CaCO3)	mg/L	360	0.50	370	0.50	150	150	340	0.50	7749701
Ion Balance	N/A	0.99	0.010	1.0	0.010	0.97	0.98	1.0	0.010	7749702
Dissolved Nitrate (NO3)	mg/L	0.067	0.044	1.3	0.044	0.64	0.61	5.8	0.044	7749704
Nitrate plus Nitrite (N)	mg/L	0.015	0.010	0.34	0.010	0.14	0.14	1.3	0.010	7749705
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	0.13	0.033	<0.033	<0.033	<0.033	0.033	7749704
Total Dissolved Solids	mg/L	530	10	800	10	810	810	390	10	7749706
Misc. Inorganics										
Conductivity	uS/cm	890	1.0	1300	1.0	1300	1300	660	1.0	7751219
pH	pH	7.91	N/A	7.80	N/A	8.08	8.09	8.18	N/A	7751213
Anions										
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	<0.50	0.50	7751217
Alkalinity (Total as CaCO3)	mg/L	360	0.50	520	0.50	520	510	320	0.50	7751217
Bicarbonate (HCO3)	mg/L	440	0.50	630	0.50	630	630	400	0.50	7751217
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	<0.50	0.50	7751217
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	<0.50	0.50	7751217
Dissolved Sulphate (SO4)	mg/L	94	1.0	190 (1)	2.0	190	190	38	1.0	7751227
Dissolved Chloride (Cl)	mg/L	33	1.0	3.9	1.0	3.9	4.0	5.6	1.0	7751223
Nutrients										
Dissolved Nitrite (N)	mg/L	<0.010	0.010	0.040	0.010	<0.010	<0.010	<0.010	0.010	7754422
Dissolved Nitrate (N)	mg/L	0.015	0.010	0.30	0.010	0.14	0.14	1.3	0.010	7754422

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) 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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

ROUTINE WATER (WATER)

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	MW10-03	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	8.5	N/A	7749703
Cation Sum	meq/L	8.5	N/A	7749703
Hardness (CaCO3)	mg/L	360	0.50	7750392
Ion Balance	N/A	1.0	0.010	7750393
Dissolved Nitrate (NO3)	mg/L	36	0.044	7750394
Nitrate plus Nitrite (N)	mg/L	8.1	0.010	7750395
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	7750394
Total Dissolved Solids	mg/L	460	10	7750396
Misc. Inorganics				
Conductivity	uS/cm	770	1.0	7751219
pH	pH	7.86	N/A	7751213
Anions				
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	7751217
Alkalinity (Total as CaCO3)	mg/L	310	0.50	7751217
Bicarbonate (HCO3)	mg/L	380	0.50	7751217
Carbonate (CO3)	mg/L	<0.50	0.50	7751217
Hydroxide (OH)	mg/L	<0.50	0.50	7751217
Dissolved Sulphate (SO4)	mg/L	54	1.0	7751227
Dissolved Chloride (Cl)	mg/L	20	1.0	7751223
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.010	0.010	7754422
Dissolved Nitrate (N)	mg/L	8.1	0.010	7754422

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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		LI5749	LI5750	LI5751	LI5752		LI5753		
Sampling Date		2014/12/09 12:00	2014/12/09 10:00	2014/12/09 13:30	2014/12/09 13:30		2014/12/09 10:32		
COC Number		A122115	A122115	A122115	A122115		A122115		
	Units	MW14-04	MW14-05A	MW14-05B	MW14-10	QC Batch	MW10-01	RDL	QC Batch
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	1.5	0.095	0.024	0.024	7750025	0.021	0.020	7750025
Elements									
Dissolved Aluminum (Al)	mg/L	0.0038	0.0046	0.0043	0.0041	7753491	0.0099	0.0030	7753491
Dissolved Antimony (Sb)	mg/L	<0.00060 (1)	<0.00060	<0.00060	<0.00060	7753491	<0.00060	0.00060	7753491
Dissolved Arsenic (As)	mg/L	0.0013	0.0010	0.0039	0.0037	7753491	0.00033	0.00020	7753491
Dissolved Barium (Ba)	mg/L	0.16	0.092	0.038	0.038	7757557	0.17	0.010	7753535
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Boron (B)	mg/L	0.064	0.21	0.25	0.25	7757557	0.028	0.020	7753535
Dissolved Calcium (Ca)	mg/L	97	100	42	41	7757557	93	0.30	7753535
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Cobalt (Co)	mg/L	0.00054	0.00078	0.00033	0.00035	7753491	<0.00030	0.00030	7753491
Dissolved Copper (Cu)	mg/L	0.0016	0.00075	0.0027	0.0024	7753491	0.0038	0.00020	7753491
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	<0.060	<0.060	7757557	<0.060	0.060	7753535
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	7753491	<0.00020	0.00020	7753491
Dissolved Lithium (Li)	mg/L	0.035	0.062	0.035	0.036	7757557	0.024	0.020	7753535
Dissolved Magnesium (Mg)	mg/L	29	29	11	11	7757557	27	0.20	7753535
Dissolved Manganese (Mn)	mg/L	0.44	0.25	0.17	0.17	7757557	<0.0040	0.0040	7753535
Dissolved Molybdenum (Mo)	mg/L	0.0080	0.0051	0.016	0.016	7753491	0.0017	0.00020	7753491
Dissolved Nickel (Ni)	mg/L	0.0017	0.0023	0.0017	0.0016	7753491	0.0015	0.00050	7753491
Dissolved Phosphorus (P)	mg/L	<0.10	0.14	<0.10	<0.10	7757557	<0.10	0.10	7753535
Dissolved Potassium (K)	mg/L	4.2	4.6	3.8	3.8	7757557	1.2	0.30	7753535
Dissolved Selenium (Se)	mg/L	<0.00020	0.00058	0.00040	0.00039	7753491	0.0038	0.00020	7753491
Dissolved Silicon (Si)	mg/L	6.4	6.9	6.7	6.7	7757557	6.0	0.10	7753535
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	7753491	<0.00010	0.00010	7753491
Dissolved Sodium (Na)	mg/L	61	160	250	250	7757557	21	0.50	7753535
Dissolved Strontium (Sr)	mg/L	0.74	0.85	0.42	0.42	7757557	0.55	0.020	7753535
Dissolved Sulphur (S)	mg/L	30	66	59	59	7757557	12	0.20	7753535
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	7753491	<0.00020	0.00020	7753491
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Uranium (U)	mg/L	0.0063	0.026	0.0058	0.0057	7753491	0.014	0.00010	7753491
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	7753491	<0.0010	0.0010	7753491
Dissolved Zinc (Zn)	mg/L	0.0073	0.0046	0.0053	<0.0030	7753491	0.017	0.0030	7753491

RDL = Reportable Detection Limit

(1) Matrix Spike exceeds acceptance limits due to matrix interference. Reanalysis yields similar results.

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	MW10-03	RDL	QC Batch
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	7750025
Elements				
Dissolved Aluminum (Al)	mg/L	0.0038	0.0030	7753491
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	7753491
Dissolved Arsenic (As)	mg/L	0.00023	0.00020	7753491
Dissolved Barium (Ba)	mg/L	0.25	0.010	7757557
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	7753491
Dissolved Boron (B)	mg/L	0.031	0.020	7757557
Dissolved Calcium (Ca)	mg/L	110	0.30	7757557
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	7753491
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	7753491
Dissolved Copper (Cu)	mg/L	0.0011	0.00020	7753491
Dissolved Iron (Fe)	mg/L	<0.060	0.060	7757557
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	7753491
Dissolved Lithium (Li)	mg/L	<0.020	0.020	7757557
Dissolved Magnesium (Mg)	mg/L	23	0.20	7757557
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	7757557
Dissolved Molybdenum (Mo)	mg/L	0.0014	0.00020	7753491
Dissolved Nickel (Ni)	mg/L	0.0012	0.00050	7753491
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	7757557
Dissolved Potassium (K)	mg/L	1.7	0.30	7757557
Dissolved Selenium (Se)	mg/L	0.0016	0.00020	7753491
Dissolved Silicon (Si)	mg/L	7.2	0.10	7757557
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	7753491
Dissolved Sodium (Na)	mg/L	29	0.50	7757557
Dissolved Strontium (Sr)	mg/L	0.58	0.020	7757557
Dissolved Sulphur (S)	mg/L	18	0.20	7757557
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	7753491
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	7753491
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	7753491
Dissolved Uranium (U)	mg/L	0.0045	0.00010	7753491
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	7753491
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	7753491
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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		LI5749	LI5750	LI5751	LI5752		LI5753		
Sampling Date		2014/12/09 12:00	2014/12/09 10:00	2014/12/09 13:30	2014/12/09 13:30		2014/12/09 10:32		
COC Number		A122115	A122115	A122115	A122115		A122115		
	Units	MW14-04	MW14-05A	MW14-05B	MW14-10	RDL	MW10-01	RDL	QC Batch
Low Level Elements									
Total Cadmium (Cd)	ug/L	2.0	0.24	0.053	0.040	0.020	3.2	0.020	7749379
Elements									
Total Aluminum (Al)	mg/L	0.82	1.2	0.17	0.36	0.0030	96 (1)	0.015	7752382
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	0.0017	0.00060	7752382
Total Arsenic (As)	mg/L	0.0022	0.0027	0.0048	0.0047	0.00020	0.14	0.00020	7752382
Total Barium (Ba)	mg/L	0.18	0.14	0.052	0.045	0.010	4.2	0.010	7752384
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0082	0.0010	7752382
Total Boron (B)	mg/L	0.071	0.21	0.26	0.25	0.020	0.057	0.020	7752384
Total Calcium (Ca)	mg/L	110	130	48	47	0.30	340	0.30	7752384
Total Chromium (Cr)	mg/L	0.0017	0.0030	<0.0010	0.0012	0.0010	0.37	0.0010	7752382
Total Cobalt (Co)	mg/L	0.00098	0.0030	0.00060	0.00058	0.00030	0.12	0.00030	7752382
Total Copper (Cu)	mg/L	0.0031	0.0042	0.0044	0.0041	0.00020	0.30	0.00020	7752382
Total Iron (Fe)	mg/L	1.0	3.2	0.39	0.39	0.060	290 (1)	0.30	7752384
Total Lead (Pb)	mg/L	0.00076	0.0030	0.00049	0.00053	0.00020	0.16	0.00020	7752382
Total Lithium (Li)	mg/L	0.036	0.066	0.036	0.036	0.020	0.19	0.020	7752384
Total Magnesium (Mg)	mg/L	30	32	13	12	0.20	130	0.20	7752384
Total Manganese (Mn)	mg/L	0.49	0.49	0.20	0.20	0.0040	5.7	0.0040	7752384
Total Molybdenum (Mo)	mg/L	0.0089	0.0056	0.019	0.018	0.00020	0.025	0.00020	7752382
Total Nickel (Ni)	mg/L	0.0039	0.0077	0.0028	0.0028	0.00050	0.38	0.00050	7752382
Total Phosphorus (P)	mg/L	<0.10	0.55	<0.10	<0.10	0.10	8.7	0.10	7752384
Total Potassium (K)	mg/L	4.4	5.1	4.0	3.9	0.30	15	0.30	7752384
Total Selenium (Se)	mg/L	<0.00020	0.00068	0.00047	0.00047	0.00020	0.0064	0.00020	7752382
Total Silicon (Si)	mg/L	7.8	11	7.8	7.6	0.10	130 (1)	0.50	7752384
Total Silver (Ag)	mg/L	0.0016	0.00038	0.00054	0.00069	0.00010	0.0028	0.00010	7752382
Total Sodium (Na)	mg/L	62	160	250	250	0.50	24	0.50	7752384
Total Strontium (Sr)	mg/L	0.79	0.92	0.47	0.46	0.020	1.3	0.020	7752384
Total Sulphur (S)	mg/L	32	70	65	64	0.20	13	0.20	7752384
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.0043	0.00020	7752382
Total Tin (Sn)	mg/L	0.0013	<0.0010	0.0025	0.0022	0.0010	0.0064	0.0010	7752382
Total Titanium (Ti)	mg/L	0.028	0.041	0.0062	0.016	0.0010	2.0	0.0010	7752382
Total Uranium (U)	mg/L	0.0070	0.027	0.0066	0.0062	0.00010	0.027	0.00010	7752382
Total Vanadium (V)	mg/L	0.0025	0.0049	<0.0010	0.0012	0.0010	0.33	0.0010	7752382
Total Zinc (Zn)	mg/L	0.010	0.021	0.0082	0.0063	0.0030	0.91	0.0030	7752382

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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	MW10-03	RDL	QC Batch
Low Level Elements				
Total Cadmium (Cd)	ug/L	9.4	0.020	7749379
Elements				
Total Aluminum (Al)	mg/L	130 (1)	0.015	7752382
Total Antimony (Sb)	mg/L	0.0015	0.00060	7752382
Total Arsenic (As)	mg/L	0.29	0.00020	7752382
Total Barium (Ba)	mg/L	8.1 (1)	0.050	7752384
Total Beryllium (Be)	mg/L	0.015	0.0010	7752382
Total Boron (B)	mg/L	0.089	0.020	7752384
Total Calcium (Ca)	mg/L	740 (1)	1.5	7752384
Total Chromium (Cr)	mg/L	1.1	0.0010	7752382
Total Cobalt (Co)	mg/L	0.21	0.00030	7752382
Total Copper (Cu)	mg/L	0.44	0.00020	7752382
Total Iron (Fe)	mg/L	470 (1)	0.30	7752384
Total Lead (Pb)	mg/L	0.28	0.00020	7752382
Total Lithium (Li)	mg/L	0.22	0.020	7752384
Total Magnesium (Mg)	mg/L	200	0.20	7752384
Total Manganese (Mn)	mg/L	17	0.0040	7752384
Total Molybdenum (Mo)	mg/L	0.074	0.00020	7752382
Total Nickel (Ni)	mg/L	1.0	0.00050	7752382
Total Phosphorus (P)	mg/L	17	0.10	7752384
Total Potassium (K)	mg/L	21	0.30	7752384
Total Selenium (Se)	mg/L	0.0065	0.00020	7752382
Total Silicon (Si)	mg/L	170 (1)	0.50	7752384
Total Silver (Ag)	mg/L	0.0059	0.00010	7752382
Total Sodium (Na)	mg/L	30	0.50	7752384
Total Strontium (Sr)	mg/L	2.0	0.020	7752384
Total Sulphur (S)	mg/L	21	0.20	7752384
Total Thallium (Tl)	mg/L	0.0065	0.00020	7752382
Total Tin (Sn)	mg/L	0.012	0.0010	7752382
Total Titanium (Ti)	mg/L	1.1	0.0010	7752382
Total Uranium (U)	mg/L	0.022	0.00010	7752382
Total Vanadium (V)	mg/L	0.46	0.0010	7752382

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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	**MW10-03**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/L	1.5	0.0030	7752382
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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		LI5749		LI5750		LI5751	LI5752		LI5753		
Sampling Date		2014/12/09 12:00		2014/12/09 10:00		2014/12/09 13:30	2014/12/09 13:30		2014/12/09 10:32		
COC Number		A122115		A122115		A122115	A122115		A122115		
	Units	MW14-04	RDL	MW14-05A	RDL	MW14-05B	MW14-10	RDL	MW10-01	RDL	QC Batch
Nutrients											
Orthophosphate (P)	mg/L	<0.0030	0.0030	<0.0030	0.0030	<0.0030	0.0030	0.0030	0.0090	0.0030	7751175
Total Phosphorus (P)	mg/L	0.041	0.0030	0.50 (1)	0.0060	0.021	0.019	0.0030	7.7 (1)	0.15	7751129
Total Total Kjeldahl Nitrogen	mg/L	0.60	0.050	0.80	0.050	0.59	0.61	0.050	3.9 (1)	0.50	7751231

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam ID		LI5754		
Sampling Date		2014/12/09 11:00		
COC Number		A122115		
	Units	MW10-03	RDL	QC Batch
Nutrients				
Orthophosphate (P)	mg/L	0.0040	0.0030	7751175
Total Phosphorus (P)	mg/L	16 (1)	0.15	7751129
Total Total Kjeldahl Nitrogen	mg/L	13 (1)	0.50	7751231

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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LI5749	LI5750	LI5751	LI5752	LI5754	
Sampling Date		2014/12/09 12:00	2014/12/09 10:00	2014/12/09 13:30	2014/12/09 13:30	2014/12/09 11:00	
COC Number		A122115	A122115	A122115	A122115	A122115	
	Units	MW14-04	MW14-05A	MW14-05B	MW14-10	MW10-03	QC Batch
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	109	123	107	108	108	7752147

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

GENERAL COMMENTS

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

Package 1	5.7°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 #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7751129	AL2	Matrix Spike [LI5749-03]	Total Phosphorus (P)	2014/12/12		97	%	80 - 120
7751129	AL2	Spiked Blank	Total Phosphorus (P)	2014/12/12		94	%	80 - 120
7751129	AL2	Method Blank	Total Phosphorus (P)	2014/12/12	<0.0030		mg/L	
7751129	AL2	RPD [LI5749-03]	Total Phosphorus (P)	2014/12/12	5.0		%	20
7751175	MBB	Matrix Spike [LI5750-01]	Orthophosphate (P)	2014/12/11		96	%	80 - 120
7751175	MBB	Spiked Blank	Orthophosphate (P)	2014/12/11		99	%	80 - 120
7751175	MBB	Method Blank	Orthophosphate (P)	2014/12/11	<0.0030		mg/L	
7751175	MBB	RPD [LI5750-01]	Orthophosphate (P)	2014/12/11	NC		%	20
7751194	SES	Matrix Spike	1,4-Difluorobenzene (sur.)	2014/12/15		95	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/12/15		103	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/12/15		104	%	70 - 130
			Benzene	2014/12/15		103	%	70 - 130
			Toluene	2014/12/15		102	%	70 - 130
			Ethylbenzene	2014/12/15		102	%	70 - 130
			m & p-Xylene	2014/12/15		103	%	70 - 130
			o-Xylene	2014/12/15		106	%	70 - 130
			(C6-C10)	2014/12/15		79	%	70 - 130
7751194	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/12/15		96	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/12/15		102	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/12/15		99	%	70 - 130
			Benzene	2014/12/15		99	%	70 - 130
			Toluene	2014/12/15		99	%	70 - 130
			Ethylbenzene	2014/12/15		100	%	70 - 130
			m & p-Xylene	2014/12/15		101	%	70 - 130
			o-Xylene	2014/12/15		103	%	70 - 130
			(C6-C10)	2014/12/15		113	%	70 - 130
7751194	SES	Method Blank	1,4-Difluorobenzene (sur.)	2014/12/15		97	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/12/15		101	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/12/15		97	%	70 - 130
			Benzene	2014/12/15	<0.00040		mg/L	
			Toluene	2014/12/15	<0.00040		mg/L	
			Ethylbenzene	2014/12/15	<0.00040		mg/L	
			m & p-Xylene	2014/12/15	<0.00080		mg/L	
			o-Xylene	2014/12/15	<0.00040		mg/L	
			Xylenes (Total)	2014/12/15	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2014/12/15	<0.10		mg/L	
			(C6-C10)	2014/12/15	<0.10		mg/L	
7751194	SES	RPD	Benzene	2014/12/15	NC		%	40
			Toluene	2014/12/15	NC		%	40
			Ethylbenzene	2014/12/15	NC		%	40
			m & p-Xylene	2014/12/15	NC		%	40
			o-Xylene	2014/12/15	NC		%	40
			Xylenes (Total)	2014/12/15	NC		%	40
			F1 (C6-C10) - BTEX	2014/12/15	NC		%	40
			(C6-C10)	2014/12/15	NC		%	40
7751213	MA4	Spiked Blank	pH	2014/12/11		100	%	97 - 103
7751213	MA4	RPD [LI5749-01]	pH	2014/12/11	0.34		%	N/A
7751217	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2014/12/11		100	%	80 - 120
7751217	MA4	Method Blank	Alkalinity (PP as CaCO3)	2014/12/11	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2014/12/11	<0.50		mg/L	
			Bicarbonate (HCO3)	2014/12/11	<0.50		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Carbonate (CO3)	2014/12/11	<0.50		mg/L	
			Hydroxide (OH)	2014/12/11	<0.50		mg/L	
7751217	MA4	RPD [LI5749-01]	Alkalinity (PP as CaCO3)	2014/12/11	NC		%	20
			Alkalinity (Total as CaCO3)	2014/12/11	0.13		%	20
			Bicarbonate (HCO3)	2014/12/11	0.11		%	20
			Carbonate (CO3)	2014/12/11	NC		%	20
			Hydroxide (OH)	2014/12/11	NC		%	20
7751219	MA4	Spiked Blank	Conductivity	2014/12/11		102	%	90 - 110
7751219	MA4	Method Blank	Conductivity	2014/12/11	<1.0		uS/cm	
7751219	MA4	RPD [LI5749-01]	Conductivity	2014/12/11	0.11		%	20
7751223	LMD	Matrix Spike [LI5749-01]	Dissolved Chloride (Cl)	2014/12/14		NC	%	80 - 120
7751223	LMD	Spiked Blank	Dissolved Chloride (Cl)	2014/12/14		103	%	80 - 120
7751223	LMD	Method Blank	Dissolved Chloride (Cl)	2014/12/14	<1.0		mg/L	
7751223	LMD	RPD [LI5749-01]	Dissolved Chloride (Cl)	2014/12/14	1.5		%	20
7751227	LMD	Matrix Spike [LI5749-01]	Dissolved Sulphate (SO4)	2014/12/14		NC	%	80 - 120
7751227	LMD	Spiked Blank	Dissolved Sulphate (SO4)	2014/12/14		105	%	80 - 120
7751227	LMD	Method Blank	Dissolved Sulphate (SO4)	2014/12/14	<1.0		mg/L	
7751227	LMD	RPD [LI5749-01]	Dissolved Sulphate (SO4)	2014/12/14	0.20		%	20
7751231	AL2	Matrix Spike [LI5751-03]	Total Total Kjeldahl Nitrogen	2014/12/12		NC	%	80 - 120
7751231	AL2	QC Standard	Total Total Kjeldahl Nitrogen	2014/12/12		113	%	80 - 120
7751231	AL2	Spiked Blank	Total Total Kjeldahl Nitrogen	2014/12/12		111	%	80 - 120
7751231	AL2	Method Blank	Total Total Kjeldahl Nitrogen	2014/12/12	<0.050		mg/L	
7751231	AL2	RPD [LI5751-03]	Total Total Kjeldahl Nitrogen	2014/12/12	1.8		%	20
7752147	GG3	Matrix Spike [LI5750-06]	O-TERPHENYL (sur.)	2014/12/13		109	%	50 - 130
7752147	GG3	Spiked Blank	O-TERPHENYL (sur.)	2014/12/13		121	%	50 - 130
7752147	GG3	Method Blank	O-TERPHENYL (sur.)	2014/12/13		108	%	50 - 130
7752382	HC7	Matrix Spike	Total Aluminum (Al)	2014/12/13		101	%	80 - 120
			Total Antimony (Sb)	2014/12/13		103	%	80 - 120
			Total Arsenic (As)	2014/12/13		101	%	80 - 120
			Total Beryllium (Be)	2014/12/13		101	%	80 - 120
			Total Chromium (Cr)	2014/12/13		100	%	80 - 120
			Total Cobalt (Co)	2014/12/13		102	%	80 - 120
			Total Copper (Cu)	2014/12/13		99	%	80 - 120
			Total Lead (Pb)	2014/12/13		101	%	80 - 120
			Total Molybdenum (Mo)	2014/12/13		103	%	80 - 120
			Total Nickel (Ni)	2014/12/13		101	%	80 - 120
			Total Selenium (Se)	2014/12/13		100	%	80 - 120
			Total Silver (Ag)	2014/12/13		99	%	80 - 120
			Total Thallium (Tl)	2014/12/13		100	%	80 - 120
			Total Tin (Sn)	2014/12/13		105	%	80 - 120
			Total Titanium (Ti)	2014/12/13		97	%	80 - 120
			Total Uranium (U)	2014/12/13		103	%	80 - 120
			Total Vanadium (V)	2014/12/13		104	%	80 - 120
			Total Zinc (Zn)	2014/12/13		97	%	80 - 120
7752382	HC7	Spiked Blank	Total Aluminum (Al)	2014/12/13		90	%	80 - 120
			Total Antimony (Sb)	2014/12/13		103	%	80 - 120
			Total Arsenic (As)	2014/12/13		101	%	80 - 120
			Total Beryllium (Be)	2014/12/13		102	%	80 - 120
			Total Chromium (Cr)	2014/12/13		102	%	80 - 120
			Total Cobalt (Co)	2014/12/13		103	%	80 - 120
			Total Copper (Cu)	2014/12/13		103	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Lead (Pb)	2014/12/13		101	%	80 - 120
			Total Molybdenum (Mo)	2014/12/13		104	%	80 - 120
			Total Nickel (Ni)	2014/12/13		100	%	80 - 120
			Total Selenium (Se)	2014/12/13		100	%	80 - 120
			Total Silver (Ag)	2014/12/13		100	%	80 - 120
			Total Thallium (Tl)	2014/12/13		103	%	80 - 120
			Total Tin (Sn)	2014/12/13		102	%	80 - 120
			Total Titanium (Ti)	2014/12/13		95	%	80 - 120
			Total Uranium (U)	2014/12/13		102	%	80 - 120
			Total Vanadium (V)	2014/12/13		104	%	80 - 120
			Total Zinc (Zn)	2014/12/13		99	%	80 - 120
7752382	HC7	Method Blank	Total Aluminum (Al)	2014/12/13	<0.0030		mg/L	
			Total Antimony (Sb)	2014/12/13	<0.00060		mg/L	
			Total Arsenic (As)	2014/12/13	<0.00020		mg/L	
			Total Beryllium (Be)	2014/12/13	<0.0010		mg/L	
			Total Chromium (Cr)	2014/12/13	<0.0010		mg/L	
			Total Cobalt (Co)	2014/12/13	<0.00030		mg/L	
			Total Copper (Cu)	2014/12/13	<0.00020		mg/L	
			Total Lead (Pb)	2014/12/13	<0.00020		mg/L	
			Total Molybdenum (Mo)	2014/12/13	<0.00020		mg/L	
			Total Nickel (Ni)	2014/12/13	<0.00050		mg/L	
			Total Selenium (Se)	2014/12/13	<0.00020		mg/L	
			Total Silver (Ag)	2014/12/13	<0.00010		mg/L	
			Total Thallium (Tl)	2014/12/13	<0.00020		mg/L	
			Total Tin (Sn)	2014/12/13	<0.0010		mg/L	
			Total Titanium (Ti)	2014/12/13	<0.0010		mg/L	
			Total Uranium (U)	2014/12/13	<0.00010		mg/L	
			Total Vanadium (V)	2014/12/13	<0.0010		mg/L	
			Total Zinc (Zn)	2014/12/13	<0.0030		mg/L	
7752382	HC7	RPD	Total Aluminum (Al)	2014/12/15	NC		%	20
			Total Antimony (Sb)	2014/12/15	NC		%	20
			Total Arsenic (As)	2014/12/15	NC		%	20
			Total Beryllium (Be)	2014/12/15	NC		%	20
			Total Chromium (Cr)	2014/12/15	NC		%	20
			Total Cobalt (Co)	2014/12/15	NC		%	20
			Total Copper (Cu)	2014/12/15	2.0		%	20
			Total Lead (Pb)	2014/12/15	NC		%	20
			Total Molybdenum (Mo)	2014/12/15	NC		%	20
			Total Nickel (Ni)	2014/12/15	NC		%	20
			Total Selenium (Se)	2014/12/15	NC		%	20
			Total Silver (Ag)	2014/12/15	NC		%	20
			Total Thallium (Tl)	2014/12/15	NC		%	20
			Total Tin (Sn)	2014/12/15	NC		%	20
			Total Titanium (Ti)	2014/12/15	NC		%	20
			Total Uranium (U)	2014/12/15	NC		%	20
			Total Vanadium (V)	2014/12/15	NC		%	20
			Total Zinc (Zn)	2014/12/15	NC		%	20
7752384	STI	Matrix Spike	Total Barium (Ba)	2014/12/13		96	%	80 - 120
			Total Boron (B)	2014/12/13		NC	%	80 - 120
			Total Calcium (Ca)	2014/12/13		103	%	80 - 120
			Total Iron (Fe)	2014/12/13		100	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Lithium (Li)	2014/12/13		98	%	80 - 120
			Total Magnesium (Mg)	2014/12/13		100	%	80 - 120
			Total Manganese (Mn)	2014/12/13		104	%	80 - 120
			Total Phosphorus (P)	2014/12/13		96	%	80 - 120
			Total Potassium (K)	2014/12/13		96	%	80 - 120
			Total Silicon (Si)	2014/12/13		104	%	80 - 120
			Total Sodium (Na)	2014/12/13		NC	%	80 - 120
			Total Strontium (Sr)	2014/12/13		103	%	80 - 120
7752384	STI	Spiked Blank	Total Barium (Ba)	2014/12/13		95	%	80 - 120
			Total Boron (B)	2014/12/13		99	%	80 - 120
			Total Calcium (Ca)	2014/12/13		102	%	80 - 120
			Total Iron (Fe)	2014/12/13		101	%	80 - 120
			Total Lithium (Li)	2014/12/13		97	%	80 - 120
			Total Magnesium (Mg)	2014/12/13		98	%	80 - 120
			Total Manganese (Mn)	2014/12/13		103	%	80 - 120
			Total Phosphorus (P)	2014/12/13		95	%	80 - 120
			Total Potassium (K)	2014/12/13		95	%	80 - 120
			Total Silicon (Si)	2014/12/13		100	%	80 - 120
			Total Sodium (Na)	2014/12/13		99	%	80 - 120
			Total Strontium (Sr)	2014/12/13		102	%	80 - 120
7752384	STI	Method Blank	Total Barium (Ba)	2014/12/13	<0.010		mg/L	
			Total Boron (B)	2014/12/13	<0.020		mg/L	
			Total Calcium (Ca)	2014/12/13	<0.30		mg/L	
			Total Iron (Fe)	2014/12/13	<0.060		mg/L	
			Total Lithium (Li)	2014/12/13	<0.020		mg/L	
			Total Magnesium (Mg)	2014/12/13	<0.20		mg/L	
			Total Manganese (Mn)	2014/12/13	<0.0040		mg/L	
			Total Phosphorus (P)	2014/12/13	<0.10		mg/L	
			Total Potassium (K)	2014/12/13	<0.30		mg/L	
			Total Silicon (Si)	2014/12/13	<0.10		mg/L	
			Total Sodium (Na)	2014/12/13	<0.50		mg/L	
			Total Strontium (Sr)	2014/12/13	<0.020		mg/L	
			Total Sulphur (S)	2014/12/13	<0.20		mg/L	
7752384	STI	RPD	Total Barium (Ba)	2014/12/13	NC		%	20
			Total Boron (B)	2014/12/13	0.59		%	20
			Total Calcium (Ca)	2014/12/13	NC		%	20
			Total Iron (Fe)	2014/12/13	NC		%	20
			Total Lithium (Li)	2014/12/13	NC		%	20
			Total Magnesium (Mg)	2014/12/13	NC		%	20
			Total Manganese (Mn)	2014/12/13	NC		%	20
			Total Phosphorus (P)	2014/12/13	NC		%	20
			Total Potassium (K)	2014/12/13	NC		%	20
			Total Silicon (Si)	2014/12/13	NC		%	20
			Total Sodium (Na)	2014/12/13	0.76		%	20
			Total Strontium (Sr)	2014/12/13	NC		%	20
			Total Sulphur (S)	2014/12/13	NC		%	20
7753491	HC7	Matrix Spike [LI5749-05]	Dissolved Aluminum (Al)	2014/12/13		105	%	80 - 120
			Dissolved Antimony (Sb)	2014/12/13		61 (1)	%	80 - 120
			Dissolved Arsenic (As)	2014/12/13		98	%	80 - 120
			Dissolved Beryllium (Be)	2014/12/13		98	%	80 - 120
			Dissolved Chromium (Cr)	2014/12/13		91	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Cobalt (Co)	2014/12/13		92	%	80 - 120
			Dissolved Copper (Cu)	2014/12/13		90	%	80 - 120
			Dissolved Lead (Pb)	2014/12/13		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2014/12/13		105	%	80 - 120
			Dissolved Nickel (Ni)	2014/12/13		91	%	80 - 120
			Dissolved Selenium (Se)	2014/12/13		97	%	80 - 120
			Dissolved Silver (Ag)	2014/12/13		98	%	80 - 120
			Dissolved Thallium (Tl)	2014/12/13		97	%	80 - 120
			Dissolved Tin (Sn)	2014/12/13		101	%	80 - 120
			Dissolved Titanium (Ti)	2014/12/13		91	%	80 - 120
			Dissolved Uranium (U)	2014/12/13		95	%	80 - 120
			Dissolved Vanadium (V)	2014/12/13		99	%	80 - 120
			Dissolved Zinc (Zn)	2014/12/13		100	%	80 - 120
7753491	HC7	Spiked Blank	Dissolved Aluminum (Al)	2014/12/13		109	%	80 - 120
			Dissolved Antimony (Sb)	2014/12/13		101	%	80 - 120
			Dissolved Arsenic (As)	2014/12/13		97	%	80 - 120
			Dissolved Beryllium (Be)	2014/12/13		93	%	80 - 120
			Dissolved Chromium (Cr)	2014/12/13		90	%	80 - 120
			Dissolved Cobalt (Co)	2014/12/13		95	%	80 - 120
			Dissolved Copper (Cu)	2014/12/13		93	%	80 - 120
			Dissolved Lead (Pb)	2014/12/13		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2014/12/13		97	%	80 - 120
			Dissolved Nickel (Ni)	2014/12/13		93	%	80 - 120
			Dissolved Selenium (Se)	2014/12/13		94	%	80 - 120
			Dissolved Silver (Ag)	2014/12/13		95	%	80 - 120
			Dissolved Thallium (Tl)	2014/12/13		97	%	80 - 120
			Dissolved Tin (Sn)	2014/12/13		99	%	80 - 120
			Dissolved Titanium (Ti)	2014/12/13		89	%	80 - 120
			Dissolved Uranium (U)	2014/12/13		91	%	80 - 120
			Dissolved Vanadium (V)	2014/12/13		97	%	80 - 120
			Dissolved Zinc (Zn)	2014/12/13		99	%	80 - 120
7753491	HC7	Method Blank	Dissolved Aluminum (Al)	2014/12/13	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2014/12/13	<0.00060		mg/L	
			Dissolved Arsenic (As)	2014/12/13	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2014/12/13	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2014/12/13	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2014/12/13	<0.00030		mg/L	
			Dissolved Copper (Cu)	2014/12/13	<0.00020		mg/L	
			Dissolved Lead (Pb)	2014/12/13	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2014/12/13	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2014/12/13	<0.00050		mg/L	
			Dissolved Selenium (Se)	2014/12/13	<0.00020		mg/L	
			Dissolved Silver (Ag)	2014/12/13	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2014/12/13	<0.00020		mg/L	
			Dissolved Tin (Sn)	2014/12/13	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2014/12/13	<0.0010		mg/L	
			Dissolved Uranium (U)	2014/12/13	<0.00010		mg/L	
			Dissolved Vanadium (V)	2014/12/13	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2014/12/13	<0.0030		mg/L	
7753491	HC7	RPD [LI5749-05]	Dissolved Aluminum (Al)	2014/12/13	NC		%	20
			Dissolved Antimony (Sb)	2014/12/13	NC		%	20

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Arsenic (As)	2014/12/13	3.3		%	20
			Dissolved Beryllium (Be)	2014/12/13	NC		%	20
			Dissolved Chromium (Cr)	2014/12/13	NC		%	20
			Dissolved Cobalt (Co)	2014/12/13	NC		%	20
			Dissolved Copper (Cu)	2014/12/13	6.5		%	20
			Dissolved Lead (Pb)	2014/12/13	NC		%	20
			Dissolved Molybdenum (Mo)	2014/12/13	2.1		%	20
			Dissolved Nickel (Ni)	2014/12/13	NC		%	20
			Dissolved Selenium (Se)	2014/12/13	NC		%	20
			Dissolved Silver (Ag)	2014/12/13	NC		%	20
			Dissolved Thallium (Tl)	2014/12/13	NC		%	20
			Dissolved Tin (Sn)	2014/12/13	NC		%	20
			Dissolved Titanium (Ti)	2014/12/13	NC		%	20
			Dissolved Uranium (U)	2014/12/13	0.56		%	20
			Dissolved Vanadium (V)	2014/12/13	NC		%	20
			Dissolved Zinc (Zn)	2014/12/13	NC		%	20
7753535	STI	Matrix Spike	Dissolved Barium (Ba)	2014/12/13		100	%	80 - 120
			Dissolved Boron (B)	2014/12/13		103	%	80 - 120
			Dissolved Calcium (Ca)	2014/12/13		NC	%	80 - 120
			Dissolved Iron (Fe)	2014/12/13		103	%	80 - 120
			Dissolved Lithium (Li)	2014/12/13		101	%	80 - 120
			Dissolved Magnesium (Mg)	2014/12/13		104	%	80 - 120
			Dissolved Manganese (Mn)	2014/12/13		105	%	80 - 120
			Dissolved Phosphorus (P)	2014/12/13		110	%	80 - 120
			Dissolved Potassium (K)	2014/12/13		102	%	80 - 120
			Dissolved Silicon (Si)	2014/12/13		101	%	80 - 120
			Dissolved Sodium (Na)	2014/12/13		NC	%	80 - 120
			Dissolved Strontium (Sr)	2014/12/13		100	%	80 - 120
7753535	STI	Spiked Blank	Dissolved Barium (Ba)	2014/12/13		98	%	80 - 120
			Dissolved Boron (B)	2014/12/13		102	%	80 - 120
			Dissolved Calcium (Ca)	2014/12/13		104	%	80 - 120
			Dissolved Iron (Fe)	2014/12/13		102	%	80 - 120
			Dissolved Lithium (Li)	2014/12/13		100	%	80 - 120
			Dissolved Magnesium (Mg)	2014/12/13		104	%	80 - 120
			Dissolved Manganese (Mn)	2014/12/13		105	%	80 - 120
			Dissolved Phosphorus (P)	2014/12/13		104	%	80 - 120
			Dissolved Potassium (K)	2014/12/13		101	%	80 - 120
			Dissolved Silicon (Si)	2014/12/13		104	%	80 - 120
			Dissolved Sodium (Na)	2014/12/13		100	%	80 - 120
			Dissolved Strontium (Sr)	2014/12/13		104	%	80 - 120
7753535	STI	Method Blank	Dissolved Barium (Ba)	2014/12/13	<0.010		mg/L	
			Dissolved Boron (B)	2014/12/13	<0.020		mg/L	
			Dissolved Calcium (Ca)	2014/12/13	<0.30		mg/L	
			Dissolved Iron (Fe)	2014/12/13	<0.060		mg/L	
			Dissolved Lithium (Li)	2014/12/13	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2014/12/13	<0.20		mg/L	
			Dissolved Manganese (Mn)	2014/12/13	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2014/12/13	<0.10		mg/L	
			Dissolved Potassium (K)	2014/12/13	<0.30		mg/L	
			Dissolved Silicon (Si)	2014/12/13	<0.10		mg/L	
			Dissolved Sodium (Na)	2014/12/13	<0.50		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Strontium (Sr)	2014/12/13	<0.020		mg/L	
			Dissolved Sulphur (S)	2014/12/13	<0.20		mg/L	
7753535	STI	RPD	Dissolved Barium (Ba)	2014/12/13	NC		%	20
			Dissolved Boron (B)	2014/12/13	0.96		%	20
			Dissolved Calcium (Ca)	2014/12/13	0.14		%	20
			Dissolved Iron (Fe)	2014/12/13	NC		%	20
			Dissolved Lithium (Li)	2014/12/13	0.15		%	20
			Dissolved Magnesium (Mg)	2014/12/13	0.36		%	20
			Dissolved Manganese (Mn)	2014/12/13	0.21		%	20
			Dissolved Phosphorus (P)	2014/12/13	NC		%	20
			Dissolved Potassium (K)	2014/12/13	0.35		%	20
			Dissolved Silicon (Si)	2014/12/13	0.50		%	20
			Dissolved Sodium (Na)	2014/12/13	0.42		%	20
			Dissolved Strontium (Sr)	2014/12/13	0.30		%	20
			Dissolved Sulphur (S)	2014/12/13	0.41		%	20
7754422	SB8	Matrix Spike	Dissolved Nitrite (N)	2014/12/16		94	%	80 - 120
			Dissolved Nitrate (N)	2014/12/16		101	%	80 - 120
7754422	SB8	Spiked Blank	Dissolved Nitrite (N)	2014/12/15		100	%	80 - 120
			Dissolved Nitrate (N)	2014/12/15		99	%	80 - 120
7754422	SB8	Method Blank	Dissolved Nitrite (N)	2014/12/15	<0.010		mg/L	
			Dissolved Nitrate (N)	2014/12/15	<0.010		mg/L	
7754422	SB8	RPD	Dissolved Nitrite (N)	2014/12/16	NC		%	20
			Dissolved Nitrate (N)	2014/12/16	NC		%	20
7757557	JK9	Matrix Spike	Dissolved Barium (Ba)	2014/12/17		101	%	80 - 120
			Dissolved Boron (B)	2014/12/17		104	%	80 - 120
			Dissolved Calcium (Ca)	2014/12/17		94	%	80 - 120
			Dissolved Iron (Fe)	2014/12/17		98	%	80 - 120
			Dissolved Lithium (Li)	2014/12/17		93	%	80 - 120
			Dissolved Magnesium (Mg)	2014/12/17		98	%	80 - 120
			Dissolved Manganese (Mn)	2014/12/17		98	%	80 - 120
			Dissolved Phosphorus (P)	2014/12/17		105	%	80 - 120
			Dissolved Potassium (K)	2014/12/17		101	%	80 - 120
			Dissolved Silicon (Si)	2014/12/17		105	%	80 - 120
			Dissolved Sodium (Na)	2014/12/17		NC	%	80 - 120
			Dissolved Strontium (Sr)	2014/12/17		95	%	80 - 120
7757557	JK9	Spiked Blank	Dissolved Barium (Ba)	2014/12/17		103	%	80 - 120
			Dissolved Boron (B)	2014/12/17		105	%	80 - 120
			Dissolved Calcium (Ca)	2014/12/17		99	%	80 - 120
			Dissolved Iron (Fe)	2014/12/17		99	%	80 - 120
			Dissolved Lithium (Li)	2014/12/17		94	%	80 - 120
			Dissolved Magnesium (Mg)	2014/12/17		103	%	80 - 120
			Dissolved Manganese (Mn)	2014/12/17		101	%	80 - 120
			Dissolved Phosphorus (P)	2014/12/17		103	%	80 - 120
			Dissolved Potassium (K)	2014/12/17		104	%	80 - 120
			Dissolved Silicon (Si)	2014/12/17		108	%	80 - 120
			Dissolved Sodium (Na)	2014/12/17		106	%	80 - 120
			Dissolved Strontium (Sr)	2014/12/17		98	%	80 - 120
			Dissolved Sulphur (S)	2014/12/17		95	%	80 - 120
7757557	JK9	Method Blank	Dissolved Barium (Ba)	2014/12/17	<0.010		mg/L	
			Dissolved Boron (B)	2014/12/17	<0.020		mg/L	
			Dissolved Calcium (Ca)	2014/12/17	<0.30		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Iron (Fe)	2014/12/17	<0.060		mg/L	
			Dissolved Lithium (Li)	2014/12/17	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2014/12/17	<0.20		mg/L	
			Dissolved Manganese (Mn)	2014/12/17	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2014/12/17	<0.10		mg/L	
			Dissolved Potassium (K)	2014/12/17	<0.30		mg/L	
			Dissolved Silicon (Si)	2014/12/17	<0.10		mg/L	
			Dissolved Sodium (Na)	2014/12/17	<0.50		mg/L	
			Dissolved Strontium (Sr)	2014/12/17	<0.020		mg/L	
			Dissolved Sulphur (S)	2014/12/17	<0.20		mg/L	
7757557	JK9	RPD	Dissolved Barium (Ba)	2014/12/17	NC		%	20
			Dissolved Boron (B)	2014/12/17	NC		%	20
			Dissolved Calcium (Ca)	2014/12/17	0.99		%	20
			Dissolved Iron (Fe)	2014/12/17	NC		%	20
			Dissolved Lithium (Li)	2014/12/17	2.1		%	20
			Dissolved Magnesium (Mg)	2014/12/17	0.53		%	20
			Dissolved Manganese (Mn)	2014/12/17	1.1		%	20
			Dissolved Phosphorus (P)	2014/12/17	NC		%	20
			Dissolved Potassium (K)	2014/12/17	2.1		%	20
			Dissolved Silicon (Si)	2014/12/17	0.28		%	20
			Dissolved Sodium (Na)	2014/12/17	2.2		%	20
			Dissolved Strontium (Sr)	2014/12/17	0.11		%	20
			Dissolved Sulphur (S)	2014/12/17	0.76		%	20
7760110	GG3	Matrix Spike [LI5750-06]	O-TERPHENYL (sur.)	2014/12/13		109	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/12/13		92	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2014/12/13		96	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2014/12/13		91	%	50 - 130
7760110	GG3	Spiked Blank	O-TERPHENYL (sur.)	2014/12/13		121	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/12/13		103	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2014/12/13		107	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2014/12/13		97	%	70 - 130
7760110	GG3	Method Blank	O-TERPHENYL (sur.)	2014/12/13		108	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/12/13	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2014/12/13	<0.20		mg/L	
			F4 (C34-C50 Hydrocarbons)	2014/12/13	<0.20		mg/L	
7760110	GG3	RPD [LI5749-06]	F2 (C10-C16 Hydrocarbons)	2014/12/13	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2014/12/13	NC		%	40

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B4B1931
Report Date: 2014/12/19

STANTEC CONSULTING LTD
Client Project #: 113929396
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: SC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			F4 (C34-C50 Hydrocarbons)	2014/12/13	NC		%	40

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.

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

12/3536.0

Chain of Custody A122115

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☑	Report Distribution (E-Mail):
Company:	Stantec		Christian.Nageli@Stantec.com
Contact:	Christian Nageli		Shayanne.Cairns@Stantec.com.
Address:	10160 112 St Edmonton		Suzanne.Musolino@Stantec.com
	Prov: AB PC: T5K2L6.	Prov: PC:	
Contact #s:	Ph: Cell: 780-233-4206.	Ph: Cell:	

REGULATORY GUIDELINES:
- ☑ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:
Project # / Name:
Site Location: Gull Lake
Quote #:
Sampled By: S. Cairns

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	WATER: ☐VOCs ☐BTEX F1 ☐BTEX F1-F2	☑BTEX F1-F4 ☐Routine Water ☐Turb ☐F	☐DOC ☐TOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐Total ☐Dissolved Mercury	Other Analysis: TKN	Orthophosphate (See Note)	Total phosphorus	Nitrite, nitrate, nitrite								HOLD - Do not Analyze	# of Containers Submitted
1	MW14-04	N/A	GW	14/12/09 12:00								✓ ✓		✓	✓		✓	✓	✓	✓									10
2	MW14-05a			10:00								✓ ✓		✓	✓		✓	✓	✓	✓									10
3	MW14-05b			13:00								✓ ✓		✓	✓		✓	✓	✓	✓									10
4	MW14-10			13:30								✓ ✓		✓	✓		✓	✓	✓	✓									10
5	MW10-01			10:32								✓		✓	✓		✓	✓	✓	✓									5
6	~~MW10-02~~																			✓									
7	MW10-03			11:00								✓ ✓		✓	✓		✓	✓	✓	✓									10
8																													
9																													
10																													
11																													
12																												F/P	

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print): Shayanne Cairns	Date (YY/MM/DD): 14/12/09	Time (24:00): 17:15
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: ~~Christian requested orthophosphate. Not orthophosphate. Please Contact him before proceeding.~~

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:
Shaun Bale	2014/12/09	1722	B413131 NFA KDH

Custody Seal	Temperature	Ice
Absent	7.5,5	Present

Lab Comments:

AB FCD-00331 Rev3 2010/05

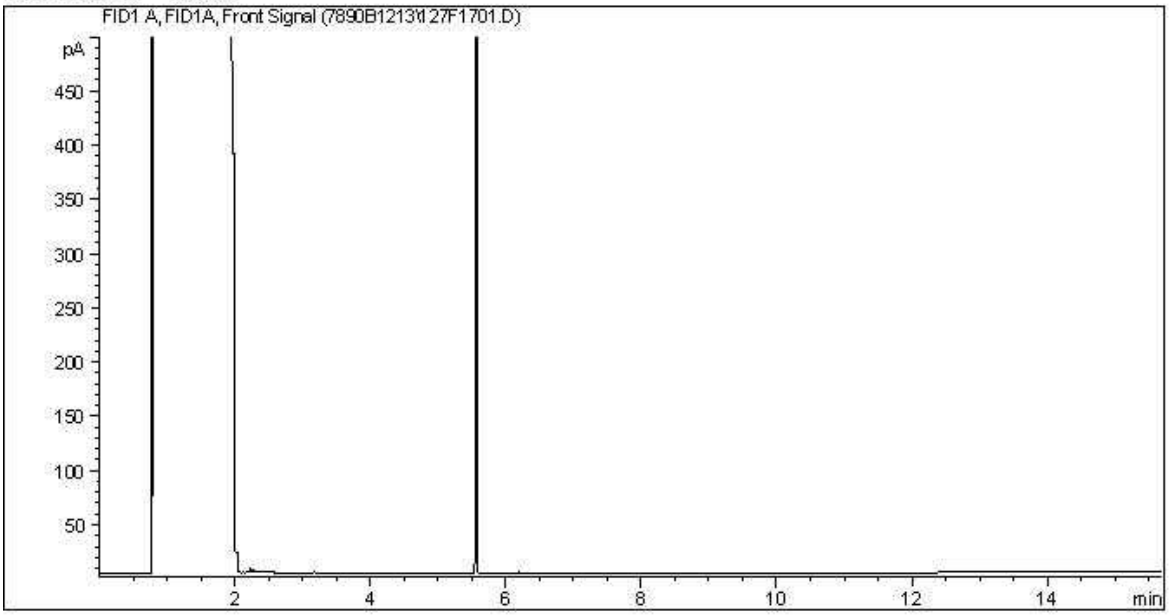
Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5749

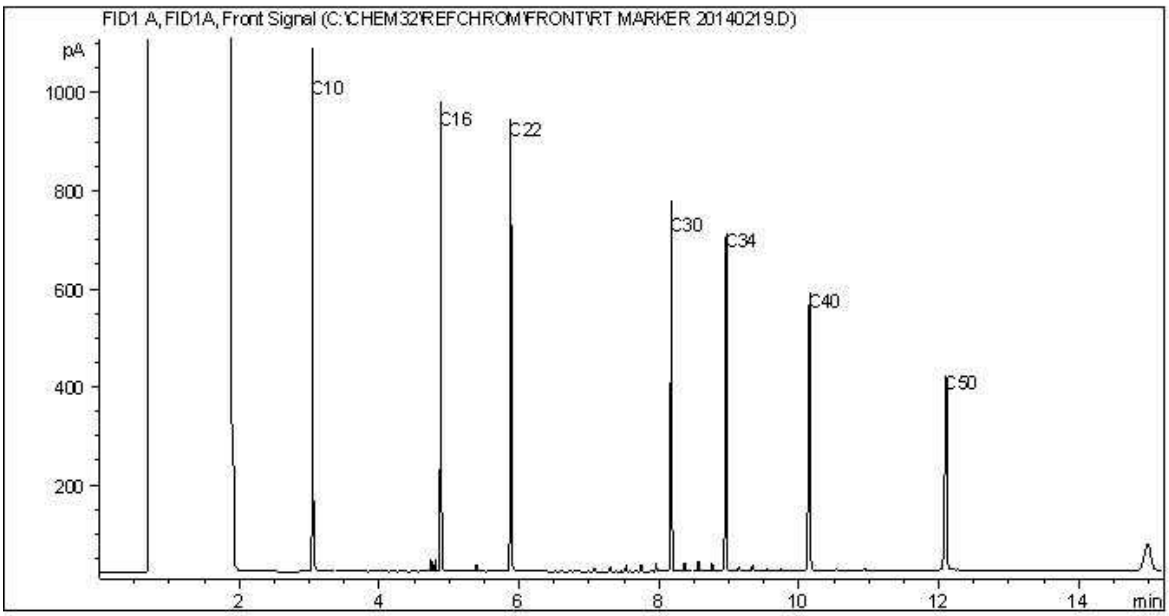
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-04

CCME Hydrocarbons in Water (F2; C10-C16) 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

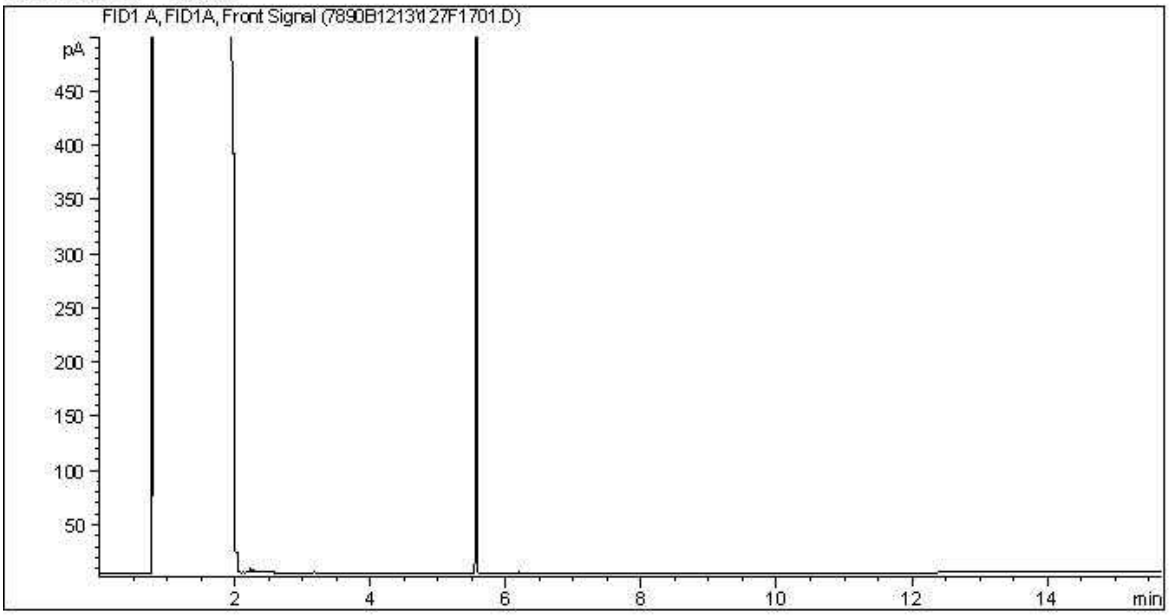
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5749

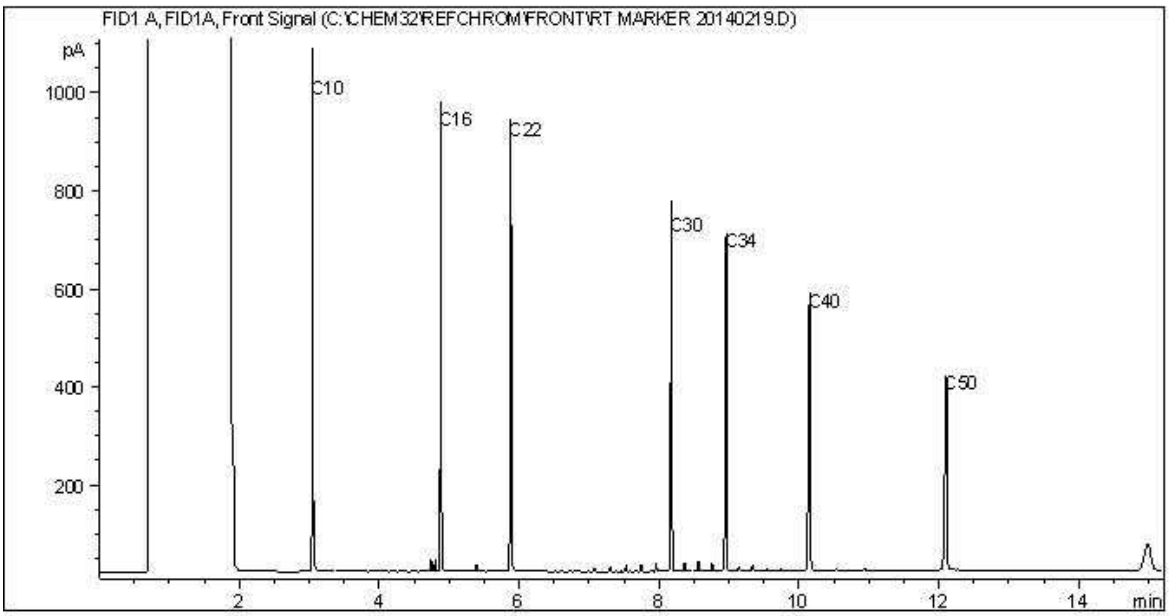
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-04

CCME Hydrocarbons (F2-F4 in water) 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+	

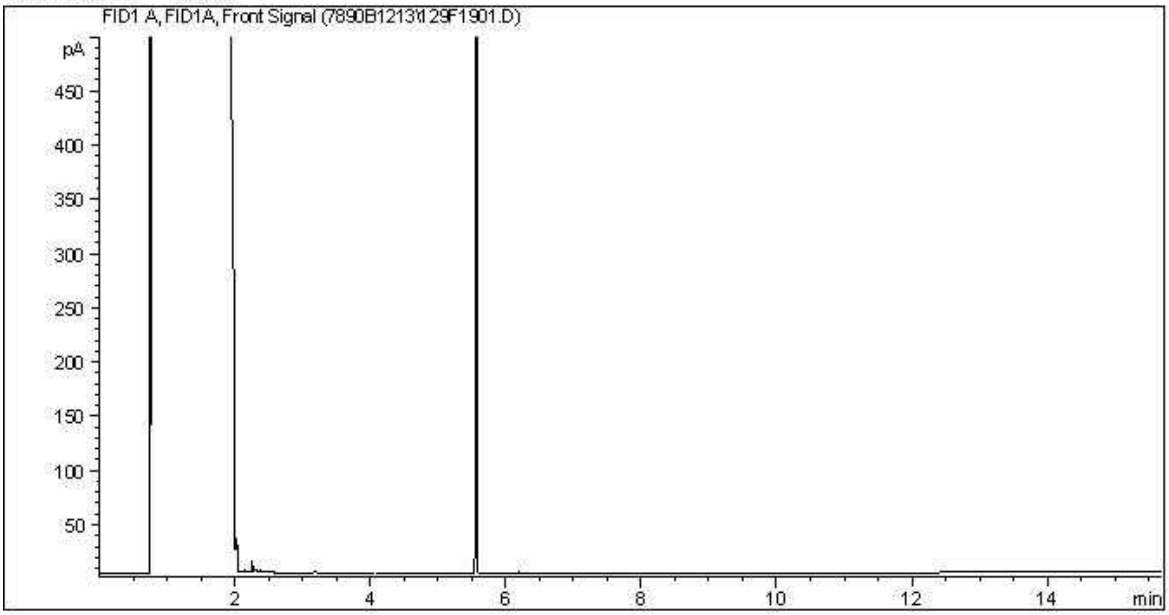
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5750

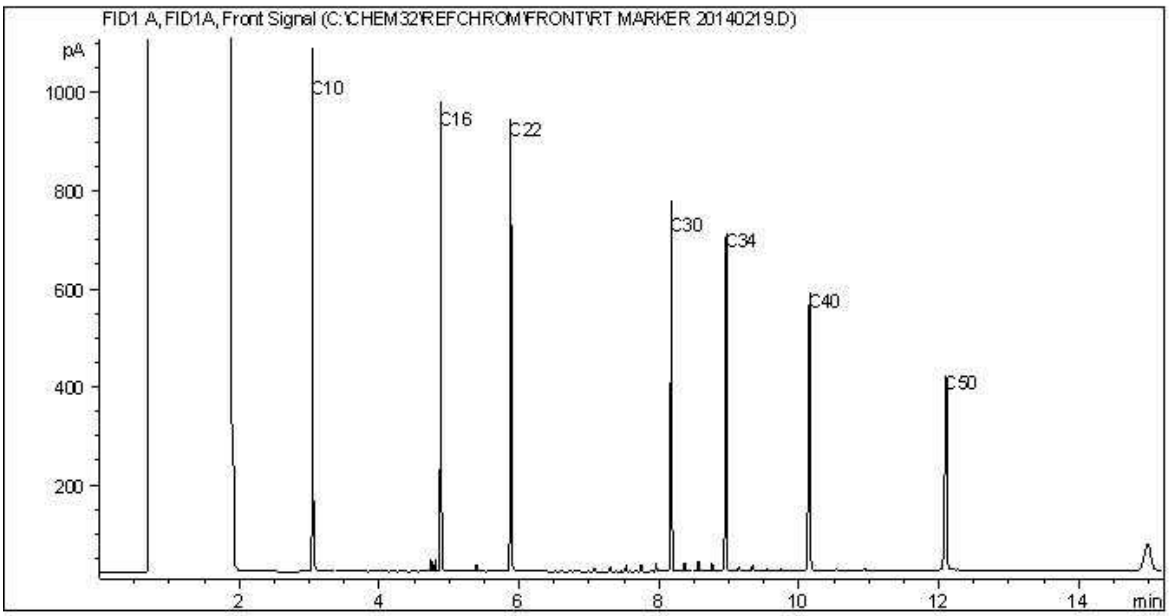
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-05A

CCME Hydrocarbons in Water (F2; C10-C16) 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+	

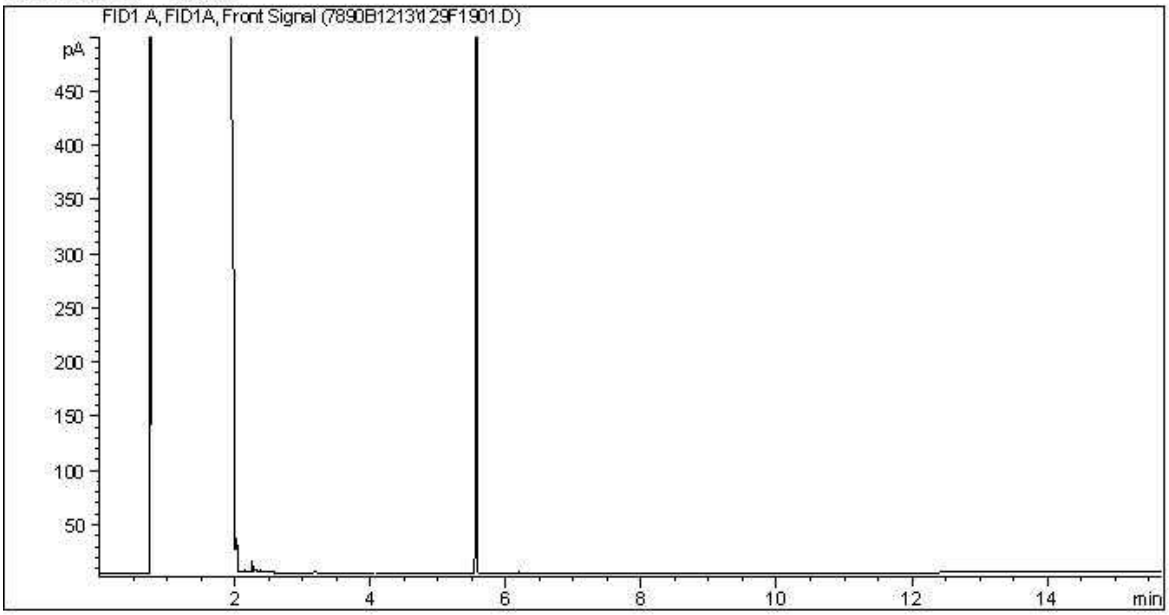
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5750

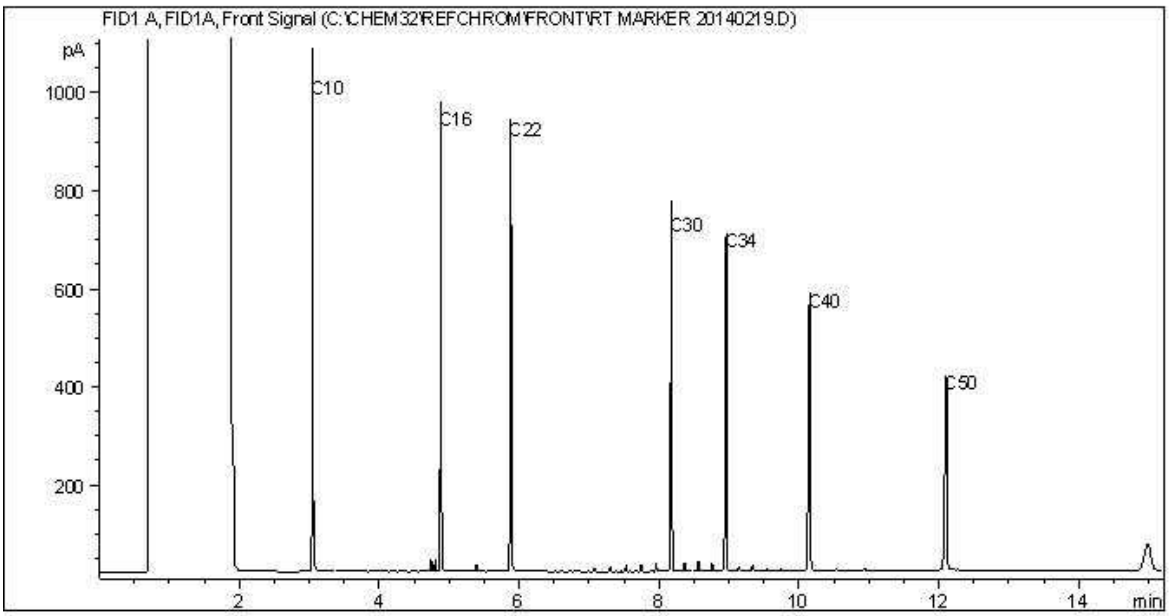
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-05A

CCME Hydrocarbons (F2-F4 in water) 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+	

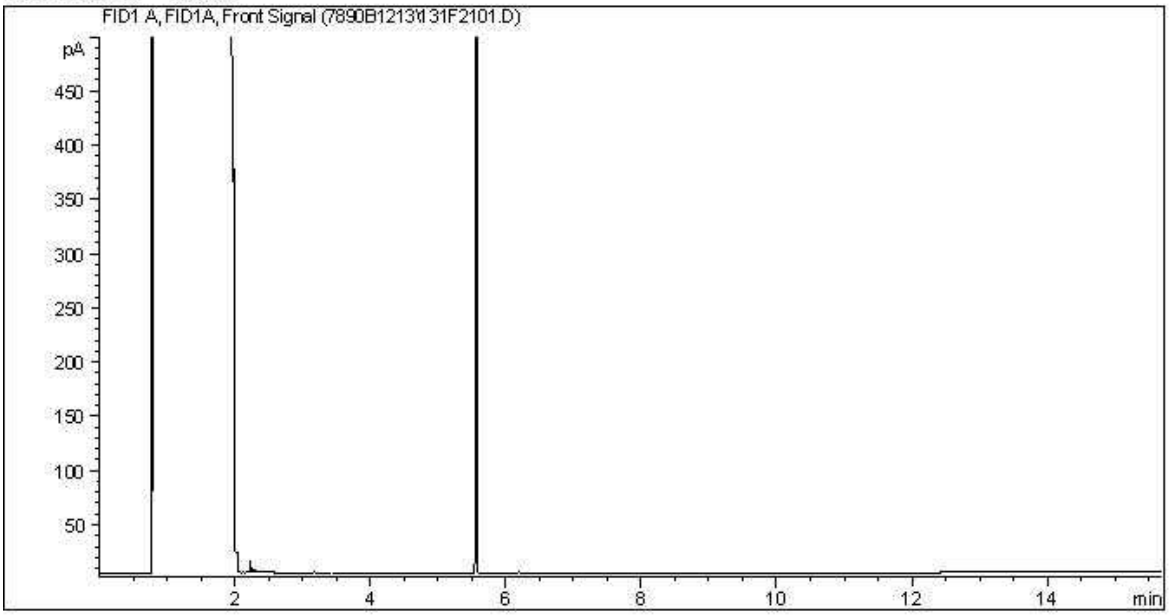
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5751

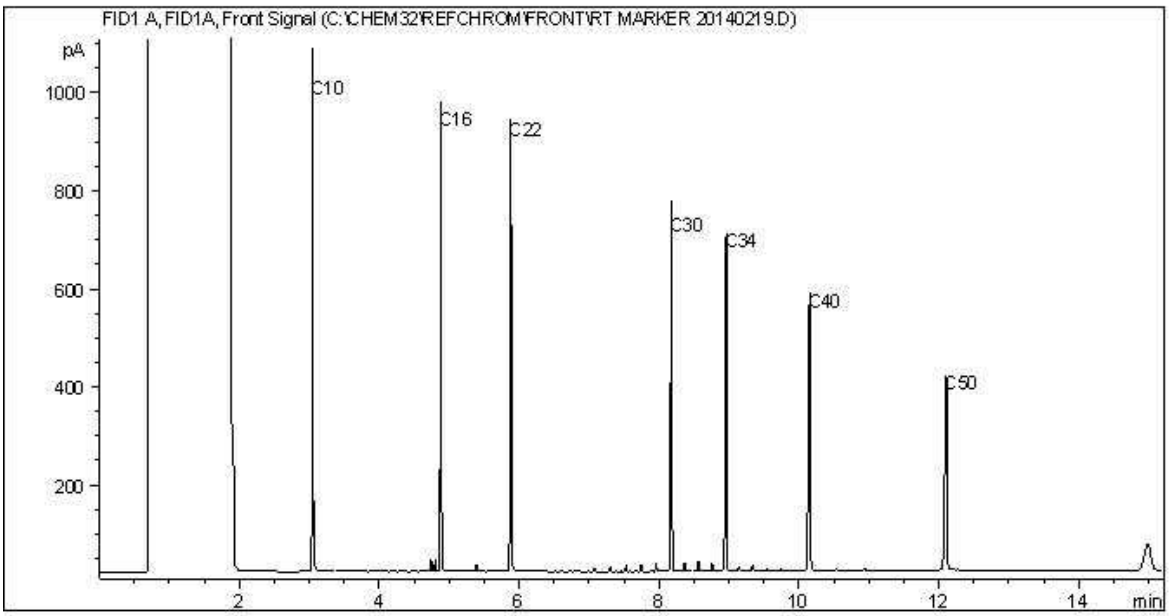
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-05B

CCME Hydrocarbons in Water (F2; C10-C16) 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+	

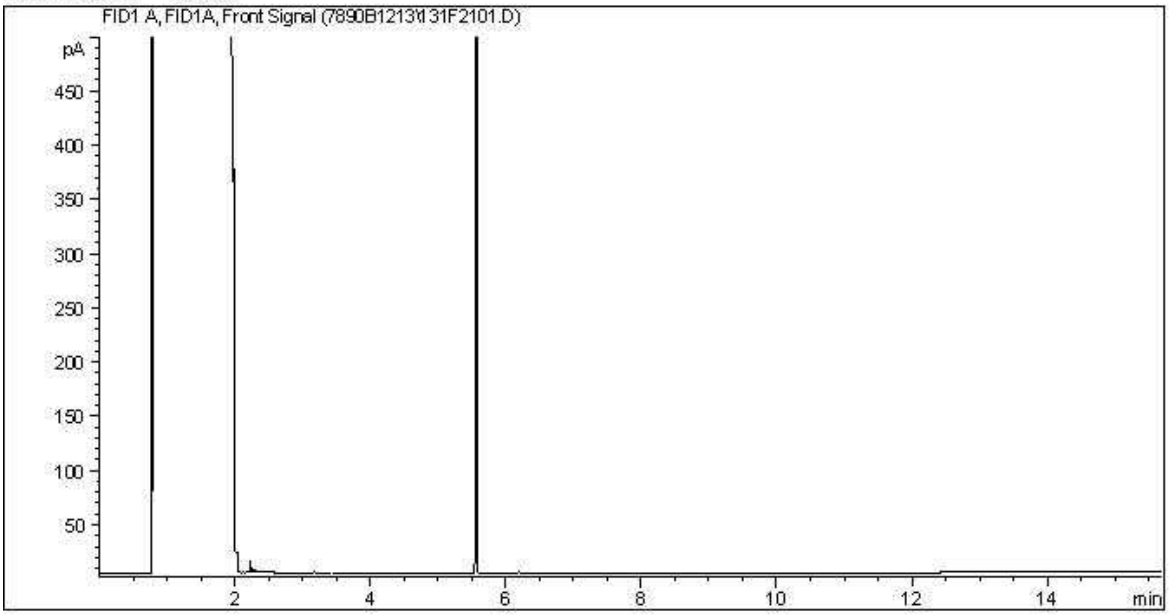
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5751

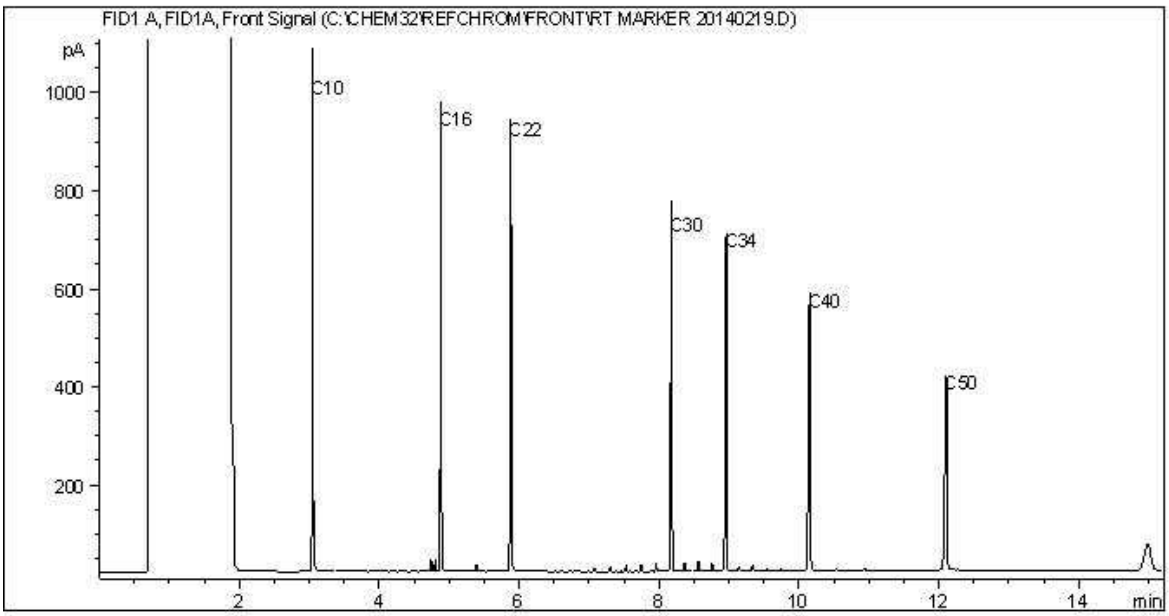
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-05B

CCME Hydrocarbons (F2-F4 in water) 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+	

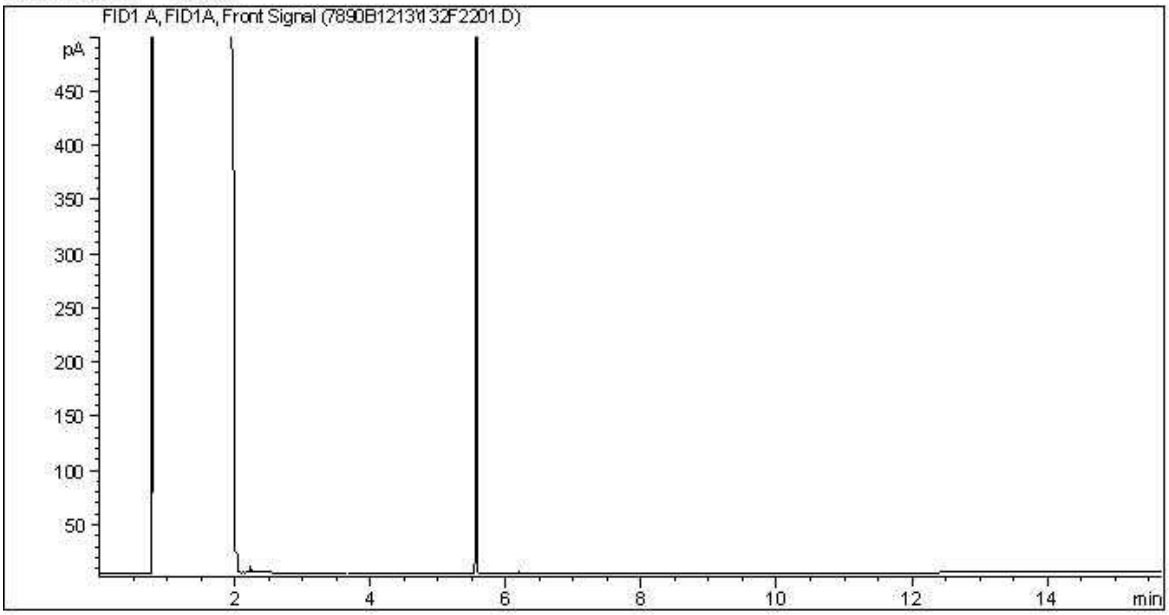
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5752

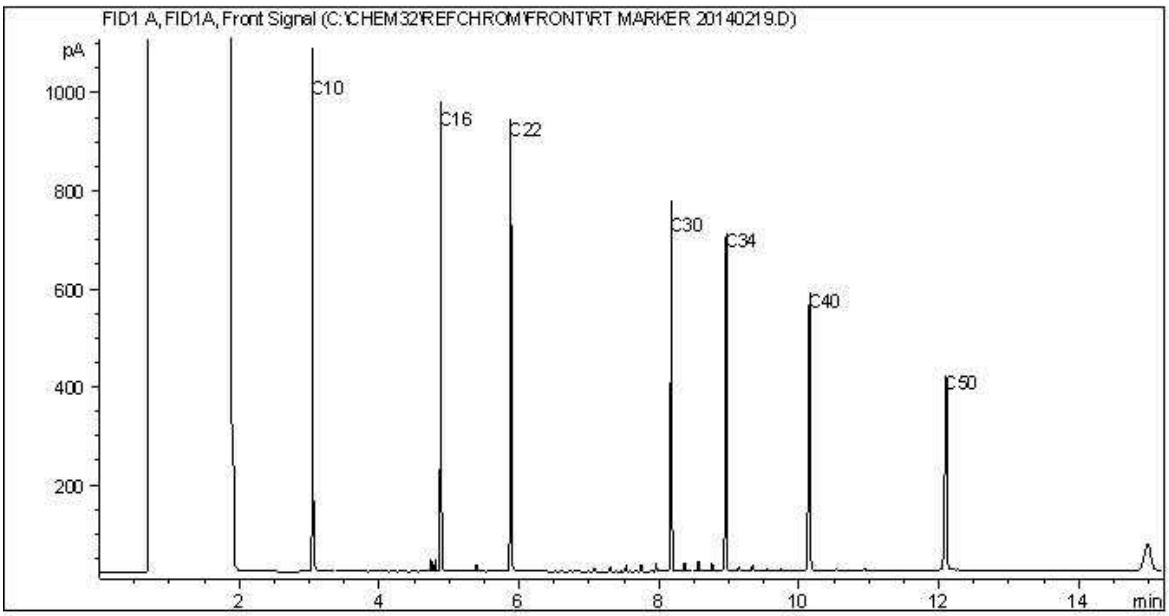
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-10

CCME Hydrocarbons in Water (F2; C10-C16) 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

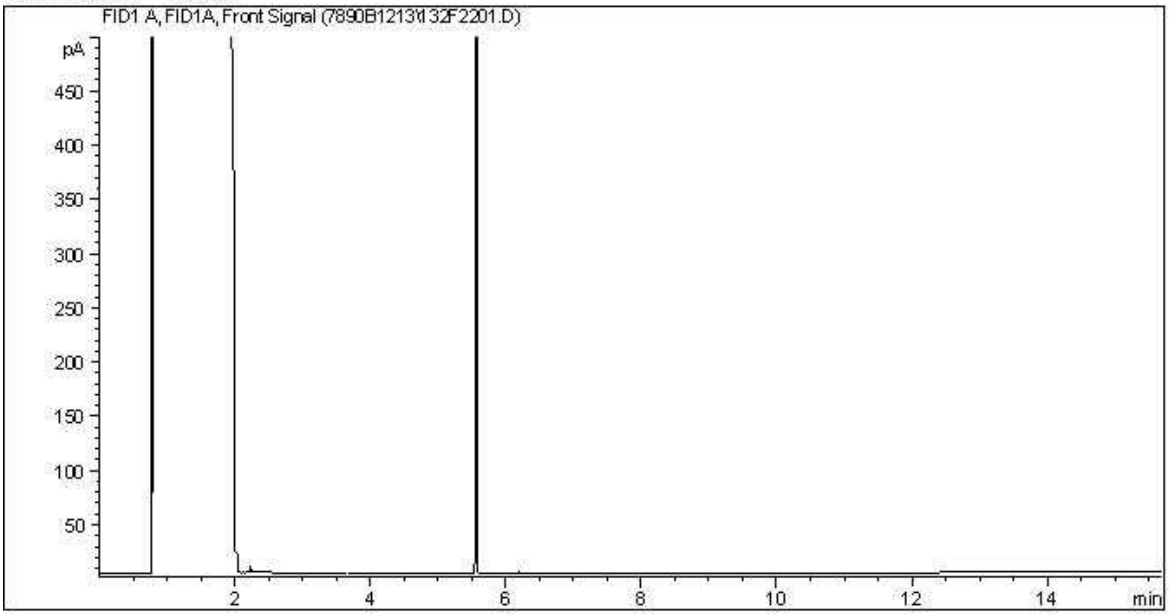
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5752

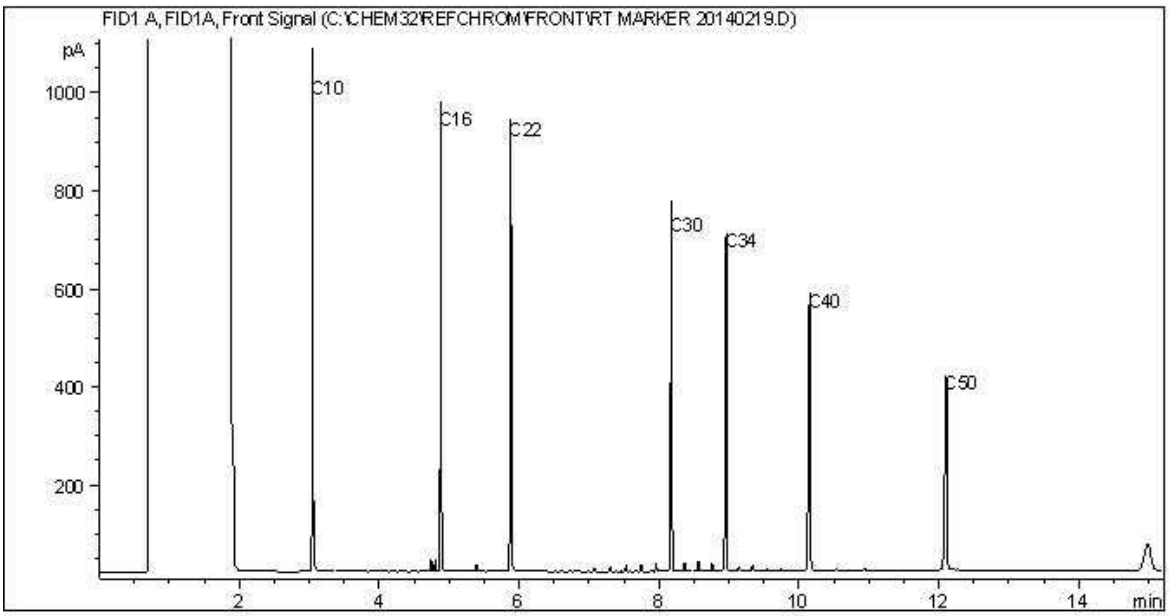
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW14-10

CCME Hydrocarbons (F2-F4 in water) 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

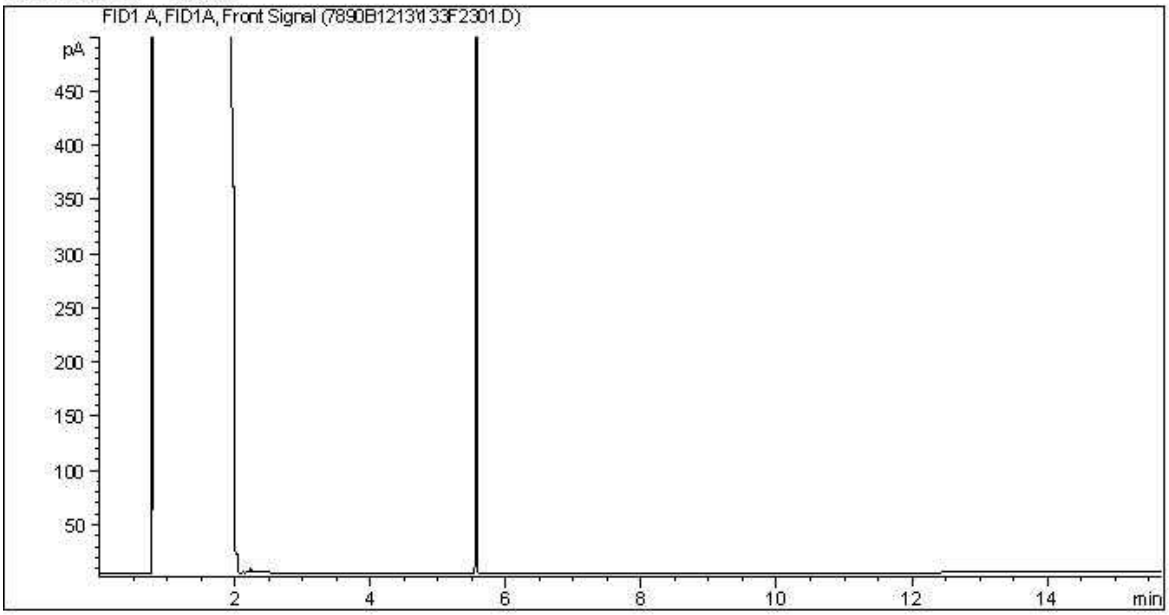
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5754

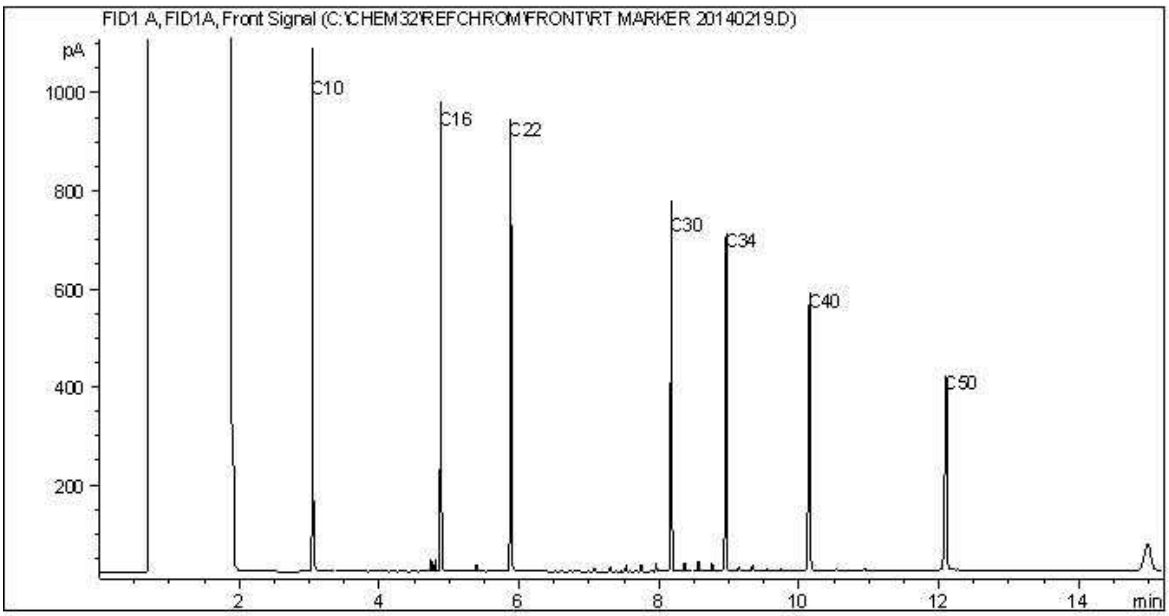
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW10-03

CCME Hydrocarbons in Water (F2; C10-C16) 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

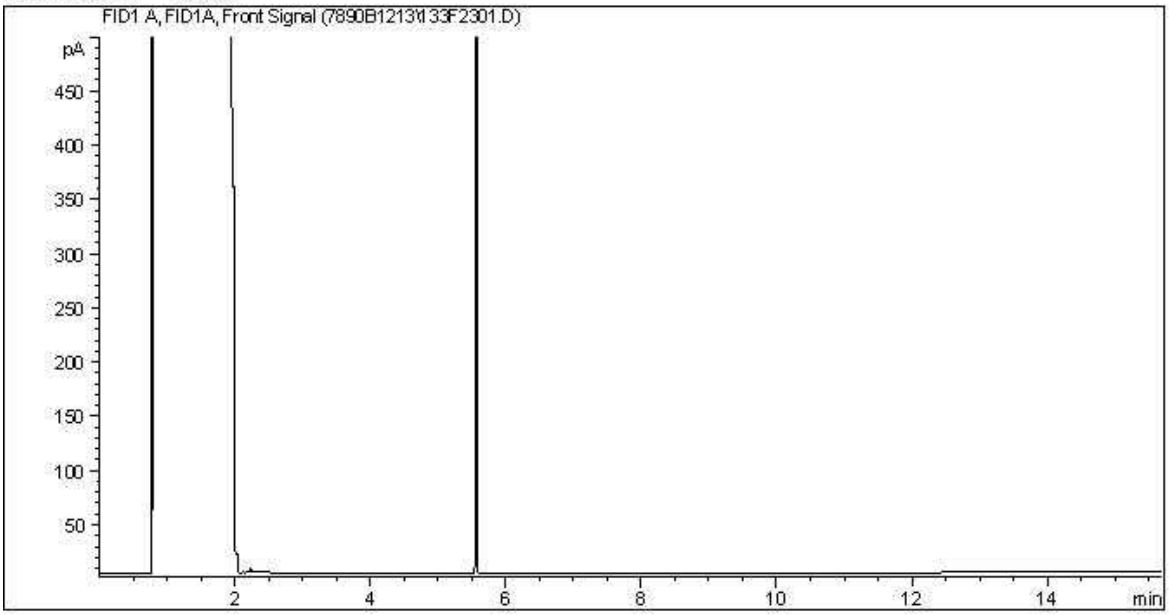
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B4B1931
Report Date: 2014/12/19
Maxxam Sample: LI5754

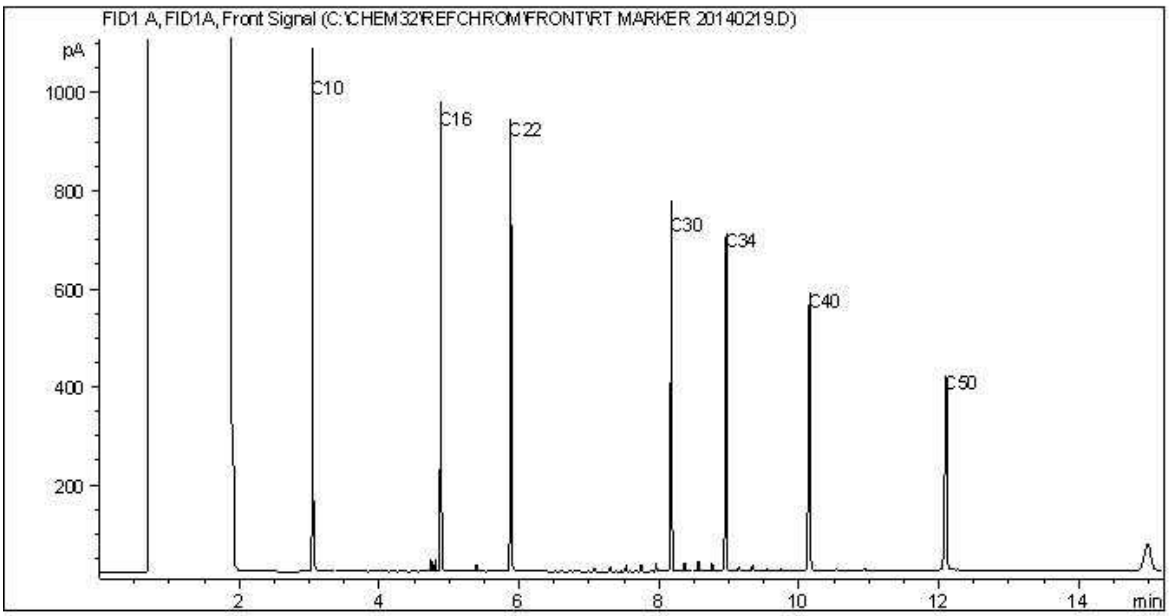
STANTEC CONSULTING LTD
Client Project #: 113929396
Site Reference: GULL LAKE
Client ID: MW10-03

CCME Hydrocarbons (F2-F4 in water) 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 P.O. #: 16300R-20
Your Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your C.O.C. #: A178065

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2015/02/26
Report #: R1811117
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B513775
Received: 2015/02/19, 16:01

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2015/02/22	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2015/02/23	AB SOP-00039	CCME CWS/EPA 8260C m
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2015/02/24	AB SOP-00039	CCME CWS/EPA 8260C m
Cadmium - low level CCME - Dissolved	1	N/A	2015/02/25	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME (Total)	1	2015/02/21	2015/02/26	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4m
Chloride by Automated Colourimetry	1	N/A	2015/02/23	AB SOP-00020	SM 22 4500-Cl G m
Conductivity @25C	1	N/A	2015/02/22	AB SOP-00005	SM 22 2510 B m
Hardness	1	N/A	2015/02/24	AB WI-00065	Auto Calc
Elements by ICP - Dissolved	1	N/A	2015/02/24	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total	1	2015/02/24	2015/02/24	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved	1	N/A	2015/02/24	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	1	2015/02/24	2015/02/25	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	1	N/A	2015/02/24	AB WI-00065	SM 1030E
Sum of cations, anions	1	N/A	2015/02/24	AB WI-00065	SM 1030E
Nitrate and Nitrite	1	N/A	2015/02/22	AB SOP-00023	Auto Calc
Nitrate + Nitrite-N (calculated)	1	N/A	2015/02/22	AB SOP-00023	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	1	N/A	2015/02/21	AB SOP-00023	SM 22 4110 B m
pH @25°C (Alkalinity titrator)	1	N/A	2015/02/22	AB SOP-00005	SM 22 4500 H+ B m
Orthophosphate by Konelab	1	N/A	2015/02/25	AB SOP-00025	SM 22 4500-P A,B,F m
Sulphate by Automated Colourimetry	1	N/A	2015/02/26	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	1	N/A	2015/02/24	AB WI-00065	SM 1030E
Total Kjeldahl Nitrogen	1	2015/02/23	2015/02/24	AB SOP-00008	EPA 351.1 R 1978 m
Total Phosphorus	1	2015/02/23	2015/02/24	AB SOP-00024	SM 22 4500-P A,B,F m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Your P.O. #: 16300R-20
Your Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your C.O.C. #: A178065

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2015/02/26
Report #: R1811117
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B513775
Received: 2015/02/19, 16:01

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780)577-7105 Ext:7105

==========

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 #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		LS5263		
Sampling Date		2015/02/19		
COC Number		A178065		
	Units	MW10-02	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	11	N/A	7814720
Cation Sum	meq/L	13	N/A	7814720
Hardness (CaCO3)	mg/L	320	0.50	7814718
Ion Balance	N/A	1.2	0.010	7814719
Dissolved Nitrate (NO3)	mg/L	0.48	0.044	7814721
Nitrate plus Nitrite (N)	mg/L	0.12	0.010	7814722
Dissolved Nitrite (NO2)	mg/L	0.036	0.033	7814721
Total Dissolved Solids	mg/L	650	10	7814723
Misc. Inorganics				
Conductivity	uS/cm	950	1.0	7815208
pH	pH	8.08	N/A	7815206
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	<0.20	0.20	7814714
Anions				
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	7815207
Alkalinity (Total as CaCO3)	mg/L	400	0.50	7815207
Bicarbonate (HCO3)	mg/L	490	0.50	7815207
Carbonate (CO3)	mg/L	<0.50	0.50	7815207
Hydroxide (OH)	mg/L	<0.50	0.50	7815207
Dissolved Sulphate (SO4)	mg/L	110	1.0	7819245
Dissolved Chloride (Cl)	mg/L	23	1.0	7814865
Nutrients				
Dissolved Nitrite (N)	mg/L	0.011	0.010	7814838
Dissolved Nitrate (N)	mg/L	0.11	0.010	7814838
Elements				
Dissolved Aluminum (Al)	mg/L	<0.030	0.030	7817514
Dissolved Antimony (Sb)	mg/L	<0.0060	0.0060	7817514
Dissolved Arsenic (As)	mg/L	<0.0020	0.0020	7817514
Dissolved Barium (Ba)	mg/L	0.14	0.020	7817518
Dissolved Beryllium (Be)	mg/L	<0.010	0.010	7817514
Dissolved Boron (B)	mg/L	0.078	0.040	7817518
Dissolved Calcium (Ca)	mg/L	86	0.60	7817518
Dissolved Chromium (Cr)	mg/L	<0.010	0.010	7817514
Dissolved Cobalt (Co)	mg/L	<0.0030	0.0030	7817514

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 #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		LS5263		
Sampling Date		2015/02/19		
COC Number		A178065		
	Units	**MW10-02**	**RDL**	**QC Batch**
Dissolved Copper (Cu)	mg/L	0.0025	0.0020	7817514
Dissolved Iron (Fe)	mg/L	<0.12	0.12	7817518
Dissolved Lead (Pb)	mg/L	<0.0020	0.0020	7817514
Dissolved Lithium (Li)	mg/L	<0.040	0.040	7817518
Dissolved Magnesium (Mg)	mg/L	25	0.40	7817518
Dissolved Manganese (Mn)	mg/L	2.3	0.0080	7817518
Dissolved Molybdenum (Mo)	mg/L	0.0029	0.0020	7817514
Dissolved Nickel (Ni)	mg/L	0.0072	0.0050	7817514
Dissolved Phosphorus (P)	mg/L	<0.20	0.20	7817518
Dissolved Potassium (K)	mg/L	1.5	0.60	7817518
Dissolved Selenium (Se)	mg/L	<0.0020	0.0020	7817514
Dissolved Silicon (Si)	mg/L	10	0.20	7817518
Dissolved Silver (Ag)	mg/L	<0.0010	0.0010	7817514
Dissolved Sodium (Na)	mg/L	160	1.0	7817518
Dissolved Strontium (Sr)	mg/L	0.54	0.040	7817518
Dissolved Sulphur (S)	mg/L	41	0.40	7817518
Dissolved Thallium (Tl)	mg/L	<0.0020	0.0020	7817514
Dissolved Tin (Sn)	mg/L	<0.010	0.010	7817514
Dissolved Titanium (Ti)	mg/L	<0.010	0.010	7817514
Dissolved Uranium (U)	mg/L	0.0065	0.0010	7817514
Dissolved Vanadium (V)	mg/L	<0.010	0.010	7817514
Dissolved Zinc (Zn)	mg/L	<0.030	0.030	7817514
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 #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		LS5263		
Sampling Date		2015/02/19		
COC Number		A178065		
	Units	MW10-02	RDL	QC Batch
Low Level Elements				
Total Cadmium (Cd)	ug/L	45	2.0	7814715
Elements				
Total Aluminum (Al)	mg/L	670 (1)	0.060	7817425
Total Antimony (Sb)	mg/L	<0.060	0.060	7817425
Total Arsenic (As)	mg/L	0.70	0.020	7817425
Total Barium (Ba)	mg/L	33 (1)	0.20	7817435
Total Beryllium (Be)	mg/L	<0.10	0.10	7817425
Total Boron (B)	mg/L	0.57	0.040	7817435
Total Calcium (Ca)	mg/L	3000 (1)	6.0	7817435
Total Chromium (Cr)	mg/L	1.3	0.10	7817425
Total Cobalt (Co)	mg/L	1.0	0.030	7817425
Total Copper (Cu)	mg/L	1.6	0.020	7817425
Total Iron (Fe)	mg/L	1700 (1)	1.2	7817435
Total Lead (Pb)	mg/L	0.95	0.020	7817425
Total Lithium (Li)	mg/L	1.1	0.040	7817435
Total Magnesium (Mg)	mg/L	740	0.40	7817435
Total Manganese (Mn)	mg/L	100 (1)	0.080	7817435
Total Molybdenum (Mo)	mg/L	0.043	0.020	7817425
Total Nickel (Ni)	mg/L	3.2	0.050	7817425
Total Phosphorus (P)	mg/L	81	0.20	7817435
Total Potassium (K)	mg/L	76	0.60	7817435
Total Selenium (Se)	mg/L	0.030	0.020	7817425
Total Silicon (Si)	mg/L	660 (1)	2.0	7817435
Total Silver (Ag)	mg/L	0.015	0.010	7817425
Total Sodium (Na)	mg/L	210	1.0	7817435
Total Strontium (Sr)	mg/L	8.1	0.040	7817435
Total Sulphur (S)	mg/L	60	0.40	7817435
Total Thallium (Tl)	mg/L	0.026	0.020	7817425
Total Tin (Sn)	mg/L	<0.10	0.10	7817425
Total Titanium (Ti)	mg/L	2.6	0.10	7817425
Total Uranium (U)	mg/L	0.12	0.010	7817425
Total Vanadium (V)	mg/L	1.9	0.10	7817425
Total Zinc (Zn)	mg/L	5.3	0.30	7817425

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 #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		LS5263		
Sampling Date		2015/02/19		
COC Number		A178065		
	Units	**MW10-02**	**RDL**	**QC Batch**
Nutrients				
Total Kjeldahl Nitrogen	mg/L	85 (1)	2.5	7815628
Orthophosphate (P)	mg/L	0.0050	0.0030	7818222
Total Phosphorus (P)	mg/L	4.6 (1)	0.030	7816036

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 #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		LS5262	LS5263		
Sampling Date		2015/02/19	2015/02/19		
COC Number		A178065	A178065		
	Units	**MW10-01**	**MW10-02**	**RDL**	**QC Batch**
Volatiles					
Benzene	mg/L	<0.00040	<0.00040	0.00040	7814875
Toluene	mg/L	<0.00040	<0.00040	0.00040	7814875
Ethylbenzene	mg/L	<0.00040	<0.00040	0.00040	7814875
m & p-Xylene	mg/L	<0.00080	<0.00080	0.00080	7814875
o-Xylene	mg/L	<0.00040	<0.00040	0.00040	7814875
Xylenes (Total)	mg/L	<0.00080	<0.00080	0.00080	7814875
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	0.10	7814875
(C6-C10)	mg/L	<0.10	<0.10	0.10	7814875
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	102	107	N/A	7814875
4-Bromofluorobenzene (sur.)	%	99	99	N/A	7814875
D4-1,2-Dichloroethane (sur.)	%	101	98	N/A	7814875

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 #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

GENERAL COMMENTS

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

Package 1	0.3°C

Sample LS5263-01 : Detection limits raised due to insufficient sample volume. Parameters affected are total B, K, Li, Mg, Na, P, S, Sr and dissolved B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, P, S, Si, Sr.

Detection limits raised due to sample matrix. Parameters affected are dissolved and total Al, Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Ionic imbalance; analysis performed in duplicate.

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 #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7814838	LMD	Matrix Spike	Dissolved Nitrite (N)	2015/02/21		108	%	80 - 120
			Dissolved Nitrate (N)	2015/02/21		108	%	80 - 120
7814838	LMD	Spiked Blank	Dissolved Nitrite (N)	2015/02/21		100	%	80 - 120
			Dissolved Nitrate (N)	2015/02/21		100	%	80 - 120
7814838	LMD	Method Blank	Dissolved Nitrite (N)	2015/02/21	<0.010		mg/L	
			Dissolved Nitrate (N)	2015/02/21	<0.010		mg/L	
7814838	LMD	RPD	Dissolved Nitrite (N)	2015/02/21	NC		%	20
			Dissolved Nitrate (N)	2015/02/21	0.22		%	20
7814865	KD5	Matrix Spike	Dissolved Chloride (Cl)	2015/02/23		NC	%	80 - 120
7814865	KD5	Spiked Blank	Dissolved Chloride (Cl)	2015/02/23		100	%	80 - 120
7814865	KD5	Method Blank	Dissolved Chloride (Cl)	2015/02/23	<1.0		mg/L	
7814865	KD5	RPD	Dissolved Chloride (Cl)	2015/02/23	0.40		%	20
7814875	SES	Matrix Spike	1,4-Difluorobenzene (sur.)	2015/02/23		104	%	70 - 130
			4-Bromofluorobenzene (sur.)	2015/02/23		103	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/02/23		98	%	70 - 130
			Benzene	2015/02/23		109	%	70 - 130
			Toluene	2015/02/23		107	%	70 - 130
			Ethylbenzene	2015/02/23		113	%	70 - 130
			m & p-Xylene	2015/02/23		115	%	70 - 130
			o-Xylene	2015/02/23		112	%	70 - 130
			(C6-C10)	2015/02/23		103	%	70 - 130
7814875	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2015/02/23		93	%	70 - 130
			4-Bromofluorobenzene (sur.)	2015/02/23		97	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/02/23		95	%	70 - 130
			Benzene	2015/02/23		99	%	70 - 130
			Toluene	2015/02/23		103	%	70 - 130
			Ethylbenzene	2015/02/23		108	%	70 - 130
			m & p-Xylene	2015/02/23		108	%	70 - 130
			o-Xylene	2015/02/23		106	%	70 - 130
			(C6-C10)	2015/02/23		102	%	70 - 130
7814875	SES	Method Blank	1,4-Difluorobenzene (sur.)	2015/02/23		96	%	70 - 130
			4-Bromofluorobenzene (sur.)	2015/02/23		96	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/02/23		95	%	70 - 130
			Benzene	2015/02/23	<0.00040		mg/L	
			Toluene	2015/02/23	<0.00040		mg/L	
			Ethylbenzene	2015/02/23	<0.00040		mg/L	
			m & p-Xylene	2015/02/23	<0.00080		mg/L	
			o-Xylene	2015/02/23	<0.00040		mg/L	
			Xylenes (Total)	2015/02/23	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2015/02/23	<0.10		mg/L	
			(C6-C10)	2015/02/23	<0.10		mg/L	
7814875	SES	RPD	Benzene	2015/02/23	NC		%	40
			Toluene	2015/02/23	NC		%	40
			Ethylbenzene	2015/02/23	NC		%	40
			m & p-Xylene	2015/02/23	NC		%	40
			o-Xylene	2015/02/23	NC		%	40
			Xylenes (Total)	2015/02/23	NC		%	40
			F1 (C6-C10) - BTEX	2015/02/23	NC		%	40
			(C6-C10)	2015/02/23	NC		%	40
7815206	MA4	Spiked Blank	pH	2015/02/22		100	%	97 - 103
7815206	MA4	RPD	pH	2015/02/22	0.39		%	N/A

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7815207	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2015/02/22		100	%	80 - 120
7815207	MA4	Method Blank	Alkalinity (PP as CaCO3)	2015/02/22	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2015/02/22	<0.50		mg/L	
			Bicarbonate (HCO3)	2015/02/22	<0.50		mg/L	
			Carbonate (CO3)	2015/02/22	<0.50		mg/L	
			Hydroxide (OH)	2015/02/22	<0.50		mg/L	
7815207	MA4	RPD	Alkalinity (PP as CaCO3)	2015/02/22	NC		%	20
			Alkalinity (Total as CaCO3)	2015/02/22	1.0		%	20
			Bicarbonate (HCO3)	2015/02/22	1.1		%	20
			Carbonate (CO3)	2015/02/22	NC		%	20
			Hydroxide (OH)	2015/02/22	NC		%	20
7815208	MA4	Spiked Blank	Conductivity	2015/02/22		99	%	90 - 110
7815208	MA4	Method Blank	Conductivity	2015/02/22	<1.0		uS/cm	
7815208	MA4	RPD	Conductivity	2015/02/22	0.48		%	20
7815628	AL2	Matrix Spike	Total Kjeldahl Nitrogen	2015/02/24		99	%	80 - 120
7815628	AL2	QC Standard	Total Kjeldahl Nitrogen	2015/02/24		104	%	80 - 120
7815628	AL2	Spiked Blank	Total Kjeldahl Nitrogen	2015/02/24		115	%	80 - 120
7815628	AL2	Method Blank	Total Kjeldahl Nitrogen	2015/02/24	<0.050		mg/L	
7815628	AL2	RPD	Total Kjeldahl Nitrogen	2015/02/24	0.58		%	20
			Total Kjeldahl Nitrogen	2015/02/24	3.3		%	20
7816036	AF6	Matrix Spike	Total Phosphorus (P)	2015/02/24		94	%	80 - 120
7816036	AF6	QC Standard	Total Phosphorus (P)	2015/02/24		89	%	80 - 120
7816036	AF6	Spiked Blank	Total Phosphorus (P)	2015/02/24		93	%	80 - 120
7816036	AF6	Method Blank	Total Phosphorus (P)	2015/02/24	0.0030, RDL=0.0030		mg/L	
7816036	AF6	RPD	Total Phosphorus (P)	2015/02/24	NC		%	20
7817425	APY	Matrix Spike	Total Aluminum (Al)	2015/02/24		NC	%	80 - 120
			Total Antimony (Sb)	2015/02/24		103	%	80 - 120
			Total Arsenic (As)	2015/02/24		102	%	80 - 120
			Total Beryllium (Be)	2015/02/24		105	%	80 - 120
			Total Chromium (Cr)	2015/02/24		103	%	80 - 120
			Total Cobalt (Co)	2015/02/24		104	%	80 - 120
			Total Copper (Cu)	2015/02/24		104	%	80 - 120
			Total Lead (Pb)	2015/02/24		106	%	80 - 120
			Total Molybdenum (Mo)	2015/02/24		105	%	80 - 120
			Total Nickel (Ni)	2015/02/24		103	%	80 - 120
			Total Selenium (Se)	2015/02/24		101	%	80 - 120
			Total Silver (Ag)	2015/02/24		104	%	80 - 120
			Total Thallium (Tl)	2015/02/24		102	%	80 - 120
			Total Tin (Sn)	2015/02/24		106	%	80 - 120
			Total Titanium (Ti)	2015/02/24		97	%	80 - 120
			Total Uranium (U)	2015/02/24		99	%	80 - 120
			Total Vanadium (V)	2015/02/24		105	%	80 - 120
			Total Zinc (Zn)	2015/02/24		102	%	80 - 120
7817425	APY	Spiked Blank	Total Aluminum (Al)	2015/02/24		96	%	80 - 120
			Total Antimony (Sb)	2015/02/24		99	%	80 - 120
			Total Arsenic (As)	2015/02/24		99	%	80 - 120
			Total Beryllium (Be)	2015/02/24		100	%	80 - 120
			Total Chromium (Cr)	2015/02/24		102	%	80 - 120
			Total Cobalt (Co)	2015/02/24		103	%	80 - 120
			Total Copper (Cu)	2015/02/24		102	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Lead (Pb)	2015/02/24		102	%	80 - 120
			Total Molybdenum (Mo)	2015/02/24		101	%	80 - 120
			Total Nickel (Ni)	2015/02/24		102	%	80 - 120
			Total Selenium (Se)	2015/02/24		95	%	80 - 120
			Total Silver (Ag)	2015/02/24		104	%	80 - 120
			Total Thallium (Tl)	2015/02/24		98	%	80 - 120
			Total Tin (Sn)	2015/02/24		103	%	80 - 120
			Total Titanium (Ti)	2015/02/24		100	%	80 - 120
			Total Uranium (U)	2015/02/24		96	%	80 - 120
			Total Vanadium (V)	2015/02/24		104	%	80 - 120
			Total Zinc (Zn)	2015/02/24		97	%	80 - 120
7817425	APY	Method Blank	Total Aluminum (Al)	2015/02/24	<0.0030		mg/L	
			Total Antimony (Sb)	2015/02/24	<0.00060		mg/L	
			Total Arsenic (As)	2015/02/24	<0.00020		mg/L	
			Total Beryllium (Be)	2015/02/24	<0.0010		mg/L	
			Total Chromium (Cr)	2015/02/24	<0.0010		mg/L	
			Total Cobalt (Co)	2015/02/24	<0.00030		mg/L	
			Total Copper (Cu)	2015/02/24	<0.00020		mg/L	
			Total Lead (Pb)	2015/02/24	<0.00020		mg/L	
			Total Molybdenum (Mo)	2015/02/24	<0.00020		mg/L	
			Total Nickel (Ni)	2015/02/24	<0.00050		mg/L	
			Total Selenium (Se)	2015/02/24	<0.00020		mg/L	
			Total Silver (Ag)	2015/02/24	<0.00010		mg/L	
			Total Thallium (Tl)	2015/02/24	<0.00020		mg/L	
			Total Tin (Sn)	2015/02/24	<0.0010		mg/L	
			Total Titanium (Ti)	2015/02/24	<0.0010		mg/L	
			Total Uranium (U)	2015/02/24	<0.00010		mg/L	
			Total Vanadium (V)	2015/02/24	<0.0010		mg/L	
			Total Zinc (Zn)	2015/02/24	<0.0030		mg/L	
7817425	APY	RPD	Total Copper (Cu)	2015/02/24	0.93		%	20
7817435	JK9	Matrix Spike	Total Barium (Ba)	2015/02/24		98	%	80 - 120
			Total Boron (B)	2015/02/24		100	%	80 - 120
			Total Calcium (Ca)	2015/02/24		NC	%	80 - 120
			Total Iron (Fe)	2015/02/24		NC	%	80 - 120
			Total Lithium (Li)	2015/02/24		100	%	80 - 120
			Total Magnesium (Mg)	2015/02/24		NC	%	80 - 120
			Total Manganese (Mn)	2015/02/24		100	%	80 - 120
			Total Phosphorus (P)	2015/02/24		97	%	80 - 120
			Total Potassium (K)	2015/02/24		101	%	80 - 120
			Total Silicon (Si)	2015/02/24		NC	%	80 - 120
			Total Sodium (Na)	2015/02/24		NC	%	80 - 120
			Total Strontium (Sr)	2015/02/24		96	%	80 - 120
7817435	JK9	Spiked Blank	Total Barium (Ba)	2015/02/24		101	%	80 - 120
			Total Boron (B)	2015/02/24		101	%	80 - 120
			Total Calcium (Ca)	2015/02/24		93	%	80 - 120
			Total Iron (Fe)	2015/02/24		101	%	80 - 120
			Total Lithium (Li)	2015/02/24		101	%	80 - 120
			Total Magnesium (Mg)	2015/02/24		103	%	80 - 120
			Total Manganese (Mn)	2015/02/24		101	%	80 - 120
			Total Phosphorus (P)	2015/02/24		98	%	80 - 120
			Total Potassium (K)	2015/02/24		103	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Silicon (Si)	2015/02/24		100	%	80 - 120
			Total Sodium (Na)	2015/02/24		105	%	80 - 120
			Total Strontium (Sr)	2015/02/24		99	%	80 - 120
			Total Sulphur (S)	2015/02/24		99	%	80 - 120
7817435	JK9	Method Blank	Total Barium (Ba)	2015/02/24	<0.010		mg/L	
			Total Boron (B)	2015/02/24	0.033, RDL=0.020		mg/L	
			Total Calcium (Ca)	2015/02/24	<0.30		mg/L	
			Total Iron (Fe)	2015/02/24	<0.060		mg/L	
			Total Lithium (Li)	2015/02/24	<0.020		mg/L	
			Total Magnesium (Mg)	2015/02/24	<0.20		mg/L	
			Total Manganese (Mn)	2015/02/24	<0.0040		mg/L	
			Total Phosphorus (P)	2015/02/24	<0.10		mg/L	
			Total Potassium (K)	2015/02/24	<0.30		mg/L	
			Total Silicon (Si)	2015/02/24	<0.10		mg/L	
			Total Sodium (Na)	2015/02/24	<0.50		mg/L	
			Total Strontium (Sr)	2015/02/24	<0.020		mg/L	
			Total Sulphur (S)	2015/02/24	<0.20		mg/L	
7817435	JK9	RPD	Total Barium (Ba)	2015/02/24	0.34		%	20
			Total Boron (B)	2015/02/24	0.71		%	20
			Total Calcium (Ca)	2015/02/24	0.72		%	20
			Total Iron (Fe)	2015/02/24	0.30		%	20
			Total Lithium (Li)	2015/02/24	NC		%	20
			Total Magnesium (Mg)	2015/02/24	0.078		%	20
			Total Manganese (Mn)	2015/02/24	1.2		%	20
			Total Phosphorus (P)	2015/02/24	0.17		%	20
			Total Potassium (K)	2015/02/24	1.6		%	20
			Total Silicon (Si)	2015/02/24	0.016		%	20
			Total Sodium (Na)	2015/02/24	1.3		%	20
			Total Strontium (Sr)	2015/02/24	0.46		%	20
			Total Sulphur (S)	2015/02/24	0.51		%	20
7817514	APY	Matrix Spike [LS5263-05]	Dissolved Aluminum (Al)	2015/02/24		101	%	80 - 120
			Dissolved Antimony (Sb)	2015/02/24		105	%	80 - 120
			Dissolved Arsenic (As)	2015/02/24		102	%	80 - 120
			Dissolved Beryllium (Be)	2015/02/24		102	%	80 - 120
			Dissolved Chromium (Cr)	2015/02/24		99	%	80 - 120
			Dissolved Cobalt (Co)	2015/02/24		99	%	80 - 120
			Dissolved Copper (Cu)	2015/02/24		100	%	80 - 120
			Dissolved Lead (Pb)	2015/02/24		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/02/24		108	%	80 - 120
			Dissolved Nickel (Ni)	2015/02/24		100	%	80 - 120
			Dissolved Selenium (Se)	2015/02/24		102	%	80 - 120
			Dissolved Silver (Ag)	2015/02/24		98	%	80 - 120
			Dissolved Thallium (Tl)	2015/02/24		100	%	80 - 120
			Dissolved Tin (Sn)	2015/02/24		107	%	80 - 120
			Dissolved Titanium (Ti)	2015/02/24		101	%	80 - 120
			Dissolved Uranium (U)	2015/02/24		97	%	80 - 120
			Dissolved Vanadium (V)	2015/02/24		102	%	80 - 120
			Dissolved Zinc (Zn)	2015/02/24		105	%	80 - 120
7817514	APY	Spiked Blank	Dissolved Aluminum (Al)	2015/02/24		100	%	80 - 120
			Dissolved Antimony (Sb)	2015/02/24		103	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Arsenic (As)	2015/02/24		104	%	80 - 120
			Dissolved Beryllium (Be)	2015/02/24		102	%	80 - 120
			Dissolved Chromium (Cr)	2015/02/24		102	%	80 - 120
			Dissolved Cobalt (Co)	2015/02/24		102	%	80 - 120
			Dissolved Copper (Cu)	2015/02/24		104	%	80 - 120
			Dissolved Lead (Pb)	2015/02/24		104	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/02/24		103	%	80 - 120
			Dissolved Nickel (Ni)	2015/02/24		103	%	80 - 120
			Dissolved Selenium (Se)	2015/02/24		105	%	80 - 120
			Dissolved Silver (Ag)	2015/02/24		105	%	80 - 120
			Dissolved Thallium (Tl)	2015/02/24		99	%	80 - 120
			Dissolved Tin (Sn)	2015/02/24		104	%	80 - 120
			Dissolved Titanium (Ti)	2015/02/24		104	%	80 - 120
			Dissolved Uranium (U)	2015/02/24		99	%	80 - 120
			Dissolved Vanadium (V)	2015/02/24		103	%	80 - 120
			Dissolved Zinc (Zn)	2015/02/24		109	%	80 - 120
7817514	APY	Method Blank	Dissolved Aluminum (Al)	2015/02/24	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2015/02/24	<0.00060		mg/L	
			Dissolved Arsenic (As)	2015/02/24	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2015/02/24	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2015/02/24	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2015/02/24	<0.00030		mg/L	
			Dissolved Copper (Cu)	2015/02/24	<0.00020		mg/L	
			Dissolved Lead (Pb)	2015/02/24	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2015/02/24	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2015/02/24	<0.00050		mg/L	
			Dissolved Selenium (Se)	2015/02/24	<0.00020		mg/L	
			Dissolved Silver (Ag)	2015/02/24	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2015/02/24	<0.00020		mg/L	
			Dissolved Tin (Sn)	2015/02/24	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2015/02/24	<0.0010		mg/L	
			Dissolved Uranium (U)	2015/02/24	<0.00010		mg/L	
			Dissolved Vanadium (V)	2015/02/24	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2015/02/24	<0.0030		mg/L	
7817514	APY	RPD [LS5263-05]	Dissolved Aluminum (Al)	2015/02/24	NC		%	20
			Dissolved Antimony (Sb)	2015/02/24	NC		%	20
			Dissolved Arsenic (As)	2015/02/24	NC		%	20
			Dissolved Beryllium (Be)	2015/02/24	NC		%	20
			Dissolved Chromium (Cr)	2015/02/24	NC		%	20
			Dissolved Cobalt (Co)	2015/02/24	NC		%	20
			Dissolved Copper (Cu)	2015/02/24	NC		%	20
			Dissolved Lead (Pb)	2015/02/24	NC		%	20
			Dissolved Molybdenum (Mo)	2015/02/24	NC		%	20
			Dissolved Nickel (Ni)	2015/02/24	NC		%	20
			Dissolved Selenium (Se)	2015/02/24	NC		%	20
			Dissolved Silver (Ag)	2015/02/24	NC		%	20
			Dissolved Thallium (Tl)	2015/02/24	NC		%	20
			Dissolved Tin (Sn)	2015/02/24	NC		%	20
			Dissolved Titanium (Ti)	2015/02/24	NC		%	20
			Dissolved Uranium (U)	2015/02/24	2.3		%	20
			Dissolved Vanadium (V)	2015/02/24	NC		%	20

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Zinc (Zn)	2015/02/24	NC		%	20
7817518	JK9	Matrix Spike	Dissolved Barium (Ba)	2015/02/24		110	%	80 - 120
			Dissolved Boron (B)	2015/02/24		113	%	80 - 120
			Dissolved Calcium (Ca)	2015/02/24		NC	%	80 - 120
			Dissolved Iron (Fe)	2015/02/24		111	%	80 - 120
			Dissolved Lithium (Li)	2015/02/24		112	%	80 - 120
			Dissolved Magnesium (Mg)	2015/02/24		110	%	80 - 120
			Dissolved Manganese (Mn)	2015/02/24		112	%	80 - 120
			Dissolved Phosphorus (P)	2015/02/24		122 (1)	%	80 - 120
			Dissolved Potassium (K)	2015/02/24		114	%	80 - 120
			Dissolved Silicon (Si)	2015/02/24		NC	%	80 - 120
			Dissolved Sodium (Na)	2015/02/24		NC	%	80 - 120
			Dissolved Strontium (Sr)	2015/02/24		107	%	80 - 120
7817518	JK9	Spiked Blank	Dissolved Barium (Ba)	2015/02/24		101	%	80 - 120
			Dissolved Boron (B)	2015/02/24		105	%	80 - 120
			Dissolved Calcium (Ca)	2015/02/24		98	%	80 - 120
			Dissolved Iron (Fe)	2015/02/24		102	%	80 - 120
			Dissolved Lithium (Li)	2015/02/24		102	%	80 - 120
			Dissolved Magnesium (Mg)	2015/02/24		107	%	80 - 120
			Dissolved Manganese (Mn)	2015/02/24		103	%	80 - 120
			Dissolved Phosphorus (P)	2015/02/24		105	%	80 - 120
			Dissolved Potassium (K)	2015/02/24		106	%	80 - 120
			Dissolved Silicon (Si)	2015/02/24		107	%	80 - 120
			Dissolved Sodium (Na)	2015/02/24		106	%	80 - 120
			Dissolved Strontium (Sr)	2015/02/24		100	%	80 - 120
			Dissolved Sulphur (S)	2015/02/24		99	%	80 - 120
7817518	JK9	Method Blank	Dissolved Barium (Ba)	2015/02/24	<0.010		mg/L	
			Dissolved Boron (B)	2015/02/24	<0.020		mg/L	
			Dissolved Calcium (Ca)	2015/02/24	<0.30		mg/L	
			Dissolved Iron (Fe)	2015/02/24	<0.060		mg/L	
			Dissolved Lithium (Li)	2015/02/24	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2015/02/24	<0.20		mg/L	
			Dissolved Manganese (Mn)	2015/02/24	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2015/02/24	<0.10		mg/L	
			Dissolved Potassium (K)	2015/02/24	<0.30		mg/L	
			Dissolved Silicon (Si)	2015/02/24	<0.10		mg/L	
			Dissolved Sodium (Na)	2015/02/24	<0.50		mg/L	
			Dissolved Strontium (Sr)	2015/02/24	<0.020		mg/L	
			Dissolved Sulphur (S)	2015/02/24	<0.20		mg/L	
7817518	JK9	RPD	Dissolved Barium (Ba)	2015/02/24	0.43		%	20
			Dissolved Boron (B)	2015/02/24	0.076		%	20
			Dissolved Calcium (Ca)	2015/02/24	0.049		%	20
			Dissolved Iron (Fe)	2015/02/24	NC		%	20
			Dissolved Lithium (Li)	2015/02/24	NC		%	20
			Dissolved Magnesium (Mg)	2015/02/24	0.15		%	20
			Dissolved Manganese (Mn)	2015/02/24	0.67		%	20
			Dissolved Phosphorus (P)	2015/02/24	NC		%	20
			Dissolved Potassium (K)	2015/02/24	0.39		%	20
			Dissolved Silicon (Si)	2015/02/24	0.062		%	20
			Dissolved Sodium (Na)	2015/02/24	0.63		%	20
			Dissolved Strontium (Sr)	2015/02/24	0.045		%	20

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B513775
Report Date: 2015/02/26

STANTEC CONSULTING LTD
Client Project #: 113929396 / LINCOLN RANCH
Site Location: NW1/4 14-41-28-W4M LACOMBE CO. AB NEAR GULL LAKE
Your P.O. #: 16300R-20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Sulphur (S)	2015/02/24	1.0		%	20
7818222	AL2	Matrix Spike	Orthophosphate (P)	2015/02/25		103	%	80 - 120
7818222	AL2	Spiked Blank	Orthophosphate (P)	2015/02/25		106	%	80 - 120
7818222	AL2	Method Blank	Orthophosphate (P)	2015/02/25	<0.0030		mg/L	
7818222	AL2	RPD	Orthophosphate (P)	2015/02/25	NC		%	20
7819245	MBB	Matrix Spike	Dissolved Sulphate (SO4)	2015/02/26		NC	%	80 - 120
7819245	MBB	Spiked Blank	Dissolved Sulphate (SO4)	2015/02/26		103	%	80 - 120
7819245	MBB	Method Blank	Dissolved Sulphate (SO4)	2015/02/26	<1.0		mg/L	
7819245	MBB	RPD	Dissolved Sulphate (SO4)	2015/02/26	2.9		%	20

N/A = Not Applicable

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

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

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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

02/497 (1)

Chain of Custody A178065

Page: 1 of 1

Invoice To:	C/O Report Address ☐	Report To: Same as Invoice ☑	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company:	Stantec		christian.nageli@stantec.com	☑ AT1
Contact:	Christian Nageli		Shayanne.Cairns@stantec.com	☐ CCME
Address:	10160 112 St		Suzanne.musolino@stantec.com	☐ Regulated Drinking Water
	Prov: Edmonton AB PC: T5K 2L6	Prov: PC:		☐ Other:
Contact #s:	Ph: Cell: 780 2334206	Ph: Cell:		

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:
Project # / Name: 113929396 / Lincoln Ranch
Site Location: NW 1/4 14-41-28-W4M Lacombe Co. AB Near Gull Lake
Quote #:
Sampled By: Suzanne Musolino

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	BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	☒BTEX F1 ☐VOCs	☐BTEX F1-F4	☒Routine Water ☐Turb ☐F	☐TOC ☐DOC	Regulated Metals (CCME/AT1) Total	Dissolved	Mercury ☐Total ☐Dissolved	TKN	Nitrite, Nitrate, NH	orthophosphate	Total Phosphorous	HOLD - Do not Analyze	# of Containers Submitted
1	MW10-01	NA	GW	15/02/19 10:45 Am							✓												3
2		↓	↓																				
3	MW10-02			15/02/19 See bottles for time							✓		✓		✓	✓		✓	✓	✓	✓		10
4																							
5																							
6																							

Notes: Limited water in wells
MW10-01 only BTEX F1 (3) vials filled
F2-F4 (2 Amber bottles) with samples empty
Same for MW10-02
Silty/Sandy water all wells limited sample for all other requested parameters (See what lab you can do)

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print): Suzanne Musolino Suzanne Musolino Date (YY/MM/DD): 15/02/19 Time (24:00): Jazoo Courier
Relinquished By (Signature/Print): Date (YY/MM/DD): Time (24:00):

Special Instructions: Danielle Hutson (maxxam) emailed samples arriving via Jazoo Feb 19/15 afternoon from PU in Red Deer.

# of Jars Used & Not Submitted

LAB USE ONLY
Received By: Jocelyn Heggerud Date: 2015/02/19 Time: 16:01
Maxxam Job #: B513775 SY3/DW2
Lab Comments:

Custody Seal	Temperature	Ice
absent	1, 1, -1	present

AB FCD-00331 Rev3 2013/05 Maxxam Analytics International Corporation o/a Maxxam Analytics

Your P.O. #: 16300R-20
Your Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your C.O.C. #: A127408

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
EDMONTON-NATIONAL CONTRACT
10160 112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2015/04/21
Report #: R1848506
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B530614
Received: 2015/04/15, 07:30

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	1	N/A	2015/04/17	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	1	N/A	2015/04/17	AB SOP-00039	CCME CWS/EPA 8260C m
Cadmium - low level CCME - Dissolved	1	N/A	2015/04/21	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME (Total)	1	2015/04/16	2015/04/18	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4m
Chloride by Automated Colourimetry	1	N/A	2015/04/17	AB SOP-00020	SM 22 4500-Cl G m
Conductivity @25C	1	N/A	2015/04/17	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in water)	1	2015/04/18	2015/04/18	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	1	N/A	2015/04/17	AB WI-00065	Auto Calc
Elements by ICP - Dissolved	1	N/A	2015/04/17	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total	1	2015/04/17	2015/04/17	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved	1	N/A	2015/04/17	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	1	2015/04/17	2015/04/17	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	1	N/A	2015/04/17	AB WI-00065	SM 1030E
Sum of cations, anions	1	N/A	2015/04/17	AB WI-00065	SM 1030E
Nitrate and Nitrite	1	N/A	2015/04/18	AB SOP-00023	Auto Calc
Nitrate + Nitrite-N (calculated)	1	N/A	2015/04/18	AB SOP-00023	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	1	N/A	2015/04/17	AB SOP-00023	SM 22 4110 B m
pH @25°C (Alkalinity titrator)	1	N/A	2015/04/17	AB SOP-00005	SM 22 4500 H+ B m
Orthophosphate by Konelab	1	N/A	2015/04/17	AB SOP-00025	SM 22 4500-P A,B,F m
Sulphate by Automated Colourimetry	1	N/A	2015/04/17	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	1	N/A	2015/04/18	AB WI-00065	SM 1030E
Total Kjeldahl Nitrogen	1	2015/04/17	2015/04/20	AB SOP-00008	EPA 351.1 R 1978 m
Total Phosphorus	1	2015/04/20	2015/04/21	AB SOP-00024	SM 22 4500-P A,B,F m

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

Your P.O. #: 16300R-20
Your Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your C.O.C. #: A127408

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
EDMONTON-NATIONAL CONTRACT
10160 112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2015/04/21
Report #: R1848506
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B530614
Received: 2015/04/15, 07:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780)577-7105 Ext:7105

==========

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 #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		MB3546		
Sampling Date		2015/04/14 16:50		
COC Number		A127408		
	Units	**MW15-03**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	0.10	7865791
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	0.20	7865791
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	0.20	7865791
Reached Baseline at C50	mg/L	Yes	N/A	7865791
Volatiles				
Benzene	mg/L	<0.00040	0.00040	7867395
Toluene	mg/L	<0.00040	0.00040	7867395
Ethylbenzene	mg/L	<0.00040	0.00040	7867395
m & p-Xylene	mg/L	<0.00080	0.00080	7867395
o-Xylene	mg/L	<0.00040	0.00040	7867395
Xylenes (Total)	mg/L	<0.00080	0.00080	7867395
F1 (C6-C10) - BTEX	mg/L	<0.10	0.10	7867395
(C6-C10)	mg/L	<0.10	0.10	7867395
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	99	N/A	7867395
4-Bromofluorobenzene (sur.)	%	100	N/A	7867395
D4-1,2-Dichloroethane (sur.)	%	111	N/A	7867395
O-TERPHENYL (sur.)	%	103	N/A	7865791

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 #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		MB3546		
Sampling Date		2015/04/14 16:50		
COC Number		A127408		
	Units	**MW15-03**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	meq/L	9.1	N/A	7867089
Cation Sum	meq/L	9.0	N/A	7867089
Hardness (CaCO3)	mg/L	200	0.50	7867064
Ion Balance	N/A	0.99	0.010	7867065
Dissolved Nitrate (NO3)	mg/L	0.16	0.044	7867090
Nitrate plus Nitrite (N)	mg/L	0.037	0.010	7867091
Dissolved Nitrite (NO2)	mg/L	<0.033	0.033	7867090
Total Dissolved Solids	mg/L	480	10	7866274
Misc. Inorganics				
Conductivity	uS/cm	820	1.0	7867974
pH	pH	7.89	N/A	7867867
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	0.028	0.020	7866236
Anions				
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	7867973
Alkalinity (Total as CaCO3)	mg/L	380	0.50	7867973
Bicarbonate (HCO3)	mg/L	460	0.50	7867973
Carbonate (CO3)	mg/L	<0.50	0.50	7867973
Hydroxide (OH)	mg/L	<0.50	0.50	7867973
Dissolved Sulphate (SO4)	mg/L	58	1.0	7867946
Dissolved Chloride (Cl)	mg/L	9.1	1.0	7867921
Nutrients				
Dissolved Nitrite (N)	mg/L	<0.010	0.010	7868003
Dissolved Nitrate (N)	mg/L	0.037	0.010	7868003
Elements				
Dissolved Aluminum (Al)	mg/L	0.0043	0.0030	7868328
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	7868328
Dissolved Arsenic (As)	mg/L	0.0031	0.00020	7868328
Dissolved Barium (Ba)	mg/L	0.15	0.010	7867899
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	7868328
Dissolved Boron (B)	mg/L	0.14	0.020	7867899
Dissolved Calcium (Ca)	mg/L	54	0.30	7867899
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	7868328

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 #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		MB3546		
Sampling Date		2015/04/14 16:50		
COC Number		A127408		
	Units	MW15-03	RDL	QC Batch
Dissolved Cobalt (Co)	mg/L	0.00052	0.00030	7868328
Dissolved Copper (Cu)	mg/L	0.00057	0.00020	7868328
Dissolved Iron (Fe)	mg/L	<0.060	0.060	7867899
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	7868328
Dissolved Lithium (Li)	mg/L	0.039	0.020	7867899
Dissolved Magnesium (Mg)	mg/L	15	0.20	7867899
Dissolved Manganese (Mn)	mg/L	0.14	0.0040	7867899
Dissolved Molybdenum (Mo)	mg/L	0.0043	0.00020	7868328
Dissolved Nickel (Ni)	mg/L	0.0017	0.00050	7868328
Dissolved Phosphorus (P)	mg/L	0.17	0.10	7867899
Dissolved Potassium (K)	mg/L	1.9	0.30	7867899
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	7868328
Dissolved Silicon (Si)	mg/L	5.8	0.10	7867899
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	7868328
Dissolved Sodium (Na)	mg/L	110	0.50	7867899
Dissolved Strontium (Sr)	mg/L	0.38	0.020	7867899
Dissolved Sulphur (S)	mg/L	19	0.20	7867899
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	7868328
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	7868328
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	7868328
Dissolved Uranium (U)	mg/L	0.0040	0.00010	7868328
Dissolved Vanadium (V)	mg/L	0.0015	0.0010	7868328
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	7868328
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 #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		MB3546		
Sampling Date		2015/04/14 16:50		
COC Number		A127408		
	Units	**MW15-03**	**RDL**	**QC Batch**
Low Level Elements				
Total Cadmium (Cd)	ug/L	0.12	0.020	7866460
Elements				
Total Aluminum (Al)	mg/L	2.9	0.0030	7867529
Total Antimony (Sb)	mg/L	<0.00060	0.00060	7867529
Total Arsenic (As)	mg/L	0.0053	0.00020	7867529
Total Barium (Ba)	mg/L	0.29	0.010	7867685
Total Beryllium (Be)	mg/L	<0.0010	0.0010	7867529
Total Boron (B)	mg/L	0.14	0.020	7867685
Total Calcium (Ca)	mg/L	58	0.30	7867685
Total Chromium (Cr)	mg/L	0.0052	0.0010	7867529
Total Cobalt (Co)	mg/L	0.0031	0.00030	7867529
Total Copper (Cu)	mg/L	0.0081	0.00020	7867529
Total Iron (Fe)	mg/L	6.5	0.060	7867685
Total Lead (Pb)	mg/L	0.0035	0.00020	7867529
Total Lithium (Li)	mg/L	0.044	0.020	7867685
Total Magnesium (Mg)	mg/L	17	0.20	7867685
Total Manganese (Mn)	mg/L	0.27	0.0040	7867685
Total Molybdenum (Mo)	mg/L	0.0047	0.00020	7867529
Total Nickel (Ni)	mg/L	0.011	0.00050	7867529
Total Phosphorus (P)	mg/L	0.22	0.10	7867685
Total Potassium (K)	mg/L	2.8	0.30	7867685
Total Selenium (Se)	mg/L	<0.00020	0.00020	7867529
Total Silicon (Si)	mg/L	15	0.10	7867685
Total Silver (Ag)	mg/L	<0.00010	0.00010	7867529
Total Sodium (Na)	mg/L	120	0.50	7867685
Total Strontium (Sr)	mg/L	0.41	0.020	7867685
Total Sulphur (S)	mg/L	19	0.20	7867685
Total Thallium (Tl)	mg/L	<0.00020	0.00020	7867529
Total Tin (Sn)	mg/L	0.0013	0.0010	7867529
Total Titanium (Ti)	mg/L	0.098	0.0010	7867529
Total Uranium (U)	mg/L	0.0044	0.00010	7867529
Total Vanadium (V)	mg/L	0.0095	0.0010	7867529
Total Zinc (Zn)	mg/L	0.028	0.0030	7867529
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 #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		MB3546		
Sampling Date		2015/04/14 16:50		
COC Number		A127408		
	Units	**MW15-03**	**RDL**	**QC Batch**
Nutrients				
Orthophosphate (P)	mg/L	0.0070	0.0030	7867524
Total Phosphorus (P)	mg/L	0.23	0.0030	7869815
Total Total Kjeldahl Nitrogen	mg/L	0.58	0.050	7867729
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 #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

GENERAL COMMENTS

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

Package 1	4.7°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 #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7865791	VV2	Matrix Spike	O-TERPHENYL (sur.)	2015/04/18		112	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/04/18		117	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2015/04/18		113	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2015/04/18		115	%	50 - 130
7865791	VV2	Spiked Blank	O-TERPHENYL (sur.)	2015/04/18		105	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/04/18		119	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2015/04/18		119	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2015/04/18		116	%	70 - 130
7865791	VV2	Method Blank	O-TERPHENYL (sur.)	2015/04/18		105	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/04/18	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2015/04/18	<0.20		mg/L	
			F4 (C34-C50 Hydrocarbons)	2015/04/18	<0.20		mg/L	
7865791	VV2	RPD	F2 (C10-C16 Hydrocarbons)	2015/04/18	23		%	40
			F3 (C16-C34 Hydrocarbons)	2015/04/18	15		%	40
			F4 (C34-C50 Hydrocarbons)	2015/04/18	NC		%	40
7867395	NSE	Matrix Spike	1,4-Difluorobenzene (sur.)	2015/04/17		96	%	70 - 130
			4-Bromofluorobenzene (sur.)	2015/04/17		103	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/04/17		117	%	70 - 130
			Benzene	2015/04/17		89	%	70 - 130
			Toluene	2015/04/17		83	%	70 - 130
			Ethylbenzene	2015/04/17		86	%	70 - 130
			m & p-Xylene	2015/04/17		86	%	70 - 130
			o-Xylene	2015/04/17		87	%	70 - 130
			(C6-C10)	2015/04/17		103	%	70 - 130
7867395	NSE	Spiked Blank	1,4-Difluorobenzene (sur.)	2015/04/17		97	%	70 - 130
			4-Bromofluorobenzene (sur.)	2015/04/17		102	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/04/17		108	%	70 - 130
			Benzene	2015/04/17		89	%	70 - 130
			Toluene	2015/04/17		85	%	70 - 130
			Ethylbenzene	2015/04/17		88	%	70 - 130
			m & p-Xylene	2015/04/17		88	%	70 - 130
			o-Xylene	2015/04/17		88	%	70 - 130
			(C6-C10)	2015/04/17		116	%	70 - 130
7867395	NSE	Method Blank	1,4-Difluorobenzene (sur.)	2015/04/17		103	%	70 - 130
			4-Bromofluorobenzene (sur.)	2015/04/17		101	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/04/17		106	%	70 - 130
			Benzene	2015/04/17	<0.00040		mg/L	
			Toluene	2015/04/17	<0.00040		mg/L	
			Ethylbenzene	2015/04/17	<0.00040		mg/L	
			m & p-Xylene	2015/04/17	<0.00080		mg/L	
			o-Xylene	2015/04/17	<0.00040		mg/L	
			Xylenes (Total)	2015/04/17	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2015/04/17	<0.10		mg/L	
			(C6-C10)	2015/04/17	<0.10		mg/L	
7867395	NSE	RPD	Benzene	2015/04/17	NC		%	40
			Toluene	2015/04/17	NC		%	40
			Ethylbenzene	2015/04/17	NC		%	40
			m & p-Xylene	2015/04/17	NC		%	40
			o-Xylene	2015/04/17	NC		%	40
			Xylenes (Total)	2015/04/17	NC		%	40
			F1 (C6-C10) - BTEX	2015/04/17	NC		%	40

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			(C6-C10)	2015/04/17	NC		%	40
7867524	AL2	Matrix Spike	Orthophosphate (P)	2015/04/17		102	%	80 - 120
7867524	AL2	Spiked Blank	Orthophosphate (P)	2015/04/17		104	%	80 - 120
7867524	AL2	Method Blank	Orthophosphate (P)	2015/04/17	0.0030, RDL=0.0030		mg/L	
7867524	AL2	RPD	Orthophosphate (P)	2015/04/17	5.1		%	20
7867529	APY	Matrix Spike [MB3546-03]	Total Aluminum (Al)	2015/04/17		NC	%	80 - 120
			Total Antimony (Sb)	2015/04/17		96	%	80 - 120
			Total Arsenic (As)	2015/04/17		99	%	80 - 120
			Total Beryllium (Be)	2015/04/17		99	%	80 - 120
			Total Chromium (Cr)	2015/04/17		94	%	80 - 120
			Total Cobalt (Co)	2015/04/17		92	%	80 - 120
			Total Copper (Cu)	2015/04/17		96	%	80 - 120
			Total Lead (Pb)	2015/04/17		100	%	80 - 120
			Total Molybdenum (Mo)	2015/04/17		100	%	80 - 120
			Total Nickel (Ni)	2015/04/17		95	%	80 - 120
			Total Selenium (Se)	2015/04/17		97	%	80 - 120
			Total Silver (Ag)	2015/04/17		101	%	80 - 120
			Total Thallium (Tl)	2015/04/17		98	%	80 - 120
			Total Tin (Sn)	2015/04/17		106	%	80 - 120
			Total Titanium (Ti)	2015/04/17		NC	%	80 - 120
			Total Uranium (U)	2015/04/17		97	%	80 - 120
			Total Vanadium (V)	2015/04/17		97	%	80 - 120
			Total Zinc (Zn)	2015/04/17		NC	%	80 - 120
7867529	APY	Spiked Blank	Total Aluminum (Al)	2015/04/17		123 (1)	%	80 - 120
			Total Antimony (Sb)	2015/04/17		103	%	80 - 120
			Total Arsenic (As)	2015/04/17		102	%	80 - 120
			Total Beryllium (Be)	2015/04/17		106	%	80 - 120
			Total Chromium (Cr)	2015/04/17		98	%	80 - 120
			Total Cobalt (Co)	2015/04/17		98	%	80 - 120
			Total Copper (Cu)	2015/04/17		100	%	80 - 120
			Total Lead (Pb)	2015/04/17		106	%	80 - 120
			Total Molybdenum (Mo)	2015/04/17		100	%	80 - 120
			Total Nickel (Ni)	2015/04/17		101	%	80 - 120
			Total Selenium (Se)	2015/04/17		100	%	80 - 120
			Total Silver (Ag)	2015/04/17		105	%	80 - 120
			Total Thallium (Tl)	2015/04/17		102	%	80 - 120
			Total Tin (Sn)	2015/04/17		110	%	80 - 120
			Total Titanium (Ti)	2015/04/17		106	%	80 - 120
			Total Uranium (U)	2015/04/17		102	%	80 - 120
			Total Vanadium (V)	2015/04/17		102	%	80 - 120
			Total Zinc (Zn)	2015/04/17		99	%	80 - 120
7867529	APY	Method Blank	Total Aluminum (Al)	2015/04/17	<0.0030		mg/L	
			Total Antimony (Sb)	2015/04/17	<0.00060		mg/L	
			Total Arsenic (As)	2015/04/17	<0.00020		mg/L	
			Total Beryllium (Be)	2015/04/17	<0.0010		mg/L	
			Total Chromium (Cr)	2015/04/17	<0.0010		mg/L	
			Total Cobalt (Co)	2015/04/17	<0.00030		mg/L	
			Total Copper (Cu)	2015/04/17	<0.00020		mg/L	
			Total Lead (Pb)	2015/04/17	<0.00020		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Molybdenum (Mo)	2015/04/17	<0.00020		mg/L	
			Total Nickel (Ni)	2015/04/17	<0.00050		mg/L	
			Total Selenium (Se)	2015/04/17	<0.00020		mg/L	
			Total Silver (Ag)	2015/04/17	<0.00010		mg/L	
			Total Thallium (Tl)	2015/04/17	<0.00020		mg/L	
			Total Tin (Sn)	2015/04/17	<0.0010		mg/L	
			Total Titanium (Ti)	2015/04/17	<0.0010		mg/L	
			Total Uranium (U)	2015/04/17	<0.00010		mg/L	
			Total Vanadium (V)	2015/04/17	<0.0010		mg/L	
			Total Zinc (Zn)	2015/04/17	<0.0030		mg/L	
7867529	APY	RPD [MB3546-03]	Total Aluminum (Al)	2015/04/17	2.5		%	20
			Total Antimony (Sb)	2015/04/17	NC		%	20
			Total Arsenic (As)	2015/04/17	4.0		%	20
			Total Beryllium (Be)	2015/04/17	NC		%	20
			Total Chromium (Cr)	2015/04/17	NC		%	20
			Total Cobalt (Co)	2015/04/17	2.6		%	20
			Total Copper (Cu)	2015/04/17	5.5		%	20
			Total Lead (Pb)	2015/04/17	3.0		%	20
			Total Molybdenum (Mo)	2015/04/17	0.043		%	20
			Total Nickel (Ni)	2015/04/17	1.9		%	20
			Total Selenium (Se)	2015/04/17	NC		%	20
			Total Silver (Ag)	2015/04/17	NC		%	20
			Total Thallium (Tl)	2015/04/17	NC		%	20
			Total Tin (Sn)	2015/04/17	NC		%	20
			Total Titanium (Ti)	2015/04/17	0.86		%	20
			Total Uranium (U)	2015/04/17	1.9		%	20
			Total Vanadium (V)	2015/04/17	0.30		%	20
			Total Zinc (Zn)	2015/04/17	12		%	20
7867685	PM5	Matrix Spike [MB3546-03]	Total Barium (Ba)	2015/04/17		101	%	80 - 120
			Total Boron (B)	2015/04/17		101	%	80 - 120
			Total Calcium (Ca)	2015/04/17		NC	%	80 - 120
			Total Iron (Fe)	2015/04/17		NC	%	80 - 120
			Total Lithium (Li)	2015/04/17		103	%	80 - 120
			Total Magnesium (Mg)	2015/04/17		98	%	80 - 120
			Total Manganese (Mn)	2015/04/17		95	%	80 - 120
			Total Phosphorus (P)	2015/04/17		98	%	80 - 120
			Total Potassium (K)	2015/04/17		101	%	80 - 120
			Total Silicon (Si)	2015/04/17		NC	%	80 - 120
			Total Sodium (Na)	2015/04/17		NC	%	80 - 120
			Total Strontium (Sr)	2015/04/17		96	%	80 - 120
7867685	PM5	Spiked Blank	Total Barium (Ba)	2015/04/17		104	%	80 - 120
			Total Boron (B)	2015/04/17		104	%	80 - 120
			Total Calcium (Ca)	2015/04/17		97	%	80 - 120
			Total Iron (Fe)	2015/04/17		94	%	80 - 120
			Total Lithium (Li)	2015/04/17		107	%	80 - 120
			Total Magnesium (Mg)	2015/04/17		102	%	80 - 120
			Total Manganese (Mn)	2015/04/17		99	%	80 - 120
			Total Phosphorus (P)	2015/04/17		99	%	80 - 120
			Total Potassium (K)	2015/04/17		103	%	80 - 120
			Total Silicon (Si)	2015/04/17		101	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Sodium (Na)	2015/04/17		105	%	80 - 120
			Total Strontium (Sr)	2015/04/17		99	%	80 - 120
			Total Sulphur (S)	2015/04/17		96	%	80 - 120
7867685	PM5	Method Blank	Total Barium (Ba)	2015/04/17	<0.010		mg/L	
			Total Boron (B)	2015/04/17	<0.020		mg/L	
			Total Calcium (Ca)	2015/04/17	<0.30		mg/L	
			Total Iron (Fe)	2015/04/17	0.092, RDL=0.060		mg/L	
			Total Lithium (Li)	2015/04/17	<0.020		mg/L	
			Total Magnesium (Mg)	2015/04/17	<0.20		mg/L	
			Total Manganese (Mn)	2015/04/17	<0.0040		mg/L	
			Total Phosphorus (P)	2015/04/17	0.14, RDL=0.10		mg/L	
			Total Potassium (K)	2015/04/17	<0.30		mg/L	
			Total Silicon (Si)	2015/04/17	<0.10		mg/L	
			Total Sodium (Na)	2015/04/17	<0.50		mg/L	
			Total Strontium (Sr)	2015/04/17	<0.020		mg/L	
			Total Sulphur (S)	2015/04/17	<0.20		mg/L	
7867685	PM5	RPD [MB3546-03]	Total Barium (Ba)	2015/04/17	4.4		%	20
			Total Boron (B)	2015/04/17	5.1		%	20
			Total Calcium (Ca)	2015/04/17	1.5		%	20
			Total Iron (Fe)	2015/04/17	3.4		%	20
			Total Lithium (Li)	2015/04/17	NC		%	20
			Total Magnesium (Mg)	2015/04/17	3.4		%	20
			Total Manganese (Mn)	2015/04/17	2.3		%	20
			Total Phosphorus (P)	2015/04/17	NC		%	20
			Total Potassium (K)	2015/04/17	7.3		%	20
			Total Silicon (Si)	2015/04/17	8.7		%	20
			Total Sodium (Na)	2015/04/17	5.2		%	20
			Total Strontium (Sr)	2015/04/17	4.0		%	20
			Total Sulphur (S)	2015/04/17	3.9		%	20
7867729	AL2	Matrix Spike	Total Total Kjeldahl Nitrogen	2015/04/20		NC	%	80 - 120
7867729	AL2	QC Standard	Total Total Kjeldahl Nitrogen	2015/04/20		93	%	80 - 120
7867729	AL2	Spiked Blank	Total Total Kjeldahl Nitrogen	2015/04/20		116	%	80 - 120
7867729	AL2	Method Blank	Total Total Kjeldahl Nitrogen	2015/04/20	<0.050		mg/L	
7867729	AL2	RPD	Total Total Kjeldahl Nitrogen	2015/04/20	8.8		%	20
7867867	RPT	Spiked Blank	pH	2015/04/17		100	%	97 - 103
7867867	RPT	RPD	pH	2015/04/17	0.34		%	N/A
7867899	PM5	Matrix Spike [MB3546-04]	Dissolved Barium (Ba)	2015/04/17		103	%	80 - 120
			Dissolved Boron (B)	2015/04/17		103	%	80 - 120
			Dissolved Calcium (Ca)	2015/04/17		NC	%	80 - 120
			Dissolved Iron (Fe)	2015/04/17		100	%	80 - 120
			Dissolved Lithium (Li)	2015/04/17		103	%	80 - 120
			Dissolved Magnesium (Mg)	2015/04/17		99	%	80 - 120
			Dissolved Manganese (Mn)	2015/04/17		98	%	80 - 120
			Dissolved Phosphorus (P)	2015/04/17		107	%	80 - 120
			Dissolved Potassium (K)	2015/04/17		103	%	80 - 120
			Dissolved Silicon (Si)	2015/04/17		102	%	80 - 120
			Dissolved Sodium (Na)	2015/04/17		NC	%	80 - 120
			Dissolved Strontium (Sr)	2015/04/17		98	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7867899	PM5	Spiked Blank	Dissolved Barium (Ba)	2015/04/17		111	%	80 - 120
			Dissolved Boron (B)	2015/04/17		113	%	80 - 120
			Dissolved Calcium (Ca)	2015/04/17		110	%	80 - 120
			Dissolved Iron (Fe)	2015/04/17		109	%	80 - 120
			Dissolved Lithium (Li)	2015/04/17		111	%	80 - 120
			Dissolved Magnesium (Mg)	2015/04/17		111	%	80 - 120
			Dissolved Manganese (Mn)	2015/04/17		107	%	80 - 120
			Dissolved Phosphorus (P)	2015/04/17		114	%	80 - 120
			Dissolved Potassium (K)	2015/04/17		112	%	80 - 120
			Dissolved Silicon (Si)	2015/04/17		115	%	80 - 120
			Dissolved Sodium (Na)	2015/04/17		110	%	80 - 120
			Dissolved Strontium (Sr)	2015/04/17		106	%	80 - 120
			Dissolved Sulphur (S)	2015/04/17		97	%	80 - 120
7867899	PM5	Method Blank	Dissolved Barium (Ba)	2015/04/17	<0.010		mg/L	
			Dissolved Boron (B)	2015/04/17	<0.020		mg/L	
			Dissolved Calcium (Ca)	2015/04/17	<0.30		mg/L	
			Dissolved Iron (Fe)	2015/04/17	<0.060		mg/L	
			Dissolved Lithium (Li)	2015/04/17	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2015/04/17	<0.20		mg/L	
			Dissolved Manganese (Mn)	2015/04/17	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2015/04/17	<0.10		mg/L	
			Dissolved Potassium (K)	2015/04/17	<0.30		mg/L	
			Dissolved Silicon (Si)	2015/04/17	<0.10		mg/L	
			Dissolved Sodium (Na)	2015/04/17	<0.50		mg/L	
			Dissolved Strontium (Sr)	2015/04/17	<0.020		mg/L	
			Dissolved Sulphur (S)	2015/04/17	<0.20		mg/L	
7867899	PM5	RPD [MB3546-04]	Dissolved Barium (Ba)	2015/04/17	0.39		%	20
			Dissolved Boron (B)	2015/04/17	0.13		%	20
			Dissolved Calcium (Ca)	2015/04/17	0.82		%	20
			Dissolved Iron (Fe)	2015/04/17	NC		%	20
			Dissolved Lithium (Li)	2015/04/17	NC		%	20
			Dissolved Magnesium (Mg)	2015/04/17	1.1		%	20
			Dissolved Manganese (Mn)	2015/04/17	0.021		%	20
			Dissolved Phosphorus (P)	2015/04/17	NC		%	20
			Dissolved Potassium (K)	2015/04/17	0.65		%	20
			Dissolved Silicon (Si)	2015/04/17	0.27		%	20
			Dissolved Sodium (Na)	2015/04/17	0.47		%	20
			Dissolved Strontium (Sr)	2015/04/17	0.65		%	20
			Dissolved Sulphur (S)	2015/04/17	0.49		%	20
7867921	KD5	Matrix Spike	Dissolved Chloride (Cl)	2015/04/17		NC	%	80 - 120
7867921	KD5	Spiked Blank	Dissolved Chloride (Cl)	2015/04/17		102	%	80 - 120
7867921	KD5	Method Blank	Dissolved Chloride (Cl)	2015/04/17	<1.0		mg/L	
7867921	KD5	RPD	Dissolved Chloride (Cl)	2015/04/17	0.96		%	20
7867946	KD5	Matrix Spike	Dissolved Sulphate (SO4)	2015/04/17		NC	%	80 - 120
7867946	KD5	Spiked Blank	Dissolved Sulphate (SO4)	2015/04/17		103	%	80 - 120
7867946	KD5	Method Blank	Dissolved Sulphate (SO4)	2015/04/17	<1.0		mg/L	
7867946	KD5	RPD	Dissolved Sulphate (SO4)	2015/04/17	0.59		%	20
7867973	RPT	Spiked Blank	Alkalinity (Total as CaCO3)	2015/04/17		101	%	80 - 120
7867973	RPT	Method Blank	Alkalinity (PP as CaCO3)	2015/04/17	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2015/04/17	<0.50		mg/L	
			Bicarbonate (HCO3)	2015/04/17	<0.50		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Carbonate (CO3)	2015/04/17	<0.50		mg/L	
			Hydroxide (OH)	2015/04/17	<0.50		mg/L	
7867973	RPT	RPD	Alkalinity (PP as CaCO3)	2015/04/17	NC		%	20
			Alkalinity (Total as CaCO3)	2015/04/17	8.5		%	20
			Bicarbonate (HCO3)	2015/04/17	8.5		%	20
			Carbonate (CO3)	2015/04/17	NC		%	20
			Hydroxide (OH)	2015/04/17	NC		%	20
7867974	RPT	Spiked Blank	Conductivity	2015/04/17		100	%	90 - 110
7867974	RPT	Method Blank	Conductivity	2015/04/17	<1.0		uS/cm	
7867974	RPT	RPD	Conductivity	2015/04/17	1.0		%	20
7868003	LMD	Matrix Spike	Dissolved Nitrite (N)	2015/04/17		105	%	80 - 120
			Dissolved Nitrate (N)	2015/04/17		106	%	80 - 120
7868003	LMD	Spiked Blank	Dissolved Nitrite (N)	2015/04/17		101	%	80 - 120
			Dissolved Nitrate (N)	2015/04/17		101	%	80 - 120
7868003	LMD	Method Blank	Dissolved Nitrite (N)	2015/04/17	<0.010		mg/L	
			Dissolved Nitrate (N)	2015/04/17	<0.010		mg/L	
7868003	LMD	RPD	Dissolved Nitrite (N)	2015/04/17	NC		%	20
			Dissolved Nitrate (N)	2015/04/17	NC		%	20
7868328	APY	Matrix Spike	Dissolved Aluminum (Al)	2015/04/17		NC	%	80 - 120
			Dissolved Antimony (Sb)	2015/04/17		106	%	80 - 120
			Dissolved Arsenic (As)	2015/04/17		99	%	80 - 120
			Dissolved Beryllium (Be)	2015/04/17		96	%	80 - 120
			Dissolved Chromium (Cr)	2015/04/17		88	%	80 - 120
			Dissolved Cobalt (Co)	2015/04/17		NC	%	80 - 120
			Dissolved Copper (Cu)	2015/04/17		88	%	80 - 120
			Dissolved Lead (Pb)	2015/04/17		94	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/04/17		100	%	80 - 120
			Dissolved Nickel (Ni)	2015/04/17		NC	%	80 - 120
			Dissolved Selenium (Se)	2015/04/17		100	%	80 - 120
			Dissolved Silver (Ag)	2015/04/17		98	%	80 - 120
			Dissolved Thallium (Tl)	2015/04/17		91	%	80 - 120
			Dissolved Tin (Sn)	2015/04/17		108	%	80 - 120
			Dissolved Titanium (Ti)	2015/04/17		92	%	80 - 120
			Dissolved Uranium (U)	2015/04/17		96	%	80 - 120
			Dissolved Vanadium (V)	2015/04/17		96	%	80 - 120
			Dissolved Zinc (Zn)	2015/04/17		NC	%	80 - 120
7868328	APY	Spiked Blank	Dissolved Aluminum (Al)	2015/04/17		101	%	80 - 120
			Dissolved Antimony (Sb)	2015/04/17		99	%	80 - 120
			Dissolved Arsenic (As)	2015/04/17		98	%	80 - 120
			Dissolved Beryllium (Be)	2015/04/17		95	%	80 - 120
			Dissolved Chromium (Cr)	2015/04/17		93	%	80 - 120
			Dissolved Cobalt (Co)	2015/04/17		95	%	80 - 120
			Dissolved Copper (Cu)	2015/04/17		97	%	80 - 120
			Dissolved Lead (Pb)	2015/04/17		102	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/04/17		96	%	80 - 120
			Dissolved Nickel (Ni)	2015/04/17		97	%	80 - 120
			Dissolved Selenium (Se)	2015/04/17		98	%	80 - 120
			Dissolved Silver (Ag)	2015/04/17		86	%	80 - 120
			Dissolved Thallium (Tl)	2015/04/17		100	%	80 - 120
			Dissolved Tin (Sn)	2015/04/17		103	%	80 - 120
			Dissolved Titanium (Ti)	2015/04/17		101	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Uranium (U)	2015/04/17		98	%	80 - 120
			Dissolved Vanadium (V)	2015/04/17		95	%	80 - 120
			Dissolved Zinc (Zn)	2015/04/17		101	%	80 - 120
7868328	APY	Method Blank	Dissolved Aluminum (Al)	2015/04/17	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2015/04/17	<0.00060		mg/L	
			Dissolved Arsenic (As)	2015/04/17	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2015/04/17	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2015/04/17	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2015/04/17	<0.00030		mg/L	
			Dissolved Copper (Cu)	2015/04/17	<0.00020		mg/L	
			Dissolved Lead (Pb)	2015/04/17	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2015/04/17	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2015/04/17	<0.00050		mg/L	
			Dissolved Selenium (Se)	2015/04/17	<0.00020		mg/L	
			Dissolved Silver (Ag)	2015/04/17	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2015/04/17	<0.00020		mg/L	
			Dissolved Tin (Sn)	2015/04/17	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2015/04/17	<0.0010		mg/L	
			Dissolved Uranium (U)	2015/04/17	<0.00010		mg/L	
			Dissolved Vanadium (V)	2015/04/17	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2015/04/17	<0.0030		mg/L	
7868328	APY	RPD	Dissolved Aluminum (Al)	2015/04/17	0.47		%	20
			Dissolved Antimony (Sb)	2015/04/17	NC		%	20
			Dissolved Arsenic (As)	2015/04/17	NC		%	20
			Dissolved Beryllium (Be)	2015/04/17	NC		%	20
			Dissolved Chromium (Cr)	2015/04/17	NC		%	20
			Dissolved Cobalt (Co)	2015/04/17	0.25		%	20
			Dissolved Copper (Cu)	2015/04/17	16		%	20
			Dissolved Lead (Pb)	2015/04/17	NC		%	20
			Dissolved Molybdenum (Mo)	2015/04/17	5.4		%	20
			Dissolved Nickel (Ni)	2015/04/17	0.55		%	20
			Dissolved Selenium (Se)	2015/04/17	NC		%	20
			Dissolved Silver (Ag)	2015/04/17	NC		%	20
			Dissolved Thallium (Tl)	2015/04/17	NC		%	20
			Dissolved Tin (Sn)	2015/04/17	NC		%	20
			Dissolved Titanium (Ti)	2015/04/17	NC		%	20
			Dissolved Uranium (U)	2015/04/17	0.56		%	20
			Dissolved Vanadium (V)	2015/04/17	NC		%	20
			Dissolved Zinc (Zn)	2015/04/17	1.4		%	20
7869815	AL2	Matrix Spike	Total Phosphorus (P)	2015/04/21		NC	%	80 - 120
7869815	AL2	QC Standard	Total Phosphorus (P)	2015/04/21		94	%	80 - 120
7869815	AL2	Spiked Blank	Total Phosphorus (P)	2015/04/21		108	%	80 - 120
7869815	AL2	Method Blank	Total Phosphorus (P)	2015/04/21	0.0030, RDL=0.0030		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B530614
Report Date: 2015/04/21

STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Location: GULL LAKE
Your P.O. #: 16300R-20
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7869815	AL2	RPD	Total Phosphorus (P)	2015/04/21	4.4		%	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.

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) 465-8869
www.maxxamanalytics.com

04/365 SH

Chain of Custody A127408

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☑	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company:	Stantec consulting Ltd.		Christian.Nagel@stantec.com	☑ AT1
Contact:	Christian Nagel		Suzanne.Muscline@stantec.com	☐ CCME
Address:	10160 112 St, Edmonton		Dale.Nisbet@stantec.com	☐ Regulated Drinking Water
	Prov: AB PC: T5K-2L6	Prov: PC:		☐ Other:
Contact #s:	Ph: (780) 917-7000 Cell: (780) 233-4206	Ph: Cell:		

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	
Project # / Name:	113927396.300 / Lincoln Ranch
Site Location:	Gull Lake
Quote #:	
Sampled By:	D. Nisbet

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	WATER: ☐BTEX F1 ☐BTEX F1-F2	☑BTEX F1-F4 ☑Routine Water ☐Turb ☐F	☐VOCs ☐TOC ☐DOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐Total ☐Dissolved Mercury	Other Analysis: TKN	Orthophosphate	Total Phosphorous	Nitrite, Nitrate, N+N	HOLD - Do not Analyze	# of Containers Submitted
1	MW15-03	✓	GW	15/04/14 16:50							✓	✓		✓	✓		✓	✓	✓	✓		10
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						

Please indicate Filtered, Preserved or Both (F, P, F/P) → F F/P P P P JLR/SC F/P

Relinquished By (Signature/Print): Dale Nisbet	Date (YY/MM/DD): 15/04/14	Time (24:00): 18:59
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Submitted same day as sampling.

# of Jars Used & Not Submitted: 0

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:
Jenna Walter	20150415	0730	B530614

Custody Seal	Temperature	Ice
absent	4.5.5	present

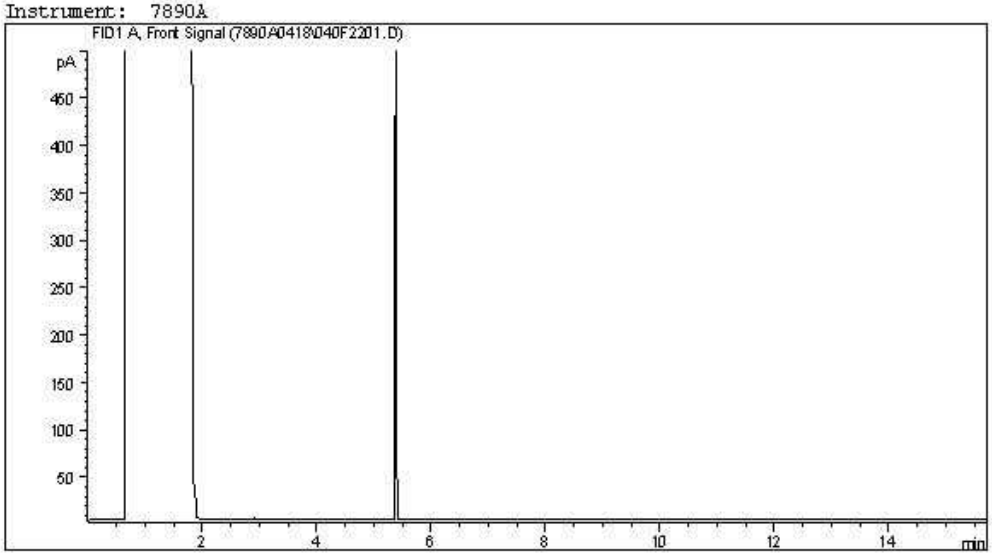
Lab Comments:

Maxxam Job #: B530614
Report Date: 2015/04/21
Maxxam Sample: MB3546

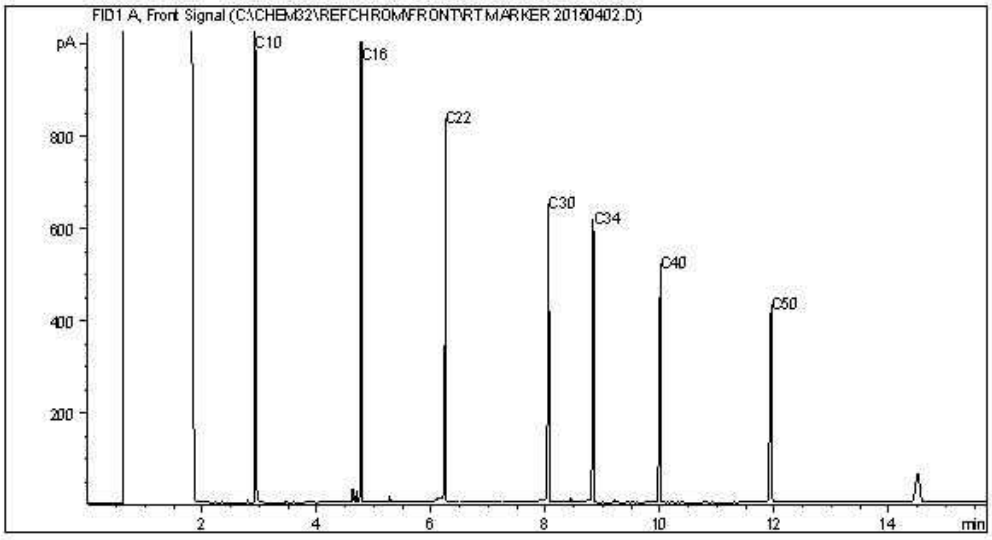
STANTEC CONSULTING LTD
Client Project #: 113929396.300/LINCOLN RANCH
Site Reference: GULL LAKE
Client ID: MW15-03

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890A



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 #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Your C.O.C. #: A127412

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2015/04/30
Report #: R1862381
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B533168
Received: 2015/04/23, 17:27

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	3	N/A	2015/04/24	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	N/A	2015/04/26	AB SOP-00039	CCME CWS/EPA 8260C m
Cadmium - low level CCME - Dissolved	2	N/A	2015/04/27	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME - Dissolved	1	N/A	2015/04/29	AB SOP-00043	EPA 200.8 R5.4 m
Cadmium - low level CCME (Total)	3	2015/04/24	2015/04/27	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4m
Chloride by Automated Colourimetry	3	N/A	2015/04/24	AB SOP-00020	SM 22 4500-Cl G m
Conductivity @25C	3	N/A	2015/04/24	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in water)	3	2015/04/25	2015/04/25	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	3	N/A	2015/04/25	AB WI-00065	Auto Calc
Elements by ICP - Dissolved	3	N/A	2015/04/25	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total	3	2015/04/25	2015/04/25	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved	2	N/A	2015/04/25	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Dissolved	1	N/A	2015/04/28	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	1	2015/04/25	2015/04/25	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	1	2015/04/25	2015/04/27	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	1	2015/04/25	2015/04/28	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	3	N/A	2015/04/25	AB WI-00065	SM 1030E
Sum of cations, anions	3	N/A	2015/04/25	AB WI-00065	SM 1030E
Nitrate and Nitrite	3	N/A	2015/04/25	AB SOP-00023	Auto Calc
Nitrate + Nitrite-N (calculated)	3	N/A	2015/04/25	AB SOP-00023	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	3	N/A	2015/04/24	AB SOP-00023	SM 22 4110 B m
pH @25°C (Alkalinity titrator)	3	N/A	2015/04/24	AB SOP-00005	SM 22 4500 H+ B m
Orthophosphate by Konelab	3	N/A	2015/04/24	AB SOP-00025	SM 22 4500-P A,B,F m
Sulphate by Automated Colourimetry	3	N/A	2015/04/24	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	3	N/A	2015/04/25	AB WI-00065	SM 1030E

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Your Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Your C.O.C. #: A127412

Attention:CHRISTIAN NAGELI

STANTEC CONSULTING LTD
10160-112 STREET
EDMONTON, AB
CANADA T5K 2L6

Report Date: 2015/04/30
Report #: R1862381
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B533168
Received: 2015/04/23, 17:27

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Kjeldahl Nitrogen	3	2015/04/24	2015/04/27	AB SOP-00008	EPA 351.1 R 1978 m
Total Phosphorus	3	2015/04/27	2015/04/28	AB SOP-00024	SM 22 4500-P A,B,F m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jeremy Wakaruk, B.Sc., Senior Project Manager
Email: JWakaruk@maxxam.ca
Phone# (780)577-7105 Ext:7105

==========

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 #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		MC6057	MC6058	MC6059		
Sampling Date		2015/04/23 13:22	2015/04/23 14:32	2015/04/23 14:33		
COC Number		A127412	A127412	A127412		
	Units	MW15-02	MW15-01	MW14-11	RDL	QC Batch
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	7882555
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	7882555
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	7882555
Reached Baseline at C50	mg/L	Yes	Yes	Yes	N/A	7882555
Volatiles						
Benzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	7882252
Toluene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	7882252
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	7882252
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	0.00080	7882252
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	0.00040	7882252
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	0.00080	7882252
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	0.10	7882252
(C6-C10)	mg/L	<0.10	<0.10	<0.10	0.10	7882252
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	101	104	104	N/A	7882252
4-Bromofluorobenzene (sur.)	%	97	98	98	N/A	7882252
D4-1,2-Dichloroethane (sur.)	%	109	105	106	N/A	7882252
O-TERPHENYL (sur.)	%	100	102	99	N/A	7882555

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 #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		MC6057			MC6058		MC6059		
Sampling Date		2015/04/23 13:22			2015/04/23 14:32		2015/04/23 14:33		
COC Number		A127412			A127412		A127412		
	Units	MW15-02	RDL	QC Batch	MW15-01	QC Batch	MW14-11	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	26	N/A	7881752	7.7	7881752	7.5	N/A	7881752
Cation Sum	meq/L	27	N/A	7881752	8.8	7881752	9.1	N/A	7881752
Hardness (CaCO3)	mg/L	410	0.50	7881748	360	7881748	370	0.50	7881748
Ion Balance	N/A	1.0	0.010	7881751	1.2	7881751	1.2	0.010	7881751
Dissolved Nitrate (NO3)	mg/L	0.26	0.044	7881753	0.72	7881753	0.71	0.044	7881753
Nitrate plus Nitrite (N)	mg/L	0.077	0.010	7881754	0.18	7881754	0.18	0.010	7881754
Dissolved Nitrite (NO2)	mg/L	0.063	0.033	7881753	0.057	7881753	0.059	0.033	7881753
Total Dissolved Solids	mg/L	1700	10	7881758	420	7881758	420	10	7881758
Misc. Inorganics									
Conductivity	uS/cm	2300	1.0	7881715	670	7881715	650	1.0	7881715
pH	pH	7.73	N/A	7881703	7.59	7881703	7.64	N/A	7881703
Low Level Elements									
Dissolved Cadmium (Cd)	ug/L	0.024	0.020	7881866	0.042	7881866	0.024	0.020	7881866
Anions									
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	7881714	<0.50	7881714	<0.50	0.50	7881714
Alkalinity (Total as CaCO3)	mg/L	410	0.50	7881714	310	7881714	310	0.50	7881714
Bicarbonate (HCO3)	mg/L	510	0.50	7881714	370	7881714	370	0.50	7881714
Carbonate (CO3)	mg/L	<0.50	0.50	7881714	<0.50	7881714	<0.50	0.50	7881714
Hydroxide (OH)	mg/L	<0.50	0.50	7881714	<0.50	7881714	<0.50	0.50	7881714
Dissolved Sulphate (SO4)	mg/L	730 (1)	5.0	7881648	56	7881648	48	1.0	7881648
Dissolved Chloride (Cl)	mg/L	87	1.0	7881645	14	7881645	13	1.0	7881645
Nutrients									
Dissolved Nitrite (N)	mg/L	0.019	0.010	7881937	0.017	7881937	0.018	0.010	7881937
Dissolved Nitrate (N)	mg/L	0.058	0.010	7881937	0.16	7881937	0.16	0.010	7881937
Elements									
Dissolved Aluminum (Al)	mg/L	0.0088	0.0030	7882758	0.12 (2)	7882758	0.0045	0.0030	7882758
Dissolved Antimony (Sb)	mg/L	0.00071	0.00060	7882758	<0.00060	7882758	<0.00060	0.00060	7882758
Dissolved Arsenic (As)	mg/L	0.0018	0.00020	7882758	0.00081 (3)	7882758	0.00074	0.00020	7882758
Dissolved Barium (Ba)	mg/L	0.14	0.010	7882730	0.11 (4)	7882730	0.10	0.010	7882730
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	7882758	<0.0010	7882758	<0.0010	0.0010	7882758

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.
(3) Dissolved greater than total. Results are within limits of uncertainty(MU).
(4) Dissolved greater than total. Results within acceptable limits of precision.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		MC6057			MC6058		MC6059		
Sampling Date		2015/04/23 13:22			2015/04/23 14:32		2015/04/23 14:33		
COC Number		A127412			A127412		A127412		
	Units	MW15-02	RDL	QC Batch	MW15-01	QC Batch	MW14-11	RDL	QC Batch
Dissolved Boron (B)	mg/L	0.21	0.020	7882730	0.066	7882730	0.068 (1)	0.020	7882730
Dissolved Calcium (Ca)	mg/L	120	0.30	7882730	97	7886998	100 (2)	0.30	7882730
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	7882758	<0.0010	7882758	<0.0010	0.0010	7882758
Dissolved Cobalt (Co)	mg/L	0.00052	0.00030	7882758	0.00096 (1)	7882758	0.00083	0.00030	7882758
Dissolved Copper (Cu)	mg/L	0.0024	0.00020	7882758	0.0014 (2)	7882758	0.00065	0.00020	7882758
Dissolved Iron (Fe)	mg/L	<0.060	0.060	7882730	0.19 (1)	7882730	<0.060	0.060	7882730
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	7882758	0.00038 (1)	7882758	<0.00020	0.00020	7882758
Dissolved Lithium (Li)	mg/L	0.051	0.020	7882730	0.025 (1)	7882730	0.026 (1)	0.020	7882730
Dissolved Magnesium (Mg)	mg/L	28	0.20	7882730	27	7882730	28 (2)	0.20	7882730
Dissolved Manganese (Mn)	mg/L	0.27	0.0040	7882730	0.30 (2)	7882730	0.29	0.0040	7882730
Dissolved Molybdenum (Mo)	mg/L	0.015	0.00020	7882758	0.0029	7882758	0.0034	0.00020	7882758
Dissolved Nickel (Ni)	mg/L	0.0027	0.00050	7882758	0.0034 (2)	7882758	0.0031	0.00050	7882758
Dissolved Phosphorus (P)	mg/L	0.12	0.10	7882730	0.11	7882730	0.22 (1)	0.10	7882730
Dissolved Potassium (K)	mg/L	5.7	0.30	7882730	3.2	7882730	3.3 (2)	0.30	7882730
Dissolved Selenium (Se)	mg/L	0.0043	0.00020	7882758	0.00075	7882758	0.00089 (1)	0.00020	7882758
Dissolved Silicon (Si)	mg/L	4.7	0.10	7882730	6.7 (2)	7882730	6.4	0.10	7882730
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	7882758	<0.00010	7882758	<0.00010	0.00010	7882758
Dissolved Sodium (Na)	mg/L	430 (2)	0.50	7882730	38 (2)	7882730	36 (2)	0.50	7882730
Dissolved Strontium (Sr)	mg/L	0.91	0.020	7882730	0.54	7882730	0.55	0.020	7882730
Dissolved Sulphur (S)	mg/L	260 (2)	0.20	7882730	32	7882730	35 (2)	0.20	7882730
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	7882758	<0.00020	7882758	<0.00020	0.00020	7882758
Dissolved Tin (Sn)	mg/L	0.0039	0.0010	7882758	0.0023 (1)	7882758	0.0017	0.0010	7882758
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	7882758	0.0041 (1)	7882758	<0.0010	0.0010	7882758
Dissolved Uranium (U)	mg/L	0.048	0.00010	7882758	0.012	7882758	0.011	0.00010	7882758
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	7882758	<0.0010	7882758	<0.0010	0.0010	7882758
Dissolved Zinc (Zn)	mg/L	0.0040	0.0030	7882758	0.0064 (1)	7882758	<0.0030	0.0030	7882758

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).
(2) Dissolved greater than total. Results within acceptable limits of precision.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		MC6057	MC6058	MC6059		
Sampling Date		2015/04/23 13:22	2015/04/23 14:32	2015/04/23 14:33		
COC Number		A127412	A127412	A127412		
	Units	MW15-02	MW15-01	MW14-11	RDL	QC Batch
Low Level Elements						
Total Cadmium (Cd)	ug/L	1.7	0.027	0.040	0.020	7881744
Elements						
Total Aluminum (Al)	mg/L	33	0.013	0.40	0.0030	7882615
Total Antimony (Sb)	mg/L	0.00088	<0.00060	<0.00060	0.00060	7882615
Total Arsenic (As)	mg/L	0.036	0.00059	0.00092	0.00020	7882615
Total Barium (Ba)	mg/L	1.3	0.099	0.12	0.010	7882620
Total Beryllium (Be)	mg/L	0.0029	<0.0010	<0.0010	0.0010	7882615
Total Boron (B)	mg/L	0.22	0.070	0.059	0.020	7882620
Total Calcium (Ca)	mg/L	210	100	97	0.30	7882620
Total Chromium (Cr)	mg/L	0.062	<0.0010	<0.0010	0.0010	7882615
Total Cobalt (Co)	mg/L	0.043	0.00080	0.0012	0.00030	7882615
Total Copper (Cu)	mg/L	0.12	0.0013	0.0017	0.00020	7882615
Total Iron (Fe)	mg/L	88	<0.060	0.77	0.060	7882620
Total Lead (Pb)	mg/L	0.056	<0.00020	0.00047	0.00020	7882615
Total Lithium (Li)	mg/L	0.11	0.024	0.025	0.020	7882620
Total Magnesium (Mg)	mg/L	62	27	27	0.20	7882620
Total Manganese (Mn)	mg/L	2.4	0.28	0.33	0.0040	7882620
Total Molybdenum (Mo)	mg/L	0.015	0.0035	0.0035	0.00020	7882615
Total Nickel (Ni)	mg/L	0.12	0.0031	0.0036	0.00050	7882615
Total Phosphorus (P)	mg/L	3.6	0.16	0.16	0.10	7882620
Total Potassium (K)	mg/L	11	3.2	3.1	0.30	7882620
Total Selenium (Se)	mg/L	0.0068	0.00081	0.00072	0.00020	7882615
Total Silicon (Si)	mg/L	48	6.4	7.4	0.10	7882620
Total Silver (Ag)	mg/L	0.00058	<0.00010	<0.00010	0.00010	7882615
Total Sodium (Na)	mg/L	400	35	34	0.50	7882620
Total Strontium (Sr)	mg/L	0.97	0.54	0.55	0.020	7882620
Total Sulphur (S)	mg/L	240	35	29	0.20	7882620
Total Thallium (Tl)	mg/L	0.0011	<0.00020	<0.00020	0.00020	7882615
Total Tin (Sn)	mg/L	0.0083	0.0017	0.0033	0.0010	7882615
Total Titanium (Ti)	mg/L	0.48	<0.0010	0.0080	0.0010	7882615
Total Uranium (U)	mg/L	0.056	0.012	0.011	0.00010	7882615
Total Vanadium (V)	mg/L	0.095	<0.0010	0.0014	0.0010	7882615
Total Zinc (Zn)	mg/L	0.36	0.0050	0.0082	0.0030	7882615
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 #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		MC6057		MC6058	MC6059		
Sampling Date		2015/04/23 13:22		2015/04/23 14:32	2015/04/23 14:33		
COC Number		A127412		A127412	A127412		
	Units	MW15-02	RDL	MW15-01	MW14-11	RDL	QC Batch
Nutrients							
Total Kjeldahl Nitrogen	mg/L	1.9	0.050	0.36	0.42	0.050	7882091
Orthophosphate (P)	mg/L	0.077	0.0030	0.0030	0.0030	0.0030	7881856
Total Phosphorus (P)	mg/L	1.0 (1)	0.015	0.026	0.021	0.0030	7883339

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 #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

GENERAL COMMENTS

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

Package 1	9.0°C

Sample MC6058-01 : Ionic imbalance; analysis performed in duplicate.

Sample MC6059-01 : Ionic imbalance; analysis performed in duplicate.

Sample MC6058, Elements by ICP - Dissolved: Test repeated.

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 #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7881645	ARD	Matrix Spike	Dissolved Chloride (Cl)	2015/04/24		104	%	80 - 120
7881645	ARD	Spiked Blank	Dissolved Chloride (Cl)	2015/04/24		100	%	80 - 120
7881645	ARD	Method Blank	Dissolved Chloride (Cl)	2015/04/24	<1.0		mg/L	
7881645	ARD	RPD	Dissolved Chloride (Cl)	2015/04/24	NC		%	20
7881648	ARD	Matrix Spike	Dissolved Sulphate (SO4)	2015/04/24		106	%	80 - 120
7881648	ARD	Spiked Blank	Dissolved Sulphate (SO4)	2015/04/24		105	%	80 - 120
7881648	ARD	Method Blank	Dissolved Sulphate (SO4)	2015/04/24	<1.0		mg/L	
7881648	ARD	RPD	Dissolved Sulphate (SO4)	2015/04/24	NC		%	20
7881703	RPT	Spiked Blank	pH	2015/04/24		100	%	97 - 103
7881703	RPT	RPD	pH	2015/04/24	0.47		%	N/A
7881714	RPT	Spiked Blank	Alkalinity (Total as CaCO3)	2015/04/24		102	%	80 - 120
7881714	RPT	Method Blank	Alkalinity (PP as CaCO3)	2015/04/24	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2015/04/24	<0.50		mg/L	
			Bicarbonate (HCO3)	2015/04/24	<0.50		mg/L	
			Carbonate (CO3)	2015/04/24	<0.50		mg/L	
			Hydroxide (OH)	2015/04/24	<0.50		mg/L	
7881714	RPT	RPD	Alkalinity (PP as CaCO3)	2015/04/24	NC		%	20
			Alkalinity (Total as CaCO3)	2015/04/24	0.29		%	20
			Bicarbonate (HCO3)	2015/04/24	0.29		%	20
			Carbonate (CO3)	2015/04/24	NC		%	20
			Hydroxide (OH)	2015/04/24	NC		%	20
7881715	RPT	Spiked Blank	Conductivity	2015/04/24		100	%	90 - 110
7881715	RPT	Method Blank	Conductivity	2015/04/24	<1.0		uS/cm	
7881715	RPT	RPD	Conductivity	2015/04/24	0.59		%	20
7881856	AL2	Matrix Spike	Orthophosphate (P)	2015/04/24		100	%	80 - 120
7881856	AL2	Spiked Blank	Orthophosphate (P)	2015/04/24		103	%	80 - 120
7881856	AL2	Method Blank	Orthophosphate (P)	2015/04/24	<0.0030		mg/L	
7881856	AL2	RPD	Orthophosphate (P)	2015/04/24	NC		%	20
7881937	LMD	Matrix Spike	Dissolved Nitrite (N)	2015/04/24		102	%	80 - 120
			Dissolved Nitrate (N)	2015/04/24		102	%	80 - 120
7881937	LMD	Spiked Blank	Dissolved Nitrite (N)	2015/04/24		101	%	80 - 120
			Dissolved Nitrate (N)	2015/04/24		100	%	80 - 120
7881937	LMD	Method Blank	Dissolved Nitrite (N)	2015/04/24	<0.010		mg/L	
			Dissolved Nitrate (N)	2015/04/24	<0.010		mg/L	
7881937	LMD	RPD	Dissolved Nitrite (N)	2015/04/24	NC		%	20
			Dissolved Nitrate (N)	2015/04/24	NC		%	20
7882091	AL2	Matrix Spike [MC6058-05]	Total Kjeldahl Nitrogen	2015/04/27		120	%	80 - 120
7882091	AL2	QC Standard	Total Kjeldahl Nitrogen	2015/04/27		101	%	80 - 120
7882091	AL2	Spiked Blank	Total Kjeldahl Nitrogen	2015/04/27		113	%	80 - 120
7882091	AL2	Method Blank	Total Kjeldahl Nitrogen	2015/04/27	<0.050		mg/L	
7882091	AL2	RPD [MC6058-05]	Total Kjeldahl Nitrogen	2015/04/27	3.6		%	20
7882252	NM5	Matrix Spike	1,4-Difluorobenzene (sur.)	2015/04/26		98	%	70 - 130
			4-Bromofluorobenzene (sur.)	2015/04/26		96	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/04/26		104	%	70 - 130
			Benzene	2015/04/26		97	%	70 - 130
			Toluene	2015/04/26		97	%	70 - 130
			Ethylbenzene	2015/04/26		97	%	70 - 130
			m & p-Xylene	2015/04/26		97	%	70 - 130
			o-Xylene	2015/04/26		98	%	70 - 130
			(C6-C10)	2015/04/26		123	%	70 - 130
7882252	NM5	Spiked Blank	1,4-Difluorobenzene (sur.)	2015/04/26		99	%	70 - 130

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			4-Bromofluorobenzene (sur.)	2015/04/26		97	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/04/26		103	%	70 - 130
			Benzene	2015/04/26		89	%	70 - 130
			Toluene	2015/04/26		90	%	70 - 130
			Ethylbenzene	2015/04/26		91	%	70 - 130
			m & p-Xylene	2015/04/26		91	%	70 - 130
			o-Xylene	2015/04/26		91	%	70 - 130
			(C6-C10)	2015/04/26		104	%	70 - 130
7882252	NM5	Method Blank	1,4-Difluorobenzene (sur.)	2015/04/26		104	%	70 - 130
			4-Bromofluorobenzene (sur.)	2015/04/26		97	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2015/04/26		100	%	70 - 130
			Benzene	2015/04/26	<0.00040		mg/L	
			Toluene	2015/04/26	<0.00040		mg/L	
			Ethylbenzene	2015/04/26	<0.00040		mg/L	
			m & p-Xylene	2015/04/26	<0.00080		mg/L	
			o-Xylene	2015/04/26	<0.00040		mg/L	
			Xylenes (Total)	2015/04/26	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2015/04/26	<0.10		mg/L	
			(C6-C10)	2015/04/26	<0.10		mg/L	
7882252	NM5	RPD	Benzene	2015/04/26	NC		%	40
			Toluene	2015/04/26	NC		%	40
			Ethylbenzene	2015/04/26	NC		%	40
			m & p-Xylene	2015/04/26	NC		%	40
			o-Xylene	2015/04/26	NC		%	40
			Xylenes (Total)	2015/04/26	NC		%	40
			F1 (C6-C10) - BTEX	2015/04/26	NC		%	40
			(C6-C10)	2015/04/26	NC		%	40
7882555	VV2	Matrix Spike	O-TERPHENYL (sur.)	2015/04/25		98	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/04/25		102	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2015/04/25		102	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2015/04/25		98	%	50 - 130
7882555	VV2	Spiked Blank	O-TERPHENYL (sur.)	2015/04/25		102	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/04/25		95	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2015/04/25		99	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2015/04/25		96	%	70 - 130
7882555	VV2	Method Blank	O-TERPHENYL (sur.)	2015/04/25		114	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2015/04/25	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2015/04/25	<0.20		mg/L	
			F4 (C34-C50 Hydrocarbons)	2015/04/25	<0.20		mg/L	
7882555	VV2	RPD	F2 (C10-C16 Hydrocarbons)	2015/04/25	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2015/04/25	NC		%	40
			F4 (C34-C50 Hydrocarbons)	2015/04/25	NC		%	40
7882615	APY	Matrix Spike	Total Aluminum (Al)	2015/04/25		104	%	80 - 120
			Total Antimony (Sb)	2015/04/25		111	%	80 - 120
			Total Arsenic (As)	2015/04/25		107	%	80 - 120
			Total Beryllium (Be)	2015/04/25		104	%	80 - 120
			Total Chromium (Cr)	2015/04/25		101	%	80 - 120
			Total Cobalt (Co)	2015/04/25		99	%	80 - 120
			Total Copper (Cu)	2015/04/25		100	%	80 - 120
			Total Lead (Pb)	2015/04/25		101	%	80 - 120
			Total Molybdenum (Mo)	2015/04/25		111	%	80 - 120
			Total Nickel (Ni)	2015/04/25		101	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Selenium (Se)	2015/04/25		107	%	80 - 120
			Total Silver (Ag)	2015/04/25		106	%	80 - 120
			Total Thallium (Tl)	2015/04/25		100	%	80 - 120
			Total Tin (Sn)	2015/04/25		115	%	80 - 120
			Total Titanium (Ti)	2015/04/25		107	%	80 - 120
			Total Uranium (U)	2015/04/25		103	%	80 - 120
			Total Vanadium (V)	2015/04/25		105	%	80 - 120
			Total Zinc (Zn)	2015/04/25		103	%	80 - 120
7882615	APY	Spiked Blank	Total Aluminum (Al)	2015/04/25		113	%	80 - 120
			Total Antimony (Sb)	2015/04/25		104	%	80 - 120
			Total Arsenic (As)	2015/04/25		104	%	80 - 120
			Total Beryllium (Be)	2015/04/25		102	%	80 - 120
			Total Chromium (Cr)	2015/04/25		103	%	80 - 120
			Total Cobalt (Co)	2015/04/25		101	%	80 - 120
			Total Copper (Cu)	2015/04/25		102	%	80 - 120
			Total Lead (Pb)	2015/04/25		104	%	80 - 120
			Total Molybdenum (Mo)	2015/04/25		106	%	80 - 120
			Total Nickel (Ni)	2015/04/25		102	%	80 - 120
			Total Selenium (Se)	2015/04/25		104	%	80 - 120
			Total Silver (Ag)	2015/04/25		107	%	80 - 120
			Total Thallium (Tl)	2015/04/25		105	%	80 - 120
			Total Tin (Sn)	2015/04/25		111	%	80 - 120
			Total Titanium (Ti)	2015/04/25		102	%	80 - 120
			Total Uranium (U)	2015/04/25		105	%	80 - 120
			Total Vanadium (V)	2015/04/25		104	%	80 - 120
			Total Zinc (Zn)	2015/04/25		102	%	80 - 120
7882615	APY	Method Blank	Total Aluminum (Al)	2015/04/25	<0.0030		mg/L	
			Total Antimony (Sb)	2015/04/25	<0.00060		mg/L	
			Total Arsenic (As)	2015/04/25	<0.00020		mg/L	
			Total Beryllium (Be)	2015/04/25	<0.0010		mg/L	
			Total Chromium (Cr)	2015/04/25	<0.0010		mg/L	
			Total Cobalt (Co)	2015/04/25	<0.00030		mg/L	
			Total Copper (Cu)	2015/04/25	<0.00020		mg/L	
			Total Lead (Pb)	2015/04/25	<0.00020		mg/L	
			Total Molybdenum (Mo)	2015/04/25	<0.00020		mg/L	
			Total Nickel (Ni)	2015/04/25	<0.00050		mg/L	
			Total Selenium (Se)	2015/04/25	<0.00020		mg/L	
			Total Silver (Ag)	2015/04/25	<0.00010		mg/L	
			Total Thallium (Tl)	2015/04/25	<0.00020		mg/L	
			Total Tin (Sn)	2015/04/25	<0.0010		mg/L	
			Total Titanium (Ti)	2015/04/25	<0.0010		mg/L	
			Total Uranium (U)	2015/04/25	<0.00010		mg/L	
			Total Vanadium (V)	2015/04/25	<0.0010		mg/L	
			Total Zinc (Zn)	2015/04/25	<0.0030		mg/L	
7882615	APY	RPD	Total Aluminum (Al)	2015/04/25	NC		%	20
			Total Antimony (Sb)	2015/04/25	NC		%	20
			Total Arsenic (As)	2015/04/25	4.7		%	20
			Total Beryllium (Be)	2015/04/25	NC		%	20
			Total Chromium (Cr)	2015/04/25	NC		%	20
			Total Cobalt (Co)	2015/04/25	NC		%	20
			Total Copper (Cu)	2015/04/25	4.0		%	20
			Total Lead (Pb)	2015/04/25	2.4		%	20

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Molybdenum (Mo)	2015/04/25	3.7		%	20
			Total Nickel (Ni)	2015/04/25	3.6		%	20
			Total Selenium (Se)	2015/04/25	NC		%	20
			Total Silver (Ag)	2015/04/25	NC		%	20
			Total Thallium (Tl)	2015/04/25	NC		%	20
			Total Tin (Sn)	2015/04/25	NC		%	20
			Total Titanium (Ti)	2015/04/25	NC		%	20
			Total Uranium (U)	2015/04/25	NC		%	20
			Total Vanadium (V)	2015/04/25	NC		%	20
			Total Zinc (Zn)	2015/04/25	NC		%	20
7882620	PM5	Matrix Spike	Total Barium (Ba)	2015/04/25		100	%	80 - 120
			Total Boron (B)	2015/04/25		102	%	80 - 120
			Total Calcium (Ca)	2015/04/25		NC	%	80 - 120
			Total Iron (Fe)	2015/04/25		92	%	80 - 120
			Total Lithium (Li)	2015/04/25		97	%	80 - 120
			Total Magnesium (Mg)	2015/04/25		NC	%	80 - 120
			Total Manganese (Mn)	2015/04/25		100	%	80 - 120
			Total Phosphorus (P)	2015/04/25		100	%	80 - 120
			Total Potassium (K)	2015/04/25		100	%	80 - 120
			Total Silicon (Si)	2015/04/25		NC	%	80 - 120
			Total Sodium (Na)	2015/04/25		NC	%	80 - 120
			Total Strontium (Sr)	2015/04/25		97	%	80 - 120
			Total Sulphur (S)	2015/04/25		0.00000	%	N/A
7882620	PM5	Spiked Blank	Total Barium (Ba)	2015/04/25		101	%	80 - 120
			Total Boron (B)	2015/04/25		103	%	80 - 120
			Total Calcium (Ca)	2015/04/25		104	%	80 - 120
			Total Iron (Fe)	2015/04/25		94	%	80 - 120
			Total Lithium (Li)	2015/04/25		97	%	80 - 120
			Total Magnesium (Mg)	2015/04/25		103	%	80 - 120
			Total Manganese (Mn)	2015/04/25		103	%	80 - 120
			Total Phosphorus (P)	2015/04/25		100	%	80 - 120
			Total Potassium (K)	2015/04/25		100	%	80 - 120
			Total Silicon (Si)	2015/04/25		105	%	80 - 120
			Total Sodium (Na)	2015/04/25		100	%	80 - 120
			Total Strontium (Sr)	2015/04/25		99	%	80 - 120
			Total Sulphur (S)	2015/04/25		97	%	80 - 120
7882620	PM5	Method Blank	Total Barium (Ba)	2015/04/25	<0.010		mg/L	
			Total Boron (B)	2015/04/25	<0.020		mg/L	
			Total Calcium (Ca)	2015/04/25	<0.30		mg/L	
			Total Iron (Fe)	2015/04/25	<0.060		mg/L	
			Total Lithium (Li)	2015/04/25	<0.020		mg/L	
			Total Magnesium (Mg)	2015/04/25	<0.20		mg/L	
			Total Manganese (Mn)	2015/04/25	<0.0040		mg/L	
			Total Phosphorus (P)	2015/04/25	0.11, RDL=0.10		mg/L	
			Total Potassium (K)	2015/04/25	<0.30		mg/L	
			Total Silicon (Si)	2015/04/25	<0.10		mg/L	
			Total Sodium (Na)	2015/04/25	<0.50		mg/L	
			Total Strontium (Sr)	2015/04/25	<0.020		mg/L	
			Total Sulphur (S)	2015/04/25	<0.20		mg/L	
7882620	PM5	RPD	Total Barium (Ba)	2015/04/25	NC		%	20
			Total Boron (B)	2015/04/25	0.080		%	20

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Calcium (Ca)	2015/04/25	1.7		%	20
			Total Iron (Fe)	2015/04/25	NC		%	20
			Total Lithium (Li)	2015/04/25	NC		%	20
			Total Magnesium (Mg)	2015/04/25	1.6		%	20
			Total Manganese (Mn)	2015/04/25	2.3		%	20
			Total Phosphorus (P)	2015/04/25	NC		%	20
			Total Potassium (K)	2015/04/25	2.8		%	20
			Total Silicon (Si)	2015/04/25	1.6		%	20
			Total Sodium (Na)	2015/04/25	1.7		%	20
			Total Strontium (Sr)	2015/04/25	1.9		%	20
			Total Sulphur (S)	2015/04/25	1.5		%	20
7882730	PM5	Matrix Spike [MC6057-04]	Dissolved Barium (Ba)	2015/04/25		93	%	80 - 120
			Dissolved Boron (B)	2015/04/25		95	%	80 - 120
			Dissolved Calcium (Ca)	2015/04/25		NC	%	80 - 120
			Dissolved Iron (Fe)	2015/04/25		93	%	80 - 120
			Dissolved Lithium (Li)	2015/04/25		90	%	80 - 120
			Dissolved Magnesium (Mg)	2015/04/25		93	%	80 - 120
			Dissolved Manganese (Mn)	2015/04/25		85	%	80 - 120
			Dissolved Phosphorus (P)	2015/04/25		100	%	80 - 120
			Dissolved Potassium (K)	2015/04/25		96	%	80 - 120
			Dissolved Silicon (Si)	2015/04/25		99	%	80 - 120
			Dissolved Sodium (Na)	2015/04/25		NC	%	80 - 120
			Dissolved Strontium (Sr)	2015/04/25		88	%	80 - 120
7882730	PM5	Spiked Blank	Dissolved Barium (Ba)	2015/04/25		100	%	80 - 120
			Dissolved Boron (B)	2015/04/25		102	%	80 - 120
			Dissolved Calcium (Ca)	2015/04/25		105	%	80 - 120
			Dissolved Iron (Fe)	2015/04/25		100	%	80 - 120
			Dissolved Lithium (Li)	2015/04/25		96	%	80 - 120
			Dissolved Magnesium (Mg)	2015/04/25		103	%	80 - 120
			Dissolved Manganese (Mn)	2015/04/25		101	%	80 - 120
			Dissolved Phosphorus (P)	2015/04/25		103	%	80 - 120
			Dissolved Potassium (K)	2015/04/25		101	%	80 - 120
			Dissolved Silicon (Si)	2015/04/25		109	%	80 - 120
			Dissolved Sodium (Na)	2015/04/25		97	%	80 - 120
			Dissolved Strontium (Sr)	2015/04/25		98	%	80 - 120
			Dissolved Sulphur (S)	2015/04/25		98	%	80 - 120
7882730	PM5	Method Blank	Dissolved Barium (Ba)	2015/04/25	<0.010		mg/L	
			Dissolved Boron (B)	2015/04/25	<0.020		mg/L	
			Dissolved Calcium (Ca)	2015/04/25	<0.30		mg/L	
			Dissolved Iron (Fe)	2015/04/25	<0.060		mg/L	
			Dissolved Lithium (Li)	2015/04/25	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2015/04/25	<0.20		mg/L	
			Dissolved Manganese (Mn)	2015/04/25	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2015/04/25	0.11, RDL=0.10		mg/L	
			Dissolved Potassium (K)	2015/04/25	<0.30		mg/L	
			Dissolved Silicon (Si)	2015/04/25	<0.10		mg/L	
			Dissolved Sodium (Na)	2015/04/25	<0.50		mg/L	
			Dissolved Strontium (Sr)	2015/04/25	<0.020		mg/L	
			Dissolved Sulphur (S)	2015/04/25	<0.20		mg/L	
7882730	PM5	RPD [MC6057-04]	Dissolved Barium (Ba)	2015/04/25	0.20		%	20

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Boron (B)	2015/04/25	0.49		%	20
			Dissolved Calcium (Ca)	2015/04/25	0.12		%	20
			Dissolved Iron (Fe)	2015/04/25	NC		%	20
			Dissolved Lithium (Li)	2015/04/25	NC		%	20
			Dissolved Magnesium (Mg)	2015/04/25	0.46		%	20
			Dissolved Manganese (Mn)	2015/04/25	0.78		%	20
			Dissolved Phosphorus (P)	2015/04/25	NC		%	20
			Dissolved Potassium (K)	2015/04/25	0.21		%	20
			Dissolved Silicon (Si)	2015/04/25	0.092		%	20
			Dissolved Sodium (Na)	2015/04/25	0.29		%	20
			Dissolved Strontium (Sr)	2015/04/25	0.41		%	20
			Dissolved Sulphur (S)	2015/04/25	0.58		%	20
7882758	APY	Matrix Spike	Dissolved Aluminum (Al)	2015/04/25		119	%	80 - 120
			Dissolved Antimony (Sb)	2015/04/25		106	%	80 - 120
			Dissolved Arsenic (As)	2015/04/25		95	%	80 - 120
			Dissolved Beryllium (Be)	2015/04/25		100	%	80 - 120
			Dissolved Chromium (Cr)	2015/04/25		96	%	80 - 120
			Dissolved Cobalt (Co)	2015/04/25		94	%	80 - 120
			Dissolved Copper (Cu)	2015/04/25		92	%	80 - 120
			Dissolved Lead (Pb)	2015/04/25		94	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/04/25		NC	%	80 - 120
			Dissolved Nickel (Ni)	2015/04/25		91	%	80 - 120
			Dissolved Selenium (Se)	2015/04/25		97	%	80 - 120
			Dissolved Silver (Ag)	2015/04/25		97	%	80 - 120
			Dissolved Thallium (Tl)	2015/04/25		92	%	80 - 120
			Dissolved Tin (Sn)	2015/04/25		109	%	80 - 120
			Dissolved Titanium (Ti)	2015/04/25		106	%	80 - 120
			Dissolved Uranium (U)	2015/04/25		96	%	80 - 120
			Dissolved Vanadium (V)	2015/04/25		96	%	80 - 120
			Dissolved Zinc (Zn)	2015/04/25		93	%	80 - 120
7882758	APY	Spiked Blank	Dissolved Aluminum (Al)	2015/04/25		110	%	80 - 120
			Dissolved Antimony (Sb)	2015/04/25		99	%	80 - 120
			Dissolved Arsenic (As)	2015/04/25		100	%	80 - 120
			Dissolved Beryllium (Be)	2015/04/25		106	%	80 - 120
			Dissolved Chromium (Cr)	2015/04/25		99	%	80 - 120
			Dissolved Cobalt (Co)	2015/04/25		99	%	80 - 120
			Dissolved Copper (Cu)	2015/04/25		100	%	80 - 120
			Dissolved Lead (Pb)	2015/04/25		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/04/25		99	%	80 - 120
			Dissolved Nickel (Ni)	2015/04/25		99	%	80 - 120
			Dissolved Selenium (Se)	2015/04/25		100	%	80 - 120
			Dissolved Silver (Ag)	2015/04/25		99	%	80 - 120
			Dissolved Thallium (Tl)	2015/04/25		99	%	80 - 120
			Dissolved Tin (Sn)	2015/04/25		103	%	80 - 120
			Dissolved Titanium (Ti)	2015/04/25		99	%	80 - 120
			Dissolved Uranium (U)	2015/04/25		98	%	80 - 120
			Dissolved Vanadium (V)	2015/04/25		99	%	80 - 120
			Dissolved Zinc (Zn)	2015/04/25		103	%	80 - 120
7882758	APY	Method Blank	Dissolved Aluminum (Al)	2015/04/25	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2015/04/25	<0.00060		mg/L	
			Dissolved Arsenic (As)	2015/04/25	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2015/04/25	<0.0010		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dissolved Chromium (Cr)	2015/04/25	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2015/04/25	<0.00030		mg/L	
			Dissolved Copper (Cu)	2015/04/25	<0.00020		mg/L	
			Dissolved Lead (Pb)	2015/04/25	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2015/04/25	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2015/04/25	<0.00050		mg/L	
			Dissolved Selenium (Se)	2015/04/25	<0.00020		mg/L	
			Dissolved Silver (Ag)	2015/04/25	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2015/04/25	<0.00020		mg/L	
			Dissolved Tin (Sn)	2015/04/25	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2015/04/25	<0.0010		mg/L	
			Dissolved Uranium (U)	2015/04/25	<0.00010		mg/L	
			Dissolved Vanadium (V)	2015/04/25	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2015/04/25	<0.0030		mg/L	
7882758	APY	RPD	Dissolved Aluminum (Al)	2015/04/25	NC		%	20
			Dissolved Antimony (Sb)	2015/04/25	NC		%	20
			Dissolved Arsenic (As)	2015/04/25	NC		%	20
			Dissolved Beryllium (Be)	2015/04/25	NC		%	20
			Dissolved Chromium (Cr)	2015/04/25	NC		%	20
			Dissolved Cobalt (Co)	2015/04/25	NC		%	20
			Dissolved Copper (Cu)	2015/04/25	NC		%	20
			Dissolved Lead (Pb)	2015/04/25	NC		%	20
			Dissolved Molybdenum (Mo)	2015/04/25	0.63		%	20
			Dissolved Nickel (Ni)	2015/04/25	NC		%	20
			Dissolved Selenium (Se)	2015/04/25	NC		%	20
			Dissolved Silver (Ag)	2015/04/25	NC		%	20
			Dissolved Thallium (Tl)	2015/04/25	NC		%	20
			Dissolved Tin (Sn)	2015/04/25	NC		%	20
			Dissolved Titanium (Ti)	2015/04/25	NC		%	20
			Dissolved Uranium (U)	2015/04/25	1.4		%	20
			Dissolved Vanadium (V)	2015/04/25	NC		%	20
			Dissolved Zinc (Zn)	2015/04/25	NC		%	20
7883339	AL2	Matrix Spike	Total Phosphorus (P)	2015/04/28		NC	%	80 - 120
7883339	AL2	QC Standard	Total Phosphorus (P)	2015/04/28		90	%	80 - 120
7883339	AL2	Spiked Blank	Total Phosphorus (P)	2015/04/28		100	%	80 - 120
7883339	AL2	Method Blank	Total Phosphorus (P)	2015/04/28	0.0030, RDL=0.0030		mg/L	
7883339	AL2	RPD	Total Phosphorus (P)	2015/04/28	0.22		%	20
7886998	JPJ	Matrix Spike	Dissolved Calcium (Ca)	2015/04/30		NC	%	80 - 120
7886998	JPJ	Spiked Blank	Dissolved Calcium (Ca)	2015/04/30		100	%	80 - 120
7886998	JPJ	Method Blank	Dissolved Calcium (Ca)	2015/04/30	<0.30		mg/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B533168
Report Date: 2015/04/30

STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Location: GULL LAKE
Sampler Initials: DN

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7886998	JPJ	RPD	Dissolved Calcium (Ca)	2015/04/30	0.046		%	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).

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) 465-8689
www.maxxamanalytics.com

04/672 AHD

Chain of Custody A127412

Page: 1 of 1

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☑	Report Distribution (E-Mail):
Company:	Stantec Consulting Ltd.		Christian.Nagel@stantec.com
Contact:	Christian Nagel		Suzanne.Musolino@stantec.com
Address:	10160 112 St		Dale.Nisbet@stantec.com
	Prov: AB PC: T5K-2L6	Prov: PC:	
Contact #s:	Ph: (780)917-700 Cell:	Ph: Cell:	

REGULATORY GUIDELINES:
- ☒ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	1139291396 300
Project # / Name:	[redacted] / Lincoln Ranch
Site Location:	Gull Lake
Quote #:	
Sampled By:	D. Nisbet

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	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: TKN	Orthophosphate	Total phosphorous	Nitrite, Nitrate, NTN	HOLD - Do not Analyze	# of Containers Submitted
1.	MW15-02		GW	15/04/23 13:22								✓	✓		✓	✓		✓	✓	✓	✓		10
2	MW15-01		GW	↓ 14:32								✓	✓		✓	✓		✓	✓	✓	✓		10
3	MW14-11		GW	↓ 14:33								✓	✓		✓	✓		✓	✓	✓	✓		10
4																							
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							
															F	F/P		P	P	P	P		F/P

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print): [redacted] / Dale Nisbet	Date (YY/MM/DD): ~~15~~ 15/04/23	Time (24:00): 17:25
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions: Submitted same day as sampling

# of Jars Used & Not Submitted: 0

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B533468		
Chris Kelly	2015 04 23	17:27	Custody Seal	Temperature	Ice
Lab Comments:			Present	10, 8, 9	Present

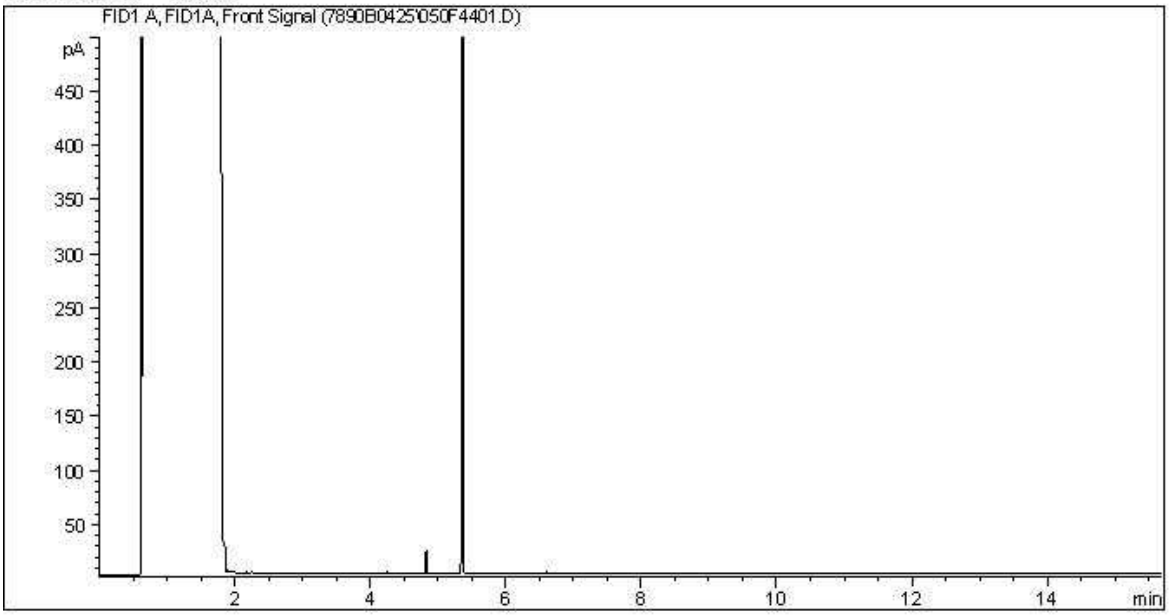
SBF/PLL

Maxxam Job #: B533168
Report Date: 2015/04/30
Maxxam Sample: MC6057

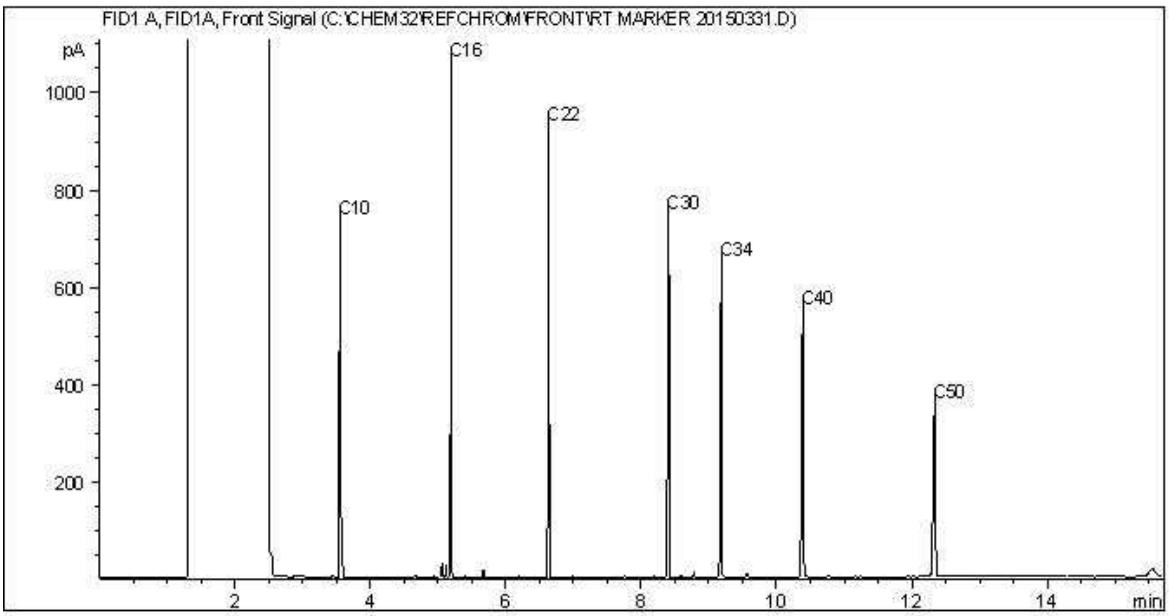
STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Reference: GULL LAKE
Client ID: MW15-02

CCME Hydrocarbons (F2-F4 in water) 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

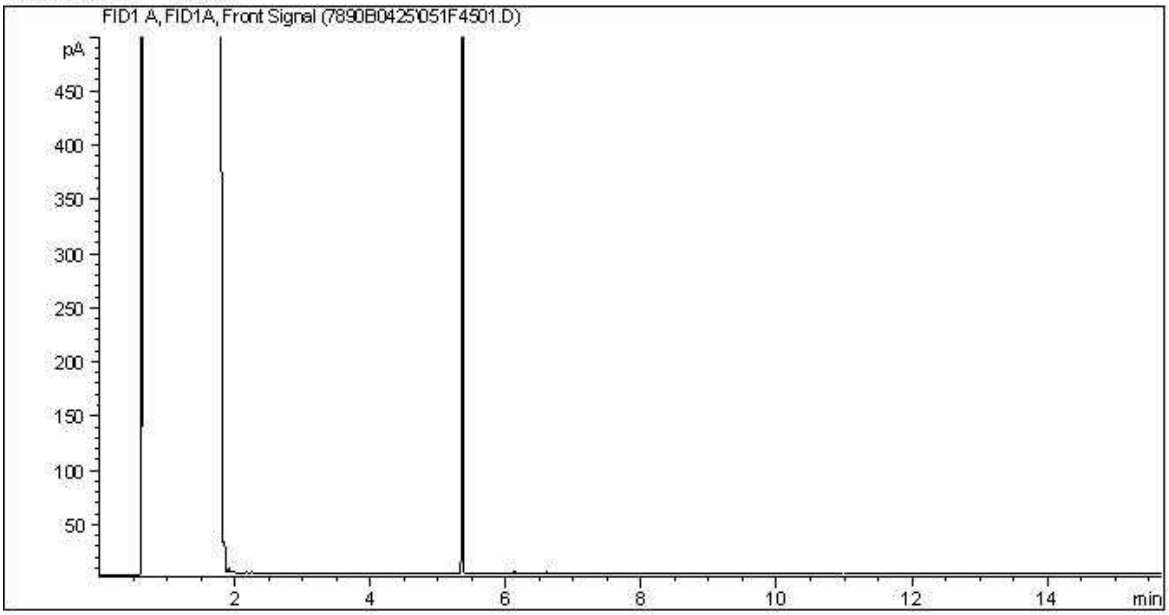
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B533168
Report Date: 2015/04/30
Maxxam Sample: MC6058

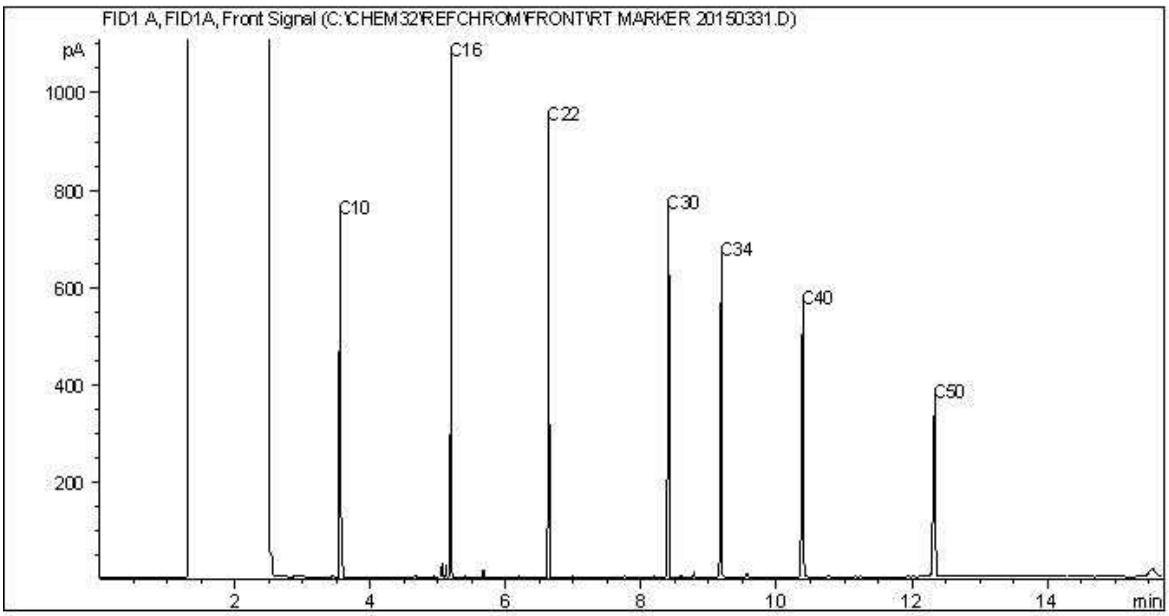
STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Reference: GULL LAKE
Client ID: MW15-01

CCME Hydrocarbons (F2-F4 in water) 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

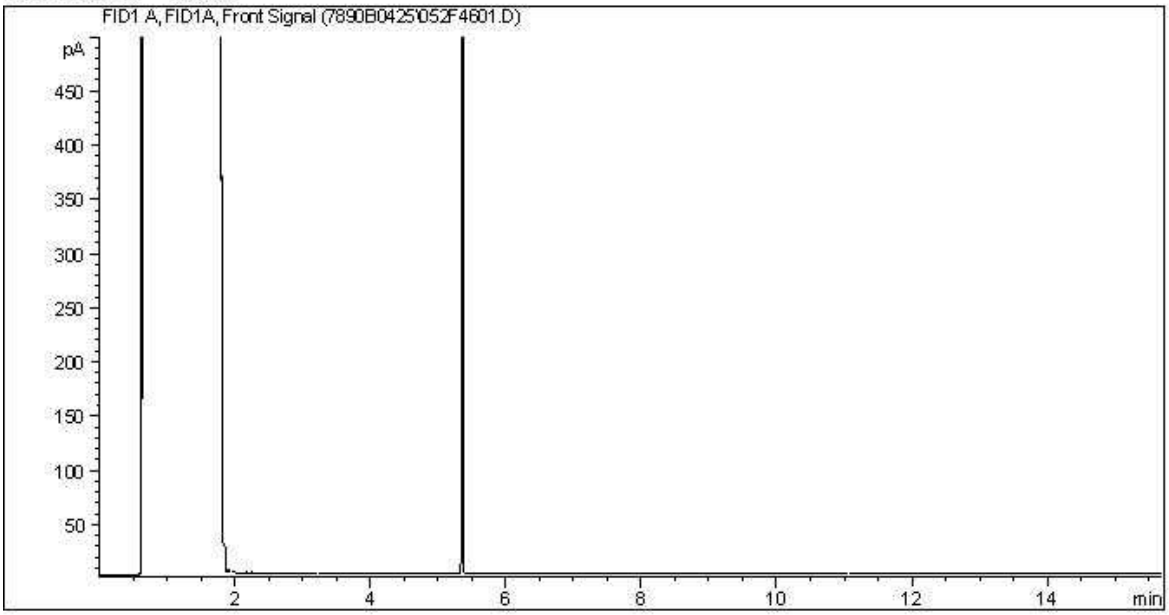
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B533168
Report Date: 2015/04/30
Maxxam Sample: MC6059

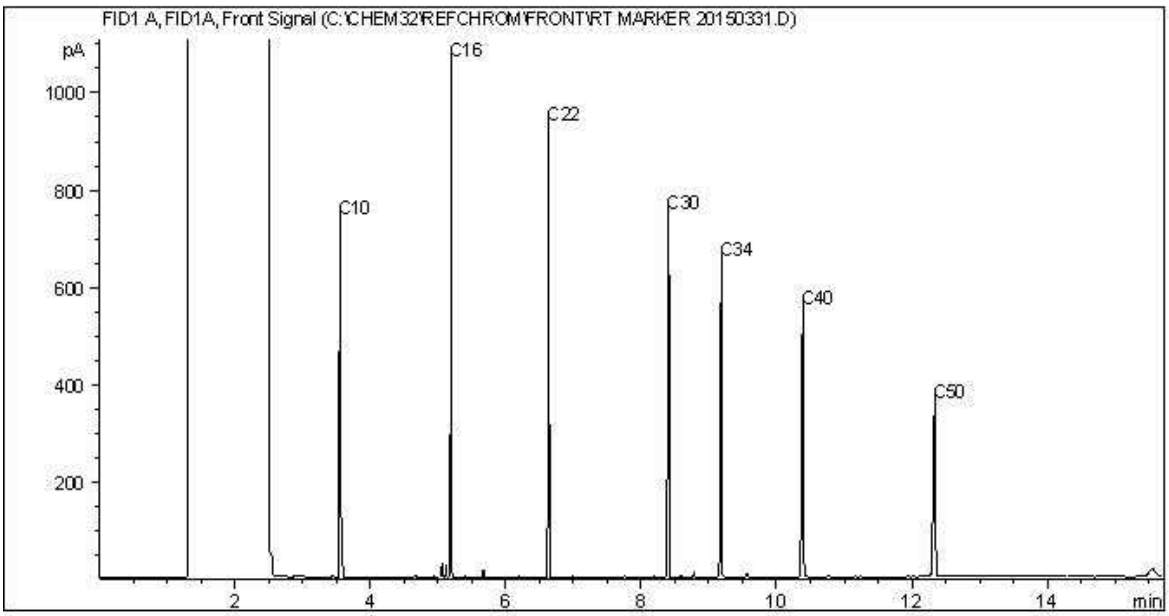
STANTEC CONSULTING LTD
Client Project #: 113929396-300/LINCOIN RANCH
Site Reference: GULL LAKE
Client ID: MW14-11

CCME Hydrocarbons (F2-F4 in water) 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.