



2014 PROGRAM REPORT
SOUTH ATHABASCA OIL SANDS AREA
REGIONAL GROUNDWATER MONITORING NETWORK

Report Prepared for:
ALBERTA ENVIRONMENT AND SUSTAINABLE RESOURCE DEVELOPMENT


Prepared by:
MATRIX SOLUTIONS INC.

March 2015
Calgary, Alberta

Suite 200, 150 - 13 Avenue SW
Calgary, Alberta, Canada T2R 0V2
Phone: 403.237.0606 Fax: 403.263.2493
www.matrix-solutions.com

2014 PROGRAM REPORT
SOUTH ATHABASCA OIL SANDS AREA
REGIONAL GROUNDWATER MONITORING NETWORK

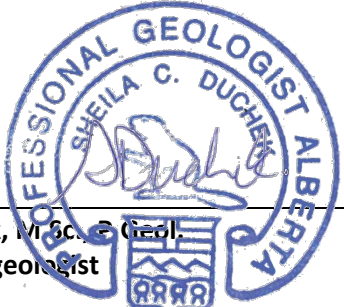
Report prepared for Alberta Environment and Sustainable Resource Development, March 2015




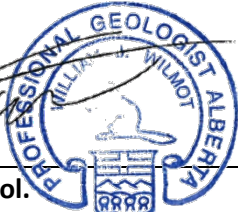
Sam Murphy, M.Sc., P.Eng.
Hydrogeologist

March 31, 2015

reviewed by

Sheila Duchek, M.Sc., P.Geol.
Senior Hydrogeologist

March 31, 2015



William Wilmot, P.Geol.
Senior Hydrogeologist

March 31, 2015

APEGA Permit to Practice
Permit No. P5540

DISCLAIMER

We certify that this report is accurate and complete and accords with the information available during the site investigation. Information obtained during the site investigation or provided by third parties is believed to be accurate but is not guaranteed. We have exercised reasonable skill, care and diligence in assessing the information obtained during the preparation of this report.

This report was prepared for Alberta Environment and Sustainable Resource Development. The report may not be relied upon by any other person or entity without our written consent and that of Alberta Environment and Sustainable Resource Development. Any uses of this report by a third party, or any reliance on decisions made based on it, are the responsibility of that party. We are not responsible for damages or injuries incurred by any third party, as a result of decisions made or actions taken based on this report.

EXECUTIVE SUMMARY

Alberta Environment and Sustainable Resource Development (ESRD) retained Matrix Solutions Inc. to conduct the 2014 groundwater monitoring program for the South Athabasca Oil Sands (SAOS) regional groundwater monitoring network. The scope of work for 2014 included conducting two monitoring events at the SAOS monitoring network; meeting with SAOS operators and ESRD to discuss monitoring programs in the SAOS area and identifying candidate monitoring locations for inclusion within the SAOS network; evaluating candidate industry monitoring locations based on priorities of the network development; and deploying the 2014 data on a web-based data viewer.

The monitoring network is being developed according to the guidance document by Matrix (2013) that provides a framework for the SAOS area and recommendations for key monitoring locations. The groundwater monitoring network is being implemented in a phased approach. Monitoring wells that were incorporated to the program in 2012 and 2013 were monitored and sampled in August and November (28 wells at 7 locations).

In December, ESRD and Matrix met with individual operators to discuss groundwater monitoring locations in their company's project areas that may be considered for incorporation to the SAOS monitoring network and solicit feedback on the development of the SAOS groundwater monitoring program. Operators provided an overview of existing monitoring locations, which were compared to previously proposed SAOS monitoring locations and investigation areas. Candidate locations that were discussed in these meetings underwent further evaluation in consideration of the SAOS monitoring program objectives and priorities. Ten monitoring locations with 23 completion intervals were ultimately selected for incorporation into the monitoring network, including wells and vibrating wire piezometers belonging to Cenovus Energy Inc., ConocoPhillips Canada Resources Corp., Devon Canada Corporation, and Nexen Inc. The rationale for selection, completion information, and historical monitoring data (where available) for each monitoring location are provided herein.

Water levels measured through 2014 at SAOS monitoring locations showed spatial variability, with recharge conditions at most locations. Unconsolidated aquifers showed stable groundwater levels, with seasonal fluctuations apparent in a few wells located adjacent to surface water bodies. Water levels in bedrock aquifers at locations with longer records show some changes and trends that may be related to withdrawal from and disposal to bedrock aquifers. It is recommended water level measurements continue to be recorded on a continuous basis at these wells.

To collect accurate temperature measurements from SAOS monitoring wells, the wells were instrumented with temperature gauges that were emplaced within each well screen. Data collected from the well screen gauges supersedes temperature data obtained above the wells screens, which was demonstrated to not accurately reflect the formation temperature.

The *Lower Athabasca Region Groundwater Management Framework* (ESRD 2012a) includes interim triggers for indicator parameters defined for the SAOS region (temperature increase, total dissolved

solids, chloride, arsenic, silica, boron, benzene, toluene, ethylbenzene and xylenes, and phenols); results from the 2014 SAOS program were compared to historical data and to SAOS interim groundwater quality triggers (GoA 2012). Interim triggers for hydrochemical parameters were exceeded in existing and recommended SAOS monitoring locations in every aquifer with active monitoring locations. The results indicated interim trigger values do not reflect the spatial variability of water conditions in key SAOS aquifers. Therefore, trigger values are recommended to be established for each aquifer at each established monitoring location (reference point) as benchmarks for assessing the status of the groundwater system.

It is recommended groundwater sampling be done semi-annually (at intervals of no less than 4 months) at ESRD-owned wells until final triggers are established. Final triggers may be established after two to three additional sampling events once there is sufficient data to reflect the range in variability of the data so that statistical methods can be employed. Specific recommendations are provided for each monitoring location and investigation area, related to instrumentation, groundwater monitoring frequency/parameters, and working with operators in the SAOS region to identify synergies with proposed/existing monitoring locations.

A web-based data viewer, referred to as the Client Data Portal (CDP), was developed in 2014 for ESRD to access and view all SAOS groundwater monitoring network data that are available to and stored on Matrix databases. Authorized individuals can provide feedback and recommendations to support data quality assurance/quality control beyond the current project completion date. Developing a publicly accessible web-based data viewer is recommended; the data viewer should build on the current data set and CDP developed by Matrix.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	iii
1 INTRODUCTION	1
1.1 Objectives	2
1.2 Scope of Work.....	2
2 BACKGROUND.....	2
2.1 South Athabasca Oil Sands Network Objectives.....	2
2.2 Framework for Regional Monitoring Network	3
2.2.1 Sub-networks	4
2.3 Regional Monitoring Network Implementation	5
3 GEOLOGY AND HYDROGEOLOGY	5
3.1 Groundwater Flow	8
4 METHODS.....	9
4.1 Safety Program	9
4.2 Groundwater Monitoring and Sampling.....	9
4.2.1 Monitoring Methods.....	10
4.2.2 Sampling Methods	10
4.2.3 Analytical Schedule.....	11
4.2.4 Instrumentation	11
4.3 Data Management Strategy.....	12
4.3.1 Web-based Data Viewer	12
4.4 Groundwater Management Framework.....	12
4.5 South Athabasca Oil Sands Groundwater Monitoring Network Development.....	14
5 RESULTS	14
5.1 Monitoring Locations Selected for Inclusion in SAOS Network.....	14
5.2 Revision to Interpreted Aquifer Extents	16
5.3 Summary Pages.....	16
5.3.1 Anzac (16-09-086-07 W4M) 494.1 m asl	17
5.3.2 Caribou (14-16-070-07 W4M) 660.7 m asl	18
5.3.3 Christina Crossing (05-36-084-04 W4M) 512 m asl	19
5.3.4 Conklin (11-30-076-07 W4M) 575 m asl.....	20
5.3.5 East Christina (04-14-076-05 W4M) 619 m asl.....	21
5.3.6 Graham (05-19-080-01 W4M) 505.4 m asl.....	22
5.3.7 Grist Lake (16-32-073-03 W4M) 635 m asl.....	23
5.3.8 House Crossing (07-36-077-15 W4M) 662.5 m asl	24
5.3.9 Kimowin (01-13-083-02 W4M) 468.6 m asl.....	25
5.3.10 Mariana Lakes (07-19-080-13 W4M) 692.9 m asl.....	26
5.3.11 Monday Creek (06-32-075-06 W4M) 601 m asl	27
5.3.12 Plamondon (10-26-068-16 W4M) 577.9 m asl	28

5.3.13	Sunday Creek (14-29-075-07 W4M) 657 m asl.....	29
5.3.14	Waddell Creek (08-27-080-09 W4M) 717.9 m asl	30
5.3.15	Wiau Lake (06-33-073-09 W4M) 667.0 m asl	32
5.3.16	Winefred Lake (16-04-075-05 W4M) 648.3 m asl	33
5.3.17	Watchusk Lake (05-14-083-03 W4M) 458 m asl.....	31
5.4	Regional Groundwater Summary	34
5.5	Temperature Comparison.....	34
6	KEY FINDINGS OF THE 2014 SAOS GROUNDWATER MONITORING PROGRAM	35
7	CONCLUSIONS.....	36
8	RECOMMENDATIONS	37
9	REFERENCES.....	38

FIGURES

FIGURE 1	In-Situ projects in the SAOS Area
FIGURE 2	SAOS Regional Groundwater Monitoring Network
FIGURE 3	Hydrostratigraphic Column
FIGURE 4	Regional Schematic Hydrostratigraphic Cross-sections
FIGURE 5	Uppermost Water Bearing Units
FIGURE 6	Sand River Aquifer
FIGURE 7	Ethel Lake Aquifer
FIGURE 8	Bonnyville Aquifer
FIGURE 9	Muriel Lake Aquifer
FIGURE 10	Empress Terrace Aquifer
FIGURE 11	Empress Channel Aquifer
FIGURE 12	Lower Grand Rapids Aquifer
FIGURE 13	Upper Clearwater Aquifer
FIGURE 14	Middle Clearwater Aquifer
FIGURE 15	McMurray Aquifer
FIGURE 16	Temperature Measurement Comparison

TABLES

TABLE 1	Seven Regulatory Framework Objectives Addressed by Proposed Groundwater Monitoring Well Network
TABLE 2	Monitoring Well Summary
TABLE 3	2014 SAOS Groundwater Sampling Summary
TABLE 4a	Industry-owned SAOS Monitoring Locations – Rationale for Selection
TABLE 4b	Industry-owned SAOS Monitoring Locations – Monitoring Well Summary
TABLE 5	Groundwater Quality Results - Field Parameters
TABLE 6	Groundwater Quality Results - General and Inorganic Parameters
TABLE 7	Groundwater Quality Results - Dissolved Metals
TABLE 8	Groundwater Quality Results - Dissolved Hydrocarbons & Naphthenic Acids
TABLE 9	Groundwater Quality Results - Polycyclic Aromatic Hydrocarbons
TABLE 10a	Water Quality Control Sample Results - Field Parameters
TABLE 10b	Water Quality Control Sample Results - General and Inorganic Parameters
TABLE 10c	Water Quality Control Sample Results - Dissolved Metals
TABLE 10d	Water Quality Control Sample Results - Dissolved Hydrocarbons
TABLE 10e	Water Quality Control Sample Results - Polycyclic Aromatic Hydrocarbons
TABLE 10f	Water Quality Control Sample Results - General and Inorganic Parameters - Blanks
TABLE 10g	Groundwater Quality Control Sample Results – Dissolved Metals
TABLE 10h	Groundwater Quality Control Sample Results - Dissolved Hydrocarbons & Naphthenic Acids
TABLE 10i	Groundwater Quality Control Sample Results - Polycyclic Aromatic Hydrocarbons
TABLE 11	SAOS Network Groundwater Quality Summary

APPENDICES

APPENDIX A	Groundwater Sampling and Quality Assurance/Quality Control Protocols
APPENDIX B	Matrix Client Data Portal - Getting Started
APPENDIX C	Laboratory Reports

1 INTRODUCTION

Alberta Environment and Sustainable Resource Development (ESRD) contracted Matrix Solutions Inc. to provide consulting services to monitor and sample the South Athabasca Oil Sands (SAOS) Area regional groundwater monitoring network in 2014, and to facilitate the expansion of the groundwater monitoring network by using existing infrastructure.

As part of the strategy to improve land-use decision-making in Alberta, the government, through the *Land-use Framework* (ESRD 2012b), created seven land-use regions and called for the development of a regional plan for each. The seven land-use regions included the Lower Athabasca Region, which comprises a substantial portion of the Athabasca oil sands area (approximately 82% of the province's oil sands resource and much of the Cold Lake oil sands area). The Athabasca River is the main source of water for oil sands mining activities, while groundwater provides the main source of water used for in situ oil sands activities in the region (GoA 2012).

The SAOS area is located within the Lower Athabasca Regional Planning area (ESRD 2012b), and covers an area of approximately 35,000 km², south of Fort McMurray, Alberta (Figure 1). The *Lower Athabasca Regional Plan 2012-2022* (LARP; GoA 2012) was released in September 2012. Aquifers in the region can potentially become affected by resource extraction development and other activities (ESRD 2012a). Bitumen recovery in the SAOS area is limited to in situ recovery techniques. Publicly disclosed in situ oil sands projects in the SAOS area are provided on Figure 1.

To support cumulative effects management at the regional level, the *Lower Athabasca Region Groundwater Management Framework* (GMF; ESRD 2012a) was developed, which encompasses three areas, including the SAOS area. The SAOS monitoring network was designed for assessing regional baseline conditions and to facilitate an understanding of potential cumulative effects from oil sands activities on regional groundwater quality and quantity. The monitoring network is being developed according to the guidance document created by Matrix (2013) that provides a framework for the SAOS area and recommendations for key monitoring locations (Figure 2). The framework outlined seven objectives of the regulatory framework that are addressed by the proposed groundwater monitoring well network (Table 1).

At the beginning of 2014, there were seven monitoring locations included in the SAOS groundwater monitoring network; these wells were established as part of Phase 1 of the SAOS monitoring network. The Phase 1 wells were monitored and sampled twice in 2014 (Figure 2, Table 2). Temperature gauges were installed within the well screens during the summer monitoring event to obtain accurate temperature measurements from the well screens. The 2014 field program is summarized in Table 3.

A review of operator-owned monitoring locations was conducted in collaboration with industry to identify suitable candidates for incorporation within the SAOS regional monitoring network. Monitoring

locations were selected and historical data was obtained from operators; the new locations are provided herein.

1.1 Objectives

The following are the objectives of this document:

- discussing the SAOS groundwater monitoring network framework outlined in the *Framework for Development of a Regional Groundwater Monitoring Network - Interim Report, Southern Athabasca Oil Sands Area* (Matrix 2013)
- describing the existing SAOS regional groundwater monitoring network
- describing work completed in 2014
- discussing key findings of the 2014 results
- providing recommendations for further development of the SAOS monitoring program
- provide access to data for the SAOS groundwater monitoring network with Client Data Portal (CDP), a web-based data viewer

1.2 Scope of Work

The scope of work for the 2014 SAOS groundwater monitoring program included the following:

- sampling ESRD-owned monitoring wells twice in 2014
- installing temperature gauges within the well screens at each monitoring location
- comparing temperature readings between instruments hung above or within the well screen and evaluate the effect of instrument hang depth on temperature recordings
- meeting with operators in the SAOS region to identify industry-owned monitoring locations that may meet the objectives of the regional monitoring network
- evaluating candidate monitoring locations owned by industry and incorporating a subset of locations into the SAOS regional groundwater monitoring network
- presenting the 2014 data using CDP
- preparing recommendations for the 2015 SAOS regional groundwater monitoring program

2 BACKGROUND

2.1 South Athabasca Oil Sands Network Objectives

The objectives of the SAOS monitoring network are to increase the understanding of the regional hydrogeological setting by establishing a monitoring network for strategic, investigative and surveillance purposes. Monitoring locations within the SAOS groundwater monitoring network represent a subset of groundwater conditions within the SAOS region and these locations may not necessarily exemplify the

variability in groundwater conditions. Rather, the SAOS groundwater monitoring locations represent reference locations for monitoring. The objectives of the monitoring network include the following:

- providing further understanding of natural variability of groundwater conditions
- providing adequate coverage in each key regional aquifer and baseline conditions where possible
- assessing long-term groundwater quality and water level trends, and assessing potential cumulative effects from current and future development activities
- providing data to support development of regional triggers and limits for indicator parameters in key aquifers
- gaining further understanding of regional aquifer interactions, and how/where the groundwater system is connected to surface environments
- collecting relevant information to support the analysis of groundwater-surface water interactions
- providing information to better understand natural groundwater discharge and constituent flux to the Athabasca and Clearwater rivers
- identifying potential areas that may require additional monitoring
- generating data with which cumulative effects predictions can be improved
- reporting and communicating the results to the public

2.2 Framework for Regional Monitoring Network

A guidance document regarding the development of the SAOS regional groundwater monitoring network was prepared for ESRD (Matrix 2013). The document's intent was to provide direction in developing a balanced, objective and practical network including the following:

- meeting the objectives of ESRD's Terms of Reference
- being consistent with Alberta's regulatory framework and goals
- incorporating previous regional groundwater monitoring initiatives in the SAOS area
- assessing and incorporating previous groundwater monitoring network proposals
- focusing on current and future in situ oil sands activities and potential effects on groundwater resources
- assessing available existing industry groundwater monitoring wells where access has been granted
- considering the current understanding of the hydrostratigraphy and groundwater flow (the conceptual model) for the region, specifically areas of potential concern
- providing ESRD with guidance on how to proceed with implementing the proposed groundwater monitoring well network
- recommending effective strategies for ESRD to manage SAOS area groundwater resources

Table 1, originally provided in the guidance document (Matrix 2013), outlines seven objectives of the Lower Athabasca Region GMF (ESRD 2012a) that have been addressed by the SAOS groundwater

monitoring network. The guidance document also recommended locations that to build on knowledge of the conceptual model, including the following:

- lakes and rivers
- aquifer extent
- aquitard extent (Colorado Group Aquitard)
- bedrock incisions
- drift thickness
- recharge versus discharge
- aquifer salinity
- in situ oil sands groundwater users and gas production
- shallow groundwater users

Budgetary constraints were an important consideration for the SAOS regional monitoring network design. Matrix (2013) outlined factors that may influence budget, including safety, access, synergies, and sampling limitations.

2.2.1 Sub-networks

Monitoring locations within the SAOS groundwater monitoring network have been categorized into four sub-networks to fulfill different objectives. The following types of monitoring were considered in terms of both groundwater quality and quantity:

- Strategic monitoring is typically beyond anthropogenic influence and aims to identify background levels and trends. These monitoring locations have been classified as sub-network A.
- Surveillance monitoring provides early warning of threshold exceedances and an understanding of cumulative effects. These monitoring locations have been classified as sub-network B.
- Operational or compliance monitoring is linked to a specific purpose and regulations. This type of monitoring is currently done by operators in the SAOS region; therefore, it not included with the SAOS regional groundwater monitoring network.
- Investigative monitoring is linked to monitoring areas of special interest (i.e., areas of potential aquifer interaction). These monitoring locations were considered to be sub-network C. Three “investigation areas” were identified within the SAOS boundaries by Matrix (2013 and 2014). The investigation areas were targeted for network expansion with sub-network C monitoring locations. As described in Section 4.5.1.1, locations have since been established for monitoring in these areas. These areas may still require special consideration for monitoring, but differentiating these areas as a different sub-network is no longer warranted.

2.3 Regional Monitoring Network Implementation

The SAOS regional groundwater monitoring network should be implemented in a phased approach (Matrix 2013). Development will be an iterative process to optimize logistics, budget, and synergies.

In November 2012, Phase 1 of the SAOS network development began, and 19 monitoring wells were installed within the drift at five monitoring stations. In all, 14 wells were classified as sub-network A and five were classified as sub-network B. Two monitoring wells were existing AGS wells that were re-purposed for the SAOS network (classified as sub-network A). The five monitoring locations are shown on Figure 2:

- Plamondon
- House Crossing (existing Alberta Geological Survey [AGS] completions in the water table aquifer [WR99-1-230] and Empress Channel Aquifer [WR99-1-8])
- Mariana Lakes
- Waddell Creek
- Conklin

Phase 2 of the network development focused on heavily used (projected use) aquifers and addressed two investigation areas outlined by Matrix (2013). In 2013, Phase 2 was implemented and two existing AGS completions were identified:

- Wiau Lake (formerly named WEPA 00-1; sub-network A)
- Winefred Lake (formerly named WEPA 00-3; sub-networks A and B)

Monitoring wells from both locations are now owned by ESRD and were established as SAOS groundwater monitoring locations in 2013. Historical water level data for the Phase 2 monitoring wells (former AGS wells) are available in Lemay and Jean (2002).

3 GEOLOGY AND HYDROGEOLOGY

This section provides an overview of the conceptual model of geology and hydrogeology of the SAOS region (Matrix 2013). The conceptual model is expected to evolve as data is collected. Information sources may include data obtained from either new well installations or reviewing completion information from existing wells; other regional studies; environmental impact assessments (EIAs); and continued compliance monitoring and reporting.

The base of sedimentary deposits in the SAOS region is the Pre-Cambrian basement. Overlying the igneous and metamorphic rocks of the Pre-Cambrian basement deposits are the Devonian-aged carbonate deposits. Siliciclastic Cretaceous-aged deposits overlie the Devonian carbonate, evaporitic and siliciclastic deposits. Overlying the siliciclastic deposits are unconsolidated

Neogene/Quaternary-aged siliciclastic deposits. In certain locales, Neogene/Quaternary incision (buried bedrock channels) into the Cretaceous-aged deposits can be substantial.

A hydrostratigraphic column is provided on Figure 3; cross-sections illustrating key hydrostratigraphic units and their general relationship to one another are provided on Figure 4. These cross-sections represent general concepts and were not intended to represent geologic reality.

In addition to local shallow aquifers or water table aquifers (Figure 5), key Neogene/Quaternary aquifers in the SAOS region include the following:

- **Sand River Aquifer** (Figure 6): The Sand River Aquifer likely outcrops at surface near the unit's extent (Figure 4).
- **Ethel Lake Aquifer** (Figure 7): The Ethel Lake Aquifer is believed to intersect Christina Lake (Figure 4).
- **Bonnyville Aquifer** (Figure 8)
- **Muriel Lake Aquifer** (Figure 9)
- **Empress Terrace Aquifer** (Figure 10): The Empress Terrace Aquifer was interpreted to be discontinuous from the Empress Channel Aquifer (Figure 4).
- **Empress Channel Aquifers** (Figure 11): For this report, all deposits in every incision, regardless of morphology, are referred to as Empress Channel Aquifer deposits. However, it is interpreted the deposits in these channels show both aquifer and aquitard properties. For pre-glacial fluvial channels, there are conceptually two aquifers separated by an aquitard (Andriashek 2003; Figure 3). For melt water or tunnel channels, the deposits are conceptualized to be a more unsorted, heterogeneous (undifferentiated) mixture of coarse- and fine-grained deposits (Figure 3). Incisions of the Christina Buried Bedrock Channel have been interpreted to erode into the Grand Rapids Formation (Figure 4). The Gregoire Channel has been interpreted to erode through Cretaceous-aged deposits (Figure 4). Nexen and OPTI Canada Inc. (2006) has confirmed that the hydraulic conductivity of the Gregoire Channel deposits is generally lower than that of other Empress Channel deposits (Matrix 2013). This suggests Gregoire Channel deposits are different from other Empress Channel deposits and grouping them together may not be completely appropriate. The geometry and connectivity of these channel aquifers to Cretaceous aquifers affects the groundwater flow regime in both the channel and Cretaceous aquifers. Locations of incisions into Cretaceous units are areas that may be more susceptible to aquifer interactions (i.e., vertical propagation of pressure effects and potential quality effects).

Key Cretaceous-aged aquifers identified in the SAOS region include the following:

- **Lower Grand Rapids Aquifer** (Figure 12): The Lower Grand Rapids Aquifer is present throughout much of the SAOS area, except along the Athabasca River (downstream of the Grand Rapids), along the Clearwater River, along lower portions of the Christina River and within the Gregoire Buried Bedrock Channel (Figures 4 and 12). In the southwest portion of the SAOS area (along the Athabasca River), some bitumen is present in the Grand Rapids Formation and is potentially in contact with non-saline groundwater resources. Gas has been identified in the Grand Rapids Formation, particularly in the southern portions of the SAOS area.
- **Upper Clearwater Aquifer** (Figure 13): The Upper Clearwater Aquifer is present in the northern portion of the SAOS area. The Upper Clearwater Aquifer may intersect the Athabasca River in the northwest and the lower reaches of the Christina River/Gregoire Buried Bedrock Channel (Figures 4 and 13). Current gas production is occurring in this unit.
- **Middle Clearwater Aquifer** (Figure 14): The Middle Clearwater Aquifer is present in the middle section of the SAOS area and is not interpreted to intersect surface. Current gas production occurs in this unit.
- **Basal McMurray Aquifer** (Figure 15): The Basal McMurray Aquifer is mainly present along the eastern portion of the SAOS area. The Basal McMurray Aquifer is interpreted to outcrop along the Athabasca River near Fort McMurray, along the Alberta portion of the Clearwater River, and along the lower reaches of the Christina River and is also interpreted to subcrop in the Gregoire Buried Bedrock Channel (Figures 4 and 15). Gas is often present in the thick eastern portion of this aquifer and generally, within the SAOS area, the aquifer is saline. The McMurray Formation is the main bitumen reservoir in the SAOS area.

Other Cretaceous units of note in the SAOS area include the Viking, Wabiskaw, and Clearwater C sand units (Figure 3). These sand units do not currently have any proposed groundwater demand in the SAOS area. In addition, these units are either of marginal thickness, marginal sandiness, or localized extent. For these reasons, these units were not considered to be key aquifers in the SAOS region (Matrix 2013).

Key Cretaceous-aged aquitards based on relationship to aquifers under planned stress include the following:

- **McMurray Bitumen Aquitard:** This unit is present over most of the SAOS area except in the east SAOS area along the Saskatchewan border. Where it exists, it is an effective barrier to vertical and horizontal groundwater flow.
- **Clearwater Shale Aquitard:** Although relatively thin, this unit provides an effective barrier to groundwater flow between the Upper Clearwater Aquifer and Lower Grand Rapids Aquifer,

as evidenced by the presence of gas in the Upper Clearwater Aquifer. In general, the Clearwater Formation has many fine-grained deposits that act as effective barriers to groundwater flow.

- **Colorado Group Aquitard:** This thick marine shale unit is an effective barrier to groundwater flow. It is present in most of the SAOS area, except along portions of the Athabasca, Clearwater, and Christina rivers (Figure 4). This unit has also been completely eroded in the Christina and Gregoire buried bedrock channels. Regions where this unit is not present are likely more susceptible to interactions between deep and shallower aquifers (aquifer interaction; Figure 4).

3.1 Groundwater Flow

Groundwater flow in the SAOS area is an interconnected system. The SAOS area has its own unique groundwater flow characteristics but is also part of a larger, basin-wide groundwater flow system. All key units identified in this report for the SAOS area are interconnected to varying degrees, none of which are totally confined, nor isolated, from one another.

The SAOS area is located at the distal edge of the Western Canadian Sedimentary Basin (WCSB). Regionally, groundwater flow in the WCSB originates in the topographic high of the Rocky Mountains and flows hundreds of kilometres across the province through deep sedimentary units (Cretaceous and Devonian-aged units for example). Groundwater discharges along major rivers adjacent to the Canadian Shield (surface outcrop of the Pre-Cambrian basement). The Athabasca River is such a discharge point, where deep, old, and saline groundwater from the WCSB discharges to surface.

Overlying this deep regional groundwater flow in the SAOS area is a shallower flow regime. In general, groundwater is recharged in the topographic highlands (Stony Mountain Uplands, Mostoos Hills, and May Hills) in the SAOS area (Barson et al. 2001). Shallowest groundwater discharges to numerous adjacent streams, rivers, and lakes throughout the SAOS area. Deeper groundwater (deeper Quaternary and Cretaceous-aged sediments) discharges to major rivers in the SAOS area (Athabasca, Clearwater, and Christina rivers). Interpreted groundwater flow for key aquifers in the SAOS region is described and illustrated in Matrix (2013).

Key groundwater flow observations include (Matrix 2013):

- Key SAOS specific discharge areas include the Athabasca and Clearwater rivers, and the lower reaches of the Christina River.
- A regionally significant discharge point is the Wiau Channel (from the western end) into the Athabasca River. Springs at this location were documented by Stewart (2003).
- Relatively low groundwater flow gradients have been observed in the Christina and Wiau channels near Saskatchewan. Groundwater flow direction in these channels is uncertain near the provincial boundary due to lack of data.

- Groundwater mounding is interpreted in the Lower Grand Rapids Aquifer beneath the Christina Channel (near the Sunday Creek Channel tributary); beneath the Stony Mountain Uplands; and near the Gregoire Channel (Matrix 2013). Apparent mounding near deep channel incisions suggests water levels in the Grand Rapids may be sensitive to water levels in upper units (or surface) near the Christina and Gregoire Channel incisions (i.e., aquifer interactions). Mounding beneath the Stony Mountain Uplands is evidence of how topography can be a major influence on groundwater flow, even for deep aquifers.
- Similar to the Grand Rapids Aquifer, groundwater mounding in the Upper and Middle Clearwater aquifers is observed in the same locations, albeit more muted.
- Groundwater mounding is apparent below the Stony Mountain Uplands in the McMurray Formation. The hydraulic gradient is relatively flat in the high permeability sediments of the Basal McMurray Aquifer (eastern part of SAOS area) suggesting horizontal flow in this unit northward to the Clearwater and Christina rivers.

4 METHODS

4.1 Safety Program

Matrix personnel were required to comply with legislated, Matrix, and ESRD health and safety standards.

4.2 Groundwater Monitoring and Sampling

The following subsections outline Matrix's approach to achieving the 2014 SAOS regional groundwater monitoring program objectives. Existing and proposed SAOS regional groundwater monitoring well locations are provided on Figure 2.

4.2.1 Monitoring Methods

Two groundwater monitoring and sampling events were completed in 2014; a summary of the field programs is provided in Table 3. At each field visit, every well was assessed for physical condition and static water levels.

Before sampling, in accordance with standard practices (Matrix 2012), each well was monitored for the presence/absence of non-aqueous phase liquids, depth to the groundwater surface (from the top of the monitoring well casing), and depth to the bottom of the well, using an electronic oil/water interface probe and/or an electronic water level tape. Water levels were referenced to the top of casing. Pressure transducers were downloaded and the instrument checked to make sure there was adequate recording capacity until the next monitoring cycle next year.

The first event was completed between August 24 and 30, 2014, with groundwater samples collected from all 28 wells.

The second event was completed between November 15 and 19, 2014, with groundwater samples collected from 27 of the 28 wells at the 7 sites. Samples were not collected from House Crossing 77-15-231 (Empress Channel Aquifer completion) due to problems with the equipment (very cold temperatures made it difficult to collect samples from greater than 200 m depth).

4.2.2 Sampling Methods

To complete the field sampling program, selection of sampling methods considered a study completed for the Cumulative Environmental Management Association (Matrix 2012). This study provided a summary of “best practices” guidelines for groundwater monitoring and sampling specifically within the oil sands region of the Regional Municipality of Wood Buffalo. The study reviewed four main sampling methods, including the advantages and limitations for each method.

According to the Matrix (2012) report, choosing the most applicable sampling device and method for a specific type of well and site location should be based on the following factors:

- site-specific sampling objectives
- type of laboratory analyses required to meet the objectives
- geology and hydrogeology at the screened interval, including the length of screen
- site conditions and site access
- health and safety requirements
- regulatory requirements
- purge water disposal

After considering the above, low-flow sampling methods were deemed to be the most suitable for deeper wells (greater than 20 m), larger diameter wells, and/or wells completed in higher permeability

units is low-flow purging. This method was used to sample the majority of SAOS monitoring wells. Details on the low-flow sampling methods and data quality assurance/quality control (QA/QC) protocols are included in Appendix A. For shallow wells (less than 20 m) and/or wells completed in low permeability units, the preferred method is fixed-volume purging; this method was used to sample the shallowest wells at each location (Appendix A).

Low-flow purge-method sampling was completed using the Geotech GeoSub pump or the Solinst® bladder pump, depending on the surface to groundwater depth.

4.2.3 Analytical Schedule

Before sampling, purged groundwater was monitored for field parameters (pH, electrical conductivity, and temperature). Once the parameters stabilized, groundwater samples were collected into laboratory-supplied containers, placed in a cooler with ice and submitted to ALS Environmental in Fort McMurray, Alberta. Laboratory analysis included the following parameters:

- major ions
- pH, conductivity and total alkalinity
- ammonia (NH₃-N), nitrate (NO₃), and nitrite (NO₂)
- dissolved organic carbon
- dissolved metals
- turbidity
- phenols
- benzene, toluene, ethylbenzene, and xylenes (BTEX) and petroleum hydrocarbons fraction 1 (C₆-C₁₀, excluding BTEX) and fraction 2 (C_{>10}-C₁₆)
- polycyclic aromatic hydrocarbons
- naphthenic acids

4.2.4 Instrumentation

During the August field event, 25 wells were instrumented with Nautilus 85 temperature gauges (manufactured by ACR Systems Inc.; ACR 2012), which were emplaced within each well screen (Table 3). Three wells previously had Nautilus 85 gauges emplaced within the well screens (Conklin 76-07-67, Mariana Lakes 80-13-134, and Plamondon 68-16-70). The newly installed temperature gauges were programmed to record temperatures at 30-second intervals.

Additionally, one well at the House Crossing location (House Crossing 77-15-161, completed in the Muriel Lake Aquifer) had temperature gauges (HOBO® TidbiTs; Onset 2015) hung along a single wire at depths corresponding with the screens of two shallower nested wells at this location (Ethel Lake Aquifer at House Crossing 77-15-82 and Bonnyville Aquifer at House Crossing 77-15-126) and within the well screen (Table 3). This was done to assess the accuracy of this “well string” configuration compared to

temperatures measured in the well screen of the same well, and in the well screens of wells adjacent to the gauges.

4.3 Data Management Strategy

The program data management strategy ensures the integrity of field data collection, QA/QC protocol of laboratory and other field data, storage, analysis, and data presentation.

Field data were recorded using standard groundwater sampling forms and field notes. Groundwater samples submitted to the laboratory were recorded using triplicate chain-of-custody forms documenting sample identification numbers, analytical parameters, shipping, and reporting details for each sample submitted. The analytical data were stored and accessed in EQUiS (a Matrix company-wide platform to manage environmental data), and the wells information, pressure and temperature data were stored and managed in Matrix's Physical Hydrogeology Database. All data entered into the Matrix databases were reviewed and verified as part of Matrix quality assurance procedures.

Details on the data management and QA/QC processes are included in Appendix A.

4.3.1 Web-based Data Viewer

The CDP provides a web-based platform for accessing and viewing all SAOS groundwater monitoring network data that are available and stored on Matrix databases. CDP enables rapid data access and supports a QA/QC process for the entire SAOS dataset. CDP works through a web browser and allows authorized individuals view and download their physical hydrogeological time series data, which are already in Matrix databases including hydraulic heads and temperatures. Charts of key chemistry indicators over time, generated by a script from Matrix EQUiS database, are also available in CDP as PDF documents. Details on full CDP functionality are included in Appendix B.

Authorized individuals at ESRD and members of the SAOS technical committee are provided access to CDP (via a unique username and password issued by Matrix), through March 31, 2016. SAOS technical committee members can use the data viewer to identify any issues related to data quality, especially those who provided data for the recommended SAOS groundwater monitoring locations. Members can provide feedback and recommendations on data quality discrepancies and/or on the utility of the data viewer to support data QA/QC beyond the current project completion date. While efforts will be made to address all issues related to the web viewer, Matrix is not committed to address issues and the amount of effort that will be required beyond the March 31, 2015, project end date.

A copy of the entire SAOS dataset is provided to ESRD as part of the data deliverables for this project.

4.4 Groundwater Management Framework

The GMF for the Lower Athabasca Region encompasses three areas, including the SAOS area (GoA 2012). In terms of groundwater quantity, the GMF objective is to ensure groundwater resources

continue to support human and ecosystem needs and maintain the regional flow system integrity. For groundwater quality objectives, the intention of the GMF is to establish limits that reflect natural variability. Regional groundwater quality triggers serve as early warnings for a negative change from natural variability and represent a condition beyond which the impact potential is considered unacceptable.

The GMF includes interim triggers for indicator groundwater quality parameters. The interim triggers were established based on regional knowledge and professional judgment, or based on descriptive statistics derived from available data (GoA 2012). The GMF acknowledges there is a wide range of groundwater quality conditions within the SAOS region and defining a suitable trigger for any location in a given aquifer is difficult. As such, the interim triggers will evolve with more data. Final trigger values could include multiple triggers within a single aquifer; this would reflect the spatial variability of groundwater quality parameters.

Analytical results from the 2014 SAOS program were compared to the interim groundwater quality triggers for the SAOS area. A list of the interim trigger values is provided in Table A.

TABLE A Interim Regional Groundwater Quality Triggers for the South Athabasca Oil Sands Area

Interval	Temperature Change ¹	TDS ^{1,2}	Cl ¹	NO ₃ ¹	As ²	Si ¹	B ¹	BTEX ¹	Phenols ¹
Surficial Deposits	5°C	600 ¹	50	0.05	0.003	10	0.2	<10% DF	0.005
Buried Channels	2°C	1,000 ¹	100	0.01	0.003	10	0.4	<10% DF	0.005
Grand Rapids Formation	2°C	2,000	1,000	0.01	0.003	10	1.0	<10% DF	0.010
Clearwater Formation	2°C	3,500	1,000	0.01	0.003	10	1.5	<10% DF	0.010
McMurray Formation	2°C	3,500	1,500	0.01	0.003	10	2.0	<10% DF	0.010

Concentrations are shown in mg/L.

¹Values selected based on regional knowledge and professional judgment.

²Value represents the 75th percentile of data from the existing database for each identified interval.

TDS - total dissolved solids

Cl - chloride

NO₃ - nitrate

As - arsenic

Si - silica

B - boron

BTEX - benzene, toluene, ethylbenzene, and xylenes

DF - detection frequency (parameter measured above detection limit)

4.5 South Athabasca Oil Sands Groundwater Monitoring Network Development

The SAOS groundwater monitoring network should be implemented in a phased approach (Matrix 2013). In 2014, ESRD collaborated with industry to identify existing completions that could be incorporated into the SAOS groundwater monitoring network. Matrix (2013) identified investigation areas and provided proposed monitoring station locations to guide the network development. Existing completions were compared to Matrix (2013) proposed locations and investigation areas and priorities were assigned. Recommendations for monitoring locations provided in Matrix (2014) were also considered. The following sections describe the process of expanding the SAOS regional groundwater monitoring network and outlines the upgrades that have been made since 2013.

4.5.1.1 Operator Consultation on Industry Monitoring Locations

Operators in the SAOS area were contacted early in the SAOS network development process to identify industry-owned monitoring locations that could be incorporated into the network (Matrix 2013, 2014). To continue this process, Matrix and ESRD met with individual operators to discuss potential monitoring locations in their company's project area and solicit feedback regarding the SAOS groundwater monitoring program. Meetings took place with Statoil Canada Ltd., MEG Energy, Canadian Natural Resources Limited, Husky Energy Ltd., Cenovus, ConocoPhillips, Devon, Athabasca Oil Corporation, and Nexen between December 9 and 16, 2014. Operators provided an overview of existing monitoring locations, including wells and vibrating wire piezometer (VWPs), which were compared to the locations of previously proposed SAOS monitoring locations and investigation areas (Matrix 2013). After the meetings, a subset of locations was evaluated considering the overall SAOS program objectives and priorities. Candidate monitoring locations included those that were distal to active or planned groundwater withdrawal or wastewater disposal, located near to areas of concern, have good spatial aquifer coverage, have sufficient data, are accessible, and have nested locations.

Three investigation areas within the SAOS region were identified in previous reports (Lower Christina River, and Christina and Gregoire channels; Matrix 2013). To strengthen the SAOS network, the candidate wells within these areas were prioritized. Several of the new monitoring locations provided herein fulfill that objective; therefore, wells within these investigation areas were classified as sub-network C. That designation implies the monitoring locations are situated near intensive in situ oil sands development; therefore, monitoring wells are more likely to show impacts to groundwater conditions than locations in sub-networks A and B.

5 RESULTS

5.1 Monitoring Locations Selected for Inclusion in SAOS Network

The industry-owned monitoring locations that were selected for inclusion within the SAOS regional groundwater monitoring network are provided in Table 4a, along with the selection rationale.

Completion details and monitoring data for 2014, where available, are provided in Table 4b. Locations of the selected wells are indicated on Figure 2.

There were ten monitoring locations with existing monitoring infrastructure owned by industry that are now part of the current SAOS groundwater monitoring network:

- seven completions owned by ConocoPhillips at four locations
 - ✦ **Watchusk Lake:** two bedrock aquifers wells in the former Lower Christina River Investigation Area
 - ✦ **Christina Crossing:** one bedrock aquifer well in the former Lower Christina River Investigation Area
 - the Christina Crossing station is approximately 6 km southeast of the originally proposed location (as provided in Matrix 2013)
 - ✦ **Graham:** two bedrock aquifer wells (proposed in Matrix 2013)
 - ✦ **Kimowin:** two bedrock aquifer wells (proposed in Matrix 2013)
- five completions owned by Cenovus at two locations
 - ✦ **Caribou:** one VWP with sensors in two bedrock aquifers (proposed in Matrix 2013)
 - ✦ **East Christina:** three nested wells and one VWP with sensors in three bedrock aquifers in the former Christina Channel Investigation Area
- four completions owned by Devon at three locations
 - ✦ **Monday Creek:** two monitoring wells in the former Christina Channel Investigation Area
 - ✦ **Sunday Creek:** one monitoring well in the former Christina Channel Investigation Area
 - ✦ **Grist Lake:** one monitoring well with sensors in two bedrock aquifers and one unconsolidated aquifer
- Two completions owned by Nexen at one location
 - ✦ **Anzac:** two monitoring wells in the former Gregoire Channel investigation area

Consultation with operators also included discussions about candidates for future locations that do not currently have monitoring completions:

- **Winefred River:** location was proposed in Matrix (2013); an existing well pad (RD2) owned by Cenovus at this location has an all-weather road for access. This is a candidate for new monitoring wells to be installed.
- A monitoring well owned by Nexen is completed in the Lower Grand Rapids Aquifer at 03-36-084-02 W4M, west of Garson Lake. This is a remote location (helicopter access only) with no existing monitoring equipment installed. Nexen would consider instrumenting this well with a data

logger and would allow ESRD to monitor the well as part of the SAOS groundwater monitoring program.

5.2 Revision to Interpreted Aquifer Extents

Additional data was provided by SAOS operators for new monitoring locations; this data was reviewed for consistency with the SAOS hydrostratigraphic framework. Based on this new information, the interpreted extents of several key aquifers were modified from the original aquifer extents presented in Matrix (2013). Modified aquifer extents include: Sand River (Figure 6; extended near Monday Creek station), Ethel Lake (Figure 7; truncated near Grist Lake station), Bonnyville (Figure 8; extended near Grist Lake, truncated near East Christina station and west of Winefred Lake), Empress Terrace (Figure 10; truncated near Grist Lake station), Empress Channel (Figure 11; extended near Grist Lake Station) and McMurray (Figure 15; truncated near East Christina station) aquifers.

5.3 Summary Pages

The results for the existing and recommended SAOS regional groundwater monitoring network are provided on the following summary pages. Each page presents the following:

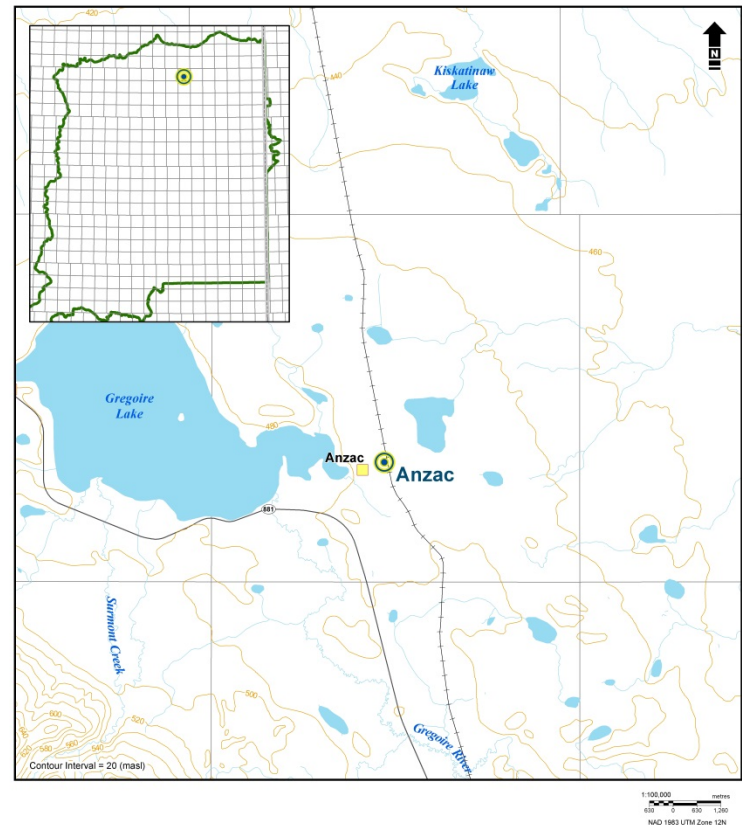
- information about each site and how it addresses SAOS network objectives
- charts showing time series data for hydraulic heads, temperatures, and total dissolved solids (TDS) concentrations
- charts showing the range of hydraulic heads, temperatures and TDS concentrations in each aquifer
- comments and specific recommendations for the monitoring station

Hydrochemistry results are provided in Table 5 (Field Parameters), Table 6 (General and Inorganic Parameters), Table 7 (Dissolved Metals), Table 8 (Dissolved Hydrocarbons & Naphthenic Acids), and Table 9 (Polycyclic Aromatic Hydrocarbons). Data quality evaluation procedures are provided in Appendix A, and QA/QC tables are provided in Tables 10a to 10i. Laboratory reports are included in Appendix C.

Summary pages for all 17 SAOS monitoring locations are provided in the following sections.

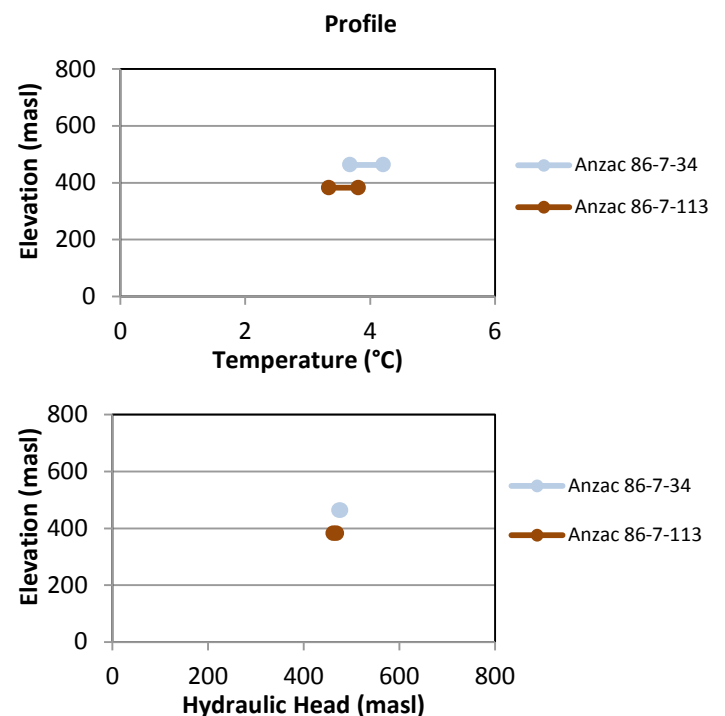
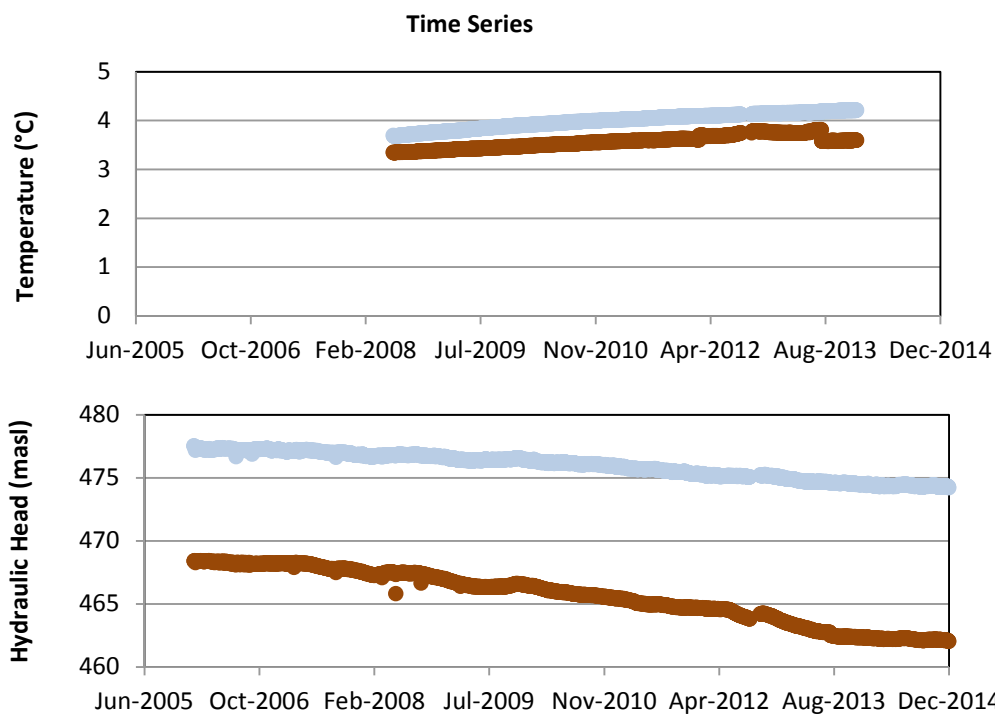
ANZAC (16-09-086-07 W4M) 494.1 masl

Location Objective	Support development of sub-network C
Key Rationale	<p>Near town of Anzac and a major water body (Gregoire Lake)</p> <p>Close to Gregoire Channel Investigation area as identified in Matrix (2013)</p> <p>Near to deep incision to Cretaceous succession</p> <p>High density of in-situ oil sands existing and proposed source and disposal wells</p> <p>High predicted drawdown for Empress Channel, Lower Grand Rapids and Upper Clearwater aquifers</p> <p>RAMP and WSC sites nearby</p>
Safety, Access, Synergies and Priorities	<p>Synergy with Nexen 1WM/16-09-086-07W4/00 and 1WM/16-09-086-07W4/02.</p> <p>Continuous pressure monitoring conducted as part of Water Act groundwater monitoring (licence no. 235896-01-00)</p>



Aspects of Conceptual Model	
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Recharge
Colorado Group Aquitard Extent - Absent	Gas Production - Proximal
Bedrock Incisions - Proximal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thin	Shallow Local Groundwater Users - Distal

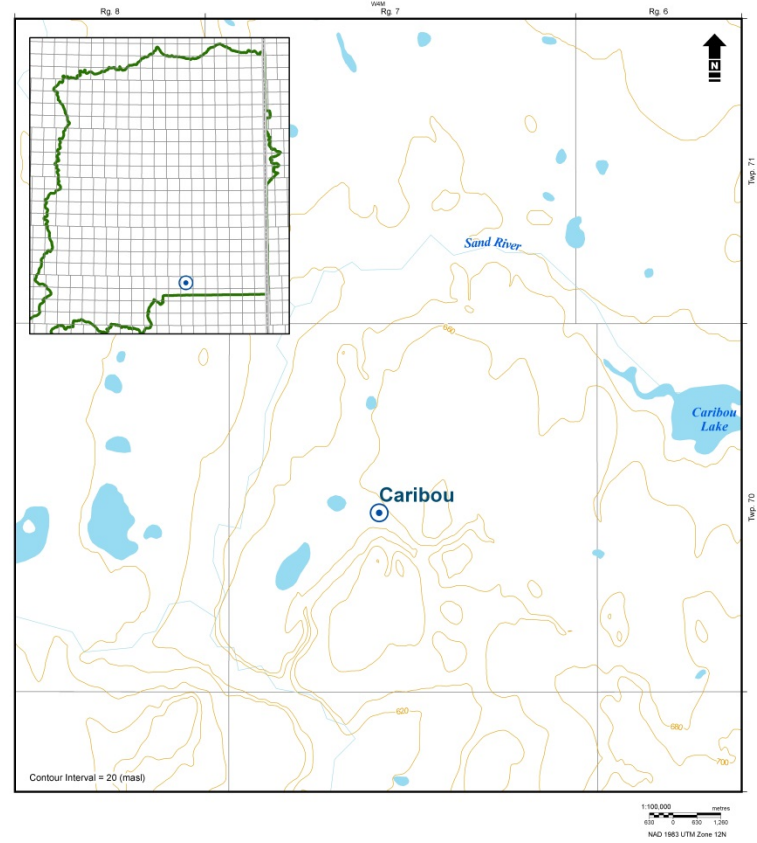
SAOS Well Name	UWI or Well Name	Screened Interval (mbgs)	Owner	Interpreted Aquifer	Sub-Network
Anzac 86-7-34	1WM/16-09-086-07W4/02	28.0 – 34.0	Nexen	Near surface	C (investigative)
Anzac 86-7-113	1WM/16-09-086-07W4/00	109.8 – 113.0	Nexen	Lower Grand Rapids	C (investigative)



Notes
Wells have been monitored semi-annually as part of <i>Water Act</i> groundwater monitoring program. Station is considered to be investigative (sub-network C) due to proximity to existing and proposed source and disposal wells (potential influence to aquifer pressures) and areas of potential aquifer interactions (Gregoire Channel).
Hydraulic heads have indicated a downward vertical hydraulic gradient from surface to the Lower Grand Rapids Aquifer. Groundwater temperatures have increased by approximately 0.5°C since 2008 in both units.
Nexen will continue monitoring these wells and provide ESRD with pressure data as it becomes available.

CARIBOU (14-16-070-07 W4M) 660.7 m asl

Location Objective	Support development of sub-networks A and B as per Matrix (2013)
Key Rationale	Moderately close to in situ oil sands Lower Grand Rapids Aquifer demand Existing VWP is more than 10 km away from any existing or proposed source/disposal wells
Safety, Access, Synergies and Priorities	Proximal to Grand Rapids, Clearwater and McMurray current gas production - but still several kilometres away Synergy with Cenovus CVE FCCL D14 FISHER 14-16-70-7 (1AA/14-16-070-07W4M) Remote access

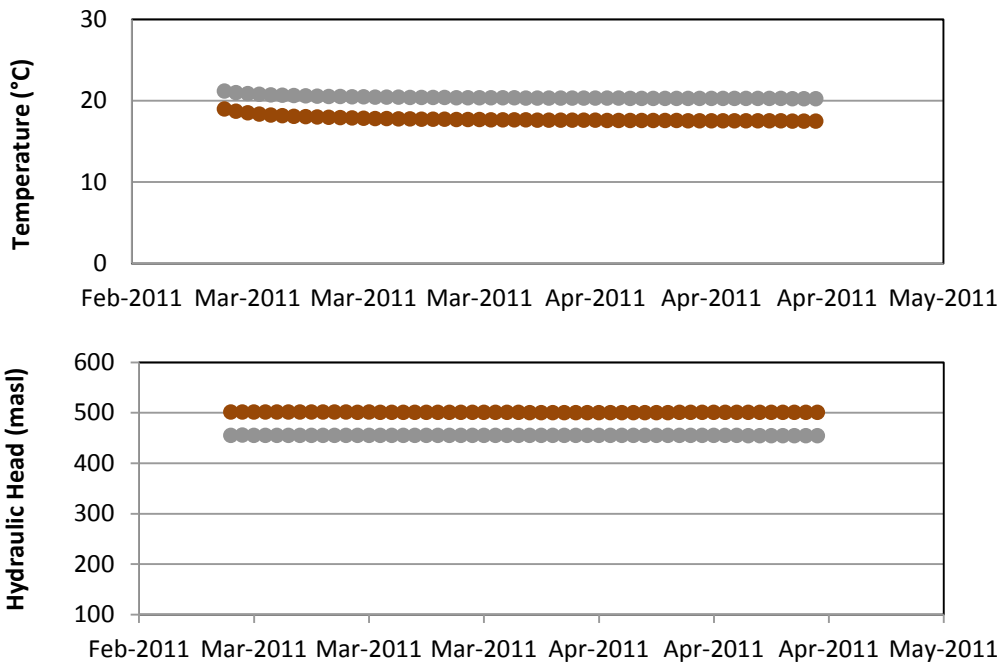


Aspects of Conceptual Model

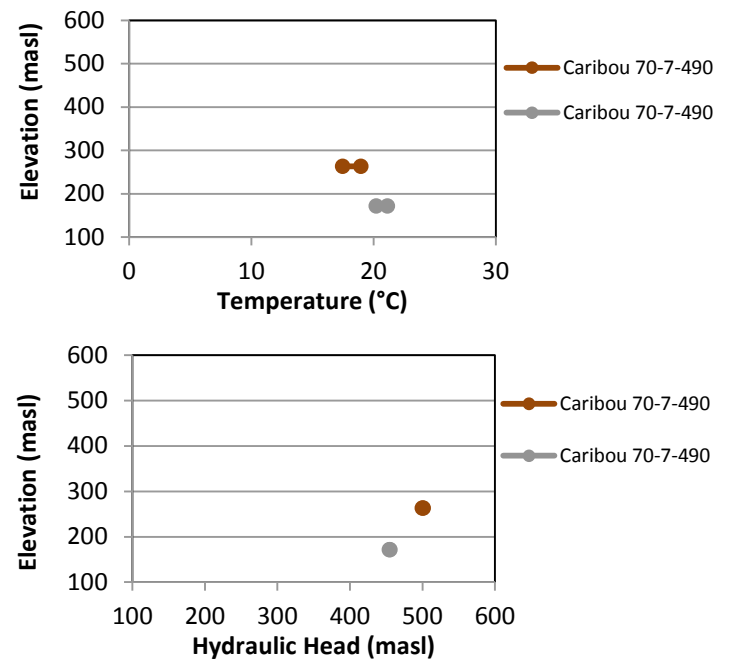
Major Lakes and Rivers - Proximal Colorado Group Aquitard Extent - Present Bedrock Incisions - Distal Unconsolidated Deposit Thickness - Thick	Regional Recharge vs. Discharge - Recharge Gas Production - Proximal Oil Sands Groundwater Users - Distal Shallow Local Groundwater Users - Distal
---	---

SAOS Well Name	UWI or Well Name	Sensor Depth (m bgs)	Owner	Interpreted Aquifer	Network
Caribou 70-07-490	CVE FCCL D14 FISHER 14-16-70-7 / 1AA/14-16-070-07W4M	397.6	Cenovus	Lower Grand Rapids	B (Surveillance)
		489.6	Cenovus	McMurray	B (Surveillance)

Time Series



Profile



Notes

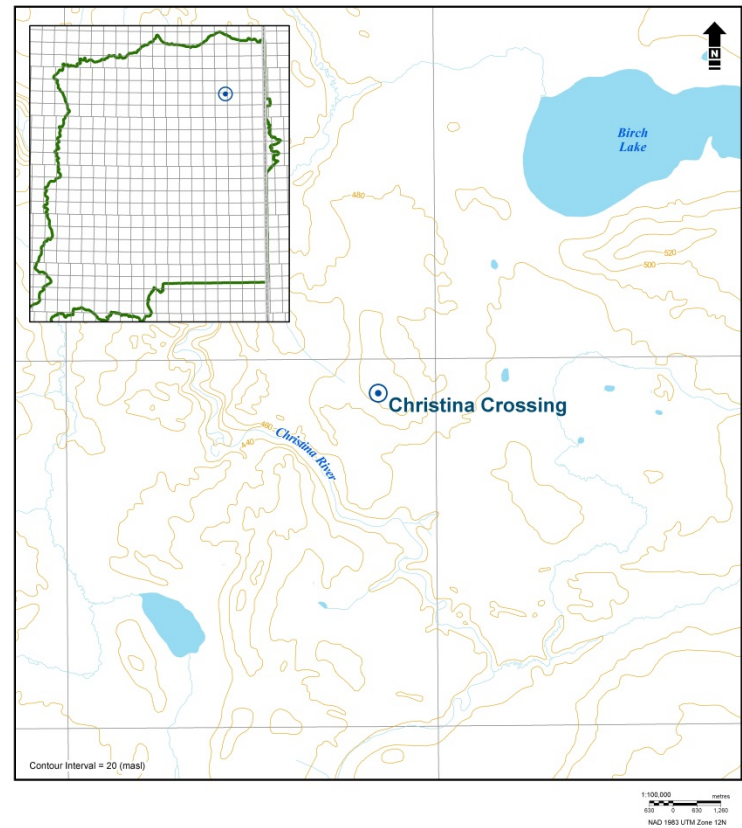
This location was originally identified in Matrix (2013). Equipment has been non-functional since 2011, and is scheduled for maintenance in 2015.

Water levels indicate a downward vertical hydraulic gradient between the Lower Grand Rapids and McMurray aquifers. Temperatures were anomalously high in 2011; equipment may not have equilibrated with formation temperature.

Cenovus will collect pressure and temperature data once equipment has been repaired. Cenovus will provide temperature and pressure data to ESRD as it becomes available.

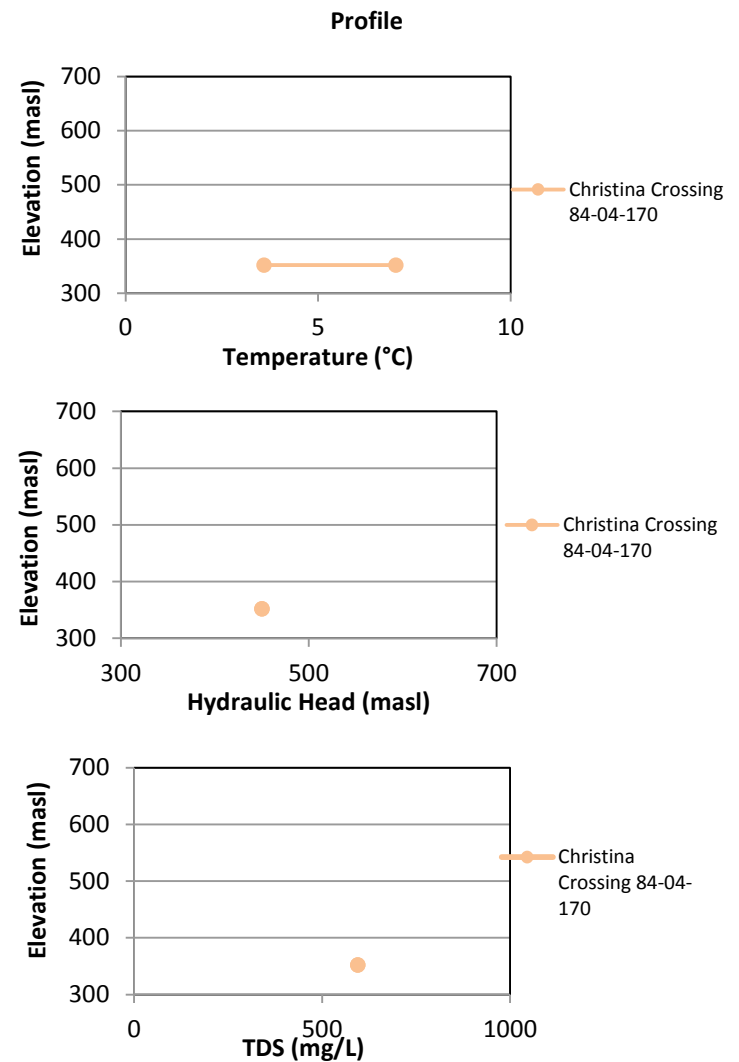
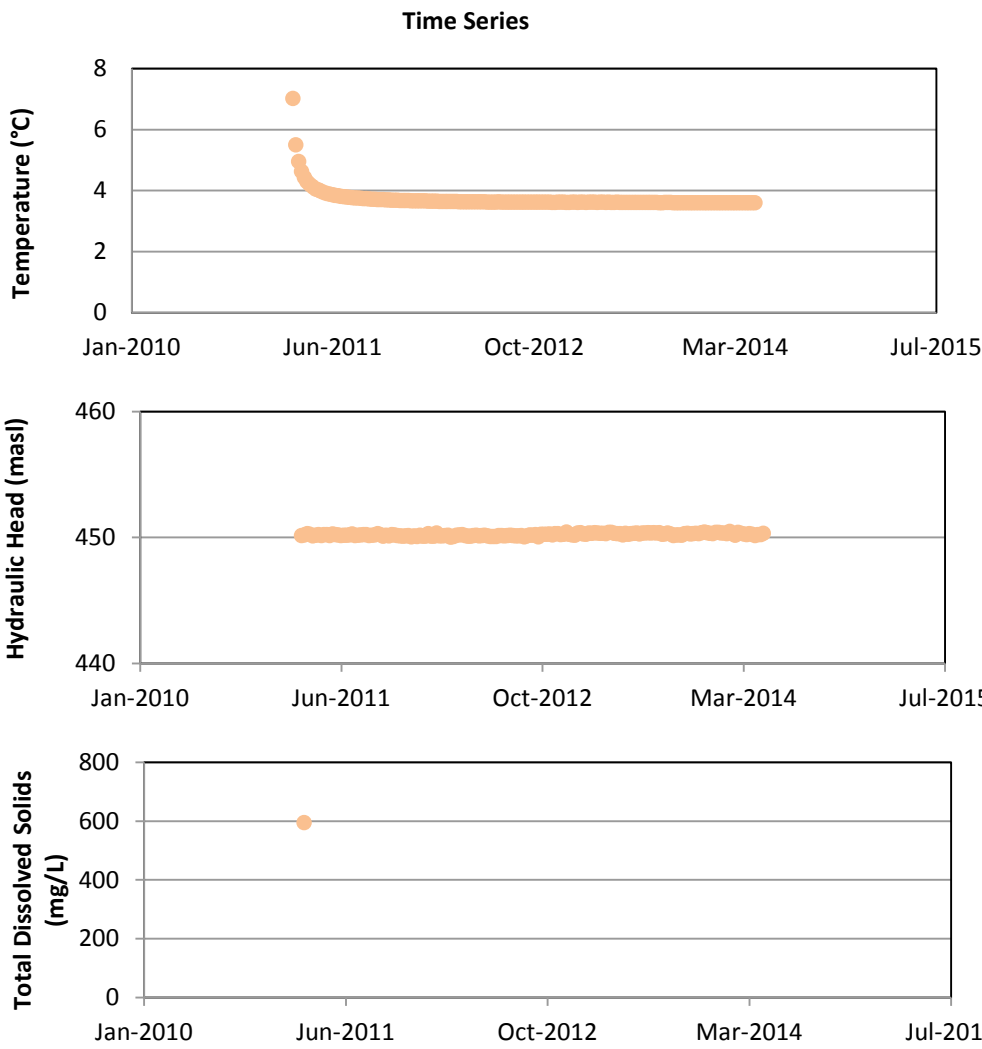
CHRISTINA CROSSING (05-36-084-04 W4M) 512 m asl

Location Objective	Support development of sub-network C
Key Rationale	<p>Colorado Group regionally eroded away</p> <p>Regional discharge area to Christina River</p> <p>Moderate density of in situ oil sands existing and proposed source and disposal wells</p> <p>Identified as potentially vulnerable area (stressed aquifers; absence of Colorado Group Aquitard)</p> <p>Relatively high predicted drawdown in Lower Grand Rapids Aquifer and Upper Clearwater Aquifer in this area</p>
Safety, Access, Synergies and Priorities	<p>Synergies with ConocoPhillips well 1F1/05-36-084-04</p> <p>Continuous pressure and temperature data is recorded with a data logger, part of a long-term groundwater monitoring program</p>



Aspects of Conceptual Model	
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Discharge
Colorado Group Aquitard Extent – Absent	Gas Production - Proximal
Bedrock Incisions - Distal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thin	Shallow Local Groundwater Users - Distal

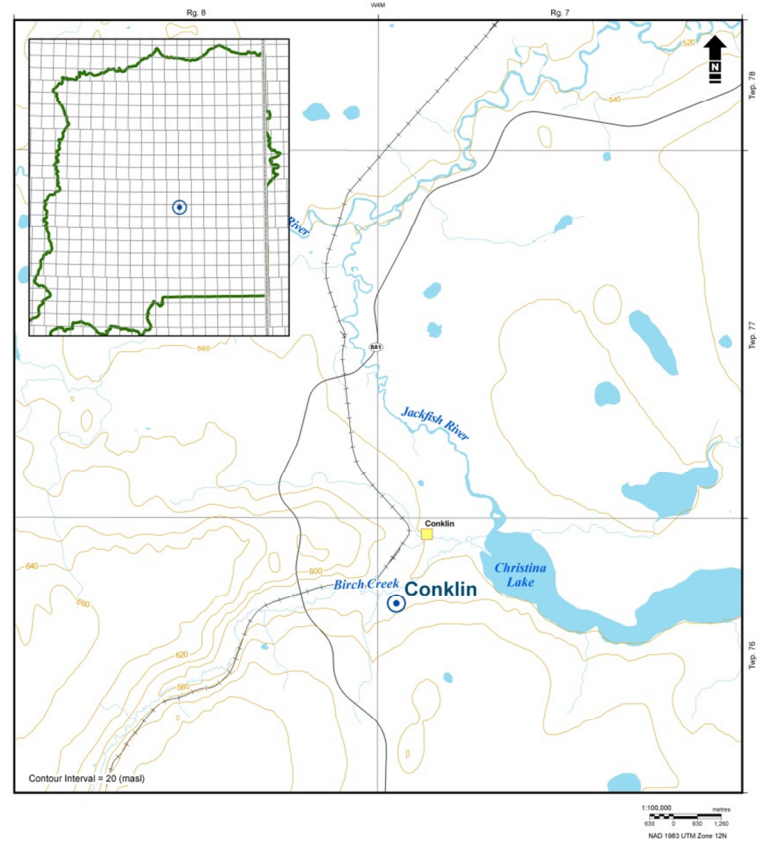
SAOS Well Name	UWI or Well Name	Screened Interval (mbgs)	Owner	Interpreted Aquifer	Sub-Network
Christina Crossing 84-04-170	1F1/05-36-084-04 W4M	149.1 - 170.4	ConocoPhillips	Upper Clearwater	C (Investigative)



Notes
Well is monitored on a biennial basis to monitor long term pressure and temperature data near ConocoPhillips' Surmont project. Well was recommended by ConocoPhillips as a potential monitoring well for the northern part of the Lower Christina River Investigation Area (Matrix 2013, 2014). Station was considered to be investigative (sub-network C) due to proximity to proposed source and disposal wells (influence to aquifer pressures) and potential aquifer interaction areas (absent Colorado Group Aquitard).
Hydraulic heads have been consistent between 2011 and 2014. Temperatures were consistent but may not reflect accurate temperatures in the Upper Clearwater Aquifer, as the hanging depth of the temperature recording instrument was above the well screens. The monitoring well has not been sampled for hydrochemical parameters; however, during a short-term pumping test, groundwater did not exceed interim groundwater quality triggers for the Clearwater Formation for indicator parameters specified in the Lower Athabasca Region Groundwater Management Framework (ESRD 2012a).
ConocoPhillips and ESRD are negotiating transferring well ownership to ESRD. ConocoPhillips will provide ESRD with pressure and temperature data when available. It is recommended to instrument the well at this location so temperature is recorded within the well screens.

CONKLIN (11-30-076-07 W4M) 575 m asl

Location Objective	Support development of sub-networks A and B as per Matrix (2013)
Key Rationale	<p>Near shallow groundwater users (societal concerns) and major water body</p> <p>Near deep incision along Christina Channel</p> <p>Near in situ oil sands groundwater users</p> <p>Near Worley Parsons proposed monitoring well MW2</p> <p>Ethel Lake Aquifer present (aquifer intersects Christina Lake; surface water - groundwater interactions)</p> <p>Numerous aquifers present (facilitates understanding of vertical hydraulic gradients)</p> <p>Over 50 m of predicted drawdown in the Lower Grand Rapids, Upper Clearwater and Middle Clearwater aquifers at this location</p> <p>Near lake monitoring and meteorological station</p>
Safety, Access, Synergies and Priorities	<p>Near historic Grand Rapids Formation gas production, within current Clearwater and McMurray formation gas production.</p> <p>All season access.</p> <p>Discussions with Christina Lake area operators (Harvest Operations Corp., Devon Canada Corporation, Cenovus Energy Inc. and MEG Energy) should be pursued to determine if nearby pressure data for the Lower Grand Rapids, Upper Clearwater and Middle Clearwater could be shared with ESRD for this program.</p> <p>This monitoring location can be linked to Christina Channel Investigation Area monitoring.</p> <p>Near surface, Sand River, Ethel Lake and Bonnyville completions installed in fall 2012.</p>



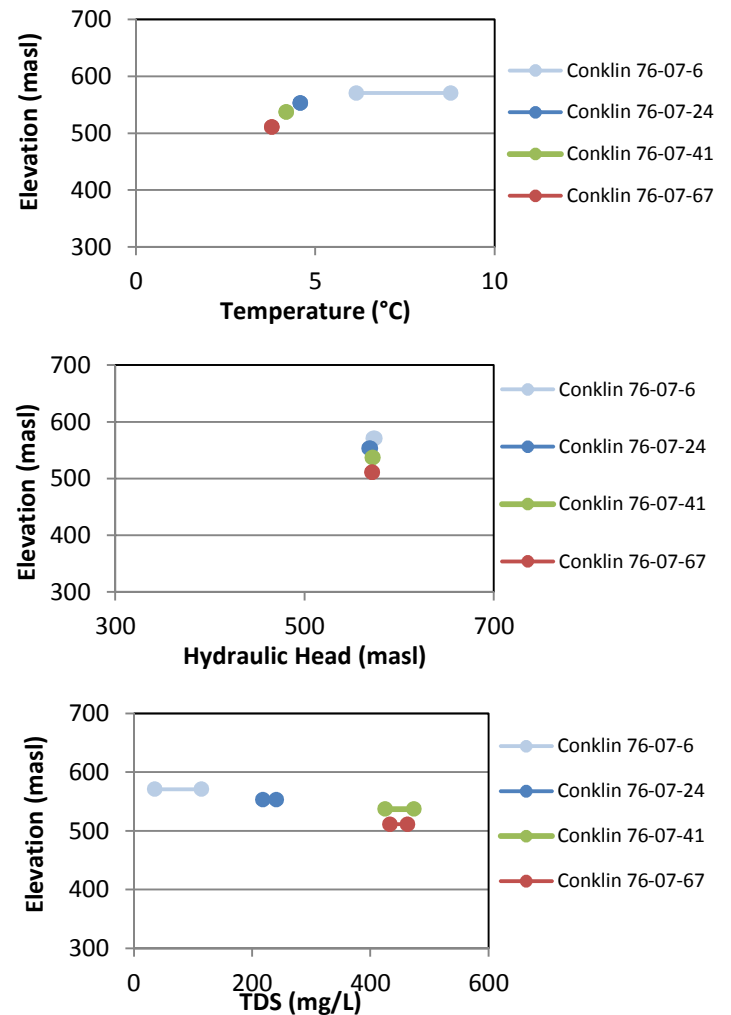
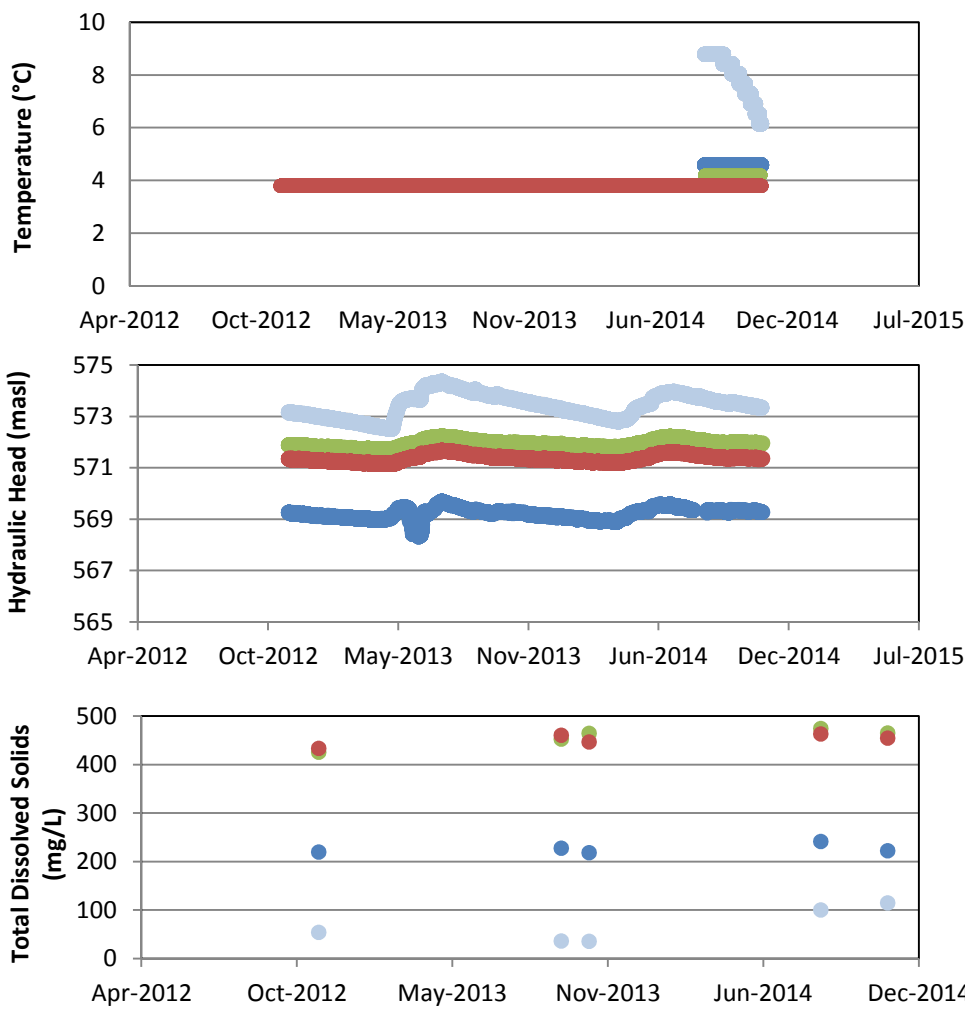
Aspects of Conceptual Model

Major Lakes and Rivers - Proximal Colorado Group Aquitard Extent - Present Bedrock Incisions - Proximal Unconsolidated Deposit Thickness - Thick	Regional Recharge vs. Discharge - Recharge Gas Production - Proximal Oil Sands Groundwater Users - Proximal Shallow Local Groundwater Users - Proximal
---	---

SAOS Well Name	Screened Interval (mbgs)	Owner	Interpreted Aquifer	Sub-Network
Conklin 76-07-6	3.0 - 6.1	ESRD	shallow	B (Surveillance)
Conklin 76-07-24	20.5 - 23.5	ESRD	Sand River	A (Strategic)
Conklin 76-07-41	35.0 - 41.0	ESRD	Ethel Lake	B (Surveillance)
Conklin 76-07-67	61.0 - 67.0	ESRD	Bonnyville	B (Surveillance)

Time Series

Profile



Notes

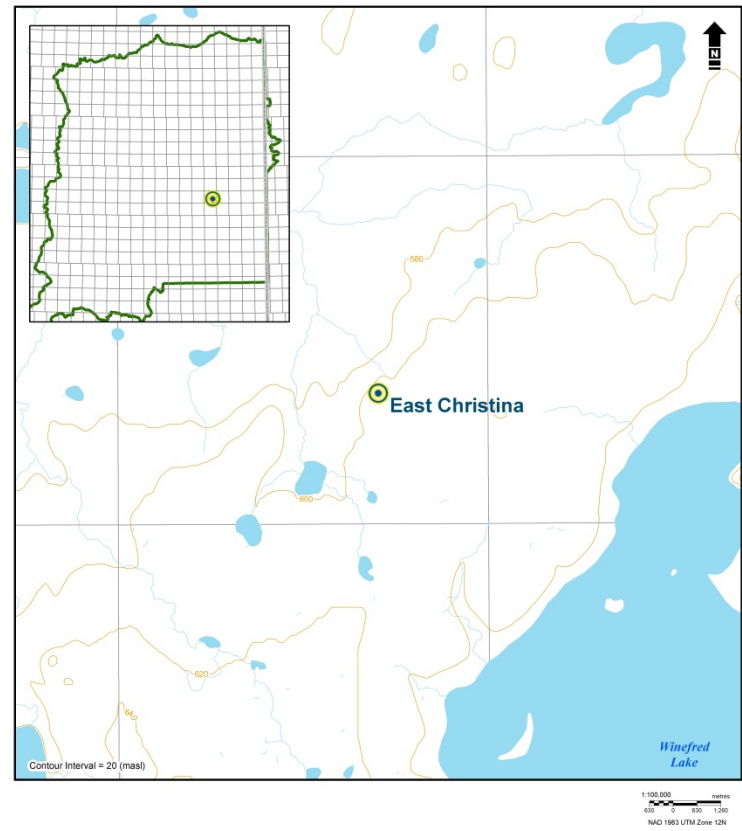
All key non-bedrock aquifers are represented at this location. Currently, there are no wells completed in bedrock; however, Matrix (2013) did not identify bedrock aquifers as a high priority for this monitoring station.

Hydraulic heads suggested local recharge conditions, with the Sand River Aquifer evidently underpressured with respect to overlying and underlying aquifers. Hydraulic heads within all units have varied seasonally. Temperature data collected from well screens was stable in all aquifers; seasonal variation was apparent in the near-surface completion. This location was sampled twice in 2014 for routine, metals and hydrocarbon parameters. Interim groundwater quality triggers were exceeded near surface (silica), in the Sand River (silica, As), Ethel Lake (silica, B) and Bonnyville (silica, B). The Sand River Aquifer completion was interpreted to represent baseline conditions in that aquifer.

It is recommended ESRD continue monitoring wells at this station and collect water quality parameters semi-annually, with sampling events at least 4 months apart.

EAST CHRISTINA (04-14-076-05 W4M) 619 m asl

Location Objective	Support development of sub-network C
Key Rationale	<p>Near deep erosional incision through Colorado group Aquitard into Grand Rapids Formation (Christina Channel) and therefore, potential for interaction between regional aquifers at this station</p> <p>High density of existing and proposed source and disposal wells</p> <p>Identified as potentially vulnerable area (stressed aquifers; absent Colorado Group Aquitard)</p> <p>Maximum predicted drawdown for many key aquifers</p> <p>RAMP, WSC, meteorological stations and lake monitoring sites nearby</p> <p>Near shallow groundwater users (societal concerns) and major water body</p> <p>Near in situ oil sands groundwater users</p> <p>Numerous aquifers present (facilitates understanding of vertical hydraulic gradients)</p>
Safety, Access, Synergies and Priorities	<p>Synergies with Cenovus monitoring wells 02MW01/04-14-076-05W4 , 02MW02A/04-14-076-05W4, 02MW02B/04-14-076-05W4, 100/04-14-076-05W4/00 and VWP 102/04-14-076-05W4/00</p> <p>Telemetry system in VWP for remote access to pressure and temperature data</p> <p>Monitoring wells have winter access only, monitored as part of Cenovus' regional monitoring program</p>

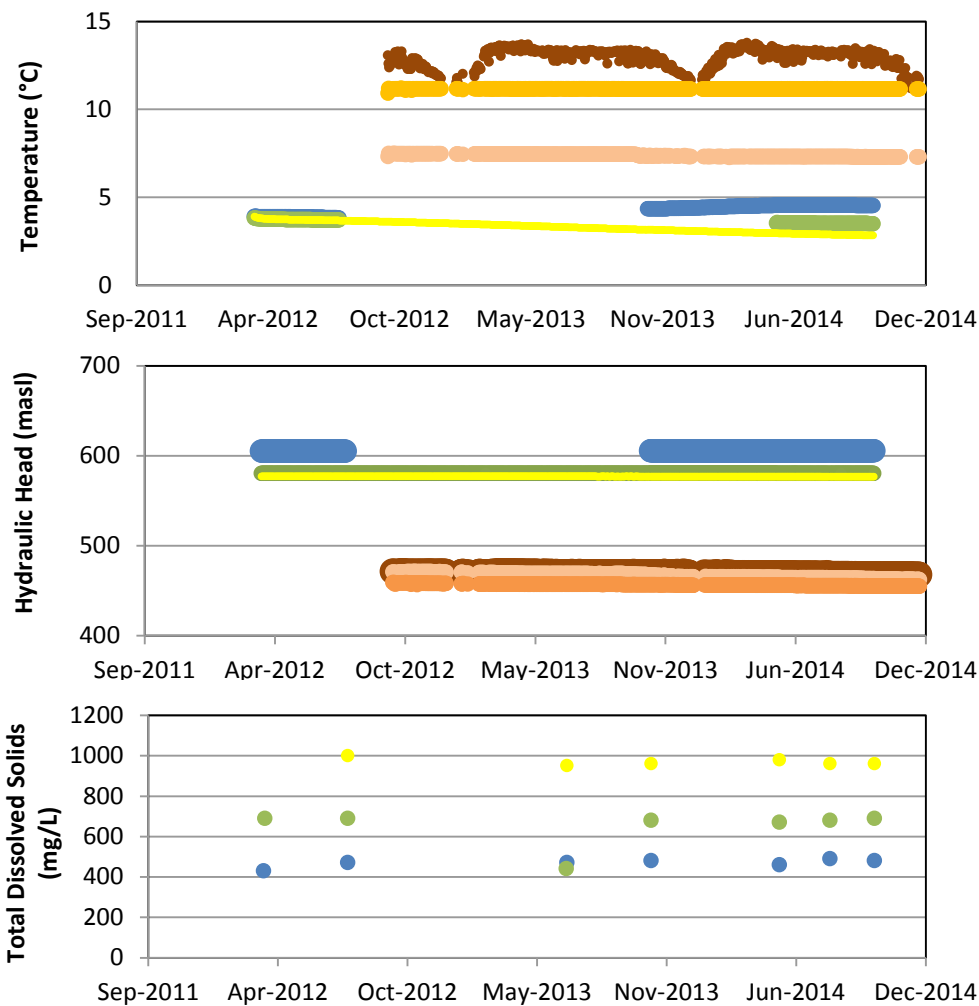


Aspects of Conceptual Model

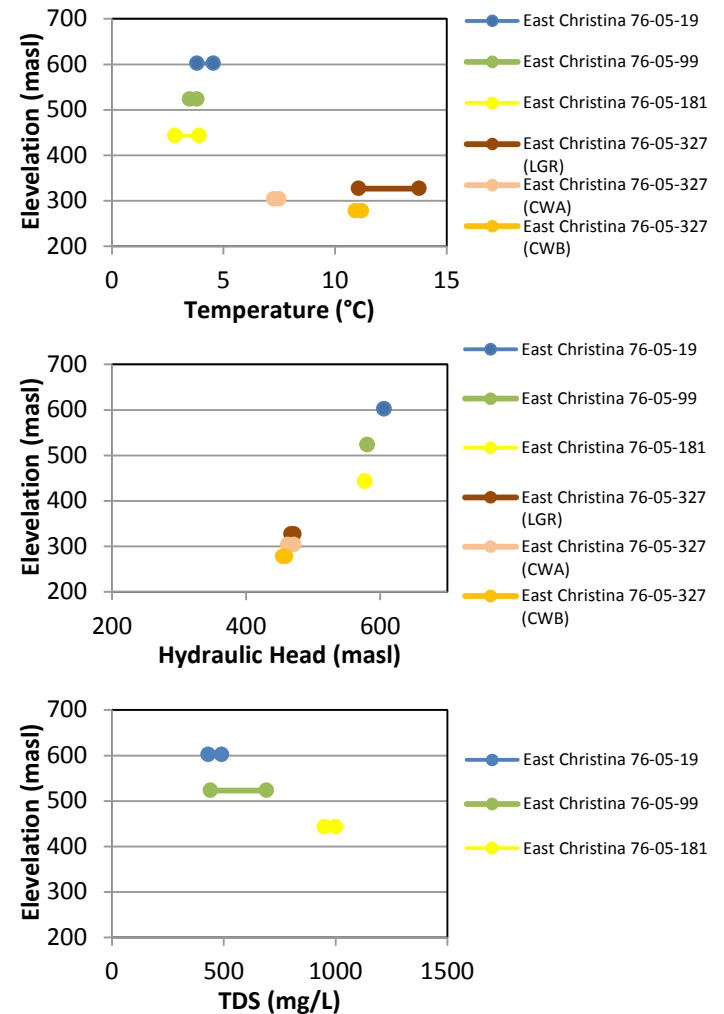
Major Lakes and Rivers – Proximal	Regional Recharge vs. Discharge - Recharge
Colorado Group Aquitard Extent - Thin	Gas Production - Proximal
Bedrock Incisions – Proximal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Proximal

SAOS Well Name	UWI or Well Name	Screened Interval (m bgs)	Sensor Depth	Owner	Interpreted Aquifer	Sub-Network
East Christina 76-05-19	02MW01/04-14-076-05W4	15.85-18.90	---	Cenovus	Sand River	C (Investigative)
East Christina 76-05-99	02MW02B/04-14-076-05W4	92.97-99.06	---	Cenovus	Ethel Lake	C (Investigative)
East Christina 76-05-181	100/04-14-076-05W4/00	171.60-180.75	---	Cenovus	Empress Channel	C (Investigative)
East Christina 76-05-327	102/04-14-076-05W4/00	---	296.50	Cenovus	Lower Grand Rapids	C (Investigative)
			319.50	Cenovus	Upper Clearwater (A)	C (Investigative)
			345.50	Cenovus	Middle Clearwater (B)	C (Investigative)

Time Series



Profile



Notes

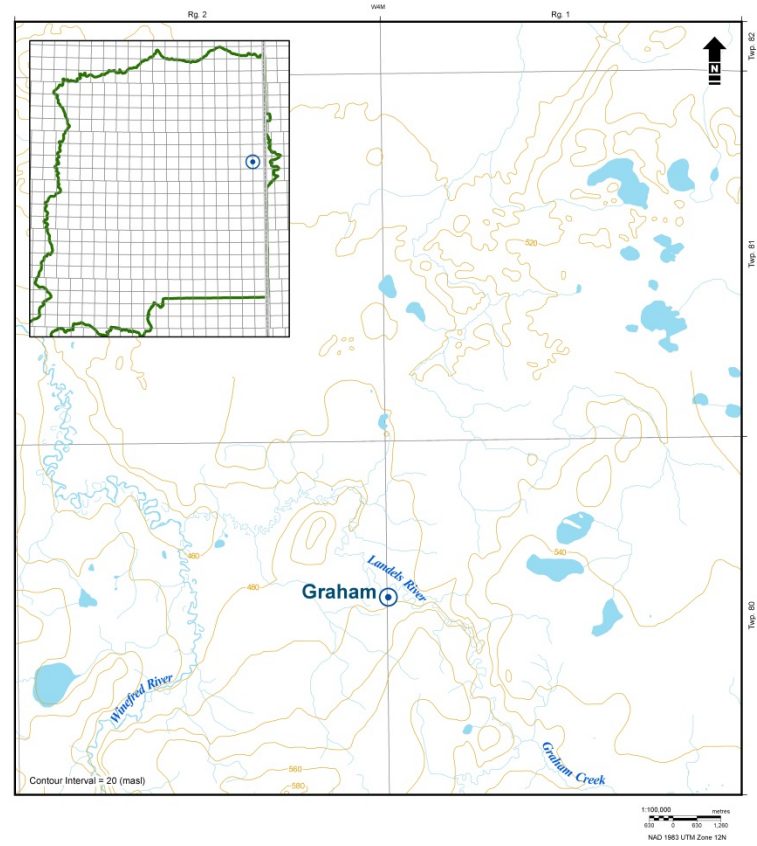
All key aquifers present at this location are represented by a monitoring well completion. Station is considered as investigative (sub-network C) due to proximity of surrounding in-situ projects (potential influence to aquifer pressures) and areas of potential aquifer interactions (Christina Channel). The VWP 102/04-14-076-05W4/00 will be used to provide pressure and temperature data only; groundwater quality samples cannot be obtained from this VWP.

Hydraulic heads have suggested local recharge conditions, as deeper aquifers have been under pressured compared to hydrostatic pressure. Hydraulic heads within bedrock aquifers decreased by 3 m over the past 2 years. Hydraulic heads observed in the unconsolidated aquifers have been stable. Similarly, effective hydraulic connection between Empress and Ethel Lake aquifers has been interpreted as both units have similar hydraulic heads. Temperatures obtained from the Lower Grand Rapids aquifer has decreased in the winter months; this should be further investigated. Temperatures decreased in the Empress Channel Aquifer from April 2012 to December 2014. Temperature readings from Ethel Lake and Empress Channel aquifer wells may not have been representative, as the instruments were previously hung above the well screens. Interim groundwater quality triggers were exceeded historically in the following aquifers: Sand River (silica, NO₃), Ethel Lake (TDS, silica, Cl, NO₃, As, B) and Empress Channel (TDS, Cl, silica, NO₃, As, B).

Currently, Cenovus will continue monitoring and sampling the wells completed in the unconsolidated deposits, as part of their regional groundwater monitoring program. Hydrostatic pressure and temperature data from bedrock completions will be downloaded annually. Cenovus will carry out the program at their discretion and forward the data to ESRD.

GRAHAM (05-19-080-01 W4M) 505.4 m asl

Location Objective	Support development of sub-network A as per Matrix (2013)
Key Rationale	<p>Existing monitoring wells in Upper Clearwater and Basal McMurray</p> <p>Located well away from existing or proposed source/disposal wells</p> <p>Near Saskatchewan border (societal concerns)</p> <p>Away from any identified gas production in Grand Rapids, Clearwater and McMurray formations</p>
Safety, Access, Synergies and Priorities	<p>Synergy with ConocoPhillips 1F1051908001W400 and 1F2051908001W400</p> <p>Remote access</p>

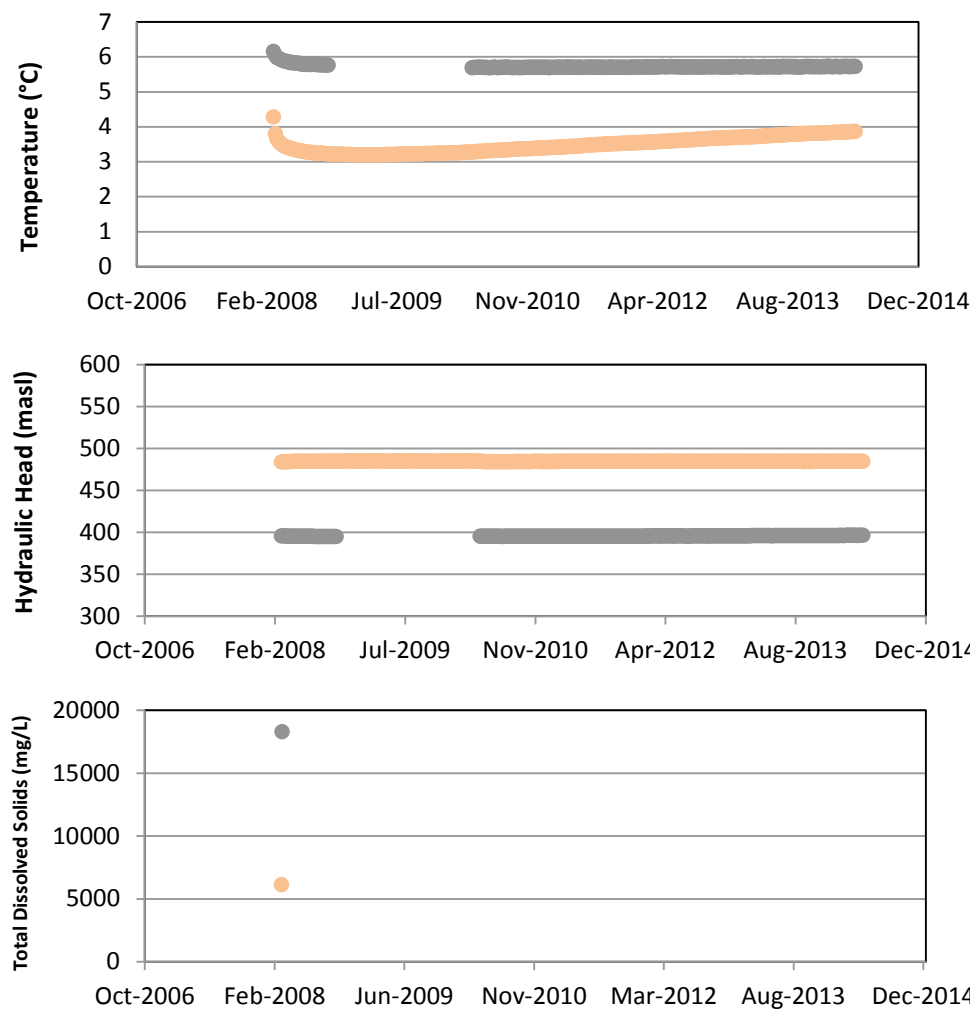


Aspects of Conceptual Model

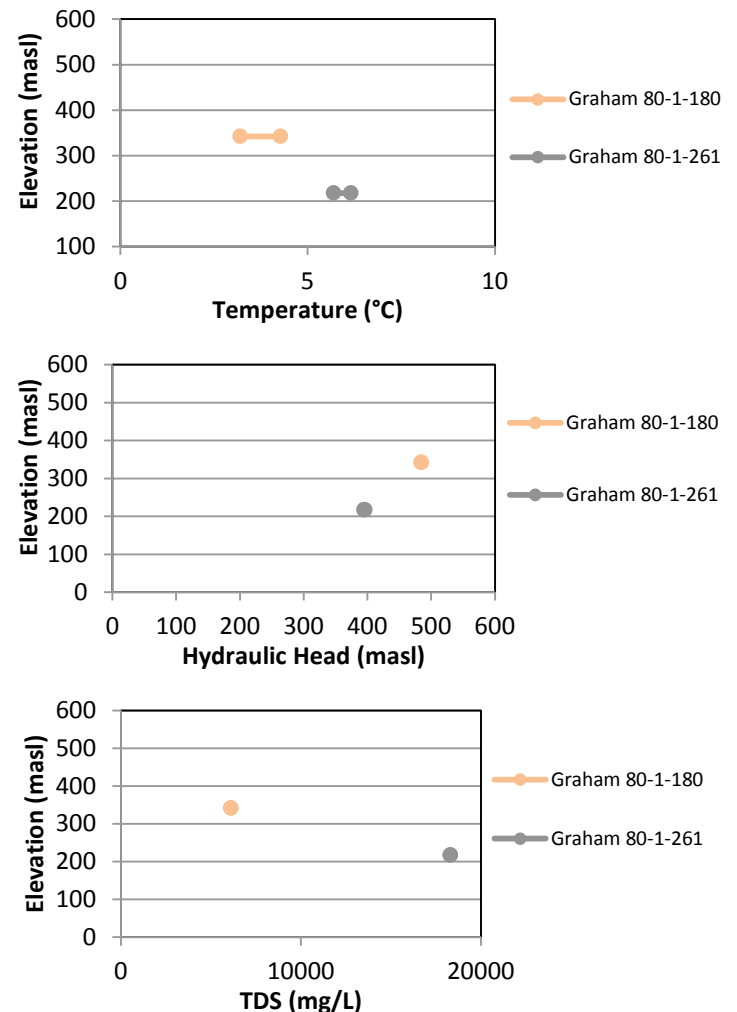
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Discharge
Colorado Group Aquitard Extent - Absent	Gas Production - Distal
Bedrock Incisions - Distal	Oil Sands Groundwater Users - Distal
Unconsolidated Deposit Thickness - Thin	Shallow Local Groundwater Users - Distal

SAOS Well Name	UWI or Well Name	Screened Interval (mbgs)	Owner	Interpreted Aquifer	Sub-Network
Graham 80-1-180	1F1/05-19-080-01W4/00	156.1 - 180.3	ConocoPhillips	Upper Clearwater	A (Strategic)
Graham 80-1-261	1F2/05-19-080-01W4/00	242.3 - 260.5	ConocoPhillips	Basal McMurray	A (Strategic)

Time Series



Profile



Notes

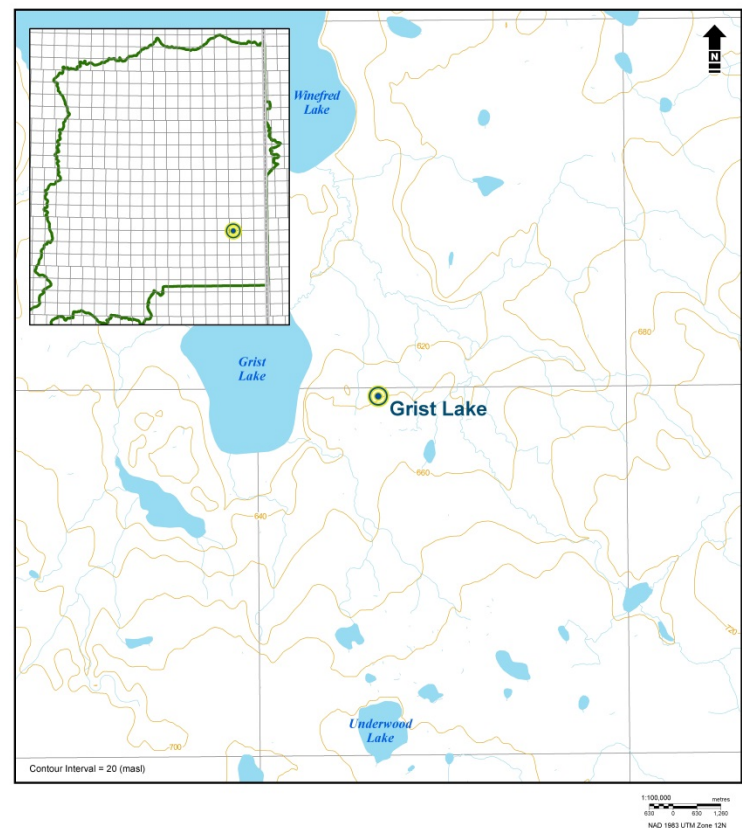
Wells have been monitored (pressure and temperature) as part of a long term regional monitoring program.

Hydraulic heads have been consistent from 2008 to 2014, and indicate a downward vertical hydraulic gradient between the Upper Clearwater and Basal McMurray aquifers. Temperatures have not shown seasonal variation; however, they may not be representative of aquifer conditions (because of instrument hanging depth). Groundwater quality results (obtained from samples collected during short-term pumping tests) were provided by ConocoPhillips; however, wells are not currently part of a regular sampling program. Water quality parameters exceeded interim triggers for TDS, Cl and B in both aquifers. Upper Clearwater and Basal McMurray aquifer completions at this location are expected to represent baseline conditions in their respective aquifers.

ConocoPhillips and ESRD are negotiating ownership transition for these monitoring wells. ConocoPhillips will provide ESRD with pressure and temperatures data as it becomes available. It is recommended to instrument the wells at this location so temperature is recorded within the well screens.

GRIST LAKE (16-32-073-03 W4M) 635 m asl

Location Objective	Support development of sub-network A
Key Rationale	<p>Located between in-situ oil sands developments and Saskatchewan provincial boundary (societal concerns)</p> <p>Many aquifers present</p> <p>Greater than 10 km from existing or proposed source/disposal wells</p> <p>Distal to gas production</p> <p>Near major water body (Grist Lake)</p> <p>Near meteorological station</p>
Safety, Access, Synergies and Priorities	<p>Synergy with Devon well DEVON NEC BP 16A KIRBY 16-32-73-3 (100/16-32-073-03W4/00)</p> <p>Remote access (helicopter or winter access)</p> <p>Equipped with pressure and temperature sensors for continuous data recording</p>



Aspects of Conceptual Model

<p>Major Lakes and Rivers - Proximal</p> <p>Colorado Group Aquitard Extent – Present</p> <p>Bedrock Incisions - Distal</p> <p>Unconsolidated Deposit Thickness - Thick</p>	<p>Regional Recharge vs. Discharge - recharge</p> <p>Gas Production - Distal</p> <p>Oil Sands Groundwater Users - Proximal</p> <p>Shallow Local Groundwater Users - Proximal</p>
--	--

SAOS Well Name	UWI or Well Name	Screened Interval (m bgs)	Owner	Interpreted Aquifer	Sub-Network
Grist Lake 73-03-492	100/16-32-073-03W4/00	180	Devon	Empress Channel	B (Surveillance)
		381		Lower Grand Rapids	B (Surveillance)
		492		McMurray	B (Surveillance)

Notes

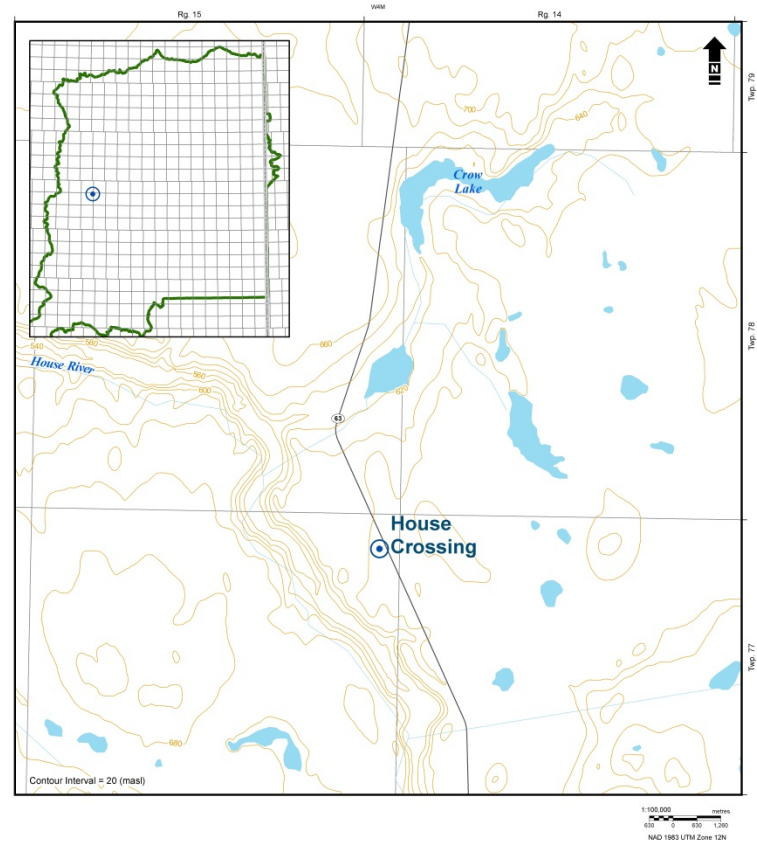
Well was drilled to test the McMurray Formation for disposal/injection capacity and was subsequently recompleted with pressure/temperature gauges in the Empress Channel, Lower Grand Rapids and McMurray aquifers.

Devon would consider transferring ownership of this well to ESRD; there may be potential to install additional wells in the drift aquifers (Bonnyville, Muriel Lake) at this location.

Historical monitoring data is not available for this well; data may become available later in 2015. Devon will provide ESRD with pressure and temperature data as it becomes available.

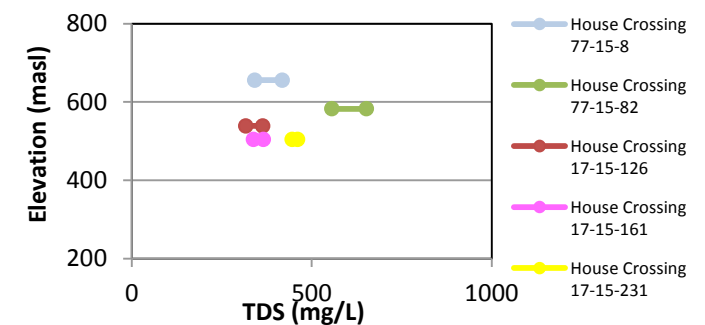
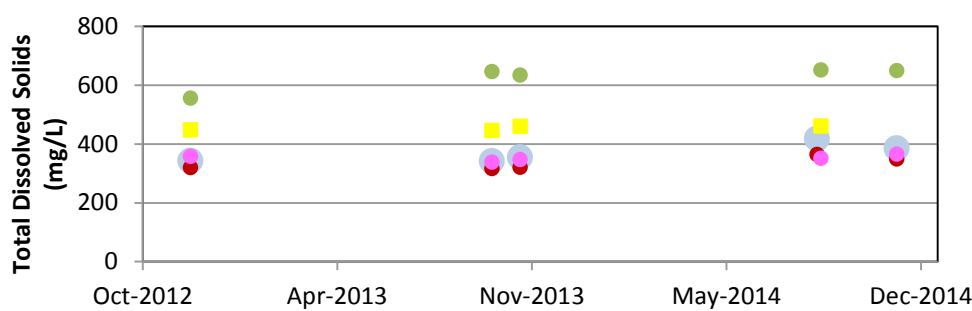
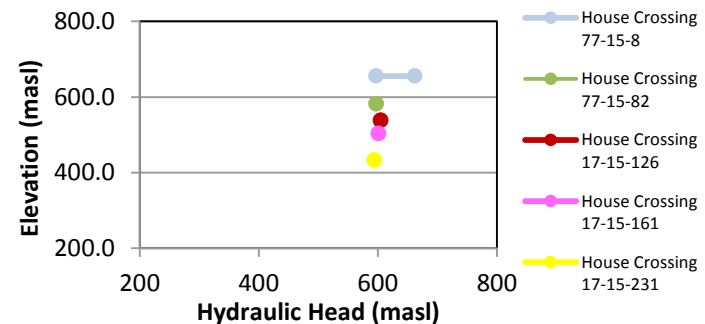
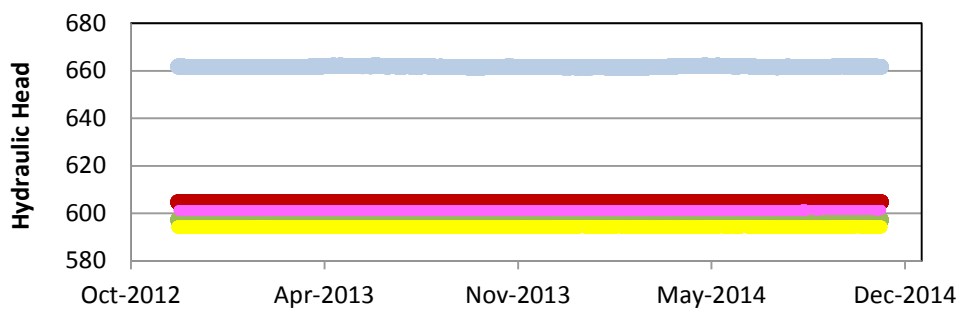
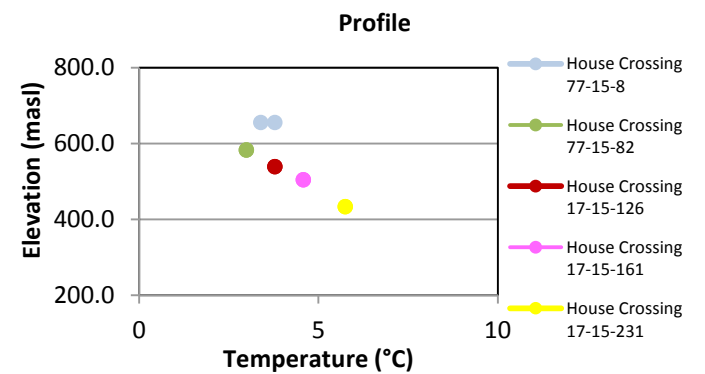
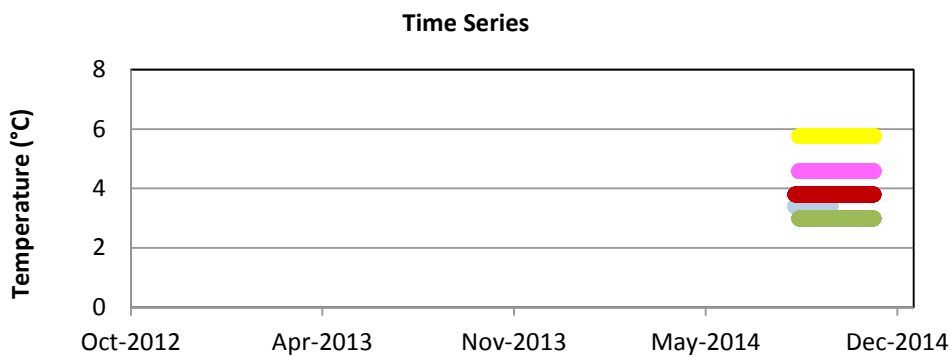
HOUSE CROSSING (07-36-077-15 W4M) 662.5 m asl

Location Objective	Support development of sub-networks A and B as per Matrix (2013)
Key Rationale	Existing AGS wells (WR99-1-8 and WR99-1-230) Empress Channel Aquifer (Wiau Channel) Near Worley Parsons (2010) proposed groundwater monitoring well MW13 Near GOWN well House River Baseline quality and quantity expected in unconsolidated units and Middle Clearwater Aquifer Predicted drawdown in this area is quite low (~ 1 m) in Empress Channel aquifer Near WSC site
Safety, Access, Synergies and Priorities	Near historic Grand Rapids Formation gas production. Near current McMurray Formation gas production. All-season access (close to Highway 63). Synergy was achieved with existing AGS wells (WR99-1). A monitoring well already exists in the Empress Channel Aquifer at this location. Near surface, Ethel Lake, Bonnyville and Muriel Lake completions installed in Fall 2012. Higher priority location for Lower Grand Rapids and Middle Clearwater aquifer completions.



Aspects of Conceptual Model	
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Recharge
Colorado Group Aquitard Extent – Present	Gas Production - Proximal
Bedrock Incisions - Proximal	Oil Sands Groundwater Users - Distal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Distal

SAOS Well Name	AGS Well Name	Screened Interval (mbgs)	Owner	Interpreted Aquifer	Sub-Network
House Crossing 77-15-8	WR99-1-8	5.5 - 8.5	AGS/ESRD	shallow	A (Strategic)
House Crossing 77-15-82	--	78.0 - 81.5	ESRD	Ethel Lake	A (Strategic)
House Crossing 77-15-126	--	120.0 - 126.0	ESRD	Bonnyville	A (Strategic)
House Crossing 77-15-161	--	155.0 - 161.0	ESRD	Muriel Lake	A (Strategic)
House Crossing 77-15-231	WR99-1-230	223.0 - 231.0	AGS/ESRD	Empress Channel	A (Strategic)



Notes

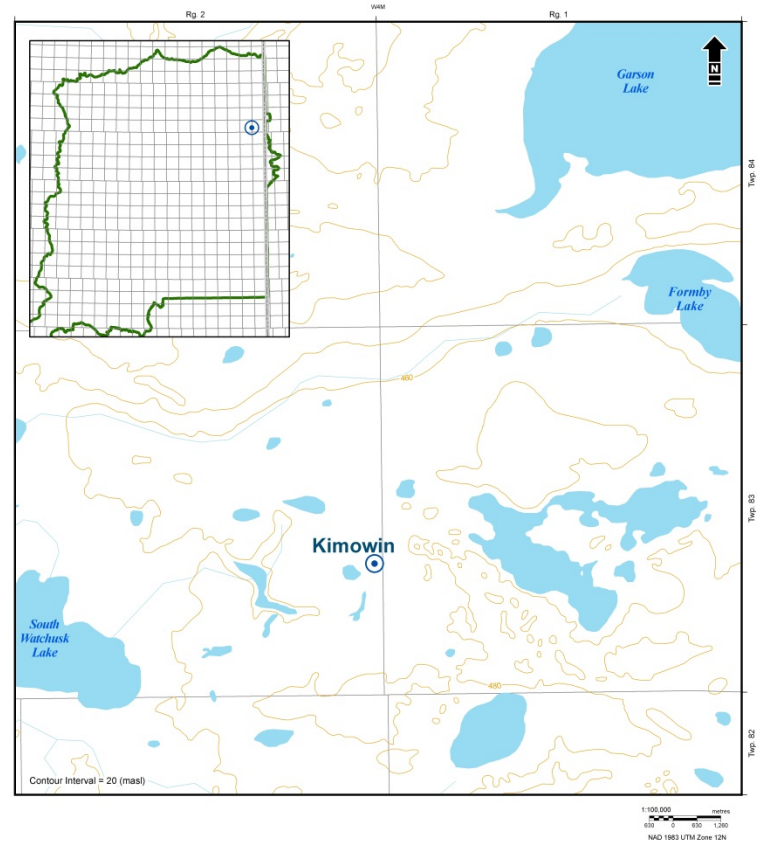
All key non-bedrock aquifers are represented at this location. There are two priority bedrock completions at this location that have yet to be installed in the Lower Grand Rapids and Middle Clearwater.

Hydraulic heads suggested local recharge conditions, with the Ethel Lake Aquifer evidently underpressured with respect to overlying and underlying aquifers. No increasing or decreasing trends in hydraulic heads were observed. Temperature data collected from well screens was stable in all aquifers; seasonal variation was not apparent in any of the aquifers. This location was sampled twice in 2014 for routine parameters, metals, and hydrocarbons. Interim triggers have been historically exceeded near surface (silica, As), in Ethel Lake (TDS, silica, As, B, BTEX and phenols), Bonnyville (silica, As, B, BTEX), Muriel Lake (As, silica, BTEX) and Empress Channel (NO₃, silica, As, BTEX). All completions at this location were interpreted to represent baseline conditions in their respective aquifers.

It is recommended ESRD continue monitoring wells at this station and collect water quality parameters semi-annually, at intervals of no less than 4 months. For the Empress Channel Aquifer well, the analytical frequency should be reduced to annual collection of samples because of the logistical difficulty of sampling in the winter.

KIMOWIN (01-13-083-02 W4M) 468.6 m asl

Location Objective	Support development of sub-network A as per Matrix (2013)
Key Rationale	Existing monitoring wells in Upper Clearwater and Basal McMurray Located far from existing or proposed source/disposal wells Near Saskatchewan border (societal concerns) Away from any identified gas production in Grand Rapids, Clearwater and McMurray formations
Safety, Access, Synergies and Priorities	Synergy with ConocoPhillips 1F1011308302W400 and 1F201130802W400 Remote access

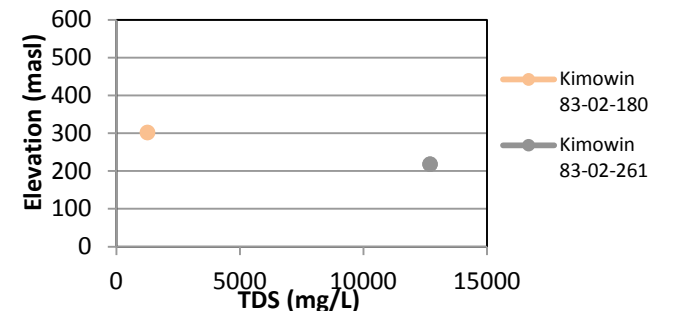
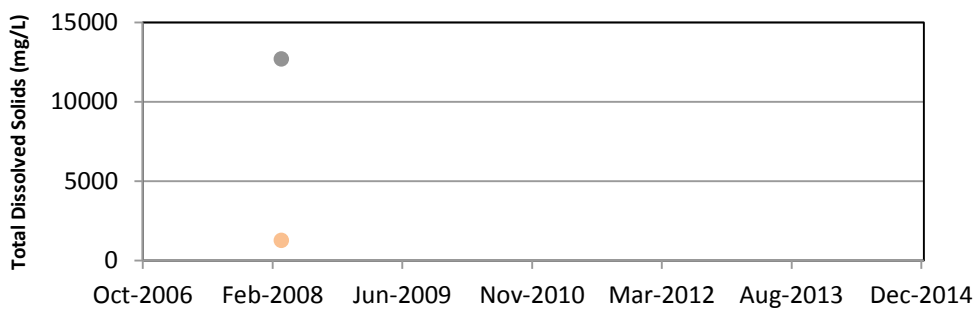
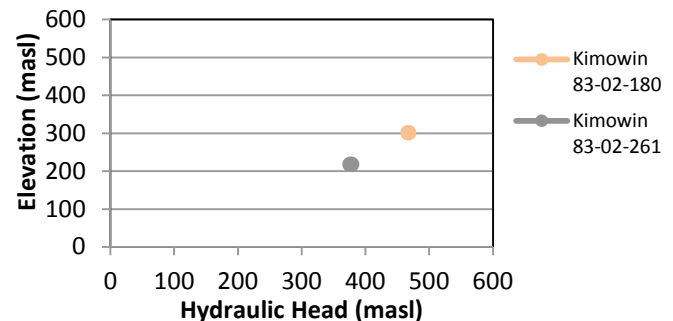
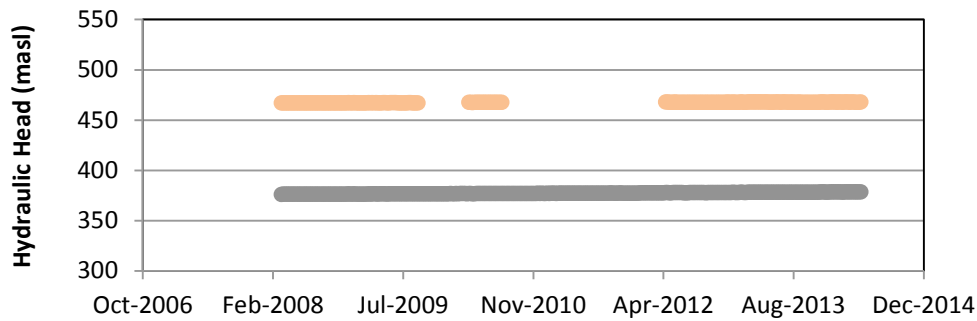
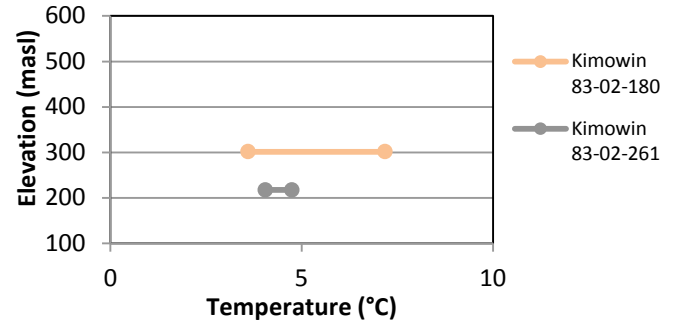
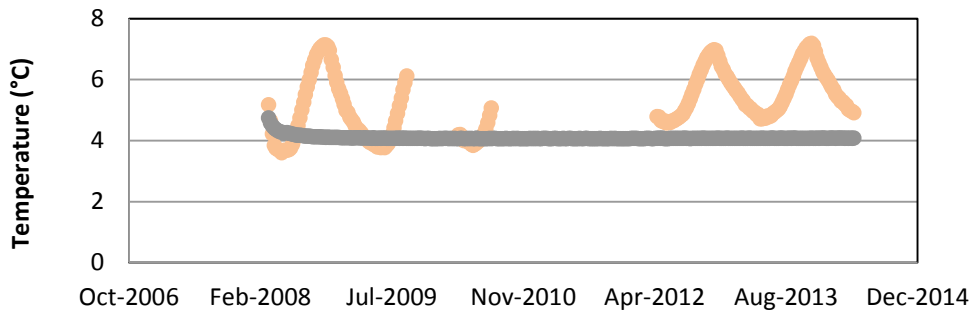


Aspects of Conceptual Model	
Major Lakes and Rivers - Distal	Regional Recharge vs. Discharge - Discharge
Colorado Group Aquitard Extent - Absent	Gas Production - Distal
Bedrock Incisions - Distal	Oil Sands Groundwater Users - Distal
Unconsolidated Deposit Thickness - Thin	Shallow Local Groundwater Users - Distal

SAOS Well Name	UWI or Well Name	Screened Interval (mbgs)	Owner	Interpreted Aquifer	Sub-Network
Kimowin 83-2-180	1F2/01-13-083-02W4/00	156.1 - 180.3	ConocoPhillips	Upper Clearwater	A (Strategic)
Kimowin 83-2 261	1F1/01-13-083-02W4/00	242.3 - 260.5	ConocoPhillips	Basal McMurray	A (Strategic)

Time Series

Profile



Notes

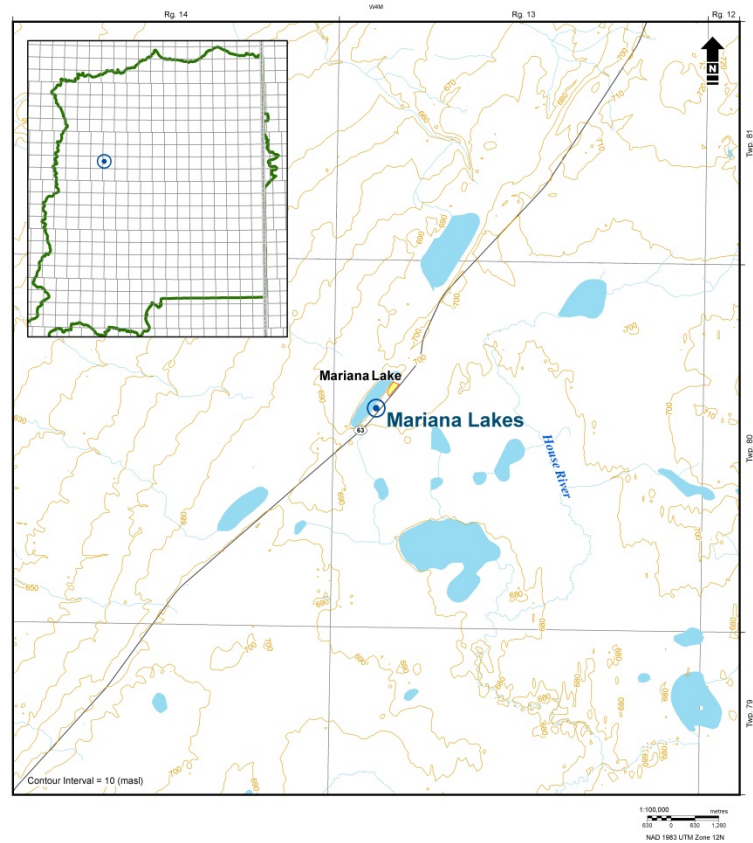
Wells have been monitored (pressure and temperature) as part of a long term regional monitoring program.

Hydraulic heads have indicated a downward vertical hydraulic gradient between the Upper Clearwater and Basal McMurray aquifers. Hydraulic heads have increased 3 m between 2008 and 2014 in the Basal McMurray Aquifer. Seasonal variation in temperature has been apparent in the Upper Clearwater Aquifer; however, temperatures in both wells may not be representative of aquifer conditions (because of instrument hanging depth). Groundwater quality results (based on samples collected during short-term pumping tests) were provided by ConocoPhillips; however, wells are not currently part of a regular sampling program. Water quality parameters exceed interim triggers in the Upper Clearwater Aquifer (B) and in the Basal McMurray Aquifer (TDS and chloride). Upper Clearwater and Basal McMurray aquifer completions at this monitoring station were interpreted to represent baseline conditions in their respective aquifers.

ConocoPhillips and ESRD are negotiating the transfer of ownership for these monitoring wells. ConocoPhillips will provide ESRD with pressure and temperature data when available. It is recommended to instrument the wells at this station so temperature is recorded within the well screens.

MARIANA LAKES (07-19-080-13 W4M) 692.9 m asl

Location Objective	Support development of sub-networks A and B as per Matrix (2013)
Key Rationale	Near Mariana Lakes (water body and shallow groundwater users) Empress Terrace Aquifer present Near Worley Parsons proposed groundwater monitoring well MW12
Safety, Access, Synergies and Priorities	Near historic Grand Rapids Formation gas production. All season access. Synergy was achieved through existing publicly-owned lands. Near Surface, Ethel Lake, Bonnyville and Empress Terrace completions installed in fall 2012.

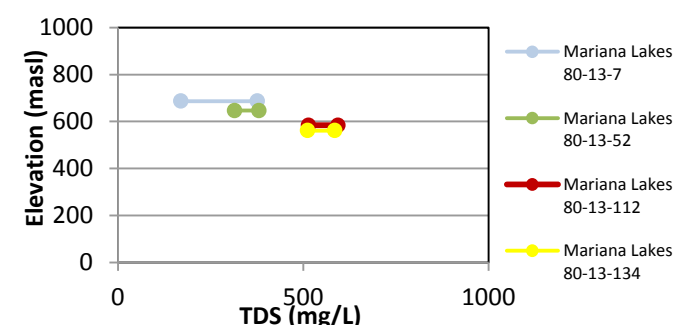
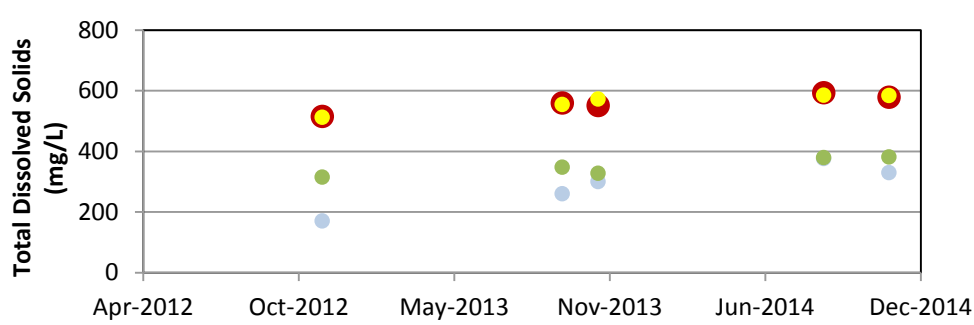
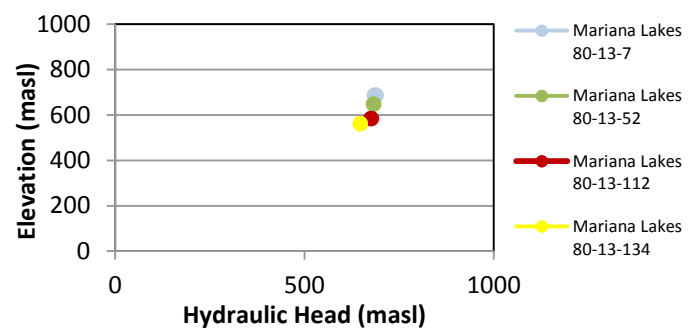
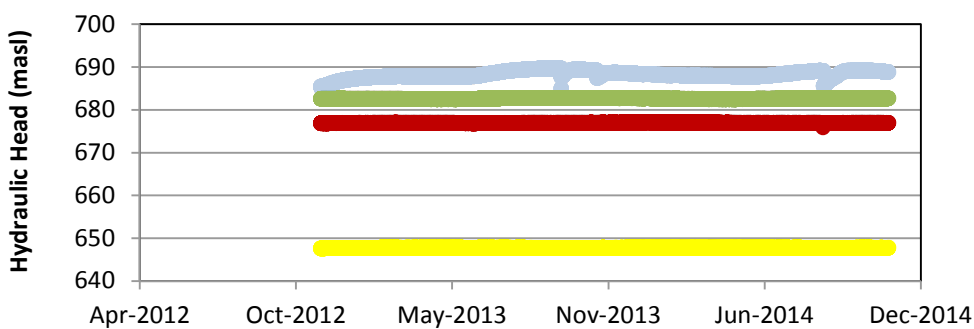
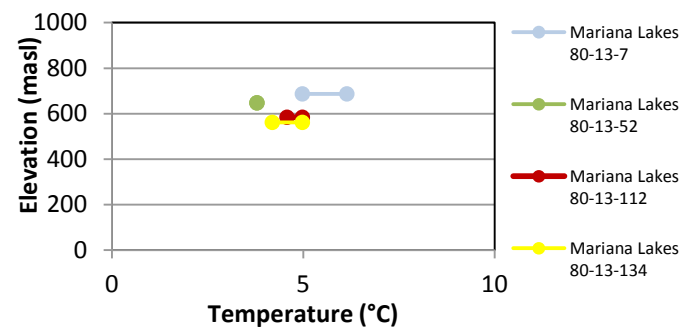
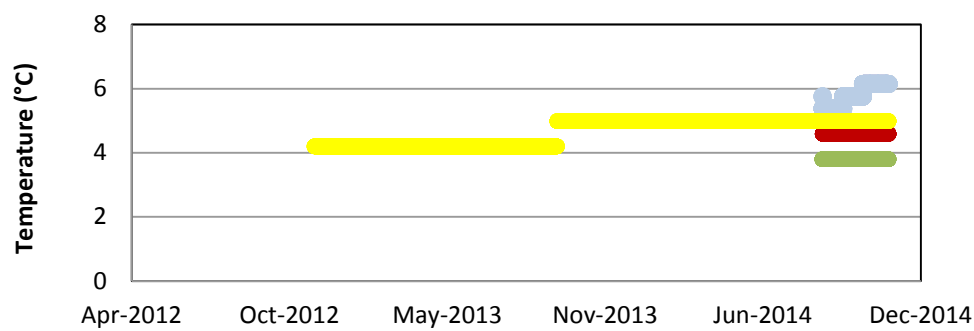


Aspects of Conceptual Model	
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Recharge
Colorado Group Aquitard Extent - Present	Gas Production - Proximal
Bedrock Incisions - Distal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Proximal

SAOS Well Name	Screened Interval (m bgs)	Owner	Interpreted Aquifer	Sub-Network
Mariana Lakes 80-13-7	4.6 - 7.6	ESRD	shallow	B (Surveillance)
Mariana Lakes 80-13-52	43.0 - 49.5	ESRD	Ethel Lake	A (Strategic)
Mariana Lakes 80-13-112	108.0 - 111.0	ESRD	Bonnyville	A (Strategic)
Mariana Lakes 80-13-134	131.0 - 134.0	ESRD	Empress Terrace	A (Strategic)

Time Series

Profile



Notes

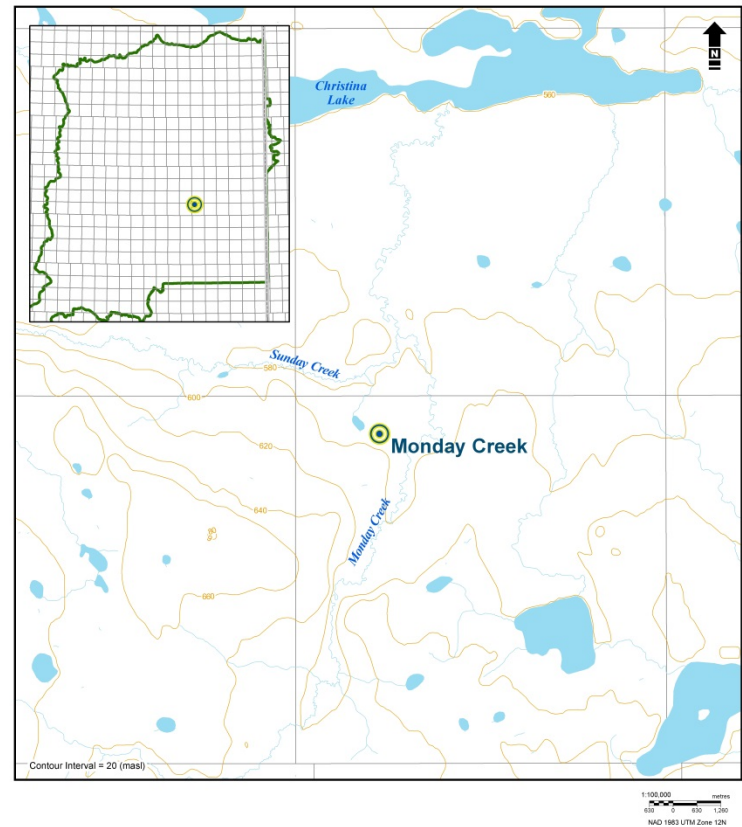
All key non-bedrock aquifers have been completed at this location. There is one low priority bedrock completion identified at this location for the Lower Grand Rapids.

Hydraulic heads indicated local recharge conditions. Hydraulic heads were consistent, with apparent seasonal variation in the near surface. Temperature data collected from well screens was stable in all aquifers; seasonal variation was apparent in the near-surface completion. This location was sampled twice in 2014 for routine parameters, metals, and hydrocarbons. Interim triggers have historically been exceeded near surface (NO₃, silica, BTEX and phenols), Ethel Lake (As, silica, BTEX), Bonnyville (silica, As, B) and Empress Terrace (silica, As, B). Aquifer completions in the Ethel Lake, Bonnyville and Empress Terrace aquifers at this location are believed to represent baseline conditions in their respective aquifers.

It is recommended that ESRD continue monitoring wells at this station and collect water quality parameters semi-annually, with sampling events at least 4 months apart.

MONDAY CREEK (06-32-075-06 W4M) 601 m asl

Location Objective	Support development of sub-network C
Key Rationale	<p>Near deep erosional incision through Colorado group Aquitard into Grand Rapids Formation (Christina Channel), area with potential interaction between regional aquifers</p> <p>High density of in situ oil sands existing and proposed source and disposal wells</p> <p>Identified as potentially vulnerable area (stressed aquifers; absent Colorado Group Aquitard)</p> <p>Maximum predicted drawdown for many key aquifers in this area</p> <p>RAMP, WSC, meteorological stations and lake monitoring sites nearby</p> <p>Near shallow groundwater users (societal concerns) and major water body</p> <p>Near in situ oil sands groundwater users</p> <p>Numerous aquifers present (facilitates understanding of vertical hydraulic gradients)</p>
Safety, Access, Synergies and Priorities	<p>Synergies with Devon regional monitoring wells RMW 6B-32 SR and RMW 6B-32 BV</p> <p>Monitored on a semi-annual basis as part of regional monitoring program.</p>

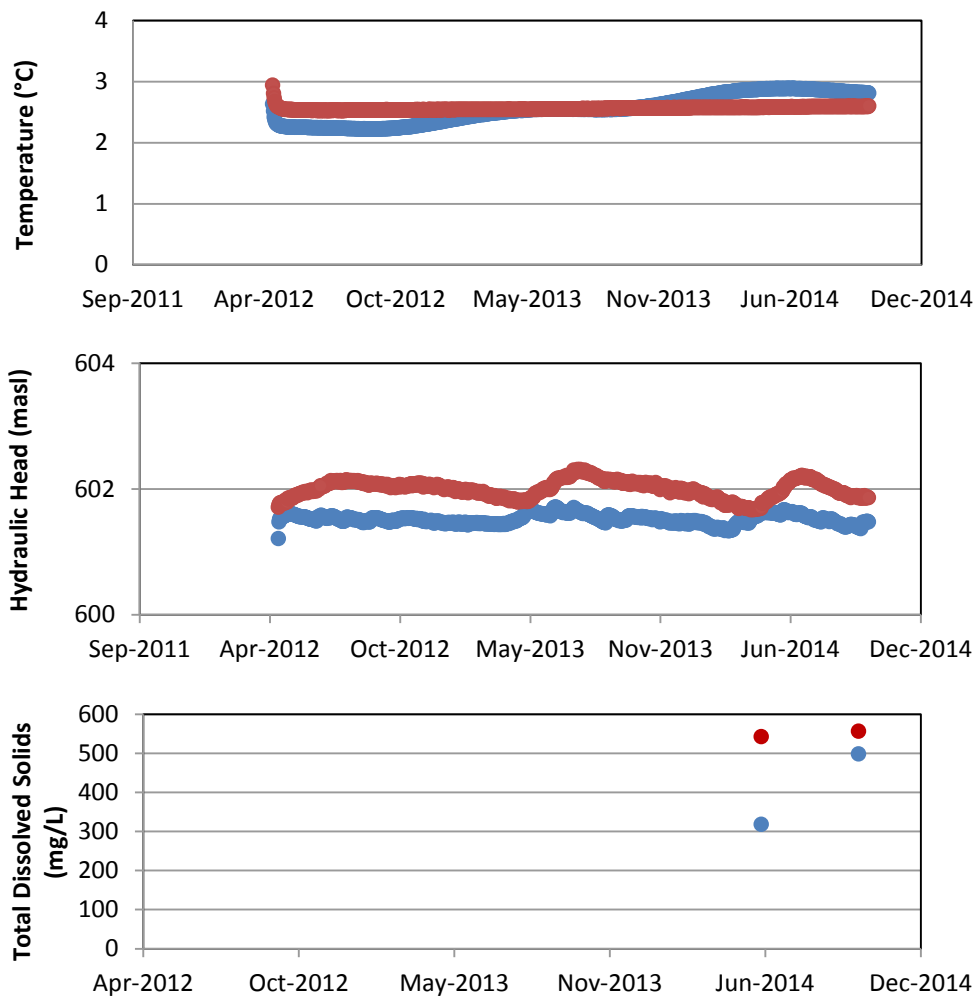


Aspects of Conceptual Model

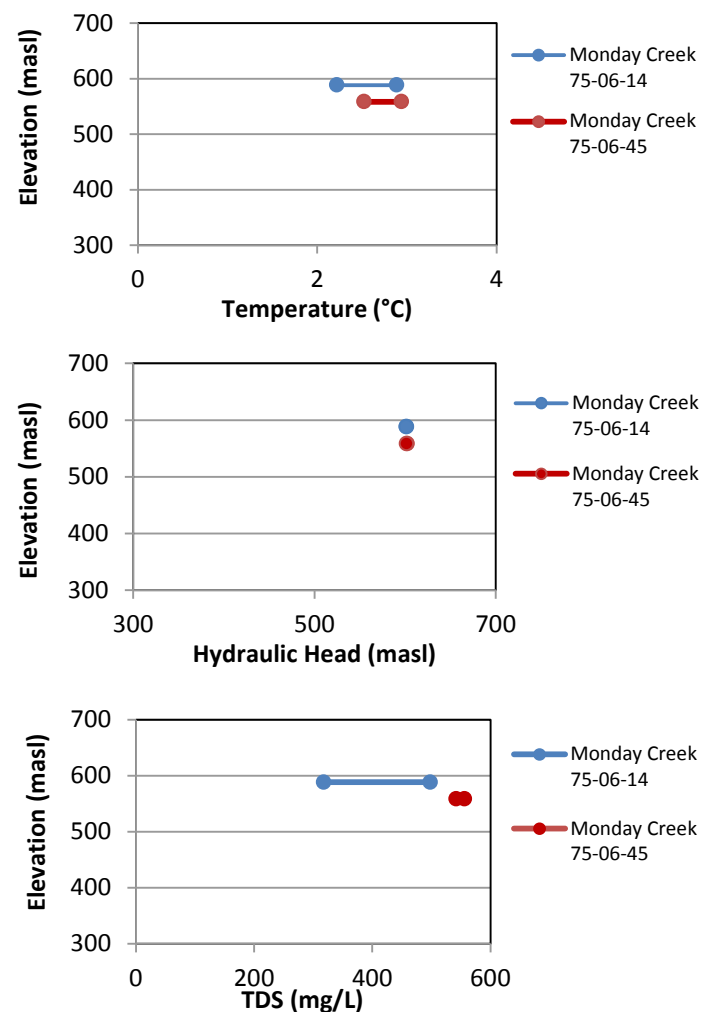
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Discharge
Colorado Group Aquitard Extent – Thin or Absent	Gas Production - Proximal
Bedrock Incisions - Proximal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Proximal

SAOS Well Name	UWI or Well Name	Screened Interval (mbgs)	Owner	Interpreted Aquifer	Sub-Network
Monday Creek 76-06-14	RMW 6B-32 SR	11.3-14.3	Devon	Sand River	C (Investigative)
Monday Creek 76-06-45	RMW 6B-32 BV	40.5-45.1	Devon	Bonnyville	C (Investigative)

Time Series



Profile



Notes

Wells have been monitored and sampled on a semi-annual basis as part of an EPEA groundwater monitoring program. Station is considered to be investigative (sub-network C) due to proximity to SAGD well pads at Devon's Jackfish 1 project (in particular to SAGD well pads) and areas of potential aquifer interactions (Christina Channel).

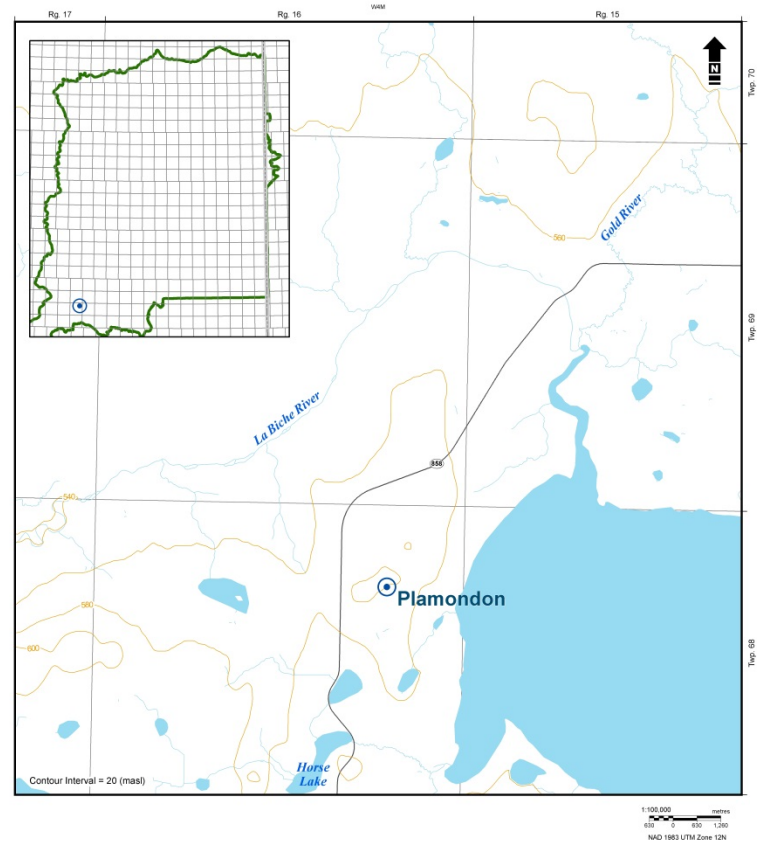
Hydraulic heads indicated an upward hydraulic gradient between the Sand River and Bonnyville aquifers. Hydraulic heads have shown seasonal variation, especially in the Bonnyville Aquifer. A hydraulic connection between the Bonnyville Aquifer and nearby watercourses has been interpreted. Temperatures in the Sand River Aquifer have shown seasonal variation and a gradual increase since monitoring began (less than 1°C). Interim groundwater quality triggers were exceeded in Sand River (NO₃, silica and As) and Bonnyville (NO₃, silica and B) aquifers.

At this time, Devon will continue to monitor and sample these completions as part of a regional groundwater monitoring program. Data will be provided to ESRD as it becomes available.

Consideration should be given to installing temperature gauges within the well screens to obtain accurate temperature measurements.

PLAMONDON (10-26-068-16 W4M) 577.9 m asl

Location Objective	Support development of sub-networks A and B as per Matrix (2013)
Key Rationale	Near Plamondon and Lac La Biche town limits (societal concerns) Near numerous shallow groundwater users and major water body Intersects buried bedrock channel Near WorleyParsons proposed groundwater monitoring well MW18 Far from any in situ oil sands project Near lake monitoring and WSC site
Safety, Access, Synergies and Priorities	Near historic and current Grand Rapids Formation gas production All season access Synergy was achieved with Canadian Natural Resources Limited at their 100/10-26-068-16 W4/00 well pad Near surface, Bonnyville (x2), and Empress Channel completions installed in fall 2012

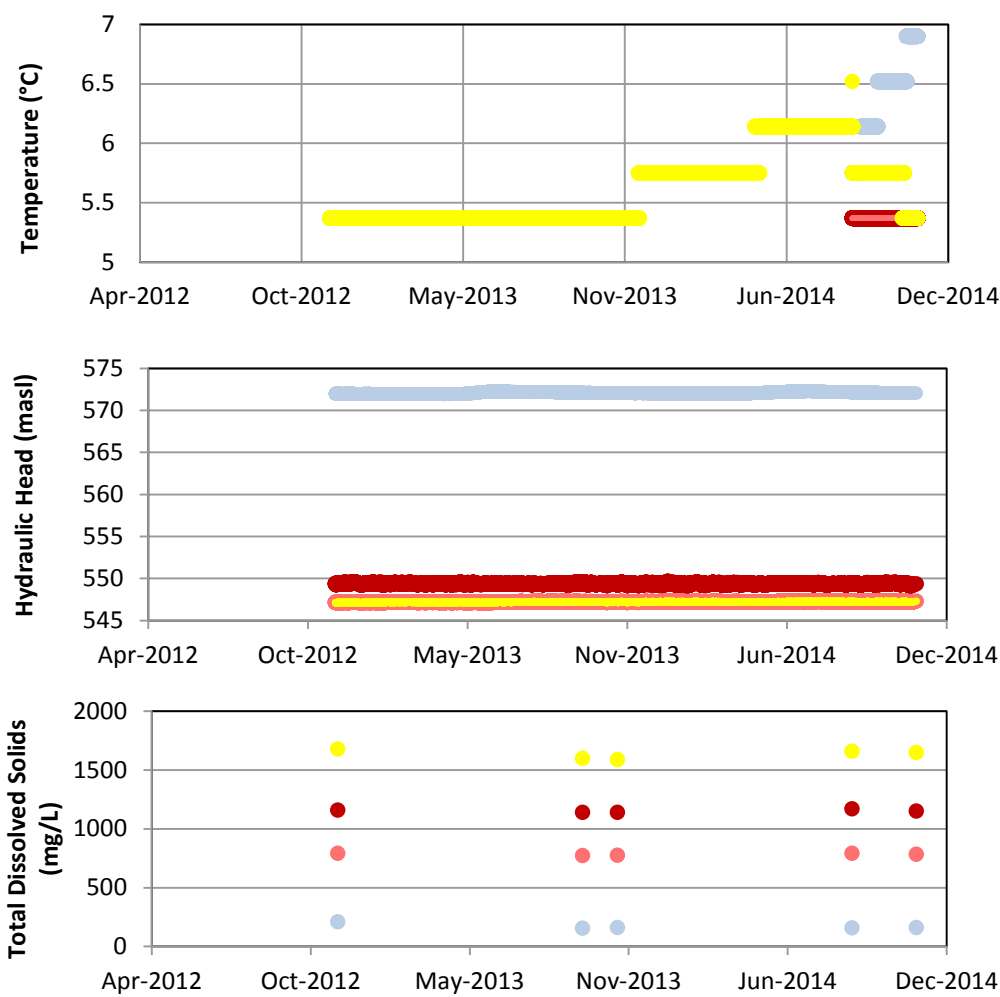


Aspects of Conceptual Model

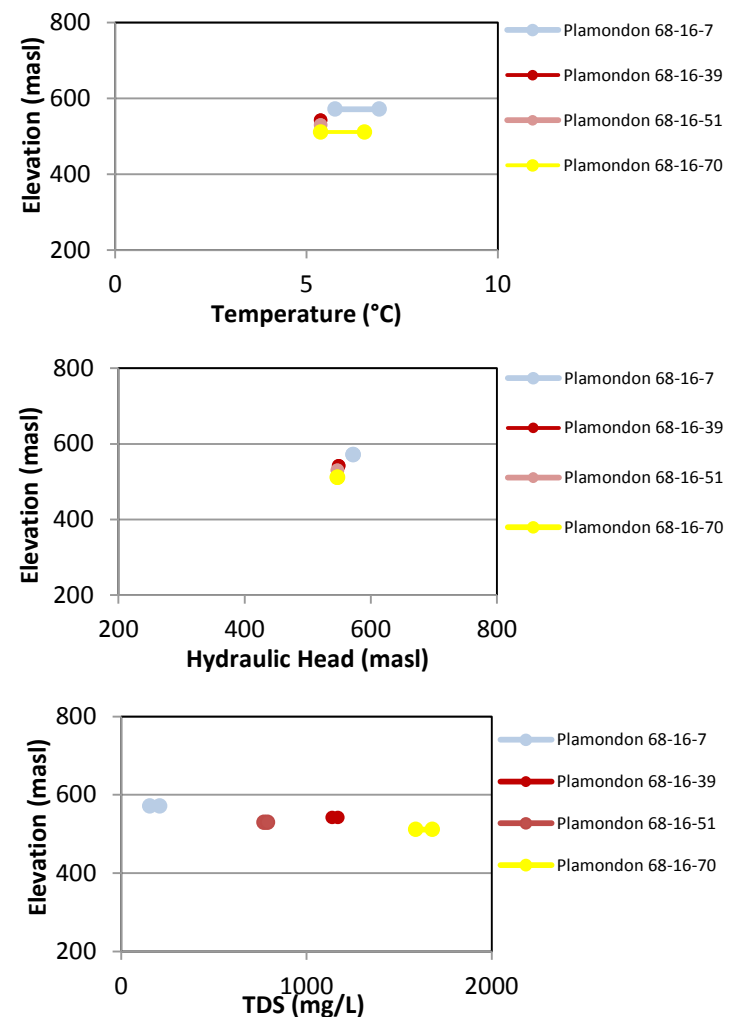
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Recharge
Colorado Group Aquitard Extent - Present	Gas Production - Proximal
Bedrock Incisions – Proximal	Oil Sands Groundwater Users - Distal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Proximal

SAOS Well Name	Screened Interval (m bgs)	Owner	Interpreted Aquifer	Sub-Network
Plamondon 68-16-7	5.0 - 7.3	ESRD	shallow	B (Surveillance)
Plamondon 68-16-39	33.0 - 38.5	ESRD	Bonnyville	B (Surveillance)
Plamondon 68-16-51	45.0 - 51.2	ESRD	Bonnyville	B (Surveillance)
Plamondon 68-16-70	64.0 - 69.5	ESRD	Empress Channel	A (Strategic)

Time Series



Profile



Notes

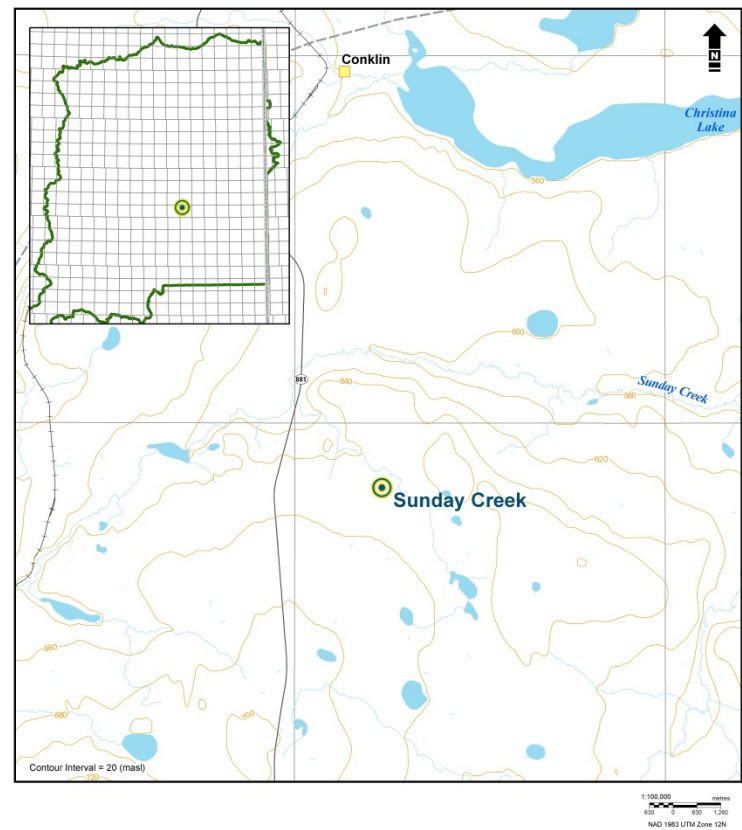
All key non-bedrock aquifers have been completed at this location. Currently there are no bedrock completions installed. Matrix (2013) has not identified bedrock aquifers as being high priority at this location.

Hydraulic heads have suggested local recharge conditions. There has been a downward vertical hydraulic gradient between the shallow aquifer and the underlying Bonnyville Aquifer, which suggests the presence of an effective confining/aquitard layer above the Bonnyville Aquifer. Hydraulic heads in the two lower wells (Bonnyville and Empress Channel) have been nearly identical since continuous monitoring began in November 2012 and were similar to the lake water elevation of Lac La Biche. Temperature data collected from within the well screens was stable in all aquifers; seasonal variation was apparent in the near-surface completion. This location was sampled twice in 2014 for routine parameters, metals and hydrocarbons. Interim triggers were exceeded near surface (NO₃, silica, As, BTEX), Bonnyville (TDS, silica, As, B, BTEX) and Empress Channel (TDS, Cl, As, B). The Empress Channel Aquifer completion was interpreted to represent baseline conditions.

It is recommended that ESRD continue monitoring at this location and collect water quality parameters semi-annually with at least 4 months between the two sampling events.

SUNDAY CREEK (14-29-075-07 W4M) 657 m asl

Location Objective	Support development of sub-network C
Key Rationale	<p>Near a deep erosional incision through Colorado group Aquitard into Grand Rapids Formation (Christina Channel), area with potential interaction between regional aquifers</p> <p>High density of in situ oil sands existing and proposed source and disposal wells</p> <p>Identified as potentially vulnerable area (stressed aquifers; absent Colorado Group Aquitard)</p> <p>Maximum predicted drawdown for many key area aquifers</p> <p>RAMP, WSC, meteorological stations and lake monitoring sites nearby</p> <p>Near shallow groundwater users (societal concerns) and major water body</p> <p>Near in situ oil sands groundwater users</p> <p>Numerous aquifers present (facilitates understanding of vertical hydraulic gradients)</p>
Safety, Access, Synergies and Priorities	<p>Synergy with Devon well DEVON 14D2 CONKLIN 14-29-75-7 (1F1/14-29-075-07W3/00)</p> <p>Location is in western portion of Jackfish 2 project</p> <p>Remote access (helicopter or winter access)</p> <p>Not currently part of a monitoring program</p>



Aspects of Conceptual Model

Major Lakes and Rivers - Proximal Colorado Group Aquitard Extent – Thin or Absent Bedrock Incisions - Proximal Unconsolidated Deposit Thickness - Thick	Regional Recharge vs. Discharge - discharge Gas Production - Proximal Oil Sands Groundwater Users - Proximal Shallow Local Groundwater Users - Proximal
--	--

SAOS Well Name	UWI or Well Name	Screened Interval (m bgs)	Owner	Interpreted Aquifer	Sub-Network
Sunday Creek 75-07-191	1F1/14-29-075-07W3/00	163.8-191.0	Devon	Empress Terrace	C (Investigative)

Notes

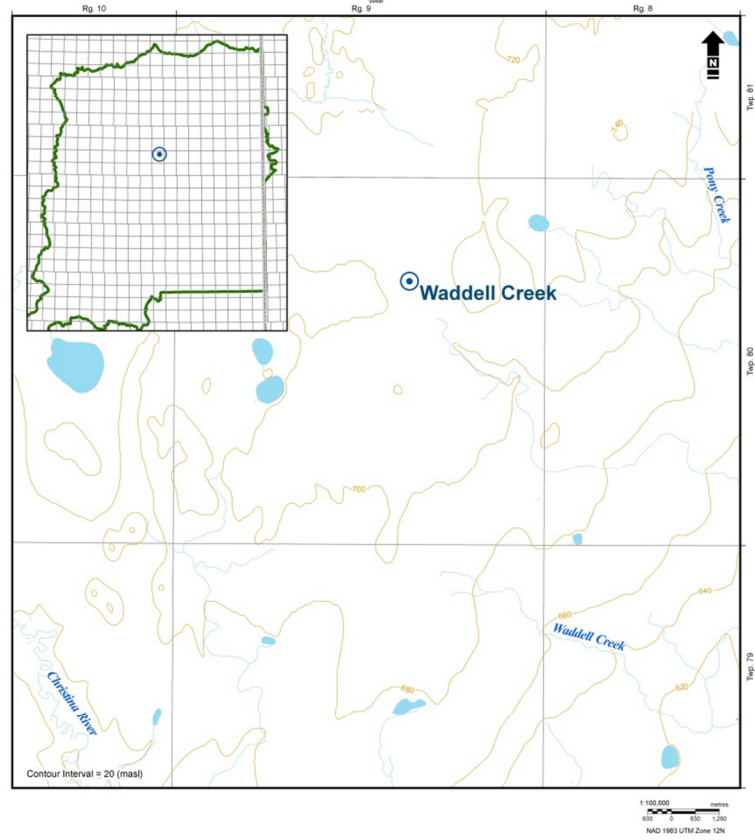
Well was originally intended for camp water supply; however, an alternate source was ultimately used so well is currently inactive. Station is considered to be investigative (part of Subnetwork C) due to proximity to surrounding operators/water users and areas of potential aquifer interactions (Christina Channel).

Devon may consider transferring well ownership to ESRD; there may be potential to install additional wells at this location. It is recommended the well be instrumented with a data logger and monitored and sampled as part of the 2015 SAOS groundwater monitoring program.

Historical monitoring data is not available for wells at this station.

WADDELL CREEK (08-27-080-09 W4M) 717.9 m asl

Location Objective	Support development of sub-networks A and B as per Matrix (2013)
Key Rationale	On Stony Mountain Uplands Empress Channel Aquifer (Leismer Channel) Near Worley Parsons (2010) proposed groundwater monitoring well MW6 Baseline quality and quantity expected in shallow unconsolidated units Over 50 m of predicted drawdown
Safety, Access, Synergies and Priorities	Near historic Grand Rapids gas production All season access Synergy was achieved through existing DRS lands. Statoil Canada Ltd. provided access to location Near surface, Sand River, Ethel Lake and Bonnyville completions installed in 2012 Higher priority location for Empress Channel aquifer completion



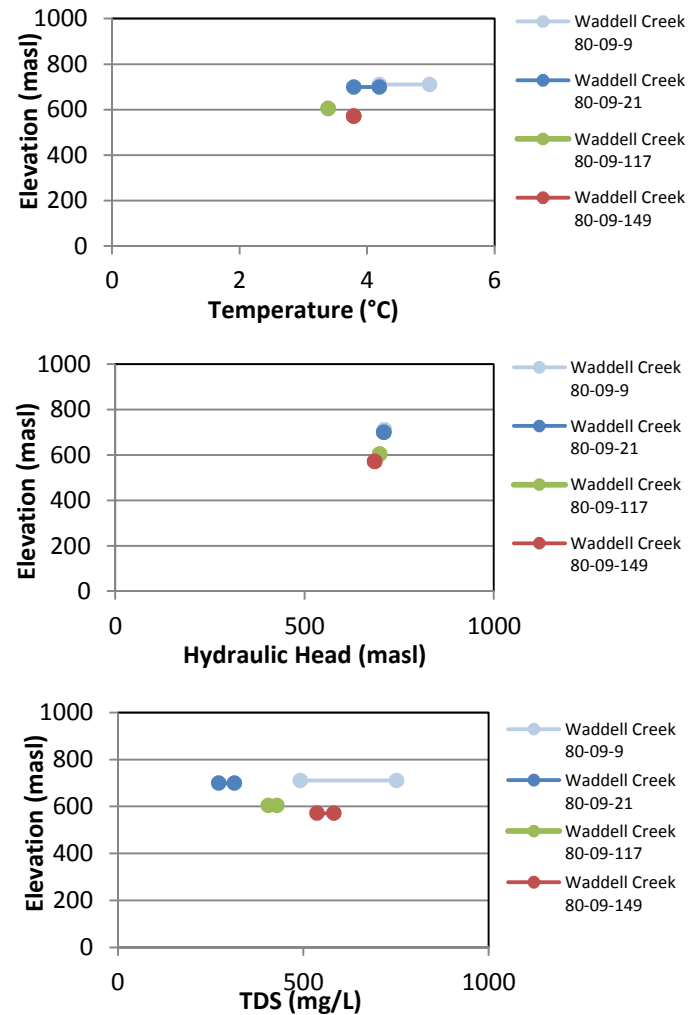
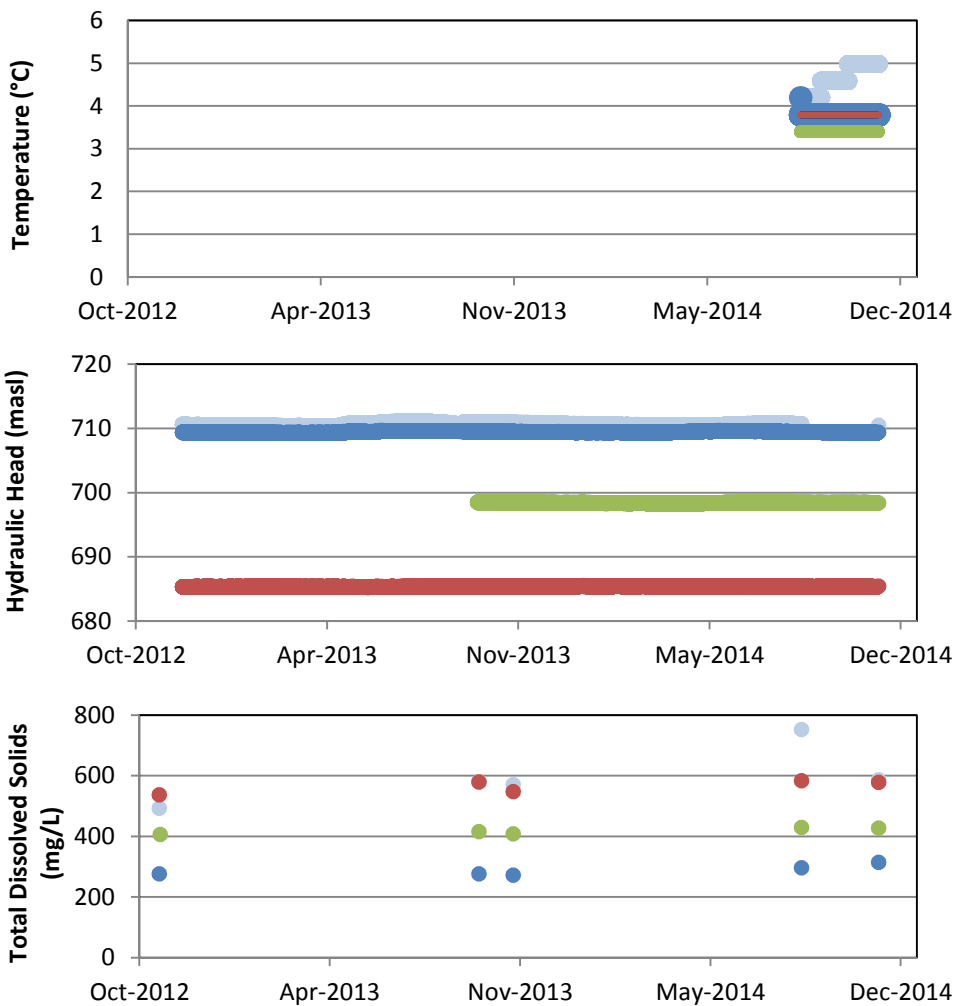
Aspects of Conceptual Model

Major Lakes and Rivers - Distal	Regional Recharge vs. Discharge - Recharge
Colorado Group Aquitard Extent - Present	Gas Production - Proximal
Bedrock Incisions - Proximal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Distal

SAOS Well Name	Screened Interval (m bgs)	Owner	Interpreted Aquifer	Sub-Network
Waddell Creek 80-9-9	6.1 - 9.2	ESRD	shallow	A (Strategic)
Waddell Creek 80-9-21	17.0 - 20.5	ESRD	Sand River	A (Strategic)
Waddell Creek 80-9-117	111.0 - 117.0	ESRD	Ethel Lake	A (Strategic)
Waddell Creek 80-9-149	146.0 - 149.0	ESRD	Bonnyville	A (Strategic)

Time Series

Profile



Notes

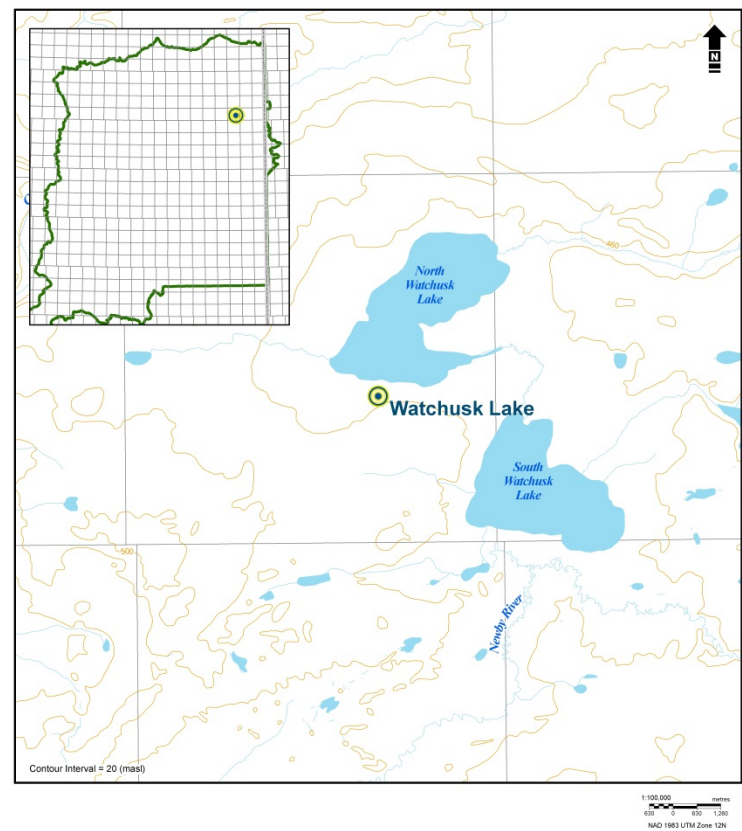
Four non-bedrock aquifers are represented at this location; there is one high priority aquifer identified at this location to be completed in the Empress Channel.

Hydraulic heads have suggested local recharge conditions, with no increasing or decreasing trends observed. Seasonal fluctuations were apparent in the near surface completion, and to a lesser extent in the Sand River completion. Temperature data collected from well screens was stable in all aquifers; seasonal variation was apparent in the near-surface completion. This location was sampled twice in 2014 for routine parameters, metals, and hydrocarbons. Interim triggers have historically been exceeded near surface (TDS, NO₃, silica, phenols) and in Sand River (As, B, silica), Ethel Lake (silica, B, phenols) and Bonnyville (silica, B). All non-bedrock aquifer completions (except Empress Channel) at this location were interpreted to represent baseline conditions in their respective aquifers.

It is recommended that ESRD continue monitoring wells at this location and collect water quality parameters semi-annually, with sampling events at least 4 months apart.

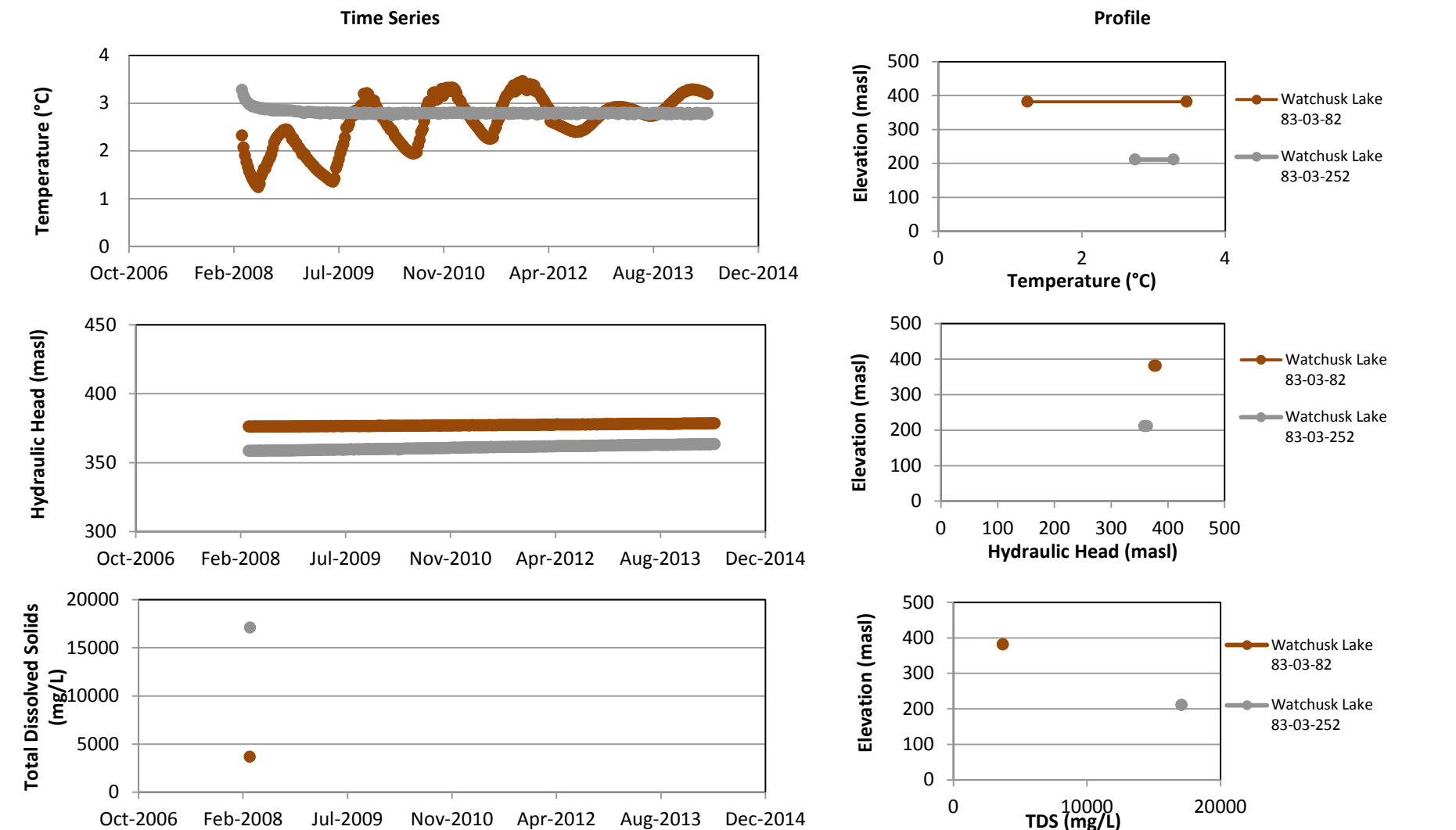
WATCHUSK LAKE (05-14-083-03 W4M) 458 m asl

Location Objective	Support development of sub-network C as per Matrix (2013)
Key Rationale	<p>Colorado Group regionally eroded away</p> <p>Regional discharge area to Christina River</p> <p>Moderate density of in situ oil sands existing and proposed source and disposal wells</p> <p>Identified as potentially vulnerable area (stressed aquifers; absence of Colorado Group Aquitard)</p> <p>Relatively high predicted drawdown in Lower Grand Rapids Aquifer and Upper Clearwater Aquifer in this area</p>
Safety, Access, Synergies and Priorities	<p>Synergies with ConocoPhillips wells 1F1/05-14-083-03W4/00 and 1F2/05-14-083-03W4/00</p> <p>Continuous pressure and temperature data is recorded with a data logger, part of a long-term groundwater monitoring program</p>



Aspects of Conceptual Model	
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - discharge
Colorado Group Aquitard Extent - Thin or Absent	Gas Production - Proximal
Bedrock Incisions - Proximal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Proximal

SAOS Well Name	UWI or Well Name	Screened Interval (m bgs)	Owner	Interpreted Aquifer	Sub-Network
Watchusk Lake 83-03-82	1F2/05-14-083-03 W4M	69.7 - 81.8	ConocoPhillips	Lower Grand Rapids	C (Investigative)
Watchusk Lake 83-03-252	1F1/05-14-083-03 W4M	240.2 - 252.3	ConocoPhillips	Basal McMurray	C (Investigative)



Notes

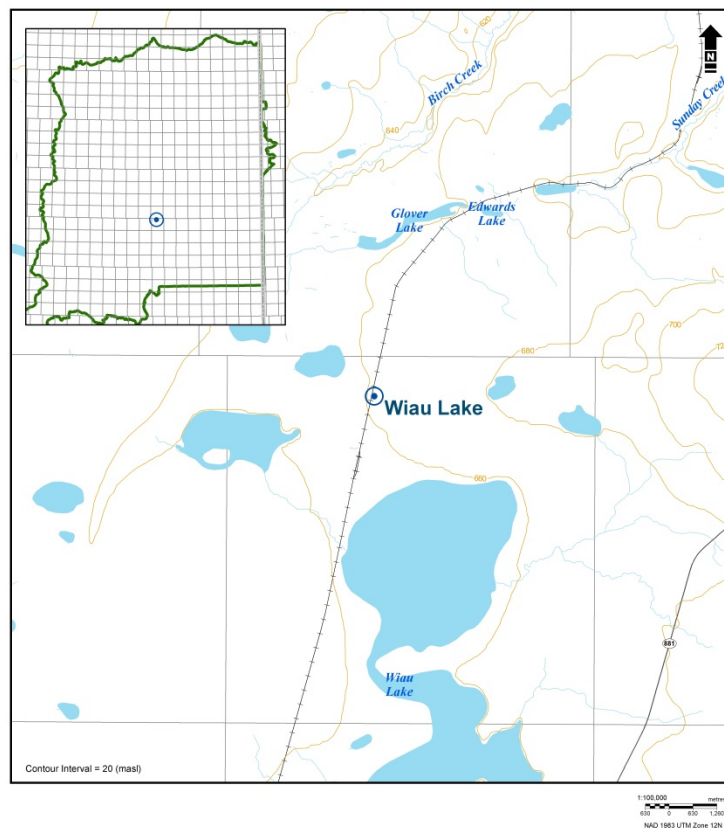
Wells are monitored on a roughly biennial basis to monitor long term pressure and temperature data near ConocoPhillips' Surmont project. Well was originally identified for the southern part of the Lower Christina River Investigation Area (Matrix 2014). Station is considered to be investigative (Subnetwork C) due to proximity to existing and proposed source and disposal wells (influence to aquifer pressures) and areas of potential aquifer interactions (absent Colorado Group Aquitard).

Hydraulic heads suggest a downward hydraulic gradient. Hydraulic heads increased in both aquifers from 2008 to 2014: by 2 m in the Lower Grand Rapids Aquifer, and by 4 m in the McMurray Aquifer. Temperatures in the Lower Grand Rapids Aquifer showed seasonal variation, but were consistent in the Basal McMurray Aquifer. However, temperature measurements were not deployed within the well screen of either well and, therefore, temperatures may not have been accurate. The wells have not been regularly sampled for hydrochemical parameters; however, during short-term pumping tests, groundwater exceeded interim groundwater quality triggers for the Lower Grand Rapids Aquifer (TDS, Cl, B) and the Basal McMurray Aquifer (TDS, Cl and As).

ConocoPhillips and ESRD are negotiating the transfer of ownership for these monitoring wells. ConocoPhillips will provide ESRD with pressure and temperature data when available. It is recommended to instrument the wells at this location so temperature is recorded within the well screens.

WIAU LAKE (06-33-073-09 W4M) 667.0 m asl

Location Objective	Support development of sub-networks A and B as per Matrix (2013)
Key Rationale	Empress Channel Aquifer (Wiau Channel) Near water body WEPA00-1 well pad present Near WorleyParsons proposed groundwater monitoring well MW14 Tens of metres of predicted drawdown in Empress Terrace Aquifer at this location About 50 m of drawdown is predicted in the Middle Clearwater Aquifer at this location
Safety, Access, Synergies and Priorities	Near historic Grand Rapids gas production and current McMurray Formation gas production, well away from any Clearwater Formation gas production. All season access. Synergy with WEPA00-1 (Sand River and Bonnyville completions already exist). Discussions with Canadian Natural are recommended as there may be a synergy with access, existing wells or monitoring locations - especially regarding deeper Cretaceous units that don't necessarily need to be sampled regularly or at all.

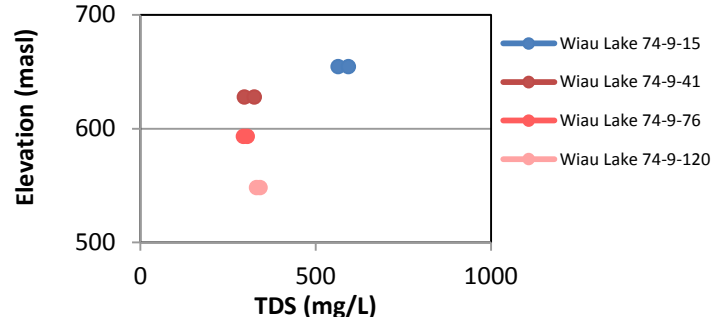
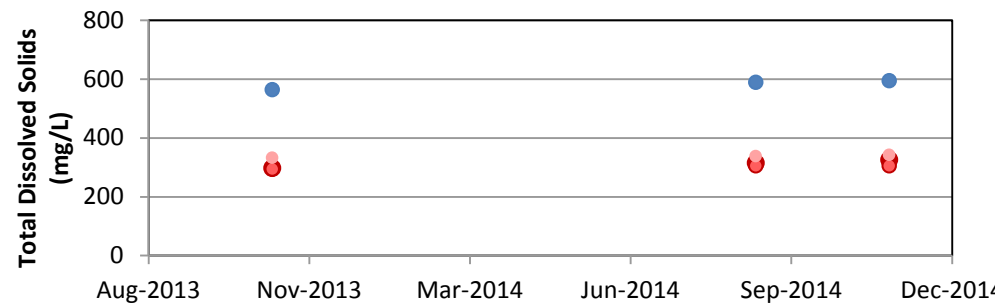
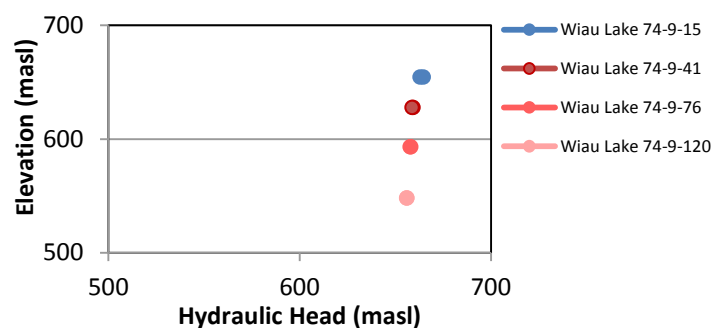
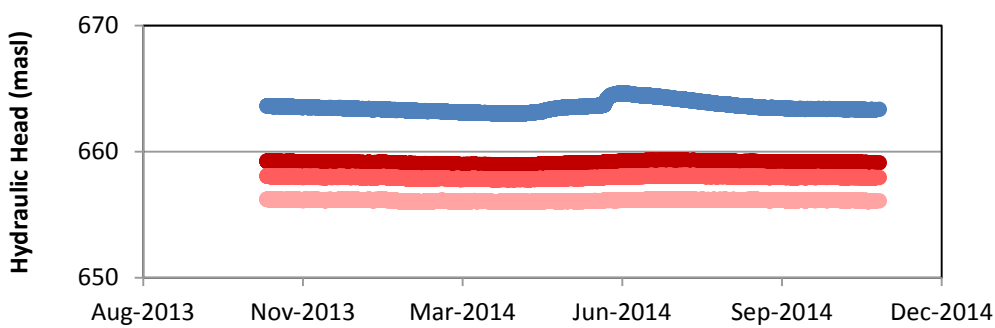
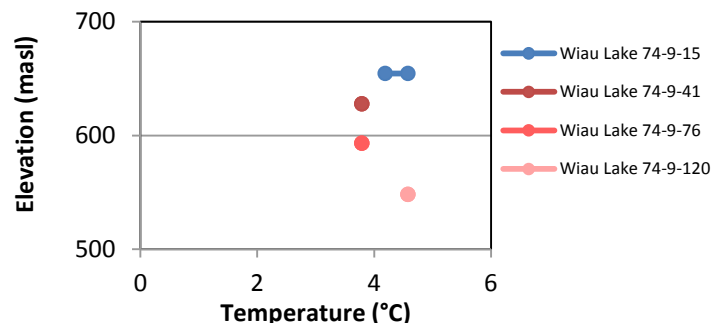
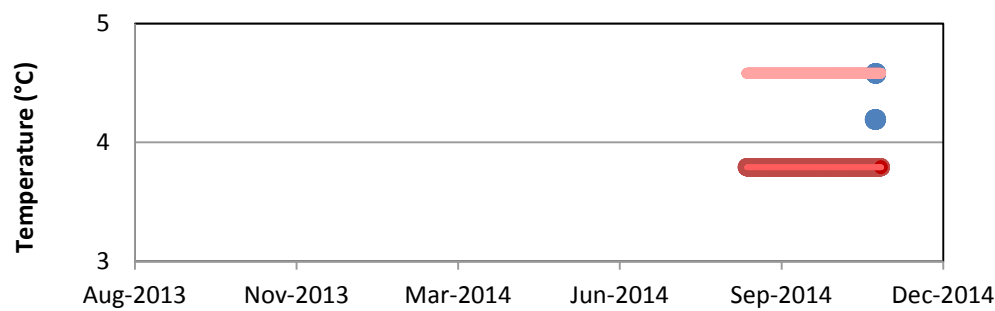


Aspects of Conceptual Model	
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Recharge
Colorado Group Aquitard Extent - Present	Gas Production - Proximal
Bedrock Incisions - Proximal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Distal

SAOS Well Name	AGS Well Name	Screened Interval (m bgs)	Owner	Interpreted Aquifer	Sub-Network
Wiau Lake 73-9-15	WEPA 00-1-WT	9.3 - 15.4	AGS/ESRD	Sand River	A (Strategic)
Wiau Lake 73-9-41	WEPA 00-1-41	37.9 - 41.0	AGS/ESRD	Bonnyville	A (Strategic)
Wiau Lake 73-9-76	WEPA 00-1-76	72.4 - 75.3	AGS/ESRD	Bonnyville	A (Strategic)
Wiau Lake 73-9-120	WEPA 00-1-120	117.3 - 120.3	AGS/ESRD	Bonnyville	A (Strategic)

Time Series

Profile



Notes

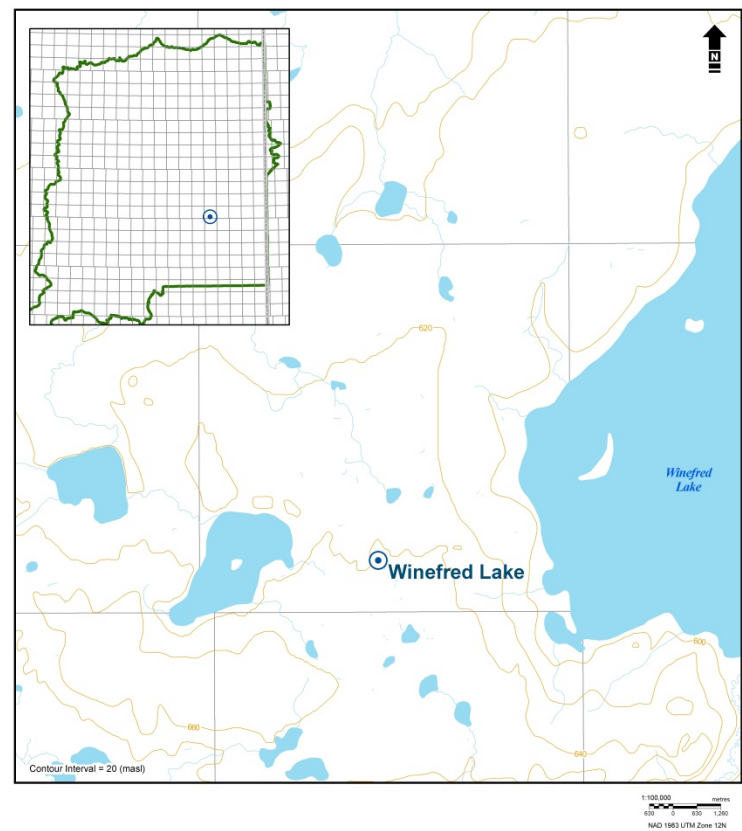
This location had four existing monitoring wells completed in Sand River and Bonnyville aquifers; additional high priority aquifers for completion include the near surface, Ethel Lake, Muriel Lake, Empress Terrace and Middle Clearwater aquifers (Matrix 2013).

Hydraulic heads suggested local recharge conditions. Seasonal variation was apparent in the Sand River Aquifer completion. Temperature data collected from well screens was stable in all aquifers; seasonal variation was not apparent. This location was sampled twice in 2014 for routine parameters, metals, and hydrocarbons. Interim triggers have historically been exceeded in the Sand River (As, silica) and the Bonnyville (As, silica). All unconsolidated aquifer completions at this location were interpreted to represent baseline conditions in their respective aquifers.

It is recommended that ESRD continue monitoring wells at this location and collect water quality parameters semi-annually, with sampling events at least 4 months apart.

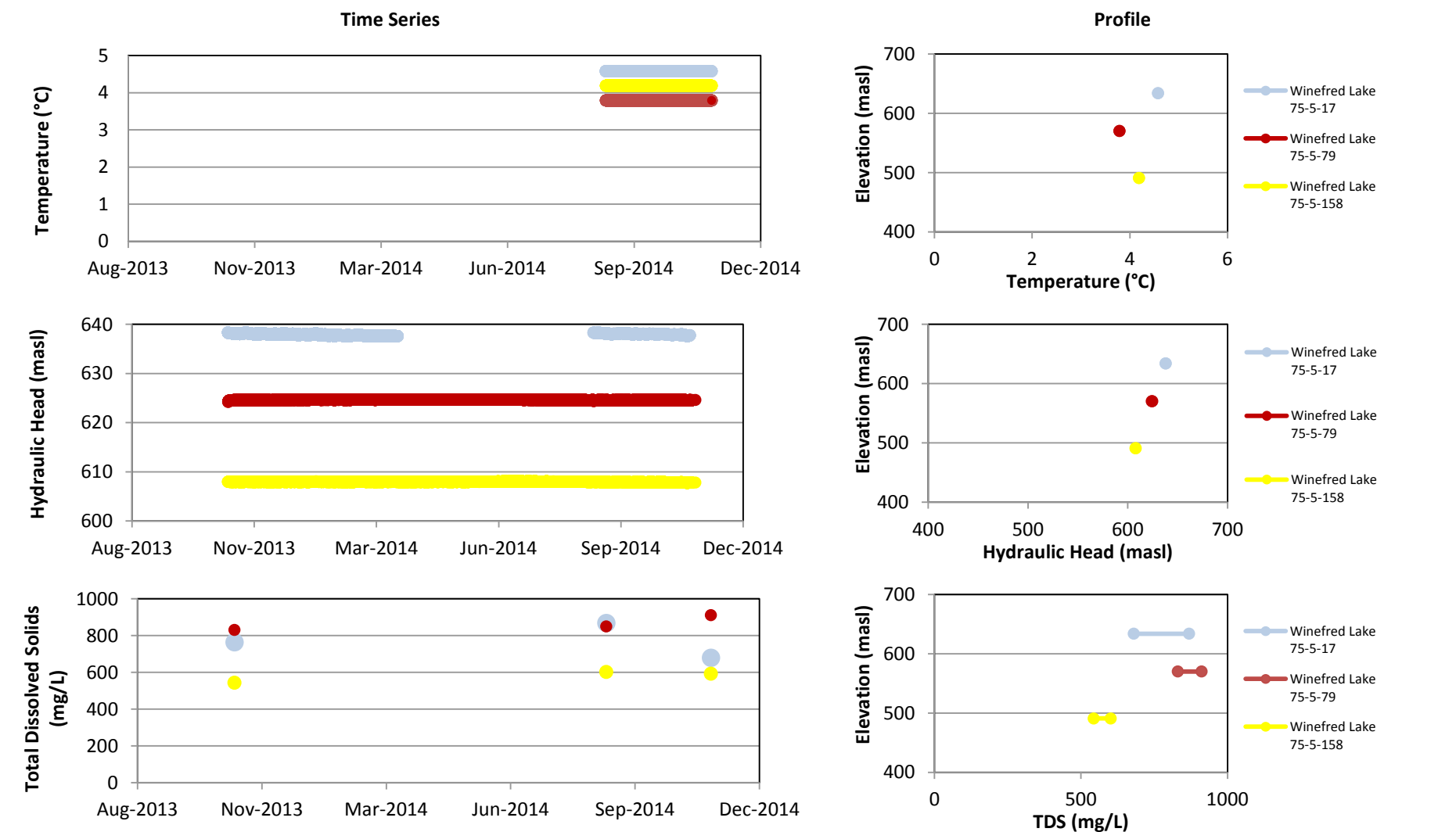
WINEFRED LAKE (16-04-075-05 W4M) 648.3 m asl

Location Objective	Support development of sub-networks A and B as per Matrix (2013)
Key Rationale	<p>Near major lake (Winefred Lake; surface water-groundwater interactions)</p> <p>Near in situ oil sands groundwater users</p> <p>Empress Terrace Aquifer present</p> <p>WEPA00-3 well pad present</p> <p>Near WorleyParsons proposed groundwater monitoring well MW3</p> <p>Over 50 m of predicted drawdown in the Lower Grand Rapids Aquifer and Upper Clearwater Aquifers at this location</p>
Safety, Access, Synergies and Priorities	<p>Near historic Grand Rapids and McMurray formation gas production, near current Clearwater gas production.</p> <p>Accessible year-round.</p> <p>Synergy with WEPA00-3 (near surface, Bonnyville and Empress Terrace completions already exist).</p> <p>Optional synergy may be found with Devon's suspended gas well at 100/13-11-075-05 W4/00.</p> <p>This monitoring location can be linked to monitoring in the Christina Channel Investigation Area.</p> <p>Higher priority location for Ethel Lake and Muriel completions.</p>



Aspects of Conceptual Model	
Major Lakes and Rivers - Proximal	Regional Recharge vs. Discharge - Recharge
Colorado Group Aquitard Extent - Present	Gas Production - Proximal
Bedrock Incisions - Distal	Oil Sands Groundwater Users - Proximal
Unconsolidated Deposit Thickness - Thick	Shallow Local Groundwater Users - Distal

SAOS Well Name	AGS Well Name	Screened Interval (m bgs)	Owner	Interpreted Aquifer	Sub-Network
Winefred Lake 75-5-17	WEPA 00-3-17	11.2 - 17.3	AGS/ESRD	shallow	A (Strategic)
Winefred Lake 75-5-79	WEPA 00-3-79	76.6 - 79.6	AGS/ESRD	Bonnyville	B (Surveillance)
Winefred Lake 75-5-158	WEPA 00-3-158	155.4 - 158.8	AGS/ESRD	Empress Terrace	B (Surveillance)



Notes

Three key non-bedrock aquifers are represented at this location; Ethel Lake and Muriel Lake aquifers are higher priority for future expansion of the network. Matrix (2013) has not identified bedrock aquifers as a high priority.

Hydraulic heads suggested local recharge conditions; heads have been consistent since monitoring began. Pressure data missing from March 2014 to August 2014 due to an instrument malfunction. Temperature data collected from well screens was stable in all aquifers; seasonal variation was not apparent. This location was sampled twice in 2014 for routine parameters, metals, and hydrocarbons. Interim groundwater quality triggers have been historically exceeded in the following aquifers: surficial deposits (TDS, Cl, NO₃, silica), Bonnyville (TDS, silica), and Empress Terrace (TDS, As, B, silica).

It is recommended that ESRD continue monitoring wells at this location and collect water quality parameters semi-annually, with sampling events at least 4 months apart.

5.4 Regional Groundwater Summary

Key aquifers in the SAOS area have been extensively studied. Large volumes of hydrogeologic information about key aquifers within the SAOS region have been compiled by operators, regulators and academics in publicly available documents (regional reports, studies, EIAs, *Water Act* diversion applications, and compliance/regulatory groundwater monitoring reports). The data provided in these documents demonstrate the spatial variability of hydrochemical conditions in the SAOS region, and highlight the difficulty in defining a single groundwater quality trigger to encompass all locations for a given aquifer. The results from the SAOS monitoring program provide evidence supporting this variability.

A summary of indicator parameters for SAOS groundwater monitoring network locations is provided in Table 11. The table illustrates the range of historical values for indicator parameters for each key aquifer, and indicates if one or more parameters exceeded each interim groundwater quality trigger. Interim triggers were exceeded in every aquifer with active monitoring locations for two or more of the key indicators specified in Table A. Currently, there is insufficient data at each station to apply statistical methods to recommend new groundwater quality triggers; the methods prescribed in the GMF require six to eight sampling events, whereas the SAOs network currently has had five events or fewer.

Because of the variability in hydrochemical conditions within each aquifer, SAOS groundwater monitoring locations are recommended to be considered as reference locations that represent a subset of groundwater conditions within SAOS region. This is a different approach from defining regional conditions in key aquifers with a single value for each parameter, which the interim triggers do (Table A; GoA 2012).

5.5 Temperature Comparison

Temperatures measured from gauges hung at different depths within House Crossing 77-15-161 (screened in the Muriel Lake Aquifer) are provided on Figure 16, along with temperatures measured from within the well screens in House Crossing 77-15-82 (screened in the Ethel Lake Aquifer) and House Crossing 77-15-126 (screened in the Bonnyville Aquifer). Temperature gauges were configured so the gauge hung at 80 m below top of casing (btoc) in House Crossing 77-15-161 was adjacent to the Ethel Lake Aquifer (and the gauge in House Crossing 77-15-82), and the gauge hung at 124 m btoc in House Crossing 77-15-161 was adjacent to the Bonnyville Aquifer (and the gauge in House Crossing 77-15-126). Data recorded from August 29 to November 15, 2014, were compared with the following observations:

- The temperature measured in the screen of House Crossing 77-15-161 (Muriel Lake Aquifer) was 4.6°C as recorded by both the Nautilus 85 gauge and by the HOB0® TidBits gauge.
- The temperature in House Crossing 77-15-161 measured at 80 m btoc (adjacent to the Ethel Lake Aquifer) was almost identical to the temperature measured in the well completed in the Ethel Lake

(House Crossing 77-15-82), at about 3.0°C. This was 1.6°C lower than the temperature of the Muriel Lake Aquifer.

- The temperature in House Crossing 77-15-161 measured at 124 m btoc (adjacent to the Bonnyville Aquifer) was 4.1°C, about 0.3°C higher than the temperature measured in the well screen of House Crossing 77-15-126 (3.8°C) and 0.4°C lower than the temperature measured in the Muriel Lake Aquifer in the same well.

6 KEY FINDINGS OF THE 2014 SAOS GROUNDWATER MONITORING PROGRAM

The following were key findings of the SAOS groundwater monitoring program:

- In all, 28 monitoring wells were monitored and sampled as part of the 2014 program. Results were consistent with historical data.
- Groundwater monitoring infrastructure owned by industry was incorporated into the program, including 23 completions at 10 stations. Considering these additions, there are completions in all 10 of the SAOS key aquifers, as well as shallow completions. There are a total of 51 completions.
- SAOS monitoring locations should be considered as reference points for groundwater conditions, and do not necessarily capture the full range of spatial variability within the SAOS region.
- Water levels in the SAOS region varied spatially.
 - ✦ Water levels generally indicated recharge conditions and downward vertical hydraulic gradients. Upward vertical hydraulic gradients were observed between aquifers at the following locations:
 - Conklin: Ethel Lake to Sand River
 - Monday Creek: Bonnyville to Sand River
 - House Crossing: Bonnyville to Ethel Lake
 - ✦ Water levels in unconsolidated aquifers were generally stable.
 - ✦ Water levels in bedrock aquifers at locations with longer records showed some perturbations and trends that were attributed to withdrawal from and disposal to bedrock aquifers.
- Temperature measurements from a monitoring well are strongly influenced by the depth at which they are recorded.
 - ✦ Gauges installed above the well screen recorded temperatures closer to the hydrogeologic unit adjacent to the well bore where the gauge was installed, than to the aquifer temperature where the well is screened. The temperature influence of the adjacent aquifer appears to be stronger on gauges with greater vertical distance from the well screen.

- ✦ Gauges were installed within the well screens of each ESRD and AGS monitoring well in August 2014. The data collected by these gauges should supersede historical data collected by pressure transducers installed above the well screens.
- ✦ Seasonal fluctuation in temperatures was evident in shallow completions and in shallow aquifers; variation attenuates with depth. Seasonal variation in temperature was not observed in deeper aquifers where temperature gauges were installed within the well screens.
- Some hydrochemical parameters measured in SAOS groundwater monitoring wells exceeded the interim water quality triggers for SAOS in the Lower Athabasca Region GMF in most aquifers.
 - ✦ The prevalence of interim trigger exceedances highlights the variability of groundwater conditions within each aquifer. A single limit for each parameter in each aquifer may not be appropriate; rather, site-specific triggers for aquifers present at each monitoring location may be more effective in the overall groundwater management of the SAOS area.
- Currently, there is insufficient data from the SAOS groundwater monitoring network to conduct statistical analyses to determine if there are statistically significant trends at most monitoring locations (reference points).

7 CONCLUSIONS

Based on the 2014 SAOS groundwater monitoring program, the following conclusions were made:

- The regional groundwater monitoring well network has been expanded as per the development guidance outlined in the *Framework for Development of a Regional Groundwater Monitoring Network - Interim Report, Southern Athabasca Oil Sands Area* (Matrix 2013).
- In 2014, existing ESRD monitoring wells were sampled (28 wells at 7 locations), candidate monitoring locations were reviewed in collaboration with industry, and a subset of monitoring locations were selected for incorporation to the SAOS regional groundwater monitoring network.
- The monitoring locations include completions in all SAOS key aquifers, plus shallow completions installed near the water table.
 - ✦ Temperature is an important parameter to measure accurately. Temperature data recorded as part of the SAOS groundwater monitoring program is considered to be accurate; however, temperature data from outside sources should be reviewed and scrutinized before incorporating into the SAOS data set. This assessment will ensure accurate data, recorded from loggers correctly placed relative to well screens, is incorporated within the data set.

- ✦ Water quality parameters exceeded the interim triggers at many monitoring locations, due to spatial variability of aquifer conditions.
- ✦ Currently, there is insufficient data for statistical analyses of trends at these reference points.
- Authorized individuals at ESRD and members of the SAOS technical committee have access to CDP until March 31, 2016, to support data QA/QC beyond the current project completion date.

8 RECOMMENDATIONS

Specific recommendations for monitoring sites and investigation areas are outlined on the summary sheets provided in Section 5. New SAOS monitoring wells and VWP's that are owned by industry are provided in Tables 4a and 4b, which include rationale for including the locations and details of the completions.

General recommendations for the development of the SAOS regional groundwater monitoring network in 2015 include the following:

- Continue collecting continuous water level and temperature data from existing SAOS regional groundwater monitoring wells.
- Collect groundwater hydrochemical data semi-annually from existing SAOS regional groundwater monitoring wells, at intervals of no less than 4 months.
- Obtain pressure, temperature, and hydrochemical data, when available, from operators who own monitoring wells at the following SAOS locations: Kimowin, Graham, Christina Crossing and Watchusk Lake (ConocoPhillips); Grist Lake and Monday Creek (Devon); Caribou and East Christina (Cenovus); and Anzac (Nexen).
- Work with Devon to determine the logistics and responsibilities for equipping the monitoring well at Sunday Creek and incorporating it into the semi-annual groundwater monitoring and sampling program. Consideration should be given to installing additional monitoring wells at this location.
- Continue discussions with ConocoPhillips to transfer ownership of monitoring wells at Graham, Kimowin, Christina Crossing, and Watchusk Lake.
 - ✦ Discuss potentially instrumenting wells with temperature gauges within the well screen to collect accurate temperature data going forward.
- Begin discussions with Devon regarding ownership transfer of the monitoring wells at Grist Lake and Sunday Creek.

- Begin discussions with Nexen for incorporating the Lower Grand Rapids Aquifer monitoring well at 03-36-084-02 W4M into the SAOS groundwater monitoring network.
- Continue discussions with SAOS operators to identify synergies with existing completions in aquifers that are not currently monitored.
- Initiate discussions with relevant parties in Saskatchewan on incorporating groundwater monitoring locations east of the border (new or existing) to be monitored jointly.
- Apply statistical methods prescribed in the draft Groundwater Management Directive to the data to conduct trend analysis and develop preliminary limits and triggers for indicator parameters (GoA 2012) at each monitoring location in each aquifer with sufficient data.
- Continue to develop a publicly accessible web-based data viewer that builds on the current data set and CDP that was developed by Matrix.

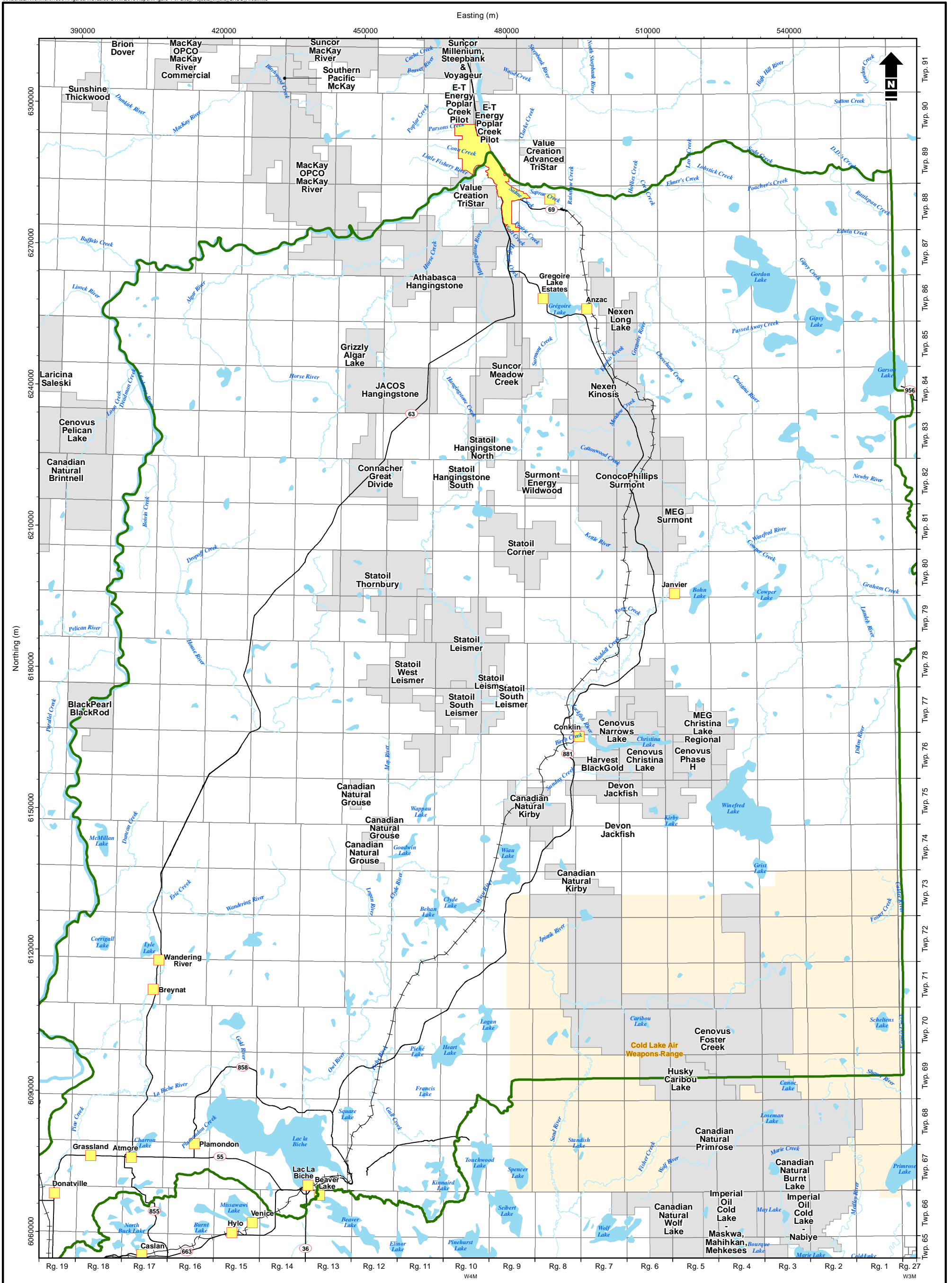
Considering the interim water quality triggers outlined in the Lower Athabasca Region GMF (GoA 2012) were exceeded at several monitoring locations, it is clear the values do not reflect the spatial variability of hydrochemical parameters in key SAOS aquifers. As such, it is recommended that interim triggers be replaced by triggers for each aquifer at each established SAOS monitoring location (reference point), which could be used as benchmarks for assessing the status of the groundwater system. Trigger values will be set once enough data has been collected to determine statistically significant trends and describe the variability of groundwater conditions. Six to eight data points are recommended to establish trigger values; therefore, trigger values may be established in 1 to 2 more years.

9 REFERENCES

- ACR Systems Inc. (ACR). 2012. *Nautilus 85, Single-Channel Temperature Data Logger (Max 85°C)*. Product datasheet.
<http://instrumentation.bhd.ca/files/product-datasheets/acr-systems/acr-nautilus-85-stainless-steel-waterproof-temperature-data-logger-datasheet.pdf>
- Alberta Environment and Sustainable Resource Development (ESRD). 2012a. *Lower Athabasca Region Groundwater Management Framework*. ISBN: 978-1-4601-0534-4. August 2012.
http://environment.alberta.ca/documents/LARP_Framework_GroundwaterMgt_FINALv2.pdf
- Alberta Environment and Sustainable Resource Development (ESRD). 2012b. *Land-use Framework*. Accessed on January 8, 2015.
<https://landuse.alberta.ca/PlanforAlberta/LanduseFramework/Pages/default.aspx>

- Alberta Environment (AENV). 2010. *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*. Edmonton, Alberta. December 2010. ISBN: 978-0-7785-9947-0.
<http://environment.gov.ab.ca/info/library/7751.pdf>
- Alberta Environment (AENV). 1999. *Surface Water Quality Guidelines for Use in Alberta*. Environmental Assurance Division, Science and Standards Branch. Publication No. T/483. ISBN: 0-7785-0897-8. Edmonton, Alberta. November 1999. <http://environment.gov.ab.ca/info/library/5713.pdf>
- Andriashek L.D. 2003. *Quaternary Geological Setting of the Athabasca Oil Sands (In Situ) Area, Northeast Alberta*. EUB/AGS Earth Sciences Report 2002-03. Alberta Energy and Utilities Board, Alberta Geological Survey. Edmonton, Alberta. April 2003.
http://www.ags.gov.ab.ca/publications/ESR/PDF/ESR_2002_03.PDF
- Barson D., Bachu S., and P. Esslinger. 2001. "Flow systems in the Mannville Group in the southeast Athabasca area and implications for steam-assisted gravity drainage (SAGD) operations for in situ bitumen production." *Bulletin of Canadian Petroleum Geology* 49 (3): 376-392.
- Bouwer H. and R.C. Rice. 1976. "A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells." *Water Resources Research* 12 (3): 423-428.
- Canadian Council of Ministers of the Environment (CCME). 2014. *Sediment Quality Guidelines for the Protection of Aquatic Life*. Canadian Environmental Quality Guidelines, Summary Tables. Accessed in January 2014. <http://st-ts.ccme.ca/en/index.html>
- Dagan G. 1978. "A note on packer, slug, and recovery tests in unconfined aquifers." *Water Resources Research* 14 (5): 929-934.
- Government of Alberta (GoA). 2012. *Lower Athabasca Regional Plan 2012-2022*. August 2012. ISBN: 978-1-4601-0537-5.
- Health Canada. 2012. *Guidelines for Canadian Drinking Water Quality-Summary Table*. Prepared by the Federal-Provincial Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch. Ottawa, Ontario. August 2012.
- Health Canada. 2006. *Guidelines for Canadian Drinking Water Quality - Guideline Technical Document - Arsenic*. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment. Water Quality Health Bureau, Healthy Environments and Consumer Safety Branch. Ottawa, Ontario. May 2006.
http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/water-eau/arsenic/arsenic-eng.pdf

- Hvorslev M.J. 1951. *Time Lag and Soil Permeability in Groundwater Observation*. U.S. Army Corps of Engineers Waterways Experimental Station Bulletin 36. Vicksburg, Mississippi.
- Hyder Z. et al. 1994. "Slug tests in partially penetrating wells." *Water Resources Research* 30 (11): 2,945-2,957.
- Lemay T.G. and G. Jean. 2002. *Static Water Levels and Completion Details of Nested Piezometers in the Quaternary-Tertiary (?) Succession, Athabasca Oil Sands (In Situ) Area, Alberta*. Prepared by Alberta Energy and Utilities Board and Alberta Geologic Survey.
- Matrix Solutions Inc. (Matrix). 2014. *2013 Program Report, South Athabasca Oil Sands Area, Regional Groundwater Monitoring Network*. Report prepared for Alberta Environment and Sustainable Resource Development. Calgary, Alberta. March 2014.
- Matrix Solutions Inc. (Matrix). 2013. *Framework for Development of a Regional Groundwater Monitoring Network - Interim Report, Southern Athabasca Oil Sands Area*. Report prepared for Alberta Environment and Sustainable Resources Development. Calgary, Alberta. April 2013.
- Matrix Solutions Inc. (Matrix). 2012. *Guidelines for Groundwater Monitoring Best Practices, Regional Municipality of Wood Buffalo*. Report Prepared for Cumulative Environment Management Association. Alberta. January 2012.
- Onset Computer Corporation. 2015. *TidbiT v2 Temperature Data Logger - Data Sheet*. Accessed in March 2015. <http://www.onsetcomp.com/products/data-loggers/utbi-001>
- Nexen Inc. and OPTI Canada Inc. (Nexen and OPTI). 2006. *Application for Approval of the Long Lake South Project*. Submitted to Alberta Energy and Utilities Board and Alberta Environment. December 2006.
- Stewart S. 2003. *Baseline Discharge and Geochemistry of the Wiau Channel Springs, 1999 - 2001, Athabasca Oil Sands (In-situ) Area, Alberta*. Alberta Energy and Utilities Board, Alberta Geological Survey. EUB/AGS Geo-Note 2002-06. April 2003.



Legend

- South Athabasca Oil Sands (SAOS) Area
- In-Situ Oil Sand Lease
- Cold Lake Air Weapons Range
- Community
- Water Body
- Watercourse
- Highway
- Railway

Scale: 1:760,000
 7,250 0 7,250 14,500 m
 NAD 1983 UTM Zone 12N

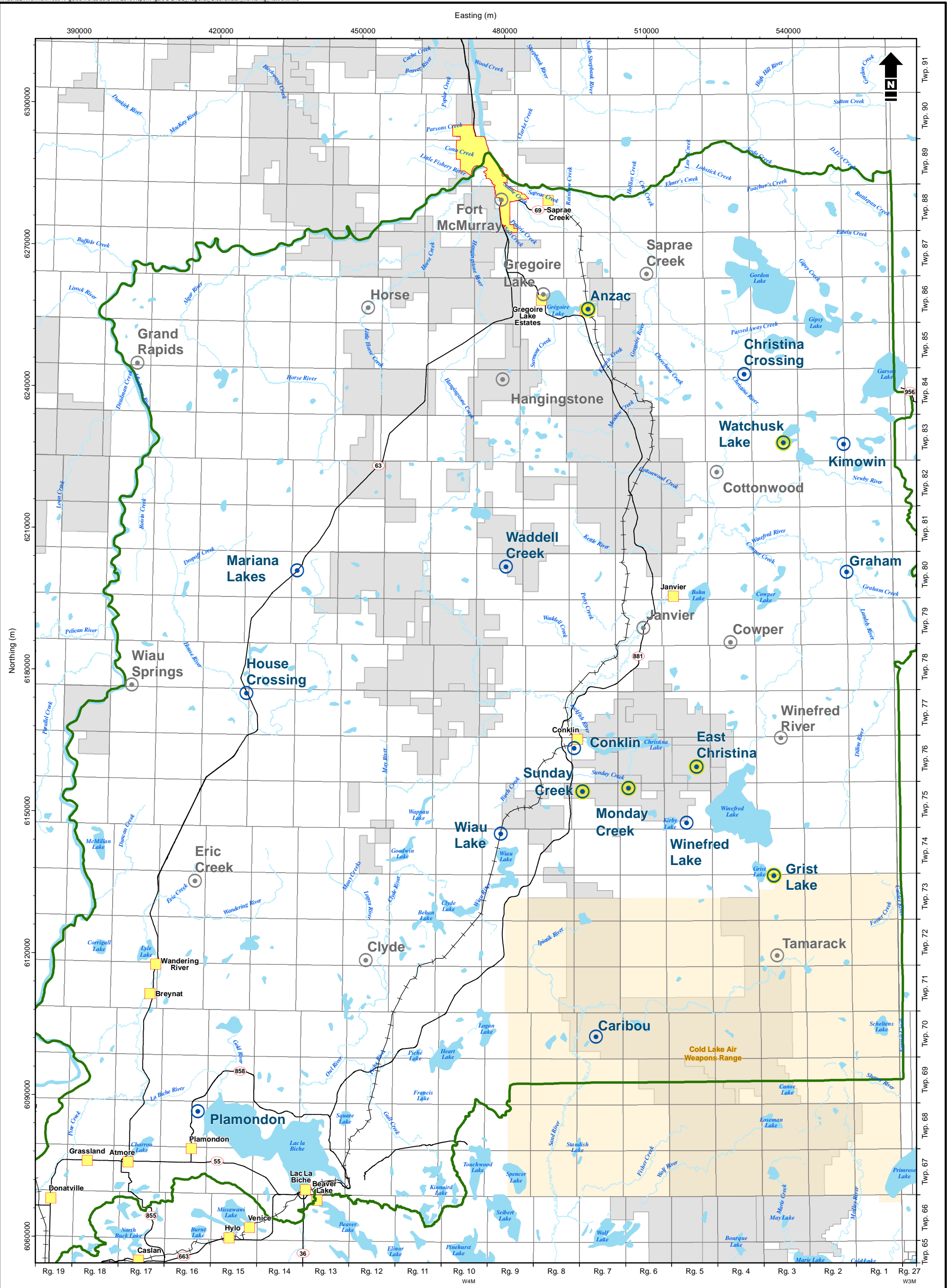
Matrix Solutions Inc.
 ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
 SAOS Regional Groundwater Monitoring Network

In-Situ Projects in the SAOS Area

Date: 26 Mar 2015 Project: 16054 Technical: S. Murphy Reviewer: W. Wilmot Drawn: C. Curry
 Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.

Figure 1



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
In-Situ Oil Sand Lease	Proposed Monitoring Location
Cold Lake Air Weapons Range	New Location (added to Matrix 2013 network)
Community	
Water Body	
Watercourse	
Highway	
Railway	

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

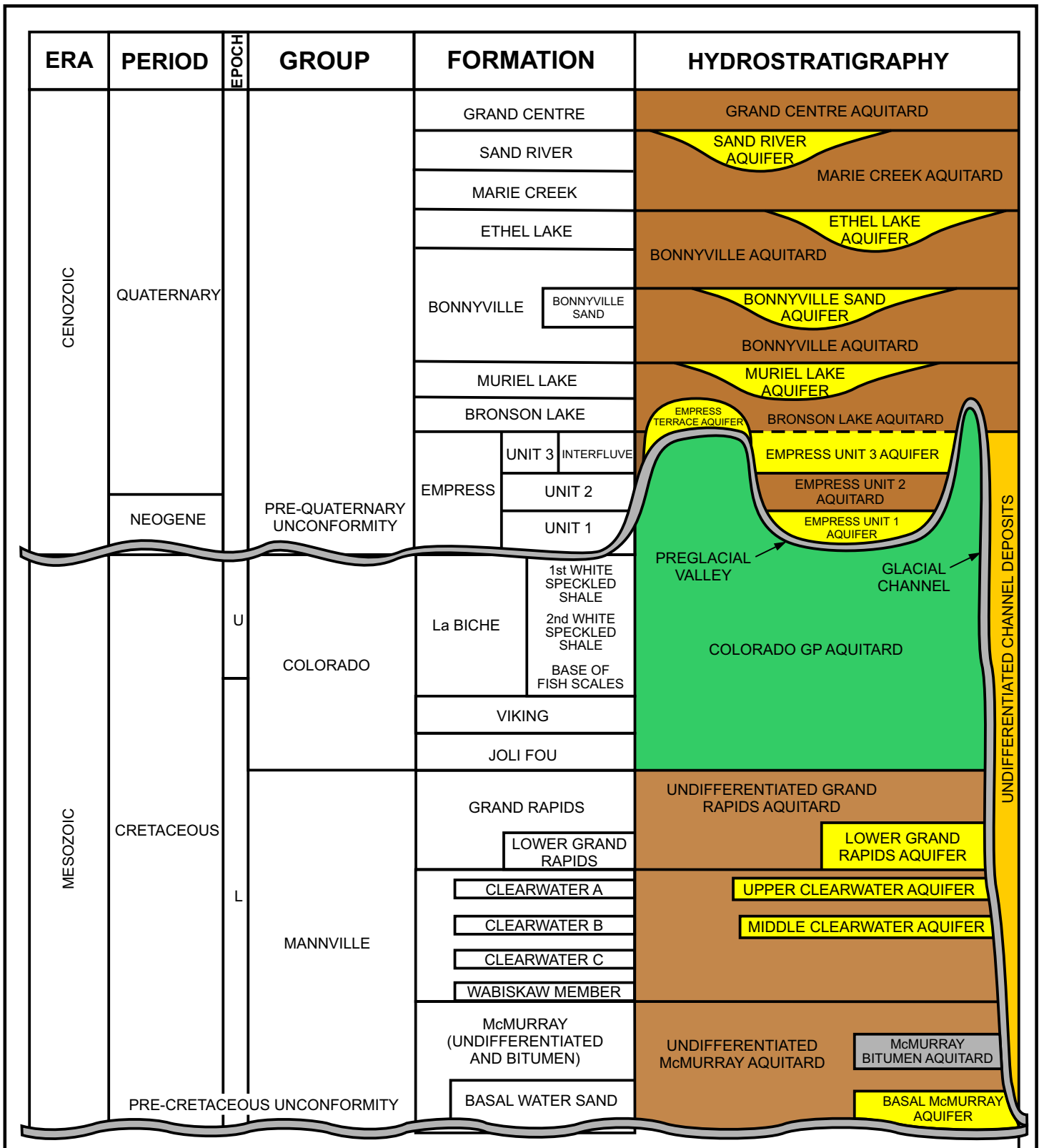
SAOS Regional Groundwater Monitoring Network

Date: 30 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaLIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license. GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 2



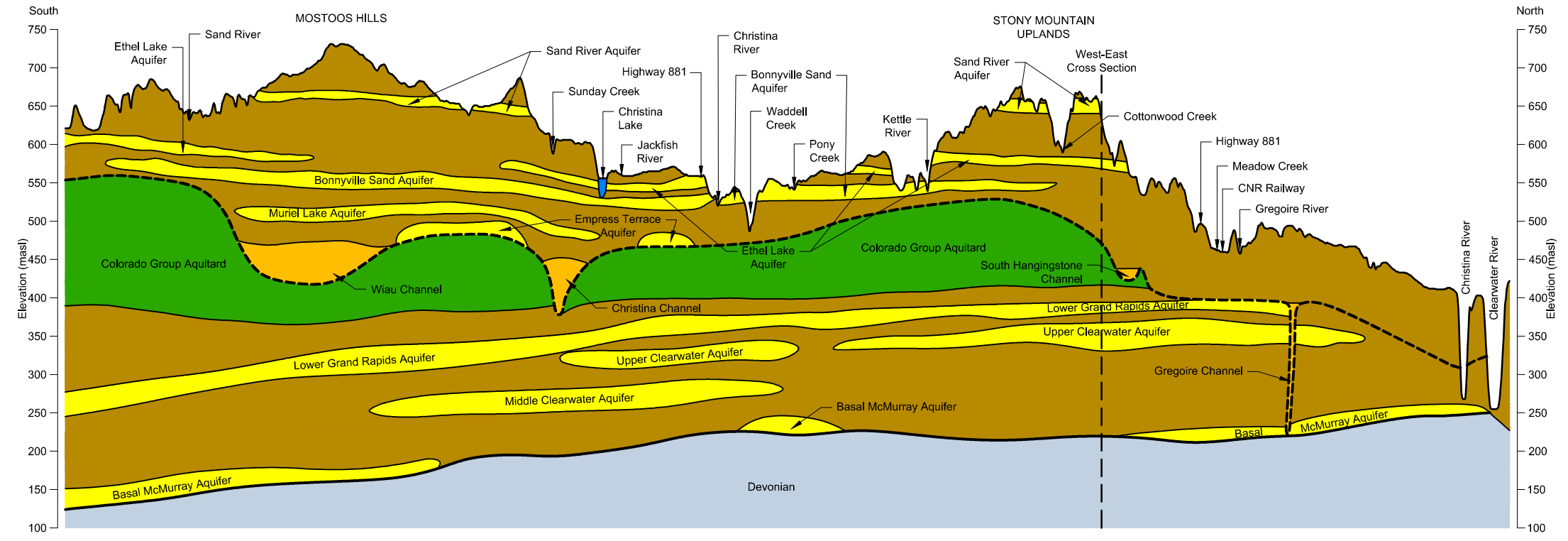
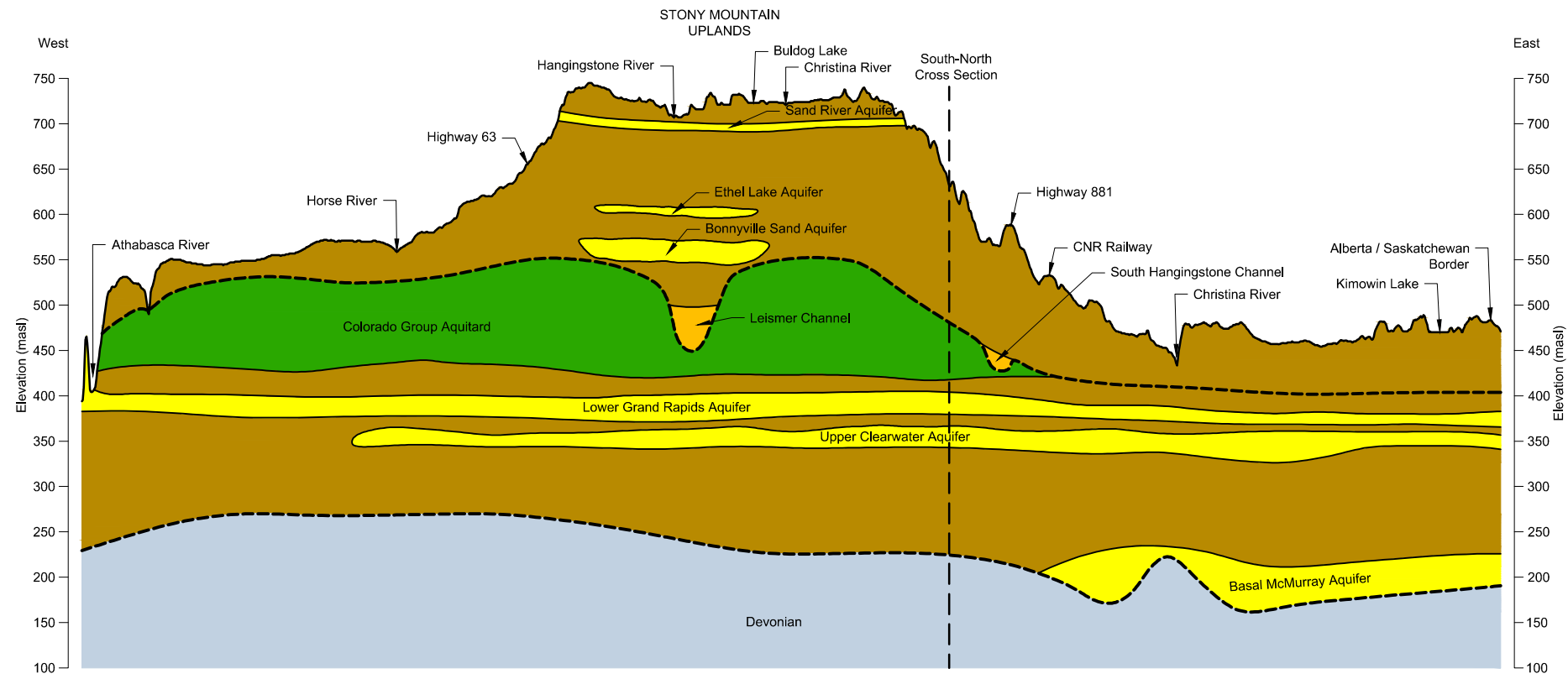
Alberta Environment and Sustainable Resource Development
SAOS Area

Hydrostratigraphic Column

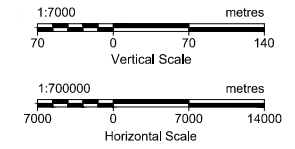
Date: February 2015 | Project: 16054-HSC-13 | Technical: S. Murphy | Reviewer: W. Wilmot | Drawn: E. Rugayan

Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.

E:\16054\Drafting\2013\16054-HSC-13.cdr



- Undifferentiated
- Key Aquifer
- Undifferentiated Channel Deposits
- Key Aquitard
- Major Unconformities

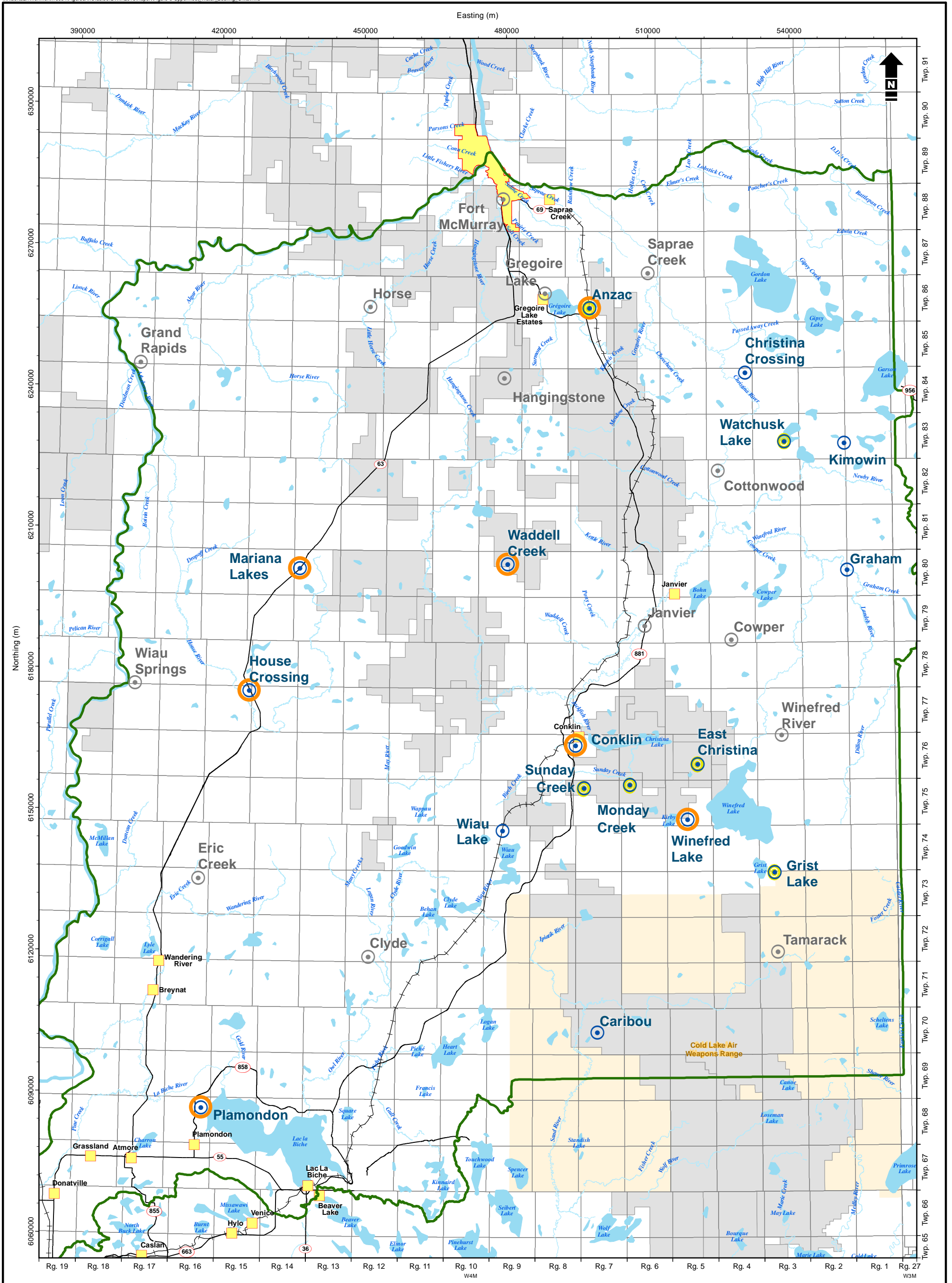


Alberta Environment and Sustainable Resource Development
SAOS Area

Regional Schematic Hydrostratigraphic Cross-sections

Date: February 2015	Project: 16054-SP-502-13	Technical: S. Murphy	Reviewer: W. Wilmot	Drawn: E. Rugayan
---------------------	--------------------------	----------------------	---------------------	-------------------

Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
In-Situ Oil Sand Lease	Proposed Monitoring Location
Cold Lake Air Weapons Range	New Location (added to Matrix 2013 network)
Community	Shallow Monitoring Well Present
Water Body	
Watercourse	
Highway	
Railway	

Reference: Data obtained from AltaLIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license.
GDM transportation infrastructure data provided by IHS © 2015 used under license.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

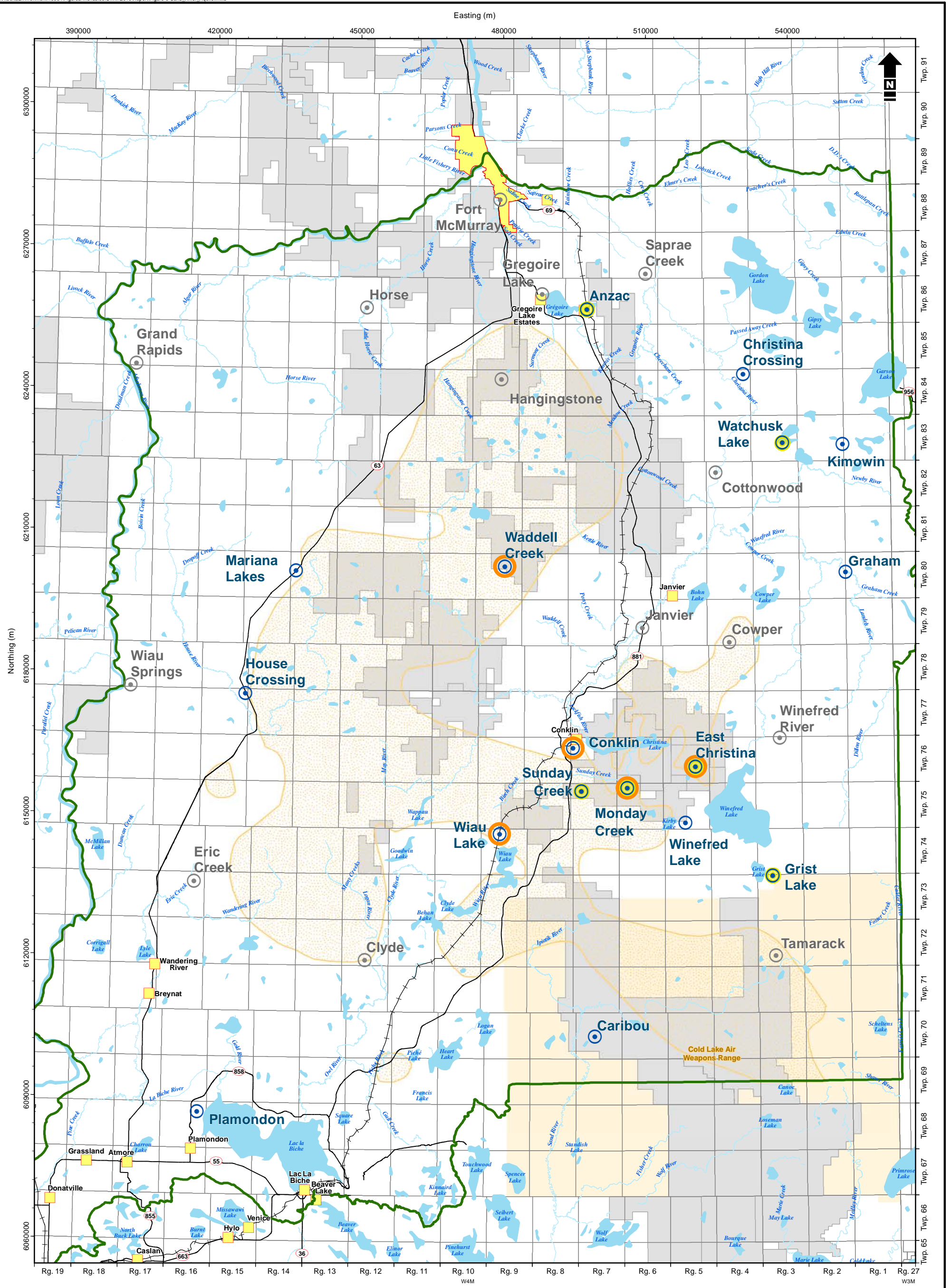
Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

Uppermost Water Bearing Units

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

1:760,000
7,250 0 7,250 14,500
m
NAD 1983 UTM Zone 12N

Figure 5

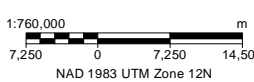


- South Athabasca Oil Sands (SAOS) Area
- Sand River Aquifer Extent
- In-Situ Oil Sand Lease
- Cold Lake Air Weapons Range
- Community
- Water Body
- Watercourse
- Highway
- Railway
- Existing Monitoring Location
- Proposed Monitoring Location
- New Location (added to Matrix 2013 network)
- Sand River Aquifer Completion Present



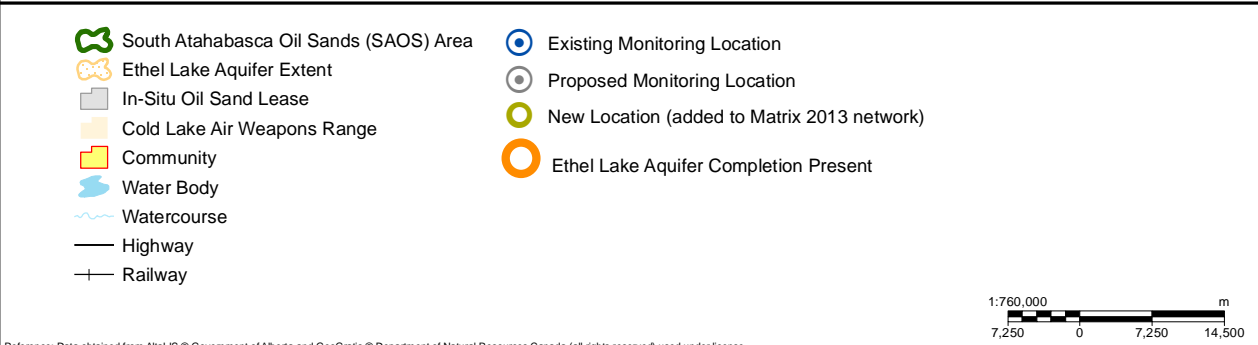
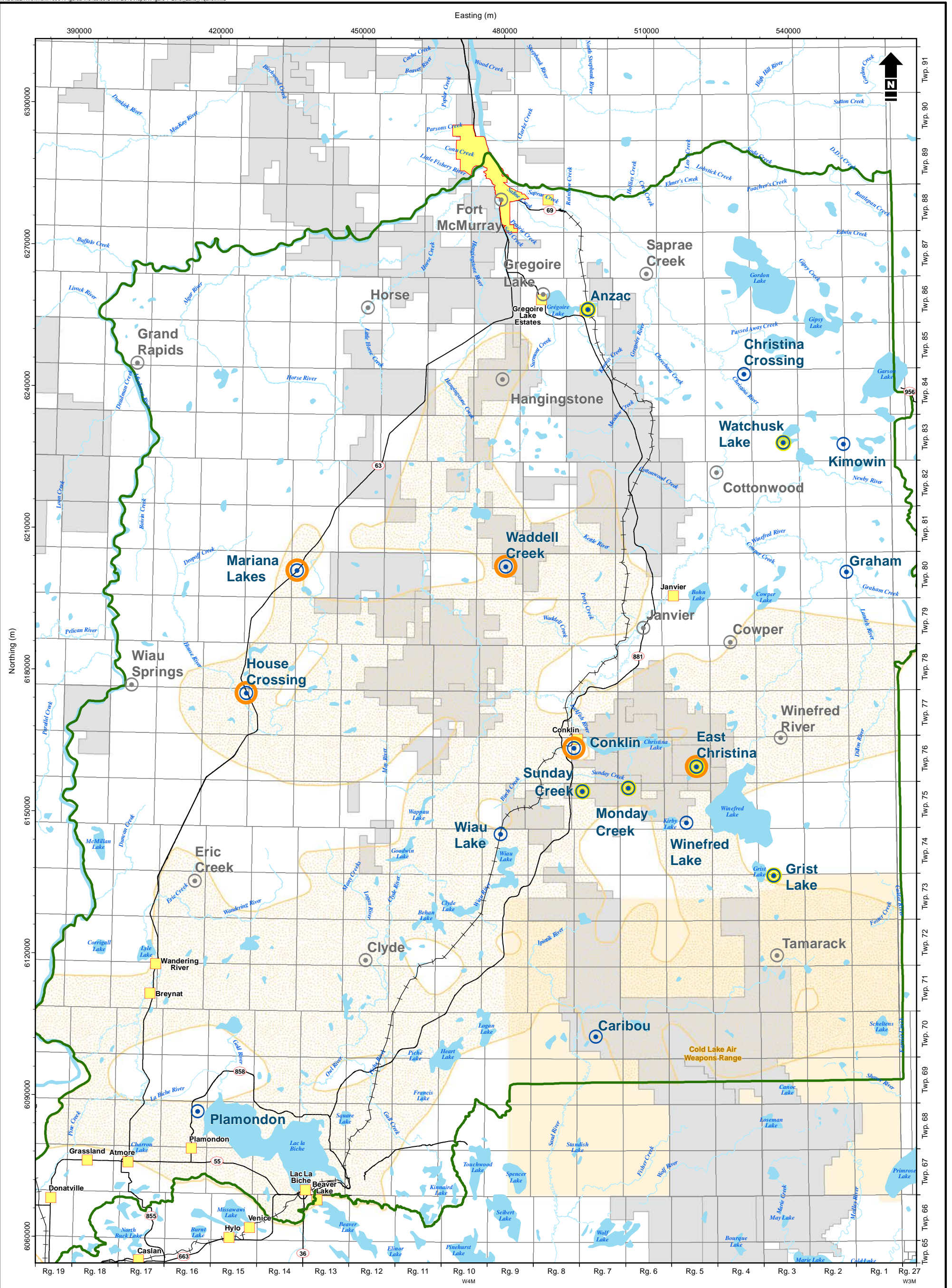
Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

Sand River Aquifer



Date: 26 Mar 2015 Project: 16054 Technical: S. Murphy Reviewer: W. Wilmut Drawn: C. Curry

Reference: Data obtained from AltaGIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license. GDM transportation infrastructure data provided by IHS © 2015 used under license.



Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

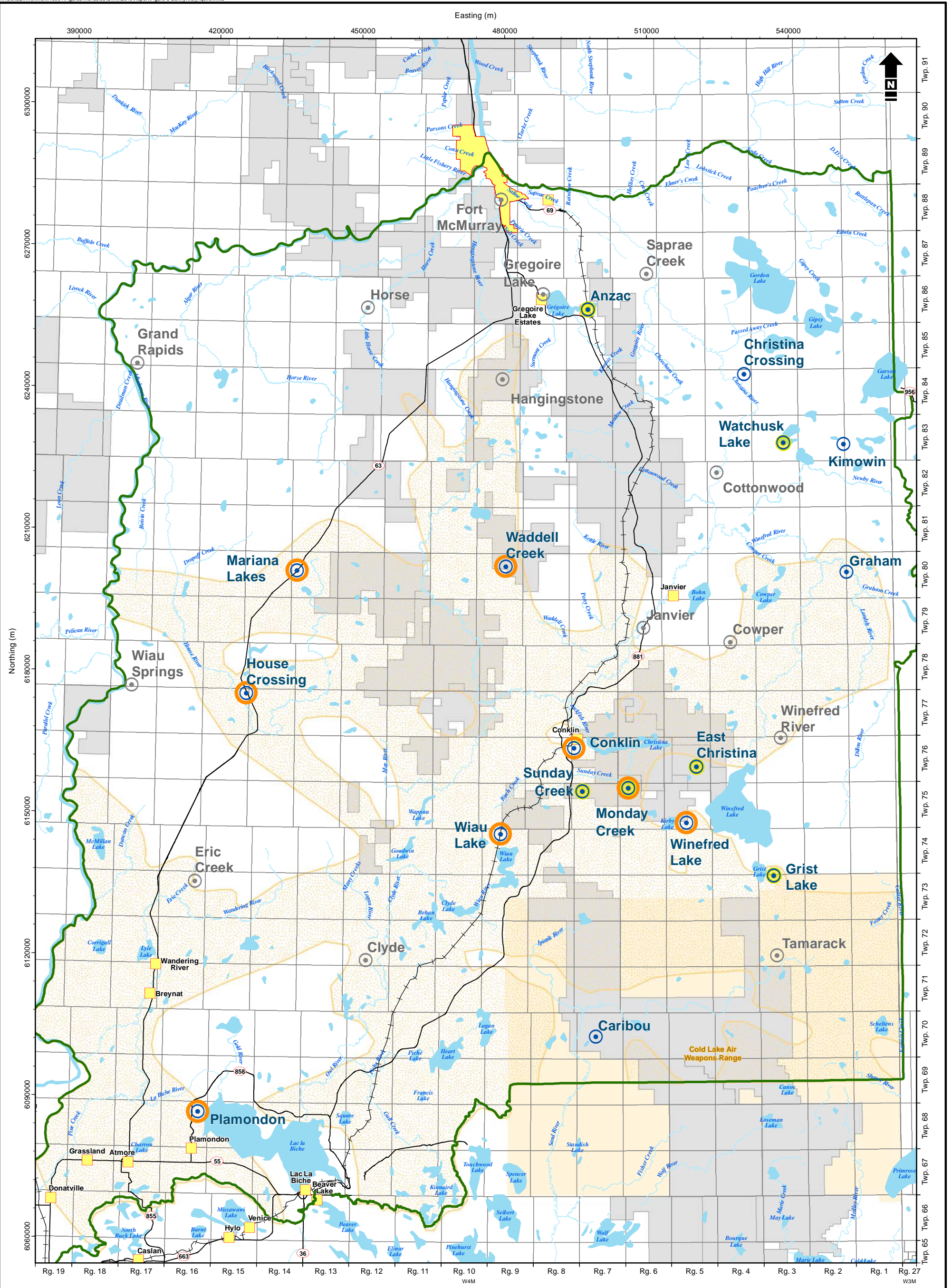
Ethel Lake Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaLIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license.
GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 7



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
Bonnyville Aquifer Extent	Proposed Monitoring Location
In-Situ Oil Sand Lease	New Location (added to Matrix 2013 network)
Cold Lake Air Weapons Range	Bonnyville Aquifer Completion Present
Community	
Water Body	
Watercourse	
Highway	
Railway	

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

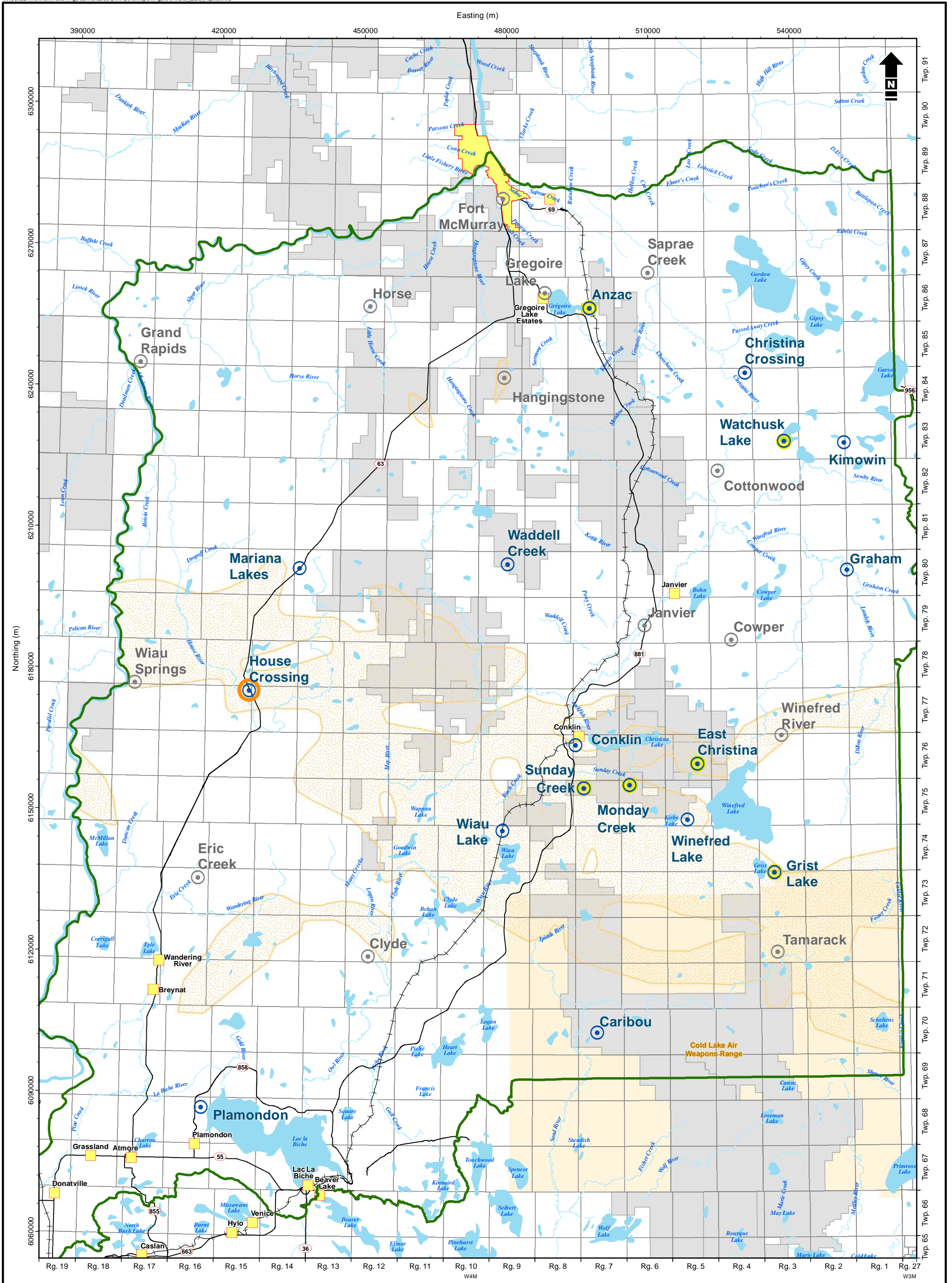
Bonnyville Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaLIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license. GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 8



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
Muriel Lake Aquifer Extent	Proposed Monitoring Location
In-Situ Oil Sand Lease	New Location (added to Matrix 2013 network)
Cold Lake Air Weapons Range	Muriel Lake Aquifer Completion Present
Community	
Water Body	
Watercourse	
Highway	
Railway	

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

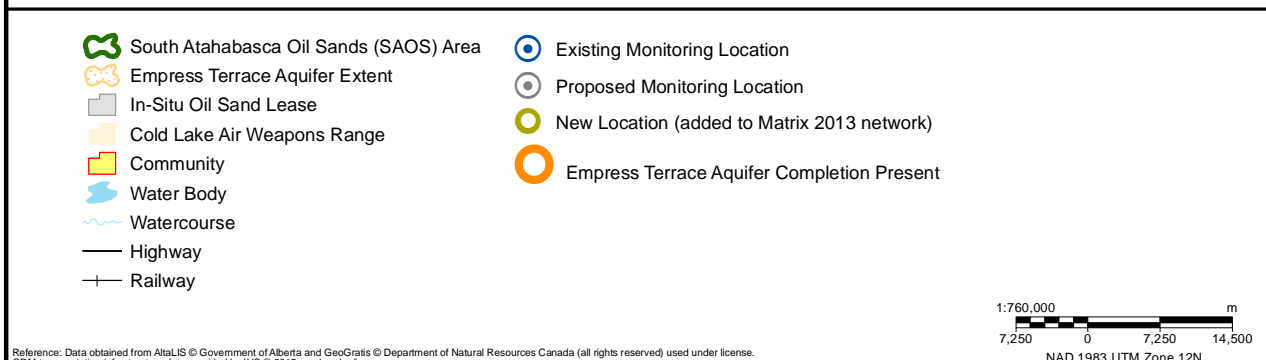
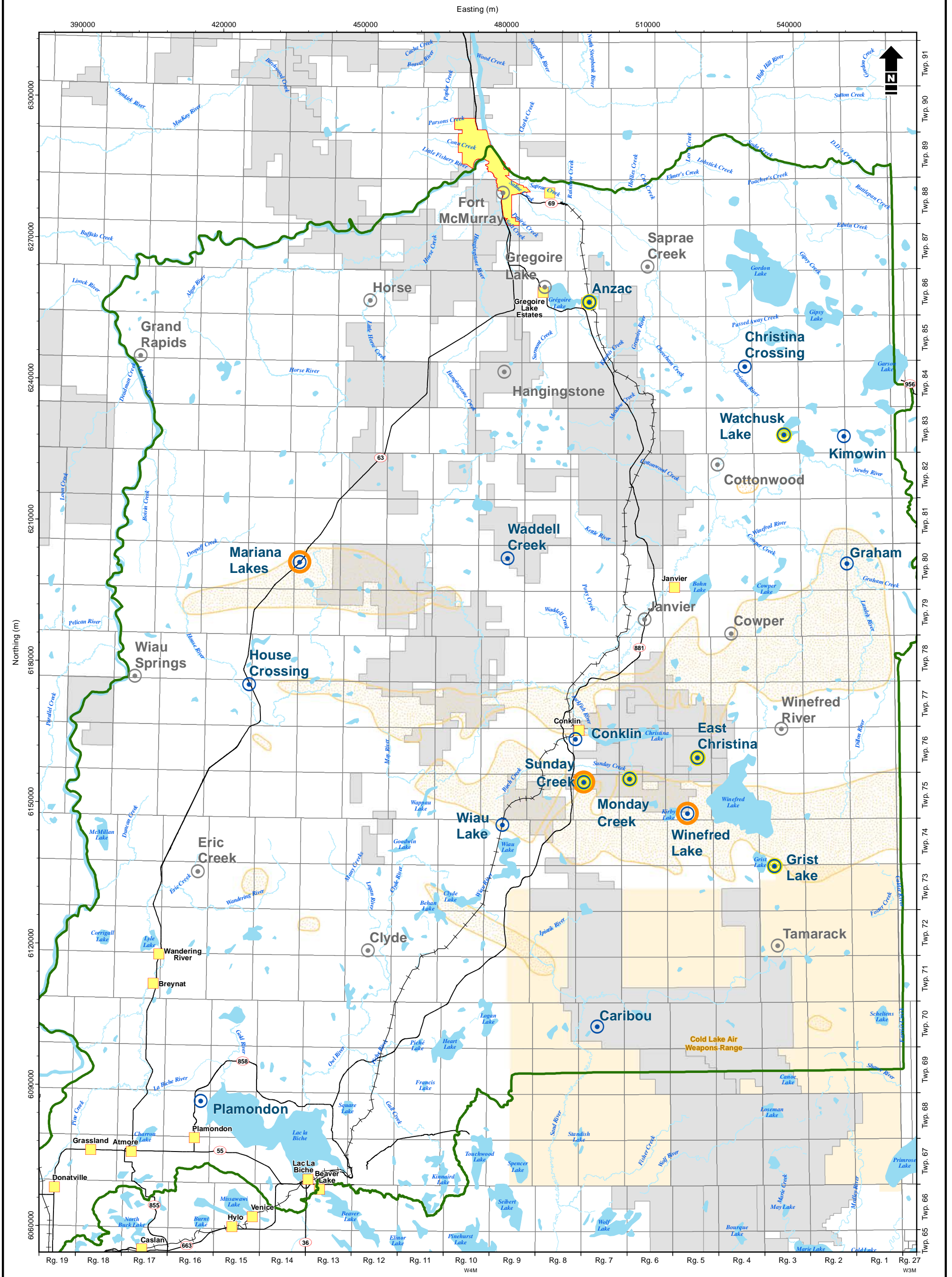
Muriel Lake Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaGIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license. GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 9



Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

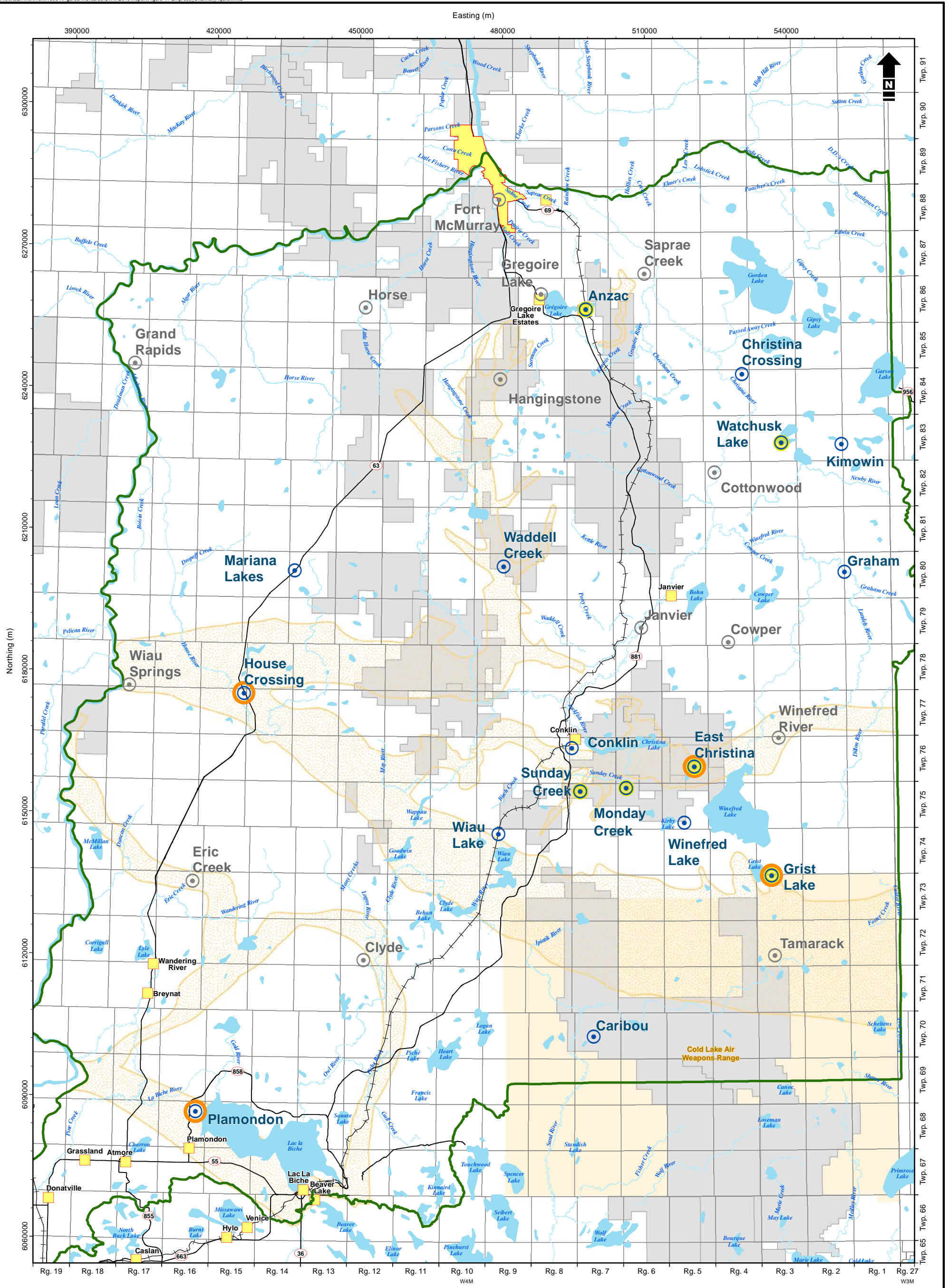
Empress Terrace Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.

Figure 10

Reference: Data obtained from AltaLIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license. GDM transportation infrastructure data provided by IHS © 2015 used under license.



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
Empress Channel Aquifer Extent	Proposed Monitoring Location
In-Situ Oil Sand Lease	New Location (added to Matrix 2013 network)
Cold Lake Air Weapons Range	Empress Channel Aquifer Completion Present
Community	
Water Body	
Watercourse	
Highway	
Railway	

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

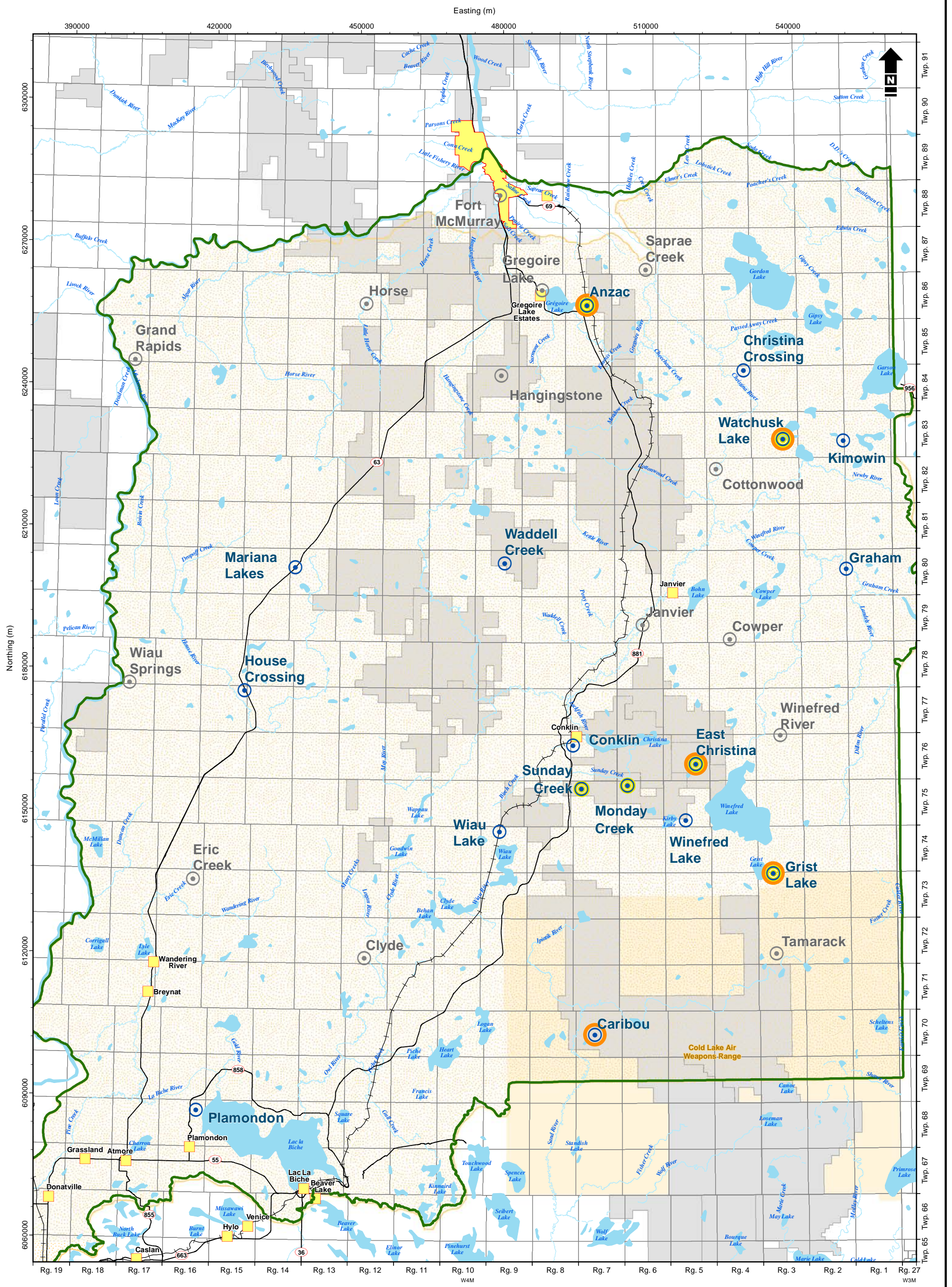
Empress Channel Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaGIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license. GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 11



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
Lower Grand Rapids Aquifer Extent	Proposed Monitoring Location
In-Situ Oil Sand Lease	New Location (added to Matrix 2013 network)
Cold Lake Air Weapons Range	Lower Grand Rapids Aquifer Completion Present
Community	
Water Body	
Watercourse	
Highway	
Railway	

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

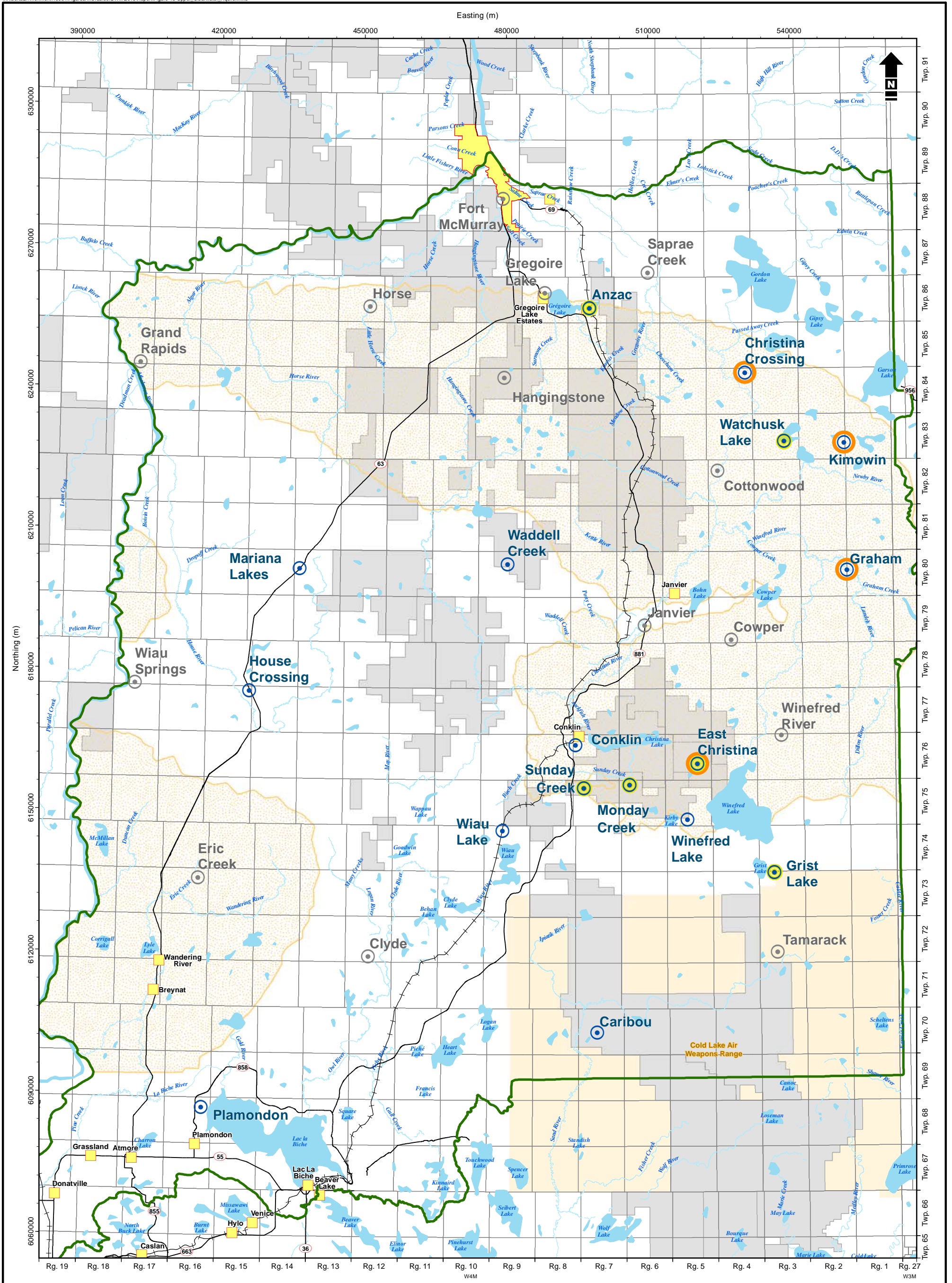
Lower Grand Rapids Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaLIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license.
GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 12



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
Upper Clearwater Aquifer Extent	Proposed Monitoring Location
In-Situ Oil Sand Lease	New Location (added to Matrix 2013 network)
Cold Lake Air Weapons Range	Upper Clearwater Aquifer Completion Present
Community	
Water Body	
Watercourse	
Highway	
Railway	

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

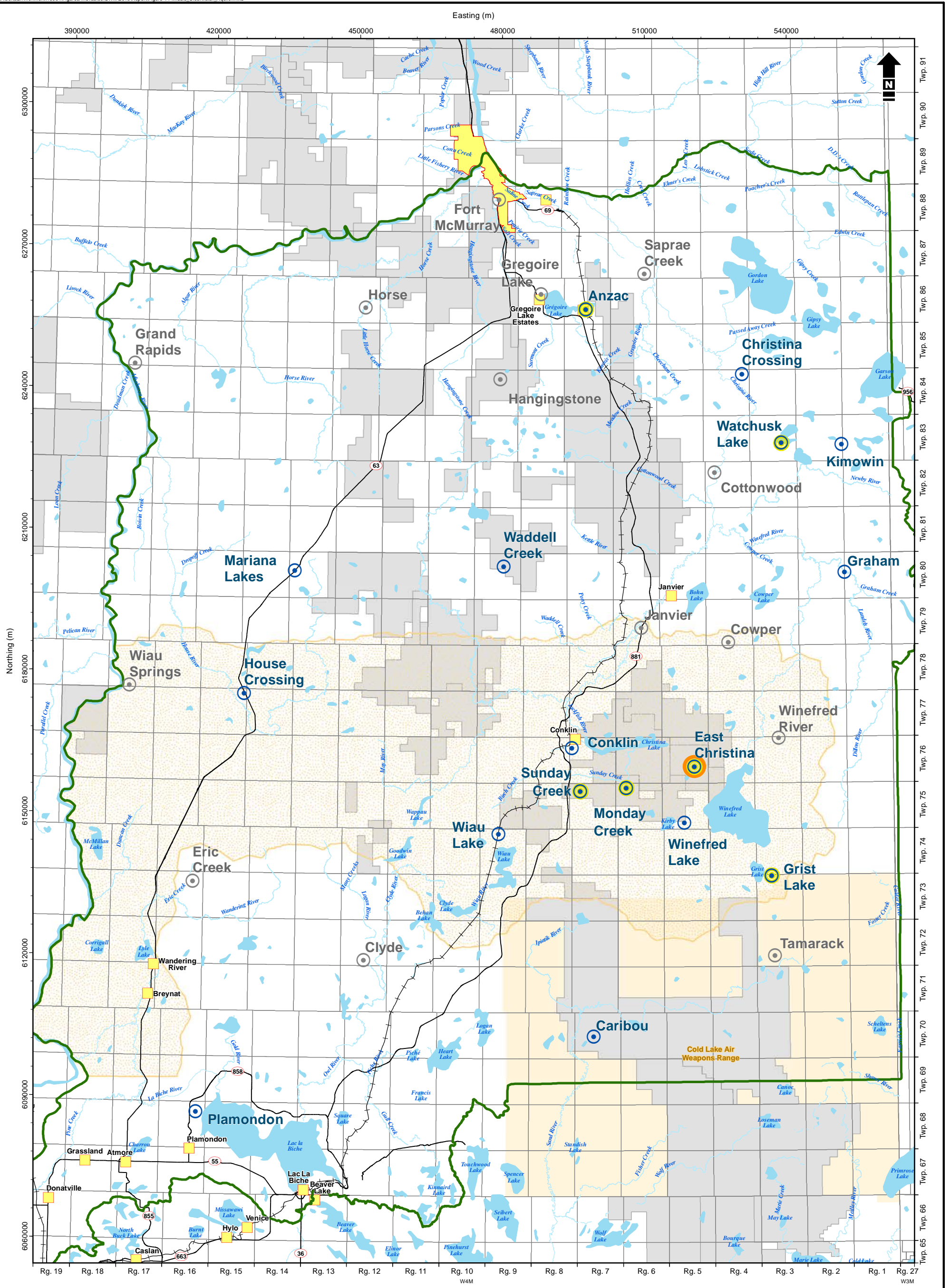
Upper Clearwater Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaLIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license. GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 13



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
Middle Clearwater Aquifer Extent	Proposed Monitoring Location
In-Situ Oil Sand Lease	New Location (added to Matrix 2013 network)
Cold Lake Air Weapons Range	Middle Clearwater Aquifer Completion Present
Community	
Water Body	
Watercourse	
Highway	
Railway	

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

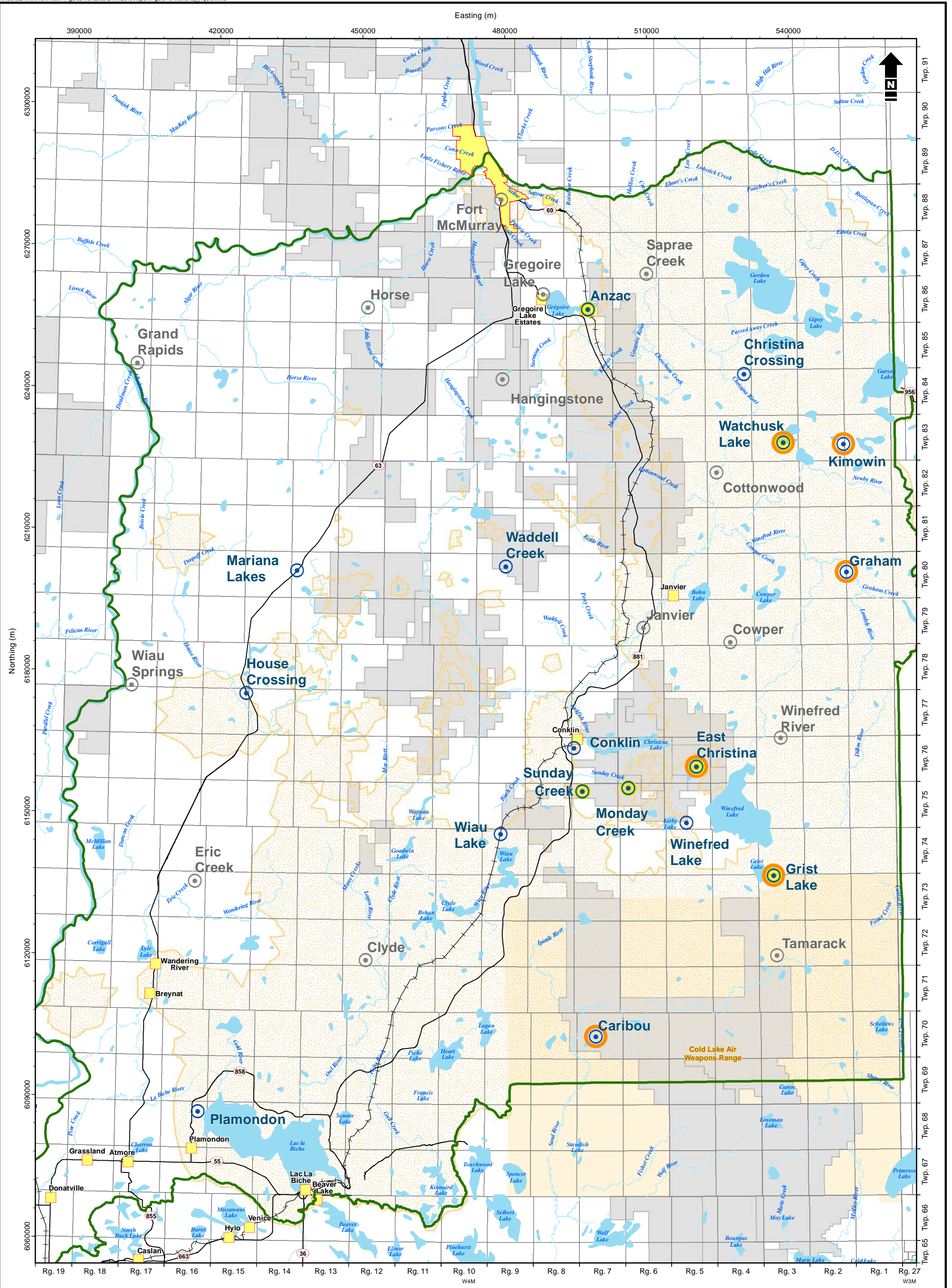
Middle Clearwater Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaGIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license.
GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 14



South Athabasca Oil Sands (SAOS) Area	Existing Monitoring Location
McMurray Aquifer Extent	Proposed Monitoring Location
In-Situ Oil Sand Lease	New Location (added to Matrix 2013 network)
Cold Lake Air Weapons Range	Basal McMurray Aquifer Completion Present
Community	
Water Body	
Watercourse	
Highway	
Railway	

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Alberta Environment and Sustainable Resource Development
SAOS Regional Groundwater Monitoring Network

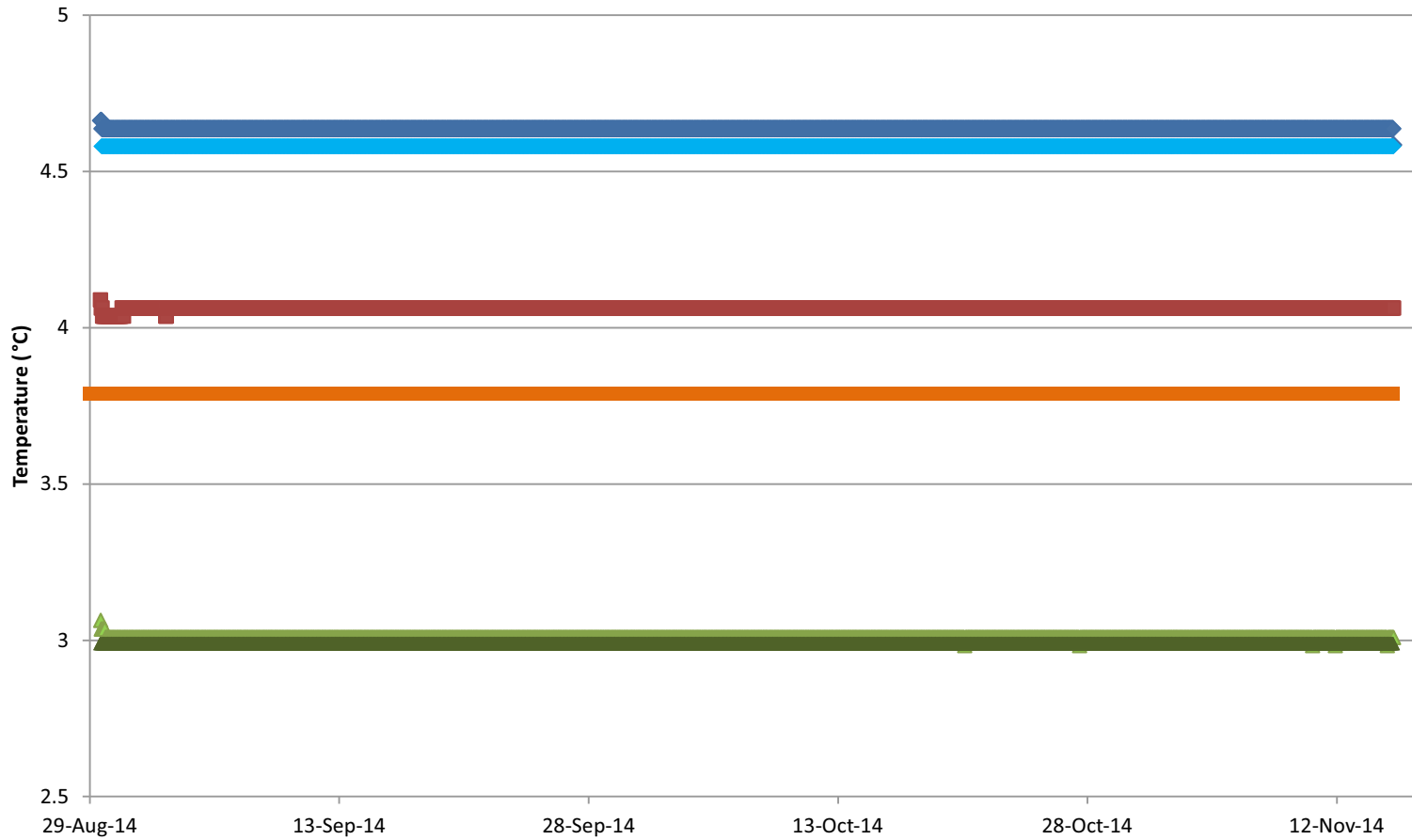
McMurray Aquifer

Date: 26 Mar 2015	Project: 16054	Technical: S. Murphy	Reviewer: W. Wilmut	Drawn: C. Curry
-------------------	----------------	----------------------	---------------------	-----------------

Reference: Data obtained from AltaLIS © Government of Alberta and GeoGratis © Department of Natural Resources Canada (all rights reserved) used under license.
GDM transportation infrastructure data provided by IHS © 2015 used under license.

1:760,000
7,250 0 7,250 14,500
NAD 1983 UTM Zone 12N

Figure 15



- ▲ Hung at 80 m (in HC 77-15-161, adjacent to Ethel Lake)
- Hung at 124 m (in HC 77-15-161, adjacent to Bonnyville)
- ◆ Hung at 159 m (Muriel Lake)
- ▲ HC 77-15-82 (Ethel Lake)
- HC 77-15-126 (Bonnyville)
- ◆ HC 77-15-161 (Muriel Lake)



Alberta Environment and Sustainable Resource Development
SAOS Area

Temperature Measurement Comparison

Date: February 2015	Project: 16054-CH-14.cdr	Technical: S. Murphy	Reviewer: W. Wilmot	Drawn: J. Kern
---------------------	--------------------------	----------------------	---------------------	----------------

Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.

TABLE 1.

SEVEN REGULATORY FRAMEWORK OBJECTIVES ADDRESSED BY PROPOSED GROUNDWATER MONITORING WELL NETWORK

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Location Name	Township	Range (west of 4th meridian)	Depth Base of Screen (m)	Interpreted Aquifer	Sub-Network	1a. Natural Variability (Quality)	1b. Natural Variability (Quantity)	2a. Baseline Conditions (Quality)	2b. Baseline Conditions (Quantity)	3. Aquifer Interactions	4. SW/GW Interaction	5. Cumulative Effects	6a. Triggers and Limits (Quality)	6b. Triggers and Limits (Quantity)	7. River Impacts		
Plamondon	68	16	7	near surface	B					✓	✓		✓				
			39, 51	Bonnyville	B	✓		✓			✓	✓		✓			
			70	Empress Channel	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
			---	Lower Grand Rapids	B	✓		✓							✓		
House Crossing	77	15	---	near surface	A	✓	✓	✓	✓		✓		✓	✓			
			82	Ethel Lake	A	✓	✓	✓	✓					✓	✓		
			126	Bonnyville	A	✓	✓	✓	✓						✓	✓	
			161	Muriel Lake	A	✓	✓	✓	✓						✓	✓	
			231	Empress Channel	A	✓	✓	✓	✓	✓					✓	✓	
			---	Lower Grand Rapids	B	✓		✓							✓		
			---	Middle Clearwater	A	✓	✓	✓	✓	✓				✓	✓	✓	
			---	Basal McMurray	B	✓		✓							✓		
Mariana Lakes	80	13	7	near surface	B	✓		✓	✓		✓		✓				
			52	Ethel Lake	A	✓	✓	✓	✓			✓		✓	✓		
			112	Bonnyville	A	✓	✓	✓	✓						✓	✓	
			134	Empress Terrace	A	✓	✓	✓	✓	✓					✓	✓	
			---	Lower Grand Rapids	B	✓		✓					✓		✓		
Waddell Creek	80	9	9	near surface	A	✓	✓	✓	✓		✓		✓	✓			
			21	Sand River	A	✓	✓	✓	✓			✓		✓	✓		
			117	Ethel Lake	A	✓	✓	✓	✓						✓	✓	
			149	Bonnyville	A	✓	✓	✓	✓						✓	✓	
			---	Empress Channel	B	✓		✓			✓		✓	✓	✓		
			---	Lower Grand Rapids	B	✓		✓						✓	✓		
Conklin	76	6	6	near surface	B	✓		✓			✓		✓				
			24	Sand River	A	✓	✓	✓	✓			✓		✓	✓		
			41	Ethel Lake	B	✓		✓				✓		✓			
			67	Bonnyville	B	✓		✓						✓	✓		
			---	Lower Grand Rapids	B	✓		✓						✓	✓		
			---	Upper Clearwater	B	✓		✓						✓	✓		
			---	Middle Clearwater	B	✓		✓						✓	✓		
			---	Basal McMurray	B	✓		✓						✓	✓		

TABLE 1.

SEVEN REGULATORY FRAMEWORK OBJECTIVES ADDRESSED BY PROPOSED GROUNDWATER MONITORING WELL NETWORK

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Location Name	Township	Range (west of 4th meridian)	Depth Base of Screen (m)	Interpreted Aquifer	Sub-Network	1a. Natural Variability (Quality)	1b. Natural Variability (Quantity)	2a. Baseline Conditions (Quality)	2b. Baseline Conditions (Quantity)	3. Aquifer Interactions	4. SW/GW Interaction	5. Cumulative Effects	6a. Triggers and Limits (Quality)	6b. Triggers and Limits (Quantity)	7. River Impacts		
Wiau Springs	78	16	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓	✓		
			---	Muriel Lake	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
			---	Empress Channel	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
			---	Lower Grand Rapids	B	✓		✓		✓		✓	✓		✓	✓	✓
			---	Middle Clearwater	A	✓	✓	✓	✓	✓					✓	✓	✓
Grand Rapids	85	17	---	near surface	A	✓	✓	✓	✓		✓		✓	✓	✓		
			---	Viking	A	✓	✓	✓	✓					✓	✓	✓	
			---	Lower Grand Rapids	A	✓	✓	✓	✓	✓	✓			✓	✓	✓	
			---	Upper Clearwater	B	✓		✓						✓			✓
Fort McMurray	88	9	---	near surface	B					✓	✓			✓			
			---	Basal McMurray	A	✓	✓	✓	✓	✓	✓			✓	✓	✓	
Gregoire Lake	86	8	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓	✓		
			---	Empress Channel	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
			---	Lower Grand Rapids	B	✓		✓		✓	✓	✓	✓		✓	✓	
Saprae Creek	87	6	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓	✓		
			---	Lower Grand Rapids	B	✓		✓		✓	✓	✓	✓		✓	✓	
			---	Basal McMurray	B	✓		✓			✓	✓	✓		✓	✓	
Christina Crossing	85	4	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓	✓		
			---	Lower Grand Rapids	B	✓		✓		✓	✓	✓	✓		✓	✓	
			170	Upper Clearwater	B	✓		✓		✓	✓	✓	✓		✓	✓	
			---	Basal McMurray	B	✓		✓					✓	✓	✓	✓	
Cottonwood	82	4	---	near surface	A	✓	✓	✓	✓		✓		✓	✓	✓		
			---	Lower Grand Rapids	B	✓		✓			✓	✓	✓		✓	✓	
			---	Upper Clearwater	B	✓		✓					✓	✓		✓	
			---	Basal McMurray	B	✓		✓					✓	✓		✓	
Janvier	79	6	---	near surface	A	✓	✓	✓	✓		✓		✓	✓	✓		
			---	Lower Grand Rapids	B	✓		✓			✓	✓	✓		✓	✓	
			---	Basal McMurray	B	✓		✓					✓	✓		✓	
Horse	86	12	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓	✓		
			---	Lower Grand Rapids	B	✓		✓		✓	✓	✓	✓		✓	✓	
			---	Upper Clearwater	B	✓		✓		✓				✓		✓	

TABLE 1.

SEVEN REGULATORY FRAMEWORK OBJECTIVES ADDRESSED BY PROPOSED GROUNDWATER MONITORING WELL NETWORK

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Location Name	Township	Range (west of 4th meridian)	Depth Base of Screen (m)	Interpreted Aquifer	Sub-Network	1a. Natural Variability (Quality)	1b. Natural Variability (Quantity)	2a. Baseline Conditions (Quality)	2b. Baseline Conditions (Quantity)	3. Aquifer Interactions	4. SW/GW Interaction	5. Cumulative Effects	6a. Triggers and Limits (Quality)	6b. Triggers and Limits (Quantity)	7. River Impacts		
Hangingstone	84	9	---	near surface	A	✓	✓	✓	✓		✓		✓	✓			
			---	Sand River	A	✓	✓	✓	✓				✓	✓			
			---	Bonnyville	A	✓	✓	✓	✓					✓	✓		
			---	Muriel Lake	A	✓	✓	✓	✓					✓	✓		
			---	Empress Channel	B	✓		✓		✓	✓	✓	✓	✓	✓	✓	
			---	Lower Grand Rapids	B	✓		✓		✓			✓	✓	✓		
---	Upper Clearwater	B	✓		✓		✓				✓	✓					
Winefred River	77	3	---	near surface	A	✓	✓	✓	✓		✓		✓	✓			
			---	Ethel Lake	B	✓		✓				✓	✓	✓			
			---	Bonnyville	A	✓	✓	✓	✓					✓	✓		
			---	Muriel Lake	A	✓	✓	✓	✓					✓	✓		
			---	Empress Channel	B	✓		✓		✓	✓	✓	✓	✓	✓		
			---	Lower Grand Rapids	A	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			---	Upper Clearwater	B	✓		✓		✓			✓	✓	✓		
---	Middle Clearwater	B	✓		✓		✓			✓	✓	✓					
---	Basal McMurray	B	✓		✓		✓			✓	✓	✓					
Winefred Lake	75	5	17	near surface	A	✓	✓	✓	✓		✓		✓	✓			
			---	Ethel Lake	B	✓		✓			✓	✓	✓	✓			
			79	Bonnyville	B	✓		✓				✓	✓	✓			
			---	Muriel Lake	B	✓		✓					✓	✓			
			158	Empress Terrace	B	✓		✓		✓	✓		✓	✓	✓		
			---	Lower Grand Rapids	B	✓		✓		✓			✓	✓	✓		
			---	Upper Clearwater	B	✓		✓		✓			✓	✓	✓		
---	Middle Clearwater	B	✓		✓		✓			✓	✓	✓					
Tamarack	72	3	---	near surface	A	✓	✓	✓	✓		✓		✓	✓			
			---	Sand River	A	✓	✓	✓	✓				✓	✓			
			---	Ethel Lake	A	✓	✓	✓	✓				✓	✓	✓		
			---	Bonnyville	A	✓	✓	✓	✓					✓	✓		
			---	Muriel Lake	A	✓	✓	✓	✓					✓	✓	✓	
			---	Empress Channel	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			---	Lower Grand Rapids	A	✓	✓	✓	✓	✓			✓	✓	✓	✓	
---	Basal McMurray	A	✓	✓	✓	✓	✓			✓	✓	✓	✓				

TABLE 1.

SEVEN REGULATORY FRAMEWORK OBJECTIVES ADDRESSED BY PROPOSED GROUNDWATER MONITORING WELL NETWORK

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Location Name	Township	Range (west of 4th meridian)	Depth Base of Screen (m)	Interpreted Aquifer	Sub-Network	1a. Natural Variability (Quality)	1b. Natural Variability (Quantity)	2a. Baseline Conditions (Quality)	2b. Baseline Conditions (Quantity)	3. Aquifer Interactions	4. SW/GW Interaction	5. Cumulative Effects	6a. Triggers and Limits (Quality)	6b. Triggers and Limits (Quantity)	7. River Impacts		
Wiau Lake	74	9	---	near surface	A	✓	✓	✓	✓		✓		✓	✓			
			15	Sand River	A	✓	✓	✓	✓				✓	✓			
			---	Ethel Lake	A	✓	✓	✓	✓					✓	✓		
			41,76,120	Bonnyville	A	✓	✓	✓	✓					✓	✓		
			---	Muriel Lake	A	✓	✓	✓	✓					✓	✓		
			---	Empress Terrace	B	✓		✓		✓		✓		✓	✓		
			---	Lower Grand Rapids	B	✓		✓					✓	✓			
			---	Middle Clearwater	B	✓		✓					✓	✓			
Cowper	79	4	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Sand River	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Ethel Lake	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Bonnyville	A	✓	✓	✓	✓	✓				✓	✓		
			---	Empress Terrace	A	✓	✓	✓	✓					✓	✓		
			---	Lower Grand Rapids	B	✓		✓					✓	✓			
Erik Creek	73	16	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Ethel Lake	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Empress Channel	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Lower Grand Rapids	B	✓		✓						✓			
			---	Upper Clearwater	B	✓		✓							✓		
			---	Middle Clearwater	B	✓		✓							✓		
			---	Basal McMurray	B	✓		✓							✓		
Clyde	72	12	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Muriel Lake	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Empress Channel	A	✓	✓	✓	✓	✓	✓		✓	✓			
			---	Lower Grand Rapids	B	✓		✓						✓			
			---	Basal McMurray	B	✓		✓							✓		
Caribou	70	7	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓			
			398	Lower Grand Rapids	B	✓		✓					✓	✓			
			490	Basal McMurray	B	✓		✓					✓	✓			

TABLE 1.

SEVEN REGULATORY FRAMEWORK OBJECTIVES ADDRESSED BY PROPOSED GROUNDWATER MONITORING WELL NETWORK

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Location Name	Township	Range (west of 4th meridian)	Depth Base of Screen (m)	Interpreted Aquifer	Sub-Network	1a. Natural Variability (Quality)	1b. Natural Variability (Quantity)	2a. Baseline Conditions (Quality)	2b. Baseline Conditions (Quantity)	3. Aquifer Interactions	4. SW/GW Interaction	5. Cumulative Effects	6a. Triggers and Limits (Quality)	6b. Triggers and Limits (Quantity)	7. River Impacts	
Kimowin	83	2	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓		
			---	Lower Grand Rapids	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			180	Upper Clearwater	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			261	Basal McMurray	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	
Graham	80	1	---	near surface	A	✓	✓	✓	✓	✓	✓		✓	✓		
			---	Bonnyville	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			---	Empress Terrace	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			---	Lower Grand Rapids	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			180	Upper Clearwater	A	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			261	Basal McMurray	A	✓	✓	✓	✓	✓		✓	✓			
East Christina	76	5	19	Sand River	C						✓	✓				
			99	Ethel Lake	C						✓	✓				
			181	Empress Channel	C						✓	✓				
			297	Lower Grand Rapids	C						✓	✓				
			320	Upper Clearwater	C						✓	✓				
			346	Middle Clearwater	C					✓	✓					
Sunday Creek	75	7	---	Sand River	C					✓	✓	✓				
			---	Ethel Lake	C					✓	✓	✓				
			---	Bonnyville	C						✓	✓	✓			
			---	Muriel Lake	C						✓	✓	✓			
			191	Empress Terrace	C						✓	✓	✓			
			---	Lower Grand Rapids	C						✓	✓	✓			
			---	Middle Clearwater	C					✓	✓					
Monday Creek	75	6	14	Sand River	C					✓	✓	✓				
			---	Ethel Lake	C					✓	✓	✓				
			45	Bonnyville	C						✓	✓	✓			
			---	Muriel Lake	C						✓	✓	✓			
			---	Empress Terrace	C						✓	✓	✓			
			---	Lower Grand Rapids	C						✓	✓	✓			
			---	Upper Clearwater	C						✓	✓	✓			
			---	Middle Clearwater	C					✓	✓					

TABLE 1.

SEVEN REGULATORY FRAMEWORK OBJECTIVES ADDRESSED BY PROPOSED GROUNDWATER MONITORING WELL NETWORK

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Location Name	Township	Range (west of 4th meridian)	Depth Base of Screen (m)	Interpreted Aquifer	Sub-Network	1a. Natural Variability (Quality)	1b. Natural Variability (Quantity)	2a. Baseline Conditions (Quality)	2b. Baseline Conditions (Quantity)	3. Aquifer Interactions	4. SW/GW Interaction	5. Cumulative Effects	6a. Triggers and Limits (Quality)	6b. Triggers and Limits (Quantity)	7. River Impacts	
Anzac	86	7	34	Shallow	C					✓	✓	✓				
			---	Gregoire Channel	C					✓	✓	✓				
			113	Lower Grand Rapids	C						✓		✓			
			---	Basal McMurray	C						✓		✓			
Grist Lake	73	3	---	Bonnyville	A	✓	✓	✓	✓				✓	✓		
			---	Muriel Lake	A	✓	✓	✓	✓				✓	✓		
			180	Empress Channel	B	✓	✓	✓	✓				✓	✓	✓	
			381	Lower Grand Rapids	B	✓		✓					✓	✓	✓	
			---	Middle Clearwater	B	✓		✓					✓	✓		
Watchusk Lake	83	3	82	Lower Grand Rapids	C					✓	✓	✓				
			---	Upper Clearwater	C					✓	✓	✓				
			252	Basal McMurray	C						✓		✓			

Notes:

- existing completion
- overburden priority completion
- bedrock priority completion

TABLE 2.

MONITORING WELL SUMMARY - EXISTING SAOS MONITORING LOCATIONS

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Elevation* (masl)					Depth (m)							Hydraulic Conductivity (m/s)	Method	Interpreted Aquifer	
	Ground Surface	Top of Casing	Stick Up	Sept-13^	Oct-13^^	Grnd. to Total Drilled	Grnd. to Top of Screen	Grnd. to Base of Screen	Sept-13^		Oct-13^^					
				Water Level	Water Level				Top of Casing to Water	Grnd. to Water	Top of Casing to Water	Grnd. to Water				
Conklin 76-07-6	575.31	576.09	0.78	573.87	573.76	6.1	3.0	6.1	2.22	1.44	2.33	1.55	2E-05	KGS	near surface	
Conklin 76-07-24	575.21	576.01	0.80	569.35	569.32	24.4	20.4	23.5	6.66	5.86	6.69	5.89	6E-05	KGS	Sand River	
Conklin 76-07-41	575.10	575.84	0.74	572.00	571.95	42.7	35.0	41.0	3.84	3.10	3.89	3.15	1E-05	KGS	Ethel lake	
Conklin 76-07-67	575.04	575.78	0.74	571.41	571.36	68.0	61.0	67.0	4.37	3.63	4.42	3.68	6E-06	KGS	Bonnyville	
Waddell Creek 80-09-9	717.98	718.73	0.75	710.97	710.88	9.2	6.1	9.2	7.76	7.01	7.85	7.10	2E-05	KGS	near surface	
Waddell Creek 80-09-21	717.93	718.65	0.72	709.51	709.50	24.4	17.4	20.4	9.14	8.42	9.15	8.43	3E-04	H	Sand River	
Waddell Creek 80-09-117	717.91	718.55	0.64	698.44	698.44	119.5	111.0	117.0	20.11	19.47	20.11	19.47	5E-04	H	Ethel lake	
Waddell Creek 80-09-149	717.79	718.48	0.69	685.44	685.43	148.8	145.7	148.8	33.04	32.35	33.05	32.36	1E-06	D	Bonnyville	
Mariana Lakes 80-13-7	692.90	693.51	0.61	689.54	689.10	7.6	4.6	7.6	3.97	3.36	4.41	3.80	3E-05	BR	near surface	
Mariana Lakes 80-13-52	692.84	693.55	0.71	682.80	682.75	51.8	43.0	49.4	10.75	10.04	10.80	10.09	1E-05	BR	Ethel Lake	
Mariana Lakes 80-13-112	692.96	693.56	0.60	676.93	676.94	113.0	108.0	111.0	16.63	16.03	16.62	16.02	2E-04	KGS	Bonnyville	
Mariana Lakes 80-13-134	692.89	693.51	0.62	647.80	647.53	140.2	130.0	133.5	45.71	45.09	45.98	45.36	2E-04	KGS	Empress Terrace	
House Crossing 77-15-8	662.60	663.61	1.01	661.35	661.69	---	---	---	2.26	1.25	1.92	0.91	2E-06	BR	near surface	
House Crossing 77-15-82	662.51	663.18	0.67	597.11	597.11	85.3	78.3	81.3	66.07	65.40	66.07	65.40	8E-06	KGS	Ethel Lake	
House Crossing 77-15-126	662.48	663.16	0.68	604.61	604.64	128.0	120.7	126.8	58.55	57.87	58.52	57.84	1E-04	BR	Bonnyville	
House Crossing 77-15-161	662.52	663.24	0.72	601.21	601.25	164.6	155.4	161.5	62.03	61.31	61.99	61.27	3E-05	BR	Muriel Lake	
House Crossing 77-15-231	662.46	663.21	0.75	594.12	594.17	--	---	---	69.09	68.34	69.04	68.29	6E-05	BR	Empress Channel	
Plamondon 68-16-7	577.92	578.64	0.72	572.10	572.06	9.7	5.3	7.3	6.54	5.82	6.58	5.86	1E-05	BR	near surface	
Plamondon 68-16-39	577.88	578.61	0.73	549.39	549.42	46.3	33.0	38.5	29.22	28.49	29.19	28.46	4E-05	BR	Bonnyville	
Plamondon 68-16-51	577.86	578.57	0.71	547.25	547.24	52.4	45.0	51.2	31.32	30.61	31.33	30.62	2E-05	BR	Bonnyville	
Plamondon 68-16-70	577.76	578.46	0.70	547.24	547.24	73.1	63.4	69.5	31.22	30.52	31.22	30.52	9E-05	BR	Empress Channel	
Wiau Lake 74-9-41	667.01	667.77	0.76	---	659.22	---	37.9	41.0	---	---	8.55	7.79	---	---	---	Sand River
Wiau Lake 74-9-76	666.99	667.76	0.77	---	658.05	---	72.4	75.3	---	---	9.71	8.94	---	---	---	Bonnyville
Wiau Lake 74-9-120	666.92	667.68	0.76	---	656.20	---	117.3	120.3	---	---	11.48	10.72	---	---	---	Bonnyville
Wiau Lake 74-9-15	666.83	667.64	0.81	---	663.65	---	9.3	15.4	---	---	3.99	3.18	---	---	---	Bonnyville
Winefred Lake 75-5-17	648.17	648.78	0.61	---	638.36	---	11.2	17.3	---	---	10.42	9.81	---	---	---	near surface
Winefred Lake 75-5-79	648.26	648.84	0.58	---	624.58	---	76.6	79.6	---	---	24.26	23.68	---	---	---	Bonnyville
Winefred Lake 75-5-158	648.20	648.87	0.67	---	607.92	---	155.4	158.8	---	---	40.95	40.28	---	---	---	Empress Terrace

TABLE 2.

MONITORING WELL SUMMARY - EXISTING SAOS MONITORING LOCATIONS

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Elevation* (masl)					Depth (m)							Hydraulic Conductivity (m/s)	Method	Interpreted Aquifer
	Ground Surface	Top of Casing	Stick Up	Aug-14 ^{AAA}	Nov-14 ^{AAAA}	Grnd. to Total Drilled	Grnd. to Top of Screen	Grnd. to Base of Screen	Aug-14 ^{AAA}		Nov-14 ^{AAAA}				
				Water Level	Water Level				Top of Casing to Water	Grnd. to Water	Top of Casing to Water	Grnd. to Water			
Conklin 76-07-6	575.31	576.09	0.78	573.70	573.36	6.1	3.0	6.1	2.39	1.61	2.73	1.95	2E-05	KGS	near surface
Conklin 76-07-24	575.21	576.01	0.80	569.32	569.27	24.4	20.4	23.5	6.69	5.89	6.74	5.94	6E-05	KGS	Sand River
Conklin 76-07-41	575.10	575.84	0.74	572.01	571.96	42.7	35.0	41.0	3.83	3.09	3.88	3.14	1E-05	KGS	Ethel lake
Conklin 76-07-67	575.04	575.78	0.74	571.43	571.36	68.0	61.0	67.0	4.35	3.61	4.42	3.68	6E-06	KGS	Bonnyville
Waddell Creek 80-09-9	717.98	718.73	0.75	710.67	710.49	9.2	6.1	9.2	8.06	7.31	8.24	7.49	2E-05	KGS	near surface
Waddell Creek 80-09-21	717.93	718.65	0.72	709.39	709.37	24.4	17.4	20.4	9.26	8.54	9.28	8.56	3E-04	H	Sand River
Waddell Creek 80-09-117	717.91	718.55	0.64	698.34	698.33	119.5	111.0	117.0	20.21	19.57	20.22	19.58	5E-04	H	Ethel lake
Waddell Creek 80-09-149	717.79	718.48	0.69	685.33	685.40	148.8	145.7	148.8	33.15	32.46	33.08	32.39	1E-06	D	Bonnyville
Mariana Lakes 80-13-7	692.90	693.51	0.61	689.08	688.81	7.6	4.6	7.6	4.43	3.82	4.70	4.09	3E-05	BR	near surface
Mariana Lakes 80-13-52	692.84	693.55	0.71	682.63	682.68	51.8	43.0	49.4	10.92	10.21	10.87	10.16	1E-05	BR	Ethel Lake
Mariana Lakes 80-13-112	692.96	693.56	0.60	675.84	676.92	113.0	108.0	111.0	17.72	17.12	16.64	16.04	2E-04	KGS	Bonnyville
Mariana Lakes 80-13-134	692.89	693.51	0.62	647.69	647.79	140.2	130.0	133.5	45.82	45.20	45.72	45.10	2E-04	KGS	Empress Terrace
House Crossing 77-15-8	662.60	663.61	1.01	661.52	661.63	---	---	---	2.09	1.08	1.98	0.97	2E-06	BR	near surface
House Crossing 77-15-82	662.51	663.18	0.67	597.02	597.10	85.3	78.3	81.3	66.16	65.49	66.08	65.41	8E-06	KGS	Ethel Lake
House Crossing 77-15-126	662.48	663.16	0.68	604.51	604.62	128.0	120.7	126.8	58.65	57.97	58.54	57.86	1E-04	BR	Bonnyville
House Crossing 77-15-161	662.52	663.24	0.72	601.14	601.24	164.6	155.4	161.5	62.10	61.38	62.00	61.28	3E-05	BR	Muriel Lake
House Crossing 77-15-231	662.46	663.21	0.75	594.04	594.17	231.0	---	---	69.17	68.42	69.04	68.29	6E-05	BR	Empress Channel
Plamondon 68-16-7	577.92	578.64	0.72	572.13	572.06	9.7	5.3	7.3	6.51	5.79	6.58	5.86	1E-05	BR	near surface
Plamondon 68-16-39	577.88	578.61	0.73	549.43	549.35	46.3	33.0	38.5	29.18	28.45	29.26	28.53	4E-05	BR	Bonnyville
Plamondon 68-16-51	577.86	578.57	0.71	547.25	547.28	52.4	45.0	51.2	31.32	30.61	31.29	30.58	2E-05	BR	Bonnyville
Plamondon 68-16-70	577.76	578.46	0.70	547.24	547.29	73.1	63.4	69.5	31.22	30.52	31.17	30.47	9E-05	BR	Empress Channel
Wiau Lake 74-9-41	667.01	667.77	0.76	659.17	659.10	---	37.9	41.0	8.60	7.84	8.67	7.91	---	---	Sand River
Wiau Lake 74-9-76	666.99	667.76	0.77	658.00	657.92	---	72.4	75.3	9.76	8.99	9.84	9.07	---	---	Bonnyville
Wiau Lake 74-9-120	666.92	667.68	0.76	656.18	656.06	---	117.3	120.3	11.50	10.74	11.62	10.86	---	---	Bonnyville
Wiau Lake 74-9-15	666.83	667.64	0.81	663.60	663.33	---	9.3	15.4	4.04	3.23	4.31	3.50	---	---	Bonnyville
Winefred Lake 75-5-17	648.17	648.78	0.61	638.31	637.87	---	11.2	17.3	10.47	9.86	10.91	10.30	---	---	near surface
Winefred Lake 75-5-79	648.26	648.84	0.58	624.55	624.61	---	76.6	79.6	24.29	23.71	24.23	23.65	---	---	Bonnyville
Winefred Lake 75-5-158	648.20	648.87	0.67	607.86	607.84	---	155.4	158.8	41.01	40.34	41.03	40.36	---	---	Empress Terrace

Notes:

- * - elevations are geodetic
- masl - metres above sea level
- - not available
- ^A - water levels measured on September 22, 2013, September 23, 2013 and September 25, 2013
- ^{AA} - water levels measured on October 24, 2013, between October 29, 2013 and October 31, 2013, November 7, 2013 and November 8, 2013
- ^{AAA} - water levels measured on August 23, 2014 and August 30, 2014.
- ^{AAAA} - water levels measured on November 15, 2014 and November 19, 2014.
- H - Hvorslev analysis method (1951)
- BR - Bouwer and Rice method (1976)
- KGS - Hyder et al method (1994)
- D - Dagan method (1978)

TABLE 3.**2014 SAOS GROUNDWATER SAMPLING SUMMARY**

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

SAOS Well ID	Former Well Name	Formation	1st Monitoring Event (Aug 2014)	2nd Monitoring Event (Nov 2014)	Temperature Gauge (installation depth)
Conklin					
Conklin 76-07-67	--	Bonnyville Sand	Yes	Yes	Nautilus 85 12101 (66 m bTOC) (installed in 2012)
Conklin 76-07-41	--	Ethel Lake	Yes	Yes	Nautilus 85 12701 (49 m bTOC)
Conklin 76-07-24	--	Sand River	Yes	Yes	Nautilus 85 12698 (24 m bTOC)
Conklin 76-07-6	--	uppermost water-bearing units	Yes	Yes	Nautilus 85 12697 (5 m bTOC)
Waddell Creek					
Waddell Creek 80-09-149	--	Bonnyville Sand	Yes	Yes	Nautilus 85 12717 (148 m bTOC)
Waddell Creek 80-09-117	--	Ethel Lake	Yes	Yes	Nautilus 85 12706 (115 m bTOC)
Waddell Creek 80-09-21	--	Sand River	Yes	Yes	Nautilus 85 12707 (20 m bTOC)
Waddell Creek 80-09-9	--	uppermost water-bearing units	Yes	Yes	Nautilus 85 12714 (10 m bTOC)
Mariana Lake					
Mariana Lake 80-13-134	--	Empress Terrace	Yes	Yes	Nautilus 85 12103 (51 m bTOC) (installed in 2012)
Mariana Lake 80-13-112	--	Bonnyville Sand	Yes	Yes	Nautilus 85 12645 (112.5 m bTOC)
Mariana Lake 80-13-52	--	Ethel Lake	Yes	Yes	Nautilus 85 12655 (48 m bTOC)
Mariana Lake 80-13-7	--	uppermost water-bearing units	Yes	Yes	Nautilus 85 12650 (8.5 m bTOC)
House Crossing					
House Crossing 77-15-8	WR99-1-8(WT)	uppermost water-bearing units	Yes	Yes	Nautilus 85 12646 (8 m bTOC)
House Crossing 77-15-82	--	Ethel Lake	Yes	Yes	Nautilus 85 12718 (80.5 m bTOC)
House Crossing 77-15-126	--	Bonnyville	Yes	Yes	Nautilus 85 12699 (124 m bTOC)
House Crossing 77-15-161	--	Muriel Lake	Yes	Yes	Nautilus 85 12708 (159 m bTOC) Hobo TidBits 10232017 (80 m bTOC) Hobo TidBits 10232015 (124 m bTOC) Hobo TidBits 10232016 (159m bTOC)
House Crossing 77-15-231	WR99-1-230	Empress Channel	Yes	Yes*	Nautilus 85 12709 (227 m bTOC)
Plamondon					
Plamondon 68-16-70	--	Empress Channel	Yes	Yes	Nautilus 85 12191 (69 m bTOC) (installed in 2012)
Plamondon 68-16-51	--	Bonnyville Sand Lower	Yes	Yes	Nautilus 85 12721 (49 m bTOC)
Plamondon 68-16-39	--	Bonyville Sand Upper	Yes	Yes	Nautilus 85 12720 (38 m bTOC)
Plamondon 68-16-7	--	uppermost water-bearing units	Yes	Yes	Nautilus 85 12719 (8 m bTOC)

TABLE 3.**2014 SAOS GROUNDWATER SAMPLING SUMMARY**

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

SAOS Well ID	Former Well Name	Formation	1st Monitoring Event (Aug 2014)	2nd Monitoring Event (Nov 2014)	Temperature Gauge (installation depth)
Wiau Lake					
Wiau Lake 74-9-120	WEPA 00-1-120	Muriel Lake	Yes	Yes	Nautilus 85 12705 (118.5 m bTOC)
Wiau Lake 74-9-41	WEPA 00-1-41	Sand River	Yes	Yes	Nautilus 85 12712 (40 m bTOC)
Wiau Lake 74-9-76	WEPA 00-1-76	Bonnyville	Yes	Yes	Nautilus 85 12713 (75 m bTOC)
Wiau Lake 74-9-15	WEPA 00-1-WT	uppermost water-bearing units	Yes	Yes	Nautilus 85 12703 (12 m bTOC)
Winefred Lake					
Winefred Lake 75-5-158	WEPA 00-3-158	Empress Channel	Yes	Yes	Nautilus 85 12696 (157 m bTOC)
Winefred Lake 75-5-79	WEPA 00-3-79	Ethel Lake	Yes	Yes	Nautilus 85 12695 (77 m bTOC)
Winefred Lake 75-5-17	WEPA 00-3-17	Sand River	Yes	Yes	Nautilus 85 12700 (15 m bTOC)

Notes:

* - temperature and pressure data was downloaded but samples were not collected

TABLE 4a.

INDUSTRY-OWNED SAOS MONITORING LOCATIONS - RATIONALE FOR SELECTION

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Proposed Monitoring Location	Hydrostratigraphic Unit	Monitoring Well Name / UWI	SAOS Monitoring Location Name	Operator	Subnetwork	Rationale
Previously Recommended Locations (Matrix 2014)						
Caribou	Lower Grand Rapids	VWP CVE FCCL D14 FISHER 1AA/14-16-070-07W4M	Caribou 70-07-398	Cenovus	B	specifically identified in Matrix (2013) for this location, nested location, moderately close to existing Lower Grand Rapids demand but located more than 10 km away from any existing or proposed Lower Grand Rapids/McMurray source/disposal well, proximal to gas Mannville gas production but still many kms away
	McMurray		Caribou 70-07-490	Cenovus	B	
Kimowin	Upper Clearwater	1F2/01-13-083-02W4	Kimowin 83-02-180	ConocoPhillips	A	specifically identified in Matrix (2013) for this location, nested location, located well away from existing/proposed source wells, away from gas production, near Saskatchewan border, Strategic (background) monitoring location [Figure 6.3.1 Matrix (2013)], ownership offered to ESRD
	Basal McMurray	1F1/01-13-083-02W4	Kimowin 83-02-261	ConocoPhillips	A	
Graham	Upper Clearwater	1F1/05-19-080-01W4	Graham 80-01-180	ConocoPhillips	A	specifically identified in Matrix (2013) for this location, nested location, located well away from existing/proposed source wells, away from gas production, near Saskatchewan border, Strategic (background) monitoring location [Figure 6.3.1 Matrix (2013)], ownership offered to ESRD
	Basal McMurray	1F2/05-19-080-01W4	Graham 80-01-261	ConocoPhillips	A	
Christina Crossing	Upper Clearwater	1F1/05-36-84-04 W4M	Christina Crossing 84-04-170	ConocoPhillips	C	specifically identified and within Lower Christina River Investigation area (Matrix 2013) - although modified from original location; near Christina River (regional discharge) and surface water-groundwater interaction); near in-situ oil sands groundwater users, near outcrop of Lower Grand Rapids, Upper Clearwater and Basal McMurray aquifers (thin drift); near salinity anomalies in bedrock aquifers; Colorado Group Aquitard absent; high drawdown predicted in Lower Grand Rapids and Upper Clearwater aquifers. Surveillance (sentinel) monitoring location (Matrix (2013), ownership offered to ESRD
Watchusk Lake	Lower Grand Rapids	1F2/05-14-083-03 W4M	Watchusk Lake 83-03-82	ConocoPhillips	C	within Lower Christina River Investigation area as identified in Matrix (2013); Colorado Group regionally eroded away, regional discharge area to Christina River; moderate density of in-situ oil sands existing and proposed source and disposal wells; high predicted drawdown in Lower Grand Rapids and Upper Clearwater aquifers. Investigative (potentially vulnerable areas) monitoring location (Matrix 2013), ownership offered to ESRD
	McMurray	1F1/05-14-083-03 W4M	Watchusk Lake 83-03-252	ConocoPhillips	C	
New Recommended Locations						
Anzac	Shallow Sands	Nexen OPTI WM Q Anzac 16-9-86-7W4 1WM/16-09-086-07W4/02	Anzac 86-07-34	Nexen	C	close to the town of Anzac and a major water body (Gregoire Lake); close to Gregoire Channel Investigation area as identified in Matrix (2013); near to deep incision to Cretaceous succession; high density of in-situ oilsands existing and proposed source and disposal wells; high predicted drawdown for Empress Channel, Lower Grand Rapids and Upper Clearwater aquifers; RAMP and WSC sites nearby
	Lower Grand Rapids	Nexen OPTI WM GR Anzac 16-9-86-7W4 1WM/16-09-086-07W4/00	Anzac 86-07-113	Nexen	C	
East Christina	Sand River	CVE KE 12MW04 4-14-76-5 02MW01/04-14-076-05W4	East Christina 76-05-19	Cenovus	C	within Christina Channel Investigation area (Matrix 2013); deep erosional incision through Colorado Group aquitard into Grand Rapids Formation; high density of in-situ oilsands existing and proposed source and disposal wells; maximum predicted drawdown for many key aquifers in area; RAMP, WSC, meteorological stations and lake monitoring site nearby
	Ethel Lake	CVE KE 12MW06 4-14-76-5 02MW02B/04-14-076-05W4	East Christina 76-05-99	Cenovus	C	
	Empress Channel	CVE FCCL GWO A4 HARDY 4-14-76-5 100/04-14-076-05W4/00	East Christina 76-05-181	Cenovus	C	
	Lower Grand Rapids	102/04-14-076-05W4/00	East Christina 76-05-327	Cenovus	C	
	Clearwater A (Upper Clearwater)				C	
Clearwater B (Middle Clearwater)	C					

TABLE 4a.**INDUSTRY-OWNED SAOS MONITORING LOCATIONS - RATIONALE FOR SELECTION**

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Proposed Monitoring Location	Hydrostratigraphic Unit	Monitoring Well Name / UWI	SAOS Monitoring Location Name	Operator	Subnetwork	Rationale
Grist Lake	Empress Channel	DEVON NEC BP 16A KIRBY 16-32-73-3 100/16-32-073-03W4/00	Grist Lake 73-03-492	Devon	B	between in-situ oil sands developments and Saskatchewan provincial boundary (societal concerns); many aquifers present; greater than 10 km away from existing or proposed source/disposal wells; distal to gas production; near major water body (Grist Lake); near meteorological station
	Grand Rapids				B	
	McMurray				B	
Monday Creek	Sand River	RMW 6B-32 SR	Monday Creek 75-06-14	Devon	C	within Christina Channel Investigation area (Matrix 2013); deep erosional incision through Colorado Group aquitard into Grand Rapids Formation; high density of in-situ oilsands existing and proposed source and disposal wells; maximum predicted drawdown for many key aquifers in area; RAMP, WSC, meteorological stations and lake monitoring site nearby
	Bonnyville	RMW 6B-32 BV	Monday Creek 75-06-45	Devon	C	
Sunday Creek	Empress Terrance	1F1/14-29-075-07W4 DEVON 14D2 CONKLIN 14-29-75-7	Sunday Creek 75-07-191	Devon	C	within Christina Channel Investigation area (Matrix 2013); deep erosional incision through Colorado Group aquitard into Grand Rapids Formation; high density of in-situ oilsands existing and proposed source and disposal wells; maximum predicted drawdown for many key aquifers in area; RAMP, WSC, meteorological stations and lake monitoring site nearby. Potential for ESRD to take over ownership

TABLE 4b.

INDUSTRY-OWNED SAOS MONITORING LOCATIONS - MONITORING WELL SUMMARY

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Elevation* (masl)							Depth (m)									Hydraulic Conductivity (m/s)	Method	Interpreted Aquifer		
	Ground Surface	Top of Casing	Stick Up	May/Jun-14^	01-Aug-14	Oct 14^^	Sensor Elevation	Grnd. to Total Drilled	Grnd. to Top of Screen	Grnd. to Base of Screen	May/Jun-14^			01-Aug-14		Oct 14^^					
				Water Level	Water Level	Water Level					Top of Casing to Water	Grnd. to Water	Top of Casing to Water	Grnd. to Water	Top of Casing to Water	Grnd. to Water					
Anzac 86-07-113	494.12	494.12	0.00	---	---	---	---	115.5	109.8	113.0	---	---	---	---	---	---	---	---	---	---	Lower Grand Rapids
Anzac 86-07-34	493.97	493.97	0.00	---	---	---	---	35.7	28.0	34.0	---	---	---	---	---	---	---	---	---	---	Quaternary
Christina Crossing 84-04-170	511.55	512.45	0.90	450.57	---	---	---	176.8	149.1	170.4	61.88	60.98	---	---	---	---	---	---	---	---	Upper Clearwater
East Christina 76-05-19	619.32	620.03	0.71	605.49	605.54	605.63	---	20.7	15.9	18.9	14.54	13.83	14.50	13.78	14.40	13.69	1E-05	---	---	---	Sand River
East Christina 76-05-99	619.12	619.85	0.73	580.50	580.45	580.45	---	106.7	93.0	99.1	39.35	38.62	39.40	38.67	39.40	38.67	9E-05	---	---	---	Ethel Lake
East Christina 76-05-181	619.15	620.05	0.90	576.86	576.77	576.77	---	189.0	171.6	180.8	43.19	42.29	43.29	42.38	43.28	42.38	3E-05	---	---	---	Empress Channel
East Christina 76-05-327	619.35	623.40	4.05	---	---	---	326.9	---	---	---	---	---	---	---	---	---	---	---	---	---	Grand Rapids
Graham 80-1-180	505.40	506.10	0.70	484.79	---	---	---	180.0	149.8	176.9	21.31	20.61	---	---	---	---	---	---	---	---	Upper Clearwater
Graham 80-1-261	506.04	506.84	0.80	396.55	---	---	---	303.8	274.9	302.2	110.29	109.49	---	---	---	---	---	---	---	---	McMurray
Grist Lake 73-03-492	634.70	---	---	---	---	---	454.7	576.0	---	---	---	---	---	---	---	---	---	---	---	---	Empress Channel
Caribou 70-7-490	660.73	660.73	0.00	---	---	---	263.1	---	---	---	---	---	---	---	---	---	---	---	---	---	Lower Grand Rapids
Kimowin 83-2-180	469.49	470.69	1.20	467.86	---	---	---	184.0	156.1	180.3	2.83	1.63	---	---	---	---	---	---	---	---	Upper Clearwater
Kimowin 83-2-261	468.63	469.83	1.20	378.40	---	---	---	264.0	242.3	260.5	91.43	90.23	---	---	---	---	---	---	---	---	McMurray
Monday Creek 75-06-14	601.19	602.27	1.08	601.66	---	601.51	---	18.3	11.3	14.3	0.61	-0.47	---	---	0.76	-0.32	---	---	---	---	Sand River
Monday Creek 75-06-45	601.35	602.30	0.94	602.01	---	601.77	---	54.9	40.5	45.1	0.29	-0.66	---	---	0.53	-0.42	---	---	---	---	Bonnyville
Sunday Creek 75-07-191	657.55	---	---	---	---	---	---	191.0	163.8	191.0	---	---	---	---	---	---	---	---	---	---	Empress Terrace
Watchusk Lake 83-03-252	457.50	458.76	1.26	363.53	---	---	---	256.0	240.2	252.3	95.23	93.97	---	---	---	---	---	---	---	---	McMurray
Watchusk Lake 83-03-82	457.54	458.76	1.22	456.44	---	---	---	85.0	69.7	81.8	2.32	1.10	---	---	---	---	---	---	---	---	Lower Grand Rapids

Notes:

- * - elevations are geodetic
- masl - metres above sea level
- - not available
- ^ - water levels measured on May 4, 5, 6, and 15, 2014 and June 5, 2014
- ^^ - water levels measured on October 8 and 9, 2014
- 0.xx - negative groundwater level denotes above ground surface

TABLE 5.

GROUNDWATER QUALITY RESULTS - FIELD PARAMETERS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Temp °C	Field pH	Field EC ²⁵ µS/cm	Field DO mg/L
Surficial Deposits						
Conklin 76-07-6	15-Nov-12	16054121115104	5.4	6.3	100	7.6
Conklin 76-07-6	23-Sep-13	16054130923054	11.0	6.5	70	---
Conklin 76-07-6	29-Oct-13	16054131029010	9.3	6.3	70	---
Conklin 76-07-6	23-Aug-14	16054140823004	12.9	7.5	120	3.8
Conklin 76-07-6	17-Nov-14	16054141117017	6.4	6.8	90	---
House Crossing 77-15-8	19-Nov-12	16054121119104	3.4	7.3	610	2.2
House Crossing 77-15-8	25-Sep-13	16054130925060	5.8	7.2	600	---
House Crossing 77-15-8	24-Oct-13	16054131024005	5.0	7.4	660	---
House Crossing 77-15-8	25-Aug-14	16054140825011	8.4	5.9	690	1.7
House Crossing 77-15-8	15-Nov-14	16054141115001	1.1	7.4	690	---
Mariana Lakes 80-13-7	17-Nov-12	16054121117102	3.1	7.0	440	7.0
Mariana Lakes 80-13-7	19-Nov-12	16054121119301	3.1	7.0	440	7.0
Mariana Lakes 80-13-7	22-Sep-13	16054130922046	9.9	6.5	460	---
Mariana Lakes 80-13-7	07-Nov-13	16054131107030	7.2	7.5	840	---
Mariana Lakes 80-13-7	24-Aug-14	16054140824006	10.5	6.0	490	1.6
Mariana Lakes 80-13-7	16-Nov-14	16054141116005	5.9	6.3	490	---
Waddell Creek 80-09-9	22-Oct-12	16054121022101	5.8	7.6	890	6.8
Waddell Creek 80-09-9	23-Sep-13	16054130923048	6.8	7.1	560	---
Waddell Creek 80-09-9	29-Oct-13	16054131029011	4.0	7.0	970	---
Waddell Creek 80-09-9	28-Aug-14	16054140828021	6.7	6.4	1000	1.6
Waddell Creek 80-09-9	17-Nov-14	16054141117013	5.4	6.6	980	---
Winefred Lake 75-5-17	31-Oct-13	16054131031023	6.4	7.2	1340	---
Winefred Lake 75-5-17	26-Aug-14	16054140826013	8.2	6.9	1380	2.9
Winefred Lake 75-5-17	18-Nov-14	16054141118023	5.3	7.4	1130	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Sand River						
Conklin 76-07-24	15-Nov-12	16054121115103	4.0	7.6	370	0.8
Conklin 76-07-24	23-Sep-13	16054130923053	6.5	7.5	425	---
Conklin 76-07-24	29-Oct-13	16054131029009	5.4	7.5	410	---
Conklin 76-07-24	23-Aug-14	16054140823003	5.7	7.4	420	0.7
Conklin 76-07-24	17-Nov-14	16054141117018	5.1	7.4	380	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Sand River						
East Christina 76-05-19	10-Mar-12	16054120310302	4.9	7.2	780	3.8
East Christina 76-05-19	18-Jul-12	16054120718302	9.4	6.9	610	1.3
East Christina 76-05-19	20-Jun-13	16054130620301	9.3	7.6	850	1
East Christina 76-05-19	29-Oct-13	16054131029306	4.8	7.1	980	2.8
East Christina 76-05-19	15-May-14	16054140515302	6.8	6.7	440	4.5
East Christina 76-05-19	01-Aug-14	16054140801302	13.1	7.0	440	7.8
East Christina 76-05-19	09-Oct-14	16054141009302	7.1	6.2	850	13.1
Monday Creek 75-06-14	13-Jun-12	03499120613302	7.5	7.4	---	---
Monday Creek 75-06-14	03-Oct-12	03499121003405	5.8	7.5	820	---
Monday Creek 75-06-14	04-Jun-13	03499130604302	8.5	7.2	900	---
Monday Creek 75-06-14	09-Oct-13	03499131009302	5.3	7.7	810	---
Monday Creek 75-06-14	05-Jun-14	03499140605202	3.9	8.1	340	---
Monday Creek 75-06-14	08-Oct-14	03499141008405	3.9	7.6	890	---
Waddell Creek 80-09-21	22-Oct-12	16054121022102	3.6	7.3	510	2.3
Waddell Creek 80-09-21	23-Sep-13	16054130923050	6.6	7.3	497	---
Waddell Creek 80-09-21	29-Oct-13	16054131029015	4.2	7.4	500	---
Waddell Creek 80-09-21	28-Aug-14	16054140828022	5.1	7.2	500	0.6
Waddell Creek 80-09-21	17-Nov-14	16054141117016	4.0	7.3	500	---
Wiau Lake 74-9-41	30-Oct-13	16054131030017	5.4	7.4	570	---
Wiau Lake 74-9-41	27-Aug-14	16054140827017	4.9	7.3	560	0.5
Wiau Lake 74-9-41	18-Nov-14	16054141118028	3.6	7.3	560	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS

TABLE 5.**GROUNDWATER QUALITY RESULTS - FIELD PARAMETERS**

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Temp °C	Field pH	Field EC ²⁵ µS/cm	Field DO mg/L
Ethel Lake						
Conklin 76-07-41	15-Nov-12	16054121115102	4.2	7.4	750	1.0
Conklin 76-07-41	23-Sep-13	16054130923052	6.4	7.4	778	---
Conklin 76-07-41	29-Oct-13	16054131029008	5.5	7.5	810	---
Conklin 76-07-41	23-Aug-14	16054140823002	5.1	7.4	790	1.7
Conklin 76-07-41	17-Nov-14	16054141117021	4.7	7.4	790	---
East Christina 76-05-99	10-Mar-12	16054120310304	4.0	8.0	1250	7.5
East Christina 76-05-99	12-Mar-12	16054120312301	6.5	7.5	1230	1.7
East Christina 76-05-99	18-Jul-12	16054120718304	7.3	7.6	1090	1.0
East Christina 76-05-99	20-Jun-13	16054130620302	10.4	7.8	670	1.9
East Christina 76-05-99	29-Oct-13	16054131029308	4.6	7.7	1390	2.0
East Christina 76-05-99	15-May-14	16054140515304	6.6	7.2	430	5.3
East Christina 76-05-99	01-Aug-14	16054140801304	9.8	7.5	430	3.4
East Christina 76-05-99	09-Oct-14	16054141009304	6.2	7.0	1140	4.3
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Ethel Lake						
House Crossing 77-15-82	19-Nov-12	16054121119101	3.0	7.8	990	---
House Crossing 77-15-82	25-Sep-13	16054130925059	5.7	7.5	1104	---
House Crossing 77-15-82	24-Oct-13	16054131024001	4.4	7.6	1070	---
House Crossing 77-15-82	29-Aug-14	16054140829026	5.6	7.4	1030	1.7
House Crossing 77-15-82	15-Nov-14	16054141115004	1.7	7.6	1010	---
Mariana Lakes 80-13-52	17-Nov-12	16054121117103	4.3	7.3	560	4.4
Mariana Lakes 80-13-52	22-Sep-13	16054130922045	5.2	7.3	610	---
Mariana Lakes 80-13-52	07-Nov-13	16054131107029	4.5	7.3	640	---
Mariana Lakes 80-13-52	24-Aug-14	16054140824008	5.6	7.2	620	1
Mariana Lakes 80-13-52	16-Nov-14	16054141116007	3.8	7.5	620	---
Waddell Creek 80-09-117	23-Oct-12	16054121023104	2.7	7.4	540	2.6
Waddell Creek 80-09-117	23-Sep-13	16054130923049	4.3	7.5	716	---
Waddell Creek 80-09-117	29-Oct-13	16054131029014	4.0	7.5	720	---
Waddell Creek 80-09-117	28-Aug-14	16054140828023	4.9	7.6	710	0.7
Waddell Creek 80-09-117	17-Nov-14	16054141117015	3.8	7.5	710	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Bonnyville						
Conklin 76-07-67	15-Nov-12	16054121115101	4.0	7.5	760	3.0
Conklin 76-07-67	23-Sep-13	16054130923051	4.9	7.4	781	---
Conklin 76-07-67	29-Oct-13	16054131029007	3.9	7.4	810	---
Conklin 76-07-67	23-Aug-14	16054140823001	5.1	7.3	800	2.2
Conklin 76-07-67	17-Nov-14	16054141117019	4.7	7.4	800	---
House Crossing 77-15-126	19-Nov-12	16054121119103	4.1	7.4	560	7.5
House Crossing 77-15-126	25-Sep-13	16054130925058	4.3	7.4	570	---
House Crossing 77-15-126	24-Oct-13	16054131024004	3.3	7.5	570	---
House Crossing 77-15-126	25-Aug-14	16054140825012	8.3	7.3	570	1.7
House Crossing 77-15-126	15-Nov-14	16054141115002	1.7	7.4	580	---
Mariana Lakes 80-13-112	17-Nov-12	16054121117104	4.2	7.5	850	1.6
Mariana Lakes 80-13-112	22-Sep-13	16054130922044	5.7	7.5	898	---
Mariana Lakes 80-13-112	07-Nov-13	16054131107028	4.6	7.5	930	---
Mariana Lakes 80-13-112	24-Aug-14	16054140824009	6.0	7.5	910	1.6
Mariana Lakes 80-13-112	16-Nov-14	16054141116006	3.5	7.5	910	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS

TABLE 5.**GROUNDWATER QUALITY RESULTS - FIELD PARAMETERS**

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Temp °C	Field pH	Field EC ²⁵ µS/cm	Field DO mg/L
Bonnyville						
Monday Creek 75-06-45	13-Jun-12	03499120613303	5.5	7.6	---	---
Monday Creek 75-06-45	03-Oct-12	03499121003404	4.8	7.7	920	---
Monday Creek 75-06-45	04-Jun-13	03499130604301	12.5	7.5	1130	---
Monday Creek 75-06-45	09-Oct-13	03499131009301	5.3	7.6	2550	---
Monday Creek 75-06-45	05-Jun-14	03499140605201	4.1	7.9	970	---
Monday Creek 75-06-45	08-Oct-14	03499141008404	4.5	7.7	960	---
Plamondon 68-16-39	21-Nov-12	16054121121104	5.1	8.0	1550	3.9
Plamondon 68-16-39	25-Sep-13	16054130925064	6.0	7.8	1706	---
Plamondon 68-16-39	08-Nov-13	16054131108034	5.7	7.9	1760	---
Plamondon 68-16-39	30-Aug-14	16054140830030	7.9	7.8	1760	0.4
Plamondon 68-16-39	19-Nov-14	16054141119032	5.7	7.8	1560	---
Plamondon 68-16-51	21-Nov-12	16054121121103	5.8	8.0	9130	3.5
Plamondon 68-16-51	25-Sep-13	16054130925063	6.1	7.9	1229	---
Plamondon 68-16-51	08-Nov-13	16054131108033	6.1	8.0	1280	---
Plamondon 68-16-51	30-Aug-14	16054140830031	7.7	7.8	1250	0.7
Plamondon 68-16-51	19-Nov-14	16054141119031	5.6	7.9	1120	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Bonnyville						
Waddell Creek 80-09-149	22-Oct-12	16054121022103	4.2	7.4	930	2.0
Waddell Creek 80-09-149	23-Sep-13	16054130923047	5.7	7.4	929	---
Waddell Creek 80-09-149	29-Oct-13	16054131029013	5.2	7.5	930	---
Waddell Creek 80-09-149	28-Aug-14	16054140828024	5.8	7.5	940	1.2
Waddell Creek 80-09-149	17-Nov-14	16054141117014	4.2	7.4	940	---
Wiau Lake 74-9-15	30-Oct-13	16054131030019	7.0	6.8	980	---
Wiau Lake 74-9-15	27-Aug-14	16054140827016	7.7	6.5	1000	0.8
Wiau Lake 74-9-15	18-Nov-14	16054141118025	5.1	7.1	980	---
Wiau Lake 74-9-76	30-Oct-13	16054131030018	5.5	7.5	570	---
Wiau Lake 74-9-76	27-Aug-14	16054140827019	6.3	7.4	570	1
Wiau Lake 74-9-76	18-Nov-14	16054141118026	3.9	7.4	570	---
Wiau Lake 74-9-120	30-Oct-13	16054131030016	5.0	7.5	620	---
Wiau Lake 74-9-120	27-Aug-14	16054140827018	5.4	7.5	620	1.3
Wiau Lake 74-9-120	18-Nov-14	16054141118027	3.7	7.4	620	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Bonnyville						
Winefred Lake 75-5-79	31-Oct-13	16054131031021	7.2	7.3	1350	---
Winefred Lake 75-5-79	26-Aug-14	16054140826015	9.0	7.3	1480	1.6
Winefred Lake 75-5-79	18-Nov-14	16054141118022	3.8	7.4	1470	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Muriel Lake						
House Crossing 77-15-161	19-Nov-12	16054121119102	4.0	7.4	620	5.1
House Crossing 77-15-161	25-Sep-13	16054130925057	5.7	7.5	625	---
House Crossing 77-15-161	24-Oct-13	16054131024003	3.5	7.6	630	---
House Crossing 77-15-161	29-Aug-14	16054140829027	8.1	7.4	630	1.6
House Crossing 77-15-161	15-Nov-14	16054141115003	3.2	7.4	630	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS

TABLE 5.**GROUNDWATER QUALITY RESULTS - FIELD PARAMETERS**

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Temp °C	Field pH	Field EC ²⁵ µS/cm	Field DO mg/L
Empress Terrace						
Mariana Lakes 80-13-134	17-Nov-12	16054121117101	5.3	7.3	840	2.5
Mariana Lakes 80-13-134	22-Sep-13	16054130922043	7.9	7.2	900	---
Mariana Lakes 80-13-134	07-Nov-13	16054131107027	4.2	7.3	930	---
Mariana Lakes 80-13-134	24-Aug-14	16054140824007	11.1	7.3	900	1.4
Mariana Lakes 80-13-134	16-Nov-14	16054141116008	5.0	7.3	900	---
Winefred Lake 75-5-158	31-Oct-13	16054131031020	5.6	7.7	910	---
Winefred Lake 75-5-158	26-Aug-14	16054140826014	7.1	7.7	930	0.3
Winefred Lake 75-5-158	18-Nov-14	16054141118024	5.4	7.7	940	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Empress Channel						
East Christina 76-05-181	10-Mar-12	16054120310301	4.6	8.1	1820	7.1
East Christina 76-05-181	18-Jul-12	16054120718301	12.2	8.1	1700	1.9
East Christina 76-05-181	21-Jun-13	16054130621301	10.8	8.1	1800	1.7
East Christina 76-05-181	29-Oct-13	16054131029305	4.6	7.8	2090	3.3
East Christina 76-05-181	15-May-14	16054140515301	5.6	7.3	420	3.7
East Christina 76-05-181	01-Aug-14	16054140801301	8.6	7.9	420	4.2
East Christina 76-05-181	09-Oct-14	16054141009301	7.3	7.5	1820	4.8
House Crossing 77-15-231	19-Nov-12	16054121119105	3.6	7.6	730	2.6
House Crossing 77-15-231	25-Sep-13	16054130925056	4.6	7.6	757	---
House Crossing 77-15-231	24-Oct-13	16054131024002	4.2	7.7	760	---
House Crossing 77-15-231	29-Aug-14	16054140829028	7.0	7.6	780	1.2
House Crossing 77-15-231	15-Nov-14	16054141115301	---	---	---	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS
Empress Channel						
Plamondon 68-16-7	21-Nov-12	16054121121101	3.3	8.2	460	10.5
Plamondon 68-16-7	25-Sep-13	16054130925065	6.5	8.4	280	---
Plamondon 68-16-7	08-Nov-13	16054131108035	5.6	8.0	300	---
Plamondon 68-16-7	30-Aug-14	16054140830029	10.9	6.5	280	2
Plamondon 68-16-7	19-Nov-14	16054141119030	6.0	7.5	360	---
Plamondon 68-16-70	21-Nov-12	16054121121102	5.9	8.4	15180	1
Plamondon 68-16-70	25-Sep-13	16054130925062	6.4	8.2	28200	---
Plamondon 68-16-70	08-Nov-13	16054131108032	6.3	8.3	2930	---
Plamondon 68-16-70	30-Aug-14	16054140830032	9.0	8.1	2900	1.1
Plamondon 68-16-70	19-Nov-14	16054141119033	5.3	8.3	2600	---
Alberta Tier 1 - Natural Areas*			NS	6.5-8.5^P	NS	NS

Notes:

--- - not analyzed

NS - not specified

^P - indicates guideline for Potable Groundwater exposure pathway²⁵ - field EC corrected to 25°C

* - Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AENV 2010)

Underline - indicates values do not meet applicable guidelines

TABLE 6.

GROUNDWATER QUALITY RESULTS - GENERAL AND INORGANIC PARAMETERS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Lab pH	Lab EC µS/cm	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO ₄ mg/L	NO ₂ -N mg/L	NO ₃ -N mg/L	NO ₂ /NO ₃ -N mg/L	NH ₃ -N mg/L	TKN mg/L	PO ₄ -P-T mg/L	Si as SiO ₂ -D mg/L	T-Alkalinity mg/L	HCO ₃ mg/L	Hardness mg/L	TDS mg/L	DOC mg/L	Phenol mg/L	Turbidity NTU		
McMurray																										
Kimowin 83-2-261	18-Mar-08	16054080318001	8.1	20300	266	137	<u>4270</u>	15.9	<i>7000</i>	<u>815</u>	<0.05	<i>0.3</i>	0.3	---	---	---	---	358	436	1230	<i>12700</i>	---	---	---		
Watchusk Lake 83-03-252	27-Mar-08	16054080327001	7.9	26500	317	167	<u>5750</u>	19.4	<i>9680</i>	<u>889</u>	<0.05	<0.1	<0.1	---	---	---	---	502	613	1480	<i>17100</i>	---	---	---		
Graham 80-1-261	13-Mar-08	16054080313001	7.9	29000	269	171	<u>5460</u>	25.8	<i>11300</i>	<u>737</u>	<0.05	<0.1	<0.1	---	---	---	---	543	662	1380	<i>18300</i>	---	---	---		
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	NS	NS	1500	NS	NS	0.002 ⁺	NS	NS	NS	NS	10	NS	NS	NS	3500	NS	0.01	NS		
Alberta Tier 1 - Natural Areas*			6.5-8.5 ^P	NS	NS	NS	200 ^P	NS	230 ^A	500 ^P	0.06 ^A	2.9 ^A	NS	0.017 ^{A,pH,T,***}	NS	NS	NS	NS	NS	NS	NS	500 ^P	NS	0.004 ^A	NS	

Notes:

--- - not analyzed

NS - not specified

^A - indicates guideline for Aquatic Life exposure pathway

^P - indicates guideline for Potable Groundwater exposure pathway

+ - Interim guidelines is for NO₃ Guideline converted to NO₃-N by Matrix Solutions

^^ - Groundwater Management Framework Interim Quality Triggers for the South Athabasca Oil Sands Area

* - Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AENV 2010)

*** - Water Quality Guidelines for the Protection of Aquatic Life (CCME accessed on line March 2014)

- insufficient information to calculate guideline

Underline - indicates values do not meet Tier 1 guidelines

Italics - indicates values do not meet Groundwater Management Framework Interim Quality Triggers for the South Athabasca Oil Sands Area

TABLE 7.

GROUNDWATER QUALITY RESULTS - DISSOLVED METALS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Table with 28 columns representing elements (Al, Sb, As, Ba, Be, Bi, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Si, Ag, Sr, Tl, Sn, Ti, U, V, Zn) and rows for Empress Channel, Lower Grand Rapids, Upper Clearwater, and McMurray. Includes monitoring wells, sample dates, and quality triggers.

Notes:

- not analyzed
NS - not specified
a - value if pH <6.5
b - value if pH >=6.5
c - chronic aquatic life guideline from Alberta Environment Surface Water Quality Guidelines for Use in Alberta (AENV 1999)
d - indicates guideline level for Cr(VI); guideline level for Cr(III) = 0.0089 mg/L
j - indicates long-term exposure guideline; see CCME factsheet for short-term exposure guideline
A - indicates guideline for Aquatic Life exposure pathway
P - indicates guideline for Potable Groundwater exposure pathway
H - dependent on hardness value
As - Guidelines for Canadian Drinking Water Quality: Guideline Technical Document for Arsenic (Health Canada 2006)
* - Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AENV 2010)
*** - Water Quality Guidelines for the Protection of Aquatic Life (CCME accessed online March 2014)
SW - Alberta Environment Surface Water Quality Guidelines for Use in Alberta (AENV 1999)
Underline - indicates values do not meet Tier 1 guidelines
Italics - indicates values do not meet Groundwater Management Framework Interim Quality Triggers for the South Athabasca Oil Sands Area

TABLE 8.

GROUNDWATER QUALITY RESULTS - DISSOLVED HYDROCARBONS & NAPHTHENIC ACIDS

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	Total BTEX mg/L	F1 C ₆ -C ₁₀ - BTEX mg/L	F2 C _{>10} -C ₁₆ mg/L	Naphthenic Acids mg/L
Surficial Deposits										
Conklin 76-07-6	15-Nov-12	16054121115104	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-6	23-Sep-13	16054130923054	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-6	29-Oct-13	16054131029010	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-6	23-Aug-14	16054140823004	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-6	17-Nov-14	16054141117017	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-8	19-Nov-12	16054121119104	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-8	25-Sep-13	16054130925060	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-8	24-Oct-13	16054131024005	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-8	25-Aug-14	16054140825011	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-8	15-Nov-14	16054141115001	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-7	17-Nov-12	16054121117102	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-7	22-Sep-13	16054130922046	<0.0005	0.00057	<0.0005	<0.00071	0.00057	<0.1	<0.25	<1.0
Mariana Lakes 80-13-7	07-Nov-13	16054131107030	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-7	24-Aug-14	16054140824006	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-7	16-Nov-14	16054141116005	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-7	21-Nov-12	16054121121101	<0.0005	0.00055	<0.0005	0.00056	0.00111	<0.1	<0.25	<1.0
Plamondon 68-16-7	25-Sep-13	16054130925065	<0.0005	0.00103	<0.0005	<0.00071	0.00103	<0.1	<0.25	2.1
Plamondon 68-16-7	08-Nov-13	16054131108035	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-7	30-Aug-14	16054140830029	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-7	19-Nov-14	16054141119030	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-9	22-Oct-12	16054121022101	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-9	23-Sep-13	16054130923048	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-9	29-Oct-13	16054131029011	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-9	28-Aug-14	16054140828021	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-9	17-Nov-14	16054141117013	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Winefred Lake 75-5-17	31-Oct-13	16054131031023	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Winefred Lake 75-5-17	26-Aug-14	16054140826013	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Winefred Lake 75-5-17	18-Nov-14	16054141118023	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS

TABLE 8.

GROUNDWATER QUALITY RESULTS - DISSOLVED HYDROCARBONS & NAPHTHENIC ACIDS

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	Total BTEX mg/L	F1 C ₆ -C ₁₀ - BTEX mg/L	F2 C ₁₀ -C ₁₆ mg/L	Naphthenic Acids mg/L
Sand River										
Conklin 76-07-24	15-Nov-12	16054121115103	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-24	23-Sep-13	16054130923053	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-24	29-Oct-13	16054131029009	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-24	23-Aug-14	16054140823003	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-24	17-Nov-14	16054141117018	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
East Christina 76-05-19	10-Mar-12	16054120310302	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0.1	<0.1	<1
East Christina 76-05-19	18-Jul-12	16054120718302	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-19	20-Jun-13	16054130620301	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-19	29-Oct-13	16054131029306	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-19	15-May-14	16054140515302	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-19	01-Aug-14	16054140801302	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0.1	<0.10	<1.0
East Christina 76-05-19	09-Oct-14	16054141009302	<0.00040	<0.00040	<0.00040	<0.00080	ND	<0.001	<0.10	<1.0
Waddell Creek 80-09-21	22-Oct-12	16054121022102	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-21	23-Sep-13	16054130923050	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-21	29-Oct-13	16054131029015	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-21	28-Aug-14	16054140828022	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-21	17-Nov-14	16054141117016	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-41	30-Oct-13	16054131030017	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-41	27-Aug-14	16054140827017	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-41	18-Nov-14	16054141118028	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS
Ethel Lake										
Conklin 76-07-41	15-Nov-12	16054121115102	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-41	23-Sep-13	16054130923052	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-41	29-Oct-13	16054131029008	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-41	23-Aug-14	16054140823002	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-41	17-Nov-14	16054141117021	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
East Christina 76-05-99	10-Mar-12	16054120310304	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0.1	<0.1	<1
East Christina 76-05-99	12-Mar-12	16054120312301	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0.1	<0.1	<1
East Christina 76-05-99	18-Jul-12	16054120718304	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-99	20-Jun-13	16054130620302	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-99	29-Oct-13	16054131029308	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-99	15-May-14	16054140515304	<0.0004	<0.70	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-99	01-Aug-14	16054140801304	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0.1	<0.10	<1.0
East Christina 76-05-99	09-Oct-14	16054141009304	<0.00040	<0.00040	<0.00040	<0.00080	ND	<0.001	<0.10	<1.0
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS

TABLE 8.

GROUNDWATER QUALITY RESULTS - DISSOLVED HYDROCARBONS & NAPHTHENIC ACIDS

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	Total BTEX mg/L	F1 C ₆ -C ₁₀ - BTEX mg/L	F2 C ₁₀ -C ₁₆ mg/L	Naphthenic Acids mg/L
Ethel Lake										
House Crossing 77-15-82	19-Nov-12	16054121119101	<0.0005	0.00738	<0.0005	<0.00071	0.00738	<0.1	<0.25	<1.0
House Crossing 77-15-82	25-Sep-13	16054130925059	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-82	24-Oct-13	16054131024001	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-82	29-Aug-14	16054140829026	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1.6
House Crossing 77-15-82	15-Nov-14	16054141115004	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-52	17-Nov-12	16054121117103	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-52	22-Sep-13	16054130922045	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-52	07-Nov-13	16054131107029	<0.0005	<0.0005	0.00059	0.00311	0.0037	<0.1	<0.25	<1.0
Mariana Lakes 80-13-52	24-Aug-14	16054140824008	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-52	16-Nov-14	16054141116007	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-117	23-Oct-12	16054121023104	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-117	23-Sep-13	16054130923049	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-117	29-Oct-13	16054131029014	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-117	28-Aug-14	16054140828023	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1.7
Waddell Creek 80-09-117	17-Nov-14	16054141117015	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS
Bonnyville										
Conklin 76-07-67	15-Nov-12	16054121115101	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-67	23-Sep-13	16054130923051	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1
Conklin 76-07-67	29-Oct-13	16054131029007	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-67	23-Aug-14	16054140823001	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Conklin 76-07-67	17-Nov-14	16054141117019	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-126	19-Nov-12	16054121119103	<0.0005	0.00092	<0.0005	<0.00071	0.00092	<0.1	<0.25	<1.0
House Crossing 77-15-126	25-Sep-13	16054130925058	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-126	24-Oct-13	16054131024004	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-126	25-Aug-14	16054140825012	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-126	15-Nov-14	16054141115002	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-112	17-Nov-12	16054121117104	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-112	22-Sep-13	16054130922044	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-112	07-Nov-13	16054131107028	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-112	24-Aug-14	16054140824009	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-112	16-Nov-14	16054141116006	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS

TABLE 8.

GROUNDWATER QUALITY RESULTS - DISSOLVED HYDROCARBONS & NAPHTHENIC ACIDS

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	Total BTEX mg/L	F1 C ₆ -C ₁₀ - BTEX mg/L	F2 C ₁₀ -C ₁₆ mg/L	Naphthenic Acids mg/L
Bonnyville										
Plamondon 68-16-39	21-Nov-12	16054121121104	<0.0005	0.00062	<0.0005	<0.0005	0.00062	<0.1	<0.25	<1.0
Plamondon 68-16-39	25-Sep-13	16054130925064	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-39	08-Nov-13	16054131108034	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-39	30-Aug-14	16054140830030	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1.2
Plamondon 68-16-39	19-Nov-14	16054141119032	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1
Plamondon 68-16-51	21-Nov-12	16054121121103	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.1	<0.25	<1.0
Plamondon 68-16-51	25-Sep-13	16054130925063	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-51	08-Nov-13	16054131108033	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-51	30-Aug-14	16054140830031	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-51	19-Nov-14	16054141119031	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1
Waddell Creek 80-09-149	22-Oct-12	16054121022103	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.1	<0.25	1
Waddell Creek 80-09-149	23-Sep-13	16054130923047	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-149	29-Oct-13	16054131029013	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Waddell Creek 80-09-149	28-Aug-14	16054140828024	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1.5
Waddell Creek 80-09-149	17-Nov-14	16054141117014	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-15	30-Oct-13	16054131030019	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-15	27-Aug-14	16054140827016	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-15	18-Nov-14	16054141118025	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-76	30-Oct-13	16054131030018	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-76	27-Aug-14	16054140827019	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-76	18-Nov-14	16054141118026	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-120	30-Oct-13	16054131030016	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-120	27-Aug-14	16054140827018	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Wiau Lake 74-9-120	18-Nov-14	16054141118027	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Winefred Lake 75-5-79	31-Oct-13	16054131031021	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1.4
Winefred Lake 75-5-79	26-Aug-14	16054140826015	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1.7
Winefred Lake 75-5-79	18-Nov-14	16054141118022	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	3.3
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS
Muriel Lake										
House Crossing 77-15-161	19-Nov-12	16054121119102	<0.0005	0.00124	<0.0005	<0.00071	0.00124	<0.1	<0.25	<1.0
House Crossing 77-15-161	25-Sep-13	16054130925057	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-161	24-Oct-13	16054131024003	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-161	29-Aug-14	16054140829027	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
House Crossing 77-15-161	15-Nov-14	16054141115003	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS

TABLE 8.

GROUNDWATER QUALITY RESULTS - DISSOLVED HYDROCARBONS & NAPHTHENIC ACIDS

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	Total BTEX mg/L	F1 C ₆ -C ₁₀ - BTEX mg/L	F2 C _{>10} -C ₁₆ mg/L	Naphtenic Acids mg/L
Empress Terrace										
Mariana Lakes 80-13-134	17-Nov-12	16054121117101	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-134	22-Sep-13	16054130922043	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-134	07-Nov-13	16054131107027	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Mariana Lakes 80-13-134	24-Aug-14	16054140824007	<0.0005	0.00077	<0.0005	<0.00071	0.00077	<0.1	<0.25	<1.0
Mariana Lakes 80-13-134	16-Nov-14	16054141116008	<0.0005	<0.0005	<0.0005	0.00162	0.00162	<0.1	<0.25	<1.0
Winefred Lake 75-5-158	31-Oct-13	16054131031020	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Winefred Lake 75-5-158	26-Aug-14	16054140826014	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Winefred Lake 75-5-158	18-Nov-14	16054141118024	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS
Empress Channel										
East Christina 76-05-181	10-Mar-12	16054120310301	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0.1	<0.1	<1
East Christina 76-05-181	18-Jul-12	16054120718301	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-181	21-Jun-13	16054130621301	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	4.9
East Christina 76-05-181	29-Oct-13	16054131029305	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-181	15-May-14	16054140515301	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0	<0.1	<1
East Christina 76-05-181	01-Aug-14	16054140801301	<0.0004	<0.0004	<0.0004	<0.0008	ND	<0.1	<0.10	<1.0
East Christina 76-05-181	09-Oct-14	16054141009301	<0.00040	<0.00040	<0.00040	<0.00080	ND	<0.001	<0.10	<1.0
House Crossing 77-15-231	19-Nov-12	16054121119105	<0.0005	0.00051	<0.0005	<0.00071	0.00051	<0.1	<0.25	<1.0
House Crossing 77-15-231	25-Sep-13	16054130925056	<0.0005	0.00076	<0.0005	<0.00071	0.00076	<0.1	<0.25	<1.0
House Crossing 77-15-231	24-Oct-13	16054131024002	<0.0005	0.00102	<0.0005	<0.00071	0.00102	<0.1	<0.25	<1.0
House Crossing 77-15-231	29-Aug-14	16054140829028	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-70	21-Nov-12	16054121121102	<0.0005	<0.0005	<0.0005	<0.0005	ND	<0.1	<0.25	1.4
Plamondon 68-16-70	25-Sep-13	16054130925062	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1.3
Plamondon 68-16-70	08-Nov-13	16054131108032	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	<1.0
Plamondon 68-16-70	30-Aug-14	16054140830032	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	4
Plamondon 68-16-70	19-Nov-14	16054141119033	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	1.3
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS
Lower Grand Rapids										
Watchusk Lake 83-03-82	26-Mar-08	16054080326001	<0.0005	0.00207	<0.0005	<0.0005	0.00207	---	---	---
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS

TABLE 8.**GROUNDWATER QUALITY RESULTS - DISSOLVED HYDROCARBONS & NAPHTHENIC ACIDS**

Alberta Environment and Sustainable Resources Development (ESRD)
 Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	Total BTEX mg/L	F1 C ₆ -C ₁₀ - BTEX mg/L	F2 C _{>10} -C ₁₆ mg/L	Naphthenic Acids mg/L
Upper Clearwater										
Graham 80-1-180	11-Mar-08	16054080311001	<0.0005	<0.0005	<0.0005	<0.0005	ND	---	---	---
Christina Crossing 84-04-170	04-Mar-11	16054110304001	<0.0005	<0.0005	<0.0005	<0.00071	ND	<0.1	<0.25	---
Kimowin 83-2-180	18-Mar-08	16054080318002	<0.0005	<0.0005	<0.0005	<0.0005	ND	---	---	<1
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS
McMurray										
Kimowin 83-2-261	18-Mar-08	16054080318001	<0.0005	<0.0005	<0.0005	<0.0005	ND	---	---	2
Watchusk Lake 83-03-252	27-Mar-08	16054080327001	<0.0005	<0.0005	<0.0005	<0.0005	ND	---	---	---
Graham 80-1-261	13-Mar-08	16054080313001	<0.0005	<0.0005	<0.0005	<0.0005	ND	---	---	---
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	<10% DF	NS	NS	NS
Alberta Tier 1 - Fine Grained Soils - Natural Areas*			0.005^P	0.024^P	0.0024^P	0.3^P	NS	2.2^P	1.1^P	NS

Notes:

--- - not analyzed

NS - not specified

DF - detection frequency

^P - indicates guideline for Potable Groundwater exposure pathway

* - Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AENV 2010)

^^ - Groundwater Management Framework Interim Quality Triggers for the South Athabasca Oil Sands Area

Underline - indicates values do not meet Tier 1 guidelines**Italics** - indicates values do not meet Groundwater Management Framework Interim Quality Triggers for the South Athabasca Oil Sands Area

TABLE 9.

GROUNDWATER QUALITY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Sample Point	Sample Date	MSI Sample Number	Acenaphthene mg/L	Acenaphthylene mg/L	Anthracene mg/L	Benz[a]anthracene** mg/L	Benzo[b+]fluoranthene** mg/L	Benzo[k]fluoranthene** mg/L	Benzo[g,h,i]perylene** mg/L	Benzo[a]pyrene** mg/L	Chrysene** mg/L	Dibenz[a,h]anthracene** mg/L	Fluoranthene mg/L	Fluorene mg/L	Indeno[1,2,3-c,d]pyrene** mg/L	Naphthalene mg/L	Phenanthrene mg/L	Pyrene mg/L	Benzo[a]pyreneTPE** mg/L
Sand River																			
Conklin 76-07-24	15-Nov-12	16054121115103	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Conklin 76-07-24	23-Sep-13	16054130923053	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Conklin 76-07-24	29-Oct-13	16054131029009	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Conklin 76-07-24	23-Aug-14	16054140823003	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
Conklin 76-07-24	17-Nov-14	16054141117018	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
East Christina 76-05-19	10-Mar-12	16054120310302	<0.0001	<0.0001	<0.00001	<0.000085	<0.000085	<0.000085	<0.000085	<0.000075	<0.000085	<0.000075	<0.00004	<0.00005	<0.000085	<0.0001	<0.00005	0.000028	ND
East Christina 76-05-19	20-Jun-13	16054130620301	<0.1	<0.1	<0.01	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.04	<0.05	<0.0085	<0.1	<0.05	<0.02	ND
East Christina 76-05-19	29-Oct-13	16054131029306	<0.0001	<0.0001	<0.00001	<0.000085	<0.000085	<0.000085	<0.000085	<0.000075	<0.000085	<0.000075	<0.00001	<0.00005	<0.000085	<0.0001	<0.00005	<0.00002	ND
East Christina 76-05-19	15-May-14	16054140515302	<0.0001	<0.0001	<0.00001	<0.000085	<0.000085	<0.000085	<0.000085	<0.000075	<0.000085	<0.000075	<0.00001	<0.00005	<0.000085	<0.0001	<0.00005	<0.00002	ND
East Christina 76-05-19	01-Aug-14	16054140801302	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
East Christina 76-05-19	09-Oct-14	16054141009302	<0.00010	<0.00010	<0.000010	<0.000085	<0.000085	<0.000085	<0.000085	<0.000075	<0.000085	<0.000075	<0.000010	<0.000050	<0.000085	<0.00010	<0.000050	<0.000020	ND
Waddell Creek 80-09-21	22-Oct-12	16054121022102	<0.00005	<0.00005	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00001	<0.00005	<0.00005	<0.00002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00002	ND
Waddell Creek 80-09-21	23-Sep-13	16054130923050	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Waddell Creek 80-09-21	29-Oct-13	16054131029015	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Waddell Creek 80-09-21	28-Aug-14	16054140828022	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
Waddell Creek 80-09-21	17-Nov-14	16054141117016	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
Wiau Lake 74-9-41	30-Oct-13	16054131030017	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Wiau Lake 74-9-41	27-Aug-14	16054140827017	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
Wiau Lake 74-9-41	18-Nov-14	16054141118028	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB Tier 1 - Fine Grained Soils - Natural Areas*			0.0058^A	0.046^A	0.000012^A	0.000018^A	0.00048^A	0.00048^A	0.00021^A	0.000017^A	0.0014^A	0.00028^A	0.00004^A	0.003^A	0.00023^A	0.0011^A	0.0004^A	0.000025^A	0.00001^P

TABLE 9.

GROUNDWATER QUALITY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Sample Point	Sample Date	MSI Sample Number	Acenaphthene mg/L	Acenaphthylene mg/L	Anthracene mg/L	Benz[a]anthracene ⁺⁺ mg/L	Benzo[b+]fluoranthene ⁺⁺ mg/L	Benzo[k]fluoranthene ⁺⁺ mg/L	Benzo[g,h,i]perylene ⁺⁺ mg/L	Benzo[a]pyrene ⁺⁺ mg/L	Chrysene ⁺⁺ mg/L	Dibenz[a,h]anthracene ⁺⁺ mg/L	Fluoranthene mg/L	Fluorene mg/L	Indeno[1,2,3-c,d]pyrene ⁺⁺ mg/L	Naphthalene mg/L	Phenanthrene mg/L	Pyrene mg/L	Benzo[a]pyreneTPE ^{**} mg/L
Muriel Lake																			
House Crossing 77-15-161	19-Nov-12	16054121119102	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000358	<0.00005	<0.00002	ND
House Crossing 77-15-161	25-Sep-13	16054130925057	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000063	<0.00005	<0.00002	ND
House Crossing 77-15-161	24-Oct-13	16054131024003	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000071	<0.00005	<0.00002	ND
House Crossing 77-15-161	29-Aug-14	16054140829027	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000077	<0.00005	<0.00001	ND
House Crossing 77-15-161	15-Nov-14	16054141115003	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000069	<0.00005	<0.00001	ND
GMF Interim Quality Triggers for SAOSA^{^^}			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB Tier 1 - Fine Grained Soils - Natural Areas[*]			0.0058^A	0.046^A	0.000012^A	0.000018^A	0.00048^A	0.00048^A	0.00021^A	0.000017^A	0.0014^A	0.00028^A	0.00004^A	0.003^A	0.00023^A	0.0011^A	0.0004^A	0.000025^A	0.00001^P
Empress Terrace																			
Mariana Lakes 80-13-134	17-Nov-12	16054121117101	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000261	<0.00005	<0.00002	ND
Mariana Lakes 80-13-134	22-Sep-13	16054130922043	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000176	<0.00005	<0.00002	ND
Mariana Lakes 80-13-134	07-Nov-13	16054131107027	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Mariana Lakes 80-13-134	24-Aug-14	16054140824007	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000067	<0.00005	<0.00001	ND
Mariana Lakes 80-13-134	16-Nov-14	16054141116008	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
Winefred Lake 75-5-158	31-Oct-13	16054131031020	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Winefred Lake 75-5-158	26-Aug-14	16054140826014	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
Winefred Lake 75-5-158	18-Nov-14	16054141118024	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
GMF Interim Quality Triggers for SAOSA^{^^}			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB Tier 1 - Fine Grained Soils - Natural Areas[*]			0.0058^A	0.046^A	0.000012^A	0.000018^A	0.00048^A	0.00048^A	0.00021^A	0.000017^A	0.0014^A	0.00028^A	0.00004^A	0.003^A	0.00023^A	0.0011^A	0.0004^A	0.000025^A	0.00001^P

TABLE 9.

GROUNDWATER QUALITY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Sample Point	Sample Date	MSI Sample Number	Acenaphthene mg/L	Acenaphthylene mg/L	Anthracene mg/L	Benzo[a]anthracene** mg/L	Benzo[b+]fluoranthene** mg/L	Benzo[k]fluoranthene** mg/L	Benzo[g,h,i]perylene** mg/L	Benzo[a]pyrene** mg/L	Chrysene** mg/L	Dibenzo[a,h]anthracene** mg/L	Fluoranthene mg/L	Fluorene mg/L	Indeno[1,2,3-c,d]pyrene** mg/L	Naphthalene mg/L	Phenanthrene mg/L	Pyrene mg/L	Benzo[a]pyreneTPE** mg/L
Empress Channel																			
East Christina 76-05-181	10-Mar-12	16054120310301	<0.0001	<0.0001	<0.00001	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000075	<0.0000085	<0.0000075	<0.00004	<0.00005	<0.0000085	<0.0001	<0.00005	0.000022	ND
East Christina 76-05-181	18-Jul-12	16054120718301	<0.0001	<0.0001	<0.00001	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000075	<0.0000085	<0.0000075	<0.00001	<0.00005	<0.0000085	<0.0001	<0.00005	<0.00002	ND
East Christina 76-05-181	21-Jun-13	16054130621301	<0.1	<0.1	<0.01	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.04	<0.05	<0.0085	<0.1	<0.05	<0.02	ND
East Christina 76-05-181	29-Oct-13	16054131029305	<0.0001	<0.0001	<0.00001	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000075	<0.0000085	<0.0000075	0.000012	<0.00005	<0.0000085	<0.0001	<0.00005	<u>0.000035</u>	ND
East Christina 76-05-181	15-May-14	16054140515301	<0.0001	<0.0001	<0.00001	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000075	<0.0000085	<0.0000075	<0.00001	<0.00005	<0.0000085	<0.0001	<0.00005	<0.00002	ND
East Christina 76-05-181	01-Aug-14	16054140801301	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
East Christina 76-05-181	09-Oct-14	16054141009301	<0.00010	<0.00010	<0.000010	<0.0000085	<0.0000085	<0.0000085	<0.0000085	<0.0000075	<0.0000085	<0.0000075	<0.000010	<0.000050	<0.0000085	<0.00010	<0.000050	<0.000020	ND
House Crossing 77-15-231	19-Nov-12	16054121119105	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
House Crossing 77-15-231	25-Sep-13	16054130925056	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000122	<0.00005	<0.00002	ND
House Crossing 77-15-231	24-Oct-13	16054131024002	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000121	<0.00005	<0.00002	ND
House Crossing 77-15-231	29-Aug-14	16054140829028	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	0.000103	<0.00005	<0.00001	ND
Plamondon 68-16-70	21-Nov-12	16054121121102	<0.00005	<0.00005	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00001	<0.00005	<0.00005	<0.00002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00002	ND
Plamondon 68-16-70	25-Sep-13	16054130925062	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Plamondon 68-16-70	08-Nov-13	16054131108032	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00002	ND
Plamondon 68-16-70	30-Aug-14	16054140830032	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
Plamondon 68-16-70	19-Nov-14	16054141119033	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001	ND
Minimal Detection Limit			0.00005	0.00005	0.00001	0.00001	0.00005	0.00005	0.00005	0.00001	0.00005	0.00005	0.00002	0.00005	0.00050	0.00005	0.00005	0.00002	-
GMF Interim Quality Triggers for SAOSA^^			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB Tier 1 - Fine Grained Soils - Natural Areas*			0.0058^A	0.046^A	0.000012^A	0.000018^A	0.00048^A	0.00048^A	0.00021^A	0.000017^A	0.0014^A	0.00028^A	0.00004^A	0.003^A	0.00023^A	0.0011^A	0.0004^A	0.000025^A	0.00001^P

Notes:

- ND - not detected
- ^A - indicates guideline for Aquatic Life exposure pathway
- ^P - indicates guideline for Potable Groundwater exposure pathway
- * - Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AENV 2010)
- ^^ - Groundwater Management Framework Interim Quality Triggers for the South Athabasca Oil Sands Area
- ** - Equivalent Benzo[a]pyrene concentrations based on relative carcinogenic potency
- ++ - Carcinogenic PAHs

Underline - indicates values do not meet Tier 1 guidelines

Italics - indicates values do not meet Groundwater Management Framework Interim Quality Triggers for the South Athabasca Oil Sands Area

TABLE 10a.**WATER QUALITY CONTROL SAMPLE RESULTS - FIELD PARAMETERS**

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Temp °C	Field pH	Field EC µS/cm
Conklin 76-07-24	23-Aug-14	16054140823003	5.7	7.4	420
Conklin 76-07-24	23-Aug-14	16054140823005	5.7	7.4	420
Detection Limit (DL)			0.1	---	10
Reliable Detection Limit (RDL)**			0.5	---	50
Absolute Difference*			0	0	0
Absolute Relative Percent Difference (RPD)*			0	---	0
Duplicate Sample Results Evaluation			Good	Good	Good

Notes:

--- - not applicable

* - non-detectable concentrations are assessed at 95% of the detection limit

** - the reliable (reporting) detection limit (RDL) or practical detection limit (PDL) is defined as 5 times the DL

Good - evaluation indicates acceptable reproducibility

Poor - evaluation indicates poor reproducibility**Evaluation of Duplicate Analyses:**

- reproducibility is unacceptable if RPD is > 30% for inorganic waters and > 40% for soils and organics

- if RPD is not applicable (---), reproducibility is evaluated based on Absolute Difference (unacceptable if > 2 x RDL)

- if Absolute Difference is not applicable (---), reproducibility is evaluated based on the parameter concentration (unacceptable if > 2 x RDL)

- pH is evaluated based on Absolute Difference (unacceptable if > 0.5)

TABLE 10b.

WATER QUALITY CONTROL SAMPLE RESULTS - GENERAL AND INORGANIC PARAMETERS

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Lab pH	Lab EC $\mu\text{S/cm}$	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO ₄ mg/L	NO ₂ -N mg/L	NO ₃ -N mg/L	NO ₂ /NO ₃ -N mg/L	NH ₃ -N mg/L	T-Alkalinity mg/L	HCO ₃ mg/L	Hardness mg/L	TDS mg/L
Conklin 76-07-24	23-Aug-14	16054140823003	8.09	424	51.7	15	12.9	3.46	<0.50	3.67	<0.020	<0.050	<0.054	0.537	218	266	191	241
Conklin 76-07-24	23-Aug-14	16054140823005	8.03	422	49.3	15.1	12.4	3.45	<0.50	3.65	<0.020	<0.050	<0.054	0.505	223	272	185	245
Detection Limit (DL)			0.1	0.2	0.5	0.1	1	0.1	0.5	0.5	0.02	0.05	0.054	0.05	2	5	1	10
Reliable Detection Limit (RDL)**			---	1	2.5	0.5	5	0.5	2.5	2.5	0.1	0.25	0.27	0.25	10	25	5	50
Absolute Difference*			0.06	2	2.4	0.1	0.5	0.01	---	0.02	---	---	---	0.032	5	6	6	4
Absolute Relative Percent Difference (RPD)*			---	0	5	1	4	0	---	1	---	---	---	6	2	2	3	2
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Mariana Lk 80-13-52	24-Aug-14	16054140824008	7.85	598	76.2	20.2	18.5	3.95	<0.50	25.7	<0.020	<0.050	<0.054	0.97	297	362	273	379
Mariana Lk 80-13-52	24-Aug-14	16054140824010	7.88	598	78.9	20.2	18.3	3.91	<0.50	26.0	<0.020	<0.050	<0.054	0.925	298	364	280	367
Detection Limit (DL)			0.1	0.2	0.5	0.1	1	0.1	0.5	0.5	0.02	0.05	0.054	0.05	2	5	1	10
Reliable Detection Limit (RDL)**			---	1	2.5	0.5	5	0.5	2.5	2.5	0.1	0.25	0.27	0.25	10	25	5	50
Absolute Difference*			0.03	0	2.7	0	0.2	0.04	---	0.3	---	---	---	0.045	1	2	7	12
Absolute Relative Percent Difference (RPD)*			---	0	3	0	1	1	---	1	---	---	---	5	0	1	3	3
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Wiau Lake 74-9-120	27-Aug-14	16054140827018	7.97	612	81.3	22.5	18.1	4.45	<0.50	<0.50	<0.020	<0.050	<0.054	1.04	341	416	296	337
Wiau Lake 74-9-120	27-Aug-14	16054140827020	7.97	613	82.1	22.1	18	4.45	<0.50	<0.50	<0.020	<0.050	<0.054	1.07	340	415	296	335
Detection Limit (DL)			0.1	0.2	0.5	0.1	1	0.1	0.5	0.5	0.02	0.05	0.054	0.05	2	5	1	10
Reliable Detection Limit (RDL)**			---	1	2.5	0.5	5	0.5	2.5	2.5	0.1	0.25	0.27	0.25	10	25	5	50
Absolute Difference*			0	1	0.8	0.4	0.1	0	---	---	---	---	---	0.03	1	1	0	2
Absolute Relative Percent Difference (RPD)*			---	0	1	2	1	0	---	---	---	---	---	3	0	0	0	1
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Conklin 76-07-24	17-Nov-14	16054141117018	8.35	404	56.1	15	12.7	3.44	<0.50	3.71	<0.020	<0.050	<0.054	0.425	206	246	202	222
Conklin 76-07-24	17-Nov-14	16054141117020	8.32	397	55.8	15.2	12.7	3.48	<0.50	3.70	<0.020	<0.050	<0.054	0.459	212	247	202	221
Detection Limit (DL)			0.1	0.2	0.5	0.1	1	0.1	0.5	0.5	0.02	0.05	0.054	0.05	2	5	1	10
Reliable Detection Limit (RDL)**			---	1	2.5	0.5	5	0.5	2.5	2.5	0.1	0.25	0.27	0.25	10	25	5	50
Absolute Difference*			0.03	7	0.3	0.2	0	0.04	---	0.01	---	---	---	0.034	6	1	0	1
Absolute Relative Percent Difference (RPD)*			---	2	1	1	0	1	---	0	---	---	---	8	3	0	0	0
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Mariana Lk 80-13-52	16-Nov-14	16054141116007	8.66	586	76.3	19.3	18.3	3.57	<0.50	29.6	<0.020	<0.050	<0.054	0.909	303	323	270	381
Mariana Lk 80-13-52	16-Nov-14	16054141116009	8.66	577	79.2	19.8	18	3.84	<0.50	29.6	<0.020	<0.050	<0.054	0.907	300	319	279	376
Detection Limit (DL)			0.1	0.2	0.5	0.1	1	0.1	0.5	0.5	0.02	0.05	0.054	0.05	2	5	1	10
Reliable Detection Limit (RDL)**			---	1	2.5	0.5	5	0.5	2.5	2.5	0.1	0.25	0.27	0.25	10	25	5	50
Absolute Difference*			0	9	2.9	0.5	0.3	0.27	---	0	---	---	---	0.002	3	4	9	5
Absolute Relative Percent Difference (RPD)*			---	2	4	3	2	7	---	0	---	---	---	0	1	1	3	1
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good

TABLE 10b.**WATER QUALITY CONTROL SAMPLE RESULTS - GENERAL AND INORGANIC PARAMETERS**

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Lab pH	Lab EC $\mu\text{S/cm}$	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO ₄ mg/L	NO ₂ -N mg/L	NO ₃ -N mg/L	NO ₂ /NO ₃ -N mg/L	NH ₃ -N mg/L	T-Alkalinity mg/L	HCO ₃ mg/L	Hardness mg/L	TDS mg/L
Wiau Lake 74-9-120	18-Nov-14	16054141118027	8.47	557	87.7	21.9	17.7	4.21	<0.50	<0.50	<0.020	<0.050	<0.054	1.02	301	340	309	342
Wiau Lake 74-9-120	18-Nov-14	16054141118029	8.47	554	90.9	21.8	18.1	4.16	<0.50	<0.50	<0.020	<0.050	<0.054	1.04	298	336	317	355
Detection Limit (DL)			0.1	0.2	0.5	0.1	1	0.1	0.5	0.5	0.02	0.05	0.054	0.05	2	5	1	10
Reliable Detection Limit (RDL)**			---	1	2.5	0.5	5	0.5	2.5	2.5	0.1	0.25	0.27	0.25	10	25	5	50
Absolute Difference*			0	3	3.2	0.1	0.4	0.05	---	---	---	---	---	0.02	3	4	8	13
Absolute Relative Percent Difference (RPD)*			---	1	4	0	2	1	---	---	---	---	---	2	1	1	3	4
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good

Notes:

--- - not applicable

* - non-detectable concentrations are assessed at 95% of the detection limit

** - the reliable (reporting) detection limit (RDL) or practical detection limit (PDL) is defined as 5 times the DL

Good - evaluation indicates acceptable reproducibility

Poor - evaluation indicates poor reproducibility**Evaluation of Duplicate Analyses:**

- reproducibility is unacceptable if RPD is > 30% for inorganic waters and > 40% for soils and organics

- if RPD is not applicable (---), reproducibility is evaluated based on Absolute Difference (unacceptable if > 2 x RDL)

- if Absolute Difference is not applicable (---), reproducibility is evaluated based on the parameter concentration (unacceptable if > 2 x RDL)

- pH is evaluated based on Absolute Difference (unacceptable if > 0.5)

TABLE 10d.

WATER QUALITY CONTROL SAMPLE RESULTS - DISSOLVED HYDROCARBONS

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C ₆ -C ₁₀ - BTEX mg/L	F2 C _{>10} -C ₁₆ mg/L	Naphthenic Acids mg/L
Conklin 76-07-24	23-Aug-14	16054140823003	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Conklin 76-07-24	23-Aug-14	16054140823005	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Detection Limit (DL)			0.0005	0.0005	0.0005	0.00071	0.1	0.25	1.0
Reliable Detection Limit (RDL)**			0.0025	0.0025	0.0025	0.00355	0.5	1.25	5
Absolute Difference*			---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*			---	---	---	---	---	---	---
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good
Mariana Lk 80-13-52	24-Aug-14	16054140824008	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Mariana Lk 80-13-52	24-Aug-14	16054140824010	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Detection Limit (DL)			0.0005	0.0005	0.0005	0.00071	0.1	0.25	1.0
Reliable Detection Limit (RDL)**			0.0025	0.0025	0.0025	0.00355	0.5	1.25	5
Absolute Difference*			---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*			---	---	---	---	---	---	---
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good
Wiau Lake 74-9-120	27-Aug-14	16054140827018	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Wiau Lake 74-9-120	27-Aug-14	16054140827020	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Detection Limit (DL)			0.0005	0.0005	0.0005	0.00071	0.1	0.25	1.0
Reliable Detection Limit (RDL)**			0.0025	0.0025	0.0025	0.00355	0.5	1.25	5
Absolute Difference*			---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*			---	---	---	---	---	---	---
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good
Conklin 76-07-24	17-Nov-14	16054141117018	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Conklin 76-07-24	17-Nov-14	16054141117020	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Detection Limit (DL)			0.0005	0.0005	0.0005	0.00071	0.1	0.25	1.0
Reliable Detection Limit (RDL)**			0.0025	0.0025	0.0025	0.00355	0.5	1.25	5
Absolute Difference*			---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*			---	---	---	---	---	---	---
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good
Mariana Lk 80-13-52	16-Nov-14	16054141116007	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Mariana Lk 80-13-52	16-Nov-14	16054141116009	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Detection Limit (DL)			0.0005	0.0005	0.0005	0.00071	0.1	0.25	1.0
Reliable Detection Limit (RDL)**			0.0025	0.0025	0.0025	0.00355	0.5	1.25	5
Absolute Difference*			---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*			---	---	---	---	---	---	---
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good

TABLE 10d.**WATER QUALITY CONTROL SAMPLE RESULTS - DISSOLVED HYDROCARBONS**

Alberta Environment and Sustainable Resources Development (ESRD)

Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C ₆ -C ₁₀ - BTEX mg/L	F2 C _{>10} -C ₁₆ mg/L	Naphthenic Acids mg/L
Wiau Lake 74-9-120	18-Nov-14	16054141118027	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Wiau Lake 74-9-120	18-Nov-14	16054141118029	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25	<1.0
Detection Limit (DL)			0.0005	0.0005	0.0005	0.00071	0.1	0.25	1.0
Reliable Detection Limit (RDL)**			0.0025	0.0025	0.0025	0.00355	0.5	1.25	5
Absolute Difference*			---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*			---	---	---	---	---	---	---
Duplicate Sample Results Evaluation			Good	Good	Good	Good	Good	Good	Good

Notes:

--- - not applicable

* - non-detectable concentrations are assessed at 95% of the detection limit

** - the reliable (reporting) detection limit (RDL) or practical detection limit (PDL) is defined as 5 times the DL

Good - evaluation indicates acceptable reproducibility

Poor - evaluation indicates poor reproducibility**Evaluation of Duplicate Analyses:**

- reproducibility is unacceptable if RPD is > 30% for inorganic waters and > 40% for soils and organics

- if RPD is not applicable (---), reproducibility is evaluated based on Absolute Difference (unacceptable if > 2 x RDL)

- if Absolute Difference is not applicable (---), reproducibility is evaluated based on the parameter concentration (unacceptable if > 2 x RDL)

TABLE 10f.

WATER QUALITY CONTROL SAMPLE RESULTS - GENERAL AND INORGANIC PARAMETERS - BLANKS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Lab pH	Lab EC μ S/cm	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO ₄ mg/L	NO ₂ -N mg/L	NO ₃ -N mg/L	NO ₂ /NO ₃ -N mg/L	NH ₃ -N mg/L	T-Alkalinity mg/L	HCO ₃ mg/L	TDS mg/L
Field Blank	28-Aug-14	16054140828025	5.92	0.7	<0.50	<0.10	<1.0	<0.10	<0.50	<0.50	<0.020	<0.050	<0.054	<0.050	<2.0	<5.0	<10
Detection Limit (DL)			0.1	0.2	0.5	0.1	1	0.1	0.5	0.5	0.02	0.05	0.054	0.05	2	5	10

TABLE 10g.

GROUNDWATER QUALITY CONTROL SAMPLE RESULTS - DISSOLVED METALS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Al mg/L	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd mg/L	Cr mg/L	Co mg/L	Cu mg/L	Fe mg/L	Pb mg/L	Mn mg/L	Hg mg/L	Mo mg/L	Ni mg/L	Se mg/L	Si mg/L	Ag mg/L	Sr mg/L	Tl mg/L	Sn mg/L	Ti mg/L	U mg/L	V mg/L	Zn mg/L
Field Blank	08-Nov-13	16054131108036	<0.001	<0.0004	<0.0004	<i>0.001</i>	<0.0005	<0.00005	<0.002	<0.0001	<0.0004	<0.0001	<0.0006	<0.01	<0.0001	<0.002	<0.0001	<0.0001	<0.0004	<0.050	<0.00001	<0.0001	<0.00005	<0.0002	<0.0003	<0.0001	<0.0001	<0.001	
Detection Limit (DL)			0.001	0.00004	0.0004	0.0001	0.0005	0.00005	0.002	0.0001	0.0004	0.00001	0.0006	0.01	0.0001	0.002	0.0001	0.001	0.0004	0.05	0.00001	0.0001	0.00005	0.0002	0.0003	0.0001	0.0001	0.001	

TABLE 10h.

GROUNDWATER QUALITY CONTROL SAMPLE RESULTS - DISSOLVED HYDROCARBONS & NAPHTHENIC ACIDS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Monitoring Well	Sample Date	MSI Sample Number	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C ₆ -C ₁₀ mg/L	F2 C _{>10} -C ₁₅ mg/L
Field Blank	28-Aug-14	16054140828025	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25
Field Blank	30-Aug-14	16054140830034	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	---
Field Blank	16-Nov-14	16054141116010	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25
Field Blank	19-Nov-14	16054141119034	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25
Trip Blank	16-Nov-14	16054141116011	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25
Trip Blank	19-Nov-14	16054141119035	<0.0005	<0.0005	<0.0005	<0.00071	<0.1	<0.25
Detection Limit (DL)			0.001	0.0005	0.0005	0.00071	0.1	0.25

TABLE 10i.

GROUNDWATER QUALITY CONTROL SAMPLE RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Alberta Environment and Sustainable Resources Development (ESRD)
Southern Athabasca Oil Sands (SAOS) Groundwater Monitoring Network

Sample Point	Sample Date	MSI Sample Number	Acenaphthene mg/L	Acenaphthylene mg/L	Anthracene mg/L	Benz[a]anthracene mg/L	Benzo[b+ij]fluoranthene mg/L	Benzo[k]fluoranthene mg/L	Benzo[g,h,i]perylene mg/L	Benzo[a]pyrene mg/L	Chrysene mg/L	Dibenzo[a,h]anthracene mg/L	Fluoranthene mg/L	Fluorene mg/L	Indeno[1,2,3-c,d]pyrene mg/L	Naphthalene mg/L	Phenanthrene mg/L	Pyrene mg/L
Field Blank	28-Aug-14	16054140828025	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.00002	<0.000005	<0.00002	<0.00002	<0.00001	<0.00005	<0.00005	<0.00001
Detection Limit (DL)			0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00002	0.000005	0.00002	0.000005	0.00002	0.00002	0.00001	0.00005	0.00005	0.00001

Notes:

--- - not analyzed

Italics - value exceeds 2 x detection limit and indicates the results for this parameter may be suspect: further investigation warranted

TABLE 11.**SAOS NETWORK GROUNDWATER QUALITY SUMMARY**

Alberta Environment and Sustainable Resource Development

South Athabasca Oil Sands Area Regional Groundwater Monitoring Network

SAOS Interval	Aquifer	Total Number of SAOS Completions	Completions with Historical Hydrochemical data	Range of Concentrations of Indicator Parameters							
				TDS (mg/L)	Cl (mg/L)	NO ₃ -N (mg/L)	As (mg/L)	Si as SiO ₂ (mg/L)	B (mg/L)	BTEX (% DF)	Phenols (mg/L)
Surficial Deposits	Shallow	7	6	35.2 - 869	0.79 - 126	<0.05 - 0.951	<0.0004 - 0.0196	10.64 - 43.9	<0.05 - 0.133	10.7%	<0.001 - 0.0611
	Sand River	5	5	218 - 498	<0.5 - 3	<0.05 - 0.22	<0.0002 - 0.014	14.6 - 25.92	0.036 - 0.26	0.0%	<0.001 - 0.0011
	Ethel Lake	5	5	315 - 700	<0.5 - 110	<0.05 - 0.052	<0.0002 - 0.0374	17.1 - 30.3	0.053 - 0.9	7.1%	<0.001 - 0.0071
	Bonnyville	11	11	294 - 1,170	0.54 - 43.7	<0.05 - 0.16	<0.0002 - 0.0766	11.9 - 27.41	<0.05 - 0.732	4.8%	<0.001 - 0.0036
	Muriel Lake	1	1	338 - 366	9.17 - 24.6	<0.05	0.00374 - 0.00486	22.9 - 27.9	0.17 - 0.2	20.0%	<0.001 - 0.0033
Empress Terrace	3	2	512 - 602	0.65 - 7.65	<0.05	0.00176 - 0.0298	18.9 - 30.2	0.418 - 0.598	25.0%	<0.001 - 0.005	
Buried Channels	Empress Channel	4	3	446 - 1,680	0.68 - 555	<0.05 - 0.318	0.00382 - 0.0857	7.22 - 29.8	0.274 - 0.873	18.8%	<0.001
Grand Rapids Formation	Lower Grand Rapids	5	1	3,700	2,060	<0.1	<0.0004	--	2.62	100%	--
Clearwater Formation	Upper Clearwater	4	3	595 - 6,110	28.9 - 3,450	0.2	<0.0004 - 0.003	--	1.14-4.16	0%	--
	Middle Clearwater	1	0	--	--	--	--	--	--	--	--
McMurray Formation	Basal McMurray	5	3	12,700 - 18,300	7,000 - 11,300	<0.1 - 0.3	<0.0004 - 0.047	--	1.76 - 2.36	0%	--

Notes:**bold** - upper range exceeds interim regional groundwater quality trigger (GoA 2012)

-- - no available data

% DF - percentage detection frequency

APPENDIX A

Groundwater Sampling and Quality Assurance/
Quality Control Protocols

APPENDIX A

GROUNDWATER SAMPLING AND QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS

The following sections describe the groundwater monitoring and sampling, and the data quality assurance/quality control (QA/QC) protocol used during the 2014 South Athabasca Oil Sands Area regional groundwater monitoring program.

1 GROUNDWATER MONITORING AND SAMPLING

1.1 Low-flow Sampling

Low-flow sampling is an acceptable method for both shallow wells and regional wells (production wells not already equipped with submersible pumps). This sampling method requires the use of a pump capable of operating at low speeds (less than or equal to the natural flow rates through the screen). The pumping rate during purging must be equal to or less than the natural recovery rate of the well. This sampling method was used to collect groundwater samples from the majority of monitoring wells as part of the 2014 SAOS groundwater monitoring program (all except shallow completions).

Low-flow sampling involves removing water directly from the screened interval without physically or hydraulically disturbing the stagnant water column above the screen (Nielsen and Nielsen 2007). It can be achieved by either installing a dedicated pump in a well or by lowering a portable pump so that its intake is within the screened interval (typically near the middle of the screen). In low-flow sampling, the well is pumped at a low flow rate to maintain a stable water level in the well. Typical flow rates are in the order of 0.1 to 0.5 mL per minute but may be as fast as 1 L per minute in high-yield (coarse) formations.

To avoid excessive drawdown in the well, water levels have to be monitored continuously until stabilization has been achieved. Keeping drawdown at a minimum will isolate the stagnant water column from the sampling point. Puls and Barcelona (1996) proposed that drawdown in a well should not exceed 0.1 m. However, the most important factor is to obtain stable water levels to eliminate the potential for stagnant water to enter the pump intake. Drawdown should not exceed the distance between the top of the well screen and the pump intake (Nielsen and Nielsen 2007).

With this method, the well is purged until indicator parameters, measured in an attached flow-through cell, have stabilized according to the criteria listed in Table 1. Parameters typically monitored include pH, temperature, electrical conductivity, oxidation-reduction potential (ORP) and dissolved oxygen (DO). The amount of water purged will vary based on the well diameter but typically ranges between less than one half of a well volume to one well volume (Barcelona et al. 1994).

Table 1 Stabilization Criteria for Groundwater Quality Indicator Parameters

Parameter	Stabilization Criteria
pH	+/- 0.1 Standard Unit
Specific Electrical Conductance (SC)	± 5% for SC ≤ 100 µS/cm ± 3% for SC > 100 µS/cm
Temperature	+/- 0.2°C for thermistor thermometers +/- 0.5°C for liquid in glass thermometers
DO	+/- 0.3 mg/L
ORP	+/- 10 mV

Source: Wilde et al. 1998

1.1.1 Method Advantages

The advantages of low-flow purging and sampling include:

- Minimizes turbulent flow through the well screen which eliminates the entrainment of artifactual turbidity in the samples collected. This negates the need for field filtration.
- Produces small volumes of purge water.
- Improves sample accuracy and precision (reproducibility).
- Reduces sampling time.
- No limits on sampling volumes other than the formation.
- Can be used in wells where the water table is above or within the screen and in bedrock wells.
- Low-flow sampling produces a weighted average concentration over the screened length (Martin-Hayden and Robbins 1997; Puls and Paul 1997). The effects of heterogeneity at the screened interval may change the contribution of various zones but do not change the effect of concentration averaging. Site-specific sampling objectives must be reviewed to determine if this sampling method is suitable.

1.1.2 Method Disadvantages

The disadvantages of low-flow purging and sampling include:

- Pumps need to be decontaminated between wells (if using portable pump).
- Produces large volumes of disposable tubing (if using portable pump).
- Requires source of power (generator or battery).
- May have mechanical problems in the field (less user friendly than other methods).
- Requires more training on use of different types of pumps.

- Initial cost can be expensive but should be considered for long-term monitoring programs.
- Certain pumps have limitations (lift capability, physical dimensions, analytical limitations, heating samples, etc.).

1.2 Fixed Volume Purging

Fixed-volume purging and sampling involves the evacuation (purging) of a predetermined volume of water from a well prior to collecting a groundwater sample. For the 2014 SAOS groundwater monitoring program, fixed volume purging was done prior to sampling shallow well completions; three well volumes were removed prior to sample collection. The purging was done using inertial lift pumps (Waterra™). This method typically requires the use of devices that mix, agitate and aerate the water in the well during purging that can result in possible chemical and physical sample alterations (Matrix 2012).

Fixed-volume purging and sampling is suitable for both shallow and regional wells provided the right purging device is used. However, this method may not be suitable for:

- Wells screened in low-yield formations because of the risks associated with dewatering a well.
- Deeper wells (regional or shallow wells) because of the prohibitive volume of purge water generated.

2 CHEMICAL ANALYSIS

All field equipment involved in monitoring and sampling was decontaminated following each event. Groundwater samples were collected using appropriate handling protocols and were placed in sample containers provided by the laboratory. Sample filtration and preservation were conducted in the field as required. All samples were labelled with a distinctive sample identifier. Chain-of-custody forms were completed and the samples were stored in chilled coolers following collection and during shipment to the analytical laboratory. Care was taken to ensure that sample holding times were not exceeded.

Groundwater samples were submitted to ALS Environmental laboratory in Fort McMurray, Alberta. ALS is accredited with the Canadian Association for Laboratory Accreditation. All samples were kept cool by refrigeration or the use of ice packs. The requested analytical parameters were outlined in the main text of this report and the analytical reports are included in the appendices.

2.1 Data Management

For this program, two standard field forms were completed. One form, the groundwater sampling form, captures all water level, purging, sampling and field parameter information; the second form, a triplicate chain-of-custody form, assigns sample control numbers, analyte requirements, shipping and reporting details for each sample submitted to the laboratory.

3 QUALITY ASSURANCE/QUALITY CONTROL PROTOCOL

Matrix standard QA/QC protocol provided a formal system for evaluating the technical adequacy of sample collection and handling, equipment decontamination procedures, and analysis. The QA/QC protocol describes procedures, auditing techniques and documentation for controlled data collection. The ultimate purpose of this protocol is to obtain representative data and to reduce uncertainty. The QA/QC program is designed to confirm that potential sources of bias (such as inconsistent sampling procedures, potential cross-contamination from sampling equipment, shipping conditions and laboratory practices) were not contributing an unacceptable variation in data quality. The QA/QC protocol for the groundwater sampling program consisted of two programs: the field and data management QA/QC programs.

3.1 Field Quality Assurance/Quality Control Program

Duplicate samples were collected at each site and used to assess precision of field sampling procedures. A duplicate sample is one where the QA/QC sample is collected successively to the original sample (i.e., two groundwater samples taken immediately after one another under comparable conditions). Both samples are submitted for laboratory analysis. Relative percent difference (RPD) is then calculated to compare the values from this pair of samples. Theoretically, these samples should have similar chemical concentrations. Due to factors such as sample matrix heterogeneity, natural variability, or variations in sample collection, handling or analysis, a minor variation in chemical concentration may occur. The maximum acceptable RPD selected to meet the data quality objectives of this project is set at 20% for inorganic parameters and 30% for organic parameters. The quantity target for QA/QC duplicate samples for water is set at 10% of total water samples submitted for analysis. The RPD was calculated as follows:

$$RPD = \frac{\text{Absolute difference between the two duplicate results}}{\text{Mean of the two duplicate results}} \times 100$$

Where: RPD = relative percent difference

Theoretically, the samples should have identical chemical concentrations (i.e., RPD = 0). The reproducibility of duplicate analyses at concentrations near the reported detection limit can be difficult, and can often result in RPD values of greater than 20% and 30%. Therefore, RPD values of greater than the project objective are acceptable if the differences in concentrations of the duplicate analyses are less than approximately ten times the method detection limit. The QA/QC duplicate samples are used to assess the reliability of field sampling procedures, with analysis of these samples used to evaluate the reproducibility or precision of the sampling methodology. Reproducibility was evaluated based on the RPD calculated for each parameter. Rinsate samples are used to assess the adequacy of the decontamination process and detect any contamination associated with sampling equipment. The rinsate samples were collected by using laboratory-supplied de-ionized water to rinse off the water level tape to confirm de-contamination of the probe.

Field blanks are used to assess contamination from field conditions during sampling. Field blank samples were collected using laboratory-supplied de-ionized water that was transferred to a sample container at a sampling location, which exposes it to the sampling environment. Trip blanks are used to assess contamination introduced during the transport of sample bottles to the site and back to the Laboratory.

The laboratory supplied the trip blank samples, which were kept with the sample bottles and samples and were returned, unopened, to the laboratory.

3.2 Data Management Quality Assurance/Quality Control Program

Project chemistry data was managed using EQuIS software, a database application developed specifically for management of environmental data. Electronic data (e.g., laboratory results) were uploaded to the database directly, and other data (e.g., data from field notes) were manually entered. The following data quality controls were established for the project database:

- A check was completed on the manually entered data to confirm that it has been transcribed correctly from the field forms into the database.
- Electronic data was checked by the data manager to confirm that data for the requested analyses have been provided by ALS.
- Database functions were used to check the data had been supplied in the correct units and were within the expected ranges.
- The project coordinator confirmed the data meets the program technical objectives.
- Database maintenance was performed on an ongoing basis and included an initial QA/QC check of data prior to entry into the database.

4 REFERENCES

- Barcelona M.J., H.A. Wehrmann and M.D. Varljen. 1994. "Reproducible well-purging procedures and VOC stabilization criteria for ground-water sampling." *Groundwater* 32(1): 12-22.
- Martin-Hayden J.M. and G.A. Robbins. 1997. "Plume distortion and apparent attenuation due to concentration averaging in monitoring wells." *Groundwater* 35(2): 339-346.
- Matrix Solutions Inc. (Matrix). 2012. *Guidelines for Groundwater Monitoring Best Practices, Regional Municipality of Wood Buffalo*. Report prepared for Cumulative Environment Management Association. Calgary, Alberta. January 2012.
- Nielsen D.M. and G.L. Nielsen. 2007. *The Essential Handbook of Groundwater Sampling*. Published by CRC Press Taylor and Francis Group. Boca Raton, Florida. 2007.
- Puls R.W. and M.J. Barcelona. 1996. "Low-flow (minimal drawdown) ground-water sampling procedures." *EPA Ground Water Issue*. United States Environmental Protection Agency, Office of Research and Development, Office of Solid Waste and Emergency Response. EPA/540/S-95/504. Washington, D.C. April 1996.
<http://www.epa.gov/superfund/remedytech/tsp/download/lwflw2a.pdf>
- Puls R.W. and C.J. Paul. 1997. "Multi-layer sampling in conventional monitoring wells for improved estimation of vertical contaminant distributions and mass." *Journal of Contaminant Hydrology* 25(1-2): 85-111.
- Wilde F.D., Radtke D.B. Gibs J. and R.T. Iwatsubo (editors). 1998. Chapter A4. Collection of water samples, United States Geological Survey, Techniques of Water-Resources Investigations, Book 9 Handbooks for Water-Resources Investigations, National Field Manual for the Collection of Water-Quality Data.

APPENDIX B

Matrix Client Data Portal - Getting Started

Matrix Client Data Portal - Getting Started

Contents

What is the Client Data Portal?	1
The Client Data Portal is New	2
Getting Started	2
Login	2
Main Page	2
Home Tab	2
Map View	3
Data View	4
Graph View Tabs.....	6
Documents View Tabs	8

What is the Client Data Portal?

The client data portal (CDP) is primarily a tool that enables rapid read-only accessibility to your physical hydrogeological data that is already stored in a database system at Matrix.

CDP functionality is delivered via a secure web application that should not interfere with corporate IT requirements. Specifically, because the CDP works through a web browser, it does not require any software to be installed and it is not blocked by corporate firewalls.

Authorized individuals can view and download their physical hydrogeological time series data which is already stored in Matrix’s Physical Hydrogeological Database (PHD), including heads, water flow rates, and temperatures.

Well locations are shown on an interactive map and are color coded depending on well type.

Wells contain screened or perforated intervals of hydraulic communication between the well and the formation, or the well may contain one or more temperature measurement points. These downhole intervals or measurement points are called “well segments” in the CDP. Details regarding well segments can be grouped, sorted and selected for data plotting in an interactive data grid view. Well segment data can be copied and pasted to other apps such as Excel.

Data plots can show data from multiple well segments and can be interactively re-scaled with the mouse for zooming in on data over small time scales. Plotted data can be exported to Excel.

The CDP is intended to provide time-efficient access to groundwater data and to support a data QA/QC process. Ultimately, it should be expected that the CDP will lower the costs of data management for several aspects of

groundwater resource stewardship such as data review, modeling, reporting, operations decision making, and permit applications.

The Client Data Portal is New

Matrix has recognized a requirement by clients for better access to their groundwater data and in response has invested in development of the CDP. This tool is new, and therefore will undoubtedly have some “rough edges”. That’s where you, as an engaged user, can help out. We want your thoughts. What works well, what needs improvement, what functionality is it missing, does it do the job at hand? We’d like to know.

We won’t promise to implement every change or suggestion we receive, but if you and others find this tool useful and worthy of its objectives, then evolutionary improvements based on your feedback will likely proceed.

Getting Started

The CDP is intended to be a fairly simple application to use, much like an iPhone or iPad application, and is probably best learned by experimenting with it. The sections below provide details on what functionality is available.

Login

- Open a web browser (e.g. Internet Explorer) and enter ‘**cdp.matrix-solutions.com**’.
- A login page should appear.
- Enter your CDP user ID and password.
- Current Limitation: Current Limitation: A second login box may appear (sorry, it’s a Microsoft technical issue yet to be resolved). Remember to always **suffix** your CDP user ID with ‘**@matrix-solutions.com**’ (e.g. ‘yourUserName@matrix-solutions.com’) and use the same CDP password as before.
- **NOTE: If you enter an incorrect password more than 3 times, you will be locked out** and will not be able to login. In that case, contact Matrix to reinstate the password. This is a security measure.
- Once you’re logged in, you should see the CDP Home Tab page in the web browser.

Main Page

- The Home tab is displayed at the top left of the Main Page and is described in the next section.
- Help, in the form of this document, is available using the Help link at the top right of the Main Page.
- Use the Send Feedback link to email question, comments, bug reports or feature requests.
- The Logout button will end your session and present the login page.

Home Tab

- Top half is the Map View, bottom half is the Data View.
- The Map View and Data View sizes can be changed by dragging the view separator bar.
- Logout button is at top right.

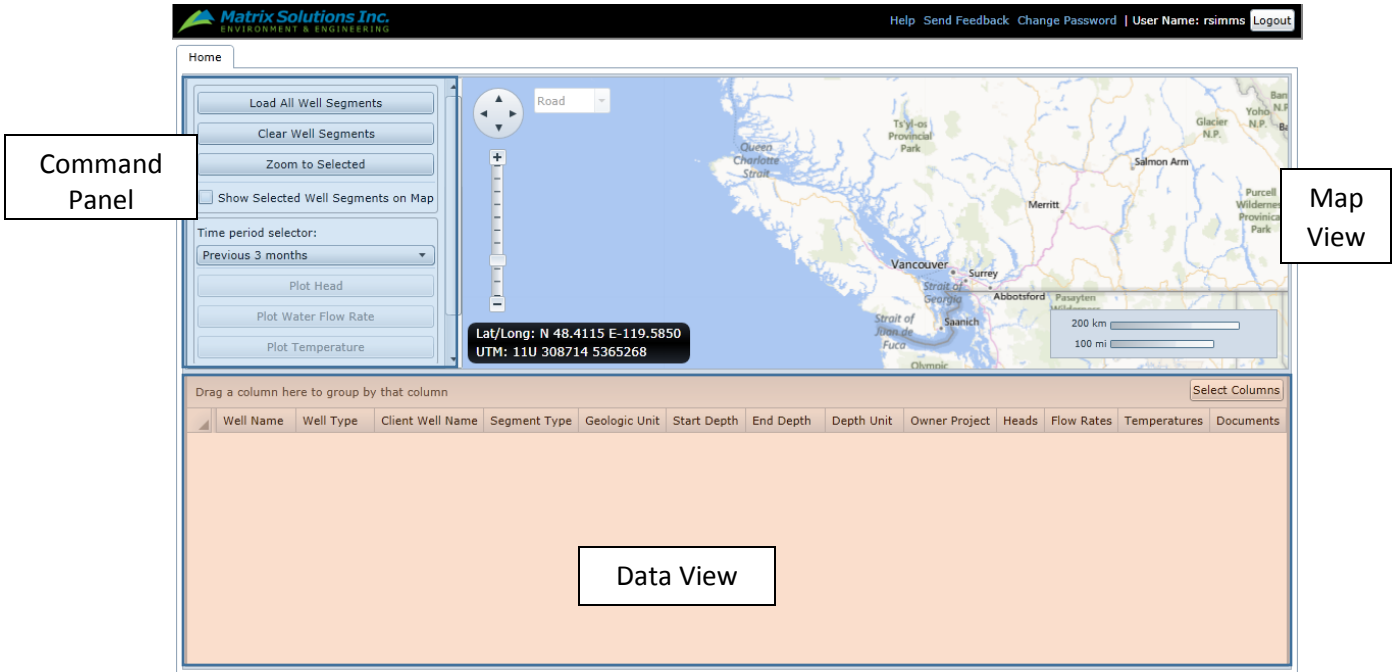


Figure 1: Home Tab layout

Map View

- The Map View is used to view the spatial locations of wells and to select wells for review.
- Well locations are shown on map and are color coded based on well type.
- Well labels are shown if they don't overlap another well point.
- Additional well information shows as a tool tip when the mouse is pointed at a well point.
- Map Zooming
 - Use the mouse scroll wheel or the zoom control at top left of map.
 - Current scale is indicated on lower right of map.
- Map Panning
 - Click and drag mouse, or use pan control at top left of map.
- Base Map Selection
 - Selectable using drop down at top left of map view.

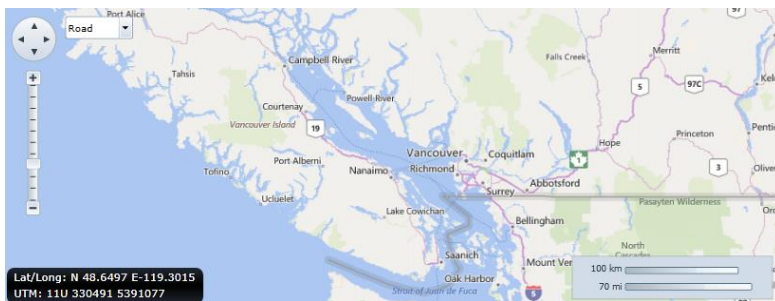


Figure 2: Map View

- Well Selection
 - Clicking on a well point will display the well’s segments in the Data View.
 - The Load All Well Segments button will load well segments from all wells into the Data View.
 - If a well has no segments, or if the well segment data is already shown in the Data View, a message box will appear to indicate either of these situations.
 - Selected wells (i.e. wells with well segments shown in the Data View) are highlighted in the Map View.
 - Well segments from multiple wells can be selected at once by clicking and dragging with the right mouse button to create a rectangular selection area.
 - In the command panel:
 - “Zoom to Selected” will focus the map so that the selected well segments are visible
- Current Limitations
 - It is not possible to see how many well segments a well has before clicking it with the mouse.

Data View

- The primary purpose of the Data View is to select individual well segments.
- Each row in the Data View corresponds to one well segment.
- Well segments from wells selected in the Map View will be shown in the Data View.
- Well segments selected in the Data View will be highlighted in the Map View.
- Columns in the data view can be shown and hidden by clicking on the “Select Columns” button and checking or unchecking the columns.
- In the command panel:
 - The Clear Well Segments button removes all well segments from the Data View.
 - The Load All Well Segment button loads all available well segments into the Data View.

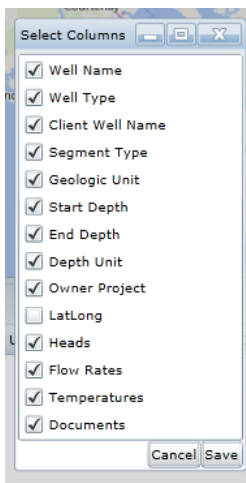


Figure 3: Column selection panel

Working with Well Segment Data

- Well segment data can be interactively grouped, sorted, filtered, selected and copied easily in the Data View. This facilitates finding well segments of particular interest.
- Grouping Data
 - Drag and drop a column label in the grey area directly above the column labels.
 - Subgrouping is possible by dragging and dropping multiple column labels individually.

- Reordering Data Columns
 - Drag a column label horizontally to a new position and drop it in place.
 - Reordering data columns is very useful to when data has been grouped or sorted.
- Sorting Data
 - Click a column label once to sort in ascending order. Further clicks will toggle to sort by descending or ascending order.
 - Multiple sorting levels are also possible by first sorting one column as just described, and then Ctrl-clicking additional columns. For example, sort by Well Type, and then sort by Geologic Unit.
- Filtering Data
 - Hold the mouse pointer near the right side of a column label to display a drop down arrow. Clicking the drop down arrow will display a filter settings box.
 - Filter settings for the column can then be set.
 - Filters can be set using multiple criteria by selecting the AND or OR radio buttons.
- Selecting Well Segments
 - Select a single well segment by clicking on the row for a well segment.
 - Select multiple well segments by first selecting a single well segment, then press the Ctrl or Shift key and click on another well segment. Ctrl-click selection will only select the well segments clicked, whereas Shift-click selection will select all well segments between the first and last well segments selected.
 - Select all well segments by first clicking on a well segment row or a group row, then press Ctrl-A.
- Copying Well Segment Data
 - First select one or more well segments then press Ctrl-C to copy data from the selected well segment rows to the clipboard.
 - The data from the clipboard can then be pasted to another application such as Excel by pressing Ctrl-P.

Plotting Well Segment Time-Series Data

- Different types of measurements, such as head, water flow rate, and temperature, may be associated with each well segment.
- The corresponding columns in the Data View show the total number of measurements available for that parameter.
- Plotting Time-Series Data
 - Select one or more well segments in the Data View.
 - In the command panel:
 - Select a timeperiod over which to search for data. The default time period will plot data collected within the last three months.
 - Press one of the available plot buttons. If the selected well segment does not have data available for a certain parameter, the corresponding plot button will be disabled.
 - Data for the selected well segment, time period, and specified measurement type is retrieved from the database for plotting.
 - A new tab is created for each plot, or Graph View, is created beside the Home Tab at the top right of the display.
 - To close a Graph View tab, click the 'X' located to the right of each tab.

Graph View Tabs



Figure 4: Graph view layout

- The purpose of the Graph View is to graphically browse and export time-series data.
- Data Zoom
 - By default, the Axis XY radio button at the bottom right of the Graph View should be selected. If not, select it.
 - Mouse-click and drag a rectangle over the plot area of interest.
 - The plot will be re-drawn to show only the area selected.
 - Click the Zoom Out button to redraw the plot at the original scale.
 - The Axis X and Axis Y radio buttons can be used to select zoom ranges along the x- and y-axes, respectively.
- Symbol Toggle
 - There may be tens of thousands of data points in each time-series.
 - Symbols can slow display time and therefore can be toggled using the Show Symbols checkbox at the bottom of the Graph View.
 - The number of symbols shown depends on the amount of zoom and the amount of data points shown on the plot. At some point when zooming in, there will be a 1:1 symbols to data point ratio.
- Export Data
 - Click the Export button, and select a folder location and file name to save an Excel file.
 - If a large data set is exported, the user interface may become unresponsive during the latter portion of the data export process.
- Time period selector
 - Same as the time period selector in the command panel. Applies only to the shown graph.

- Show Legend
 - Enable/disable the legend
- Plot as relative difference
 - Toggles between plotting the values of a parameter over time to plotting the change in the parameter values over time
 - The selected date from is treated as the 'zero change' point and values are plotted relative to this zero change
- Current Limitations
 - The interface will be slow when plotting long time series collected at a high frequency. To improve performance, we recommend using a small time period whenever possible.
 - The chart doesn't render every data point. You will need to zoom in to see all the data.

Documents View Tabs

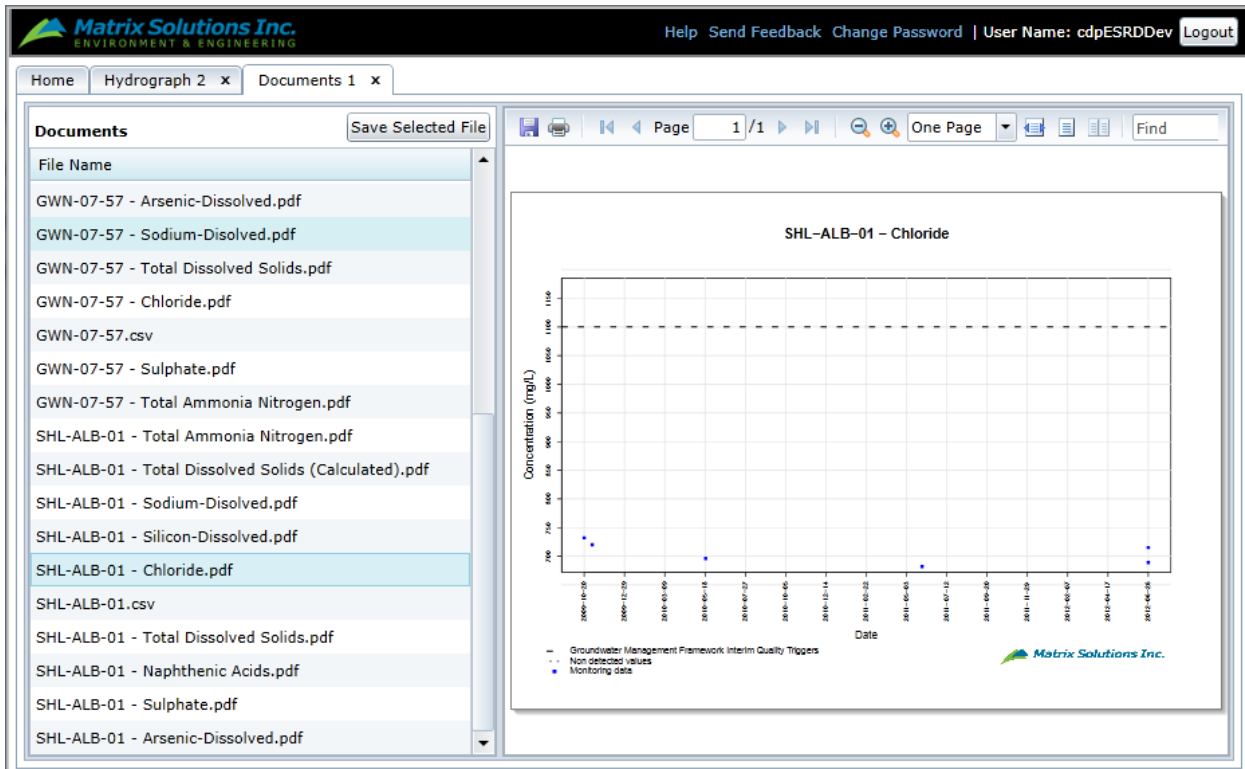


Figure 5: Documents view layout

- The Documents View is where you can access files related to the selected well segments.
- Documents can be downloaded by pressing the “Save Selected File” button.
- Documents can be filtered and sorted in the same way that well segments are filtered and sorted.
- The CDP has support for a few file formats through its online interface:
 - PDF – Portable Document Format files
 - CSV – Comma Separated Value files
 - Cells can be copy and pasted directly in to Excel
 - Other – files in other formats cannot be viewed online but they may be downloaded with the “Save Select File” button

APPENDIX C
Laboratory Reports



Matrix Solutions Inc.
ATTN: Sue Raynard
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Date Received: 25-AUG-14
Report Date: 07-JAN-15 15:14 (MT)
Version: FINAL REV. 3

Client Phone: 403-513-2275

Certificate of Analysis

Lab Work Order #: L1507500
Project P.O. #: NOT SUBMITTED
Job Reference: 16054-504 SAOS
C of C Numbers: M050656
Legal Site Desc:

Comments: ADDITIONAL 05-JAN-15 09:21
ADDITIONAL 16-DEC-14 10:07

Nicole Thibault
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-1 16054140823001									
Sampled By: bp/ea on 23-AUG-14 @ 12:00									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	99.4	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	86.4	-		N/A	%	-		27-AUG-14	R2928251
Surr: 3,4-Dichlorotoluene (SS)	90.6	-		N/A	%	-		27-AUG-14	R2928251
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
Surr: 2-Bromobenzotrifluoride	98.9	-		N/A	%	-	27-AUG-14	27-AUG-14	R2931993
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0036	+/-0.0020		0.0030	mg/L	0		28-AUG-14	R2930655
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2930655
Arsenic (As)-Total	0.00012	+/-0.00004		0.00010	mg/L	0		28-AUG-14	R2930655
Barium (Ba)-Total	0.110	+/-0.012		0.000050	mg/L	0		28-AUG-14	R2930655
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		28-AUG-14	R2930655
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2930655
Boron (B)-Total	0.258	+/-0.041		0.010	mg/L	0		28-AUG-14	R2930655
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2930655
Calcium (Ca)-Total	81.3	+/-9.6		0.10	mg/L	0		28-AUG-14	R2930655
Chromium (Cr)-Total	0.00013	+/-0.00005		0.00010	mg/L	0		28-AUG-14	R2930655
Cobalt (Co)-Total	0.00011	+/-0.00001		0.00010	mg/L	0		28-AUG-14	R2930655
Copper (Cu)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2930655
Iron (Fe)-Total	1.58	+/-0.25		0.030	mg/L	0		28-AUG-14	R2930655
Lead (Pb)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2930655
Lithium (Li)-Total	0.0502	+/-0.0093		0.0050	mg/L	0		28-AUG-14	R2930655
Magnesium (Mg)-Total	25.6	+/-3.1		0.10	mg/L	0		28-AUG-14	R2930655
Manganese (Mn)-Total	0.0432	+/-0.0044		0.0050	mg/L	0		28-AUG-14	R2930655
Molybdenum (Mo)-Total	0.000574	+/-0.000071		0.000050	mg/L	0		28-AUG-14	R2930655
Nickel (Ni)-Total	0.00017	+/-0.00006		0.00010	mg/L	0		28-AUG-14	R2930655
Potassium (K)-Total	5.71	+/-0.70		0.50	mg/L	0		28-AUG-14	R2930655
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2930655
Silicon (Si)-Total	10.2	+/-2.0		0.050	mg/L	0		28-AUG-14	R2930655
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2930655
Sodium (Na)-Total	64.1	+/-7.9		1.0	mg/L	0		28-AUG-14	R2930655
Strontium (Sr)-Total	0.671	+/-0.096		0.00010	mg/L	0		28-AUG-14	R2930655
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2930655
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2930655
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		28-AUG-14	R2930655
Uranium (U)-Total	0.000032	+/-0.000004		0.000010	mg/L	0		28-AUG-14	R2930655

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-1 16054140823001									
Sampled By: bp/ea on 23-AUG-14 @ 12:00									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		28-AUG-14	R2930655
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		28-AUG-14	R2930655
Miscellaneous Parameters									
Ammonia, Total (as N)	2.69	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	7.4	+/-1.0		1.0	mg/L	0		30-AUG-14	R2934298
Naphthenic Acids	<1.0	-		1.0	mg/L	-	02-SEP-14	04-SEP-14	R2938469
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Total Dissolved Solids	463	+/-31		10	mg/L	0		30-AUG-14	R2934091
Silicon (as SiO2)-Total	21.8	-		0.11	mg/L	-		29-AUG-14	
Turbidity	1.96	+/-0.16		0.10	NTU	0		26-AUG-14	R2929451
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Anthracene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Fluoranthene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Fluorene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Naphthalene	<0.000050	-		0.000050	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Phenanthrene	<0.000050	-		0.000050	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Pyrene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	26-AUG-14	26-AUG-14	R2930735
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	26-AUG-14	26-AUG-14	R2930735
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Surr: d10-Acenaphthene	94.0	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Surr: d10-Phenanthrene	97.5	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Surr: d12-Chrysene	94.9	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0015	+/-0.0004		0.0010	mg/L	0		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.0753	+/-0.0065		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	0.00013	+/-0.00001		0.00010	mg/L	0		03-SEP-14	R2936909
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		03-SEP-14	R2936909
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.0420	+/-0.0052		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.0392	+/-0.0027		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00055	+/-0.00006		0.00010	mg/L	0		03-SEP-14	R2936909

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-1 16054140823001									
Sampled By: bp/ea on 23-AUG-14 @ 12:00									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	0.00032	+/-0.00005		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Silicon (Si)-Dissolved	9.75	+/-0.83		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.644	+/-0.048		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	0.000030	+/-0.000003		0.000010	mg/L	0		03-SEP-14	R2936909
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0039	+/-0.0005		0.0010	mg/L	0		03-SEP-14	R2936909
Ion Balance Calculation									
Ion Balance	100	-			%	-		04-SEP-14	
TDS (Calculated)	445	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	305	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030
Sulfate by IC									
Sulfate (SO4)	9.15	+/-0.54		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	8.10	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	800	+/-40		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	539	+/-21		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	442	+/-28		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	20.9	-		0.11	mg/L	-		04-SEP-14	
L1507500-2 16054140823002									
Sampled By: bp/ea on 23-AUG-14 @ 14:12									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	97.4	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	84.2	-		N/A	%	-		27-AUG-14	R2928251

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-2 16054140823002									
Sampled By: bp/ea on 23-AUG-14 @ 14:12									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Anthracene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Fluoranthene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Fluorene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Naphthalene	<0.000050	-		0.000050	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Phenanthrene	<0.000050	-		0.000050	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Pyrene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	26-AUG-14	26-AUG-14	R2930735
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	26-AUG-14	26-AUG-14	R2930735
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Surr: d10-Acenaphthene	84.1	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Surr: d10-Phenanthrene	94.0	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Surr: d12-Chrysene	96.7	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.0636	+/-0.0055		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		03-SEP-14	R2936909
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.0389	+/-0.0048		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.0555	+/-0.0038		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00120	+/-0.00013		0.00010	mg/L	0		03-SEP-14	R2936909
Nickel (Ni)-Dissolved	0.00013	+/-0.00004		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Silicon (Si)-Dissolved	10.0	+/-0.85		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.626	+/-0.047		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	<0.0010	-		0.0010	mg/L	-		03-SEP-14	R2936909

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-2 16054140823002									
Sampled By: bp/ea on 23-AUG-14 @ 14:12									
Matrix: H2O									
Ion Balance Calculation									
Ion Balance	98.9	-			%	-		04-SEP-14	
TDS (Calculated)	441	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	305	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030
Sulfate by IC									
Sulfate (SO4)	10.0	+/-0.59		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	8.07	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	796	+/-40		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	535	+/-21		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	438	+/-28		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.5	-		0.11	mg/L	-		04-SEP-14	
L1507500-3 16054140823003									
Sampled By: bp/ea on 23-AUG-14 @ 15:41									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	98.8	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	85.8	-		N/A	%	-		27-AUG-14	R2928251
Surr: 3,4-Dichlorotoluene (SS)	86.9	-		N/A	%	-		27-AUG-14	R2928251
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
Surr: 2-Bromobenzotrifluoride	105.0	-		N/A	%	-	27-AUG-14	27-AUG-14	R2931993
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	<0.0030	-		0.0030	mg/L	-		28-AUG-14	R2932131

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-3 16054140823003									
Sampled By: bp/ea on 23-AUG-14 @ 15:41									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Arsenic (As)-Total	0.00516	+/-0.00060		0.00010	mg/L	0		28-AUG-14	R2932131
Barium (Ba)-Total	0.132	+/-0.015		0.000050	mg/L	0		28-AUG-14	R2932131
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		28-AUG-14	R2932131
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2932131
Boron (B)-Total	0.074	+/-0.012		0.010	mg/L	0		28-AUG-14	R2932131
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2932131
Calcium (Ca)-Total	50.7	+/-6.0		0.10	mg/L	0		28-AUG-14	R2932131
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Cobalt (Co)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Copper (Cu)-Total	0.00645	+/-0.00078		0.00010	mg/L	0		28-AUG-14	R2932131
Iron (Fe)-Total	1.45	+/-0.23		0.030	mg/L	0		28-AUG-14	R2932131
Lead (Pb)-Total	0.000592	+/-0.000097		0.000050	mg/L	0		28-AUG-14	R2932131
Lithium (Li)-Total	0.0231	+/-0.0043		0.0050	mg/L	0		28-AUG-14	R2932131
Magnesium (Mg)-Total	14.9	+/-1.8		0.10	mg/L	0		28-AUG-14	R2932131
Manganese (Mn)-Total	0.176	+/-0.018		0.0050	mg/L	0		28-AUG-14	R2932131
Molybdenum (Mo)-Total	0.00360	+/-0.00044		0.000050	mg/L	0		28-AUG-14	R2932131
Nickel (Ni)-Total	0.00023	+/-0.00006		0.00010	mg/L	0		28-AUG-14	R2932131
Potassium (K)-Total	3.54	+/-0.43		0.50	mg/L	0		28-AUG-14	R2932131
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Silicon (Si)-Total	10.4	+/-2.1		0.050	mg/L	0		28-AUG-14	R2932131
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2932131
Sodium (Na)-Total	12.7	+/-1.6		1.0	mg/L	0		28-AUG-14	R2932131
Strontium (Sr)-Total	0.374	+/-0.054		0.00010	mg/L	0		28-AUG-14	R2932131
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2932131
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		28-AUG-14	R2932131
Uranium (U)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2932131
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		28-AUG-14	R2932131
Zinc (Zn)-Total	0.0151	+/-0.0032		0.0050	mg/L	0		28-AUG-14	R2932131
Miscellaneous Parameters									
Ammonia, Total (as N)	0.537	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	4.6	+/-0.7		1.0	mg/L	0		30-AUG-14	R2934298
Naphthenic Acids	<1.0	-		1.0	mg/L	-	02-SEP-14	04-SEP-14	R2938469
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Total Dissolved Solids	241	+/-17		10	mg/L	0		30-AUG-14	R2934091
Silicon (as SiO2)-Total	22.2	-		0.11	mg/L	-		29-AUG-14	
Turbidity	12.3	+/-0.72		0.10	NTU	0		26-AUG-14	R2929451
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Anthracene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Fluoranthene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Fluorene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Naphthalene	<0.000050	-		0.000050	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Phenanthrene	<0.000050	-		0.000050	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Pyrene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-3 16054140823003									
Sampled By: bp/ea on 23-AUG-14 @ 15:41									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	26-AUG-14	26-AUG-14	R2930735
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	26-AUG-14	26-AUG-14	R2930735
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Surr: d10-Acenaphthene	93.5	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Surr: d10-Phenanthrene	95.7	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Surr: d12-Chrysene	93.5	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	0.00378	+/-0.00040		0.00040	mg/L	0		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.112	+/-0.0097		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Copper (Cu)-Dissolved	0.00093	+/-0.00008		0.00060	mg/L	0		03-SEP-14	R2936909
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.0238	+/-0.0030		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.168	+/-0.011		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00384	+/-0.00040		0.00010	mg/L	0		03-SEP-14	R2936909
Nickel (Ni)-Dissolved	0.00026	+/-0.00005		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Silicon (Si)-Dissolved	9.80	+/-0.83		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.378	+/-0.028		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0074	+/-0.0009		0.0010	mg/L	0		03-SEP-14	R2936909
Ion Balance Calculation									
Ion Balance	102	-			%	-		04-SEP-14	
TDS (Calculated)	218	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	191	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.000050	-		0.000005	mg/L	-		02-SEP-14	R2936072
				0					
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-3 16054140823003 Sampled By: bp/ea on 23-AUG-14 @ 15:41 Matrix: H2O									
Sulfate by IC									
Sulfate (SO4)	3.67	+/-0.24		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	8.09	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	424	+/-21		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	266	+/-11		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	218	+/-14		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.0	-		0.11	mg/L	-		04-SEP-14	
L1507500-4 16054140823004 Sampled By: bp/ea on 23-AUG-14 @ 17:10 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	98.7	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	87.7	-		N/A	%	-		27-AUG-14	R2928251
Surr: 3,4-Dichlorotoluene (SS)	92.4	-		N/A	%	-		27-AUG-14	R2928251
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
Surr: 2-Bromobenzotrifluoride	105.7	-		N/A	%	-	27-AUG-14	27-AUG-14	R2931993
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000394	+/-0.0000073		0.0000050	mg/L	0		02-SEP-14	R2936072
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	8.93	+/-1.4		0.0030	mg/L	0		28-AUG-14	R2930655
Antimony (Sb)-Total	0.00017	+/-0.00007		0.00010	mg/L	0		28-AUG-14	R2930655
Arsenic (As)-Total	0.00491	+/-0.00057		0.00010	mg/L	0		28-AUG-14	R2930655
Barium (Ba)-Total	0.138	+/-0.015		0.000050	mg/L	0		28-AUG-14	R2930655
Beryllium (Be)-Total	0.00061	+/-0.00014		0.00050	mg/L	0		28-AUG-14	R2930655
Bismuth (Bi)-Total	0.000170	+/-0.000040		0.000050	mg/L	0		28-AUG-14	R2930655
Boron (B)-Total	0.020	+/-0.003		0.010	mg/L	0		28-AUG-14	R2930655
Cadmium (Cd)-Total	0.000240	+/-0.000046		0.000010	mg/L	0		28-AUG-14	R2930655
Calcium (Ca)-Total	13.7	+/-1.6		0.10	mg/L	0		28-AUG-14	R2930655
Chromium (Cr)-Total	0.0174	+/-0.0025		0.00010	mg/L	0		28-AUG-14	R2930655
Cobalt (Co)-Total	0.00800	+/-0.0011		0.00010	mg/L	0		28-AUG-14	R2930655
Copper (Cu)-Total	0.0184	+/-0.0022		0.00010	mg/L	0		28-AUG-14	R2930655
Iron (Fe)-Total	16.3	+/-2.6		0.030	mg/L	0		28-AUG-14	R2930655
Lead (Pb)-Total	0.00978	+/-0.0015		0.000050	mg/L	0		28-AUG-14	R2930655

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-4 16054140823004									
Sampled By: bp/ea on 23-AUG-14 @ 17:10									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Lithium (Li)-Total	0.0101	+/-0.0019		0.0050	mg/L	0		28-AUG-14	R2930655
Magnesium (Mg)-Total	6.22	+/-0.75		0.10	mg/L	0		28-AUG-14	R2930655
Manganese (Mn)-Total	0.232	+/-0.023		0.0050	mg/L	0		28-AUG-14	R2930655
Molybdenum (Mo)-Total	0.000319	+/-0.000042		0.000050	mg/L	0		28-AUG-14	R2930655
Nickel (Ni)-Total	0.0219	+/-0.0024		0.00010	mg/L	0		28-AUG-14	R2930655
Potassium (K)-Total	3.10	+/-0.38		0.50	mg/L	0		28-AUG-14	R2930655
Selenium (Se)-Total	0.00038	+/-0.00005		0.00010	mg/L	0		28-AUG-14	R2930655
Silicon (Si)-Total	21.2	+/-4.2		0.050	mg/L	0		28-AUG-14	R2930655
Silver (Ag)-Total	0.000090	+/-0.000019		0.000010	mg/L	0		28-AUG-14	R2930655
Sodium (Na)-Total	2.1	+/-0.3		1.0	mg/L	0		28-AUG-14	R2930655
Strontium (Sr)-Total	0.0543	+/-0.0078		0.00010	mg/L	0		28-AUG-14	R2930655
Thallium (Tl)-Total	0.000253	+/-0.000039		0.000050	mg/L	0		28-AUG-14	R2930655
Tin (Sn)-Total	0.00070	+/-0.00010		0.00010	mg/L	0		28-AUG-14	R2930655
Titanium (Ti)-Total	0.184	+/-0.060		0.00030	mg/L	0		28-AUG-14	R2930655
Uranium (U)-Total	0.00117	+/-0.00016		0.000010	mg/L	0		28-AUG-14	R2930655
Vanadium (V)-Total	0.0241	+/-0.0029		0.00050	mg/L	0		28-AUG-14	R2930655
Zinc (Zn)-Total	0.0687	+/-0.011		0.0050	mg/L	0		28-AUG-14	R2930655
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	3.2	+/-0.6		1.0	mg/L	0		30-AUG-14	R2934298
Naphthenic Acids	<1.0	-		1.0	mg/L	-	02-SEP-14	04-SEP-14	R2938469
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Total Dissolved Solids	100	+/-8		10	mg/L	0		30-AUG-14	R2934091
Silicon (as SiO2)-Total	45.3	-		0.11	mg/L	-		29-AUG-14	
Turbidity	989	+/-54		0.10	NTU	0		26-AUG-14	R2929451
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Anthracene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Fluoranthene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Fluorene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Naphthalene	<0.000050	-		0.000050	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Phenanthrene	<0.000050	-		0.000050	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Pyrene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	26-AUG-14	26-AUG-14	R2930735
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	26-AUG-14	26-AUG-14	R2930735
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	26-AUG-14	26-AUG-14	R2930735
Surr: d10-Acenaphthene	90.2	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Surr: d10-Phenanthrene	96.2	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Surr: d12-Chrysene	95.9	-		N/A	%	-	26-AUG-14	26-AUG-14	R2930735
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	1.46	+/-0.12		0.50	mg/L	0		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-4 16054140823004									
Sampled By: bp/ea on 23-AUG-14 @ 17:10									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0648	+/-0.0097		0.0010	mg/L	0		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.0185	+/-0.0016		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	0.00035	+/-0.00003		0.00010	mg/L	0		03-SEP-14	R2936909
Copper (Cu)-Dissolved	0.00062	+/-0.00006		0.00060	mg/L	0		03-SEP-14	R2936909
Iron (Fe)-Dissolved	0.057	+/-0.005		0.010	mg/L	0		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	<0.0050	-		0.0050	mg/L	-		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.0228	+/-0.0016		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00015	+/-0.00002		0.00010	mg/L	0		03-SEP-14	R2936909
Nickel (Ni)-Dissolved	0.00171	+/-0.00015		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Silicon (Si)-Dissolved	5.43	+/-0.46		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.0283	+/-0.0021		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	0.00411	+/-0.0019		0.00030	mg/L	0		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	0.000019	+/-0.000002		0.000010	mg/L	0		03-SEP-14	R2936909
Vanadium (V)-Dissolved	0.00051	+/-0.00004		0.00010	mg/L	0		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0019	+/-0.0004		0.0010	mg/L	0		03-SEP-14	R2936909
Ion Balance Calculation									
Ion Balance	Low EC	-			%	-		04-SEP-14	
TDS (Calculated)	42.9	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	36.9	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	0.059	+/-0.008		0.050	mg/L	0		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	0.059	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030
Sulfate by IC									
Sulfate (SO4)	3.20	+/-0.21		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	7.15	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	90.2	+/-4.6		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	46.4	+/-3.1		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	38.1	+/-3.4		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	11.6	-		0.11	mg/L	-		04-SEP-14	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-5 16054140823005									
Sampled By: bp/ea on 23-AUG-14 @ 15:41									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	97.2	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	88.1	-		N/A	%	-		27-AUG-14	R2928251
Surr: 3,4-Dichlorotoluene (SS)	89.5	-		N/A	%	-		27-AUG-14	R2928251
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
Surr: 2-Bromobenzotrifluoride	104.0	-		N/A	%	-	27-AUG-14	27-AUG-14	R2931993
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	<0.0030	-		0.0030	mg/L	-		28-AUG-14	R2932131
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Arsenic (As)-Total	0.00525	+/-0.00061		0.00010	mg/L	0		28-AUG-14	R2932131
Barium (Ba)-Total	0.137	+/-0.015		0.000050	mg/L	0		28-AUG-14	R2932131
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		28-AUG-14	R2932131
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2932131
Boron (B)-Total	0.076	+/-0.012		0.010	mg/L	0		28-AUG-14	R2932131
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2932131
Calcium (Ca)-Total	49.7	+/-5.9		0.10	mg/L	0		28-AUG-14	R2932131
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Cobalt (Co)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Copper (Cu)-Total	0.00575	+/-0.00070		0.00010	mg/L	0		28-AUG-14	R2932131
Iron (Fe)-Total	1.45	+/-0.23		0.030	mg/L	0		28-AUG-14	R2932131
Lead (Pb)-Total	0.000525	+/-0.000087		0.000050	mg/L	0		28-AUG-14	R2932131
Lithium (Li)-Total	0.0226	+/-0.0042		0.0050	mg/L	0		28-AUG-14	R2932131
Magnesium (Mg)-Total	15.2	+/-1.8		0.10	mg/L	0		28-AUG-14	R2932131
Manganese (Mn)-Total	0.174	+/-0.018		0.0050	mg/L	0		28-AUG-14	R2932131
Molybdenum (Mo)-Total	0.00364	+/-0.00044		0.000050	mg/L	0		28-AUG-14	R2932131
Nickel (Ni)-Total	0.00021	+/-0.00006		0.00010	mg/L	0		28-AUG-14	R2932131
Potassium (K)-Total	3.51	+/-0.43		0.50	mg/L	0		28-AUG-14	R2932131
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Silicon (Si)-Total	10.5	+/-2.1		0.050	mg/L	0		28-AUG-14	R2932131
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2932131
Sodium (Na)-Total	12.7	+/-1.6		1.0	mg/L	0		28-AUG-14	R2932131
Strontium (Sr)-Total	0.382	+/-0.055		0.00010	mg/L	0		28-AUG-14	R2932131
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2932131
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		28-AUG-14	R2932131
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		28-AUG-14	R2932131
Uranium (U)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2932131

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-5 16054140823005									
Sampled By: bp/ea on 23-AUG-14 @ 15:41									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		28-AUG-14	R2932131
Zinc (Zn)-Total	0.0147	+/-0.0032		0.0050	mg/L	0		28-AUG-14	R2932131
Miscellaneous Parameters									
Ammonia, Total (as N)	0.505	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	3.4	+/-0.6		1.0	mg/L	0		30-AUG-14	R2934298
Naphthenic Acids	<1.0	-		1.0	mg/L	-	02-SEP-14	04-SEP-14	R2938469
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Total Dissolved Solids	245	+/-17		10	mg/L	0		30-AUG-14	R2934091
Silicon (as SiO2)-Total	22.4	-		0.11	mg/L	-		29-AUG-14	
Turbidity	11.7	+/-0.69		0.10	NTU	0		26-AUG-14	R2929451
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	98.3	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	96.0	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	94.7	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0012	+/-0.0004		0.0010	mg/L	0		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	0.00370	+/-0.00039		0.00040	mg/L	0		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.111	+/-0.0097		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		03-SEP-14	R2936909
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.0237	+/-0.0030		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.166	+/-0.011		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00382	+/-0.00040		0.00010	mg/L	0		03-SEP-14	R2936909

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-5 16054140823005									
Sampled By: bp/ea on 23-AUG-14 @ 15:41									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	0.00025	+/-0.00004		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Silicon (Si)-Dissolved	9.85	+/-0.84		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.372	+/-0.028		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0088	+/-0.0011		0.0010	mg/L	0		03-SEP-14	R2936909
Ion Balance Calculation									
Ion Balance	96.3	-			%	-		04-SEP-14	
TDS (Calculated)	218	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	185	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030
Sulfate by IC									
Sulfate (SO4)	3.65	+/-0.24		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	8.03	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	422	+/-21		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	272	+/-11		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	223	+/-15		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.1	-		0.11	mg/L	-		04-SEP-14	
L1507500-6 16054140824006									
Sampled By: bp/ea on 24-AUG-14 @ 11:00									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	99.2	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	84.1	-		N/A	%	-		27-AUG-14	R2928251

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-6 16054140824006									
Sampled By: bp/ea on 24-AUG-14 @ 11:00									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	0.000056	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000020	-	DLM	0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	102.8	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	97.9	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	100.8	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	1.53	+/-0.12		0.50	mg/L	0		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0228	+/-0.0035		0.0010	mg/L	0		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	0.00169	+/-0.00018		0.00040	mg/L	0		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.111	+/-0.0097		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	0.00849	+/-0.00080		0.00010	mg/L	0		03-SEP-14	R2936909
Copper (Cu)-Dissolved	0.00069	+/-0.00007		0.00060	mg/L	0		03-SEP-14	R2936909
Iron (Fe)-Dissolved	2.54	+/-0.23		0.010	mg/L	0		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.0652	+/-0.0081		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	2.17	+/-0.15		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00160	+/-0.00017		0.00010	mg/L	0		03-SEP-14	R2936909
Nickel (Ni)-Dissolved	0.0283	+/-0.0023		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	0.00074	+/-0.00012		0.00040	mg/L	0		03-SEP-14	R2936909
Silicon (Si)-Dissolved	11.2	+/-0.95		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.294	+/-0.022		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	0.00087	+/-0.00042		0.00030	mg/L	0		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	0.000975	+/-0.00010		0.000010	mg/L	0		03-SEP-14	R2936909
Vanadium (V)-Dissolved	0.00035	+/-0.00003		0.00010	mg/L	0		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0104	+/-0.0013		0.0010	mg/L	0		03-SEP-14	R2936909

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-6 16054140824006 Sampled By: bp/ea on 24-AUG-14 @ 11:00 Matrix: H2O									
Ion Balance Calculation									
Ion Balance	98.0	-			%	-		04-SEP-14	
TDS (Calculated)	265	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	206	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	0.093	+/-0.011		0.050	mg/L	0		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	0.093	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030
Sulfate by IC									
Sulfate (SO4)	69.6	+/-3.9		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	7.35	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	482	+/-24		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	209	+/-8.7		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	171	+/-11		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	23.9	-		0.11	mg/L	-		04-SEP-14	
L1507500-7 16054140824007 Sampled By: bp/ea on 24-AUG-14 @ 12:50 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-	RRV	0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	0.00077	-	RRV	0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-	RRV	0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-	RRV	0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-	RRV	0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-	RRV	0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-	RRV	0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	98.2	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	85.5	-		N/A	%	-		27-AUG-14	R2928251
Surr: 3,4-Dichlorotoluene (SS)	88.7	-		N/A	%	-		27-AUG-14	R2928251
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
Surr: 2-Bromobenzotrifluoride	98.6	-		N/A	%	-	27-AUG-14	27-AUG-14	R2931993
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.109	+/-0.018		0.0030	mg/L	0		28-AUG-14	R2930655

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-7 16054140824007									
Sampled By: bp/ea on 24-AUG-14 @ 12:50									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Antimony (Sb)-Total	0.00028	+/-0.00008		0.00010	mg/L	0		28-AUG-14	R2930655
Arsenic (As)-Total	0.00426	+/-0.00050		0.00010	mg/L	0		28-AUG-14	R2930655
Barium (Ba)-Total	0.0699	+/-0.0078		0.000050	mg/L	0		28-AUG-14	R2930655
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		28-AUG-14	R2930655
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2930655
Boron (B)-Total	0.522	+/-0.083		0.010	mg/L	0		28-AUG-14	R2930655
Cadmium (Cd)-Total	0.000050	+/-0.000010		0.000010	mg/L	0		28-AUG-14	R2930655
Calcium (Ca)-Total	75.3	+/-8.9		0.10	mg/L	0		28-AUG-14	R2930655
Chromium (Cr)-Total	0.00218	+/-0.00032		0.00010	mg/L	0		28-AUG-14	R2930655
Cobalt (Co)-Total	0.00041	+/-0.00006		0.00010	mg/L	0		28-AUG-14	R2930655
Copper (Cu)-Total	0.00186	+/-0.00025		0.00010	mg/L	0		28-AUG-14	R2930655
Iron (Fe)-Total	0.465	+/-0.074		0.030	mg/L	0		28-AUG-14	R2930655
Lead (Pb)-Total	0.000358	+/-0.000061		0.000050	mg/L	0		28-AUG-14	R2930655
Lithium (Li)-Total	0.0956	+/-0.018		0.0050	mg/L	0		28-AUG-14	R2930655
Magnesium (Mg)-Total	18.9	+/-2.3		0.10	mg/L	0		28-AUG-14	R2930655
Manganese (Mn)-Total	0.568	+/-0.057		0.0050	mg/L	0		28-AUG-14	R2930655
Molybdenum (Mo)-Total	0.0122	+/-0.0015		0.000050	mg/L	0		28-AUG-14	R2930655
Nickel (Ni)-Total	0.00430	+/-0.00048		0.00010	mg/L	0		28-AUG-14	R2930655
Potassium (K)-Total	5.96	+/-0.73		0.50	mg/L	0		28-AUG-14	R2930655
Selenium (Se)-Total	0.00010	+/-0.00002		0.00010	mg/L	0		28-AUG-14	R2930655
Silicon (Si)-Total	9.07	+/-1.8		0.050	mg/L	0		28-AUG-14	R2930655
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		28-AUG-14	R2930655
Sodium (Na)-Total	103	+/-13		1.0	mg/L	0		28-AUG-14	R2930655
Strontium (Sr)-Total	0.642	+/-0.092		0.00010	mg/L	0		28-AUG-14	R2930655
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		28-AUG-14	R2930655
Tin (Sn)-Total	0.00291	+/-0.00041		0.00010	mg/L	0		28-AUG-14	R2930655
Titanium (Ti)-Total	0.00244	+/-0.00081		0.00030	mg/L	0		28-AUG-14	R2930655
Uranium (U)-Total	0.00166	+/-0.00023		0.000010	mg/L	0		28-AUG-14	R2930655
Vanadium (V)-Total	0.00126	+/-0.00021		0.00050	mg/L	0		28-AUG-14	R2930655
Zinc (Zn)-Total	0.0118	+/-0.0028		0.0050	mg/L	0		28-AUG-14	R2930655
Miscellaneous Parameters									
Ammonia, Total (as N)	1.46	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	6.9	+/-0.9		1.0	mg/L	0		01-SEP-14	R2934298
Naphthenic Acids	<1.0	-		1.0	mg/L	-	02-SEP-14	04-SEP-14	R2938469
Phenols (4AAP)	0.0047	+/-0.0009		0.0010	mg/L	-7.4%		04-SEP-14	R2938100
Total Dissolved Solids	585	+/-39		10	mg/L	0		31-AUG-14	R2934337
Silicon (as SiO2)-Total	19.4	-		0.11	mg/L	-		29-AUG-14	
Turbidity	31.4	+/-1.8		0.10	NTU	0		26-AUG-14	R2929451
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	0.000067	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-7 16054140824007									
Sampled By: bp/ea on 24-AUG-14 @ 12:50									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	97.6	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	96.1	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	96.9	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	1.49	+/-0.12		0.50	mg/L	0		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	0.00272	+/-0.00029		0.00040	mg/L	0		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.0473	+/-0.0041		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	0.00058	+/-0.00004		0.00040	mg/L	0		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	0.00014	+/-0.00001		0.00010	mg/L	0		03-SEP-14	R2936909
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		03-SEP-14	R2936909
Iron (Fe)-Dissolved	0.075	+/-0.007		0.010	mg/L	0		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.0922	+/-0.011		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.555	+/-0.038		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00212	+/-0.00022		0.00010	mg/L	0		03-SEP-14	R2936909
Nickel (Ni)-Dissolved	0.00123	+/-0.00011		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	0.00062	+/-0.00010		0.00040	mg/L	0		03-SEP-14	R2936909
Silicon (Si)-Dissolved	8.82	+/-0.75		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.543	+/-0.040		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		03-SEP-14	R2936909
Tin (Sn)-Dissolved	0.00072	+/-0.00006		0.00020	mg/L	0		03-SEP-14	R2936909
Uranium (U)-Dissolved	0.00106	+/-0.00011		0.000010	mg/L	0		03-SEP-14	R2936909
Vanadium (V)-Dissolved	0.00036	+/-0.00003		0.00010	mg/L	0		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0049	+/-0.0006		0.0010	mg/L	0		03-SEP-14	R2936909
Ion Balance Calculation									
Ion Balance	97.7	-			%	-		04-SEP-14	
TDS (Calculated)	528	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	256	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.000050	-		0.000005	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-7 16054140824007 Sampled By: bp/ea on 24-AUG-14 @ 12:50 Matrix: H2O									
Sulfate by IC									
Sulfate (SO4)	109	+/-6.1		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	7.99	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	896	+/-45		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	458	+/-18		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	375	+/-24		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	18.9	-		0.11	mg/L	-		04-SEP-14	
L1507500-8 16054140824008 Sampled By: bp/ea on 24-AUG-14 @ 14:15 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	96.7	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	86.1	-		N/A	%	-		27-AUG-14	R2928251
Surr: 3,4-Dichlorotoluene (SS)	86.4	-		N/A	%	-		27-AUG-14	R2928251
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
Surr: 2-Bromobenzotrifluoride	104.3	-		N/A	%	-	27-AUG-14	27-AUG-14	R2931993
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050 0	mg/L	-		02-SEP-14	R2936072
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.723	+/-0.12		0.0030	mg/L	0		27-AUG-14	R2930655
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-AUG-14	R2930655
Arsenic (As)-Total	0.0241	+/-0.0028		0.00010	mg/L	0		27-AUG-14	R2930655
Barium (Ba)-Total	0.0959	+/-0.011		0.000050	mg/L	0		27-AUG-14	R2930655
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2930655
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-AUG-14	R2930655
Boron (B)-Total	0.160	+/-0.026		0.010	mg/L	0		27-AUG-14	R2930655
Cadmium (Cd)-Total	0.000051	+/-0.000010		0.000010	mg/L	0		27-AUG-14	R2930655
Calcium (Ca)-Total	78.0	+/-9.2		0.10	mg/L	0		27-AUG-14	R2930655
Chromium (Cr)-Total	0.00879	+/-0.0013		0.00010	mg/L	0		27-AUG-14	R2930655
Cobalt (Co)-Total	0.00096	+/-0.00013		0.00010	mg/L	0		27-AUG-14	R2930655
Copper (Cu)-Total	0.00242	+/-0.00032		0.00010	mg/L	0		27-AUG-14	R2930655
Iron (Fe)-Total	12.2	+/-1.9		0.030	mg/L	0		27-AUG-14	R2930655
Lead (Pb)-Total	0.00100	+/-0.00016		0.000050	mg/L	0		27-AUG-14	R2930655

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-8 16054140824008									
Sampled By: bp/ea on 24-AUG-14 @ 14:15									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	0.0214	+/-0.0023		0.00040	mg/L	0		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.0655	+/-0.0057		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		03-SEP-14	R2936909
Iron (Fe)-Dissolved	8.99	+/-0.81		0.010	mg/L	0		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.0436	+/-0.0054		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.461	+/-0.031		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00790	+/-0.00083		0.00010	mg/L	0		03-SEP-14	R2936909
Nickel (Ni)-Dissolved	0.00044	+/-0.00005		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Silicon (Si)-Dissolved	8.79	+/-0.75		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.456	+/-0.034		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	0.000049	+/-0.000005		0.000010	mg/L	0		03-SEP-14	R2936909
Vanadium (V)-Dissolved	0.00010	+/-0.00001		0.00010	mg/L	0		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0025	+/-0.0004		0.0010	mg/L	0		03-SEP-14	R2936909
Ion Balance Calculation									
Ion Balance	99.6	-			%	-		04-SEP-14	
TDS (Calculated)	323	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	273	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030
Sulfate by IC									
Sulfate (SO4)	25.7	+/-1.5		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	7.85	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	598	+/-30		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	362	+/-14		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	297	+/-19		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	18.8	-		0.11	mg/L	-		04-SEP-14	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-9 16054140824009									
Sampled By: bp/ea on 24-AUG-14 @ 15:42									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	97.4	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	84.4	-		N/A	%	-		27-AUG-14	R2928251
Surr: 3,4-Dichlorotoluene (SS)	86.0	-		N/A	%	-		27-AUG-14	R2928251
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	27-AUG-14	27-AUG-14	R2931993
Surr: 2-Bromobenzotrifluoride	97.4	-		N/A	%	-	27-AUG-14	27-AUG-14	R2931993
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0093	+/-0.0025		0.0030	mg/L	0		04-SEP-14	R2938205
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938205
Arsenic (As)-Total	0.00466	+/-0.00054		0.00010	mg/L	0		04-SEP-14	R2938205
Barium (Ba)-Total	0.0311	+/-0.0035		0.000050	mg/L	0		04-SEP-14	R2938205
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		04-SEP-14	R2938205
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938205
Boron (B)-Total	0.435	+/-0.070		0.010	mg/L	0		04-SEP-14	R2938205
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		04-SEP-14	R2938205
Calcium (Ca)-Total	75.2	+/-8.9		0.10	mg/L	0		04-SEP-14	R2938205
Chromium (Cr)-Total	0.00021	+/-0.00006		0.00010	mg/L	0		04-SEP-14	R2938205
Cobalt (Co)-Total	0.00011	+/-0.00002		0.00010	mg/L	0		04-SEP-14	R2938205
Copper (Cu)-Total	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938205
Iron (Fe)-Total	1.80	+/-0.29		0.030	mg/L	0		04-SEP-14	R2938205
Lead (Pb)-Total	0.000052	+/-0.000017		0.000050	mg/L	0		04-SEP-14	R2938205
Lithium (Li)-Total	0.105	+/-0.019		0.0050	mg/L	0		04-SEP-14	R2938205
Magnesium (Mg)-Total	21.3	+/-2.6		0.10	mg/L	0		04-SEP-14	R2938205
Manganese (Mn)-Total	0.137	+/-0.014		0.0050	mg/L	0		04-SEP-14	R2938205
Molybdenum (Mo)-Total	0.0152	+/-0.0018		0.000050	mg/L	0		04-SEP-14	R2938205
Nickel (Ni)-Total	0.00034	+/-0.00007		0.00010	mg/L	0		04-SEP-14	R2938205
Potassium (K)-Total	7.56	+/-0.93		0.50	mg/L	0		04-SEP-14	R2938205
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938205
Silicon (Si)-Total	12.6	+/-2.5		0.050	mg/L	0		04-SEP-14	R2938205
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		04-SEP-14	R2938205
Sodium (Na)-Total	103	+/-13		1.0	mg/L	0		04-SEP-14	R2938205
Strontium (Sr)-Total	0.719	+/-0.10		0.00010	mg/L	0		04-SEP-14	R2938205
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938205
Tin (Sn)-Total	0.00018	+/-0.00004		0.00010	mg/L	0		04-SEP-14	R2938205
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		04-SEP-14	R2938205
Uranium (U)-Total	0.000037	+/-0.000005		0.000010	mg/L	0		04-SEP-14	R2938205

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-9 16054140824009									
Sampled By: bp/ea on 24-AUG-14 @ 15:42									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		04-SEP-14	R2938205
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		04-SEP-14	R2938205
Miscellaneous Parameters									
Ammonia, Total (as N)	1.96	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	7.0	+/-0.9		1.0	mg/L	0		01-SEP-14	R2934298
Naphthenic Acids	<1.0	-		1.0	mg/L	-	02-SEP-14	04-SEP-14	R2938469
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Total Dissolved Solids	594	+/-40		10	mg/L	0		31-AUG-14	R2934337
Silicon (as SiO2)-Total	27.0	-		0.11	mg/L	-		06-SEP-14	
Turbidity	15.5	+/-0.90		0.10	NTU	0		26-AUG-14	R2929451
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	100.8	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	96.7	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	98.2	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	0.54	+/-0.09		0.50	mg/L	0		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	0.00441	+/-0.00046		0.00040	mg/L	0		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.0294	+/-0.0026		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	0.00012	+/-0.00001		0.00010	mg/L	0		03-SEP-14	R2936909
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		03-SEP-14	R2936909
Iron (Fe)-Dissolved	1.60	+/-0.14		0.010	mg/L	0		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.103	+/-0.013		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.126	+/-0.0086		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.0151	+/-0.0016		0.00010	mg/L	0		03-SEP-14	R2936909

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-9 16054140824009									
Sampled By: bp/ea on 24-AUG-14 @ 15:42									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	0.00023	+/-0.00004		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Silicon (Si)-Dissolved	11.0	+/-0.93		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.729	+/-0.054		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	0.000030	+/-0.000003		0.000010	mg/L	0		03-SEP-14	R2936909
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0017	+/-0.0004		0.0010	mg/L	0		03-SEP-14	R2936909
Ion Balance Calculation									
Ion Balance	98.5	-			%	-		05-SEP-14	R2939363
TDS (Calculated)	542	-			mg/L	-		05-SEP-14	R2939363
Hardness (as CaCO3)	271	-			mg/L	-		05-SEP-14	R2939363
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030
Sulfate by IC									
Sulfate (SO4)	115	+/-6.5		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	8.09	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	909	+/-46		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	465	+/-18		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	381	+/-24		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	23.4	-		0.11	mg/L	-		04-SEP-14	
L1507500-10 16054140824010									
Sampled By: bp/ea on 24-AUG-14 @ 14:15									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Toluene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
EthylBenzene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
o-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		27-AUG-14	R2928251
Styrene	<0.0010	-		0.0010	mg/L	-		27-AUG-14	R2928251
F1(C6-C10)	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
F1-BTEX	<0.10	-		0.10	mg/L	-		27-AUG-14	R2928251
Xylenes	<0.00071	-		0.00071	mg/L	-		27-AUG-14	R2928251
Surr: 1,4-Difluorobenzene (SS)	99.1	-		N/A	%	-		27-AUG-14	R2928251
Surr: 4-Bromofluorobenzene (SS)	82.8	-		N/A	%	-		27-AUG-14	R2928251

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-10 16054140824010									
Sampled By: bp/ea on 24-AUG-14 @ 14:15									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	98.2	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	97.2	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	96.0	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		26-AUG-14	R2930030
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		03-SEP-14	R2936909
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Arsenic (As)-Dissolved	0.0211	+/-0.0022		0.00040	mg/L	0		03-SEP-14	R2936909
Barium (Ba)-Dissolved	0.0669	+/-0.0058		0.00010	mg/L	0		03-SEP-14	R2936909
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936909
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		03-SEP-14	R2936909
Iron (Fe)-Dissolved	9.16	+/-0.83		0.010	mg/L	0		03-SEP-14	R2936909
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Lithium (Li)-Dissolved	0.0440	+/-0.0055		0.0050	mg/L	0		03-SEP-14	R2936909
Manganese (Mn)-Dissolved	0.451	+/-0.031		0.0020	mg/L	0		03-SEP-14	R2936909
Molybdenum (Mo)-Dissolved	0.00827	+/-0.00087		0.00010	mg/L	0		03-SEP-14	R2936909
Nickel (Ni)-Dissolved	0.00043	+/-0.00005		0.00010	mg/L	0		03-SEP-14	R2936909
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		03-SEP-14	R2936909
Silicon (Si)-Dissolved	8.71	+/-0.74		0.050	mg/L	0		03-SEP-14	R2936909
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		03-SEP-14	R2936909
Strontium (Sr)-Dissolved	0.464	+/-0.034		0.00010	mg/L	0		03-SEP-14	R2936909
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936909
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		03-SEP-14	R2936909
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		03-SEP-14	R2936909
Uranium (U)-Dissolved	0.000048	+/-0.000005		0.000010	mg/L	0		03-SEP-14	R2936909
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936909
Zinc (Zn)-Dissolved	0.0053	+/-0.0007		0.0010	mg/L	0		03-SEP-14	R2936909

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1507500-10 16054140824010									
Sampled By: bp/ea on 24-AUG-14 @ 14:15									
Matrix: H2O									
Ion Balance Calculation									
Ion Balance	101	-			%	-		04-SEP-14	
TDS (Calculated)	326	-			mg/L	-		04-SEP-14	
Hardness (as CaCO3)	280	-			mg/L	-		04-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		26-AUG-14	R2930030
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		28-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		26-AUG-14	R2930030
Sulfate by IC									
Sulfate (SO4)	26.0	+/-1.5		0.50	mg/L	0		26-AUG-14	R2930030
pH, Conductivity and Total Alkalinity									
pH	7.88	+/-0.01		0.10	pH	0		26-AUG-14	R2928836
Conductivity (EC)	598	+/-30		0.20	uS/cm	0		26-AUG-14	R2928836
Bicarbonate (HCO3)	364	+/-14		5.0	mg/L	0		26-AUG-14	R2928836
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-AUG-14	R2928836
Alkalinity, Total (as CaCO3)	298	+/-19		2.0	mg/L	0		26-AUG-14	R2928836
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	18.6	-		0.11	mg/L	-		04-SEP-14	
* Refer to Referenced Information for Qualifiers (if any) and Methodology.									

Reference Information

Report Comments: ADDITIONAL 05-JAN-15 09:21
ADDITIONAL 16-DEC-14 10:07

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chloride (Cl)	MS-B	

Qualifiers for Individual Samples Listed:

Sample Number	Client ID	Qualifier	Description
L1507500-6	16054140824006	WSMD	HG-D - Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
L1507500-9	16054140824009	SFPL	HG-D - Sample was Filtered and Preserved at the laboratory

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)		EPA 5021/8015&8260 GC-MS & FID
C-DIS-ORG-ED	Water	Dissolved Organic Carbon		APHA 5310 B-Instrumental
CL-IC-ED	Water	Chloride by IC		APHA 4110 B-ION CHROMATOGRAPHY
F2,F3,F4-ED	Water	F2, F3, F4		EPA 3510/CCME PHC CWS-GC-FID
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved		EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)		EPA 245.7 / EPA 245.1
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR, Syncrude, 1994

Dissolved naphthenic acids are solvent extracted from acidified aqueous samples using Dichloromethane prior to quantitation by Fourier Transform Infra-Red spectroscopy. Note that FTIR is not uniquely selective to naphthenic acids. If present, other carboxylic acids (e.g. humic acids, fulvic acids) may also be detected by this method.

NH3-CFA-ED Water Ammonia in Water by Colour APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

NO2+NO3-CALC-ED Water Nitrate+Nitrite CALCULATION

NO2-IC-ED Water Nitrite as N by IC APHA 4110 B-ION CHROMATOGRAPHY

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

NO3-IC-ED Water Nitrate as N by IC APHA 4110 B-ION CHROMATOGRAPHY

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

PAH-ABT1-CL Water PAH & Carcinogenic PAH List EPA 3510/8270-GC/MS

PH/EC/ALK-ED Water pH, Conductivity and Total Alkalinity APHA 4500-H, 2510, 2320

All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PHENOLS-4AAP-ED Water Phenols (4AAP) AB ENV.06537-COLORIMETRIC

This analysis is carried out using procedures adapted from ENVIRODAT VMV 06537 689, Method Code 154, in "Methods Manual for Chemical Analysis of Water and Wastes" published by the Alberta Environmental Centre. This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide and 4-aminoantipyrine to form a red complex which is measured at 505 nm.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
SIO2-D-CALC-ED	Water	Dissolved Silicon (reported as Silica)		CALCULATION
SIO2-T-CALC-ED	Water	Total Silicon (reported as Silica)		CALCULATION
SO4-IC-ED	Water	Sulfate by IC		APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TDS-ED	Water	Total Dissolved Solids		APHA 2540 C
TURBIDITY-ED	Water	Turbidity		APHA 2130 B-Nephelometer

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
FM	ALS ENVIRONMENTAL - FORT MCMURRAY, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

M050656

GLOSSARY OF REPORT TERMS

Surr - Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.

Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent.

Zero values indicate no detectable method bias.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental

Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 1 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R2928251							
WG1938592-8	DUP	L1507500-8						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	27-AUG-14
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	27-AUG-14
EthylBenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	27-AUG-14
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	27-AUG-14
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	27-AUG-14
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	50	27-AUG-14
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	27-AUG-14
WG1938592-2	LCS							
Benzene			97.1		%		70-130	27-AUG-14
Toluene			80.5		%		70-130	27-AUG-14
EthylBenzene			85.1		%		70-130	27-AUG-14
o-Xylene			87.1		%		70-130	27-AUG-14
m+p-Xylene			90.3		%		70-130	27-AUG-14
Styrene			96.4		%		70-130	27-AUG-14
WG1938592-3	LCS							
F1(C6-C10)			111.0		%		70-130	27-AUG-14
WG1938592-6	LCS							
Benzene			95.3		%		70-130	27-AUG-14
Toluene			78.4		%		70-130	27-AUG-14
EthylBenzene			84.6		%		70-130	27-AUG-14
o-Xylene			86.3		%		70-130	27-AUG-14
m+p-Xylene			91.2		%		70-130	27-AUG-14
Styrene			95.6		%		70-130	27-AUG-14
WG1938592-7	LCS							
F1(C6-C10)			99.96		%		70-130	27-AUG-14
WG1938592-1	MB							
Benzene			<0.00050		mg/L		0.0005	27-AUG-14
Toluene			<0.00050		mg/L		0.0005	27-AUG-14
EthylBenzene			<0.00050		mg/L		0.0005	27-AUG-14
o-Xylene			<0.00050		mg/L		0.0005	27-AUG-14
m+p-Xylene			<0.00050		mg/L		0.0005	27-AUG-14
Styrene			<0.0010		mg/L		0.001	27-AUG-14
F1(C6-C10)			<0.10		mg/L		0.1	27-AUG-14
Surrogate: 1,4-Difluorobenzene (SS)			101.3		%		70-130	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 2 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R2928251							
WG1938592-1	MB							
Surrogate: 4-Bromofluorobenzene (SS)			87.5		%		70-130	27-AUG-14
Surrogate: 3,4-Dichlorotoluene (SS)			92.6		%		70-130	27-AUG-14
WG1938592-5	MB							
Benzene			<0.00050		mg/L		0.0005	27-AUG-14
Toluene			<0.00050		mg/L		0.0005	27-AUG-14
EthylBenzene			<0.00050		mg/L		0.0005	27-AUG-14
o-Xylene			<0.00050		mg/L		0.0005	27-AUG-14
m+p-Xylene			<0.00050		mg/L		0.0005	27-AUG-14
Styrene			<0.0010		mg/L		0.001	27-AUG-14
F1(C6-C10)			<0.10		mg/L		0.1	27-AUG-14
Surrogate: 1,4-Difluorobenzene (SS)			100.8		%		70-130	27-AUG-14
Surrogate: 4-Bromofluorobenzene (SS)			85.8		%		70-130	27-AUG-14
Surrogate: 3,4-Dichlorotoluene (SS)			93.9		%		70-130	27-AUG-14
C-DIS-ORG-ED		Water						
Batch	R2934298							
WG1941113-3	CVS							
Dissolved Organic Carbon			130.3		%		80-160	29-AUG-14
WG1941113-2	LCS							
Dissolved Organic Carbon			99.7		%		80-120	29-AUG-14
WG1941113-1	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	29-AUG-14
CL-IC-ED		Water						
Batch	R2930030							
WG1939009-13	DUP	L1507540-9						
Chloride (Cl)		10.3	10.2		mg/L	1.2	20	26-AUG-14
WG1939009-15	DUP	L1507540-23						
Chloride (Cl)		9.93	9.91		mg/L	0.2	20	26-AUG-14
WG1939009-3	DUP	L1507518-7						
Chloride (Cl)		3.78	3.73		mg/L	1.2	20	26-AUG-14
WG1939009-9	DUP	L1507255-1						
Chloride (Cl)		202	202		mg/L	0.0	20	26-AUG-14
WG1939009-11	LCS							
Chloride (Cl)			103.1		%		90-110	26-AUG-14
WG1939009-17	LCS							
Chloride (Cl)			102.9		%		90-110	26-AUG-14
WG1939009-2	LCS							



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 3 of 38

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-ED		Water						
Batch	R2930030							
WG1939009-2	LCS							
Chloride (Cl)			102.1		%		90-110	26-AUG-14
WG1939009-5	LCS							
Chloride (Cl)			102.6		%		90-110	26-AUG-14
WG1939009-7	LCS							
Chloride (Cl)			102.7		%		90-110	26-AUG-14
WG1939009-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-12	MB							
Chloride (Cl)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-18	MB							
Chloride (Cl)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-6	MB							
Chloride (Cl)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-8	MB							
Chloride (Cl)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-10	MS	L1507255-1						
Chloride (Cl)			N/A	MS-B	%		-	26-AUG-14
WG1939009-14	MS	L1507540-9						
Chloride (Cl)			97.1		%		75-125	26-AUG-14
WG1939009-16	MS	L1507540-23						
Chloride (Cl)			91.4		%		75-125	26-AUG-14
WG1939009-4	MS	L1507518-7						
Chloride (Cl)			102.2		%		75-125	26-AUG-14
F2,F3,F4-ED		Water						
Batch	R2931993							
WG1939240-2	LCS							
F2 (>C10-C16)			101.3		%		65-135	27-AUG-14
F3 (C16-C34)			105.5		%		65-135	27-AUG-14
F4 (C34-C50)			99.8		%		65-135	27-AUG-14
WG1939240-5	LCS							
F2 (>C10-C16)			107.0		%		65-135	27-AUG-14
F3 (C16-C34)			110.3		%		65-135	27-AUG-14
F4 (C34-C50)			102.6		%		65-135	27-AUG-14
WG1939240-1	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	27-AUG-14
F3 (C16-C34)			<0.25		mg/L		0.25	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 4 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2,F3,F4-ED		Water						
Batch	R2931993							
WG1939240-1	MB							
F4 (C34-C50)			<0.25		mg/L		0.25	27-AUG-14
Surrogate: 2-Bromobenzotrifluoride			87.9		%		50-150	27-AUG-14
WG1939240-4	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	27-AUG-14
F3 (C16-C34)			<0.25		mg/L		0.25	27-AUG-14
F4 (C34-C50)			<0.25		mg/L		0.25	27-AUG-14
Surrogate: 2-Bromobenzotrifluoride			97.4		%		50-150	27-AUG-14
WG1939240-3	MS	L1507251-1						
F2 (>C10-C16)			104.6		%		50-150	27-AUG-14
F3 (C16-C34)			108.0		%		50-150	27-AUG-14
F4 (C34-C50)			116.7		%		50-150	27-AUG-14
WG1939240-6	MS	L1507500-5						
F2 (>C10-C16)			103.4		%		50-150	27-AUG-14
F3 (C16-C34)			107.8		%		50-150	27-AUG-14
F4 (C34-C50)			110.9		%		50-150	27-AUG-14
HG-D-L-CVAA-ED		Water						
Batch	R2936072							
WG1942902-3	DUP	L1507500-1						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942902-7	DUP	L1507518-12						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942902-2	LCS							
Mercury (Hg)-Dissolved			85.8		%		80-120	02-SEP-14
WG1942902-6	LCS							
Mercury (Hg)-Dissolved			86.7		%		80-120	02-SEP-14
WG1942902-1	MB							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	02-SEP-14
WG1942902-5	MB							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	02-SEP-14
WG1942902-4	MS	L1507500-1						
Mercury (Hg)-Dissolved			87.5		%		70-130	02-SEP-14
WG1942902-8	MS	L1507518-12						
Mercury (Hg)-Dissolved			78.7		%		70-130	02-SEP-14
HG-T-L-CVAA-ED		Water						



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 5 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-L-CVAA-ED		Water						
Batch	R2936072							
WG1942905-3	DUP	L1508704-1						
Mercury (Hg)-Total		0.0000293	0.0000291		mg/L	0.7	20	02-SEP-14
WG1942905-2	LCS							
Mercury (Hg)-Total			82.6		%		80-120	02-SEP-14
WG1942905-1	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	02-SEP-14
WG1942905-4	MS	L1508704-1						
Mercury (Hg)-Total			74.0		%		70-130	02-SEP-14
MET-D-CCMS-ED		Water						
Batch	R2936909							
WG1943514-2	CRM	ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			97.4		%		80-120	03-SEP-14
Antimony (Sb)-Dissolved			103.6		%		80-120	03-SEP-14
Arsenic (As)-Dissolved			97.9		%		80-120	03-SEP-14
Barium (Ba)-Dissolved			104.1		%		80-120	03-SEP-14
Beryllium (Be)-Dissolved			95.7		%		80-120	03-SEP-14
Bismuth (Bi)-Dissolved			94.0		%		80-120	03-SEP-14
Cadmium (Cd)-Dissolved			99.3		%		80-120	03-SEP-14
Chromium (Cr)-Dissolved			101.0		%		80-120	03-SEP-14
Cobalt (Co)-Dissolved			99.7		%		80-120	03-SEP-14
Copper (Cu)-Dissolved			97.9		%		80-120	03-SEP-14
Lead (Pb)-Dissolved			95.0		%		80-120	03-SEP-14
Lithium (Li)-Dissolved			100.7		%		80-120	03-SEP-14
Manganese (Mn)-Dissolved			97.9		%		80-120	03-SEP-14
Molybdenum (Mo)-Dissolved			99.4		%		80-120	03-SEP-14
Nickel (Ni)-Dissolved			99.7		%		80-120	03-SEP-14
Selenium (Se)-Dissolved			101.1		%		80-120	03-SEP-14
Silicon (Si)-Dissolved			92.7		%		80-120	03-SEP-14
Silver (Ag)-Dissolved			104.1		%		80-120	03-SEP-14
Strontium (Sr)-Dissolved			102.8		%		80-120	03-SEP-14
Thallium (Tl)-Dissolved			96.4		%		80-120	03-SEP-14
Titanium (Ti)-Dissolved			94.1		%		80-120	03-SEP-14
Tin (Sn)-Dissolved			99.8		%		80-120	03-SEP-14
Uranium (U)-Dissolved			98.8		%		80-120	03-SEP-14
Vanadium (V)-Dissolved			101.2		%		80-120	03-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 6 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2936909							
WG1943514-2 CRM	ED-HIGH-WATRM							
Zinc (Zn)-Dissolved			96.5		%		80-120	03-SEP-14
WG1943514-4 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			100.7		%		80-120	03-SEP-14
Antimony (Sb)-Dissolved			104.6		%		80-120	03-SEP-14
Arsenic (As)-Dissolved			99.6		%		80-120	03-SEP-14
Barium (Ba)-Dissolved			107.7		%		80-120	03-SEP-14
Beryllium (Be)-Dissolved			99.0		%		80-120	03-SEP-14
Bismuth (Bi)-Dissolved			94.0		%		80-120	03-SEP-14
Cadmium (Cd)-Dissolved			101.1		%		80-120	03-SEP-14
Chromium (Cr)-Dissolved			102.3		%		80-120	03-SEP-14
Cobalt (Co)-Dissolved			102.7		%		80-120	03-SEP-14
Copper (Cu)-Dissolved			99.5		%		80-120	03-SEP-14
Lead (Pb)-Dissolved			97.4		%		80-120	03-SEP-14
Lithium (Li)-Dissolved			101.9		%		80-120	03-SEP-14
Manganese (Mn)-Dissolved			101.3		%		80-120	03-SEP-14
Molybdenum (Mo)-Dissolved			100.6		%		80-120	03-SEP-14
Nickel (Ni)-Dissolved			100.7		%		80-120	03-SEP-14
Selenium (Se)-Dissolved			103.7		%		80-120	03-SEP-14
Silicon (Si)-Dissolved			92.6		%		80-120	03-SEP-14
Silver (Ag)-Dissolved			107.5		%		80-120	03-SEP-14
Strontium (Sr)-Dissolved			100.2		%		80-120	03-SEP-14
Thallium (Tl)-Dissolved			100.4		%		80-120	03-SEP-14
Titanium (Ti)-Dissolved			101.8		%		80-120	03-SEP-14
Tin (Sn)-Dissolved			101.8		%		80-120	03-SEP-14
Uranium (U)-Dissolved			105.4		%		80-120	03-SEP-14
Vanadium (V)-Dissolved			102.0		%		80-120	03-SEP-14
Zinc (Zn)-Dissolved			98.7		%		80-120	03-SEP-14
WG1943514-6 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			96.9		%		80-120	03-SEP-14
Antimony (Sb)-Dissolved			102.7		%		80-120	03-SEP-14
Arsenic (As)-Dissolved			98.2		%		80-120	03-SEP-14
Barium (Ba)-Dissolved			101.6		%		80-120	03-SEP-14
Beryllium (Be)-Dissolved			96.7		%		80-120	03-SEP-14
Bismuth (Bi)-Dissolved			98.2		%		80-120	03-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 7 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2936909							
WG1943514-6 CRM		ED-HIGH-WATRM						
Cadmium (Cd)-Dissolved			99.9		%		80-120	03-SEP-14
Chromium (Cr)-Dissolved			101.0		%		80-120	03-SEP-14
Cobalt (Co)-Dissolved			99.6		%		80-120	03-SEP-14
Copper (Cu)-Dissolved			96.8		%		80-120	03-SEP-14
Lead (Pb)-Dissolved			98.8		%		80-120	03-SEP-14
Lithium (Li)-Dissolved			94.1		%		80-120	03-SEP-14
Manganese (Mn)-Dissolved			101.5		%		80-120	03-SEP-14
Molybdenum (Mo)-Dissolved			96.8		%		80-120	03-SEP-14
Nickel (Ni)-Dissolved			99.4		%		80-120	03-SEP-14
Selenium (Se)-Dissolved			102.8		%		80-120	03-SEP-14
Silicon (Si)-Dissolved			90.7		%		80-120	03-SEP-14
Silver (Ag)-Dissolved			105.3		%		80-120	03-SEP-14
Strontium (Sr)-Dissolved			97.4		%		80-120	03-SEP-14
Thallium (Tl)-Dissolved			100.4		%		80-120	03-SEP-14
Titanium (Ti)-Dissolved			98.5		%		80-120	03-SEP-14
Tin (Sn)-Dissolved			103.1		%		80-120	03-SEP-14
Uranium (U)-Dissolved			107.5		%		80-120	03-SEP-14
Vanadium (V)-Dissolved			100.5		%		80-120	03-SEP-14
Zinc (Zn)-Dissolved			97.6		%		80-120	03-SEP-14
WG1943514-8 CRM		ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			100.0		%		80-120	03-SEP-14
Antimony (Sb)-Dissolved			101.3		%		80-120	03-SEP-14
Arsenic (As)-Dissolved			99.1		%		80-120	03-SEP-14
Barium (Ba)-Dissolved			103.5		%		80-120	03-SEP-14
Beryllium (Be)-Dissolved			98.5		%		80-120	03-SEP-14
Bismuth (Bi)-Dissolved			98.6		%		80-120	03-SEP-14
Cadmium (Cd)-Dissolved			98.0		%		80-120	03-SEP-14
Chromium (Cr)-Dissolved			100.5		%		80-120	03-SEP-14
Cobalt (Co)-Dissolved			101.4		%		80-120	03-SEP-14
Copper (Cu)-Dissolved			99.4		%		80-120	03-SEP-14
Lead (Pb)-Dissolved			97.9		%		80-120	03-SEP-14
Lithium (Li)-Dissolved			96.9		%		80-120	03-SEP-14
Manganese (Mn)-Dissolved			101.4		%		80-120	03-SEP-14
Molybdenum (Mo)-Dissolved			99.4		%		80-120	03-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 8 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2936909							
WG1943514-8	CRM	ED-HIGH-WATRM						
Nickel (Ni)-Dissolved			100.6		%		80-120	03-SEP-14
Selenium (Se)-Dissolved			102.2		%		80-120	03-SEP-14
Silicon (Si)-Dissolved			92.1		%		80-120	03-SEP-14
Silver (Ag)-Dissolved			105.5		%		80-120	03-SEP-14
Strontium (Sr)-Dissolved			100.0		%		80-120	03-SEP-14
Thallium (Tl)-Dissolved			100.3		%		80-120	03-SEP-14
Titanium (Ti)-Dissolved			101.7		%		80-120	03-SEP-14
Tin (Sn)-Dissolved			99.0		%		80-120	03-SEP-14
Uranium (U)-Dissolved			102.9		%		80-120	03-SEP-14
Vanadium (V)-Dissolved			100.8		%		80-120	03-SEP-14
Zinc (Zn)-Dissolved			98.8		%		80-120	03-SEP-14
WG1943514-12	DUP	L1508669-2						
Aluminum (Al)-Dissolved		0.0029	0.0029		mg/L	0.9	20	03-SEP-14
Antimony (Sb)-Dissolved		0.00015	0.00015		mg/L	1.5	20	03-SEP-14
Arsenic (As)-Dissolved		0.00054	0.00052		mg/L	4.3	20	03-SEP-14
Barium (Ba)-Dissolved		0.142	0.143		mg/L	0.6	20	03-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	03-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	03-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Copper (Cu)-Dissolved		0.00166	0.00160		mg/L	3.5	20	03-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	03-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Lithium (Li)-Dissolved		0.0130	0.0143		mg/L	10	20	03-SEP-14
Manganese (Mn)-Dissolved		0.00171	0.00160		mg/L	6.5	20	03-SEP-14
Molybdenum (Mo)-Dissolved		0.000831	0.000849		mg/L	2.1	20	03-SEP-14
Nickel (Ni)-Dissolved		0.00084	0.00081		mg/L	4.0	20	03-SEP-14
Selenium (Se)-Dissolved		0.00035	0.00034		mg/L	3.2	20	03-SEP-14
Silicon (Si)-Dissolved		3.98	3.98		mg/L	0.2	20	03-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	03-SEP-14
Strontium (Sr)-Dissolved		0.206	0.207		mg/L	0.2	20	03-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 9 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2936909							
WG1943514-12	DUP	L1508669-2						
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	03-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Uranium (U)-Dissolved		0.00112	0.00110		mg/L	1.4	20	03-SEP-14
Vanadium (V)-Dissolved		0.00097	0.00100		mg/L	3.1	20	03-SEP-14
Zinc (Zn)-Dissolved		0.0033	0.0039		mg/L	18	20	03-SEP-14
WG1943514-9	DUP	L1508307-1						
Aluminum (Al)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	03-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Arsenic (As)-Dissolved		0.00023	0.00025		mg/L	8.8	20	03-SEP-14
Barium (Ba)-Dissolved		0.440	0.440		mg/L	0.0	20	03-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	03-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	03-SEP-14
Chromium (Cr)-Dissolved		0.00015	0.00014		mg/L	1.4	20	03-SEP-14
Cobalt (Co)-Dissolved		0.00078	0.00078		mg/L	0.3	20	03-SEP-14
Copper (Cu)-Dissolved		0.00024	0.00023		mg/L	2.7	20	03-SEP-14
Iron (Fe)-Dissolved		1.04	1.08		mg/L	3.5	20	03-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Lithium (Li)-Dissolved		0.112	0.122		mg/L	8.9	20	03-SEP-14
Manganese (Mn)-Dissolved		0.114	0.116		mg/L	1.4	20	03-SEP-14
Molybdenum (Mo)-Dissolved		0.00104	0.00106		mg/L	1.7	20	03-SEP-14
Nickel (Ni)-Dissolved		0.00053	0.00055		mg/L	3.3	20	03-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Silicon (Si)-Dissolved		9.69	9.81		mg/L	1.2	20	03-SEP-14
Silver (Ag)-Dissolved		0.000013	0.000012		mg/L	10	20	03-SEP-14
Strontium (Sr)-Dissolved		2.19	2.33		mg/L	6.3	20	03-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	03-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Uranium (U)-Dissolved		0.00186	0.00183		mg/L	1.3	20	03-SEP-14
Vanadium (V)-Dissolved		0.00014	0.00013		mg/L	8.6	20	03-SEP-14
Zinc (Zn)-Dissolved		0.0192	0.0194		mg/L	0.9	20	03-SEP-14
WG1943514-1	MB							



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 10 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2936909							
WG1943514-1	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	03-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	03-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	03-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	03-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	03-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	03-SEP-14
WG1943514-3	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	03-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 11 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2936909							
WG1943514-3 MB								
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	03-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	03-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	03-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	03-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	03-SEP-14
WG1943514-5 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	03-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	03-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	03-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 12 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2936909							
WG1943514-5 MB								
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	03-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	03-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	03-SEP-14
WG1943514-7 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	03-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	03-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	03-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	03-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 13 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2936909							
WG1943514-7	MB							
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	03-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	03-SEP-14
MET-T-CCMS-ED		Water						
Batch	R2930655							
WG1938752-6	DUP	L1507500-8						
Aluminum (Al)-Total		0.723	0.753		mg/L	4.1	20	27-AUG-14
Antimony (Sb)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	27-AUG-14
Arsenic (As)-Total		0.0241	0.0241		mg/L	0.2	20	27-AUG-14
Barium (Ba)-Total		0.0959	0.0960		mg/L	0.0	20	27-AUG-14
Beryllium (Be)-Total		<0.00050	<0.00010	RPD-NA	mg/L	N/A	20	27-AUG-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-AUG-14
Boron (B)-Total		0.160	0.156		mg/L	2.8	20	27-AUG-14
Cadmium (Cd)-Total		0.000051	<0.00020	RPD-NA	mg/L	N/A	20	27-AUG-14
Calcium (Ca)-Total		78.0	76.5		mg/L	2.0	20	27-AUG-14
Chromium (Cr)-Total		0.00879	0.0086		mg/L	2.4	20	27-AUG-14
Cobalt (Co)-Total		0.00096	0.00096		mg/L	0.6	20	27-AUG-14
Copper (Cu)-Total		0.00242	0.0025		mg/L	1.5	20	27-AUG-14
Iron (Fe)-Total		12.2	12.2		mg/L	0.5	20	27-AUG-14
Lead (Pb)-Total		0.00100	0.00104		mg/L	3.3	20	27-AUG-14
Lithium (Li)-Total		0.0411	0.0404		mg/L	1.8	20	27-AUG-14
Magnesium (Mg)-Total		20.2	20.8		mg/L	2.8	20	27-AUG-14
Manganese (Mn)-Total		0.510	0.496		mg/L	2.8	20	27-AUG-14
Molybdenum (Mo)-Total		0.0116	0.0115		mg/L	1.2	20	27-AUG-14
Nickel (Ni)-Total		0.00834	0.0081		mg/L	2.7	20	27-AUG-14
Potassium (K)-Total		4.35	4.41		mg/L	1.2	20	27-AUG-14
Selenium (Se)-Total		0.00016	<0.00040	RPD-NA	mg/L	N/A	20	27-AUG-14
Silicon (Si)-Total		10.7	11.0		mg/L	2.2	20	27-AUG-14
Silver (Ag)-Total		0.000011	<0.00040	RPD-NA	mg/L	N/A	20	27-AUG-14
Sodium (Na)-Total		19.5	19.3		mg/L	0.7	20	27-AUG-14
Strontium (Sr)-Total		0.506	0.495		mg/L	2.1	20	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 14 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2930655							
WG1938752-6	DUP	L1507500-8						
Thallium (Tl)-Total		<0.000050	0.000038		mg/L	0.6	20	27-AUG-14
Tin (Sn)-Total		0.00079	0.00079		mg/L	0.7	20	27-AUG-14
Titanium (Ti)-Total		0.0213	0.0237		mg/L	11	20	27-AUG-14
Uranium (U)-Total		0.000211	0.00021		mg/L	1.4	20	27-AUG-14
Vanadium (V)-Total		0.00301	0.00309		mg/L	2.6	20	27-AUG-14
Zinc (Zn)-Total		0.0111	0.0111		mg/L	0.7	20	27-AUG-14
WG1939388-3	DUP	L1507138-2						
Aluminum (Al)-Total		0.0304	0.0299		mg/L	1.5	20	28-AUG-14
Antimony (Sb)-Total		0.00011	0.00010		mg/L	5.9	20	28-AUG-14
Arsenic (As)-Total		0.00092	0.00092		mg/L	0.6	20	28-AUG-14
Barium (Ba)-Total		0.293	0.296		mg/L	1.1	20	28-AUG-14
Beryllium (Be)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-AUG-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14
Boron (B)-Total		0.040	0.039		mg/L	1.6	20	28-AUG-14
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-AUG-14
Calcium (Ca)-Total		24.5	24.1		mg/L	1.6	20	28-AUG-14
Chromium (Cr)-Total		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Copper (Cu)-Total		0.00042	0.00043		mg/L	1.1	20	28-AUG-14
Iron (Fe)-Total		0.041	0.042		mg/L	1.1	20	28-AUG-14
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14
Lithium (Li)-Total		0.0123	0.0116		mg/L	6.0	20	28-AUG-14
Magnesium (Mg)-Total		9.30	9.57		mg/L	2.8	20	28-AUG-14
Manganese (Mn)-Total		0.0145	0.0143		mg/L	1.4	20	28-AUG-14
Molybdenum (Mo)-Total		0.00151	0.00149		mg/L	1.3	20	28-AUG-14
Nickel (Ni)-Total		0.00099	0.00098		mg/L	1.1	20	28-AUG-14
Potassium (K)-Total		2.40	2.42		mg/L	0.6	20	28-AUG-14
Selenium (Se)-Total		0.00015	0.00016		mg/L	7.6	20	28-AUG-14
Silicon (Si)-Total		4.17	4.29		mg/L	2.9	20	28-AUG-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-AUG-14
Sodium (Na)-Total		150	150		mg/L	0.1	20	28-AUG-14
Strontium (Sr)-Total		0.485	0.482		mg/L	0.6	20	28-AUG-14
Thallium (Tl)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 15 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2930655							
WG1939388-3	DUP	L1507138-2						
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Titanium (Ti)-Total		0.00076	0.00066		mg/L	14	20	28-AUG-14
Uranium (U)-Total		0.00121	0.00125		mg/L	3.2	20	28-AUG-14
Vanadium (V)-Total		0.00079	0.00078		mg/L	0.9	20	28-AUG-14
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1938752-5	LCS							
Aluminum (Al)-Total			106.5		%		80-120	27-AUG-14
Aluminum (Al)-Total			106.5		%		80-120	27-AUG-14
Antimony (Sb)-Total			101.3		%		80-120	27-AUG-14
Antimony (Sb)-Total			101.3		%		80-120	27-AUG-14
Arsenic (As)-Total			102.6		%		80-120	27-AUG-14
Arsenic (As)-Total			102.6		%		80-120	27-AUG-14
Barium (Ba)-Total			104.1		%		80-120	27-AUG-14
Barium (Ba)-Total			104.1		%		80-120	27-AUG-14
Beryllium (Be)-Total			101.5		%		80-120	27-AUG-14
Beryllium (Be)-Total			101.5		%		80-120	27-AUG-14
Bismuth (Bi)-Total			105.9		%		80-120	27-AUG-14
Bismuth (Bi)-Total			105.9		%		80-120	27-AUG-14
Boron (B)-Total			90.9		%		80-120	27-AUG-14
Boron (B)-Total			90.9		%		80-120	27-AUG-14
Cadmium (Cd)-Total			101.3		%		80-120	27-AUG-14
Cadmium (Cd)-Total			101.3		%		80-120	27-AUG-14
Calcium (Ca)-Total			102.0		%		80-120	27-AUG-14
Calcium (Ca)-Total			102.0		%		80-120	27-AUG-14
Chromium (Cr)-Total			105.9		%		80-120	27-AUG-14
Chromium (Cr)-Total			105.9		%		80-120	27-AUG-14
Cobalt (Co)-Total			106.5		%		80-120	27-AUG-14
Cobalt (Co)-Total			106.5		%		80-120	27-AUG-14
Copper (Cu)-Total			104.8		%		80-120	27-AUG-14
Copper (Cu)-Total			104.8		%		80-120	27-AUG-14
Iron (Fe)-Total			95.5		%		80-120	27-AUG-14
Iron (Fe)-Total			95.5		%		80-120	27-AUG-14
Lead (Pb)-Total			106.5		%		80-120	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 16 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2930655							
WG1938752-5	LCS							
Lead (Pb)-Total			106.5		%		80-120	27-AUG-14
Lithium (Li)-Total			98.8		%		80-120	27-AUG-14
Lithium (Li)-Total			98.8		%		80-120	27-AUG-14
Magnesium (Mg)-Total			109.2		%		80-120	27-AUG-14
Magnesium (Mg)-Total			109.2		%		80-120	27-AUG-14
Manganese (Mn)-Total			105.6		%		80-120	27-AUG-14
Manganese (Mn)-Total			105.6		%		80-120	27-AUG-14
Molybdenum (Mo)-Total			100.7		%		80-120	27-AUG-14
Molybdenum (Mo)-Total			100.7		%		80-120	27-AUG-14
Nickel (Ni)-Total			105.7		%		80-120	27-AUG-14
Nickel (Ni)-Total			105.7		%		80-120	27-AUG-14
Potassium (K)-Total			104.0		%		80-120	27-AUG-14
Potassium (K)-Total			104.0		%		80-120	27-AUG-14
Selenium (Se)-Total			105.2		%		80-120	27-AUG-14
Selenium (Se)-Total			105.2		%		80-120	27-AUG-14
Silicon (Si)-Total			102.0		%		80-120	27-AUG-14
Silicon (Si)-Total			102.0		%		80-120	27-AUG-14
Silver (Ag)-Total			100.6		%		80-120	27-AUG-14
Silver (Ag)-Total			100.6		%		80-120	27-AUG-14
Sodium (Na)-Total			107.9		%		80-120	27-AUG-14
Sodium (Na)-Total			107.9		%		80-120	27-AUG-14
Strontium (Sr)-Total			101.7		%		80-120	27-AUG-14
Strontium (Sr)-Total			101.7		%		80-120	27-AUG-14
Thallium (Tl)-Total			103.1		%		80-120	27-AUG-14
Thallium (Tl)-Total			103.1		%		80-120	27-AUG-14
Tin (Sn)-Total			98.5		%		80-120	27-AUG-14
Tin (Sn)-Total			98.5		%		80-120	27-AUG-14
Titanium (Ti)-Total			100.1		%		80-120	27-AUG-14
Titanium (Ti)-Total			100.1		%		80-120	27-AUG-14
Uranium (U)-Total			101.1		%		80-120	27-AUG-14
Uranium (U)-Total			101.1		%		80-120	27-AUG-14
Vanadium (V)-Total			107.2		%		80-120	27-AUG-14
Vanadium (V)-Total			107.2		%		80-120	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 17 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2930655							
WG1938752-5	LCS							
Zinc (Zn)-Total			104.0		%		80-120	27-AUG-14
Zinc (Zn)-Total			104.0		%		80-120	27-AUG-14
WG1939388-2	LCS							
Aluminum (Al)-Total			103.0		%		80-120	27-AUG-14
Antimony (Sb)-Total			96.5		%		80-120	27-AUG-14
Arsenic (As)-Total			101.3		%		80-120	27-AUG-14
Barium (Ba)-Total			107.8		%		80-120	27-AUG-14
Beryllium (Be)-Total			92.3		%		80-120	27-AUG-14
Bismuth (Bi)-Total			104.1		%		80-120	27-AUG-14
Boron (B)-Total			90.7		%		80-120	27-AUG-14
Cadmium (Cd)-Total			102.7		%		80-120	27-AUG-14
Calcium (Ca)-Total			95.9		%		80-120	27-AUG-14
Chromium (Cr)-Total			106.3		%		80-120	27-AUG-14
Cobalt (Co)-Total			101.6		%		80-120	27-AUG-14
Copper (Cu)-Total			99.9		%		80-120	27-AUG-14
Iron (Fe)-Total			97.2		%		80-120	27-AUG-14
Lead (Pb)-Total			106.2		%		80-120	27-AUG-14
Lithium (Li)-Total			88.9		%		80-120	27-AUG-14
Magnesium (Mg)-Total			103.5		%		80-120	27-AUG-14
Manganese (Mn)-Total			99.9		%		80-120	27-AUG-14
Molybdenum (Mo)-Total			93.9		%		80-120	27-AUG-14
Nickel (Ni)-Total			103.2		%		80-120	27-AUG-14
Potassium (K)-Total			101.8		%		80-120	27-AUG-14
Selenium (Se)-Total			102.6		%		80-120	27-AUG-14
Silicon (Si)-Total			98.4		%		80-120	27-AUG-14
Silver (Ag)-Total			97.4		%		80-120	27-AUG-14
Sodium (Na)-Total			103.7		%		80-120	27-AUG-14
Strontium (Sr)-Total			96.6		%		80-120	27-AUG-14
Thallium (Tl)-Total			98.8		%		80-120	27-AUG-14
Tin (Sn)-Total			95.7		%		80-120	27-AUG-14
Titanium (Ti)-Total			107.1		%		80-120	27-AUG-14
Uranium (U)-Total			97.9		%		80-120	27-AUG-14
Vanadium (V)-Total			104.6		%		80-120	27-AUG-14
Zinc (Zn)-Total			101.4		%		80-120	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 18 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2930655							
WG1938752-4 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-AUG-14
Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-AUG-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Boron (B)-Total			<0.010		mg/L		0.01	27-AUG-14
Boron (B)-Total			<0.010		mg/L		0.01	27-AUG-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	27-AUG-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	27-AUG-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Iron (Fe)-Total			<0.010		mg/L		0.01	27-AUG-14
Iron (Fe)-Total			<0.010		mg/L		0.01	27-AUG-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	27-AUG-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	27-AUG-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-AUG-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-AUG-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 19 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2930655							
WG1938752-4	MB							
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Potassium (K)-Total			<0.050		mg/L		0.05	27-AUG-14
Potassium (K)-Total			<0.050		mg/L		0.05	27-AUG-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Silicon (Si)-Total			<0.050		mg/L		0.05	27-AUG-14
Silicon (Si)-Total			<0.050		mg/L		0.05	27-AUG-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Sodium (Na)-Total			<0.050		mg/L		0.05	27-AUG-14
Sodium (Na)-Total			<0.050		mg/L		0.05	27-AUG-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-AUG-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-AUG-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-AUG-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-AUG-14
WG1939388-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-AUG-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 20 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch R2930655								
WG1939388-1 MB								
Boron (B)-Total			<0.010		mg/L		0.01	27-AUG-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	27-AUG-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Iron (Fe)-Total			<0.010		mg/L		0.01	27-AUG-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	27-AUG-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-AUG-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-AUG-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Potassium (K)-Total			<0.050		mg/L		0.05	27-AUG-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Silicon (Si)-Total			<0.050		mg/L		0.05	27-AUG-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Sodium (Na)-Total			<0.050		mg/L		0.05	27-AUG-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-AUG-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-AUG-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-AUG-14
Vanadium (V)-Total			<0.00020		mg/L		0.0002	27-AUG-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-AUG-14
Batch R2932131								
WG1937342-3 DUP		L1508740-3						
Aluminum (Al)-Total		0.0066	0.0059		mg/L	9.9	20	28-AUG-14
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Arsenic (As)-Total		0.00041	0.00036		mg/L	14	20	28-AUG-14
Barium (Ba)-Total		0.0811	0.0816		mg/L	0.6	20	28-AUG-14
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 21 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2932131							
WG1937342-3	DUP	L1508740-3						
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-AUG-14
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-AUG-14
Calcium (Ca)-Total		62.9	63.9		mg/L	1.6	20	28-AUG-14
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Copper (Cu)-Total		0.00022	0.00020		mg/L	11	20	28-AUG-14
Iron (Fe)-Total		0.081	0.081		mg/L	0.6	20	28-AUG-14
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14
Lithium (Li)-Total		0.0062	0.0067		mg/L	7.2	20	28-AUG-14
Magnesium (Mg)-Total		16.6	17.0		mg/L	2.0	20	28-AUG-14
Manganese (Mn)-Total		0.0101	0.0101		mg/L	0.3	20	28-AUG-14
Molybdenum (Mo)-Total		0.000782	0.000800		mg/L	2.3	20	28-AUG-14
Nickel (Ni)-Total		0.00032	0.00030		mg/L	8.7	20	28-AUG-14
Potassium (K)-Total		0.962	0.961		mg/L	0.1	20	28-AUG-14
Selenium (Se)-Total		<0.00010	0.00011	RPD-NA	mg/L	N/A	20	28-AUG-14
Silicon (Si)-Total		3.96	3.94		mg/L	0.5	20	28-AUG-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-AUG-14
Sodium (Na)-Total		16.0	15.7		mg/L	1.7	20	28-AUG-14
Strontium (Sr)-Total		0.348	0.366		mg/L	5.1	20	28-AUG-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-AUG-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	28-AUG-14
Uranium (U)-Total		0.00109	0.00108		mg/L	1.1	20	28-AUG-14
Vanadium (V)-Total		0.00019	0.00022		mg/L	9.9	20	28-AUG-14
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1937342-4	DUP	L1507028-4						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	28-AUG-14
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Barium (Ba)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14
Beryllium (Be)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-AUG-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 22 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2932131							
WG1937342-4	DUP	L1507028-4						
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-AUG-14
Calcium (Ca)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	28-AUG-14
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Copper (Cu)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Iron (Fe)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	28-AUG-14
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14
Lithium (Li)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	28-AUG-14
Magnesium (Mg)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	28-AUG-14
Manganese (Mn)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	28-AUG-14
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14
Nickel (Ni)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Potassium (K)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	28-AUG-14
Selenium (Se)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Silicon (Si)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-AUG-14
Sodium (Na)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	20	28-AUG-14
Strontium (Sr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Thallium (Tl)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-AUG-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	28-AUG-14
Uranium (U)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-AUG-14
Vanadium (V)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-AUG-14
Zinc (Zn)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1937342-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	28-AUG-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Boron (B)-Total			<0.010		mg/L		0.01	28-AUG-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	28-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 23 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2932131							
WG1937342-1 MB								
Calcium (Ca)-Total			<0.020		mg/L		0.02	28-AUG-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Iron (Fe)-Total			<0.010		mg/L		0.01	28-AUG-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	28-AUG-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	28-AUG-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Potassium (K)-Total			<0.050		mg/L		0.05	28-AUG-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Silicon (Si)-Total			<0.050		mg/L		0.05	28-AUG-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	28-AUG-14
Sodium (Na)-Total			<0.050		mg/L		0.05	28-AUG-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	28-AUG-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	28-AUG-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	28-AUG-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	28-AUG-14
WG1937342-2 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	28-AUG-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Boron (B)-Total			<0.010		mg/L		0.01	28-AUG-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	28-AUG-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	28-AUG-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	28-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 24 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2932131							
WG1937342-2	MB							
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Iron (Fe)-Total			<0.010		mg/L		0.01	28-AUG-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	28-AUG-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	28-AUG-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	28-AUG-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Potassium (K)-Total			<0.050		mg/L		0.05	28-AUG-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Silicon (Si)-Total			<0.050		mg/L		0.05	28-AUG-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	28-AUG-14
Sodium (Na)-Total			<0.050		mg/L		0.05	28-AUG-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	28-AUG-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	28-AUG-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	28-AUG-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	28-AUG-14
WG1938752-4	MB							
Vanadium (V)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	28-AUG-14
Batch	R2938205							
WG1943138-2	DUP	L1510999-1						
Aluminum (Al)-Total		0.0481	0.0456		mg/L	5.5	20	04-SEP-14
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Arsenic (As)-Total		0.00020	0.00018		mg/L	11	20	04-SEP-14
Barium (Ba)-Total		0.0529	0.0540		mg/L	1.9	20	04-SEP-14
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Boron (B)-Total		0.014	0.014		mg/L	3.0	20	04-SEP-14
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 25 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2938205							
WG1943138-2	DUP	L1510999-1						
Calcium (Ca)-Total		34.2	33.8		mg/L	1.0	20	04-SEP-14
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Copper (Cu)-Total		0.0130	0.0129		mg/L	0.6	20	04-SEP-14
Iron (Fe)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	04-SEP-14
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Lithium (Li)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	04-SEP-14
Magnesium (Mg)-Total		9.62	9.65		mg/L	0.3	20	04-SEP-14
Manganese (Mn)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	04-SEP-14
Molybdenum (Mo)-Total		0.000657	0.000664		mg/L	1.1	20	04-SEP-14
Nickel (Ni)-Total		0.00065	0.00068		mg/L	4.6	20	04-SEP-14
Potassium (K)-Total		1.20	1.19		mg/L	1.0	20	04-SEP-14
Selenium (Se)-Total		0.00012	0.00011		mg/L	8.9	20	04-SEP-14
Silicon (Si)-Total		1.25	1.25		mg/L	0.2	20	04-SEP-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Sodium (Na)-Total		17.0	16.9		mg/L	0.6	20	04-SEP-14
Strontium (Sr)-Total		0.229	0.235		mg/L	2.7	20	04-SEP-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-SEP-14
Uranium (U)-Total		0.000012	0.000014		mg/L	19	20	04-SEP-14
Vanadium (V)-Total		0.00012	0.00011		mg/L	9.8	20	04-SEP-14
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-SEP-14
WG1943138-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	04-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	04-SEP-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	04-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	04-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	04-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	04-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 26 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2938205							
WG1943138-1	MB							
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	04-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	04-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	04-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	04-SEP-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	04-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	04-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	04-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	04-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	04-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	04-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	04-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	04-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	04-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	04-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	04-SEP-14
NAPHTHENIC-ACID-FM		Water						
Batch	R2938469							
WG1942696-3	DUP	L1507500-2						
Naphthenic Acids		<1.0	<1.0	RPD-NA	mg/L	N/A	30	04-SEP-14
WG1942696-7	DUP	L1508128-2						
Naphthenic Acids		48.4	46.7		mg/L	3.5	30	04-SEP-14
WG1942696-4	LCS							
Naphthenic Acids			73.5		%		70-130	04-SEP-14
WG1942696-8	LCS							
Naphthenic Acids			90.7		%		70-130	04-SEP-14
WG1942696-1	MB							
Naphthenic Acids			<1.0		mg/L		1	04-SEP-14
WG1942696-5	MB							



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 28 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-ED		Water						
Batch	R2930030							
WG1939009-7	LCS							
Nitrite (as N)			104.8		%		90-110	26-AUG-14
WG1939009-1	MB							
Nitrite (as N)			<0.020		mg/L		0.02	26-AUG-14
WG1939009-12	MB							
Nitrite (as N)			<0.020		mg/L		0.02	26-AUG-14
WG1939009-18	MB							
Nitrite (as N)			<0.020		mg/L		0.02	26-AUG-14
WG1939009-6	MB							
Nitrite (as N)			<0.020		mg/L		0.02	26-AUG-14
WG1939009-8	MB							
Nitrite (as N)			<0.020		mg/L		0.02	26-AUG-14
WG1939009-10	MS	L1507255-1						
Nitrite (as N)			91.2		%		75-125	26-AUG-14
WG1939009-14	MS	L1507540-9						
Nitrite (as N)			102.8		%		75-125	26-AUG-14
WG1939009-16	MS	L1507540-23						
Nitrite (as N)			98.9		%		75-125	26-AUG-14
WG1939009-4	MS	L1507518-7						
Nitrite (as N)			97.9		%		75-125	26-AUG-14
NO3-IC-ED		Water						
Batch	R2930030							
WG1939009-13	DUP	L1507540-9						
Nitrate (as N)		0.054	<0.050	RPD-NA	mg/L	N/A	20	26-AUG-14
WG1939009-15	DUP	L1507540-23						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-AUG-14
WG1939009-3	DUP	L1507518-7						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-AUG-14
WG1939009-9	DUP	L1507255-1						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-AUG-14
WG1939009-11	LCS							
Nitrate (as N)			100.3		%		90-110	26-AUG-14
WG1939009-17	LCS							
Nitrate (as N)			98.1		%		90-110	26-AUG-14
WG1939009-2	LCS							
Nitrate (as N)			100.8		%		90-110	26-AUG-14
WG1939009-5	LCS							
Nitrate (as N)			101.1		%		90-110	26-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 29 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-ED		Water						
Batch	R2930030							
WG1939009-7	LCS							
Nitrate (as N)			100.3		%		90-110	26-AUG-14
WG1939009-1	MB							
Nitrate (as N)			<0.050		mg/L		0.05	26-AUG-14
WG1939009-12	MB							
Nitrate (as N)			<0.050		mg/L		0.05	26-AUG-14
WG1939009-18	MB							
Nitrate (as N)			<0.050		mg/L		0.05	26-AUG-14
WG1939009-6	MB							
Nitrate (as N)			<0.050		mg/L		0.05	26-AUG-14
WG1939009-8	MB							
Nitrate (as N)			<0.050		mg/L		0.05	26-AUG-14
WG1939009-10	MS	L1507255-1						
Nitrate (as N)			96.3		%		75-125	26-AUG-14
WG1939009-14	MS	L1507540-9						
Nitrate (as N)			88.9		%		75-125	26-AUG-14
WG1939009-16	MS	L1507540-23						
Nitrate (as N)			85.9		%		75-125	26-AUG-14
WG1939009-4	MS	L1507518-7						
Nitrate (as N)			95.9		%		75-125	26-AUG-14
PAH-ABT1-CL		Water						
Batch	R2930735							
WG1939787-2	LCS							
Acenaphthene			86.7		%		60-130	26-AUG-14
Acenaphthylene			94.2		%		60-130	26-AUG-14
Anthracene			96.4		%		60-130	26-AUG-14
Fluoranthene			91.5		%		60-130	26-AUG-14
Fluorene			87.7		%		60-130	26-AUG-14
Naphthalene			86.1		%		50-130	26-AUG-14
Phenanthrene			92.3		%		60-130	26-AUG-14
Pyrene			98.0		%		60-130	26-AUG-14
Benzo(a)anthracene			93.1		%		60-130	26-AUG-14
Benzo(k)fluoranthene			89.6		%		60-130	26-AUG-14
Benzo(b&j)fluoranthene			88.8		%		60-130	26-AUG-14
Benzo(g,h,i)perylene			93.4		%		60-130	26-AUG-14
Benzo(a)pyrene			87.3		%		60-130	26-AUG-14
Chrysene			94.4				60-130	



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 30 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R2930735							
WG1939787-2	LCS							
Chrysene			94.4		%		60-130	26-AUG-14
Dibenzo(a,h)anthracene			94.5		%		60-130	26-AUG-14
Indeno(1,2,3-cd)pyrene			93.7		%		60-130	26-AUG-14
WG1939787-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	26-AUG-14
Acenaphthylene			<0.000020		mg/L		0.00002	26-AUG-14
Anthracene			<0.000010		mg/L		0.00001	26-AUG-14
Fluoranthene			<0.000020		mg/L		0.00002	26-AUG-14
Fluorene			<0.000020		mg/L		0.00002	26-AUG-14
Naphthalene			<0.000050		mg/L		0.00005	26-AUG-14
Phenanthrene			<0.000050		mg/L		0.00005	26-AUG-14
Pyrene			<0.000010		mg/L		0.00001	26-AUG-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	26-AUG-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	26-AUG-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	26-AUG-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	26-AUG-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	26-AUG-14
Chrysene			<0.000020		mg/L		0.00002	26-AUG-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	26-AUG-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	26-AUG-14
Surrogate: d10-Acenaphthene			95.2		%		60-130	26-AUG-14
Surrogate: d10-Phenanthrene			96.1		%		60-130	26-AUG-14
Surrogate: d12-Chrysene			92.5		%		60-130	26-AUG-14
Batch	R2938782							
WG1943842-2	LCS							
Acenaphthene			94.3		%		60-130	02-SEP-14
Acenaphthylene			101.6		%		60-130	02-SEP-14
Anthracene			102.4		%		60-130	02-SEP-14
Fluoranthene			95.9		%		60-130	02-SEP-14
Fluorene			97.6		%		60-130	02-SEP-14
Naphthalene			98.0		%		50-130	02-SEP-14
Phenanthrene			98.6		%		60-130	02-SEP-14
Pyrene			95.2		%		60-130	02-SEP-14
Benzo(a)anthracene			100.2		%		60-130	02-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 31 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL								
	Water							
Batch	R2938782							
WG1943842-2	LCS							
Benzo(k)fluoranthene			95.1		%		60-130	02-SEP-14
Benzo(b&j)fluoranthene			97.0		%		60-130	02-SEP-14
Benzo(g,h,i)perylene			94.8		%		60-130	02-SEP-14
Benzo(a)pyrene			94.6		%		60-130	02-SEP-14
Chrysene			98.9		%		60-130	02-SEP-14
Dibenzo(a,h)anthracene			97.3		%		60-130	02-SEP-14
Indeno(1,2,3-cd)pyrene			96.9		%		60-130	02-SEP-14
WG1943842-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	02-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	02-SEP-14
Anthracene			<0.000010		mg/L		0.00001	02-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	02-SEP-14
Fluorene			<0.000020		mg/L		0.00002	02-SEP-14
Naphthalene			<0.000050		mg/L		0.00005	02-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	02-SEP-14
Pyrene			<0.000010		mg/L		0.00001	02-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	02-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	02-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	02-SEP-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	02-SEP-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	02-SEP-14
Chrysene			<0.000020		mg/L		0.00002	02-SEP-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	02-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	02-SEP-14
Surrogate: d10-Acenaphthene			102.6		%		60-130	02-SEP-14
Surrogate: d10-Phenanthrene			97.7		%		60-130	02-SEP-14
Surrogate: d12-Chrysene			96.7		%		60-130	02-SEP-14
PH/EC/ALK-ED								
	Water							
Batch	R2928836							
WG1938353-10	DUP	L1507255-1						
pH		8.17	8.08	J	pH	0.08	0.3	27-AUG-14
Conductivity (EC)		1470	1470		uS/cm	0.1	10	27-AUG-14
Bicarbonate (HCO3)		502	500		mg/L	0.4	25	27-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	27-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 32 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2928836							
WG1938353-10	DUP	L1507255-1						
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	27-AUG-14
Alkalinity, Total (as CaCO3)		412	410		mg/L	0.4	20	27-AUG-14
WG1938353-11	DUP	L1507000-6						
pH		8.60	8.58	J	pH	0.01	0.3	27-AUG-14
Conductivity (EC)		1960	1950		uS/cm	0.9	10	27-AUG-14
Bicarbonate (HCO3)		539	537		mg/L	0.5	25	27-AUG-14
Carbonate (CO3)		20.7	19.5		mg/L	6.0	25	27-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	27-AUG-14
Alkalinity, Total (as CaCO3)		477	473		mg/L	0.9	20	27-AUG-14
WG1938353-12	DUP	L1507540-7						
pH		7.92	7.90	J	pH	0.01	0.3	27-AUG-14
Conductivity (EC)		296	296		uS/cm	0.0	10	27-AUG-14
Bicarbonate (HCO3)		179	178		mg/L	0.5	25	27-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	27-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	27-AUG-14
Alkalinity, Total (as CaCO3)		147	146		mg/L	0.5	20	27-AUG-14
WG1938353-6	DUP	L1507039-1						
pH		8.21	8.08	J	pH	0.13	0.3	26-AUG-14
Conductivity (EC)		315	312		uS/cm	1.0	10	26-AUG-14
Bicarbonate (HCO3)		134	132		mg/L	1.5	25	26-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	26-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	26-AUG-14
Alkalinity, Total (as CaCO3)		110	108		mg/L	1.5	20	26-AUG-14
WG1938353-9	DUP	L1507518-7						
pH		7.44	7.45	J	pH	0.01	0.3	26-AUG-14
Conductivity (EC)		418	419		uS/cm	0.2	10	26-AUG-14
Bicarbonate (HCO3)		261	260		mg/L	0.4	25	26-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	26-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	26-AUG-14
Alkalinity, Total (as CaCO3)		214	213		mg/L	0.4	20	26-AUG-14
WG1938353-14	LCS	L1507518-7						
Conductivity (EC)			97.8		%		90-110	26-AUG-14
WG1938353-15	LCS	L1507518-7						
pH			7.01		pH		6.7-7.3	26-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 33 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2928836							
WG1938353-16	LCS							
Alkalinity, Total (as CaCO3)			98.9		%		85-115	26-AUG-14
WG1938353-17	LCS							
Conductivity (EC)			94.8		%		90-110	26-AUG-14
WG1938353-19	LCS							
Conductivity (EC)			97.3		%		90-110	26-AUG-14
WG1938353-2	LCS							
Conductivity (EC)			98.8		%		90-110	26-AUG-14
WG1938353-20	LCS							
pH			7.03		pH		6.7-7.3	26-AUG-14
WG1938353-21	LCS							
Alkalinity, Total (as CaCO3)			99.5		%		85-115	26-AUG-14
WG1938353-22	LCS							
Conductivity (EC)			94.0		%		90-110	26-AUG-14
WG1938353-24	LCS							
Conductivity (EC)			96.1		%		90-110	26-AUG-14
WG1938353-25	LCS							
pH			7.02		pH		6.7-7.3	26-AUG-14
WG1938353-26	LCS							
Alkalinity, Total (as CaCO3)			99.4		%		85-115	26-AUG-14
WG1938353-27	LCS							
Conductivity (EC)			92.5		%		90-110	26-AUG-14
WG1938353-29	LCS							
Conductivity (EC)			98.3		%		90-110	26-AUG-14
WG1938353-3	LCS							
pH			7.01		pH		6.7-7.3	26-AUG-14
WG1938353-30	LCS							
pH			7.03		pH		6.7-7.3	26-AUG-14
WG1938353-31	LCS							
Alkalinity, Total (as CaCO3)			100.6		%		85-115	26-AUG-14
WG1938353-32	LCS							
Conductivity (EC)			97.3		%		90-110	26-AUG-14
WG1938353-4	LCS							
Alkalinity, Total (as CaCO3)			98.6		%		85-115	26-AUG-14
WG1938353-5	LCS							
Conductivity (EC)			96.3		%		90-110	26-AUG-14
WG1938353-1	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	26-AUG-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 34 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2928836							
WG1938353-1 MB								
Carbonate (CO3)			<5.0		mg/L		5	26-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	26-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-AUG-14
WG1938353-13 MB								
Bicarbonate (HCO3)			<5.0		mg/L		5	26-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	26-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	26-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-AUG-14
WG1938353-18 MB								
Bicarbonate (HCO3)			<5.0		mg/L		5	26-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	26-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	26-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-AUG-14
WG1938353-23 MB								
Bicarbonate (HCO3)			<5.0		mg/L		5	26-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	26-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	26-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-AUG-14
WG1938353-28 MB								
Bicarbonate (HCO3)			<5.0		mg/L		5	26-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	26-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	26-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-AUG-14
PHENOLS-4AAP-ED		Water						
Batch	R2938100							
WG1944702-3 DUP		L1511741-5						
Phenols (4AAP)		0.0229	0.0253		mg/L	10	15	04-SEP-14
WG1944702-4 DUP		L1508704-5						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	04-SEP-14
WG1944702-5 DUP		L1509884-6						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	04-SEP-14
WG1944702-2 LCS								
Phenols (4AAP)			100.0		%		85-115	04-SEP-14
WG1944702-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	04-SEP-14



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 35 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-ED		Water						
Batch	R2930030							
WG1939009-13	DUP	L1507540-9						
Sulfate (SO4)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	26-AUG-14
WG1939009-15	DUP	L1507540-23						
Sulfate (SO4)		1.48	1.42		mg/L	4.4	20	26-AUG-14
WG1939009-3	DUP	L1507518-7						
Sulfate (SO4)		1.13	1.09		mg/L	3.4	20	26-AUG-14
WG1939009-9	DUP	L1507255-1						
Sulfate (SO4)		42.5	42.6		mg/L	0.2	20	26-AUG-14
WG1939009-11	LCS							
Sulfate (SO4)			101.5		%		90-110	26-AUG-14
WG1939009-17	LCS							
Sulfate (SO4)			101.3		%		90-110	26-AUG-14
WG1939009-2	LCS							
Sulfate (SO4)			100.8		%		90-110	26-AUG-14
WG1939009-5	LCS							
Sulfate (SO4)			101.8		%		90-110	26-AUG-14
WG1939009-7	LCS							
Sulfate (SO4)			101.2		%		90-110	26-AUG-14
WG1939009-1	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-12	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-18	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-6	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-8	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	26-AUG-14
WG1939009-10	MS	L1507255-1						
Sulfate (SO4)			97.9		%		75-125	26-AUG-14
WG1939009-14	MS	L1507540-9						
Sulfate (SO4)			95.2		%		75-125	26-AUG-14
WG1939009-16	MS	L1507540-23						
Sulfate (SO4)			89.3		%		75-125	26-AUG-14
WG1939009-4	MS	L1507518-7						
Sulfate (SO4)			99.0		%		75-125	26-AUG-14
SOLIDS-TDS-ED		Water						



Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Page 36 of 38

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-ED		Water						
Batch	R2934091							
WG1941947-3	DUP	L1507769-2						
Total Dissolved Solids		1130	1090		mg/L	3.4	20	30-AUG-14
WG1941947-2	LCS							
Total Dissolved Solids			96.5		%		85-115	30-AUG-14
WG1941947-1	MB							
Total Dissolved Solids			<10		mg/L		10	30-AUG-14
Batch	R2934337							
WG1942249-3	DUP	L1507500-7						
Total Dissolved Solids		585	588		mg/L	0.5	20	31-AUG-14
WG1942249-2	LCS							
Total Dissolved Solids			105.4		%		85-115	31-AUG-14
WG1942249-1	MB							
Total Dissolved Solids			<10		mg/L		10	31-AUG-14
TURBIDITY-ED		Water						
Batch	R2929451							
WG1938438-3	DUP	L1507500-10						
Turbidity		130	132		NTU	1.5	15	26-AUG-14
WG1938438-4	DUP	L1507766-13						
Turbidity		0.28	0.28		NTU	1.1	15	26-AUG-14
WG1938438-2	LCS							
Turbidity			97.9		%		70-130	26-AUG-14
WG1938438-1	MB							
Turbidity			<0.10		NTU		0.1	26-AUG-14

Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Page 37 of 38

Contact: Sue Raynard

Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1507500

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2
Contact: Sue Raynard

Page 38 of 38

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Turbidity							
	1	23-AUG-14 12:00	26-AUG-14 00:00	48	60	hours	EHTR
	2	23-AUG-14 14:12	26-AUG-14 00:00	48	58	hours	EHTR
	3	23-AUG-14 15:41	26-AUG-14 00:00	48	56	hours	EHTR
	4	23-AUG-14 17:10	26-AUG-14 00:00	48	55	hours	EHTL
	5	23-AUG-14 15:41	26-AUG-14 00:00	48	56	hours	EHTR
Anions and Nutrients							
Nitrate as N by IC							
	1	23-AUG-14 12:00	26-AUG-14 08:00	48	68	hours	EHTR
	2	23-AUG-14 14:12	26-AUG-14 08:00	48	66	hours	EHTR
	3	23-AUG-14 15:41	26-AUG-14 08:00	48	64	hours	EHTR
	4	23-AUG-14 17:10	26-AUG-14 08:00	48	63	hours	EHTL
	5	23-AUG-14 15:41	26-AUG-14 08:00	48	64	hours	EHTR
Nitrite as N by IC							
	1	23-AUG-14 12:00	26-AUG-14 08:00	48	68	hours	EHTR
	2	23-AUG-14 14:12	26-AUG-14 08:00	48	66	hours	EHTR
	3	23-AUG-14 15:41	26-AUG-14 08:00	48	64	hours	EHTR
	4	23-AUG-14 17:10	26-AUG-14 08:00	48	63	hours	EHTL
	5	23-AUG-14 15:41	26-AUG-14 08:00	48	64	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1507500 were received on 25-AUG-14 16:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

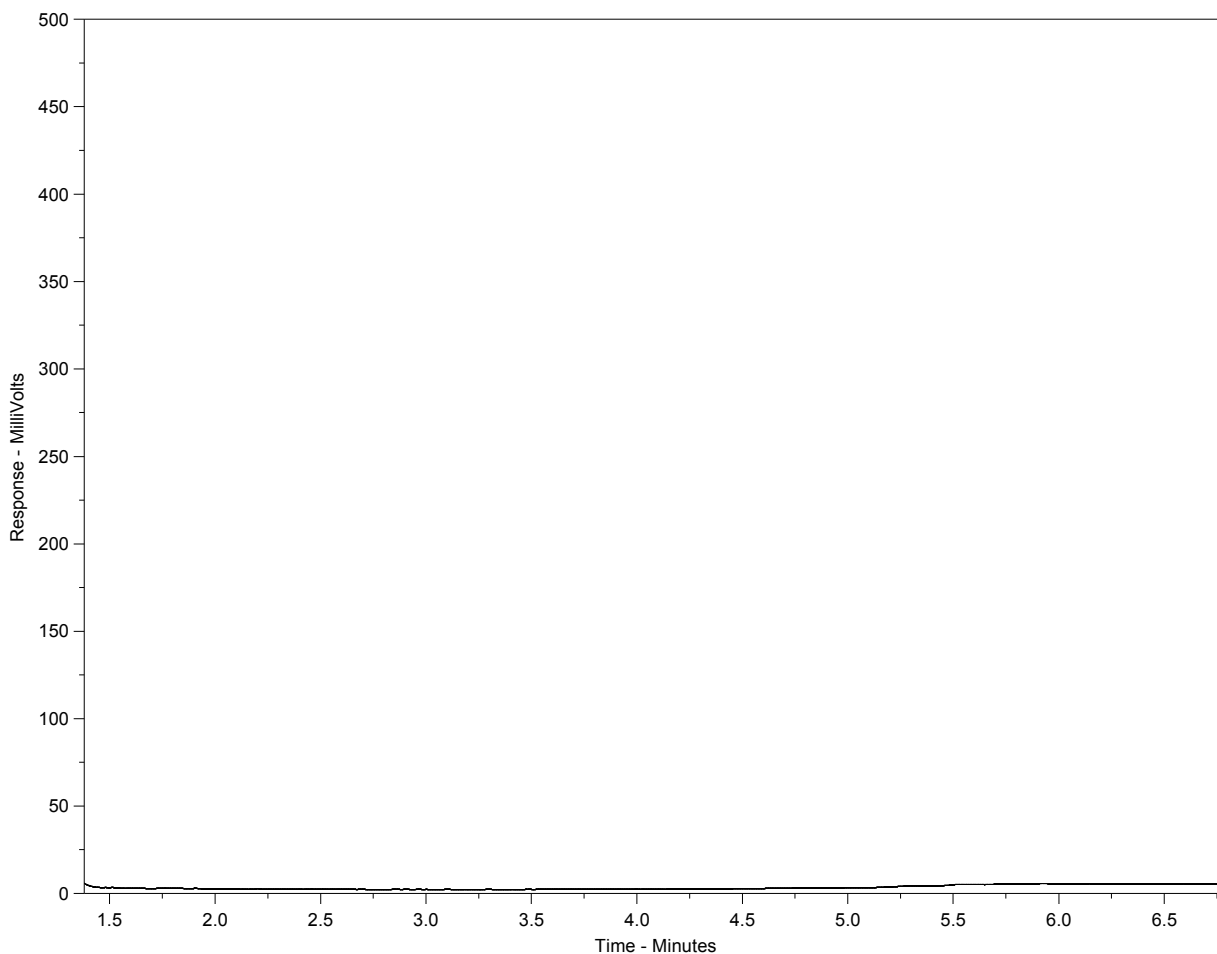
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-1
 Client ID: 16054140823001



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

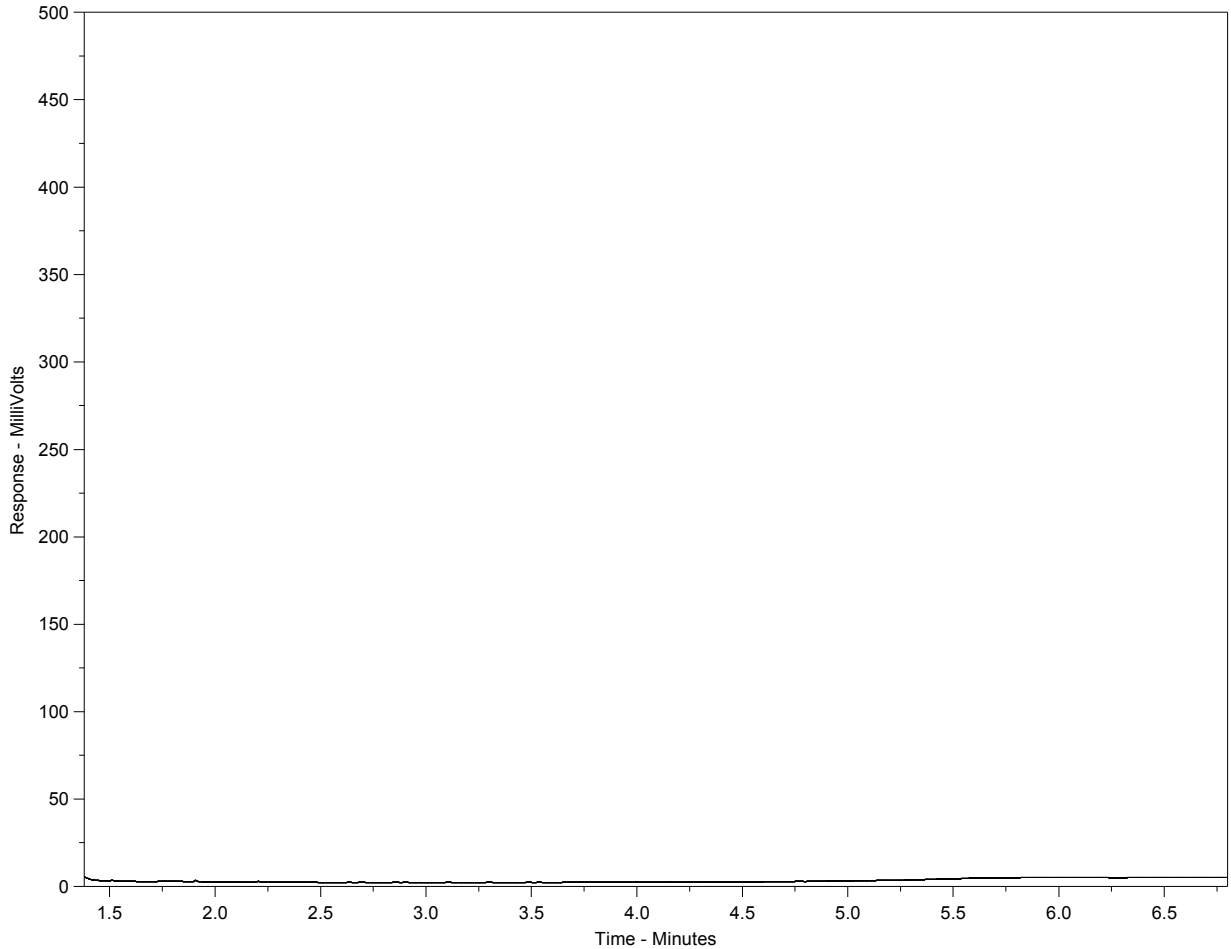
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-2
 Client ID: 16054140823002



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

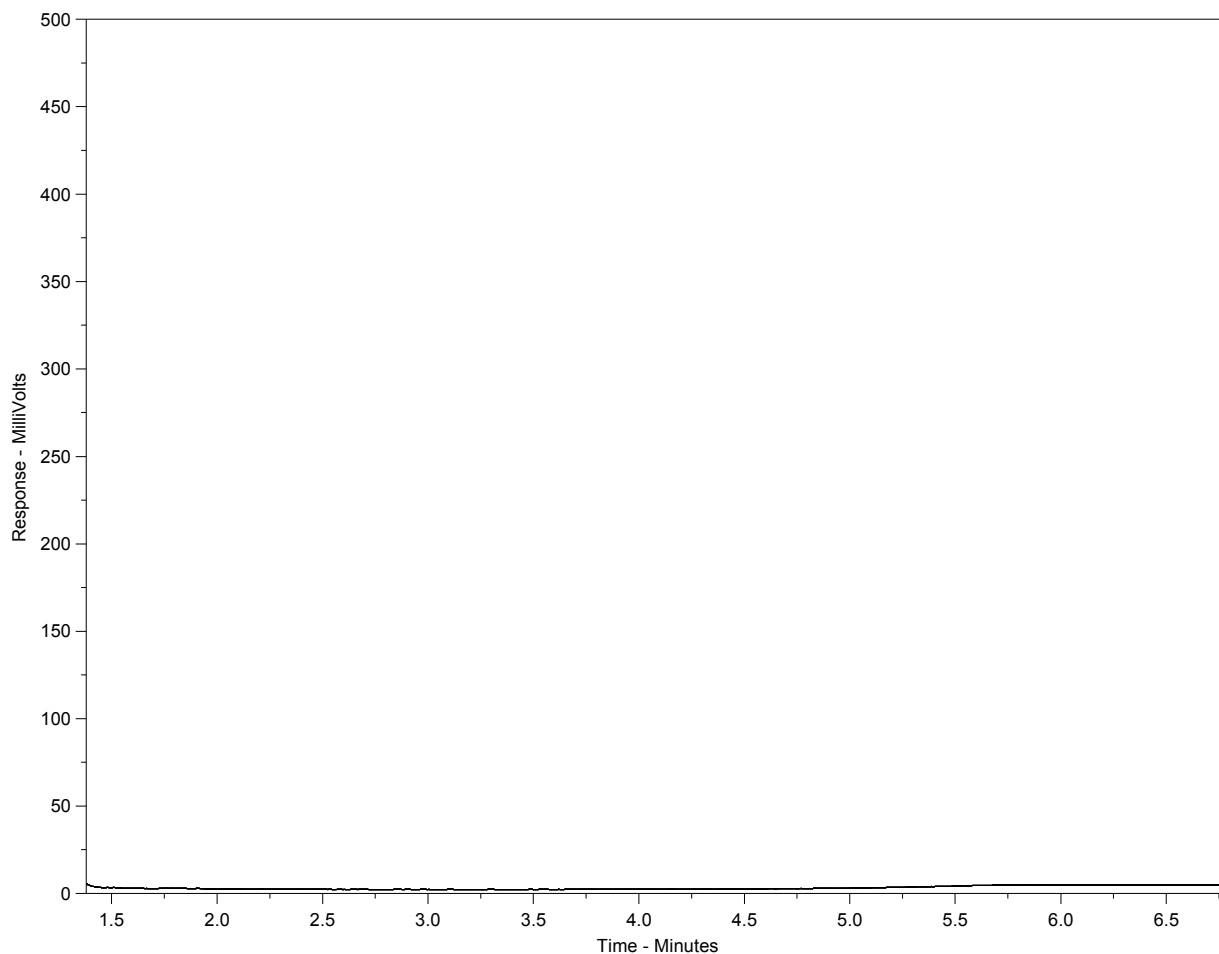
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-3
Client ID: 16054140823003



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

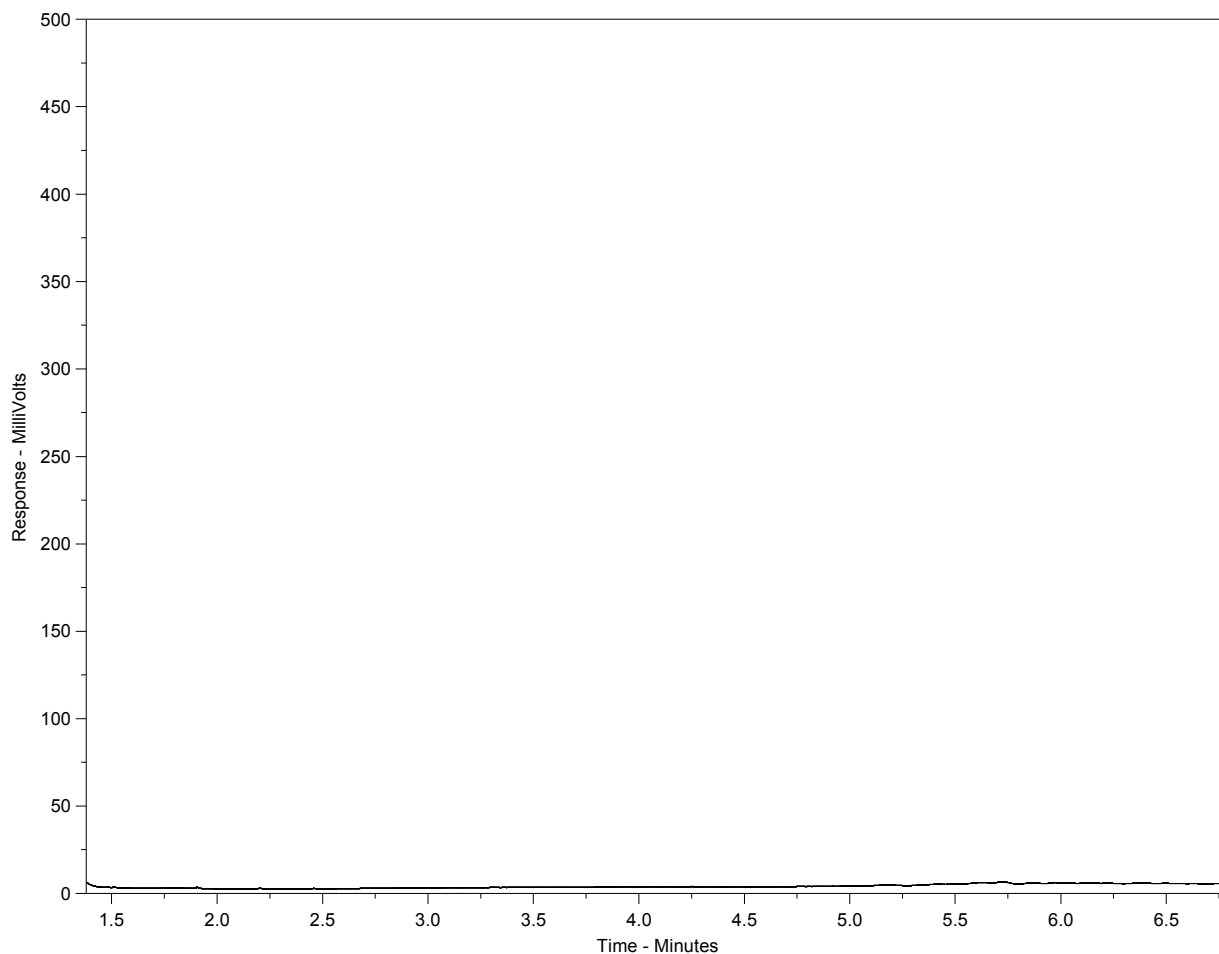
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-4
Client ID: 16054140823004



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

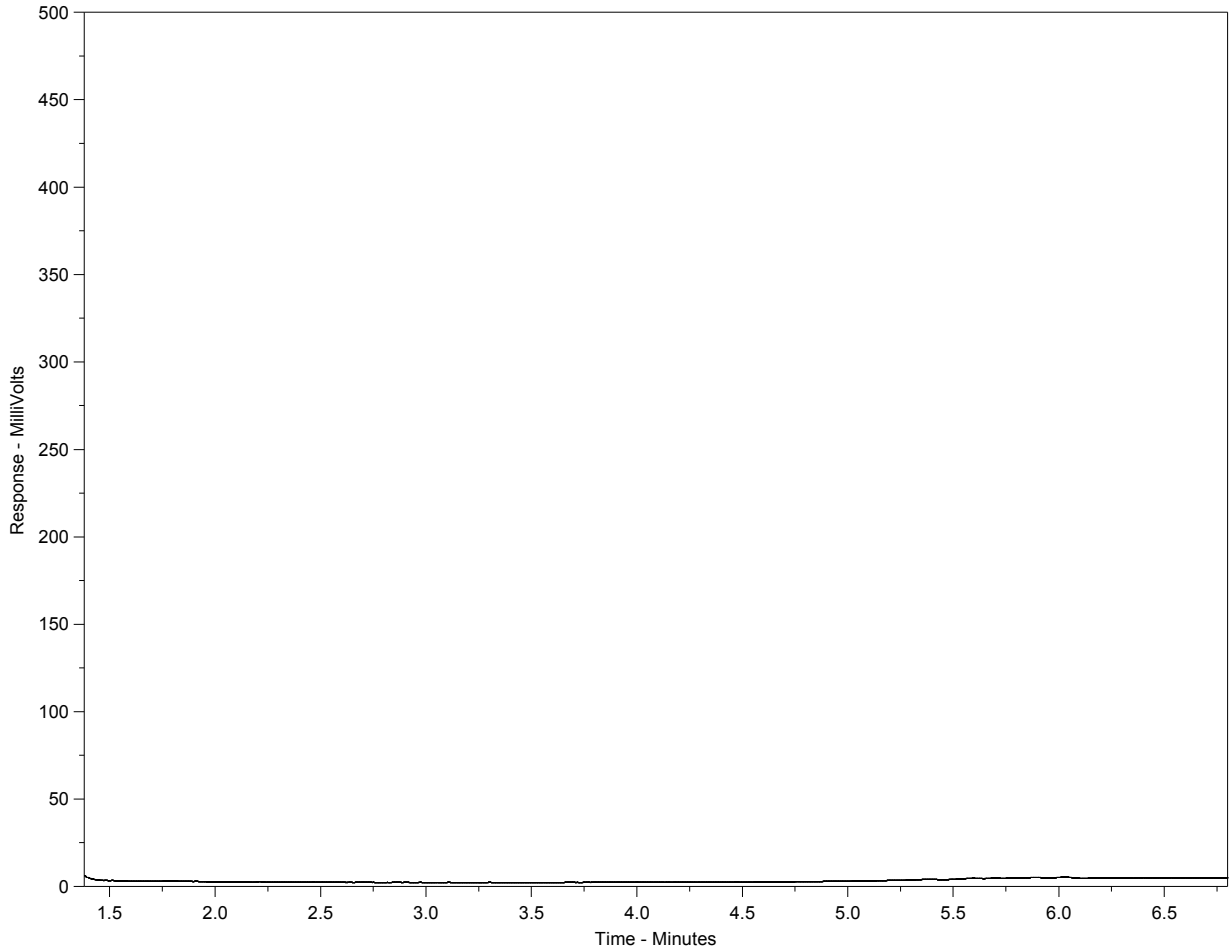
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-5
Client ID: 16054140823005



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

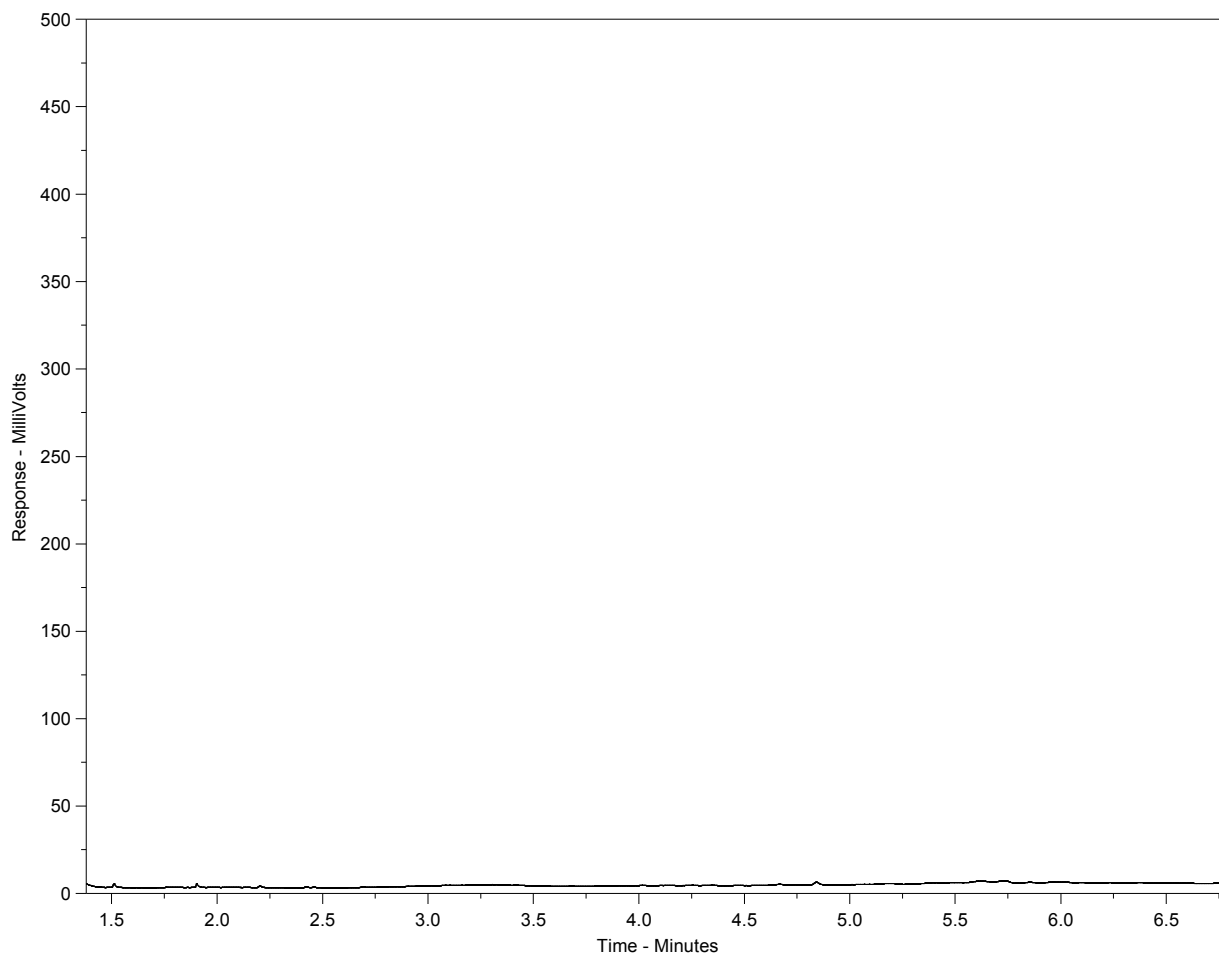
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-6
Client ID: 16054140824006



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

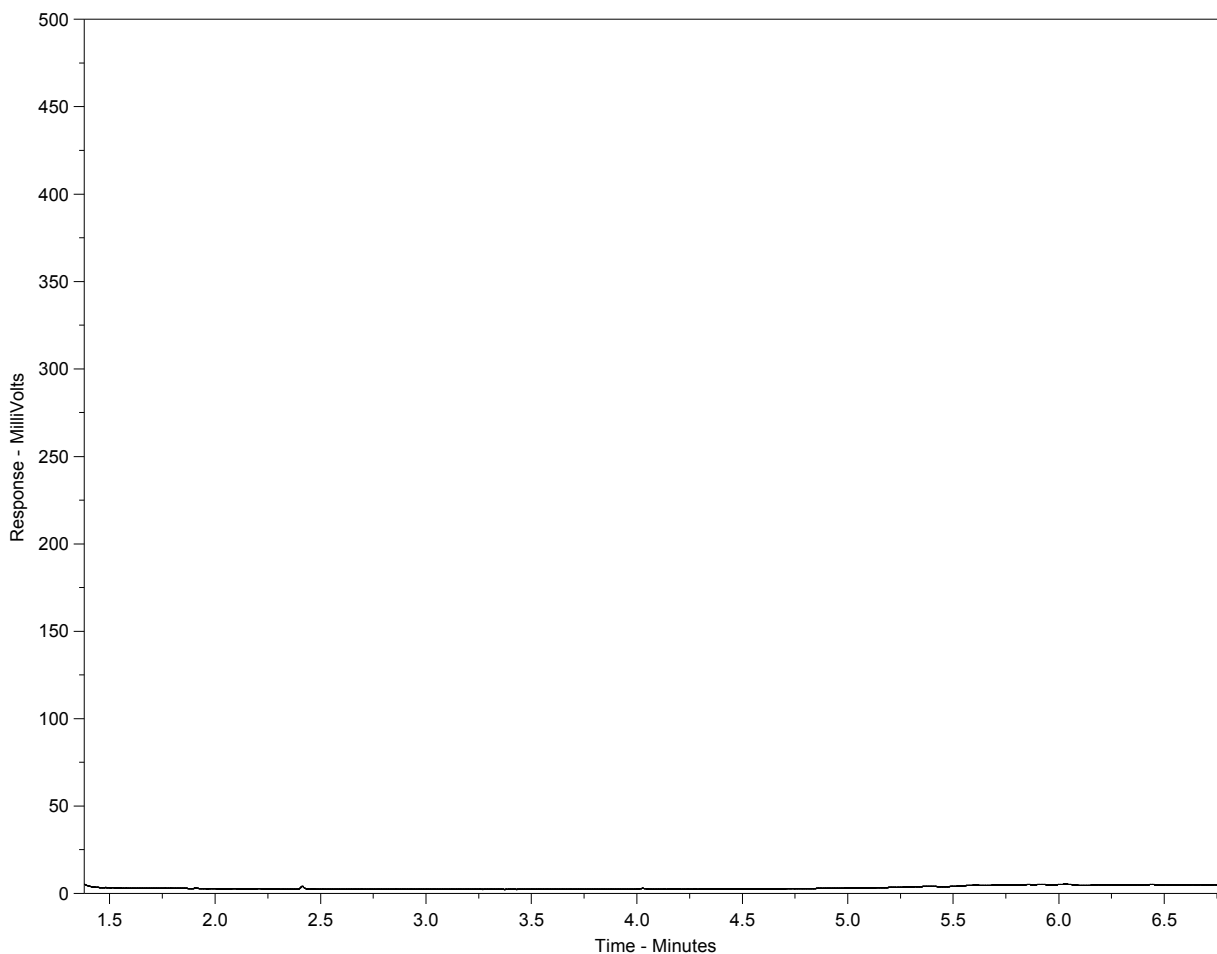
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-7
 Client ID: 16054140824007



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

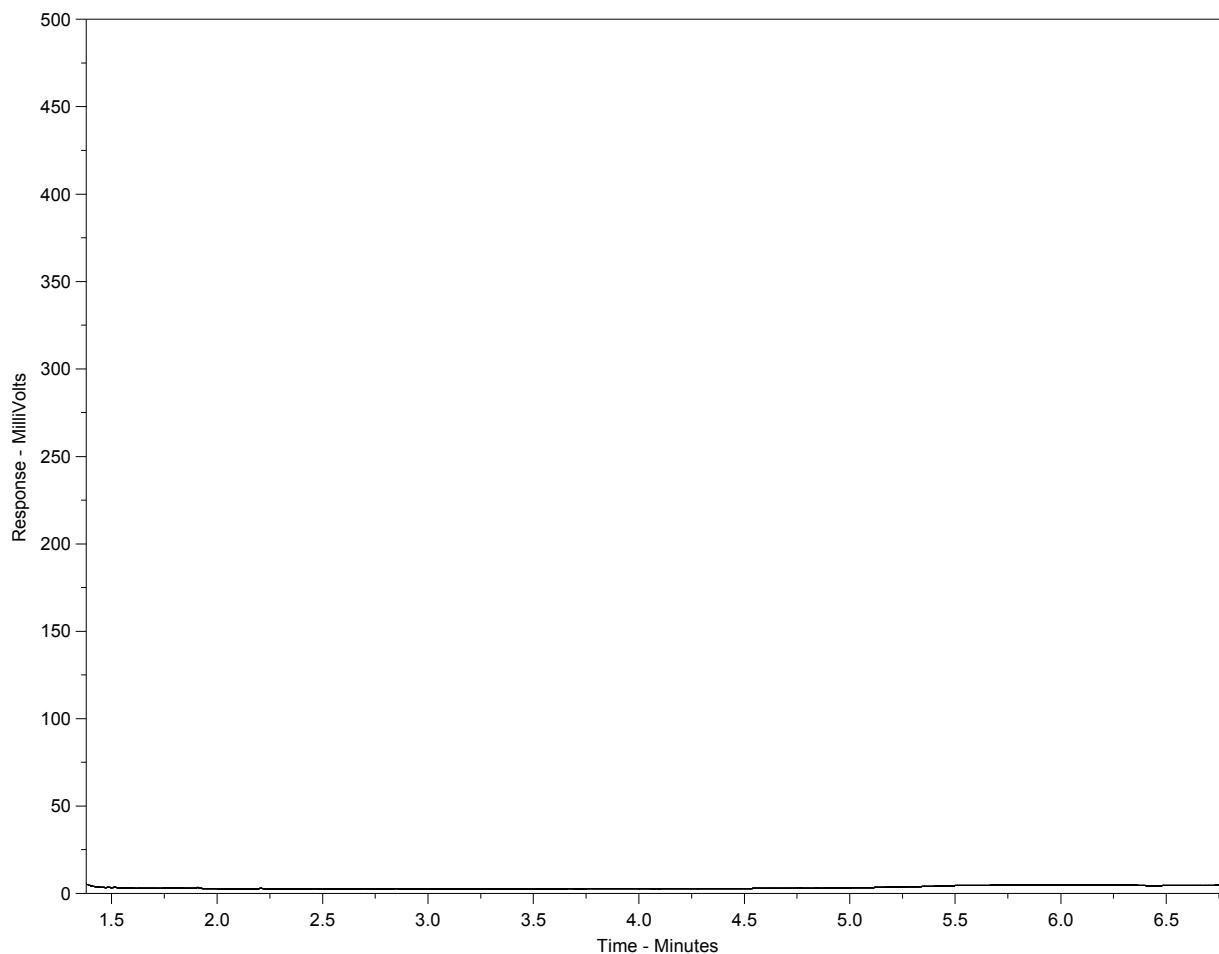
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-8
Client ID: 16054140824008



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

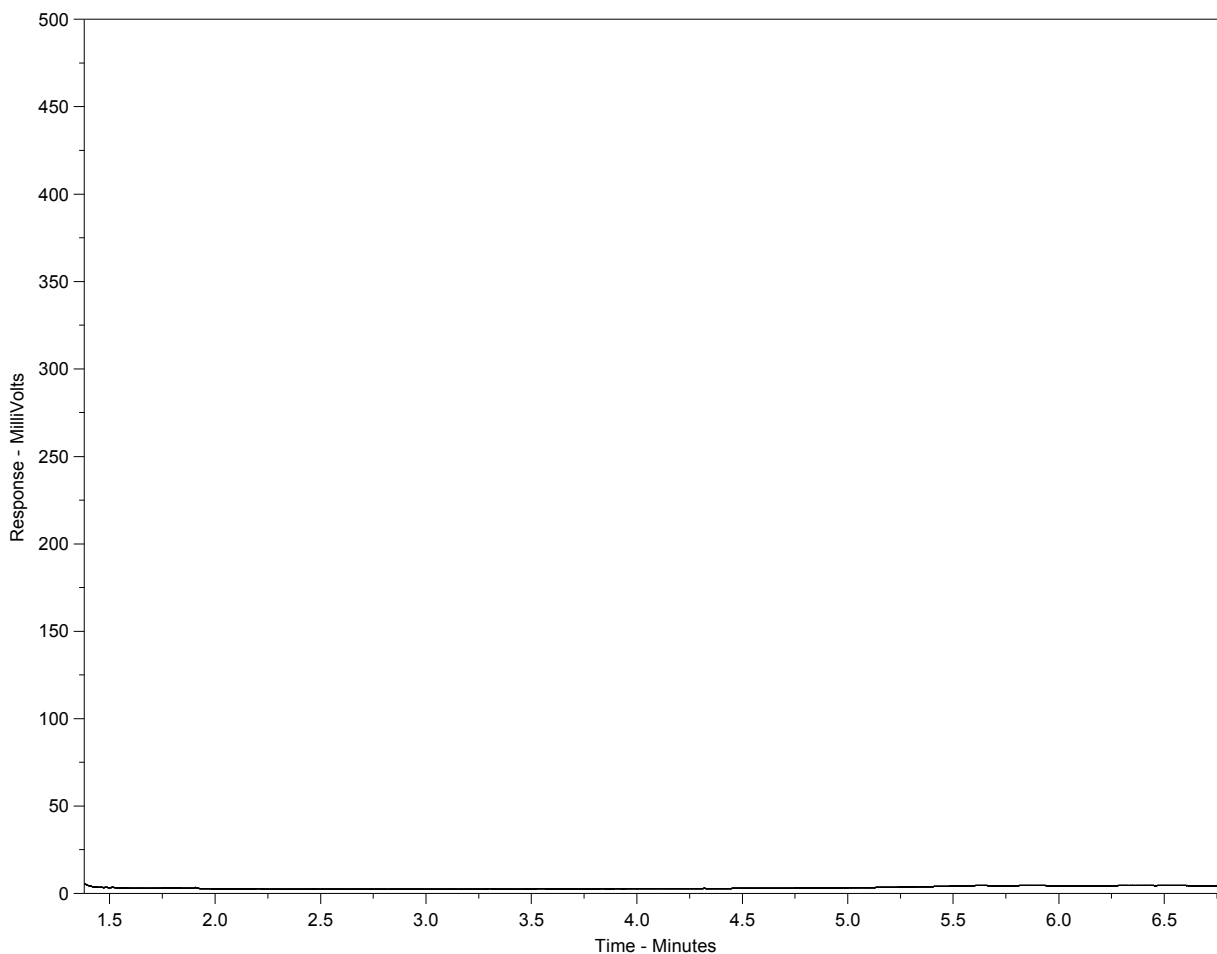
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-9
 Client ID: 16054140824009



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

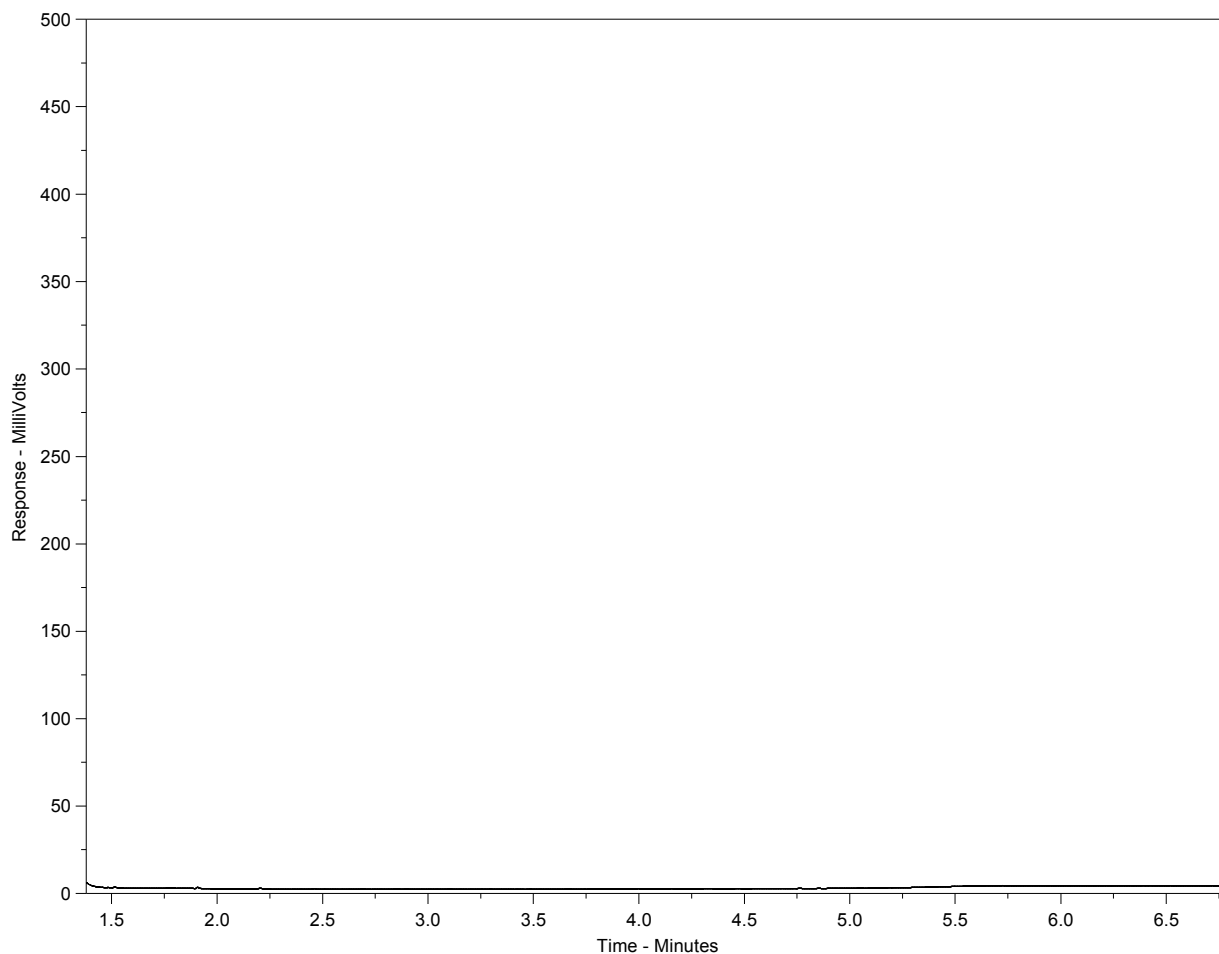
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1507500-10
Client ID: 16054140824010



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		1067°F		
← Gasoline →		← Diesel/ Jet Fuels →		← Motor Oils/ Lube Oils/ Grease →			

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



Matrix Solutions Inc.
ATTN: Sue Raynard
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Date Received: 27-AUG-14
Report Date: 07-JAN-15 15:30 (MT)
Version: FINAL REV. 3

Client Phone: 403-513-2275

Certificate of Analysis

Lab Work Order #: L1508704
Project P.O. #: NOT SUBMITTED
Job Reference: 16054-502 SAOS
C of C Numbers: M050657
Legal Site Desc:

Comments: ADDITIONAL 05-JAN-15 09:22
ADDITIONAL 16-DEC-14 10:09

Nicole Thibault
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-1 16054140825011									
Sampled By: BP/EA on 25-AUG-14 @ 11:30									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Toluene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
EthylBenzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
o-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Styrene	<0.0010	-		0.0010	mg/L	-		29-AUG-14	R2933137
F1(C6-C10)	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
F1-BTEX	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
Xylenes	<0.00071	-		0.00071	mg/L	-		29-AUG-14	R2933137
Surr: 1,4-Difluorobenzene (SS)	101.0	-		N/A	%	-		29-AUG-14	R2933137
Surr: 4-Bromofluorobenzene (SS)	90.0	-		N/A	%	-		29-AUG-14	R2933137
Surr: 3,4-Dichlorotoluene (SS)	102.0	-		N/A	%	-		29-AUG-14	R2933137
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
Surr: 2-Bromobenzotrifluoride	89.7	-		N/A	%	-	29-AUG-14	29-AUG-14	R2933790
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000293	+/-0.0000061		0.000005 0	mg/L	0		02-SEP-14	R2936072
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	7.55	+/-1.2		0.0030	mg/L	0		03-SEP-14	R2936933
Antimony (Sb)-Total	0.00031	+/-0.00008		0.00010	mg/L	0		03-SEP-14	R2936933
Arsenic (As)-Total	0.0276	+/-0.0032		0.00010	mg/L	0		03-SEP-14	R2936933
Barium (Ba)-Total	0.461	+/-0.052		0.000050	mg/L	0		03-SEP-14	R2936933
Beryllium (Be)-Total	0.00066	+/-0.00015		0.00050	mg/L	0		03-SEP-14	R2936933
Bismuth (Bi)-Total	0.000232	+/-0.000044		0.000050	mg/L	0		03-SEP-14	R2936933
Boron (B)-Total	0.057	+/-0.009		0.010	mg/L	0		03-SEP-14	R2936933
Cadmium (Cd)-Total	0.000363	+/-0.000069		0.000010	mg/L	0		03-SEP-14	R2936933
Calcium (Ca)-Total	105	+/-12		0.10	mg/L	0		03-SEP-14	R2936933
Chromium (Cr)-Total	0.0124	+/-0.0018		0.00010	mg/L	0		03-SEP-14	R2936933
Cobalt (Co)-Total	0.00727	+/-0.00098		0.00010	mg/L	0		03-SEP-14	R2936933
Copper (Cu)-Total	0.0222	+/-0.0026		0.00010	mg/L	0		03-SEP-14	R2936933
Iron (Fe)-Total	29.7	+/-4.7		0.030	mg/L	0		03-SEP-14	R2936933
Lead (Pb)-Total	0.0121	+/-0.0019		0.000050	mg/L	0		03-SEP-14	R2936933
Lithium (Li)-Total	0.0283	+/-0.0053		0.0050	mg/L	0		03-SEP-14	R2936933
Magnesium (Mg)-Total	22.3	+/-2.7		0.10	mg/L	0		03-SEP-14	R2936933
Manganese (Mn)-Total	1.47	+/-0.15		0.0050	mg/L	0		03-SEP-14	R2936933
Molybdenum (Mo)-Total	0.00568	+/-0.00069		0.000050	mg/L	0		03-SEP-14	R2936933
Nickel (Ni)-Total	0.0187	+/-0.0020		0.00010	mg/L	0		03-SEP-14	R2936933
Potassium (K)-Total	4.12	+/-0.51		0.50	mg/L	0		03-SEP-14	R2936933
Selenium (Se)-Total	0.00091	+/-0.00013		0.00010	mg/L	0		03-SEP-14	R2936933
Silicon (Si)-Total	21.8	+/-4.3		0.050	mg/L	0		03-SEP-14	R2936933
Silver (Ag)-Total	0.000175	+/-0.000036		0.000010	mg/L	0		03-SEP-14	R2936933
Sodium (Na)-Total	4.0	+/-0.5		1.0	mg/L	0		03-SEP-14	R2936933
Strontium (Sr)-Total	0.456	+/-0.065		0.00010	mg/L	0		03-SEP-14	R2936933
Thallium (Tl)-Total	0.000267	+/-0.000041		0.000050	mg/L	0		03-SEP-14	R2936933
Tin (Sn)-Total	0.00054	+/-0.00008		0.00010	mg/L	0		03-SEP-14	R2936933
Titanium (Ti)-Total	0.0819	+/-0.0027		0.00030	mg/L	0		03-SEP-14	R2936933
Uranium (U)-Total	0.00189	+/-0.00027		0.000010	mg/L	0		03-SEP-14	R2936933

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-1 16054140825011									
Sampled By: BP/EA on 25-AUG-14 @ 11:30									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	0.0245	+/-0.0030		0.00050	mg/L	0		03-SEP-14	R2936933
Zinc (Zn)-Total	0.0745	+/-0.012		0.0050	mg/L	0		03-SEP-14	R2936933
Miscellaneous Parameters									
Ammonia, Total (as N)	0.311	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	8.6	+/-1.1		1.0	mg/L	0		01-SEP-14	R2934709
Naphthenic Acids	<1.0	-		1.0	mg/L	-	03-SEP-14	08-SEP-14	R2941389
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Total Dissolved Solids	418	+/-28		10	mg/L	0		31-AUG-14	R2934337
Silicon (as SiO2)-Total	46.6	-		0.11	mg/L	-		04-SEP-14	
Turbidity	484	+/-27		0.10	NTU	0		28-AUG-14	R2932233
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	91.6	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	89.9	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	95.6	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	29.3	+/-1.7		0.50	mg/L	0		28-AUG-14	R2931933
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-	DLM	0.0010	mg/L	-		04-SEP-14	R2938189
Antimony (Sb)-Dissolved	<0.00040	-	DLM	0.00040	mg/L	-		04-SEP-14	R2938189
Arsenic (As)-Dissolved	0.0170	+/-0.0018	DLM	0.00040	mg/L	0		04-SEP-14	R2938189
Barium (Ba)-Dissolved	0.264	+/-0.023	DLM	0.00010	mg/L	0		04-SEP-14	R2938189
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		04-SEP-14	R2938189
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Cadmium (Cd)-Dissolved	<0.00010	-	DLM	0.00010	mg/L	-		04-SEP-14	R2938189
Chromium (Cr)-Dissolved	<0.00040	-	DLM	0.00040	mg/L	-		04-SEP-14	R2938189
Cobalt (Co)-Dissolved	0.00028	+/-0.00003		0.00010	mg/L	0		04-SEP-14	R2938189
Copper (Cu)-Dissolved	<0.00060	-	DLM	0.00060	mg/L	-		04-SEP-14	R2938189
Iron (Fe)-Dissolved	11.5	+/-1.0	DLM	0.010	mg/L	0		04-SEP-14	R2938189
Lead (Pb)-Dissolved	<0.00010	-	DLM	0.00010	mg/L	-		04-SEP-14	R2938189
Lithium (Li)-Dissolved	0.0189	+/-0.0024		0.0050	mg/L	0		04-SEP-14	R2938189
Manganese (Mn)-Dissolved	1.25	+/-0.085	DLM	0.0020	mg/L	0		04-SEP-14	R2938189
Molybdenum (Mo)-Dissolved	0.00520	+/-0.00054		0.00010	mg/L	0		04-SEP-14	R2938189

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-1 16054140825011 Sampled By: BP/EA on 25-AUG-14 @ 11:30 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	0.00051	+/-0.00006	DLM	0.00010	mg/L	0		04-SEP-14	R2938189
Selenium (Se)-Dissolved	<0.00040	-	DLM	0.00040	mg/L	-		04-SEP-14	R2938189
Silicon (Si)-Dissolved	8.88	+/-0.76	DLM	0.050	mg/L	0		04-SEP-14	R2938189
Silver (Ag)-Dissolved	<0.000010	-	DLM	0.000010	mg/L	-		04-SEP-14	R2938189
Strontium (Sr)-Dissolved	0.436	+/-0.032		0.00010	mg/L	0		04-SEP-14	R2938189
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		04-SEP-14	R2938189
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		04-SEP-14	R2938189
Uranium (U)-Dissolved	0.000477	+/-0.000049	DLM	0.000010	mg/L	0		04-SEP-14	R2938189
Vanadium (V)-Dissolved	0.00018	+/-0.00001		0.00010	mg/L	0		04-SEP-14	R2938189
Zinc (Zn)-Dissolved	0.0152	+/-0.0018	DLM	0.0010	mg/L	0		04-SEP-14	R2938189
Ion Balance Calculation									
Ion Balance	98.7	-			%	-		05-SEP-14	
TDS (Calculated)	340	-			mg/L	-		05-SEP-14	
Hardness (as CaCO3)	330	-			mg/L	-		05-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		28-AUG-14	R2931933
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		29-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		28-AUG-14	R2931933
Sulfate by IC									
Sulfate (SO4)	5.05	+/-0.31		0.50	mg/L	0		28-AUG-14	R2931933
pH, Conductivity and Total Alkalinity									
pH	7.40	+/-0.01		0.10	pH	0		28-AUG-14	R2931888
Conductivity (EC)	656	+/-33		0.20	uS/cm	0		28-AUG-14	R2931888
Bicarbonate (HCO3)	366	+/-14		5.0	mg/L	0		28-AUG-14	R2931888
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Alkalinity, Total (as CaCO3)	300	+/-19		2.0	mg/L	0		28-AUG-14	R2931888
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	19.0	-		0.11	mg/L	-		05-SEP-14	
L1508704-2 16054140825012 Sampled By: BP/EA Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Toluene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
EthylBenzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
o-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Styrene	<0.0010	-		0.0010	mg/L	-		29-AUG-14	R2933137
F1(C6-C10)	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
F1-BTEX	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
Xylenes	<0.00071	-		0.00071	mg/L	-		29-AUG-14	R2933137
Surr:	1,4-Difluorobenzene (SS)	103.0	-	N/A	%	-		29-AUG-14	R2933137
Surr:	4-Bromofluorobenzene (SS)	88.0	-	N/A	%	-		29-AUG-14	R2933137

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-2 16054140825012									
Sampled By: BP/EA									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	97.4	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	96.5	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	96.6	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		28-AUG-14	R2931933
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938189
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Arsenic (As)-Dissolved	0.00754	+/-0.00079		0.00040	mg/L	0		04-SEP-14	R2938189
Barium (Ba)-Dissolved	0.0499	+/-0.0043		0.00010	mg/L	0		04-SEP-14	R2938189
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		04-SEP-14	R2938189
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		04-SEP-14	R2938189
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		04-SEP-14	R2938189
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Lithium (Li)-Dissolved	0.0412	+/-0.0051		0.0050	mg/L	0		04-SEP-14	R2938189
Manganese (Mn)-Dissolved	0.463	+/-0.032		0.0020	mg/L	0		04-SEP-14	R2938189
Molybdenum (Mo)-Dissolved	0.0136	+/-0.0014		0.00010	mg/L	0		04-SEP-14	R2938189
Nickel (Ni)-Dissolved	0.00020	+/-0.00004		0.00010	mg/L	0		04-SEP-14	R2938189
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Silicon (Si)-Dissolved	10.2	+/-0.87		0.050	mg/L	0		04-SEP-14	R2938189
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		04-SEP-14	R2938189
Strontium (Sr)-Dissolved	0.415	+/-0.031		0.00010	mg/L	0		04-SEP-14	R2938189
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		04-SEP-14	R2938189
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		04-SEP-14	R2938189
Uranium (U)-Dissolved	<0.000010	-		0.000010	mg/L	-		04-SEP-14	R2938189
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Zinc (Zn)-Dissolved	0.0022	+/-0.0004		0.0010	mg/L	0		04-SEP-14	R2938189

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-2 16054140825012									
Sampled By: BP/EA									
Matrix: H2O									
Ion Balance Calculation									
Ion Balance	101	-			%	-		05-SEP-14	
TDS (Calculated)	314	-			mg/L	-		05-SEP-14	
Hardness (as CaCO3)	229	-			mg/L	-		05-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		28-AUG-14	R2931933
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		29-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		28-AUG-14	R2931933
Sulfate by IC									
Sulfate (SO4)	15.3	+/-0.88		0.50	mg/L	0		28-AUG-14	R2931933
pH, Conductivity and Total Alkalinity									
pH	7.72	+/-0.01		0.10	pH	0		28-AUG-14	R2931888
Conductivity (EC)	577	+/-29		0.20	uS/cm	0		28-AUG-14	R2931888
Bicarbonate (HCO3)	364	+/-14		5.0	mg/L	0		28-AUG-14	R2931888
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Alkalinity, Total (as CaCO3)	298	+/-19		2.0	mg/L	0		28-AUG-14	R2931888
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.8	-		0.11	mg/L	-		05-SEP-14	
L1508704-3 16054140826013									
Sampled By: BP/EA on 26-AUG-14 @ 13:20									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Toluene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
EthylBenzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
o-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Styrene	<0.0010	-		0.0010	mg/L	-		29-AUG-14	R2933137
F1(C6-C10)	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
F1-BTEX	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
Xylenes	<0.00071	-		0.00071	mg/L	-		29-AUG-14	R2933137
Surr: 1,4-Difluorobenzene (SS)	102.0	-		N/A	%	-		29-AUG-14	R2933137
Surr: 4-Bromofluorobenzene (SS)	90.0	-		N/A	%	-		29-AUG-14	R2933137
Surr: 3,4-Dichlorotoluene (SS)	104.0	-		N/A	%	-		29-AUG-14	R2933137
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
Surr: 2-Bromobenzotrifluoride	102.2	-		N/A	%	-	29-AUG-14	29-AUG-14	R2933790
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000249	+/-0.0000056		0.0000050	mg/L	0		02-SEP-14	R2936072
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	8.73	+/-1.4		0.0030	mg/L	0		03-SEP-14	R2936933

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-3 16054140826013									
Sampled By: BP/EA on 26-AUG-14 @ 13:20									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Antimony (Sb)-Total	0.00032	+/-0.00008		0.00010	mg/L	0		03-SEP-14	R2936933
Arsenic (As)-Total	0.0311	+/-0.0036		0.00010	mg/L	0		03-SEP-14	R2936933
Barium (Ba)-Total	0.581	+/-0.065		0.000050	mg/L	0		03-SEP-14	R2936933
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936933
Bismuth (Bi)-Total	0.000131	+/-0.000037		0.000050	mg/L	0		03-SEP-14	R2936933
Boron (B)-Total	0.041	+/-0.007		0.010	mg/L	0		03-SEP-14	R2936933
Cadmium (Cd)-Total	0.00193	+/-0.00037		0.000010	mg/L	0		03-SEP-14	R2936933
Calcium (Ca)-Total	167	+/-20		0.10	mg/L	0		03-SEP-14	R2936933
Chromium (Cr)-Total	0.0144	+/-0.0021		0.00010	mg/L	0		03-SEP-14	R2936933
Cobalt (Co)-Total	0.0189	+/-0.0026		0.00010	mg/L	0		03-SEP-14	R2936933
Copper (Cu)-Total	0.0182	+/-0.0021		0.00010	mg/L	0		03-SEP-14	R2936933
Iron (Fe)-Total	25.0	+/-4.0		0.030	mg/L	0		03-SEP-14	R2936933
Lead (Pb)-Total	0.00739	+/-0.0012		0.000050	mg/L	0		03-SEP-14	R2936933
Lithium (Li)-Total	0.0527	+/-0.0098		0.0050	mg/L	0		03-SEP-14	R2936933
Magnesium (Mg)-Total	67.6	+/-8.2		0.10	mg/L	0		03-SEP-14	R2936933
Manganese (Mn)-Total	9.44	+/-0.95		0.0050	mg/L	0		06-SEP-14	R2939469
Molybdenum (Mo)-Total	0.00410	+/-0.00050		0.000050	mg/L	0		03-SEP-14	R2936933
Nickel (Ni)-Total	0.0460	+/-0.0050		0.00010	mg/L	0		03-SEP-14	R2936933
Potassium (K)-Total	5.56	+/-0.68		0.50	mg/L	0		03-SEP-14	R2936933
Selenium (Se)-Total	0.00043	+/-0.00006		0.00010	mg/L	0		03-SEP-14	R2936933
Silicon (Si)-Total	26.2	+/-5.2		0.050	mg/L	0		03-SEP-14	R2936933
Silver (Ag)-Total	0.000085	+/-0.000018		0.000010	mg/L	0		03-SEP-14	R2936933
Sodium (Na)-Total	49.7	+/-6.1		1.0	mg/L	0		03-SEP-14	R2936933
Strontium (Sr)-Total	0.492	+/-0.071		0.00010	mg/L	0		03-SEP-14	R2936933
Thallium (Tl)-Total	0.000357	+/-0.000055		0.000050	mg/L	0		03-SEP-14	R2936933
Tin (Sn)-Total	0.00063	+/-0.00010		0.00010	mg/L	0		03-SEP-14	R2936933
Titanium (Ti)-Total	0.205	+/-0.067		0.00030	mg/L	0		03-SEP-14	R2936933
Uranium (U)-Total	0.00655	+/-0.00092		0.000010	mg/L	0		03-SEP-14	R2936933
Vanadium (V)-Total	0.0244	+/-0.0029		0.00050	mg/L	0		03-SEP-14	R2936933
Zinc (Zn)-Total	0.0428	+/-0.0073		0.0050	mg/L	0		03-SEP-14	R2936933
Miscellaneous Parameters									
Ammonia, Total (as N)	0.057	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	11.0	+/-1.3		1.0	mg/L	0		01-SEP-14	R2934709
Iron Bacteria	See Attached	-				-		28-AUG-14	R2937318
Naphthenic Acids	<1.0	-		1.0	mg/L	-	03-SEP-14	08-SEP-14	R2941389
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Sulphate Reducing Bacteria	See Attached	-				-		28-AUG-14	R2937318
Total Dissolved Solids	869	+/-58		10	mg/L	0		02-SEP-14	R2937101
Silicon (as SiO2)-Total	56.1	-		0.11	mg/L	-		06-SEP-14	
Turbidity	367	+/-20		0.10	NTU	0		28-AUG-14	R2932233
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-3 16054140826013									
Sampled By: BP/EA on 26-AUG-14 @ 13:20									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	101.5	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	99.5	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	100.4	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	126	+/-7.1		0.50	mg/L	0		28-AUG-14	R2931933
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0013	+/-0.0004		0.0010	mg/L	0		04-SEP-14	R2938189
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Arsenic (As)-Dissolved	0.00084	+/-0.00009		0.00040	mg/L	0		04-SEP-14	R2938189
Barium (Ba)-Dissolved	0.200	+/-0.017		0.00010	mg/L	0		04-SEP-14	R2938189
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		04-SEP-14	R2938189
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Copper (Cu)-Dissolved	0.00205	+/-0.00015		0.00060	mg/L	0		04-SEP-14	R2938189
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		04-SEP-14	R2938189
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Lithium (Li)-Dissolved	0.0485	+/-0.0060		0.0050	mg/L	0		04-SEP-14	R2938189
Manganese (Mn)-Dissolved	0.0603	+/-0.0041		0.0020	mg/L	0		04-SEP-14	R2938189
Molybdenum (Mo)-Dissolved	0.00144	+/-0.00015		0.00010	mg/L	0		04-SEP-14	R2938189
Nickel (Ni)-Dissolved	0.00167	+/-0.00014		0.00010	mg/L	0		04-SEP-14	R2938189
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Silicon (Si)-Dissolved	10.3	+/-0.88		0.050	mg/L	0		04-SEP-14	R2938189
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		04-SEP-14	R2938189
Strontium (Sr)-Dissolved	0.470	+/-0.035		0.00010	mg/L	0		04-SEP-14	R2938189
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		04-SEP-14	R2938189
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		04-SEP-14	R2938189
Uranium (U)-Dissolved	0.00571	+/-0.00060		0.000010	mg/L	0		04-SEP-14	R2938189
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Zinc (Zn)-Dissolved	0.0043	+/-0.0006		0.0010	mg/L	0		04-SEP-14	R2938189
Ion Balance Calculation									
Ion Balance	101	-			%	-		05-SEP-14	R2939366
TDS (Calculated)	762	-			mg/L	-		05-SEP-14	R2939366
Hardness (as CaCO3)	647	-			mg/L	-		05-SEP-14	R2939366
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005	mg/L	-		02-SEP-14	R2936072
				0					
Nitrate as N by IC									
Nitrate (as N)	0.090	+/-0.011		0.050	mg/L	0		28-AUG-14	R2931933
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	0.090	-		0.054	mg/L	-		29-AUG-14	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-3 16054140826013 Sampled By: BP/EA on 26-AUG-14 @ 13:20 Matrix: H2O									
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		28-AUG-14	R2931933
Sulfate by IC									
Sulfate (SO4)	42.9	+/-2.4		0.50	mg/L	0		28-AUG-14	R2931933
pH, Conductivity and Total Alkalinity									
pH	7.58	+/-0.01		0.10	pH	0		28-AUG-14	R2931888
Conductivity (EC)	1380	+/-69		0.20	uS/cm	0		28-AUG-14	R2931888
Bicarbonate (HCO3)	650	+/-25		5.0	mg/L	0		28-AUG-14	R2931888
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Alkalinity, Total (as CaCO3)	533	+/-34		2.0	mg/L	0		28-AUG-14	R2931888
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	22.1	-		0.11	mg/L	-		05-SEP-14	
L1508704-4 16054140826014 Sampled By: BP/EA on 26-AUG-14 @ 14:47 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Toluene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
EthylBenzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
o-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Styrene	<0.0010	-		0.0010	mg/L	-		29-AUG-14	R2933137
F1(C6-C10)	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
F1-BTEX	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
Xylenes	<0.00071	-		0.00071	mg/L	-		29-AUG-14	R2933137
Surr: 1,4-Difluorobenzene (SS)	105.0	-		N/A	%	-		29-AUG-14	R2933137
Surr: 4-Bromofluorobenzene (SS)	100.0	-		N/A	%	-		29-AUG-14	R2933137
Surr: 3,4-Dichlorotoluene (SS)	97.0	-		N/A	%	-		29-AUG-14	R2933137
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
Surr: 2-Bromobenzotrifluoride	99.0	-		N/A	%	-	29-AUG-14	29-AUG-14	R2933790
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.321	+/-0.051		0.0030	mg/L	0		03-SEP-14	R2936933
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		03-SEP-14	R2936933
Arsenic (As)-Total	0.0284	+/-0.0033		0.00010	mg/L	0		03-SEP-14	R2936933
Barium (Ba)-Total	0.0897	+/-0.010		0.000050	mg/L	0		03-SEP-14	R2936933
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936933
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936933
Boron (B)-Total	0.371	+/-0.059		0.010	mg/L	0		03-SEP-14	R2936933
Cadmium (Cd)-Total	0.000044	+/-0.000009		0.000010	mg/L	0		03-SEP-14	R2936933
Calcium (Ca)-Total	33.8	+/-4.0		0.10	mg/L	0		03-SEP-14	R2936933
Chromium (Cr)-Total	0.00986	+/-0.0014		0.00010	mg/L	0		03-SEP-14	R2936933
Cobalt (Co)-Total	0.00075	+/-0.00010		0.00010	mg/L	0		03-SEP-14	R2936933
Copper (Cu)-Total	0.00261	+/-0.00034		0.00010	mg/L	0		03-SEP-14	R2936933

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-4 16054140826014									
Sampled By: BP/EA on 26-AUG-14 @ 14:47									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Iron (Fe)-Total	1.35	+/-0.21		0.030	mg/L	0		03-SEP-14	R2936933
Lead (Pb)-Total	0.000780	+/-0.00013		0.000050	mg/L	0		03-SEP-14	R2936933
Lithium (Li)-Total	0.0444	+/-0.0083		0.0050	mg/L	0		03-SEP-14	R2936933
Magnesium (Mg)-Total	11.0	+/-1.3		0.10	mg/L	0		03-SEP-14	R2936933
Manganese (Mn)-Total	0.175	+/-0.018		0.0050	mg/L	0		03-SEP-14	R2936933
Molybdenum (Mo)-Total	0.0329	+/-0.0040		0.000050	mg/L	0		03-SEP-14	R2936933
Nickel (Ni)-Total	0.00992	+/-0.0011		0.00010	mg/L	0		03-SEP-14	R2936933
Potassium (K)-Total	4.77	+/-0.58		0.50	mg/L	0		03-SEP-14	R2936933
Selenium (Se)-Total	0.00011	+/-0.00002		0.00010	mg/L	0		03-SEP-14	R2936933
Silicon (Si)-Total	12.2	+/-2.4		0.050	mg/L	0		03-SEP-14	R2936933
Silver (Ag)-Total	0.000013	+/-0.000005		0.000010	mg/L	0		03-SEP-14	R2936933
Sodium (Na)-Total	175	+/-22		1.0	mg/L	0		03-SEP-14	R2936933
Strontium (Sr)-Total	0.358	+/-0.051		0.00010	mg/L	0		03-SEP-14	R2936933
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936933
Tin (Sn)-Total	0.00083	+/-0.00012		0.00010	mg/L	0		03-SEP-14	R2936933
Titanium (Ti)-Total	0.0126	+/-0.0041		0.00030	mg/L	0		03-SEP-14	R2936933
Uranium (U)-Total	0.000419	+/-0.000059		0.000010	mg/L	0		03-SEP-14	R2936933
Vanadium (V)-Total	0.00171	+/-0.00026		0.00050	mg/L	0		03-SEP-14	R2936933
Zinc (Zn)-Total	0.0121	+/-0.0028		0.0050	mg/L	0		03-SEP-14	R2936933
Miscellaneous Parameters									
Ammonia, Total (as N)	1.35	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	9.5	+/-1.2		1.0	mg/L	0		01-SEP-14	R2934709
Iron Bacteria	See Attached	-				-		28-AUG-14	R2937318
Naphthenic Acids	<1.0	-		1.0	mg/L	-	03-SEP-14	08-SEP-14	R2941389
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Sulphate Reducing Bacteria	See Attached	-				-		28-AUG-14	R2937318
Total Dissolved Solids	602	+/-40		10	mg/L	0		02-SEP-14	R2937101
Silicon (as SiO2)-Total	26.1	-		0.11	mg/L	-		04-SEP-14	
Turbidity	18.3	+/-1.1		0.10	NTU	0		28-AUG-14	R2932233
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	100.6	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	98.7	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-4 16054140826014 Sampled By: BP/EA on 26-AUG-14 @ 14:47 Matrix: H2O									
PAH & Carcinogenic PAH List Surr: d12-Chrysene	99.3	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC Chloride (Cl)	6.75	+/-0.40		0.50	mg/L	0		28-AUG-14	R2931933
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938189
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Arsenic (As)-Dissolved	0.0298	+/-0.0031		0.00040	mg/L	0		04-SEP-14	R2938189
Barium (Ba)-Dissolved	0.0705	+/-0.0061		0.00010	mg/L	0		04-SEP-14	R2938189
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		04-SEP-14	R2938189
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Cobalt (Co)-Dissolved	0.00028	+/-0.00003		0.00010	mg/L	0		04-SEP-14	R2938189
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		04-SEP-14	R2938189
Iron (Fe)-Dissolved	0.559	+/-0.050		0.010	mg/L	0		04-SEP-14	R2938189
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Lithium (Li)-Dissolved	0.0491	+/-0.0061		0.0050	mg/L	0		04-SEP-14	R2938189
Manganese (Mn)-Dissolved	0.136	+/-0.0093		0.0020	mg/L	0		04-SEP-14	R2938189
Molybdenum (Mo)-Dissolved	0.0297	+/-0.0031		0.00010	mg/L	0		04-SEP-14	R2938189
Nickel (Ni)-Dissolved	0.00191	+/-0.00016		0.00010	mg/L	0		04-SEP-14	R2938189
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Silicon (Si)-Dissolved	13.0	+/-1.1		0.050	mg/L	0		04-SEP-14	R2938189
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		04-SEP-14	R2938189
Strontium (Sr)-Dissolved	0.356	+/-0.027		0.00010	mg/L	0		04-SEP-14	R2938189
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		04-SEP-14	R2938189
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		04-SEP-14	R2938189
Uranium (U)-Dissolved	0.000327	+/-0.000034		0.000010	mg/L	0		04-SEP-14	R2938189
Vanadium (V)-Dissolved	0.00014	+/-0.00001		0.00010	mg/L	0		04-SEP-14	R2938189
Zinc (Zn)-Dissolved	0.0066	+/-0.0008		0.0010	mg/L	0		04-SEP-14	R2938189
Ion Balance Calculation									
Ion Balance	104	-			%	-		05-SEP-14	
TDS (Calculated)	552	-			mg/L	-		05-SEP-14	
Hardness (as CaCO3)	125	-			mg/L	-		05-SEP-14	
Mercury (Hg) - Dissolved Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC Nitrate (as N)	<0.050	-		0.050	mg/L	-		28-AUG-14	R2931933
Nitrate+Nitrite Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		29-AUG-14	
Nitrite as N by IC Nitrite (as N)	<0.020	-		0.020	mg/L	-		28-AUG-14	R2931933
Sulfate by IC Sulfate (SO4)	43.8	+/-2.5		0.50	mg/L	0		28-AUG-14	R2931933
pH, Conductivity and Total Alkalinity									
pH	8.00	+/-0.01		0.10	pH	0		28-AUG-14	R2931888
Conductivity (EC)	930	+/-47		0.20	uS/cm	0		28-AUG-14	R2931888
Bicarbonate (HCO3)	555	+/-21		5.0	mg/L	0		28-AUG-14	R2931888
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-4 16054140826014 Sampled By: BP/EA on 26-AUG-14 @ 14:47 Matrix: H2O pH, Conductivity and Total Alkalinity Alkalinity, Total (as CaCO3)	455	+/-29		2.0	mg/L	0		28-AUG-14	R2931888
Silicon (reported as Silica) Dissolved Silicon (reported as Silica) Silicon (as SiO2)-Dissolved	27.7	-		0.11	mg/L	-		05-SEP-14	
L1508704-5 16054140826015 Sampled By: BP/EA on 26-AUG-14 @ 15:49 Matrix: H2O BTXS, Styrene & F1-F4 BTEX, Styrene and F1 (C6-C10) Benzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Toluene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
EthylBenzene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
o-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		29-AUG-14	R2933137
Styrene	<0.0010	-		0.0010	mg/L	-		29-AUG-14	R2933137
F1(C6-C10)	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
F1-BTEX	<0.10	-		0.10	mg/L	-		29-AUG-14	R2933137
Xylenes	<0.00071	-		0.00071	mg/L	-		29-AUG-14	R2933137
Surr: 1,4-Difluorobenzene (SS)	102.0	-		N/A	%	-		29-AUG-14	R2933137
Surr: 4-Bromofluorobenzene (SS)	89.0	-		N/A	%	-		29-AUG-14	R2933137
Surr: 3,4-Dichlorotoluene (SS)	102.0	-		N/A	%	-		29-AUG-14	R2933137
F2, F3, F4 F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	29-AUG-14	29-AUG-14	R2933790
Surr: 2-Bromobenzotrifluoride	107.5	-		N/A	%	-	29-AUG-14	29-AUG-14	R2933790
Alberta Tier 1 Metals (Total) Mercury (Hg) Mercury (Hg)-Total	<0.0000050	-		0.000005 0	mg/L	-		02-SEP-14	R2936072
Total Metals in Water by CRC ICPMS Aluminum (Al)-Total	1.21	+/-0.19		0.0030	mg/L	0		03-SEP-14	R2936933
Antimony (Sb)-Total	0.00013	+/-0.00007		0.00010	mg/L	0		03-SEP-14	R2936933
Arsenic (As)-Total	0.0135	+/-0.0016		0.00010	mg/L	0		03-SEP-14	R2936933
Barium (Ba)-Total	0.0764	+/-0.0086		0.000050	mg/L	0		03-SEP-14	R2936933
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		03-SEP-14	R2936933
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936933
Boron (B)-Total	0.246	+/-0.039		0.010	mg/L	0		03-SEP-14	R2936933
Cadmium (Cd)-Total	0.000037	+/-0.000007		0.000010	mg/L	0		03-SEP-14	R2936933
Calcium (Ca)-Total	150	+/-18		0.10	mg/L	0		03-SEP-14	R2936933
Chromium (Cr)-Total	0.00276	+/-0.00041		0.00010	mg/L	0		03-SEP-14	R2936933
Cobalt (Co)-Total	0.00292	+/-0.00040		0.00010	mg/L	0		03-SEP-14	R2936933
Copper (Cu)-Total	0.00259	+/-0.00033		0.00010	mg/L	0		03-SEP-14	R2936933
Iron (Fe)-Total	3.65	+/-0.58		0.030	mg/L	0		03-SEP-14	R2936933
Lead (Pb)-Total	0.00115	+/-0.00018		0.000050	mg/L	0		03-SEP-14	R2936933
Lithium (Li)-Total	0.0539	+/-0.010		0.0050	mg/L	0		03-SEP-14	R2936933
Magnesium (Mg)-Total	42.8	+/-5.2		0.10	mg/L	0		03-SEP-14	R2936933
Manganese (Mn)-Total	0.898	+/-0.090		0.0050	mg/L	0		03-SEP-14	R2936933
Molybdenum (Mo)-Total	0.00539	+/-0.00066		0.000050	mg/L	0		03-SEP-14	R2936933
Nickel (Ni)-Total	0.00485	+/-0.00054		0.00010	mg/L	0		03-SEP-14	R2936933
Potassium (K)-Total	5.40	+/-0.66		0.50	mg/L	0		03-SEP-14	R2936933
Selenium (Se)-Total	0.00018	+/-0.00003		0.00010	mg/L	0		03-SEP-14	R2936933

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-5 16054140826015									
Sampled By: BP/EA on 26-AUG-14 @ 15:49									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Silicon (Si)-Total	11.2	+/-2.2		0.050	mg/L	0		03-SEP-14	R2936933
Silver (Ag)-Total	0.000021	+/-0.000006		0.000010	mg/L	0		03-SEP-14	R2936933
Sodium (Na)-Total	144	+/-18		1.0	mg/L	0		03-SEP-14	R2936933
Strontium (Sr)-Total	0.662	+/-0.095		0.00010	mg/L	0		03-SEP-14	R2936933
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		03-SEP-14	R2936933
Tin (Sn)-Total	0.00302	+/-0.00042		0.00010	mg/L	0		03-SEP-14	R2936933
Titanium (Ti)-Total	0.0439	+/-0.014		0.00030	mg/L	0		03-SEP-14	R2936933
Uranium (U)-Total	0.00562	+/-0.00079		0.000010	mg/L	0		03-SEP-14	R2936933
Vanadium (V)-Total	0.00341	+/-0.00045		0.00050	mg/L	0		03-SEP-14	R2936933
Zinc (Zn)-Total	0.0140	+/-0.0031		0.0050	mg/L	0		03-SEP-14	R2936933
Miscellaneous Parameters									
Ammonia, Total (as N)	1.45	-		0.050	mg/L	-		04-SEP-14	R2937961
Dissolved Organic Carbon	14.9	+/-1.7		1.0	mg/L	0		01-SEP-14	R2934709
Iron Bacteria	See Attached	-				-		28-AUG-14	R2937318
Naphthenic Acids	1.7	+/-0.5		1.0	mg/L	0	03-SEP-14	08-SEP-14	R2941389
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938100
Sulphate Reducing Bacteria	See Attached	-				-		28-AUG-14	R2937318
Total Dissolved Solids	850	+/-57		10	mg/L	0		02-SEP-14	R2937101
Silicon (as SiO2)-Total	24.0	-		0.11	mg/L	-		04-SEP-14	
Turbidity	42.2	+/-2.4		0.10	NTU	0		28-AUG-14	R2932233
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluoranthene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Fluorene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Naphthalene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Phenanthrene	<0.000050	-		0.000050	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	02-SEP-14	02-SEP-14	R2938782
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Acenaphthene	100.8	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d10-Phenanthrene	99.6	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Surr: d12-Chrysene	101.0	-		N/A	%	-	02-SEP-14	02-SEP-14	R2938782
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	43.7	+/-2.5		0.50	mg/L	0		28-AUG-14	R2931933
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		04-SEP-14	R2938189
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Arsenic (As)-Dissolved	0.0166	+/-0.0018	RRV	0.00040	mg/L	0		06-SEP-14	R2939468
Barium (Ba)-Dissolved	0.0597	+/-0.0052		0.00010	mg/L	0		04-SEP-14	R2938189

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1508704-5 16054140826015									
Sampled By: BP/EA on 26-AUG-14 @ 15:49									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		04-SEP-14	R2938189
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Cobalt (Co)-Dissolved	0.00297	+/-0.00028		0.00010	mg/L	0		04-SEP-14	R2938189
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		04-SEP-14	R2938189
Iron (Fe)-Dissolved	2.25	+/-0.20		0.010	mg/L	0		04-SEP-14	R2938189
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Lithium (Li)-Dissolved	0.0561	+/-0.0069		0.0050	mg/L	0		04-SEP-14	R2938189
Manganese (Mn)-Dissolved	0.751	+/-0.051		0.0020	mg/L	0		04-SEP-14	R2938189
Molybdenum (Mo)-Dissolved	0.00539	+/-0.00056		0.00010	mg/L	0		04-SEP-14	R2938189
Nickel (Ni)-Dissolved	0.00223	+/-0.00019		0.00010	mg/L	0		04-SEP-14	R2938189
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		04-SEP-14	R2938189
Silicon (Si)-Dissolved	9.87	+/-0.84		0.050	mg/L	0		04-SEP-14	R2938189
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		04-SEP-14	R2938189
Strontium (Sr)-Dissolved	0.632	+/-0.047		0.00010	mg/L	0		04-SEP-14	R2938189
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		04-SEP-14	R2938189
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		04-SEP-14	R2938189
Tin (Sn)-Dissolved	0.00062	+/-0.00005		0.00020	mg/L	0		04-SEP-14	R2938189
Uranium (U)-Dissolved	0.00661	+/-0.00069		0.000010	mg/L	0		04-SEP-14	R2938189
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		04-SEP-14	R2938189
Zinc (Zn)-Dissolved	0.0028	+/-0.0004		0.0010	mg/L	0		04-SEP-14	R2938189
Ion Balance Calculation									
Ion Balance	98.8	-			%	-		07-JAN-15	
TDS (Calculated)	900	-			mg/L	-		07-JAN-15	
Hardness (as CaCO3)	539	-			mg/L	-		07-JAN-15	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		02-SEP-14	R2936072
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		28-AUG-14	R2931933
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		29-AUG-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		28-AUG-14	R2931933
Sulfate by IC									
Sulfate (SO4)	72.7	+/-4.1		0.50	mg/L	0		28-AUG-14	R2931933
pH, Conductivity and Total Alkalinity									
pH	7.70	+/-0.01		0.10	pH	0		28-AUG-14	R2931888
Conductivity (EC)	1480	+/-74		0.20	uS/cm	0		28-AUG-14	R2931888
Bicarbonate (HCO3)	904	+/-34		5.0	mg/L	0		28-AUG-14	R2931888
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		28-AUG-14	R2931888
Alkalinity, Total (as CaCO3)	741	+/-46		2.0	mg/L	0		28-AUG-14	R2931888
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.1	-		0.11	mg/L	-		07-JAN-15	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Report Comments: ADDITIONAL 05-JAN-15 09:22
ADDITIONAL 16-DEC-14 10:09

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Vanadium (V)-Total	MB-LOR	
Matrix Spike	Chloride (Cl)	MS-B	
Matrix Spike	Chloride (Cl)	MS-B	
Matrix Spike	Chloride (Cl)	MS-B	
Matrix Spike	Chloride (Cl)	MS-B	
Matrix Spike	Sulfate (SO4)	MS-B	

Qualifiers for Individual Samples Listed:

Sample Number	Client ID	Qualifier	Description
L1508704-1	16054140825011	WSMD	HG-D - Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
L1508704-3	16054140826013	WSMD	HG-D - Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
L1508704-4	16054140826014	WSMD	HG-D - Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
L1508704-5	16054140826015	WSMD	HG-D - Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)		EPA 5021/8015&8260 GC-MS & FID
C-DIS-ORG-ED	Water	Dissolved Organic Carbon		APHA 5310 B-Instrumental
CL-IC-ED	Water	Chloride by IC		APHA 4110 B-ION CHROMATOGRAPHY
F2,F3,F4-ED	Water	F2, F3, F4		EPA 3510/CCME PHC CWS-GC-FID
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved		EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)		EPA 245.7 / EPA 245.1
IB-BART-PB	Water	Iron Bacteria		BART Test Kit
BART Test Kit Analysis performed at PBR Laboratories Inc., Edmonton.				
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR,Syn crude,1994
Dissolved naphthenic acids are solvent extracted from acidified aqueous samples using Dichloromethane prior to quantitation by Fourier Transform Infra-Red spectroscopy. Note that FTIR is not uniquely selective to naphthenic acids. If present, other carboxylic acids (e.g. humic acids, fulvic acids) may also be detected by this method.				
NH3-CFA-ED	Water	Ammonia in Water by Colour		APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.				
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite		CALCULATION
NO2-IC-ED	Water	Nitrite as N by IC		APHA 4110 B-ION CHROMATOGRAPHY

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".				
NO3-IC-ED	Water	Nitrate as N by IC		APHA 4110 B-ION CHROMATOGRAPHY
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".				
PAH-ABT1-CL	Water	PAH & Carcinogenic PAH List		EPA 3510/8270-GC/MS
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity		APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)				
PHENOLS-4AAP-ED	Water	Phenols (4AAP)		AB ENV.06537-COLORIMETRIC
This analysis is carried out using procedures adapted from ENVIRODAT VMV 06537 689, Method Code 154, in "Methods Manual for Chemical Analysis of Water and Wastes" published by the Alberta Environmental Centre. This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide and 4-aminoantipyrine to form a red complex which is measured at 505 nm.				
SIO2-D-CALC-ED	Water	Dissolved Silicon (reported as Silica)		CALCULATION
SIO2-T-CALC-ED	Water	Total Silicon (reported as Silica)		CALCULATION
SO4-IC-ED	Water	Sulfate by IC		APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TDS-ED	Water	Total Dissolved Solids		APHA 2540 C
SRB-BART-PB	Water	Sulphate Reducing Bacteria / BART method		BART TEST KIT
BART Test Kit				
TURBIDITY-ED	Water	Turbidity		APHA 2130 B-Nephelometer

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
PB	PBR LABORATORIES
FM	ALS ENVIRONMENTAL - FORT MCMURRAY, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

M050657

GLOSSARY OF REPORT TERMS

Surr - Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.

Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent. Zero values indicate no detectable method bias.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 1 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R2933137							
WG1940247-2	LCS							
Benzene			97.9		%		70-130	29-AUG-14
Toluene			96.3		%		70-130	29-AUG-14
EthylBenzene			97.1		%		70-130	29-AUG-14
o-Xylene			101.5		%		70-130	29-AUG-14
m+p-Xylene			89.5		%		70-130	29-AUG-14
Styrene			89.7		%		70-130	29-AUG-14
WG1940247-3	LCS							
F1(C6-C10)			96.8		%		70-130	29-AUG-14
WG1940247-6	LCS							
Benzene			94.2		%		70-130	29-AUG-14
Toluene			106.6		%		70-130	29-AUG-14
EthylBenzene			102.5		%		70-130	29-AUG-14
o-Xylene			107.3		%		70-130	29-AUG-14
m+p-Xylene			97.4		%		70-130	29-AUG-14
Styrene			94.7		%		70-130	29-AUG-14
WG1940247-7	LCS							
F1(C6-C10)			92.4		%		70-130	29-AUG-14
WG1940247-1	MB							
Benzene			<0.00050		mg/L		0.0005	29-AUG-14
Toluene			<0.00050		mg/L		0.0005	29-AUG-14
EthylBenzene			<0.00050		mg/L		0.0005	29-AUG-14
o-Xylene			<0.00050		mg/L		0.0005	29-AUG-14
m+p-Xylene			<0.00050		mg/L		0.0005	29-AUG-14
Styrene			<0.0010		mg/L		0.001	29-AUG-14
F1(C6-C10)			<0.10		mg/L		0.1	29-AUG-14
Surrogate: 1,4-Difluorobenzene (SS)			104.0		%		70-130	29-AUG-14
Surrogate: 4-Bromofluorobenzene (SS)			95.0		%		70-130	29-AUG-14
Surrogate: 3,4-Dichlorotoluene (SS)			103.0		%		70-130	29-AUG-14
WG1940247-5	MB							
Benzene			<0.00050		mg/L		0.0005	29-AUG-14
Toluene			<0.00050		mg/L		0.0005	29-AUG-14
EthylBenzene			<0.00050		mg/L		0.0005	29-AUG-14
o-Xylene			<0.00050		mg/L		0.0005	29-AUG-14
m+p-Xylene			<0.00050		mg/L		0.0005	29-AUG-14
							0.001	



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 2 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R2933137							
WG1940247-5	MB							
Styrene			<0.0010		mg/L		0.001	29-AUG-14
F1(C6-C10)			<0.10		mg/L		0.1	29-AUG-14
Surrogate: 1,4-Difluorobenzene (SS)			101.0		%		70-130	29-AUG-14
Surrogate: 4-Bromofluorobenzene (SS)			91.0		%		70-130	29-AUG-14
Surrogate: 3,4-Dichlorotoluene (SS)			99.0		%		70-130	29-AUG-14
C-DIS-ORG-ED		Water						
Batch	R2934709							
WG1942697-3	CVS							
Dissolved Organic Carbon			122.3		%		80-160	01-SEP-14
WG1942697-2	LCS							
Dissolved Organic Carbon			93.0		%		80-120	01-SEP-14
WG1942697-1	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	01-SEP-14
CL-IC-ED		Water						
Batch	R2931933							
WG1940605-3	DUP	L1509027-10						
Chloride (Cl)		116	116		mg/L	0.5	20	28-AUG-14
WG1940605-5	DUP	L1509027-30						
Chloride (Cl)		309	309		mg/L	0.2	20	28-AUG-14
WG1940605-7	DUP	L1509165-14						
Chloride (Cl)		112	112		mg/L	0.5	20	28-AUG-14
WG1940605-9	DUP	L1509036-2						
Chloride (Cl)		104	104		mg/L	0.1	20	28-AUG-14
WG1940605-11	LCS							
Chloride (Cl)			101.5		%		90-110	28-AUG-14
WG1940605-13	LCS							
Chloride (Cl)			101.6		%		90-110	28-AUG-14
WG1940605-15	LCS							
Chloride (Cl)			101.6		%		90-110	28-AUG-14
WG1940605-17	LCS							
Chloride (Cl)			101.8		%		90-110	28-AUG-14
WG1940605-2	LCS							
Chloride (Cl)			101.9		%		90-110	28-AUG-14
WG1940605-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	28-AUG-14
WG1940605-12	MB							



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 3 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
CL-IC-ED		Water							
Batch	R2931933								
WG1940605-12	MB								
Chloride (Cl)			<0.50		mg/L		0.5	28-AUG-14	
WG1940605-14	MB								
Chloride (Cl)			<0.50		mg/L		0.5	28-AUG-14	
WG1940605-16	MB								
Chloride (Cl)			<0.50		mg/L		0.5	28-AUG-14	
WG1940605-18	MB								
Chloride (Cl)			<0.50		mg/L		0.5	28-AUG-14	
WG1940605-10	MS	L1509036-2							
Chloride (Cl)			N/A	MS-B	%		-	28-AUG-14	
WG1940605-4	MS	L1509027-10							
Chloride (Cl)			N/A	MS-B	%		-	28-AUG-14	
WG1940605-6	MS	L1509027-30							
Chloride (Cl)			N/A	MS-B	%		-	28-AUG-14	
WG1940605-8	MS	L1509165-14							
Chloride (Cl)			N/A	MS-B	%		-	28-AUG-14	
F2,F3,F4-ED		Water							
Batch	R2933790								
WG1940464-2	LCS								
F2 (>C10-C16)			100.3		%		65-135	29-AUG-14	
F3 (C16-C34)			107.3		%		65-135	29-AUG-14	
F4 (C34-C50)			100.2		%		65-135	29-AUG-14	
WG1940464-1	MB								
F2 (>C10-C16)			<0.25		mg/L		0.25	29-AUG-14	
F3 (C16-C34)			<0.25		mg/L		0.25	29-AUG-14	
F4 (C34-C50)			<0.25		mg/L		0.25	29-AUG-14	
Surrogate: 2-Bromobenzotrifluoride			82.5		%		50-150	29-AUG-14	
WG1940464-3	MS	L1508704-1							
F2 (>C10-C16)			109.8		%		50-150	29-AUG-14	
F3 (C16-C34)			113.8		%		50-150	29-AUG-14	
F4 (C34-C50)			106.5		%		50-150	29-AUG-14	
HG-D-L-CVAA-ED		Water							
Batch	R2936072								
WG1942902-3	DUP	L1507500-1							
Mercury (Hg)-Dissolved			<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942902-7	DUP	L1507518-12							
Mercury (Hg)-Dissolved			<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	02-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 4 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-L-CVAA-ED		Water						
Batch	R2936072							
WG1942902-2	LCS							
Mercury (Hg)-Dissolved			85.8		%		80-120	02-SEP-14
WG1942902-6	LCS							
Mercury (Hg)-Dissolved			86.7		%		80-120	02-SEP-14
WG1942902-1	MB							
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	02-SEP-14
WG1942902-5	MB							
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	02-SEP-14
WG1942902-4	MS	L1507500-1						
Mercury (Hg)-Dissolved			87.5		%		70-130	02-SEP-14
WG1942902-8	MS	L1507518-12						
Mercury (Hg)-Dissolved			78.7		%		70-130	02-SEP-14
HG-T-L-CVAA-ED		Water						
Batch	R2936072							
WG1942905-3	DUP	L1508704-1						
Mercury (Hg)-Total		0.0000293	0.0000291		mg/L	0.7	20	02-SEP-14
WG1942905-2	LCS							
Mercury (Hg)-Total			82.6		%		80-120	02-SEP-14
WG1942905-1	MB							
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	02-SEP-14
WG1942905-4	MS	L1508704-1						
Mercury (Hg)-Total			74.0		%		70-130	02-SEP-14
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-10	CRM	ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			97.7		%		80-120	04-SEP-14
Antimony (Sb)-Dissolved			98.2		%		80-120	04-SEP-14
Arsenic (As)-Dissolved			103.8		%		80-120	04-SEP-14
Barium (Ba)-Dissolved			105.8		%		80-120	04-SEP-14
Beryllium (Be)-Dissolved			96.5		%		80-120	04-SEP-14
Bismuth (Bi)-Dissolved			106.6		%		80-120	04-SEP-14
Cadmium (Cd)-Dissolved			102.4		%		80-120	04-SEP-14
Chromium (Cr)-Dissolved			103.9		%		80-120	04-SEP-14
Cobalt (Co)-Dissolved			102.2		%		80-120	04-SEP-14
Copper (Cu)-Dissolved			101.0		%		80-120	04-SEP-14
Lead (Pb)-Dissolved			108.8		%		80-120	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 5 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-10 CRM	ED-HIGH-WATRM							
Lithium (Li)-Dissolved			102.8		%		80-120	04-SEP-14
Manganese (Mn)-Dissolved			102.6		%		80-120	04-SEP-14
Molybdenum (Mo)-Dissolved			102.1		%		80-120	04-SEP-14
Nickel (Ni)-Dissolved			104.5		%		80-120	04-SEP-14
Selenium (Se)-Dissolved			109.1		%		80-120	04-SEP-14
Silicon (Si)-Dissolved			89.5		%		80-120	04-SEP-14
Silver (Ag)-Dissolved			103.6		%		80-120	04-SEP-14
Strontium (Sr)-Dissolved			106.9		%		80-120	04-SEP-14
Thallium (Tl)-Dissolved			109.2		%		80-120	04-SEP-14
Titanium (Ti)-Dissolved			102.8		%		80-120	04-SEP-14
Tin (Sn)-Dissolved			102.4		%		80-120	04-SEP-14
Uranium (U)-Dissolved			105.8		%		80-120	04-SEP-14
Vanadium (V)-Dissolved			106.3		%		80-120	04-SEP-14
Zinc (Zn)-Dissolved			94.3		%		80-120	04-SEP-14
WG1944463-17 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			101.7		%		80-120	04-SEP-14
Antimony (Sb)-Dissolved			106.1		%		80-120	04-SEP-14
Arsenic (As)-Dissolved			106.5		%		80-120	04-SEP-14
Barium (Ba)-Dissolved			103.8		%		80-120	04-SEP-14
Beryllium (Be)-Dissolved			103.6		%		80-120	04-SEP-14
Bismuth (Bi)-Dissolved			100.6		%		80-120	04-SEP-14
Cadmium (Cd)-Dissolved			103.6		%		80-120	04-SEP-14
Chromium (Cr)-Dissolved			108.1		%		80-120	04-SEP-14
Cobalt (Co)-Dissolved			106.8		%		80-120	04-SEP-14
Copper (Cu)-Dissolved			102.4		%		80-120	04-SEP-14
Lead (Pb)-Dissolved			104.2		%		80-120	04-SEP-14
Lithium (Li)-Dissolved			100.4		%		80-120	04-SEP-14
Manganese (Mn)-Dissolved			106.1		%		80-120	04-SEP-14
Molybdenum (Mo)-Dissolved			100.0		%		80-120	04-SEP-14
Nickel (Ni)-Dissolved			105.7		%		80-120	04-SEP-14
Selenium (Se)-Dissolved			103.0		%		80-120	04-SEP-14
Silicon (Si)-Dissolved			100.4		%		80-120	04-SEP-14
Silver (Ag)-Dissolved			105.7		%		80-120	04-SEP-14
Strontium (Sr)-Dissolved			104.6		%		80-120	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 6 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-17 CRM		ED-HIGH-WATRM						
Thallium (Tl)-Dissolved			103.6		%		80-120	04-SEP-14
Titanium (Ti)-Dissolved			108.9		%		80-120	04-SEP-14
Tin (Sn)-Dissolved			104.3		%		80-120	04-SEP-14
Uranium (U)-Dissolved			108.4		%		80-120	04-SEP-14
Vanadium (V)-Dissolved			102.6		%		80-120	04-SEP-14
Zinc (Zn)-Dissolved			106.1		%		80-120	04-SEP-14
WG1944463-2 CRM		ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			119.8		%		80-120	04-SEP-14
Antimony (Sb)-Dissolved			103.4		%		80-120	04-SEP-14
Arsenic (As)-Dissolved			111.3		%		80-120	04-SEP-14
Barium (Ba)-Dissolved			114.3		%		80-120	04-SEP-14
Beryllium (Be)-Dissolved			90.7		%		80-120	04-SEP-14
Bismuth (Bi)-Dissolved			110.2		%		80-120	04-SEP-14
Cadmium (Cd)-Dissolved			110.0		%		80-120	04-SEP-14
Chromium (Cr)-Dissolved			111.1		%		80-120	04-SEP-14
Cobalt (Co)-Dissolved			108.3		%		80-120	04-SEP-14
Copper (Cu)-Dissolved			107.9		%		80-120	04-SEP-14
Lead (Pb)-Dissolved			106.8		%		80-120	04-SEP-14
Lithium (Li)-Dissolved			95.5		%		80-120	04-SEP-14
Manganese (Mn)-Dissolved			111.1		%		80-120	04-SEP-14
Molybdenum (Mo)-Dissolved			99.2		%		80-120	04-SEP-14
Nickel (Ni)-Dissolved			112.0		%		80-120	04-SEP-14
Selenium (Se)-Dissolved			115.0		%		80-120	04-SEP-14
Silicon (Si)-Dissolved			93.8		%		80-120	04-SEP-14
Silver (Ag)-Dissolved			110.0		%		80-120	04-SEP-14
Strontium (Sr)-Dissolved			102.0		%		80-120	04-SEP-14
Thallium (Tl)-Dissolved			106.7		%		80-120	04-SEP-14
Titanium (Ti)-Dissolved			116.4		%		80-120	04-SEP-14
Tin (Sn)-Dissolved			107.3		%		80-120	04-SEP-14
Uranium (U)-Dissolved			106.9		%		80-120	04-SEP-14
Vanadium (V)-Dissolved			113.6		%		80-120	04-SEP-14
Zinc (Zn)-Dissolved			103.4		%		80-120	04-SEP-14
WG1944463-4 CRM		ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			101.0		%		80-120	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 7 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-4 CRM	ED-HIGH-WATRM							
Antimony (Sb)-Dissolved			101.0		%		80-120	04-SEP-14
Arsenic (As)-Dissolved			101.7		%		80-120	04-SEP-14
Barium (Ba)-Dissolved			104.1		%		80-120	04-SEP-14
Beryllium (Be)-Dissolved			98.2		%		80-120	04-SEP-14
Bismuth (Bi)-Dissolved			108.5		%		80-120	04-SEP-14
Cadmium (Cd)-Dissolved			101.6		%		80-120	04-SEP-14
Chromium (Cr)-Dissolved			102.2		%		80-120	04-SEP-14
Cobalt (Co)-Dissolved			99.9		%		80-120	04-SEP-14
Copper (Cu)-Dissolved			100.1		%		80-120	04-SEP-14
Lead (Pb)-Dissolved			106.7		%		80-120	04-SEP-14
Lithium (Li)-Dissolved			97.2		%		80-120	04-SEP-14
Manganese (Mn)-Dissolved			103.7		%		80-120	04-SEP-14
Molybdenum (Mo)-Dissolved			102.0		%		80-120	04-SEP-14
Nickel (Ni)-Dissolved			100.8		%		80-120	04-SEP-14
Selenium (Se)-Dissolved			98.5		%		80-120	04-SEP-14
Silicon (Si)-Dissolved			91.5		%		80-120	04-SEP-14
Silver (Ag)-Dissolved			104.7		%		80-120	04-SEP-14
Strontium (Sr)-Dissolved			101.7		%		80-120	04-SEP-14
Thallium (Tl)-Dissolved			104.8		%		80-120	04-SEP-14
Titanium (Ti)-Dissolved			104.6		%		80-120	04-SEP-14
Tin (Sn)-Dissolved			104.3		%		80-120	04-SEP-14
Uranium (U)-Dissolved			110.8		%		80-120	04-SEP-14
Vanadium (V)-Dissolved			105.0		%		80-120	04-SEP-14
Zinc (Zn)-Dissolved			102.2		%		80-120	04-SEP-14
WG1944463-6 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			98.5		%		80-120	04-SEP-14
Antimony (Sb)-Dissolved			98.3		%		80-120	04-SEP-14
Arsenic (As)-Dissolved			101.2		%		80-120	04-SEP-14
Barium (Ba)-Dissolved			103.5		%		80-120	04-SEP-14
Beryllium (Be)-Dissolved			96.4		%		80-120	04-SEP-14
Bismuth (Bi)-Dissolved			106.3		%		80-120	04-SEP-14
Cadmium (Cd)-Dissolved			101.9		%		80-120	04-SEP-14
Chromium (Cr)-Dissolved			102.2		%		80-120	04-SEP-14
Cobalt (Co)-Dissolved			99.5		%		80-120	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 8 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-6 CRM	ED-HIGH-WATRM							
Copper (Cu)-Dissolved			99.5		%		80-120	04-SEP-14
Lead (Pb)-Dissolved			104.4		%		80-120	04-SEP-14
Lithium (Li)-Dissolved			98.0		%		80-120	04-SEP-14
Manganese (Mn)-Dissolved			102.6		%		80-120	04-SEP-14
Molybdenum (Mo)-Dissolved			100.6		%		80-120	04-SEP-14
Nickel (Ni)-Dissolved			100.5		%		80-120	04-SEP-14
Selenium (Se)-Dissolved			100.1		%		80-120	04-SEP-14
Silicon (Si)-Dissolved			87.8		%		80-120	04-SEP-14
Silver (Ag)-Dissolved			102.0		%		80-120	04-SEP-14
Strontium (Sr)-Dissolved			97.5		%		80-120	04-SEP-14
Thallium (Tl)-Dissolved			108.0		%		80-120	04-SEP-14
Titanium (Ti)-Dissolved			103.1		%		80-120	04-SEP-14
Tin (Sn)-Dissolved			100.9		%		80-120	04-SEP-14
Uranium (U)-Dissolved			108.5		%		80-120	04-SEP-14
Vanadium (V)-Dissolved			103.9		%		80-120	04-SEP-14
Zinc (Zn)-Dissolved			96.5		%		80-120	04-SEP-14
WG1944463-8 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			96.6		%		80-120	04-SEP-14
Antimony (Sb)-Dissolved			101.8		%		80-120	04-SEP-14
Arsenic (As)-Dissolved			104.3		%		80-120	04-SEP-14
Barium (Ba)-Dissolved			102.6		%		80-120	04-SEP-14
Beryllium (Be)-Dissolved			92.1		%		80-120	04-SEP-14
Bismuth (Bi)-Dissolved			108.4		%		80-120	04-SEP-14
Cadmium (Cd)-Dissolved			102.9		%		80-120	04-SEP-14
Chromium (Cr)-Dissolved			103.9		%		80-120	04-SEP-14
Cobalt (Co)-Dissolved			101.5		%		80-120	04-SEP-14
Copper (Cu)-Dissolved			101.0		%		80-120	04-SEP-14
Lead (Pb)-Dissolved			107.6		%		80-120	04-SEP-14
Lithium (Li)-Dissolved			88.3		%		80-120	04-SEP-14
Manganese (Mn)-Dissolved			101.9		%		80-120	04-SEP-14
Molybdenum (Mo)-Dissolved			97.8		%		80-120	04-SEP-14
Nickel (Ni)-Dissolved			103.8		%		80-120	04-SEP-14
Selenium (Se)-Dissolved			109.1		%		80-120	04-SEP-14
Silicon (Si)-Dissolved			90.8		%		80-120	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 9 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-8 CRM	ED-HIGH-WATRM							
Silver (Ag)-Dissolved			104.2		%		80-120	04-SEP-14
Strontium (Sr)-Dissolved			102.6		%		80-120	04-SEP-14
Thallium (Tl)-Dissolved			109.4		%		80-120	04-SEP-14
Titanium (Ti)-Dissolved			104.8		%		80-120	04-SEP-14
Tin (Sn)-Dissolved			102.9		%		80-120	04-SEP-14
Uranium (U)-Dissolved			105.2		%		80-120	04-SEP-14
Vanadium (V)-Dissolved			106.6		%		80-120	04-SEP-14
Zinc (Zn)-Dissolved			98.3		%		80-120	04-SEP-14
WG1944463-11 DUP		L1444454-32						
Aluminum (Al)-Dissolved		N/A	0.0130		mg/L	3.7	20	04-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Barium (Ba)-Dissolved		N/A	0.000420		mg/L	12	20	04-SEP-14
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Copper (Cu)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Lithium (Li)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-SEP-14
Manganese (Mn)-Dissolved		N/A	0.000099		mg/L	0.0	20	04-SEP-14
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Nickel (Ni)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Silicon (Si)-Dissolved		N/A	0.137		mg/L	1.5	20	04-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Strontium (Sr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 10 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2938189							
WG1944463-11 DUP		L1444454-32						
Vanadium (V)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Zinc (Zn)-Dissolved		N/A	0.0017		mg/L	14	20	04-SEP-14
WG1944463-12 DUP		L1509027-33						
Aluminum (Al)-Dissolved		0.0027	0.0036	J	mg/L	0.0009	0.002	04-SEP-14
Antimony (Sb)-Dissolved		0.00018	0.00017		mg/L	4.5	20	04-SEP-14
Arsenic (As)-Dissolved		0.00017	0.00018		mg/L	4.5	20	04-SEP-14
Barium (Ba)-Dissolved		0.329	0.344		mg/L	4.4	20	04-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Cadmium (Cd)-Dissolved		0.000152	0.000159		mg/L	5.0	20	04-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Cobalt (Co)-Dissolved		0.00044	0.00044		mg/L	0.6	20	04-SEP-14
Copper (Cu)-Dissolved		0.00162	0.00168		mg/L	3.2	20	04-SEP-14
Iron (Fe)-Dissolved		0.062	0.057		mg/L	8.3	20	04-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Lithium (Li)-Dissolved		0.0046	0.0047		mg/L	3.7	20	04-SEP-14
Manganese (Mn)-Dissolved		0.349	0.351		mg/L	0.4	20	04-SEP-14
Molybdenum (Mo)-Dissolved		0.000138	0.000145		mg/L	5.0	20	04-SEP-14
Nickel (Ni)-Dissolved		0.00289	0.00300		mg/L	3.6	20	04-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Silicon (Si)-Dissolved		5.34	5.44		mg/L	1.7	20	04-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Strontium (Sr)-Dissolved		0.317	0.315		mg/L	0.7	20	04-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Uranium (U)-Dissolved		0.000658	0.000663		mg/L	0.6	20	04-SEP-14
Vanadium (V)-Dissolved		0.00030	0.00032		mg/L	7.3	20	04-SEP-14
Zinc (Zn)-Dissolved		0.0013	0.0021	J	mg/L	0.0008	0.002	04-SEP-14
WG1944463-13 DUP		L1509027-24						
Aluminum (Al)-Dissolved		0.0037	0.0036		mg/L	4.1	20	04-SEP-14
Antimony (Sb)-Dissolved		0.00011	0.00011		mg/L	1.3	20	04-SEP-14
Arsenic (As)-Dissolved		0.00455	0.00445		mg/L	2.2	20	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 11 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-13 DUP		L1509027-24						
Barium (Ba)-Dissolved		0.410	0.417		mg/L	1.7	20	04-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Cadmium (Cd)-Dissolved		0.000012	0.000011		mg/L	11	20	04-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Cobalt (Co)-Dissolved		0.00506	0.00500		mg/L	1.2	20	04-SEP-14
Copper (Cu)-Dissolved		0.00084	0.00083		mg/L	1.7	20	04-SEP-14
Iron (Fe)-Dissolved		1.11	1.09		mg/L	1.4	20	04-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Lithium (Li)-Dissolved		0.0142	0.0139		mg/L	2.4	20	04-SEP-14
Manganese (Mn)-Dissolved		3.66	3.66		mg/L	0.1	20	04-SEP-14
Molybdenum (Mo)-Dissolved		0.00118	0.00115		mg/L	2.5	20	04-SEP-14
Nickel (Ni)-Dissolved		0.00681	0.00690		mg/L	1.4	20	04-SEP-14
Selenium (Se)-Dissolved		0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Silicon (Si)-Dissolved		8.00	8.06		mg/L	0.8	20	04-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Strontium (Sr)-Dissolved		0.449	0.449		mg/L	0.0	20	04-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Uranium (U)-Dissolved		0.00375	0.00379		mg/L	1.1	20	04-SEP-14
Vanadium (V)-Dissolved		0.00031	0.00031		mg/L	1.0	20	04-SEP-14
Zinc (Zn)-Dissolved		2.70	2.74		mg/L	1.5	20	04-SEP-14
WG1944463-14 DUP		L1509027-5						
Aluminum (Al)-Dissolved		0.0046	0.0050		mg/L	8.7	20	04-SEP-14
Antimony (Sb)-Dissolved		0.00012	0.00013		mg/L	1.0	20	04-SEP-14
Arsenic (As)-Dissolved		0.00033	0.00034		mg/L	3.4	20	04-SEP-14
Barium (Ba)-Dissolved		0.307	0.319		mg/L	3.9	20	04-SEP-14
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Cadmium (Cd)-Dissolved		0.000053	0.000057		mg/L	7.8	20	04-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Cobalt (Co)-Dissolved		0.00016	0.00017		mg/L	4.2	20	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 12 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2938189							
WG1944463-14 DUP		L1509027-5						
Copper (Cu)-Dissolved		0.00173	0.00173		mg/L	0.2	20	04-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Lithium (Li)-Dissolved		0.0144	0.0144		mg/L	0.1	20	04-SEP-14
Manganese (Mn)-Dissolved		0.0167	0.0167		mg/L	0.3	20	04-SEP-14
Molybdenum (Mo)-Dissolved		0.000399	0.000385		mg/L	3.7	20	04-SEP-14
Nickel (Ni)-Dissolved		0.00634	0.00632		mg/L	0.3	20	04-SEP-14
Selenium (Se)-Dissolved		0.00012	0.00013		mg/L	11	20	04-SEP-14
Silicon (Si)-Dissolved		10.0	9.88		mg/L	1.6	20	04-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Strontium (Sr)-Dissolved		0.267	0.260		mg/L	2.8	20	04-SEP-14
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Uranium (U)-Dissolved		0.00150	0.00146		mg/L	2.6	20	04-SEP-14
Vanadium (V)-Dissolved		0.00029	0.00028		mg/L	3.2	20	04-SEP-14
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-SEP-14
WG1944463-15 DUP		L1505554-3						
Aluminum (Al)-Dissolved		N/A	0.0053		mg/L	13	20	04-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Barium (Ba)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Copper (Cu)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Lithium (Li)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-SEP-14
Manganese (Mn)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 13 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2938189							
WG1944463-15 DUP		L1505554-3						
Nickel (Ni)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Silicon (Si)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Strontium (Sr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-14
Vanadium (V)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-SEP-14
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-SEP-14
WG1944463-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	04-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	04-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	04-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 14 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-1 MB								
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	04-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
WG1944463-3 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	04-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	04-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	04-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	04-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
WG1944463-5 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 15 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-5 MB								
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	04-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	04-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	04-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	04-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
WG1944463-7 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 16 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-7 MB								
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	04-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	04-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	04-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	04-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
WG1944463-9 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	04-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	04-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	04-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 17 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2938189							
WG1944463-9 MB								
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	04-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	04-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	04-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	04-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	04-SEP-14
Batch	R2939468							
WG1945356-2 CRM	ED-HIGH-WATRM							
Arsenic (As)-Dissolved			100.3		%		80-120	06-SEP-14
WG1945356-4 CRM	ED-HIGH-WATRM							
Arsenic (As)-Dissolved			99.9		%		80-120	06-SEP-14
WG1945356-6 CRM	ED-HIGH-WATRM							
Arsenic (As)-Dissolved			99.9		%		80-120	06-SEP-14
WG1945356-8 CRM	ED-HIGH-WATRM							
Arsenic (As)-Dissolved			101.8		%		80-120	06-SEP-14
WG1945356-10 DUP	L1505661-5							
Arsenic (As)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	06-SEP-14
WG1945356-11 DUP	L1506152-3							
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	06-SEP-14
WG1945356-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	05-SEP-14
WG1945356-3 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	05-SEP-14
WG1945356-5 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
WG1945356-7 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14

MET-T-CCMS-ED **Water**



Environmental

Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 18 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2936933							
WG1942320-17 DUP		L1508704-2						
Aluminum (Al)-Total		0.0262	0.0316		mg/L	19	20	03-SEP-14
Antimony (Sb)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	03-SEP-14
Arsenic (As)-Total		0.0135	0.0137		mg/L	1.2	20	03-SEP-14
Barium (Ba)-Total		0.0921	0.0925		mg/L	0.4	20	03-SEP-14
Beryllium (Be)-Total		<0.00050	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Boron (B)-Total		0.190	0.202		mg/L	6.0	20	03-SEP-14
Cadmium (Cd)-Total		<0.000010	<0.00020	RPD-NA	mg/L	N/A	20	03-SEP-14
Calcium (Ca)-Total		66.9	64.6		mg/L	3.4	20	03-SEP-14
Chromium (Cr)-Total		0.00020	<0.0050	RPD-NA	mg/L	N/A	20	03-SEP-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Copper (Cu)-Total		0.00040	<0.0010	RPD-NA	mg/L	N/A	20	03-SEP-14
Iron (Fe)-Total		4.07	4.19		mg/L	2.9	20	03-SEP-14
Lead (Pb)-Total		0.000188	0.00019		mg/L	0.2	20	03-SEP-14
Lithium (Li)-Total		0.0384	0.0390		mg/L	1.5	20	03-SEP-14
Magnesium (Mg)-Total		17.2	17.9		mg/L	3.8	20	03-SEP-14
Manganese (Mn)-Total		0.509	0.544		mg/L	6.6	20	03-SEP-14
Molybdenum (Mo)-Total		0.0138	0.0142		mg/L	2.9	20	03-SEP-14
Nickel (Ni)-Total		0.00032	<0.0020	RPD-NA	mg/L	N/A	20	03-SEP-14
Potassium (K)-Total		4.06	4.21		mg/L	3.7	20	03-SEP-14
Selenium (Se)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	03-SEP-14
Silicon (Si)-Total		9.19	9.63		mg/L	4.6	20	03-SEP-14
Silver (Ag)-Total		0.000014	<0.00040	RPD-NA	mg/L	N/A	20	03-SEP-14
Sodium (Na)-Total		34.9	35.7		mg/L	2.3	20	03-SEP-14
Strontium (Sr)-Total		0.432	0.431		mg/L	0.3	20	03-SEP-14
Thallium (Tl)-Total		<0.000050	<0.000010	RPD-NA	mg/L	N/A	20	03-SEP-14
Tin (Sn)-Total		0.00011	0.00011		mg/L	2.0	20	03-SEP-14
Titanium (Ti)-Total		0.00087	0.00109	J	mg/L	0.00022	0.0006	03-SEP-14
Uranium (U)-Total		0.000011	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Vanadium (V)-Total		<0.00050	0.00030		mg/L	13	20	03-SEP-14
Zinc (Zn)-Total		<0.0050	<0.0040	RPD-NA	mg/L	N/A	20	03-SEP-14
WG1942320-18 DUP		L1510277-8						
Aluminum (Al)-Total		0.0043	0.0031	J	mg/L	0.0012	0.006	03-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 19 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2936933							
WG1942320-18 DUP		L1510277-8						
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Arsenic (As)-Total		0.00501	0.00509		mg/L	1.7	20	03-SEP-14
Barium (Ba)-Total		0.150	0.148		mg/L	1.3	20	03-SEP-14
Beryllium (Be)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	03-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Boron (B)-Total		0.343	0.329		mg/L	4.2	20	03-SEP-14
Cadmium (Cd)-Total		0.000014	0.000014		mg/L	6.1	20	03-SEP-14
Calcium (Ca)-Total		9.79	9.47		mg/L	3.3	20	03-SEP-14
Chromium (Cr)-Total		0.00011	0.00011		mg/L	3.6	20	03-SEP-14
Cobalt (Co)-Total		0.00025	0.00027		mg/L	5.3	20	03-SEP-14
Copper (Cu)-Total		0.00089	0.00087		mg/L	1.8	20	03-SEP-14
Iron (Fe)-Total		4.00	3.97		mg/L	0.8	20	03-SEP-14
Lead (Pb)-Total		0.000126	0.000135		mg/L	6.8	20	03-SEP-14
Lithium (Li)-Total		0.0226	0.0221		mg/L	2.3	20	03-SEP-14
Magnesium (Mg)-Total		4.01	4.23		mg/L	5.3	20	03-SEP-14
Manganese (Mn)-Total		0.0922	0.0927		mg/L	0.6	20	03-SEP-14
Molybdenum (Mo)-Total		0.0545	0.0532		mg/L	2.3	20	03-SEP-14
Nickel (Ni)-Total		0.00037	0.00037		mg/L	1.1	20	03-SEP-14
Potassium (K)-Total		1.94	1.96		mg/L	1.5	20	03-SEP-14
Selenium (Se)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Silicon (Si)-Total		4.82	4.93		mg/L	2.3	20	03-SEP-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	03-SEP-14
Sodium (Na)-Total		229	237		mg/L	3.3	20	03-SEP-14
Strontium (Sr)-Total		0.152	0.148		mg/L	2.8	20	03-SEP-14
Thallium (Tl)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Titanium (Ti)-Total		<0.00030	0.00038	RPD-NA	mg/L	N/A	20	03-SEP-14
Uranium (U)-Total		0.000011	0.000011		mg/L	3.9	20	03-SEP-14
Vanadium (V)-Total		0.00069	0.00070		mg/L	1.7	20	03-SEP-14
Zinc (Zn)-Total		0.0690	0.0676		mg/L	2.2	20	03-SEP-14
WG1942320-16 LCS								
Aluminum (Al)-Total			102.2		%		70-130	03-SEP-14
Antimony (Sb)-Total			106.6		%		70-130	03-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 20 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2936933							
WG1942320-16 LCS								
Arsenic (As)-Total			100.5		%		70-130	03-SEP-14
Barium (Ba)-Total			107.4		%		70-130	03-SEP-14
Beryllium (Be)-Total			99.8		%		70-130	03-SEP-14
Bismuth (Bi)-Total			104.7		%		70-130	03-SEP-14
Boron (B)-Total			77.6		%		70-130	03-SEP-14
Cadmium (Cd)-Total			103.6		%		70-130	03-SEP-14
Calcium (Ca)-Total			100.5		%		70-130	03-SEP-14
Chromium (Cr)-Total			102.3		%		70-130	03-SEP-14
Cobalt (Co)-Total			102.7		%		70-130	03-SEP-14
Copper (Cu)-Total			100.0		%		70-130	03-SEP-14
Iron (Fe)-Total			97.4		%		70-130	03-SEP-14
Lead (Pb)-Total			101.2		%		70-130	03-SEP-14
Lithium (Li)-Total			101.9		%		70-130	03-SEP-14
Magnesium (Mg)-Total			106.9		%		70-130	03-SEP-14
Manganese (Mn)-Total			102.3		%		70-130	03-SEP-14
Molybdenum (Mo)-Total			99.9		%		70-130	03-SEP-14
Nickel (Ni)-Total			101.2		%		70-130	03-SEP-14
Potassium (K)-Total			94.7		%		70-130	03-SEP-14
Selenium (Se)-Total			102.7		%		70-130	03-SEP-14
Silicon (Si)-Total			97.3		%		70-130	03-SEP-14
Silver (Ag)-Total			108.4		%		70-130	03-SEP-14
Sodium (Na)-Total			110.2		%		70-130	03-SEP-14
Strontium (Sr)-Total			102.1		%		70-130	03-SEP-14
Thallium (Tl)-Total			104.2		%		70-130	03-SEP-14
Tin (Sn)-Total			102.0		%		70-130	03-SEP-14
Titanium (Ti)-Total			94.5		%		70-130	03-SEP-14
Uranium (U)-Total			100.2		%		70-130	03-SEP-14
Vanadium (V)-Total			105.0		%		70-130	03-SEP-14
Zinc (Zn)-Total			100.5		%		70-130	03-SEP-14
WG1942320-14 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	03-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	03-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 21 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2936933							
WG1942320-14 MB								
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	03-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	03-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	03-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	03-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	03-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	03-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	03-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	03-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	03-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Vanadium (V)-Total			0.00023	MB-LOR	mg/L		0.0001	03-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-SEP-14
Batch	R2939469							
WG1942320-14 MB								
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	06-SEP-14
NAPHTHENIC-ACID-FM		Water						
Batch	R2941389							
WG1943426-3 DUP								
Naphthenic Acids		L1506038-2	<1.0		mg/L	N/A	30	08-SEP-14
WG1943426-7 DUP								
Naphthenic Acids		L1508704-2	<1.0		mg/L	N/A	30	08-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 22 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NAPHTHENIC-ACID-FM Water								
Batch	R2941389							
WG1943426-4	LCS							
Naphthenic Acids			96.1		%		70-130	08-SEP-14
WG1943426-8	LCS							
Naphthenic Acids			94.0		%		70-130	08-SEP-14
WG1943426-1	MB							
Naphthenic Acids			<1.0		mg/L		1	08-SEP-14
WG1943426-5	MB							
Naphthenic Acids			<1.0		mg/L		1	08-SEP-14
WG1943426-2	MS	L1506038-1						
Naphthenic Acids			102.4		%		50-150	08-SEP-14
WG1943426-6	MS	L1508704-1						
Naphthenic Acids			105.9		%		50-150	08-SEP-14
NH3-CFA-ED Water								
Batch	R2937961							
WG1944262-4	DUP	L1508139-1						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-SEP-14
WG1944262-5	DUP	L1512277-1						
Ammonia, Total (as N)		0.053	0.053		mg/L	0.4	20	04-SEP-14
WG1944262-2	LCS							
Ammonia, Total (as N)			98.9		%		85-115	04-SEP-14
WG1944262-1	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	04-SEP-14
WG1944262-3	MS	L1505215-1						
Ammonia, Total (as N)			98.3		%		75-125	04-SEP-14
WG1944262-7	MS	L1505525-1						
Ammonia, Total (as N)			75.1		%		75-125	04-SEP-14
NO2-IC-ED Water								
Batch	R2931933							
WG1940605-3	DUP	L1509027-10						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940605-5	DUP	L1509027-30						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940605-7	DUP	L1509165-14						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940605-9	DUP	L1509036-2						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940605-11	LCS							
Nitrite (as N)			94.9		%		90-110	28-AUG-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 23 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-ED		Water						
Batch	R2931933							
WG1940605-13	LCS							
Nitrite (as N)			95.6		%		90-110	28-AUG-14
WG1940605-15	LCS							
Nitrite (as N)			96.1		%		90-110	28-AUG-14
WG1940605-17	LCS							
Nitrite (as N)			96.4		%		90-110	28-AUG-14
WG1940605-2	LCS							
Nitrite (as N)			92.8		%		90-110	28-AUG-14
WG1940605-1	MB							
Nitrite (as N)			<0.020		mg/L		0.02	28-AUG-14
WG1940605-12	MB							
Nitrite (as N)			<0.020		mg/L		0.02	28-AUG-14
WG1940605-14	MB							
Nitrite (as N)			<0.020		mg/L		0.02	28-AUG-14
WG1940605-16	MB							
Nitrite (as N)			<0.020		mg/L		0.02	28-AUG-14
WG1940605-18	MB							
Nitrite (as N)			<0.020		mg/L		0.02	28-AUG-14
WG1940605-10	MS	L1509036-2						
Nitrite (as N)			92.8		%		75-125	28-AUG-14
WG1940605-4	MS	L1509027-10						
Nitrite (as N)			93.6		%		75-125	28-AUG-14
WG1940605-6	MS	L1509027-30						
Nitrite (as N)			90.1		%		75-125	28-AUG-14
WG1940605-8	MS	L1509165-14						
Nitrite (as N)			92.5		%		75-125	28-AUG-14
NO3-IC-ED		Water						
Batch	R2931933							
WG1940605-3	DUP	L1509027-10						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940605-5	DUP	L1509027-30						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940605-7	DUP	L1509165-14						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940605-9	DUP	L1509036-2						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940605-11	LCS							
Nitrate (as N)			99.8		%		90-110	28-AUG-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 24 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-ED		Water						
Batch	R2931933							
WG1940605-13	LCS							
Nitrate (as N)			99.9		%		90-110	28-AUG-14
WG1940605-15	LCS							
Nitrate (as N)			99.6		%		90-110	28-AUG-14
WG1940605-17	LCS							
Nitrate (as N)			99.3		%		90-110	28-AUG-14
WG1940605-2	LCS							
Nitrate (as N)			99.9		%		90-110	28-AUG-14
WG1940605-1	MB							
Nitrate (as N)			<0.050		mg/L		0.05	28-AUG-14
WG1940605-12	MB							
Nitrate (as N)			<0.050		mg/L		0.05	28-AUG-14
WG1940605-14	MB							
Nitrate (as N)			<0.050		mg/L		0.05	28-AUG-14
WG1940605-16	MB							
Nitrate (as N)			<0.050		mg/L		0.05	28-AUG-14
WG1940605-18	MB							
Nitrate (as N)			<0.050		mg/L		0.05	28-AUG-14
WG1940605-10	MS	L1509036-2						
Nitrate (as N)			94.4		%		75-125	28-AUG-14
WG1940605-4	MS	L1509027-10						
Nitrate (as N)			95.2		%		75-125	28-AUG-14
WG1940605-6	MS	L1509027-30						
Nitrate (as N)			94.2		%		75-125	28-AUG-14
WG1940605-8	MS	L1509165-14						
Nitrate (as N)			93.6		%		75-125	28-AUG-14
PAH-ABT1-CL		Water						
Batch	R2938782							
WG1943842-2	LCS							
Acenaphthene			94.3		%		60-130	02-SEP-14
Acenaphthylene			101.6		%		60-130	02-SEP-14
Anthracene			102.4		%		60-130	02-SEP-14
Fluoranthene			95.9		%		60-130	02-SEP-14
Fluorene			97.6		%		60-130	02-SEP-14
Naphthalene			98.0		%		50-130	02-SEP-14
Phenanthrene			98.6		%		60-130	02-SEP-14
Pyrene			95.2		%		60-130	02-SEP-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 25 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R2938782							
WG1943842-2	LCS							
Benzo(a)anthracene			100.2		%		60-130	02-SEP-14
Benzo(k)fluoranthene			95.1		%		60-130	02-SEP-14
Benzo(b&j)fluoranthene			97.0		%		60-130	02-SEP-14
Benzo(g,h,i)perylene			94.8		%		60-130	02-SEP-14
Benzo(a)pyrene			94.6		%		60-130	02-SEP-14
Chrysene			98.9		%		60-130	02-SEP-14
Dibenzo(a,h)anthracene			97.3		%		60-130	02-SEP-14
Indeno(1,2,3-cd)pyrene			96.9		%		60-130	02-SEP-14
WG1943842-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	02-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	02-SEP-14
Anthracene			<0.000010		mg/L		0.00001	02-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	02-SEP-14
Fluorene			<0.000020		mg/L		0.00002	02-SEP-14
Naphthalene			<0.000050		mg/L		0.00005	02-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	02-SEP-14
Pyrene			<0.000010		mg/L		0.00001	02-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	02-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	02-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	02-SEP-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	02-SEP-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	02-SEP-14
Chrysene			<0.000020		mg/L		0.00002	02-SEP-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	02-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	02-SEP-14
Surrogate: d10-Acenaphthene			102.6		%		60-130	02-SEP-14
Surrogate: d10-Phenanthrene			97.7		%		60-130	02-SEP-14
Surrogate: d12-Chrysene			96.7		%		60-130	02-SEP-14
PH/EC/ALK-ED		Water						
Batch	R2931888							
WG1940264-10	DUP		L1509165-14					
pH		8.19	8.19	J	pH	0.00	0.3	29-AUG-14
Conductivity (EC)		1690	1690		uS/cm	0.1	10	29-AUG-14
Bicarbonate (HCO3)		763	764		mg/L	0.1	25	29-AUG-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 26 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2931888							
WG1940264-10	DUP	L1509165-14						
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	29-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	29-AUG-14
Alkalinity, Total (as CaCO3)		625	626		mg/L	0.1	20	29-AUG-14
WG1940264-11	DUP	L1509061-2						
pH		8.44	8.44	J	pH	0.00	0.3	29-AUG-14
Conductivity (EC)		1380	1380		uS/cm	0.1	10	29-AUG-14
Bicarbonate (HCO3)		763	774		mg/L	1.4	25	29-AUG-14
Carbonate (CO3)		11.0	9.9		mg/L	10	25	29-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	29-AUG-14
Alkalinity, Total (as CaCO3)		644	651		mg/L	1.1	20	29-AUG-14
WG1940264-7	DUP	L1508669-8						
pH		7.66	7.68	J	pH	0.02	0.3	28-AUG-14
Conductivity (EC)		1040	1050		uS/cm	0.6	10	28-AUG-14
Bicarbonate (HCO3)		281	281		mg/L	0.0	25	28-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-AUG-14
Alkalinity, Total (as CaCO3)		230	230		mg/L	0.0	20	28-AUG-14
WG1940264-8	DUP	L1509027-10						
pH		7.67	7.69	J	pH	0.02	0.3	28-AUG-14
Conductivity (EC)		1240	1240		uS/cm	0.1	10	28-AUG-14
Bicarbonate (HCO3)		577	576		mg/L	0.1	25	28-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-AUG-14
Alkalinity, Total (as CaCO3)		473	472		mg/L	0.1	20	28-AUG-14
WG1940264-9	DUP	L1509027-30						
pH		7.61	7.61	J	pH	0.01	0.3	28-AUG-14
Conductivity (EC)		2150	2140		uS/cm	0.5	10	28-AUG-14
Bicarbonate (HCO3)		836	837		mg/L	0.1	25	28-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-AUG-14
Alkalinity, Total (as CaCO3)		685	686		mg/L	0.1	20	28-AUG-14
WG1940264-13	LCS							
Conductivity (EC)			99.0		%		90-110	28-AUG-14
WG1940264-14	LCS							



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 27 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2931888							
WG1940264-14	LCS							
pH			7.00		pH		6.7-7.3	28-AUG-14
WG1940264-15	LCS							
Alkalinity, Total (as CaCO3)			99.3		%		85-115	28-AUG-14
WG1940264-16	LCS							
Conductivity (EC)			95.5		%		90-110	28-AUG-14
WG1940264-18	LCS							
Conductivity (EC)			98.6		%		90-110	28-AUG-14
WG1940264-19	LCS							
pH			7.00		pH		6.7-7.3	28-AUG-14
WG1940264-2	LCS							
Conductivity (EC)			93.6		%		90-110	28-AUG-14
WG1940264-20	LCS							
Alkalinity, Total (as CaCO3)			99.6		%		85-115	28-AUG-14
WG1940264-21	LCS							
Conductivity (EC)			94.8		%		90-110	28-AUG-14
WG1940264-23	LCS							
Conductivity (EC)			98.0		%		90-110	28-AUG-14
WG1940264-24	LCS							
pH			6.99		pH		6.7-7.3	28-AUG-14
WG1940264-25	LCS							
Alkalinity, Total (as CaCO3)			99.3		%		85-115	28-AUG-14
WG1940264-26	LCS							
Conductivity (EC)			93.9		%		90-110	28-AUG-14
WG1940264-28	LCS							
Conductivity (EC)			98.9		%		90-110	29-AUG-14
WG1940264-29	LCS							
pH			7.00		pH		6.7-7.3	29-AUG-14
WG1940264-3	LCS							
pH			7.00		pH		6.7-7.3	28-AUG-14
WG1940264-30	LCS							
Alkalinity, Total (as CaCO3)			98.9		%		85-115	29-AUG-14
WG1940264-31	LCS							
Conductivity (EC)			93.3		%		90-110	29-AUG-14
WG1940264-33	LCS							
Conductivity (EC)			97.5		%		90-110	29-AUG-14
WG1940264-34	LCS							
pH			7.01		pH		6.7-7.3	29-AUG-14
WG1940264-35	LCS							



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 28 of 33

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2931888							
WG1940264-35	LCS							
Alkalinity, Total (as CaCO3)			98.9		%		85-115	29-AUG-14
WG1940264-36	LCS							
Conductivity (EC)			92.9		%		90-110	29-AUG-14
WG1940264-4	LCS							
Alkalinity, Total (as CaCO3)			98.7		%		85-115	28-AUG-14
WG1940264-5	LCS							
Conductivity (EC)			96.7		%		90-110	28-AUG-14
WG1940264-1	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	28-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	28-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	28-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	28-AUG-14
WG1940264-12	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	28-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	28-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	28-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	28-AUG-14
WG1940264-17	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	28-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	28-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	28-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	28-AUG-14
WG1940264-22	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	28-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	28-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	28-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	28-AUG-14
WG1940264-27	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	29-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	29-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	29-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	29-AUG-14
WG1940264-32	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	29-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	29-AUG-14



Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Page 31 of 33

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-ED		Water						
Batch	R2932233							
WG1940259-2	LCS							
Turbidity			98.6		%		70-130	28-AUG-14
WG1940259-1	MB							
Turbidity			<0.10		NTU		0.1	28-AUG-14

Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2
Contact: Sue Raynard

Page 32 of 33

Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1508704

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2
Contact: Sue Raynard

Page 33 of 33

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Turbidity	1	25-AUG-14 11:30	28-AUG-14 00:00	48	60	hours	EHTL
Anions and Nutrients							
Nitrate as N by IC	1	25-AUG-14 11:30	28-AUG-14 08:00	48	68	hours	EHTL
Nitrite as N by IC	1	25-AUG-14 11:30	28-AUG-14 08:00	48	68	hours	EHTL

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1508704 were received on 27-AUG-14 11:36.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



ALS 140903-04 (14-CKX)

CONFIDENTIAL ANALYSIS REPORT

REPORT #: 140903-04

WO #: 14-CKX

PO #: L1508704

CLIENT: ALS Laboratory Group - Edmonton
9936-67 Avenue
Edmonton, AB
T6E 0P5

ATTENTION: ALS-ED Reporting
Tel: (780) 413-5227
Fax: (780) 437-2311

SAMPLE DESCRIPTION: Water Samples

DATE AND TIME OF SAMPLE COLLECTION: August 26, 2014

DATE AND TIME OF SAMPLE RECEIPT: August 28, 2014/08:30

SAMPLE TEMPERATURE WHEN RECEIVED: 8.5° Celsius

TEST PERFORMED:
Iron Related Bacteria
Sulfate Reducing Bacteria

TEST START DATE: August 28, 2014/09:34

DATE COMPLETED: September 03, 2014

CERTIFICATE OF ANALYSIS: See Page 2

QUALITY CONTROL DATA: See Attached Appendix 1

The report shall not be reproduced, except in full, without the written authority of PBR Laboratories Inc.

Certificate of Analysis

PBR ID	Sample #	Client ID	Lot #	Test	Protocol	Quantity Analyzed	*DF	Result	Units	Note
14-CKX-01	L1508704-3	16054140826013		Iron Related Bacteria	BART	15 ml		2.3×10^3	CFU/ml	1
				Sulfate Reducing Bacteria	BART	15 ml		1.2×10^3	CFU/ml	1
14-CKX-02	L1508704-4	16054140826014		Iron Related Bacteria	BART	15 ml		2.3×10^3	CFU/ml	1
				Sulfate Reducing Bacteria	BART	15 ml		5.0×10^3	CFU/ml	1
14-CKX-03	L1508704-5	16054140826015		Iron Related Bacteria	BART	15 ml		9.0×10^3	CFU/ml	1
				Sulfate Reducing Bacteria	BART	15 ml		1.8×10^5	CFU/ml	1

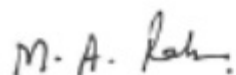
*DF - Dilution Factor used for analysis

Notes

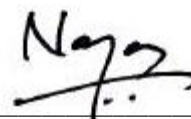
1 CFU = Colony Forming Unit.

BART results represent the Approximate Population only.

The reported results apply only to the items tested.



Abdul Rahman Mohammed (Analyst)
Date: Sep 03 2014



Approved By:

Narayan Pokharel, Ph.D.
Date: Sep 03 2014





PIBR
Laboratories Inc.

ALS 140903-04 (14-CKX)

APPENDIX 1

Quality Control Data for Iron Related Bacteria (BART)

Controls	Organism/Medium	Result
Sterility (media blank)	BART medium	Pass
Positive	Acidithiobacillus ferrooxidans	Pass
Negative	D/W Sterile	Pass

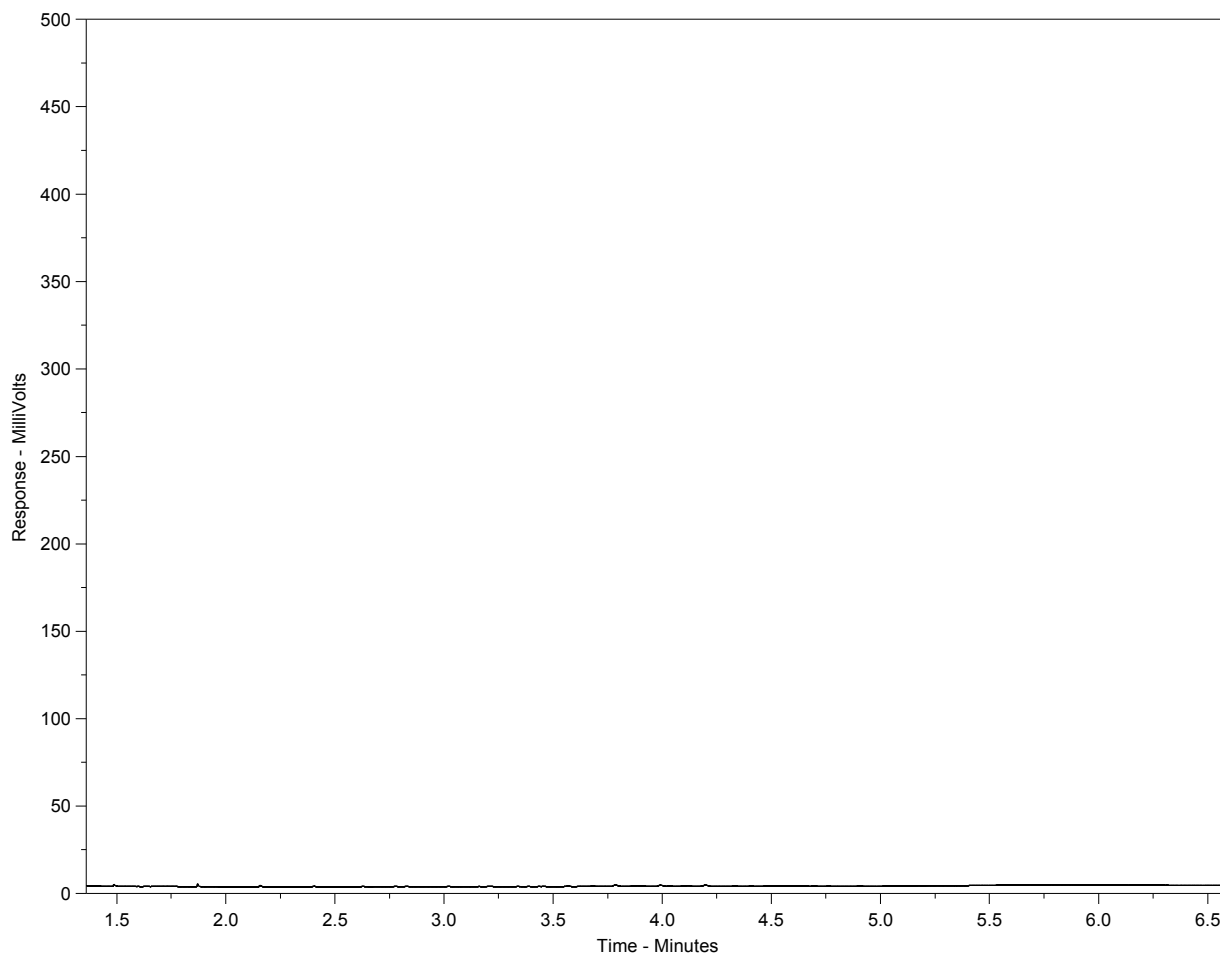
Quality Control Data for Sulfate Reducing Bacteria (BART)

Controls	Organism/Medium	Result
Sterility	BART medium	Pass
Positive	SRB	Pass
Negative	D/W Sterile	Pass

Hydrocarbon Distribution Report



ALS Sample ID: L1508704-1
Client ID: 16054140825011



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

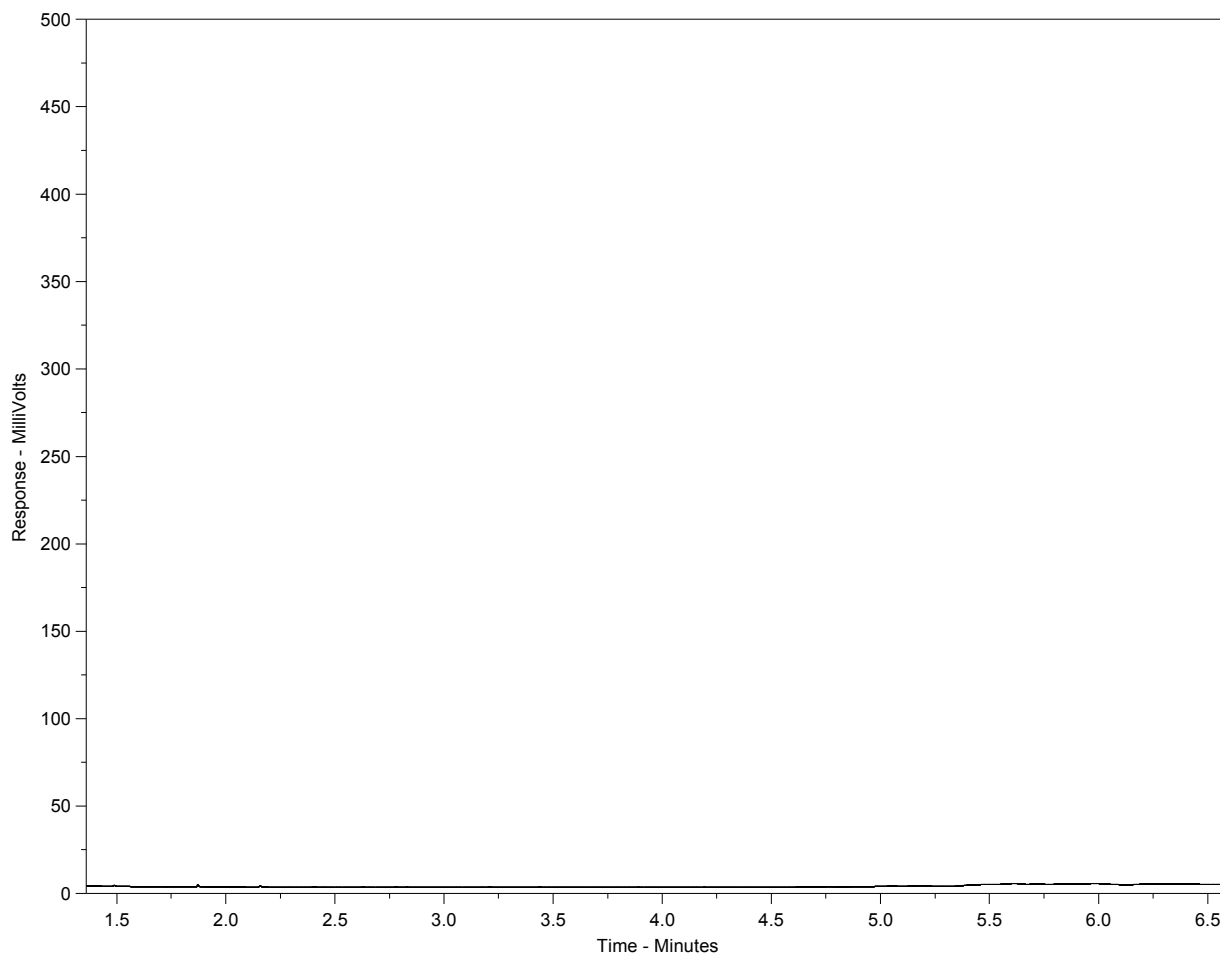
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1508704-2
Client ID: 16054140825012



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

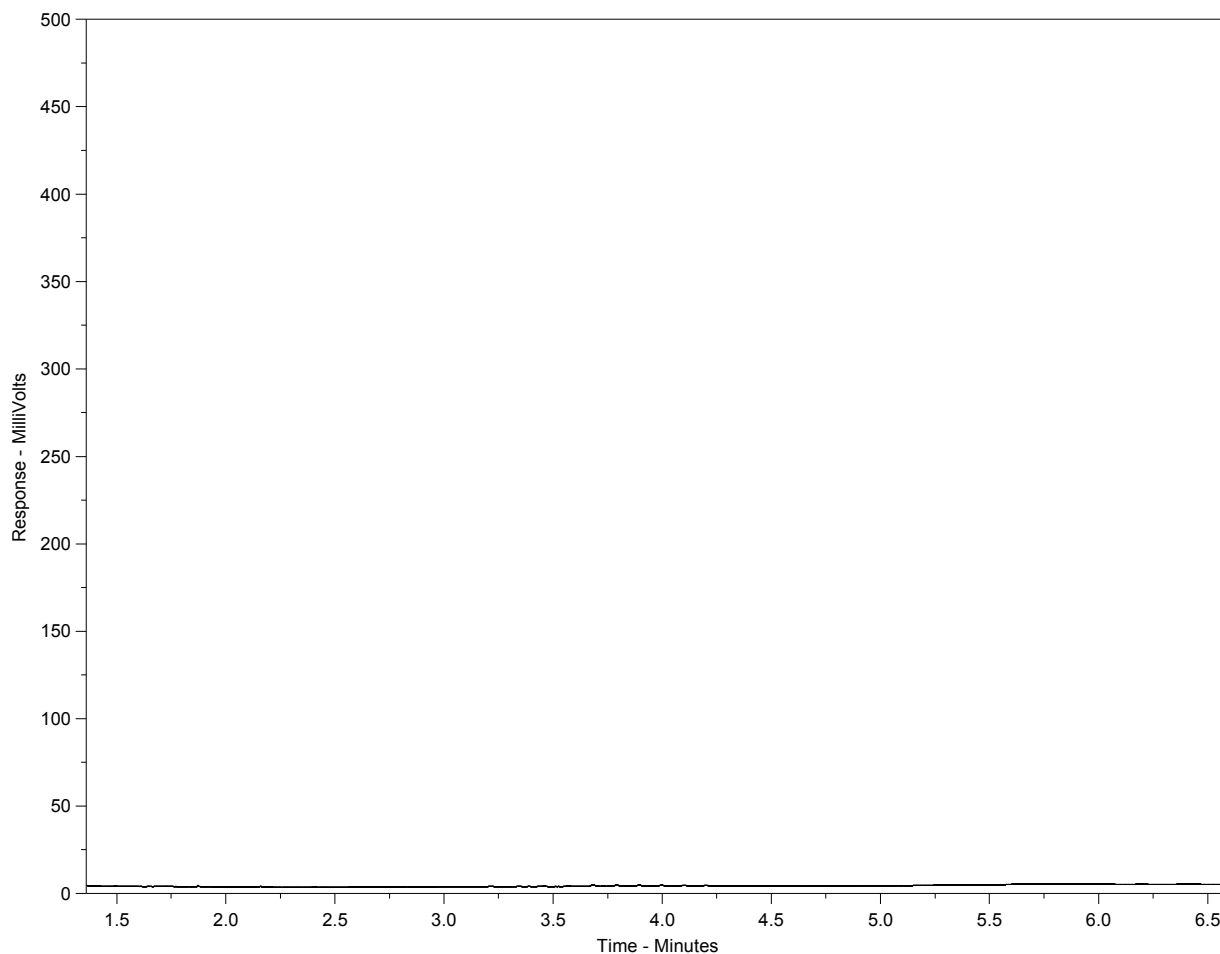
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1508704-3
Client ID: 16054140826013



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

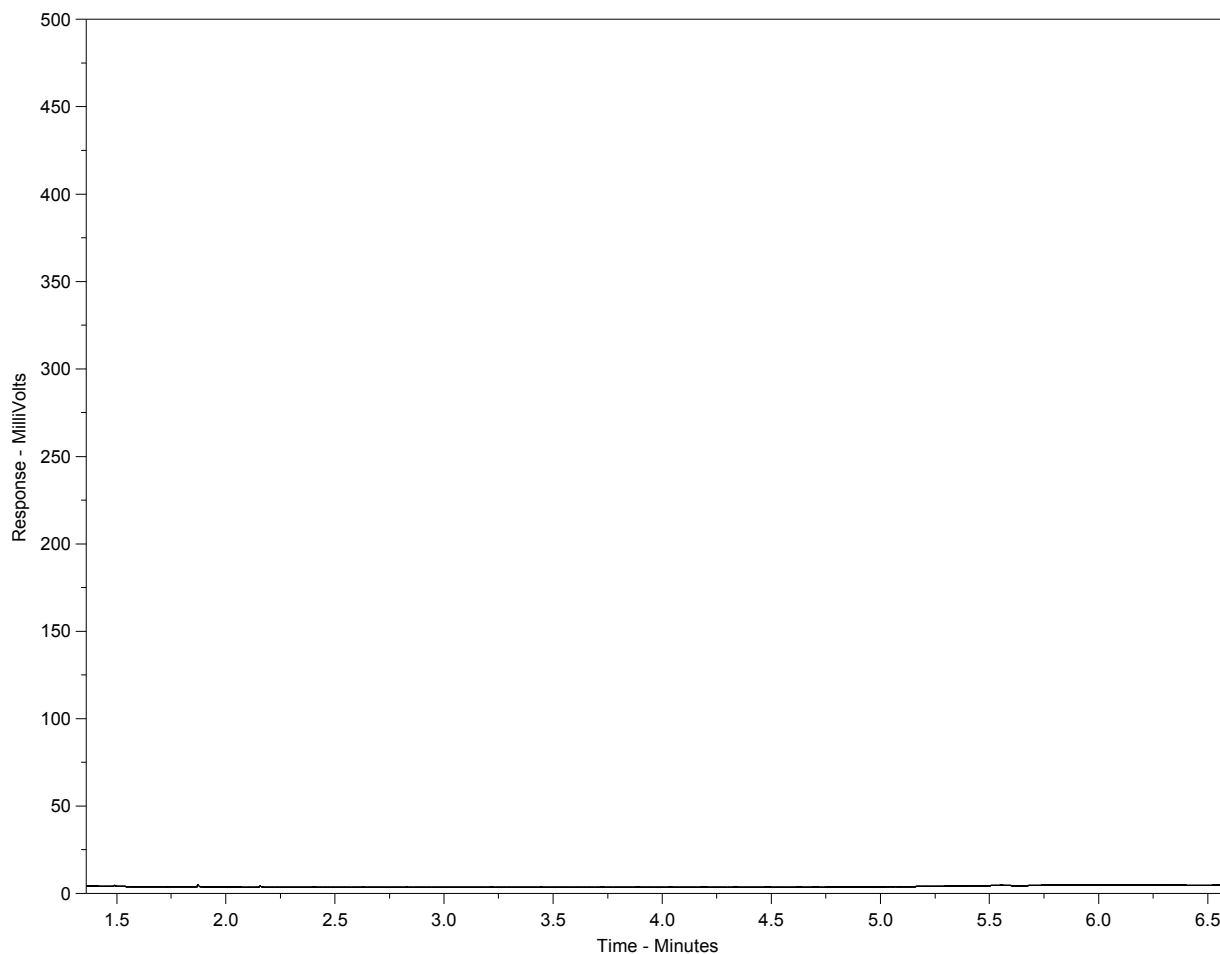
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1508704-4
Client ID: 16054140826014



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →					
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

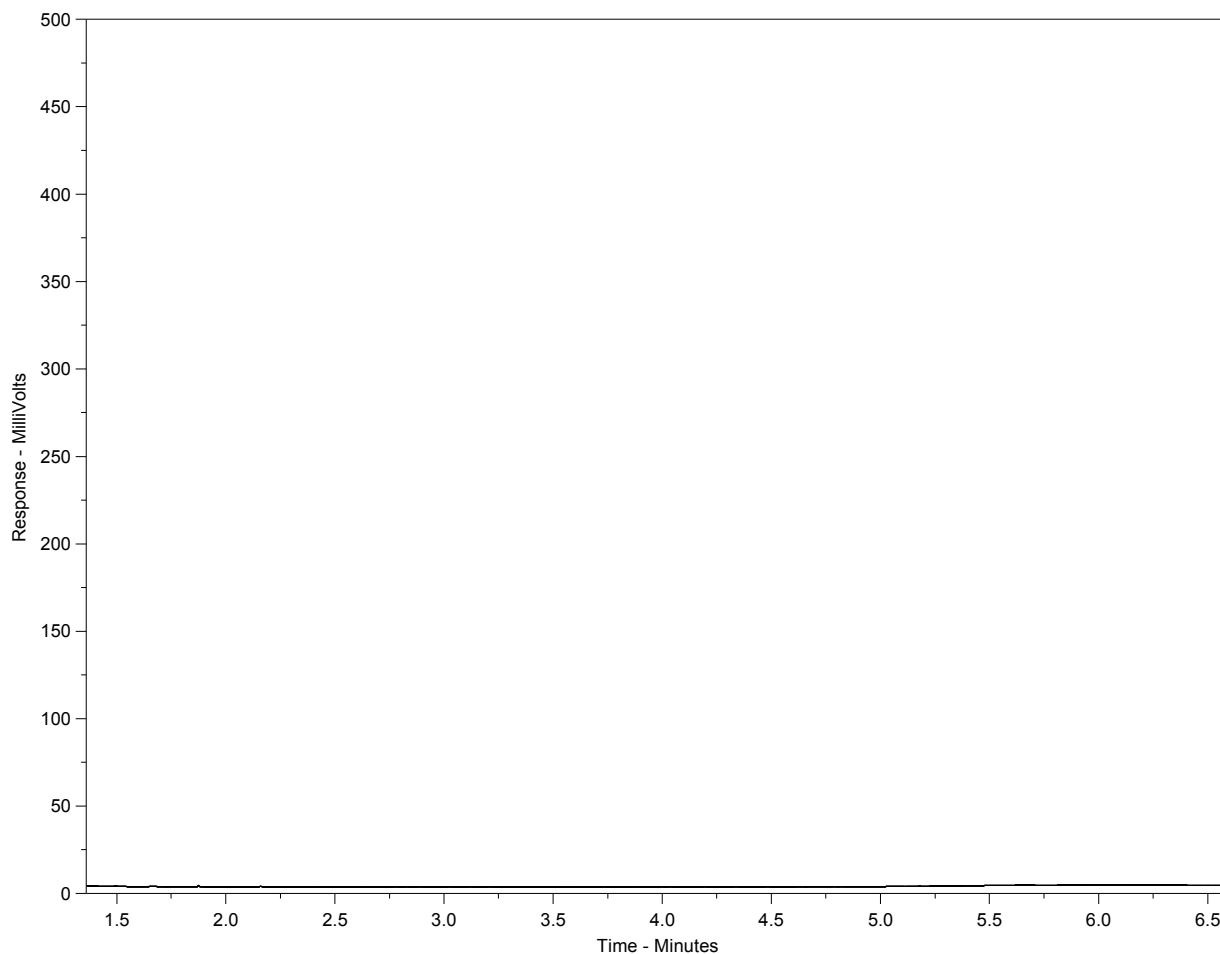
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1508704-5
Client ID: 16054140826015



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



Matrix Solutions Inc.
ATTN: Sue Raynard
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Date Received: 28-AUG-14
Report Date: 07-JAN-15 15:42 (MT)
Version: FINAL REV. 3

Client Phone: 403-513-2275

Certificate of Analysis

Lab Work Order #: L1509452
Project P.O. #: NOT SUBMITTED
Job Reference: 16054-502 SAOS
C of C Numbers: M061308
Legal Site Desc:

Comments: ADDITIONAL 05-JAN-15 09:33
ADDITIONAL 16-DEC-14 10:38

Nicole Thibault
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-1 16054140827016									
Sampled By: bp/ea on 27-AUG-14 @ 12:25									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
Toluene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
EthylBenzene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
o-Xylene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
Styrene	<0.0010	-		0.0010	mg/L	-		30-AUG-14	R2932845
F1(C6-C10)	<0.10	-		0.10	mg/L	-		30-AUG-14	R2932845
F1-BTEX	<0.10	-		0.10	mg/L	-		30-AUG-14	R2932845
Xylenes	<0.00071	-		0.00071	mg/L	-		30-AUG-14	R2932845
Surr: 1,4-Difluorobenzene (SS)	99.5	-		N/A	%	-		30-AUG-14	R2932845
Surr: 4-Bromofluorobenzene (SS)	85.6	-		N/A	%	-		30-AUG-14	R2932845
Surr: 3,4-Dichlorotoluene (SS)	96.5	-		N/A	%	-		30-AUG-14	R2932845
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
Surr: 2-Bromobenzotrifluoride	95.5	-		N/A	%	-	03-SEP-14	03-SEP-14	R2938358
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		05-SEP-14	R2939974
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.102	+/-0.017		0.0030	mg/L	0		02-SEP-14	R2935468
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Arsenic (As)-Total	0.00023	+/-0.00004		0.00010	mg/L	0		02-SEP-14	R2935468
Barium (Ba)-Total	0.233	+/-0.026		0.000050	mg/L	0		02-SEP-14	R2935468
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Boron (B)-Total	0.018	+/-0.003		0.010	mg/L	0		02-SEP-14	R2935468
Cadmium (Cd)-Total	0.000052	+/-0.000010		0.000010	mg/L	0		02-SEP-14	R2935468
Calcium (Ca)-Total	156	+/-18		0.10	mg/L	0		02-SEP-14	R2935468
Chromium (Cr)-Total	0.00063	+/-0.00011		0.00010	mg/L	0		02-SEP-14	R2935468
Cobalt (Co)-Total	0.00670	+/-0.00091		0.00010	mg/L	0		02-SEP-14	R2935468
Copper (Cu)-Total	0.00159	+/-0.00022		0.00010	mg/L	0		02-SEP-14	R2935468
Iron (Fe)-Total	0.308	+/-0.049		0.030	mg/L	0		02-SEP-14	R2935468
Lead (Pb)-Total	0.000577	+/-0.000095		0.000050	mg/L	0		02-SEP-14	R2935468
Lithium (Li)-Total	0.0138	+/-0.0026		0.0050	mg/L	0		02-SEP-14	R2935468
Magnesium (Mg)-Total	51.8	+/-6.3		0.10	mg/L	0		02-SEP-14	R2935468
Manganese (Mn)-Total	0.223	+/-0.022		0.0050	mg/L	0		02-SEP-14	R2935468
Molybdenum (Mo)-Total	0.000595	+/-0.000074		0.000050	mg/L	0		02-SEP-14	R2935468
Nickel (Ni)-Total	0.00384	+/-0.00043		0.00010	mg/L	0		02-SEP-14	R2935468
Potassium (K)-Total	1.37	+/-0.17		0.50	mg/L	0		02-SEP-14	R2935468
Selenium (Se)-Total	0.00016	+/-0.00003		0.00010	mg/L	0		02-SEP-14	R2935468
Silicon (Si)-Total	10.8	+/-2.1		0.050	mg/L	0		02-SEP-14	R2935468
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Sodium (Na)-Total	4.2	+/-0.5		1.0	mg/L	0		02-SEP-14	R2935468
Strontium (Sr)-Total	0.155	+/-0.022		0.00010	mg/L	0		02-SEP-14	R2935468
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Tin (Sn)-Total	0.00013	+/-0.00004		0.00010	mg/L	0		02-SEP-14	R2935468
Titanium (Ti)-Total	0.00395	+/-0.0013		0.00030	mg/L	0		02-SEP-14	R2935468
Uranium (U)-Total	0.000856	+/-0.00012		0.000010	mg/L	0		02-SEP-14	R2935468

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-1 16054140827016									
Sampled By: bp/ea on 27-AUG-14 @ 12:25									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2935468
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		05-SEP-14	R2939171
Dissolved Organic Carbon	6.6	+/-0.9		1.0	mg/L	0		03-SEP-14	R2937077
Iron Bacteria	See Attached	-				-		29-AUG-14	R2943786
Naphthenic Acids	<1.0	-		1.0	mg/L	-	04-SEP-14	09-SEP-14	R2942742
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		05-SEP-14	R2939481
Sulphate Reducing Bacteria	See Attached	-				-		29-AUG-14	R2943786
Total Dissolved Solids	589	+/-39		10	mg/L	0		03-SEP-14	R2937933
Silicon (as SiO2)-Total	23.1	-		0.11	mg/L	-		03-SEP-14	
Turbidity	3.18	+/-0.22		0.10	NTU	0		29-AUG-14	R2933068
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluoranthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluorene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Naphthalene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Phenanthrene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Acenaphthene	100.2	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Phenanthrene	102.5	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d12-Chrysene	87.0	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	0.96	+/-0.10		0.50	mg/L	0		29-AUG-14	R2934237
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0014	+/-0.0004		0.0010	mg/L	0		07-SEP-14	R2939908
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Barium (Ba)-Dissolved	0.214	+/-0.019		0.00010	mg/L	0		07-SEP-14	R2939908
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		07-SEP-14	R2939908
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Cobalt (Co)-Dissolved	0.00039	+/-0.00004		0.00010	mg/L	0		07-SEP-14	R2939908
Copper (Cu)-Dissolved	0.00122	+/-0.00010		0.00060	mg/L	0		07-SEP-14	R2939908
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		07-SEP-14	R2939908
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-1 16054140827016 Sampled By: bp/ea on 27-AUG-14 @ 12:25 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Lithium (Li)-Dissolved	0.0134	+/-0.0017		0.0050	mg/L	0		07-SEP-14	R2939908
Manganese (Mn)-Dissolved	0.0507	+/-0.0035		0.0020	mg/L	0		07-SEP-14	R2939908
Molybdenum (Mo)-Dissolved	0.00043	+/-0.00005		0.00010	mg/L	0		07-SEP-14	R2939908
Nickel (Ni)-Dissolved	0.00324	+/-0.00027		0.00010	mg/L	0		07-SEP-14	R2939908
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Silicon (Si)-Dissolved	11.3	+/-0.96		0.050	mg/L	0		07-SEP-14	R2939908
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		07-SEP-14	R2939908
Strontium (Sr)-Dissolved	0.147	+/-0.011		0.00010	mg/L	0		07-SEP-14	R2939908
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		07-SEP-14	R2939908
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		07-SEP-14	R2939908
Uranium (U)-Dissolved	0.000827	+/-0.000086		0.000010	mg/L	0		07-SEP-14	R2939908
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Zinc (Zn)-Dissolved	0.0043	+/-0.0006		0.0010	mg/L	0		07-SEP-14	R2939908
Ion Balance Calculation									
Ion Balance	99.7	-			%	-		08-SEP-14	
TDS (Calculated)	562	-			mg/L	-		08-SEP-14	
Hardness (as CaCO3)	580	-			mg/L	-		08-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		05-SEP-14	R2939974
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		29-AUG-14	R2934237
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		02-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		29-AUG-14	R2934237
Sulfate by IC									
Sulfate (SO4)	3.12	+/-0.21		0.50	mg/L	0		29-AUG-14	R2934237
pH, Conductivity and Total Alkalinity									
pH	7.56	+/-0.01		0.10	pH	0		29-AUG-14	R2933060
Conductivity (EC)	1020	+/-51		0.20	uS/cm	0		29-AUG-14	R2933060
Bicarbonate (HCO3)	716	+/-27		5.0	mg/L	0		29-AUG-14	R2933060
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		29-AUG-14	R2933060
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		29-AUG-14	R2933060
Alkalinity, Total (as CaCO3)	587	+/-37		2.0	mg/L	0		29-AUG-14	R2933060
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	24.3	-		0.11	mg/L	-		08-SEP-14	
L1509452-2 16054140827017 Sampled By: bp/ea on 27-AUG-14 @ 13:45 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
Toluene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
EthylBenzene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
o-Xylene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
Styrene	<0.0010	-		0.0010	mg/L	-		30-AUG-14	R2932845
F1(C6-C10)	<0.10	-		0.10	mg/L	-		30-AUG-14	R2932845
F1-BTEX	<0.10	-		0.10	mg/L	-		30-AUG-14	R2932845

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-2 16054140827017									
Sampled By: bp/ea on 27-AUG-14 @ 13:45									
Matrix: H2O									
BTEX, Styrene and F1 (C6-C10)									
Xylenes	<0.00071	-		0.00071	mg/L	-		30-AUG-14	R2932845
Surr: 1,4-Difluorobenzene (SS)	101.5	-		N/A	%	-		30-AUG-14	R2932845
Surr: 4-Bromofluorobenzene (SS)	86.9	-		N/A	%	-		30-AUG-14	R2932845
Surr: 3,4-Dichlorotoluene (SS)	96.2	-		N/A	%	-		30-AUG-14	R2932845
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
Surr: 2-Bromobenzotrifluoride	98.2	-		N/A	%	-	03-SEP-14	03-SEP-14	R2938358
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.000005 0	mg/L	-		05-SEP-14	R2939974
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0037	+/-0.0020		0.0030	mg/L	0		02-SEP-14	R2934348
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Arsenic (As)-Total	0.0139	+/-0.0016		0.00010	mg/L	0		02-SEP-14	R2934348
Barium (Ba)-Total	0.204	+/-0.023		0.000050	mg/L	0		02-SEP-14	R2934348
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2934348
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2934348
Boron (B)-Total	0.049	+/-0.008		0.010	mg/L	0		02-SEP-14	R2934348
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2934348
Calcium (Ca)-Total	79.7	+/-9.4		0.10	mg/L	0		02-SEP-14	R2934348
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Cobalt (Co)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Copper (Cu)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Iron (Fe)-Total	3.42	+/-0.54		0.030	mg/L	0		02-SEP-14	R2934348
Lead (Pb)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2934348
Lithium (Li)-Total	0.0225	+/-0.0042		0.0050	mg/L	0		02-SEP-14	R2934348
Magnesium (Mg)-Total	22.7	+/-2.8		0.10	mg/L	0		02-SEP-14	R2934348
Manganese (Mn)-Total	0.436	+/-0.044		0.0050	mg/L	0		02-SEP-14	R2934348
Molybdenum (Mo)-Total	0.00106	+/-0.00013		0.000050	mg/L	0		02-SEP-14	R2934348
Nickel (Ni)-Total	0.00016	+/-0.00006		0.00010	mg/L	0		02-SEP-14	R2934348
Potassium (K)-Total	2.83	+/-0.35		0.50	mg/L	0		02-SEP-14	R2934348
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Silicon (Si)-Total	8.93	+/-1.8		0.050	mg/L	0		02-SEP-14	R2934348
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2934348
Sodium (Na)-Total	7.3	+/-0.9		1.0	mg/L	0		02-SEP-14	R2934348
Strontium (Sr)-Total	0.412	+/-0.059		0.00010	mg/L	0		02-SEP-14	R2934348
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2934348
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		02-SEP-14	R2934348
Uranium (U)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2934348
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2934348
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2934348
Miscellaneous Parameters									
Ammonia, Total (as N)	0.842	-		0.050	mg/L	-		05-SEP-14	R2939171
Dissolved Organic Carbon	6.2	+/-0.9		1.0	mg/L	0		03-SEP-14	R2937077
Iron Bacteria	See Attached	-				-		29-AUG-14	R2943786
Naphthenic Acids	<1.0	-		1.0	mg/L	-	04-SEP-14	09-SEP-14	R2942742
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		05-SEP-14	R2939481

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-2 16054140827017									
Sampled By: bp/ea on 27-AUG-14 @ 13:45									
Matrix: H2O									
Sulphate Reducing Bacteria	See Attached	-				-		29-AUG-14	R2943786
Total Dissolved Solids	314	+/-21		10	mg/L	0		03-SEP-14	R2937933
Silicon (as SiO2)-Total	19.1	-		0.11	mg/L	-		02-SEP-14	
Turbidity	34.4	+/-1.9		0.10	NTU	0		29-AUG-14	R2933068
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluoranthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluorene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Naphthalene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Phenanthrene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Acenaphthene	96.7	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Phenanthrene	100.2	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d12-Chrysene	92.7	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	0.83	+/-0.09		0.50	mg/L	0		29-AUG-14	R2934237
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		07-SEP-14	R2939908
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Arsenic (As)-Dissolved	0.0140	+/-0.0015		0.00040	mg/L	0		07-SEP-14	R2939908
Barium (Ba)-Dissolved	0.209	+/-0.018		0.00010	mg/L	0		07-SEP-14	R2939908
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		07-SEP-14	R2939908
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		07-SEP-14	R2939908
Iron (Fe)-Dissolved	3.43	+/-0.31		0.010	mg/L	0		07-SEP-14	R2939908
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Lithium (Li)-Dissolved	0.0231	+/-0.0029		0.0050	mg/L	0		07-SEP-14	R2939908
Manganese (Mn)-Dissolved	0.486	+/-0.033		0.0020	mg/L	0		07-SEP-14	R2939908
Molybdenum (Mo)-Dissolved	0.00113	+/-0.00012		0.00010	mg/L	0		07-SEP-14	R2939908
Nickel (Ni)-Dissolved	0.00013	+/-0.00004		0.00010	mg/L	0		07-SEP-14	R2939908
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Silicon (Si)-Dissolved	9.08	+/-0.77		0.050	mg/L	0		07-SEP-14	R2939908
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		07-SEP-14	R2939908
Strontium (Sr)-Dissolved	0.439	+/-0.033		0.00010	mg/L	0		07-SEP-14	R2939908
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		07-SEP-14	R2939908

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-3 16054140827018									
Sampled By: bp/ea on 27-AUG-14 @ 14:30									
Matrix: H2O									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		05-SEP-14	R2939974
				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0086	+/-0.0024		0.0030	mg/L	0		02-SEP-14	R2935468
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Arsenic (As)-Total	0.00016	+/-0.00004		0.00010	mg/L	0		02-SEP-14	R2935468
Barium (Ba)-Total	0.338	+/-0.038		0.000050	mg/L	0		02-SEP-14	R2935468
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Boron (B)-Total	0.114	+/-0.018		0.010	mg/L	0		02-SEP-14	R2935468
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Calcium (Ca)-Total	80.3	+/-9.5		0.10	mg/L	0		02-SEP-14	R2935468
Chromium (Cr)-Total	0.00011	+/-0.00005		0.00010	mg/L	0		02-SEP-14	R2935468
Cobalt (Co)-Total	0.00033	+/-0.00005		0.00010	mg/L	0		02-SEP-14	R2935468
Copper (Cu)-Total	0.00015	+/-0.00010		0.00010	mg/L	0		02-SEP-14	R2935468
Iron (Fe)-Total	3.51	+/-0.56		0.030	mg/L	0		02-SEP-14	R2935468
Lead (Pb)-Total	0.000086	+/-0.000021		0.000050	mg/L	0		02-SEP-14	R2935468
Lithium (Li)-Total	0.0307	+/-0.0057		0.0050	mg/L	0		02-SEP-14	R2935468
Magnesium (Mg)-Total	22.6	+/-2.7		0.10	mg/L	0		02-SEP-14	R2935468
Manganese (Mn)-Total	0.175	+/-0.018		0.0050	mg/L	0		02-SEP-14	R2935468
Molybdenum (Mo)-Total	0.00107	+/-0.00013		0.000050	mg/L	0		02-SEP-14	R2935468
Nickel (Ni)-Total	0.00037	+/-0.00007		0.00010	mg/L	0		02-SEP-14	R2935468
Potassium (K)-Total	4.10	+/-0.50		0.50	mg/L	0		02-SEP-14	R2935468
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Silicon (Si)-Total	9.22	+/-1.8		0.050	mg/L	0		02-SEP-14	R2935468
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Sodium (Na)-Total	19.0	+/-2.3		1.0	mg/L	0		02-SEP-14	R2935468
Strontium (Sr)-Total	0.632	+/-0.091		0.00010	mg/L	0		02-SEP-14	R2935468
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Titanium (Ti)-Total	0.00036	+/-0.00016		0.00030	mg/L	0		02-SEP-14	R2935468
Uranium (U)-Total	0.000018	+/-0.000002		0.000010	mg/L	0		02-SEP-14	R2935468
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2935468
Miscellaneous Parameters									
Ammonia, Total (as N)	1.04	-		0.050	mg/L	-		05-SEP-14	R2939171
Dissolved Organic Carbon	5.5	+/-0.8		1.0	mg/L	0		03-SEP-14	R2937077
Iron Bacteria	See Attached	-				-		29-AUG-14	R2943786
Naphthenic Acids	<1.0	-		1.0	mg/L	-	04-SEP-14	09-SEP-14	R2942742
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		05-SEP-14	R2939481
Sulphate Reducing Bacteria	See Attached	-				-		29-AUG-14	R2943786
Total Dissolved Solids	337	+/-23		10	mg/L	0		03-SEP-14	R2937933
Silicon (as SiO2)-Total	19.7	-		0.11	mg/L	-		03-SEP-14	
Turbidity	36.1	+/-2.0		0.10	NTU	0		29-AUG-14	R2933068
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluoranthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluorene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Naphthalene	0.000057	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-3 16054140827018									
Sampled By: bp/ea on 27-AUG-14 @ 14:30									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Phenanthrene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Acenaphthene	108.5	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Phenanthrene	108.6	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d12-Chrysene	94.8	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		29-AUG-14	R2934237
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		07-SEP-14	R2939908
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Barium (Ba)-Dissolved	0.306	+/-0.027		0.00010	mg/L	0		07-SEP-14	R2939908
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		07-SEP-14	R2939908
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Cobalt (Co)-Dissolved	0.00020	+/-0.00002		0.00010	mg/L	0		07-SEP-14	R2939908
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		07-SEP-14	R2939908
Iron (Fe)-Dissolved	3.34	+/-0.30		0.010	mg/L	0		07-SEP-14	R2939908
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Lithium (Li)-Dissolved	0.0303	+/-0.0038		0.0050	mg/L	0		07-SEP-14	R2939908
Manganese (Mn)-Dissolved	0.173	+/-0.012		0.0020	mg/L	0		07-SEP-14	R2939908
Molybdenum (Mo)-Dissolved	0.00094	+/-0.00010		0.00010	mg/L	0		07-SEP-14	R2939908
Nickel (Ni)-Dissolved	0.00033	+/-0.00005		0.00010	mg/L	0		07-SEP-14	R2939908
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Silicon (Si)-Dissolved	9.85	+/-0.84		0.050	mg/L	0		07-SEP-14	R2939908
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		07-SEP-14	R2939908
Strontium (Sr)-Dissolved	0.620	+/-0.046		0.00010	mg/L	0		07-SEP-14	R2939908
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		07-SEP-14	R2939908
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		07-SEP-14	R2939908
Uranium (U)-Dissolved	0.000013	+/-0.000001		0.000010	mg/L	0		07-SEP-14	R2939908
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Zinc (Zn)-Dissolved	0.0019	+/-0.0004		0.0010	mg/L	0		07-SEP-14	R2939908
Ion Balance Calculation									
Ion Balance	101	-			%	-		08-SEP-14	
TDS (Calculated)	331	-			mg/L	-		08-SEP-14	
Hardness (as CaCO3)	296	-			mg/L	-		08-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.000050	-		0.000005	mg/L	-		05-SEP-14	R2939974

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-3 16054140827018 Sampled By: bp/ea on 27-AUG-14 @ 14:30 Matrix: H2O									
Mercury (Hg) - Dissolved									
				0					
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		29-AUG-14	R2934237
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		02-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		29-AUG-14	R2934237
Sulfate by IC									
Sulfate (SO4)	<0.50	-		0.50	mg/L	-		29-AUG-14	R2934237
pH, Conductivity and Total Alkalinity									
pH	7.97	+/-0.01		0.10	pH	0		29-AUG-14	R2933060
Conductivity (EC)	612	+/-31		0.20	uS/cm	0		29-AUG-14	R2933060
Bicarbonate (HCO3)	416	+/-16		5.0	mg/L	0		29-AUG-14	R2933060
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		29-AUG-14	R2933060
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		29-AUG-14	R2933060
Alkalinity, Total (as CaCO3)	341	+/-22		2.0	mg/L	0		29-AUG-14	R2933060
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.1	-		0.11	mg/L	-		08-SEP-14	
L1509452-4 16054140827019 Sampled By: bp/ea on 27-AUG-14 @ 15:35 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
Toluene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
EthylBenzene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
o-Xylene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
Styrene	<0.0010	-		0.0010	mg/L	-		30-AUG-14	R2932845
F1(C6-C10)	<0.10	-		0.10	mg/L	-		30-AUG-14	R2932845
F1-BTEX	<0.10	-		0.10	mg/L	-		30-AUG-14	R2932845
Xylenes	<0.00071	-		0.00071	mg/L	-		30-AUG-14	R2932845
Surr:	1,4-Difluorobenzene (SS)	100.4	-	N/A	%	-		30-AUG-14	R2932845
Surr:	4-Bromofluorobenzene (SS)	87.4	-	N/A	%	-		30-AUG-14	R2932845
Surr:	3,4-Dichlorotoluene (SS)	95.0	-	N/A	%	-		30-AUG-14	R2932845
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
Surr:	2-Bromobenzotrifluoride	102.5	-	N/A	%	-	03-SEP-14	03-SEP-14	R2938358
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		05-SEP-14	R2939974
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0421	+/-0.0074		0.0030	mg/L	0		02-SEP-14	R2935468
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Arsenic (As)-Total	0.00168	+/-0.00020		0.00010	mg/L	0		02-SEP-14	R2935468
Barium (Ba)-Total	0.242	+/-0.027		0.000050	mg/L	0		02-SEP-14	R2935468
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-4 16054140827019									
Sampled By: bp/ea on 27-AUG-14 @ 15:35									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Boron (B)-Total	0.079	+/-0.013		0.010	mg/L	0		02-SEP-14	R2935468
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Calcium (Ca)-Total	70.2	+/-8.3		0.10	mg/L	0		02-SEP-14	R2935468
Chromium (Cr)-Total	0.00044	+/-0.00008		0.00010	mg/L	0		02-SEP-14	R2935468
Cobalt (Co)-Total	0.00088	+/-0.00012		0.00010	mg/L	0		02-SEP-14	R2935468
Copper (Cu)-Total	0.00024	+/-0.00010		0.00010	mg/L	0		02-SEP-14	R2935468
Iron (Fe)-Total	4.39	+/-0.70		0.030	mg/L	0		02-SEP-14	R2935468
Lead (Pb)-Total	0.000125	+/-0.000026		0.000050	mg/L	0		02-SEP-14	R2935468
Lithium (Li)-Total	0.0219	+/-0.0041		0.0050	mg/L	0		02-SEP-14	R2935468
Magnesium (Mg)-Total	20.0	+/-2.4		0.10	mg/L	0		02-SEP-14	R2935468
Manganese (Mn)-Total	0.669	+/-0.067		0.0050	mg/L	0		02-SEP-14	R2935468
Molybdenum (Mo)-Total	0.00476	+/-0.00058		0.000050	mg/L	0		02-SEP-14	R2935468
Nickel (Ni)-Total	0.00221	+/-0.00026		0.00010	mg/L	0		02-SEP-14	R2935468
Potassium (K)-Total	5.47	+/-0.67		0.50	mg/L	0		02-SEP-14	R2935468
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Silicon (Si)-Total	6.78	+/-1.3		0.050	mg/L	0		02-SEP-14	R2935468
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Sodium (Na)-Total	13.3	+/-1.6		1.0	mg/L	0		02-SEP-14	R2935468
Strontium (Sr)-Total	0.514	+/-0.074		0.00010	mg/L	0		02-SEP-14	R2935468
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Titanium (Ti)-Total	0.00138	+/-0.00047		0.00030	mg/L	0		02-SEP-14	R2935468
Uranium (U)-Total	0.000513	+/-0.000072		0.000010	mg/L	0		02-SEP-14	R2935468
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2935468
Miscellaneous Parameters									
Ammonia, Total (as N)	2.17	-		0.050	mg/L	-		05-SEP-14	R2939171
Dissolved Organic Carbon	5.6	+/-0.8		1.0	mg/L	0		03-SEP-14	R2937077
Iron Bacteria	See Attached	-				-		29-AUG-14	R2943786
Naphthenic Acids	<1.0	-		1.0	mg/L	-	04-SEP-14	09-SEP-14	R2942742
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		05-SEP-14	R2939481
Sulphate Reducing Bacteria	See Attached	-				-		29-AUG-14	R2943786
Total Dissolved Solids	305	+/-21		10	mg/L	0		03-SEP-14	R2937933
Silicon (as SiO2)-Total	14.5	-		0.11	mg/L	-		03-SEP-14	
Turbidity	35.4	+/-2.0		0.10	NTU	0		29-AUG-14	R2933068
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluoranthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluorene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Naphthalene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Phenanthrene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)pyrene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-4 16054140827019									
Sampled By: bp/ea on 27-AUG-14 @ 15:35									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Acenaphthene	93.7	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Phenanthrene	96.4	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d12-Chrysene	83.1	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		29-AUG-14	R2934237
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		07-SEP-14	R2939908
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Arsenic (As)-Dissolved	0.00163	+/-0.00017		0.00040	mg/L	0		07-SEP-14	R2939908
Barium (Ba)-Dissolved	0.233	+/-0.020		0.00010	mg/L	0		07-SEP-14	R2939908
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		07-SEP-14	R2939908
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Cobalt (Co)-Dissolved	0.00076	+/-0.00007		0.00010	mg/L	0		07-SEP-14	R2939908
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		07-SEP-14	R2939908
Iron (Fe)-Dissolved	4.21	+/-0.38		0.010	mg/L	0		07-SEP-14	R2939908
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Lithium (Li)-Dissolved	0.0231	+/-0.0029		0.0050	mg/L	0		07-SEP-14	R2939908
Manganese (Mn)-Dissolved	0.666	+/-0.045		0.0020	mg/L	0		07-SEP-14	R2939908
Molybdenum (Mo)-Dissolved	0.00384	+/-0.00040		0.00010	mg/L	0		07-SEP-14	R2939908
Nickel (Ni)-Dissolved	0.00164	+/-0.00014		0.00010	mg/L	0		07-SEP-14	R2939908
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Silicon (Si)-Dissolved	7.37	+/-0.63		0.050	mg/L	0		07-SEP-14	R2939908
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		07-SEP-14	R2939908
Strontium (Sr)-Dissolved	0.521	+/-0.039		0.00010	mg/L	0		07-SEP-14	R2939908
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		07-SEP-14	R2939908
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		07-SEP-14	R2939908
Uranium (U)-Dissolved	0.000459	+/-0.000048		0.000010	mg/L	0		07-SEP-14	R2939908
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Zinc (Zn)-Dissolved	0.0015	+/-0.0003		0.0010	mg/L	0		07-SEP-14	R2939908
Ion Balance Calculation									
Ion Balance	101	-			%	-		08-SEP-14	
TDS (Calculated)	295	-			mg/L	-		08-SEP-14	
Hardness (as CaCO3)	265	-			mg/L	-		08-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.000050	-		0.000005	mg/L	-		05-SEP-14	R2939974
				0					
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		29-AUG-14	R2934237
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		02-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		29-AUG-14	R2934237
Sulfate by IC									
Sulfate (SO4)	0.72	+/-0.10		0.50	mg/L	0		29-AUG-14	R2934237

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-4 16054140827019 Sampled By: bp/ea on 27-AUG-14 @ 15:35 Matrix: H2O									
pH, Conductivity and Total Alkalinity									
pH	7.93	+/-0.01		0.10	pH	0		29-AUG-14	R2933060
Conductivity (EC)	558	+/-28		0.20	uS/cm	0		29-AUG-14	R2933060
Bicarbonate (HCO3)	372	+/-15		5.0	mg/L	0		29-AUG-14	R2933060
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		29-AUG-14	R2933060
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		29-AUG-14	R2933060
Alkalinity, Total (as CaCO3)	305	+/-20		2.0	mg/L	0		29-AUG-14	R2933060
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	15.8	-		0.11	mg/L	-		08-SEP-14	
L1509452-5 16054140827020 Sampled By: bp/ea on 27-AUG-14 @ 14:30 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
Toluene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
EthylBenzene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
o-Xylene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		30-AUG-14	R2932845
Styrene	<0.0010	-		0.0010	mg/L	-		30-AUG-14	R2932845
F1(C6-C10)	<0.10	-		0.10	mg/L	-		30-AUG-14	R2932845
F1-BTEX	<0.10	-		0.10	mg/L	-		30-AUG-14	R2932845
Xylenes	<0.00071	-		0.00071	mg/L	-		30-AUG-14	R2932845
Surr: 1,4-Difluorobenzene (SS)	100.0	-		N/A	%	-		30-AUG-14	R2932845
Surr: 4-Bromofluorobenzene (SS)	89.0	-		N/A	%	-		30-AUG-14	R2932845
Surr: 3,4-Dichlorotoluene (SS)	92.0	-		N/A	%	-		30-AUG-14	R2932845
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2938358
Surr: 2-Bromobenzotrifluoride	101.8	-		N/A	%	-	03-SEP-14	03-SEP-14	R2938358
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.000005 0	mg/L	-		05-SEP-14	R2939974
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0080	+/-0.0024		0.0030	mg/L	0		02-SEP-14	R2935468
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Arsenic (As)-Total	0.00016	+/-0.00004		0.00010	mg/L	0		02-SEP-14	R2935468
Barium (Ba)-Total	0.314	+/-0.035		0.000050	mg/L	0		02-SEP-14	R2935468
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Boron (B)-Total	0.113	+/-0.018		0.010	mg/L	0		02-SEP-14	R2935468
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Calcium (Ca)-Total	77.9	+/-9.2		0.10	mg/L	0		02-SEP-14	R2935468
Chromium (Cr)-Total	0.00011	+/-0.00005		0.00010	mg/L	0		02-SEP-14	R2935468
Cobalt (Co)-Total	0.00033	+/-0.00005		0.00010	mg/L	0		02-SEP-14	R2935468
Copper (Cu)-Total	0.00011	+/-0.00010		0.00010	mg/L	0		02-SEP-14	R2935468
Iron (Fe)-Total	3.51	+/-0.56		0.030	mg/L	0		02-SEP-14	R2935468
Lead (Pb)-Total	0.000077	+/-0.000019		0.000050	mg/L	0		02-SEP-14	R2935468
Lithium (Li)-Total	0.0292	+/-0.0054		0.0050	mg/L	0		02-SEP-14	R2935468
Magnesium (Mg)-Total	22.0	+/-2.7		0.10	mg/L	0		02-SEP-14	R2935468

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-5 16054140827020									
Sampled By: bp/ea on 27-AUG-14 @ 14:30									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Manganese (Mn)-Total	0.173	+/-0.017		0.0050	mg/L	0		02-SEP-14	R2935468
Molybdenum (Mo)-Total	0.00107	+/-0.00013		0.000050	mg/L	0		02-SEP-14	R2935468
Nickel (Ni)-Total	0.00041	+/-0.00007		0.00010	mg/L	0		02-SEP-14	R2935468
Potassium (K)-Total	4.03	+/-0.49		0.50	mg/L	0		02-SEP-14	R2935468
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Silicon (Si)-Total	8.93	+/-1.8		0.050	mg/L	0		02-SEP-14	R2935468
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Sodium (Na)-Total	19.2	+/-2.4		1.0	mg/L	0		02-SEP-14	R2935468
Strontium (Sr)-Total	0.628	+/-0.090		0.00010	mg/L	0		02-SEP-14	R2935468
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Titanium (Ti)-Total	0.00038	+/-0.00017		0.00030	mg/L	0		02-SEP-14	R2935468
Uranium (U)-Total	0.000015	+/-0.000002		0.000010	mg/L	0		02-SEP-14	R2935468
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2935468
Miscellaneous Parameters									
Ammonia, Total (as N)	1.07	-		0.050	mg/L	-		05-SEP-14	R2939171
Dissolved Organic Carbon	5.6	+/-0.8		1.0	mg/L	0		03-SEP-14	R2937077
Iron Bacteria	See Attached	-				-		29-AUG-14	R2943786
Naphthenic Acids	<1.0	-		1.0	mg/L	-	04-SEP-14	09-SEP-14	R2942742
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		05-SEP-14	R2939481
Sulphate Reducing Bacteria	See Attached	-				-		29-AUG-14	R2943786
Total Dissolved Solids	335	+/-23		10	mg/L	0		03-SEP-14	R2937933
Silicon (as SiO2)-Total	19.1	-		0.11	mg/L	-		03-SEP-14	
Turbidity	35.3	+/-2.0		0.10	NTU	0		29-AUG-14	R2933068
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluoranthene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Fluorene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Naphthalene	0.000051	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Phenanthrene	<0.000050	-		0.000050	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	03-SEP-14	03-SEP-14	R2939392
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Acenaphthene	98.7	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d10-Phenanthrene	99.6	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Surr: d12-Chrysene	90.5	-		N/A	%	-	03-SEP-14	03-SEP-14	R2939392
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		29-AUG-14	R2934237

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1509452-5 16054140827020									
Sampled By: bp/ea on 27-AUG-14 @ 14:30									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0011	+/-0.0004		0.0010	mg/L	0		07-SEP-14	R2939908
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Barium (Ba)-Dissolved	0.304	+/-0.026		0.00010	mg/L	0		07-SEP-14	R2939908
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		07-SEP-14	R2939908
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Cobalt (Co)-Dissolved	0.00020	+/-0.00002		0.00010	mg/L	0		07-SEP-14	R2939908
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		07-SEP-14	R2939908
Iron (Fe)-Dissolved	3.29	+/-0.30		0.010	mg/L	0		07-SEP-14	R2939908
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Lithium (Li)-Dissolved	0.0305	+/-0.0038		0.0050	mg/L	0		07-SEP-14	R2939908
Manganese (Mn)-Dissolved	0.172	+/-0.012		0.0020	mg/L	0		07-SEP-14	R2939908
Molybdenum (Mo)-Dissolved	0.00092	+/-0.00010		0.00010	mg/L	0		07-SEP-14	R2939908
Nickel (Ni)-Dissolved	0.00031	+/-0.00005		0.00010	mg/L	0		07-SEP-14	R2939908
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		07-SEP-14	R2939908
Silicon (Si)-Dissolved	9.77	+/-0.83		0.050	mg/L	0		07-SEP-14	R2939908
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		07-SEP-14	R2939908
Strontium (Sr)-Dissolved	0.633	+/-0.047		0.00010	mg/L	0		07-SEP-14	R2939908
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		07-SEP-14	R2939908
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		07-SEP-14	R2939908
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		07-SEP-14	R2939908
Uranium (U)-Dissolved	0.000016	+/-0.000001		0.000010	mg/L	0		07-SEP-14	R2939908
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		07-SEP-14	R2939908
Zinc (Zn)-Dissolved	<0.0010	-		0.0010	mg/L	-		07-SEP-14	R2939908
Ion Balance Calculation									
Ion Balance	101	-			%	-		08-SEP-14	
TDS (Calculated)	331	-			mg/L	-		08-SEP-14	
Hardness (as CaCO3)	296	-			mg/L	-		08-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		05-SEP-14	R2939974
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		29-AUG-14	R2934237
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		02-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		29-AUG-14	R2934237
Sulfate by IC									
Sulfate (SO4)	<0.50	-		0.50	mg/L	-		29-AUG-14	R2934237
pH, Conductivity and Total Alkalinity									
pH	7.97	+/-0.01		0.10	pH	0		29-AUG-14	R2933060
Conductivity (EC)	613	+/-31		0.20	uS/cm	0		29-AUG-14	R2933060
Bicarbonate (HCO3)	415	+/-16		5.0	mg/L	0		29-AUG-14	R2933060
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		29-AUG-14	R2933060
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		29-AUG-14	R2933060
Alkalinity, Total (as CaCO3)	340	+/-22		2.0	mg/L	0		29-AUG-14	R2933060
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	20.9	-		0.11	mg/L	-		08-SEP-14	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
* Refer to Referenced Information for Qualifiers (if any) and Methodology.									

Reference Information

Report Comments: ADDITIONAL 05-JAN-15 09:33
ADDITIONAL 16-DEC-14 10:38

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chloride (Cl)	MS-B	

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)		EPA 5021/8015&8260 GC-MS & FID
C-DIS-ORG-ED	Water	Dissolved Organic Carbon		APHA 5310 B-Instrumental
CL-IC-ED	Water	Chloride by IC		APHA 4110 B-ION CHROMATOGRAPHY
F2,F3,F4-ED	Water	F2, F3, F4		EPA 3510/CCME PHC CWS-GC-FID
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved		EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)		EPA 245.7 / EPA 245.1
IB-BART-PB	Water	Iron Bacteria		BART Test Kit
BART Test Kit Analysis performed at PBR Laboratories Inc., Edmonton.				
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR, Syncrude, 1994
Dissolved naphthenic acids are solvent extracted from acidified aqueous samples using Dichloromethane prior to quantitation by Fourier Transform Infra-Red spectroscopy. Note that FTIR is not uniquely selective to naphthenic acids. If present, other carboxylic acids (e.g. humic acids, fulvic acids) may also be detected by this method.				
NH3-CFA-ED	Water	Ammonia in Water by Colour		APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.				
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite		CALCULATION
NO2-IC-ED	Water	Nitrite as N by IC		APHA 4110 B-ION CHROMATOGRAPHY
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".				
NO3-IC-ED	Water	Nitrate as N by IC		APHA 4110 B-ION CHROMATOGRAPHY
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".				
PAH-ABT1-CL	Water	PAH & Carcinogenic PAH List		EPA 3510/8270-GC/MS
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity		APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)				
PHENOLS-4AAP-ED	Water	Phenols (4AAP)		AB ENV.06537-COLORIMETRIC
This analysis is carried out using procedures adapted from ENVIRODAT VMV 06537 689, Method Code 154, in "Methods Manual for Chemical Analysis of Water and Wastes" published by the Alberta Environmental Centre. This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide and 4-aminoantipyrine to form a red complex which is measured at 505 nm.				
SIO2-D-CALC-ED	Water	Dissolved Silicon (reported as Silica)		CALCULATION
SIO2-T-CALC-ED	Water	Total Silicon (reported as Silica)		CALCULATION
SO4-IC-ED	Water	Sulfate by IC		APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TDS-ED	Water	Total Dissolved Solids		APHA 2540 C
SRB-BART-PB	Water	Sulphate Reducing Bacteria / BART method		BART TEST KIT
BART Test Kit				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
TURBIDITY-ED	Water	Turbidity		APHA 2130 B-Nephelometer

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
PB	PBR LABORATORIES
FM	ALS ENVIRONMENTAL - FORT MCMURRAY, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

M061308

GLOSSARY OF REPORT TERMS

Surr - Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.

Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent. Zero values indicate no detectable method bias.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental

Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 1 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R2932845							
WG1941349-2	LCS							
Benzene			118.3		%		70-130	30-AUG-14
Toluene			113.3		%		70-130	30-AUG-14
EthylBenzene			110.4		%		70-130	30-AUG-14
o-Xylene			111.0		%		70-130	30-AUG-14
m+p-Xylene			108.4		%		70-130	30-AUG-14
Styrene			99.3		%		70-130	30-AUG-14
WG1941349-3	LCS							
F1(C6-C10)			104.9		%		70-130	29-AUG-14
WG1941349-6	LCS							
Benzene			111.2		%		70-130	30-AUG-14
Toluene			94.4		%		70-130	30-AUG-14
EthylBenzene			98.3		%		70-130	30-AUG-14
o-Xylene			99.1		%		70-130	30-AUG-14
m+p-Xylene			98.3		%		70-130	30-AUG-14
Styrene			90.1		%		70-130	30-AUG-14
WG1941349-7	LCS							
F1(C6-C10)			103.3		%		70-130	30-AUG-14
WG1941349-1	MB							
Benzene			<0.00050		mg/L		0.0005	29-AUG-14
Toluene			<0.00050		mg/L		0.0005	29-AUG-14
EthylBenzene			<0.00050		mg/L		0.0005	29-AUG-14
o-Xylene			<0.00050		mg/L		0.0005	29-AUG-14
m+p-Xylene			<0.00050		mg/L		0.0005	29-AUG-14
Styrene			<0.0010		mg/L		0.001	29-AUG-14
F1(C6-C10)			<0.10		mg/L		0.1	29-AUG-14
Surrogate: 1,4-Difluorobenzene (SS)			105.0		%		70-130	29-AUG-14
Surrogate: 4-Bromofluorobenzene (SS)			92.0		%		70-130	29-AUG-14
Surrogate: 3,4-Dichlorotoluene (SS)			99.0		%		70-130	29-AUG-14
WG1941349-5	MB							
Benzene			<0.00050		mg/L		0.0005	30-AUG-14
Toluene			<0.00050		mg/L		0.0005	30-AUG-14
EthylBenzene			<0.00050		mg/L		0.0005	30-AUG-14
o-Xylene			<0.00050		mg/L		0.0005	30-AUG-14
m+p-Xylene			<0.00050		mg/L		0.0005	30-AUG-14
							0.001	



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 2 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R2932845							
WG1941349-5	MB							
Styrene			<0.0010		mg/L		0.001	30-AUG-14
F1(C6-C10)			<0.10		mg/L		0.1	30-AUG-14
Surrogate: 1,4-Difluorobenzene (SS)			101.0		%		70-130	30-AUG-14
Surrogate: 4-Bromofluorobenzene (SS)			86.0		%		70-130	30-AUG-14
Surrogate: 3,4-Dichlorotoluene (SS)			98.4		%		70-130	30-AUG-14
C-DIS-ORG-ED		Water						
Batch	R2937077							
WG1943621-3	CVS							
Dissolved Organic Carbon			135.7		%		80-160	03-SEP-14
WG1943621-2	LCS							
Dissolved Organic Carbon			93.9		%		80-120	03-SEP-14
WG1943621-1	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	03-SEP-14
CL-IC-ED		Water						
Batch	R2934237							
WG1941708-3	DUP	L1509878-2						
Chloride (Cl)		3.21	3.20		mg/L	0.3	20	29-AUG-14
WG1941708-5	DUP	L1510276-3						
Chloride (Cl)		166	166		mg/L	0.1	20	29-AUG-14
WG1941708-11	LCS							
Chloride (Cl)			102.2		%		90-110	29-AUG-14
WG1941708-13	LCS							
Chloride (Cl)			102.5		%		90-110	29-AUG-14
WG1941708-15	LCS							
Chloride (Cl)			102.8		%		90-110	29-AUG-14
WG1941708-2	LCS							
Chloride (Cl)			101.7		%		90-110	29-AUG-14
WG1941708-7	LCS							
Chloride (Cl)			101.3		%		90-110	29-AUG-14
WG1941708-9	LCS							
Chloride (Cl)			102.5		%		90-110	29-AUG-14
WG1941708-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-10	MB							
Chloride (Cl)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-12	MB							



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 3 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-ED		Water						
Batch	R2934237							
WG1941708-12	MB							
Chloride (Cl)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-14	MB							
Chloride (Cl)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-16	MB							
Chloride (Cl)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-8	MB							
Chloride (Cl)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-4	MS	L1509878-2						
Chloride (Cl)			102.6		%		75-125	29-AUG-14
WG1941708-6	MS	L1510276-3						
Chloride (Cl)			N/A	MS-B	%		-	29-AUG-14
F2,F3,F4-ED		Water						
Batch	R2938358							
WG1943061-2	LCS							
F2 (>C10-C16)			115.8		%		65-135	03-SEP-14
F3 (C16-C34)			112.3		%		65-135	03-SEP-14
F4 (C34-C50)			105.9		%		65-135	03-SEP-14
WG1943061-5	LCS							
F2 (>C10-C16)			112.7		%		65-135	03-SEP-14
F3 (C16-C34)			108.2		%		65-135	03-SEP-14
F4 (C34-C50)			104.3		%		65-135	03-SEP-14
WG1943061-1	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	03-SEP-14
F3 (C16-C34)			<0.25		mg/L		0.25	03-SEP-14
F4 (C34-C50)			<0.25		mg/L		0.25	03-SEP-14
Surrogate: 2-Bromobenzotrifluoride			98.7		%		50-150	03-SEP-14
WG1943061-4	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	03-SEP-14
F3 (C16-C34)			<0.25		mg/L		0.25	03-SEP-14
F4 (C34-C50)			<0.25		mg/L		0.25	03-SEP-14
Surrogate: 2-Bromobenzotrifluoride			99.1		%		50-150	03-SEP-14
WG1943061-3	MS	L1509452-1						
F2 (>C10-C16)			111.7		%		50-150	03-SEP-14
F3 (C16-C34)			110.6		%		50-150	03-SEP-14
F4 (C34-C50)			105.0		%		50-150	03-SEP-14
WG1943061-6	MS	L1510277-17						



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 4 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2,F3,F4-ED								
	Water							
Batch	R2938358							
WG1943061-6 MS		L1510277-17						
F2 (>C10-C16)			111.9		%		50-150	03-SEP-14
F3 (C16-C34)			111.8		%		50-150	03-SEP-14
F4 (C34-C50)			107.2		%		50-150	03-SEP-14
HG-D-L-CVAA-ED								
	Water							
Batch	R2939974							
WG1945350-11 DUP		L1510112-5						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	05-SEP-14
WG1945350-15 DUP		L1510277-12						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	06-SEP-14
WG1945350-3 DUP		L1505661-1						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	05-SEP-14
WG1945350-7 DUP		L1509165-15						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	05-SEP-14
WG1945350-10 LCS								
Mercury (Hg)-Dissolved			86.9		%		80-120	05-SEP-14
WG1945350-14 LCS								
Mercury (Hg)-Dissolved			87.7		%		80-120	05-SEP-14
WG1945350-2 LCS								
Mercury (Hg)-Dissolved			88.4		%		80-120	05-SEP-14
WG1945350-6 LCS								
Mercury (Hg)-Dissolved			86.9		%		80-120	05-SEP-14
WG1945350-1 MB								
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	05-SEP-14
WG1945350-13 MB								
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	05-SEP-14
WG1945350-5 MB								
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	05-SEP-14
WG1945350-9 MB								
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	05-SEP-14
WG1945350-12 MS		L1510112-5						
Mercury (Hg)-Dissolved			81.1		%		70-130	05-SEP-14
WG1945350-16 MS		L1510277-12						
Mercury (Hg)-Dissolved			80.5		%		70-130	06-SEP-14
WG1945350-4 MS		L1505661-1						
Mercury (Hg)-Dissolved			91.1		%		70-130	05-SEP-14
WG1945350-8 MS		L1509165-15						
Mercury (Hg)-Dissolved			83.3		%		70-130	05-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 5 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-L-CVAA-ED		Water						
Batch	R2939974							
WG1945352-3	DUP	L1509165-2						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	05-SEP-14
WG1945352-7	DUP	L1509825-1						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	05-SEP-14
WG1945352-2	LCS							
Mercury (Hg)-Total			88.0		%		80-120	05-SEP-14
WG1945352-6	LCS							
Mercury (Hg)-Total			87.8		%		80-120	05-SEP-14
WG1945352-1	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	05-SEP-14
WG1945352-5	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	05-SEP-14
WG1945352-4	MS	L1509165-2						
Mercury (Hg)-Total			82.5		%		70-130	05-SEP-14
WG1945352-8	MS	L1509825-1						
Mercury (Hg)-Total			88.8		%		70-130	05-SEP-14
MET-D-CCMS-ED		Water						
Batch	R2939908							
WG1945942-14	CRM	ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			106.7		%		80-120	07-SEP-14
Antimony (Sb)-Dissolved			108.2		%		80-120	07-SEP-14
Arsenic (As)-Dissolved			103.4		%		80-120	07-SEP-14
Barium (Ba)-Dissolved			106.1		%		80-120	07-SEP-14
Beryllium (Be)-Dissolved			95.6		%		80-120	07-SEP-14
Bismuth (Bi)-Dissolved			108.3		%		80-120	07-SEP-14
Cadmium (Cd)-Dissolved			100.1		%		80-120	07-SEP-14
Chromium (Cr)-Dissolved			102.2		%		80-120	07-SEP-14
Cobalt (Co)-Dissolved			104.2		%		80-120	07-SEP-14
Copper (Cu)-Dissolved			103.6		%		80-120	07-SEP-14
Lead (Pb)-Dissolved			103.6		%		80-120	07-SEP-14
Lithium (Li)-Dissolved			103.5		%		80-120	07-SEP-14
Manganese (Mn)-Dissolved			105.8		%		80-120	07-SEP-14
Molybdenum (Mo)-Dissolved			104.4		%		80-120	07-SEP-14
Nickel (Ni)-Dissolved			106.9		%		80-120	07-SEP-14
Selenium (Se)-Dissolved			105.5		%		80-120	07-SEP-14
Silicon (Si)-Dissolved			113.3		%		80-120	07-SEP-14



Environmental

Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 6 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2939908							
WG1945942-14 CRM	ED-HIGH-WATRM							
Silver (Ag)-Dissolved			113.1		%		80-120	07-SEP-14
Strontium (Sr)-Dissolved			109.4		%		80-120	07-SEP-14
Thallium (Tl)-Dissolved			104.0		%		80-120	07-SEP-14
Titanium (Ti)-Dissolved			107.2		%		80-120	07-SEP-14
Tin (Sn)-Dissolved			107.8		%		80-120	07-SEP-14
Uranium (U)-Dissolved			105.5		%		80-120	07-SEP-14
Vanadium (V)-Dissolved			105.4		%		80-120	07-SEP-14
Zinc (Zn)-Dissolved			105.5		%		80-120	07-SEP-14
WG1945942-4 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			110.0		%		80-120	06-SEP-14
Antimony (Sb)-Dissolved			100.8		%		80-120	06-SEP-14
Arsenic (As)-Dissolved			106.6		%		80-120	06-SEP-14
Barium (Ba)-Dissolved			107.3		%		80-120	06-SEP-14
Beryllium (Be)-Dissolved			105.0		%		80-120	06-SEP-14
Bismuth (Bi)-Dissolved			103.7		%		80-120	06-SEP-14
Cadmium (Cd)-Dissolved			103.9		%		80-120	06-SEP-14
Chromium (Cr)-Dissolved			106.9		%		80-120	06-SEP-14
Cobalt (Co)-Dissolved			104.6		%		80-120	06-SEP-14
Copper (Cu)-Dissolved			102.7		%		80-120	06-SEP-14
Lead (Pb)-Dissolved			105.3		%		80-120	06-SEP-14
Lithium (Li)-Dissolved			105.0		%		80-120	06-SEP-14
Manganese (Mn)-Dissolved			105.9		%		80-120	06-SEP-14
Molybdenum (Mo)-Dissolved			98.4		%		80-120	06-SEP-14
Nickel (Ni)-Dissolved			104.2		%		80-120	06-SEP-14
Selenium (Se)-Dissolved			108.4		%		80-120	06-SEP-14
Silicon (Si)-Dissolved			114.3		%		80-120	06-SEP-14
Silver (Ag)-Dissolved			104.9		%		80-120	06-SEP-14
Strontium (Sr)-Dissolved			101.6		%		80-120	06-SEP-14
Thallium (Tl)-Dissolved			104.9		%		80-120	06-SEP-14
Titanium (Ti)-Dissolved			109.2		%		80-120	06-SEP-14
Tin (Sn)-Dissolved			100.5		%		80-120	06-SEP-14
Uranium (U)-Dissolved			104.6		%		80-120	06-SEP-14
Vanadium (V)-Dissolved			108.3		%		80-120	06-SEP-14
Zinc (Zn)-Dissolved			106.3		%		80-120	06-SEP-14



Environmental

Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 7 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2939908							
WG1945942-6 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			111.7		%		80-120	06-SEP-14
Antimony (Sb)-Dissolved			101.4		%		80-120	06-SEP-14
Arsenic (As)-Dissolved			107.7		%		80-120	06-SEP-14
Barium (Ba)-Dissolved			108.3		%		80-120	06-SEP-14
Beryllium (Be)-Dissolved			107.0		%		80-120	06-SEP-14
Bismuth (Bi)-Dissolved			103.8		%		80-120	06-SEP-14
Cadmium (Cd)-Dissolved			104.7		%		80-120	06-SEP-14
Chromium (Cr)-Dissolved			107.3		%		80-120	06-SEP-14
Cobalt (Co)-Dissolved			106.1		%		80-120	06-SEP-14
Copper (Cu)-Dissolved			104.0		%		80-120	06-SEP-14
Lead (Pb)-Dissolved			104.0		%		80-120	06-SEP-14
Lithium (Li)-Dissolved			106.1		%		80-120	06-SEP-14
Manganese (Mn)-Dissolved			108.0		%		80-120	06-SEP-14
Molybdenum (Mo)-Dissolved			97.9		%		80-120	06-SEP-14
Nickel (Ni)-Dissolved			105.7		%		80-120	06-SEP-14
Selenium (Se)-Dissolved			108.8		%		80-120	06-SEP-14
Silicon (Si)-Dissolved			113.2		%		80-120	06-SEP-14
Silver (Ag)-Dissolved			106.2		%		80-120	06-SEP-14
Strontium (Sr)-Dissolved			102.5		%		80-120	06-SEP-14
Thallium (Tl)-Dissolved			104.4		%		80-120	06-SEP-14
Titanium (Ti)-Dissolved			100.1		%		80-120	06-SEP-14
Tin (Sn)-Dissolved			101.4		%		80-120	06-SEP-14
Uranium (U)-Dissolved			103.3		%		80-120	06-SEP-14
Vanadium (V)-Dissolved			109.7		%		80-120	06-SEP-14
Zinc (Zn)-Dissolved			106.0		%		80-120	06-SEP-14
WG1945942-8 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			108.9		%		80-120	06-SEP-14
Antimony (Sb)-Dissolved			102.0		%		80-120	06-SEP-14
Arsenic (As)-Dissolved			104.9		%		80-120	06-SEP-14
Barium (Ba)-Dissolved			105.9		%		80-120	06-SEP-14
Beryllium (Be)-Dissolved			107.0		%		80-120	06-SEP-14
Bismuth (Bi)-Dissolved			101.6		%		80-120	06-SEP-14
Cadmium (Cd)-Dissolved			101.5		%		80-120	06-SEP-14
Chromium (Cr)-Dissolved			104.0		%		80-120	06-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 8 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2939908							
WG1945942-8 CRM	ED-HIGH-WATRM							
Cobalt (Co)-Dissolved			103.3		%		80-120	06-SEP-14
Copper (Cu)-Dissolved			101.4		%		80-120	06-SEP-14
Lead (Pb)-Dissolved			104.1		%		80-120	06-SEP-14
Lithium (Li)-Dissolved			107.3		%		80-120	06-SEP-14
Manganese (Mn)-Dissolved			103.7		%		80-120	06-SEP-14
Molybdenum (Mo)-Dissolved			97.5		%		80-120	06-SEP-14
Nickel (Ni)-Dissolved			102.1		%		80-120	06-SEP-14
Selenium (Se)-Dissolved			106.9		%		80-120	06-SEP-14
Silicon (Si)-Dissolved			111.8		%		80-120	06-SEP-14
Silver (Ag)-Dissolved			107.6		%		80-120	06-SEP-14
Strontium (Sr)-Dissolved			101.8		%		80-120	06-SEP-14
Thallium (Tl)-Dissolved			104.3		%		80-120	06-SEP-14
Titanium (Ti)-Dissolved			102.5		%		80-120	06-SEP-14
Tin (Sn)-Dissolved			99.9		%		80-120	06-SEP-14
Uranium (U)-Dissolved			101.3		%		80-120	06-SEP-14
Vanadium (V)-Dissolved			105.7		%		80-120	06-SEP-14
Zinc (Zn)-Dissolved			104.0		%		80-120	06-SEP-14
WG1945942-10 DUP		L1510112-4						
Aluminum (Al)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Barium (Ba)-Dissolved		0.000266	0.000266		mg/L	0.1	20	07-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Copper (Cu)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	07-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Lithium (Li)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	07-SEP-14
Manganese (Mn)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 9 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2939908							
WG1945942-10	DUP	L1510112-4						
Nickel (Ni)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Silicon (Si)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	07-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Strontium (Sr)-Dissolved		0.00039	0.00040		mg/L	2.1	20	07-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	07-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Vanadium (V)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-14
WG1945942-11	DUP	L1510112-16						
Aluminum (Al)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Barium (Ba)-Dissolved		0.000454	0.000451		mg/L	0.8	20	07-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Copper (Cu)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	07-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Lithium (Li)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	07-SEP-14
Manganese (Mn)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Nickel (Ni)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Silicon (Si)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	07-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Strontium (Sr)-Dissolved		0.00074	0.00072		mg/L	2.8	20	07-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 10 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2939908							
WG1945942-11 DUP		L1510112-16						
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	07-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Vanadium (V)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-14
WG1945942-12 DUP		L1510128-12						
Aluminum (Al)-Dissolved		0.0012	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Arsenic (As)-Dissolved		0.00015	0.00014		mg/L	11	20	07-SEP-14
Barium (Ba)-Dissolved		0.287	0.278		mg/L	3.2	20	07-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Chromium (Cr)-Dissolved		0.00017	0.00017		mg/L	4.1	20	07-SEP-14
Cobalt (Co)-Dissolved		0.00010	0.00010		mg/L	2.2	20	07-SEP-14
Copper (Cu)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Iron (Fe)-Dissolved		0.020	0.019		mg/L	2.2	20	07-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Lithium (Li)-Dissolved		0.0246	0.0244		mg/L	0.7	20	07-SEP-14
Manganese (Mn)-Dissolved		0.245	0.244		mg/L	0.5	20	07-SEP-14
Molybdenum (Mo)-Dissolved		0.000079	0.000077		mg/L	1.7	20	07-SEP-14
Nickel (Ni)-Dissolved		0.00175	0.00165		mg/L	5.9	20	07-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Silicon (Si)-Dissolved		8.36	8.38		mg/L	0.2	20	07-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Strontium (Sr)-Dissolved		0.583	0.568		mg/L	2.7	20	07-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	07-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Uranium (U)-Dissolved		0.000057	0.000057		mg/L	0.1	20	07-SEP-14
Vanadium (V)-Dissolved		0.00012	0.00012		mg/L	3.2	20	07-SEP-14
Zinc (Zn)-Dissolved		0.0050	0.0050		mg/L	0.1	20	07-SEP-14
WG1945942-17 DUP		L1510277-5						



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 11 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2939908							
WG1945942-17	DUP	L1510277-5						
Aluminum (Al)-Dissolved		0.0012	0.0011		mg/L	12	20	07-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Arsenic (As)-Dissolved		0.0131	0.0129		mg/L	1.6	20	07-SEP-14
Barium (Ba)-Dissolved		0.0917	0.0951		mg/L	3.6	20	07-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Cobalt (Co)-Dissolved		0.00014	0.00015		mg/L	0.9	20	07-SEP-14
Copper (Cu)-Dissolved		0.00013	0.00011		mg/L	14	20	07-SEP-14
Iron (Fe)-Dissolved		2.22	2.19		mg/L	1.2	20	07-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Lithium (Li)-Dissolved		0.0364	0.0347		mg/L	4.8	20	07-SEP-14
Manganese (Mn)-Dissolved		0.307	0.312		mg/L	1.9	20	07-SEP-14
Molybdenum (Mo)-Dissolved		0.00622	0.00597		mg/L	4.1	20	07-SEP-14
Nickel (Ni)-Dissolved		0.00016	0.00019		mg/L	18	20	07-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Silicon (Si)-Dissolved		8.41	8.48		mg/L	0.8	20	07-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Strontium (Sr)-Dissolved		0.412	0.400		mg/L	2.9	20	07-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	07-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Uranium (U)-Dissolved		0.00122	0.00119		mg/L	1.9	20	07-SEP-14
Vanadium (V)-Dissolved		0.00011	0.00014		mg/L	17	20	07-SEP-14
Zinc (Zn)-Dissolved		0.0013	0.0014		mg/L	4.0	20	07-SEP-14
WG1945942-9	DUP	L1509399-1						
Aluminum (Al)-Dissolved		0.0030	0.0028		mg/L	4.3	20	07-SEP-14
Antimony (Sb)-Dissolved		0.00036	0.00037		mg/L	3.5	20	07-SEP-14
Arsenic (As)-Dissolved		0.00072	0.00073		mg/L	0.9	20	07-SEP-14
Barium (Ba)-Dissolved		0.0788	0.0815		mg/L	3.3	20	07-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 12 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2939908							
WG1945942-9	DUP	L1509399-1						
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-14
Cobalt (Co)-Dissolved		0.00060	0.00058		mg/L	3.1	20	07-SEP-14
Copper (Cu)-Dissolved		0.00075	0.00078		mg/L	3.4	20	07-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	07-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Lithium (Li)-Dissolved		0.110	0.112		mg/L	1.6	20	07-SEP-14
Manganese (Mn)-Dissolved		0.164	0.164		mg/L	0.2	20	07-SEP-14
Molybdenum (Mo)-Dissolved		0.00233	0.00248		mg/L	6.1	20	07-SEP-14
Nickel (Ni)-Dissolved		0.00131	0.00124		mg/L	5.3	20	07-SEP-14
Selenium (Se)-Dissolved		0.00070	0.00069		mg/L	0.5	20	07-SEP-14
Silicon (Si)-Dissolved		5.54	5.51		mg/L	0.5	20	07-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-14
Strontium (Sr)-Dissolved		0.377	0.388		mg/L	2.9	20	07-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	07-SEP-14
Tin (Sn)-Dissolved		0.00027	0.00029		mg/L	4.5	20	07-SEP-14
Uranium (U)-Dissolved		0.00528	0.00523		mg/L	0.9	20	07-SEP-14
Vanadium (V)-Dissolved		0.00057	0.00048		mg/L	16	20	07-SEP-14
Zinc (Zn)-Dissolved		0.0034	0.0032		mg/L	8.0	20	07-SEP-14
WG1945942-1	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	06-SEP-14
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	06-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 13 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2939908							
WG1945942-1	MB							
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	06-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	06-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	06-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	06-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	06-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	06-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 14 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2939908							
WG1945942-1	MB							
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	06-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	06-SEP-14
WG1945942-3	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	06-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	06-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	06-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	06-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	06-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 15 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
------	--------	-----------	--------	-----------	-------	-----	-------	----------

MET-D-CCMS-ED Water

Batch R2939908

WG1945942-5 MB

Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	06-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	06-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	06-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	06-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	06-SEP-14

MET-T-CCMS-ED Water

Batch R2934348

WG1942365-2 DUP L1509165-2

Aluminum (Al)-Total	<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	02-SEP-14
Antimony (Sb)-Total	<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Arsenic (As)-Total	0.0127	0.0127		mg/L	0.1	20	02-SEP-14
Barium (Ba)-Total	0.0861	0.0871		mg/L	1.2	20	02-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 16 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2934348							
WG1942365-2 DUP		L1509165-2						
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Boron (B)-Total		0.284	0.279		mg/L	2.0	20	02-SEP-14
Cadmium (Cd)-Total		<0.000010	<0.00020	RPD-NA	mg/L	N/A	20	02-SEP-14
Calcium (Ca)-Total		96.6	98.7		mg/L	2.1	20	02-SEP-14
Chromium (Cr)-Total		<0.00010	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Cobalt (Co)-Total		0.00011	0.00011		mg/L	0.2	20	02-SEP-14
Copper (Cu)-Total		<0.00010	<0.0010	RPD-NA	mg/L	N/A	20	02-SEP-14
Iron (Fe)-Total		5.17	5.39		mg/L	4.2	20	02-SEP-14
Lead (Pb)-Total		<0.000050	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Lithium (Li)-Total		0.0721	0.0701		mg/L	2.8	20	02-SEP-14
Magnesium (Mg)-Total		31.0	31.3		mg/L	1.0	20	02-SEP-14
Manganese (Mn)-Total		0.0469	0.0470		mg/L	0.1	20	02-SEP-14
Molybdenum (Mo)-Total		0.00846	0.00838		mg/L	1.0	20	02-SEP-14
Nickel (Ni)-Total		<0.00010	<0.0020	RPD-NA	mg/L	N/A	20	02-SEP-14
Potassium (K)-Total		5.71	5.76		mg/L	0.8	20	02-SEP-14
Selenium (Se)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Silicon (Si)-Total		13.1	13.0		mg/L	0.1	20	02-SEP-14
Silver (Ag)-Total		<0.000010	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Sodium (Na)-Total		167	166		mg/L	0.5	20	02-SEP-14
Strontium (Sr)-Total		0.674	0.674		mg/L	0.1	20	02-SEP-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	02-SEP-14
Uranium (U)-Total		0.000034	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Vanadium (V)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Zinc (Zn)-Total		<0.0030	<0.0040	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942365-4 DUP		L1510112-5						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	02-SEP-14
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Barium (Ba)-Total		0.000925	0.000904		mg/L	2.4	20	02-SEP-14
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 17 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2934348							
WG1942365-4	DUP	L1510112-5						
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-SEP-14
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Calcium (Ca)-Total		0.023	0.022		mg/L	2.5	20	02-SEP-14
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Copper (Cu)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Iron (Fe)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	02-SEP-14
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Lithium (Li)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Magnesium (Mg)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Manganese (Mn)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Nickel (Ni)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Potassium (K)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-14
Selenium (Se)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Silicon (Si)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Sodium (Na)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-14
Strontium (Sr)-Total		0.00133	0.00130		mg/L	2.3	20	02-SEP-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	02-SEP-14
Uranium (U)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Vanadium (V)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942365-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 18 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2934348							
WG1942365-1	MB							
Boron (B)-Total			<0.010		mg/L		0.01	01-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	01-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	01-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	01-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	01-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	01-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	01-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-SEP-14
WG1942365-3	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	01-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	01-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 19 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch R2934348								
WG1942365-3 MB								
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	01-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	01-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-SEP-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	01-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	01-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	01-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-SEP-14
Batch R2935468								
WG1942349-5 DUP								
		L1509827-3						
Aluminum (Al)-Total		0.0560	0.0562		mg/L	0.4	20	02-SEP-14
Antimony (Sb)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Arsenic (As)-Total		0.00469	0.00469		mg/L	0.0	20	02-SEP-14
Barium (Ba)-Total		0.0763	0.0787		mg/L	3.0	20	02-SEP-14
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Boron (B)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-14
Cadmium (Cd)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	02-SEP-14
Calcium (Ca)-Total		29.2	28.5		mg/L	2.4	20	02-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 20 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2935468							
WG1942349-5	DUP	L1509827-3						
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Cobalt (Co)-Total		0.00047	0.00049		mg/L	4.9	20	02-SEP-14
Copper (Cu)-Total		0.0020	0.0020		mg/L	2.1	20	02-SEP-14
Iron (Fe)-Total		0.259	0.262		mg/L	1.1	20	02-SEP-14
Lead (Pb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Lithium (Li)-Total		0.0118	0.0121		mg/L	2.3	20	02-SEP-14
Magnesium (Mg)-Total		14.5	15.1		mg/L	4.1	20	02-SEP-14
Manganese (Mn)-Total		0.122	0.124		mg/L	1.6	20	02-SEP-14
Molybdenum (Mo)-Total		0.00507	0.00512		mg/L	0.9	20	02-SEP-14
Nickel (Ni)-Total		0.0036	0.0036		mg/L	0.5	20	02-SEP-14
Potassium (K)-Total		14.9	15.0		mg/L	0.4	20	02-SEP-14
Selenium (Se)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Silicon (Si)-Total		1.53	1.56		mg/L	2.2	20	02-SEP-14
Silver (Ag)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Sodium (Na)-Total		7.0	7.2		mg/L	2.8	20	02-SEP-14
Strontium (Sr)-Total		0.133	0.135		mg/L	1.0	20	02-SEP-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Titanium (Ti)-Total		0.00161	0.00153		mg/L	4.8	20	02-SEP-14
Uranium (U)-Total		0.00135	0.00139		mg/L	2.6	20	02-SEP-14
Vanadium (V)-Total		0.00181	0.00179		mg/L	0.9	20	02-SEP-14
Zinc (Zn)-Total		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942349-6	DUP	L1509165-13						
Aluminum (Al)-Total		0.0035	0.0045	J	mg/L	0.0010	0.006	03-SEP-14
Antimony (Sb)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	03-SEP-14
Arsenic (As)-Total		0.00739	0.00745		mg/L	0.7	20	03-SEP-14
Barium (Ba)-Total		0.0816	0.0812		mg/L	0.5	20	03-SEP-14
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-14
Boron (B)-Total		0.271	0.253		mg/L	6.7	20	03-SEP-14
Cadmium (Cd)-Total		<0.000010	<0.00020	RPD-NA	mg/L	N/A	20	03-SEP-14
Calcium (Ca)-Total		107	101		mg/L	5.4	20	03-SEP-14
Chromium (Cr)-Total		0.00044	<0.0050	RPD-NA	mg/L	N/A	20	03-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 21 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2935468							
WG1942349-6	DUP	L1509165-13						
Cobalt (Co)-Total		0.00019	0.00017		mg/L	12	20	03-SEP-14
Copper (Cu)-Total		0.00028	<0.0010	RPD-NA	mg/L	N/A	20	03-SEP-14
Iron (Fe)-Total		10.5	10.5		mg/L	0.1	20	03-SEP-14
Lead (Pb)-Total		0.000127	0.00015		mg/L	16	20	03-SEP-14
Lithium (Li)-Total		0.0799	0.0754		mg/L	5.7	20	03-SEP-14
Magnesium (Mg)-Total		30.1	29.9		mg/L	0.8	20	03-SEP-14
Manganese (Mn)-Total		0.162	0.163		mg/L	0.5	20	03-SEP-14
Molybdenum (Mo)-Total		0.00992	0.00961		mg/L	3.1	20	03-SEP-14
Nickel (Ni)-Total		0.00065	<0.0020	RPD-NA	mg/L	N/A	20	03-SEP-14
Potassium (K)-Total		5.57	5.74		mg/L	3.0	20	03-SEP-14
Selenium (Se)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	03-SEP-14
Silicon (Si)-Total		11.6	11.6		mg/L	0.1	20	03-SEP-14
Silver (Ag)-Total		<0.000010	<0.00040	RPD-NA	mg/L	N/A	20	03-SEP-14
Sodium (Na)-Total		148	146		mg/L	1.6	20	03-SEP-14
Strontium (Sr)-Total		0.795	0.753		mg/L	5.4	20	03-SEP-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	03-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	03-SEP-14
Uranium (U)-Total		0.000081	<0.00010	RPD-NA	mg/L	N/A	20	03-SEP-14
Vanadium (V)-Total		0.00013	0.00012		mg/L	6.1	20	03-SEP-14
Zinc (Zn)-Total		0.0195	0.0187		mg/L	3.9	20	03-SEP-14
WG1942349-3	LCS							
Aluminum (Al)-Total			104.4		%		80-120	02-SEP-14
Antimony (Sb)-Total			102.7		%		80-120	02-SEP-14
Arsenic (As)-Total			103.2		%		80-120	02-SEP-14
Barium (Ba)-Total			110.6		%		80-120	02-SEP-14
Beryllium (Be)-Total			109.5		%		80-120	02-SEP-14
Bismuth (Bi)-Total			108.5		%		80-120	02-SEP-14
Boron (B)-Total			84.3		%		80-120	02-SEP-14
Cadmium (Cd)-Total			101.9		%		80-120	02-SEP-14
Calcium (Ca)-Total			108.9		%		80-120	02-SEP-14
Chromium (Cr)-Total			104.3		%		80-120	02-SEP-14
Cobalt (Co)-Total			102.2		%		80-120	02-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 22 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2935468							
WG1942349-3	LCS							
Copper (Cu)-Total			101.0		%		80-120	02-SEP-14
Iron (Fe)-Total			99.1		%		80-120	02-SEP-14
Lead (Pb)-Total			106.4		%		80-120	02-SEP-14
Lithium (Li)-Total			116.8		%		80-120	02-SEP-14
Magnesium (Mg)-Total			110.2		%		80-120	02-SEP-14
Manganese (Mn)-Total			103.5		%		80-120	02-SEP-14
Molybdenum (Mo)-Total			106.0		%		80-120	02-SEP-14
Nickel (Ni)-Total			103.1		%		80-120	02-SEP-14
Potassium (K)-Total			105.5		%		80-120	02-SEP-14
Selenium (Se)-Total			107.5		%		80-120	02-SEP-14
Silicon (Si)-Total			103.8		%		80-120	02-SEP-14
Silver (Ag)-Total			107.1		%		80-120	02-SEP-14
Sodium (Na)-Total			100.9		%		80-120	02-SEP-14
Strontium (Sr)-Total			110.4		%		80-120	02-SEP-14
Thallium (Tl)-Total			110.0		%		80-120	02-SEP-14
Tin (Sn)-Total			103.3		%		80-120	02-SEP-14
Titanium (Ti)-Total			102.3		%		80-120	02-SEP-14
Uranium (U)-Total			105.0		%		80-120	02-SEP-14
Vanadium (V)-Total			105.9		%		80-120	02-SEP-14
Zinc (Zn)-Total			106.6		%		80-120	02-SEP-14
WG1942349-4	LCS							
Aluminum (Al)-Total			109.3		%		70-130	02-SEP-14
Antimony (Sb)-Total			110.6		%		70-130	02-SEP-14
Arsenic (As)-Total			105.0		%		70-130	02-SEP-14
Barium (Ba)-Total			109.8		%		70-130	02-SEP-14
Beryllium (Be)-Total			106.3		%		70-130	02-SEP-14
Bismuth (Bi)-Total			107.3		%		70-130	02-SEP-14
Boron (B)-Total			83.5		%		70-130	02-SEP-14
Cadmium (Cd)-Total			100.8		%		70-130	02-SEP-14
Calcium (Ca)-Total			106.7		%		70-130	02-SEP-14
Chromium (Cr)-Total			107.2		%		70-130	02-SEP-14
Cobalt (Co)-Total			105.0		%		70-130	02-SEP-14
Copper (Cu)-Total			104.4		%		70-130	02-SEP-14
Iron (Fe)-Total			101.5		%		70-130	02-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 23 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2935468							
WG1942349-4	LCS							
Lead (Pb)-Total			104.5		%		70-130	02-SEP-14
Lithium (Li)-Total			114.8		%		70-130	02-SEP-14
Magnesium (Mg)-Total			110.8		%		70-130	02-SEP-14
Manganese (Mn)-Total			106.1		%		70-130	02-SEP-14
Molybdenum (Mo)-Total			104.2		%		70-130	02-SEP-14
Nickel (Ni)-Total			105.5		%		70-130	02-SEP-14
Potassium (K)-Total			106.9		%		70-130	02-SEP-14
Selenium (Se)-Total			107.7		%		70-130	02-SEP-14
Silicon (Si)-Total			101.6		%		70-130	02-SEP-14
Silver (Ag)-Total			111.7		%		70-130	02-SEP-14
Sodium (Na)-Total			102.7		%		70-130	02-SEP-14
Strontium (Sr)-Total			112.6		%		70-130	02-SEP-14
Thallium (Tl)-Total			108.0		%		70-130	02-SEP-14
Tin (Sn)-Total			103.0		%		70-130	02-SEP-14
Titanium (Ti)-Total			103.5		%		70-130	02-SEP-14
Uranium (U)-Total			101.4		%		70-130	02-SEP-14
Vanadium (V)-Total			108.2		%		70-130	02-SEP-14
Zinc (Zn)-Total			107.2		%		70-130	02-SEP-14
WG1942349-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	03-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	03-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	03-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	03-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	03-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 24 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2935468							
WG1942349-1 MB								
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	03-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	03-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	03-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	03-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	03-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-SEP-14
WG1942349-2 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	03-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	03-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	03-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	03-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	03-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	03-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	03-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	03-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 25 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2935468							
WG1942349-2 MB								
Potassium (K)-Total			<0.050		mg/L		0.05	03-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	03-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	03-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	03-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	03-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-SEP-14
WG1942365-1 MB								
Manganese (Mn)-Total			0.000067	B	mg/L		0.00005	03-SEP-14
NAPHTHENIC-ACID-FM		Water						
Batch	R2942742							
WG1944566-3 DUP		L1509165-2						
Naphthenic Acids		<1.0	<1.0	RPD-NA	mg/L	N/A	30	09-SEP-14
WG1944566-7 DUP		L1509399-4						
Naphthenic Acids		<1.0	<1.0	RPD-NA	mg/L	N/A	30	09-SEP-14
WG1944566-4 LCS								
Naphthenic Acids			96.8		%		70-130	09-SEP-14
WG1944566-8 LCS								
Naphthenic Acids			97.3		%		70-130	09-SEP-14
WG1944566-1 MB								
Naphthenic Acids			<1.0		mg/L		1	09-SEP-14
WG1944566-5 MB								
Naphthenic Acids			<1.0		mg/L		1	09-SEP-14
WG1944566-2 MS		L1509165-1						
Naphthenic Acids			104.5		%		50-150	09-SEP-14
WG1944566-6 MS		L1509399-2						
Naphthenic Acids			102.1		%		50-150	09-SEP-14
NH3-CFA-ED		Water						



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 27 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-ED		Water						
Batch	R2934237							
WG1941708-14	MB							
Nitrite (as N)			<0.020		mg/L		0.02	29-AUG-14
WG1941708-16	MB							
Nitrite (as N)			<0.020		mg/L		0.02	29-AUG-14
WG1941708-8	MB							
Nitrite (as N)			<0.020		mg/L		0.02	29-AUG-14
WG1941708-4	MS	L1509878-2						
Nitrite (as N)			102.2		%		75-125	29-AUG-14
NO3-IC-ED		Water						
Batch	R2934237							
WG1941708-3	DUP	L1509878-2						
Nitrate (as N)		1.90	1.90		mg/L	0.0	20	29-AUG-14
WG1941708-11	LCS							
Nitrate (as N)			99.3		%		90-110	29-AUG-14
WG1941708-13	LCS							
Nitrate (as N)			99.1		%		90-110	29-AUG-14
WG1941708-15	LCS							
Nitrate (as N)			99.3		%		90-110	29-AUG-14
WG1941708-2	LCS							
Nitrate (as N)			99.0		%		90-110	29-AUG-14
WG1941708-7	LCS							
Nitrate (as N)			104.3		%		90-110	29-AUG-14
WG1941708-9	LCS							
Nitrate (as N)			99.1		%		90-110	29-AUG-14
WG1941708-1	MB							
Nitrate (as N)			<0.050		mg/L		0.05	29-AUG-14
WG1941708-10	MB							
Nitrate (as N)			<0.050		mg/L		0.05	29-AUG-14
WG1941708-12	MB							
Nitrate (as N)			<0.050		mg/L		0.05	29-AUG-14
WG1941708-14	MB							
Nitrate (as N)			<0.050		mg/L		0.05	29-AUG-14
WG1941708-16	MB							
Nitrate (as N)			<0.050		mg/L		0.05	29-AUG-14
WG1941708-8	MB							
Nitrate (as N)			<0.050		mg/L		0.05	29-AUG-14
WG1941708-4	MS	L1509878-2						
Nitrate (as N)			98.3		%		75-125	29-AUG-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 28 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R2939392							
WG1945556-2	LCS							
Acenaphthene			93.8		%		60-130	03-SEP-14
Acenaphthylene			100.4		%		60-130	03-SEP-14
Anthracene			98.4		%		60-130	03-SEP-14
Fluoranthene			98.7		%		60-130	03-SEP-14
Fluorene			95.6		%		60-130	03-SEP-14
Naphthalene			94.9		%		50-130	03-SEP-14
Phenanthrene			100.1		%		60-130	03-SEP-14
Pyrene			98.7		%		60-130	03-SEP-14
Benzo(a)anthracene			102.6		%		60-130	03-SEP-14
Benzo(k)fluoranthene			104.3		%		60-130	03-SEP-14
Benzo(b&j)fluoranthene			101.6		%		60-130	03-SEP-14
Benzo(g,h,i)perylene			98.3		%		60-130	03-SEP-14
Benzo(a)pyrene			98.2		%		60-130	03-SEP-14
Chrysene			103.0		%		60-130	03-SEP-14
Dibenzo(a,h)anthracene			102.2		%		60-130	03-SEP-14
Indeno(1,2,3-cd)pyrene			99.9		%		60-130	03-SEP-14
WG1945556-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	03-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	03-SEP-14
Anthracene			<0.000010		mg/L		0.00001	03-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	03-SEP-14
Fluorene			<0.000020		mg/L		0.00002	03-SEP-14
Naphthalene			<0.000050		mg/L		0.00005	03-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	03-SEP-14
Pyrene			<0.000010		mg/L		0.00001	03-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	03-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	03-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	03-SEP-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	03-SEP-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	03-SEP-14
Chrysene			<0.000020		mg/L		0.00002	03-SEP-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	03-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	03-SEP-14
Surrogate: d10-Acenaphthene			98.4		%		60-130	03-SEP-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 29 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R2939392							
WG1945556-1	MB							
Surrogate: d10-Phenanthrene			101.4		%		60-130	03-SEP-14
Surrogate: d12-Chrysene			103.7		%		60-130	03-SEP-14
PH/EC/ALK-ED		Water						
Batch	R2933060							
WG1941196-10	DUP	L1509878-2						
pH		7.72	7.75	J	pH	0.04	0.3	30-AUG-14
Conductivity (EC)		1050	1050		uS/cm	0.2	10	30-AUG-14
Bicarbonate (HCO3)		682	682		mg/L	0.0	25	30-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	30-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	30-AUG-14
Alkalinity, Total (as CaCO3)		559	559		mg/L	0.0	20	30-AUG-14
WG1941196-8	DUP	L1509355-10						
pH		8.43	8.49	J	pH	0.06	0.3	29-AUG-14
Conductivity (EC)		503	504		uS/cm	0.2	10	29-AUG-14
Bicarbonate (HCO3)		277	276		mg/L	0.6	25	29-AUG-14
Carbonate (CO3)		5.3	8.1	J	mg/L	2.7	10	29-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	29-AUG-14
Alkalinity, Total (as CaCO3)		236	239		mg/L	1.3	20	29-AUG-14
WG1941196-9	DUP	L1509862-1						
pH		7.97	7.98	J	pH	0.01	0.3	29-AUG-14
Conductivity (EC)		13000	13000		uS/cm	0.2	10	29-AUG-14
Bicarbonate (HCO3)		2290	2300		mg/L	0.2	25	29-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	29-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	29-AUG-14
Alkalinity, Total (as CaCO3)		1880	1880		mg/L	0.2	20	29-AUG-14
WG1941196-12	LCS							
Conductivity (EC)			93.3		%		90-110	29-AUG-14
WG1941196-13	LCS							
pH			7.00		pH		6.7-7.3	29-AUG-14
WG1941196-14	LCS							
Alkalinity, Total (as CaCO3)			97.5		%		85-115	29-AUG-14
WG1941196-15	LCS							
Conductivity (EC)			96.8		%		90-110	29-AUG-14
WG1941196-17	LCS							
Conductivity (EC)			100.1		%		90-110	29-AUG-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 30 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2933060							
WG1941196-18	LCS							
pH			7.00		pH		6.7-7.3	29-AUG-14
WG1941196-19	LCS							
Alkalinity, Total (as CaCO3)			99.0		%		85-115	29-AUG-14
WG1941196-2	LCS							
Conductivity (EC)			94.6		%		90-110	29-AUG-14
WG1941196-20	LCS							
Conductivity (EC)			95.4		%		90-110	29-AUG-14
WG1941196-22	LCS							
Conductivity (EC)			99.7		%		90-110	30-AUG-14
WG1941196-23	LCS							
pH			7.01		pH		6.7-7.3	30-AUG-14
WG1941196-24	LCS							
Alkalinity, Total (as CaCO3)			99.0		%		85-115	30-AUG-14
WG1941196-25	LCS							
Conductivity (EC)			95.0		%		90-110	30-AUG-14
WG1941196-27	LCS							
Conductivity (EC)			99.9		%		90-110	30-AUG-14
WG1941196-28	LCS							
pH			7.00		pH		6.7-7.3	30-AUG-14
WG1941196-29	LCS							
Alkalinity, Total (as CaCO3)			99.0		%		85-115	30-AUG-14
WG1941196-3	LCS							
pH			7.01		pH		6.7-7.3	29-AUG-14
WG1941196-30	LCS							
Conductivity (EC)			94.6		%		90-110	30-AUG-14
WG1941196-4	LCS							
Alkalinity, Total (as CaCO3)			98.1		%		85-115	29-AUG-14
WG1941196-5	LCS							
Conductivity (EC)			98.3		%		90-110	29-AUG-14
WG1941196-1	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	29-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	29-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	29-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	29-AUG-14
WG1941196-11	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	29-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	29-AUG-14



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 32 of 34

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-ED		Water						
Batch	R2934237							
WG1941708-11	LCS							
Sulfate (SO4)			100.6		%		90-110	29-AUG-14
WG1941708-13	LCS							
Sulfate (SO4)			101.5		%		90-110	29-AUG-14
WG1941708-15	LCS							
Sulfate (SO4)			101.3		%		90-110	29-AUG-14
WG1941708-2	LCS							
Sulfate (SO4)			100.3		%		90-110	29-AUG-14
WG1941708-7	LCS							
Sulfate (SO4)			100.5		%		90-110	29-AUG-14
WG1941708-9	LCS							
Sulfate (SO4)			100.5		%		90-110	29-AUG-14
WG1941708-1	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-10	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-12	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-14	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-16	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-8	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	29-AUG-14
WG1941708-4	MS	L1509878-2						
Sulfate (SO4)			97.0		%		75-125	29-AUG-14
SOLIDS-TDS-ED		Water						
Batch	R2937933							
WG1943337-3	DUP	L1510103-1						
Total Dissolved Solids		1320	1290		mg/L	2.1	20	03-SEP-14
WG1943337-4	DUP	L1510128-17						
Total Dissolved Solids		705	699		mg/L	0.9	20	03-SEP-14
WG1943337-2	LCS							
Total Dissolved Solids			98.1		%		85-115	03-SEP-14
TURBIDITY-ED		Water						



Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Page 33 of 34

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-ED		Water						
Batch	R2933068							
WG1941210-3	DUP	L1509418-1						
Turbidity		0.79	0.79		NTU	0.3	15	29-AUG-14
WG1941210-4	DUP	L1509856-12						
Turbidity		0.93	0.95		NTU	2.4	15	29-AUG-14
WG1941210-2	LCS							
Turbidity			97.9		%		70-130	29-AUG-14
WG1941210-1	MB							
Turbidity			<0.10		NTU		0.1	29-AUG-14

Quality Control Report

Workorder: L1509452

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Page 34 of 34

Contact: Sue Raynard

Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



ALS 140910-04 (14-CLK)

CONFIDENTIAL ANALYSIS REPORT

REPORT #: 140910-04

WO #: 14-CLK

PO #: L1509452

CLIENT: ALS Laboratory Group - Edmonton
9936-67 Avenue
Edmonton, AB
T6E 0P5

ATTENTION: ALS-ED Reporting
Tel: (780) 413-5227
Fax: (780) 437-2311

SAMPLE DESCRIPTION: Water Samples

DATE AND TIME OF SAMPLE COLLECTION: August 27, 2014

DATE AND TIME OF SAMPLE RECEIPT: August 29, 2014/07:46

SAMPLE TEMPERATURE WHEN RECEIVED: 9.8° Celsius

TEST PERFORMED:

Iron Related Bacteria
Sulfate Reducing Bacteria [P/A]
Sulfate Reducing Bacteria

TEST START DATE: August 29, 2014/08:46

DATE COMPLETED: September 09, 2014

CERTIFICATE OF ANALYSIS: See Page 2

QUALITY CONTROL DATA: See Attached Appendix 1

The report shall not be reproduced, except in full, without the written authority of PBR Laboratories Inc.

Certificate of Analysis

PBR ID	Sample #	Client ID	Lot #	Test	Protocol	Quantity Analyzed	*DF	Result	Units	Note
14-CLK-01	L1509452-1	16054140827016		Iron Related Bacteria	BART	15 ml		2.3×10^3	CFU/ml	1
				Sulfate Reducing Bacteria [P/A]	BART	15 ml		Absent		
14-CLK-02	L1509452-2	16054140827017		Iron Related Bacteria	BART	15 ml		2.3×10^3	CFU/ml	1
				Sulfate Reducing Bacteria	BART	15 ml		200	CFU/ml	1
14-CLK-03	L1509452-3	16054140827018		Iron Related Bacteria	BART	15 ml		2.3×10^3	CFU/ml	1
				Sulfate Reducing Bacteria	BART	15 ml		1.2×10^3	CFU/ml	1
14-CLK-04	L1509452-4	16054140827019		Iron Related Bacteria	BART	15 ml		9.0×10^3	CFU/ml	1
				Sulfate Reducing Bacteria	BART	15 ml		200	CFU/ml	1
14-CLK-05	L1509452-5	16054140827020		Iron Related Bacteria	BART	15 ml		2.3×10^3	CFU/ml	1
				Sulfate Reducing Bacteria	BART	15 ml		200	CFU/ml	1

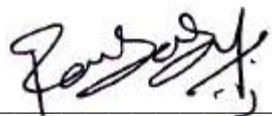
*DF - Dilution Factor used for analysis

Notes

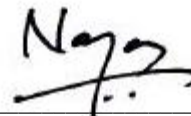
1 CFU = Colony Forming Unit.

BART results represent the Approximate Population only.

The reported results apply only to the items tested.


Rambabu Naravaneni Ph. D (Analyst)
Date: Sep 10 2014

Approved By:


Narayan Pokharel, Ph.D.
Date: Sep 10 2014



P|B|R
Laboratories Inc.

ALS 140910-04 (14-CLK)

APPENDIX 1

Quality Control Data for Iron Related Bacteria (BART)

Controls	Organism/Medium	Result
Sterility (media blank)	BART medium	Pass
Positive	Acidithiobacillus ferrooxidans	Pass
Negative	D/W Sterile	Pass

Quality Control Data for Sulfate Reducing Bacteria [P/A] (BART)

Controls	Organism/Medium	Result
Sterility	BART medium	Pass
Positive	SRB	Pass
Negative	D/W sterile	Pass

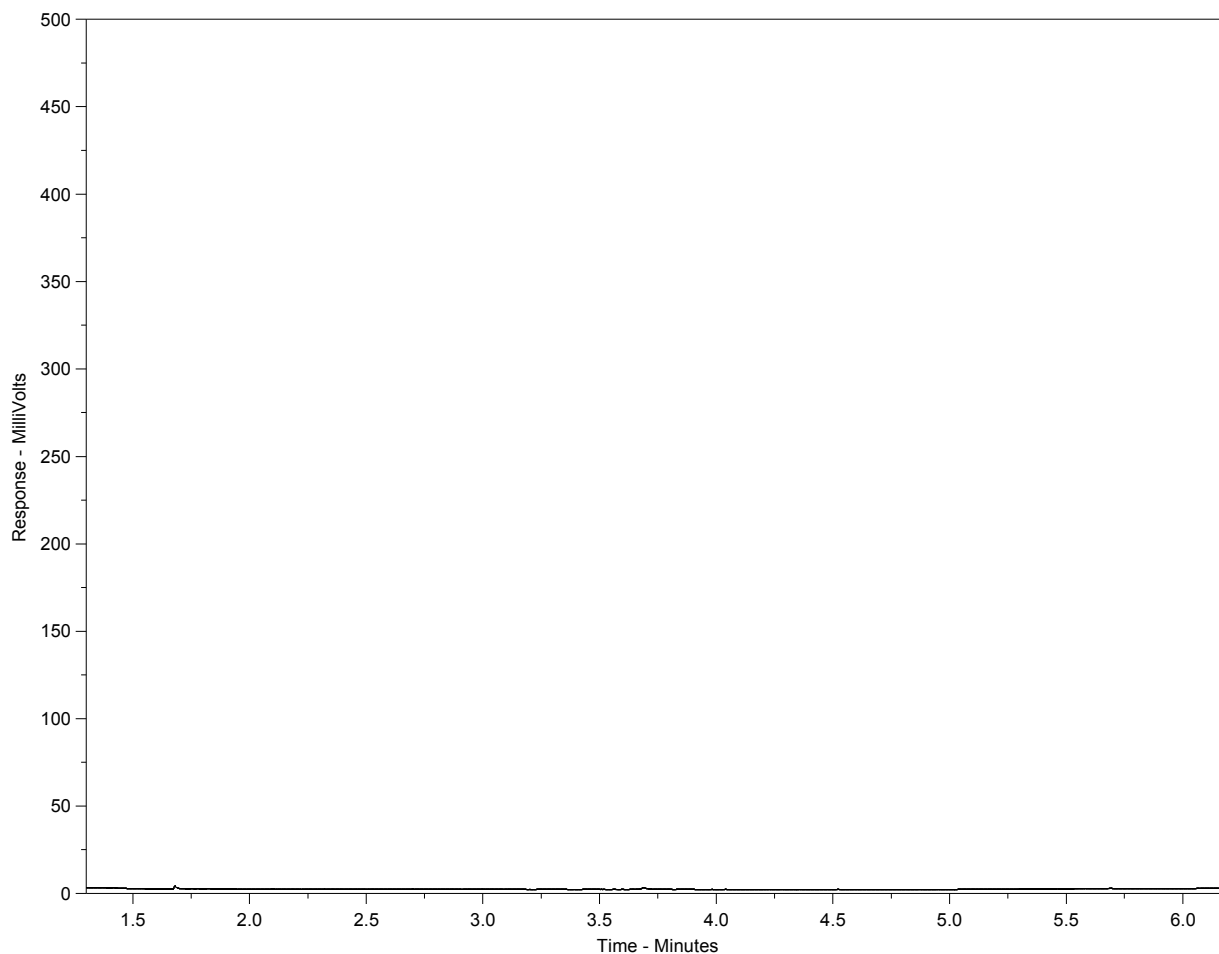
Quality Control Data for Sulfate Reducing Bacteria (BART)

Controls	Organism/Medium	Result
Sterility	BART medium	Pass
Positive	SRB	Pass
Negative	D/W Sterile	Pass

Hydrocarbon Distribution Report



ALS Sample ID: L1509452-1
Client ID: 16054140827016



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		1067°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

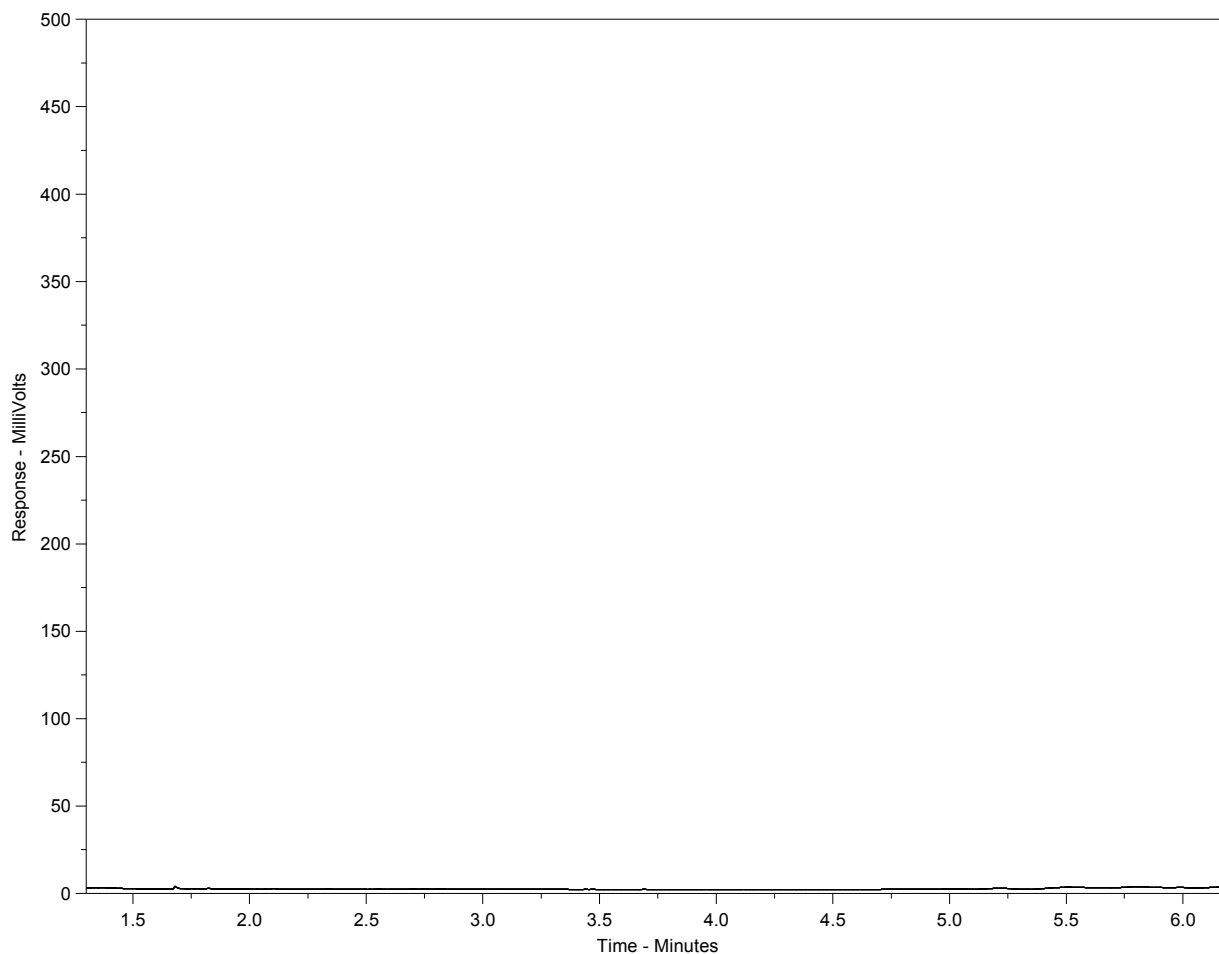
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1509452-2
Client ID: 16054140827017



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

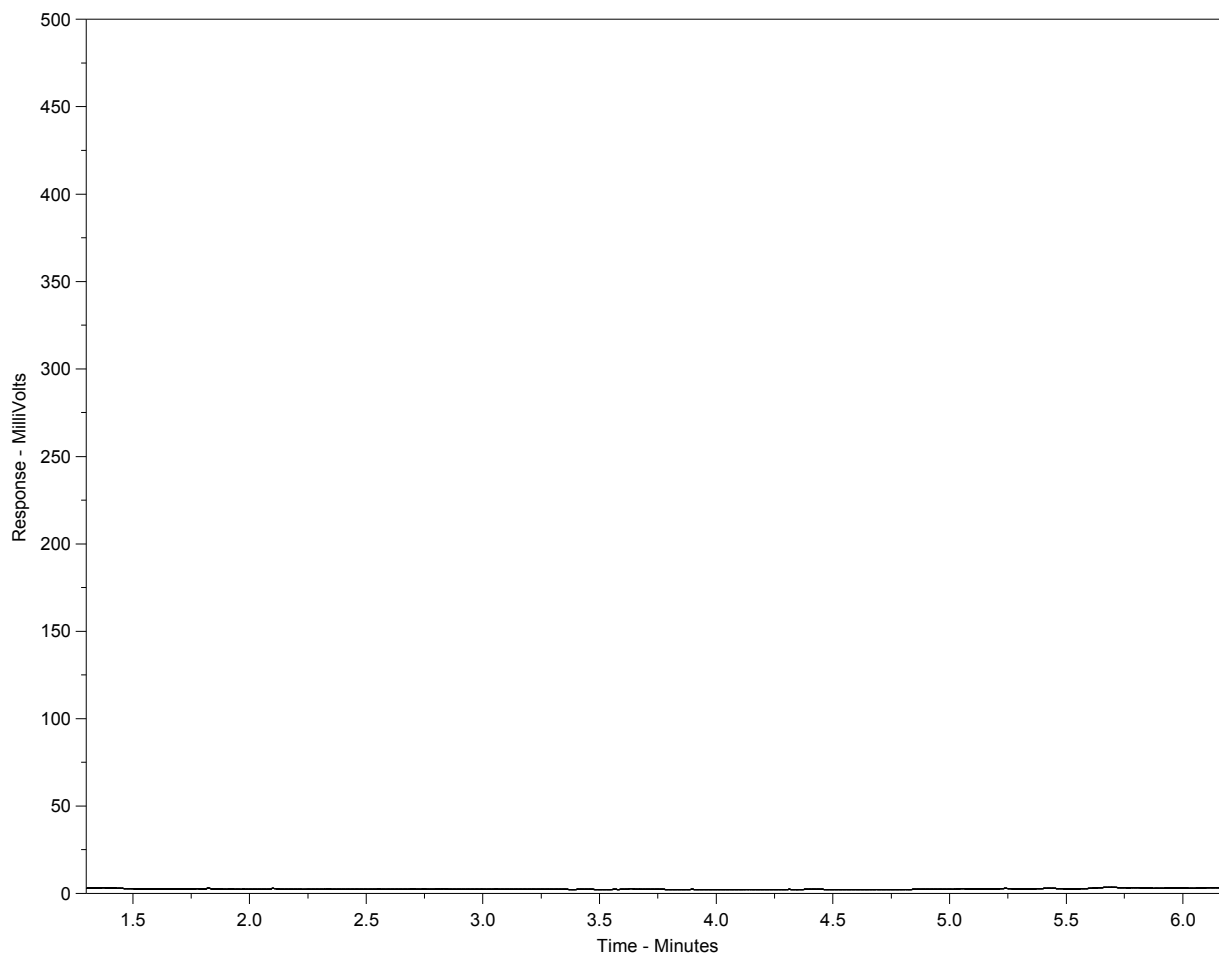
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1509452-3
Client ID: 16054140827018



← F2 →		← F3 →		← F4 →		← F4 →
nC10	nC16	nC34	nC50			
174°C	287°C	481°C	575°C			
346°F	549°F	898°F	1067°F			
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →						

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

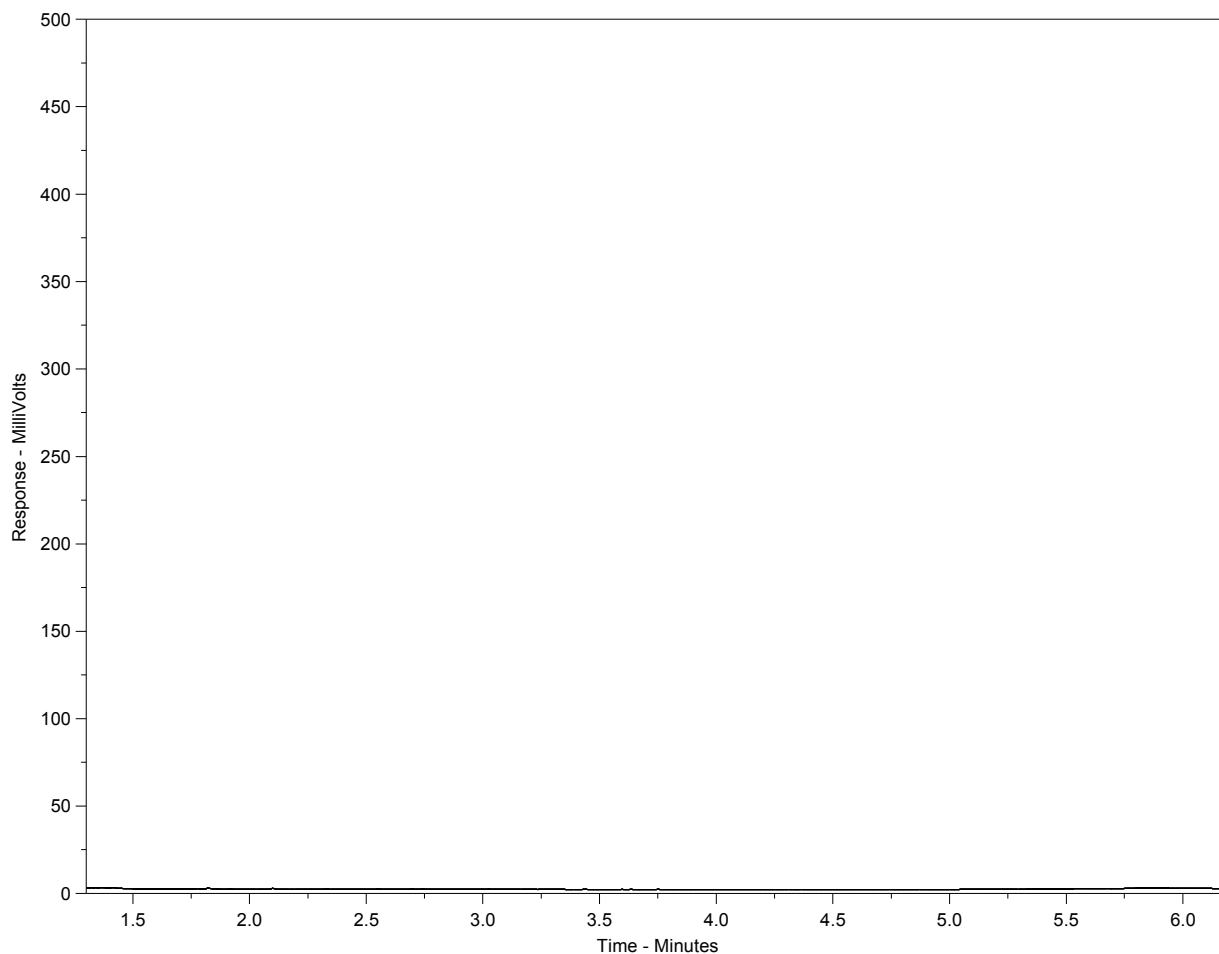
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1509452-4
Client ID: 16054140827019



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

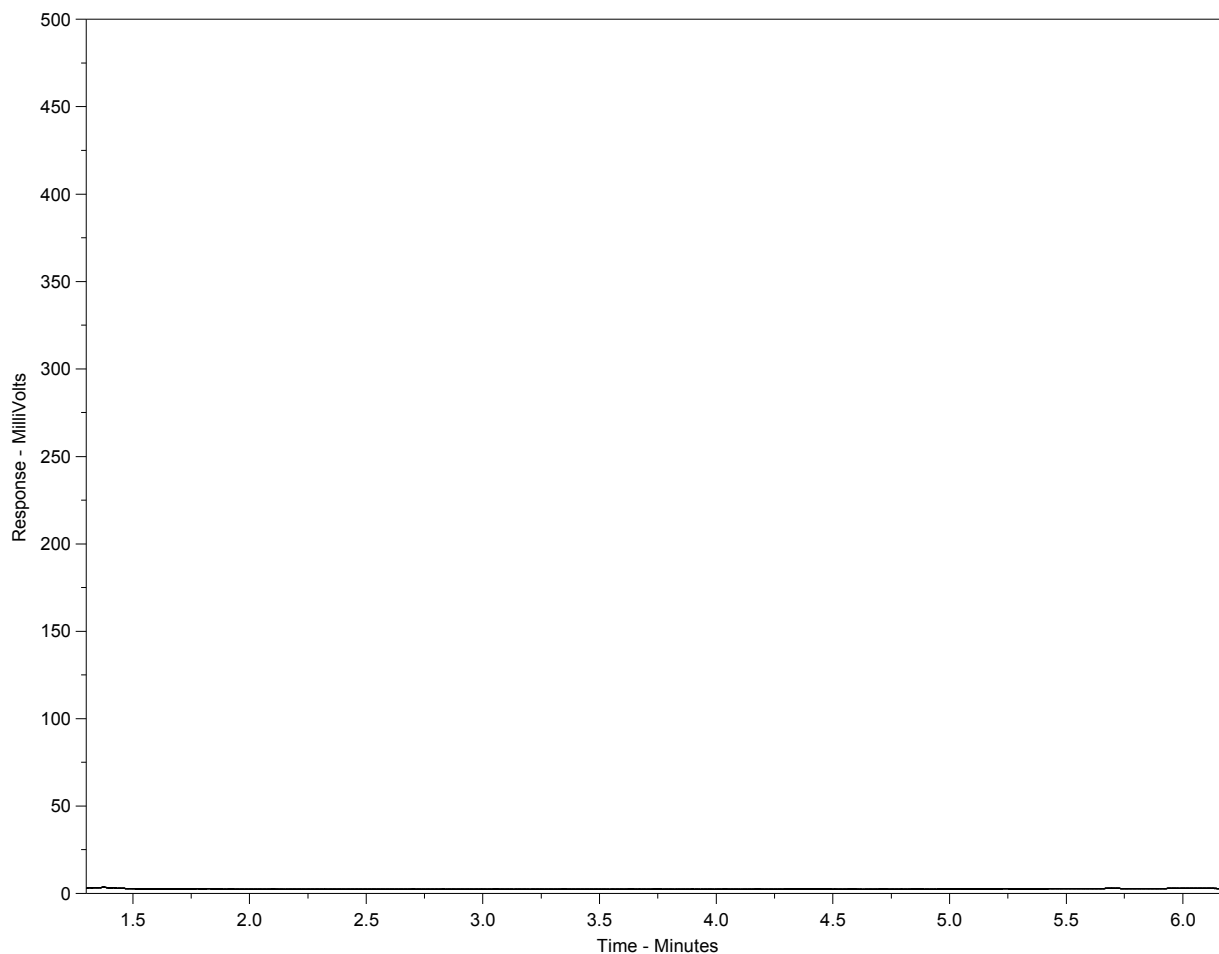
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1509452-5
Client ID: 16054140827020



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



Matrix Solutions Inc.
ATTN: Sue Raynard
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Date Received: 29-AUG-14
Report Date: 07-JAN-15 15:44 (MT)
Version: FINAL REV. 3

Client Phone: 403-513-2275

Certificate of Analysis

Lab Work Order #: L1510165
Project P.O. #: NOT SUBMITTED
Job Reference: 16054-502 SAOS
C of C Numbers: M061303
Legal Site Desc:

Comments: ADDITIONAL 05-JAN-15 09:33
ADDITIONAL 16-DEC-14 10:50

Nicole Thibault
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-1 16054140828021									
Sampled By: bp/ea on 28-AUG-14 @ 11:30									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Toluene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
EthylBenzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
o-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Styrene	<0.0010	-		0.0010	mg/L	-		31-AUG-14	R2932610
F1(C6-C10)	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
F1-BTEX	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
Xylenes	<0.00071	-		0.00071	mg/L	-		31-AUG-14	R2932610
Surr: 1,4-Difluorobenzene (SS)	101.7	-		N/A	%	-		31-AUG-14	R2932610
Surr: 4-Bromofluorobenzene (SS)	93.0	-		N/A	%	-		31-AUG-14	R2932610
Surr: 3,4-Dichlorotoluene (SS)	102.8	-		N/A	%	-		31-AUG-14	R2932610
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
Surr: 2-Bromobenzotrifluoride	102.3	-		N/A	%	-	02-SEP-14	02-SEP-14	R2936930
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000341	+/-0.0000067		0.000005 0	mg/L	0		08-SEP-14	R2940513
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	7.11	+/-1.1		0.0030	mg/L	0		02-SEP-14	R2935468
Antimony (Sb)-Total	0.00047	+/-0.00009		0.00010	mg/L	0		02-SEP-14	R2935468
Arsenic (As)-Total	0.0120	+/-0.0014		0.00010	mg/L	0		02-SEP-14	R2935468
Barium (Ba)-Total	0.300	+/-0.034		0.000050	mg/L	0		02-SEP-14	R2935468
Beryllium (Be)-Total	0.00074	+/-0.00017		0.00050	mg/L	0		02-SEP-14	R2935468
Bismuth (Bi)-Total	0.000232	+/-0.000044		0.000050	mg/L	0		02-SEP-14	R2935468
Boron (B)-Total	0.070	+/-0.011		0.010	mg/L	0		02-SEP-14	R2935468
Cadmium (Cd)-Total	0.000554	+/-0.00011		0.000010	mg/L	0		02-SEP-14	R2935468
Calcium (Ca)-Total	140	+/-17		0.10	mg/L	0		02-SEP-14	R2935468
Chromium (Cr)-Total	0.0128	+/-0.0019		0.00010	mg/L	0		02-SEP-14	R2935468
Cobalt (Co)-Total	0.0122	+/-0.0017		0.00010	mg/L	0		02-SEP-14	R2935468
Copper (Cu)-Total	0.0237	+/-0.0028		0.00010	mg/L	0		02-SEP-14	R2935468
Iron (Fe)-Total	21.5	+/-3.4		0.030	mg/L	0		02-SEP-14	R2935468
Lead (Pb)-Total	0.0123	+/-0.0020		0.000050	mg/L	0		02-SEP-14	R2935468
Lithium (Li)-Total	0.0571	+/-0.011		0.0050	mg/L	0		02-SEP-14	R2935468
Magnesium (Mg)-Total	47.2	+/-5.7		0.10	mg/L	0		02-SEP-14	R2935468
Manganese (Mn)-Total	0.481	+/-0.049		0.0050	mg/L	0		02-SEP-14	R2935468
Molybdenum (Mo)-Total	0.00195	+/-0.00024		0.000050	mg/L	0		02-SEP-14	R2935468
Nickel (Ni)-Total	0.0262	+/-0.0029		0.00010	mg/L	0		02-SEP-14	R2935468
Potassium (K)-Total	5.27	+/-0.65		0.50	mg/L	0		02-SEP-14	R2935468
Selenium (Se)-Total	0.00554	+/-0.00077		0.00010	mg/L	0		02-SEP-14	R2935468
Silicon (Si)-Total	24.2	+/-4.8		0.050	mg/L	0		02-SEP-14	R2935468
Silver (Ag)-Total	0.000221	+/-0.000045		0.000010	mg/L	0		02-SEP-14	R2935468
Sodium (Na)-Total	10.4	+/-1.3		1.0	mg/L	0		02-SEP-14	R2935468
Strontium (Sr)-Total	0.326	+/-0.047		0.00010	mg/L	0		02-SEP-14	R2935468
Thallium (Tl)-Total	0.000428	+/-0.000067		0.000050	mg/L	0		02-SEP-14	R2935468
Tin (Sn)-Total	0.00068	+/-0.00010		0.00010	mg/L	0		02-SEP-14	R2935468
Titanium (Ti)-Total	0.132	+/-0.043		0.00030	mg/L	0		02-SEP-14	R2935468
Uranium (U)-Total	0.0170	+/-0.0024		0.000010	mg/L	0		02-SEP-14	R2935468

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-1 16054140828021									
Sampled By: bp/ea on 28-AUG-14 @ 11:30									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	0.0258	+/-0.0031		0.00050	mg/L	0		02-SEP-14	R2935468
Zinc (Zn)-Total	0.0826	+/-0.013		0.0050	mg/L	0		02-SEP-14	R2935468
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		09-SEP-14	R2942212
Dissolved Organic Carbon	8.2	+/-1.1		1.0	mg/L	0		08-SEP-14	R2941343
Naphthenic Acids	<1.0	-		1.0	mg/L	-	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		10-SEP-14	R2943611
Total Dissolved Solids	752	+/-50		10	mg/L	0		04-SEP-14	R2939017
Silicon (as SiO2)-Total	51.8	-		0.11	mg/L	-		03-SEP-14	
Turbidity	362	+/-20		0.10	NTU	0		30-AUG-14	R2934513
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Anthracene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Fluoranthene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Fluorene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Naphthalene	<0.000050	-		0.000050	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Phenanthrene	<0.000050	-		0.000050	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Pyrene	0.000011	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	09-SEP-14	09-SEP-14	R2943446
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	09-SEP-14	09-SEP-14	R2943446
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Surr: d10-Acenaphthene	86.3	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Surr: d10-Phenanthrene	89.7	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Surr: d12-Chrysene	90.7	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	6.61	+/-0.39		0.50	mg/L	0		30-AUG-14	R2939362
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0020	+/-0.0005		0.0010	mg/L	0		09-SEP-14	R2942563
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Barium (Ba)-Dissolved	0.130	+/-0.011		0.00010	mg/L	0		09-SEP-14	R2942563
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		09-SEP-14	R2942563
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Cobalt (Co)-Dissolved	0.00050	+/-0.00005		0.00010	mg/L	0		09-SEP-14	R2942563
Copper (Cu)-Dissolved	0.00179	+/-0.00014		0.00060	mg/L	0		09-SEP-14	R2942563
Iron (Fe)-Dissolved	0.012	+/-0.001		0.010	mg/L	0		09-SEP-14	R2942563
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Lithium (Li)-Dissolved	0.0470	+/-0.0058		0.0050	mg/L	0		09-SEP-14	R2942563
Manganese (Mn)-Dissolved	0.0575	+/-0.0039		0.0020	mg/L	0		09-SEP-14	R2942563
Molybdenum (Mo)-Dissolved	0.00067	+/-0.00007		0.00010	mg/L	0		09-SEP-14	R2942563

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-1 16054140828021 Sampled By: bp/ea on 28-AUG-14 @ 11:30 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	0.00255	+/-0.00021		0.00010	mg/L	0		09-SEP-14	R2942563
Selenium (Se)-Dissolved	0.00352	+/-0.00058		0.00040	mg/L	0		09-SEP-14	R2942563
Silicon (Si)-Dissolved	11.3	+/-0.96		0.050	mg/L	0		09-SEP-14	R2942563
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		09-SEP-14	R2942563
Strontium (Sr)-Dissolved	0.282	+/-0.021		0.00010	mg/L	0		09-SEP-14	R2942563
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		09-SEP-14	R2942563
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		09-SEP-14	R2942563
Uranium (U)-Dissolved	0.0145	+/-0.0015		0.000010	mg/L	0		09-SEP-14	R2942563
Vanadium (V)-Dissolved	0.00020	+/-0.00002		0.00010	mg/L	0		09-SEP-14	R2942563
Zinc (Zn)-Dissolved	0.0064	+/-0.0008		0.0010	mg/L	0		09-SEP-14	R2942563
Ion Balance Calculation									
Ion Balance	96.8	-			%	-		10-SEP-14	
TDS (Calculated)	559	-			mg/L	-		10-SEP-14	
Hardness (as CaCO3)	531	-			mg/L	-		10-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		07-SEP-14	R2940513
Nitrate as N by IC									
Nitrate (as N)	0.761	+/-0.077		0.050	mg/L	0		30-AUG-14	R2939362
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	0.761	-		0.054	mg/L	-		05-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		30-AUG-14	R2939362
Sulfate by IC									
Sulfate (SO4)	41.2	+/-2.3		0.50	mg/L	0		30-AUG-14	R2939362
pH, Conductivity and Total Alkalinity									
pH	7.46	+/-0.01		0.10	pH	0		30-AUG-14	R2933870
Conductivity (EC)	1000	+/-50		0.20	uS/cm	0		30-AUG-14	R2933870
Bicarbonate (HCO3)	634	+/-24		5.0	mg/L	0		30-AUG-14	R2933870
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Alkalinity, Total (as CaCO3)	520	+/-33		2.0	mg/L	0		30-AUG-14	R2933870
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	24.2	-		0.11	mg/L	-		10-SEP-14	
L1510165-2 16054140828022 Sampled By: bp/ea on 28-AUG-14 @ 13:18 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Toluene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
EthylBenzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
o-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Styrene	<0.0010	-		0.0010	mg/L	-		31-AUG-14	R2932610
F1(C6-C10)	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
F1-BTEX	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
Xylenes	<0.00071	-		0.00071	mg/L	-		31-AUG-14	R2932610
Surr:	1,4-Difluorobenzene (SS)	103.2	-	N/A	%	-		31-AUG-14	R2932610
Surr:	4-Bromofluorobenzene (SS)	90.3	-	N/A	%	-		31-AUG-14	R2932610

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-2 16054140828022									
Sampled By: bp/ea on 28-AUG-14 @ 13:18									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Anthracene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Fluoranthene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Fluorene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Naphthalene	<0.000050	-		0.000050	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Phenanthrene	<0.000050	-		0.000050	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Pyrene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	09-SEP-14	09-SEP-14	R2943446
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	09-SEP-14	09-SEP-14	R2943446
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Surr: d10-Acenaphthene	86.4	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Surr: d10-Phenanthrene	89.3	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Surr: d12-Chrysene	91.5	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		30-AUG-14	R2939362
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942563
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Arsenic (As)-Dissolved	0.00474	+/-0.00050		0.00040	mg/L	0		09-SEP-14	R2942563
Barium (Ba)-Dissolved	0.118	+/-0.010		0.00010	mg/L	0		09-SEP-14	R2942563
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		09-SEP-14	R2942563
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Cobalt (Co)-Dissolved	0.00029	+/-0.00003		0.00010	mg/L	0		09-SEP-14	R2942563
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		09-SEP-14	R2942563
Iron (Fe)-Dissolved	1.76	+/-0.16		0.010	mg/L	0		09-SEP-14	R2942563
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Lithium (Li)-Dissolved	0.0207	+/-0.0026		0.0050	mg/L	0		09-SEP-14	R2942563
Manganese (Mn)-Dissolved	0.215	+/-0.015		0.0020	mg/L	0		09-SEP-14	R2942563
Molybdenum (Mo)-Dissolved	0.00227	+/-0.00024		0.00010	mg/L	0		09-SEP-14	R2942563
Nickel (Ni)-Dissolved	0.00061	+/-0.00006		0.00010	mg/L	0		09-SEP-14	R2942563
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Silicon (Si)-Dissolved	9.60	+/-0.82		0.050	mg/L	0		09-SEP-14	R2942563
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		09-SEP-14	R2942563
Strontium (Sr)-Dissolved	0.219	+/-0.016		0.00010	mg/L	0		09-SEP-14	R2942563
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		09-SEP-14	R2942563
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		09-SEP-14	R2942563
Uranium (U)-Dissolved	0.00154	+/-0.00016		0.000010	mg/L	0		09-SEP-14	R2942563
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Zinc (Zn)-Dissolved	0.0015	+/-0.0003		0.0010	mg/L	0		09-SEP-14	R2942563

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-2 16054140828022									
Sampled By: bp/ea on 28-AUG-14 @ 13:18									
Matrix: H2O									
Ion Balance Calculation									
Ion Balance	97.9	-			%	-		10-SEP-14	
TDS (Calculated)	267	-			mg/L	-		10-SEP-14	
Hardness (as CaCO3)	255	-			mg/L	-		10-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		07-SEP-14	R2940513
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		30-AUG-14	R2939362
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		05-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		30-AUG-14	R2939362
Sulfate by IC									
Sulfate (SO4)	13.2	+/-0.76		0.50	mg/L	0		30-AUG-14	R2939362
pH, Conductivity and Total Alkalinity									
pH	7.80	+/-0.01		0.10	pH	0		30-AUG-14	R2933870
Conductivity (EC)	505	+/-25		0.20	uS/cm	0		30-AUG-14	R2933870
Bicarbonate (HCO3)	319	+/-13		5.0	mg/L	0		30-AUG-14	R2933870
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Alkalinity, Total (as CaCO3)	261	+/-17		2.0	mg/L	0		30-AUG-14	R2933870
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	20.5	-		0.11	mg/L	-		10-SEP-14	
L1510165-3 16054140828023									
Sampled By: bp/ea on 28-AUG-14 @ 14:02									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Toluene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
EthylBenzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
o-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Styrene	<0.0010	-		0.0010	mg/L	-		31-AUG-14	R2932610
F1(C6-C10)	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
F1-BTEX	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
Xylenes	<0.00071	-		0.00071	mg/L	-		31-AUG-14	R2932610
Surr: 1,4-Difluorobenzene (SS)	100.0	-		N/A	%	-		31-AUG-14	R2932610
Surr: 4-Bromofluorobenzene (SS)	90.4	-		N/A	%	-		31-AUG-14	R2932610
Surr: 3,4-Dichlorotoluene (SS)	101.0	-		N/A	%	-		31-AUG-14	R2932610
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
Surr: 2-Bromobenzotrifluoride	108.1	-		N/A	%	-	02-SEP-14	02-SEP-14	R2936930
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.000005 0	mg/L	-		07-SEP-14	R2940513
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0862	+/-0.014		0.0030	mg/L	0		02-SEP-14	R2935468

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-3 16054140828023									
Sampled By: bp/ea on 28-AUG-14 @ 14:02									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Arsenic (As)-Total	0.00081	+/-0.00011		0.00010	mg/L	0		02-SEP-14	R2935468
Barium (Ba)-Total	0.0895	+/-0.010		0.000050	mg/L	0		02-SEP-14	R2935468
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Boron (B)-Total	0.246	+/-0.039		0.010	mg/L	0		02-SEP-14	R2935468
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Calcium (Ca)-Total	62.2	+/-7.3		0.10	mg/L	0		02-SEP-14	R2935468
Chromium (Cr)-Total	0.00115	+/-0.00018		0.00010	mg/L	0		02-SEP-14	R2935468
Cobalt (Co)-Total	0.00039	+/-0.00005		0.00010	mg/L	0		02-SEP-14	R2935468
Copper (Cu)-Total	0.00030	+/-0.00011		0.00010	mg/L	0		02-SEP-14	R2935468
Iron (Fe)-Total	4.17	+/-0.66		0.030	mg/L	0		02-SEP-14	R2935468
Lead (Pb)-Total	0.000165	+/-0.000031		0.000050	mg/L	0		02-SEP-14	R2935468
Lithium (Li)-Total	0.0398	+/-0.0074		0.0050	mg/L	0		02-SEP-14	R2935468
Magnesium (Mg)-Total	16.9	+/-2.0		0.10	mg/L	0		02-SEP-14	R2935468
Manganese (Mn)-Total	0.245	+/-0.025		0.0050	mg/L	0		02-SEP-14	R2935468
Molybdenum (Mo)-Total	0.00530	+/-0.00064		0.000050	mg/L	0		02-SEP-14	R2935468
Nickel (Ni)-Total	0.00167	+/-0.00020		0.00010	mg/L	0		02-SEP-14	R2935468
Potassium (K)-Total	4.18	+/-0.51		0.50	mg/L	0		02-SEP-14	R2935468
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Silicon (Si)-Total	9.36	+/-1.9		0.050	mg/L	0		02-SEP-14	R2935468
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Sodium (Na)-Total	73.7	+/-9.1		1.0	mg/L	0		02-SEP-14	R2935468
Strontium (Sr)-Total	0.478	+/-0.069		0.00010	mg/L	0		02-SEP-14	R2935468
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Tin (Sn)-Total	0.00038	+/-0.00006		0.00010	mg/L	0		02-SEP-14	R2935468
Titanium (Ti)-Total	0.00297	+/-0.00098		0.00030	mg/L	0		02-SEP-14	R2935468
Uranium (U)-Total	0.000199	+/-0.000028		0.000010	mg/L	0		02-SEP-14	R2935468
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2935468
Miscellaneous Parameters									
Ammonia, Total (as N)	1.38	-		0.050	mg/L	-		09-SEP-14	R2942212
Dissolved Organic Carbon	6.6	+/-0.9		1.0	mg/L	0		08-SEP-14	R2941343
Naphthenic Acids	1.7	+/-0.5		1.0	mg/L	0	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		10-SEP-14	R2943611
Total Dissolved Solids	429	+/-29		10	mg/L	0		04-SEP-14	R2939017
Silicon (as SiO2)-Total	20.0	-		0.11	mg/L	-		03-SEP-14	
Turbidity	33.2	+/-1.9		0.10	NTU	0		30-AUG-14	R2934513
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Anthracene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Fluoranthene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Fluorene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Naphthalene	0.000068	-		0.000050	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Phenanthrene	<0.000050	-		0.000050	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Pyrene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-3 16054140828023									
Sampled By: bp/ea on 28-AUG-14 @ 14:02									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Benzo(a)pyrene	<0.0000050	-		0.000005 0	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Chrysene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005 0	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Surr: d10-Acenaphthene	85.7	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Surr: d10-Phenanthrene	88.1	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Surr: d12-Chrysene	88.7	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		30-AUG-14	R2939362
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0017	+/-0.0004		0.0010	mg/L	0		09-SEP-14	R2942563
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Arsenic (As)-Dissolved	0.00076	+/-0.00008		0.00040	mg/L	0		09-SEP-14	R2942563
Barium (Ba)-Dissolved	0.0863	+/-0.0075		0.00010	mg/L	0		09-SEP-14	R2942563
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		09-SEP-14	R2942563
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Cobalt (Co)-Dissolved	0.00029	+/-0.00003		0.00010	mg/L	0		09-SEP-14	R2942563
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		09-SEP-14	R2942563
Iron (Fe)-Dissolved	3.74	+/-0.34		0.010	mg/L	0		09-SEP-14	R2942563
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Lithium (Li)-Dissolved	0.0369	+/-0.0046		0.0050	mg/L	0		09-SEP-14	R2942563
Manganese (Mn)-Dissolved	0.223	+/-0.015		0.0020	mg/L	0		09-SEP-14	R2942563
Molybdenum (Mo)-Dissolved	0.00455	+/-0.00048		0.00010	mg/L	0		09-SEP-14	R2942563
Nickel (Ni)-Dissolved	0.00071	+/-0.00007		0.00010	mg/L	0		09-SEP-14	R2942563
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Silicon (Si)-Dissolved	9.05	+/-0.77		0.050	mg/L	0		09-SEP-14	R2942563
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		09-SEP-14	R2942563
Strontium (Sr)-Dissolved	0.440	+/-0.033		0.00010	mg/L	0		09-SEP-14	R2942563
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		09-SEP-14	R2942563
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		09-SEP-14	R2942563
Uranium (U)-Dissolved	0.000200	+/-0.000020		0.000010	mg/L	0		09-SEP-14	R2942563
Vanadium (V)-Dissolved	0.00010	+/-0.00001		0.00010	mg/L	0		09-SEP-14	R2942563
Zinc (Zn)-Dissolved	0.0032	+/-0.0005		0.0010	mg/L	0		09-SEP-14	R2942563
Ion Balance Calculation									
Ion Balance	92.1	-			%	-		10-SEP-14	
TDS (Calculated)	391	-			mg/L	-		10-SEP-14	
Hardness (as CaCO3)	221	-			mg/L	-		10-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		07-SEP-14	R2940513
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		30-AUG-14	R2939362
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		05-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		30-AUG-14	R2939362

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-3 16054140828023 Sampled By: bp/ea on 28-AUG-14 @ 14:02 Matrix: H2O									
Sulfate by IC									
Sulfate (SO4)	21.9	+/-1.3		0.50	mg/L	0		30-AUG-14	R2939362
pH, Conductivity and Total Alkalinity									
pH	7.87	+/-0.01		0.10	pH	0		30-AUG-14	R2933870
Conductivity (EC)	716	+/-36		0.20	uS/cm	0		30-AUG-14	R2933870
Bicarbonate (HCO3)	457	+/-18		5.0	mg/L	0		30-AUG-14	R2933870
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Alkalinity, Total (as CaCO3)	375	+/-24		2.0	mg/L	0		30-AUG-14	R2933870
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	19.4	-		0.11	mg/L	-		10-SEP-14	
L1510165-4 16054140828024 Sampled By: bp/ea on 28-AUG-14 @ 14:50 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Toluene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
EthylBenzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
o-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Styrene	<0.0010	-		0.0010	mg/L	-		31-AUG-14	R2932610
F1(C6-C10)	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
F1-BTEX	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
Xylenes	<0.00071	-		0.00071	mg/L	-		31-AUG-14	R2932610
Surr: 1,4-Difluorobenzene (SS)	99.7	-		N/A	%	-		31-AUG-14	R2932610
Surr: 4-Bromofluorobenzene (SS)	91.7	-		N/A	%	-		31-AUG-14	R2932610
Surr: 3,4-Dichlorotoluene (SS)	98.4	-		N/A	%	-		31-AUG-14	R2932610
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
Surr: 2-Bromobenzotrifluoride	105.6	-		N/A	%	-	02-SEP-14	02-SEP-14	R2936930
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050 0	mg/L	-		07-SEP-14	R2940513
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0093	+/-0.0025		0.0030	mg/L	0		02-SEP-14	R2935468
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2935468
Arsenic (As)-Total	0.00037	+/-0.00006		0.00010	mg/L	0		02-SEP-14	R2935468
Barium (Ba)-Total	0.0678	+/-0.0076		0.000050	mg/L	0		02-SEP-14	R2935468
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2935468
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2935468
Boron (B)-Total	0.221	+/-0.035		0.010	mg/L	0		02-SEP-14	R2935468
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2935468
Calcium (Ca)-Total	95.2	+/-11		0.10	mg/L	0		02-SEP-14	R2935468
Chromium (Cr)-Total	0.00293	+/-0.00043		0.00010	mg/L	0		02-SEP-14	R2935468
Cobalt (Co)-Total	0.00017	+/-0.00002		0.00010	mg/L	0		02-SEP-14	R2935468
Copper (Cu)-Total	0.00064	+/-0.00013		0.00010	mg/L	0		02-SEP-14	R2935468
Iron (Fe)-Total	4.00	+/-0.63		0.030	mg/L	0		02-SEP-14	R2935468
Lead (Pb)-Total	0.000091	+/-0.000021		0.000050	mg/L	0		02-SEP-14	R2935468

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-4 16054140828024									
Sampled By: bp/ea on 28-AUG-14 @ 14:50									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942563
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Barium (Ba)-Dissolved	0.0647	+/-0.0056		0.00010	mg/L	0		09-SEP-14	R2942563
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		09-SEP-14	R2942563
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Cobalt (Co)-Dissolved	0.00012	+/-0.00001		0.00010	mg/L	0		09-SEP-14	R2942563
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		09-SEP-14	R2942563
Iron (Fe)-Dissolved	3.75	+/-0.34		0.010	mg/L	0		09-SEP-14	R2942563
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Lithium (Li)-Dissolved	0.0622	+/-0.0077		0.0050	mg/L	0		09-SEP-14	R2942563
Manganese (Mn)-Dissolved	0.0835	+/-0.0057		0.0020	mg/L	0		09-SEP-14	R2942563
Molybdenum (Mo)-Dissolved	0.0118	+/-0.0012		0.00010	mg/L	0		09-SEP-14	R2942563
Nickel (Ni)-Dissolved	0.00049	+/-0.00006		0.00010	mg/L	0		09-SEP-14	R2942563
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Silicon (Si)-Dissolved	10.5	+/-0.89		0.050	mg/L	0		09-SEP-14	R2942563
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		09-SEP-14	R2942563
Strontium (Sr)-Dissolved	0.931	+/-0.069		0.00010	mg/L	0		09-SEP-14	R2942563
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		09-SEP-14	R2942563
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		09-SEP-14	R2942563
Uranium (U)-Dissolved	0.000040	+/-0.000004		0.000010	mg/L	0		09-SEP-14	R2942563
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Zinc (Zn)-Dissolved	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942563
Ion Balance Calculation									
Ion Balance	93.9	-			%	-		10-SEP-14	
TDS (Calculated)	530	-			mg/L	-		10-SEP-14	
Hardness (as CaCO3)	334	-			mg/L	-		10-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		07-SEP-14	R2940513
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		30-AUG-14	R2939362
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		05-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		30-AUG-14	R2939362
Sulfate by IC									
Sulfate (SO4)	46.9	+/-2.7		0.50	mg/L	0		30-AUG-14	R2939362
pH, Conductivity and Total Alkalinity									
pH	7.86	+/-0.01		0.10	pH	0		30-AUG-14	R2933870
Conductivity (EC)	935	+/-47		0.20	uS/cm	0		30-AUG-14	R2933870
Bicarbonate (HCO3)	589	+/-23		5.0	mg/L	0		30-AUG-14	R2933870
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Alkalinity, Total (as CaCO3)	483	+/-30		2.0	mg/L	0		30-AUG-14	R2933870
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	22.4	-		0.11	mg/L	-		10-SEP-14	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-5 16054140828025									
Sampled By: bp/ea on 28-AUG-14 @ 15:00									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Toluene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
EthylBenzene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
o-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		31-AUG-14	R2932610
Styrene	<0.0010	-		0.0010	mg/L	-		31-AUG-14	R2932610
F1(C6-C10)	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
F1-BTEX	<0.10	-		0.10	mg/L	-		31-AUG-14	R2932610
Xylenes	<0.00071	-		0.00071	mg/L	-		31-AUG-14	R2932610
Surr: 1,4-Difluorobenzene (SS)	100.3	-		N/A	%	-		31-AUG-14	R2932610
Surr: 4-Bromofluorobenzene (SS)	91.3	-		N/A	%	-		31-AUG-14	R2932610
Surr: 3,4-Dichlorotoluene (SS)	98.7	-		N/A	%	-		31-AUG-14	R2932610
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	02-SEP-14	02-SEP-14	R2936930
Surr: 2-Bromobenzotrifluoride	104.7	-		N/A	%	-	02-SEP-14	02-SEP-14	R2936930
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		07-SEP-14	R2940513
				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	<0.0030	-		0.0030	mg/L	-		02-SEP-14	R2934348
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Arsenic (As)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Barium (Ba)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2934348
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2934348
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2934348
Boron (B)-Total	<0.010	-		0.010	mg/L	-		02-SEP-14	R2934348
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2934348
Calcium (Ca)-Total	<0.10	-		0.10	mg/L	-		02-SEP-14	R2934348
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Cobalt (Co)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Copper (Cu)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Iron (Fe)-Total	<0.030	-		0.030	mg/L	-		02-SEP-14	R2934348
Lead (Pb)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2934348
Lithium (Li)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2934348
Magnesium (Mg)-Total	<0.10	-		0.10	mg/L	-		02-SEP-14	R2934348
Manganese (Mn)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2934348
Molybdenum (Mo)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2934348
Nickel (Ni)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Potassium (K)-Total	<0.50	-		0.50	mg/L	-		02-SEP-14	R2934348
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Silicon (Si)-Total	<0.050	-		0.050	mg/L	-		02-SEP-14	R2934348
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2934348
Sodium (Na)-Total	<1.0	-		1.0	mg/L	-		02-SEP-14	R2934348
Strontium (Sr)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		02-SEP-14	R2934348
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		02-SEP-14	R2934348
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		02-SEP-14	R2934348
Uranium (U)-Total	<0.000010	-		0.000010	mg/L	-		02-SEP-14	R2934348

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-5 16054140828025									
Sampled By: bp/ea on 28-AUG-14 @ 15:00									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		02-SEP-14	R2934348
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		02-SEP-14	R2934348
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		09-SEP-14	R2942212
Dissolved Organic Carbon	1.3	+/-0.5	RRV	1.0	mg/L	0		10-SEP-14	R2943661
Naphthenic Acids	<1.0	-		1.0	mg/L	-	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		10-SEP-14	R2943611
Total Dissolved Solids	<10	-		10	mg/L	-		04-SEP-14	R2939017
Silicon (as SiO2)-Total	<0.11	-		0.11	mg/L	-		02-SEP-14	
Turbidity	0.12	+/-0.06		0.10	NTU	0		02-SEP-14	R2936048
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Anthracene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Fluoranthene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Fluorene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Naphthalene	<0.000050	-		0.000050	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Phenanthrene	<0.000050	-		0.000050	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Pyrene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	09-SEP-14	09-SEP-14	R2943446
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	09-SEP-14	09-SEP-14	R2943446
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	09-SEP-14	09-SEP-14	R2943446
Surr: d10-Acenaphthene	83.4	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Surr: d10-Phenanthrene	85.2	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Surr: d12-Chrysene	88.9	-		N/A	%	-	09-SEP-14	09-SEP-14	R2943446
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		30-AUG-14	R2939362
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942563
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Barium (Ba)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		09-SEP-14	R2942563
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		09-SEP-14	R2942563
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		09-SEP-14	R2942563
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Lithium (Li)-Dissolved	<0.0050	-		0.0050	mg/L	-		09-SEP-14	R2942563
Manganese (Mn)-Dissolved	<0.0020	-		0.0020	mg/L	-		09-SEP-14	R2942563
Molybdenum (Mo)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510165-5 16054140828025									
Sampled By: bp/ea on 28-AUG-14 @ 15:00									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		09-SEP-14	R2942563
Silicon (Si)-Dissolved	<0.050	-		0.050	mg/L	-		09-SEP-14	R2942563
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		09-SEP-14	R2942563
Strontium (Sr)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2942563
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		09-SEP-14	R2942563
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		09-SEP-14	R2942563
Uranium (U)-Dissolved	<0.000010	-		0.000010	mg/L	-		09-SEP-14	R2942563
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		09-SEP-14	R2942563
Zinc (Zn)-Dissolved	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942563
Ion Balance Calculation									
Ion Balance	Low TDS	-			%	-		10-SEP-14	
TDS (Calculated)	<1.0	-			mg/L	-		10-SEP-14	
Hardness (as CaCO3)	<1.0	-			mg/L	-		10-SEP-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		07-SEP-14	R2940513
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		30-AUG-14	R2939362
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		05-SEP-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		30-AUG-14	R2939362
Sulfate by IC									
Sulfate (SO4)	<0.50	-		0.50	mg/L	-		30-AUG-14	R2939362
pH, Conductivity and Total Alkalinity									
pH	5.92	+/-0.01		0.10	pH	0		03-SEP-14	R2937060
Conductivity (EC)	0.64	+/-0.25		0.20	uS/cm	0		03-SEP-14	R2937060
Conductivity (EC)	0.70	+/-0.26		0.20	uS/cm	0		30-AUG-14	R2933870
Bicarbonate (HCO3)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Bicarbonate (HCO3)	<5.0	-		5.0	mg/L	-		03-SEP-14	R2937060
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		03-SEP-14	R2937060
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		30-AUG-14	R2933870
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		03-SEP-14	R2937060
Alkalinity, Total (as CaCO3)	<2.0	-		2.0	mg/L	-		03-SEP-14	R2937060
Alkalinity, Total (as CaCO3)	<2.0	-		2.0	mg/L	-		30-AUG-14	R2933870
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	<0.11	-		0.11	mg/L	-		10-SEP-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Report Comments: ADDITIONAL 05-JAN-15 09:33
ADDITIONAL 16-DEC-14 10:50

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chloride (Cl)	MS-B	
Matrix Spike	Dissolved Organic Carbon	MS-B	

Qualifiers for Individual Samples Listed:

Sample Number	Client ID	Qualifier	Description
L1510165-1	16054140828021	WSMD	HG-D - Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

Sample Parameter Qualifier Key:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)		EPA 5021/8015&8260 GC-MS & FID
C-DIS-ORG-ED	Water	Dissolved Organic Carbon		APHA 5310 B-Instrumental
CL-IC-ED	Water	Chloride by IC		APHA 4110 B-ION CHROMATOGRAPHY
F2,F3,F4-ED	Water	F2, F3, F4		EPA 3510/CCME PHC CWS-GC-FID
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved		EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)		EPA 245.7 / EPA 245.1
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR, Syncrude, 1994
Dissolved naphthenic acids are solvent extracted from acidified aqueous samples using Dichloromethane prior to quantitation by Fourier Transform Infra-Red spectroscopy. Note that FTIR is not uniquely selective to naphthenic acids. If present, other carboxylic acids (e.g. humic acids, fulvic acids) may also be detected by this method.				
NH3-CFA-ED	Water	Ammonia in Water by Colour		APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.				
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite		CALCULATION
NO2-IC-ED	Water	Nitrite as N by IC		APHA 4110 B-ION CHROMATOGRAPHY
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".				
NO3-IC-ED	Water	Nitrate as N by IC		APHA 4110 B-ION CHROMATOGRAPHY
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".				
PAH-ABT1-CL	Water	PAH & Carcinogenic PAH List		EPA 3510/8270-GC/MS
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity		APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)				
PHENOLS-4AAP-ED	Water	Phenols (4AAP)		AB ENV.06537-COLORIMETRIC
This analysis is carried out using procedures adapted from ENVIRODAT VMV 06537 689, Method Code 154, in "Methods Manual for Chemical Analysis of Water and Wastes" published by the Alberta Environmental Centre. This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide and 4-aminoantipyrine to form a red complex which is measured at 505 nm.				
SIO2-D-CALC-ED	Water	Dissolved Silicon (reported as Silica)		CALCULATION

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
SIO2-T-CALC-ED	Water	Total Silicon (reported as Silica)		CALCULATION
SO4-IC-ED	Water	Sulfate by IC		APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TDS-ED	Water	Total Dissolved Solids		APHA 2540 C
TURBIDITY-ED	Water	Turbidity		APHA 2130 B-Nephelometer

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
FM	ALS ENVIRONMENTAL - FORT MCMURRAY, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

M061303

GLOSSARY OF REPORT TERMS

Surr - Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.

Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent. Zero values indicate no detectable method bias.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 1 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R2932610							
WG1942023-4	DUP	L1509883-5						
Benzene		0.224	0.194		mg/L	14	30	31-AUG-14
Toluene		0.0363	0.0314		mg/L	14	30	31-AUG-14
EthylBenzene		0.102	0.0847		mg/L	19	30	31-AUG-14
o-Xylene		0.149	0.125		mg/L	18	24	31-AUG-14
m+p-Xylene		0.0978	0.0807		mg/L	19	24	31-AUG-14
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	50	31-AUG-14
F1(C6-C10)		1.59	1.59		mg/L	0.1	30	31-AUG-14
WG1942023-8	DUP	L1510165-5						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-14
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-14
EthylBenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-14
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	31-AUG-14
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	31-AUG-14
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	50	31-AUG-14
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	31-AUG-14
WG1942023-2	LCS							
Benzene			124.5		%		70-130	31-AUG-14
Toluene			99.2		%		70-130	31-AUG-14
EthylBenzene			107.7		%		70-130	31-AUG-14
o-Xylene			105.9		%		70-130	31-AUG-14
m+p-Xylene			107.1		%		70-130	31-AUG-14
Styrene			102.4		%		70-130	31-AUG-14
WG1942023-3	LCS							
F1(C6-C10)			99.0		%		70-130	31-AUG-14
WG1942023-6	LCS							
Benzene			122.9		%		70-130	31-AUG-14
Toluene			127.5		%		70-130	31-AUG-14
EthylBenzene			127.3		%		70-130	31-AUG-14
o-Xylene			125.7		%		70-130	31-AUG-14
m+p-Xylene			125.0		%		70-130	31-AUG-14
Styrene			117.6		%		70-130	31-AUG-14
WG1942023-7	LCS							
F1(C6-C10)			102.0		%		70-130	31-AUG-14
WG1942023-1	MB							



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 2 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch R2932610								
WG1942023-1 MB								
Benzene			<0.00050		mg/L		0.0005	31-AUG-14
Toluene			<0.00050		mg/L		0.0005	31-AUG-14
EthylBenzene			<0.00050		mg/L		0.0005	31-AUG-14
o-Xylene			<0.00050		mg/L		0.0005	31-AUG-14
m+p-Xylene			<0.00050		mg/L		0.0005	31-AUG-14
Styrene			<0.0010		mg/L		0.001	31-AUG-14
F1(C6-C10)			<0.10		mg/L		0.1	31-AUG-14
Surrogate: 1,4-Difluorobenzene (SS)			100.1		%		70-130	31-AUG-14
Surrogate: 4-Bromofluorobenzene (SS)			90.5		%		70-130	31-AUG-14
Surrogate: 3,4-Dichlorotoluene (SS)			102.2		%		70-130	31-AUG-14
WG1942023-5 MB								
Benzene			<0.00050		mg/L		0.0005	31-AUG-14
Toluene			<0.00050		mg/L		0.0005	31-AUG-14
EthylBenzene			<0.00050		mg/L		0.0005	31-AUG-14
o-Xylene			<0.00050		mg/L		0.0005	31-AUG-14
m+p-Xylene			<0.00050		mg/L		0.0005	31-AUG-14
Styrene			<0.0010		mg/L		0.001	31-AUG-14
F1(C6-C10)			<0.10		mg/L		0.1	31-AUG-14
Surrogate: 1,4-Difluorobenzene (SS)			100.8		%		70-130	31-AUG-14
Surrogate: 4-Bromofluorobenzene (SS)			92.1		%		70-130	31-AUG-14
Surrogate: 3,4-Dichlorotoluene (SS)			100.5		%		70-130	31-AUG-14
C-DIS-ORG-ED		Water						
Batch R2941343								
WG1945729-3 CVS								
Dissolved Organic Carbon			126.5		%		80-160	08-SEP-14
WG1945729-4 DUP		L1510781-8						
Dissolved Organic Carbon		21.5	21.9		mg/L	1.8	20	08-SEP-14
WG1945729-2 LCS								
Dissolved Organic Carbon			99.0		%		80-120	08-SEP-14
WG1945729-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	08-SEP-14
WG1945729-5 MS		L1510781-8						
Dissolved Organic Carbon			N/A	MS-B	%		-	08-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 3 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-ED		Water						
Batch	R2943661							
WG1947190-3	CVS							
Dissolved Organic Carbon			136.3		%		80-160	10-SEP-14
WG1947190-10	DUP	L1509883-1						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	10-SEP-14
WG1947190-2	LCS							
Dissolved Organic Carbon			109.9		%		80-120	10-SEP-14
WG1947190-1	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	10-SEP-14
WG1947190-11	MS	L1509883-1						
Dissolved Organic Carbon			100.9		%		70-130	10-SEP-14
CL-IC-ED		Water						
Batch	R2939362							
WG1942157-3	DUP	L1510213-4						
Chloride (Cl)		1.65	1.64		mg/L	0.7	20	30-AUG-14
WG1942157-5	DUP	L1510574-3						
Chloride (Cl)		107	107		mg/L	0.0	20	30-AUG-14
WG1942157-11	LCS							
Chloride (Cl)			102.3		%		90-110	30-AUG-14
WG1942157-2	LCS							
Chloride (Cl)			102.4		%		90-110	30-AUG-14
WG1942157-7	LCS							
Chloride (Cl)			102.0		%		90-110	30-AUG-14
WG1942157-9	LCS							
Chloride (Cl)			102.1		%		90-110	30-AUG-14
WG1942157-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	30-AUG-14
WG1942157-10	MB							
Chloride (Cl)			<0.50		mg/L		0.5	30-AUG-14
WG1942157-12	MB							
Chloride (Cl)			<0.50		mg/L		0.5	30-AUG-14
WG1942157-8	MB							
Chloride (Cl)			<0.50		mg/L		0.5	30-AUG-14
WG1942157-4	MS	L1510213-4						
Chloride (Cl)			101.3		%		75-125	30-AUG-14
WG1942157-6	MS	L1510574-3						
Chloride (Cl)			N/A	MS-B	%		-	30-AUG-14
F2,F3,F4-ED		Water						



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 4 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2,F3,F4-ED		Water						
Batch	R2936930							
WG1942267-2	LCS							
F2 (>C10-C16)			102.1		%		65-135	02-SEP-14
F3 (C16-C34)			100.4		%		65-135	02-SEP-14
F4 (C34-C50)			97.3		%		65-135	02-SEP-14
WG1942267-5	LCS							
F2 (>C10-C16)			105.0		%		65-135	02-SEP-14
F3 (C16-C34)			102.0		%		65-135	02-SEP-14
F4 (C34-C50)			99.8		%		65-135	02-SEP-14
WG1942267-1	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	02-SEP-14
F3 (C16-C34)			<0.25		mg/L		0.25	02-SEP-14
F4 (C34-C50)			<0.25		mg/L		0.25	02-SEP-14
Surrogate: 2-Bromobenzotrifluoride			107.8		%		50-150	02-SEP-14
WG1942267-4	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	02-SEP-14
F3 (C16-C34)			<0.25		mg/L		0.25	02-SEP-14
F4 (C34-C50)			<0.25		mg/L		0.25	02-SEP-14
Surrogate: 2-Bromobenzotrifluoride			103.4		%		50-150	02-SEP-14
WG1942267-3	MS	L1509108-11						
F2 (>C10-C16)			104.5		%		50-150	02-SEP-14
F3 (C16-C34)			101.7		%		50-150	02-SEP-14
F4 (C34-C50)			98.6		%		50-150	02-SEP-14
WG1942267-6	MS	L1510573-1						
F2 (>C10-C16)			103.5		%		50-150	02-SEP-14
F3 (C16-C34)			103.2		%		50-150	02-SEP-14
F4 (C34-C50)			103.1		%		50-150	02-SEP-14
HG-D-L-CVAA-ED		Water						
Batch	R2940513							
WG1946227-3	DUP	L1507769-1						
Mercury (Hg)-Dissolved		<0.020	<0.0000050	RPD-NA	mg/L	N/A	20	07-SEP-14
WG1946227-7	DUP	L1513261-10						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	07-SEP-14
WG1946227-2	LCS							
Mercury (Hg)-Dissolved			96.7		%		80-120	07-SEP-14
WG1946227-6	LCS							
Mercury (Hg)-Dissolved			80.8		%		80-120	07-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 5 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-L-CVAA-ED								
	Water							
Batch	R2940513							
WG1946227-1 MB								
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	07-SEP-14
WG1946227-5 MB								
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	07-SEP-14
WG1946227-4 MS		L1507769-1						
Mercury (Hg)-Dissolved			98.7		%		70-130	07-SEP-14
WG1946227-8 MS		L1513261-10						
Mercury (Hg)-Dissolved			92.8		%		70-130	07-SEP-14
HG-T-L-CVAA-ED								
	Water							
Batch	R2940513							
WG1946228-7 DUP		L1510574-1						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	07-SEP-14
WG1946228-6 LCS								
Mercury (Hg)-Total			96.5		%		80-120	07-SEP-14
WG1946228-1 MB								
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	07-SEP-14
WG1946228-5 MB								
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	07-SEP-14
WG1946228-8 MS		L1510574-1						
Mercury (Hg)-Total			83.6		%		70-130	07-SEP-14
MET-D-CCMS-ED								
	Water							
Batch	R2942563							
WG1947561-4 CRM		ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			104.9		%		80-120	09-SEP-14
Antimony (Sb)-Dissolved			101.1		%		80-120	09-SEP-14
Arsenic (As)-Dissolved			101.1		%		80-120	09-SEP-14
Barium (Ba)-Dissolved			106.7		%		80-120	09-SEP-14
Beryllium (Be)-Dissolved			101.3		%		80-120	09-SEP-14
Bismuth (Bi)-Dissolved			112.2		%		80-120	09-SEP-14
Cadmium (Cd)-Dissolved			104.0		%		80-120	09-SEP-14
Chromium (Cr)-Dissolved			97.6		%		80-120	09-SEP-14
Cobalt (Co)-Dissolved			101.7		%		80-120	09-SEP-14
Copper (Cu)-Dissolved			98.4		%		80-120	09-SEP-14
Lead (Pb)-Dissolved			107.4		%		80-120	09-SEP-14
Lithium (Li)-Dissolved			98.2		%		80-120	09-SEP-14
Manganese (Mn)-Dissolved			98.8		%		80-120	09-SEP-14



Environmental

Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 6 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2942563							
WG1947561-4 CRM	ED-HIGH-WATRM							
Molybdenum (Mo)-Dissolved			96.9		%		80-120	09-SEP-14
Nickel (Ni)-Dissolved			100.1		%		80-120	09-SEP-14
Selenium (Se)-Dissolved			101.5		%		80-120	09-SEP-14
Silicon (Si)-Dissolved			93.9		%		80-120	09-SEP-14
Silver (Ag)-Dissolved			108.7		%		80-120	09-SEP-14
Strontium (Sr)-Dissolved			99.9		%		80-120	09-SEP-14
Thallium (Tl)-Dissolved			106.5		%		80-120	09-SEP-14
Titanium (Ti)-Dissolved			104.1		%		80-120	09-SEP-14
Tin (Sn)-Dissolved			101.1		%		80-120	09-SEP-14
Vanadium (V)-Dissolved			104.5		%		80-120	09-SEP-14
Zinc (Zn)-Dissolved			100.9		%		80-120	09-SEP-14
WG1947561-6 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			99.9		%		80-120	09-SEP-14
Antimony (Sb)-Dissolved			98.7		%		80-120	09-SEP-14
Arsenic (As)-Dissolved			98.5		%		80-120	09-SEP-14
Barium (Ba)-Dissolved			104.9		%		80-120	09-SEP-14
Beryllium (Be)-Dissolved			97.6		%		80-120	09-SEP-14
Bismuth (Bi)-Dissolved			103.8		%		80-120	09-SEP-14
Cadmium (Cd)-Dissolved			101.4		%		80-120	09-SEP-14
Chromium (Cr)-Dissolved			96.5		%		80-120	09-SEP-14
Cobalt (Co)-Dissolved			101.0		%		80-120	09-SEP-14
Copper (Cu)-Dissolved			98.4		%		80-120	09-SEP-14
Lead (Pb)-Dissolved			102.6		%		80-120	09-SEP-14
Lithium (Li)-Dissolved			93.2		%		80-120	09-SEP-14
Manganese (Mn)-Dissolved			99.8		%		80-120	09-SEP-14
Molybdenum (Mo)-Dissolved			94.6		%		80-120	09-SEP-14
Nickel (Ni)-Dissolved			99.8		%		80-120	09-SEP-14
Selenium (Se)-Dissolved			100.3		%		80-120	09-SEP-14
Silicon (Si)-Dissolved			92.9		%		80-120	09-SEP-14
Silver (Ag)-Dissolved			108.8		%		80-120	09-SEP-14
Strontium (Sr)-Dissolved			96.2		%		80-120	09-SEP-14
Thallium (Tl)-Dissolved			103.3		%		80-120	09-SEP-14
Titanium (Ti)-Dissolved			97.2		%		80-120	09-SEP-14
Tin (Sn)-Dissolved			99.2		%		80-120	09-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 7 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2942563							
WG1947561-6 CRM	ED-HIGH-WATRM							
Vanadium (V)-Dissolved			101.2		%		80-120	09-SEP-14
Zinc (Zn)-Dissolved			110.0		%		80-120	09-SEP-14
WG1947561-1 DUP	L1510165-4							
Aluminum (Al)-Dissolved		<0.0010	<0.0050	RPD-NA	mg/L	N/A	20	09-SEP-14
Antimony (Sb)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	09-SEP-14
Arsenic (As)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	09-SEP-14
Barium (Ba)-Dissolved		0.0647	0.0651		mg/L	0.6	20	09-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	09-SEP-14
Cadmium (Cd)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Chromium (Cr)-Dissolved		<0.00040	<0.0050	RPD-NA	mg/L	N/A	20	09-SEP-14
Cobalt (Co)-Dissolved		0.00012	0.00012		mg/L	1.8	20	09-SEP-14
Copper (Cu)-Dissolved		<0.00060	<0.0010	RPD-NA	mg/L	N/A	20	09-SEP-14
Iron (Fe)-Dissolved		3.75	3.70		mg/L	1.2	20	09-SEP-14
Lead (Pb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Lithium (Li)-Dissolved		0.0622	0.0636		mg/L	2.3	20	09-SEP-14
Manganese (Mn)-Dissolved		0.0835	0.0835		mg/L	0.1	20	09-SEP-14
Molybdenum (Mo)-Dissolved		0.0118	0.0123		mg/L	4.2	20	09-SEP-14
Nickel (Ni)-Dissolved		0.00049	<0.0020	RPD-NA	mg/L	N/A	20	09-SEP-14
Selenium (Se)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	09-SEP-14
Silicon (Si)-Dissolved		10.5	10.7		mg/L	1.9	20	09-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Strontium (Sr)-Dissolved		0.931	0.962		mg/L	3.3	20	09-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000010	RPD-NA	mg/L	N/A	20	09-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	09-SEP-14
Tin (Sn)-Dissolved		<0.00020	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Uranium (U)-Dissolved		0.000040	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Vanadium (V)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Zinc (Zn)-Dissolved		<0.0010	<0.0030	RPD-NA	mg/L	N/A	20	09-SEP-14
WG1947561-3 DUP	L1510574-1							
Aluminum (Al)-Dissolved		0.0318	0.0313		mg/L	1.6	20	09-SEP-14
Antimony (Sb)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	09-SEP-14
Arsenic (As)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	09-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 8 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2942563							
WG1947561-3	DUP	L1510574-1						
Barium (Ba)-Dissolved		0.251	0.244		mg/L	2.7	20	09-SEP-14
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	09-SEP-14
Cadmium (Cd)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	09-SEP-14
Cobalt (Co)-Dissolved		0.00300	0.00308		mg/L	2.6	20	09-SEP-14
Copper (Cu)-Dissolved		0.0038	0.0039		mg/L	2.0	20	09-SEP-14
Iron (Fe)-Dissolved		0.067	0.067		mg/L	0.5	20	09-SEP-14
Lead (Pb)-Dissolved		0.00010	0.00010		mg/L	1.1	20	09-SEP-14
Lithium (Li)-Dissolved		0.0789	0.0784		mg/L	0.7	20	09-SEP-14
Manganese (Mn)-Dissolved		0.210	0.213		mg/L	1.3	20	09-SEP-14
Molybdenum (Mo)-Dissolved		0.0176	0.0175		mg/L	0.6	20	09-SEP-14
Nickel (Ni)-Dissolved		0.0095	0.0096		mg/L	1.8	20	09-SEP-14
Selenium (Se)-Dissolved		0.00281	0.00279		mg/L	0.6	20	09-SEP-14
Silicon (Si)-Dissolved		10.3	10.1		mg/L	1.4	20	09-SEP-14
Silver (Ag)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Strontium (Sr)-Dissolved		0.564	0.570		mg/L	1.0	20	09-SEP-14
Thallium (Tl)-Dissolved		0.000015	0.000021	J	mg/L	0.000006	0.00002	09-SEP-14
Titanium (Ti)-Dissolved		0.00174	0.00168		mg/L	3.3	20	09-SEP-14
Tin (Sn)-Dissolved		0.00040	0.00033	J	mg/L	0.00008	0.0002	09-SEP-14
Uranium (U)-Dissolved		0.0112	0.0112		mg/L	0.5	20	09-SEP-14
Vanadium (V)-Dissolved		0.00038	0.00033		mg/L	15	20	09-SEP-14
Zinc (Zn)-Dissolved		0.0053	0.0051		mg/L	4.0	20	09-SEP-14
WG1947561-5	DUP	L1510942-2						
Aluminum (Al)-Dissolved		0.0065	0.0074		mg/L	12	20	09-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Barium (Ba)-Dissolved		0.000542	0.000501		mg/L	7.8	20	09-SEP-14
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	09-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	09-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 9 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2942563							
WG1947561-5	DUP	L1510942-2						
Copper (Cu)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	09-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	09-SEP-14
Lithium (Li)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	09-SEP-14
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	09-SEP-14
Nickel (Ni)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Silicon (Si)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	09-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	09-SEP-14
Strontium (Sr)-Dissolved		0.00079	0.00077		mg/L	2.3	20	09-SEP-14
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	09-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	09-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	09-SEP-14
Vanadium (V)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	09-SEP-14
WG1947561-7	DUP	L1513261-5						
Aluminum (Al)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	09-SEP-14
Antimony (Sb)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	09-SEP-14
Arsenic (As)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	09-SEP-14
Barium (Ba)-Dissolved		0.163	0.158		mg/L	3.1	20	09-SEP-14
Beryllium (Be)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	09-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	09-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	09-SEP-14
Chromium (Cr)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	09-SEP-14
Cobalt (Co)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	09-SEP-14
Copper (Cu)-Dissolved		0.0021	0.0018		mg/L	11	20	09-SEP-14
Iron (Fe)-Dissolved		0.025	0.021		mg/L	15	20	09-SEP-14
Lead (Pb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Lithium (Li)-Dissolved		0.015	0.015		mg/L	2.6	20	09-SEP-14
Manganese (Mn)-Dissolved		0.0087	0.0084		mg/L	3.1	20	09-SEP-14
Molybdenum (Mo)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	09-SEP-14
Nickel (Ni)-Dissolved		0.0021	0.0020		mg/L	1.1	20	09-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 10 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R2942563							
WG1947561-7 DUP		L1513261-5						
Selenium (Se)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	09-SEP-14
Silicon (Si)-Dissolved		2.41	2.31		mg/L	4.3	20	09-SEP-14
Silver (Ag)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	09-SEP-14
Strontium (Sr)-Dissolved		0.271	0.267		mg/L	1.6	20	09-SEP-14
Thallium (Tl)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	09-SEP-14
Titanium (Ti)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	09-SEP-14
Tin (Sn)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	09-SEP-14
Uranium (U)-Dissolved		0.00194	0.00196		mg/L	1.0	20	09-SEP-14
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	09-SEP-14
Zinc (Zn)-Dissolved		0.0062	0.0044	J	mg/L	0.0018	0.008	09-SEP-14
WG1947561-10 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	09-SEP-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	09-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	09-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	09-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	09-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	09-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	09-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	09-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 11 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2942563							
WG1947561-10 MB								
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.000010		mg/L		0.00001	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.0010		mg/L		0.001	09-SEP-14
WG1947561-11 MB								
			<0.0010		mg/L		0.001	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.000050		mg/L		0.00005	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.000050		mg/L		0.00005	09-SEP-14
			<0.000010		mg/L		0.00001	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.010		mg/L		0.01	09-SEP-14
			<0.000050		mg/L		0.00005	09-SEP-14
			<0.0030		mg/L		0.003	09-SEP-14
			<0.000050		mg/L		0.00005	09-SEP-14
			<0.000050		mg/L		0.00005	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.050		mg/L		0.05	09-SEP-14
			<0.000010		mg/L		0.00001	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.000010		mg/L		0.00001	09-SEP-14
			<0.00030		mg/L		0.0003	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.000010		mg/L		0.00001	09-SEP-14
			<0.0010		mg/L		0.001	09-SEP-14
WG1947561-9 MB								
			<0.0010		mg/L		0.001	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.00010		mg/L		0.0001	09-SEP-14
			<0.000050		mg/L		0.00005	09-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 12 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R2942563							
WG1947561-9	MB							
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	09-SEP-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	09-SEP-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	09-SEP-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	09-SEP-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	09-SEP-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	09-SEP-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	09-SEP-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	09-SEP-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	09-SEP-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	09-SEP-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	09-SEP-14
MET-T-CCMS-ED		Water						
Batch	R2934348							
WG1942365-2	DUP	L1509165-2						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	02-SEP-14
Antimony (Sb)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Arsenic (As)-Total		0.0127	0.0127		mg/L	0.1	20	02-SEP-14
Barium (Ba)-Total		0.0861	0.0871		mg/L	1.2	20	02-SEP-14
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Boron (B)-Total		0.284	0.279		mg/L	2.0	20	02-SEP-14
Cadmium (Cd)-Total		<0.000010	<0.00020	RPD-NA	mg/L	N/A	20	02-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 13 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2934348							
WG1942365-2	DUP	L1509165-2						
Calcium (Ca)-Total		96.6	98.7		mg/L	2.1	20	02-SEP-14
Chromium (Cr)-Total		<0.00010	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Cobalt (Co)-Total		0.00011	0.00011		mg/L	0.2	20	02-SEP-14
Copper (Cu)-Total		<0.00010	<0.0010	RPD-NA	mg/L	N/A	20	02-SEP-14
Iron (Fe)-Total		5.17	5.39		mg/L	4.2	20	02-SEP-14
Lead (Pb)-Total		<0.000050	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Lithium (Li)-Total		0.0721	0.0701		mg/L	2.8	20	02-SEP-14
Magnesium (Mg)-Total		31.0	31.3		mg/L	1.0	20	02-SEP-14
Manganese (Mn)-Total		0.0469	0.0470		mg/L	0.1	20	02-SEP-14
Molybdenum (Mo)-Total		0.00846	0.00838		mg/L	1.0	20	02-SEP-14
Nickel (Ni)-Total		<0.00010	<0.0020	RPD-NA	mg/L	N/A	20	02-SEP-14
Potassium (K)-Total		5.71	5.76		mg/L	0.8	20	02-SEP-14
Selenium (Se)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Silicon (Si)-Total		13.1	13.0		mg/L	0.1	20	02-SEP-14
Silver (Ag)-Total		<0.000010	<0.00040	RPD-NA	mg/L	N/A	20	02-SEP-14
Sodium (Na)-Total		167	166		mg/L	0.5	20	02-SEP-14
Strontium (Sr)-Total		0.674	0.674		mg/L	0.1	20	02-SEP-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	02-SEP-14
Uranium (U)-Total		0.000034	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Vanadium (V)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Zinc (Zn)-Total		<0.0030	<0.0040	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942365-4	DUP	L1510112-5						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	02-SEP-14
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Barium (Ba)-Total		0.000925	0.000904		mg/L	2.4	20	02-SEP-14
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-SEP-14
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Calcium (Ca)-Total		0.023	0.022		mg/L	2.5	20	02-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 14 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2934348							
WG1942365-4	DUP	L1510112-5						
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Copper (Cu)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Iron (Fe)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	02-SEP-14
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Lithium (Li)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Magnesium (Mg)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Manganese (Mn)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Nickel (Ni)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Potassium (K)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-14
Selenium (Se)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Silicon (Si)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Sodium (Na)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-14
Strontium (Sr)-Total		0.00133	0.00130		mg/L	2.3	20	02-SEP-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	02-SEP-14
Uranium (U)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Vanadium (V)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942365-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	01-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	01-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 15 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2934348							
WG1942365-1 MB								
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	01-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	01-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	01-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	01-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	01-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-SEP-14
WG1942365-3 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	01-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	01-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	01-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 16 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch R2934348								
WG1942365-3 MB								
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	01-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-SEP-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	01-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	01-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	01-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	01-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-SEP-14
Batch R2935468								
WG1942733-3 DUP		L1509355-11						
Aluminum (Al)-Total		0.0328	0.0360		mg/L	9.4	20	02-SEP-14
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Arsenic (As)-Total		0.00037	0.00036		mg/L	1.7	20	02-SEP-14
Barium (Ba)-Total		0.0714	0.0715		mg/L	0.1	20	02-SEP-14
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-SEP-14
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Calcium (Ca)-Total		59.2	56.5		mg/L	4.7	20	02-SEP-14
Chromium (Cr)-Total		0.00014	0.00015		mg/L	4.7	20	02-SEP-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Copper (Cu)-Total		0.00030	0.00033		mg/L	9.2	20	02-SEP-14
Iron (Fe)-Total		0.164	0.166		mg/L	1.3	20	02-SEP-14



Environmental

Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 17 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED								
	Water							
Batch	R2935468							
WG1942733-3	DUP	L1509355-11						
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-SEP-14
Lithium (Li)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-14
Magnesium (Mg)-Total		10.3	10.3		mg/L	0.4	20	02-SEP-14
Manganese (Mn)-Total		0.0251	0.0254		mg/L	1.3	20	02-SEP-14
Molybdenum (Mo)-Total		0.000478	0.000470		mg/L	1.7	20	02-SEP-14
Nickel (Ni)-Total		0.00041	0.00048		mg/L	15	20	02-SEP-14
Potassium (K)-Total		0.579	0.567		mg/L	2.1	20	02-SEP-14
Selenium (Se)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Silicon (Si)-Total		3.25	3.31		mg/L	1.8	20	02-SEP-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Sodium (Na)-Total		9.96	10.2		mg/L	2.0	20	02-SEP-14
Strontium (Sr)-Total		0.175	0.171		mg/L	2.2	20	02-SEP-14
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-14
Titanium (Ti)-Total		0.00076	0.00065		mg/L	16	20	02-SEP-14
Uranium (U)-Total		0.000461	0.000455		mg/L	1.4	20	02-SEP-14
Vanadium (V)-Total		0.00034	0.00033		mg/L	1.9	20	02-SEP-14
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1942733-2	LCS							
Aluminum (Al)-Total			99.5		%		80-120	02-SEP-14
Antimony (Sb)-Total			103.8		%		80-120	02-SEP-14
Arsenic (As)-Total			100.4		%		80-120	02-SEP-14
Barium (Ba)-Total			105.5		%		80-120	02-SEP-14
Beryllium (Be)-Total			103.1		%		80-120	02-SEP-14
Bismuth (Bi)-Total			101.3		%		80-120	02-SEP-14
Boron (B)-Total			80.0		%		80-120	02-SEP-14
Cadmium (Cd)-Total			103.0		%		80-120	02-SEP-14
Calcium (Ca)-Total			104.4		%		80-120	02-SEP-14
Chromium (Cr)-Total			99.5		%		80-120	02-SEP-14
Cobalt (Co)-Total			100.1		%		80-120	02-SEP-14
Copper (Cu)-Total			99.4		%		80-120	02-SEP-14
Iron (Fe)-Total			96.1		%		80-120	02-SEP-14
Lead (Pb)-Total			101.4		%		80-120	02-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 18 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2935468							
WG1942733-2	LCS							
Lithium (Li)-Total			102.0		%		80-120	02-SEP-14
Magnesium (Mg)-Total			109.6		%		80-120	02-SEP-14
Manganese (Mn)-Total			101.9		%		80-120	02-SEP-14
Molybdenum (Mo)-Total			101.4		%		80-120	02-SEP-14
Nickel (Ni)-Total			100.3		%		80-120	02-SEP-14
Potassium (K)-Total			102.4		%		80-120	02-SEP-14
Selenium (Se)-Total			103.4		%		80-120	02-SEP-14
Silicon (Si)-Total			99.5		%		80-120	02-SEP-14
Silver (Ag)-Total			105.7		%		80-120	02-SEP-14
Sodium (Na)-Total			99.0		%		80-120	02-SEP-14
Strontium (Sr)-Total			113.0		%		80-120	02-SEP-14
Thallium (Tl)-Total			105.3		%		80-120	02-SEP-14
Tin (Sn)-Total			104.3		%		80-120	02-SEP-14
Titanium (Ti)-Total			100.2		%		80-120	02-SEP-14
Uranium (U)-Total			100.2		%		80-120	02-SEP-14
Vanadium (V)-Total			102.8		%		80-120	02-SEP-14
Zinc (Zn)-Total			101.2		%		80-120	02-SEP-14
WG1942365-1	MB							
Manganese (Mn)-Total			0.000067	B	mg/L		0.00005	03-SEP-14
WG1942733-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	02-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	02-SEP-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	02-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	02-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	02-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	02-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	02-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	02-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 19 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R2935468							
WG1942733-1	MB							
Lithium (Li)-Total			<0.0050		mg/L		0.005	02-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	02-SEP-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	02-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	02-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	02-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Silicon (Si)-Total			<0.050		mg/L		0.05	02-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	02-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	02-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	03-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	02-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	02-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	02-SEP-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-SEP-14
NAPHTHENIC-ACID-FM		Water						
Batch	R2944891							
WG1946484-3	DUP	L1509108-2						
Naphthenic Acids		2.0	2.1		mg/L	4.3	30	10-SEP-14
WG1946484-7	DUP	L1509864-2						
Naphthenic Acids		1.3	1.7		mg/L	29	30	10-SEP-14
WG1946484-4	LCS							
Naphthenic Acids			100.9		%		70-130	10-SEP-14
WG1946484-8	LCS							
Naphthenic Acids			100.2		%		70-130	10-SEP-14
WG1946484-1	MB							
Naphthenic Acids			<1.0		mg/L		1	10-SEP-14
WG1946484-5	MB							
Naphthenic Acids			<1.0		mg/L		1	10-SEP-14
WG1946484-2	MS	L1509108-1						
Naphthenic Acids			129.7		%		50-150	10-SEP-14
WG1946484-6	MS	L1509864-1						
Naphthenic Acids			115.8		%		50-150	10-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 20 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-CFA-ED		Water						
Batch	R2942212							
WG1947213-3	DUP	L1513261-1						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	09-SEP-14
WG1947213-5	DUP	L1506371-1						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	09-SEP-14
WG1947213-8	DUP	L1514402-1						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	09-SEP-14
WG1947213-2	LCS							
Ammonia, Total (as N)			96.8		%		85-115	09-SEP-14
WG1947213-1	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	09-SEP-14
WG1947213-4	MS	L1506876-7						
Ammonia, Total (as N)			96.3		%		75-125	09-SEP-14
WG1947213-6	MS	L1509864-3						
Ammonia, Total (as N)			97.8		%		75-125	09-SEP-14
WG1947213-7	MS	L1509108-11						
Ammonia, Total (as N)			93.9		%		75-125	09-SEP-14
NO2-IC-ED		Water						
Batch	R2939362							
WG1942157-5	DUP	L1510574-3						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	30-AUG-14
WG1942157-11	LCS							
Nitrite (as N)			99.98		%		90-110	30-AUG-14
WG1942157-2	LCS							
Nitrite (as N)			104.6		%		90-110	30-AUG-14
WG1942157-7	LCS							
Nitrite (as N)			99.98		%		90-110	30-AUG-14
WG1942157-9	LCS							
Nitrite (as N)			100.1		%		90-110	30-AUG-14
WG1942157-1	MB							
Nitrite (as N)			<0.020		mg/L		0.02	30-AUG-14
WG1942157-10	MB							
Nitrite (as N)			<0.020		mg/L		0.02	30-AUG-14
WG1942157-12	MB							
Nitrite (as N)			<0.020		mg/L		0.02	30-AUG-14
WG1942157-8	MB							
Nitrite (as N)			<0.020		mg/L		0.02	30-AUG-14
WG1942157-6	MS	L1510574-3						
Nitrite (as N)			89.8		%		75-125	30-AUG-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 21 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-ED		Water						
Batch	R2939362							
WG1942157-5	DUP	L1510574-3						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	30-AUG-14
WG1942157-11	LCS							
Nitrate (as N)			100.6		%		90-110	30-AUG-14
WG1942157-2	LCS							
Nitrate (as N)			102.0		%		90-110	30-AUG-14
WG1942157-7	LCS							
Nitrate (as N)			97.6		%		90-110	30-AUG-14
WG1942157-9	LCS							
Nitrate (as N)			97.0		%		90-110	30-AUG-14
WG1942157-1	MB							
Nitrate (as N)			<0.050		mg/L		0.05	30-AUG-14
WG1942157-10	MB							
Nitrate (as N)			<0.050		mg/L		0.05	30-AUG-14
WG1942157-12	MB							
Nitrate (as N)			<0.050		mg/L		0.05	30-AUG-14
WG1942157-8	MB							
Nitrate (as N)			<0.050		mg/L		0.05	30-AUG-14
WG1942157-6	MS	L1510574-3						
Nitrate (as N)			90.3		%		75-125	30-AUG-14
PAH-ABT1-CL		Water						
Batch	R2943446							
WG1948406-2	LCS							
Acenaphthene			86.2		%		60-130	09-SEP-14
Acenaphthylene			88.7		%		60-130	09-SEP-14
Anthracene			92.6		%		60-130	09-SEP-14
Fluoranthene			91.3		%		60-130	09-SEP-14
Fluorene			89.5		%		60-130	09-SEP-14
Naphthalene			85.3		%		50-130	09-SEP-14
Phenanthrene			87.9		%		60-130	09-SEP-14
Pyrene			92.2		%		60-130	09-SEP-14
Benzo(a)anthracene			94.3		%		60-130	09-SEP-14
Benzo(k)fluoranthene			93.3		%		60-130	09-SEP-14
Benzo(b&j)fluoranthene			94.7		%		60-130	09-SEP-14
Benzo(g,h,i)perylene			87.0		%		60-130	09-SEP-14
Benzo(a)pyrene			100.4		%		60-130	09-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 22 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R2943446							
WG1948406-2	LCS							
Chrysene			88.8		%		60-130	09-SEP-14
Dibenzo(a,h)anthracene			90.8		%		60-130	09-SEP-14
Indeno(1,2,3-cd)pyrene			96.2		%		60-130	09-SEP-14
WG1948406-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	09-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	09-SEP-14
Anthracene			<0.000010		mg/L		0.00001	09-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	09-SEP-14
Fluorene			<0.000020		mg/L		0.00002	09-SEP-14
Naphthalene			<0.000050		mg/L		0.00005	09-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	09-SEP-14
Pyrene			<0.000010		mg/L		0.00001	09-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	09-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	09-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	09-SEP-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	09-SEP-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	09-SEP-14
Chrysene			<0.000020		mg/L		0.00002	09-SEP-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	09-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	09-SEP-14
Surrogate: d10-Acenaphthene			87.5		%		60-130	09-SEP-14
Surrogate: d10-Phenanthrene			89.4		%		60-130	09-SEP-14
Surrogate: d12-Chrysene			89.9		%		60-130	09-SEP-14
PH/EC/ALK-ED		Water						
Batch	R2933870							
WG1941919-20	DUP	L1510165-1						
pH		7.46	7.45	J	pH	0.01	0.3	30-AUG-14
Conductivity (EC)		1000	1000		uS/cm	0.2	10	30-AUG-14
Bicarbonate (HCO3)		634	632		mg/L	0.3	25	30-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	30-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	30-AUG-14
Alkalinity, Total (as CaCO3)		520	518		mg/L	0.3	20	30-AUG-14
WG1941919-21	DUP	L1510128-20						
pH		8.09	8.08	J	pH	0.02	0.3	30-AUG-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 23 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2933870							
WG1941919-21 DUP	L1510128-20							
Conductivity (EC)		1330	1340		uS/cm	0.5	10	30-AUG-14
Bicarbonate (HCO3)		665	668		mg/L	0.6	25	30-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	30-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	30-AUG-14
Alkalinity, Total (as CaCO3)		545	548		mg/L	0.6	20	30-AUG-14
WG1941919-22 DUP	L1510277-5							
pH		8.22	8.21	J	pH	0.01	0.3	31-AUG-14
Conductivity (EC)		915	916		uS/cm	0.1	10	31-AUG-14
Bicarbonate (HCO3)		627	623		mg/L	0.7	25	31-AUG-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	31-AUG-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	31-AUG-14
Alkalinity, Total (as CaCO3)		514	511		mg/L	0.7	20	31-AUG-14
WG1941919-15 LCS								
Conductivity (EC)			97.0		%		90-110	30-AUG-14
WG1941919-16 LCS								
pH			7.01		pH		6.7-7.3	30-AUG-14
WG1941919-17 LCS								
Alkalinity, Total (as CaCO3)			96.5		%		85-115	30-AUG-14
WG1941919-18 LCS								
Conductivity (EC)			92.0		%		90-110	30-AUG-14
WG1941919-24 LCS								
Conductivity (EC)			95.8		%		90-110	30-AUG-14
WG1941919-25 LCS								
pH			7.01		pH		6.7-7.3	30-AUG-14
WG1941919-26 LCS								
Alkalinity, Total (as CaCO3)			99.7		%		85-115	30-AUG-14
WG1941919-27 LCS								
Conductivity (EC)			95.9		%		90-110	30-AUG-14
WG1941919-29 LCS								
Conductivity (EC)			98.9		%		90-110	30-AUG-14
WG1941919-30 LCS								
pH			7.03		pH		6.7-7.3	30-AUG-14
WG1941919-31 LCS								
Alkalinity, Total (as CaCO3)			99.6		%		85-115	30-AUG-14
WG1941919-32 LCS								
Conductivity (EC)			94.6		%		90-110	30-AUG-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 24 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2933870							
WG1941919-34	LCS							
Conductivity (EC)			97.8		%		90-110	31-AUG-14
WG1941919-35	LCS							
pH			7.04		pH		6.7-7.3	31-AUG-14
WG1941919-36	LCS							
Alkalinity, Total (as CaCO3)			100.1		%		85-115	31-AUG-14
WG1941919-37	LCS							
Conductivity (EC)			93.5		%		90-110	31-AUG-14
WG1941919-39	LCS							
Conductivity (EC)			97.0		%		90-110	31-AUG-14
WG1941919-40	LCS							
pH			7.04		pH		6.7-7.3	31-AUG-14
WG1941919-41	LCS							
Alkalinity, Total (as CaCO3)			99.95		%		85-115	31-AUG-14
WG1941919-42	LCS							
Conductivity (EC)			92.9		%		90-110	31-AUG-14
WG1941919-14	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	30-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	30-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	30-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	30-AUG-14
WG1941919-23	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	30-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	30-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	30-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	30-AUG-14
WG1941919-28	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	30-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	30-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	30-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	30-AUG-14
WG1941919-33	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	31-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	31-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	31-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	31-AUG-14
WG1941919-38	MB							



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 25 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch R2933870								
WG1941919-38 MB								
Bicarbonate (HCO3)			<5.0		mg/L		5	31-AUG-14
Carbonate (CO3)			<5.0		mg/L		5	31-AUG-14
Hydroxide (OH)			<5.0		mg/L		5	31-AUG-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	31-AUG-14
Batch R2937060								
WG1943352-6 DUP		L1511078-3						
pH		5.28	5.33	J	pH	0.05	0.3	03-SEP-14
Conductivity (EC)		0.66	0.54	J	uS/cm	0.12	0.4	03-SEP-14
Bicarbonate (HCO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	03-SEP-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	03-SEP-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	03-SEP-14
Alkalinity, Total (as CaCO3)		<2.0	<2.0	RPD-NA	mg/L	N/A	20	03-SEP-14
WG1943352-7 DUP		L1511500-1						
pH		8.28	8.28	J	pH	0.00	0.3	03-SEP-14
Conductivity (EC)		963	962		uS/cm	0.1	10	03-SEP-14
Bicarbonate (HCO3)		602	602		mg/L	0.0	25	03-SEP-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	03-SEP-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	03-SEP-14
Alkalinity, Total (as CaCO3)		493	493		mg/L	0.0	20	03-SEP-14
WG1943352-10 LCS								
Conductivity (EC)			98.6		%		90-110	03-SEP-14
WG1943352-11 LCS								
pH			6.02		pH		5.9-6.1	03-SEP-14
WG1943352-12 LCS								
Alkalinity, Total (as CaCO3)			97.8		%		85-115	03-SEP-14
WG1943352-13 LCS								
Conductivity (EC)			94.3		%		90-110	03-SEP-14
WG1943352-15 LCS								
Conductivity (EC)			97.9		%		90-110	03-SEP-14
WG1943352-16 LCS								
pH			6.02		pH		5.9-6.1	03-SEP-14
WG1943352-17 LCS								
Alkalinity, Total (as CaCO3)			99.9		%		85-115	03-SEP-14
WG1943352-18 LCS								
Conductivity (EC)			93.9		%		90-110	03-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 26 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R2937060							
WG1943352-2	LCS							
Conductivity (EC)			99.0		%		90-110	03-SEP-14
WG1943352-3	LCS							
pH			7.00		pH		6.7-7.3	03-SEP-14
WG1943352-4	LCS							
Alkalinity, Total (as CaCO3)			99.4		%		85-115	03-SEP-14
WG1943352-5	LCS							
Conductivity (EC)			95.1		%		90-110	03-SEP-14
WG1943352-1	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	03-SEP-14
Carbonate (CO3)			<5.0		mg/L		5	03-SEP-14
Hydroxide (OH)			<5.0		mg/L		5	03-SEP-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	03-SEP-14
WG1943352-14	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	03-SEP-14
Carbonate (CO3)			<5.0		mg/L		5	03-SEP-14
Hydroxide (OH)			<5.0		mg/L		5	03-SEP-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	03-SEP-14
WG1943352-9	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	03-SEP-14
Carbonate (CO3)			<5.0		mg/L		5	03-SEP-14
Hydroxide (OH)			<5.0		mg/L		5	03-SEP-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	03-SEP-14
PHENOLS-4AAP-ED		Water						
Batch	R2943611							
WG1948599-10	DUP	L1510509-12						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	10-SEP-14
WG1948599-7	DUP	L1509756-6						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	10-SEP-14
WG1948599-8	DUP	L1510822-5						
Phenols (4AAP)		0.0086	0.0088		mg/L	2.3	15	10-SEP-14
WG1948599-9	DUP	L1508740-8						
Phenols (4AAP)		0.0012	0.0011		mg/L	8.7	15	10-SEP-14
WG1948599-2	LCS							
Phenols (4AAP)			103.0		%		85-115	10-SEP-14
WG1948599-1	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	10-SEP-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 27 of 30

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-ED		Water						
Batch	R2939362							
WG1942157-5	DUP	L1510574-3						
Sulfate (SO4)		0.50	<0.50	RPD-NA	mg/L	N/A	20	30-AUG-14
WG1942157-11	LCS							
Sulfate (SO4)			100.7		%		90-110	30-AUG-14
WG1942157-2	LCS							
Sulfate (SO4)			100.9		%		90-110	30-AUG-14
WG1942157-7	LCS							
Sulfate (SO4)			100.2		%		90-110	30-AUG-14
WG1942157-9	LCS							
Sulfate (SO4)			100.4		%		90-110	30-AUG-14
WG1942157-1	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	30-AUG-14
WG1942157-10	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	30-AUG-14
WG1942157-12	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	30-AUG-14
WG1942157-8	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	30-AUG-14
WG1942157-6	MS	L1510574-3						
Sulfate (SO4)			94.8		%		75-125	30-AUG-14
SOLIDS-TDS-ED		Water						
Batch	R2939017							
WG1944307-3	DUP	L1511529-1						
Total Dissolved Solids		896	874		mg/L	2.5	20	04-SEP-14
WG1944307-4	DUP	L1510097-1						
Total Dissolved Solids		9780	9920		mg/L	1.4	20	04-SEP-14
WG1944307-2	LCS							
Total Dissolved Solids			103.0		%		85-115	04-SEP-14
WG1944307-1	MB							
Total Dissolved Solids			<10		mg/L		10	04-SEP-14
TURBIDITY-ED		Water						
Batch	R2934513							
WG1942014-3	DUP	L1510165-1						
Turbidity		362	345		NTU	4.8	15	30-AUG-14
WG1942014-2	LCS							
Turbidity			97.9		%		70-130	30-AUG-14
WG1942014-1	MB							
Turbidity			<0.10		NTU		0.1	30-AUG-14



Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Page 28 of 30

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-ED		Water						
Batch	R2936048							
WG1942704-3	DUP	L1510765-1						
Turbidity		12.4	13.0		NTU	4.7	15	02-SEP-14
WG1942704-2	LCS							
Turbidity			97.9		%		70-130	02-SEP-14
WG1942704-1	MB							
Turbidity			<0.10		NTU		0.1	02-SEP-14

Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2
Contact: Sue Raynard

Page 29 of 30

Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1510165

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Page 30 of 30

Contact: Sue Raynard

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Turbidity	5	28-AUG-14 15:00	02-SEP-14 00:00	48	105	hours	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1510165 were received on 29-AUG-14 11:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

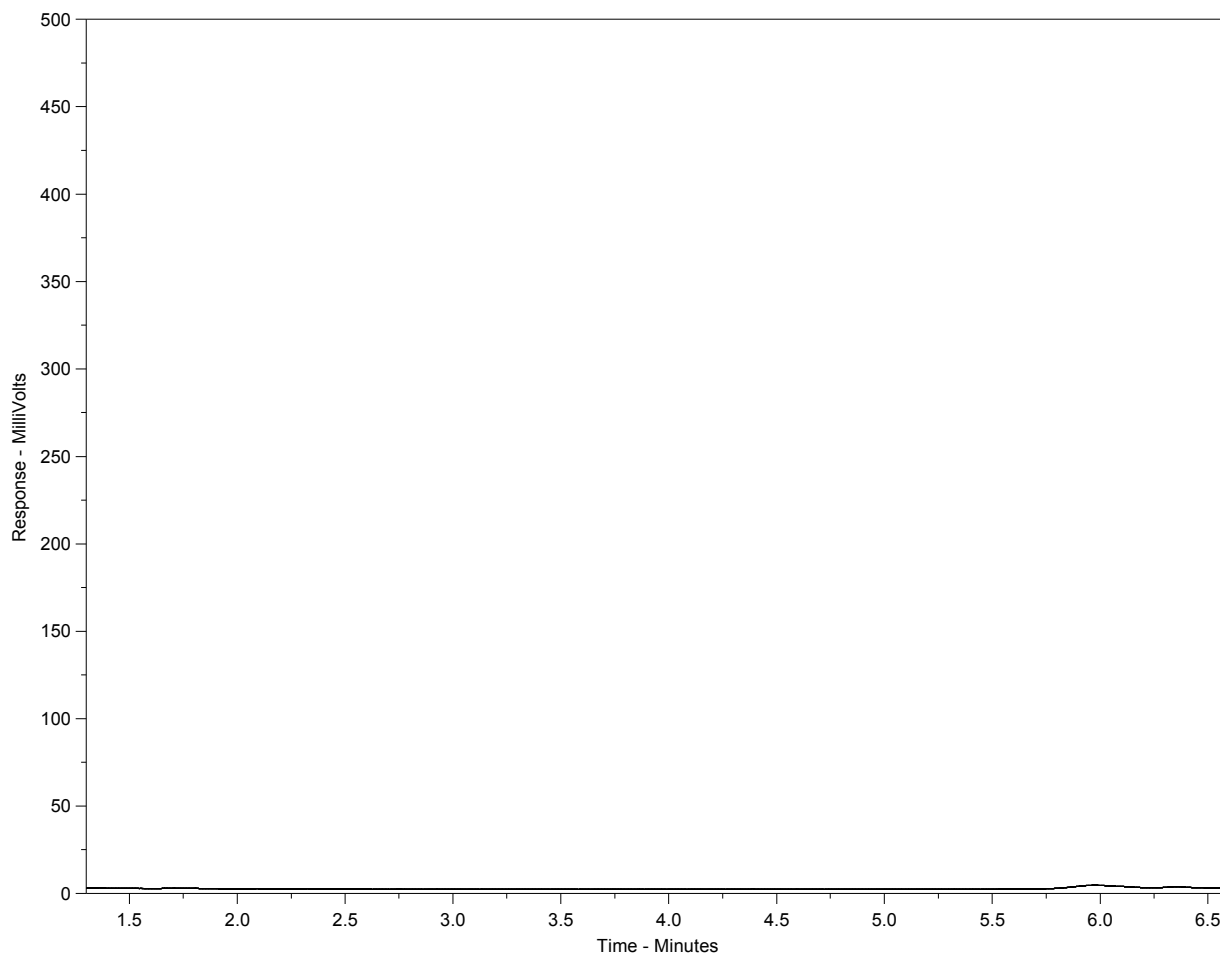
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Hydrocarbon Distribution Report



ALS Sample ID: L1510165-1
Client ID: 16054140828021



F2		F3		F4		>F4	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		106°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

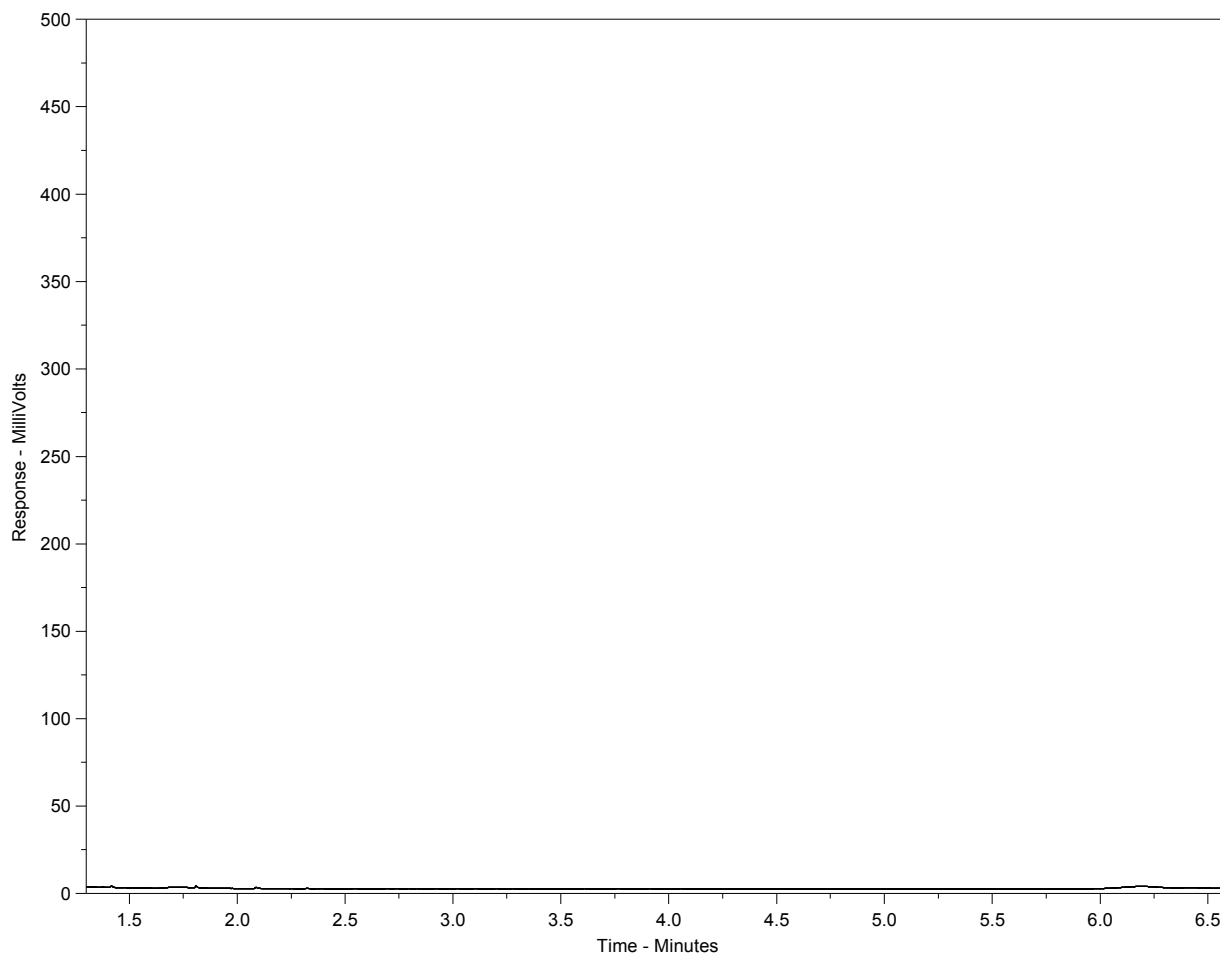
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1510165-2
Client ID: 16054140828022



F2		F3		F4		>F4	
nC10	nC16			nC34		nC50	
174°C	287°C			481°C		575°C	
346°F	549°F			898°F		106°F	
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

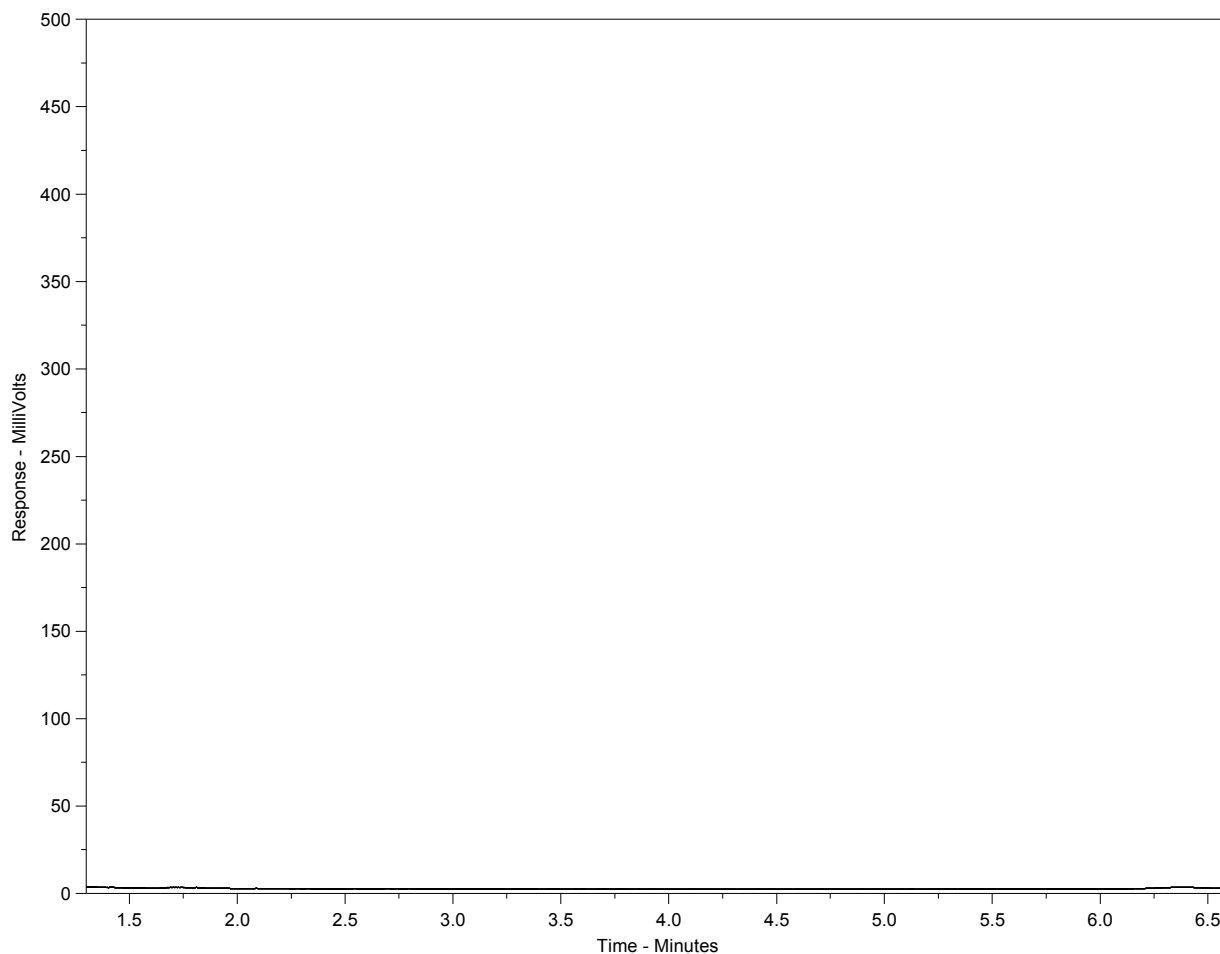
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1510165-3
 Client ID: 16054140828023



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		106°F		
← Gasoline →		← Diesel/ Jet Fuels →				← Motor Oils/ Lube Oils/ Grease →	

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

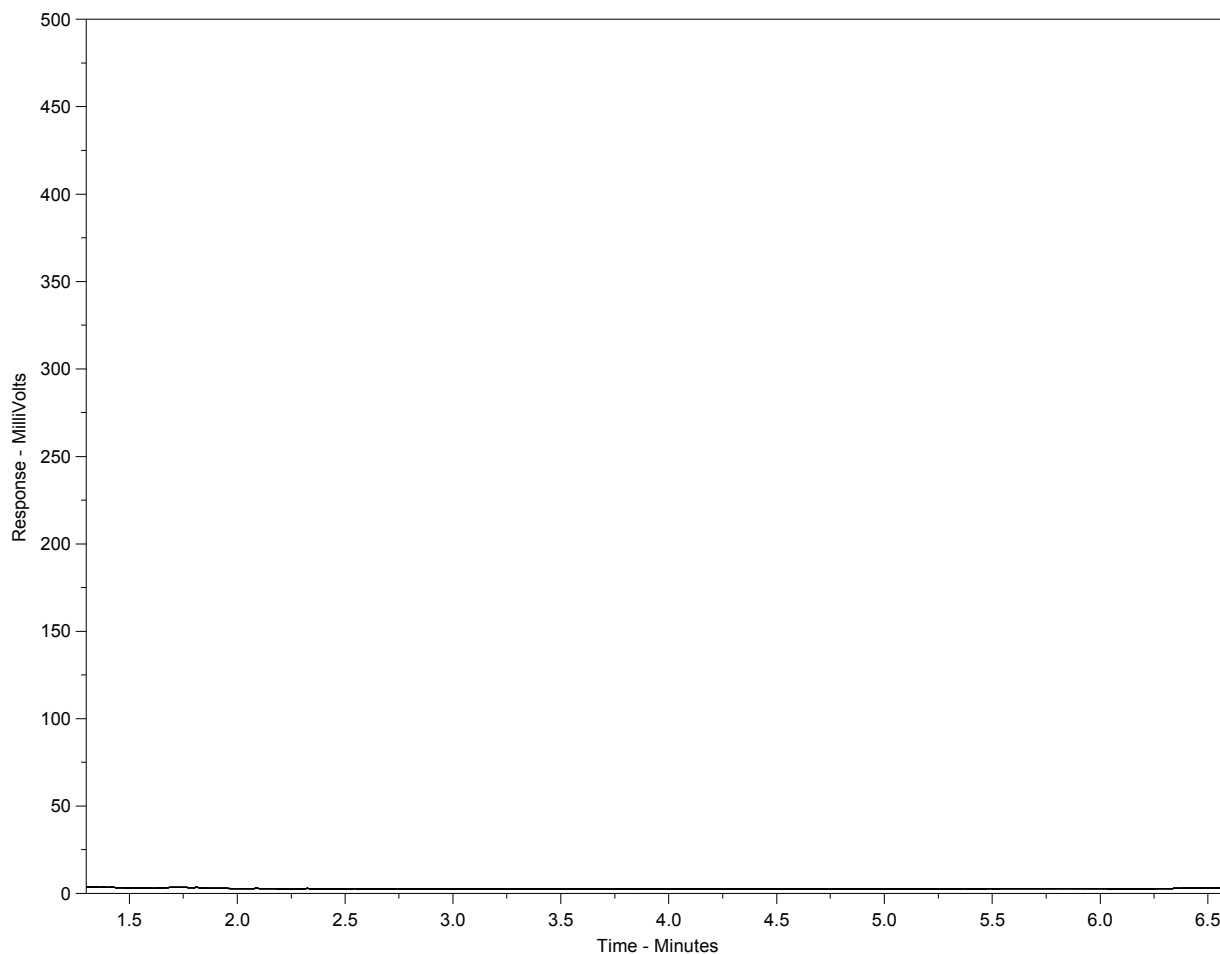
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1510165-4
Client ID: 16054140828024



← F2 →		← F3 →		← F4 →		← F4 →
nC10	nC16		nC34		nC50	
174°C	287°C		481°C		575°C	
346°F	549°F		898°F		106°F	
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →						

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

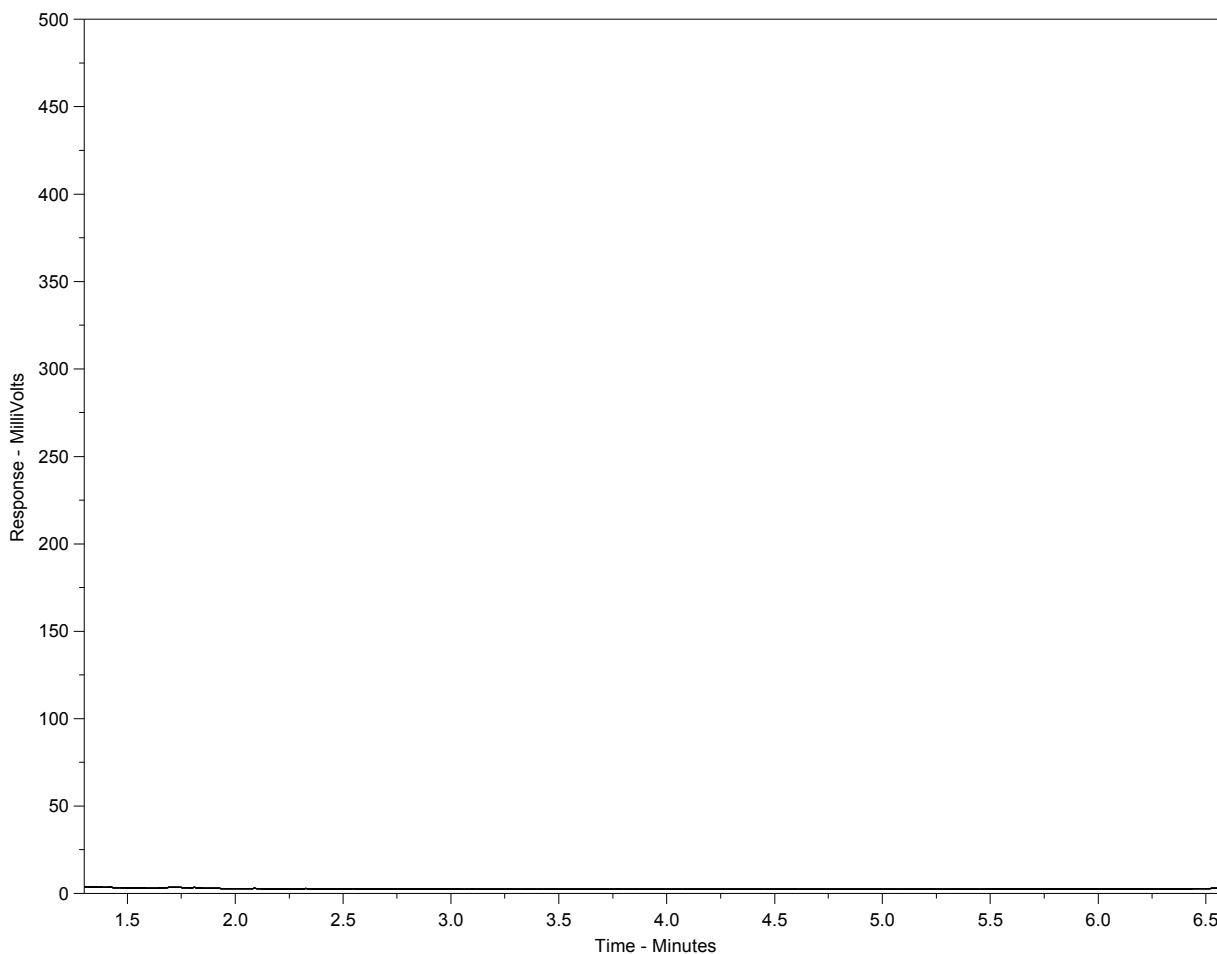
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1510165-5
Client ID: 16054140828025



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16		nC34		nC50		
174°C	287°C		481°C		575°C		
346°F	549°F		898°F		106°F		
← Gasoline →		← Diesel/ Jet Fuels →				← Motor Oils/ Lube Oils/ Grease →	

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.



Matrix Solutions Inc.
ATTN: SUE RAYNARD
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Date Received: 02-SEP-14
Report Date: 07-JAN-15 15:49 (MT)
Version: FINAL REV. 2

Client Phone: 403-237-0606

Certificate of Analysis

Lab Work Order #: L1510941
Project P.O. #: NOT SUBMITTED
Job Reference: 16054-502 SAOS
C of C Numbers: M061305
Legal Site Desc:

Monica Gibson
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-1 16054140829026									
Sampled By: BP/EA on 29-AUG-14 @ 10:58									
Matrix: WATER									
BTEX with Styrene, F1, F2, F3, F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Toluene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Ethylbenzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
o-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
m+p-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Xylenes	<0.00071	-		0.00071	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Styrene	<0.0010	-		0.0010	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1(C6-C10)	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1-BTEX	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
Total Metals - Matrix									
Total Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Total	<0.000025	-	DLM	0.000025	mg/L	-		05-SEP-14	R2939443
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	8.77	+/-1.7		0.0030	mg/L	0		09-SEP-14	R2941501
Antimony (Sb)-Total	0.00040	+/-0.00006		0.00010	mg/L	0		09-SEP-14	R2941501
Arsenic (As)-Total	0.0352	+/-0.0050		0.00010	mg/L	0		09-SEP-14	R2941501
Barium (Ba)-Total	0.200	+/-0.020		0.000050	mg/L	0		09-SEP-14	R2941501
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		09-SEP-14	R2941501
Bismuth (Bi)-Total	0.000105	+/-0.000014		0.000050	mg/L	0		09-SEP-14	R2941501
Boron (B)-Total	0.841	+/-0.11		0.010	mg/L	0		09-SEP-14	R2941501
Cadmium (Cd)-Total	0.000281	+/-0.000076		0.000010	mg/L	0		09-SEP-14	R2941501
Calcium (Ca)-Total	48.2	+/-6.5		0.10	mg/L	0		09-SEP-14	R2941501
Chromium (Cr)-Total	0.0276	+/-0.0056		0.00010	mg/L	0		09-SEP-14	R2941501
Cobalt (Co)-Total	0.00579	+/-0.00069		0.00010	mg/L	0		09-SEP-14	R2941501
Copper (Cu)-Total	0.0183	+/-0.0022		0.00010	mg/L	0		09-SEP-14	R2941501
Iron (Fe)-Total	12.8	+/-1.8		0.010	mg/L	0		09-SEP-14	R2941501
Lead (Pb)-Total	0.00650	+/-0.00087		0.000050	mg/L	0		09-SEP-14	R2941501
Lithium (Li)-Total	0.0800	+/-0.011		0.0050	mg/L	0		09-SEP-14	R2941501
Magnesium (Mg)-Total	13.6	+/-1.5		0.10	mg/L	0		09-SEP-14	R2941501
Manganese (Mn)-Total	0.435	+/-0.038		0.0020	mg/L	0		09-SEP-14	R2941501
Molybdenum (Mo)-Total	0.0412	+/-0.0050		0.000050	mg/L	0		09-SEP-14	R2941501
Nickel (Ni)-Total	0.0240	+/-0.0028		0.00010	mg/L	0		09-SEP-14	R2941501
Potassium (K)-Total	6.36	+/-0.55		0.10	mg/L	0		09-SEP-14	R2941501
Selenium (Se)-Total	0.00059	+/-0.00011	DTC	0.00010	mg/L	0		09-SEP-14	R2941501
Silver (Ag)-Total	0.000082	+/-0.000017		0.000010	mg/L	0		09-SEP-14	R2941501
Sodium (Na)-Total	169	+/-15		0.50	mg/L	0		09-SEP-14	R2941501
Strontium (Sr)-Total	0.397	+/-0.035		0.00010	mg/L	0		09-SEP-14	R2941501
Thallium (Tl)-Total	0.000196	+/-0.000023		0.000050	mg/L	0		09-SEP-14	R2941501
Tin (Sn)-Total	0.00391	+/-0.00051		0.00010	mg/L	0		09-SEP-14	R2941501
Titanium (Ti)-Total	0.344	+/-0.11		0.00030	mg/L	0		09-SEP-14	R2941501
Uranium (U)-Total	0.00152	+/-0.00015		0.000010	mg/L	0		09-SEP-14	R2941501
Vanadium (V)-Total	0.0254	+/-0.0037		0.00010	mg/L	0		09-SEP-14	R2941501
Zinc (Zn)-Total	0.0860	+/-0.010		0.0040	mg/L	0		09-SEP-14	R2941501
Total Metals in Water by ICPOES									
Silicon (Si)-Total	14.1	+/-1.6	DLA	0.050	mg/L	0		09-SEP-14	R2941089
Miscellaneous Parameters									
Ammonia, Total (as N)	1.03	-	DLA	0.10	mg/L	-		09-SEP-14	R2942548

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-1 16054140829026									
Sampled By: BP/EA on 29-AUG-14 @ 10:58									
Matrix: WATER									
Silicon (Si)-Dissolved	7.91	+/-0.66		0.050	mg/L	0		09-SEP-14	R2941089
Dissolved Organic Carbon	6.4	+/-1.1		1.0	mg/L	0		04-SEP-14	R2939224
Naphthenic Acids	1.6	+/-0.4		1.0	mg/L	0	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942503
Total Dissolved Solids	652	-		10	mg/L	-		03-SEP-14	R2939412
Turbidity	237	+/-17		0.10	NTU	0		02-SEP-14	R2935637
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Anthracene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Fluoranthene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Fluorene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Naphthalene	<0.000050	-		0.000050	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Phenanthrene	<0.000050	-		0.000050	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Pyrene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Chrysene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Surr: d10-Acenaphthene	88.6	-		N/A	%	-	04-SEP-14	04-SEP-14	R2940122
Surr: d10-Phenanthrene	92.8	-		N/A	%	-	04-SEP-14	04-SEP-14	R2940122
Surr: d12-Chrysene	90.0	-		N/A	%	-	04-SEP-14	04-SEP-14	R2940122
Major Ions & Trace Dissolved Metals									
Chloride (Cl)									
Chloride (Cl)	31.6	+/-1.4		0.10	mg/L	0		02-SEP-14	R2937088
Dis. Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005	mg/L	-		05-SEP-14	R2939443
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0020	+/-0.0005		0.0010	mg/L	0		08-SEP-14	R2941501
Antimony (Sb)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Arsenic (As)-Dissolved	0.0231	+/-0.0024		0.00010	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Dissolved	0.0654	+/-0.0057		0.000050	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Boron (B)-Dissolved	0.799	+/-0.097		0.010	mg/L	0		08-SEP-14	R2941501
Cadmium (Cd)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Calcium (Ca)-Dissolved	44.7	+/-6.1		0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Dissolved	0.00019	+/-0.00002		0.00010	mg/L	0		08-SEP-14	R2941501
Cobalt (Co)-Dissolved	0.00035	+/-0.00003		0.00010	mg/L	0		08-SEP-14	R2941501
Copper (Cu)-Dissolved	0.00010	+/-0.00004		0.00010	mg/L	0		08-SEP-14	R2941501
Iron (Fe)-Dissolved	1.87	+/-0.17		0.010	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Lithium (Li)-Dissolved	0.0743	+/-0.0092		0.0050	mg/L	0		08-SEP-14	R2941501
Magnesium (Mg)-Dissolved	11.0	+/-0.85		0.10	mg/L	0		08-SEP-14	R2941501
Manganese (Mn)-Dissolved	0.226	+/-0.015		0.0020	mg/L	0		08-SEP-14	R2941501

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-1 16054140829026 Sampled By: BP/EA on 29-AUG-14 @ 10:58 Matrix: WATER									
Dissolved Metals in Water by CRC ICPMS									
Molybdenum (Mo)-Dissolved	0.0265	+/-0.0028		0.000050	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Dissolved	0.00118	+/-0.00010		0.00010	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Dissolved	4.39	+/-0.34		0.10	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Dissolved	0.00202	+/-0.00033	DTC	0.00010	mg/L	0		08-SEP-14	R2941501
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Sodium (Na)-Dissolved	168	+/-12		0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Dissolved	0.378	+/-0.028		0.00010	mg/L	0		08-SEP-14	R2941501
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		08-SEP-14	R2941501
Tin (Sn)-Dissolved	0.00032	+/-0.00002		0.00010	mg/L	0		08-SEP-14	R2941501
Uranium (U)-Dissolved	0.000449	+/-0.000047		0.000010	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Dissolved	0.00019	+/-0.00002		0.00010	mg/L	0		08-SEP-14	R2941501
Zinc (Zn)-Dissolved	0.0206	+/-0.0024		0.0040	mg/L	0		08-SEP-14	R2941501
Ion Balance Calculation									
Ion Balance	93.0	-			%	-		09-SEP-14	
TDS (Calculated)	608	-			mg/L	-		09-SEP-14	
Hardness (as CaCO3)	157	-			mg/L	-		09-SEP-14	
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		03-SEP-14	
Nitrate-N									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		02-SEP-14	R2937088
Nitrite-N									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		02-SEP-14	R2937088
Sulfate (SO4)									
Sulfate (SO4)	87.1	+/-4.0		0.50	mg/L	0		02-SEP-14	R2937088
pH, Conductivity and Total Alkalinity									
pH	8.11	-		0.10	pH	-		02-SEP-14	R2936748
Conductivity (EC)	1010	-		3.0	uS/cm	-		02-SEP-14	R2936748
Bicarbonate (HCO3)	532	-		5.0	mg/L	-		02-SEP-14	R2936748
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Alkalinity, Total (as CaCO3)	436	-		5.0	mg/L	-		02-SEP-14	R2936748
Diss. Si (reported as Silica) by ICPOES									
Silicon (reported as Silica)									
Silicon (as SiO2)	30.3	-		0.30	mg/L	-		09-SEP-14	
Total Si (reported as Silica) by ICPOES									
Total Silicon (reported as Silica)									
Silicon (as SiO2)-Total	30.3	-		0.11	mg/L	-		10-SEP-14	
L1510941-2 16054140829027 Sampled By: BP/EA on 29-AUG-14 @ 14:02 Matrix: WATER									
BTEX with Styrene, F1, F2, F3, F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Toluene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Ethylbenzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
o-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
m+p-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Xylenes	<0.00071	-		0.00071	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Styrene	<0.0010	-		0.0010	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1(C6-C10)	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-2 16054140829027									
Sampled By: BP/EA on 29-AUG-14 @ 14:02									
Matrix: WATER									
BTEX, Styrene and F1 (C6-C10)									
F1-BTEX	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	04-SEP-14	R2935533
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	04-SEP-14	R2935533
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	04-SEP-14	R2935533
Total Metals - Matrix									
Total Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Total	<0.000025	-	DLM	0.000025	mg/L	-		05-SEP-14	R2939443
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	1.22	+/-0.24	DLA	0.015	mg/L	0		08-SEP-14	R2941501
Antimony (Sb)-Total	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Arsenic (As)-Total	0.00552	+/-0.00078	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Total	0.172	+/-0.017	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Total	<0.0025	-	DLA	0.0025	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Total	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Boron (B)-Total	0.186	+/-0.024	DLA	0.050	mg/L	0		08-SEP-14	R2941501
Cadmium (Cd)-Total	0.000073	+/-0.000020	DLA	0.000050	mg/L	0		08-SEP-14	R2941501
Calcium (Ca)-Total	65.6	+/-8.8	DLA	0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Total	0.00287	+/-0.00059	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Cobalt (Co)-Total	0.00108	+/-0.00013	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Copper (Cu)-Total	0.00269	+/-0.00034	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Iron (Fe)-Total	7.59	+/-1.1	DLA	0.050	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Total	0.00152	+/-0.00021	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Lithium (Li)-Total	0.041	+/-0.006	DLA	0.025	mg/L	0		08-SEP-14	R2941501
Magnesium (Mg)-Total	17.5	+/-1.9	DLA	0.10	mg/L	0		08-SEP-14	R2941501
Manganese (Mn)-Total	0.287	+/-0.025	DLA	0.0020	mg/L	0		08-SEP-14	R2941501
Molybdenum (Mo)-Total	0.00676	+/-0.00082	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Total	0.00433	+/-0.00051	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Total	4.26	+/-0.37	DLA	0.25	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Total	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Silver (Ag)-Total	<0.000050	-	DLA	0.000050	mg/L	-		08-SEP-14	R2941501
Sodium (Na)-Total	38.2	+/-3.4	DLA	0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Total	0.449	+/-0.040	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Thallium (Tl)-Total	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Tin (Sn)-Total	0.00304	+/-0.00040	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Titanium (Ti)-Total	0.0259	+/-0.0080	DLA	0.0015	mg/L	0		08-SEP-14	R2941501
Uranium (U)-Total	0.000274	+/-0.000028	DLA	0.000050	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Total	0.00407	+/-0.00059	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Zinc (Zn)-Total	<0.020	-	DLA	0.020	mg/L	-		08-SEP-14	R2941501
Total Metals in Water by ICPOES									
Silicon (Si)-Total	13.1	+/-1.4		0.050	mg/L	0		09-SEP-14	R2941089
Miscellaneous Parameters									
Ammonia, Total (as N)	1.27	-	DLA	0.25	mg/L	-		09-SEP-14	R2942548
Silicon (Si)-Dissolved	10.4	+/-0.87		0.050	mg/L	0		09-SEP-14	R2941089
Dissolved Organic Carbon	3.7	+/-0.7		1.0	mg/L	0		04-SEP-14	R2939224
Naphthenic Acids	<1.0	-		1.0	mg/L	-	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942503
Total Dissolved Solids	351	-		10	mg/L	-		03-SEP-14	R2939412
Turbidity	71.9	+/-5.0		0.10	NTU	0		02-SEP-14	R2935637
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-2 16054140829027									
Sampled By: BP/EA on 29-AUG-14 @ 14:02									
Matrix: WATER									
PAH & Carcinogenic PAH List									
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Anthracene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Fluoranthene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Fluorene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Naphthalene	0.000077	-		0.000050	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Phenanthrene	<0.000050	-		0.000050	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Pyrene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	04-SEP-14	04-SEP-14	R2940122
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	04-SEP-14	04-SEP-14	R2940122
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	04-SEP-14	04-SEP-14	R2940122
Surr: d10-Acenaphthene	92.5	-		N/A	%	-	04-SEP-14	04-SEP-14	R2940122
Surr: d10-Phenanthrene	98.6	-		N/A	%	-	04-SEP-14	04-SEP-14	R2940122
Surr: d12-Chrysene	91.8	-		N/A	%	-	04-SEP-14	04-SEP-14	R2940122
Major Ions & Trace Dissolved Metals									
Chloride (Cl)									
Chloride (Cl)	10.1	+/-0.46		0.10	mg/L	0		02-SEP-14	R2937088
Dis. Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Dissolved	<0.000050	-		0.000005	mg/L	-		05-SEP-14	R2939443
				0					
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0012	+/-0.0004		0.0010	mg/L	0		08-SEP-14	R2941501
Antimony (Sb)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Arsenic (As)-Dissolved	0.00486	+/-0.00051		0.00010	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Dissolved	0.137	+/-0.012		0.000050	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Boron (B)-Dissolved	0.173	+/-0.021		0.010	mg/L	0		08-SEP-14	R2941501
Cadmium (Cd)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Calcium (Ca)-Dissolved	57.9	+/-7.9		0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Dissolved	0.00032	+/-0.00003		0.00010	mg/L	0		08-SEP-14	R2941501
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Copper (Cu)-Dissolved	0.00016	+/-0.00005		0.00010	mg/L	0		08-SEP-14	R2941501
Iron (Fe)-Dissolved	4.97	+/-0.45		0.010	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Lithium (Li)-Dissolved	0.0344	+/-0.0043		0.0050	mg/L	0		08-SEP-14	R2941501
Magnesium (Mg)-Dissolved	16.8	+/-1.3		0.10	mg/L	0		08-SEP-14	R2941501
Manganese (Mn)-Dissolved	0.245	+/-0.017		0.0020	mg/L	0		08-SEP-14	R2941501
Molybdenum (Mo)-Dissolved	0.00558	+/-0.00058		0.000050	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Dissolved	0.00057	+/-0.00006		0.00010	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Dissolved	3.75	+/-0.29		0.10	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Dissolved	0.00039	+/-0.00006		0.00010	mg/L	0		08-SEP-14	R2941501
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Sodium (Na)-Dissolved	38.6	+/-2.7		0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Dissolved	0.417	+/-0.031		0.00010	mg/L	0		08-SEP-14	R2941501

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-2 16054140829027 Sampled By: BP/EA on 29-AUG-14 @ 14:02 Matrix: WATER									
Dissolved Metals in Water by CRC ICPMS									
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		08-SEP-14	R2941501
Tin (Sn)-Dissolved	0.00052	+/-0.00004		0.00010	mg/L	0		08-SEP-14	R2941501
Uranium (U)-Dissolved	0.000072	+/-0.000007		0.000010	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Zinc (Zn)-Dissolved	0.0059	+/-0.0007		0.0040	mg/L	0		08-SEP-14	R2941501
Ion Balance Calculation									
Ion Balance	89.3	-	BL:INT		%	-		09-SEP-14	
TDS (Calculated)	332	-			mg/L	-		09-SEP-14	
Hardness (as CaCO3)	214	-			mg/L	-		09-SEP-14	
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		03-SEP-14	
Nitrate-N									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		02-SEP-14	R2937088
Nitrite-N									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		02-SEP-14	R2937088
Sulfate (SO4)									
Sulfate (SO4)	20.5	+/-0.96		0.50	mg/L	0		02-SEP-14	R2937088
pH, Conductivity and Total Alkalinity									
pH	7.97	-		0.10	pH	-		02-SEP-14	R2936748
Conductivity (EC)	593	-		3.0	uS/cm	-		02-SEP-14	R2936748
Bicarbonate (HCO3)	376	-		5.0	mg/L	-		02-SEP-14	R2936748
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Alkalinity, Total (as CaCO3)	308	-		5.0	mg/L	-		02-SEP-14	R2936748
Diss. Si (reported as Silica) by ICPOES									
Silicon (reported as Silica)									
Silicon (as SiO2)	27.9	-		0.30	mg/L	-		09-SEP-14	
Total Si (reported as Silica) by ICPOES									
Total Silicon (reported as Silica)									
Silicon (as SiO2)-Total	27.9	-		0.11	mg/L	-		09-SEP-14	
L1510941-3 16054140829028 Sampled By: BP/EA on 29-AUG-14 @ 15:59 Matrix: WATER									
BTEX with Styrene, F1, F2, F3, F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Toluene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Ethylbenzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
o-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
m+p-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Xylenes	<0.00071	-		0.00071	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Styrene	<0.0010	-		0.0010	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1(C6-C10)	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1-BTEX	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
Total Metals - Matrix									
Total Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Total	<0.000025	-	DLM	0.000025	mg/L	-		05-SEP-14	R2939443

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-3 16054140829028									
Sampled By: BP/EA on 29-AUG-14 @ 15:59									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	2.28	+/-0.44	DLA	0.015	mg/L	0		08-SEP-14	R2941501
Antimony (Sb)-Total	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Arsenic (As)-Total	0.203	+/-0.029	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Total	1.43	+/-0.14	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Total	<0.0025	-	DLA	0.0025	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Total	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Boron (B)-Total	0.244	+/-0.032	DLA	0.050	mg/L	0		08-SEP-14	R2941501
Cadmium (Cd)-Total	0.000308	+/-0.000084	DLA	0.000050	mg/L	0		08-SEP-14	R2941501
Calcium (Ca)-Total	63.2	+/-8.5	DLA	0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Total	0.0217	+/-0.0044	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Cobalt (Co)-Total	0.00272	+/-0.00033	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Copper (Cu)-Total	0.0125	+/-0.0015	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Iron (Fe)-Total	61.9	+/-9.0	DLA	0.050	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Total	0.0243	+/-0.0032	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Lithium (Li)-Total	0.049	+/-0.007	DLA	0.025	mg/L	0		08-SEP-14	R2941501
Magnesium (Mg)-Total	14.9	+/-1.6	DLA	0.10	mg/L	0		08-SEP-14	R2941501
Manganese (Mn)-Total	0.731	+/-0.064	DLA	0.0020	mg/L	0		08-SEP-14	R2941501
Molybdenum (Mo)-Total	0.00746	+/-0.00090	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Total	0.0140	+/-0.0016	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Total	4.93	+/-0.43	DLA	0.25	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Total	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Silver (Ag)-Total	<0.000050	-	DLA	0.000050	mg/L	-		08-SEP-14	R2941501
Sodium (Na)-Total	71.1	+/-6.3	DLA	0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Total	0.769	+/-0.068	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Thallium (Tl)-Total	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Tin (Sn)-Total	0.00685	+/-0.00090	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Titanium (Ti)-Total	0.0637	+/-0.020	DLA	0.0015	mg/L	0		08-SEP-14	R2941501
Uranium (U)-Total	0.00109	+/-0.00011	DLA	0.000050	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Total	0.00856	+/-0.0012	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Zinc (Zn)-Total	3.43	+/-0.39	DLA	0.020	mg/L	0		08-SEP-14	R2941501
Total Metals in Water by ICPOES									
Silicon (Si)-Total	13.9	+/-1.5	DLA	0.050	mg/L	0		09-SEP-14	R2941089
Miscellaneous Parameters									
Ammonia, Total (as N)	1.82	-	DLA	0.25	mg/L	-		09-SEP-14	R2942548
Silicon (Si)-Dissolved	9.35	+/-0.78		0.050	mg/L	0		09-SEP-14	R2941089
Dissolved Organic Carbon	7.1	+/-1.2		1.0	mg/L	0		04-SEP-14	R2939224
Naphthenic Acids	<1.0	-		1.0	mg/L	-	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942503
Total Dissolved Solids	461	-		10	mg/L	-		03-SEP-14	R2939412
Turbidity	691	+/-48		0.10	NTU	0		02-SEP-14	R2935637
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Anthracene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Fluoranthene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Fluorene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Naphthalene	0.000103	-		0.000050	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Phenanthrene	<0.000050	-		0.000050	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Pyrene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-3 16054140829028									
Sampled By: BP/EA on 29-AUG-14 @ 15:59									
Matrix: WATER									
PAH & Carcinogenic PAH List									
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	06-SEP-14	06-SEP-14	R2940122
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	06-SEP-14	06-SEP-14	R2940122
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Surr: d10-Acenaphthene	88.7	-		N/A	%	-	06-SEP-14	06-SEP-14	R2940122
Surr: d10-Phenanthrene	96.9	-		N/A	%	-	06-SEP-14	06-SEP-14	R2940122
Surr: d12-Chrysene	81.6	-		N/A	%	-	06-SEP-14	06-SEP-14	R2940122
Major Ions & Trace Dissolved Metals									
Chloride (Cl)									
Chloride (Cl)	0.68	+/-0.07		0.10	mg/L	0		02-SEP-14	R2937088
Dis. Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005	mg/L	-		05-SEP-14	R2939443
				0					
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		08-SEP-14	R2941501
Antimony (Sb)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Arsenic (As)-Dissolved	0.0167	+/-0.0018		0.00010	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Dissolved	0.0971	+/-0.0084		0.000050	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Boron (B)-Dissolved	0.274	+/-0.033		0.010	mg/L	0		08-SEP-14	R2941501
Cadmium (Cd)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Calcium (Ca)-Dissolved	52.9	+/-7.2		0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Copper (Cu)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Iron (Fe)-Dissolved	2.49	+/-0.22		0.010	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Lithium (Li)-Dissolved	0.0489	+/-0.0061		0.0050	mg/L	0		08-SEP-14	R2941501
Magnesium (Mg)-Dissolved	15.8	+/-1.2		0.10	mg/L	0		08-SEP-14	R2941501
Manganese (Mn)-Dissolved	0.0978	+/-0.0067		0.0020	mg/L	0		08-SEP-14	R2941501
Molybdenum (Mo)-Dissolved	0.00808	+/-0.00085		0.000050	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Dissolved	0.00022	+/-0.00004		0.00010	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Dissolved	5.01	+/-0.39		0.10	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Sodium (Na)-Dissolved	86.0	+/-6.1		0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Dissolved	0.516	+/-0.038		0.00010	mg/L	0		08-SEP-14	R2941501
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		08-SEP-14	R2941501
Tin (Sn)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Uranium (U)-Dissolved	0.000078	+/-0.000008		0.000010	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Zinc (Zn)-Dissolved	0.177	+/-0.021		0.0040	mg/L	0		08-SEP-14	R2941501
Ion Balance Calculation									
Ion Balance	90.7	-			%	-		09-SEP-14	
TDS (Calculated)	434	-			mg/L	-		09-SEP-14	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-3 16054140829028 Sampled By: BP/EA on 29-AUG-14 @ 15:59 Matrix: WATER									
Ion Balance Calculation									
Hardness (as CaCO3)	197	-			mg/L	-		09-SEP-14	
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		03-SEP-14	
Nitrate-N									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		02-SEP-14	R2937088
Nitrite-N									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		02-SEP-14	R2937088
Sulfate (SO4)									
Sulfate (SO4)	31.6	+/-1.5		0.50	mg/L	0		02-SEP-14	R2937088
pH, Conductivity and Total Alkalinity									
pH	8.09	-		0.10	pH	-		02-SEP-14	R2936748
Conductivity (EC)	745	-		3.0	uS/cm	-		02-SEP-14	R2936748
Bicarbonate (HCO3)	493	-		5.0	mg/L	-		02-SEP-14	R2936748
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Alkalinity, Total (as CaCO3)	404	-		5.0	mg/L	-		02-SEP-14	R2936748
Diss. Si (reported as Silica) by ICPOES									
Silicon (reported as Silica)									
Silicon (as SiO2)	29.8	-		0.30	mg/L	-		09-SEP-14	
Total Si (reported as Silica) by ICPOES									
Total Silicon (reported as Silica)									
Silicon (as SiO2)-Total	29.8	-		0.11	mg/L	-		09-SEP-14	
L1510941-4 16054140830029 Sampled By: BP/EA on 30-AUG-14 @ 09:54 Matrix: WATER									
BTEX with Styrene, F1, F2, F3, F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Toluene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Ethylbenzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
o-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
m+p-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Xylenes	<0.00071	-		0.00071	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Styrene	<0.0010	-		0.0010	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1(C6-C10)	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1-BTEX	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
Total Metals - Matrix									
Total Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Total	<0.000025	-	DLM	0.000025	mg/L	-		05-SEP-14	R2939443
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	7.40	+/-1.4	DLA	0.015	mg/L	0		08-SEP-14	R2941501
Antimony (Sb)-Total	0.00061	+/-0.00009	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Arsenic (As)-Total	0.00623	+/-0.00088	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Total	0.357	+/-0.036	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Total	<0.0025	-	DLA	0.0025	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Total	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Boron (B)-Total	<0.050	-	DLA	0.050	mg/L	-		08-SEP-14	R2941501
Cadmium (Cd)-Total	0.000131	+/-0.000036	DLA	0.000050	mg/L	0		08-SEP-14	R2941501

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-4 16054140830029									
Sampled By: BP/EA on 30-AUG-14 @ 09:54									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Calcium (Ca)-Total	31.9	+/-4.3	DLA	0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Total	0.00570	+/-0.0012	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Cobalt (Co)-Total	0.00648	+/-0.00078	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Copper (Cu)-Total	0.00812	+/-0.00097	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Iron (Fe)-Total	9.12	+/-1.3	DLA	0.050	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Total	0.00956	+/-0.0013	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Lithium (Li)-Total	<0.025	-	DLA	0.025	mg/L	-		08-SEP-14	R2941501
Magnesium (Mg)-Total	10.3	+/-1.1	DLA	0.10	mg/L	0		08-SEP-14	R2941501
Manganese (Mn)-Total	0.722	+/-0.063	DLA	0.0020	mg/L	0		08-SEP-14	R2941501
Molybdenum (Mo)-Total	0.00131	+/-0.00016	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Total	0.0105	+/-0.0012	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Total	3.35	+/-0.29	DLA	0.25	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Total	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Silver (Ag)-Total	0.000056	+/-0.000013	DLA	0.000050	mg/L	0		08-SEP-14	R2941501
Sodium (Na)-Total	12.2	+/-1.1	DLA	0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Total	0.120	+/-0.011	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Thallium (Tl)-Total	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Tin (Sn)-Total	0.00079	+/-0.00010	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Titanium (Ti)-Total	0.103	+/-0.032	DLA	0.0015	mg/L	0		08-SEP-14	R2941501
Uranium (U)-Total	0.00489	+/-0.00049	DLA	0.000050	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Total	0.00887	+/-0.0013	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Zinc (Zn)-Total	0.034	+/-0.004	DLA	0.020	mg/L	0		08-SEP-14	R2941501
Total Metals in Water by ICPOES									
Silicon (Si)-Total	20.5	+/-2.3	DLA	0.050	mg/L	0		09-SEP-14	R2941089
Miscellaneous Parameters									
Ammonia, Total (as N)	0.062	-		0.050	mg/L	-		09-SEP-14	R2942548
Silicon (Si)-Dissolved	4.92	+/-0.41		0.050	mg/L	0		09-SEP-14	R2941089
Dissolved Organic Carbon	2.2	+/-0.5		1.0	mg/L	0		04-SEP-14	R2939224
Naphthenic Acids	<1.0	-		1.0	mg/L	-	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942503
Total Dissolved Solids	157	-		10	mg/L	-		03-SEP-14	R2939412
Turbidity	390	+/-27		0.10	NTU	0		02-SEP-14	R2935637
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Anthracene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Fluoranthene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Fluorene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Naphthalene	<0.000050	-		0.000050	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Phenanthrene	<0.000050	-		0.000050	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Pyrene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Benzo(a)pyrene	<0.0000050	-		0.0000050	mg/L	-	06-SEP-14	06-SEP-14	R2940122
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	06-SEP-14	06-SEP-14	R2940122
Dibenzo(a,h)anthracene	<0.0000050	-		0.0000050	mg/L	-	06-SEP-14	06-SEP-14	R2940122
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	06-SEP-14	06-SEP-14	R2940122

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-4 16054140830029 Sampled By: BP/EA on 30-AUG-14 @ 09:54 Matrix: WATER									
Sulfate (SO4) Sulfate (SO4)	7.06	+/-0.35		0.50	mg/L	0		02-SEP-14	R2937088
pH, Conductivity and Total Alkalinity pH	8.19	-		0.10	pH	-		02-SEP-14	R2936748
Conductivity (EC)	267	-		3.0	uS/cm	-		02-SEP-14	R2936748
Bicarbonate (HCO3)	174	-		5.0	mg/L	-		02-SEP-14	R2936748
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Alkalinity, Total (as CaCO3)	142	-		5.0	mg/L	-		02-SEP-14	R2936748
Diss. Si (reported as Silica) by ICPOES Silicon (reported as Silica) Silicon (as SiO2)	43.9	-		0.30	mg/L	-		09-SEP-14	
Total Si (reported as Silica) by ICPOES Total Silicon (reported as Silica) Silicon (as SiO2)-Total	43.9	-		0.11	mg/L	-		09-SEP-14	
L1510941-5 16054140830030 Sampled By: BP/EA on 30-AUG-14 @ 10:52 Matrix: WATER									
BTEX with Styrene, F1, F2, F3, F4 BTEX, Styrene and F1 (C6-C10) Benzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Toluene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Ethylbenzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
o-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
m+p-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Xylenes	<0.00071	-		0.00071	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Styrene	<0.0010	-		0.0010	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1(C6-C10)	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1-BTEX	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F2, F3, F4 F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
Total Metals - Matrix Total Mercury in Water by CVAAS (Low) Mercury (Hg)-Total	<0.0000050	-		0.000005 0	mg/L	-		05-SEP-14	R2939443
Total Metals in Water by CRC ICPMS Aluminum (Al)-Total	0.162	+/-0.032		0.0030	mg/L	0		09-SEP-14	R2941501
Antimony (Sb)-Total	0.00013	+/-0.00002		0.00010	mg/L	0		09-SEP-14	R2941501
Arsenic (As)-Total	0.0250	+/-0.0035		0.00010	mg/L	0		09-SEP-14	R2941501
Barium (Ba)-Total	0.109	+/-0.011		0.000050	mg/L	0		09-SEP-14	R2941501
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		09-SEP-14	R2941501
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2941501
Boron (B)-Total	0.693	+/-0.090		0.010	mg/L	0		09-SEP-14	R2941501
Cadmium (Cd)-Total	0.000012	+/-0.000004		0.000010	mg/L	0		09-SEP-14	R2941501
Calcium (Ca)-Total	63.3	+/-8.5		0.10	mg/L	0		09-SEP-14	R2941501
Chromium (Cr)-Total	0.00121	+/-0.00025		0.00010	mg/L	0		09-SEP-14	R2941501
Cobalt (Co)-Total	0.00048	+/-0.00006		0.00010	mg/L	0		09-SEP-14	R2941501
Copper (Cu)-Total	0.00099	+/-0.00014		0.00010	mg/L	0		09-SEP-14	R2941501
Iron (Fe)-Total	1.70	+/-0.25		0.010	mg/L	0		09-SEP-14	R2941501
Lead (Pb)-Total	0.000224	+/-0.000033		0.000050	mg/L	0		09-SEP-14	R2941501
Lithium (Li)-Total	0.0373	+/-0.0052		0.0050	mg/L	0		09-SEP-14	R2941501

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-5 16054140830030									
Sampled By: BP/EA on 30-AUG-14 @ 10:52									
Matrix: WATER									
Dis. Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Dissolved	<0.000050	-		0.000005 0	mg/L	-		05-SEP-14	R2939443
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0017	+/-0.0004		0.0010	mg/L	0		08-SEP-14	R2941501
Antimony (Sb)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Arsenic (As)-Dissolved	0.0267	+/-0.0028		0.00010	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Dissolved	0.104	+/-0.0090		0.000050	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Boron (B)-Dissolved	0.606	+/-0.073		0.010	mg/L	0		08-SEP-14	R2941501
Cadmium (Cd)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Calcium (Ca)-Dissolved	59.1	+/-8.0		0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Dissolved	0.00013	+/-0.00002		0.00010	mg/L	0		08-SEP-14	R2941501
Cobalt (Co)-Dissolved	0.00035	+/-0.00003		0.00010	mg/L	0		08-SEP-14	R2941501
Copper (Cu)-Dissolved	0.00021	+/-0.00005		0.00010	mg/L	0		08-SEP-14	R2941501
Iron (Fe)-Dissolved	1.44	+/-0.13		0.010	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Lithium (Li)-Dissolved	0.0352	+/-0.0044		0.0050	mg/L	0		08-SEP-14	R2941501
Magnesium (Mg)-Dissolved	21.7	+/-1.7		0.10	mg/L	0		08-SEP-14	R2941501
Manganese (Mn)-Dissolved	0.192	+/-0.013		0.0020	mg/L	0		08-SEP-14	R2941501
Molybdenum (Mo)-Dissolved	0.00878	+/-0.00092		0.000050	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Dissolved	0.00116	+/-0.00010		0.00010	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Dissolved	3.27	+/-0.25		0.10	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Dissolved	0.00038	+/-0.00006	DTC	0.00010	mg/L	0		08-SEP-14	R2941501
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Sodium (Na)-Dissolved	303	+/-21		0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Dissolved	0.620	+/-0.046		0.00010	mg/L	0		08-SEP-14	R2941501
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		08-SEP-14	R2941501
Tin (Sn)-Dissolved	0.00029	+/-0.00002		0.00010	mg/L	0		08-SEP-14	R2941501
Uranium (U)-Dissolved	0.000399	+/-0.000041		0.000010	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Dissolved	0.00020	+/-0.00002		0.00010	mg/L	0		08-SEP-14	R2941501
Zinc (Zn)-Dissolved	0.0051	+/-0.0007		0.0040	mg/L	0		08-SEP-14	R2941501
Ion Balance Calculation									
Ion Balance	93.4	-			%	-		09-SEP-14	
TDS (Calculated)	1140	-			mg/L	-		09-SEP-14	
Hardness (as CaCO3)	237	-			mg/L	-		09-SEP-14	
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		03-SEP-14	
Nitrate-N									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		02-SEP-14	R2937088
Nitrite-N									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		02-SEP-14	R2937088
Sulfate (SO4)									
Sulfate (SO4)	435	+/-20		0.50	mg/L	0		02-SEP-14	R2937088
pH, Conductivity and Total Alkalinity									
pH	8.16	-		0.10	pH	-		02-SEP-14	R2936748
Conductivity (EC)	1710	-		3.0	uS/cm	-		02-SEP-14	R2936748
Bicarbonate (HCO3)	633	-		5.0	mg/L	-		02-SEP-14	R2936748
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Alkalinity, Total (as CaCO3)	519	-		5.0	mg/L	-		02-SEP-14	R2936748

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-5 16054140830030 Sampled By: BP/EA on 30-AUG-14 @ 10:52 Matrix: WATER									
Diss. Si (reported as Silica) by ICPOES									
Silicon (reported as Silica)									
Silicon (as SiO ₂)	12.6	-		0.30	mg/L	-		09-SEP-14	
Total Si (reported as Silica) by ICPOES									
Total Silicon (reported as Silica)									
Silicon (as SiO ₂)-Total	12.6	-		0.11	mg/L	-		10-SEP-14	
L1510941-6 16054140830031 Sampled By: BP/EA on 30-AUG-14 @ 11:50 Matrix: WATER									
BTEX with Styrene, F1, F2, F3, F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Toluene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Ethylbenzene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
o-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
m+p-Xylene	<0.00050	-		0.00050	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Xylenes	<0.00071	-		0.00071	mg/L	-	03-SEP-14	03-SEP-14	R2937510
Styrene	<0.0010	-		0.0010	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1(C6-C10)	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F1-BTEX	<0.10	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	03-SEP-14	03-SEP-14	R2935533
Total Metals - Matrix									
Total Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		05-SEP-14	R2939443
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0747	+/-0.015		0.0030	mg/L	0		09-SEP-14	R2941501
Antimony (Sb)-Total	0.00019	+/-0.00003		0.00010	mg/L	0		09-SEP-14	R2941501
Arsenic (As)-Total	0.0670	+/-0.0094		0.00010	mg/L	0		09-SEP-14	R2941501
Barium (Ba)-Total	0.228	+/-0.023		0.000050	mg/L	0		09-SEP-14	R2941501
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		09-SEP-14	R2941501
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2941501
Boron (B)-Total	0.390	+/-0.051		0.010	mg/L	0		09-SEP-14	R2941501
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		09-SEP-14	R2941501
Calcium (Ca)-Total	26.8	+/-3.6		0.10	mg/L	0		09-SEP-14	R2941501
Chromium (Cr)-Total	0.00442	+/-0.00090		0.00010	mg/L	0		09-SEP-14	R2941501
Cobalt (Co)-Total	0.00102	+/-0.00012		0.00010	mg/L	0		09-SEP-14	R2941501
Copper (Cu)-Total	0.00144	+/-0.00019		0.00010	mg/L	0		09-SEP-14	R2941501
Iron (Fe)-Total	0.782	+/-0.11		0.010	mg/L	0		09-SEP-14	R2941501
Lead (Pb)-Total	0.000143	+/-0.000023		0.000050	mg/L	0		09-SEP-14	R2941501
Lithium (Li)-Total	0.0180	+/-0.0025		0.0050	mg/L	0		09-SEP-14	R2941501
Magnesium (Mg)-Total	9.56	+/-1.0		0.10	mg/L	0		09-SEP-14	R2941501
Manganese (Mn)-Total	0.110	+/-0.0096		0.0020	mg/L	0		09-SEP-14	R2941501
Molybdenum (Mo)-Total	0.00273	+/-0.00033		0.000050	mg/L	0		09-SEP-14	R2941501
Nickel (Ni)-Total	0.00557	+/-0.00066		0.00010	mg/L	0		09-SEP-14	R2941501
Potassium (K)-Total	2.11	+/-0.18		0.10	mg/L	0		09-SEP-14	R2941501
Selenium (Se)-Total	0.00013	+/-0.00002	DTC	0.00010	mg/L	0		09-SEP-14	R2941501
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		09-SEP-14	R2941501
Sodium (Na)-Total	247	+/-22		0.50	mg/L	0		09-SEP-14	R2941501
Strontium (Sr)-Total	0.300	+/-0.027		0.00010	mg/L	0		09-SEP-14	R2941501

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-6 16054140830031									
Sampled By: BP/EA on 30-AUG-14 @ 11:50									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		09-SEP-14	R2941501
Tin (Sn)-Total	0.00130	+/-0.00017		0.00010	mg/L	0		09-SEP-14	R2941501
Titanium (Ti)-Total	0.00295	+/-0.00095		0.00030	mg/L	0		09-SEP-14	R2941501
Uranium (U)-Total	0.000369	+/-0.000037		0.000010	mg/L	0		09-SEP-14	R2941501
Vanadium (V)-Total	0.00124	+/-0.00018		0.00010	mg/L	0		09-SEP-14	R2941501
Zinc (Zn)-Total	0.0090	+/-0.0018		0.0040	mg/L	0		09-SEP-14	R2941501
Total Metals in Water by ICPOES									
Silicon (Si)-Total	5.57	+/-0.61	DLA	0.050	mg/L	0		09-SEP-14	R2941089
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		09-SEP-14	R2942548
Silicon (Si)-Dissolved	4.94	+/-0.41	DLA	0.050	mg/L	0		09-SEP-14	R2941089
Dissolved Organic Carbon	12.8	+/-2.0		1.0	mg/L	0		04-SEP-14	R2939224
Naphthenic Acids	<1.0	-		1.0	mg/L	-	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942503
Total Dissolved Solids	791	-		10	mg/L	-		03-SEP-14	R2939412
Turbidity	3.13	+/-0.26		0.10	NTU	0		02-SEP-14	R2935637
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Anthracene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Fluoranthene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Fluorene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Naphthalene	<0.000050	-		0.000050	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Phenanthrene	<0.000050	-		0.000050	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Pyrene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	05-SEP-14	05-SEP-14	R2939894
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	05-SEP-14	05-SEP-14	R2939894
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Surr: d10-Acenaphthene	83.1	-		N/A	%	-	05-SEP-14	05-SEP-14	R2939894
Surr: d10-Phenanthrene	81.9	-		N/A	%	-	05-SEP-14	05-SEP-14	R2939894
Surr: d12-Chrysene	94.5	-		N/A	%	-	05-SEP-14	05-SEP-14	R2939894
Major Ions & Trace Dissolved Metals									
Chloride (Cl)									
Chloride (Cl)	22.7	+/-1.0		0.10	mg/L	0		02-SEP-14	R2937088
Dis. Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005	mg/L	-		05-SEP-14	R2939443
				0					
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0027	+/-0.0006		0.0010	mg/L	0		08-SEP-14	R2941501
Antimony (Sb)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Arsenic (As)-Dissolved	0.0720	+/-0.0076		0.00010	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Dissolved	0.207	+/-0.018		0.000050	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-6 16054140830031									
Sampled By: BP/EA on 30-AUG-14 @ 11:50									
Matrix: WATER									
Dissolved Metals in Water by CRC ICPMS									
Boron (B)-Dissolved	0.350	+/-0.042		0.010	mg/L	0		08-SEP-14	R2941501
Cadmium (Cd)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Calcium (Ca)-Dissolved	25.1	+/-3.4		0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Dissolved	0.00019	+/-0.00002		0.00010	mg/L	0		08-SEP-14	R2941501
Cobalt (Co)-Dissolved	0.00076	+/-0.00007		0.00010	mg/L	0		08-SEP-14	R2941501
Copper (Cu)-Dissolved	<0.00010	-		0.00010	mg/L	-		08-SEP-14	R2941501
Iron (Fe)-Dissolved	0.634	+/-0.057		0.010	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Lithium (Li)-Dissolved	0.0174	+/-0.0022		0.0050	mg/L	0		08-SEP-14	R2941501
Magnesium (Mg)-Dissolved	9.26	+/-0.72		0.10	mg/L	0		08-SEP-14	R2941501
Manganese (Mn)-Dissolved	0.0942	+/-0.0064		0.0020	mg/L	0		08-SEP-14	R2941501
Molybdenum (Mo)-Dissolved	0.00164	+/-0.00017		0.000050	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Dissolved	0.00195	+/-0.00016		0.00010	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Dissolved	2.11	+/-0.16		0.10	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Dissolved	0.00054	+/-0.00009	DTC	0.00010	mg/L	0		08-SEP-14	R2941501
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		08-SEP-14	R2941501
Sodium (Na)-Dissolved	250	+/-18		0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Dissolved	0.286	+/-0.021		0.00010	mg/L	0		08-SEP-14	R2941501
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		08-SEP-14	R2941501
Titanium (Ti)-Dissolved	0.00051	+/-0.00025		0.00030	mg/L	0		08-SEP-14	R2941501
Tin (Sn)-Dissolved	0.00027	+/-0.00002		0.00010	mg/L	0		08-SEP-14	R2941501
Uranium (U)-Dissolved	0.000295	+/-0.000030		0.000010	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Dissolved	0.00083	+/-0.00007		0.00010	mg/L	0		08-SEP-14	R2941501
Zinc (Zn)-Dissolved	<0.0040	-		0.0040	mg/L	-		08-SEP-14	R2941501
Ion Balance Calculation									
Ion Balance	89.8	-	BL:INT		%	-		09-SEP-14	
TDS (Calculated)	765	-			mg/L	-		09-SEP-14	
Hardness (as CaCO3)	101	-			mg/L	-		09-SEP-14	
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		03-SEP-14	
Nitrate-N									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		02-SEP-14	R2937088
Nitrite-N									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		02-SEP-14	R2937088
Sulfate (SO4)									
Sulfate (SO4)	113	+/-5.2		0.50	mg/L	0		02-SEP-14	R2937088
pH, Conductivity and Total Alkalinity									
pH	8.25	-		0.10	pH	-		02-SEP-14	R2936748
Conductivity (EC)	1230	-		3.0	uS/cm	-		02-SEP-14	R2936748
Bicarbonate (HCO3)	697	-		5.0	mg/L	-		02-SEP-14	R2936748
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Alkalinity, Total (as CaCO3)	572	-		5.0	mg/L	-		02-SEP-14	R2936748
Diss. Si (reported as Silica) by ICPOES									
Silicon (reported as Silica)									
Silicon (as SiO2)	11.9	-		0.30	mg/L	-		09-SEP-14	
Total Si (reported as Silica) by ICPOES									
Total Silicon (reported as Silica)									
Silicon (as SiO2)-Total	11.9	-		0.11	mg/L	-		10-SEP-14	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-7 16054140830032									
Sampled By: BP/EA on 30-AUG-14 @ 12:53									
Matrix: WATER									
Ammonia, Total (as N)	2.51	-	DLA	0.25	mg/L	-		09-SEP-14	R2942548
Silicon (Si)-Dissolved	3.68	+/-0.31	DLA	0.050	mg/L	0		09-SEP-14	R2941089
Dissolved Organic Carbon	16.7	+/-2.5		1.0	mg/L	0		04-SEP-14	R2939224
Naphthenic Acids	4.0	+/-0.8		1.0	mg/L	0	08-SEP-14	10-SEP-14	R2944891
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		09-SEP-14	R2942503
Total Dissolved Solids	1660	-		10	mg/L	-		03-SEP-14	R2939412
Turbidity	6.51	+/-0.50		0.10	NTU	0		02-SEP-14	R2935637
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Anthracene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Fluoranthene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Fluorene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Naphthalene	<0.000050	-		0.000050	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Phenanthrene	<0.000050	-		0.000050	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Pyrene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Benzo(a)pyrene	<0.000050	-		0.000050	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Chrysene	<0.000020	-		0.000020	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Dibenzo(a,h)anthracene	<0.000050	-		0.000050	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	05-SEP-14	05-SEP-14	R2939894
Surr: d10-Acenaphthene	90.5	-		N/A	%	-	05-SEP-14	05-SEP-14	R2939894
Surr: d10-Phenanthrene	89.2	-		N/A	%	-	05-SEP-14	05-SEP-14	R2939894
Surr: d12-Chrysene	93.8	-		N/A	%	-	05-SEP-14	05-SEP-14	R2939894
Major Ions & Trace Dissolved Metals									
Chloride (Cl)									
Chloride (Cl)	538	+/-24		0.10	mg/L	0		02-SEP-14	R2937088
Dis. Mercury in Water by CVAAS (Low)									
Mercury (Hg)-Dissolved	<0.000050	-		0.000050	mg/L	-		05-SEP-14	R2939443
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0066	+/-0.0011	DLA	0.0050	mg/L	0		08-SEP-14	R2941501
Antimony (Sb)-Dissolved	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Arsenic (As)-Dissolved	0.0454	+/-0.0048	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Barium (Ba)-Dissolved	0.313	+/-0.027	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Beryllium (Be)-Dissolved	<0.0025	-	DLA	0.0025	mg/L	-		08-SEP-14	R2941501
Bismuth (Bi)-Dissolved	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Boron (B)-Dissolved	0.746	+/-0.090	DLA	0.050	mg/L	0		08-SEP-14	R2941501
Cadmium (Cd)-Dissolved	<0.000050	-	DLA	0.000050	mg/L	-		08-SEP-14	R2941501
Calcium (Ca)-Dissolved	24.8	+/-3.4	DLA	0.10	mg/L	0		08-SEP-14	R2941501
Chromium (Cr)-Dissolved	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Cobalt (Co)-Dissolved	0.00072	+/-0.00007	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Copper (Cu)-Dissolved	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Iron (Fe)-Dissolved	0.401	+/-0.036	DLA	0.050	mg/L	0		08-SEP-14	R2941501
Lead (Pb)-Dissolved	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Lithium (Li)-Dissolved	0.057	+/-0.007	DLA	0.025	mg/L	0		08-SEP-14	R2941501
Magnesium (Mg)-Dissolved	8.83	+/-0.69	DLA	0.10	mg/L	0		08-SEP-14	R2941501

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-7 16054140830032 Sampled By: BP/EA on 30-AUG-14 @ 12:53 Matrix: WATER									
Dissolved Metals in Water by CRC ICPMS									
Manganese (Mn)-Dissolved	0.105	+/-0.0072	DLA	0.0020	mg/L	0		08-SEP-14	R2941501
Molybdenum (Mo)-Dissolved	0.0101	+/-0.0011	DLA	0.00025	mg/L	0		08-SEP-14	R2941501
Nickel (Ni)-Dissolved	0.00142	+/-0.00012	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Potassium (K)-Dissolved	3.75	+/-0.29	DLA	0.25	mg/L	0		08-SEP-14	R2941501
Selenium (Se)-Dissolved	0.00089	+/-0.00015	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Silver (Ag)-Dissolved	<0.000050	-	DLA	0.000050	mg/L	-		08-SEP-14	R2941501
Sodium (Na)-Dissolved	539	+/-38	DLA	0.50	mg/L	0		08-SEP-14	R2941501
Strontium (Sr)-Dissolved	0.414	+/-0.031	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Thallium (Tl)-Dissolved	<0.00025	-	DLA	0.00025	mg/L	-		08-SEP-14	R2941501
Titanium (Ti)-Dissolved	<0.0015	-	DLA	0.0015	mg/L	-		08-SEP-14	R2941501
Tin (Sn)-Dissolved	0.00116	+/-0.00010	DLA	0.00050	mg/L	0		08-SEP-14	R2941501
Uranium (U)-Dissolved	0.000582	+/-0.000060	DLA	0.000050	mg/L	0		08-SEP-14	R2941501
Vanadium (V)-Dissolved	<0.00050	-	DLA	0.00050	mg/L	-		08-SEP-14	R2941501
Zinc (Zn)-Dissolved	<0.020	-	DLA	0.020	mg/L	-		08-SEP-14	R2941501
Ion Balance Calculation									
Ion Balance	89.1	-	BL:INT		%	-		09-SEP-14	
TDS (Calculated)	1560	-			mg/L	-		09-SEP-14	
Hardness (as CaCO3)	98.3	-			mg/L	-		09-SEP-14	
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		03-SEP-14	
Nitrate-N									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		02-SEP-14	R2937088
Nitrite-N									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		02-SEP-14	R2937088
Sulfate (SO4)									
Sulfate (SO4)	91.1	+/-4.1		0.50	mg/L	0		02-SEP-14	R2937088
pH, Conductivity and Total Alkalinity									
pH	8.34	-		0.10	pH	-		02-SEP-14	R2936748
Conductivity (EC)	2800	-		3.0	uS/cm	-		02-SEP-14	R2936748
Bicarbonate (HCO3)	702	-		5.0	mg/L	-		02-SEP-14	R2936748
Carbonate (CO3)	7.9	-		5.0	mg/L	-		02-SEP-14	R2936748
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		02-SEP-14	R2936748
Alkalinity, Total (as CaCO3)	589	-		5.0	mg/L	-		02-SEP-14	R2936748
Diss. Si (reported as Silica) by ICPOES									
Silicon (reported as Silica)									
Silicon (as SiO2)	8.80	-		0.30	mg/L	-		09-SEP-14	
Total Si (reported as Silica) by ICPOES									
Total Silicon (reported as Silica)									
Silicon (as SiO2)-Total	8.80	-		0.11	mg/L	-		09-SEP-14	
L1510941-8 16054140830033 Sampled By: BP/EA on 30-AUG-14 @ 13:05 Matrix: WATER									
BTEX, Styrene and F1 (C6-C10)									
Benzene	0.0847	+/-0.019		0.00050	mg/L	0	03-SEP-14	03-SEP-14	R2937510
Toluene	0.0721	+/-0.017		0.00050	mg/L	0	03-SEP-14	03-SEP-14	R2937510
Ethylbenzene	0.0626	+/-0.012		0.00050	mg/L	0	03-SEP-14	03-SEP-14	R2937510
o-Xylene	0.0646	+/-0.013		0.00050	mg/L	0	03-SEP-14	03-SEP-14	R2937510
m+p-Xylene	0.124	+/-0.030		0.00050	mg/L	0	03-SEP-14	03-SEP-14	R2937510
Xylenes	0.188	+/-0.043		0.00071	mg/L	0	03-SEP-14	03-SEP-14	R2937510
Styrene	0.0635	+/-0.014		0.0010	mg/L	0	03-SEP-14	03-SEP-14	R2937510

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1510941-8 16054140830033 Sampled By: BP/EA on 30-AUG-14 @ 13:05 Matrix: WATER BTEX, Styrene and F1 (C6-C10)									
F1(C6-C10)	0.86	+/-0.16		0.10	mg/L	0	03-SEP-14	03-SEP-14	R2937510
F1-BTEX	0.45	-		0.10	mg/L	-	03-SEP-14	03-SEP-14	R2937510
L1510941-9 16054140830034 Sampled By: BP/EA on 30-AUG-14 @ 13:32 Matrix: WATER BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-	04-SEP-14	04-SEP-14	R2937510
Toluene	<0.00050	-		0.00050	mg/L	-	04-SEP-14	04-SEP-14	R2937510
Ethylbenzene	<0.00050	-		0.00050	mg/L	-	04-SEP-14	04-SEP-14	R2937510
o-Xylene	<0.00050	-		0.00050	mg/L	-	04-SEP-14	04-SEP-14	R2937510
m+p-Xylene	<0.00050	-		0.00050	mg/L	-	04-SEP-14	04-SEP-14	R2937510
Xylenes	<0.00071	-		0.00071	mg/L	-	04-SEP-14	04-SEP-14	R2937510
Styrene	<0.0010	-		0.0010	mg/L	-	04-SEP-14	04-SEP-14	R2937510
F1(C6-C10)	<0.10	-		0.10	mg/L	-	04-SEP-14	04-SEP-14	R2937510
F1-BTEX	<0.10	-		0.10	mg/L	-	04-SEP-14	04-SEP-14	R2937510
* Refer to Referenced Information for Qualifiers (if any) and Methodology.									

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Dissolved Organic Carbon	DLA	
Method Blank	Copper (Cu)-Total	MB-LOR	
Method Blank	Vanadium (V)-Total	MB-LOR	
Method Blank	Barium (Ba)-Total	MB-LOR	

Qualifiers for Sample Submission Listed:

Qualifier	Description
WSMD	Dissolved Hg - Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
BTXS,F1-CL	Water	BTEX, Styrene and F1 (C6-C10)		EPA 5030/8015&8260-P&T GC-MS & FID
C-DIS-ORG-CL	Water	Dissolved Organic Carbon		APHA 5310 B-Instrumental
CL-CL	Water	Chloride (Cl)		APHA 4110 B-Ion Chromatography

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography"

F2,F3,F4-CL	Water	F2, F3, F4		EPA 3511/ CCME PHC CWS GC-FID
-------------	-------	------------	--	-------------------------------

Water samples are spiked with 2-BBTF surrogate, and extracted by reciprocal action shaker for 30 minutes using a single micro-extraction with 2 mL hexane. After extraction, hexane extracts are dispensed into GC vials for GC-FID analysis.

HG-D-L-CVAA-CL	Water	Dis. Mercury in Water by CVAAS (Low)		EPA 245.1
----------------	-------	--------------------------------------	--	-----------

This analysis is carried out using procedures adapted from Method 245.1 by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorbance spectrophotometry (CVAAS).

HG-T-L-CVAA-CL	Water	Total Mercury in Water by CVAAS (Low)		EPA 245.1
----------------	-------	---------------------------------------	--	-----------

This analysis is carried out using procedures adapted from Method 245.1 by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorbance spectrophotometry (CVAAS).

IONBALANCE-CL	Water	Ion Balance Calculation		APHA 1030E
MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ICP-CL	Water	Dissolved Metals by ICPOES		EPA SW-846 3005A/6010B
----------------	-------	----------------------------	--	------------------------

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
---------------	-------	------------------------------------	--	----------------------------------

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
MET-TOT-ICP-CL	Water	Total Metals in Water by ICPOES		EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion using a hotblock (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).				
N2N3-CALC-CL	Water	Nitrate+Nitrite		CALCULATION
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR,Syncrude,1994
Dissolved naphthenic acids are solvent extracted from acidified aqueous samples using Dichloromethane prior to quantitation by Fourier Transform Infra-Red spectroscopy. Note that FTIR is not uniquely selective to naphthenic acids. If present, other carboxylic acids (e.g. humic acids, fulvic acids) may also be detected by this method.				
NH4-CL	Water	Ammonia-N		APHA 4500 NH3F-Colorimetry
Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.				
NO2-CL	Water	Nitrite-N		APHA 4110 B-Ion Chromatography
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.				
NO3-IC-CL	Water	Nitrate-N		APHA 4110 B-Ion Chromatography
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance				
PAH-ABT1-CL	Water	PAH & Carcinogenic PAH List		EPA 3510/8270-GC/MS
PH/EC/ALK-CL	Water	pH, Conductivity and Total Alkalinity		APHA 4500H,2510,2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed) pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid Conductivity measurement is based on the sample's capacity to convey an electric current				
PHENOLS-4AAP-ED	Water	Phenols (4AAP)		AB ENV.06537-COLORIMETRIC
This analysis is carried out using procedures adapted from ENVIRODAT VMV 06537 689, Method Code 154, in "Methods Manual for Chemical Analysis of Water and Wastes" published by the Alberta Environmental Centre. This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide and 4-aminoantipyrine to form a red complex which is measured at 505 nm.				
SIO2-CALC-CL	Water	Silicon (reported as Silica)		ICP/CALCULATION-ICP/CALCULATION
SIO2-T-CALC-CL	Water	Total Silicon (reported as Silica)		ICP/CALCULATION-ICP/CALCULATION
SO4-CL	Water	Sulfate (SO4)		APHA 4110 B-Ion Chromatography
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography"				
SOLIDS-TDS-CL	Water	Total Dissolved Solids		APHA 2540 C
TURBIDITY-CL	Water	Turbidity		APHA 2130 B-Nephelometer
This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.				

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
FM	ALS ENVIRONMENTAL - FORT MCMURRAY, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

M061305

Reference Information

GLOSSARY OF REPORT TERMS

Surr - Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.

Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent.

Zero values indicate no detectable method bias.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental

Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 1 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-CL		Water						
Batch	R2937510							
WG1944017-3	DUP	L1510998-1						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	03-SEP-14
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	03-SEP-14
Ethylbenzene		0.00059	0.00058		mg/L	1.7	30	03-SEP-14
o-Xylene		0.00115	0.00107		mg/L	7.2	30	03-SEP-14
m+p-Xylene		0.00083	0.00071		mg/L	16	30	03-SEP-14
Xylenes		0.00198	0.00178		mg/L	11	30	03-SEP-14
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	03-SEP-14
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	03-SEP-14
WG1944017-2	LCS							
Benzene			116.4		%		70-130	03-SEP-14
Toluene			104.8		%		70-130	03-SEP-14
Ethylbenzene			108.6		%		70-130	03-SEP-14
o-Xylene			107.6		%		70-130	03-SEP-14
m+p-Xylene			105.7		%		70-130	03-SEP-14
Xylenes			106.7		%		70-130	03-SEP-14
Styrene			101.3		%		70-130	03-SEP-14
F1(C6-C10)			90.3		%		70-130	03-SEP-14
WG1944017-1	MB							
Benzene			<0.00050		mg/L		0.0005	03-SEP-14
Toluene			<0.00050		mg/L		0.0005	03-SEP-14
Ethylbenzene			<0.00050		mg/L		0.0005	03-SEP-14
o-Xylene			<0.00050		mg/L		0.0005	03-SEP-14
m+p-Xylene			<0.00050		mg/L		0.0005	03-SEP-14
Xylenes			<0.00071		mg/L		0.00071	03-SEP-14
Styrene			<0.0010		mg/L		0.001	03-SEP-14
F1(C6-C10)			<0.10		mg/L		0.1	03-SEP-14
C-DIS-ORG-CL		Water						
Batch	R2939224							
WG1945440-3	DUP	L1510697-1						
Dissolved Organic Carbon		81.5	85.7		mg/L	5.0	20	04-SEP-14
WG1945440-4	DUP	L1509884-1						
Dissolved Organic Carbon		1230	1210		mg/L	1.9	20	04-SEP-14
WG1945440-2	LCS							
Dissolved Organic Carbon			87.6		%		80-120	04-SEP-14



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 2 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-CL		Water						
Batch	R2939224							
WG1945440-1	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	04-SEP-14
CL-CL		Water						
Batch	R2937088							
WG1943831-3	DUP	L1510941-7						
Chloride (Cl)		538	537		mg/L	0.3	20	02-SEP-14
WG1943831-2	LCS							
Chloride (Cl)			100.5		%		90-110	02-SEP-14
WG1943831-1	MB							
Chloride (Cl)			<0.10		mg/L		0.1	02-SEP-14
WG1943831-4	MS	L1511211-3						
Chloride (Cl)			100.4		%		75-125	02-SEP-14
F2,F3,F4-CL		Water						
Batch	R2935533							
WG1942939-2	LCS							
F2 (>C10-C16)			105.8		%		65-135	02-SEP-14
F3 (C16-C34)			105.8		%		65-135	02-SEP-14
F4 (C34-C50)			105.8		%		65-135	02-SEP-14
WG1942939-1	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	02-SEP-14
F3 (C16-C34)			<0.25		mg/L		0.25	02-SEP-14
F4 (C34-C50)			<0.25		mg/L		0.25	02-SEP-14
WG1942939-3	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	03-SEP-14
F3 (C16-C34)			<0.25		mg/L		0.25	03-SEP-14
F4 (C34-C50)			<0.25		mg/L		0.25	03-SEP-14
HG-D-L-CVAA-CL		Water						
Batch	R2939443							
WG1945677-4	DUP	L1510697-6						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	05-SEP-14
WG1945677-1	MB							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	05-SEP-14
HG-T-L-CVAA-CL		Water						



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 3 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-L-CVAA-CL								
	Water							
Batch	R2939443							
WG1945677-4	DUP	L1510697-6						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	05-SEP-14
WG1945677-1	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	05-SEP-14
MET-D-CCMS-CL								
	Water							
Batch	R2941501							
WG1946997-5	CRM	TMRM						
Aluminum (Al)-Dissolved			105.6		%		80-120	08-SEP-14
Antimony (Sb)-Dissolved			98.0		%		80-120	08-SEP-14
Arsenic (As)-Dissolved			103.5		%		80-120	08-SEP-14
Barium (Ba)-Dissolved			111.3		%		80-120	08-SEP-14
Beryllium (Be)-Dissolved			95.9		%		80-120	08-SEP-14
Bismuth (Bi)-Dissolved			92.9		%		80-120	08-SEP-14
Boron (B)-Dissolved			92.4		%		80-120	08-SEP-14
Cadmium (Cd)-Dissolved			103.2		%		80-120	08-SEP-14
Calcium (Ca)-Dissolved			95.4		%		80-120	08-SEP-14
Chromium (Cr)-Dissolved			103.3		%		80-120	08-SEP-14
Cobalt (Co)-Dissolved			104.2		%		80-120	08-SEP-14
Copper (Cu)-Dissolved			97.8		%		80-120	08-SEP-14
Iron (Fe)-Dissolved			97.3		%		80-120	08-SEP-14
Lead (Pb)-Dissolved			94.6		%		80-120	08-SEP-14
Lithium (Li)-Dissolved			99.5		%		80-120	08-SEP-14
Magnesium (Mg)-Dissolved			98.1		%		80-120	08-SEP-14
Manganese (Mn)-Dissolved			105.4		%		80-120	08-SEP-14
Molybdenum (Mo)-Dissolved			97.9		%		80-120	08-SEP-14
Nickel (Ni)-Dissolved			103.4		%		80-120	08-SEP-14
Potassium (K)-Dissolved			103.2		%		80-120	08-SEP-14
Selenium (Se)-Dissolved			98.1		%		80-120	08-SEP-14
Silver (Ag)-Dissolved			107.0		%		80-120	08-SEP-14
Sodium (Na)-Dissolved			101.9		%		80-120	08-SEP-14
Strontium (Sr)-Dissolved			96.2		%		80-120	08-SEP-14
Thallium (Tl)-Dissolved			96.2		%		80-120	08-SEP-14
Titanium (Ti)-Dissolved			111.3		%		80-120	08-SEP-14
Tin (Sn)-Dissolved			99.2		%		80-120	08-SEP-14
Uranium (U)-Dissolved			98.1		%		80-120	08-SEP-14



Environmental

Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 4 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL								
	Water							
Batch	R2941501							
WG1946997-5 CRM		TMRM						
Vanadium (V)-Dissolved			105.1		%		80-120	08-SEP-14
Zinc (Zn)-Dissolved			96.3		%		80-120	08-SEP-14
WG1946997-6 DUP		L1510697-5						
Aluminum (Al)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	08-SEP-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Barium (Ba)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-SEP-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-14
Calcium (Ca)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	08-SEP-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Copper (Cu)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-SEP-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Lithium (Li)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	08-SEP-14
Magnesium (Mg)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	08-SEP-14
Manganese (Mn)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Nickel (Ni)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Potassium (K)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	08-SEP-14
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-14
Sodium (Na)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	08-SEP-14
Strontium (Sr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Thallium (Tl)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	08-SEP-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-14
Vanadium (V)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Zinc (Zn)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	08-SEP-14



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 5 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-CL		Water						
Batch	R2941089							
WG1946751-4	DUP	L1513629-1						
Silicon (Si)-Dissolved		7.44	7.38		mg/L	0.8	20	09-SEP-14
WG1946751-5	DUP	L1513344-1						
Silicon (Si)-Dissolved		4.00	4.06		mg/L	1.4	20	09-SEP-14
WG1946751-1	MB							
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	09-SEP-14
MET-T-CCMS-CL		Water						
Batch	R2941501							
WG1946997-2	CRM	TMRM						
Aluminum (Al)-Total			101.6		%		80-120	08-SEP-14
Antimony (Sb)-Total			100.1		%		80-120	08-SEP-14
Arsenic (As)-Total			100.2		%		80-120	08-SEP-14
Barium (Ba)-Total			102.3		%		80-120	08-SEP-14
Beryllium (Be)-Total			95.8		%		80-120	08-SEP-14
Bismuth (Bi)-Total			93.8		%		80-120	08-SEP-14
Boron (B)-Total			90.7		%		80-120	08-SEP-14
Cadmium (Cd)-Total			95.7		%		80-120	08-SEP-14
Calcium (Ca)-Total			98.5		%		80-120	08-SEP-14
Chromium (Cr)-Total			99.1		%		80-120	08-SEP-14
Cobalt (Co)-Total			101.0		%		80-120	08-SEP-14
Copper (Cu)-Total			94.8		%		80-120	08-SEP-14
Iron (Fe)-Total			101.1		%		80-120	08-SEP-14
Lead (Pb)-Total			97.0		%		80-120	08-SEP-14
Lithium (Li)-Total			97.0		%		80-120	08-SEP-14
Magnesium (Mg)-Total			95.7		%		80-120	08-SEP-14
Manganese (Mn)-Total			101.0		%		80-120	08-SEP-14
Molybdenum (Mo)-Total			98.2		%		80-120	08-SEP-14
Nickel (Ni)-Total			100.2		%		80-120	08-SEP-14
Potassium (K)-Total			100.6		%		80-120	08-SEP-14
Selenium (Se)-Total			98.9		%		80-120	08-SEP-14
Silver (Ag)-Total			105.2		%		80-120	08-SEP-14
Sodium (Na)-Total			98.1		%		80-120	08-SEP-14
Strontium (Sr)-Total			97.6		%		80-120	08-SEP-14
Thallium (Tl)-Total			99.1		%		80-120	08-SEP-14
Tin (Sn)-Total			96.8		%		80-120	08-SEP-14



Environmental

Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 6 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL								
	Water							
Batch	R2941501							
WG1946997-2 CRM		TMRM						
Titanium (Ti)-Total			98.3		%		80-120	08-SEP-14
Uranium (U)-Total			98.6		%		80-120	08-SEP-14
Vanadium (V)-Total			103.3		%		80-120	08-SEP-14
Zinc (Zn)-Total			94.8		%		80-120	08-SEP-14
WG1947089-2 CRM		TMRM						
Aluminum (Al)-Total			89.2		%		80-120	08-SEP-14
Antimony (Sb)-Total			94.8		%		80-120	08-SEP-14
Arsenic (As)-Total			91.7		%		80-120	08-SEP-14
Barium (Ba)-Total			95.2		%		80-120	08-SEP-14
Beryllium (Be)-Total			88.0		%		80-120	08-SEP-14
Bismuth (Bi)-Total			87.9		%		80-120	08-SEP-14
Boron (B)-Total			84.2		%		80-120	08-SEP-14
Cadmium (Cd)-Total			91.0		%		80-120	08-SEP-14
Calcium (Ca)-Total			90.1		%		80-120	08-SEP-14
Chromium (Cr)-Total			89.7		%		80-120	08-SEP-14
Cobalt (Co)-Total			88.6		%		80-120	08-SEP-14
Copper (Cu)-Total			86.9		%		80-120	08-SEP-14
Iron (Fe)-Total			89.1		%		80-120	08-SEP-14
Lead (Pb)-Total			89.8		%		80-120	08-SEP-14
Lithium (Li)-Total			90.3		%		80-120	08-SEP-14
Magnesium (Mg)-Total			86.1		%		80-120	08-SEP-14
Manganese (Mn)-Total			90.8		%		80-120	08-SEP-14
Molybdenum (Mo)-Total			92.7		%		80-120	08-SEP-14
Nickel (Ni)-Total			90.7		%		80-120	08-SEP-14
Potassium (K)-Total			91.0		%		80-120	08-SEP-14
Selenium (Se)-Total			91.0		%		80-120	08-SEP-14
Silver (Ag)-Total			98.8		%		80-120	08-SEP-14
Sodium (Na)-Total			87.4		%		80-120	08-SEP-14
Strontium (Sr)-Total			90.7		%		80-120	08-SEP-14
Thallium (Tl)-Total			91.8		%		80-120	08-SEP-14
Tin (Sn)-Total			91.0		%		80-120	08-SEP-14
Titanium (Ti)-Total			86.5		%		80-120	08-SEP-14
Uranium (U)-Total			92.8		%		80-120	08-SEP-14
Vanadium (V)-Total			93.0		%		80-120	08-SEP-14



Environmental

Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 7 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL		Water						
Batch	R2941501							
WG1947089-2	CRM	TMRM						
Zinc (Zn)-Total			83.9		%		80-120	08-SEP-14
WG1946997-3	DUP	L1510346-1						
Aluminum (Al)-Total		0.0195	0.0191		mg/L	2.0	20	08-SEP-14
Antimony (Sb)-Total		0.00048	0.00056		mg/L	15	20	08-SEP-14
Arsenic (As)-Total		0.00199	0.00184		mg/L	7.8	20	08-SEP-14
Barium (Ba)-Total		0.0431	0.0389		mg/L	10	20	08-SEP-14
Beryllium (Be)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Boron (B)-Total		0.045	0.048		mg/L	7.2	20	08-SEP-14
Cadmium (Cd)-Total		0.000041	0.000038		mg/L	6.4	20	08-SEP-14
Calcium (Ca)-Total		26.7	27.0		mg/L	1.1	20	08-SEP-14
Chromium (Cr)-Total		0.00081	0.00075		mg/L	7.8	20	08-SEP-14
Cobalt (Co)-Total		0.00053	0.00049		mg/L	6.8	20	08-SEP-14
Copper (Cu)-Total		0.00924	0.0101		mg/L	9.1	20	08-SEP-14
Iron (Fe)-Total		24.5	23.0		mg/L	6.3	20	08-SEP-14
Lead (Pb)-Total		0.000646	0.000675		mg/L	4.3	20	08-SEP-14
Lithium (Li)-Total		0.0089	0.0087		mg/L	2.9	20	08-SEP-14
Magnesium (Mg)-Total		2.37	2.20		mg/L	7.6	20	08-SEP-14
Manganese (Mn)-Total		0.456	0.429		mg/L	6.2	20	08-SEP-14
Molybdenum (Mo)-Total		0.0231	0.0237		mg/L	2.3	20	08-SEP-14
Nickel (Ni)-Total		0.00627	0.00577		mg/L	8.2	20	08-SEP-14
Potassium (K)-Total		12.6	11.5		mg/L	8.6	20	08-SEP-14
Selenium (Se)-Total		0.00030	0.00034		mg/L	13	20	08-SEP-14
Silver (Ag)-Total		0.000012	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-14
Sodium (Na)-Total		101	88.6		mg/L	13	20	08-SEP-14
Strontium (Sr)-Total		0.152	0.157		mg/L	3.1	20	08-SEP-14
Thallium (Tl)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Titanium (Ti)-Total		0.00053	0.00038	J	mg/L	0.00015	0.0006	08-SEP-14
Uranium (U)-Total		0.000035	0.000036		mg/L	4.0	20	08-SEP-14
Vanadium (V)-Total		0.00126	0.00118		mg/L	7.3	20	08-SEP-14
Zinc (Zn)-Total		0.0627	0.0589		mg/L	6.3	20	08-SEP-14
WG1947089-4	DUP	L1510655-8						



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 8 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL								
	Water							
Batch	R2941501							
WG1947089-4	DUP	L1510655-8						
Aluminum (Al)-Total		0.0535	0.0505		mg/L	5.8	20	08-SEP-14
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Arsenic (As)-Total		0.00027	0.00026		mg/L	3.0	20	08-SEP-14
Barium (Ba)-Total		0.122	0.118		mg/L	3.5	20	08-SEP-14
Beryllium (Be)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Boron (B)-Total		0.014	0.014		mg/L	2.7	20	08-SEP-14
Cadmium (Cd)-Total		0.000022	0.000022		mg/L	0.0	20	08-SEP-14
Calcium (Ca)-Total		52.9	50.6		mg/L	4.3	20	08-SEP-14
Chromium (Cr)-Total		0.00011	0.00013		mg/L	17	20	08-SEP-14
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Copper (Cu)-Total		0.00072	0.00068		mg/L	5.6	20	08-SEP-14
Iron (Fe)-Total		0.093	0.098		mg/L	5.6	20	08-SEP-14
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Lithium (Li)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	08-SEP-14
Magnesium (Mg)-Total		10.9	10.7		mg/L	1.2	20	08-SEP-14
Manganese (Mn)-Total		0.00169	0.00168		mg/L	0.9	20	08-SEP-14
Molybdenum (Mo)-Total		0.000878	0.000863		mg/L	1.8	20	08-SEP-14
Nickel (Ni)-Total		0.00079	0.00075		mg/L	5.7	20	08-SEP-14
Potassium (K)-Total		0.940	0.924		mg/L	1.8	20	08-SEP-14
Selenium (Se)-Total		0.00039	0.00038		mg/L	4.2	20	08-SEP-14
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-14
Sodium (Na)-Total		4.89	4.78		mg/L	2.3	20	08-SEP-14
Strontium (Sr)-Total		0.388	0.373		mg/L	4.0	20	08-SEP-14
Thallium (Tl)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-14
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-14
Titanium (Ti)-Total		0.00067	0.00061		mg/L	8.3	20	08-SEP-14
Uranium (U)-Total		0.000684	0.000669		mg/L	2.2	20	08-SEP-14
Vanadium (V)-Total		0.00035	0.00036		mg/L	4.5	20	08-SEP-14
Zinc (Zn)-Total		<0.0050	<0.0040	RPD-NA	mg/L	N/A	20	08-SEP-14
WG1946997-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	08-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	08-SEP-14



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 9 of 20

Client: Matrix Solutions Inc.
 200 - 150 13 Ave SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL		Water						
Batch	R2941501							
WG1946997-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Beryllium (Be)-Total			<0.00050		mg/L		0.0005	08-SEP-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	08-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	08-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	08-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Copper (Cu)-Total			0.00017	MB-LOR	mg/L		0.0001	08-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	08-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	08-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	08-SEP-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	08-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	08-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	08-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Thallium (Tl)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	08-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	08-SEP-14
Vanadium (V)-Total			0.00020	MB-LOR	mg/L		0.0001	08-SEP-14
Zinc (Zn)-Total			<0.0040		mg/L		0.004	08-SEP-14
WG1947089-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	08-SEP-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Barium (Ba)-Total			0.000075	MB-LOR	mg/L		0.00005	08-SEP-14
Beryllium (Be)-Total			<0.00050		mg/L		0.0005	08-SEP-14



Environmental

Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 10 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL		Water						
Batch	R2941501							
WG1947089-1	MB							
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Boron (B)-Total			<0.010		mg/L		0.01	08-SEP-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	08-SEP-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	08-SEP-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Iron (Fe)-Total			<0.010		mg/L		0.01	08-SEP-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	08-SEP-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	08-SEP-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Potassium (K)-Total			<0.050		mg/L		0.05	08-SEP-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	08-SEP-14
Sodium (Na)-Total			<0.050		mg/L		0.05	08-SEP-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Thallium (Tl)-Total			<0.000050		mg/L		0.00005	08-SEP-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	08-SEP-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	08-SEP-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	08-SEP-14
Zinc (Zn)-Total			<0.0040		mg/L		0.004	08-SEP-14
MET-TOT-ICP-CL		Water						
Batch	R2941089							
WG1947089-2	CRM	TMRM						
Silicon (Si)-Total			110.0		%		80-120	09-SEP-14
WG1947089-3	DUP	L1510941-2						
Silicon (Si)-Total		13.1	11.1		mg/L	16	20	09-SEP-14
WG1947089-1	MB							
Silicon (Si)-Total			<0.050		mg/L		0.05	09-SEP-14
NAPHTHENIC-ACID-FM		Water						



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 11 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NAPHTHENIC-ACID-FM								
	Water							
Batch	R2944891							
WG1946484-3	DUP	L1509108-2						
Naphthenic Acids		2.0	2.1		mg/L	4.3	30	10-SEP-14
WG1946484-7	DUP	L1509864-2						
Naphthenic Acids		1.3	1.7		mg/L	29	30	10-SEP-14
WG1946484-4	LCS							
Naphthenic Acids			100.9		%		70-130	10-SEP-14
WG1946484-8	LCS							
Naphthenic Acids			100.2		%		70-130	10-SEP-14
WG1946484-1	MB							
Naphthenic Acids			<1.0		mg/L		1	10-SEP-14
WG1946484-5	MB							
Naphthenic Acids			<1.0		mg/L		1	10-SEP-14
WG1946484-2	MS	L1509108-1						
Naphthenic Acids			129.7		%		50-150	10-SEP-14
WG1946484-6	MS	L1509864-1						
Naphthenic Acids			115.8		%		50-150	10-SEP-14
NH4-CL								
	Water							
Batch	R2942548							
WG1947688-3	DUP	L1510941-4						
Ammonia, Total (as N)		0.062	0.066		mg/L	5.6	20	09-SEP-14
WG1947688-8	DUP	L1510490-2						
Ammonia, Total (as N)		0.115	0.125		mg/L	7.9	20	09-SEP-14
WG1947688-2	LCS							
Ammonia, Total (as N)			101.4		%		85-115	09-SEP-14
WG1947688-6	LCS							
Ammonia, Total (as N)			101.0		%		85-115	09-SEP-14
WG1947688-1	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	09-SEP-14
WG1947688-5	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	09-SEP-14
WG1947688-4	MS	L1510697-2						
Ammonia, Total (as N)			90.5		%		75-125	09-SEP-14
WG1947688-7	MS	L1510490-2						
Ammonia, Total (as N)			93.3		%		75-125	09-SEP-14
NO2-CL								
	Water							



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 12 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-CL		Water						
Batch	R2937088							
WG1943831-3	DUP	L1510941-7						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1943831-2	LCS							
Nitrite (as N)			103.5		%		90-110	02-SEP-14
WG1943831-1	MB							
Nitrite (as N)			<0.020		mg/L		0.02	02-SEP-14
WG1943831-4	MS	L1511211-3						
Nitrite (as N)			103.3		%		75-125	02-SEP-14
NO3-IC-CL		Water						
Batch	R2937088							
WG1943831-3	DUP	L1510941-7						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-14
WG1943831-2	LCS							
Nitrate (as N)			99.96		%		90-110	02-SEP-14
WG1943831-1	MB							
Nitrate (as N)			<0.050		mg/L		0.05	02-SEP-14
WG1943831-4	MS	L1511211-3						
Nitrate (as N)			99.7		%		75-125	02-SEP-14
PAH-ABT1-CL		Water						
Batch	R2939894							
WG1946004-2	LCS							
Acenaphthene			102.4		%		60-130	05-SEP-14
Acenaphthylene			101.7		%		60-130	05-SEP-14
Anthracene			102.6		%		60-130	05-SEP-14
Fluoranthene			101.3		%		60-130	05-SEP-14
Fluorene			103.2		%		60-130	05-SEP-14
Naphthalene			95.7		%		50-130	05-SEP-14
Phenanthrene			102.3		%		60-130	05-SEP-14
Pyrene			101.2		%		60-130	05-SEP-14
Benzo(a)anthracene			101.7		%		60-130	05-SEP-14
Benzo(k)fluoranthene			99.6		%		60-130	05-SEP-14
Benzo(b&j)fluoranthene			101.0		%		60-130	05-SEP-14
Benzo(g,h,i)perylene			99.0		%		60-130	05-SEP-14
Benzo(a)pyrene			104.3		%		60-130	05-SEP-14
Chrysene			100.8		%		60-130	05-SEP-14
Dibenzo(a,h)anthracene			106.0		%		60-130	05-SEP-14



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 13 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R2939894							
WG1946004-2	LCS							
Indeno(1,2,3-cd)pyrene			96.1		%		60-130	05-SEP-14
WG1946004-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	05-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	05-SEP-14
Anthracene			<0.000010		mg/L		0.00001	05-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	05-SEP-14
Fluorene			<0.000020		mg/L		0.00002	05-SEP-14
Naphthalene			<0.000050		mg/L		0.00005	05-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	05-SEP-14
Pyrene			<0.000010		mg/L		0.00001	05-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	05-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	05-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	05-SEP-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	05-SEP-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	05-SEP-14
Chrysene			<0.000020		mg/L		0.00002	05-SEP-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	05-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	05-SEP-14
Surrogate: d10-Acenaphthene			102.4		%		60-130	05-SEP-14
Surrogate: d10-Phenanthrene			102.0		%		60-130	05-SEP-14
Surrogate: d12-Chrysene			101.2		%		60-130	05-SEP-14
Batch	R2940122							
WG1946239-3	LCS							
Acenaphthene			96.0		%		60-130	04-SEP-14
Acenaphthylene			95.5		%		60-130	04-SEP-14
Anthracene			95.6		%		60-130	04-SEP-14
Fluoranthene			103.8		%		60-130	04-SEP-14
Fluorene			99.4		%		60-130	04-SEP-14
Naphthalene			91.4		%		50-130	04-SEP-14
Phenanthrene			101.5		%		60-130	04-SEP-14
Pyrene			104.5		%		60-130	04-SEP-14
Benzo(a)anthracene			109.5		%		60-130	04-SEP-14
Benzo(k)fluoranthene			107.8		%		60-130	04-SEP-14
Benzo(b&j)fluoranthene			113.6		%		60-130	04-SEP-14



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 14 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R2940122							
WG1946239-3	LCS							
Benzo(g,h,i)perylene			94.5		%		60-130	04-SEP-14
Benzo(a)pyrene			104.9		%		60-130	04-SEP-14
Chrysene			107.3		%		60-130	04-SEP-14
Dibenzo(a,h)anthracene			106.8		%		60-130	04-SEP-14
Indeno(1,2,3-cd)pyrene			92.3		%		60-130	04-SEP-14
WG1946239-4	LCS							
Acenaphthene			95.6		%		60-130	06-SEP-14
Acenaphthylene			96.3		%		60-130	06-SEP-14
Anthracene			98.1		%		60-130	06-SEP-14
Fluoranthene			105.1		%		60-130	06-SEP-14
Fluorene			99.2		%		60-130	06-SEP-14
Naphthalene			85.7		%		50-130	06-SEP-14
Phenanthrene			104.4		%		60-130	06-SEP-14
Pyrene			105.6		%		60-130	06-SEP-14
Benzo(a)anthracene			106.5		%		60-130	06-SEP-14
Benzo(k)fluoranthene			110.8		%		60-130	06-SEP-14
Benzo(b&j)fluoranthene			111.6		%		60-130	06-SEP-14
Benzo(g,h,i)perylene			110.8		%		60-130	06-SEP-14
Benzo(a)pyrene			106.9		%		60-130	06-SEP-14
Chrysene			109.1		%		60-130	06-SEP-14
Dibenzo(a,h)anthracene			112.9		%		60-130	06-SEP-14
Indeno(1,2,3-cd)pyrene			112.4		%		60-130	06-SEP-14
WG1946239-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	04-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	04-SEP-14
Anthracene			<0.000010		mg/L		0.00001	04-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	04-SEP-14
Fluorene			<0.000020		mg/L		0.00002	04-SEP-14
Naphthalene			<0.000050		mg/L		0.00005	04-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	04-SEP-14
Pyrene			<0.000010		mg/L		0.00001	04-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	04-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	04-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	04-SEP-14



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 15 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL	Water							
Batch	R2940122							
WG1946239-1 MB								
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	04-SEP-14
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	04-SEP-14
Chrysene			<0.000020		mg/L		0.00002	04-SEP-14
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	04-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	04-SEP-14
Surrogate: d10-Acenaphthene			89.4		%		60-130	04-SEP-14
Surrogate: d10-Phenanthrene			96.4		%		60-130	04-SEP-14
Surrogate: d12-Chrysene			98.9		%		60-130	04-SEP-14
WG1946239-2 MB								
Acenaphthene			<0.000020		mg/L		0.00002	04-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	04-SEP-14
Anthracene			<0.000010		mg/L		0.00001	04-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	04-SEP-14
Fluorene			<0.000020		mg/L		0.00002	04-SEP-14
Naphthalene			<0.000050		mg/L		0.00005	04-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	04-SEP-14
Pyrene			<0.000010		mg/L		0.00001	04-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	04-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	04-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	04-SEP-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	04-SEP-14
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	04-SEP-14
Chrysene			<0.000020		mg/L		0.00002	04-SEP-14
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	04-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	04-SEP-14
Surrogate: d10-Acenaphthene			97.3		%		60-130	04-SEP-14
Surrogate: d10-Phenanthrene			98.4		%		60-130	04-SEP-14
Surrogate: d12-Chrysene			98.4		%		60-130	04-SEP-14
WG1946239-5 MB								
Acenaphthene			<0.000020		mg/L		0.00002	06-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	06-SEP-14
Anthracene			<0.000010		mg/L		0.00001	06-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	06-SEP-14
Fluorene			<0.000020		mg/L		0.00002	06-SEP-14



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 16 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R2940122							
WG1946239-5	MB							
Naphthalene			<0.000050		mg/L		0.00005	06-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	06-SEP-14
Pyrene			<0.000010		mg/L		0.00001	06-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	06-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	06-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	06-SEP-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	06-SEP-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	06-SEP-14
Chrysene			<0.000020		mg/L		0.00002	06-SEP-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	06-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	06-SEP-14
Surrogate: d10-Acenaphthene			87.1		%		60-130	06-SEP-14
Surrogate: d10-Phenanthrene			95.0		%		60-130	06-SEP-14
Surrogate: d12-Chrysene			98.8		%		60-130	06-SEP-14
WG1946239-6	MB							
Acenaphthene			<0.000020		mg/L		0.00002	07-SEP-14
Acenaphthylene			<0.000020		mg/L		0.00002	07-SEP-14
Anthracene			<0.000010		mg/L		0.00001	07-SEP-14
Fluoranthene			<0.000020		mg/L		0.00002	07-SEP-14
Fluorene			<0.000020		mg/L		0.00002	07-SEP-14
Naphthalene			<0.000050		mg/L		0.00005	07-SEP-14
Phenanthrene			<0.000050		mg/L		0.00005	07-SEP-14
Pyrene			<0.000010		mg/L		0.00001	07-SEP-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	07-SEP-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	07-SEP-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	07-SEP-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	07-SEP-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	07-SEP-14
Chrysene			<0.000020		mg/L		0.00002	07-SEP-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	07-SEP-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	07-SEP-14
Surrogate: d10-Acenaphthene			80.9		%		60-130	07-SEP-14
Surrogate: d10-Phenanthrene			93.4		%		60-130	07-SEP-14
Surrogate: d12-Chrysene			93.1		%		60-130	07-SEP-14



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 17 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-CL		Water						
Batch	R2936748							
WG1943628-3	DUP	L1510998-1						
pH		8.15	8.15	J	pH	0.00	0.2	02-SEP-14
Conductivity (EC)		286	286		uS/cm	0.0	10	02-SEP-14
Bicarbonate (HCO3)		158	158		mg/L	0.5	20	02-SEP-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	20	02-SEP-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	20	02-SEP-14
Alkalinity, Total (as CaCO3)		129	130		mg/L	0.5	20	02-SEP-14
WG1943628-2	LCS							
pH			7.01		pH		6.9-7.1	02-SEP-14
Conductivity (EC)			101.3		%		90-110	02-SEP-14
Alkalinity, Total (as CaCO3)			101.4		%		85-115	02-SEP-14
PHENOLS-4AAP-ED		Water						
Batch	R2942503							
WG1947691-3	DUP	L1510941-7						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	09-SEP-14
WG1947691-4	DUP	L1510655-8						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	09-SEP-14
WG1947691-5	DUP	L1498214-1						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	09-SEP-14
WG1947691-2	LCS							
Phenols (4AAP)			99.0		%		85-115	09-SEP-14
WG1947691-1	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	09-SEP-14
SO4-CL		Water						
Batch	R2937088							
WG1943831-3	DUP	L1510941-7						
Sulfate (SO4)		91.1	90.8		mg/L	0.3	20	02-SEP-14
WG1943831-2	LCS							
Sulfate (SO4)			101.4		%		90-110	02-SEP-14
WG1943831-1	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	02-SEP-14
WG1943831-4	MS	L1511211-3						
Sulfate (SO4)			100.7		%		75-125	02-SEP-14
SOLIDS-TDS-CL		Water						



Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Page 18 of 20

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL		Water						
Batch	R2939412							
WG1943461-3	DUP	L1509840-2						
Total Dissolved Solids		4410	4370		mg/L	0.8	20	03-SEP-14
WG1943461-2	LCS							
Total Dissolved Solids			101.1		%		85-115	03-SEP-14
WG1943461-5	LCS							
Total Dissolved Solids			99.7		%		85-115	03-SEP-14
WG1943461-1	MB							
Total Dissolved Solids			<10		mg/L		10	03-SEP-14
WG1943461-4	MB							
Total Dissolved Solids			<10		mg/L		10	03-SEP-14
TURBIDITY-CL		Water						
Batch	R2935637							
WG1943173-3	DUP	L1510697-1						
Turbidity		85.7	82.5		NTU	3.8	15	02-SEP-14
WG1943173-2	LCS							
Turbidity			94.0		%		85-115	02-SEP-14
WG1943173-1	MB							
Turbidity			<0.10		NTU		0.1	02-SEP-14

Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2

Page 19 of 20

Contact: SUE RAYNARD

Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1510941

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
200 - 150 13 Ave SW
Calgary AB T2R 0V2
Contact: SUE RAYNARD

Page 20 of 20

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Turbidity							
	1	29-AUG-14 10:58	02-SEP-14 16:45	48	102	hours	EHTR
	2	29-AUG-14 14:02	02-SEP-14 16:45	48	99	hours	EHTR
	3	29-AUG-14 15:59	02-SEP-14 16:45	48	97	hours	EHTR
	4	30-AUG-14 09:54	02-SEP-14 16:45	48	79	hours	EHTR
	5	30-AUG-14 10:52	02-SEP-14 16:45	48	78	hours	EHTR
	6	30-AUG-14 11:50	02-SEP-14 16:45	48	77	hours	EHTR
	7	30-AUG-14 12:53	02-SEP-14 16:45	48	76	hours	EHTR
Anions and Nutrients							
Nitrate-N							
	1	29-AUG-14 10:58	02-SEP-14 14:21	48	99	hours	EHTR
	2	29-AUG-14 14:02	02-SEP-14 14:21	48	96	hours	EHTR
	3	29-AUG-14 15:59	02-SEP-14 14:21	48	94	hours	EHTR
	4	30-AUG-14 09:54	02-SEP-14 14:21	48	77	hours	EHTR
	5	30-AUG-14 10:52	02-SEP-14 14:21	48	76	hours	EHTR
	6	30-AUG-14 11:50	02-SEP-14 14:21	48	74	hours	EHTR
	7	30-AUG-14 12:53	02-SEP-14 14:21	48	73	hours	EHTR
Nitrite-N							
	1	29-AUG-14 10:58	02-SEP-14 14:21	48	99	hours	EHTR
	2	29-AUG-14 14:02	02-SEP-14 14:21	48	96	hours	EHTR
	3	29-AUG-14 15:59	02-SEP-14 14:21	48	94	hours	EHTR
	4	30-AUG-14 09:54	02-SEP-14 14:21	48	77	hours	EHTR
	5	30-AUG-14 10:52	02-SEP-14 14:21	48	76	hours	EHTR
	6	30-AUG-14 11:50	02-SEP-14 14:21	48	74	hours	EHTR
	7	30-AUG-14 12:53	02-SEP-14 14:21	48	73	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1510941 were received on 02-SEP-14 08:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Matrix Solutions Inc.
ATTN: Sue Raynard
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Date Received: 17-NOV-14
Report Date: 07-JAN-15 15:48 (MT)
Version: FINAL REV. 3

Client Phone: 403-513-2275

Certificate of Analysis

Lab Work Order #: L1547314
Project P.O. #: NOT SUBMITTED
Job Reference: 16054-502 SAOS
C of C Numbers: M050685
Legal Site Desc:

Comments: ADDITIONAL 05-JAN-15 09:35
ADDITIONAL 16-DEC-14 10:53

Nicole Thibault
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-1 16054141115001									
Sampled By: BP/EA on 15-NOV-14 @ 10:50									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	100.9	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	98.6	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	108.9	-		N/A	%	-		20-NOV-14	R3089331
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	93.0	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000912	+/-0.000015		0.000005 0	mg/L	0		22-NOV-14	R3099674
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	18.3	+/-2.9		0.0030	mg/L	0		22-NOV-14	R3099598
Antimony (Sb)-Total	0.00033	+/-0.00008		0.00010	mg/L	0		22-NOV-14	R3099598
Arsenic (As)-Total	0.0524	+/-0.0060		0.00010	mg/L	0		22-NOV-14	R3099598
Barium (Ba)-Total	0.699	+/-0.078		0.000050	mg/L	0		22-NOV-14	R3099598
Beryllium (Be)-Total	0.00174	+/-0.00040		0.00050	mg/L	0		22-NOV-14	R3099598
Bismuth (Bi)-Total	0.000700	+/-0.000091		0.000050	mg/L	0		22-NOV-14	R3099598
Boron (B)-Total	0.083	+/-0.013		0.010	mg/L	0		22-NOV-14	R3099598
Cadmium (Cd)-Total	0.00132	+/-0.00025		0.000010	mg/L	0		22-NOV-14	R3099598
Calcium (Ca)-Total	109	+/-13		0.10	mg/L	0		22-NOV-14	R3099598
Chromium (Cr)-Total	0.0367	+/-0.0053		0.00010	mg/L	0		22-NOV-14	R3099598
Cobalt (Co)-Total	0.0248	+/-0.0034		0.00010	mg/L	0		22-NOV-14	R3099598
Copper (Cu)-Total	0.0694	+/-0.0081		0.00010	mg/L	0		22-NOV-14	R3099598
Iron (Fe)-Total	64.6	+/-10		0.030	mg/L	0		22-NOV-14	R3099598
Lead (Pb)-Total	0.0387	+/-0.0061		0.000050	mg/L	0		22-NOV-14	R3099598
Lithium (Li)-Total	0.0413	+/-0.0077		0.0050	mg/L	0		22-NOV-14	R3099598
Magnesium (Mg)-Total	26.8	+/-3.2		0.10	mg/L	0		22-NOV-14	R3099598
Manganese (Mn)-Total	2.10	+/-0.21		0.0050	mg/L	0		22-NOV-14	R3099598
Molybdenum (Mo)-Total	0.00635	+/-0.00077		0.000050	mg/L	0		22-NOV-14	R3099598
Nickel (Ni)-Total	0.0598	+/-0.0065		0.00010	mg/L	0		22-NOV-14	R3099598
Potassium (K)-Total	6.25	+/-0.77		0.50	mg/L	0		22-NOV-14	R3099598
Selenium (Se)-Total	0.00257	+/-0.00036		0.00010	mg/L	0		22-NOV-14	R3099598
Silicon (Si)-Total	40.1	+/-8.0		0.050	mg/L	0		22-NOV-14	R3099598
Silver (Ag)-Total	0.000418	+/-0.000085		0.000010	mg/L	0		22-NOV-14	R3099598
Sodium (Na)-Total	4.0	+/-0.5		1.0	mg/L	0		22-NOV-14	R3099598
Strontium (Sr)-Total	0.526	+/-0.075		0.00010	mg/L	0		22-NOV-14	R3099598
Thallium (Tl)-Total	0.000839	+/-0.00013		0.000050	mg/L	0		22-NOV-14	R3099598
Tin (Sn)-Total	0.00140	+/-0.00020		0.00010	mg/L	0		22-NOV-14	R3099598
Titanium (Ti)-Total	0.149	+/-0.048		0.00030	mg/L	0		22-NOV-14	R3099598
Uranium (U)-Total	0.00508	+/-0.00071		0.000010	mg/L	0		22-NOV-14	R3099598

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-1 16054141115001									
Sampled By: BP/EA on 15-NOV-14 @ 10:50									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	0.0563	+/-0.0067		0.00050	mg/L	0		22-NOV-14	R3099598
Zinc (Zn)-Total	0.808	+/-0.12		0.0050	mg/L	0		22-NOV-14	R3099598
Miscellaneous Parameters									
Ammonia, Total (as N)	0.293	-		0.050	mg/L	-		19-NOV-14	R3088270
Dissolved Organic Carbon	9.0	+/-1.1		1.0	mg/L	0		18-NOV-14	R3084990
Naphthenic Acids	<1.0	-		1.0	mg/L	-	17-NOV-14	19-NOV-14	R3090968
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		24-NOV-14	R3102448
Total Dissolved Solids	385	+/-26		10	mg/L	0		18-NOV-14	R3088892
Silicon (as SiO2)-Total	85.8	-		0.11	mg/L	-		24-NOV-14	
Turbidity	551	+/-30		0.10	NTU	0		18-NOV-14	R3087395
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluoranthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluorene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Naphthalene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Phenanthrene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Pyrene	0.000020	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(b&j)fluoranthene	<0.000020	-	DLM	0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)pyrene	<0.0000060	-	DLM	0.0000060	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Chrysene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Dibenzo(a,h)anthracene	<0.0000050	-		0.0000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Acenaphthene	99.1	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Phenanthrene	88.0	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d12-Chrysene	71.7	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	30.2	+/-1.7		0.50	mg/L	0		18-NOV-14	R3085749
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0015	+/-0.0004		0.0010	mg/L	0		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.0196	+/-0.0021		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.259	+/-0.022		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	0.00026	+/-0.00002		0.00010	mg/L	0		22-NOV-14	R3099595
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		22-NOV-14	R3099595
Iron (Fe)-Dissolved	13.7	+/-1.2		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.0165	+/-0.0021		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	1.20	+/-0.082		0.0020	mg/L	0		22-NOV-14	R3099595
Molybdenum (Mo)-Dissolved	0.00448	+/-0.00047		0.00010	mg/L	0		22-NOV-14	R3099595

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-1 16054141115001 Sampled By: BP/EA on 15-NOV-14 @ 10:50 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	0.00059	+/-0.00006		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Silicon (Si)-Dissolved	8.79	+/-0.75		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.407	+/-0.030		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		22-NOV-14	R3099595
Uranium (U)-Dissolved	0.000339	+/-0.000035		0.000010	mg/L	0		22-NOV-14	R3099595
Vanadium (V)-Dissolved	0.00013	+/-0.00001		0.00010	mg/L	0		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	0.204	+/-0.024		0.0010	mg/L	0		22-NOV-14	R3099595
Ion Balance Calculation									
Ion Balance	91.6	-			%	-		24-NOV-14	
TDS (Calculated)	341	-			mg/L	-		24-NOV-14	
Hardness (as CaCO3)	315	-			mg/L	-		24-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		22-NOV-14	R3099674
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749
Sulfate by IC									
Sulfate (SO4)	5.88	+/-0.36		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.61	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	636	+/-32		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	331	+/-13		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	22.5	+/-4.0		5.0	mg/L	0		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	309	+/-20		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	18.8	-		0.11	mg/L	-		24-NOV-14	
L1547314-2 16054141115002 Sampled By: BP/EA on 15-NOV-14 @ 12:56 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	101.2	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	99.8	-		N/A	%	-		20-NOV-14	R3089331

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-2 16054141115002									
Sampled By: BP/EA on 15-NOV-14 @ 12:56									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluoranthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluorene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Naphthalene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Phenanthrene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	19-NOV-14	19-NOV-14	R3093268
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	19-NOV-14	19-NOV-14	R3093268
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Acenaphthene	95.7	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Phenanthrene	91.4	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d12-Chrysene	83.0	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		18-NOV-14	R3085749
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.0150	+/-0.0016		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.0784	+/-0.0068		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		22-NOV-14	R3099595
Iron (Fe)-Dissolved	3.68	+/-0.33		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.0357	+/-0.0044		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	0.495	+/-0.034		0.0020	mg/L	0		22-NOV-14	R3099595
Molybdenum (Mo)-Dissolved	0.0118	+/-0.0012		0.00010	mg/L	0		22-NOV-14	R3099595
Nickel (Ni)-Dissolved	0.00024	+/-0.00004		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Silicon (Si)-Dissolved	9.98	+/-0.85		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.415	+/-0.031		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		22-NOV-14	R3099595
Uranium (U)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	0.0039	+/-0.0005		0.0010	mg/L	0		22-NOV-14	R3099595

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-2 16054141115002 Sampled By: BP/EA on 15-NOV-14 @ 12:56 Matrix: H2O									
Ion Balance Calculation									
Ion Balance	95.2	-			%	-		24-NOV-14	
TDS (Calculated)	318	-			mg/L	-		24-NOV-14	
Hardness (as CaCO3)	225	-			mg/L	-		24-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		22-NOV-14	R3099674
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749
Sulfate by IC									
Sulfate (SO4)	17.5	+/-1.0		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.66	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	564	+/-28		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	326	+/-13		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	23.1	+/-4.1		5.0	mg/L	0		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	306	+/-20		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.3	-		0.11	mg/L	-		24-NOV-14	
L1547314-3 16054141115003 Sampled By: BP/EA on 15-NOV-14 @ 14:50 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	101.5	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	95.8	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	109.8	-		N/A	%	-		20-NOV-14	R3089331
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	94.0	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		22-NOV-14	R3099674
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0742	+/-0.012		0.0030	mg/L	0		22-NOV-14	R3099598

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-3 16054141115003									
Sampled By: BP/EA on 15-NOV-14 @ 14:50									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099598
Arsenic (As)-Total	0.00437	+/-0.00051		0.00010	mg/L	0		22-NOV-14	R3099598
Barium (Ba)-Total	0.138	+/-0.015		0.000050	mg/L	0		22-NOV-14	R3099598
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099598
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099598
Boron (B)-Total	0.194	+/-0.031		0.010	mg/L	0		22-NOV-14	R3099598
Cadmium (Cd)-Total	0.000010	+/-0.000003		0.000010	mg/L	0		22-NOV-14	R3099598
Calcium (Ca)-Total	61.7	+/-7.3		0.10	mg/L	0		22-NOV-14	R3099598
Chromium (Cr)-Total	0.00246	+/-0.00036		0.00010	mg/L	0		22-NOV-14	R3099598
Cobalt (Co)-Total	0.00039	+/-0.00005		0.00010	mg/L	0		22-NOV-14	R3099598
Copper (Cu)-Total	0.00069	+/-0.00013		0.00010	mg/L	0		22-NOV-14	R3099598
Iron (Fe)-Total	4.90	+/-0.78		0.030	mg/L	0		22-NOV-14	R3099598
Lead (Pb)-Total	0.000196	+/-0.000036		0.000050	mg/L	0		22-NOV-14	R3099598
Lithium (Li)-Total	0.0338	+/-0.0063		0.0050	mg/L	0		22-NOV-14	R3099598
Magnesium (Mg)-Total	17.3	+/-2.1		0.10	mg/L	0		22-NOV-14	R3099598
Manganese (Mn)-Total	0.235	+/-0.024		0.0050	mg/L	0		22-NOV-14	R3099598
Molybdenum (Mo)-Total	0.00595	+/-0.00072		0.000050	mg/L	0		22-NOV-14	R3099598
Nickel (Ni)-Total	0.00618	+/-0.00069		0.00010	mg/L	0		22-NOV-14	R3099598
Potassium (K)-Total	3.82	+/-0.47		0.50	mg/L	0		22-NOV-14	R3099598
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099598
Silicon (Si)-Total	10.5	+/-2.1		0.050	mg/L	0		22-NOV-14	R3099598
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099598
Sodium (Na)-Total	40.1	+/-4.9		1.0	mg/L	0		22-NOV-14	R3099598
Strontium (Sr)-Total	0.425	+/-0.061		0.00010	mg/L	0		22-NOV-14	R3099598
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099598
Tin (Sn)-Total	0.00186	+/-0.00026		0.00010	mg/L	0		22-NOV-14	R3099598
Titanium (Ti)-Total	0.00236	+/-0.00079		0.00030	mg/L	0		22-NOV-14	R3099598
Uranium (U)-Total	0.000069	+/-0.000009		0.000010	mg/L	0		22-NOV-14	R3099598
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099598
Zinc (Zn)-Total	0.0085	+/-0.0024		0.0050	mg/L	0		22-NOV-14	R3099598
Miscellaneous Parameters									
Ammonia, Total (as N)	1.39	-		0.050	mg/L	-		19-NOV-14	R3088270
Dissolved Organic Carbon	5.7	+/-0.8		1.0	mg/L	0		18-NOV-14	R3084990
Naphthenic Acids	<1.0	-		1.0	mg/L	-	17-NOV-14	19-NOV-14	R3090968
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		24-NOV-14	R3102448
Total Dissolved Solids	366	+/-25		10	mg/L	0		18-NOV-14	R3088892
Silicon (as SiO2)-Total	22.5	-		0.11	mg/L	-		24-NOV-14	
Turbidity	52.6	+/-2.9		0.10	NTU	0		18-NOV-14	R3087395
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluoranthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluorene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Naphthalene	0.000069	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Phenanthrene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-3 16054141115003									
Sampled By: BP/EA on 15-NOV-14 @ 14:50									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	19-NOV-14	19-NOV-14	R3093268
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	19-NOV-14	19-NOV-14	R3093268
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Acenaphthene	97.4	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Phenanthrene	91.2	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d12-Chrysene	79.4	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	9.89	+/-0.58		0.50	mg/L	0		18-NOV-14	R3085749
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0012	+/-0.0004		0.0010	mg/L	0		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.00469	+/-0.00049		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.127	+/-0.011		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	0.00047	+/-0.00004		0.00040	mg/L	0		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	0.00022	+/-0.00002		0.00010	mg/L	0		22-NOV-14	R3099595
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		22-NOV-14	R3099595
Iron (Fe)-Dissolved	4.70	+/-0.42		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.0403	+/-0.0050		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	0.220	+/-0.015		0.0020	mg/L	0		22-NOV-14	R3099595
Molybdenum (Mo)-Dissolved	0.00523	+/-0.00055		0.00010	mg/L	0		22-NOV-14	R3099595
Nickel (Ni)-Dissolved	0.00112	+/-0.00010		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Silicon (Si)-Dissolved	10.8	+/-0.91		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.452	+/-0.034		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	0.00050	+/-0.00004		0.00020	mg/L	0		22-NOV-14	R3099595
Uranium (U)-Dissolved	0.000051	+/-0.000005		0.000010	mg/L	0		22-NOV-14	R3099595
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	0.0015	+/-0.0003		0.0010	mg/L	0		22-NOV-14	R3099595
Ion Balance Calculation									
Ion Balance	95.7	-			%	-		24-NOV-14	
TDS (Calculated)	339	-			mg/L	-		24-NOV-14	
Hardness (as CaCO3)	237	-			mg/L	-		24-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.000050	-		0.000005	mg/L	-		22-NOV-14	R3099674
				0					
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-3 16054141115003 Sampled By: BP/EA on 15-NOV-14 @ 14:50 Matrix: H2O									
Sulfate by IC									
Sulfate (SO4)	19.1	+/-1.1		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.67	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	606	+/-30		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	327	+/-13		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	24.5	+/-4.2		5.0	mg/L	0		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	309	+/-20		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	23.0	-		0.11	mg/L	-		24-NOV-14	
L1547314-4 16054141115004 Sampled By: BP/EA on 15-NOV-14 @ 16:44 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	99.8	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	92.6	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	110.7	-		N/A	%	-		20-NOV-14	R3089331
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	94.2	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000132	+/-0.0000046		0.000005 0	mg/L	0		22-NOV-14	R3099674
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	2.17	+/-0.34		0.0030	mg/L	0		22-NOV-14	R3099598
Antimony (Sb)-Total	0.00023	+/-0.00007		0.00010	mg/L	0		22-NOV-14	R3099598
Arsenic (As)-Total	0.0246	+/-0.0028		0.00010	mg/L	0		22-NOV-14	R3099598
Barium (Ba)-Total	0.103	+/-0.012		0.000050	mg/L	0		22-NOV-14	R3099598
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099598
Bismuth (Bi)-Total	0.000066	+/-0.000035		0.000050	mg/L	0		22-NOV-14	R3099598
Boron (B)-Total	0.767	+/-0.12		0.010	mg/L	0		22-NOV-14	R3099598
Cadmium (Cd)-Total	0.000123	+/-0.000024		0.000010	mg/L	0		22-NOV-14	R3099598
Calcium (Ca)-Total	43.0	+/-5.1		0.10	mg/L	0		22-NOV-14	R3099598
Chromium (Cr)-Total	0.00588	+/-0.00086		0.00010	mg/L	0		22-NOV-14	R3099598
Cobalt (Co)-Total	0.00279	+/-0.00038		0.00010	mg/L	0		22-NOV-14	R3099598
Copper (Cu)-Total	0.00622	+/-0.00075		0.00010	mg/L	0		22-NOV-14	R3099598
Iron (Fe)-Total	6.62	+/-1.0		0.030	mg/L	0		22-NOV-14	R3099598
Lead (Pb)-Total	0.00286	+/-0.00045		0.000050	mg/L	0		22-NOV-14	R3099598

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-4 16054141115004									
Sampled By: BP/EA on 15-NOV-14 @ 16:44									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0013	+/-0.0004		0.0010	mg/L	0		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.0217	+/-0.0023		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.0552	+/-0.0048		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	0.00032	+/-0.00003		0.00010	mg/L	0		22-NOV-14	R3099595
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		22-NOV-14	R3099595
Iron (Fe)-Dissolved	2.06	+/-0.19		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.0768	+/-0.0095		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	0.216	+/-0.015		0.0020	mg/L	0		22-NOV-14	R3099595
Molybdenum (Mo)-Dissolved	0.0208	+/-0.0022		0.00010	mg/L	0		22-NOV-14	R3099595
Nickel (Ni)-Dissolved	0.00097	+/-0.00009		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	0.00088	+/-0.00014		0.00040	mg/L	0		22-NOV-14	R3099595
Silicon (Si)-Dissolved	8.24	+/-0.70		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.364	+/-0.027		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		22-NOV-14	R3099595
Uranium (U)-Dissolved	0.000313	+/-0.000032		0.000010	mg/L	0		22-NOV-14	R3099595
Vanadium (V)-Dissolved	0.00012	+/-0.00001		0.00010	mg/L	0		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	<0.0010	-		0.0010	mg/L	-		22-NOV-14	R3099595
Ion Balance Calculation									
Ion Balance	91.3	-			%	-		24-NOV-14	
TDS (Calculated)	606	-			mg/L	-		24-NOV-14	
Hardness (as CaCO3)	161	-			mg/L	-		24-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		22-NOV-14	R3099674
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749
Sulfate by IC									
Sulfate (SO4)	88.2	+/-5.0		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.80	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	1030	+/-51		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	460	+/-18		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	41.2	+/-6.2		5.0	mg/L	0		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	445	+/-28		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	17.6	-		0.11	mg/L	-		24-NOV-14	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-5 16054141116005									
Sampled By: BP/EA on 16-NOV-14 @ 10:15									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	100.5	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	92.5	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	106.1	-		N/A	%	-		20-NOV-14	R3089331
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	95.1	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000651	+/-0.000011		0.000005 0	mg/L	0		22-NOV-14	R3099674
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	1.61	+/-0.26		0.0030	mg/L	0		22-NOV-14	R3099598
Antimony (Sb)-Total	0.00035	+/-0.00008		0.00010	mg/L	0		22-NOV-14	R3099598
Arsenic (As)-Total	0.00266	+/-0.00032		0.00010	mg/L	0		22-NOV-14	R3099598
Barium (Ba)-Total	0.128	+/-0.014		0.000050	mg/L	0		22-NOV-14	R3099598
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099598
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099598
Boron (B)-Total	0.126	+/-0.020		0.010	mg/L	0		22-NOV-14	R3099598
Cadmium (Cd)-Total	0.000199	+/-0.000038		0.000010	mg/L	0		22-NOV-14	R3099598
Calcium (Ca)-Total	48.8	+/-5.8		0.10	mg/L	0		22-NOV-14	R3099598
Chromium (Cr)-Total	0.00602	+/-0.00088		0.00010	mg/L	0		22-NOV-14	R3099598
Cobalt (Co)-Total	0.00554	+/-0.00075		0.00010	mg/L	0		22-NOV-14	R3099598
Copper (Cu)-Total	0.00570	+/-0.00069		0.00010	mg/L	0		22-NOV-14	R3099598
Iron (Fe)-Total	3.88	+/-0.61		0.030	mg/L	0		22-NOV-14	R3099598
Lead (Pb)-Total	0.00310	+/-0.00049		0.000050	mg/L	0		22-NOV-14	R3099598
Lithium (Li)-Total	0.0579	+/-0.011		0.0050	mg/L	0		22-NOV-14	R3099598
Magnesium (Mg)-Total	11.4	+/-1.4		0.10	mg/L	0		22-NOV-14	R3099598
Manganese (Mn)-Total	0.938	+/-0.095		0.0050	mg/L	0		22-NOV-14	R3099598
Molybdenum (Mo)-Total	0.00135	+/-0.00016		0.000050	mg/L	0		22-NOV-14	R3099598
Nickel (Ni)-Total	0.0245	+/-0.0027		0.00010	mg/L	0		22-NOV-14	R3099598
Potassium (K)-Total	4.50	+/-0.55		0.50	mg/L	0		22-NOV-14	R3099598
Selenium (Se)-Total	0.00164	+/-0.00023		0.00010	mg/L	0		22-NOV-14	R3099598
Silicon (Si)-Total	15.8	+/-3.1		0.050	mg/L	0		22-NOV-14	R3099598
Silver (Ag)-Total	0.000027	+/-0.000007		0.000010	mg/L	0		22-NOV-14	R3099598
Sodium (Na)-Total	19.1	+/-2.4		1.0	mg/L	0		22-NOV-14	R3099598
Strontium (Sr)-Total	0.245	+/-0.035		0.00010	mg/L	0		22-NOV-14	R3099598
Thallium (Tl)-Total	0.000111	+/-0.000017		0.000050	mg/L	0		22-NOV-14	R3099598
Tin (Sn)-Total	0.00066	+/-0.00010		0.00010	mg/L	0		22-NOV-14	R3099598
Titanium (Ti)-Total	0.0412	+/-0.013		0.00030	mg/L	0		22-NOV-14	R3099598
Uranium (U)-Total	0.000807	+/-0.00011		0.000010	mg/L	0		22-NOV-14	R3099598

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-5 16054141116005									
Sampled By: BP/EA on 16-NOV-14 @ 10:15									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	0.00617	+/-0.00078		0.00050	mg/L	0		22-NOV-14	R3099598
Zinc (Zn)-Total	0.0775	+/-0.012		0.0050	mg/L	0		22-NOV-14	R3099598
Miscellaneous Parameters									
Ammonia, Total (as N)	0.053	-		0.050	mg/L	-		19-NOV-14	R3088270
Dissolved Organic Carbon	5.4	+/-0.8		1.0	mg/L	0		18-NOV-14	R3084990
Naphthenic Acids	<1.0	-		1.0	mg/L	-	17-NOV-14	19-NOV-14	R3090968
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		24-NOV-14	R3102448
Total Dissolved Solids	330	+/-22		10	mg/L	0		18-NOV-14	R3088892
Silicon (as SiO2)-Total	33.8	-		0.11	mg/L	-		24-NOV-14	
Turbidity	121	+/-6.7		0.10	NTU	0		18-NOV-14	R3087395
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluoranthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluorene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Naphthalene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Phenanthrene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	19-NOV-14	19-NOV-14	R3093268
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	19-NOV-14	19-NOV-14	R3093268
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Acenaphthene	92.3	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Phenanthrene	87.4	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d12-Chrysene	73.8	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	2.21	+/-0.15		0.50	mg/L	0		18-NOV-14	R3085749
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0303	+/-0.0046		0.0010	mg/L	0		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.00082	+/-0.00009		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.102	+/-0.0089		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	0.00415	+/-0.00039		0.00010	mg/L	0		22-NOV-14	R3099595
Copper (Cu)-Dissolved	0.00111	+/-0.00009		0.00060	mg/L	0		22-NOV-14	R3099595
Iron (Fe)-Dissolved	2.14	+/-0.19		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	0.00011	+/-0.00001		0.00010	mg/L	0		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.0632	+/-0.0078		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	1.16	+/-0.079	RRV	0.0020	mg/L	0		24-NOV-14	R3102229
Molybdenum (Mo)-Dissolved	0.00110	+/-0.00012		0.00010	mg/L	0		22-NOV-14	R3099595

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-5 16054141116005 Sampled By: BP/EA on 16-NOV-14 @ 10:15 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	0.0186	+/-0.0015		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	0.00289	+/-0.00048	RRV	0.00040	mg/L	0		24-NOV-14	R3102229
Silicon (Si)-Dissolved	13.5	+/-1.1		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.265	+/-0.020		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		22-NOV-14	R3099595
Uranium (U)-Dissolved	0.000461	+/-0.000048		0.000010	mg/L	0		22-NOV-14	R3099595
Vanadium (V)-Dissolved	0.00012	+/-0.00001		0.00010	mg/L	0		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	0.226	+/-0.026	RRV	0.0030	mg/L	0		24-NOV-14	R3102229
Ion Balance Calculation									
Ion Balance	93.3	-			%	-		07-JAN-15	
TDS (Calculated)	262	-			mg/L	-		07-JAN-15	
Hardness (as CaCO3)	177	-			mg/L	-		07-JAN-15	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		22-NOV-14	R3099674
Nitrate as N by IC									
Nitrate (as N)	0.068	+/-0.009		0.050	mg/L	0		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	0.068	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749
Sulfate by IC									
Sulfate (SO4)	76.3	+/-4.3		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.43	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	464	+/-23		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	191	+/-8.1		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	162	+/-11		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	28.8	-		0.11	mg/L	-		07-JAN-15	
L1547314-6 16054141116006 Sampled By: BP/EA on 16-NOV-14 @ 10:55 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	100.4	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	95.4	-		N/A	%	-		20-NOV-14	R3089331

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-6 16054141116006									
Sampled By: BP/EA on 16-NOV-14 @ 10:55									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluoranthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluorene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Naphthalene	0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Phenanthrene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	19-NOV-14	19-NOV-14	R3093268
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	19-NOV-14	19-NOV-14	R3093268
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Acenaphthene	99.6	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Phenanthrene	95.2	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d12-Chrysene	83.2	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	0.69	+/-0.09		0.50	mg/L	0		18-NOV-14	R3085749
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.00439	+/-0.00046		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.0248	+/-0.0022		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	0.00012	+/-0.00001		0.00010	mg/L	0		22-NOV-14	R3099595
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		22-NOV-14	R3099595
Iron (Fe)-Dissolved	1.50	+/-0.13		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.107	+/-0.013		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	0.121	+/-0.0083		0.0020	mg/L	0		22-NOV-14	R3099595
Molybdenum (Mo)-Dissolved	0.0137	+/-0.0014		0.00010	mg/L	0		22-NOV-14	R3099595
Nickel (Ni)-Dissolved	0.00020	+/-0.00004		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Silicon (Si)-Dissolved	12.0	+/-1.0		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.738	+/-0.055		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		22-NOV-14	R3099595
Uranium (U)-Dissolved	0.000027	+/-0.000003		0.000010	mg/L	0		22-NOV-14	R3099595
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	0.0016	+/-0.0004		0.0010	mg/L	0		22-NOV-14	R3099595

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-6 16054141116006 Sampled By: BP/EA on 16-NOV-14 @ 10:55 Matrix: H2O									
Ion Balance Calculation									
Ion Balance	99.5	-			%	-		24-NOV-14	
TDS (Calculated)	534	-			mg/L	-		24-NOV-14	
Hardness (as CaCO3)	265	-			mg/L	-		24-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		22-NOV-14	R3099674
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749
Sulfate by IC									
Sulfate (SO4)	120	+/-6.8		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.60	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	868	+/-44		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	400	+/-16		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	21.4	+/-3.9		5.0	mg/L	0		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	363	+/-23		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	25.7	-		0.11	mg/L	-		24-NOV-14	
L1547314-7 16054141116007 Sampled By: BP/EA on 16-NOV-14 @ 11:46 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	101.8	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	96.1	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	107.5	-		N/A	%	-		20-NOV-14	R3089331
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	95.1	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000134	+/-0.0000046		0.000005 0	mg/L	0		22-NOV-14	R3099674
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.664	+/-0.11		0.0030	mg/L	0		22-NOV-14	R3099598

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-7 16054141116007									
Sampled By: BP/EA on 16-NOV-14 @ 11:46									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099598
Arsenic (As)-Total	0.0222	+/-0.0026		0.00010	mg/L	0		22-NOV-14	R3099598
Barium (Ba)-Total	0.0733	+/-0.0082		0.000050	mg/L	0		22-NOV-14	R3099598
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099598
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099598
Boron (B)-Total	0.187	+/-0.030		0.010	mg/L	0		22-NOV-14	R3099598
Cadmium (Cd)-Total	0.000038	+/-0.000008		0.000010	mg/L	0		22-NOV-14	R3099598
Calcium (Ca)-Total	75.0	+/-8.9		0.10	mg/L	0		22-NOV-14	R3099598
Chromium (Cr)-Total	0.00146	+/-0.00022		0.00010	mg/L	0		22-NOV-14	R3099598
Cobalt (Co)-Total	0.00090	+/-0.00012		0.00010	mg/L	0		22-NOV-14	R3099598
Copper (Cu)-Total	0.00230	+/-0.00030		0.00010	mg/L	0		22-NOV-14	R3099598
Iron (Fe)-Total	11.7	+/-1.8		0.030	mg/L	0		22-NOV-14	R3099598
Lead (Pb)-Total	0.00102	+/-0.00017		0.000050	mg/L	0		22-NOV-14	R3099598
Lithium (Li)-Total	0.0410	+/-0.0076		0.0050	mg/L	0		22-NOV-14	R3099598
Magnesium (Mg)-Total	19.3	+/-2.3		0.10	mg/L	0		22-NOV-14	R3099598
Manganese (Mn)-Total	0.461	+/-0.046		0.0050	mg/L	0		22-NOV-14	R3099598
Molybdenum (Mo)-Total	0.0105	+/-0.0013		0.000050	mg/L	0		22-NOV-14	R3099598
Nickel (Ni)-Total	0.00310	+/-0.00035		0.00010	mg/L	0		22-NOV-14	R3099598
Potassium (K)-Total	4.02	+/-0.49		0.50	mg/L	0		22-NOV-14	R3099598
Selenium (Se)-Total	0.00012	+/-0.00002		0.00010	mg/L	0		22-NOV-14	R3099598
Silicon (Si)-Total	10.6	+/-2.1		0.050	mg/L	0		22-NOV-14	R3099598
Silver (Ag)-Total	0.000022	+/-0.000006		0.000010	mg/L	0		22-NOV-14	R3099598
Sodium (Na)-Total	19.4	+/-2.4		1.0	mg/L	0		22-NOV-14	R3099598
Strontium (Sr)-Total	0.475	+/-0.068		0.00010	mg/L	0		22-NOV-14	R3099598
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099598
Tin (Sn)-Total	0.00096	+/-0.00014		0.00010	mg/L	0		22-NOV-14	R3099598
Titanium (Ti)-Total	0.0206	+/-0.00067		0.00030	mg/L	0		22-NOV-14	R3099598
Uranium (U)-Total	0.000176	+/-0.000024		0.000010	mg/L	0		22-NOV-14	R3099598
Vanadium (V)-Total	0.00251	+/-0.00035		0.00050	mg/L	0		22-NOV-14	R3099598
Zinc (Zn)-Total	0.0112	+/-0.0027		0.0050	mg/L	0		22-NOV-14	R3099598
Miscellaneous Parameters									
Ammonia, Total (as N)	0.909	-		0.050	mg/L	-		19-NOV-14	R3088270
Dissolved Organic Carbon	7.7	+/-1.0		1.0	mg/L	0		18-NOV-14	R3084990
Naphthenic Acids	<1.0	-		1.0	mg/L	-	17-NOV-14	19-NOV-14	R3090968
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		24-NOV-14	R3102448
Total Dissolved Solids	381	+/-26		10	mg/L	0		18-NOV-14	R3088892
Silicon (as SiO2)-Total	22.6	-		0.11	mg/L	-		24-NOV-14	
Turbidity	102	+/-5.7		0.10	NTU	0		18-NOV-14	R3087395
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluoranthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Fluorene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Naphthalene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Phenanthrene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-7 16054141116007									
Sampled By: BP/EA on 16-NOV-14 @ 11:46									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Benzo(a)pyrene	<0.000050	-		0.000005 0	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Chrysene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Dibenzo(a,h)anthracene	<0.000050	-		0.000005 0	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Acenaphthene	92.1	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d10-Phenanthrene	89.3	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Surr: d12-Chrysene	71.3	-		N/A	%	-	19-NOV-14	19-NOV-14	R3093268
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		18-NOV-14	R3085749
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.0229	+/-0.0024		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.0614	+/-0.0053		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		22-NOV-14	R3099595
Iron (Fe)-Dissolved	9.13	+/-0.82		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.0421	+/-0.0052		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	0.425	+/-0.029		0.0020	mg/L	0		22-NOV-14	R3099595
Molybdenum (Mo)-Dissolved	0.00775	+/-0.00081		0.00010	mg/L	0		22-NOV-14	R3099595
Nickel (Ni)-Dissolved	0.00025	+/-0.00004		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Silicon (Si)-Dissolved	9.67	+/-0.82		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.461	+/-0.034		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		22-NOV-14	R3099595
Uranium (U)-Dissolved	0.000035	+/-0.000003		0.000010	mg/L	0		22-NOV-14	R3099595
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	0.0023	+/-0.0004		0.0010	mg/L	0		22-NOV-14	R3099595
Ion Balance Calculation									
Ion Balance	95.1	-			%	-		24-NOV-14	
TDS (Calculated)	329	-			mg/L	-		24-NOV-14	
Hardness (as CaCO3)	270	-			mg/L	-		24-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.000050	-		0.000005 0	mg/L	-		22-NOV-14	R3099674
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-7 16054141116007 Sampled By: BP/EA on 16-NOV-14 @ 11:46 Matrix: H2O									
Sulfate by IC									
Sulfate (SO4)	29.6	+/-1.7		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.66	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	586	+/-29		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	323	+/-13		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	23.0	+/-4.1		5.0	mg/L	0		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	303	+/-19		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	20.7	-		0.11	mg/L	-		24-NOV-14	
L1547314-8 16054141116008 Sampled By: BP/EA on 16-NOV-14 @ 13:07 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	0.00060	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	0.00102	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	0.00162	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	100.7	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	93.4	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	112.8	-		N/A	%	-		20-NOV-14	R3089331
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	98.6	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000106	+/-0.0000044		0.000005 0	mg/L	0		22-NOV-14	R3099674
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.713	+/-0.11		0.0030	mg/L	0		22-NOV-14	R3099598
Antimony (Sb)-Total	0.00027	+/-0.00007		0.00010	mg/L	0		22-NOV-14	R3099598
Arsenic (As)-Total	0.00566	+/-0.00066		0.00010	mg/L	0		22-NOV-14	R3099598
Barium (Ba)-Total	0.0492	+/-0.0055		0.000050	mg/L	0		22-NOV-14	R3099598
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099598
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099598
Boron (B)-Total	0.570	+/-0.091		0.010	mg/L	0		22-NOV-14	R3099598
Cadmium (Cd)-Total	0.000197	+/-0.000038		0.000010	mg/L	0		22-NOV-14	R3099598
Calcium (Ca)-Total	75.9	+/-9.0		0.10	mg/L	0		22-NOV-14	R3099598
Chromium (Cr)-Total	0.00262	+/-0.00039		0.00010	mg/L	0		22-NOV-14	R3099598
Cobalt (Co)-Total	0.00184	+/-0.00025		0.00010	mg/L	0		22-NOV-14	R3099598
Copper (Cu)-Total	0.00430	+/-0.00053		0.00010	mg/L	0		22-NOV-14	R3099598
Iron (Fe)-Total	2.01	+/-0.32		0.030	mg/L	0		22-NOV-14	R3099598
Lead (Pb)-Total	0.00120	+/-0.00019		0.000050	mg/L	0		22-NOV-14	R3099598

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-8 16054141116008									
Sampled By: BP/EA on 16-NOV-14 @ 13:07									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.00297	+/-0.00031		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.0273	+/-0.0024		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	0.00038	+/-0.00004		0.00010	mg/L	0		22-NOV-14	R3099595
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		22-NOV-14	R3099595
Iron (Fe)-Dissolved	0.240	+/-0.021		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.0966	+/-0.012		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	0.508	+/-0.035		0.0020	mg/L	0		22-NOV-14	R3099595
Molybdenum (Mo)-Dissolved	0.0149	+/-0.0016		0.00010	mg/L	0		22-NOV-14	R3099595
Nickel (Ni)-Dissolved	0.00198	+/-0.00017		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	0.00076	+/-0.00013		0.00040	mg/L	0		24-NOV-14	R3102229
Silicon (Si)-Dissolved	9.67	+/-0.82		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.568	+/-0.042		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		22-NOV-14	R3099595
Uranium (U)-Dissolved	0.00154	+/-0.00016		0.000010	mg/L	0		22-NOV-14	R3099595
Vanadium (V)-Dissolved	0.00011	+/-0.00001		0.00010	mg/L	0		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	<0.0010	-		0.0010	mg/L	-		22-NOV-14	R3099595
Ion Balance Calculation									
Ion Balance	95.5	-			%	-		07-JAN-15	
TDS (Calculated)	529	-			mg/L	-		07-JAN-15	
Hardness (as CaCO3)	257	-			mg/L	-		07-JAN-15	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		22-NOV-14	R3099674
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749
Sulfate by IC									
Sulfate (SO4)	119	+/-6.7		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.62	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	873	+/-44		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	398	+/-16		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	25.1	+/-4.3		5.0	mg/L	0		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	368	+/-23		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	20.7	-		0.11	mg/L	-		07-JAN-15	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-9 16054141116009									
Sampled By: BP/EA on 16-NOV-14 @ 11:46									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	101.1	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	94.6	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	109.5	-		N/A	%	-		20-NOV-14	R3089331
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	99.8	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000120	+/-0.0000045		0.000005 0	mg/L	0		22-NOV-14	R3099674
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.663	+/-0.11		0.0030	mg/L	0		22-NOV-14	R3099598
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099598
Arsenic (As)-Total	0.0221	+/-0.0025		0.00010	mg/L	0		22-NOV-14	R3099598
Barium (Ba)-Total	0.0736	+/-0.0083		0.000050	mg/L	0		22-NOV-14	R3099598
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099598
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099598
Boron (B)-Total	0.184	+/-0.029		0.010	mg/L	0		22-NOV-14	R3099598
Cadmium (Cd)-Total	0.000041	+/-0.000008		0.000010	mg/L	0		22-NOV-14	R3099598
Calcium (Ca)-Total	73.7	+/-8.7		0.10	mg/L	0		22-NOV-14	R3099598
Chromium (Cr)-Total	0.00149	+/-0.00022		0.00010	mg/L	0		22-NOV-14	R3099598
Cobalt (Co)-Total	0.00086	+/-0.00012		0.00010	mg/L	0		22-NOV-14	R3099598
Copper (Cu)-Total	0.00229	+/-0.00030		0.00010	mg/L	0		22-NOV-14	R3099598
Iron (Fe)-Total	11.6	+/-1.8		0.030	mg/L	0		22-NOV-14	R3099598
Lead (Pb)-Total	0.000968	+/-0.00016		0.000050	mg/L	0		22-NOV-14	R3099598
Lithium (Li)-Total	0.0400	+/-0.0074		0.0050	mg/L	0		22-NOV-14	R3099598
Magnesium (Mg)-Total	19.6	+/-2.4		0.10	mg/L	0		22-NOV-14	R3099598
Manganese (Mn)-Total	0.493	+/-0.050		0.0050	mg/L	0		22-NOV-14	R3099598
Molybdenum (Mo)-Total	0.0102	+/-0.0012		0.000050	mg/L	0		22-NOV-14	R3099598
Nickel (Ni)-Total	0.00310	+/-0.00035		0.00010	mg/L	0		22-NOV-14	R3099598
Potassium (K)-Total	4.01	+/-0.49		0.50	mg/L	0		22-NOV-14	R3099598
Selenium (Se)-Total	0.00013	+/-0.00002		0.00010	mg/L	0		22-NOV-14	R3099598
Silicon (Si)-Total	10.6	+/-2.1		0.050	mg/L	0		22-NOV-14	R3099598
Silver (Ag)-Total	0.000014	+/-0.000005		0.000010	mg/L	0		22-NOV-14	R3099598
Sodium (Na)-Total	19.1	+/-2.4		1.0	mg/L	0		22-NOV-14	R3099598
Strontium (Sr)-Total	0.473	+/-0.068		0.00010	mg/L	0		22-NOV-14	R3099598
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099598
Tin (Sn)-Total	0.00094	+/-0.00014		0.00010	mg/L	0		22-NOV-14	R3099598
Titanium (Ti)-Total	0.0202	+/-0.0066		0.00030	mg/L	0		22-NOV-14	R3099598
Uranium (U)-Total	0.000179	+/-0.000025		0.000010	mg/L	0		22-NOV-14	R3099598

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-9 16054141116009									
Sampled By: BP/EA on 16-NOV-14 @ 11:46									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	0.00260	+/-0.00036		0.00050	mg/L	0		22-NOV-14	R3099598
Zinc (Zn)-Total	0.0135	+/-0.0030		0.0050	mg/L	0		22-NOV-14	R3099598
Miscellaneous Parameters									
Ammonia, Total (as N)	0.907	-		0.050	mg/L	-		19-NOV-14	R3088270
Dissolved Organic Carbon	7.8	+/-1.0		1.0	mg/L	0		18-NOV-14	R3084990
Naphthenic Acids	<1.0	-		1.0	mg/L	-	17-NOV-14	19-NOV-14	R3090968
Phenols (4AAP)	0.0011	+/-0.0007		0.0010	mg/L	-7.4%		24-NOV-14	R3102448
Total Dissolved Solids	376	+/-25		10	mg/L	0		18-NOV-14	R3088892
Silicon (as SiO2)-Total	22.7	-		0.11	mg/L	-		24-NOV-14	
Turbidity	130	+/-7.2		0.10	NTU	0		18-NOV-14	R3087395
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Fluoranthene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Fluorene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Naphthalene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Phenanthrene	<0.000050	-		0.000050	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	19-NOV-14	20-NOV-14	R3093268
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	19-NOV-14	20-NOV-14	R3093268
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	19-NOV-14	20-NOV-14	R3093268
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	19-NOV-14	20-NOV-14	R3093268
Surr: d10-Acenaphthene	96.5	-		N/A	%	-	19-NOV-14	20-NOV-14	R3093268
Surr: d10-Phenanthrene	94.0	-		N/A	%	-	19-NOV-14	20-NOV-14	R3093268
Surr: d12-Chrysene	79.3	-		N/A	%	-	19-NOV-14	20-NOV-14	R3093268
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		18-NOV-14	R3085749
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		22-NOV-14	R3099595
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Arsenic (As)-Dissolved	0.0230	+/-0.0024		0.00040	mg/L	0		22-NOV-14	R3099595
Barium (Ba)-Dissolved	0.0592	+/-0.0051		0.00010	mg/L	0		22-NOV-14	R3099595
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		22-NOV-14	R3099595
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		22-NOV-14	R3099595
Iron (Fe)-Dissolved	8.98	+/-0.81		0.010	mg/L	0		22-NOV-14	R3099595
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Lithium (Li)-Dissolved	0.0430	+/-0.0053		0.0050	mg/L	0		22-NOV-14	R3099595
Manganese (Mn)-Dissolved	0.418	+/-0.029		0.0020	mg/L	0		22-NOV-14	R3099595
Molybdenum (Mo)-Dissolved	0.00808	+/-0.00085		0.00010	mg/L	0		22-NOV-14	R3099595

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-9 16054141116009 Sampled By: BP/EA on 16-NOV-14 @ 11:46 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Nickel (Ni)-Dissolved	0.00025	+/-0.00004		0.00010	mg/L	0		22-NOV-14	R3099595
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		22-NOV-14	R3099595
Silicon (Si)-Dissolved	9.41	+/-0.80		0.050	mg/L	0		22-NOV-14	R3099595
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		22-NOV-14	R3099595
Strontium (Sr)-Dissolved	0.490	+/-0.036		0.00010	mg/L	0		22-NOV-14	R3099595
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		22-NOV-14	R3099595
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		22-NOV-14	R3099595
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		22-NOV-14	R3099595
Uranium (U)-Dissolved	0.000042	+/-0.000004		0.000010	mg/L	0		22-NOV-14	R3099595
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		22-NOV-14	R3099595
Zinc (Zn)-Dissolved	0.0018	+/-0.0004		0.0010	mg/L	0		22-NOV-14	R3099595
Ion Balance Calculation									
Ion Balance	98.7	-			%	-		24-NOV-14	
TDS (Calculated)	330	-			mg/L	-		24-NOV-14	
Hardness (as CaCO3)	279	-			mg/L	-		24-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		22-NOV-14	R3099674
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		18-NOV-14	R3085749
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		19-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		18-NOV-14	R3085749
Sulfate by IC									
Sulfate (SO4)	29.6	+/-1.7		0.50	mg/L	0		18-NOV-14	R3085749
pH, Conductivity and Total Alkalinity									
pH	8.66	+/-0.01		0.10	pH	0		21-NOV-14	R3097370
Conductivity (EC)	577	+/-29		0.20	uS/cm	0		21-NOV-14	R3097370
Bicarbonate (HCO3)	319	+/-13		5.0	mg/L	0		21-NOV-14	R3097370
Carbonate (CO3)	23.1	+/-4.1		5.0	mg/L	0		21-NOV-14	R3097370
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		21-NOV-14	R3097370
Alkalinity, Total (as CaCO3)	300	+/-19		2.0	mg/L	0		21-NOV-14	R3097370
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	20.1	-		0.11	mg/L	-		24-NOV-14	
L1547314-10 16054141116010 Sampled By: BP/EA on 16-NOV-14 @ 13:15 Matrix: H2O									
BTEX, Styrene & F1-F2									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr:	1,4-Difluorobenzene (SS)	100.4	-	N/A	%	-		20-NOV-14	R3089331
Surr:	4-Bromofluorobenzene (SS)	96.2	-	N/A	%	-		20-NOV-14	R3089331

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1547314-10 16054141116010 Sampled By: BP/EA on 16-NOV-14 @ 13:15 Matrix: H2O BTEX, Styrene and F1 (C6-C10) Surr: 3,4-Dichlorotoluene (SS)	106.8	-		N/A	%	-		20-NOV-14	R3089331
F2 (>C10-C16) F2 (C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	96.2	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
L1547314-11 16054141116011 Sampled By: BP/EA on 16-NOV-14 @ 13:30 Matrix: H2O BTEX, Styrene & F1-F2 BTEX, Styrene and F1 (C6-C10) Benzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	<0.0010	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	<0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	<0.00071	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	100.9	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	96.5	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	108.2	-		N/A	%	-		20-NOV-14	R3089331
F2 (>C10-C16) F2 (C10-C16)	<0.25	-		0.25	mg/L	-	19-NOV-14	19-NOV-14	R3094429
Surr: 2-Bromobenzotrifluoride	95.4	-		N/A	%	-	19-NOV-14	19-NOV-14	R3094429
L1547314-12 16054141116012 Sampled By: BP/EA on 16-NOV-14 @ 13:35 Matrix: H2O BTEX, Styrene and F1 (C6-C10) Benzene	0.0987	-		0.00050	mg/L	-		20-NOV-14	R3089331
Toluene	0.105	-		0.00050	mg/L	-		20-NOV-14	R3089331
EthylBenzene	0.102	-		0.00050	mg/L	-		20-NOV-14	R3089331
o-Xylene	0.101	-		0.00050	mg/L	-		20-NOV-14	R3089331
m+p-Xylene	0.198	-		0.00050	mg/L	-		20-NOV-14	R3089331
Styrene	0.100	-		0.0010	mg/L	-		20-NOV-14	R3089331
F1(C6-C10)	0.71	-		0.10	mg/L	-		20-NOV-14	R3089331
F1-BTEX	0.10	-		0.10	mg/L	-		20-NOV-14	R3089331
Xylenes	0.299	-		0.00071	mg/L	-		20-NOV-14	R3089331
Surr: 1,4-Difluorobenzene (SS)	100.3	-		N/A	%	-		20-NOV-14	R3089331
Surr: 4-Bromofluorobenzene (SS)	98.6	-		N/A	%	-		20-NOV-14	R3089331
Surr: 3,4-Dichlorotoluene (SS)	106.6	-		N/A	%	-		20-NOV-14	R3089331
* Refer to Referenced Information for Qualifiers (if any) and Methodology.									

Reference Information

Report Comments: ADDITIONAL 05-JAN-15 09:35
ADDITIONAL 16-DEC-14 10:53

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Sulfate (SO4)	DLM	

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)		EPA 5021/8015&8260 GC-MS & FID
C-DIS-ORG-ED	Water	Dissolved Organic Carbon		APHA 5310 B-Instrumental
CL-IC-ED	Water	Chloride by IC		APHA 4110 B-ION CHROMATOGRAPHY
F2,F3,F4-ED	Water	F2, F3, F4		EPA 3510/CCME PHC CWS-GC-FID
F2-ED	Water	F2 (>C10-C16)		EPA 3510/CCME PHC CWS-GC-FID
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved		EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)		EPA 245.7 / EPA 245.1
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR, Syncrude, 1994

Dissolved naphthenic acids are solvent extracted from acidified aqueous samples using Dichloromethane prior to quantitation by Fourier Transform Infra-Red spectroscopy. Note that FTIR is not uniquely selective to naphthenic acids. If present, other carboxylic acids (e.g. humic acids, fulvic acids) may also be detected by this method.

NH3-CFA-ED Water Ammonia in Water by Colour APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

NO2+NO3-CALC-ED Water Nitrate+Nitrite CALCULATION

NO2-IC-ED Water Nitrite as N by IC APHA 4110 B-ION CHROMATOGRAPHY

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

NO3-IC-ED Water Nitrate as N by IC APHA 4110 B-ION CHROMATOGRAPHY

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

PAH-ABT1-CL Water PAH & Carcinogenic PAH List EPA 3510/8270-GC/MS

PH/EC/ALK-ED Water pH, Conductivity and Total Alkalinity APHA 4500-H, 2510, 2320

All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PHENOLS-4AAP-ED Water Phenols (4AAP) AB ENV.06537-COLORIMETRIC

This analysis is carried out using procedures adapted from ENVIRODAT VMV 06537 689, Method Code 154, in "Methods Manual for Chemical Analysis of Water and Wastes" published by the Alberta Environmental Centre. This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide and 4-aminoantipyrine to form a red complex which is measured at 505 nm.

SIO2-D-CALC-ED Water Dissolved Silicon (reported as Silica) CALCULATION

SIO2-T-CALC-ED Water Total Silicon (reported as Silica) CALCULATION

SO4-IC-ED Water Sulfate by IC APHA 4110 B-ION CHROMATOGRAPHY

SOLIDS-TDS-ED Water Total Dissolved Solids APHA 2540 C

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
TURBIDITY-ED	Water	Turbidity		APHA 2130 B-Nephelometer

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
FM	ALS ENVIRONMENTAL - FORT MCMURRAY, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

M050685

GLOSSARY OF REPORT TERMS

Surr - Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.

Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent.

Zero values indicate no detectable method bias.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 1 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R3089331							
WG1998055-4	DUP	L1546996-1						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	20-NOV-14
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	20-NOV-14
EthylBenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	20-NOV-14
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	20-NOV-14
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	20-NOV-14
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	50	20-NOV-14
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	20-NOV-14
WG1998055-8	DUP	L1547314-4						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	20-NOV-14
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	20-NOV-14
EthylBenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	20-NOV-14
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	20-NOV-14
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	20-NOV-14
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	50	20-NOV-14
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	20-NOV-14
WG1998055-2	LCS							
Benzene			104.7		%		70-130	20-NOV-14
Toluene			110.0		%		70-130	20-NOV-14
EthylBenzene			105.9		%		70-130	20-NOV-14
o-Xylene			104.0		%		70-130	20-NOV-14
m+p-Xylene			101.3		%		70-130	20-NOV-14
Styrene			102.6		%		70-130	20-NOV-14
WG1998055-3	LCS							
F1(C6-C10)			98.3		%		70-130	20-NOV-14
WG1998055-6	LCS							
Benzene			125.7		%		70-130	20-NOV-14
Toluene			125.4		%		70-130	20-NOV-14
EthylBenzene			119.3		%		70-130	20-NOV-14
o-Xylene			123.9		%		70-130	20-NOV-14
m+p-Xylene			113.5		%		70-130	20-NOV-14
Styrene			121.0		%		70-130	20-NOV-14
WG1998055-7	LCS							
F1(C6-C10)			119.9		%		70-130	20-NOV-14
WG1998055-1	MB							



Environmental

Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 2 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R3089331							
WG1998055-1	MB							
Benzene			<0.00050		mg/L		0.0005	20-NOV-14
Toluene			<0.00050		mg/L		0.0005	20-NOV-14
EthylBenzene			<0.00050		mg/L		0.0005	20-NOV-14
o-Xylene			<0.00050		mg/L		0.0005	20-NOV-14
m+p-Xylene			<0.00050		mg/L		0.0005	20-NOV-14
Styrene			<0.0010		mg/L		0.001	20-NOV-14
F1(C6-C10)			<0.10		mg/L		0.1	20-NOV-14
Surrogate: 1,4-Difluorobenzene (SS)			101.4		%		70-130	20-NOV-14
Surrogate: 4-Bromofluorobenzene (SS)			94.6		%		70-130	20-NOV-14
Surrogate: 3,4-Dichlorotoluene (SS)			112.6		%		70-130	20-NOV-14
WG1998055-5	MB							
Benzene			<0.00050		mg/L		0.0005	20-NOV-14
Toluene			<0.00050		mg/L		0.0005	20-NOV-14
EthylBenzene			<0.00050		mg/L		0.0005	20-NOV-14
o-Xylene			<0.00050		mg/L		0.0005	20-NOV-14
m+p-Xylene			<0.00050		mg/L		0.0005	20-NOV-14
Styrene			<0.0010		mg/L		0.001	20-NOV-14
F1(C6-C10)			<0.10		mg/L		0.1	20-NOV-14
Surrogate: 1,4-Difluorobenzene (SS)			100.7		%		70-130	20-NOV-14
Surrogate: 4-Bromofluorobenzene (SS)			95.5		%		70-130	20-NOV-14
Surrogate: 3,4-Dichlorotoluene (SS)			109.0		%		70-130	20-NOV-14
C-DIS-ORG-ED		Water						
Batch	R3084990							
WG1997858-3	CVS							
Dissolved Organic Carbon			114.7		%		80-160	18-NOV-14
WG1997858-4	DUP	L1547314-9						
Dissolved Organic Carbon		7.8	7.7		mg/L	1.9	20	18-NOV-14
WG1997858-6	DUP	L1547576-4						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	18-NOV-14
WG1997858-2	LCS							
Dissolved Organic Carbon			98.7		%		80-120	18-NOV-14
WG1997858-1	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	18-NOV-14
WG1997858-5	MS	L1547314-9						
Dissolved Organic Carbon			98.2		%		70-130	18-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 3 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-ED								
	Water							
Batch	R3084990							
WG1997858-7	MS	L1547576-4						
Dissolved Organic Carbon			121.4		%		70-130	18-NOV-14
CL-IC-ED								
	Water							
Batch	R3085749							
WG1998056-3	DUP	L1547314-9						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	18-NOV-14
WG1998056-11	LCS		102.7		%		90-110	18-NOV-14
Chloride (Cl)								
WG1998056-2	LCS		102.1		%		90-110	18-NOV-14
Chloride (Cl)								
WG1998056-5	LCS		102.5		%		90-110	18-NOV-14
Chloride (Cl)								
WG1998056-9	LCS		102.7		%		90-110	18-NOV-14
Chloride (Cl)								
WG1998056-1	MB		<0.50		mg/L		0.5	18-NOV-14
Chloride (Cl)								
WG1998056-10	MB		<0.50		mg/L		0.5	18-NOV-14
Chloride (Cl)								
WG1998056-12	MB		<0.50		mg/L		0.5	18-NOV-14
Chloride (Cl)								
WG1998056-6	MB		<0.50		mg/L		0.5	18-NOV-14
Chloride (Cl)								
WG1998056-4	MS	L1547314-9	100.7		%		75-125	18-NOV-14
Chloride (Cl)								
F2,F3,F4-ED								
	Water							
Batch	R3094429							
WG1997829-2	LCS							
F2 (>C10-C16)			92.0		%		70-130	19-NOV-14
F3 (C16-C34)			89.9		%		70-130	19-NOV-14
F4 (C34-C50)			87.1		%		70-130	19-NOV-14
WG1997829-1	MB		<0.25		mg/L		0.25	19-NOV-14
F2 (>C10-C16)								
F3 (C16-C34)			<0.25		mg/L		0.25	19-NOV-14
F4 (C34-C50)			<0.25		mg/L		0.25	19-NOV-14
Surrogate: 2-Bromobenzotrifluoride			91.0		%		60-140	19-NOV-14
WG1997829-3	MS	L1547314-1						



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 4 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2,F3,F4-ED								
	Water							
Batch	R3094429							
WG1997829-3	MS	L1547314-1						
F2 (>C10-C16)			93.0		%		60-140	19-NOV-14
F3 (C16-C34)			92.1		%		60-140	19-NOV-14
F4 (C34-C50)			90.5		%		60-140	19-NOV-14
F2-ED								
	Water							
Batch	R3094429							
WG1997829-2	LCS							
F2 (C10-C16)			92.0		%		70-130	19-NOV-14
WG1997829-1	MB							
F2 (C10-C16)			<0.25		mg/L		0.25	19-NOV-14
Surrogate: 2-Bromobenzotrifluoride			91.0		%		65-135	19-NOV-14
HG-D-L-CVAA-ED								
	Water							
Batch	R3099674							
WG2001087-11	DUP	L1548214-6						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	22-NOV-14
WG2001087-7	DUP	L1547314-7						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	22-NOV-14
WG2001087-10	LCS							
Mercury (Hg)-Dissolved			99.1		%		80-120	22-NOV-14
WG2001087-2	LCS							
Mercury (Hg)-Dissolved			98.3		%		80-120	22-NOV-14
WG2001087-6	LCS							
Mercury (Hg)-Dissolved			98.9		%		80-120	22-NOV-14
WG2001087-1	MB							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	22-NOV-14
WG2001087-5	MB							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	22-NOV-14
WG2001087-9	MB							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	22-NOV-14
WG2001087-12	MS	L1548214-6						
Mercury (Hg)-Dissolved			98.5		%		70-130	22-NOV-14
WG2001087-8	MS	L1547314-7						
Mercury (Hg)-Dissolved			95.9		%		70-130	22-NOV-14
HG-T-L-CVAA-ED								
	Water							



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 5 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-L-CVAA-ED		Water						
Batch	R3099674							
WG2001089-3	DUP	L1547314-2						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	22-NOV-14
WG2001089-2	LCS							
Mercury (Hg)-Total			100.9		%		80-120	22-NOV-14
WG2001089-1	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	22-NOV-14
WG2001089-4	MS	L1547314-2						
Mercury (Hg)-Total			98.1		%		70-130	22-NOV-14
MET-D-CCMS-ED		Water						
Batch	R3099595							
WG2001094-2	CRM	ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			101.3		%		80-120	22-NOV-14
Antimony (Sb)-Dissolved			97.7		%		80-120	22-NOV-14
Arsenic (As)-Dissolved			93.1		%		80-120	22-NOV-14
Barium (Ba)-Dissolved			95.1		%		80-120	22-NOV-14
Beryllium (Be)-Dissolved			86.9		%		80-120	22-NOV-14
Bismuth (Bi)-Dissolved			100.0		%		80-120	22-NOV-14
Cadmium (Cd)-Dissolved			96.2		%		80-120	22-NOV-14
Chromium (Cr)-Dissolved			98.9		%		80-120	22-NOV-14
Cobalt (Co)-Dissolved			96.0		%		80-120	22-NOV-14
Copper (Cu)-Dissolved			93.7		%		80-120	22-NOV-14
Iron (Fe)-Dissolved			91.3		%		80-120	22-NOV-14
Lead (Pb)-Dissolved			100.3		%		80-120	22-NOV-14
Lithium (Li)-Dissolved			90.1		%		80-120	22-NOV-14
Manganese (Mn)-Dissolved			97.2		%		80-120	22-NOV-14
Molybdenum (Mo)-Dissolved			92.0		%		80-120	22-NOV-14
Nickel (Ni)-Dissolved			95.6		%		80-120	22-NOV-14
Selenium (Se)-Dissolved			93.7		%		80-120	22-NOV-14
Silicon (Si)-Dissolved			102.6		%		80-120	22-NOV-14
Silver (Ag)-Dissolved			97.4		%		80-120	22-NOV-14
Strontium (Sr)-Dissolved			97.8		%		80-120	22-NOV-14
Thallium (Tl)-Dissolved			96.0		%		80-120	22-NOV-14
Titanium (Ti)-Dissolved			101.9		%		80-120	22-NOV-14
Tin (Sn)-Dissolved			95.9		%		80-120	22-NOV-14
Uranium (U)-Dissolved			89.5		%		80-120	22-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 6 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3099595							
WG2001094-2 CRM	ED-HIGH-WATRM							
Vanadium (V)-Dissolved			98.4		%		80-120	22-NOV-14
Zinc (Zn)-Dissolved			101.1		%		80-120	22-NOV-14
WG2001094-5 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			96.7		%		80-120	22-NOV-14
Antimony (Sb)-Dissolved			97.2		%		80-120	22-NOV-14
Arsenic (As)-Dissolved			91.4		%		80-120	22-NOV-14
Barium (Ba)-Dissolved			94.0		%		80-120	22-NOV-14
Beryllium (Be)-Dissolved			88.7		%		80-120	22-NOV-14
Bismuth (Bi)-Dissolved			100.0		%		80-120	22-NOV-14
Cadmium (Cd)-Dissolved			94.5		%		80-120	22-NOV-14
Chromium (Cr)-Dissolved			97.0		%		80-120	22-NOV-14
Cobalt (Co)-Dissolved			93.2		%		80-120	22-NOV-14
Copper (Cu)-Dissolved			92.3		%		80-120	22-NOV-14
Iron (Fe)-Dissolved			88.2		%		80-120	22-NOV-14
Lead (Pb)-Dissolved			96.7		%		80-120	22-NOV-14
Lithium (Li)-Dissolved			91.9		%		80-120	22-NOV-14
Manganese (Mn)-Dissolved			94.1		%		80-120	22-NOV-14
Molybdenum (Mo)-Dissolved			93.1		%		80-120	22-NOV-14
Nickel (Ni)-Dissolved			93.2		%		80-120	22-NOV-14
Selenium (Se)-Dissolved			91.2		%		80-120	22-NOV-14
Silicon (Si)-Dissolved			114.0		%		80-120	22-NOV-14
Silver (Ag)-Dissolved			94.7		%		80-120	22-NOV-14
Strontium (Sr)-Dissolved			97.2		%		80-120	22-NOV-14
Thallium (Tl)-Dissolved			97.1		%		80-120	22-NOV-14
Titanium (Ti)-Dissolved			97.7		%		80-120	22-NOV-14
Tin (Sn)-Dissolved			92.5		%		80-120	22-NOV-14
Uranium (U)-Dissolved			92.5		%		80-120	22-NOV-14
Vanadium (V)-Dissolved			95.9		%		80-120	22-NOV-14
Zinc (Zn)-Dissolved			97.4		%		80-120	22-NOV-14
WG2001094-3 DUP	L1547494-8							
Aluminum (Al)-Dissolved		0.0259	0.0214		mg/L	19	20	22-NOV-14
Antimony (Sb)-Dissolved		0.00024	0.00025		mg/L	5.6	20	22-NOV-14
Arsenic (As)-Dissolved		0.00120	0.00118		mg/L	1.0	20	22-NOV-14
Barium (Ba)-Dissolved		0.00598	0.00501		mg/L	18	20	22-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 7 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R3099595							
WG2001094-3	DUP	L1547494-8						
Beryllium (Be)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-NOV-14
Bismuth (Bi)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Cadmium (Cd)-Dissolved		0.000027	0.000022	J	mg/L	0.000006	0.00004	22-NOV-14
Chromium (Cr)-Dissolved		0.00036	0.00035		mg/L	3.6	20	22-NOV-14
Cobalt (Co)-Dissolved		0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-NOV-14
Copper (Cu)-Dissolved		0.0117	0.0102		mg/L	13	20	22-NOV-14
Iron (Fe)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	22-NOV-14
Lead (Pb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Lithium (Li)-Dissolved		0.109	0.0955		mg/L	13	20	22-NOV-14
Manganese (Mn)-Dissolved		0.00017	0.00014	J	mg/L	0.00003	0.0002	22-NOV-14
Molybdenum (Mo)-Dissolved		0.00348	0.00330		mg/L	5.3	20	22-NOV-14
Nickel (Ni)-Dissolved		0.00218	0.00192		mg/L	13	20	22-NOV-14
Selenium (Se)-Dissolved		0.00021	0.00020		mg/L	0.6	20	22-NOV-14
Silicon (Si)-Dissolved		5.83	5.74		mg/L	1.6	20	22-NOV-14
Silver (Ag)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	22-NOV-14
Thallium (Tl)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	22-NOV-14
Titanium (Ti)-Dissolved		<0.00060	<0.00060	RPD-NA	mg/L	N/A	20	22-NOV-14
Tin (Sn)-Dissolved		0.00035	0.00033		mg/L	4.4	20	22-NOV-14
Uranium (U)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	22-NOV-14
Vanadium (V)-Dissolved		0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-NOV-14
Zinc (Zn)-Dissolved		0.0310	0.0265		mg/L	16	20	22-NOV-14
WG2001094-6	DUP	L1547314-1						
Aluminum (Al)-Dissolved		0.0015	<0.0050	RPD-NA	mg/L	N/A	20	22-NOV-14
Antimony (Sb)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	22-NOV-14
Arsenic (As)-Dissolved		0.0196	0.0199		mg/L	1.3	20	22-NOV-14
Barium (Ba)-Dissolved		0.259	0.274		mg/L	5.6	20	22-NOV-14
Beryllium (Be)-Dissolved		<0.00050	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-NOV-14
Cadmium (Cd)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Chromium (Cr)-Dissolved		<0.00040	<0.0050	RPD-NA	mg/L	N/A	20	22-NOV-14
Cobalt (Co)-Dissolved		0.00026	0.00024		mg/L	6.6	20	22-NOV-14
Copper (Cu)-Dissolved		<0.00060	<0.0010	RPD-NA	mg/L	N/A	20	22-NOV-14
Iron (Fe)-Dissolved		13.7	13.7		mg/L	0.1	20	22-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 8 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R3099595							
WG2001094-6 DUP		L1547314-1						
Lead (Pb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Lithium (Li)-Dissolved		0.0165	0.0178		mg/L	7.9	20	22-NOV-14
Manganese (Mn)-Dissolved		1.20	1.20		mg/L	0.2	20	22-NOV-14
Molybdenum (Mo)-Dissolved		0.00448	0.00461		mg/L	2.9	20	22-NOV-14
Nickel (Ni)-Dissolved		0.00059	<0.0020	RPD-NA	mg/L	N/A	20	22-NOV-14
Selenium (Se)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	22-NOV-14
Silicon (Si)-Dissolved		8.79	8.64		mg/L	1.7	20	22-NOV-14
Silver (Ag)-Dissolved		<0.000010	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Strontium (Sr)-Dissolved		0.407	0.415		mg/L	2.0	20	22-NOV-14
Thallium (Tl)-Dissolved		<0.000050	<0.000010	RPD-NA	mg/L	N/A	20	22-NOV-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	22-NOV-14
Tin (Sn)-Dissolved		<0.00020	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Uranium (U)-Dissolved		0.000339	0.00035		mg/L	4.5	20	22-NOV-14
Vanadium (V)-Dissolved		0.00013	0.00012		mg/L	6.5	20	22-NOV-14
Zinc (Zn)-Dissolved		0.204	0.205		mg/L	0.4	20	22-NOV-14
WG2001094-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	22-NOV-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	22-NOV-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 9 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3099595							
WG2001094-1 MB								
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-NOV-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-NOV-14
WG2001094-4 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	22-NOV-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	22-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-NOV-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	22-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 10 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch R3099595								
WG2001094-4 MB								
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-NOV-14
Batch R3102229								
WG2001684-2 CRM		ED-HIGH-WATRM						
Manganese (Mn)-Dissolved			97.2		%		80-120	24-NOV-14
Selenium (Se)-Dissolved			98.4		%		80-120	24-NOV-14
Zinc (Zn)-Dissolved			97.3		%		80-120	24-NOV-14
WG2001684-3 DUP		L1549498-3						
Manganese (Mn)-Dissolved		0.000264	0.000256		mg/L	3.4	20	24-NOV-14
Selenium (Se)-Dissolved		0.00013	0.00013		mg/L	1.4	20	24-NOV-14
Zinc (Zn)-Dissolved		0.0798	0.0701		mg/L	13	20	24-NOV-14
WG2001684-1 MB								
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	24-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	24-NOV-14
WG2001684-4 MB								
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	24-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	24-NOV-14
MET-T-CCMS-ED		Water						
Batch R3099598								
WG1997976-6 DUP		L1547314-3						
Aluminum (Al)-Total		0.0742	0.0681		mg/L	8.6	20	22-NOV-14
Antimony (Sb)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	22-NOV-14
Arsenic (As)-Total		0.00437	0.00430		mg/L	1.6	20	22-NOV-14
Barium (Ba)-Total		0.138	0.131		mg/L	5.3	20	22-NOV-14
Beryllium (Be)-Total		<0.00050	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-NOV-14
Boron (B)-Total		0.194	0.193		mg/L	0.6	20	22-NOV-14
Cadmium (Cd)-Total		0.000010	<0.00020	RPD-NA	mg/L	N/A	20	22-NOV-14
Calcium (Ca)-Total		61.7	64.2		mg/L	3.9	20	22-NOV-14
Chromium (Cr)-Total		0.00246	<0.0050	RPD-NA	mg/L	N/A	20	22-NOV-14
Cobalt (Co)-Total		0.00039	0.00036		mg/L	7.7	20	22-NOV-14
Copper (Cu)-Total		0.00069	<0.0010	RPD-NA	mg/L	N/A	20	22-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 11 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R3099598							
WG1997976-6	DUP	L1547314-3						
Iron (Fe)-Total		4.90	4.89		mg/L	0.1	20	22-NOV-14
Lead (Pb)-Total		0.000196	0.00017		mg/L	16	20	22-NOV-14
Lithium (Li)-Total		0.0338	0.0356		mg/L	5.1	20	22-NOV-14
Magnesium (Mg)-Total		17.3	17.4		mg/L	0.7	20	22-NOV-14
Manganese (Mn)-Total		0.235	0.236		mg/L	0.0	20	22-NOV-14
Molybdenum (Mo)-Total		0.00595	0.00601		mg/L	1.0	20	22-NOV-14
Nickel (Ni)-Total		0.00618	0.0058		mg/L	5.8	20	22-NOV-14
Potassium (K)-Total		3.82	3.75		mg/L	1.9	20	22-NOV-14
Selenium (Se)-Total		<0.00010	<0.00040	RPD-NA	mg/L	N/A	20	22-NOV-14
Silicon (Si)-Total		10.5	10.2		mg/L	3.0	20	22-NOV-14
Silver (Ag)-Total		<0.000010	<0.00040	RPD-NA	mg/L	N/A	20	22-NOV-14
Sodium (Na)-Total		40.1	40.7		mg/L	1.6	20	22-NOV-14
Strontium (Sr)-Total		0.425	0.437		mg/L	2.9	20	22-NOV-14
Thallium (Tl)-Total		<0.000050	<0.000010	RPD-NA	mg/L	N/A	20	22-NOV-14
Tin (Sn)-Total		0.00186	0.00183		mg/L	1.9	20	22-NOV-14
Titanium (Ti)-Total		0.00236	0.00185	J	mg/L	0.00051	0.0006	22-NOV-14
Uranium (U)-Total		0.000069	<0.00010	RPD-NA	mg/L	N/A	20	22-NOV-14
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-NOV-14
Zinc (Zn)-Total		0.0085	0.0085		mg/L	0.2	20	22-NOV-14
WG1997976-5	LCS							
Aluminum (Al)-Total			97.4		%		70-130	22-NOV-14
Antimony (Sb)-Total			95.9		%		70-130	22-NOV-14
Arsenic (As)-Total			93.4		%		70-130	22-NOV-14
Barium (Ba)-Total			97.4		%		70-130	22-NOV-14
Beryllium (Be)-Total			87.3		%		70-130	22-NOV-14
Bismuth (Bi)-Total			97.1		%		70-130	22-NOV-14
Boron (B)-Total			98.6		%		70-130	22-NOV-14
Cadmium (Cd)-Total			91.6		%		70-130	22-NOV-14
Calcium (Ca)-Total			94.3		%		70-130	22-NOV-14
Chromium (Cr)-Total			95.1		%		70-130	22-NOV-14
Cobalt (Co)-Total			94.5		%		70-130	22-NOV-14
Copper (Cu)-Total			90.6		%		70-130	22-NOV-14
Iron (Fe)-Total			84.8		%		70-130	22-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 12 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R3099598							
WG1997976-5	LCS							
Lead (Pb)-Total			98.4		%		70-130	22-NOV-14
Lithium (Li)-Total			92.9		%		70-130	22-NOV-14
Magnesium (Mg)-Total			96.9		%		70-130	22-NOV-14
Manganese (Mn)-Total			95.2		%		70-130	22-NOV-14
Molybdenum (Mo)-Total			93.3		%		70-130	22-NOV-14
Nickel (Ni)-Total			93.8		%		70-130	22-NOV-14
Potassium (K)-Total			92.7		%		70-130	22-NOV-14
Selenium (Se)-Total			90.2		%		70-130	22-NOV-14
Silicon (Si)-Total			100.5		%		70-130	22-NOV-14
Silver (Ag)-Total			96.8		%		70-130	22-NOV-14
Sodium (Na)-Total			100.0		%		70-130	22-NOV-14
Strontium (Sr)-Total			92.7		%		70-130	22-NOV-14
Thallium (Tl)-Total			96.6		%		70-130	22-NOV-14
Tin (Sn)-Total			94.7		%		70-130	22-NOV-14
Titanium (Ti)-Total			100.9		%		70-130	22-NOV-14
Uranium (U)-Total			89.3		%		70-130	22-NOV-14
Vanadium (V)-Total			96.9		%		70-130	22-NOV-14
Zinc (Zn)-Total			95.8		%		70-130	22-NOV-14
WG1997976-4	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	22-NOV-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Boron (B)-Total			<0.010		mg/L		0.01	22-NOV-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	22-NOV-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	22-NOV-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Iron (Fe)-Total			<0.010		mg/L		0.01	22-NOV-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	22-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 13 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R3099598							
WG1997976-4	MB							
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	22-NOV-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Potassium (K)-Total			<0.050		mg/L		0.05	22-NOV-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Silicon (Si)-Total			<0.050		mg/L		0.05	22-NOV-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	22-NOV-14
Sodium (Na)-Total			<0.050		mg/L		0.05	22-NOV-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	22-NOV-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	22-NOV-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-NOV-14
Vanadium (V)-Total			<0.00050		mg/L		0.0005	22-NOV-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-NOV-14
NAPHTHENIC-ACID-FM		Water						
Batch	R3090968							
WG1997147-3	DUP	L1546389-8						
Naphthenic Acids		<1.0	<1.0	RPD-NA	mg/L	N/A	30	19-NOV-14
WG1997147-4	LCS							
Naphthenic Acids			98.9		%		70-130	19-NOV-14
WG1997147-1	MB							
Naphthenic Acids			<1.0		mg/L		1	19-NOV-14
WG1997147-2	MS	L1546389-7						
Naphthenic Acids			104.2		%		50-150	19-NOV-14
NH3-CFA-ED		Water						
Batch	R3088270							
WG1998444-3	DUP	L1547561-2						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	19-NOV-14
WG1998444-5	DUP	L1547766-1						
Ammonia, Total (as N)		0.132	0.134		mg/L	1.4	20	19-NOV-14
WG1998444-7	DUP	L1548123-1						
Ammonia, Total (as N)		<0.050	0.053	RPD-NA	mg/L	N/A	20	19-NOV-14
WG1998444-9	DUP	L1548275-1						



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 14 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-CFA-ED		Water						
Batch	R3088270							
WG1998444-9	DUP	L1548275-1						
Ammonia, Total (as N)		1.16	1.16		mg/L	0.2	20	19-NOV-14
WG1998444-2	LCS							
Ammonia, Total (as N)			103.6		%		85-115	19-NOV-14
WG1998444-1	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	19-NOV-14
WG1998444-4	MS	L1547570-2						
Ammonia, Total (as N)			94.8		%		75-125	19-NOV-14
WG1998444-6	MS	L1547573-5						
Ammonia, Total (as N)			100.0		%		75-125	19-NOV-14
WG1998444-8	MS	L1547576-4						
Ammonia, Total (as N)			99.3		%		75-125	19-NOV-14
NO2-IC-ED		Water						
Batch	R3085749							
WG1998056-3	DUP	L1547314-9						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	18-NOV-14
WG1998056-11	LCS							
Nitrite (as N)			100.2		%		90-110	18-NOV-14
WG1998056-2	LCS							
Nitrite (as N)			102.2		%		90-110	18-NOV-14
WG1998056-5	LCS							
Nitrite (as N)			106.2		%		90-110	18-NOV-14
WG1998056-9	LCS							
Nitrite (as N)			100.0		%		90-110	18-NOV-14
WG1998056-1	MB							
Nitrite (as N)			<0.020		mg/L		0.02	18-NOV-14
WG1998056-10	MB							
Nitrite (as N)			<0.020		mg/L		0.02	18-NOV-14
WG1998056-12	MB							
Nitrite (as N)			<0.020		mg/L		0.02	18-NOV-14
WG1998056-6	MB							
Nitrite (as N)			<0.020		mg/L		0.02	18-NOV-14
WG1998056-4	MS	L1547314-9						
Nitrite (as N)			97.2		%		75-125	18-NOV-14
NO3-IC-ED		Water						



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 15 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-ED		Water						
Batch	R3085749							
WG1998056-3	DUP	L1547314-9						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-NOV-14
WG1998056-11	LCS							
Nitrate (as N)			102.2		%		90-110	18-NOV-14
WG1998056-2	LCS							
Nitrate (as N)			101.4		%		90-110	18-NOV-14
WG1998056-5	LCS							
Nitrate (as N)			101.9		%		90-110	18-NOV-14
WG1998056-9	LCS							
Nitrate (as N)			102.1		%		90-110	18-NOV-14
WG1998056-1	MB							
Nitrate (as N)			<0.050		mg/L		0.05	18-NOV-14
WG1998056-10	MB							
Nitrate (as N)			<0.050		mg/L		0.05	18-NOV-14
WG1998056-12	MB							
Nitrate (as N)			<0.050		mg/L		0.05	18-NOV-14
WG1998056-6	MB							
Nitrate (as N)			<0.050		mg/L		0.05	18-NOV-14
WG1998056-4	MS	L1547314-9						
Nitrate (as N)			99.97		%		75-125	18-NOV-14
PAH-ABT1-CL		Water						
Batch	R3093268							
WG1999551-2	LCS							
Acenaphthene			92.4		%		60-130	19-NOV-14
Acenaphthylene			97.6		%		60-130	19-NOV-14
Anthracene			94.1		%		60-130	19-NOV-14
Fluoranthene			98.0		%		60-130	19-NOV-14
Fluorene			95.4		%		60-130	19-NOV-14
Naphthalene			89.7		%		50-130	19-NOV-14
Phenanthrene			92.3		%		60-130	19-NOV-14
Pyrene			99.0		%		60-130	19-NOV-14
Benzo(a)anthracene			99.3		%		60-130	19-NOV-14
Benzo(k)fluoranthene			100.9		%		60-130	19-NOV-14
Benzo(b&j)fluoranthene			99.8		%		60-130	19-NOV-14
Benzo(g,h,i)perylene			101.7		%		60-130	19-NOV-14
Benzo(a)pyrene			106.5		%		60-130	19-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 16 of 20

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R3093268							
WG1999551-2	LCS							
Chrysene			96.6		%		60-130	19-NOV-14
Dibenzo(a,h)anthracene			103.4		%		60-130	19-NOV-14
Indeno(1,2,3-cd)pyrene			104.6		%		60-130	19-NOV-14
WG1999551-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	19-NOV-14
Acenaphthylene			<0.000020		mg/L		0.00002	19-NOV-14
Anthracene			<0.000010		mg/L		0.00001	19-NOV-14
Fluoranthene			<0.000020		mg/L		0.00002	19-NOV-14
Fluorene			<0.000020		mg/L		0.00002	19-NOV-14
Naphthalene			<0.000050		mg/L		0.00005	19-NOV-14
Phenanthrene			<0.000050		mg/L		0.00005	19-NOV-14
Pyrene			<0.000010		mg/L		0.00001	19-NOV-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	19-NOV-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	19-NOV-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	19-NOV-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	19-NOV-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	19-NOV-14
Chrysene			<0.000020		mg/L		0.00002	19-NOV-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	19-NOV-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	19-NOV-14
Surrogate: d10-Acenaphthene			104.3		%		60-130	19-NOV-14
Surrogate: d10-Phenanthrene			97.5		%		60-130	19-NOV-14
Surrogate: d12-Chrysene			91.6		%		60-130	19-NOV-14
PH/EC/ALK-ED		Water						
Batch	R3097370							
WG2000524-10	DUP	L1548818-23						
pH		7.96	7.94	J	pH	0.02	0.3	21-NOV-14
Conductivity (EC)		1230	1230		uS/cm	0.1	10	21-NOV-14
Bicarbonate (HCO3)		996	1040		mg/L	3.9	25	21-NOV-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	21-NOV-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	21-NOV-14
Alkalinity, Total (as CaCO3)		817	849		mg/L	3.9	20	21-NOV-14
WG2000524-9	DUP	L1547314-9						
pH		8.66	8.67	J	pH	0.02	0.3	21-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 17 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R3097370							
WG2000524-9	DUP	L1547314-9						
Conductivity (EC)		577	583		uS/cm	1.1	10	21-NOV-14
Bicarbonate (HCO3)		319	327		mg/L	2.2	25	21-NOV-14
Carbonate (CO3)		23.1	23.6		mg/L	2.4	25	21-NOV-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	21-NOV-14
Alkalinity, Total (as CaCO3)		300	307		mg/L	2.2	20	21-NOV-14
WG2000524-12	LCS							
Conductivity (EC)			100.8		%		90-110	21-NOV-14
WG2000524-14	LCS							
Alkalinity, Total (as CaCO3)			100.6		%		85-115	21-NOV-14
WG2000524-15	LCS							
Conductivity (EC)			97.5		%		90-110	21-NOV-14
WG2000524-3	LCS							
pH			6.08		pH		5.9-6.1	21-NOV-14
WG2000524-4	LCS							
Alkalinity, Total (as CaCO3)			101.7		%		85-115	21-NOV-14
WG2000524-5	LCS							
Conductivity (EC)			101.7		%		90-110	21-NOV-14
WG2000524-1	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	21-NOV-14
Carbonate (CO3)			<5.0		mg/L		5	21-NOV-14
Hydroxide (OH)			<5.0		mg/L		5	21-NOV-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	21-NOV-14
PHENOLS-4AAP-ED		Water						
Batch	R3102448							
WG2001882-3	DUP	L1544573-1						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	24-NOV-14
WG2001882-4	DUP	L1546930-8						
Phenols (4AAP)		<0.0010	0.0014	RPD-NA	mg/L	N/A	15	24-NOV-14
WG2001882-5	DUP	L1547090-3						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	15	24-NOV-14
WG2001882-6	DUP	L1547314-9						
Phenols (4AAP)		0.0011	0.0014	J	mg/L	0.0003	0.002	24-NOV-14
WG2001882-2	LCS							
Phenols (4AAP)			103.0		%		85-115	24-NOV-14
WG2001882-1	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	24-NOV-14



Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Page 18 of 20

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: Sue Raynard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-ED		Water						
Batch	R3085749							
WG1998056-13	DUP	L1547025-3						
Sulfate (SO4)		1440	1460		mg/L	0.9	20	18-NOV-14
WG1998056-3	DUP	L1547314-9						
Sulfate (SO4)		29.6	29.4		mg/L	0.5	20	18-NOV-14
WG1998056-11	LCS							
Sulfate (SO4)			103.0		%		90-110	18-NOV-14
WG1998056-2	LCS							
Sulfate (SO4)			102.2		%		90-110	18-NOV-14
WG1998056-5	LCS							
Sulfate (SO4)			102.6		%		90-110	18-NOV-14
WG1998056-9	LCS							
Sulfate (SO4)			102.8		%		90-110	18-NOV-14
WG1998056-1	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	18-NOV-14
WG1998056-10	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	18-NOV-14
WG1998056-12	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	18-NOV-14
WG1998056-6	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	18-NOV-14
WG1998056-4	MS	L1547314-9						
Sulfate (SO4)			96.2		%		75-125	18-NOV-14
SOLIDS-TDS-ED		Water						
Batch	R3088892							
WG1998026-3	DUP	L1547314-9						
Total Dissolved Solids		376	375		mg/L	0.3	20	18-NOV-14
WG1998026-2	LCS							
Total Dissolved Solids			103.0		%		85-115	18-NOV-14
WG1998026-1	MB							
Total Dissolved Solids			<10		mg/L		10	18-NOV-14
TURBIDITY-ED		Water						
Batch	R3087395							
WG1997904-3	DUP	L1547314-9						
Turbidity		130	133		NTU	2.3	15	18-NOV-14
WG1997904-2	LCS							
Turbidity			99.3		%		70-130	18-NOV-14
WG1997904-1	MB							
Turbidity			<0.10		NTU		0.1	18-NOV-14

Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Page 19 of 20

Contact: Sue Raynard

Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1547314

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2
Contact: Sue Raynard

Page 20 of 20

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Turbidity							
	1	15-NOV-14 10:50	18-NOV-14 00:00	48	61	hours	EHTL
	2	15-NOV-14 12:56	18-NOV-14 00:00	48	59	hours	EHTL
	3	15-NOV-14 14:50	18-NOV-14 00:00	48	57	hours	EHTL
	4	15-NOV-14 16:44	18-NOV-14 00:00	48	55	hours	EHTL
Anions and Nutrients							
Nitrate as N by IC							
	1	15-NOV-14 10:50	18-NOV-14 08:00	48	69	hours	EHTL
	2	15-NOV-14 12:56	18-NOV-14 08:00	48	67	hours	EHTL
	3	15-NOV-14 14:50	18-NOV-14 08:00	48	65	hours	EHTL
	4	15-NOV-14 16:44	18-NOV-14 08:00	48	63	hours	EHTL
Nitrite as N by IC							
	1	15-NOV-14 10:50	18-NOV-14 08:00	48	69	hours	EHTL
	2	15-NOV-14 12:56	18-NOV-14 08:00	48	67	hours	EHTL
	3	15-NOV-14 14:50	18-NOV-14 08:00	48	65	hours	EHTL
	4	15-NOV-14 16:44	18-NOV-14 08:00	48	63	hours	EHTL

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1547314 were received on 17-NOV-14 09:52.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Matrix Solutions Inc.
ATTN: SUE RAYNARD
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Date Received: 19-NOV-14
Report Date: 07-JAN-15 15:37 (MT)
Version: FINAL REV. 4

Client Phone: 403-513-2275

Certificate of Analysis

Lab Work Order #: L1548841
Project P.O. #: NOT SUBMITTED
Job Reference: 16054-502 SAOS
C of C Numbers: M050663, M050664
Legal Site Desc:

Comments: ADDITIONAL 05-JAN-15 10:17
ADDITIONAL 05-JAN-15 09:37
ADDITIONAL 16-DEC-14 10:56

Nicole Thibault
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-1 16054141117013									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 11:11									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	98.8	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	106.7	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	105.2	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	103.5	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000533	+/-0.0000092		0.0000050	mg/L	0		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	5.41	+/-0.86		0.0030	mg/L	0		27-NOV-14	R3109211
Antimony (Sb)-Total	0.00032	+/-0.00008		0.00010	mg/L	0		27-NOV-14	R3109211
Arsenic (As)-Total	0.00954	+/-0.0011		0.00010	mg/L	0		27-NOV-14	R3109211
Barium (Ba)-Total	0.248	+/-0.028		0.000050	mg/L	0		27-NOV-14	R3109211
Beryllium (Be)-Total	0.00062	+/-0.00014		0.00050	mg/L	0		27-NOV-14	R3109211
Bismuth (Bi)-Total	0.000156	+/-0.000039		0.000050	mg/L	0		27-NOV-14	R3109211
Boron (B)-Total	0.099	+/-0.016		0.010	mg/L	0		27-NOV-14	R3109211
Cadmium (Cd)-Total	0.000437	+/-0.000084		0.000010	mg/L	0		27-NOV-14	R3109211
Calcium (Ca)-Total	146	+/-17		0.10	mg/L	0		27-NOV-14	R3109211
Chromium (Cr)-Total	0.0103	+/-0.0015		0.00010	mg/L	0		27-NOV-14	R3109211
Cobalt (Co)-Total	0.00980	+/-0.0013		0.00010	mg/L	0		27-NOV-14	R3109211
Copper (Cu)-Total	0.0180	+/-0.0021		0.00010	mg/L	0		27-NOV-14	R3109211
Iron (Fe)-Total	16.6	+/-2.6		0.030	mg/L	0		27-NOV-14	R3109211
Lead (Pb)-Total	0.00889	+/-0.0014		0.000050	mg/L	0		27-NOV-14	R3109211
Lithium (Li)-Total	0.0590	+/-0.011		0.0050	mg/L	0		27-NOV-14	R3109211
Magnesium (Mg)-Total	48.9	+/-5.9		0.10	mg/L	0		27-NOV-14	R3109211
Manganese (Mn)-Total	0.452	+/-0.046		0.0050	mg/L	0		27-NOV-14	R3109211
Molybdenum (Mo)-Total	0.00186	+/-0.00023		0.000050	mg/L	0		27-NOV-14	R3109211
Nickel (Ni)-Total	0.0197	+/-0.0022		0.00010	mg/L	0		27-NOV-14	R3109211
Potassium (K)-Total	5.10	+/-0.63		0.50	mg/L	0		27-NOV-14	R3109211
Selenium (Se)-Total	0.00529	+/-0.00073		0.00010	mg/L	0		27-NOV-14	R3109211
Silicon (Si)-Total	24.4	+/-4.9		0.050	mg/L	0		27-NOV-14	R3109211
Silver (Ag)-Total	0.000188	+/-0.000039		0.000010	mg/L	0		27-NOV-14	R3109211
Sodium (Na)-Total	7.7	+/-1.0		1.0	mg/L	0		27-NOV-14	R3109211
Strontium (Sr)-Total	0.325	+/-0.047		0.00010	mg/L	0		27-NOV-14	R3109211
Thallium (Tl)-Total	0.000321	+/-0.000050		0.000050	mg/L	0		27-NOV-14	R3109211
Tin (Sn)-Total	0.00035	+/-0.00006		0.00010	mg/L	0		27-NOV-14	R3109211
Titanium (Ti)-Total	0.114	+/-0.037		0.00030	mg/L	0		27-NOV-14	R3109211
Uranium (U)-Total	0.0140	+/-0.0020		0.000010	mg/L	0		27-NOV-14	R3109211

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-1 16054141117013									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 11:11									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	0.0208	+/-0.0025		0.00050	mg/L	0		27-NOV-14	R3109211
Zinc (Zn)-Total	0.0530	+/-0.0088		0.0050	mg/L	0		27-NOV-14	R3109211
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0838	+/-0.010		0.0020	mg/L	0		05-JAN-15	R3110054
Dissolved Organic Carbon	12.1	+/-1.4		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	586	+/-39		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	52.3	-		0.11	mg/L	-		27-NOV-14	
Turbidity	304	+/-17		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluoranthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluorene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Naphthalene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Phenanthrene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Pyrene	0.000013	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Acenaphthene	98.8	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Phenanthrene	92.4	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d12-Chrysene	86.3	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	3.64	+/-0.23	RRV	0.50	mg/L	0		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0023	+/-0.0005		0.0010	mg/L	0		27-NOV-14	R3110054
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054
Barium (Ba)-Dissolved	0.132	+/-0.011		0.00010	mg/L	0		27-NOV-14	R3110054
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110054
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110054
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110054
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054
Cobalt (Co)-Dissolved	0.00036	+/-0.00003		0.00010	mg/L	0		27-NOV-14	R3110054
Copper (Cu)-Dissolved	0.00136	+/-0.00011		0.00060	mg/L	0		27-NOV-14	R3110054
Iron (Fe)-Dissolved	<0.010	-		0.010	mg/L	-		27-NOV-14	R3110054
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110054
Lithium (Li)-Dissolved	0.0504	+/-0.0063		0.0050	mg/L	0		27-NOV-14	R3110054

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-1 16054141117013 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 11:11 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Manganese (Mn)-Dissolved	0.0570	+/-0.0039		0.0020	mg/L	0		27-NOV-14	R3110054
Molybdenum (Mo)-Dissolved	0.00195	+/-0.00021		0.00010	mg/L	0		27-NOV-14	R3110054
Nickel (Ni)-Dissolved	0.00210	+/-0.00018		0.00010	mg/L	0		27-NOV-14	R3110054
Selenium (Se)-Dissolved	0.00496	+/-0.00083		0.00040	mg/L	0		27-NOV-14	R3110054
Silicon (Si)-Dissolved	11.5	+/-0.98		0.050	mg/L	0		27-NOV-14	R3110054
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110054
Strontium (Sr)-Dissolved	0.283	+/-0.021		0.00010	mg/L	0		27-NOV-14	R3110054
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110054
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110054
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		27-NOV-14	R3110054
Uranium (U)-Dissolved	0.0139	+/-0.0015		0.000010	mg/L	0		27-NOV-14	R3110054
Vanadium (V)-Dissolved	0.00016	+/-0.00001		0.00010	mg/L	0		27-NOV-14	R3110054
Zinc (Zn)-Dissolved	0.0016	+/-0.0003		0.0010	mg/L	0		27-NOV-14	R3110054
Ion Balance Calculation									
Ion Balance	138	-	BL:INT		%	-		28-NOV-14	
TDS (Calculated)	479	-			mg/L	-		28-NOV-14	
Hardness (as CaCO3)	566	-			mg/L	-		28-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	0.822	+/-0.083		0.050	mg/L	0		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	0.822	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	37.2	+/-2.1	RRV	0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.23	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	740	+/-37		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	462	+/-18		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	378	+/-24		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	24.6	-		0.11	mg/L	-		28-NOV-14	
L1548841-2 16054141117014 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 11:45 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-2 16054141117014									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 11:45									
Matrix: H2O									
BTEX, Styrene and F1 (C6-C10)									
Surr: 1,4-Difluorobenzene (SS)	98.5	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	105.1	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	103.1	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	103.0	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0067	+/-0.0022		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.00035	+/-0.00006		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.0653	+/-0.0073		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.243	+/-0.039		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	92.1	+/-11		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.00021	+/-0.00006		0.00010	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00016	+/-0.00002		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.00055	+/-0.00012		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	3.91	+/-0.62		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.000171	+/-0.000032		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0721	+/-0.013		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	25.4	+/-3.1		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.0806	+/-0.0081		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.0129	+/-0.0016		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00218	+/-0.00025		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	7.76	+/-0.95		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	0.00014	+/-0.00002		0.00010	mg/L	0		27-NOV-14	R3110066
Silicon (Si)-Total	11.0	+/-2.2		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	71.0	+/-8.7		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.952	+/-0.14		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	0.00020	+/-0.00004		0.00010	mg/L	0		27-NOV-14	R3110066
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110066
Uranium (U)-Total	0.000025	+/-0.000003		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	1.78	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.273	+/-0.033		0.0020	mg/L	0		05-JAN-15	R3110797
Dissolved Organic Carbon	8.0	+/-1.0		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	578	+/-39		10	mg/L	0		21-NOV-14	R3099459

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-2 16054141117014									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 11:45									
Matrix: H2O									
Silicon (as SiO2)-Total	23.6	-		0.11	mg/L	-		27-NOV-14	
Turbidity	44.8	+/-2.5		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluoranthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluorene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Naphthalene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Phenanthrene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Acenaphthene	96.8	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Phenanthrene	93.0	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d12-Chrysene	90.9	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-	RRV	0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0024	+/-0.0005		0.0010	mg/L	0		27-NOV-14	R3110797
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110797
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110797
Barium (Ba)-Dissolved	0.0638	+/-0.0055		0.00010	mg/L	0		27-NOV-14	R3110797
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110797
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110797
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110797
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110797
Cobalt (Co)-Dissolved	0.00019	+/-0.00002		0.00010	mg/L	0		27-NOV-14	R3110797
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		27-NOV-14	R3110797
Iron (Fe)-Dissolved	3.84	+/-0.35		0.010	mg/L	0		27-NOV-14	R3110797
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110797
Lithium (Li)-Dissolved	0.0715	+/-0.0088		0.0050	mg/L	0		27-NOV-14	R3110797
Manganese (Mn)-Dissolved	0.0852	+/-0.0058		0.0020	mg/L	0		27-NOV-14	R3110797
Molybdenum (Mo)-Dissolved	0.0124	+/-0.0013		0.00010	mg/L	0		27-NOV-14	R3110797
Nickel (Ni)-Dissolved	0.00172	+/-0.00015		0.00010	mg/L	0		27-NOV-14	R3110797
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110797
Silicon (Si)-Dissolved	11.1	+/-0.95		0.050	mg/L	0		27-NOV-14	R3110797
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110797
Strontium (Sr)-Dissolved	0.957	+/-0.071		0.00010	mg/L	0		27-NOV-14	R3110797
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110797
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110797
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		27-NOV-14	R3110797
Uranium (U)-Dissolved	0.000028	+/-0.000003		0.000010	mg/L	0		27-NOV-14	R3110797

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-2 16054141117014 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 11:45 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110797
Zinc (Zn)-Dissolved	0.0017	+/-0.0004		0.0010	mg/L	0		27-NOV-14	R3110797
Ion Balance Calculation									
Ion Balance	117	-	BL:INT		%	-		28-NOV-14	
TDS (Calculated)	481	-			mg/L	-		28-NOV-14	
Hardness (as CaCO3)	332	-			mg/L	-		28-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	50.7	+/-2.9	RRV	0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.43	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	794	+/-40		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	438	+/-17		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	14.8	+/-3.2		5.0	mg/L	0		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	384	+/-24		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	23.8	-		0.11	mg/L	-		28-NOV-14	
L1548841-3 16054141117015 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 12:40 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr:	1,4-Difluorobenzene (SS)	98.6	-	N/A	%	-		25-NOV-14	R3096172
Surr:	4-Bromofluorobenzene (SS)	106.4	-	N/A	%	-		25-NOV-14	R3096172
Surr:	3,4-Dichlorotoluene (SS)	105.0	-	N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.57	+/-0.17		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.74	+/-0.20		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr:	2-Bromobenzotrifluoride	99.6	-	N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.000005	mg/L	-		24-NOV-14	R3101936

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-3 16054141117015									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 12:40									
Matrix: H2O									
Mercury (Hg)				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0739	+/-0.012		0.0030	mg/L	0		27-NOV-14	R3109211
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3109211
Arsenic (As)-Total	0.00073	+/-0.00010		0.00010	mg/L	0		27-NOV-14	R3109211
Barium (Ba)-Total	0.0837	+/-0.0094		0.000050	mg/L	0		27-NOV-14	R3109211
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3109211
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3109211
Boron (B)-Total	0.333	+/-0.053		0.010	mg/L	0		27-NOV-14	R3109211
Cadmium (Cd)-Total	0.00022	+/-0.000005		0.000010	mg/L	0		27-NOV-14	R3109211
Calcium (Ca)-Total	68.3	+/-8.1		0.10	mg/L	0		27-NOV-14	R3109211
Chromium (Cr)-Total	0.00121	+/-0.00019		0.00010	mg/L	0		27-NOV-14	R3109211
Cobalt (Co)-Total	0.00042	+/-0.00006		0.00010	mg/L	0		27-NOV-14	R3109211
Copper (Cu)-Total	0.00083	+/-0.00015		0.00010	mg/L	0		27-NOV-14	R3109211
Iron (Fe)-Total	3.97	+/-0.63		0.030	mg/L	0		27-NOV-14	R3109211
Lead (Pb)-Total	0.000372	+/-0.000063		0.000050	mg/L	0		27-NOV-14	R3109211
Lithium (Li)-Total	0.0448	+/-0.0083		0.0050	mg/L	0		27-NOV-14	R3109211
Magnesium (Mg)-Total	16.5	+/-2.0		0.10	mg/L	0		27-NOV-14	R3109211
Manganese (Mn)-Total	0.228	+/-0.023		0.0050	mg/L	0		27-NOV-14	R3109211
Molybdenum (Mo)-Total	0.00561	+/-0.00068		0.000050	mg/L	0		27-NOV-14	R3109211
Nickel (Ni)-Total	0.00370	+/-0.00042		0.00010	mg/L	0		27-NOV-14	R3109211
Potassium (K)-Total	4.26	+/-0.52		0.50	mg/L	0		27-NOV-14	R3109211
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3109211
Silicon (Si)-Total	9.98	+/-2.0		0.050	mg/L	0		27-NOV-14	R3109211
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3109211
Sodium (Na)-Total	61.1	+/-7.5		1.0	mg/L	0		27-NOV-14	R3109211
Strontium (Sr)-Total	0.481	+/-0.069		0.00010	mg/L	0		27-NOV-14	R3109211
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3109211
Tin (Sn)-Total	0.00072	+/-0.00011		0.00010	mg/L	0		27-NOV-14	R3109211
Titanium (Ti)-Total	0.00337	+/-0.0011		0.00030	mg/L	0		27-NOV-14	R3109211
Uranium (U)-Total	0.000162	+/-0.000022		0.000010	mg/L	0		27-NOV-14	R3109211
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3109211
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3109211
Miscellaneous Parameters									
Ammonia, Total (as N)	1.40	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.314	+/-0.038		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	6.6	+/-0.9		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	427	+/-29		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	21.3	-		0.11	mg/L	-		27-NOV-14	
Turbidity	37.5	+/-2.1		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluoranthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluorene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Naphthalene	0.000063	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Phenanthrene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-3 16054141117015 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 12:40 Matrix: H2O									
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	21.8	+/-1.2		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.46	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	661	+/-33		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	380	+/-15		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	19.2	+/-3.6		5.0	mg/L	0		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	343	+/-22		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	22.0	-		0.11	mg/L	-		27-NOV-14	
L1548841-4 16054141117016 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 13:16 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	97.7	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	105.8	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	103.5	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.46	+/-0.15		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.58	+/-0.17		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	91.8	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0950	+/-0.016		0.0030	mg/L	0		27-NOV-14	R3109211
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3109211
Arsenic (As)-Total	0.00467	+/-0.00055		0.00010	mg/L	0		27-NOV-14	R3109211
Barium (Ba)-Total	0.120	+/-0.013		0.000050	mg/L	0		27-NOV-14	R3109211
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3109211
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3109211
Boron (B)-Total	0.051	+/-0.008		0.010	mg/L	0		27-NOV-14	R3109211
Cadmium (Cd)-Total	0.000021	+/-0.000005		0.000010	mg/L	0		27-NOV-14	R3109211

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-4 16054141117016									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 13:16									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Calcium (Ca)-Total	75.0	+/-8.9		0.10	mg/L	0		27-NOV-14	R3109211
Chromium (Cr)-Total	0.00117	+/-0.00018		0.00010	mg/L	0		27-NOV-14	R3109211
Cobalt (Co)-Total	0.00040	+/-0.00005		0.00010	mg/L	0		27-NOV-14	R3109211
Copper (Cu)-Total	0.00079	+/-0.00014		0.00010	mg/L	0		27-NOV-14	R3109211
Iron (Fe)-Total	2.03	+/-0.32		0.030	mg/L	0		27-NOV-14	R3109211
Lead (Pb)-Total	0.000199	+/-0.000036		0.000050	mg/L	0		27-NOV-14	R3109211
Lithium (Li)-Total	0.0243	+/-0.0045		0.0050	mg/L	0		27-NOV-14	R3109211
Magnesium (Mg)-Total	19.1	+/-2.3		0.10	mg/L	0		27-NOV-14	R3109211
Manganese (Mn)-Total	0.215	+/-0.022		0.0050	mg/L	0		27-NOV-14	R3109211
Molybdenum (Mo)-Total	0.00290	+/-0.00035		0.000050	mg/L	0		27-NOV-14	R3109211
Nickel (Ni)-Total	0.00163	+/-0.00020		0.00010	mg/L	0		27-NOV-14	R3109211
Potassium (K)-Total	2.39	+/-0.29		0.50	mg/L	0		27-NOV-14	R3109211
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3109211
Silicon (Si)-Total	9.57	+/-1.9		0.050	mg/L	0		27-NOV-14	R3109211
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3109211
Sodium (Na)-Total	4.7	+/-0.6		1.0	mg/L	0		27-NOV-14	R3109211
Strontium (Sr)-Total	0.240	+/-0.034		0.00010	mg/L	0		27-NOV-14	R3109211
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3109211
Tin (Sn)-Total	0.00016	+/-0.00004		0.00010	mg/L	0		27-NOV-14	R3109211
Titanium (Ti)-Total	0.00334	+/-0.0011		0.00030	mg/L	0		27-NOV-14	R3109211
Uranium (U)-Total	0.00121	+/-0.00017		0.000010	mg/L	0		27-NOV-14	R3109211
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3109211
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3109211
Miscellaneous Parameters									
Ammonia, Total (as N)	0.087	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0533	+/-0.0064		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	6.7	+/-0.9		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	314	+/-21		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	20.5	-		0.11	mg/L	-		27-NOV-14	
Turbidity	16.9	+/-0.98		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluoranthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluorene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Naphthalene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Phenanthrene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-4 16054141117016									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 13:16									
Matrix: H2O									
PAH & Carcinogenic PAH List									
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Acenaphthene	91.8	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Phenanthrene	90.2	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d12-Chrysene	90.7	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0011	+/-0.0004		0.0010	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	0.00440	+/-0.00046		0.00040	mg/L	0		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.116	+/-0.010		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	0.00022	+/-0.00002		0.00010	mg/L	0		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	1.70	+/-0.15		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0210	+/-0.0026		0.0050	mg/L	0		26-NOV-14	R3109464
Manganese (Mn)-Dissolved	0.206	+/-0.014		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00256	+/-0.00027		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00067	+/-0.00007		0.00010	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	9.94	+/-0.84		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.231	+/-0.017		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.00134	+/-0.00014		0.000010	mg/L	0		26-NOV-14	R3109464
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0011	+/-0.0003		0.0010	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	110	-			%	-		27-NOV-14	
TDS (Calculated)	266	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	270	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	14.3	+/-0.83		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.35	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	486	+/-24		0.20	uS/cm	0		25-NOV-14	R3105390

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-4 16054141117016 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 13:16 Matrix: H2O									
pH, Conductivity and Total Alkalinity									
Bicarbonate (HCO3)	296	+/-12		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	249	+/-16		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.3	-		0.11	mg/L	-		27-NOV-14	
L1548841-5 16054141117017 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 16:08 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	97.7	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	105.1	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	104.3	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.83	+/-0.22		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.74	+/-0.20		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	95.4	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000832	+/-0.000014		0.000005 0	mg/L	0		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	27.8	+/-4.4		0.0030	mg/L	0		27-NOV-14	R3109211
Antimony (Sb)-Total	0.00019	+/-0.00007		0.00010	mg/L	0		27-NOV-14	R3109211
Arsenic (As)-Total	0.0149	+/-0.0017		0.00010	mg/L	0		27-NOV-14	R3109211
Barium (Ba)-Total	0.341	+/-0.038		0.000050	mg/L	0		27-NOV-14	R3109211
Beryllium (Be)-Total	0.00191	+/-0.00044		0.00050	mg/L	0		27-NOV-14	R3109211
Bismuth (Bi)-Total	0.000510	+/-0.000071		0.000050	mg/L	0		27-NOV-14	R3109211
Boron (B)-Total	0.031	+/-0.005		0.010	mg/L	0		27-NOV-14	R3109211
Cadmium (Cd)-Total	0.000632	+/-0.00012		0.000010	mg/L	0		27-NOV-14	R3109211
Calcium (Ca)-Total	26.3	+/-3.1		0.10	mg/L	0		27-NOV-14	R3109211
Chromium (Cr)-Total	0.0615	+/-0.0089		0.00010	mg/L	0		27-NOV-14	R3109211
Cobalt (Co)-Total	0.0264	+/-0.0036		0.00010	mg/L	0		27-NOV-14	R3109211
Copper (Cu)-Total	0.0618	+/-0.0072		0.00010	mg/L	0		27-NOV-14	R3109211
Iron (Fe)-Total	60.6	+/-9.6		0.030	mg/L	0		27-NOV-14	R3109211
Lead (Pb)-Total	0.0299	+/-0.0047		0.000050	mg/L	0		27-NOV-14	R3109211
Lithium (Li)-Total	0.0399	+/-0.0074		0.0050	mg/L	0		27-NOV-14	R3109211
Magnesium (Mg)-Total	16.6	+/-2.0		0.10	mg/L	0		27-NOV-14	R3109211
Manganese (Mn)-Total	0.663	+/-0.067		0.0050	mg/L	0		27-NOV-14	R3109211
Molybdenum (Mo)-Total	0.000523	+/-0.000065		0.000050	mg/L	0		27-NOV-14	R3109211

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-5 16054141117017									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 16:08									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Nickel (Ni)-Total	0.0686	+/-0.0075		0.00010	mg/L	0		27-NOV-14	R3109211
Potassium (K)-Total	7.52	+/-0.92		0.50	mg/L	0		27-NOV-14	R3109211
Selenium (Se)-Total	0.00087	+/-0.00012		0.00010	mg/L	0		27-NOV-14	R3109211
Silicon (Si)-Total	56.1	+/-11		0.050	mg/L	0		27-NOV-14	R3109211
Silver (Ag)-Total	0.000305	+/-0.000062		0.000010	mg/L	0		27-NOV-14	R3109211
Sodium (Na)-Total	2.2	+/-0.3		1.0	mg/L	0		27-NOV-14	R3109211
Strontium (Sr)-Total	0.103	+/-0.015		0.00010	mg/L	0		27-NOV-14	R3109211
Thallium (Tl)-Total	0.000681	+/-0.00011		0.000050	mg/L	0		27-NOV-14	R3109211
Tin (Sn)-Total	0.00079	+/-0.00012		0.00010	mg/L	0		27-NOV-14	R3109211
Titanium (Ti)-Total	0.388	+/-0.13		0.00030	mg/L	0		27-NOV-14	R3109211
Uranium (U)-Total	0.00336	+/-0.00047		0.000010	mg/L	0		27-NOV-14	R3109211
Vanadium (V)-Total	0.0736	+/-0.0088		0.00050	mg/L	0		27-NOV-14	R3109211
Zinc (Zn)-Total	0.228	+/-0.035		0.0050	mg/L	0		27-NOV-14	R3109211
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0118	+/-0.0015		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	1.5	+/-0.5		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	114	+/-9	DLA	20	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	120	-		0.11	mg/L	-		27-NOV-14	
Turbidity	1480	+/-81		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluoranthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluorene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Naphthalene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Phenanthrene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Pyrene	0.000040	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(g,h,i)perylene	0.000028	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Chrysene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Acenaphthene	102.3	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Phenanthrene	93.0	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d12-Chrysene	83.5	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	1.16	+/-0.11		0.50	mg/L	0		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0100	+/-0.0016		0.0010	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-6 16054141117018									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:10									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	97.5	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	105.8	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	104.7	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.32	+/-0.12		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.42	+/-0.14		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	97.5	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0056	+/-0.0021		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.00504	+/-0.00059		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.127	+/-0.014		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.075	+/-0.012		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	49.6	+/-5.9		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Cobalt (Co)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Copper (Cu)-Total	0.00568	+/-0.00069		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	1.39	+/-0.22		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.00104	+/-0.00017		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0208	+/-0.0039		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	14.1	+/-1.7		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.164	+/-0.016		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.00347	+/-0.00042		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00084	+/-0.00011		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	3.45	+/-0.42		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	10.5	+/-2.1		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	11.3	+/-1.4		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.364	+/-0.052		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110066
Uranium (U)-Total	0.000012	+/-0.000002		0.000010	mg/L	0		27-NOV-14	R3110066

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-6 16054141117018									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:10									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	0.0069	+/-0.0023		0.0050	mg/L	0		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	0.425	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0800	+/-0.0096		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	2.0	+/-0.6		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	222	+/-15		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	22.4	-		0.11	mg/L	-		27-NOV-14	
Turbidity	13.5	+/-0.79		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluoranthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluorene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Naphthalene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Phenanthrene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Acenaphthene	98.1	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Phenanthrene	95.0	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d12-Chrysene	90.5	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0011	+/-0.0004		0.0010	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	0.00464	+/-0.00049		0.00040	mg/L	0		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.124	+/-0.011		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	1.39	+/-0.13		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0218	+/-0.0027		0.0050	mg/L	0		26-NOV-14	R3109464

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-6 16054141117018									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:10									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Manganese (Mn)-Dissolved	0.167	+/-0.011		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00355	+/-0.00037		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00042	+/-0.00005		0.00010	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	10.8	+/-0.92		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.390	+/-0.029		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.000014	+/-0.000001		0.000010	mg/L	0		26-NOV-14	R3109464
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0015	+/-0.0003		0.0010	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	115	-	BL:INT		%	-		27-NOV-14	
TDS (Calculated)	215	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	202	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	3.71	+/-0.24		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.35	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	404	+/-20		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	246	+/-10		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	206	+/-14		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	23.2	-		0.11	mg/L	-		27-NOV-14	
L1548841-7 16054141117019									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:40									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-7 16054141117019									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:40									
Matrix: H2O									
BTEX, Styrene and F1 (C6-C10)									
Surr: 1,4-Difluorobenzene (SS)	99.6	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	107.4	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	103.7	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	97.8	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0074	+/-0.0023		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Barium (Ba)-Total	0.116	+/-0.013		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.239	+/-0.038		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	77.4	+/-9.1		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Cobalt (Co)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Copper (Cu)-Total	0.00034	+/-0.00011		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	1.48	+/-0.24		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.000161	+/-0.000031		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0473	+/-0.0088		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	24.2	+/-2.9		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.0396	+/-0.0040		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.000548	+/-0.000068		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00034	+/-0.00007		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	5.53	+/-0.68		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	10.7	+/-2.1		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	57.7	+/-7.1		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.627	+/-0.090		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110066
Uranium (U)-Total	0.000031	+/-0.000004		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	2.63	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.246	+/-0.030		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	6.4	+/-0.9		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	454	+/-30		10	mg/L	0		21-NOV-14	R3099459

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-7 16054141117019									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:40									
Matrix: H2O									
Silicon (as SiO2)-Total	22.8	-		0.11	mg/L	-		27-NOV-14	
Turbidity	16.0	+/-0.93		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluoranthene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Fluorene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Naphthalene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Phenanthrene	<0.000050	-		0.000050	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	21-NOV-14	22-NOV-14	R3101035
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Acenaphthene	97.8	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d10-Phenanthrene	94.2	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Surr: d12-Chrysene	88.9	-		N/A	%	-	21-NOV-14	22-NOV-14	R3101035
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.104	+/-0.0090		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	0.00010	+/-0.000009		0.00010	mg/L	0		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	1.45	+/-0.13		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0467	+/-0.0058		0.0050	mg/L	0		26-NOV-14	R3109464
Manganese (Mn)-Dissolved	0.0404	+/-0.0028		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00055	+/-0.00006		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	11.1	+/-0.95		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.653	+/-0.049		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.000033	+/-0.000003		0.000010	mg/L	0		26-NOV-14	R3109464

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-7 16054141117019 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:40 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	<0.0010	-		0.0010	mg/L	-		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	104	-			%	-		27-NOV-14	
TDS (Calculated)	452	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	320	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	10.3	+/-0.60		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.64	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	790	+/-40		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	442	+/-17		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	46.9	+/-6.9		5.0	mg/L	0		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	440	+/-28		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	23.8	-		0.11	mg/L	-		27-NOV-14	
L1548841-8 16054141117020 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:10 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr:	1,4-Difluorobenzene (SS)	98.8	-	N/A	%	-		25-NOV-14	R3096172
Surr:	4-Bromofluorobenzene (SS)	104.9	-	N/A	%	-		25-NOV-14	R3096172
Surr:	3,4-Dichlorotoluene (SS)	102.6	-	N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr:	2-Bromobenzotrifluoride	100.8	-	N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-8 16054141117020									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:10									
Matrix: H2O									
Mercury (Hg)				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0057	+/-0.0021		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.00496	+/-0.00058		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.131	+/-0.015		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.074	+/-0.012		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	48.5	+/-5.7		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Cobalt (Co)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Copper (Cu)-Total	0.00472	+/-0.00058		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	1.41	+/-0.22		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.000757	+/-0.00012		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0215	+/-0.0040		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	13.7	+/-1.7		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.166	+/-0.017		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.00346	+/-0.00042		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00106	+/-0.00014		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	3.44	+/-0.42		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	10.4	+/-2.1		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	11.4	+/-1.4		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.365	+/-0.052		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110066
Uranium (U)-Total	0.000013	+/-0.000002		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	0.0066	+/-0.0022		0.0050	mg/L	0		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	0.459	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0839	+/-0.010		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	2.1	+/-0.6		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	221	+/-15		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	22.2	-		0.11	mg/L	-		27-NOV-14	
Turbidity	13.8	+/-0.81		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-8 16054141117020 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 17:10 Matrix: H2O									
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	3.70	+/-0.24		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.32	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	397	+/-20		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	247	+/-10		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	5.6	+/-2.4		5.0	mg/L	0		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	212	+/-14		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	23.1	-		0.11	mg/L	-		27-NOV-14	
L1548841-9 16054141117021 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 18:11 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	99.7	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	105.8	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	102.6	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	99.7	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0698	+/-0.012		0.0030	mg/L	0		27-NOV-14	R3109211
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3109211
Arsenic (As)-Total	0.00016	+/-0.00004		0.00010	mg/L	0		27-NOV-14	R3109211
Barium (Ba)-Total	0.0889	+/-0.010		0.000050	mg/L	0		27-NOV-14	R3109211
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3109211
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3109211
Boron (B)-Total	0.243	+/-0.039		0.010	mg/L	0		27-NOV-14	R3109211
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3109211

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-9 16054141117021									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 18:11									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Calcium (Ca)-Total	80.6	+/-9.5		0.10	mg/L	0		27-NOV-14	R3109211
Chromium (Cr)-Total	0.00025	+/-0.00006		0.00010	mg/L	0		27-NOV-14	R3109211
Cobalt (Co)-Total	0.00017	+/-0.00002		0.00010	mg/L	0		27-NOV-14	R3109211
Copper (Cu)-Total	0.00031	+/-0.00011		0.00010	mg/L	0		27-NOV-14	R3109211
Iron (Fe)-Total	1.89	+/-0.30		0.030	mg/L	0		27-NOV-14	R3109211
Lead (Pb)-Total	0.000203	+/-0.000037		0.000050	mg/L	0		27-NOV-14	R3109211
Lithium (Li)-Total	0.0484	+/-0.0090		0.0050	mg/L	0		27-NOV-14	R3109211
Magnesium (Mg)-Total	25.2	+/-3.1		0.10	mg/L	0		27-NOV-14	R3109211
Manganese (Mn)-Total	0.0599	+/-0.0060		0.0050	mg/L	0		27-NOV-14	R3109211
Molybdenum (Mo)-Total	0.00126	+/-0.00015		0.000050	mg/L	0		27-NOV-14	R3109211
Nickel (Ni)-Total	0.00034	+/-0.00007		0.00010	mg/L	0		27-NOV-14	R3109211
Potassium (K)-Total	5.39	+/-0.66		0.50	mg/L	0		27-NOV-14	R3109211
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3109211
Silicon (Si)-Total	10.6	+/-2.1		0.050	mg/L	0		27-NOV-14	R3109211
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3109211
Sodium (Na)-Total	52.2	+/-6.4		1.0	mg/L	0		27-NOV-14	R3109211
Strontium (Sr)-Total	0.663	+/-0.095		0.00010	mg/L	0		27-NOV-14	R3109211
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3109211
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3109211
Titanium (Ti)-Total	0.00274	+/-0.00091		0.00030	mg/L	0		27-NOV-14	R3109211
Uranium (U)-Total	0.000027	+/-0.000004		0.000010	mg/L	0		27-NOV-14	R3109211
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3109211
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3109211
Miscellaneous Parameters									
Ammonia, Total (as N)	2.27	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.241	+/-0.029		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	6.0	+/-0.9		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	465	+/-31		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	22.7	-		0.11	mg/L	-		27-NOV-14	
Turbidity	17.6	+/-1.0		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-9 16054141117021									
Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 18:11									
Matrix: H2O									
PAH & Carcinogenic PAH List									
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Acenaphthene	107.7	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Phenanthrene	102.8	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d12-Chrysene	99.5	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.0931	+/-0.0081		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	1.60	+/-0.14		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0457	+/-0.0057		0.0050	mg/L	0		26-NOV-14	R3109464
Manganese (Mn)-Dissolved	0.0569	+/-0.0039		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00120	+/-0.00013		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	11.3	+/-0.96		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.670	+/-0.050		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0015	+/-0.0003		0.0010	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	112	-	BL:INT		%	-		27-NOV-14	
TDS (Calculated)	437	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	336	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	11.3	+/-0.65		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.55	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	753	+/-38		0.20	uS/cm	0		25-NOV-14	R3105390

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-9 16054141117021 Sampled By: B PETERS EDDIE A on 17-NOV-14 @ 18:11 Matrix: H2O									
pH, Conductivity and Total Alkalinity									
Bicarbonate (HCO3)	435	+/-17		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	32.6	+/-5.2		5.0	mg/L	0		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	411	+/-26		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	24.2	-		0.11	mg/L	-		27-NOV-14	
L1548841-10 16054141118022 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 10:57 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	100.0	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	108.2	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	101.5	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	102.3	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.473	+/-0.076		0.0030	mg/L	0		27-NOV-14	R3109211
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3109211
Arsenic (As)-Total	0.0116	+/-0.0013		0.00010	mg/L	0		27-NOV-14	R3109211
Barium (Ba)-Total	0.0644	+/-0.0072		0.000050	mg/L	0		27-NOV-14	R3109211
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3109211
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3109211
Boron (B)-Total	0.292	+/-0.047		0.010	mg/L	0		27-NOV-14	R3109211
Cadmium (Cd)-Total	0.000028	+/-0.000006		0.000010	mg/L	0		27-NOV-14	R3109211
Calcium (Ca)-Total	151	+/-18		0.10	mg/L	0		27-NOV-14	R3109211
Chromium (Cr)-Total	0.00382	+/-0.00056		0.00010	mg/L	0		27-NOV-14	R3109211
Cobalt (Co)-Total	0.00524	+/-0.00071		0.00010	mg/L	0		27-NOV-14	R3109211
Copper (Cu)-Total	0.00161	+/-0.00023		0.00010	mg/L	0		27-NOV-14	R3109211
Iron (Fe)-Total	3.50	+/-0.55		0.030	mg/L	0		27-NOV-14	R3109211
Lead (Pb)-Total	0.000553	+/-0.000091		0.000050	mg/L	0		27-NOV-14	R3109211
Lithium (Li)-Total	0.0545	+/-0.010		0.0050	mg/L	0		27-NOV-14	R3109211
Magnesium (Mg)-Total	41.3	+/-5.0		0.10	mg/L	0		27-NOV-14	R3109211
Manganese (Mn)-Total	0.873	+/-0.088		0.0050	mg/L	0		27-NOV-14	R3109211
Molybdenum (Mo)-Total	0.00621	+/-0.00076		0.000050	mg/L	0		27-NOV-14	R3109211

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-10 16054141118022									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 10:57									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Nickel (Ni)-Total	0.0249	+/-0.0027		0.00010	mg/L	0		27-NOV-14	R3109211
Potassium (K)-Total	5.27	+/-0.65		0.50	mg/L	0		27-NOV-14	R3109211
Selenium (Se)-Total	0.00016	+/-0.00003		0.00010	mg/L	0		27-NOV-14	R3109211
Silicon (Si)-Total	10.5	+/-2.1		0.050	mg/L	0		27-NOV-14	R3109211
Silver (Ag)-Total	0.000015	+/-0.000005		0.000010	mg/L	0		27-NOV-14	R3109211
Sodium (Na)-Total	128	+/-16		1.0	mg/L	0		27-NOV-14	R3109211
Strontium (Sr)-Total	0.664	+/-0.095		0.00010	mg/L	0		27-NOV-14	R3109211
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3109211
Tin (Sn)-Total	0.00147	+/-0.00021		0.00010	mg/L	0		27-NOV-14	R3109211
Titanium (Ti)-Total	0.0234	+/-0.0076		0.00030	mg/L	0		27-NOV-14	R3109211
Uranium (U)-Total	0.00461	+/-0.00065		0.000010	mg/L	0		27-NOV-14	R3109211
Vanadium (V)-Total	0.00159	+/-0.00024		0.00050	mg/L	0		27-NOV-14	R3109211
Zinc (Zn)-Total	0.0088	+/-0.0024		0.0050	mg/L	0		27-NOV-14	R3109211
Miscellaneous Parameters									
Ammonia, Total (as N)	1.26	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.280	+/-0.034		0.0020	mg/L	0		05-JAN-15	R3110054
Dissolved Organic Carbon	12.3	+/-1.5		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	3.3	+/-0.7		1.0	mg/L	0	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	912	+/-61		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	22.4	-		0.11	mg/L	-		27-NOV-14	
Turbidity	40.0	+/-2.2		0.10	NTU	0		20-NOV-14	R3099430
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)pyrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Dibenzo(a,h)anthracene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Acenaphthene	100.7	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Phenanthrene	95.8	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d12-Chrysene	85.5	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	37.5	+/-2.1	RRV	0.50	mg/L	0		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0014	+/-0.0004		0.0010	mg/L	0		27-NOV-14	R3110054
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-10 16054141118022 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 10:57 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Arsenic (As)-Dissolved	0.00991	+/-0.0010		0.00040	mg/L	0		27-NOV-14	R3110054
Barium (Ba)-Dissolved	0.0592	+/-0.0051		0.00010	mg/L	0		27-NOV-14	R3110054
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110054
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110054
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110054
Chromium (Cr)-Dissolved	0.00207	+/-0.00017		0.00040	mg/L	0		27-NOV-14	R3110054
Cobalt (Co)-Dissolved	0.00452	+/-0.00042		0.00010	mg/L	0		27-NOV-14	R3110054
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		27-NOV-14	R3110054
Iron (Fe)-Dissolved	2.49	+/-0.22		0.010	mg/L	0		27-NOV-14	R3110054
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110054
Lithium (Li)-Dissolved	0.0483	+/-0.0060		0.0050	mg/L	0		27-NOV-14	R3110054
Manganese (Mn)-Dissolved	0.773	+/-0.053		0.0020	mg/L	0		27-NOV-14	R3110054
Molybdenum (Mo)-Dissolved	0.00449	+/-0.00047		0.00010	mg/L	0		27-NOV-14	R3110054
Nickel (Ni)-Dissolved	0.0208	+/-0.0017		0.00010	mg/L	0		27-NOV-14	R3110054
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054
Silicon (Si)-Dissolved	9.41	+/-0.80		0.050	mg/L	0		27-NOV-14	R3110054
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110054
Strontium (Sr)-Dissolved	0.595	+/-0.044		0.00010	mg/L	0		27-NOV-14	R3110054
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110054
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110054
Tin (Sn)-Dissolved	0.00025	+/-0.00002		0.00020	mg/L	0		27-NOV-14	R3110054
Uranium (U)-Dissolved	0.00420	+/-0.00044		0.000010	mg/L	0		27-NOV-14	R3110054
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110054
Zinc (Zn)-Dissolved	0.0015	+/-0.0003		0.0010	mg/L	0		27-NOV-14	R3110054
Ion Balance Calculation									
Ion Balance	115	-	BL:INT		%	-		28-NOV-14	
TDS (Calculated)	753	-			mg/L	-		28-NOV-14	
Hardness (as CaCO3)	497	-			mg/L	-		28-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	70.9	+/-4.0	RRV	0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.32	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	1220	+/-61		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	663	+/-25		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	8.6	+/-2.6		5.0	mg/L	0		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	558	+/-35		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	20.1	-		0.11	mg/L	-		28-NOV-14	
L1548841-11 16054141118023 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 11:25 Matrix: H2O									

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-11 16054141118023									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 11:25									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	98.3	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	105.1	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	103.3	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	98.1	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000083	+/-0.0000043		0.0000050	mg/L	0		24-NOV-14	R3101936
				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	2.56	+/-0.41		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	0.00017	+/-0.00007		0.00010	mg/L	0		27-NOV-14	R3110066
Arsenic (As)-Total	0.0149	+/-0.0017		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.350	+/-0.039		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.052	+/-0.008		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	0.000633	+/-0.00012		0.000010	mg/L	0		27-NOV-14	R3110066
Calcium (Ca)-Total	147	+/-17		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.00507	+/-0.00074		0.00010	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00720	+/-0.00098		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.00797	+/-0.00095		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	9.72	+/-1.5		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.00266	+/-0.00042		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0397	+/-0.0074		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	54.1	+/-6.6		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	3.41	+/-0.34		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.00200	+/-0.00024		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.0164	+/-0.0018		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	4.34	+/-0.53		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	0.00022	+/-0.00003		0.00010	mg/L	0		27-NOV-14	R3110066
Silicon (Si)-Total	16.2	+/-3.2		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	0.000022	+/-0.000006		0.000010	mg/L	0		27-NOV-14	R3110066
Sodium (Na)-Total	28.1	+/-3.5		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.432	+/-0.062		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	0.000122	+/-0.000019		0.000050	mg/L	0		27-NOV-14	R3110066
Tin (Sn)-Total	0.00024	+/-0.00005		0.00010	mg/L	0		27-NOV-14	R3110066
Titanium (Ti)-Total	0.0873	+/-0.028		0.00030	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.00431	+/-0.00061		0.000010	mg/L	0		27-NOV-14	R3110066

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-11 16054141118023									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 11:25									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	0.00822	+/-0.0010		0.00050	mg/L	0		27-NOV-14	R3110066
Zinc (Zn)-Total	0.0187	+/-0.0037		0.0050	mg/L	0		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0636	+/-0.0076		0.0020	mg/L	0		05-JAN-15	R3110797
Dissolved Organic Carbon	6.7	+/-0.9		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	680	+/-45		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	34.6	-		0.11	mg/L	-		27-NOV-14	
Turbidity	192	+/-11		0.10	NTU	0		20-NOV-14	R3099430
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Acenaphthene	101.5	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Phenanthrene	100.4	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d12-Chrysene	82.1	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	59.0	+/-3.3		0.50	mg/L	0		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0020	+/-0.0005		0.0010	mg/L	0		27-NOV-14	R3110797
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110797
Arsenic (As)-Dissolved	0.00133	+/-0.00014		0.00040	mg/L	0		27-NOV-14	R3110797
Barium (Ba)-Dissolved	0.192	+/-0.017		0.00010	mg/L	0		27-NOV-14	R3110797
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110797
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110797
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110797
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110797
Cobalt (Co)-Dissolved	0.00058	+/-0.00005		0.00010	mg/L	0		27-NOV-14	R3110797
Copper (Cu)-Dissolved	0.00148	+/-0.00011		0.00060	mg/L	0		27-NOV-14	R3110797
Iron (Fe)-Dissolved	0.013	+/-0.001		0.010	mg/L	0		27-NOV-14	R3110797
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110797
Lithium (Li)-Dissolved	0.0349	+/-0.0043		0.0050	mg/L	0		27-NOV-14	R3110797

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-11 16054141118023									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 11:25									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Manganese (Mn)-Dissolved	0.380	+/-0.026		0.0020	mg/L	0		27-NOV-14	R3110797
Molybdenum (Mo)-Dissolved	0.00204	+/-0.00021		0.00010	mg/L	0		27-NOV-14	R3110797
Nickel (Ni)-Dissolved	0.00159	+/-0.00014		0.00010	mg/L	0		27-NOV-14	R3110797
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110797
Silicon (Si)-Dissolved	10.1	+/-0.86		0.050	mg/L	0		27-NOV-14	R3110797
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110797
Strontium (Sr)-Dissolved	0.427	+/-0.032		0.00010	mg/L	0		27-NOV-14	R3110797
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110797
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110797
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		27-NOV-14	R3110797
Uranium (U)-Dissolved	0.00320	+/-0.00033		0.000010	mg/L	0		27-NOV-14	R3110797
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110797
Zinc (Zn)-Dissolved	0.0090	+/-0.0011		0.0010	mg/L	0		27-NOV-14	R3110797
Ion Balance Calculation									
Ion Balance	110	-			%	-		28-NOV-14	
TDS (Calculated)	581	-			mg/L	-		28-NOV-14	
Hardness (as CaCO3)	544	-			mg/L	-		28-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	0.127	+/-0.014		0.050	mg/L	0		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	0.127	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	33.8	+/-1.9		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.29	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	1050	+/-52		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	542	+/-21		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	445	+/-28		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.5	-		0.11	mg/L	-		28-NOV-14	
L1548841-12 16054141118024									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 10:12									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-12 16054141118024									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 10:12									
Matrix: H2O									
BTEX, Styrene and F1 (C6-C10)									
Surr: 1,4-Difluorobenzene (SS)	98.2	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	104.1	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	102.0	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	101.7	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	1.15	+/-0.18		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	0.00018	+/-0.00007		0.00010	mg/L	0		27-NOV-14	R3110066
Arsenic (As)-Total	0.0292	+/-0.0034		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.133	+/-0.015		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.439	+/-0.070		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	0.000130	+/-0.000025		0.000010	mg/L	0		27-NOV-14	R3110066
Calcium (Ca)-Total	36.2	+/-4.3		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.00394	+/-0.00058		0.00010	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00192	+/-0.00026		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.0140	+/-0.0017		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	3.64	+/-0.58		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.00407	+/-0.00065		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0484	+/-0.0090		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	11.3	+/-1.4		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.241	+/-0.024		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.0340	+/-0.0041		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00855	+/-0.00095		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	5.39	+/-0.66		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	0.00030	+/-0.00004		0.00010	mg/L	0		27-NOV-14	R3110066
Silicon (Si)-Total	14.9	+/-3.0		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	0.000025	+/-0.000007		0.000010	mg/L	0		27-NOV-14	R3110066
Sodium (Na)-Total	166	+/-20		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.387	+/-0.056		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	0.000065	+/-0.000010		0.000050	mg/L	0		27-NOV-14	R3110066
Tin (Sn)-Total	0.00362	+/-0.00051		0.00010	mg/L	0		27-NOV-14	R3110066
Titanium (Ti)-Total	0.0406	+/-0.013		0.00030	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.000745	+/-0.00010		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	0.00540	+/-0.00069		0.00050	mg/L	0		27-NOV-14	R3110066
Zinc (Zn)-Total	0.0392	+/-0.0067		0.0050	mg/L	0		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	1.36	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.455	+/-0.055		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	8.7	+/-1.1		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	593	+/-40		10	mg/L	0		21-NOV-14	R3099459

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-12 16054141118024									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 10:12									
Matrix: H2O									
Silicon (as SiO2)-Total	31.8	-		0.11	mg/L	-		27-NOV-14	
Turbidity	49.3	+/-2.8		0.10	NTU	0		20-NOV-14	R3099430
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Acenaphthene	102.4	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Phenanthrene	97.6	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d12-Chrysene	99.8	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	7.65	+/-0.45		0.50	mg/L	0		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0020	+/-0.0005		0.0010	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	0.0256	+/-0.0027		0.00040	mg/L	0		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.0745	+/-0.0065		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	0.00029	+/-0.00003		0.00010	mg/L	0		26-NOV-14	R3109464
Copper (Cu)-Dissolved	0.00088	+/-0.00008		0.00060	mg/L	0		26-NOV-14	R3109464
Iron (Fe)-Dissolved	0.470	+/-0.042		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0440	+/-0.0055		0.0050	mg/L	0		26-NOV-14	R3109464
Manganese (Mn)-Dissolved	0.136	+/-0.0093		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.0282	+/-0.0029		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00280	+/-0.00023		0.00010	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	13.3	+/-1.1		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.358	+/-0.027		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.000364	+/-0.000038		0.000010	mg/L	0		26-NOV-14	R3109464

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-12 16054141118024 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 10:12 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Vanadium (V)-Dissolved	0.00011	+/-0.00001		0.00010	mg/L	0		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0105	+/-0.0013		0.0010	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	100	-			%	-		27-NOV-14	
TDS (Calculated)	545	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	126	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	47.4	+/-2.7		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.66	+/-0.01		0.10	pH	0		25-NOV-14	R3105390
Conductivity (EC)	953	+/-48		0.20	uS/cm	0		25-NOV-14	R3105390
Bicarbonate (HCO3)	460	+/-18		5.0	mg/L	0		25-NOV-14	R3105390
Carbonate (CO3)	43.4	+/-6.5		5.0	mg/L	0		25-NOV-14	R3105390
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		25-NOV-14	R3105390
Alkalinity, Total (as CaCO3)	449	+/-28		2.0	mg/L	0		25-NOV-14	R3105390
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	28.4	-		0.11	mg/L	-		27-NOV-14	
L1548841-13 16054141118025 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 14:44 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		24-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		24-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		24-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		24-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		24-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		24-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		24-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		24-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		24-NOV-14	R3096172
Surr:	1,4-Difluorobenzene (SS)	98.9	-	N/A	%	-		24-NOV-14	R3096172
Surr:	4-Bromofluorobenzene (SS)	106.0	-	N/A	%	-		24-NOV-14	R3096172
Surr:	3,4-Dichlorotoluene (SS)	100.2	-	N/A	%	-		24-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr:	2-Bromobenzotrifluoride	95.1	-	N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.000005	mg/L	-		24-NOV-14	R3101936

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-13 16054141118025									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 14:44									
Matrix: H2O									
Mercury (Hg)				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0337	+/-0.0061		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.00015	+/-0.00004		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.218	+/-0.024		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.020	+/-0.003		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	0.000037	+/-0.000007		0.000010	mg/L	0		27-NOV-14	R3110066
Calcium (Ca)-Total	148	+/-17		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.00020	+/-0.00006		0.00010	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00171	+/-0.00023		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.00124	+/-0.00019		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	0.126	+/-0.020		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.000347	+/-0.000059		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0149	+/-0.0028		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	47.0	+/-5.7		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.0788	+/-0.0080		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.000352	+/-0.000045		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00291	+/-0.00033		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	1.34	+/-0.16		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	0.00012	+/-0.00002		0.00010	mg/L	0		27-NOV-14	R3110066
Silicon (Si)-Total	11.0	+/-2.2		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	3.7	+/-0.5		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.137	+/-0.020		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Titanium (Ti)-Total	0.00238	+/-0.00079		0.00030	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.000791	+/-0.00011		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0222	+/-0.0027		0.0020	mg/L	0		05-JAN-15	R3110797
Dissolved Organic Carbon	6.0	+/-0.9		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	594	+/-40		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	23.6	-		0.11	mg/L	-		27-NOV-14	
Turbidity	3.48	+/-0.24		0.10	NTU	0		20-NOV-14	R3099430
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-13 16054141118025 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 14:44 Matrix: H2O									
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	3.59	+/-0.23	RRV	0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.29	+/-0.01		0.10	pH	0		26-NOV-14	R3107649
Conductivity (EC)	646	+/-32		0.20	uS/cm	0		26-NOV-14	R3107649
Bicarbonate (HCO3)	441	+/-17		5.0	mg/L	0		26-NOV-14	R3107649
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Alkalinity, Total (as CaCO3)	362	+/-23		2.0	mg/L	0		26-NOV-14	R3107649
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	24.1	-		0.11	mg/L	-		28-NOV-14	
L1548841-14 16054141118026 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 15:32 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	98.7	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	105.4	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	101.3	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	102.0	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.237	+/-0.038		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.00148	+/-0.00018		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.248	+/-0.028		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.092	+/-0.015		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	0.000012	+/-0.000003		0.000010	mg/L	0		27-NOV-14	R3110066

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-14 16054141118026									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 15:32									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Calcium (Ca)-Total	72.4	+/-8.6		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.00110	+/-0.00017		0.00010	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00174	+/-0.00024		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.00074	+/-0.00014		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	5.15	+/-0.82		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.000498	+/-0.000082		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0260	+/-0.0048		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	19.1	+/-2.3		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.626	+/-0.063		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.00497	+/-0.00060		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00628	+/-0.00070		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	6.03	+/-0.74		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	7.85	+/-1.6		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	14.2	+/-1.7		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.497	+/-0.071		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	0.00039	+/-0.00006		0.00010	mg/L	0		27-NOV-14	R3110066
Titanium (Ti)-Total	0.00829	+/-0.0027		0.00030	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.000549	+/-0.000077		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	0.00064	+/-0.00015		0.00050	mg/L	0		27-NOV-14	R3110066
Zinc (Zn)-Total	0.0106	+/-0.0027		0.0050	mg/L	0		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	2.23	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0918	+/-0.011		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	4.5	+/-0.7		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	305	+/-21		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	16.8	-		0.11	mg/L	-		27-NOV-14	
Turbidity	36.0	+/-2.0		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-14 16054141118026									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 15:32									
Matrix: H2O									
PAH & Carcinogenic PAH List									
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Acenaphthene	98.4	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Phenanthrene	93.7	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d12-Chrysene	83.2	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0011	+/-0.0004		0.0010	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	0.00146	+/-0.00015		0.00040	mg/L	0		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.231	+/-0.020		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	0.00092	+/-0.00009		0.00010	mg/L	0		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	4.30	+/-0.39		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0240	+/-0.0030		0.0050	mg/L	0		26-NOV-14	R3109464
Manganese (Mn)-Dissolved	0.611	+/-0.042		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00395	+/-0.00041		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00329	+/-0.00027		0.00010	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	7.78	+/-0.66		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.491	+/-0.036		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.000419	+/-0.000043		0.000010	mg/L	0		26-NOV-14	R3109464
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	<0.0010	-		0.0010	mg/L	-		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	119	-	BL:INT		%	-		27-NOV-14	
TDS (Calculated)	288	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	287	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	0.99	+/-0.11		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.43	+/-0.01		0.10	pH	0		26-NOV-14	R3107649
Conductivity (EC)	510	+/-26		0.20	uS/cm	0		26-NOV-14	R3107649

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-14 16054141118026 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 15:32 Matrix: H2O									
pH, Conductivity and Total Alkalinity									
Bicarbonate (HCO3)	322	+/-13		5.0	mg/L	0		26-NOV-14	R3107649
Carbonate (CO3)	7.5	+/-2.5		5.0	mg/L	0		26-NOV-14	R3107649
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Alkalinity, Total (as CaCO3)	276	+/-18		2.0	mg/L	0		26-NOV-14	R3107649
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	16.6	-		0.11	mg/L	-		27-NOV-14	
L1548841-15 16054141118027 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:20 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	98.7	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	106.6	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	102.8	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	105.2	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0090	+/-0.0025		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.00014	+/-0.00004		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.321	+/-0.036		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.125	+/-0.020		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	80.3	+/-9.5		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00036	+/-0.00005		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Iron (Fe)-Total	3.21	+/-0.51		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Lithium (Li)-Total	0.0327	+/-0.0061		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	20.9	+/-2.5		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.156	+/-0.016		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.000884	+/-0.00011		0.000050	mg/L	0		27-NOV-14	R3110066

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-15 16054141118027									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:20									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Nickel (Ni)-Total	0.00037	+/-0.00007		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	4.17	+/-0.51		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	9.58	+/-1.9		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	17.0	+/-2.1		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.586	+/-0.084		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Titanium (Ti)-Total	0.00032	+/-0.00015		0.00030	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.000017	+/-0.000002		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	1.02	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.121	+/-0.015		0.0020	mg/L	0		05-JAN-15	R3110054
Dissolved Organic Carbon	4.7	+/-0.7		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	342	+/-23		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	20.5	-		0.11	mg/L	-		27-NOV-14	
Turbidity	30.5	+/-1.7		0.10	NTU	0		20-NOV-14	R3099430
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Acenaphthene	95.7	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Phenanthrene	92.3	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d12-Chrysene	88.8	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3110054
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-15 16054141118027									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:20									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054
Barium (Ba)-Dissolved	0.311	+/-0.027		0.00010	mg/L	0		27-NOV-14	R3110054
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110054
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110054
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110054
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054
Cobalt (Co)-Dissolved	0.00025	+/-0.00002		0.00010	mg/L	0		27-NOV-14	R3110054
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		27-NOV-14	R3110054
Iron (Fe)-Dissolved	3.15	+/-0.28		0.010	mg/L	0		27-NOV-14	R3110054
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110054
Lithium (Li)-Dissolved	0.0315	+/-0.0039		0.0050	mg/L	0		27-NOV-14	R3110054
Manganese (Mn)-Dissolved	0.149	+/-0.010		0.0020	mg/L	0		27-NOV-14	R3110054
Molybdenum (Mo)-Dissolved	0.00091	+/-0.00010		0.00010	mg/L	0		27-NOV-14	R3110054
Nickel (Ni)-Dissolved	0.00020	+/-0.00004		0.00010	mg/L	0		27-NOV-14	R3110054
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		27-NOV-14	R3110054
Silicon (Si)-Dissolved	9.69	+/-0.82		0.050	mg/L	0		27-NOV-14	R3110054
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110054
Strontium (Sr)-Dissolved	0.562	+/-0.042		0.00010	mg/L	0		27-NOV-14	R3110054
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110054
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110054
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		27-NOV-14	R3110054
Uranium (U)-Dissolved	0.000012	+/-0.000001		0.000010	mg/L	0		27-NOV-14	R3110054
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110054
Zinc (Zn)-Dissolved	0.0010	+/-0.0003		0.0010	mg/L	0		27-NOV-14	R3110054
Ion Balance Calculation									
Ion Balance	105	-			%	-		07-JAN-15	
TDS (Calculated)	297	-			mg/L	-		07-JAN-15	
Hardness (as CaCO3)	270	-			mg/L	-		07-JAN-15	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.47	+/-0.01		0.10	pH	0		26-NOV-14	R3107649
Conductivity (EC)	557	+/-28		0.20	uS/cm	0		26-NOV-14	R3107649
Bicarbonate (HCO3)	340	+/-13		5.0	mg/L	0		26-NOV-14	R3107649
Carbonate (CO3)	13.4	+/-3.0		5.0	mg/L	0		26-NOV-14	R3107649
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Alkalinity, Total (as CaCO3)	301	+/-19		2.0	mg/L	0		26-NOV-14	R3107649
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	20.7	-		0.11	mg/L	-		27-NOV-14	
L1548841-16 16054141118028									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:55									
Matrix: H2O									

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-16 16054141118028									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:55									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	99.0	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	106.6	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	102.1	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	94.1	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0057	+/-0.0021		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.0146	+/-0.0017		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.212	+/-0.024		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.051	+/-0.008		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	74.0	+/-8.7		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Cobalt (Co)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Copper (Cu)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Iron (Fe)-Total	3.29	+/-0.52		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Lithium (Li)-Total	0.0235	+/-0.0044		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	21.2	+/-2.6		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.449	+/-0.045		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.00106	+/-0.00013		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00019	+/-0.00006		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	2.81	+/-0.34		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	8.91	+/-1.8		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	7.3	+/-0.9		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.402	+/-0.058		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Titanium (Ti)-Total	<0.00030	-		0.00030	mg/L	-		27-NOV-14	R3110066
Uranium (U)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-16 16054141118028									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:55									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	0.964	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0551	+/-0.0066		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	5.5	+/-0.8		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	0.0011	+/-0.0007		0.0010	mg/L	-7.4%		27-NOV-14	R3109714
Total Dissolved Solids	325	+/-22		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	19.1	-		0.11	mg/L	-		27-NOV-14	
Turbidity	29.6	+/-1.7		0.10	NTU	0		20-NOV-14	R3099430
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Acenaphthene	101.3	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Phenanthrene	94.0	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d12-Chrysene	88.9	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	1.02	+/-0.10		0.50	mg/L	0		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	0.0133	+/-0.0014		0.00040	mg/L	0		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.201	+/-0.017		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	3.21	+/-0.29		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0223	+/-0.0028		0.0050	mg/L	0		26-NOV-14	R3109464

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-16 16054141118028									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:55									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Manganese (Mn)-Dissolved	0.432	+/-0.029		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00112	+/-0.00012		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00017	+/-0.00004		0.00010	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	9.19	+/-0.78		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.408	+/-0.030		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0011	+/-0.0003		0.0010	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	112	-	BL:INT		%	-		27-NOV-14	
TDS (Calculated)	291	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	303	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	1.30	+/-0.12		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.45	+/-0.01		0.10	pH	0		26-NOV-14	R3107649
Conductivity (EC)	522	+/-26		0.20	uS/cm	0		26-NOV-14	R3107649
Bicarbonate (HCO3)	311	+/-12		5.0	mg/L	0		26-NOV-14	R3107649
Carbonate (CO3)	19.0	+/-3.6		5.0	mg/L	0		26-NOV-14	R3107649
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Alkalinity, Total (as CaCO3)	287	+/-18		2.0	mg/L	0		26-NOV-14	R3107649
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	19.7	-		0.11	mg/L	-		27-NOV-14	
L1548841-17 16054141118029									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:20									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-17 16054141118029									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:20									
Matrix: H2O									
BTEX, Styrene and F1 (C6-C10)									
Surr: 1,4-Difluorobenzene (SS)	99.9	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	106.2	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	102.2	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.40	+/-0.13		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.51	+/-0.15		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	98.7	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0085	+/-0.0024		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.00013	+/-0.00004		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.324	+/-0.036		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.129	+/-0.021		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	76.3	+/-9.0		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00036	+/-0.00005		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Iron (Fe)-Total	3.24	+/-0.51		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Lithium (Li)-Total	0.0314	+/-0.0058		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	20.5	+/-2.5		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.157	+/-0.016		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.000861	+/-0.00011		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00036	+/-0.00007		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	4.01	+/-0.49		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	9.63	+/-1.9		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	17.1	+/-2.1		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.563	+/-0.081		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Titanium (Ti)-Total	0.00030	+/-0.00014		0.00030	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.000013	+/-0.000002		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	1.04	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.129	+/-0.016		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	4.9	+/-0.8		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	0.0011	+/-0.0007		0.0010	mg/L	-7.4%		27-NOV-14	R3109714
Total Dissolved Solids	355	+/-24		10	mg/L	0		21-NOV-14	R3099459

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-17 16054141118029									
Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:20									
Matrix: H2O									
Silicon (as SiO2)-Total	20.6	-		0.11	mg/L	-		27-NOV-14	
Turbidity	34.7	+/-2.0		0.10	NTU	0		22-NOV-14	R3101170
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Benzo(a)pyrene	<0.000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Dibenzo(a,h)anthracene	<0.000050	-		0.000005	mg/L	-	24-NOV-14	24-NOV-14	R3106369
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Acenaphthene	97.6	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d10-Phenanthrene	94.7	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Surr: d12-Chrysene	92.1	-		N/A	%	-	24-NOV-14	24-NOV-14	R3106369
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	<0.0010	-		0.0010	mg/L	-		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.298	+/-0.026		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	0.00027	+/-0.00003		0.00010	mg/L	0		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	3.16	+/-0.29		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0311	+/-0.0039		0.0050	mg/L	0		26-NOV-14	R3109464
Manganese (Mn)-Dissolved	0.160	+/-0.011		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00093	+/-0.00010		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00017	+/-0.00004		0.00010	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	10.0	+/-0.85		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.598	+/-0.044		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.000012	+/-0.000001		0.000010	mg/L	0		26-NOV-14	R3109464

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-17 16054141118029 Sampled By: B PETERS EDDIE A on 18-NOV-14 @ 16:20 Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Vanadium (V)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0015	+/-0.0003		0.0010	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	122	-	BL:INT		%	-		27-NOV-14	
TDS (Calculated)	314	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	317	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		20-NOV-14	R3097489
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC									
Sulfate (SO4)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity									
pH	8.47	+/-0.01		0.10	pH	0		26-NOV-14	R3107649
Conductivity (EC)	554	+/-28		0.20	uS/cm	0		26-NOV-14	R3107649
Bicarbonate (HCO3)	336	+/-13		5.0	mg/L	0		26-NOV-14	R3107649
Carbonate (CO3)	13.7	+/-3.1		5.0	mg/L	0		26-NOV-14	R3107649
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Alkalinity, Total (as CaCO3)	298	+/-19		2.0	mg/L	0		26-NOV-14	R3107649
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	21.4	-		0.11	mg/L	-		27-NOV-14	
L1548841-18 16054141119030 Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 11:47 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	99.8	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	104.5	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	100.4	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.58	+/-0.17		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.60	+/-0.17		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	96.6	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	0.0000439	+/-0.0000079		0.000005	mg/L	0		24-NOV-14	R3101936

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-18 16054141119030									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 11:47									
Matrix: H2O									
Mercury (Hg)				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	10.5	+/-1.7		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	0.00061	+/-0.00010		0.00010	mg/L	0		27-NOV-14	R3110066
Arsenic (As)-Total	0.0119	+/-0.0014		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.629	+/-0.070		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	0.00167	+/-0.00038		0.00050	mg/L	0		27-NOV-14	R3110066
Bismuth (Bi)-Total	0.000437	+/-0.000063		0.000050	mg/L	0		27-NOV-14	R3110066
Boron (B)-Total	0.044	+/-0.007		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	0.000313	+/-0.000060		0.000010	mg/L	0		27-NOV-14	R3110066
Calcium (Ca)-Total	39.9	+/-4.7		0.010	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.0104	+/-0.0015		0.00010	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.0122	+/-0.0017		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.0153	+/-0.0018		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	17.9	+/-2.8		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.0203	+/-0.0032		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0135	+/-0.0025		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	12.2	+/-1.5		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	1.58	+/-0.16		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.00109	+/-0.00013		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.0204	+/-0.0022		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	4.84	+/-0.59		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	0.00074	+/-0.00010		0.00010	mg/L	0		27-NOV-14	R3110066
Silicon (Si)-Total	22.6	+/-4.5		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	0.000120	+/-0.000025		0.000010	mg/L	0		27-NOV-14	R3110066
Sodium (Na)-Total	18.6	+/-2.3		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.198	+/-0.028		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	0.000316	+/-0.000049		0.000050	mg/L	0		27-NOV-14	R3110066
Tin (Sn)-Total	0.00078	+/-0.00012		0.00010	mg/L	0		27-NOV-14	R3110066
Titanium (Ti)-Total	0.0774	+/-0.025		0.00030	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.00887	+/-0.0012		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	0.0160	+/-0.0019		0.00050	mg/L	0		27-NOV-14	R3110066
Zinc (Zn)-Total	0.0656	+/-0.011		0.0050	mg/L	0		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	0.094	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.0316	+/-0.0038		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	3.0	+/-0.6		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	<1.0	-		1.0	mg/L	-	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3109714
Total Dissolved Solids	159	+/-12		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	48.4	-		0.11	mg/L	-		27-NOV-14	
Turbidity	159	+/-8.8		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Pyrene	0.000024	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-18 16054141119030									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 11:47									
Matrix: H2O									
PAH & Carcinogenic PAH List									
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	25-NOV-14	R3105748
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	25-NOV-14	R3105748
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Surr: d10-Acenaphthene	129.7	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Surr: d10-Phenanthrene	129.2	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Surr: d12-Chrysene	116.0	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	<0.50	-		0.50	mg/L	-		20-NOV-14	R3097489
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0038	+/-0.0007		0.0010	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	0.00239	+/-0.00025		0.00040	mg/L	0		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.0891	+/-0.0077		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	0.00061	+/-0.00006		0.00010	mg/L	0		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	0.014	+/-0.001		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	<0.0050	-		0.0050	mg/L	-		26-NOV-14	R3109464
Manganese (Mn)-Dissolved	0.364	+/-0.025		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00110	+/-0.00012		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00138	+/-0.00012		0.00010	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	5.46	+/-0.46		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.0999	+/-0.0074		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.00182	+/-0.00019		0.000010	mg/L	0		26-NOV-14	R3109464
Vanadium (V)-Dissolved	0.00032	+/-0.00003		0.00010	mg/L	0		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0014	+/-0.0003		0.0010	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	99.6	-			%	-		27-NOV-14	
TDS (Calculated)	148	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	110	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005	mg/L	-		24-NOV-14	R3101936
				0					
Nitrate as N by IC									

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-18 16054141119030 Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 11:47 Matrix: H2O									
Nitrate as N by IC Nitrate (as N)	0.167	+/-0.018		0.050	mg/L	0		20-NOV-14	R3097489
Nitrate+Nitrite Nitrate and Nitrite (as N)	0.167	-		0.054	mg/L	-		21-NOV-14	
Nitrite as N by IC Nitrite (as N)	<0.020	-		0.020	mg/L	-		20-NOV-14	R3097489
Sulfate by IC Sulfate (SO4)	7.57	+/-0.45		0.50	mg/L	0		20-NOV-14	R3097489
pH, Conductivity and Total Alkalinity pH	8.20	+/-0.01		0.10	pH	0		26-NOV-14	R3107649
Conductivity (EC)	304	+/-15		0.20	uS/cm	0		26-NOV-14	R3107649
Bicarbonate (HCO3)	170	+/-7.3		5.0	mg/L	0		26-NOV-14	R3107649
Carbonate (CO3)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Alkalinity, Total (as CaCO3)	139	+/-9.4		2.0	mg/L	0		26-NOV-14	R3107649
Silicon (reported as Silica) Dissolved Silicon (reported as Silica) Silicon (as SiO2)-Dissolved	11.7	-		0.11	mg/L	-		27-NOV-14	
L1548841-19 16054141119031 Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 12:36 Matrix: H2O									
BTXS, Styrene & F1-F4 BTEX, Styrene and F1 (C6-C10) Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	99.5	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	104.1	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	99.5	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4 F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.33	+/-0.12		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.39	+/-0.13		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	104.2	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total) Mercury (Hg) Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS Aluminum (Al)-Total	0.0336	+/-0.0061		0.0030	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.0763	+/-0.0088		0.00010	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.232	+/-0.026		0.000050	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.394	+/-0.063		0.010	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-19 16054141119031									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 12:36									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Calcium (Ca)-Total	29.5	+/-3.5		0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.00042	+/-0.00008		0.00010	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00079	+/-0.00011		0.00010	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.00062	+/-0.00013		0.00010	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	0.779	+/-0.12		0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.000119	+/-0.000025		0.000050	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.0209	+/-0.0039		0.0050	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	9.81	+/-1.2		0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.0876	+/-0.0088		0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.00177	+/-0.00022		0.000050	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00197	+/-0.00023		0.00010	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	2.19	+/-0.27		0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	0.00013	+/-0.00002		0.00010	mg/L	0		27-NOV-14	R3110066
Silicon (Si)-Total	6.25	+/-1.2		0.050	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	256	+/-31		1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.310	+/-0.044		0.00010	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	0.00061	+/-0.00009		0.00010	mg/L	0		27-NOV-14	R3110066
Titanium (Ti)-Total	0.00126	+/-0.00043		0.00030	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.000252	+/-0.000035		0.000010	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	0.00103	+/-0.00018		0.00050	mg/L	0		27-NOV-14	R3110066
Zinc (Zn)-Total	<0.0050	-		0.0050	mg/L	-		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	3.78	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.393	+/-0.048		0.0020	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	14.9	+/-1.7		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	1.0	+/-0.4		1.0	mg/L	0	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	0.0010	+/-0.0007		0.0010	mg/L	-7.4%		27-NOV-14	R3109714
Total Dissolved Solids	783	+/-52		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	13.4	-		0.11	mg/L	-		27-NOV-14	
Turbidity	2.53	+/-0.19		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(a)pyrene	<0.0000050	-		0.0000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Dibenzo(a,h)anthracene	<0.0000050	-		0.0000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-19 16054141119031									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 12:36									
Matrix: H2O									
PAH & Carcinogenic PAH List									
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Surr: d10-Acenaphthene	125.3	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Surr: d10-Phenanthrene	124.4	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Surr: d12-Chrysene	103.0	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	16.4	+/-0.94		0.50	mg/L	0		21-NOV-14	R3099411
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0021	+/-0.0005		0.0010	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	0.0708	+/-0.0075		0.00040	mg/L	0		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.212	+/-0.018		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	0.00065	+/-0.00006		0.00010	mg/L	0		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	0.633	+/-0.057		0.010	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0180	+/-0.0023		0.0050	mg/L	0		26-NOV-14	R3109464
Manganese (Mn)-Dissolved	0.0808	+/-0.0055		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.00126	+/-0.00013		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00147	+/-0.00013		0.00010	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	6.01	+/-0.51		0.050	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000010	-		0.000010	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.296	+/-0.022		0.00010	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00030	-		0.00030	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	<0.00020	-		0.00020	mg/L	-		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.000187	+/-0.000019		0.000010	mg/L	0		26-NOV-14	R3109464
Vanadium (V)-Dissolved	0.00081	+/-0.00007		0.00010	mg/L	0		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0018	+/-0.0004		0.0010	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	100	-			%	-		27-NOV-14	
TDS (Calculated)	764	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	112	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		21-NOV-14	R3099411
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		24-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		21-NOV-14	R3099411
Sulfate by IC									
Sulfate (SO4)	115	+/-6.5		0.50	mg/L	0		21-NOV-14	R3099411
pH, Conductivity and Total Alkalinity									
pH	8.76	+/-0.01		0.10	pH	0		26-NOV-14	R3107649
Conductivity (EC)	1280	+/-64		0.20	uS/cm	0		26-NOV-14	R3107649

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-19 16054141119031 Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 12:36 Matrix: H2O									
pH, Conductivity and Total Alkalinity									
Bicarbonate (HCO3)	558	+/-21		5.0	mg/L	0		26-NOV-14	R3107649
Carbonate (CO3)	56.4	+/-8.0		5.0	mg/L	0		26-NOV-14	R3107649
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Alkalinity, Total (as CaCO3)	552	+/-35		2.0	mg/L	0		26-NOV-14	R3107649
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	12.9	-		0.11	mg/L	-		27-NOV-14	
L1548841-20 16054141119032 Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 13:29 Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	99.7	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	107.5	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	100.2	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.43	+/-0.14		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.51	+/-0.15		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	104.4	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0713	+/-0.012	DLM	0.0060	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00020	-	DLM	0.00020	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.0266	+/-0.0031	DLM	0.00020	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.102	+/-0.011	DLM	0.00010	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.661	+/-0.11	DLM	0.020	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000020	-	DLM	0.000020	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	66.0	+/-7.8	DLM	0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.00038	+/-0.00007	DLM	0.00020	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00049	+/-0.00007		0.00020	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.00025	+/-0.00010	DLM	0.00020	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	1.70	+/-0.27	DLM	0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.00014	+/-0.00003	DLM	0.00010	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.038	+/-0.007		0.010	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	21.8	+/-2.6	DLM	0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.170	+/-0.017	DLM	0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.00980	+/-0.0012		0.00010	mg/L	0		27-NOV-14	R3110066

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-20 16054141119032									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 13:29									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Nickel (Ni)-Total	0.00313	+/-0.00036	DLM	0.00020	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	3.19	+/-0.39	DLM	0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00020	-	DLM	0.00020	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	6.16	+/-1.2	DLM	0.10	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000020	-	DLM	0.000020	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	290	+/-36	DLM	1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.631	+/-0.091		0.00020	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	0.00059	+/-0.00009		0.00020	mg/L	0		27-NOV-14	R3110066
Titanium (Ti)-Total	0.00174	+/-0.00059		0.00060	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.000404	+/-0.000057	DLM	0.000020	mg/L	0		27-NOV-14	R3110066
Vanadium (V)-Total	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	<0.0060	-	DLM	0.0060	mg/L	-		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	3.82	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.716	+/-0.087		0.0040	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	12.2	+/-1.4		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	1.0	+/-0.4		1.0	mg/L	0	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3110181
Total Dissolved Solids	1150	+/-77		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	13.2	-		0.21	mg/L	-		27-NOV-14	
Turbidity	16.7	+/-0.97		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Anthracene	0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(a)pyrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Dibenzo(a,h)anthracene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Surr: d10-Acenaphthene	126.5	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Surr: d10-Phenanthrene	123.0	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Surr: d12-Chrysene	93.0	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	3.62	+/-0.23		0.50	mg/L	0		21-NOV-14	R3099411
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0094	+/-0.0015		0.0020	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-21 16054141119033									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 14:21									
Matrix: H2O									
BTXS, Styrene & F1-F4									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172
Surr: 1,4-Difluorobenzene (SS)	99.0	-		N/A	%	-		25-NOV-14	R3096172
Surr: 4-Bromofluorobenzene (SS)	104.9	-		N/A	%	-		25-NOV-14	R3096172
Surr: 3,4-Dichlorotoluene (SS)	102.0	-		N/A	%	-		25-NOV-14	R3096172
F2, F3, F4									
F2 (>C10-C16)	<0.25	-		0.25	mg/L	-	21-NOV-14	21-NOV-14	R3099730
F3 (C16-C34)	0.53	+/-0.16		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
F4 (C34-C50)	0.64	+/-0.18		0.25	mg/L	0	21-NOV-14	21-NOV-14	R3099730
Surr: 2-Bromobenzotrifluoride	96.4	-		N/A	%	-	21-NOV-14	21-NOV-14	R3099730
Alberta Tier 1 Metals (Total)									
Mercury (Hg)									
Mercury (Hg)-Total	<0.0000050	-		0.0000050	mg/L	-		24-NOV-14	R3101936
				0					
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0489	+/-0.0085	DLM	0.0060	mg/L	0		27-NOV-14	R3110066
Antimony (Sb)-Total	<0.00020	-	DLM	0.00020	mg/L	-		27-NOV-14	R3110066
Arsenic (As)-Total	0.0533	+/-0.0061	DLM	0.00020	mg/L	0		27-NOV-14	R3110066
Barium (Ba)-Total	0.371	+/-0.042	DLM	0.00010	mg/L	0		27-NOV-14	R3110066
Beryllium (Be)-Total	<0.00050	-		0.00050	mg/L	-		27-NOV-14	R3110066
Bismuth (Bi)-Total	<0.00010	-		0.00010	mg/L	-		27-NOV-14	R3110066
Boron (B)-Total	0.818	+/-0.13	DLM	0.020	mg/L	0		27-NOV-14	R3110066
Cadmium (Cd)-Total	<0.000020	-	DLM	0.000020	mg/L	-		27-NOV-14	R3110066
Calcium (Ca)-Total	28.5	+/-3.4	DLM	0.10	mg/L	0		27-NOV-14	R3110066
Chromium (Cr)-Total	0.00118	+/-0.00018	DLM	0.00020	mg/L	0		27-NOV-14	R3110066
Cobalt (Co)-Total	0.00090	+/-0.00012		0.00020	mg/L	0		27-NOV-14	R3110066
Copper (Cu)-Total	0.00170	+/-0.00024	DLM	0.00020	mg/L	0		27-NOV-14	R3110066
Iron (Fe)-Total	0.604	+/-0.096	DLM	0.030	mg/L	0		27-NOV-14	R3110066
Lead (Pb)-Total	0.00023	+/-0.00004	DLM	0.00010	mg/L	0		27-NOV-14	R3110066
Lithium (Li)-Total	0.066	+/-0.012		0.010	mg/L	0		27-NOV-14	R3110066
Magnesium (Mg)-Total	9.88	+/-1.2	DLM	0.10	mg/L	0		27-NOV-14	R3110066
Manganese (Mn)-Total	0.112	+/-0.011	DLM	0.0050	mg/L	0		27-NOV-14	R3110066
Molybdenum (Mo)-Total	0.0125	+/-0.0015		0.00010	mg/L	0		27-NOV-14	R3110066
Nickel (Ni)-Total	0.00312	+/-0.00036	DLM	0.00020	mg/L	0		27-NOV-14	R3110066
Potassium (K)-Total	3.98	+/-0.49	DLM	0.50	mg/L	0		27-NOV-14	R3110066
Selenium (Se)-Total	<0.00020	-	DLM	0.00020	mg/L	-		27-NOV-14	R3110066
Silicon (Si)-Total	4.43	+/-0.88	DLM	0.10	mg/L	0		27-NOV-14	R3110066
Silver (Ag)-Total	<0.000020	-	DLM	0.000020	mg/L	-		27-NOV-14	R3110066
Sodium (Na)-Total	578	+/-71	DLM	1.0	mg/L	0		27-NOV-14	R3110066
Strontium (Sr)-Total	0.435	+/-0.062		0.00020	mg/L	0		27-NOV-14	R3110066
Thallium (Tl)-Total	<0.000050	-		0.000050	mg/L	-		27-NOV-14	R3110066
Tin (Sn)-Total	0.00114	+/-0.00016		0.00020	mg/L	0		27-NOV-14	R3110066
Titanium (Ti)-Total	0.00135	+/-0.00046		0.00060	mg/L	0		27-NOV-14	R3110066
Uranium (U)-Total	0.000567	+/-0.000079	DLM	0.000020	mg/L	0		27-NOV-14	R3110066

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-21 16054141119033									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 14:21									
Matrix: H2O									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3110066
Zinc (Zn)-Total	0.0069	+/-0.0022	DLM	0.0060	mg/L	0		27-NOV-14	R3110066
Miscellaneous Parameters									
Ammonia, Total (as N)	2.56	-		0.050	mg/L	-		24-NOV-14	R3100969
Boron (B)-Dissolved	0.873	+/-0.11		0.0040	mg/L	0		05-JAN-15	R3109464
Dissolved Organic Carbon	22.3	+/-2.4		1.0	mg/L	0		21-NOV-14	R3099564
Naphthenic Acids	1.3	+/-0.4		1.0	mg/L	0	25-NOV-14	25-NOV-14	R3106831
Phenols (4AAP)	<0.0010	-		0.0010	mg/L	-		27-NOV-14	R3110181
Total Dissolved Solids	1650	+/-110		10	mg/L	0		21-NOV-14	R3099459
Silicon (as SiO2)-Total	9.48	-		0.21	mg/L	-		27-NOV-14	
Turbidity	4.22	+/-0.28		0.10	NTU	0		21-NOV-14	R3099229
PAH & Carcinogenic PAH List									
Acenaphthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Acenaphthylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Fluoranthene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Fluorene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Naphthalene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Phenanthrene	<0.000050	-		0.000050	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(a)anthracene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(k)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(b&j)fluoranthene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(g,h,i)perylene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Benzo(a)pyrene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	25-NOV-14	R3105748
				0					
Chrysene	<0.000020	-		0.000020	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Dibenzo(a,h)anthracene	<0.0000050	-		0.000005	mg/L	-	24-NOV-14	25-NOV-14	R3105748
				0					
Indeno(1,2,3-cd)pyrene	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
B(A)P Total Potency Equivalent	<0.000010	-		0.000010	mg/L	-	24-NOV-14	25-NOV-14	R3105748
Surr: d10-Acenaphthene	113.0	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Surr: d10-Phenanthrene	115.9	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Surr: d12-Chrysene	91.4	-		N/A	%	-	24-NOV-14	25-NOV-14	R3105748
Major Ions & Trace Dissolved Metals									
Chloride by IC									
Chloride (Cl)	524	+/-30		0.50	mg/L	0		21-NOV-14	R3099411
Dissolved Metals in Water by CRC ICPMS									
Aluminum (Al)-Dissolved	0.0046	+/-0.0008		0.0020	mg/L	0		26-NOV-14	R3109464
Antimony (Sb)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Arsenic (As)-Dissolved	0.0507	+/-0.0053		0.00040	mg/L	0		26-NOV-14	R3109464
Barium (Ba)-Dissolved	0.314	+/-0.027		0.00010	mg/L	0		26-NOV-14	R3109464
Beryllium (Be)-Dissolved	<0.00050	-		0.00050	mg/L	-		26-NOV-14	R3109464
Bismuth (Bi)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Cadmium (Cd)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Chromium (Cr)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Cobalt (Co)-Dissolved	0.00079	+/-0.00007		0.00020	mg/L	0		26-NOV-14	R3109464
Copper (Cu)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Iron (Fe)-Dissolved	0.376	+/-0.034		0.020	mg/L	0		26-NOV-14	R3109464
Lead (Pb)-Dissolved	<0.00010	-		0.00010	mg/L	-		26-NOV-14	R3109464
Lithium (Li)-Dissolved	0.0613	+/-0.0076		0.0060	mg/L	0		26-NOV-14	R3109464

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L1548841-21 16054141119033									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 14:21									
Matrix: H2O									
Dissolved Metals in Water by CRC ICPMS									
Manganese (Mn)-Dissolved	0.108	+/-0.0074		0.0020	mg/L	0		26-NOV-14	R3109464
Molybdenum (Mo)-Dissolved	0.0109	+/-0.0011		0.00010	mg/L	0		26-NOV-14	R3109464
Nickel (Ni)-Dissolved	0.00107	+/-0.00010		0.00020	mg/L	0		26-NOV-14	R3109464
Selenium (Se)-Dissolved	<0.00040	-		0.00040	mg/L	-		26-NOV-14	R3109464
Silicon (Si)-Dissolved	4.13	+/-0.35		0.10	mg/L	0		26-NOV-14	R3109464
Silver (Ag)-Dissolved	<0.000020	-		0.000020	mg/L	-		26-NOV-14	R3109464
Strontium (Sr)-Dissolved	0.439	+/-0.033		0.00020	mg/L	0		26-NOV-14	R3109464
Thallium (Tl)-Dissolved	<0.000050	-		0.000050	mg/L	-		26-NOV-14	R3109464
Titanium (Ti)-Dissolved	<0.00060	-		0.00060	mg/L	-		26-NOV-14	R3109464
Tin (Sn)-Dissolved	0.00050	+/-0.00004		0.00020	mg/L	0		26-NOV-14	R3109464
Uranium (U)-Dissolved	0.000511	+/-0.000053		0.000020	mg/L	0		26-NOV-14	R3109464
Vanadium (V)-Dissolved	0.00052	+/-0.00004		0.00020	mg/L	0		26-NOV-14	R3109464
Zinc (Zn)-Dissolved	0.0024	+/-0.0004		0.0020	mg/L	0		26-NOV-14	R3109464
Ion Balance Calculation									
Ion Balance	105	-			%	-		27-NOV-14	
TDS (Calculated)	1620	-			mg/L	-		27-NOV-14	
Hardness (as CaCO3)	111	-			mg/L	-		27-NOV-14	
Mercury (Hg) - Dissolved									
Mercury (Hg)-Dissolved	<0.0000050	-		0.000005 0	mg/L	-		24-NOV-14	R3101936
Nitrate as N by IC									
Nitrate (as N)	<0.050	-		0.050	mg/L	-		21-NOV-14	R3099411
Nitrate+Nitrite									
Nitrate and Nitrite (as N)	<0.054	-		0.054	mg/L	-		24-NOV-14	
Nitrite as N by IC									
Nitrite (as N)	<0.020	-		0.020	mg/L	-		21-NOV-14	R3099411
Sulfate by IC									
Sulfate (SO4)	96.5	+/-5.5		0.50	mg/L	0		21-NOV-14	R3099411
pH, Conductivity and Total Alkalinity									
pH	8.78	+/-0.01		0.10	pH	0		26-NOV-14	R3107649
Conductivity (EC)	2960	+/-150		0.20	uS/cm	0		26-NOV-14	R3107649
Bicarbonate (HCO3)	566	+/-22		5.0	mg/L	0		26-NOV-14	R3107649
Carbonate (CO3)	60.5	+/-8.5		5.0	mg/L	0		26-NOV-14	R3107649
Hydroxide (OH)	<5.0	-		5.0	mg/L	-		26-NOV-14	R3107649
Alkalinity, Total (as CaCO3)	565	+/-36		2.0	mg/L	0		26-NOV-14	R3107649
Silicon (reported as Silica)									
Dissolved Silicon (reported as Silica)									
Silicon (as SiO2)-Dissolved	8.83	-		0.21	mg/L	-		27-NOV-14	
L1548841-22 16054141119034									
Sampled By: B PETERS EDDIE A on 19-NOV-14 @ 14:36									
Matrix: H2O									
BTEX, Styrene & F1-F2									
BTEX, Styrene and F1 (C6-C10)									
Benzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Toluene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
EthylBenzene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
o-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
m+p-Xylene	<0.00050	-		0.00050	mg/L	-		25-NOV-14	R3096172
Styrene	<0.0010	-		0.0010	mg/L	-		25-NOV-14	R3096172
F1(C6-C10)	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
F1-BTEX	<0.10	-		0.10	mg/L	-		25-NOV-14	R3096172
Xylenes	<0.00071	-		0.00071	mg/L	-		25-NOV-14	R3096172

Reference Information

Report Comments: ADDITIONAL 05-JAN-15 10:17
 ADDITIONAL 05-JAN-15 09:37
 ADDITIONAL 16-DEC-14 10:56

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Dissolved Organic Carbon	MS-B	

Sample Parameter Qualifier Key:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
B-D-L-CCMS-ED	Water	Dissolved Boron in Water by CRC ICPMS		APHA 3030 B / EPA SW-846 6020A
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).				
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)		EPA 5021/8015&8260 GC-MS & FID
C-DIS-ORG-ED	Water	Dissolved Organic Carbon		APHA 5310 B-Instrumental
CL-IC-ED	Water	Chloride by IC		APHA 4110 B-ION CHROMATOGRAPHY
F2,F3,F4-ED	Water	F2, F3, F4		EPA 3510/CCME PHC CWS-GC-FID
F2-ED	Water	F2 (>C10-C16)		EPA 3510/CCME PHC CWS-GC-FID
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved		EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)		EPA 245.7 / EPA 245.1
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET-D-CCMS-ED	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS		APHA 3030 B&E / EPA SW-846 6020A
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR, Syncrude, 1994
Dissolved naphthenic acids are solvent extracted from acidified aqueous samples using Dichloromethane prior to quantitation by Fourier Transform Infra-Red spectroscopy. Note that FTIR is not uniquely selective to naphthenic acids. If present, other carboxylic acids (e.g. humic acids, fulvic acids) may also be detected by this method.				
NH3-CFA-ED	Water	Ammonia in Water by Colour		APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.				
NO2+NO3-CALC-ED	Water	Nitrate+Nitrite		CALCULATION
NO2-IC-ED	Water	Nitrite as N by IC		APHA 4110 B-ION CHROMATOGRAPHY
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".				
NO3-IC-ED	Water	Nitrate as N by IC		APHA 4110 B-ION CHROMATOGRAPHY
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".				
PAH-ABT1-CL	Water	PAH & Carcinogenic PAH List		EPA 3510/8270-GC/MS
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity		APHA 4500-H, 2510, 2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)				
PHENOLS-4AAP-ED	Water	Phenols (4AAP)		AB ENV.06537-COLORIMETRIC

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
This analysis is carried out using procedures adapted from ENVIRODAT VMV 06537 689, Method Code 154, in "Methods Manual for Chemical Analysis of Water and Wastes" published by the Alberta Environmental Centre. This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide and 4-aminoantipyrine to form a red complex which is measured at 505 nm.				
SIO2-D-CALC-ED	Water	Dissolved Silicon (reported as Silica)		CALCULATION
SIO2-T-CALC-ED	Water	Total Silicon (reported as Silica)		CALCULATION
SO4-IC-ED	Water	Sulfate by IC		APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TDS-ED	Water	Total Dissolved Solids		APHA 2540 C
TURBIDITY-ED	Water	Turbidity		APHA 2130 B-Nephelometer

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
FM	ALS ENVIRONMENTAL - FORT MCMURRAY, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

M050663	M050664
---------	---------

GLOSSARY OF REPORT TERMS

Surr - Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.

Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent.

Zero values indicate no detectable method bias.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 1 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-D-L-CCMS-ED		Water						
Batch R3109464								
WG2003367-5 CRM		ED-HIGH-WATRM						
Boron (B)-Dissolved			97.8		%		80-120	26-NOV-14
WG2003367-8 CRM		ED-HIGH-WATRM						
Boron (B)-Dissolved			99.2		%		80-120	26-NOV-14
WG2003367-1 MB								
Boron (B)-Dissolved			<0.0020		mg/L		0.002	05-JAN-15
WG2003367-4 MB								
Boron (B)-Dissolved			<0.0020		mg/L		0.002	26-NOV-14
WG2003367-7 MB								
Boron (B)-Dissolved			<0.0020		mg/L		0.002	26-NOV-14
Batch R3110054								
WG2003975-2 CRM		ED-HIGH-WATRM						
Boron (B)-Dissolved			98.4		%		80-120	27-NOV-14
WG2003975-8 CRM		ED-HIGH-WATRM						
Boron (B)-Dissolved			96.3		%		80-120	27-NOV-14
WG2003975-1 MB								
Boron (B)-Dissolved			<0.0020		mg/L		0.002	27-NOV-14
WG2003975-7 MB								
Boron (B)-Dissolved			<0.0020		mg/L		0.002	27-NOV-14
Batch R3110797								
WG2005031-2 CRM		ED-HIGH-WATRM						
Boron (B)-Dissolved			101.1		%		80-120	27-NOV-14
WG2005031-1 MB								
Boron (B)-Dissolved			<0.0020		mg/L		0.002	27-NOV-14
BTXS,F1-ED		Water						
Batch R3096172								
WG2001407-4 DUP		L1548841-21						
Benzene			<0.00050	RPD-NA	mg/L	N/A	30	25-NOV-14
Toluene			<0.00050	RPD-NA	mg/L	N/A	30	25-NOV-14
EthylBenzene			<0.00050	RPD-NA	mg/L	N/A	30	25-NOV-14
o-Xylene			<0.00050	RPD-NA	mg/L	N/A	24	25-NOV-14
m+p-Xylene			<0.00050	RPD-NA	mg/L	N/A	24	25-NOV-14
Styrene			<0.0010	RPD-NA	mg/L	N/A	50	25-NOV-14
F1(C6-C10)			<0.10	RPD-NA	mg/L	N/A	30	25-NOV-14
WG2001407-2 LCS								
Benzene			104.7		%		70-130	25-NOV-14
Toluene			106.4		%		70-130	25-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 2 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED		Water						
Batch	R3096172							
WG2001407-2	LCS							
EthylBenzene			96.0		%		70-130	25-NOV-14
o-Xylene			111.0		%		70-130	25-NOV-14
m+p-Xylene			118.5		%		70-130	25-NOV-14
Styrene			101.5		%		70-130	25-NOV-14
WG2001407-3	LCS							
F1(C6-C10)			101.6		%		70-130	25-NOV-14
WG2001407-6	LCS							
Benzene			105.0		%		70-130	25-NOV-14
Toluene			102.5		%		70-130	25-NOV-14
EthylBenzene			113.5		%		70-130	25-NOV-14
o-Xylene			106.1		%		70-130	25-NOV-14
m+p-Xylene			113.3		%		70-130	25-NOV-14
Styrene			97.5		%		70-130	25-NOV-14
WG2001407-7	LCS							
F1(C6-C10)			101.7		%		70-130	25-NOV-14
WG2001407-1	MB							
Benzene			<0.00050		mg/L		0.0005	25-NOV-14
Toluene			<0.00050		mg/L		0.0005	25-NOV-14
EthylBenzene			<0.00050		mg/L		0.0005	25-NOV-14
o-Xylene			<0.00050		mg/L		0.0005	25-NOV-14
m+p-Xylene			<0.00050		mg/L		0.0005	25-NOV-14
Styrene			<0.0010		mg/L		0.001	25-NOV-14
F1(C6-C10)			<0.10		mg/L		0.1	25-NOV-14
Surrogate: 1,4-Difluorobenzene (SS)			98.7		%		70-130	25-NOV-14
Surrogate: 4-Bromofluorobenzene (SS)			100.6		%		70-130	25-NOV-14
Surrogate: 3,4-Dichlorotoluene (SS)			105.5		%		70-130	25-NOV-14
WG2001407-5	MB							
Benzene			<0.00050		mg/L		0.0005	25-NOV-14
Toluene			<0.00050		mg/L		0.0005	25-NOV-14
EthylBenzene			<0.00050		mg/L		0.0005	25-NOV-14
o-Xylene			<0.00050		mg/L		0.0005	25-NOV-14
m+p-Xylene			<0.00050		mg/L		0.0005	25-NOV-14
Styrene			<0.0010		mg/L		0.001	25-NOV-14
F1(C6-C10)			<0.10		mg/L		0.1	25-NOV-14
							70-130	



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 3 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
BTXS,F1-ED Water									
Batch R3096172									
WG2001407-5 MB									
Surrogate: 1,4-Difluorobenzene (SS)			98.9		%		70-130	25-NOV-14	
Surrogate: 4-Bromofluorobenzene (SS)			101.6		%		70-130	25-NOV-14	
Surrogate: 3,4-Dichlorotoluene (SS)			101.3		%		70-130	25-NOV-14	
C-DIS-ORG-ED Water									
Batch R3099564									
WG2001065-3 CVS									
Dissolved Organic Carbon			100.2		%		80-160	21-NOV-14	
WG2001065-6 DUP L1548841-21									
Dissolved Organic Carbon			22.3	21.7	mg/L	3.0	20	21-NOV-14	
WG2001065-2 LCS									
Dissolved Organic Carbon			106.3		%		80-120	21-NOV-14	
WG2001065-1 MB									
Dissolved Organic Carbon			<1.0		mg/L		1	21-NOV-14	
WG2001065-7 MS L1548841-21									
Dissolved Organic Carbon			N/A	MS-B	%		-	21-NOV-14	
CL-IC-ED Water									
Batch R3097489									
WG2000133-3 DUP L1548841-8									
Chloride (Cl)			<0.50	<0.50	mg/L	RPD-NA	N/A	20	20-NOV-14
WG2000133-7 DUP L1548841-17									
Chloride (Cl)			<0.50	<0.50	mg/L	RPD-NA	N/A	20	20-NOV-14
WG2000133-11 LCS									
Chloride (Cl)			100.9		%		90-110	20-NOV-14	
WG2000133-13 LCS									
Chloride (Cl)			101.0		%		90-110	20-NOV-14	
WG2000133-2 LCS									
Chloride (Cl)			101.1		%		90-110	20-NOV-14	
WG2000133-5 LCS									
Chloride (Cl)			101.1		%		90-110	20-NOV-14	
WG2000133-9 LCS									
Chloride (Cl)			101.0		%		90-110	20-NOV-14	
WG2000133-1 MB									
Chloride (Cl)			<0.50		mg/L		0.5	20-NOV-14	
WG2000133-10 MB									
Chloride (Cl)			<0.50		mg/L		0.5	20-NOV-14	
WG2000133-12 MB									
							0.5		



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 4 of 42

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-ED		Water						
Batch	R3097489							
WG2000133-12	MB							
Chloride (Cl)			<0.50		mg/L		0.5	20-NOV-14
WG2000133-14	MB							
Chloride (Cl)			<0.50		mg/L		0.5	20-NOV-14
WG2000133-6	MB							
Chloride (Cl)			<0.50		mg/L		0.5	20-NOV-14
WG2000133-4	MS	L1548841-8						
Chloride (Cl)			101.0		%		75-125	20-NOV-14
WG2000133-8	MS	L1548841-17						
Chloride (Cl)			98.0		%		75-125	20-NOV-14
Batch	R3099411							
WG2000896-11	DUP	L1549075-3						
Chloride (Cl)		3.92	3.82		mg/L	2.6	20	21-NOV-14
WG2000896-13	DUP	L1549479-20						
Chloride (Cl)		0.95	0.96		mg/L	0.9	20	21-NOV-14
WG2000896-2	LCS							
Chloride (Cl)			100.5		%		90-110	21-NOV-14
WG2000896-3	LCS							
Chloride (Cl)			100.8		%		90-110	21-NOV-14
WG2000896-5	LCS							
Chloride (Cl)			100.5		%		90-110	21-NOV-14
WG2000896-7	LCS							
Chloride (Cl)			100.8		%		90-110	21-NOV-14
WG2000896-9	LCS							
Chloride (Cl)			100.8		%		90-110	21-NOV-14
WG2000896-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-10	MB							
Chloride (Cl)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-4	MB							
Chloride (Cl)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-6	MB							
Chloride (Cl)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-8	MB							
Chloride (Cl)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-12	MS	L1549075-3						
Chloride (Cl)			102.9		%		75-125	21-NOV-14
WG2000896-14	MS	L1549479-20						



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 5 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-ED								
	Water							
Batch	R3099411							
WG2000896-14	MS	L1549479-20						
Chloride (Cl)			99.4		%		75-125	21-NOV-14
F2,F3,F4-ED								
	Water							
Batch	R3099730							
WG2000442-2	LCS							
F2 (>C10-C16)			82.1		%		70-130	21-NOV-14
F3 (C16-C34)			83.9		%		70-130	21-NOV-14
F4 (C34-C50)			80.1		%		70-130	21-NOV-14
WG2000442-5	LCS							
F2 (>C10-C16)			86.6		%		70-130	21-NOV-14
F3 (C16-C34)			89.6		%		70-130	21-NOV-14
F4 (C34-C50)			85.7		%		70-130	21-NOV-14
WG2000442-1	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	21-NOV-14
F3 (C16-C34)			<0.25		mg/L		0.25	21-NOV-14
F4 (C34-C50)			<0.25		mg/L		0.25	21-NOV-14
Surrogate: 2-Bromobenzotrifluoride			91.8		%		60-140	21-NOV-14
WG2000442-4	MB							
F2 (>C10-C16)			<0.25		mg/L		0.25	21-NOV-14
F3 (C16-C34)			<0.25		mg/L		0.25	21-NOV-14
F4 (C34-C50)			<0.25		mg/L		0.25	21-NOV-14
Surrogate: 2-Bromobenzotrifluoride			95.0		%		60-140	21-NOV-14
WG2000442-3	MS	L1548841-6						
F2 (>C10-C16)			87.1		%		60-140	21-NOV-14
F3 (C16-C34)			90.0		%		60-140	21-NOV-14
F4 (C34-C50)			86.5		%		60-140	21-NOV-14
WG2000442-6	MS	L1549341-4						
F2 (>C10-C16)			89.1		%		60-140	21-NOV-14
F3 (C16-C34)			92.5		%		60-140	21-NOV-14
F4 (C34-C50)			89.1		%		60-140	21-NOV-14
F2-ED								
	Water							
Batch	R3099730							
WG2000442-2	LCS							
F2 (C10-C16)			82.1		%		70-130	21-NOV-14
WG2000442-5	LCS							



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 6 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-ED		Water						
Batch	R3099730							
WG2000442-5	LCS							
F2 (C10-C16)			86.6		%		70-130	21-NOV-14
WG2000442-1	MB							
F2 (C10-C16)			<0.25		mg/L		0.25	21-NOV-14
Surrogate: 2-Bromobenzotrifluoride			91.8		%		65-135	21-NOV-14
WG2000442-4	MB							
F2 (C10-C16)			<0.25		mg/L		0.25	21-NOV-14
Surrogate: 2-Bromobenzotrifluoride			95.0		%		65-135	21-NOV-14
HG-D-L-CVAA-ED		Water						
Batch	R3101936							
WG2001603-3	DUP	L1548841-1						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	24-NOV-14
WG2001603-7	DUP	L1548841-21						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	24-NOV-14
WG2001603-2	LCS							
Mercury (Hg)-Dissolved			98.6		%		80-120	24-NOV-14
WG2001603-6	LCS							
Mercury (Hg)-Dissolved			99.98		%		80-120	24-NOV-14
WG2001603-1	MB							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	24-NOV-14
WG2001603-5	MB							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	24-NOV-14
WG2001603-4	MS	L1548841-1						
Mercury (Hg)-Dissolved			94.3		%		70-130	24-NOV-14
WG2001603-8	MS	L1548841-21						
Mercury (Hg)-Dissolved			79.1		%		70-130	24-NOV-14
HG-T-L-CVAA-ED		Water						
Batch	R3101936							
WG2001604-3	DUP	L1548841-2						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	24-NOV-14
WG2001604-7	DUP	L1549178-1						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	24-NOV-14
WG2001604-2	LCS							
Mercury (Hg)-Total			96.7		%		80-120	24-NOV-14
WG2001604-6	LCS							
Mercury (Hg)-Total			99.7		%		80-120	24-NOV-14
WG2001604-1	MB						0.000005	



Environmental

Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 7 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-L-CVAA-ED								
	Water							
Batch	R3101936							
WG2001604-1 MB								
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	24-NOV-14
WG2001604-5 MB								
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	24-NOV-14
WG2001604-4 MS		L1548841-2						
Mercury (Hg)-Total			90.5		%		70-130	24-NOV-14
WG2001604-8 MS		L1549178-1						
Mercury (Hg)-Total			95.5		%		70-130	24-NOV-14
MET-D-CCMS-ED								
	Water							
Batch	R3109464							
WG2003367-5 CRM		ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			99.7		%		80-120	26-NOV-14
Antimony (Sb)-Dissolved			102.4		%		80-120	26-NOV-14
Arsenic (As)-Dissolved			93.2		%		80-120	26-NOV-14
Barium (Ba)-Dissolved			101.7		%		80-120	26-NOV-14
Beryllium (Be)-Dissolved			98.8		%		80-120	26-NOV-14
Bismuth (Bi)-Dissolved			99.8		%		80-120	26-NOV-14
Cadmium (Cd)-Dissolved			99.1		%		80-120	26-NOV-14
Chromium (Cr)-Dissolved			98.0		%		80-120	26-NOV-14
Cobalt (Co)-Dissolved			98.4		%		80-120	26-NOV-14
Copper (Cu)-Dissolved			95.2		%		80-120	26-NOV-14
Iron (Fe)-Dissolved			93.7		%		80-120	26-NOV-14
Lead (Pb)-Dissolved			98.6		%		80-120	26-NOV-14
Lithium (Li)-Dissolved			108.3		%		80-120	26-NOV-14
Manganese (Mn)-Dissolved			96.7		%		80-120	26-NOV-14
Molybdenum (Mo)-Dissolved			96.0		%		80-120	26-NOV-14
Nickel (Ni)-Dissolved			98.6		%		80-120	26-NOV-14
Selenium (Se)-Dissolved			93.7		%		80-120	26-NOV-14
Silicon (Si)-Dissolved			114.8		%		80-120	26-NOV-14
Silver (Ag)-Dissolved			99.8		%		80-120	26-NOV-14
Strontium (Sr)-Dissolved			99.3		%		80-120	26-NOV-14
Thallium (Tl)-Dissolved			100.7		%		80-120	26-NOV-14
Titanium (Ti)-Dissolved			89.4		%		80-120	26-NOV-14
Tin (Sn)-Dissolved			102.0		%		80-120	26-NOV-14
Uranium (U)-Dissolved			95.6		%		80-120	26-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 8 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3109464							
WG2003367-5	CRM	ED-HIGH-WATRM						
Vanadium (V)-Dissolved			98.7		%		80-120	26-NOV-14
Zinc (Zn)-Dissolved			96.1		%		80-120	26-NOV-14
WG2003367-8	CRM	ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			94.4		%		80-120	26-NOV-14
Antimony (Sb)-Dissolved			101.1		%		80-120	26-NOV-14
Arsenic (As)-Dissolved			95.1		%		80-120	26-NOV-14
Barium (Ba)-Dissolved			97.8		%		80-120	26-NOV-14
Beryllium (Be)-Dissolved			92.9		%		80-120	26-NOV-14
Bismuth (Bi)-Dissolved			100.5		%		80-120	26-NOV-14
Cadmium (Cd)-Dissolved			94.2		%		80-120	26-NOV-14
Chromium (Cr)-Dissolved			97.2		%		80-120	26-NOV-14
Cobalt (Co)-Dissolved			95.7		%		80-120	26-NOV-14
Copper (Cu)-Dissolved			94.9		%		80-120	26-NOV-14
Iron (Fe)-Dissolved			86.3		%		80-120	26-NOV-14
Lead (Pb)-Dissolved			99.9		%		80-120	26-NOV-14
Lithium (Li)-Dissolved			90.4		%		80-120	26-NOV-14
Manganese (Mn)-Dissolved			99.0		%		80-120	26-NOV-14
Molybdenum (Mo)-Dissolved			95.0		%		80-120	26-NOV-14
Nickel (Ni)-Dissolved			97.1		%		80-120	26-NOV-14
Selenium (Se)-Dissolved			93.9		%		80-120	26-NOV-14
Silicon (Si)-Dissolved			101.4		%		80-120	26-NOV-14
Silver (Ag)-Dissolved			95.7		%		80-120	26-NOV-14
Strontium (Sr)-Dissolved			94.6		%		80-120	26-NOV-14
Thallium (Tl)-Dissolved			101.8		%		80-120	26-NOV-14
Titanium (Ti)-Dissolved			94.0		%		80-120	26-NOV-14
Tin (Sn)-Dissolved			100.6		%		80-120	26-NOV-14
Uranium (U)-Dissolved			98.7		%		80-120	26-NOV-14
Vanadium (V)-Dissolved			96.3		%		80-120	26-NOV-14
Zinc (Zn)-Dissolved			88.7		%		80-120	26-NOV-14
WG2003367-3	DUP	L1548787-1						
Aluminum (Al)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	26-NOV-14
Antimony (Sb)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	26-NOV-14
Arsenic (As)-Dissolved		0.00431	0.00442		mg/L	2.6	20	26-NOV-14
Barium (Ba)-Dissolved		1.05	1.06		mg/L	1.2	20	26-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 9 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R3109464							
WG2003367-3	DUP	L1548787-1						
Beryllium (Be)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	26-NOV-14
Cadmium (Cd)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	26-NOV-14
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	26-NOV-14
Cobalt (Co)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	26-NOV-14
Copper (Cu)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-14
Iron (Fe)-Dissolved		8.12	8.29		mg/L	2.0	20	26-NOV-14
Lead (Pb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-NOV-14
Lithium (Li)-Dissolved		0.0128	0.0127		mg/L	0.8	20	26-NOV-14
Manganese (Mn)-Dissolved		2.40	2.36		mg/L	1.6	20	26-NOV-14
Molybdenum (Mo)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	26-NOV-14
Nickel (Ni)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	26-NOV-14
Selenium (Se)-Dissolved		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	26-NOV-14
Silicon (Si)-Dissolved		7.88	7.78		mg/L	1.2	20	26-NOV-14
Silver (Ag)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-NOV-14
Strontium (Sr)-Dissolved		0.589	0.590		mg/L	0.2	20	26-NOV-14
Thallium (Tl)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-NOV-14
Titanium (Ti)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-14
Tin (Sn)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-NOV-14
Uranium (U)-Dissolved		0.00130	0.00131		mg/L	1.4	20	26-NOV-14
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-14
Zinc (Zn)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	26-NOV-14
WG2003367-1	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	26-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 10 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3109464							
WG2003367-1	MB							
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	26-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	26-NOV-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	26-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	26-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	26-NOV-14
WG2003367-4	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	26-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	26-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	26-NOV-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 11 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3109464							
WG2003367-4	MB							
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	26-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	26-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	26-NOV-14
WG2003367-7	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	26-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	26-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	26-NOV-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	26-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	26-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	26-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	26-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 12 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3109464							
WG2003367-7	MB							
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	26-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	26-NOV-14
Batch	R3110054							
WG2003975-2	CRM		ED-HIGH-WATRM					
Aluminum (Al)-Dissolved			102.4		%		80-120	27-NOV-14
Antimony (Sb)-Dissolved			97.6		%		80-120	27-NOV-14
Arsenic (As)-Dissolved			96.8		%		80-120	27-NOV-14
Barium (Ba)-Dissolved			95.0		%		80-120	27-NOV-14
Beryllium (Be)-Dissolved			103.2		%		80-120	27-NOV-14
Bismuth (Bi)-Dissolved			98.1		%		80-120	27-NOV-14
Cadmium (Cd)-Dissolved			92.2		%		80-120	27-NOV-14
Chromium (Cr)-Dissolved			95.7		%		80-120	27-NOV-14
Cobalt (Co)-Dissolved			95.2		%		80-120	27-NOV-14
Copper (Cu)-Dissolved			93.3		%		80-120	27-NOV-14
Iron (Fe)-Dissolved			91.4		%		80-120	27-NOV-14
Lead (Pb)-Dissolved			97.3		%		80-120	27-NOV-14
Lithium (Li)-Dissolved			109.5		%		80-120	27-NOV-14
Manganese (Mn)-Dissolved			96.6		%		80-120	27-NOV-14
Molybdenum (Mo)-Dissolved			110.5		%		80-120	27-NOV-14
Nickel (Ni)-Dissolved			94.4		%		80-120	27-NOV-14
Selenium (Se)-Dissolved			94.3		%		80-120	27-NOV-14
Silicon (Si)-Dissolved			103.3		%		80-120	27-NOV-14
Silver (Ag)-Dissolved			89.9		%		80-120	27-NOV-14
Strontium (Sr)-Dissolved			96.1		%		80-120	27-NOV-14
Thallium (Tl)-Dissolved			102.2		%		80-120	27-NOV-14
Titanium (Ti)-Dissolved			98.3		%		80-120	27-NOV-14
Tin (Sn)-Dissolved			95.8		%		80-120	27-NOV-14
Uranium (U)-Dissolved			96.9		%		80-120	27-NOV-14
Vanadium (V)-Dissolved			98.7		%		80-120	27-NOV-14
Zinc (Zn)-Dissolved			95.0		%		80-120	27-NOV-14
WG2003975-5	CRM		ED-HIGH-WATRM					
Aluminum (Al)-Dissolved			100.1		%		80-120	27-NOV-14
Antimony (Sb)-Dissolved			95.2		%		80-120	27-NOV-14
Arsenic (As)-Dissolved			96.1		%		80-120	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 13 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3110054							
WG2003975-5 CRM	ED-HIGH-WATRM							
Barium (Ba)-Dissolved			99.5		%		80-120	27-NOV-14
Beryllium (Be)-Dissolved			96.3		%		80-120	27-NOV-14
Bismuth (Bi)-Dissolved			102.7		%		80-120	27-NOV-14
Cadmium (Cd)-Dissolved			92.9		%		80-120	27-NOV-14
Chromium (Cr)-Dissolved			97.3		%		80-120	27-NOV-14
Cobalt (Co)-Dissolved			94.8		%		80-120	27-NOV-14
Copper (Cu)-Dissolved			93.5		%		80-120	27-NOV-14
Iron (Fe)-Dissolved			92.0		%		80-120	27-NOV-14
Lead (Pb)-Dissolved			99.2		%		80-120	27-NOV-14
Lithium (Li)-Dissolved			95.1		%		80-120	27-NOV-14
Manganese (Mn)-Dissolved			93.4		%		80-120	27-NOV-14
Molybdenum (Mo)-Dissolved			99.8		%		80-120	27-NOV-14
Nickel (Ni)-Dissolved			96.2		%		80-120	27-NOV-14
Selenium (Se)-Dissolved			97.7		%		80-120	27-NOV-14
Silicon (Si)-Dissolved			98.4		%		80-120	27-NOV-14
Silver (Ag)-Dissolved			88.0		%		80-120	27-NOV-14
Strontium (Sr)-Dissolved			96.2		%		80-120	27-NOV-14
Thallium (Tl)-Dissolved			105.1		%		80-120	27-NOV-14
Titanium (Ti)-Dissolved			99.3		%		80-120	27-NOV-14
Tin (Sn)-Dissolved			93.7		%		80-120	27-NOV-14
Uranium (U)-Dissolved			98.6		%		80-120	27-NOV-14
Vanadium (V)-Dissolved			99.0		%		80-120	27-NOV-14
Zinc (Zn)-Dissolved			91.6		%		80-120	27-NOV-14
WG2003975-8 CRM	ED-HIGH-WATRM							
Aluminum (Al)-Dissolved			97.0		%		80-120	27-NOV-14
Antimony (Sb)-Dissolved			96.9		%		80-120	27-NOV-14
Arsenic (As)-Dissolved			95.3		%		80-120	27-NOV-14
Barium (Ba)-Dissolved			97.2		%		80-120	27-NOV-14
Beryllium (Be)-Dissolved			94.5		%		80-120	27-NOV-14
Bismuth (Bi)-Dissolved			110.1		%		80-120	27-NOV-14
Cadmium (Cd)-Dissolved			92.8		%		80-120	27-NOV-14
Chromium (Cr)-Dissolved			98.0		%		80-120	27-NOV-14
Cobalt (Co)-Dissolved			95.4		%		80-120	27-NOV-14
Copper (Cu)-Dissolved			93.9		%		80-120	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 14 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3110054							
WG2003975-8	CRM	ED-HIGH-WATRM						
Iron (Fe)-Dissolved			92.1		%		80-120	27-NOV-14
Lead (Pb)-Dissolved			103.4		%		80-120	27-NOV-14
Lithium (Li)-Dissolved			92.7		%		80-120	27-NOV-14
Manganese (Mn)-Dissolved			95.0		%		80-120	27-NOV-14
Molybdenum (Mo)-Dissolved			99.3		%		80-120	27-NOV-14
Nickel (Ni)-Dissolved			97.1		%		80-120	27-NOV-14
Selenium (Se)-Dissolved			98.0		%		80-120	27-NOV-14
Silicon (Si)-Dissolved			99.4		%		80-120	27-NOV-14
Silver (Ag)-Dissolved			91.0		%		80-120	27-NOV-14
Strontium (Sr)-Dissolved			97.2		%		80-120	27-NOV-14
Thallium (Tl)-Dissolved			105.5		%		80-120	27-NOV-14
Titanium (Ti)-Dissolved			99.1		%		80-120	27-NOV-14
Tin (Sn)-Dissolved			96.0		%		80-120	27-NOV-14
Uranium (U)-Dissolved			103.3		%		80-120	27-NOV-14
Vanadium (V)-Dissolved			99.0		%		80-120	27-NOV-14
Zinc (Zn)-Dissolved			90.7		%		80-120	27-NOV-14
WG2003367-6	DUP	L1548841-15						
Silicon (Si)-Dissolved		9.69	9.60		mg/L	1.0	20	27-NOV-14
WG2003975-3	DUP	L1549981-1						
Aluminum (Al)-Dissolved		0.0487	0.0482		mg/L	0.9	20	27-NOV-14
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-NOV-14
Arsenic (As)-Dissolved		0.00040	0.00037		mg/L	8.8	20	27-NOV-14
Barium (Ba)-Dissolved		0.0650	0.0665		mg/L	2.3	20	27-NOV-14
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-NOV-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-NOV-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-NOV-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-NOV-14
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-NOV-14
Copper (Cu)-Dissolved		0.0704	0.0689		mg/L	2.2	20	27-NOV-14
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	27-NOV-14
Lead (Pb)-Dissolved		0.000060	0.000059		mg/L	2.6	20	27-NOV-14
Lithium (Li)-Dissolved		0.0109	0.0107		mg/L	1.6	20	27-NOV-14
Manganese (Mn)-Dissolved		0.000717	0.000672		mg/L	6.5	20	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 15 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R3110054							
WG2003975-3	DUP	L1549981-1						
Molybdenum (Mo)-Dissolved		0.00100	0.000998		mg/L	0.4	20	27-NOV-14
Nickel (Ni)-Dissolved		0.00118	0.00116		mg/L	1.3	20	27-NOV-14
Selenium (Se)-Dissolved		0.00012	0.00013		mg/L	8.7	20	27-NOV-14
Silicon (Si)-Dissolved		1.49	1.49		mg/L	0.4	20	27-NOV-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-NOV-14
Strontium (Sr)-Dissolved		0.189	0.187		mg/L	0.9	20	27-NOV-14
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-NOV-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	27-NOV-14
Tin (Sn)-Dissolved		0.00013	0.00013		mg/L	1.1	20	27-NOV-14
Uranium (U)-Dissolved		0.000129	0.000126		mg/L	2.3	20	27-NOV-14
Vanadium (V)-Dissolved		0.00021	0.00020		mg/L	3.2	20	27-NOV-14
Zinc (Zn)-Dissolved		0.0290	0.0282		mg/L	3.0	20	27-NOV-14
WG2003975-6	DUP	L1549479-25						
Aluminum (Al)-Dissolved		0.0010	0.0015	J	mg/L	0.0005	0.002	27-NOV-14
Antimony (Sb)-Dissolved		0.00048	0.00050		mg/L	4.7	20	27-NOV-14
Arsenic (As)-Dissolved		0.00141	0.00134		mg/L	4.9	20	27-NOV-14
Barium (Ba)-Dissolved		0.980	1.01		mg/L	2.7	20	27-NOV-14
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-NOV-14
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-NOV-14
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-NOV-14
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-NOV-14
Cobalt (Co)-Dissolved		0.0220	0.0218		mg/L	0.8	20	27-NOV-14
Copper (Cu)-Dissolved		0.00018	0.00020		mg/L	10	20	27-NOV-14
Iron (Fe)-Dissolved		0.792	0.793		mg/L	0.1	20	27-NOV-14
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-NOV-14
Lithium (Li)-Dissolved		0.0237	0.0235		mg/L	1.2	20	27-NOV-14
Manganese (Mn)-Dissolved		4.97	5.04		mg/L	1.4	20	27-NOV-14
Molybdenum (Mo)-Dissolved		0.0140	0.0140		mg/L	0.3	20	27-NOV-14
Nickel (Ni)-Dissolved		0.0473	0.0475		mg/L	0.4	20	27-NOV-14
Selenium (Se)-Dissolved		0.00015	0.00015		mg/L	2.3	20	27-NOV-14
Silicon (Si)-Dissolved		7.80	7.67		mg/L	1.8	20	27-NOV-14
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-NOV-14
Strontium (Sr)-Dissolved		0.650	0.642		mg/L	1.3	20	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 16 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED								
	Water							
Batch	R3110054							
WG2003975-6	DUP	L1549479-25						
Thallium (Tl)-Dissolved		0.000055	0.000053		mg/L	3.8	20	27-NOV-14
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	27-NOV-14
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-NOV-14
Uranium (U)-Dissolved		0.00625	0.00611		mg/L	2.2	20	27-NOV-14
Vanadium (V)-Dissolved		0.00013	0.00011		mg/L	12	20	27-NOV-14
Zinc (Zn)-Dissolved		<0.0010	0.0015	RPD-NA	mg/L	N/A	20	27-NOV-14
WG2003975-1	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	27-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	27-NOV-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	27-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-NOV-14
WG2003975-4	MB							



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 17 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3110054							
WG2003975-4	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	27-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	27-NOV-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	27-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-NOV-14
WG2003975-7	MB							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 18 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3110054							
WG2003975-7	MB							
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	27-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	27-NOV-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	27-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-NOV-14
Batch	R3110797							
WG2005031-2	CRM							
		ED-HIGH-WATRM						
Aluminum (Al)-Dissolved			99.4		%		80-120	27-NOV-14
Antimony (Sb)-Dissolved			97.3		%		80-120	27-NOV-14
Arsenic (As)-Dissolved			97.2		%		80-120	27-NOV-14
Barium (Ba)-Dissolved			104.3		%		80-120	27-NOV-14
Beryllium (Be)-Dissolved			96.1		%		80-120	27-NOV-14
Bismuth (Bi)-Dissolved			97.8		%		80-120	27-NOV-14
Cadmium (Cd)-Dissolved			97.9		%		80-120	27-NOV-14
Chromium (Cr)-Dissolved			97.7		%		80-120	27-NOV-14
Cobalt (Co)-Dissolved			96.2		%		80-120	27-NOV-14
Copper (Cu)-Dissolved			96.0		%		80-120	27-NOV-14
Iron (Fe)-Dissolved			96.4		%		80-120	27-NOV-14
Lead (Pb)-Dissolved			101.1		%		80-120	27-NOV-14
Lithium (Li)-Dissolved			87.5		%		80-120	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 19 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3110797							
WG2005031-2 CRM	ED-HIGH-WATRM							
Manganese (Mn)-Dissolved			97.7		%		80-120	27-NOV-14
Molybdenum (Mo)-Dissolved			99.7		%		80-120	27-NOV-14
Nickel (Ni)-Dissolved			95.9		%		80-120	27-NOV-14
Selenium (Se)-Dissolved			100.9		%		80-120	27-NOV-14
Silicon (Si)-Dissolved			101.1		%		80-120	27-NOV-14
Silver (Ag)-Dissolved			100.1		%		80-120	27-NOV-14
Strontium (Sr)-Dissolved			99.2		%		80-120	27-NOV-14
Thallium (Tl)-Dissolved			99.1		%		80-120	27-NOV-14
Titanium (Ti)-Dissolved			95.1		%		80-120	27-NOV-14
Tin (Sn)-Dissolved			98.2		%		80-120	27-NOV-14
Uranium (U)-Dissolved			98.4		%		80-120	27-NOV-14
Vanadium (V)-Dissolved			98.5		%		80-120	27-NOV-14
Zinc (Zn)-Dissolved			99.7		%		80-120	27-NOV-14
WG2005031-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-NOV-14
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	27-NOV-14
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Lithium (Li)-Dissolved			<0.0030		mg/L		0.003	27-NOV-14
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	28-NOV-14
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-NOV-14
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-NOV-14
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 20 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-ED		Water						
Batch	R3110797							
WG2005031-1	MB							
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	27-NOV-14
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-NOV-14
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	27-NOV-14
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-NOV-14
MET-T-CCMS-ED		Water						
Batch	R3109211							
WG2000822-2	LCS							
Aluminum (Al)-Total			100.2		%		80-120	26-NOV-14
Antimony (Sb)-Total			106.5		%		80-120	26-NOV-14
Arsenic (As)-Total			100.3		%		80-120	26-NOV-14
Barium (Ba)-Total			100.7		%		80-120	26-NOV-14
Beryllium (Be)-Total			103.1		%		80-120	26-NOV-14
Bismuth (Bi)-Total			107.5		%		80-120	26-NOV-14
Boron (B)-Total			101.4		%		80-120	26-NOV-14
Cadmium (Cd)-Total			103.5		%		80-120	26-NOV-14
Calcium (Ca)-Total			106.3		%		80-120	26-NOV-14
Chromium (Cr)-Total			101.8		%		80-120	26-NOV-14
Cobalt (Co)-Total			101.9		%		80-120	26-NOV-14
Copper (Cu)-Total			101.1		%		80-120	26-NOV-14
Iron (Fe)-Total			97.0		%		80-120	26-NOV-14
Lead (Pb)-Total			104.4		%		80-120	26-NOV-14
Lithium (Li)-Total			107.6		%		80-120	26-NOV-14
Magnesium (Mg)-Total			100.4		%		80-120	26-NOV-14
Manganese (Mn)-Total			103.7		%		80-120	26-NOV-14
Molybdenum (Mo)-Total			104.1		%		80-120	26-NOV-14
Nickel (Ni)-Total			100.8		%		80-120	26-NOV-14
Potassium (K)-Total			101.5		%		80-120	26-NOV-14
Selenium (Se)-Total			98.8		%		80-120	26-NOV-14
Silicon (Si)-Total			102.6		%		80-120	26-NOV-14
Silver (Ag)-Total			102.9		%		80-120	26-NOV-14
Sodium (Na)-Total			93.8		%		80-120	26-NOV-14
Strontium (Sr)-Total			106.6		%		80-120	26-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 21 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R3109211							
WG2000822-2 LCS								
Strontium (Sr)-Total			106.6		%		80-120	26-NOV-14
Thallium (Tl)-Total			103.0		%		80-120	26-NOV-14
Tin (Sn)-Total			103.2		%		80-120	26-NOV-14
Titanium (Ti)-Total			97.5		%		80-120	26-NOV-14
Uranium (U)-Total			96.7		%		80-120	26-NOV-14
Vanadium (V)-Total			106.1		%		80-120	26-NOV-14
Zinc (Zn)-Total			108.8		%		80-120	26-NOV-14
WG2000822-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	22-NOV-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Boron (B)-Total			<0.010		mg/L		0.01	22-NOV-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	22-NOV-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	22-NOV-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Iron (Fe)-Total			<0.010		mg/L		0.01	22-NOV-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	22-NOV-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	22-NOV-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	22-NOV-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Potassium (K)-Total			<0.050		mg/L		0.05	22-NOV-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Silicon (Si)-Total			<0.050		mg/L		0.05	22-NOV-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	22-NOV-14
Sodium (Na)-Total			<0.050		mg/L		0.05	22-NOV-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	22-NOV-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	22-NOV-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	22-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 22 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch R3109211								
WG2000822-1 MB								
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-NOV-14
Vanadium (V)-Total			<0.00050		mg/L		0.0005	22-NOV-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-NOV-14
Batch R3110066								
WG2001233-5 LCS								
Aluminum (Al)-Total			103.1		%		80-120	27-NOV-14
Antimony (Sb)-Total			93.2		%		80-120	27-NOV-14
Arsenic (As)-Total			94.0		%		80-120	27-NOV-14
Barium (Ba)-Total			94.5		%		80-120	27-NOV-14
Beryllium (Be)-Total			98.1		%		80-120	27-NOV-14
Bismuth (Bi)-Total			100.1		%		80-120	27-NOV-14
Boron (B)-Total			92.0		%		80-120	27-NOV-14
Cadmium (Cd)-Total			92.4		%		80-120	27-NOV-14
Calcium (Ca)-Total			92.3		%		80-120	27-NOV-14
Chromium (Cr)-Total			97.7		%		80-120	27-NOV-14
Cobalt (Co)-Total			96.0		%		80-120	27-NOV-14
Copper (Cu)-Total			93.4		%		80-120	27-NOV-14
Iron (Fe)-Total			89.4		%		80-120	27-NOV-14
Lead (Pb)-Total			97.1		%		80-120	27-NOV-14
Lithium (Li)-Total			107.1		%		80-120	27-NOV-14
Magnesium (Mg)-Total			93.6		%		80-120	27-NOV-14
Manganese (Mn)-Total			96.7		%		80-120	27-NOV-14
Molybdenum (Mo)-Total			93.2		%		80-120	27-NOV-14
Nickel (Ni)-Total			94.6		%		80-120	27-NOV-14
Potassium (K)-Total			101.0		%		80-120	27-NOV-14
Selenium (Se)-Total			90.3		%		80-120	27-NOV-14
Silicon (Si)-Total			99.9		%		80-120	27-NOV-14
Silver (Ag)-Total			88.6		%		80-120	27-NOV-14
Sodium (Na)-Total			95.2		%		80-120	27-NOV-14
Strontium (Sr)-Total			93.1		%		80-120	27-NOV-14
Thallium (Tl)-Total			99.3		%		80-120	27-NOV-14
Tin (Sn)-Total			89.7		%		80-120	27-NOV-14
Titanium (Ti)-Total			97.6		%		80-120	27-NOV-14
Uranium (U)-Total			97.0		%		80-120	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 23 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R3110066							
WG2001233-5	LCS							
Vanadium (V)-Total			99.9		%		80-120	27-NOV-14
Zinc (Zn)-Total			94.9		%		80-120	27-NOV-14
WG2001230-3	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-NOV-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Boron (B)-Total			<0.010		mg/L		0.01	27-NOV-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	27-NOV-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	27-NOV-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Iron (Fe)-Total			<0.010		mg/L		0.01	27-NOV-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	27-NOV-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-NOV-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Potassium (K)-Total			<0.050		mg/L		0.05	27-NOV-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Silicon (Si)-Total			<0.050		mg/L		0.05	27-NOV-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	27-NOV-14
Sodium (Na)-Total			<0.050		mg/L		0.05	27-NOV-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-NOV-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-NOV-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-NOV-14
Vanadium (V)-Total			<0.00050		mg/L		0.0005	27-NOV-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 24 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED		Water						
Batch	R3110066							
WG2001233-4 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-NOV-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Boron (B)-Total			<0.010		mg/L		0.01	27-NOV-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	27-NOV-14
Calcium (Ca)-Total			<0.020		mg/L		0.02	27-NOV-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Iron (Fe)-Total			<0.010		mg/L		0.01	27-NOV-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	27-NOV-14
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-NOV-14
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-NOV-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Potassium (K)-Total			<0.050		mg/L		0.05	27-NOV-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Silicon (Si)-Total			<0.050		mg/L		0.05	27-NOV-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	27-NOV-14
Sodium (Na)-Total			<0.050		mg/L		0.05	27-NOV-14
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-NOV-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-NOV-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-NOV-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-NOV-14
Vanadium (V)-Total			<0.00050		mg/L		0.0005	27-NOV-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-NOV-14

NAPHTHENIC-ACID-FM Water



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 25 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NAPHTHENIC-ACID-FM								
	Water							
Batch	R3106831							
WG2002273-3	DUP	L1548841-2						
Naphthenic Acids		<1.0	<1.0	RPD-NA	mg/L	N/A	30	25-NOV-14
WG2002273-4	LCS							
Naphthenic Acids			92.8		%		70-130	25-NOV-14
WG2002273-1	MB							
Naphthenic Acids			<1.0		mg/L		1	25-NOV-14
WG2002273-2	MS	L1548841-1						
Naphthenic Acids			101.5		%		50-150	25-NOV-14
NH3-CFA-ED								
	Water							
Batch	R3100969							
WG2001497-3	DUP	L1467424-61						
Ammonia, Total (as N)		1.64	1.61		mg/L	1.7	20	24-NOV-14
WG2001497-4	DUP	L1548841-11						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-NOV-14
WG2001497-7	DUP	L1550021-1						
Ammonia, Total (as N)		0.956	0.952		mg/L	0.5	20	24-NOV-14
WG2001497-2	LCS							
Ammonia, Total (as N)			99.8		%		85-115	24-NOV-14
WG2001497-1	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	24-NOV-14
WG2001497-5	MS	L1549305-2						
Ammonia, Total (as N)			98.0		%		75-125	24-NOV-14
WG2001497-6	MS	L1549751-4						
Ammonia, Total (as N)			107.8		%		75-125	24-NOV-14
NO2-IC-ED								
	Water							
Batch	R3097489							
WG2000133-3	DUP	L1548841-8						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	20-NOV-14
WG2000133-7	DUP	L1548841-17						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	20-NOV-14
WG2000133-11	LCS							
Nitrite (as N)			95.1		%		90-110	20-NOV-14
WG2000133-13	LCS							
Nitrite (as N)			94.7		%		90-110	20-NOV-14
WG2000133-2	LCS							
Nitrite (as N)			95.2		%		90-110	20-NOV-14
WG2000133-5	LCS							
Nitrite (as N)			94.4		%		90-110	20-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 26 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-ED		Water						
Batch	R3097489							
WG2000133-9	LCS							
Nitrite (as N)			95.3		%		90-110	20-NOV-14
WG2000133-1	MB							
Nitrite (as N)			<0.020		mg/L		0.02	20-NOV-14
WG2000133-10	MB							
Nitrite (as N)			<0.020		mg/L		0.02	20-NOV-14
WG2000133-12	MB							
Nitrite (as N)			<0.020		mg/L		0.02	20-NOV-14
WG2000133-14	MB							
Nitrite (as N)			<0.020		mg/L		0.02	20-NOV-14
WG2000133-6	MB							
Nitrite (as N)			<0.020		mg/L		0.02	20-NOV-14
WG2000133-4	MS	L1548841-8						
Nitrite (as N)			94.5		%		75-125	20-NOV-14
WG2000133-8	MS	L1548841-17						
Nitrite (as N)			91.4		%		75-125	20-NOV-14
Batch	R3099411							
WG2000896-11	DUP	L1549075-3						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	21-NOV-14
WG2000896-13	DUP	L1549479-20						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	21-NOV-14
WG2000896-2	LCS							
Nitrite (as N)			96.3		%		90-110	21-NOV-14
WG2000896-3	LCS							
Nitrite (as N)			94.4		%		90-110	21-NOV-14
WG2000896-5	LCS							
Nitrite (as N)			94.2		%		90-110	21-NOV-14
WG2000896-7	LCS							
Nitrite (as N)			95.6		%		90-110	21-NOV-14
WG2000896-9	LCS							
Nitrite (as N)			95.2		%		90-110	21-NOV-14
WG2000896-1	MB							
Nitrite (as N)			<0.020		mg/L		0.02	21-NOV-14
WG2000896-10	MB							
Nitrite (as N)			<0.020		mg/L		0.02	21-NOV-14
WG2000896-4	MB							
Nitrite (as N)			<0.020		mg/L		0.02	21-NOV-14
WG2000896-6	MB							



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 27 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-ED		Water						
Batch	R3099411							
WG2000896-6	MB							
Nitrite (as N)			<0.020		mg/L		0.02	21-NOV-14
WG2000896-8	MB							
Nitrite (as N)			<0.020		mg/L		0.02	21-NOV-14
WG2000896-12	MS	L1549075-3						
Nitrite (as N)			96.2		%		75-125	21-NOV-14
WG2000896-14	MS	L1549479-20						
Nitrite (as N)			93.2		%		75-125	21-NOV-14
NO3-IC-ED		Water						
Batch	R3097489							
WG2000133-3	DUP	L1548841-8						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	20-NOV-14
WG2000133-7	DUP	L1548841-17						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	20-NOV-14
WG2000133-11	LCS							
Nitrate (as N)			98.1		%		90-110	20-NOV-14
WG2000133-13	LCS							
Nitrate (as N)			97.7		%		90-110	20-NOV-14
WG2000133-2	LCS							
Nitrate (as N)			98.3		%		90-110	20-NOV-14
WG2000133-5	LCS							
Nitrate (as N)			98.1		%		90-110	20-NOV-14
WG2000133-9	LCS							
Nitrate (as N)			97.9		%		90-110	20-NOV-14
WG2000133-1	MB							
Nitrate (as N)			<0.050		mg/L		0.05	20-NOV-14
WG2000133-10	MB							
Nitrate (as N)			<0.050		mg/L		0.05	20-NOV-14
WG2000133-12	MB							
Nitrate (as N)			<0.050		mg/L		0.05	20-NOV-14
WG2000133-14	MB							
Nitrate (as N)			<0.050		mg/L		0.05	20-NOV-14
WG2000133-6	MB							
Nitrate (as N)			<0.050		mg/L		0.05	20-NOV-14
WG2000133-4	MS	L1548841-8						
Nitrate (as N)			96.0		%		75-125	20-NOV-14
WG2000133-8	MS	L1548841-17						
Nitrate (as N)			92.7		%		75-125	20-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 28 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-ED		Water						
Batch	R3099411							
WG2000896-11	DUP	L1549075-3						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	21-NOV-14
WG2000896-13	DUP	L1549479-20						
Nitrate (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	21-NOV-14
WG2000896-2	LCS							
Nitrate (as N)			96.4		%		90-110	21-NOV-14
WG2000896-3	LCS							
Nitrate (as N)			96.4		%		90-110	21-NOV-14
WG2000896-5	LCS							
Nitrate (as N)			95.9		%		90-110	21-NOV-14
WG2000896-7	LCS							
Nitrate (as N)			96.4		%		90-110	21-NOV-14
WG2000896-9	LCS							
Nitrate (as N)			96.6		%		90-110	21-NOV-14
WG2000896-1	MB							
Nitrate (as N)			<0.050		mg/L		0.05	21-NOV-14
WG2000896-10	MB							
Nitrate (as N)			<0.050		mg/L		0.05	21-NOV-14
WG2000896-4	MB							
Nitrate (as N)			<0.050		mg/L		0.05	21-NOV-14
WG2000896-6	MB							
Nitrate (as N)			<0.050		mg/L		0.05	21-NOV-14
WG2000896-8	MB							
Nitrate (as N)			<0.050		mg/L		0.05	21-NOV-14
WG2000896-12	MS	L1549075-3						
Nitrate (as N)			100.5		%		75-125	21-NOV-14
WG2000896-14	MS	L1549479-20						
Nitrate (as N)			96.5		%		75-125	21-NOV-14
PAH-ABT1-CL		Water						
Batch	R3101035							
WG2001421-2	LCS							
Acenaphthene			112.7		%		60-130	22-NOV-14
Acenaphthylene			116.8		%		60-130	22-NOV-14
Anthracene			112.2		%		60-130	22-NOV-14
Fluoranthene			117.0		%		60-130	22-NOV-14
Fluorene			114.5		%		60-130	22-NOV-14
Naphthalene			117.0		%		50-130	22-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 29 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R3101035							
WG2001421-2	LCS							
Phenanthrene			108.0		%		60-130	22-NOV-14
Pyrene			118.8		%		60-130	22-NOV-14
Benzo(a)anthracene			122.2		%		60-130	22-NOV-14
Benzo(k)fluoranthene			95.7		%		60-130	22-NOV-14
Benzo(b&j)fluoranthene			110.1		%		60-130	22-NOV-14
Benzo(g,h,i)perylene			121.1		%		60-130	22-NOV-14
Benzo(a)pyrene			114.1		%		60-130	22-NOV-14
Chrysene			118.8		%		60-130	22-NOV-14
Dibenzo(a,h)anthracene			120.4		%		60-130	22-NOV-14
Indeno(1,2,3-cd)pyrene			125.1		%		60-130	22-NOV-14
WG2001421-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	22-NOV-14
Acenaphthylene			<0.000020		mg/L		0.00002	22-NOV-14
Anthracene			<0.000010		mg/L		0.00001	22-NOV-14
Fluoranthene			<0.000020		mg/L		0.00002	22-NOV-14
Fluorene			<0.000020		mg/L		0.00002	22-NOV-14
Naphthalene			<0.000050		mg/L		0.00005	22-NOV-14
Phenanthrene			<0.000050		mg/L		0.00005	22-NOV-14
Pyrene			<0.000010		mg/L		0.00001	22-NOV-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	22-NOV-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	22-NOV-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	22-NOV-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	22-NOV-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	22-NOV-14
Chrysene			<0.000020		mg/L		0.00002	22-NOV-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	22-NOV-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	22-NOV-14
Surrogate: d10-Acenaphthene			96.9		%		60-130	22-NOV-14
Surrogate: d10-Phenanthrene			94.2		%		60-130	22-NOV-14
Surrogate: d12-Chrysene			96.1		%		60-130	22-NOV-14
Batch	R3105748							
WG2002478-1	LCS							
Acenaphthene			112.2		%		60-130	24-NOV-14
Acenaphthylene			115.7		%		60-130	24-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 30 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R3105748							
WG2002478-1	LCS							
Anthracene			115.8		%		60-130	24-NOV-14
Fluoranthene			117.7		%		60-130	24-NOV-14
Fluorene			113.7		%		60-130	24-NOV-14
Naphthalene			108.7		%		50-130	24-NOV-14
Phenanthrene			111.1		%		60-130	24-NOV-14
Pyrene			119.8		%		60-130	24-NOV-14
Benzo(a)anthracene			126.7		%		60-130	24-NOV-14
Benzo(k)fluoranthene			118.2		%		60-130	24-NOV-14
Benzo(b&j)fluoranthene			128.5		%		60-130	24-NOV-14
Benzo(g,h,i)perylene			122.0		%		60-130	24-NOV-14
Benzo(a)pyrene			128.6		%		60-130	24-NOV-14
Chrysene			120.1		%		60-130	24-NOV-14
Dibenzo(a,h)anthracene			116.9		%		60-130	24-NOV-14
Indeno(1,2,3-cd)pyrene			96.5		%		60-130	24-NOV-14
WG2002478-2	MB							
Acenaphthene			<0.000020		mg/L		0.00002	24-NOV-14
Acenaphthylene			<0.000020		mg/L		0.00002	24-NOV-14
Anthracene			<0.000010		mg/L		0.00001	24-NOV-14
Fluoranthene			<0.000020		mg/L		0.00002	24-NOV-14
Fluorene			<0.000020		mg/L		0.00002	24-NOV-14
Naphthalene			<0.000050		mg/L		0.00005	24-NOV-14
Phenanthrene			<0.000050		mg/L		0.00005	24-NOV-14
Pyrene			<0.000010		mg/L		0.00001	24-NOV-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	24-NOV-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	24-NOV-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	24-NOV-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	24-NOV-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	24-NOV-14
Chrysene			<0.000020		mg/L		0.00002	24-NOV-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	24-NOV-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	24-NOV-14
Surrogate: d10-Acenaphthene			114.3		%		60-130	24-NOV-14
Surrogate: d10-Phenanthrene			115.1		%		60-130	24-NOV-14
Surrogate: d12-Chrysene			110.9		%		60-130	24-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 31 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R3106369							
WG2002484-2	LCS							
Acenaphthene			101.9		%		60-130	24-NOV-14
Acenaphthylene			105.6		%		60-130	24-NOV-14
Anthracene			101.6		%		60-130	24-NOV-14
Fluoranthene			107.7		%		60-130	24-NOV-14
Fluorene			105.7		%		60-130	24-NOV-14
Naphthalene			102.0		%		50-130	24-NOV-14
Phenanthrene			99.9		%		60-130	24-NOV-14
Pyrene			108.3		%		60-130	24-NOV-14
Benzo(a)anthracene			111.0		%		60-130	24-NOV-14
Benzo(k)fluoranthene			116.3		%		60-130	24-NOV-14
Benzo(b&j)fluoranthene			112.9		%		60-130	24-NOV-14
Benzo(g,h,i)perylene			112.3		%		60-130	24-NOV-14
Benzo(a)pyrene			126.6		%		60-130	24-NOV-14
Chrysene			109.2		%		60-130	24-NOV-14
Dibenzo(a,h)anthracene			112.3		%		60-130	24-NOV-14
Indeno(1,2,3-cd)pyrene			109.7		%		60-130	24-NOV-14
WG2002484-4	LCS							
Acenaphthene			101.0		%		60-130	25-NOV-14
Acenaphthylene			104.0		%		60-130	25-NOV-14
Anthracene			101.5		%		60-130	25-NOV-14
Fluoranthene			106.2		%		60-130	25-NOV-14
Fluorene			103.5		%		60-130	25-NOV-14
Naphthalene			100.1		%		50-130	25-NOV-14
Phenanthrene			98.0		%		60-130	25-NOV-14
Pyrene			106.7		%		60-130	25-NOV-14
Benzo(a)anthracene			109.1		%		60-130	25-NOV-14
Benzo(k)fluoranthene			106.4		%		60-130	25-NOV-14
Benzo(b&j)fluoranthene			103.2		%		60-130	25-NOV-14
Benzo(g,h,i)perylene			110.5		%		60-130	25-NOV-14
Benzo(a)pyrene			116.8		%		60-130	25-NOV-14
Chrysene			105.7		%		60-130	25-NOV-14
Dibenzo(a,h)anthracene			112.1		%		60-130	25-NOV-14
Indeno(1,2,3-cd)pyrene			111.0		%		60-130	25-NOV-14
WG2002484-1	MB							



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 32 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R3106369							
WG2002484-1	MB							
Acenaphthene			<0.000020		mg/L		0.00002	24-NOV-14
Acenaphthylene			<0.000020		mg/L		0.00002	24-NOV-14
Anthracene			<0.000010		mg/L		0.00001	24-NOV-14
Fluoranthene			<0.000020		mg/L		0.00002	24-NOV-14
Fluorene			<0.000020		mg/L		0.00002	24-NOV-14
Naphthalene			<0.000050		mg/L		0.00005	24-NOV-14
Phenanthrene			<0.000050		mg/L		0.00005	24-NOV-14
Pyrene			<0.000010		mg/L		0.00001	24-NOV-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	24-NOV-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	24-NOV-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	24-NOV-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	24-NOV-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	24-NOV-14
Chrysene			<0.000020		mg/L		0.00002	24-NOV-14
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	24-NOV-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	24-NOV-14
Surrogate: d10-Acenaphthene			103.7		%		60-130	24-NOV-14
Surrogate: d10-Phenanthrene			97.8		%		60-130	24-NOV-14
Surrogate: d12-Chrysene			90.3		%		60-130	24-NOV-14
WG2002484-3	MB							
Acenaphthene			<0.000020		mg/L		0.00002	25-NOV-14
Acenaphthylene			<0.000020		mg/L		0.00002	25-NOV-14
Anthracene			<0.000010		mg/L		0.00001	25-NOV-14
Fluoranthene			<0.000020		mg/L		0.00002	25-NOV-14
Fluorene			<0.000020		mg/L		0.00002	25-NOV-14
Naphthalene			<0.000050		mg/L		0.00005	25-NOV-14
Phenanthrene			<0.000050		mg/L		0.00005	25-NOV-14
Pyrene			<0.000010		mg/L		0.00001	25-NOV-14
Benzo(a)anthracene			<0.000010		mg/L		0.00001	25-NOV-14
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	25-NOV-14
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	25-NOV-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	25-NOV-14
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	25-NOV-14
Chrysene			<0.000020		mg/L		0.00002	25-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 33 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ABT1-CL		Water						
Batch	R3106369							
WG2002484-3	MB							
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	25-NOV-14
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	25-NOV-14
Surrogate: d10-Acenaphthene			107.0		%		60-130	25-NOV-14
Surrogate: d10-Phenanthrene			99.4		%		60-130	25-NOV-14
Surrogate: d12-Chrysene			96.6		%		60-130	25-NOV-14
PH/EC/ALK-ED		Water						
Batch	R3105390							
WG2002376-10	DUP	L1546952-4						
pH		8.23	8.24	J	pH	0.00	0.3	25-NOV-14
Conductivity (EC)		429	427		uS/cm	0.4	10	25-NOV-14
Bicarbonate (HCO3)		223	220		mg/L	1.1	25	25-NOV-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	25-NOV-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	25-NOV-14
Alkalinity, Total (as CaCO3)		183	181		mg/L	1.1	20	25-NOV-14
WG2002376-7	DUP	L1548841-12						
pH		8.66	8.65	J	pH	0.01	0.3	25-NOV-14
Conductivity (EC)		953	952		uS/cm	0.1	10	25-NOV-14
Bicarbonate (HCO3)		460	473		mg/L	2.8	25	25-NOV-14
Carbonate (CO3)		43.4	42.3		mg/L	2.7	25	25-NOV-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	25-NOV-14
Alkalinity, Total (as CaCO3)		449	458		mg/L	1.9	20	25-NOV-14
WG2002376-8	DUP	L1548537-4						
pH		6.93	6.93	J	pH	0.00	0.3	25-NOV-14
Conductivity (EC)		70.2	72.5		uS/cm	3.2	10	25-NOV-14
Bicarbonate (HCO3)		21.5	22.2		mg/L	3.1	25	25-NOV-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	25-NOV-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	25-NOV-14
Alkalinity, Total (as CaCO3)		17.6	18.2		mg/L	3.1	20	25-NOV-14
WG2002376-9	DUP	L1548787-10						
pH		8.29	8.30	J	pH	0.00	0.3	25-NOV-14
Conductivity (EC)		667	681		uS/cm	2.1	10	25-NOV-14
Bicarbonate (HCO3)		309	311		mg/L	0.7	25	25-NOV-14
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	25-NOV-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	25-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 34 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R3105390							
WG2002376-9	DUP	L1548787-10						
Alkalinity, Total (as CaCO3)		253	255		mg/L	0.7	20	25-NOV-14
WG2002376-12	LCS							
Conductivity (EC)			102.0		%		90-110	25-NOV-14
WG2002376-13	LCS							
pH			6.07		pH		5.9-6.1	25-NOV-14
WG2002376-14	LCS							
Alkalinity, Total (as CaCO3)			97.9		%		85-115	25-NOV-14
WG2002376-15	LCS							
Conductivity (EC)			97.8		%		90-110	25-NOV-14
WG2002376-17	LCS							
Conductivity (EC)			102.4		%		90-110	25-NOV-14
WG2002376-18	LCS							
pH			6.08		pH		5.9-6.1	25-NOV-14
WG2002376-19	LCS							
Alkalinity, Total (as CaCO3)			100.7		%		85-115	25-NOV-14
WG2002376-2	LCS							
Conductivity (EC)			99.5		%		90-110	25-NOV-14
WG2002376-20	LCS							
Conductivity (EC)			99.3		%		90-110	25-NOV-14
WG2002376-22	LCS							
Conductivity (EC)			103.1		%		90-110	25-NOV-14
WG2002376-23	LCS							
pH			6.07		pH		5.9-6.1	25-NOV-14
WG2002376-25	LCS							
Conductivity (EC)			100.3		%		90-110	25-NOV-14
WG2002376-3	LCS							
pH			6.05		pH		5.9-6.1	25-NOV-14
WG2002376-4	LCS							
Alkalinity, Total (as CaCO3)			100.3		%		85-115	25-NOV-14
WG2002376-5	LCS							
Conductivity (EC)			99.0		%		90-110	25-NOV-14
WG2002376-1	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	25-NOV-14
Carbonate (CO3)			<5.0		mg/L		5	25-NOV-14
Hydroxide (OH)			<5.0		mg/L		5	25-NOV-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-NOV-14
WG2002376-16	MB							



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 35 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch R3105390								
WG2002376-16 MB								
Bicarbonate (HCO3)			<5.0		mg/L		5	25-NOV-14
Carbonate (CO3)			<5.0		mg/L		5	25-NOV-14
Hydroxide (OH)			<5.0		mg/L		5	25-NOV-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-NOV-14
WG2002376-21 MB								
Bicarbonate (HCO3)			<5.0		mg/L		5	25-NOV-14
Carbonate (CO3)			<5.0		mg/L		5	25-NOV-14
Hydroxide (OH)			<5.0		mg/L		5	25-NOV-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-NOV-14
Batch R3107649								
WG2003032-7 DUP		L1550496-20						
pH		8.45	8.44	J	pH	0.01	0.3	26-NOV-14
Conductivity (EC)		700	706		uS/cm	0.8	10	26-NOV-14
Bicarbonate (HCO3)		424	423		mg/L	0.2	25	26-NOV-14
Carbonate (CO3)		21.1	19.8		mg/L	6.3	25	26-NOV-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	26-NOV-14
Alkalinity, Total (as CaCO3)		383	380		mg/L	0.7	20	26-NOV-14
WG2003032-8 DUP		L1548841-17						
pH		8.47	8.50	J	pH	0.03	0.3	26-NOV-14
Conductivity (EC)		554	567		uS/cm	2.2	10	26-NOV-14
Bicarbonate (HCO3)		336	338		mg/L	0.7	25	26-NOV-14
Carbonate (CO3)		13.7	21.2	J	mg/L	7.5	10	26-NOV-14
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	26-NOV-14
Alkalinity, Total (as CaCO3)		298	313		mg/L	4.8	20	26-NOV-14
WG2003032-10 LCS								
Conductivity (EC)			103.4		%		90-110	26-NOV-14
WG2003032-11 LCS								
pH			6.07		pH		5.9-6.1	26-NOV-14
WG2003032-12 LCS								
Alkalinity, Total (as CaCO3)			99.7		%		85-115	26-NOV-14
WG2003032-13 LCS								
Conductivity (EC)			101.9		%		90-110	26-NOV-14
WG2003032-15 LCS								
Conductivity (EC)			104.7		%		90-110	26-NOV-14
WG2003032-16 LCS								



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 36 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R3107649							
WG2003032-16	LCS							
pH			6.07		pH		5.9-6.1	26-NOV-14
WG2003032-17	LCS							
Alkalinity, Total (as CaCO3)			95.9		%		85-115	26-NOV-14
WG2003032-2	LCS							
Conductivity (EC)			101.7		%		90-110	26-NOV-14
WG2003032-20	LCS							
Conductivity (EC)			105.8		%		90-110	26-NOV-14
WG2003032-21	LCS							
pH			6.08		pH		5.9-6.1	26-NOV-14
WG2003032-22	LCS							
Alkalinity, Total (as CaCO3)			104.3		%		85-115	26-NOV-14
WG2003032-23	LCS							
Conductivity (EC)			104.8		%		90-110	26-NOV-14
WG2003032-3	LCS							
pH			6.07		pH		5.9-6.1	26-NOV-14
WG2003032-4	LCS							
Alkalinity, Total (as CaCO3)			97.5		%		85-115	26-NOV-14
WG2003032-5	LCS							
Conductivity (EC)			100.7		%		90-110	26-NOV-14
WG2003032-1	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	26-NOV-14
Carbonate (CO3)			<5.0		mg/L		5	26-NOV-14
Hydroxide (OH)			<5.0		mg/L		5	26-NOV-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-NOV-14
WG2003032-19	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	26-NOV-14
Carbonate (CO3)			<5.0		mg/L		5	26-NOV-14
Hydroxide (OH)			<5.0		mg/L		5	26-NOV-14
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-NOV-14
PHENOLS-4AAP-ED		Water						
Batch	R3109714							
WG2003147-3	DUP	L1540257-3						
Phenols (4AAP)		0.0027	0.0030		mg/L	11	15	27-NOV-14
WG2003147-2	LCS							
Phenols (4AAP)			100.0		%		85-115	27-NOV-14
WG2003147-1	MB							



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 37 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-ED		Water						
Batch	R3109714							
WG2003147-1	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	27-NOV-14
Batch	R3110181							
WG2004372-3	DUP	L1546226-1						
Phenols (4AAP)		0.0242	0.0226		mg/L	6.8	15	27-NOV-14
WG2004372-4	DUP	L1549570-1						
Phenols (4AAP)		0.0021	0.0030	J	mg/L	0.0009	0.002	27-NOV-14
WG2004372-2	LCS							
Phenols (4AAP)			88.0		%		85-115	27-NOV-14
WG2004372-1	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	27-NOV-14
SO4-IC-ED		Water						
Batch	R3097489							
WG2000133-3	DUP	L1548841-8						
Sulfate (SO4)		3.70	3.74		mg/L	1.1	20	20-NOV-14
WG2000133-7	DUP	L1548841-17						
Sulfate (SO4)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	20-NOV-14
WG2000133-11	LCS							
Sulfate (SO4)			100.5		%		90-110	20-NOV-14
WG2000133-13	LCS							
Sulfate (SO4)			100.8		%		90-110	20-NOV-14
WG2000133-2	LCS							
Sulfate (SO4)			100.8		%		90-110	20-NOV-14
WG2000133-5	LCS							
Sulfate (SO4)			100.8		%		90-110	20-NOV-14
WG2000133-9	LCS							
Sulfate (SO4)			100.9		%		90-110	20-NOV-14
WG2000133-1	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	20-NOV-14
WG2000133-10	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	20-NOV-14
WG2000133-12	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	20-NOV-14
WG2000133-14	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	20-NOV-14
WG2000133-6	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	20-NOV-14



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 38 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2

Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-ED								
	Water							
Batch	R3097489							
WG2000133-4	MS	L1548841-8						
Sulfate (SO4)			99.5		%		75-125	20-NOV-14
WG2000133-8	MS	L1548841-17						
Sulfate (SO4)			96.8		%		75-125	20-NOV-14
Batch	R3099411							
WG2000896-11	DUP	L1549075-3						
Sulfate (SO4)		3.76	3.74		mg/L	0.6	20	21-NOV-14
WG2000896-13	DUP	L1549479-20						
Sulfate (SO4)		18.3	18.3		mg/L	0.1	20	21-NOV-14
WG2000896-2	LCS							
Sulfate (SO4)			101.1		%		90-110	21-NOV-14
WG2000896-3	LCS							
Sulfate (SO4)			101.4		%		90-110	21-NOV-14
WG2000896-5	LCS							
Sulfate (SO4)			100.7		%		90-110	21-NOV-14
WG2000896-7	LCS							
Sulfate (SO4)			101.0		%		90-110	21-NOV-14
WG2000896-9	LCS							
Sulfate (SO4)			101.1		%		90-110	21-NOV-14
WG2000896-1	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-10	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-4	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-6	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-8	MB							
Sulfate (SO4)			<0.50		mg/L		0.5	21-NOV-14
WG2000896-12	MS	L1549075-3						
Sulfate (SO4)			103.1		%		75-125	21-NOV-14
WG2000896-14	MS	L1549479-20						
Sulfate (SO4)			96.7		%		75-125	21-NOV-14
SOLIDS-TDS-ED								
	Water							
Batch	R3099459							
WG2000537-3	DUP	L1548841-10						
Total Dissolved Solids		912	904		mg/L	0.9	20	21-NOV-14
WG2000537-2	LCS							



Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Page 39 of 42

Client: Matrix Solutions Inc.
 Suite 200, 150 - 13 Avenue SW
 Calgary AB T2R 0V2
 Contact: SUE RAYNARD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-ED		Water						
Batch	R3099459							
WG2000537-2	LCS							
Total Dissolved Solids			99.5		%		85-115	21-NOV-14
WG2000537-1	MB							
Total Dissolved Solids			<10		mg/L		10	21-NOV-14
TURBIDITY-ED		Water						
Batch	R3099229							
WG2000455-3	DUP	L1548841-14						
Turbidity		36.0	35.9		NTU	0.3	15	21-NOV-14
WG2000455-4	DUP	L1549075-5						
Turbidity		2.87	3.05		NTU	6.1	15	21-NOV-14
WG2000455-2	LCS							
Turbidity			99.3		%		70-130	21-NOV-14
WG2000455-1	MB							
Turbidity			<0.10		NTU		0.1	21-NOV-14
Batch	R3099430							
WG1999686-3	DUP	L1548537-1						
Turbidity		2.44	2.57		NTU	5.2	15	20-NOV-14
WG1999686-2	LCS							
Turbidity			100.0		%		70-130	20-NOV-14
WG1999686-1	MB							
Turbidity			<0.10		NTU		0.1	20-NOV-14
Batch	R3101170							
WG2001033-3	DUP	L1549525-1						
Turbidity		0.13	0.13		NTU	0.8	15	22-NOV-14
WG2001033-2	LCS							
Turbidity			99.3		%		70-130	22-NOV-14
WG2001033-1	MB							
Turbidity			<0.10		NTU		0.1	22-NOV-14

Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Page 40 of 42

Contact: SUE RAYNARD

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2
Contact: SUE RAYNARD

Page 41 of 42

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Turbidity							
	1	17-NOV-14 11:11	21-NOV-14 00:00	48	85	hours	EHTR
	2	17-NOV-14 11:45	21-NOV-14 00:00	48	84	hours	EHTR
	3	17-NOV-14 12:40	21-NOV-14 00:00	48	83	hours	EHTR
	4	17-NOV-14 13:16	21-NOV-14 00:00	48	83	hours	EHTR
	5	17-NOV-14 16:08	21-NOV-14 00:00	48	80	hours	EHTR
	6	17-NOV-14 17:10	21-NOV-14 00:00	48	79	hours	EHTR
	7	17-NOV-14 17:40	21-NOV-14 00:00	48	78	hours	EHTR
	8	17-NOV-14 17:10	21-NOV-14 00:00	48	79	hours	EHTR
	9	17-NOV-14 18:11	21-NOV-14 00:00	48	78	hours	EHTR
	14	18-NOV-14 15:32	21-NOV-14 00:00	48	56	hours	EHTL
	17	18-NOV-14 16:20	22-NOV-14 00:00	48	80	hours	EHTL
Anions and Nutrients							
Nitrate as N by IC							
	1	17-NOV-14 11:11	20-NOV-14 08:00	48	69	hours	EHTR
	2	17-NOV-14 11:45	20-NOV-14 08:00	48	68	hours	EHTR
	3	17-NOV-14 12:40	20-NOV-14 08:00	48	67	hours	EHTR
	4	17-NOV-14 13:16	20-NOV-14 08:00	48	67	hours	EHTR
	5	17-NOV-14 16:08	20-NOV-14 08:00	48	64	hours	EHTR
	6	17-NOV-14 17:10	20-NOV-14 08:00	48	63	hours	EHTR
	7	17-NOV-14 17:40	20-NOV-14 08:00	48	62	hours	EHTR
	8	17-NOV-14 17:10	20-NOV-14 08:00	48	63	hours	EHTR
	9	17-NOV-14 18:11	20-NOV-14 08:00	48	62	hours	EHTR
Nitrite as N by IC							
	1	17-NOV-14 11:11	20-NOV-14 08:00	48	69	hours	EHTR
	2	17-NOV-14 11:45	20-NOV-14 08:00	48	68	hours	EHTR
	3	17-NOV-14 12:40	20-NOV-14 08:00	48	67	hours	EHTR
	4	17-NOV-14 13:16	20-NOV-14 08:00	48	67	hours	EHTR
	5	17-NOV-14 16:08	20-NOV-14 08:00	48	64	hours	EHTR
	6	17-NOV-14 17:10	20-NOV-14 08:00	48	63	hours	EHTR
	7	17-NOV-14 17:40	20-NOV-14 08:00	48	62	hours	EHTR
	8	17-NOV-14 17:10	20-NOV-14 08:00	48	63	hours	EHTR
	9	17-NOV-14 18:11	20-NOV-14 08:00	48	62	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
 EHTR: Exceeded ALS recommended hold time prior to sample receipt.
 EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
 EHT: Exceeded ALS recommended hold time prior to analysis.
 Rec. HT: ALS recommended hold time (see units).

Notes*:
 Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
 Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1548841 were received on 19-NOV-14 19:28.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

Quality Control Report

Workorder: L1548841

Report Date: 07-JAN-15

Client: Matrix Solutions Inc.
Suite 200, 150 - 13 Avenue SW
Calgary AB T2R 0V2

Contact: SUE RAYNARD

Page 42 of 42

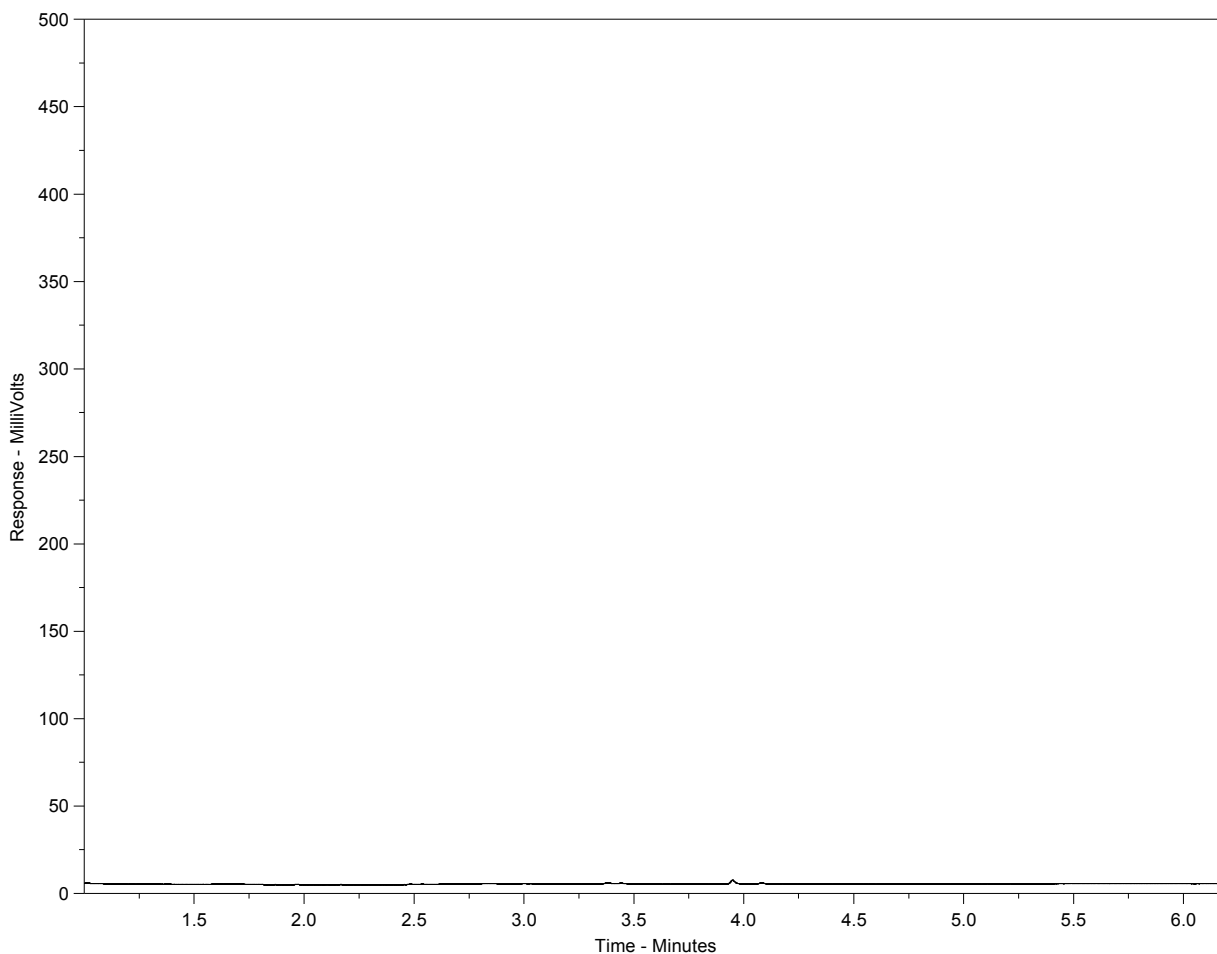
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-1
Client ID: 16054141117013



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

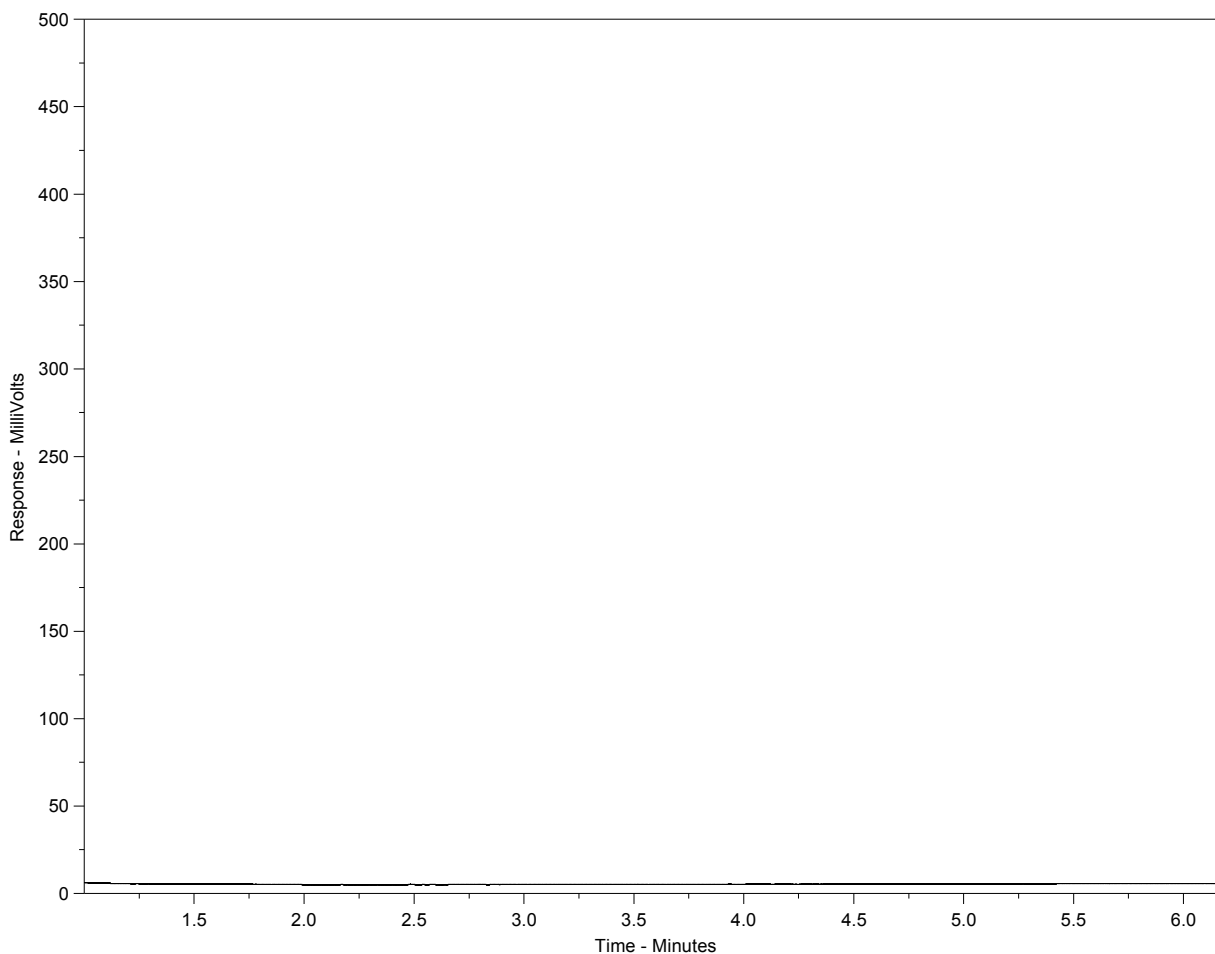
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-2
Client ID: 16054141117014



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

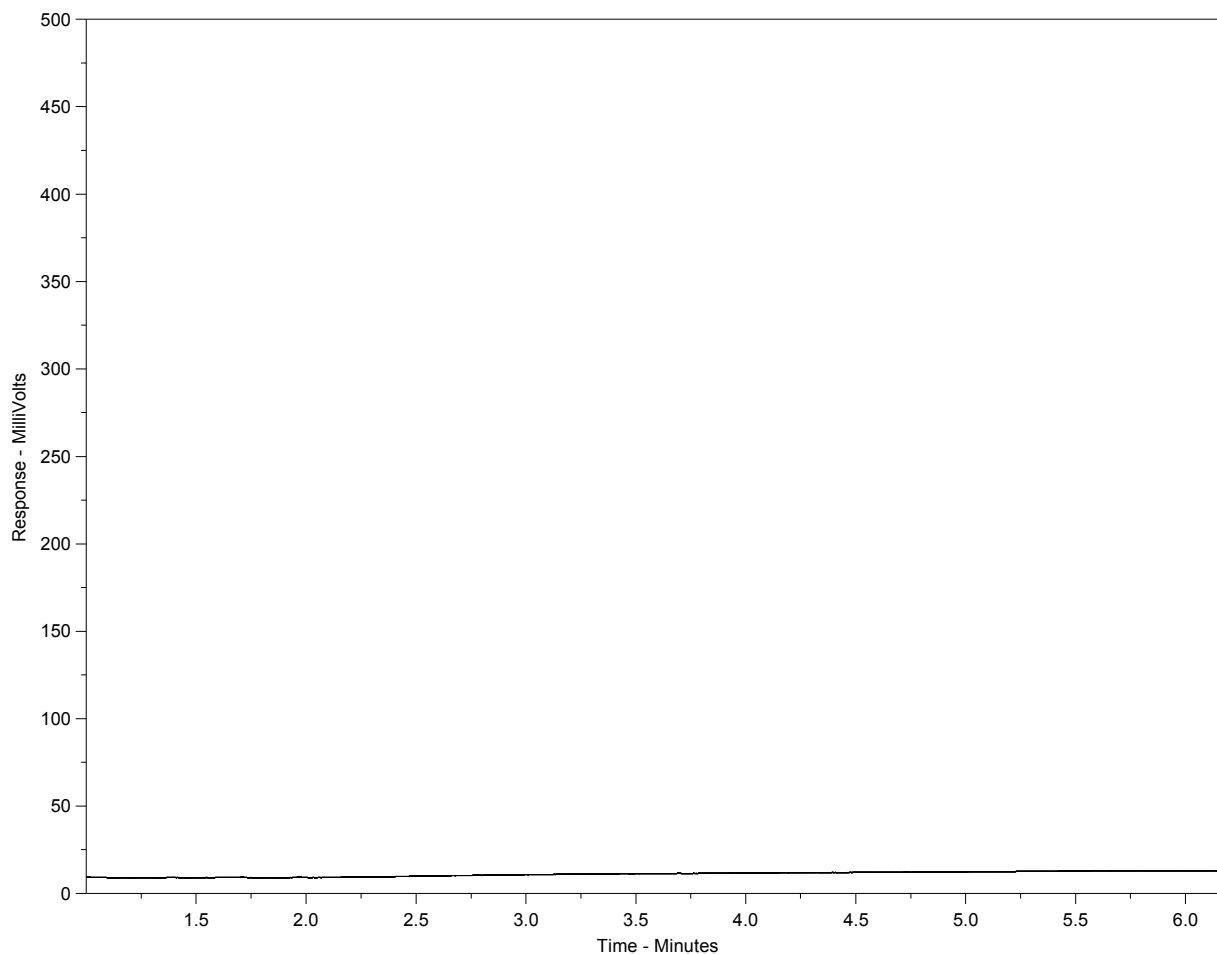
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-3
Client ID: 16054141117015



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

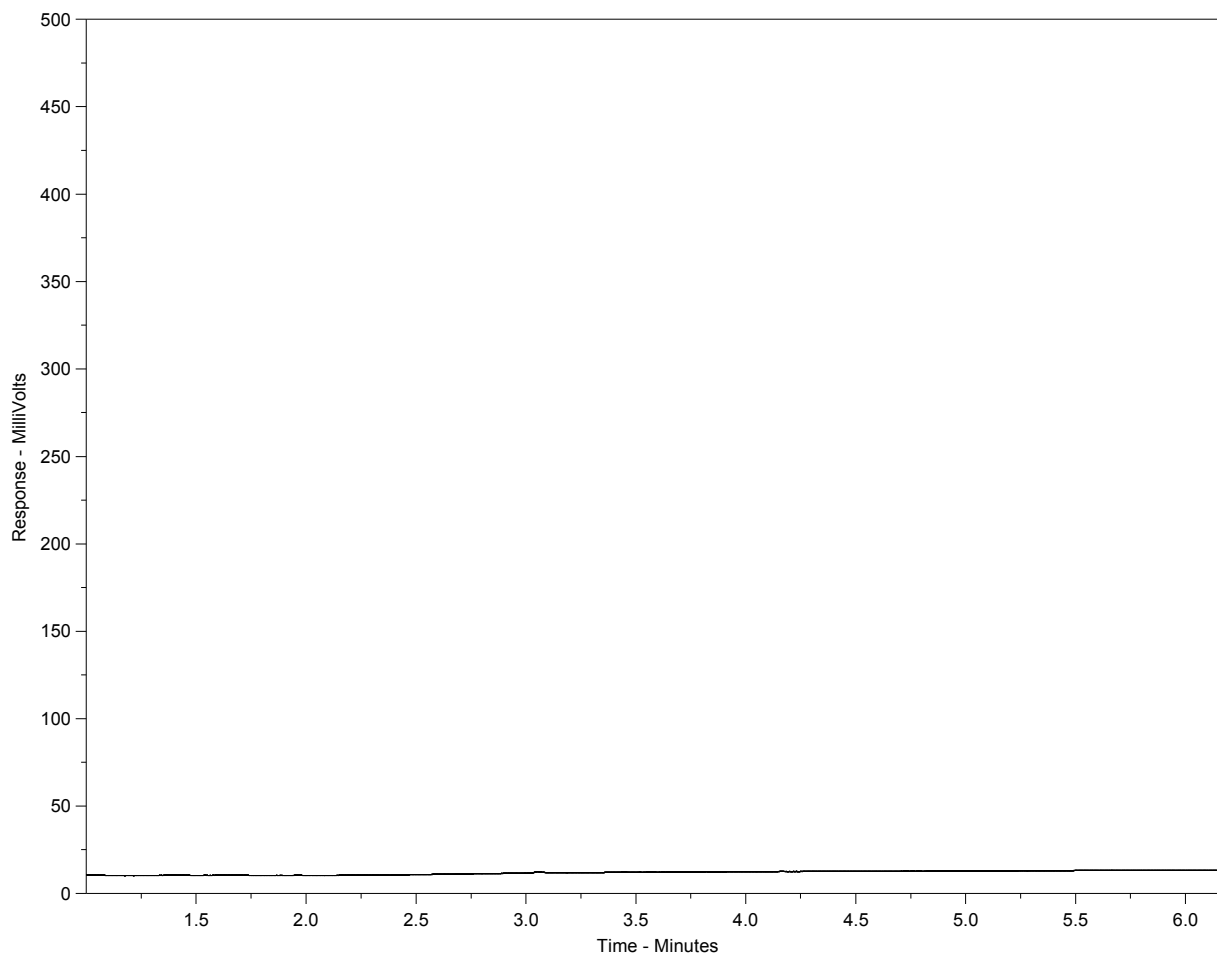
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-4
 Client ID: 16054141117016



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

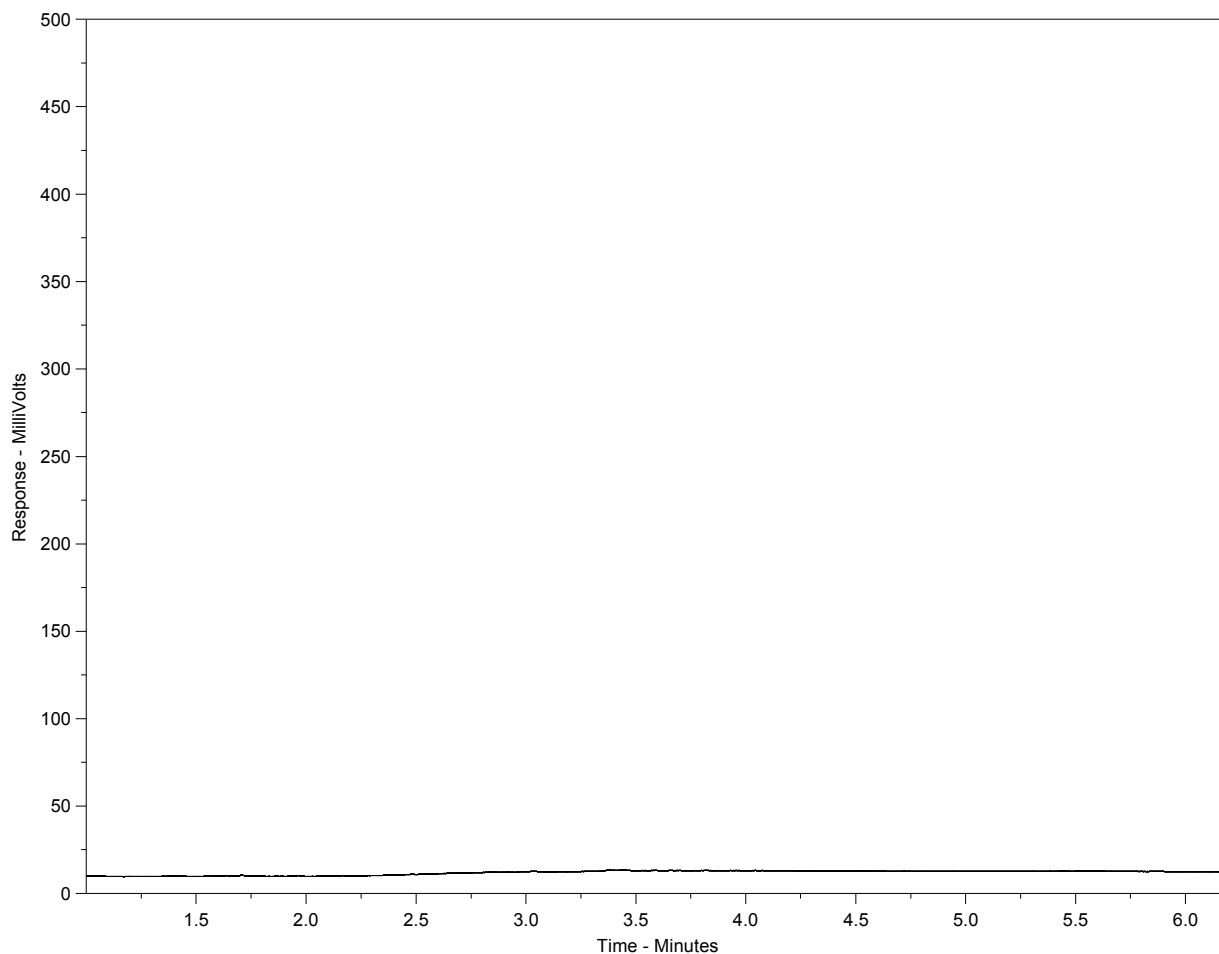
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-5
Client ID: 16054141117017



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

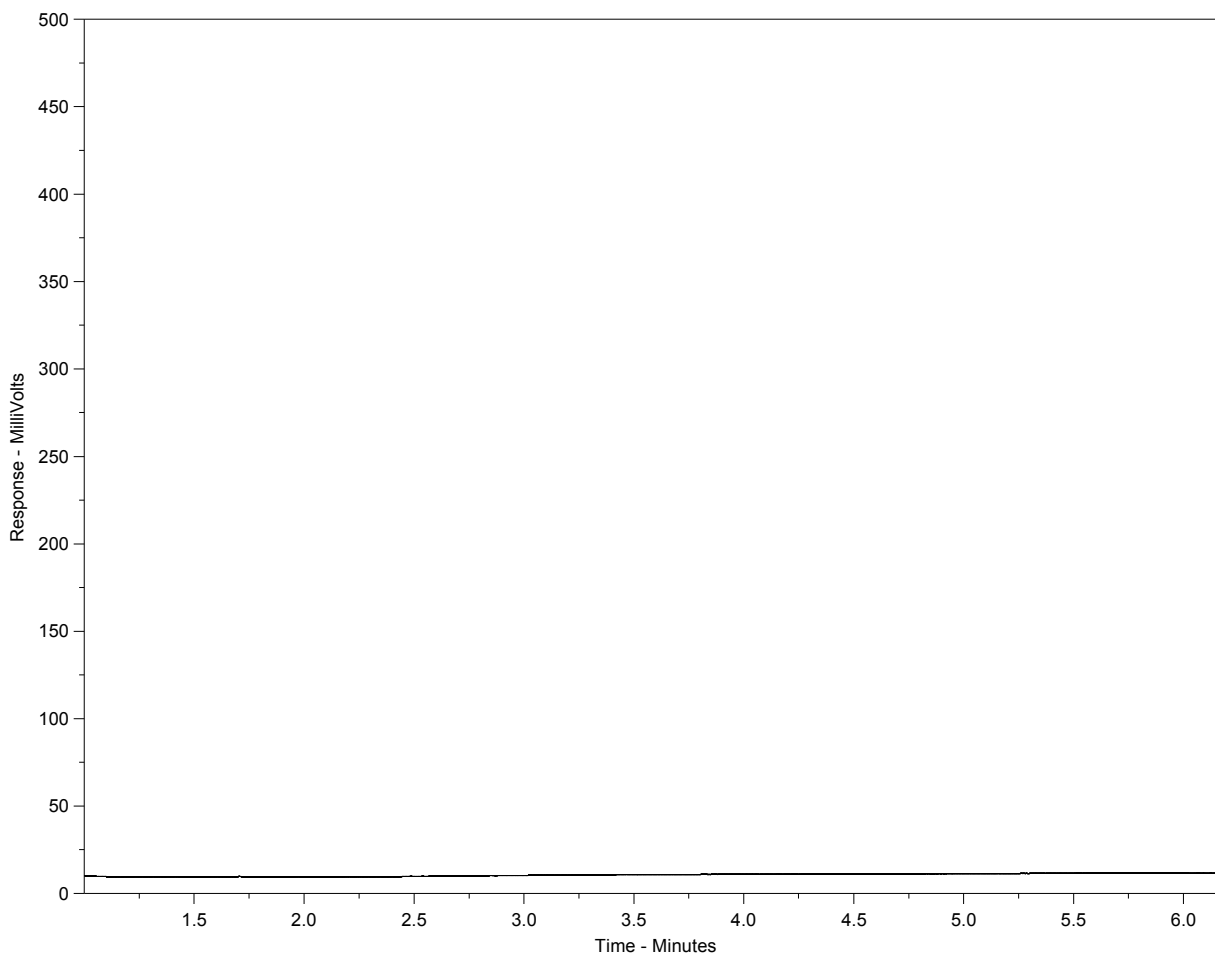
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-6
Client ID: 16054141117018



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

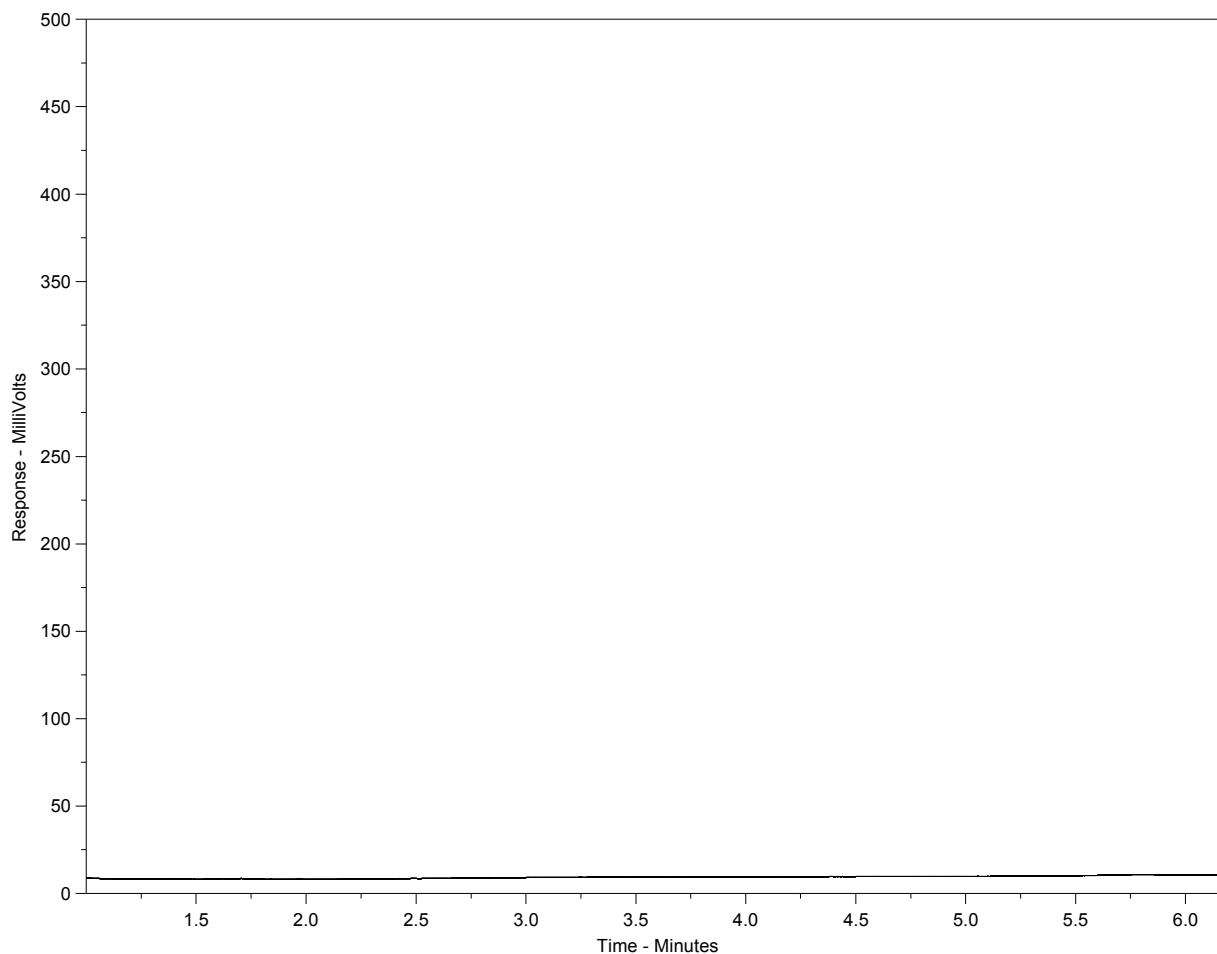
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-7
Client ID: 16054141117019



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

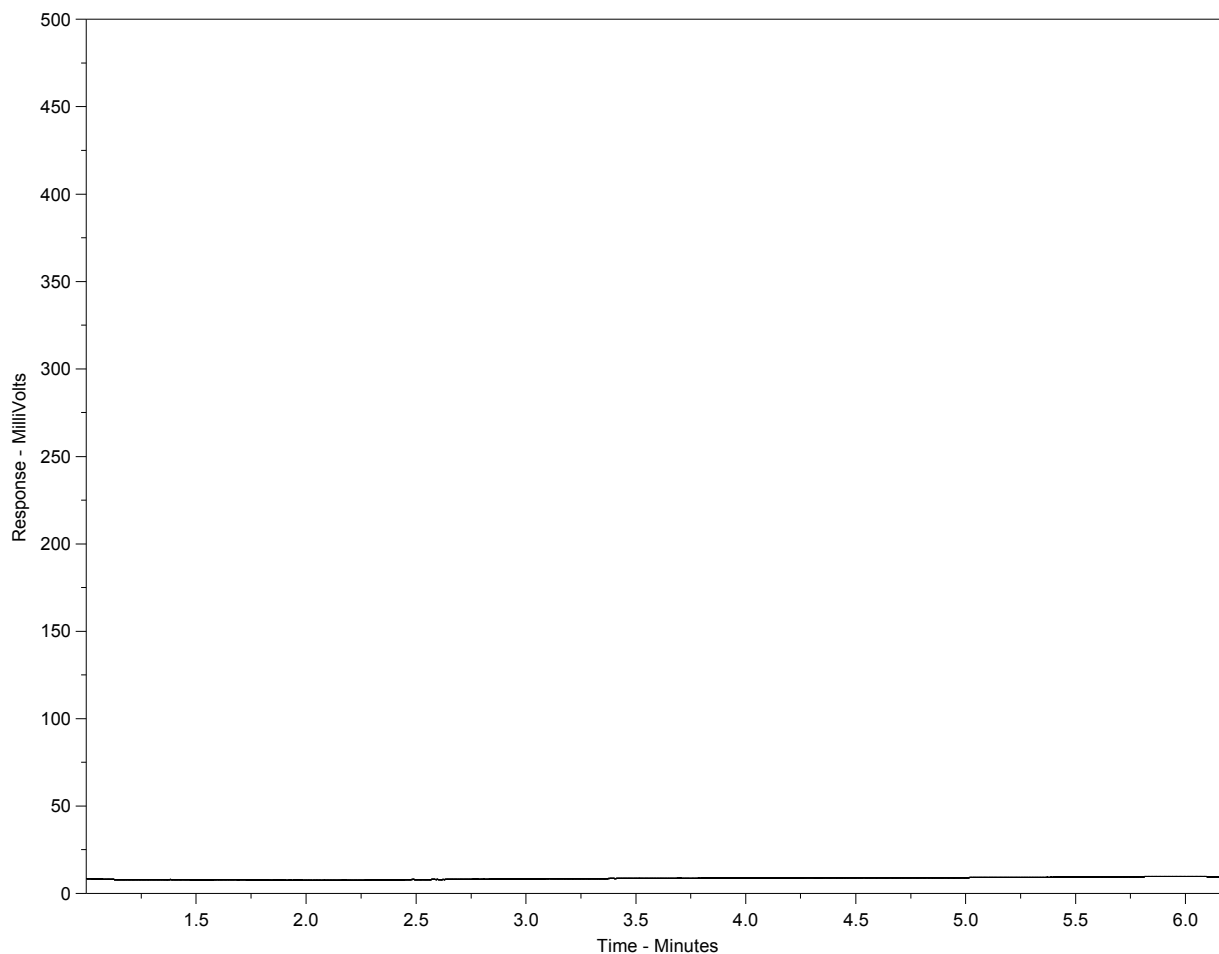
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-8
Client ID: 16054141117020



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

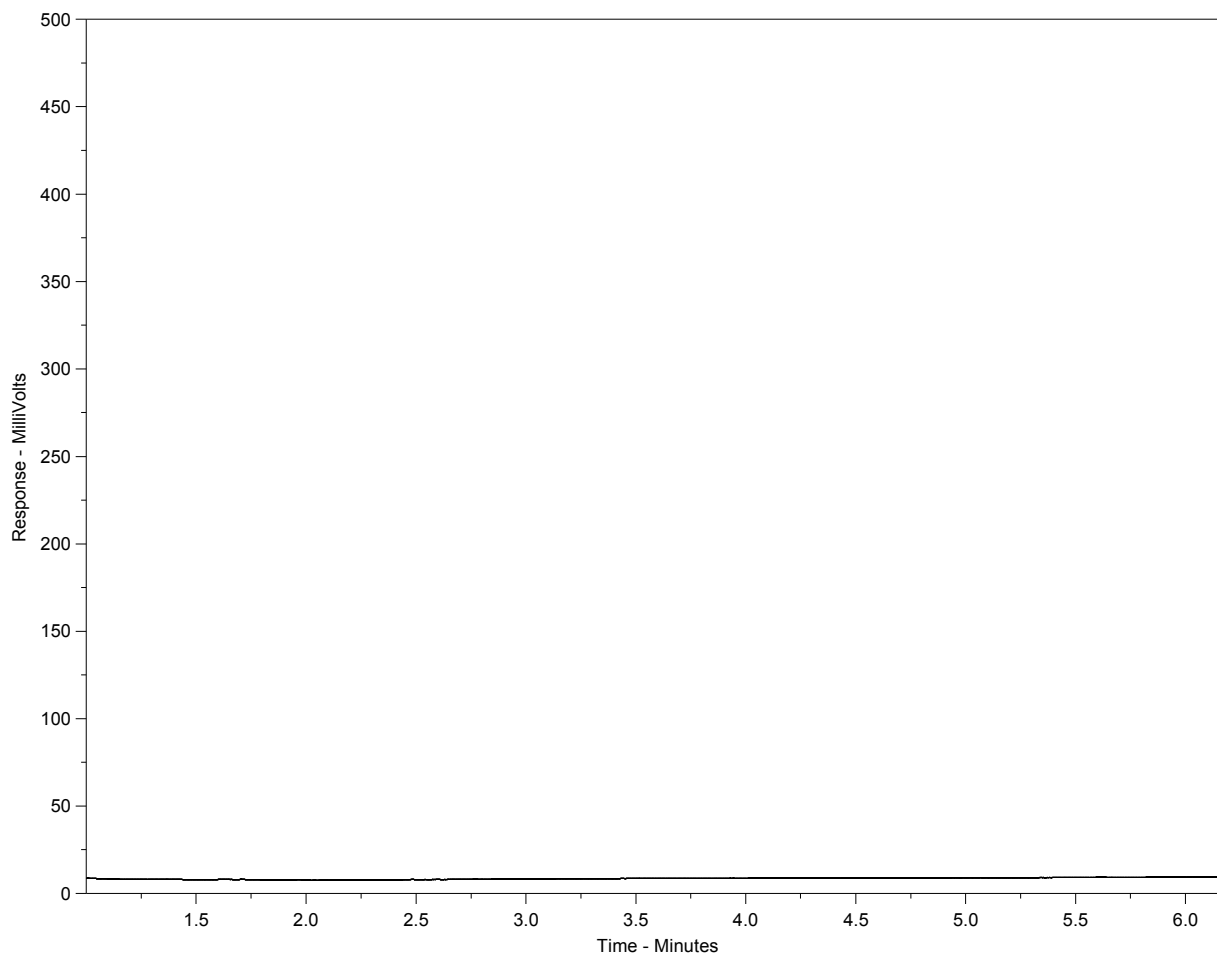
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-9
 Client ID: 16054141117021



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

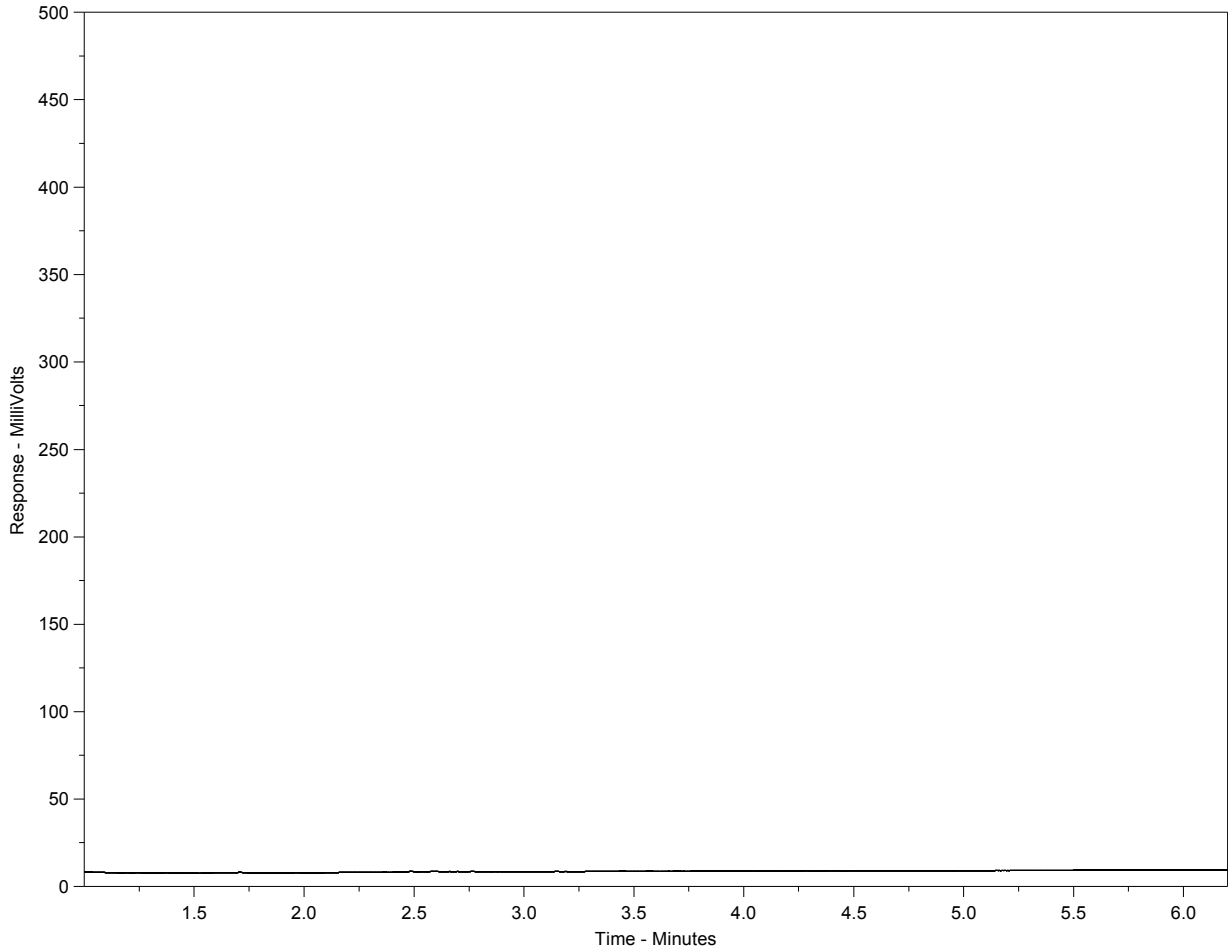
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-10
Client ID: 16054141118022



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

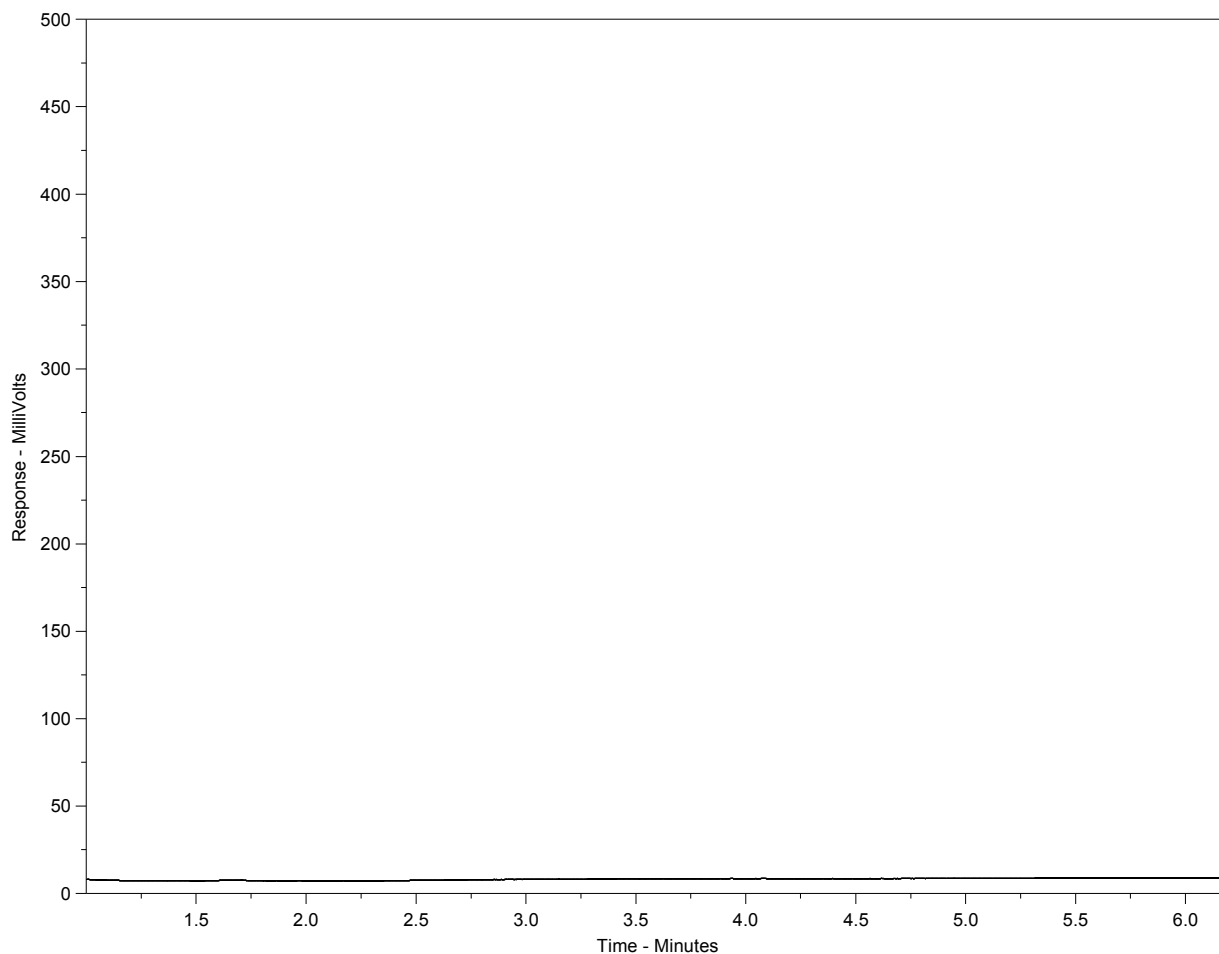
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
 This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-11
 Client ID: 16054141118023



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

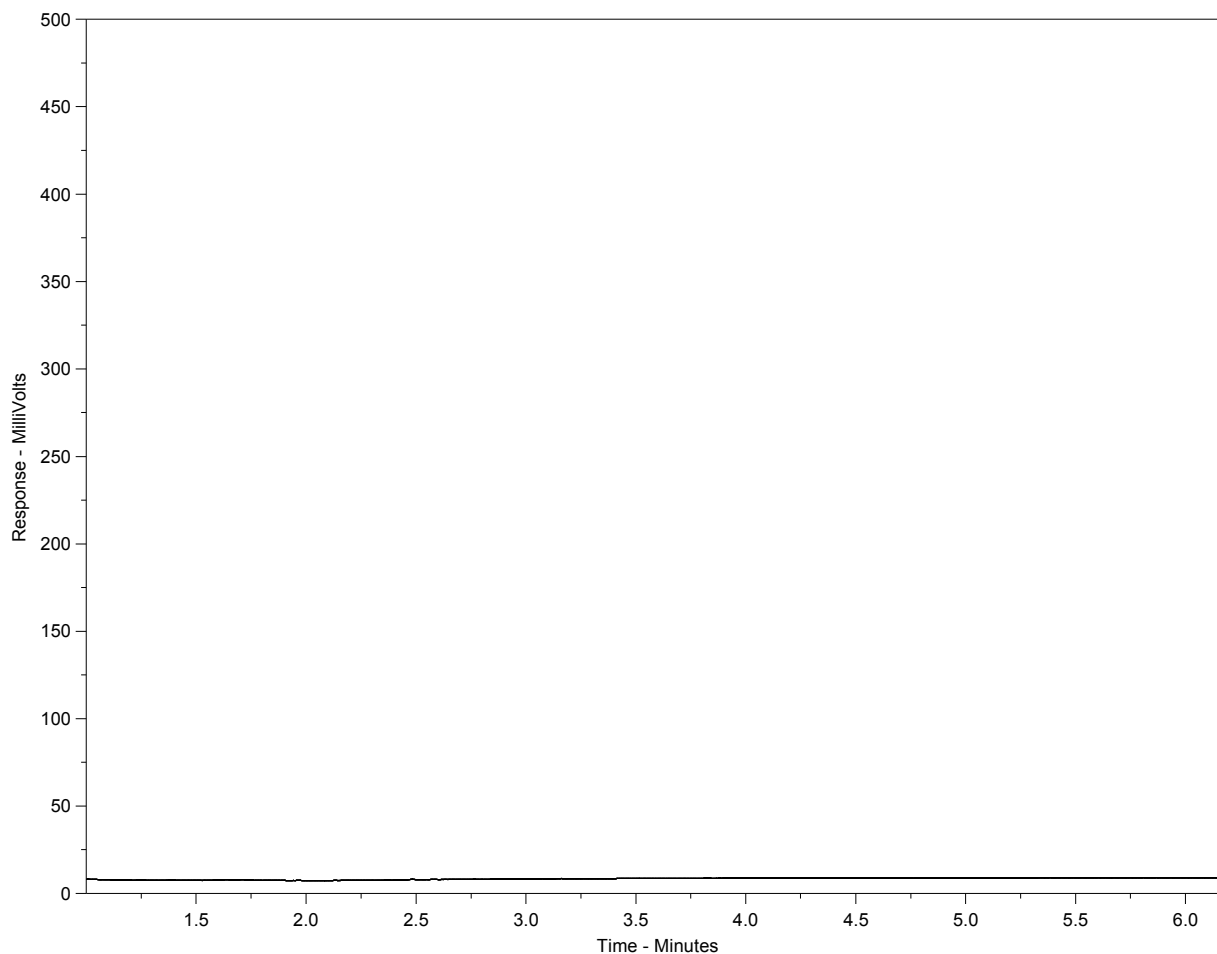
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-12
Client ID: 16054141118024



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

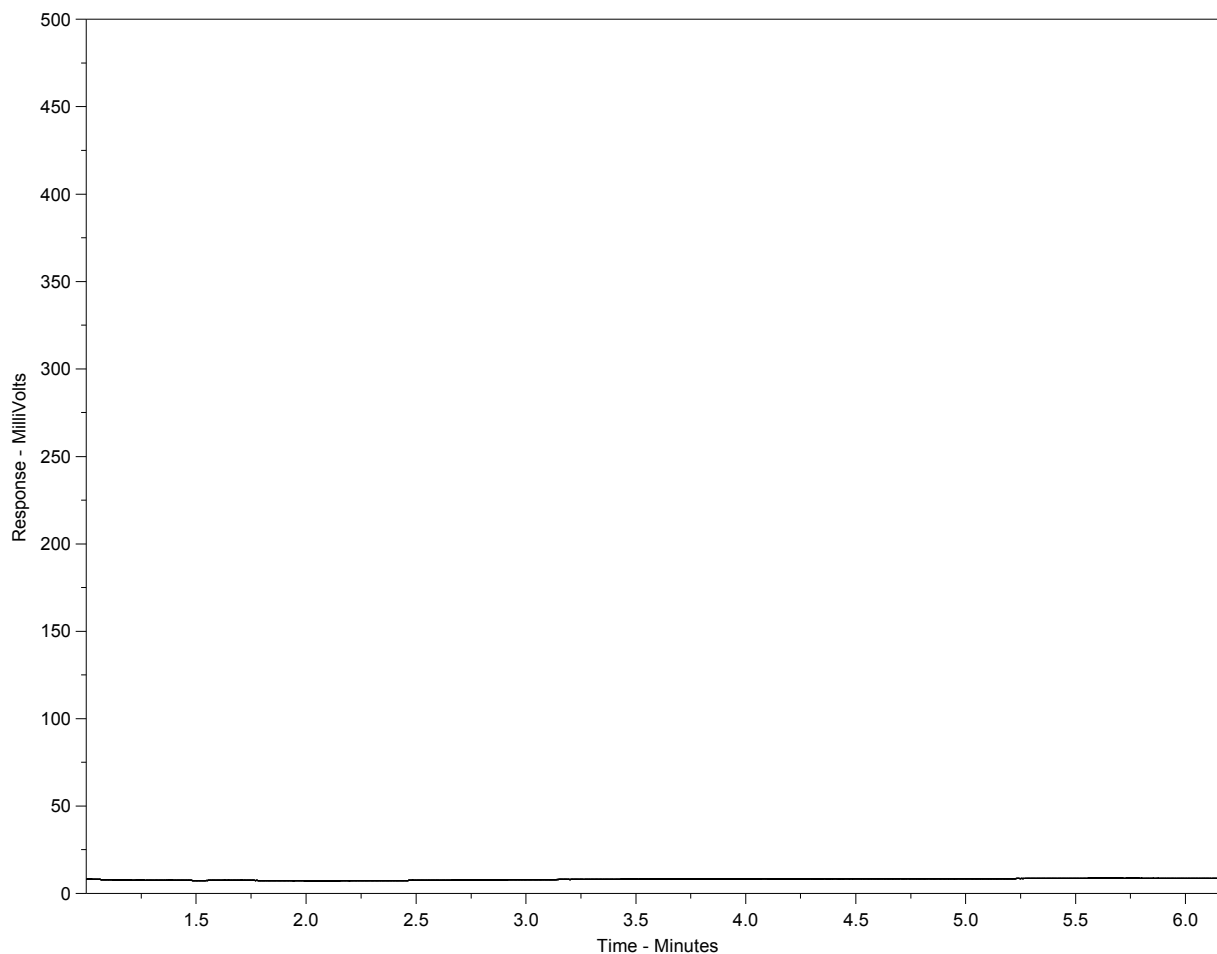
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-13
 Client ID: 16054141118025



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

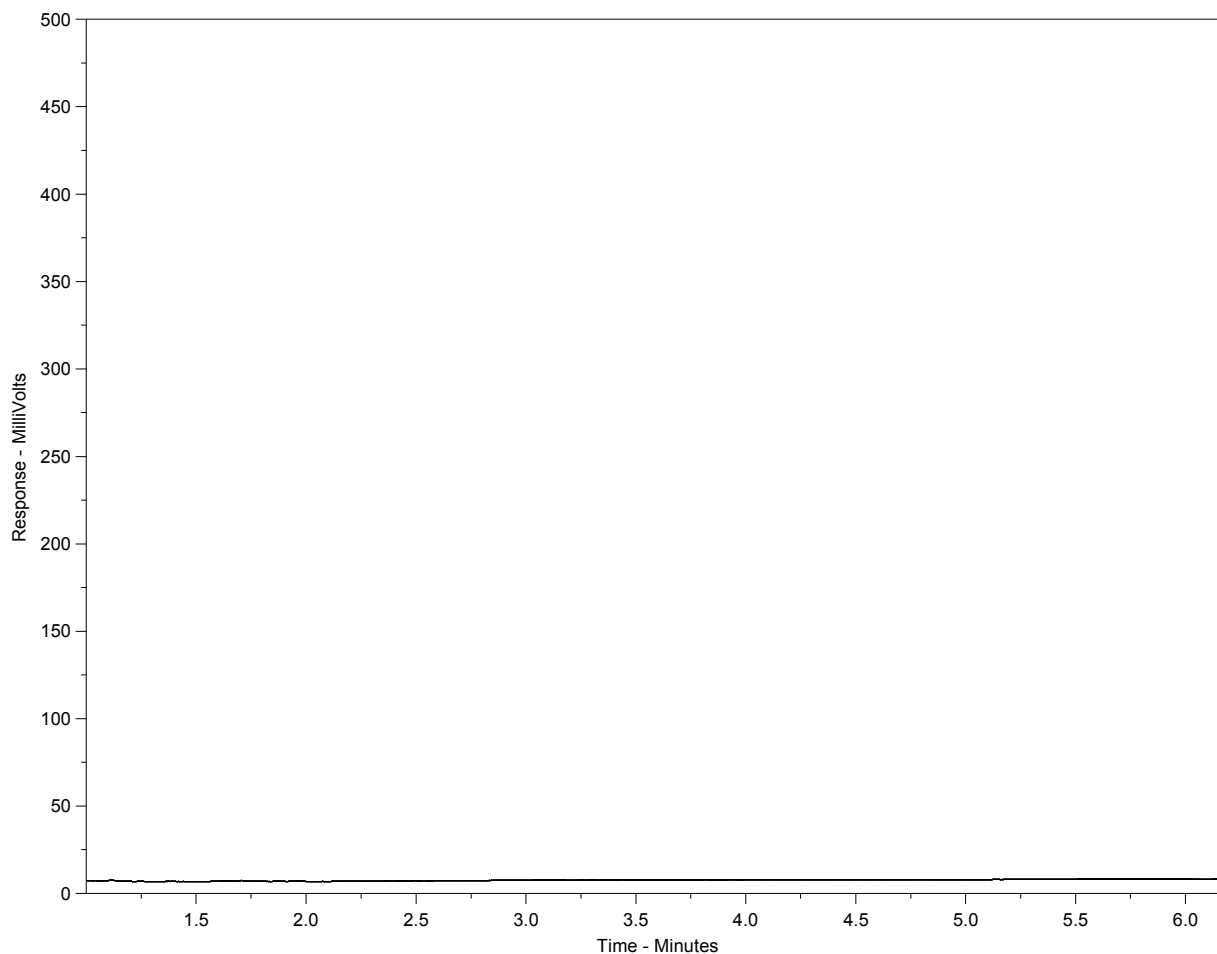
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-14
 Client ID: 16054141118026



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

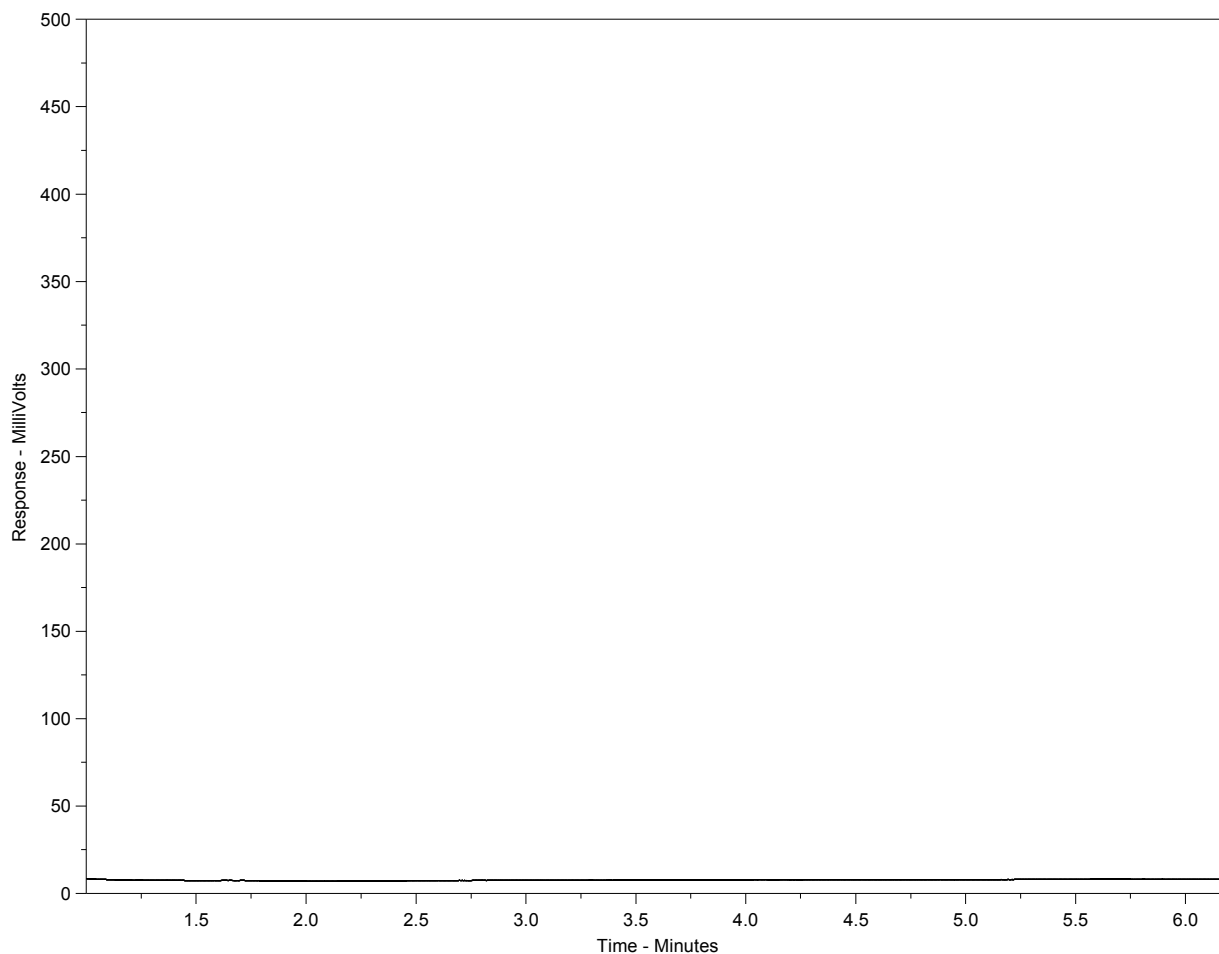
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-15
Client ID: 16054141118027



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

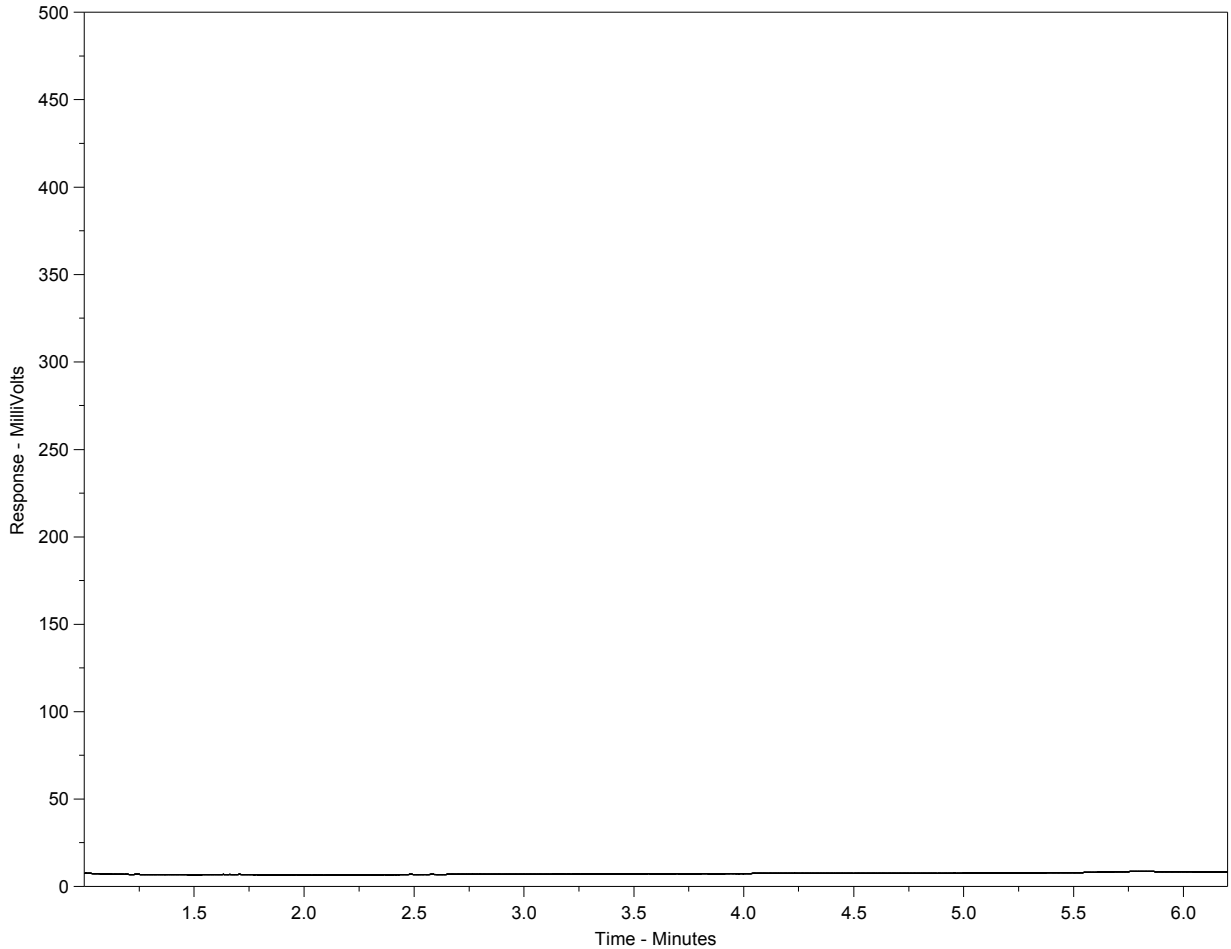
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-16
Client ID: 16054141118028



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

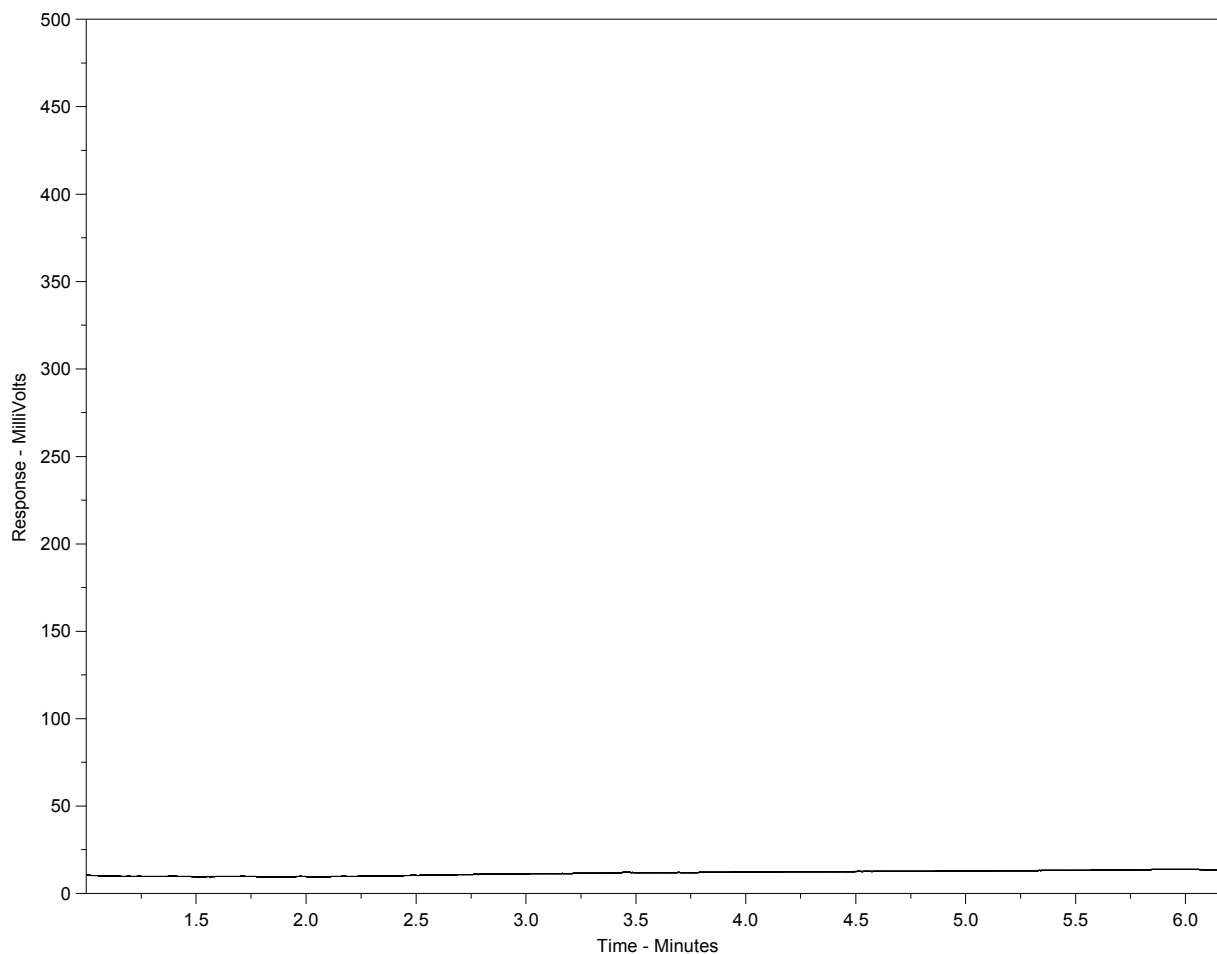
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-17
 Client ID: 16054141118029



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

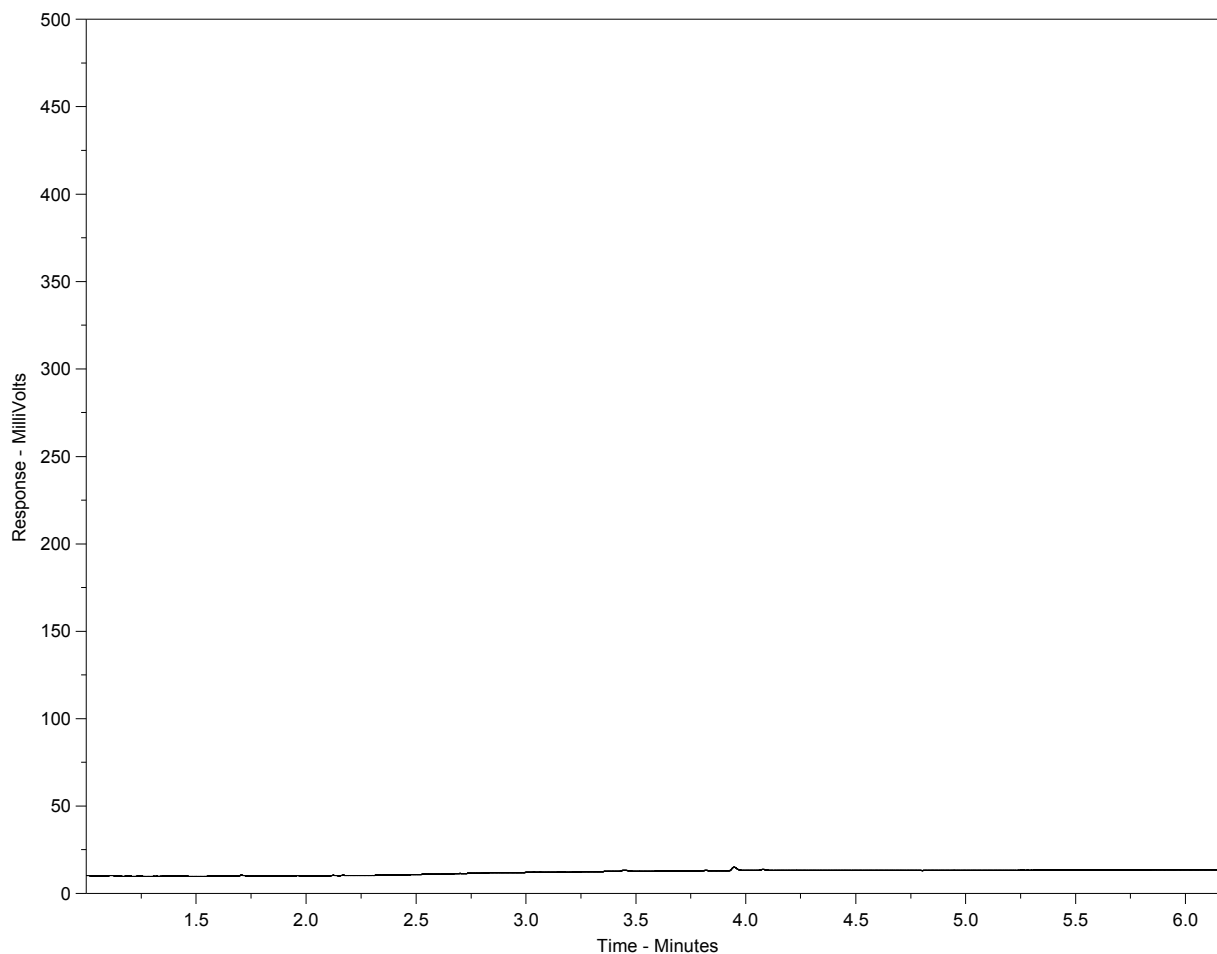
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-18
 Client ID: 16054141119030



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

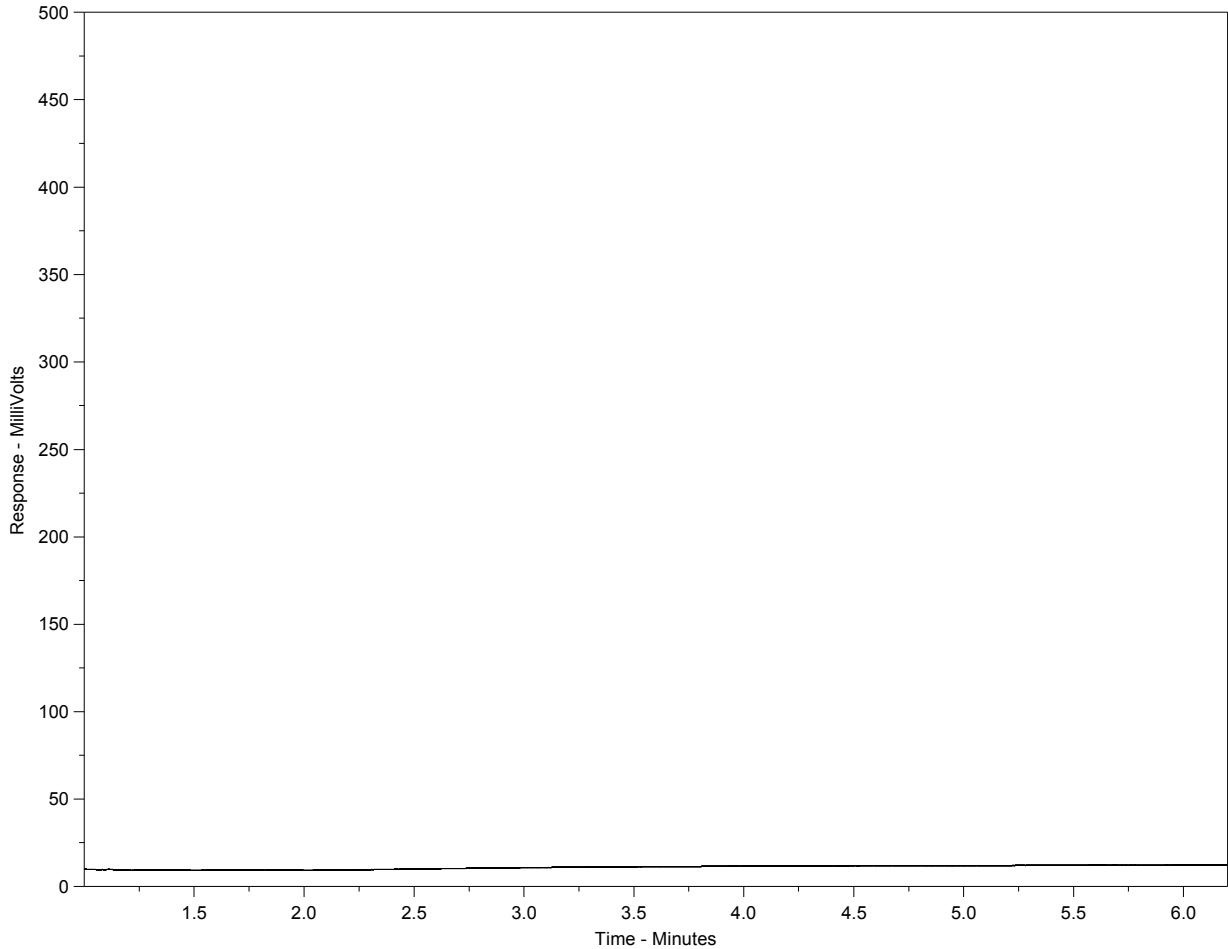
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-19
Client ID: 16054141119031



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

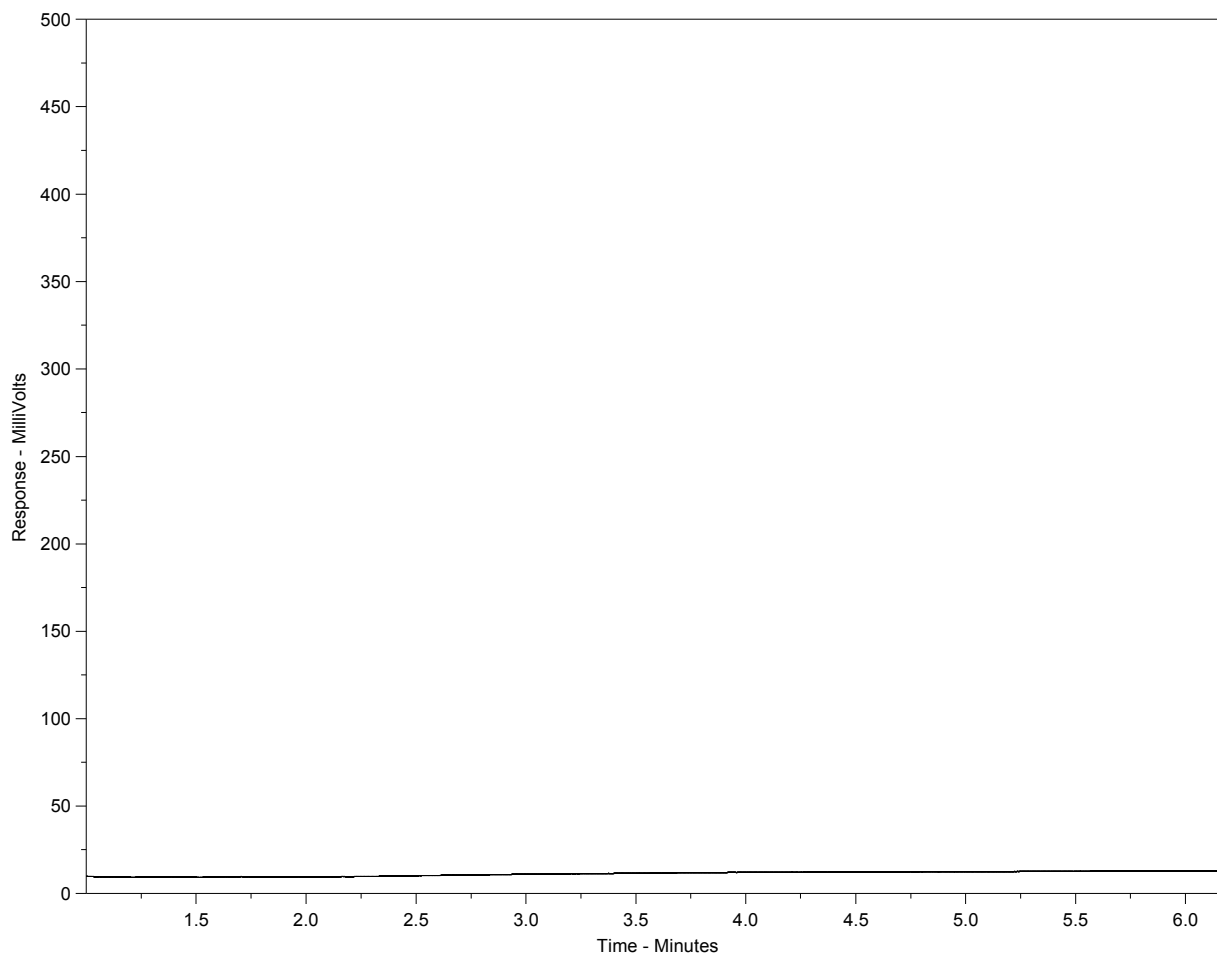
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-20
Client ID: 16054141119032



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

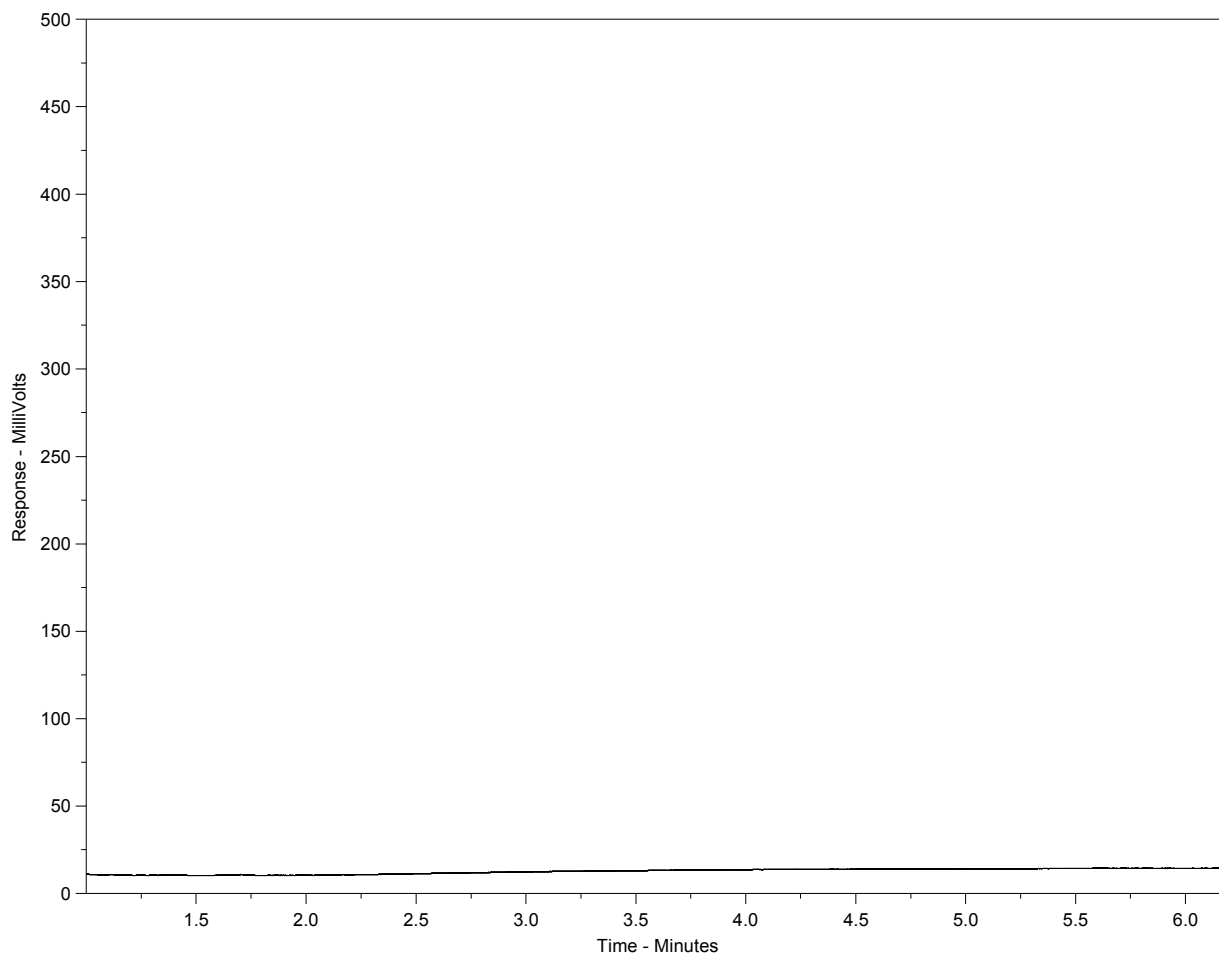
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-21
 Client ID: 16054141119033



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

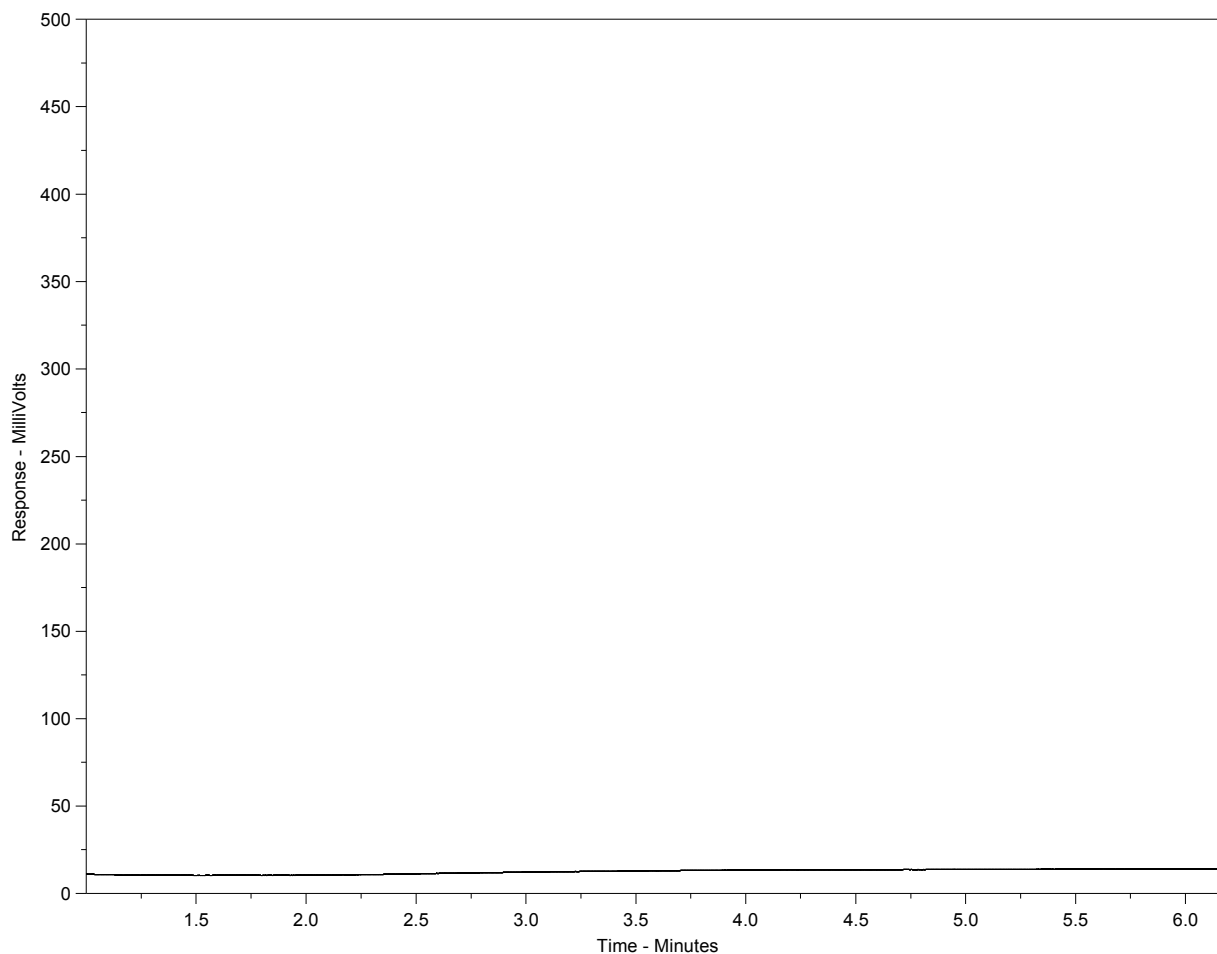
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-22
 Client ID: 16054141119034



← F2 →		← F3 →		← F4 →		← F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →				← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

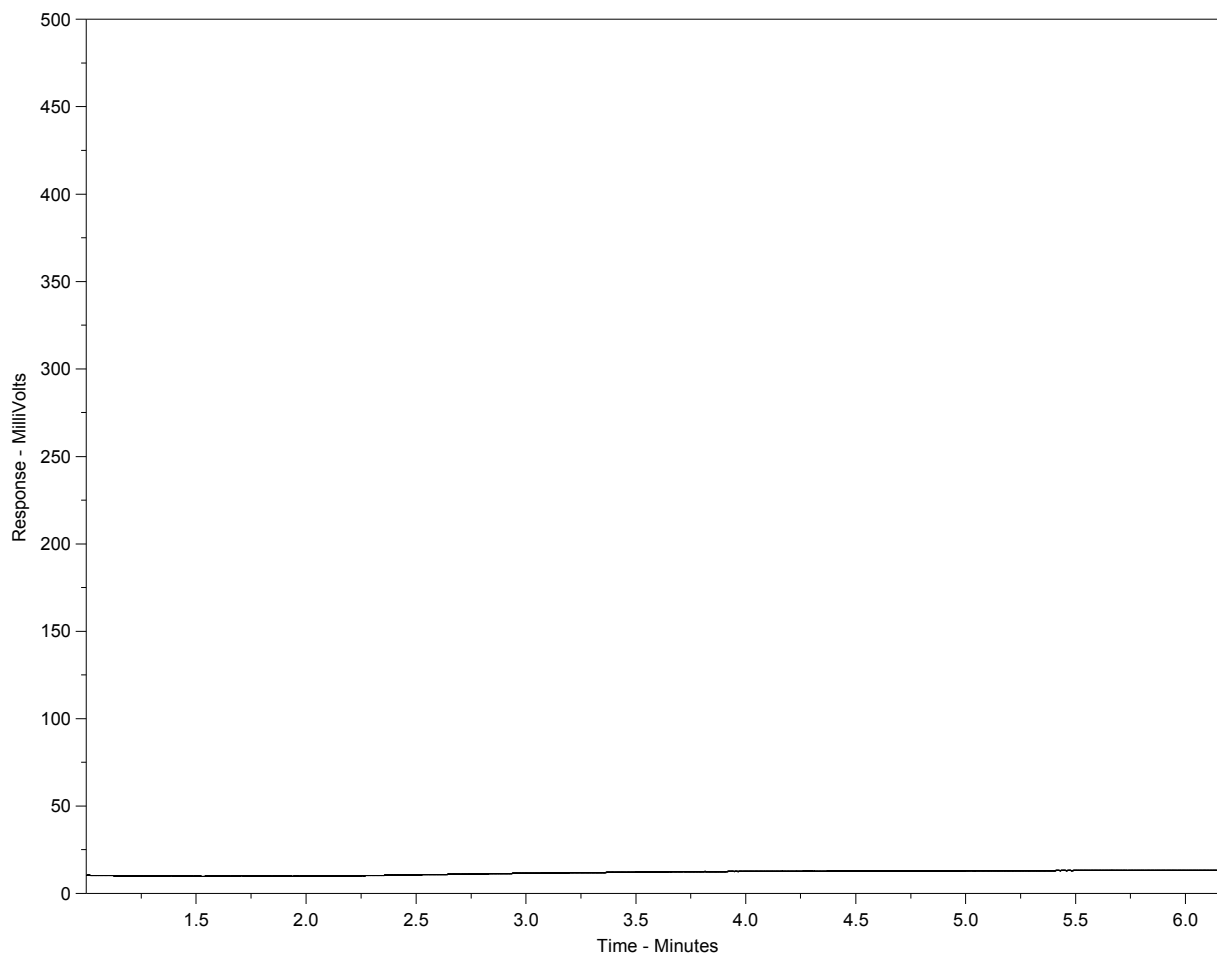
Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report



ALS Sample ID: L1548841-23
Client ID: 16054141119035



← F2 →		← F3 →		← F4 →		← > F4 →	
nC10	nC16	nC34	nC50				
174°C	287°C	481°C	575°C				
346°F	549°F	898°F	1067°F				
← Gasoline →			← Motor Oils/ Lube Oils/ Grease →				
← Diesel/ Jet Fuels →							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.