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2014 BIOFARM MONITORING AND SAMPLING REPORT

Shell Winnipeg Terminal

December 10, 2014
Project 622653

Prepared For:

Shell Canada Products

SNC-LAVALIN INC.

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ATTENTION: Mr. Don Labossiere, Director
REFERENCE: **2014 Biofarm Monitoring and Sampling Program**
Shell Winnipeg Terminal
212 Panet Road, Winnipeg, Manitoba
(P00403)

On behalf of Shell Canada Products (Shell), the Environment & Water business unit of SNC-Lavalin Inc. (SNC-Lavalin) is pleased to submit the following report (the "Report") documenting results of the biofarm monitoring and sampling program completed at the above-referenced petroleum distribution terminal (the Site) in 2014:

- *2014 Biofarm Monitoring and Sampling Report, Shell Winnipeg Terminal, prepared by SNC-Lavalin Inc., dated December 10, 2014.*

We wish to point out that the Report was prepared exclusively for Shell. Shell is providing the Report on a confidential basis. It is Shell's position that the Report is confidential and disclosure of the Report by you to third parties will prejudice Shell's competitive position and interfere significantly with Shell's contractual or other negotiations resulting in undue loss to Shell.

The Report has been prepared to satisfy Condition 7 of Clean Environment Commission (CEC) Order No. 1019. The report is being submitted to Manitoba Conservation and Water Stewardship (MCWS) with the understanding that the CEC no longer regulates the referenced Order, rather this is now completed by MCWS.

Please do not hesitate to contact the undersigned at 416-635-5882 ext.55836 or the Terminal Manager, Olumakinwa Olatunde (204-925-3911) if you have any questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ryan Breivik', written over a horizontal line.

Ryan Breivik, P.Eng. (MB and ON)
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SNC-LAVALIN INC.

cc: Mr. Olumakinwa Olatunde, Terminal Manager, Shell Winnipeg Terminal

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1 INTRODUCTION

The Environment & Water business unit of SNC-Lavalin Inc. (SNC-Lavalin) was retained by Shell Canada Products (Shell) to carry out a soil and groundwater monitoring program in the fall of 2014 at its existing biofarm (landfarm) at the Winnipeg Terminal located at 212 Panet Road in Winnipeg, Manitoba (the "site"). The scope of work was carried out per the terms of reference in SNC-Lavalin's cost estimate dated September 10, 2014, as approved by Shell on September 11, 2014. This report provides a summary of the soil and groundwater monitoring program completed by SNC-Lavalin.

A key plan of the site is provided on Figure 1. Layouts of the site and the biofarm are provided on Figures 2 and 3.

2 SITE DESCRIPTION AND BACKGROUND

The biofarm, comprised of six (6) paddocks and two “front” areas for the potential disposal of hydrocarbon sludge, is located at the northwest corner of the site. Operations at the biofarm are governed by Clean Environment Commission (CEC) Order No. 1019, dated May 29, 1984 (the “Order”). Specific clauses of the Order that apply to the work program carried out by SNC-Lavalin include:

- No. 6 – *“The Applicant shall ensure that the concentration of hydrocarbons in the soil does not exceed 8 percent of soil weight when the total weight of hydrocarbons in the soil profile is calculated as a percentage of the weight of the top 6 inches of soil.”*
- No. 7 – *“The Applicant shall ensure that a soil and groundwater sampling and analysis program is carried out and reported upon to the satisfaction of the Environmental Management Division for such period of time as requested by the said Division, to determine:*
 - (a) twice in each year in the Summer and in the Fall, the rates and extent of hydrocarbon and nitrogen movement through the soil profile and in a lateral direction; and*
 - (b) once in each year, in the Fall, the rates of degradation of hydrocarbon fractions;**and the Applicant shall submit reports of the said sampling and analysis to the said Division within 30 days of the date the samples are taken.”*

Summer 2014 monitoring by SNC-Lavalin was not commissioned by Shell. It is our understanding that limited application (sludge from Tank 1550; specific location and extent not available at the issue date of this report) was completed in the summer prior to implementation of fall monitoring.

In preparation for fall monitoring, SNC-Lavalin was provided the following reports for review:

- *Shell Canada Products Winnipeg Terminal Facility Biofarm 2011 Annual Summary Report*, prepared by Stantec Consulting Ltd. (Stantec), dated March 2012 (Stantec, 2012)
- *Shell Canada Products Winnipeg Terminal Facility Biofarm 2012 Annual Summary Report*, prepared by Stantec, dated February 2013 (Stantec, 2013)
- *Shell Canada Products Winnipeg Terminal Facility Biofarm 2013 Annual Summary Report*, prepared by Stantec, dated February 14, 2014 (Stantec, 2014)

Stantec, 2012 – 2014 provide indication of biofarm monitoring and maintenance since 2005. Principal tasks have included:

- Rotational paddock use, whereby hydrocarbon sludge is applied to differing paddocks on an annual basis
- Spring and fall soil sampling of the active landfarming areas

- Monitoring of two installed wells – identified as “West MW” and “North MW”, which SNC-Lavalin shows to be consistent with MW5 and MW4, respectively, as shown on Figure 3.
- Third-party laboratory analysis of soil and groundwater samples for petroleum hydrocarbon and nutrient (nitrogen and phosphorous) concentrations – it is noted that Stantec, 2014 indicates that nutrient monitoring may not have been consistently completed prior to 2011.
- Compilation and submission of annual reports documenting findings of the monitoring program.

Of note, Stantec, 2014 indicates that soil from former windrows established in Paddocks 2 through 5 as well as in the “West Front” and “Front” areas of the biofarm was removed from the Winnipeg Terminal in the fall of 2013.

Also of note, Stantec, 2014 indicates that Paddock 6 was intended for hydrocarbon sludge disposal in 2014. Based on discussions with Shell, it is our understanding that Paddock 6 was not used for disposal due to its limited accessibility. While the location of application of Tank 1550 sludge was not disclosed at the issue date of this report, all other sludge applications were reportedly made within Paddock 2.

3 REGULATORY FRAMEWORK

The Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG) and Canada Wide Standard (CWS) for Petroleum Hydrocarbons (PHC) in Soil contain a series of PHC parameter guideline limits based on potential receptor pathways. Review of these pathways allows for selection of remedial criteria more directly applicable to the site-specific conditions. Furthermore, the CCME CEQG and CWS present different target values based on soil texture (i.e., grain size), soil depth, and land use.

The primary soil and groundwater standards in Manitoba are the Canadian Council of Ministers of the Environment (CCME) guidelines as per the Contaminated Sites Remediation (CSR) Act and in absence of those, the Act suggests using Ontario standards followed by Alberta. It is noted that Ontario standards are based on 10^{-6} incremental cancer risk and selected variances for assumptions followed by CCME and other Provinces across Canada which are unique to Ontario and/or not consistent with CCME rationales. On this basis, SNC-Lavalin has defaulted to Alberta Environment guidelines where a risk based strategy is applied in the case where no CCME guidelines exist as with groundwater. Alberta Environment and Sustainable Resource Development (AESRD) has aligned their guidance with principles of CCME and Health Canada in 2010 (Alberta Environment [AENV] Tiered Guidance) and have recently updated their guidance in 2014 to re-align with current science and publications included by several federal agencies such as CCME, Environment Canada, and Health Canada to more closely align with current risk based guidance and endpoints protective of all of Canada.

In order to best represent prairie geological conditions and in accordance with Shell's objectives to provide safe land use developments and on-going operations across Canada, for the Site considered herein, SNC-Lavalin has defaulted to the AESRD guidelines where a risk based strategy is applied to this site where no CCME guidelines exist for non-potable groundwater conditions (SNC-Lavalin, 2014a).

An outline of the applicable pathways and other site-specific characteristics are presented in the following sections:

3.1 Groundwater Ingestion Pathway

Alberta Environment and Sustainable Resource and Development's Tier 2 Soil and Groundwater Remediation Guidelines document (AESDR, 2014a) indicates that the Groundwater Ingestion Pathway is applicable in all cases where groundwater is, or has the potential to be used as drinking water, with a domestic use aquifer (DUA) defined as a geologic unit that is above the Base of Groundwater Protection (i.e., the depth above which groundwater is naturally non-saline) and having one or more of the following properties:

- A bulk hydraulic conductivity of 1.0×10^{-6} metres per second (m/s) or greater;
- Is currently being used for domestic purposes; or
- Any aquifer determined by Alberta Environment to be a DUA.

A search of the Manitoba Water Stewardship water well database by Manitoba Water Stewardship personnel identified up to three registered domestic water wells located within 800 m of the site. The wells are cased through the overburden to depths ranging from 17.7 m to 23.3 m below grade and then completed as an open hole to depths ranging from 30.5 m to 59.5 m below grade.

Based on the logs for the three registered domestic water wells located in the vicinity of the site, there is at least 5 m of fine-grained material (i.e., clay) between the maximum depth of impact and any potential DUA beneath the site. Typically, clay material has a hydraulic conductivity of less than 1.0×10^{-7} m/s (Freeze and Cherry, 1979).

Based on the foregoing, it appears that the groundwater ingestion pathway is not applicable to the site.

3.1.1 Freshwater Aquatic Life Pathway

The freshwater aquatic life pathway is considered applicable if a surface water body is located within 500 m of a site (CCME, 2008a). The nearest major surface water body is the Seine River which is located approximately 800 m west of the site. As such, the freshwater aquatic life pathway is not considered applicable to the site.

3.1.2 Soil Vapour Inhalation Pathway

Indoor vapour inhalation is applicable for any site with a building within 30 m of PHC contamination (CCME, 2008b). The soil vapour inhalation pathway for non-threshold constituents (i.e., carcinogens) such as benzene is applicable if the soil borne constituent is a minimum of 0.3 m from a building foundation. The vapours must migrate through this 0.3 m of clean soil before reaching and penetrating the building foundation. For commercial land use, slab-on-grade type building construction is only considered because in all cases the soil quality guideline for indoor vapour inhalation is the lower of the two numbers based on the type of construction. When considering the lifetime cancer risk, CCME developed the guideline employing a critical risk specific dose based on an incremental risk from soil exposure of both 10^{-5} and 10^{-6} above background levels. The exposure assumptions for the guideline are that an adult human receptor within the building must be exposed to vapours for greater than 10 hours/day, for 5 days/week, for 48 weeks/year for 30 to 40 years over a lifetime.

There currently are several buildings located on the site. In addition, future use of the site is unknown and may include structures with slab-on-grade construction. As such, the vapour inhalation pathway with a 10^{-5} cancer risk is considered potentially applicable to the site

3.1.3 Eco-Soil Contact Pathway

The site is generally covered by grass, gravel and sand and, as such, ecological receptors could potentially contact PHC constituents in shallow soil. As such, the eco-soil contact guideline is applicable up to a depth of 1.5 m bgs.

3.1.4 Soil Ingestion and Dermal Contact Pathways

As stated in Appendix D of the CCME (2008b) CWS User Guidance, “The direct contact pathway (soil ingestion and dermal contact) requires direct exposure to soil. Therefore, if the PHC contamination is greater than 1.5 m below grade, these pathways would only apply during construction activities when subsurface soils are exposed.” As noted previously, the site is currently occupied; therefore, soil ingestion and dermal contact pathways are considered applicable to a maximum depth of 1.5 m bgs at the site.

3.1.5 Management Limits Pathway

The management limits were developed by CCME to assess risks potentially associated with impact at depth and to allow for the option to eliminate the eco-soil contact pathway in deeper soil. Factors considered in the derivation of the management limits include free phase formation, worker exposure to vapours in trenches, fire/explosion hazards, and damage to buried infrastructure. Management limits always apply, regardless of depth of impact, and take into account the potential for direct human contact with soil brought to the surface during construction or other disturbance. The management limits apply when other, more stringent, pathways have been excluded.

As discussed above, the eco soil pathway is being applied to the site. However, as there is generally limited required ecological function at depths below 1.5 m, the management limit pathway is considered applicable to soil greater than 1.5 m below grade.

Soil

Based on site stratigraphy, Canadian Soil Quality Guidelines (CSQGs) for fine-grained soil apply to shallow soil (≤ 1.5 m depth) and subsurface soil (> 1.5 m depth). Pathways noted above are considered applicable at the site; however, as noted above, have limited applicability in subsurface soils. The SQGs for benzene are based on an incremental lifetime cancer risk of 10^{-5} , which is based on guidance provided by Manitoba Conservation (2005).

The resultant comparative soil guideline values are:

Depth from Surface	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	F1 (mg/kg)	F2 (mg/kg)	F3 (mg/kg)	F4 (mg/kg)
≤1.5 m	2.8 ^{1,2,5}	330 ^{1,5}	430 ^{1,5}	230 ^{1,5}	320 ^{3,5}	260 ^{3,5}	2,500 ^{3,5}	6,600 ^{3,5}
>1.5 m	2.9 ^{1,2,5}	660 ^{1,5}	860 ^{1,5}	460 ^{1,5}	800 ^{3,6}	1000 ^{3,6}	5,000 ^{3,6}	10,000 ^{3,6}

¹ Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (CSQGs) for the Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in Surface Soil/Subsoil, Commercial Land-Use, Fine-Grained Soil

² Soil Quality Guidelines and Check Values for benzene for a 10⁻⁵ incremental cancer risk

³ Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil, (CCME 2008), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial Land-Use

⁴ Soil Vapour Inhalation

⁵ Ecological Soil Contact

⁶ Management Limit

Groundwater

A remediation plan (RP) dated October 29, 2014 (SNC-Lavalin, 2014b) was submitted to Manitoba Conservation and outlined the future environmental activities at the site. The RP selected groundwater quality guidelines to identify contaminants of potential concern at the site based on the AESRD Soil and Groundwater Remediation Guidelines (AESRD, 2014a and 2014b). SNC-Lavalin has selected the use of these guidelines for the groundwater criteria at this site, as in general the derivation of Ontario standards are based on 10⁻⁶ incremental cancer risk as well as other selected variances for assumptions followed by the CCME and other Provinces across Canada which are unique to Ontario and/or not consistent with CCME rationales. The comparative groundwater guideline values selected by the RP correspond to:

Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	F1 (mg/L)	F2 (mg/L)	F3 (mg/L)	F4 (mg/L)
19 ^{1,2}	240 ^{1,3}	150 ^{1,3}	74 ^{1,3}	9.9 ^{1,3}	3.1 ^{1,3}	NG	NG

¹ Alberta Environment and Sustainable Resource Development (AESDR) Tier 2 Soil and Groundwater Remediation Guidelines (AESDR 2014), Groundwater Remediation Guideline Values for Commercial/Industrial Land Use – All Water Uses

² Vapour inhalation

³ Eco Soil Contact

NG – no guideline

The above referenced soil and groundwater guidelines will be used for comparison of petroleum hydrocarbon results obtained through the current investigation. In the absence of CCME and AESDR guidelines for nutrients in groundwater, SNC-Lavalin has used the Health Canada Guidelines for Canadian Drinking Water Quality (2010) for assessment purposes to keep consistent with previous reports prepared by others.

4 WORK PROGRAM

SNC-Lavalin developed a work plan to facilitate remaining operational tasks at the biofarm as well as to carry out fall 2014 soil and groundwater monitoring. The following tasks were implemented:

- Task 1: Utility Clearances;
- Task 2: Biofarm Leveling, Tilling and Shallow Soil Sampling;
- Task 3: Daylighting Activities, Borehole Drilling and Soil Sampling;
- Task 4: Monitoring Well Installation;
- Task 5: Well Development, Site Monitoring and Groundwater Sampling; and,
- Task 6: Quality Assurance & Quality Control (QA/QC)

Utility clearances, biofarm leveling/tilling and shallow soil sampling were conducted between October 7 and 23, 2014. Daylighting activities, borehole drilling, soil sampling, and monitoring well installation and development were conducted between November 6 and 7, 2014. Monitoring well sampling activities were conducted on November 13, 2014.

The work program was conducted in accordance with applicable Shell and site-specific safety requirements, as well as SNC-Lavalin's Health and Safety policy.

Operations:

Task 1 – Utility Clearances

Utilities in the work area were cleared by various public and private utility companies. In addition, Structure Scan Inc. of Winnipeg, Manitoba, a private utility locating company, was contracted by SNC-Lavalin to mark and clear all private utilities and confirm the locations of public utilities.

Task 2 – Biofarm Leveling, Tilling and Shallow Soil Sampling

Cambrian Excavators Ltd. (Cambrian) of Winnipeg, Manitoba was contracted by SNC-Lavalin to provide services for leveling and tilling Paddocks 1 through 6, Front and West Front areas of the biofarm between October 7 and 13, 2014. Following tilling and aeration, SNC-Lavalin personnel collected shallow soil samples from Paddocks 1 through 6 as well as the Front and West Front areas of the biofarm on October 22 and 23, 2014 using a hand auger. Soil samples were collected using a stratified random sampling approach resulting in several sampling stations, ranging from five (5) in Paddock 6, to twelve (12) in the biofarm Front area. Each sampling station was sampled at depth intervals of 0-15 cm, 15-30 cm, 30-60 cm, 60-90 cm and 90-120 cm below ground surface (bgs). Samples collected from the same depth interval at sampling stations within a Paddock/area were combined to form a composite sample, representative of that depth.

The composite samples were divided into two (2) portions: the first for laboratory analysis and the second for field logging/screening purposes. The portion retained for laboratory analysis was placed in laboratory-

supplied sampling containers and stored in a cooler equipped with ice. The second portion was placed in a sealable sample bag for field logging/screening purposes. Samples were inspected and logged for soil type, moisture, colour, structure, texture as well as visual and/or olfactory evidence of impact. Headspace vapours were screened using an RKI Eagle 2 organic vapour meter (OVM) operated in methane elimination mode and calibrated to known hexane standards.

Forty (40) soil samples were submitted to Maxxam Analytics Inc. (Maxxam) of Winnipeg, Manitoba for laboratory analysis of BTEX, PHC F1 to F4 and nutrients, including nitrate, nitrite, nitrate + nitrite, ammonia and orthophosphate. Maxxam is an environmental testing laboratory accredited by the Standards Council of Canada (SCC).

As part of quality assurance and quality control (QA/QC) measures, three (3) field duplicate soil samples were submitted for analysis of BTEX, PHC F1 to F4. The duplicates were collected from Paddocks 4, 5 and 6 and identified as FD1 to FD3.

Soil samples selected for laboratory analysis were placed in coolers containing ice and delivered under chain of custody to Maxxam by SNC-Lavalin field personnel. The sampling stations for each Paddock/area are shown on Figure 4.

Environmental Services:

Task 3 – Daylighting Activities, Borehole Drilling and Soil Sampling

Badger Daylighting of Winnipeg, Manitoba was contracted by SNC-Lavalin on November 6, 2014 to daylight one (1) proposed borehole location to 1.5 m bgs prior to advancement. Daylighting is a non-destructive excavation method using pressurized water and a vacuum truck to expose underground infrastructure. The daylighting and borehole drilling location was finalized based on the location of site infrastructure and utilities.

One (1) borehole (BH14-1) was advanced to 4.9 m bgs by Paddock Drilling Ltd. of Winnipeg, Manitoba under the supervision of SNC-Lavalin personnel on November 7, 2014. Drilling was conducted using a truck-mounted drill rig equipped with 0.15 m outside diameter (O.D.) hollow stem augers and split spoon sampling equipment. The location of BH14-1 is shown on Figure 3. The borehole log is provided in Appendix A.

The sampling, field screening and lab submission techniques described under Task 2 were also applied to the samples collected from borehole BH14-1. Two (2) soil samples were selected from the newly drilled borehole based on OVM readings and field observations, and were submitted to Maxxam laboratory analysis of BTEX and PHC F1 to F4.

Excess soil generated during the drilling activities was temporarily stored on-site in a labelled polyethylene soil bag (0.76 m³ capacity), and subsequently removed for off-site disposal at a Shell approved and licensed waste receiver by Tervita Corporation (Tervita) of Winnipeg, Manitoba on November 18, 2014.

Task 4 – Monitoring Well Installation

Borehole BH14-1 was completed as a groundwater monitoring well (MW14-1) constructed using 5.1 cm inner diameter (ID), flush-threaded, PVC well screen and solid riser. Silica sand was placed around the well screen, with a granular bentonite seal placed above the sand pack. Monitoring well MW14-1 was finished with a re-sealable steel stick-up casing. The monitoring well installation details are provided in Appendix A.

Task 5 – Well Development, Site Monitoring and Groundwater Sampling

Monitoring, development and sampling of the newly installed monitoring well MW14-1 and previously existing on-site wells MW4 and MW5 was conducted between November 7 and 13, 2014.

Prior to sampling, headspace vapour readings were measured in the newly installed monitoring well and two (2) existing biofarm wells upon removal of the well cap using the OVM operated in methane elimination mode and calibrated in the field to hexane standards. Water level in the monitoring wells was measured relative to the top of riser pipe using a Heron Instruments interface probe. The wells were also examined for the presence of light non-aqueous phase liquid (LNAPL) using the interface probe.

The monitoring wells were equipped with dedicated sampling equipment including low density polyethylene (LDPE) tubing and inertial foot valves. In preparation for sampling, the newly installed monitoring well was developed by removing approximately three (3) borehole volumes of water (calculated as the volume of standing water in the well plus the volume of water in the sand pack surrounding the well screen) or until dry and allowing it to recover three (3) times. Before sampling, biofarm wells were subsequently purged dry and allowed to recover three (3) times.

Groundwater generated during well development and purging activities was disposed in the on-site oil water separator (OWS).

Samples collected from the groundwater monitoring wells were submitted to Maxxam for laboratory analysis of BTEX, PHC F1 to F4, nitrate and nitrite.

As part of QA/QC measures, one (1) field blank (identified as FB and prepared from organic-free water supplied by the laboratory) was submitted during the November sampling event for analysis of BTEX parameters and PHC F1 to F4, and one (1) trip blank sample (prepared by the laboratory and identified as TRIP BLANK) was submitted for analysis of BTEX parameters and PHC F1.

Samples submitted for laboratory analysis were collected following field protocols designed to minimize the loss of volatile constituents and using laboratory supplied sampling containers. Samples were placed in coolers containing ice and delivered under chain of custody to Maxxam by courier.

Task 6 – Quality Assurance & Quality Control (QA/QC)

A QA/QC program was implemented to ensure sample integrity, and to minimize and identify potential cross-contamination introduced during sample collection, handling, shipping and analysis. As part of the QA/QC program, sampling protocols included minimizing sample handling, submitting field QA/QC samples, washing sampling equipment with soap and water between samples, using sample specific identification and labelling procedures, and using chain of custody records. Field duplicate soil and groundwater samples for BTEX and PHC parameters were prepared and analysed to assess reproducibility of results.

Chemical analyses were performed by Maxxam. Laboratory analysis was completed in accordance with Standard Methods and generally accepted industry practices. Laboratory QA/QC measures included analysis of laboratory blank, spiked blank, duplicate and matrix spike samples.

5 RESULTS

5.1 Site Geology

Shallow soil evaluated during drilling and soil sampling generally consisted of dark grey clay fill underlain by dark grey clay to the maximum depth investigated (i.e., 4.9 m bgs). Bedrock was not encountered during this work program.

5.2 Field Screening and Monitoring Results

A maximum OVM reading of 175 parts per million by volume (ppmv) was measured on a shallow soil sample collected from the Front area of the biofarm. OVM readings for soil samples collected from the remaining biofarm paddocks/areas and borehole BH14-1 were ≤ 150 ppmv.

Headspace vapour readings of ≤ 60 ppmv were observed in monitoring wells MW4, MW5 and MW14-1 during the November 2014 monitoring event.

The depth to groundwater measured in the monitoring wells ranged from 2.28 m (MW5) to 2.83 m (BH14-1) bgs on November 13, 2014. Based on the review of the groundwater monitoring data, SNC-Lavalin notes that interpreted shallow horizontal groundwater flow direction is towards the north/northeast, as shown on Figure 3.

LNAPL was not observed during the November 2014 groundwater monitoring and sampling activities conducted at the biofarm.

Groundwater monitoring results are provided in Table 1. Soil OVM readings are included in the borehole log presented in Appendix A.

5.3 Soil Analytical Results

5.3.1 Petroleum Hydrocarbon Analysis

In 2014, the concentrations of BTEX, PHC F1 and F4 were lower than the CCME guidelines for soil samples collected from biofarm paddocks/areas. Concentrations of PHC F2 and/or F3 were above the applicable soil guidelines of 260 and 2500 mg/kg, respectively, in thirteen (13) soil samples collected from the biofarm paddocks/areas. Generally, elevated PHC F2 and/or F3 were observed in samples collected from the upper 0.6 m bgs in all areas of the biofarm.

Concentrations of analysed parameters were below the CCME guidelines for soil samples submitted from borehole BH-14-1. Results of soil analyses are outlined in detail below:

Paddock 1

- An elevated concentration of PHC F3 (4,000 mg/kg) was reported above the CSQG at the depth interval of 30-60 cm bgs.

Paddock 2

- Elevated concentrations of PHC F2 and F3 (4,300 and 5,100 mg/kg) were reported above the CSQGs at depth intervals of 0-15 and 15-30 cm bgs, respectively.

Paddock 3

- Elevated concentrations of PHC F2 (640 and 920 mg/kg) were reported above the CSQG at depth intervals of 15-30 and 30-60 cm bgs, respectively.
- Elevated concentrations of PHC F3 (7,400, 7,300 and 9,400 mg/kg) were reported above the CSQG at depth intervals of 0-15, 15-30 and 30-60 cm bgs, respectively.

Paddock 4

- An elevated concentration of PHC F2 (310 mg/kg) was reported above the CSQG at the depth interval of 0-15 cm bgs.
- Elevated concentrations of PHC F3 (4,500 and 2,700 mg/kg) were reported above the CSQG at depth intervals of 0-15 and 90-120 cm bgs, respectively.

Paddock 5

- Elevated concentrations of PHC F2 (510 - average of primary and field duplicate samples and 2000 mg/kg) were reported above the CSQG at depth intervals of 0-15 and 30-60 cm bgs, respectively.
- Elevated concentrations of PHC F3 (10,950 - average of primary and field duplicate samples and 18,000 mg/kg) were reported above the CSQG at depth intervals of 0-15 and 30-60 cm bgs, respectively.

Paddock 6

- An elevated concentration of PHC F3 (2,700 mg/kg - average of primary and field duplicate samples) was reported above the CSQG at the depth of 0-15 cm bgs.

Front

- An elevated concentration of PHC F2 (350 mg/kg) was reported above the CSQG at the depth of 30-60 cm bgs.

West Front

- An elevated concentration of PHC F3 (8,600 mg/kg) was reported above the CSQG at the depth of 0-15 cm bgs.

BH-14-1

- Concentrations of BTEX and PHC F1 to F4 were below the CSQG guidelines for analysed soil samples.

Table 2 provides a summary of the soil analytical results (BTEX and PHC F1 to F4). Figure 4 provides a visual display of the analytical results. A comparison of the soil analytical results PHC Laboratory Certificates of Analysis (soil) are provided in Appendix D.

5.3.2 PHC Degradation

Based on our review of Stantec 2012 - 2014, it would appear that PHC analyses were restricted to soil samples collected from paddocks selected for sludge applications in each respective year. Given our understanding that soil from former windrows established in Paddocks 2 through 5 as well as in the "West Front" and "Front" areas of the biofarm was removed from the Winnipeg Terminal in the fall of 2013, soil samples were collected from across all paddocks/areas of the biofarm during the fall 2014 monitoring period to establish existing PHC concentrations in surface soil.

A comparison of PHC analytical results from fall 2013 and fall 2014 for Paddocks 1 and 2 provides the following observations:

- F1 and F2 concentrations at all sampling depth intervals in fall 2014 were less than or equal to those from fall 2013.
- F3 and F4 concentrations were lower in the upper 30 cm of soil and higher from 30-120 cm in Paddock 1 in fall 2014.
- F3 concentrations were higher in the upper 30 cm of soil and significantly lower from 30 -120 cm in Paddock 2 in fall 2014.
- F4 concentrations were higher in the upper 60 cm of soil and significantly lower from 60 – 120 cm in Paddock 2 in fall 2014.

The higher F3 and F4 concentrations observed in upper soil samples collected from Paddock 2 in fall 2014 are attributed to sludge applications in the current year.

Available historical PHC analytical results are provided in Appendix C.

5.3.3 Calculated Total Petroleum Hydrocarbons

To fulfill the requirements of Order 1019, the concentration of total petroleum hydrocarbons (TPH) in soil was calculated based on sampling results to confirm that it did not exceed 8% of the soil weight when the total weight of hydrocarbons in the 0-15 cm depth interval. The calculated TPH concentration in the soil in Paddocks 1 through 6, Front and West Front areas ranged from 0.1 to 1.7%, and therefore lower than the

stipulated threshold. The calculated values of the TPH by percent weight in the top 15 cm of soil are provided in Table 3.

5.3.4 Nutrient Analysis

The 2014 soil analytical results provide indication that biofarm soil was deficient in nitrogen and fairly deficient in phosphorus in certain areas as well, specifically in Paddocks 1 (6.3 mg/kg of ammonia-nitrogen, <0.5 µg/g of phosphate) and 2 (6.2 mg/kg of ammonia-nitrogen, 5 µg/g of phosphate). This is attributed to the absence of fertilizer additions in 2014 or in previous years as reported in Stantec, 2013. Nutrient analytical results (soil) are summarized in Table 4. Historical nutrient analytical results (2012 – 2014) for Paddocks 1 and 2 are graphically displayed in Appendix B.

5.4 Groundwater Analytical Results

5.4.1 Petroleum Hydrocarbon Analysis

The concentrations of the analyzed PHC parameters were consistent with historical data and less than the applicable guideline values in all groundwater samples submitted for analysis from the biofarm, including the newly installed monitoring well and the two (2) existing biofarm wells

The analytical results for the groundwater samples submitted from the biofarm are presented in Table 5 along with applicable groundwater guideline values. Figure 5 provides a visual display of the analytical results. Laboratory Certificates of Analysis (groundwater) are provided in Appendix E.

5.4.2 Nutrient Analysis

Concentrations of nitrates and nitrites in samples submitted from the biofarm wells were lower than the reportable detection limits, and therefore well below the stipulated threshold of 10 mg/L as set by Health Canada for nitrate-nitrogen in drinking water. Table 6 shows the results of the nutrient analysis for the biofarm wells.

5.5 Quality Assurance & Quality Control (QA/QC)

Analytical results for the field duplicate soil samples (P4-COMP-2, P5-COMP-1 and P6-COMP-1) generally showed acceptable correlation (relative percent difference (RPD) less than 100%) to their corresponding analytical pairs (FD1, FD2 and FD3, respectively) where calculable. The exception was the PHC F4 concentration in samples P4-COMP-2 and FD1 (RPD of 104%). The observed variability is likely due to sample heterogeneity. Overall, however, the observed variability does not affect the conclusions based on these results. Groundwater results for the field blank and trip blank water samples were below the laboratory reportable detection limits (RDLs) for the parameters analyzed. As such, results of QA/QC analyses suggest

that field sampling/handling and laboratory analytical protocols were acceptable. The RPD calculations are presented in Appendix D.

6 SUMMARY

- The biofarm was leveled and tilled between October 7 and 13, 2014 prior to soil and groundwater monitoring.
- Soil and groundwater monitoring was limited to one (1) seasonal monitoring period (fall) in 2014.
- One (1) additional shallow groundwater monitoring well (MW14-1) was installed within the eastern portion of the biofarm to permit an assessment of horizontal groundwater flow direction.
- Shallow groundwater flow direction across the biofarm on November 13, 2014 is interpreted as northerly.
- Based on an understanding of hydrocarbon sludge applications over the course of 2014 coupled with PHC analytical results (soil), the concentration of hydrocarbons in soil at the biofarm did not exceed 8% of soil weight in the upper 15 cm (0.15 m).
- Elevated concentrations of PHC (F2 and/or F3) were reported in thirteen (13) soil samples collected from each of the paddocks/areas of the biofarm.
 - Higher PHC F3 and F4 concentrations observed in upper soil samples collected from Paddock 2 in fall 2014 are attributed to sludge applications in the current year.
- Lower than desired concentrations of nitrogen and phosphorus were observed in analyzed soil composites collected from the paddocks.
- There were no contaminants of concern reported above applicable assessment criteria in any of the analyzed groundwater samples collected during the fall 2014 monitoring program.

7 RECOMMENDATIONS

Based on the foregoing, the following recommendations are provided for the consideration of Shell:

- Addition of nutrients (fertilizer) in the spring of 2015. Fertilizer should be applied to supply approximately 100 kg N/ha and 40 kg P₂O₅/ha.
- Tillage of all paddocks/areas during the spreading season to promote PHC degradation. The frequency of tillage should be assessed based on planned hydrocarbon sludge applications over the course of 2015.
- Implementation of soil and groundwater monitoring per the prescribed frequency set forth in the Order. As part of monitoring, soil sampling should be completed in all paddocks/areas of the biofarm in 2015.

8 REFERENCES

- Alberta Environment and Sustainable Resource Development (AESDR). 2014a. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Government of Alberta, May 23.
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TABLES

TABLE 1 MONITORING RESULTS
212 Panet Road, Winnipeg, Manitoba

(see notes at end of table, check LNAPL occurrence in following table)

Location	Ground Elev	Screen Top Elev	Bottom of Well Elev	Monitoring Date	OVM Reading	LNAPL Present In Well Or Skimmer	Depth to Water (m bgs)	Water Elevation (m)
	(m)	(m)	(m)					
MW14-1	99.69	nm	nm	13-Nov-14	5	nd	1.80	97.89
MW4	98.83	nm	nm	13-Nov-14	50	nd	1.66	97.18
MW5	99.92	nm	nm	13-Nov-14	60	nd	1.38	98.54

Explanatory Notes:

- o Elevations reported according to benchmark.
- o Water elevations NOT corrected for LNAPL, if present.
- o Water depths reported below ground surface (bgs).
- o Water depths measured using Heron Instruments interface probe (or equivalent) after removal of skimmer (if present).
- o Organic vapour meter (OVM) reading measured using Gastech 1238 ME (or equivalent) and reported in ppmv (parts per million by volume) unless noted as %LEL (lower explosive limit of hexane).

(s) indicates skimmer present in well.

(*) indicates water level higher than top of well screen.

(s*) indicates skimmer present and water level higher than well screen.

(nm) indicates well not monitored, (na) well not accessible or (nd) if not detected.

Benchmark:

local (m ald), reference elevation (m) - 100.00

reference point - Temporary Local Datum

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.	RDL	Units	Soil Guidelines		P1-COMP-1	P1-COMP-2	P1-COMP-3	P1-COMP-4	P1-COMP-5
			≤1.5 m	>1.5 m					
Laboratory Sample No.	na	na	na	na	KY4960	KY4961	KY4962	KY4963	KY4964
Sampling Date	na	na	na	na	22-Oct-2014	22-Oct-2014	22-Oct-2014	22-Oct-2014	22-Oct-2014
Sample Location	na	na	na	na	P1-COMP-1	P1-COMP-2	P1-COMP-3	P1-COMP-4	P1-COMP-5
Sample Depth	na	m bgs	na	na	0.0 - 0.15	0.15 - 0.30	0.30 - 0.60	0.60 - 0.90	0.90 - 1.20
OVm Reading	na	see note	na	na	80	70	115	95	85
Benzene	0.005	mg/kg	2.8 ^{1,2,5}	2.9 ^{1,2,5}	<	<	<	<	<
Toluene	0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	<	<	<	<	<
Ethylbenzene	0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	<	<	<	<	<
Xylenes	0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
PHC F1	10	mg/kg	320 ^{3,5}	800 ^{3,6}	<	<	<	<	<
PHC F2	10	mg/kg	260 ^{3,5}	1000 ^{3,6}	43	84	120	77	89
PHC F3	10	mg/kg	2500 ^{3,5}	5000 ^{3,6}	1100	1400	4000	1000	2100
PHC F4	10	mg/kg	6600 ^{3,5}	10000 ^{3,6}	230	250	940	230	670

mg/g
RDL
m bgs
OVm Reading
ppmv
% LEL
na
<
<###
<###
<###
BOLD
1
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militigrams per gram
reportable detection limit unless noted
metres below ground surface
organic vapour meter reading (in ppmv unless noted)
parts per million by volume
percent of the lower explosive limit of hexane
not applicable
less than RDL
less than adjusted RDL (###)
not analysed
adjusted RDL (###) exceeds soil site condition standard
exceeds selected soil guidelines
Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the
Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in
Surface Soil/Subsoil, Commercial Land-Use, Fine Grained Soil
Soil Quality Guidelines and Check Values for benzene for a 10-5 incremental cancer risk
Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons
(PHC) in Soil, (CCME 2006), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial
Land-Use
Soil Vapour Inhalation
Ecological Soil Contact
Management Limit

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.	RDL	Units	Soil Guidelines		P2-COMP-1	P2-COMP-2	P2-COMP-3	P2-COMP-4	P2-COMP-5
			≤1.5 m	>1.5 m					
Laboratory Sample No.	na	na	na	na	KY4965	KY4966	KY4967	KY4968	KY4969
Sample Location	na	na	na	na	22-Oct-2014	22-Oct-2014	22-Oct-2014	22-Oct-2014	22-Oct-2014
Sample Depth	na	na	na	na	P2-COMP-1	P2-COMP-2	P2-COMP-3	P2-COMP-4	P2-COMP-5
OVIM Reading	na	m bgs	na	na	0.0 - 0.15	0.15 - 0.30	0.30 - 0.60	0.60 - 0.90	0.90 - 1.20
	na	see note	na	na	75	100	85	85	105
Benzene	0.005	mg/kg	2.8 ^{1,2,5}	2.9 ^{1,2,5}	<	<	<	<	<
Toluene	0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	<	<	<	<	<
Ethylbenzene	0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	<	<	<	<	<
Xylenes	0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
PHC F1	10	mg/kg	320 ^{3,5}	800 ^{3,5}	<	<	<	<	<
PHC F2	10	mg/kg	260 ^{3,5}	1000 ^{3,6}	61	240	<	<	<
PHC F3	10	mg/kg	2500 ^{3,5}	5000 ^{3,6}	4300	5100	360	89	49
PHC F4	10	mg/kg	6600 ^{3,5}	10000 ^{3,5}	1400	1800	950	31	15

mg/g
RDL
m bgs
OVIM Reading
ppmv
% LEL
na
<
<##
<##
<##
BOLD
1
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6

milligrams per gram
reportable detection limit unless noted
metres below ground surface
organic vapour meter reading (in ppmv unless noted)
parts per million by volume
percent of the lower explosive limit of hexane
not applicable
less than RDL
less than adjusted RDL (##)
not analysed
adjusted RDL (##) exceeds soil site condition standard
exceeds selected soil guidelines
Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the
Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in
Surface Soil/Subsoil, Commercial Land-Use, Fine Grained Soil
Soil Quality Guidelines and Check Values for benzene for a 10-5 incremental cancer risk
Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons
(PHC) in Soil, (CCME 2008), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial
Land-Use
Soil Vapour Inhalation
Ecological Soil Contact
Management Limit

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.	RDL	Units	Soil Guidelines		P3-COMP-1	P3-COMP-2	P3-COMP-3	P3-COMP-4	P3-COMP-5
			≤1.5 m	>1.5 m					
Laboratory Sample No.	na	na	na	na	KY4970	KY4971	KY4972	KY4973	KY4974
Sample Date	na	na	na	na	22-Oct-2014	22-Oct-2014	22-Oct-2014	22-Oct-2014	22-Oct-2014
Sample Location	na	na	na	na	P3-COMP-1	P3-COMP-2	P3-COMP-3	P3-COMP-4	P3-COMP-5
Sample Depth	na	m bgs	na	na	0.0 - 0.15	0.15 - 0.30	0.30 - 0.60	0.60 - 0.90	0.90 - 1.20
OVM Reading	na	see note	na	na	<5	<5	25	20	50
Benzene	0.005	mg/kg	2.8 ^{1,2,5}	2.9 ^{1,2,5}	<	<	<	<	<
Toluene	0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	<	<	<	<	<
Ethylbenzene	0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	<	<	<	<	<
Xylenes	0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
PHC F1	10	mg/kg	320 ^{3,5}	800 ^{3,6}	<	<	<	<	<
PHC F2	10	mg/kg	260 ^{3,5}	1000 ^{3,6}	68	640	920	21	<
PHC F3	10	mg/kg	2500 ^{3,5}	5000 ^{3,6}	7400	7300	9400	700	87
PHC F4	10	mg/kg	6600 ^{3,5}	10000 ^{3,6}	2600	1500	2000	1100	25

mg/g milligrams per gram
RDL reportable detection limit unless noted
m bgs metres below ground surface
OVM Reading organic vapour meter reading (in ppmv unless noted)
ppmv parts per million by volume
% LEL percent of the lower explosive limit of hexane
na not applicable
< less than RDL
<### less than adjusted RDL (###)
- not analysed
adjusted RDL (###) exceeds soil site condition standard
exceeds selected soil guidelines
Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in Surface Soil/Subsoil, Commercial Land-Use, Fine Grained Soil
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BOLD
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6
Soil Quality Guidelines and Check Values for benzene for a 10-5 incremental cancer risk
Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil, (CCME 2008), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial Land-Use
Soil Vapour Inhalation
Ecological Soil Contact
Management Limit

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

	SNC-Lavalin Sample No.	RDL	Units	Soil Guidelines		P4-COMP-1	P4-COMP-2	FD1 Field Duplicate of P4-COMP-2	P4-COMP-3	P4-COMP-4
				≤1.5 m	>1.5 m					
	Laboratory Sample No.	na	na	na	na	KY4975	KY4976	KY5000	KY4977	KY4978
	Sampling Date	na	na	na	na	22-Oct-2014	22-Oct-2014	23-Oct-2014	22-Oct-2014	22-Oct-2014
	Sample Location	na	na	na	na	P4-COMP-1	P4-COMP-2	FD1	P4-COMP-3	P4-COMP-4
	Sample Depth	na	m bgs	na	na	0.0 - 0.15	0.15 - 0.30	0.15 - 0.30	0.30 - 0.60	0.60 - 0.90
	OV/M Reading	na	see note	na	na	15	90	90	50	35
Benzene		0.005	mg/kg	2.8 ^{1,2,5}	2.9 ^{1,2,5}	<	<	<	<	<
Toluene		0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	<	<	<	<	<
Ethylbenzene		0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	<	<	<	<	<
Xylenes		0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
PHC F1		10	mg/kg	320 ^{3,5}	800 ^{3,5}	<	<	<	<	<
PHC F2		10	mg/kg	260 ^{3,5}	1000 ^{3,5}	310	<	<	<	34
PHC F3		10	mg/kg	2500 ^{3,5}	5000 ^{3,5}	4500	270	190	170	560
PHC F4		10	mg/kg	6600 ^{3,5}	10000 ^{3,5}	1300	5700	1800	2800	2100

mg/g
RDL
m bgs
OV/M Reading
ppmv
% LEL
na
<
<###
-
<###
BOLD
1

milligrams per gram
reportable detection limit unless noted
metres below ground surface
organic vapour meter reading (in ppmv unless noted)
parts per million by volume
percent of the lower explosive limit of hexane
not applicable
na
less than RDL
less than adjusted RDL (###)
not analysed
adjusted RDL (###) exceeds soil site condition standard
exceeds selected soil guidelines
Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the
Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in
Surface Soil/Subsoil, Commercial Land-Use, Fine Grained Soil
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Soil Quality Guidelines and Check Values for benzene for a 10-5 incremental cancer risk
Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons
(PHC) in Soil (CCME 2008), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial
Land-Use
Soil Vapour Inhalation
Ecological Soil Contact
Management Limit

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		RDL	Units	Soil Guidelines		P4-COMP-5	P5-COMP-1	FD2 Field Duplicate of P5-COMP-1	P5-COMP-2	P5-COMP-3
				≤1.5 m	>1.5 m					
Laboratory Sample No.		na	na	na	na	KY4979	KY4980	KY5001	KY4981	KY4982
Sampling Date		na	na	na	na	22-Oct-2014	23-Oct-2014	23-Oct-2014	23-Oct-2014	23-Oct-2014
Sample Location		na	na	na	na	P4-COMP-5	P5-COMP-1	FD2	P5-COMP-2	P5-COMP-3
Sample Depth		na	m bgs	na	na	0.90 - 1.20	0.0 - 0.15	0.0 - 0.15	0.15 - 0.30	0.30 - 0.60
OVM Reading		na	see note	na	na	10	90	90	75	80
Benzene		0.005	mg/kg	2.8 ^{1,2,5}	2.9 ^{1,2,5}	<	<	<	<	<
Toluene		0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	<	<	<	<	<
Ethylbenzene		0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	<	<	<	<	<
Xylenes		0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
PHC F1		10	mg/kg	320 ^{3,5}	800 ^{3,6}	<	<	<	<	<
PHC F2		10	mg/kg	260 ^{3,5}	1000 ^{3,6}	170	600	420	82	2000
PHC F3		10	mg/kg	2500 ^{3,5}	5000 ^{3,6}	2700	14000	7900	2500	18000
PHC F4		10	mg/kg	6600 ^{3,5}	10000 ^{3,6}	740	2800	1500	590	3000

mg/g
RDL
m bgs
OVM Reading
ppmv
% LEL
na
<
<###
<###
BOLD
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milligrams per gram
reportable detection limit unless noted
metres below ground surface
organic vapour meter reading (in ppmv unless noted)
parts per million by volume
percent of the lower explosive limit of hexane
not applicable
less than RDL
less than adjusted RDL (###)
not analysed
adjusted RDL (###) exceeds soil site condition standard
exceeds selected soil guidelines
Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the
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Land-Use
Soil Vapour Inhalation
Ecological Soil Contact
Management Limit

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.	RDL	Units	Soil Guidelines		P5-COMP-4	P5-COMP-5	P6-COMP-1	FD3 Field Duplicate of P6-COMP-1	P6-COMP-2
			Soil Guidelines						
			≤1.5 m	>1.5 m					
Laboratory Sample No. Sampling Date Sample Location Sample Depth OVM Reading	na	na	na	na	KY4983 23-Oct-2014 P5-COMP-4 0.60 - 0.90 60	KY4984 23-Oct-2014 P5-COMP-5 0.90 - 1.20 35	KY4985 23-Oct-2014 P6-COMP-1 0.0 - 0.15 90	KY5002 23-Oct-2014 FD3 0.0 - 0.15 90	KY4986 23-Oct-2014 P6-COMP-2 0.15 - 0.30 75
	0.005	mg/kg	2.8 ^{1,2,5}	2.9 ^{1,2,5}	<	<	<	<	<
	0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	<	<	<	<	<
	0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	<	<	<	<	<
	0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
	10	mg/kg	320 ^{3,5}	800 ^{3,6}	<	<	<	<	<
	10	mg/kg	260 ^{3,5}	1000 ^{3,6}	53	<	59	79	<
	10	mg/kg	2500 ^{3,5}	5000 ^{3,6}	340	78	2400	3000	34
	10	mg/kg	6600 ^{3,5}	10000 ^{3,6}	<	32	660	850	630

mg/g milligrams per gram
 RDL reportable detection limit unless noted
 m bgs metres below ground surface
 OVM Reading organic vapour meter reading (in ppmv unless noted)
 ppmv parts per million by volume
 % LEL percent of the lower explosive limit of hexane
 na not applicable
 < less than RDL
 <## less than adjusted RDL (##)
 - not analysed
 adjusted RDL (##) exceeds soil site condition standard
 exceeds selected soil guidelines
 Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the
 Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in
 Surface Soil/Subsoil, Commercial Land-Use, Fine Grained Soil.
 2 Soil Quality Guidelines and Check Values for benzene for a 10-5 incremental cancer risk
 3 Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons
 (PHC) in Soil, (CCME 2008), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial
 Land-Use
 4 Soil Vapour Inhalation
 5 Ecological Soil Contact
 6 Management Limit

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.	RDL	Units	Soil Guidelines		P6-COMP-3	P6-COMP-4	P6-COMP-5	F-COMP-1	F-COMP-2
			≤1.5 m	>1.5 m					
Laboratory Sample No.	na	na	na	na	KY4987	KY4988	KY4989	KY4990	KY4991
Sampling Date	na	na	na	na	23-Oct-2014	23-Oct-2014	23-Oct-2014	23-Oct-2014	23-Oct-2014
Sample Location	na	na	na	na	P6-COMP-3	P6-COMP-4	P6-COMP-5	F-COMP-1	F-COMP-2
Sample Depth	na	m bgs	na	na	0.30 - 0.60	0.60 - 0.90	0.90 - 1.20	0.0 - 0.15	0.15 - 0.30
OVm Reading	na	see note	na	na	70	75	85	175	150
Benzene	0.005	mg/kg	2.8 ^{1,2,5}	2.9 ^{1,2,5}	<	<	<	0.0059	0.013
Toluene	0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	<	<	<	<	<
Ethylbenzene	0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	<	<	<	<	<
Xylenes	0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
PHC F1	10	mg/kg	320 ^{3,5}	800 ^{3,6}	<	<	<	<	<
PHC F2	10	mg/kg	260 ^{3,5}	1000 ^{3,6}	<	<	<	63	250
PHC F3	10	mg/kg	2500 ^{3,5}	5000 ^{3,6}	79	31	210	570	1000
PHC F4	10	mg/kg	5600 ^{3,5}	10000 ^{3,6}	640	490	1000	4400	130

mg/g: milligrams per gram
RDL: reportable detection limit unless noted
m bgs: metres below ground surface
OVm Reading: organic vapour meter reading (in ppmv unless noted)
ppmv: parts per million by volume
% LEL: percent of the lower explosive limit of hexane
na: not applicable
<: less than RDL
<###: less than adjusted RDL (###)
<###: not analysed
<###: adjusted RDL (###) exceeds soil site condition standard
<###: exceeds selected soil guidelines
BOLD: Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in Surface Soil/Subsoil, Commercial Land-Use, Fine Grained Soil
1: Soil Quality Guidelines and Check Values for benzene for a 10-5 incremental cancer risk
2: Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil (CCME 2008), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial Land-Use
3: Soil Vapour Inhalation
4: Ecological Soil Contact
5: Management Limit
6:

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

	SNC-Lavalin Sample No.	RDL	Units	Soil Guidelines		F-COMP-3	F-COMP-4	F-COMP-5	WF-COMP-1	WF-COMP-2
				≤1.5 m	>1.5 m					
	Laboratory Sample No.	na	na	na	na					
	Sample Date	na	na	na	na					
	Sample Location	na	na	na	na					
	Sample Depth	na	m bgs	na	na					
	OVIM Reading	na	see note	na	na					
Benzene		0.005	mg/kg	2.9 ^{1,2,5}	2.9 ^{1,2,5}	KY4992 23-Oct-2014 F-COMP-3 0.30 - 0.60 125	KY4993 23-Oct-2014 F-COMP-4 0.60 - 0.90 20	KY4994 23-Oct-2014 F-COMP-5 0.90 - 1.20 50	KY4995 23-Oct-2014 WF-COMP-1 0.0 - 0.15 135	KY4996 23-Oct-2014 WF-COMP-2 0.15 - 0.30 90
Toluene		0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	0.017	<	<	<	<
Ethylbenzene		0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	0.014	<	<	<	<
Xylenes		0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
PHC F1		10	mg/kg	320 ^{3,5}	800 ^{3,6}	<	<	<	<	<
PHC F2		10	mg/kg	260 ^{3,5}	1000 ^{3,5}	350	<	<	200	<
PHC F3		10	mg/kg	2500 ^{3,5}	5000 ^{3,5}	880	93	70	8600	73
PHC F4		10	mg/kg	6600 ^{3,5}	10000 ^{3,5}	120	1100	620	2500	1100

mg/g milligrams per gram
RDL reportable detection limit unless noted
m bgs metres below ground surface
OVIM Reading organic vapour meter reading (in ppmv unless noted)
ppmv parts per million by volume
% LEL percent of the lower explosive limit of hexane
na not applicable
< less than RDL
<## less than adjusted RDL (##)
- not analysed
<## adjusted RDL (##), exceeds soil site condition standard
<## exceeds selected soil guidelines
BOLD Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in Surface Soil/Subsoil, Commercial Land-Use, Fine Grained Soil
1 Soil Quality Guidelines and Check Values for benzene for a 10-5 incremental cancer risk
2 Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil, (CCME 2008), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial Land-Use
3 Soil Vapour Inhalation
4 Ecological Soil Contact
5 Management Limit
6

TABLE 2 SOIL ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.	RDL	Units	Soil Guidelines		WF-COMP-3	WF-COMP-4	WF-COMP-5	BH14-1-3	BH14-1-7
			<1.5 m	>1.5 m					
Laboratory Sample No.	na	na	na	na	KY4997	KY4998	KY4999	LC8600	LC8601
Sample Date	na	na	na	na	23-Oct-2014	23-Oct-2014	23-Oct-2014	23-Oct-2014	23-Oct-2014
Sample Location	na	na	na	na	WF-COMP-3	WF-COMP-4	WF-COMP-5	BH14-1	BH14-1
Sample Depth	na	m bgs	na	na	0.30 - 0.60	0.60 - 0.90	0.90 - 1.20	1.8 - 2.4	4.3 - 4.9
OVM Reading	na	see note	na	na	130	90	110	15	<5
Benzene	0.005	mg/kg	2.8 ^{1,2,5}	2.9 ^{1,2,5}	<	<	<	<	<
Toluene	0.02	mg/kg	330 ^{1,5}	660 ^{1,5}	<	<	<	<	<
Ethylbenzene	0.01	mg/kg	430 ^{1,5}	860 ^{1,5}	<	<	<	<	<
Xylenes	0.04	mg/kg	230 ^{1,5}	460 ^{1,5}	<	<	<	<	<
PHC F1	10	mg/kg	320 ^{3,5}	800 ^{3,5}	<	<	<	<	<
PHC F2	10	mg/kg	260 ^{3,5}	1000 ^{3,5}	<	<	<	<	<
PHC F3	10	mg/kg	2500 ^{3,5}	5000 ^{3,5}	78	50	45	<	58
PHC F4	10	mg/kg	6600 ^{3,5}	10000 ^{3,5}	780	650	480	<	44

mg/g
RDL
m bgs
OVM Reading
ppmv
% LEL
na
<

BOLD
1
2
3
4
5
6

milligrams per gram
reportable detection limit unless noted
metres below ground surface
organic vapour meter reading (in ppmv unless noted)
parts per million by volume
percent of the lower explosive limit of hexane
not applicable
less than RDL
adjusted RDL (###) exceeds soil site condition standard
exceeds selected soil guidelines
Canadian Council of Ministers of the Environment, Canadian Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health (CCME 2004), Soil Quality Guidelines and Check Values in Surface Soil/Subsoil, Commercial Land-Use, Fine Grained Soil
Soil Quality Guidelines and Check Values for benzene for a 10-5 incremental cancer risk
Canadian Council of Ministers of the Environment, Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil, (CCME 2008), Tier 1 Levels for PHCs for Fine-Grained Surface Soils/Subsoils, Commercial Land-Use
Soil Vapour Inhalation
Ecological Soil Contact
Management Limit

TABLE 3
SOIL ANALYTICAL CALCULATIONS
Total Petroleum Hydrocarbons
212 Panet Road, Winnipeg, Manitoba

	PHC F1 (C6-C10)	PHC F2 (C10-C16)	PHC F3 (C16-C34)	PHC F4 (C34-C50)	CALCULATED TPH	CALCULATED TPH*
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
Paddock 1 (0-15 cm)	10	43	1100	230	1380	0.13
Paddock 2 (0-15 cm)	10	61	4300	1400	5770	0.5
Paddock 3 (0-15 cm)	10	68	7400	2600	10080	1.01
Paddock 4 (0-15 cm)	10	310	4500	1300	6120	0.61
Paddock 5 (0-15 cm)	10	600	14000	2800	17410	1.74
Paddock 6 (0-15 cm)	10	59	2400	660	3130	0.31
Front (0-15 cm)	10	63	570	4400	5040	0.50
West Front (0-15 cm)	10	200	8600	2500	11310	1.13

mg/kg
 TPH
 %
 *

milligrams per kilogram
 total petroleum hydrocarbons (sum of PHC F1 to F4)
 calculated by adding PHC F1 to F4 to obtain Total PHC concentration
 not to exceed 8% of the soil weight when the total weight of hydrocarbons in the soil profile calculated as a percentage of the weight of the top 15 cm of soil - per Order 1019

TABLE 4 SOIL ANALYTICAL RESULTS
Nutrients
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.	RDL	Units	P1-COMP-1	P1-COMP-2	P1-COMP-3	P1-COMP-4	P1-COMP-5	P2-COMP-1	P2-COMP-2	P2-COMP-3
Laboratory Sample No.	na	na	KY4960	KY4961	KY4962	KY4963	KY4964	KY4965	KY4966	KY4967
Sampling Date	na	na	22-Oct-14	22-Oct-14	22-Oct-14	22-Oct-14	22-Oct-14	22-Oct-14	22-Oct-14	22-Oct-14
Sample Location	na	na	P1-COMP-1	P1-COMP-2	P1-COMP-3	P1-COMP-4	P1-COMP-5	P2-COMP-1	P2-COMP-2	P2-COMP-3
Sample Depth	na	m bgs	0 - 15	15 - 30	30 - 60	60 - 90	90 - 120	0 - 15	15 - 30	30 - 60
OVm Reading	na	see note	80	70	115	95	85	75	100	85
Nitrite	0.50	mg/kg	0.73	0.55	0.60	<0.50	0.73	0.55	<0.50	<0.50
Nitrate	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.4	<2.0	<2.0
Nitrate + Nitrite	2.0	ug/g	<2.0	<2.0	<2.0	<2.0	2.1	3.0	<2.0	<2.0
Ammonia	0.50	mg/kg	7.31	7.74	3.06	6.76	6.73	4.78	8.44	5.99
Orthophosphate	0.50	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	50.7	14.3
pH	N/A	pH	7.97	7.86	8.02	7.92	7.97	8.07	7.95	7.95

mg/kg
µg/g
na
RDL
m bgs
OVm Reading
ppmv
<
<###

milligrams per kilogram
micrograms per gram
not applicable
reportable detection limit unless noted
metres below ground surface
organic vapour meter reading (in ppmv unless noted)
parts per million by volume
less than RDL
less than adjusted RDL (###)

TABLE 4 SOIL ANALYTICAL RESULTS
Nutrients
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		RDL	Units	P2-COMP-4	P2-COMP-5	P3-COMP-1	P3-COMP-2	P3-COMP-3	P3-COMP-4	P3-COMP-5	P4-COMP-1
Laboratory Sample No.	Sample Date	Sample Location	Sample Depth	OVM Reading							
Nitrite		na	na								
Nitrate		na	na								
Nitrate + Nitrite		na	na								
Ammonia		na	m bgs								
Orthophosphate		na	see note								
pH		N/A									

mg/kg
µg/g
na
RDL
m bgs
OVM Reading
ppmv
<
<###

militograms per kilogram
micrograms per gram
not applicable
reportable detection limit unless noted
metres below ground surface
organic vapour meter reading (in ppmv unless noted)
parts per million by volume
less than RDL
less than adjusted RDL (###)

TABLE 4 SOIL ANALYTICAL RESULTS
Nutrients
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		RD/L	Units	P4-COMP-2	P4-COMP-3	P4-COMP-4	P4-COMP-5	P5-COMP-1	P5-COMP-2	P5-COMP-3	P5-COMP-4
Laboratory Sample No.	Sample Date	na	na	KY4976	KY4977	KY4978	KY4979	KY4980	KY4981	KY4982	KY4983
Sample Location	Sample Depth	na	na	22-Oct-14	22-Oct-14	22-Oct-14	22-Oct-14	23-Oct-14	23-Oct-14	23-Oct-14	23-Oct-14
OVM Reading		na	m bgs	P4-COMP-2	P4-COMP-3	P4-COMP-4	P4-COMP-5	P5-COMP-1	P5-COMP-2	P5-COMP-3	P5-COMP-4
		na	see note	15 - 30	30 - 60	60 - 90	90 - 120	0 - 15	15 - 30	30 - 60	60 - 90
				90	50	35	10	90	75	80	60
Nitrite		0.50	mg/kg	<0.50	0.92	0.60	0.77	1.02	<0.50	<0.50	0.52
Nitrate		2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nitrate + Nitrite		2.0	ug/g	<2.0	2.8	2.6	2.6	2.4	<2.0	<2.0	<2.0
Ammonia		0.50	mg/kg	6.13	8.53	3.38	5.96	6.15	9.34	5.49	10.6
Orthophosphate		0.50	ug/g	13.8	65.8	155	269	39.0	15.2	9.52	10.0
pH		N/A	pH	8.15	7.87	7.97	7.84	7.98	7.99	8.13	8.05

mg/kg
µg/g
na
RD/L
m bgs
ppmv
<
<###

militigrams per kilogram
micrograms per gram
not applicable
reportable detection limit unless noted
metres below ground surface
organic vapour meter reading (in ppmv unless noted)
parts per million by volume
less than RD/L
less than adjusted RD/L (###)

TABLE 4 SOIL ANALYTICAL RESULTS
Nutrients
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		Units		P5-COMP-5	P6-COMP-1	P6-COMP-2	P6-COMP-3	P6-COMP-4	P6-COMP-5	F-COMP-1	F-COMP-2
Laboratory Sample No.	Sampling Date	RDL									
Sample Location		na	na	KY4984	KY4985	KY4986	KY4987	KY4988	KY4989	KY4990	KY4991
Sample Depth		na	na	23-Oct-14	23-Oct-14	23-Oct-14	23-Oct-14	23-Oct-14	23-Oct-14	23-Oct-14	23-Oct-14
OVIM Reading		na	na	P5-COMP-5	P6-COMP-1	P6-COMP-2	P6-COMP-3	P6-COMP-4	P6-COMP-5	F-COMP-1	F-COMP-2
		na	na	90 - 120	0 - 15	15 - 30	30 - 60	60 - 90	90 - 120	0 - 15	15 - 30
		na	na	35	90	75	70	75	85	175	150
		na	see note								
Nitrite		0.50	mg/kg	<0.50	<0.50	0.57	<0.50	0.57	<0.50	0.56	0.52
Nitrate		2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	16	11
Nitrate + Nitrite		2.0	ug/g	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	16.2	11.2
Ammonia		0.50	mg/kg	15.9	10.6	6.28	5.43	5.42	3.92	6.11	7.86
Orthophosphate		0.50	ug/g	9.37	20.4	4.15	4.87	4.88	8.07	15.5	12.9
pH		N/A	pH	8.08	8.07	8.19	8.22	8.23	8.22	8.11	8.05

mg/kg milligram per kilogram
 ug/g micrograms per gram
 na not applicable
 RDL reportable detection limit unless noted
 m bgs metres below ground surface
 OVIM Reading organic vapour meter reading (in ppmv unless noted)
 ppmv parts per million by volume
 < less than RDL
 <### less than adjusted RDL (###)

TABLE 4 SOIL ANALYTICAL RESULTS
Nutrients
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		RDL		Units	F-COMP-3	F-COMP-4	F-COMP-5	WF-COMP-1	WF-COMP-2	WF-COMP-3	WF-COMP-4	WF-COMP-5
Laboratory Sample No.	Sampling Date	Sample Location	Sample Depth	OVM Reading								
Nitrite		na	na	na	na	na	na	na	na	na	na	na
Nitrate		na	na	na	na	na	na	na	na	na	na	na
Nitrate + Nitrite		na	na	na	na	na	na	na	na	na	na	na
Ammonia		na	na	na	na	na	na	na	na	na	na	na
Orthophosphate		na	na	na	na	na	na	na	na	na	na	na
pH		na	na	na	na	na	na	na	na	na	na	na

mg/kg milligrams per kilogram
µg/g micrograms per gram
na not applicable
RDL reportable detection limit unless noted
m bgs metres below ground surface
OVM Reading organic vapour meter reading (in ppmv unless noted)
ppmv parts per million by volume
< less than RDL
<### less than adjusted RDL (###)

TABLE 5 GROUNDWATER ANALYTICAL RESULTS
Petroleum Parameters
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		RDL	Units	AESDR 2014 Tier 2 ¹	MW14-1	MW4	MW5	FB	TRIP BLANK
Laboratory Sample No.	Sampling Date								
Monitoring Well No.									
Benzene		na	na	na	LD7646	LD7647	LD7648	LD7694	LD7649
Toluene		na	na	na	2014/11/12	2014/11/12	2014/11/12	2014/11/14	2014/11/12
Ethylbenzene		na	na	na	MW14-1	MW4	MW5	FB	TRIP BLANK
Xylenes		0.00040	mg/L	19 ^{1,2}	<	<	<	<	<
		0.00040	mg/L	240 ^{1,3}	<	<	<	<	<
		0.00040	mg/L	150 ^{1,3}	<	<	<	<	<
		0.00040	mg/L	74 ^{1,3}	<	<	<	<	<
PHC F1		0.30	mg/L	9.9 ^{1,3}	<	<	<	<	<
PHC F2		0.15	mg/L	3.1 ^{1,3}	<	<	<	<	<
PHC F3		0.20	mg/L	ng	<	<	<	<	<
PHC F4		0.20	mg/L	ng	<	<	<	<	<

µg/L
RDL
na
ng
<
<###
-
<###
BOLD
1
milligrams per litre
reportable detection limit unless noted
not applicable
no guideline
less than RDL
less than adjusted RDL (###)
not analysed
adjusted RDL (###) exceeds groundwater site condition standard
exceeds selected Table 3 standard
Alberta, Environment and Sustainable Resource Development (AESDR) Tier 2 Soil and Groundwater Remediation Guidelines (AESDR 2014), Groundwater Remediation Guideline Values for Commercial/Industrial Land Use – All Water Uses
2. Vapour Inhalation
3. Eco Soil Contact

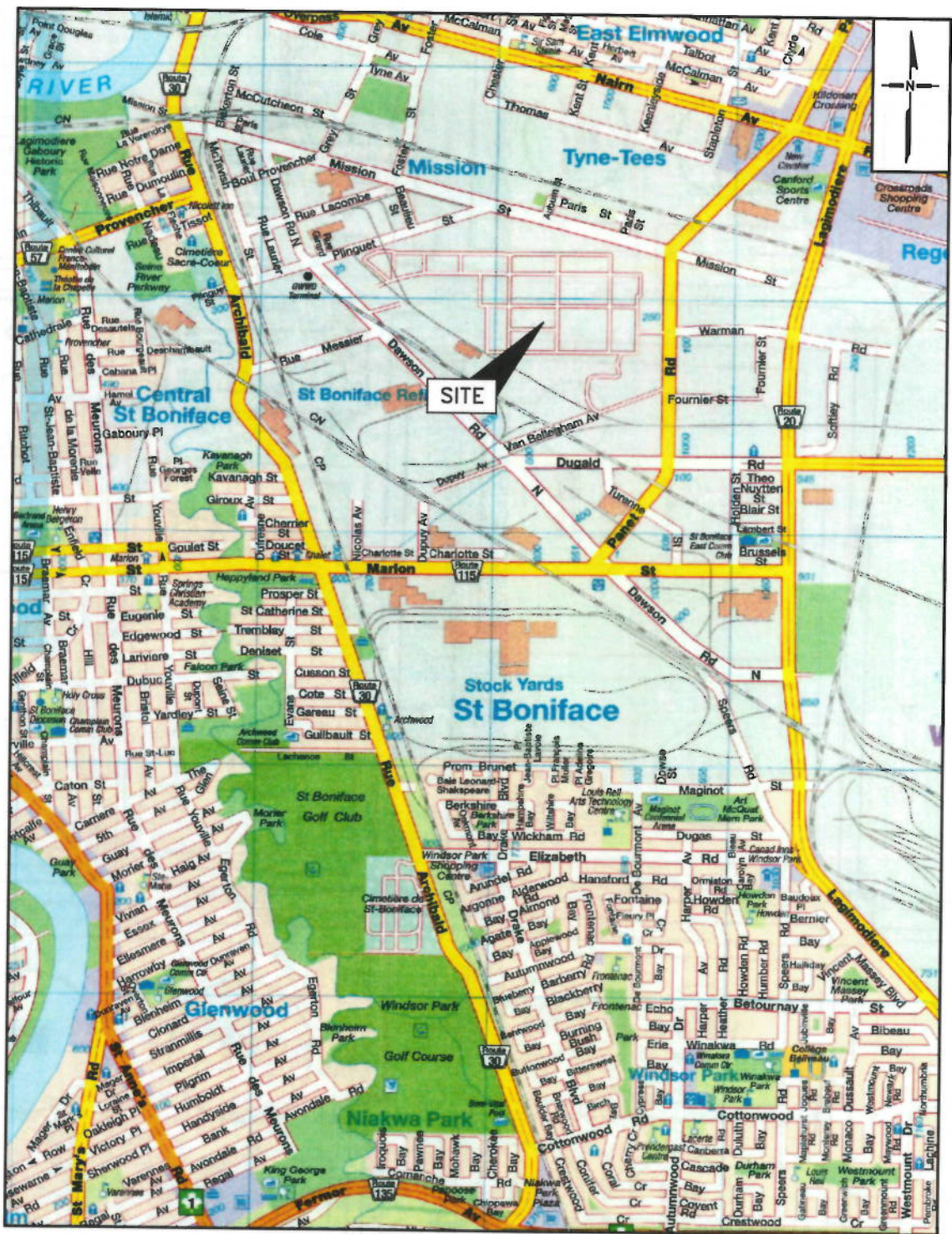
TABLE 6 GROUNDWATER ANALYTICAL RESULTS
Nutrients
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		RDL	Units	MW14-1	MW4	MW5
Nitrate Nitrite Nitrate + Nitrite	Laboratory Sample No.	na	na	LD7646	LD7647	LD7648
	Sampling Date	na	na	12-Nov-14	12-Nov-14	12-Nov-14
	Monitoring Well No.	na	na	MW14-1	MW4	MW5
		0.020 0.002 0.020	mg/L mg/L mg/L	< < <	< < <	< < <

mg/L
RDL
na
<

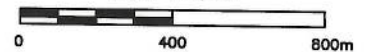
milligrams per litre
reportable detection limit unless noted
not applicable
less than RDL

FIGURES



SOURCE(S):
1. SCHWERTD GRAPHIC ARTS LTD., (MapArt), 2007 EDITION

SCALE 1:20,000



Client/Location:

SHELL
212 PANET ROAD,
WINNIPEG, MB

Title:

SITE LOCATION PLAN

Project No:

622653

Filename:

001F01_622653

Date:

NOVEMBER 2014

Dwg No:

FIGURE 1

Drawn:

AG

Verified:

Project Manager:

RB



TANK NEST 'P'

TANK NEST 'I'

"E" AVENUE

"D" AVENUE

"C" AVENUE

8th STREET

7th STREET

6th STREET

5th STREET

SOIL STOCKPILE

SOIL STOCKPILE

TANK NEST 'B'

TANK NEST 'D'

TANK NEST 'J'

TANK NEST 'C'

TANK 1531A (NOT IN USE)

TANK 1531B (NOT IN USE)

TANK 1532 (USLD)

TANK 1585 (DCA)

TANK 1520A (JET)

TANK 1521B (NOT IN USE)

TANK 1521A (PUG)

TANK 1520B (JET)

TANK 1510B (NOT USED)

TANK 1504A (NOT IN USE)

TANK 1504B (NOT IN USE)

TANK 1535 (ETH)

TANK 1536 (ETH)

TANK 1553 (ULSD)

TANK 1554 (CBOB)

TANK 1550 (CBOB)

TANK 1551 (CBOB)

TANK 1552 (JET)

TANK 1519 (NOT IN USE)

TANK 1518 (NOT IN USE)

TANK 1508 (NOT IN USE)

TANK 1514 (NOT IN USE)

TANK 1522A (NOT IN USE)

TANK 1522B (NOT IN USE)

TANK 1502 (NOT IN USE)

TANK 1501C (NOT IN USE)

TANK 1508 (FAME)

TANK 1708 (CO)

TANK 1542 (CO)

FIRE HOUSE

TRANSFER PUMPHOUSE

PIPE CHASE

PIPE CHASE

10,000L RAILCAR LOADING OIL STORAGE TANK

RAILCAR LOADING

AREA 'E'

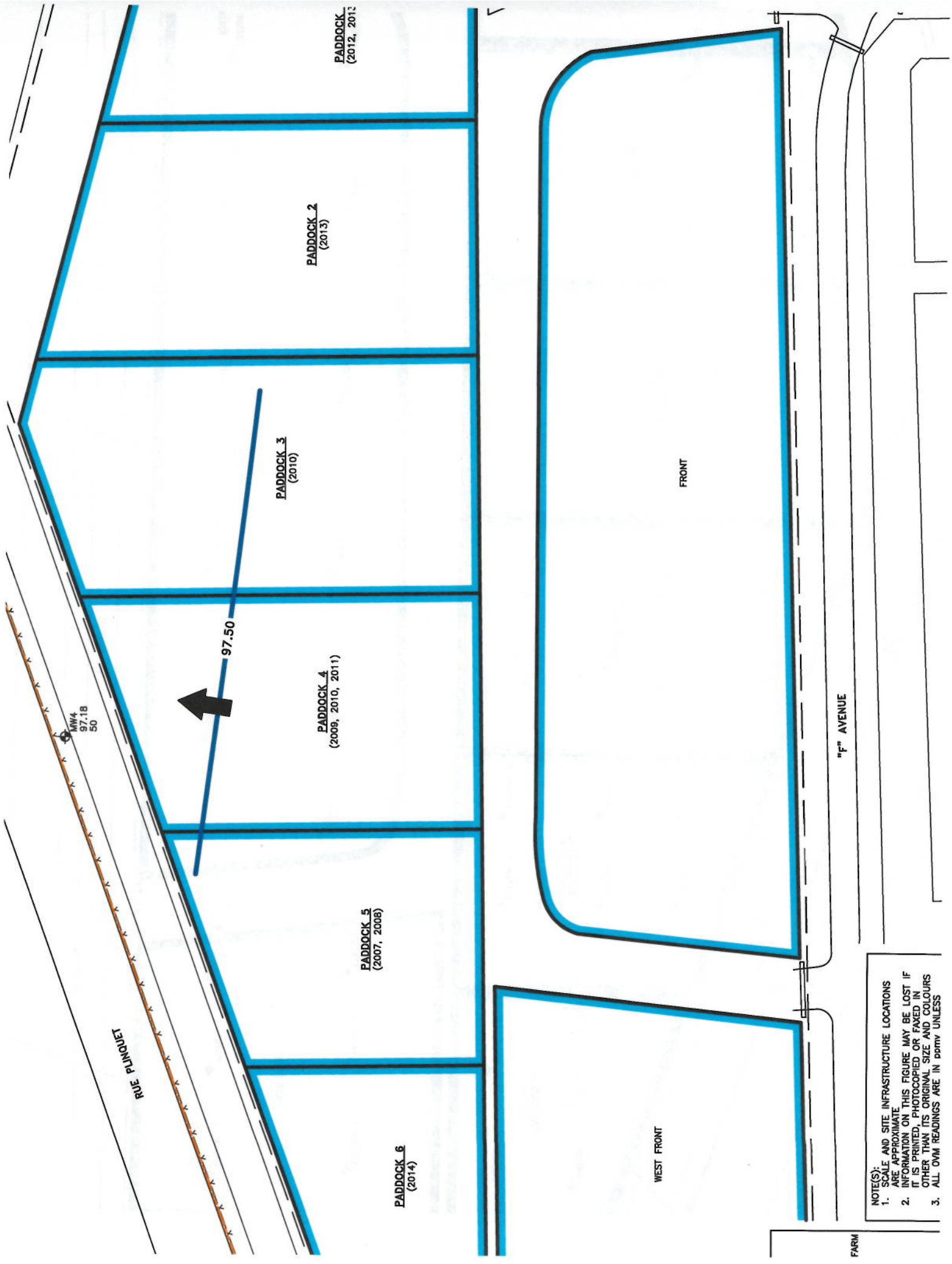
RAILCAR LOADING SPILL CONTAINMENT TRAYS

AUXILIARY TRANSFER PUMPHOUSE

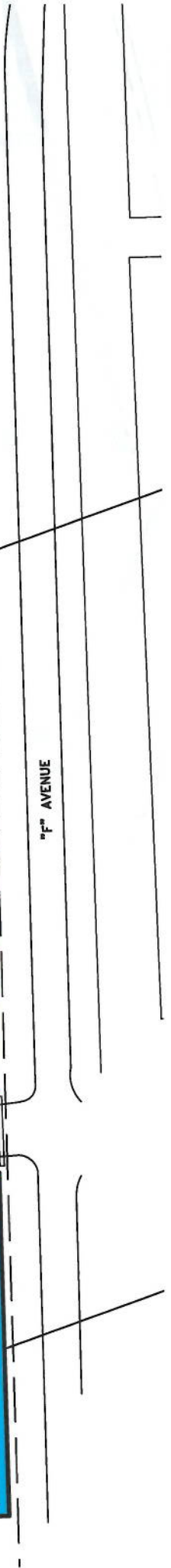
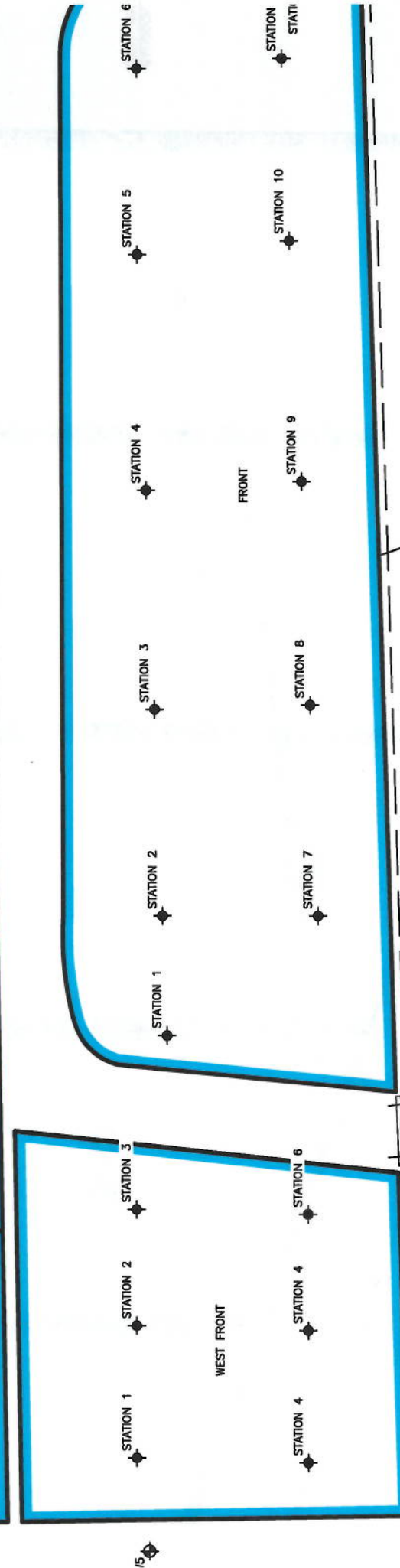
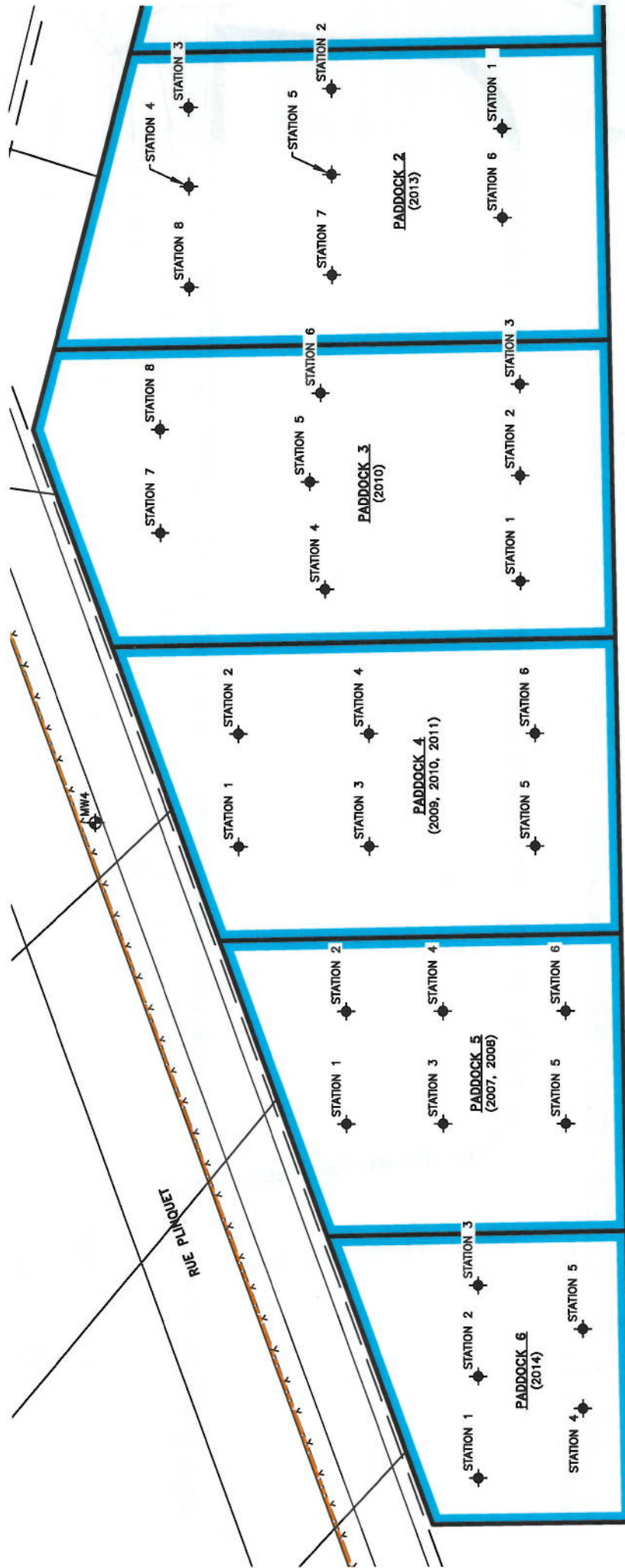
OIL/WATER SEPARATOR

RAILCAR LOADING

TANK FARM OFFICE



NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PRINTED, PHOTOCOPIED OR FAXED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. ALL OVM READINGS ARE IN mmv UNLESS





MW14-1		
DATE	B	
2014/11/12	✓	

F1	F2	F3	F4
<	<	<	<

PARAMETERS	ABBREVIATION	ROUTINE RDL	GUIDELINES
BENZENE	B	0.0004	19 ^{1,2}
TOLUENE	T	0.0004	240 ^{1,3}
ETHYLBENZENE	E	0.0004	150 ^{1,3}
TOTAL XYLENES	X	0.0004	74 ^{1,3}
PHC F1	F1	0.30	9.9 ^{1,3}
PHC F2	F2	0.15	3.1 ^{1,3}
PHC F3	F3	0.20	NG
PHC F4	F4	0.20	NG

STANDARDS:
ALBERTA ENVIRONMENT AND SUSTAINABLE RESOURCE DEVELOPMENT
(AESDR) TIER 2 SOIL AND GROUNDWATER REMEDIATION GUIDELINES
(AESDR 2014), GROUNDWATER REMEDIATION GUIDELINE VALUES FOR
COMMERCIAL/INDUSTRIAL LAND USE - ALL WATER USES
2 VAPOUR INHALATION

FARM

KING

NG

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AT

APPENDIX A

Borehole Log and Monitoring Well Installation

Project No.: 622653

Client: Shell Canada Products

Location: 212 Panet Road, Winnipeg, MB

Date Completed: November 7, 2014

Site Datum: NA

Supervisor: S. Parrera

Drilling Method: Daylighting / Hollow stem

Borehole Diameter: 20.3 cm

Monitoring Well Diameter: 5.1 cm

Drilling Company: Badger / Paddock

Drilling Equipment: Hydrovac / CME

Well Casing: Stick-up

Well Screen: 5.1 cm PVC size 10 slot

OVM: RKI Eagle II

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)	
ft m									
-3									
-2									
-1									
0							Ground Surface	100.00	
1								99.69	
2	NA	BH14-1-1		<5	NA		CLAY FILL black moist, dark grey, trace gravel	99.00	
3									
4									
5	NA	BH14-1-2		<5	NA			98.00	
6									
7	NA	BH14-1-3		15	100		CLAY moist, dark grey		
8									
9	NA	BH14-1-4		10	100			97.00	
10									
11	NA	BH14-1-5		<5	100			96.00	
12									
13	NA	BH14-1-6		<5	100				
14									
15	NA	BH14-1-7		<5	100			95.00	
16									
17							End of borehole at 4.9 m.		

97.89 m - November 13, 2014

Stick-up casing
Well cap

Concrete

Bentonite

Silica sand

End cap

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) reading (ppmv unless noted)

The data represented in this borehole log requires interpretation by SNC-Lavalin personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

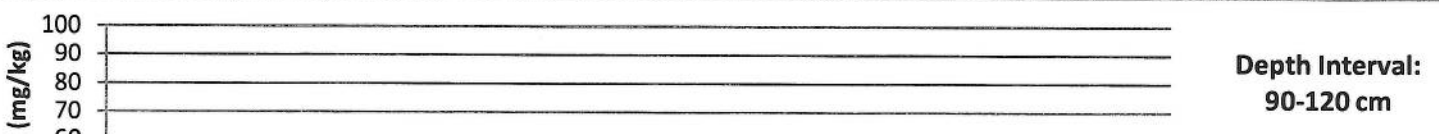
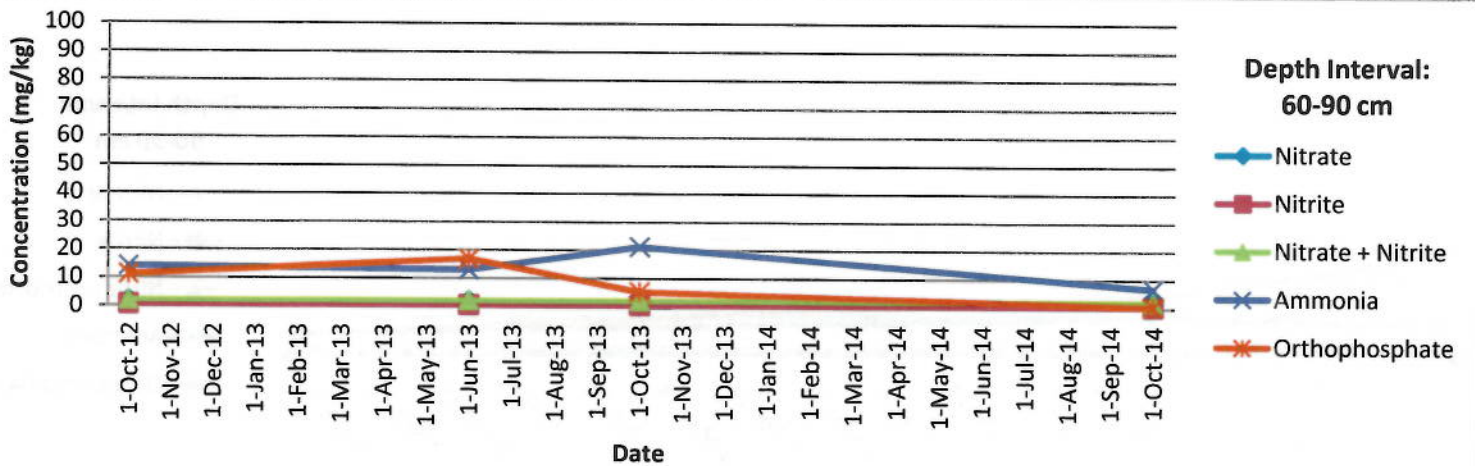
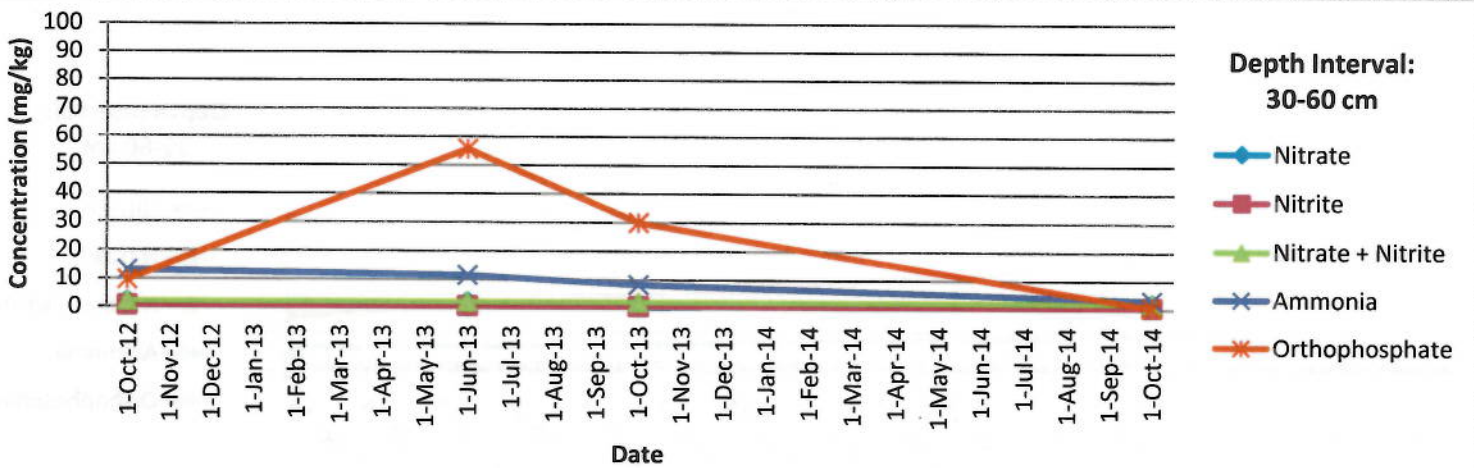
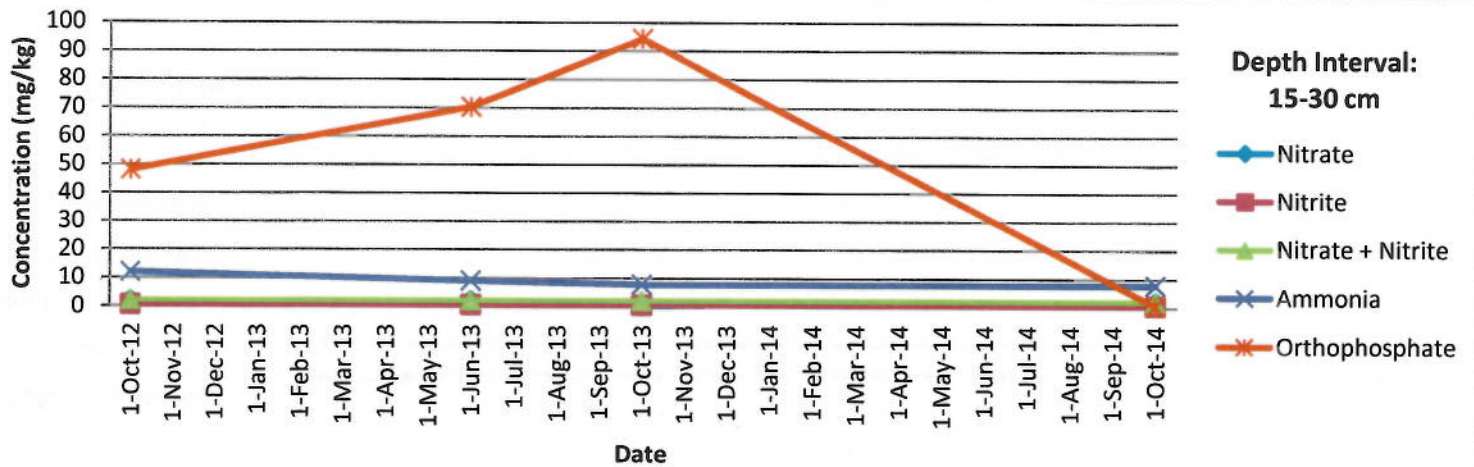
NA = Not Applicable



APPENDIX B

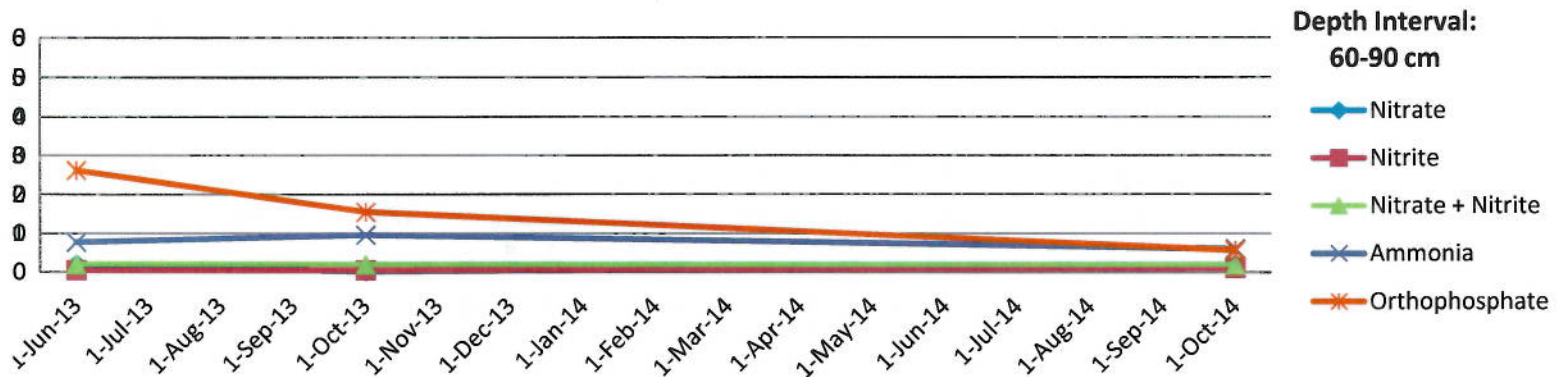
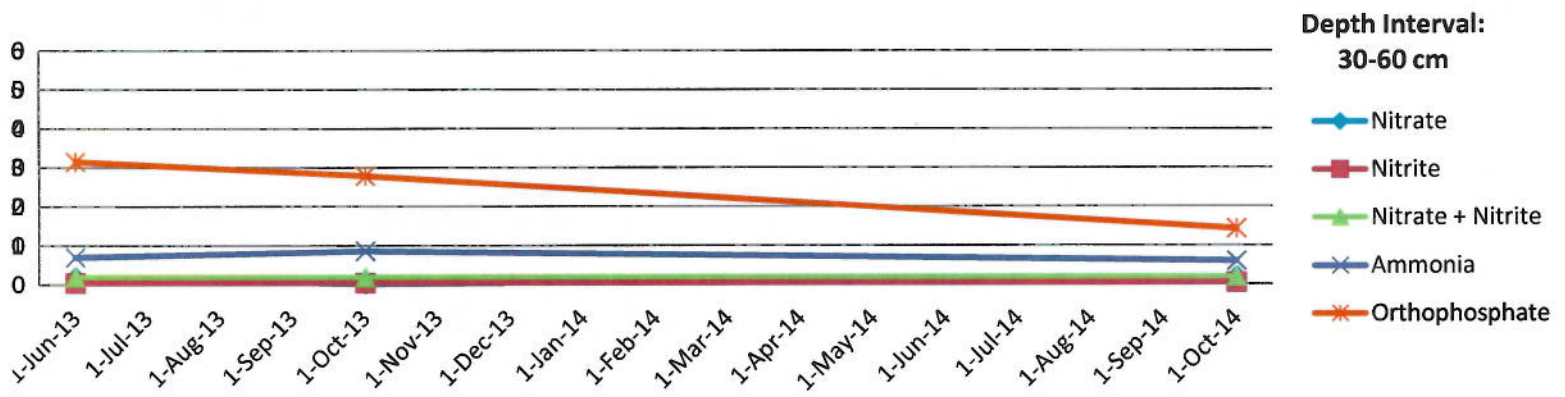
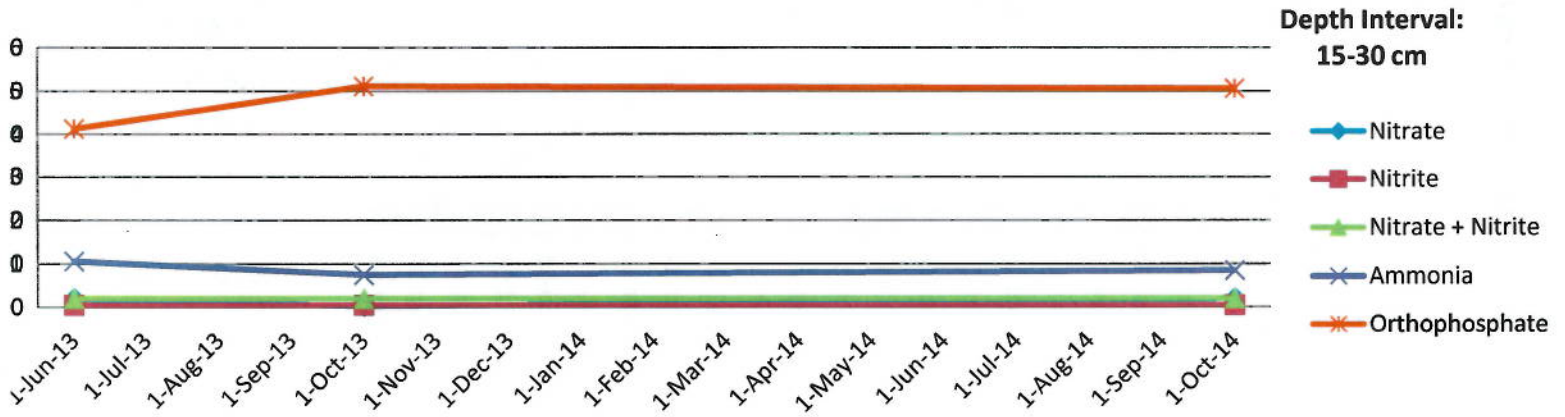
Nutrient Graphs

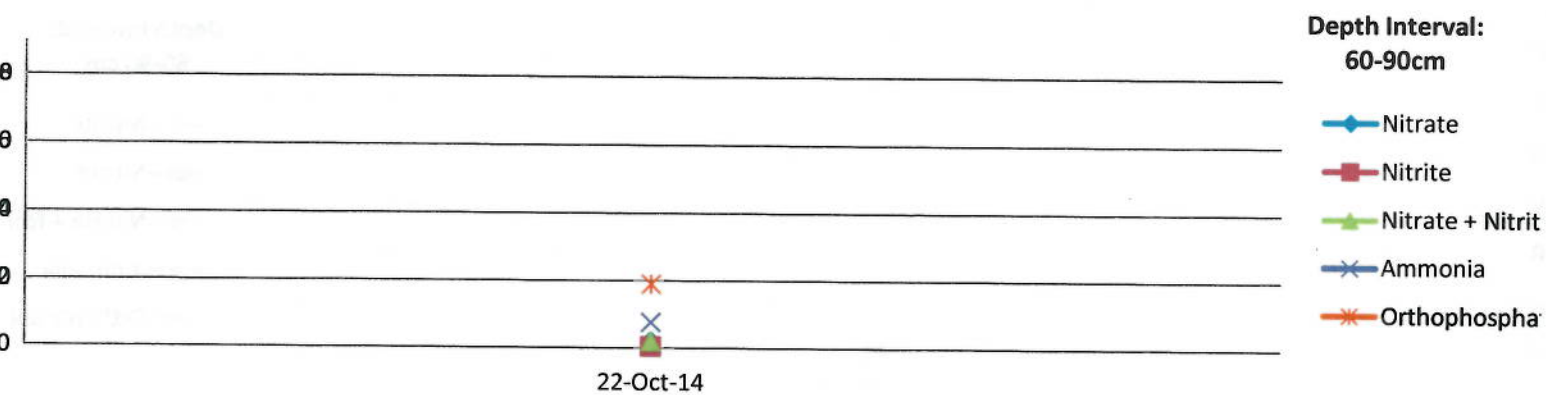
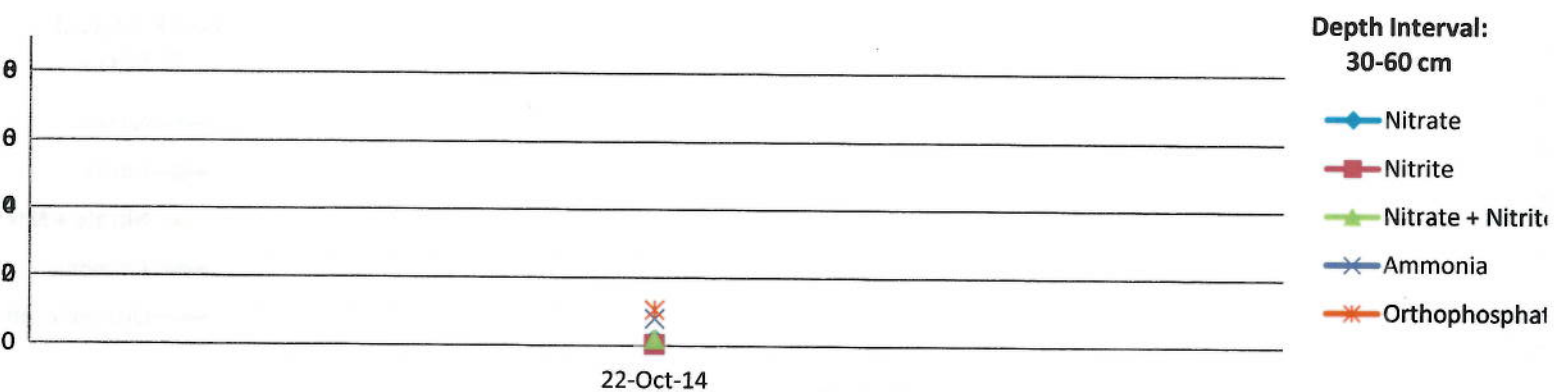
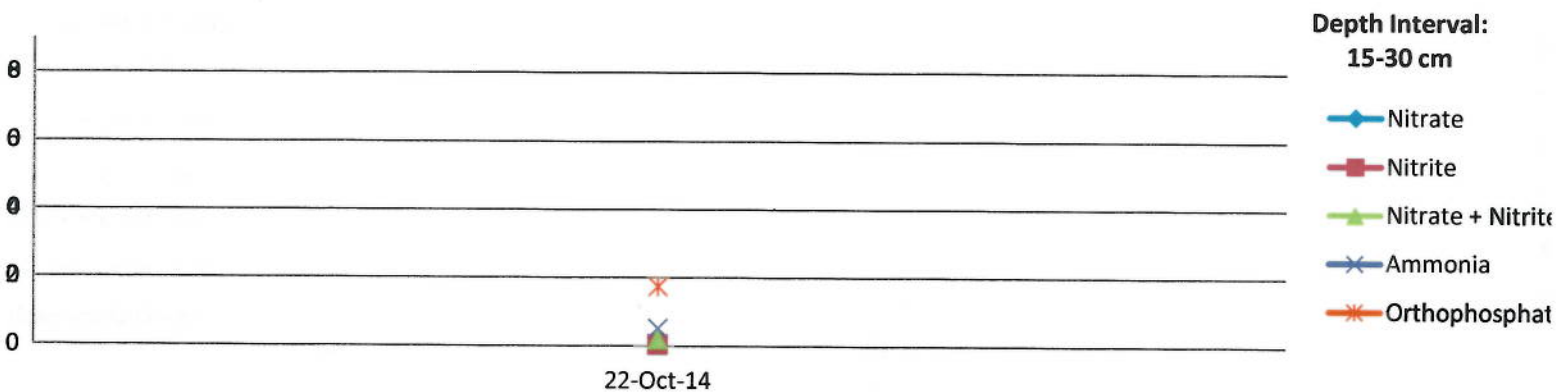
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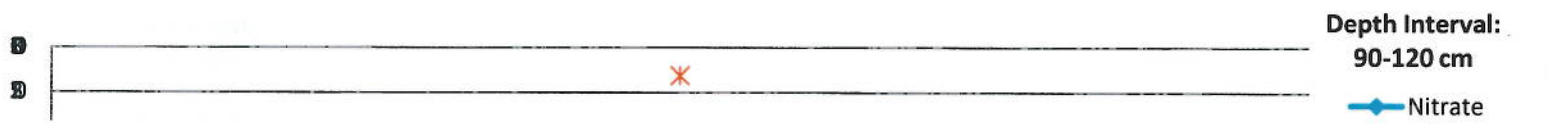
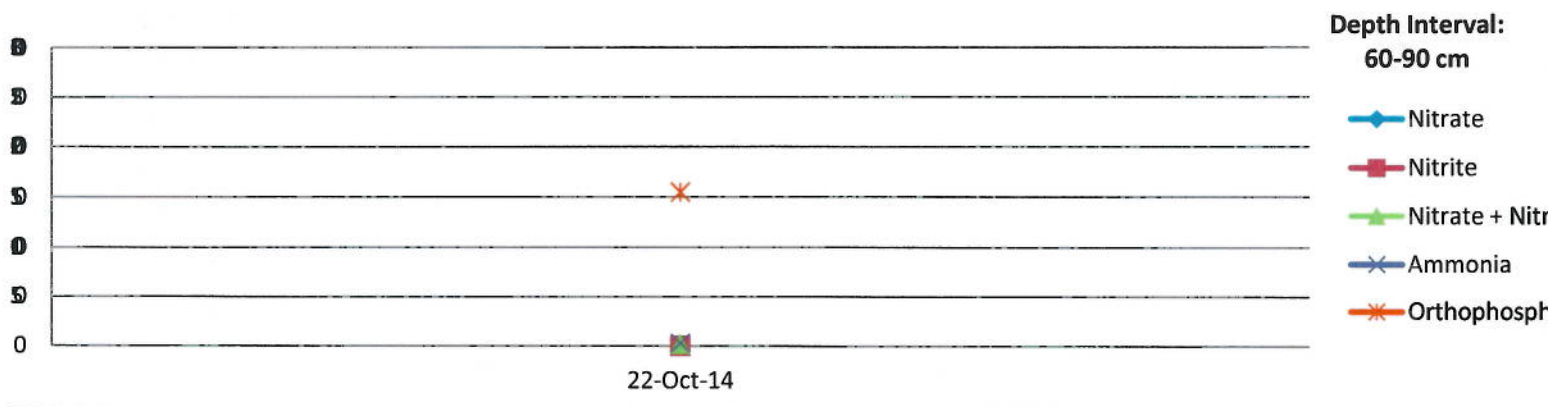
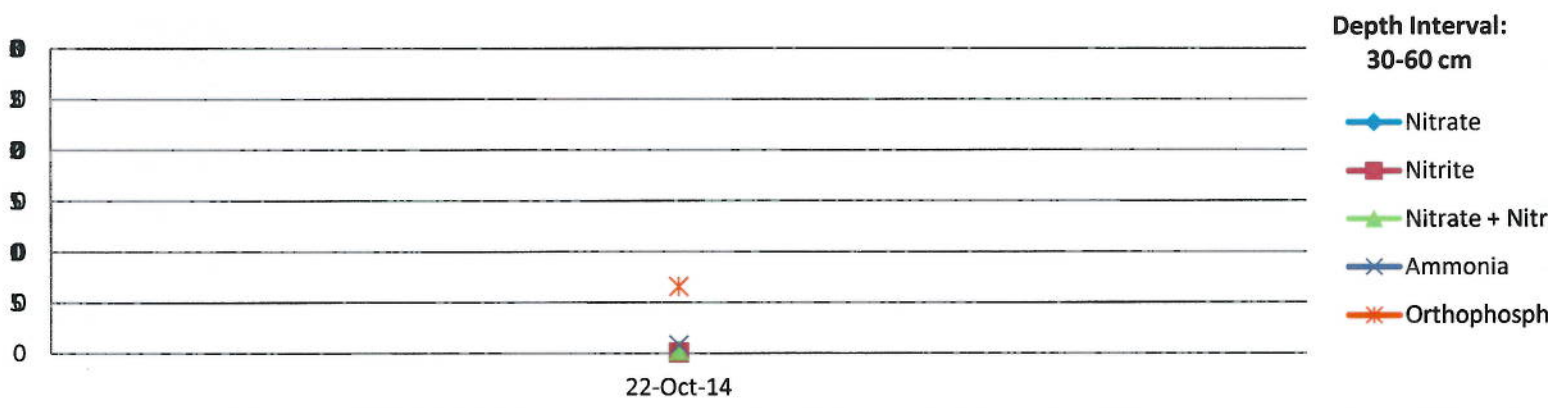
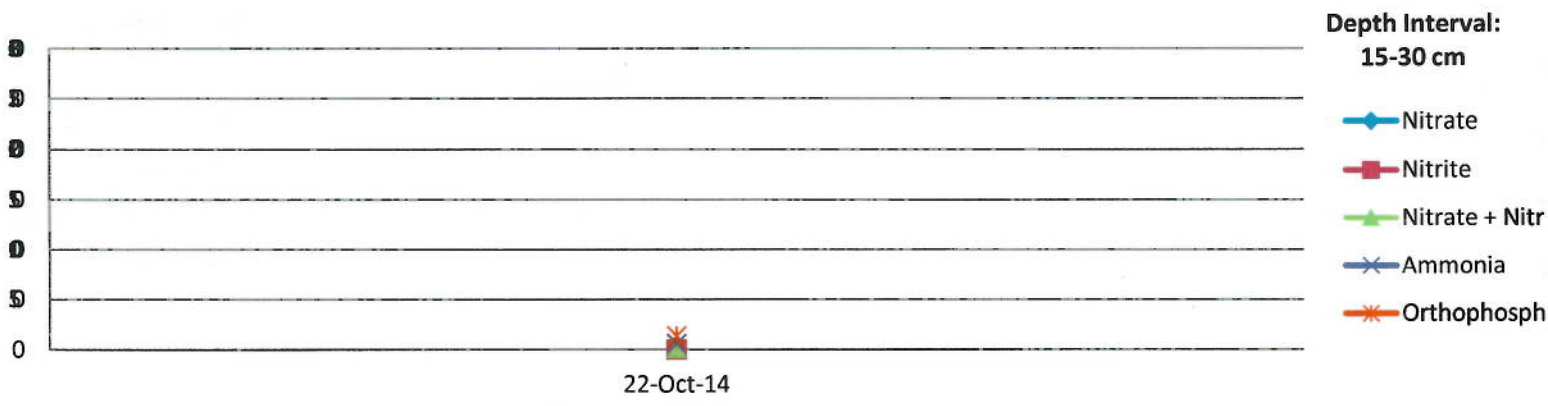
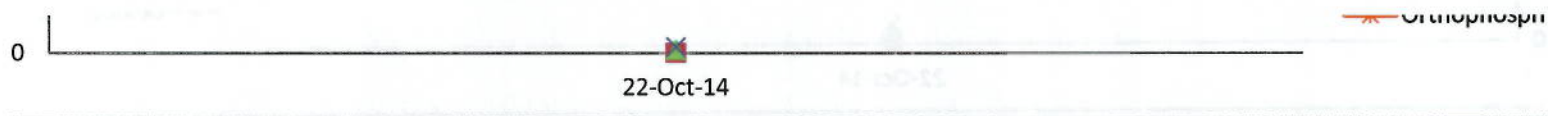


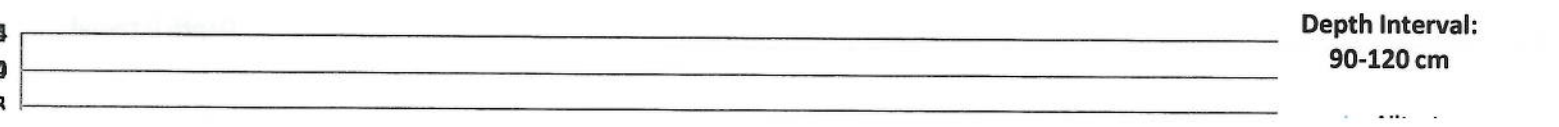
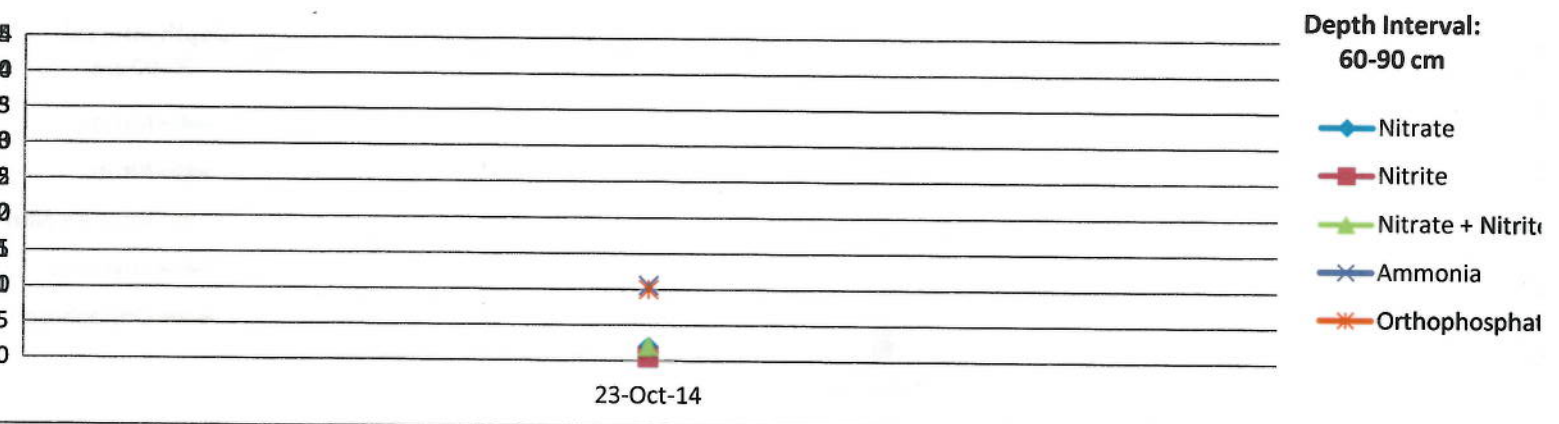
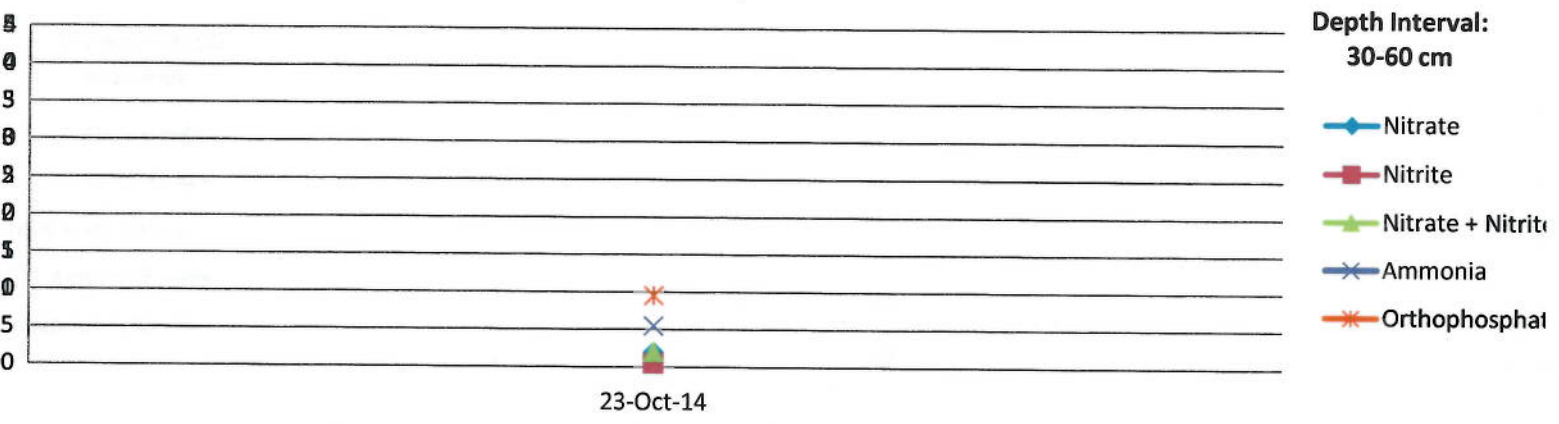
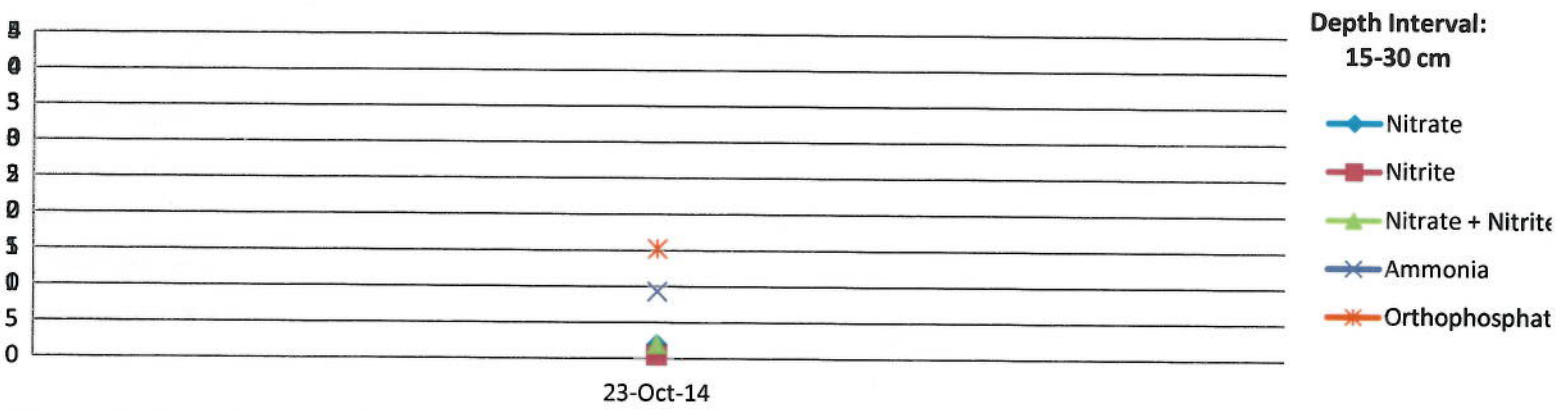
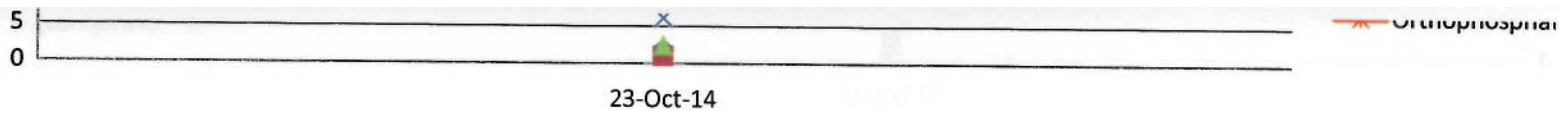
1-Jun-13 1-Jul-13 1-Aug-13 1-Sep-13 1-Oct-13 1-Nov-13 1-Dec-13 1-Jan-14 1-Feb-14 1-Mar-14 1-Apr-14 1-May-14 1-Jun-14 1-Jul-14 1-Aug-14 1-Sep-14 1-Oct-14

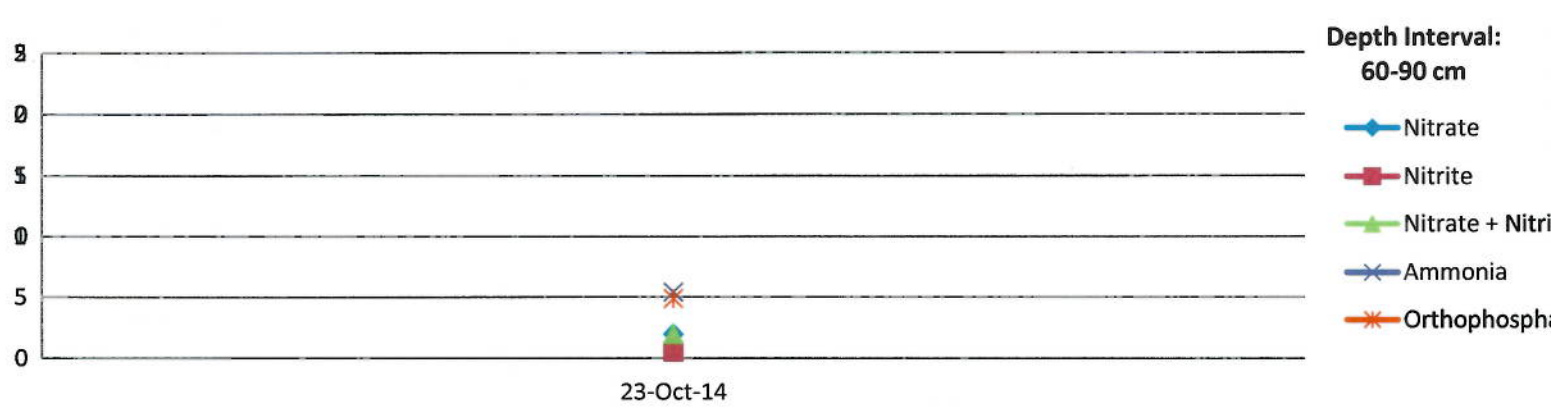
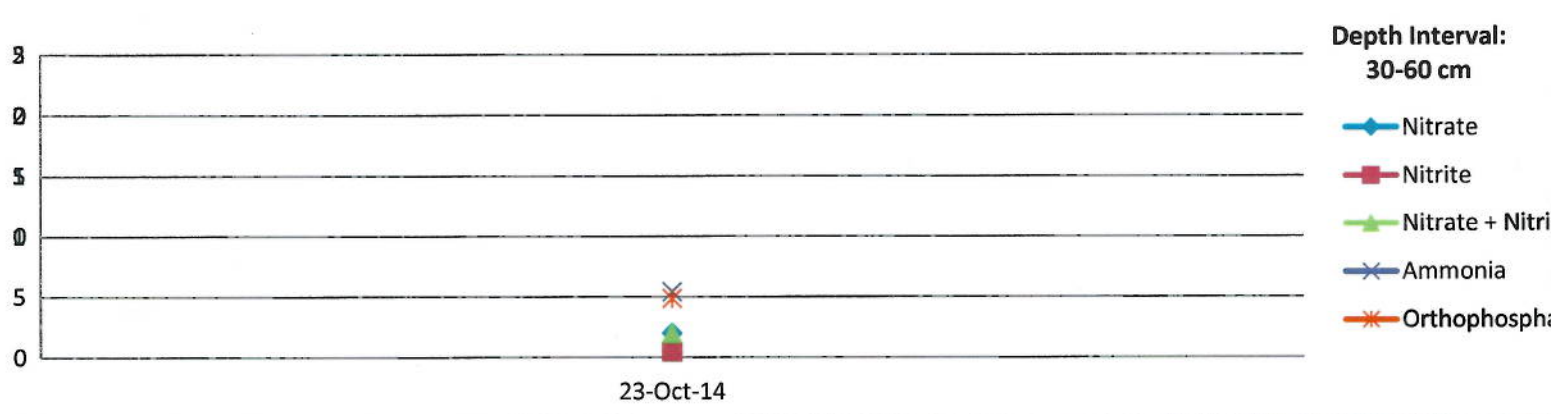
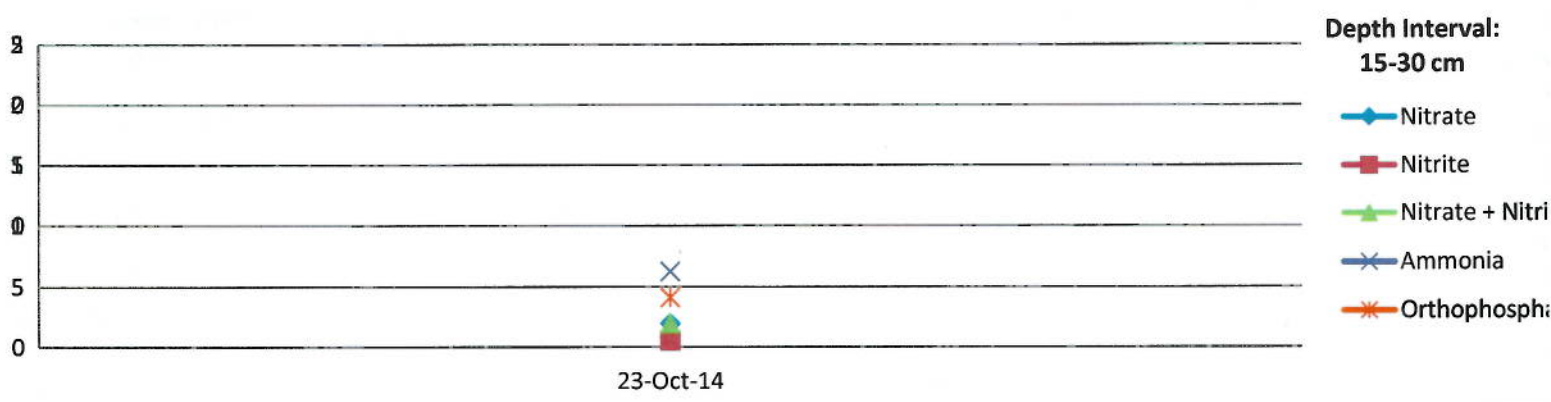
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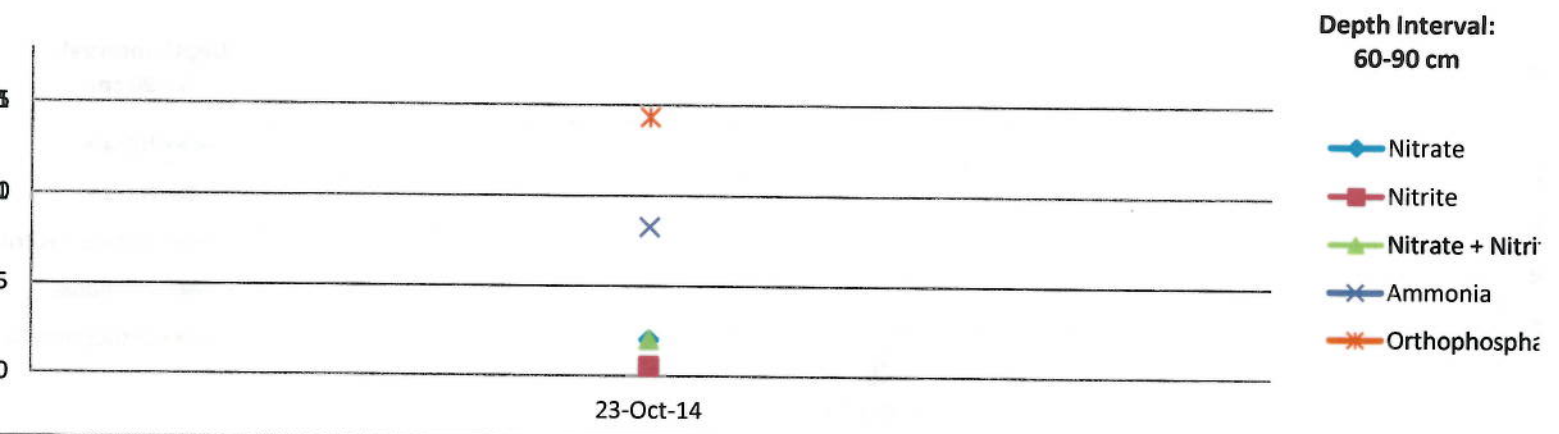
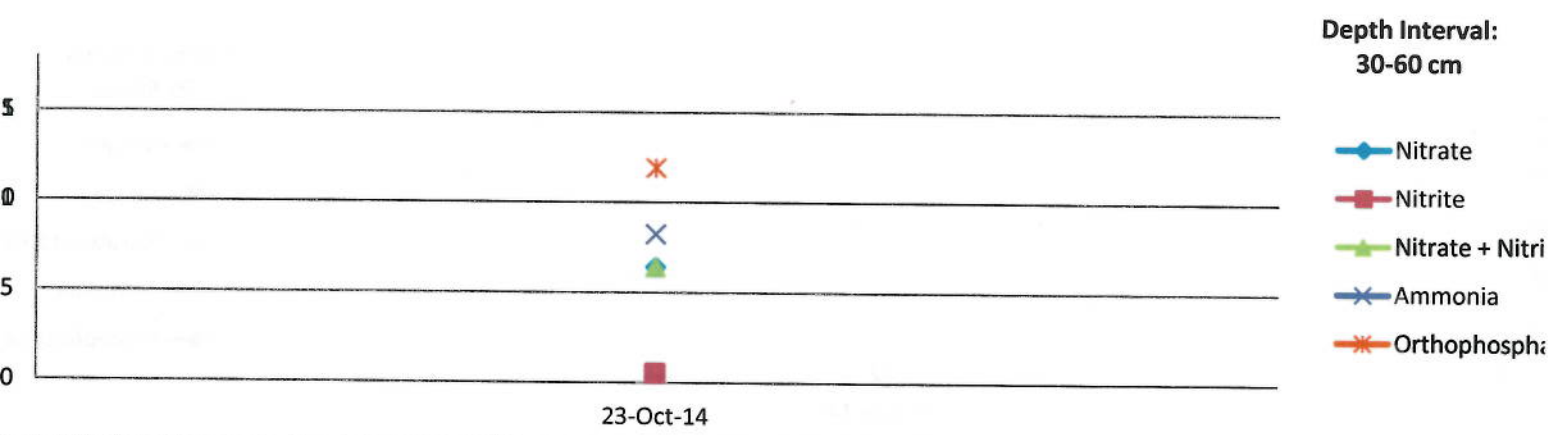
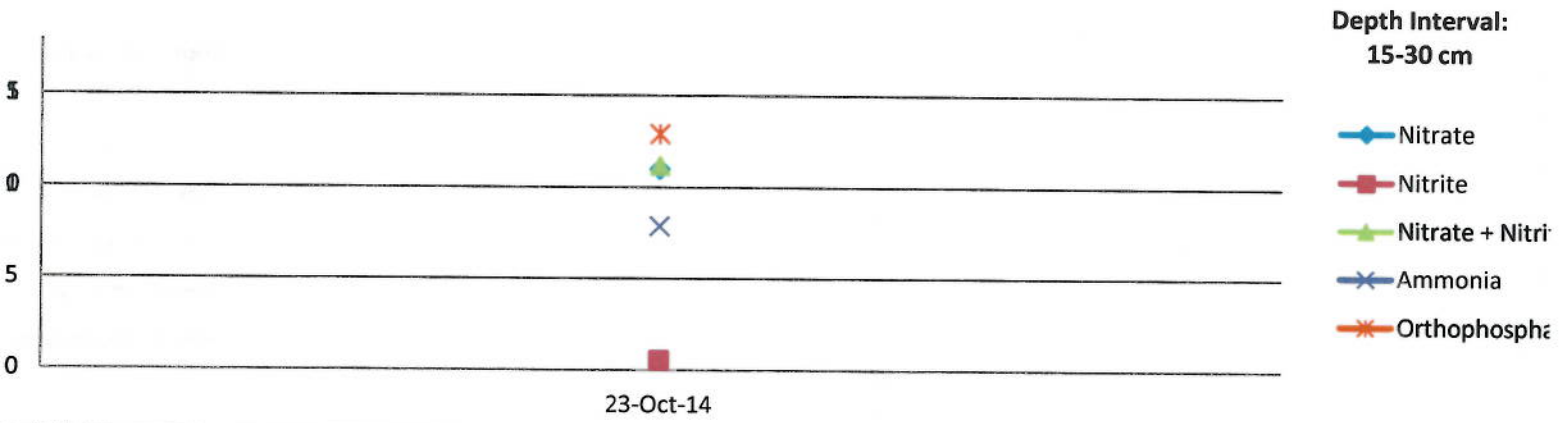


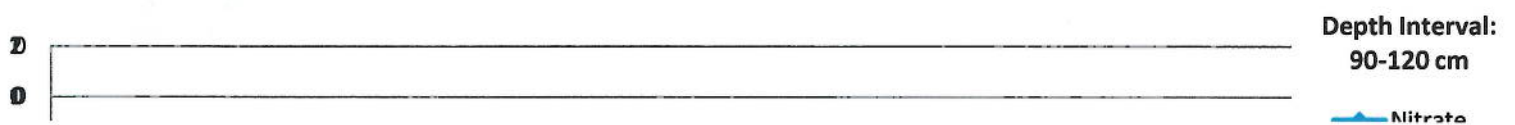
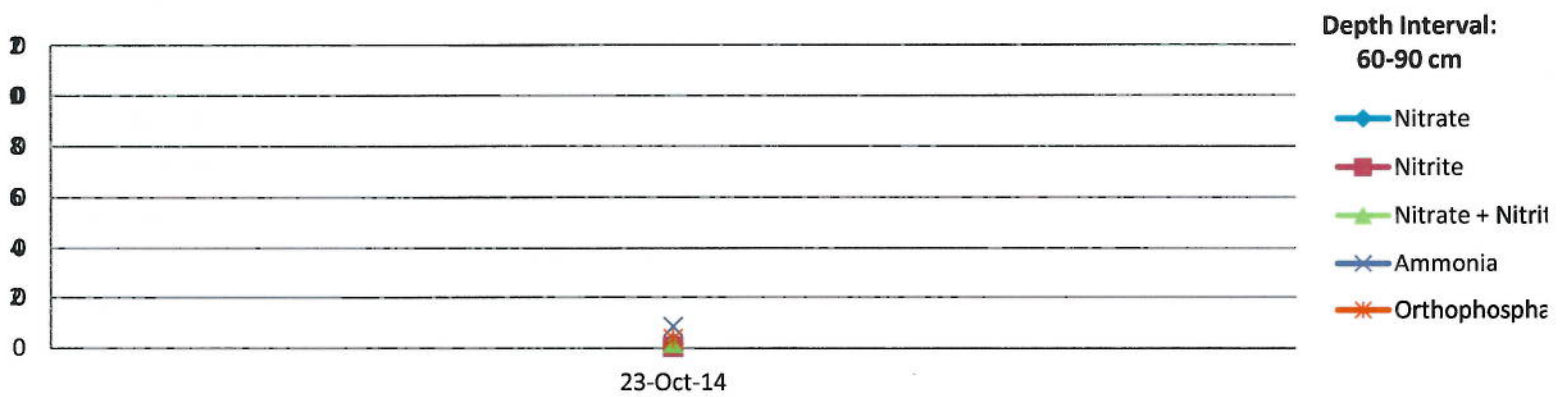
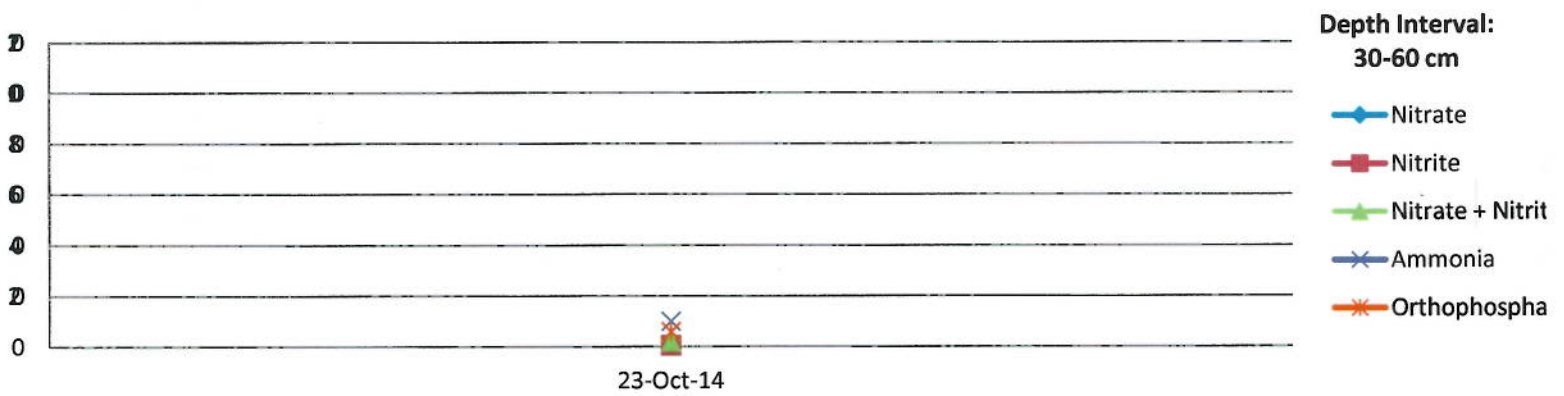
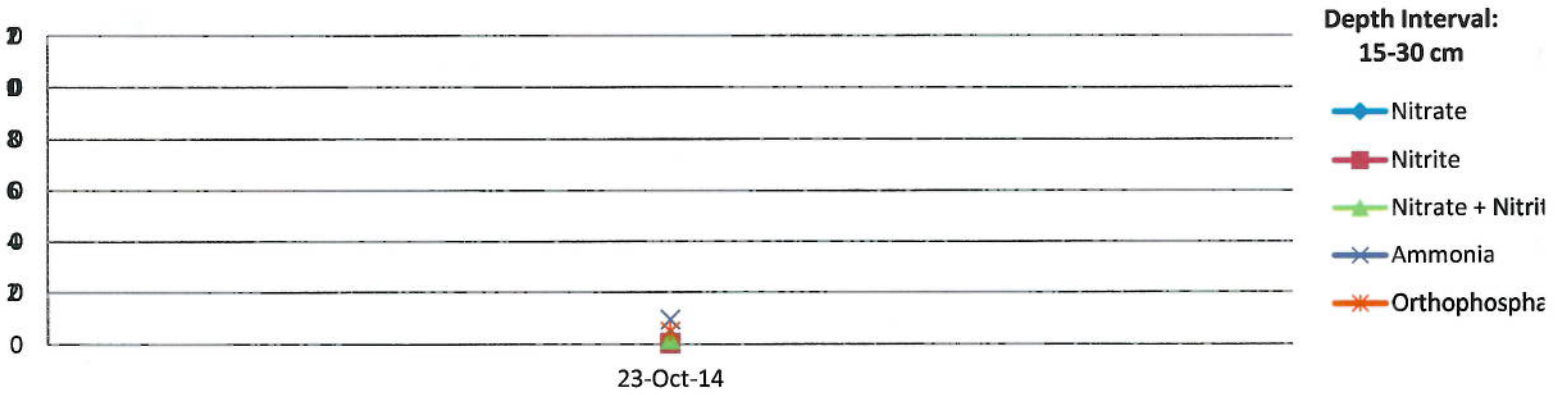












APPENDIX C

Historial Soil Analytical Results

Appendix C Historical Soil Analytical Results
PHC Degradation
212 Panet Road, Winnipeg, Manitoba

Paddock 1

Depth (cm bgs)	PHC Fraction ¹	Sampling Date			
		Oct-12 *	Jun-13 *	Oct-13 *	Nov-14
0-15	PHC F1 (C6-C10)	490	20	250	10
15-30		64	1200	1300	10
30-60		10	310	140	10
60-90		10	110	10	10
90-120		140	630	36	10
0-15	PHC F2 (C10-C16)	3500	460	2600	43
15-30		890	550	600	84
30-60		440	480	360	120
60-90		660	700	360	77
90-120		440	220	2200	89
0-15	PHC F3 (C16-C34)	2600	1400	4000	1100
15-30		2300	1900	3600	1400
30-60		1600	2500	890	4000
60-90		2300	1500	410	1000
90-120		2000	110	2000	2100
0-15	PHC F4 (C34-C50)	220	300	480	230
15-30		370	540	870	250
30-60		280	570	190	940
60-90		530	200	20	230
90-120		520	21	130	670

cm bgs

centimeters below ground surface

¹ PHC Fractions are reported in milligrams/kilogram (mg/kg), unless otherwise noted

* Data collected prior to 2014 provided by others

Appendix C Historical Soil Analytical Results
PHC Degradation
212 Panet Road, Winnipeg, Manitoba

Paddock 2

Depth (cm bgs)	PHC Fraction ¹	Sampling Date		
		Jun-13 *	Oct-12 *	Nov-14
0-15	PHC F1 (C6-C10)	18	110	10
15-30		10	19	10
30-60		290	34	10
60-90		71	12	10
90-120		44	44	10
0-15	PHC F2 (C10-C16)	84	640	61
15-30		120	1100	240
30-60		1400	670	10
60-90		680	560	10
90-120		730	560	10
0-15	PHC F3 (C16-C34)	1600	2800	4300
15-30		2000	4300	5100
30-60		3400	3200	360
60-90		3500	3600	89
90-120		1600	1000	49
0-15	PHC F4 (C34-C50)	420	360	1400
15-30		470	840	1800
30-60		620	770	950
60-90		940	410	31
90-120		220	220	15

cm bgs

centimeters below ground surface

¹ PHC Fractions are reported in milligrams/kilogram (mg/kg), unless otherwise noted

* Data collected prior to 2014 provided by others

Appendix C Historical Soil Analytical Results
PHC Degradation
212 Panet Road, Winnipeg, Manitoba

Paddock 3

Depth (cm bgs)	PHC Fraction ¹	Sampling Date	
		Nov-10 *	Nov-14
0-15	PHC F1 (C6-C10)	10	10
15-30		10	10
30-60		10	10
60-90		10	10
90-120		10	10
0-15	PHC F2 (C10-C16)	520	68
15-30		1100	640
30-60		140	920
60-90		52	21
90-120		74	10
0-15	PHC F3 (C16-C34)	500	7400
15-30		3900	7300
30-60		2600	9400
60-90		510	700
90-120		940	87
0-15	PHC F4 (C34-C50)	1400	2600
15-30		740	1500
30-60		720	2000
60-90		840	1100
90-120		970	25

cm bgs

centimeters below ground surface

¹ PHC Fractions are reported in milligrams/kilogram (mg/kg), unless otherwise noted

* Data collected prior to 2014 provided by others

Appendix C Historical Soil Analytical Results
PHC Degradation
212 Panet Road, Winnipeg, Manitoba

Paddock 4

Depth (cm bgs)	PHC Fraction ¹	Sampling Date				
		Oct-09 *	Nov-10 *	Jun-11 *	Nov-11 *	Nov-14
0-15	PHC F1 (C6-C10)	12	10	280	10	10
15-30		12	10	82	10	10
30-60		12	10	5	10	10
60-90		12	10	5	10	10
90-120		12	10	17	10	10
0-15	PHC F2 (C10-C16)	1200	150	3100	710	310
15-30		660	290	1900	350	10
30-60		110	43	500	65	10
60-90		600	130	540	67	34
90-120		22	21	750	20	170
0-15	PHC F3 (C16-C34)	3900	6400	6600	6900	4500
15-30		7500	5000	5300	4900	230
30-60		1400	490	2700	950	170
60-90		4100	1300	2400	750	560
90-120		160	240	2100	53	2700
0-15	PHC F4 (C34-C50)	6500	1600	1600	2100	1300
15-30		5400	1000	1500	1300	3750
30-60		3300	160	660	30	2800
60-90		250	210	2100	340	2100
90-120		10	78	480	35	740

cm bgs

centimeters below ground surface

¹

PHC Fractions are reported in milligrams/kilogram (mg/kg), unless otherwise noted

*

Data collected prior to 2014 provided by others

Appendix C Historical Soil Analytical Results
PHC Degradation
212 Panet Road, Winnipeg, Manitoba

Paddock 5

Depth (cm bgs)	PHC Fraction ¹	Sampling Date	
		Oct-09 *	Nov-14
0-15	PHC F1 (C6-C10)	12	10
15-30		12	10
30-60		12	10
60-90		12	10
90-120		12	10
0-15	PHC F2 (C10-C16)	98	510
15-30		94	82
30-60		380	2000
60-90		83	53
90-120		10	10
0-15	PHC F3 (C16-C34)	6500	10950
15-30		5400	2500
30-60		3300	18000
60-90		250	340
90-120		10	78
0-15	PHC F4 (C34-C50)	2200	2150
15-30		1500	590
30-60		580	3000
60-90		110	10
90-120		10	32

cm bgs

centimeters below ground surface

¹ PHC Fractions are reported in milligrams/kilogram (mg/kg), unless otherwise noted

* Data collected prior to 2014 provided by others

Appendix C Historical Soil Analytical Results
PHC Degradation
212 Panet Road, Winnipeg, Manitoba

Front

Depth (cm bgs)	PHC Fraction ¹	Sampling Date			
		2007 *	Oct-08 *	Oct-09 *	Nov-14
0-15	PHC F1 (C6-C10)	12	4	12	10
15-30		12	4	12	10
30-60		12	4	12	10
60-90		12	4	12	10
90-120		12	4	12	10
0-15	PHC F2 (C10-C16)	108	184	180	63
15-30		85	754	100	250
30-60		25	185	120	350
60-90		20	102	38	<
90-120		17	20	10	<
0-15	PHC F3 (C16-C34)	5710	5990	5200	570
15-30		2430	7960	4700	1000
30-60		199	2320	3200	880
60-90		183	756	690	93
90-120		85	119	10	70
0-15	PHC F4 (C34-C50)	1740	796	1500	4400
15-30		731	623	11500	130
30-60		136	445	820	120
60-90		83	107	70	1100
90-120		55	32	10	620

cm bgs

centimeters below ground surface

¹ PHC Fractions are reported in milligrams/kilogram (mg/kg), unless otherwise noted

* Data collected prior to 2014 provided by others

APPENDIX D

Laboratory Certificates of Analysis (Soil) Table D.1 – RPD Calculations

TABLE D.1 FIELD DUPLICATE RPD CALCULATIONS
Petroleum Parameters
Soil Samples
212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		Units	RPD Alert Limits	P4-COMP-2	RDL	FD1 Field Duplicate of P4-Comp-2	RDL	RPD	P5-COMP-1	RDL	FD2 Field Duplicate of P5-COMP-1
Laboratory Sample No. Sampling Date											
Benzene		na	na	KY4976	na	KY5000	na	na	KY4980	na	KY5001
Toluene		na	na	2014/10/22	na	2014/10/22	na	na	2014/10/23	na	2014/10/23
Ethylbenzene		mg/kg	100%	<	0.005	<	0.005	nc	<	0.005	<
Xylenes		mg/kg	100%	<	0.02	<	0.02	nc	<	0.02	<
		mg/kg	100%	<	0.01	<	0.01	nc	<	0.01	<
		mg/kg	100%	<	0.04	<	0.04	nc	<	0.04	<
PHC F1		mg/kg	100%	<	10	<	10	nc	<	10	<
PHC F2		mg/kg	100%	<	10	<	10	nc	600	10	420
PHC F3		mg/kg	100%	270	10	190	10	0.35	14000	10	7900
PHC F4		mg/kg	100%	5700	10	1800	10	1.04	2800	10	1500

µg/g
RDL
<
RPD
na
nc
BOLD

micrograms per gram
reportable detection limit unless noted
less than RDL
Relative Percent Difference (not calculated when one or both results are less than or equal to 6X RDL)
not applicable
RPD not calculable
exceeds alert limit

TABLE D.1 FIELD DUPLICATE RPD CALCULATIONS
 Petroleum Parameters
 Soil Samples
 212 Panet Road, Winnipeg, Manitoba

SNC-Lavalin Sample No.		Units	RPD Alert Limits	RDL	RPD	P6-COMP-1	RDL	FD3 Field Duplicate of P6-COMP-1	RDL	RPD
Laboratory Sample No. Sampling Date										
Benzene		na	na	na	na	KY4985 2014/10/23	na	KY5002 23/10/2014	na	na
Toluene		na	na	na	na		na		na	na
Ethylbenzene		mg/kg	100%	0.005	nc	<	0.005	<	0.005	nc
Xylenes		mg/kg	100%	0.02	nc	<	0.02	<	0.02	nc
		mg/kg	100%	0.01	nc	<	0.01	<	0.01	nc
		mg/kg	100%	0.04	nc	<	0.04	<	0.04	nc
PHC F1		mg/kg	100%	10	nc	<	10	<	10	nc
PHC F2		mg/kg	100%	10	35%	59	10	79	10	29%
PHC F3		mg/kg	100%	10	56%	2400	10	3000	10	22%
PHC F4		mg/kg	100%	10	60%	660	10	850	10	25%

µg/g
 RDL
 <
 RPD
 na
 nc
BOLD
 micrograms per gram
 reportable detection limit unless noted
 less than RDL
 Relative Percent Difference (not calculated when one or both results are less than or equal to 5X RDL)
 not applicable
 RPD not calculable
 exceeds alert limit

Attention: RYAN BREIVIK

SNC-LAVALIN INC.
TORONTO - SHELL
SUITE 200 - 20 DEBOERS DRIVE
TORONTO, ON
CANADA M3J 0H1

Your P.O. #: 622653
Your Project #: 622653
Site Location: WPG SHELL TERMINAL
Your C.O.C. #: A063677

Report Date: 2014/11/20
Report #: R1687377
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4A3152

Received: 2014/11/12, 14:50

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE Soil LH, VH, F1 SIM/MS (1)	1	2014/11/14	2014/11/18	BBY8SOP-00010, BBY8SOEPA 8260c R3 m -00011	
Volatile F1-BTEX (1)	1	N/A	2014/11/19	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	1	2014/11/14	2014/11/19	BBY8SOP-00030	CCME PHC-CWS
Moisture (1)	1	N/A	2014/11/15	BBY8SOP-00017	OMOE E3139 3.1 m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Vancouver

(2) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Encryption Key



Samantha Fregien

20 Nov 2014 16:38:10 -08:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Janelle Kochan, B.Sc., Project Manager

Email: JKochan@maxxam.ca

Phone# (204)772-7276 Ext:2209

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B4A3152
Report Date: 2014/11/20

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: WPG SHELL TERMINAL
Your P.O. #: 622653
Sampler Initials: SP

PHYSICAL TESTING (SOIL)

Maxxam ID		LD0517	LD0517		
Sampling Date		2014/11/12	2014/11/12		
COC Number		A063677	A063677		
	Units	WF-COMP-1	WF-COMP-1 Lab-Dup	RDL	QC Batch
Physical Properties					
Moisture	%	7.7	8.0	0.30	7719666
RDL = Reportable Detection Limit					
Lab-Dup = Laboratory Initiated Duplicate					

Maxxam Job #: B4A3152
Report Date: 2014/11/20

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: WPG SHELL TERMINAL
Your P.O. #: 622653
Sampler Initials: SP

CCME BTEX/F1-F4 IN SOIL (SOIL)

Maxxam ID		LD0517		
Sampling Date		2014/11/12		
COC Number		A063677		
	Units	WF-COMP-1	RDL	QC Batch
Calculated Parameters				
F1 (C6-C10) - BTEX	mg/kg	<10	10	7717282
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	200	10	7722781
F3 (C16-C34 Hydrocarbons)	mg/kg	8600	10	7722781
F4 (C34-C50 Hydrocarbons)	mg/kg	2500	10	7722781
Reached Baseline at C50	mg/kg	Yes	N/A	7722781
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	7723541
Toluene	mg/kg	<0.020	0.020	7723541
Ethylbenzene	mg/kg	<0.010	0.010	7723541
m & p-Xylene	mg/kg	<0.040	0.040	7723541
o-Xylene	mg/kg	<0.040	0.040	7723541
Xylenes (Total)	mg/kg	<0.040	0.040	7723541
(C6-C10)	mg/kg	<10	10	7723541
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	96		7723541
4-Bromofluorobenzene (sur.)	%	102		7723541
D10-ETHYLBENZENE (sur.)	%	105		7723541
D4-1,2-Dichloroethane (sur.)	%	115		7723541
O-TERPHENYL (sur.)	%	78		7722781
RDL = Reportable Detection Limit				
N/A = Not Applicable				

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: WPG SHELL TERMINAL
Your P.O. #: 622653
Sampler Initials: SP

GENERAL COMMENTS

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

Package 1	6.8°C
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Results relate only to the items tested.

Maxxam Job #: B4A3152
Report Date: 2014/11/20

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: WPG SHELL TERMINAL
Your P.O. #: 622653
Sampler Initials: SP

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7719666	RG9	Method Blank	Moisture	2014/11/15	<0.30		%	
7719666	RG9	RPD [LD0517-01]	Moisture	2014/11/15	3.8		%	20
7722781	TL2	Matrix Spike	O-TERPHENYL (sur.)	2014/11/19		70	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/11/19		99	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2014/11/19		105	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2014/11/19		103	%	50 - 130
7722781	TL2	Spiked Blank	O-TERPHENYL (sur.)	2014/11/19		91	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/11/19		100	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2014/11/19		102	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2014/11/19		102	%	80 - 120
7722781	TL2	Method Blank	O-TERPHENYL (sur.)	2014/11/19		99	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/11/19	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2014/11/19	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2014/11/19	<10		mg/kg	
			Reached Baseline at C50	2014/11/19	YES		mg/kg	
7722781	TL2	RPD	F2 (C10-C16 Hydrocarbons)	2014/11/19	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2014/11/19	NC		%	40
			F4 (C34-C50 Hydrocarbons)	2014/11/19	NC		%	40
			Reached Baseline at C50	2014/11/19	NC		%	50
7723541	KL	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/11/19		95	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/11/19		105	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/11/19		96	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/11/19		102	%	70 - 130
			Benzene	2014/11/19		103	%	60 - 140
			Toluene	2014/11/19		104	%	60 - 140
			Ethylbenzene	2014/11/19		100	%	60 - 140
			m & p-Xylene	2014/11/19		95	%	60 - 140
			o-Xylene	2014/11/19		100	%	60 - 140
			(C6-C10)	2014/11/19		116	%	60 - 140
7723541	KL	Method Blank	1,4-Difluorobenzene (sur.)	2014/11/18		91	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/11/18		103	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/11/18		103	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/11/18		117	%	70 - 130
			Benzene	2014/11/18	<0.0050		mg/kg	
			Toluene	2014/11/18	<0.020		mg/kg	
			Ethylbenzene	2014/11/18	<0.010		mg/kg	
			m & p-Xylene	2014/11/18	<0.040		mg/kg	
			o-Xylene	2014/11/18	<0.040		mg/kg	
			Xylenes (Total)	2014/11/18	<0.040		mg/kg	
			(C6-C10)	2014/11/18	<10		mg/kg	

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

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

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

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

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

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

VALIDATION SIGNATURE PAGE

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



Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Calgary: 4090 19th St. SE, 12E 08A, Ph: (403) 291-3377 Fax: (403) 732-2249 Tel Fax: (403) 386-7247
 Edmonton: 9321-48 Street, 7th Fl. Ph: (780) 577-7100 Fax: (780) 459-4107 Tel Fax: (780) 459-9988
 www.maxxaminternational.com

Chain of Custody

Page: _____ of _____

Company: INVOICE TO: 250 Report Address
 Contact: 2ND FLOOR
 Address: 20 DEROGES DRIVE SUITE 200
 City: TORONTO, ONTARIO M5T 0H1
 Contact #s: Ph: 1-647-229-6552

Report To: ryon.brew@maxxam.com
 Same as Invoice ☐
 Project: _____
 PO: _____
 Cell: _____

Report Distribution (E-Mail):
 REGULATORY GUIDELINES:
☐ AT1
☐ OCME
☐ Regulated Drinking Water
☐ Other:

PO #: 622653
 Project # / Name: 622653
 Site Location: WIG SHAL TERNER
 Quote #: _____
 Sampled By: S. KEROCK
 SERVICE ☐ RUSH (Contact lab to reserve)
 REQUESTED: ☒ REGULAR (5 to 7 Days)

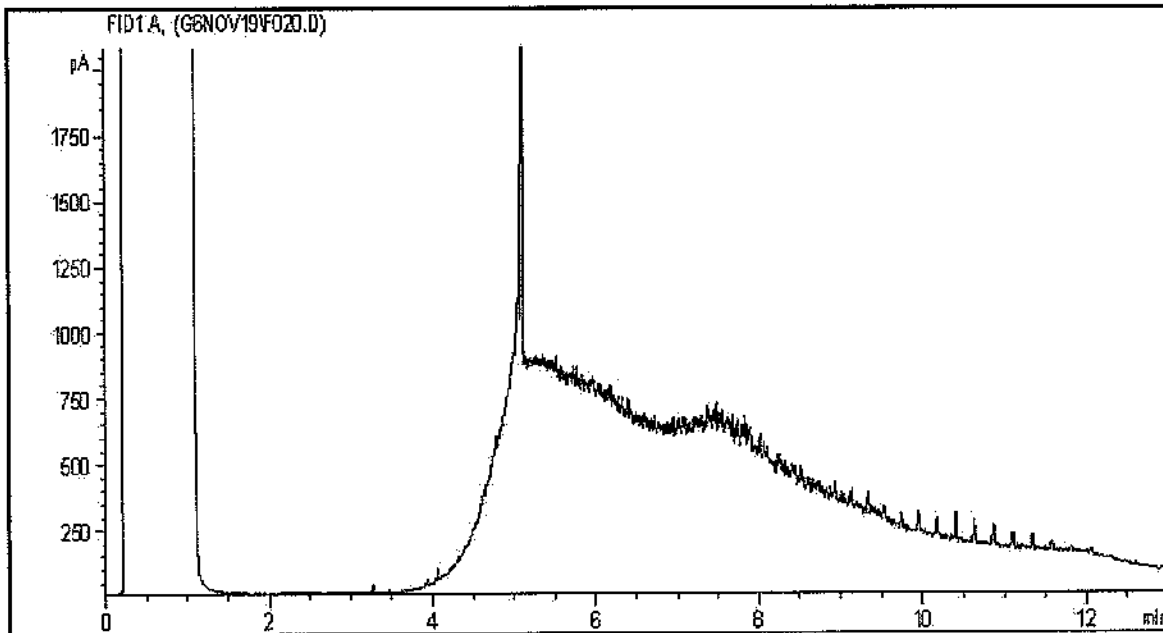
WATER		SOIL		Other Analysis		# of Containers Submitted
Regulated Metals (OCME / AT1)		Regulated Metals (OCME / AT1)		Regulated Metals (OCME / AT1)		
☐ BTEX F1-F4	☐ BTEX F1-F4	☐ BTEX F1-F4	☐ BTEX F1-F4	☐ BTEX F1-F4	☐ BTEX F1-F4	2
☐ VOCs	☐ VOCs	☐ VOCs	☐ VOCs	☐ VOCs	☐ VOCs	
☐ DBTEX F1-F4	☐ DBTEX F1-F4	☐ DBTEX F1-F4	☐ DBTEX F1-F4	☐ DBTEX F1-F4	☐ DBTEX F1-F4	2
☐ Turbidity	☐ Turbidity	☐ Turbidity	☐ Turbidity	☐ Turbidity	☐ Turbidity	
☐ TOC	☐ TOC	☐ TOC	☐ TOC	☐ TOC	☐ TOC	2
☐ DOC	☐ DOC	☐ DOC	☐ DOC	☐ DOC	☐ DOC	
☐ Total Dissolved	☐ Total Dissolved	☐ Total Dissolved	☐ Total Dissolved	☐ Total Dissolved	☐ Total Dissolved	2
☐ Mercury	☐ Mercury	☐ Mercury	☐ Mercury	☐ Mercury	☐ Mercury	
☐ Salinity 4	☐ Salinity 4	☐ Salinity 4	☐ Salinity 4	☐ Salinity 4	☐ Salinity 4	2
☐ Basic Class II Landfill	☐ Basic Class II Landfill	☐ Basic Class II Landfill	☐ Basic Class II Landfill	☐ Basic Class II Landfill	☐ Basic Class II Landfill	

Received By: S. KEROCK Date: 2011/11/12 Time: 14:50
 Maximum Job #: B4A3152
 Custody Seal: _____ Temperature: 6.8°C X3
 Lab Comments: _____

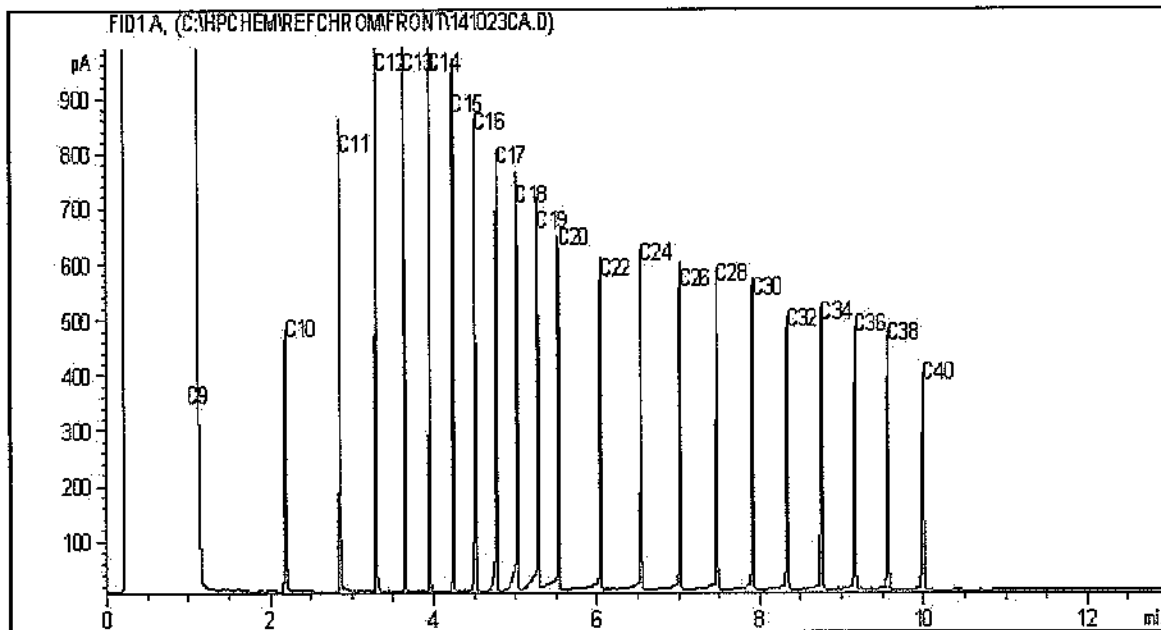
Maxxam Analytics International Corporation o/a Maxxam Analytics

AS FOD-00331 Rev'd 2010-05

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Your Project #: 622653

Your C.O.C. #: A063679

Attention: RYAN BREIVIK

SNC-LAVALIN INC.
TORONTO - SHELL
SUITE 200 - 20 DEBOERS DRIVE
TORONTO, ON
CANADA M3J 0H1

Report Date: 2014/11/19

Report #: R1686817

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4A3713

Received: 2014/11/12, 09:50

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE Soil LH, VH, F1 SIM/MS (1)	1	2014/11/13	2014/11/18	BBY8SOP-00010, BBY8SOP EPA 8260c R3 m -00011	
BTEX/MTBE Soil LH, VH, F1 SIM/MS (1)	1	2014/11/14	2014/11/17	BBY8SOP-00010, BBY8SOP EPA 8260c R3 m -00011	
Volatile F1-BTEX (1)	2	N/A	2014/11/18	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	1	2014/11/13	2014/11/19	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	1	2014/11/14	2014/11/19	BBY8SOP-00030	CCME PHC-CWS
Moisture (1)	1	N/A	2014/11/13	BBY8SOP-00017	OMOE E3139 3.1 m
Moisture (1)	1	N/A	2014/11/14	BBY8SOP-00017	OMOE E3139 3.1 m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Vancouver

(2) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Encryption Key



Debbie Nordbruet

19 Nov 2014 18:14:40 -08:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Janelle Kochan, B.Sc., Project Manager

Email: JKochan@maxxam.ca

Phone# (204)772-7276 Ext:2209

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LC8600	LC8601		
Sampling Date		2014/11/07	2014/11/07		
COC Number		A063679	A063679		
	Units	BH14-1-3	BH14-1-7	RDL	QC Batch
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	10	7722781
F3 (C16-C34 Hydrocarbons)	mg/kg	<10	58	10	7722781
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	44	10	7722781
Reached Baseline at C50	mg/kg	Yes	Yes	N/A	7722781
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	97	92		7722781
RDL = Reportable Detection Limit					
N/A = Not Applicable					

Maxxam Job #: B4A3713
Report Date: 2014/11/19

SNC-LAVALIN INC.
Client Project #: 622653

PHYSICAL TESTING (SOIL)

Maxxam ID		LC8600		LC8601		
Sampling Date		2014/11/07		2014/11/07		
COC Number		A063679		A063679		
	Units	BH14-1-3	QC Batch	BH14-1-7	RDL	QC Batch
Physical Properties						
Moisture	%	23	7718937	33	0.30	7718154
RDL = Reportable Detection Limit						

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		LC8600	LC8600	LC8601		
Sampling Date		2014/11/07	2014/11/07	2014/11/07		
COC Number		A063679	A063679	A063679		
	Units	BH14-1-3	BH14-1-3 Lab-Dup	BH14-1-7	RDL	QC Batch
Calculated Parameters						
F1 (C6-C10) - BTEX	mg/kg	<10		<10	10	7716571
Volatiles						
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	7722206
Toluene	mg/kg	<0.020	<0.020	<0.020	0.020	7722206
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	0.010	7722206
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	0.040	7722206
o-Xylene	mg/kg	<0.040	<0.040	<0.040	0.040	7722206
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	0.040	7722206
(C6-C10)	mg/kg	<10	<10	<10	10	7722206
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	95	96	97		7722206
4-Bromofluorobenzene (sur.)	%	96	95	98		7722206
D10-ETHYLBENZENE (sur.)	%	121	121	122		7722206
D4-1,2-Dichloroethane (sur.)	%	108	110	108		7722206
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						

Maxxam Job #: B4A3713
Report Date: 2014/11/19

SNC-LAVALIN INC.
Client Project #: 622653

GENERAL COMMENTS

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
	7718154	CG5	Method Blank	Moisture	2014/11/13	<0.30		%	
	7718154	CG5	RPD	Moisture	2014/11/13	5.4		%	20
	7718937	RG9	Method Blank	Moisture	2014/11/15	<0.30		%	
	7718937	RG9	RPD	Moisture	2014/11/15	9.9		%	20
	7722206	KPA	Matrix Spike [LC8600-01]	1,4-Difluorobenzene (sur.)	2014/11/17		89	%	70 - 130
				4-Bromofluorobenzene (sur.)	2014/11/17		100	%	70 - 130
				D10-ETHYLBENZENE (sur.)	2014/11/17		116	%	50 - 130
				D4-1,2-Dichloroethane (sur.)	2014/11/17		98	%	70 - 130
				Benzene	2014/11/17		113	%	60 - 140
				Toluene	2014/11/17		117	%	60 - 140
				Ethylbenzene	2014/11/17		127	%	60 - 140
				m & p-Xylene	2014/11/17		121	%	60 - 140
				o-Xylene	2014/11/17		120	%	60 - 140
	7722206	KPA	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/11/17		88	%	70 - 130
				4-Bromofluorobenzene (sur.)	2014/11/17		100	%	70 - 130
				D10-ETHYLBENZENE (sur.)	2014/11/17		101	%	50 - 130
				D4-1,2-Dichloroethane (sur.)	2014/11/17		100	%	70 - 130
				Benzene	2014/11/17		110	%	60 - 140
				Toluene	2014/11/17		109	%	60 - 140
				Ethylbenzene	2014/11/17		121	%	60 - 140
				m & p-Xylene	2014/11/17		115	%	60 - 140
				o-Xylene	2014/11/17		112	%	60 - 140
				(C6-C10)	2014/11/17		98	%	60 - 140
	7722206	KPA	Method Blank	1,4-Difluorobenzene (sur.)	2014/11/17		95	%	70 - 130
				4-Bromofluorobenzene (sur.)	2014/11/17		96	%	70 - 130
				D10-ETHYLBENZENE (sur.)	2014/11/17		109	%	50 - 130
				D4-1,2-Dichloroethane (sur.)	2014/11/17		105	%	70 - 130
				Benzene	2014/11/17	<0.0050		mg/kg	
				Toluene	2014/11/17	<0.020		mg/kg	
				Ethylbenzene	2014/11/17	<0.010		mg/kg	
				m & p-Xylene	2014/11/17	<0.040		mg/kg	
				o-Xylene	2014/11/17	<0.040		mg/kg	
				Xylenes (Total)	2014/11/17	<0.040		mg/kg	
				(C6-C10)	2014/11/17	<10		mg/kg	
	7722206	KPA	RPD [LC8600-01]	Benzene	2014/11/17	NC		%	40
				Toluene	2014/11/17	NC		%	40
				Ethylbenzene	2014/11/17	NC		%	40
				m & p-Xylene	2014/11/17	NC		%	40
				o-Xylene	2014/11/17	NC		%	40
				Xylenes (Total)	2014/11/17	NC		%	40
				(C6-C10)	2014/11/17	NC		%	40
	7722781	TL2	Matrix Spike	O-TERPHENYL (sur.)	2014/11/19		70	%	50 - 130
				F2 (C10-C16 Hydrocarbons)	2014/11/19		99	%	50 - 130
				F3 (C16-C34 Hydrocarbons)	2014/11/19		105	%	50 - 130
				F4 (C34-C50 Hydrocarbons)	2014/11/19		103	%	50 - 130
	7722781	TL2	Spiked Blank	O-TERPHENYL (sur.)	2014/11/19		91	%	50 - 130
				F2 (C10-C16 Hydrocarbons)	2014/11/19		100	%	80 - 120
				F3 (C16-C34 Hydrocarbons)	2014/11/19		102	%	80 - 120
				F4 (C34-C50 Hydrocarbons)	2014/11/19		102	%	80 - 120
	7722781	TL2	Method Blank	O-TERPHENYL (sur.)	2014/11/19		99	%	50 - 130
				F2 (C10-C16 Hydrocarbons)	2014/11/19	<10		mg/kg	
				F3 (C16-C34 Hydrocarbons)	2014/11/19	<10		mg/kg	
				F4 (C34-C50 Hydrocarbons)	2014/11/19	<10		mg/kg	
				Reached Baseline at C50	2014/11/19	YES		mg/kg	

Maxxam Job #: B4A3713
Report Date: 2014/11/19

SNC-LAVALIN INC.
Client Project #: 622653

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC			Parameter	Date	Value	Recovery	Units	QC Limits
Batch	Init	QC Type		Analyzed				
7722781	TL2	RPD	F2 (C10-C16 Hydrocarbons)	2014/11/19	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2014/11/19	NC		%	40
			F4 (C34-C50 Hydrocarbons)	2014/11/19	NC		%	40
			Reached Baseline at C50	2014/11/19	NC		%	50

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

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

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

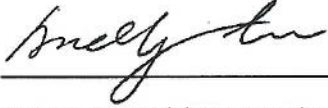
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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

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

VALIDATION SIGNATURE PAGE

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



Andy Lu, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Company:	Maxxam	Report To:	ryan.brewer@maxxam.com
Contact:	SHARON SCHEMBRA	Report Distribution (E-Mail):	ryan.brewer@maxxam.com
Address:	20 DEBORAH DRIVE SUITE 200	Regulatory Guidelines:	☐ AT1 ☐ COME ☐ Regulated Drinking Water ☐ Other:
Contact #s:	Ph: 1-547-224-6554		

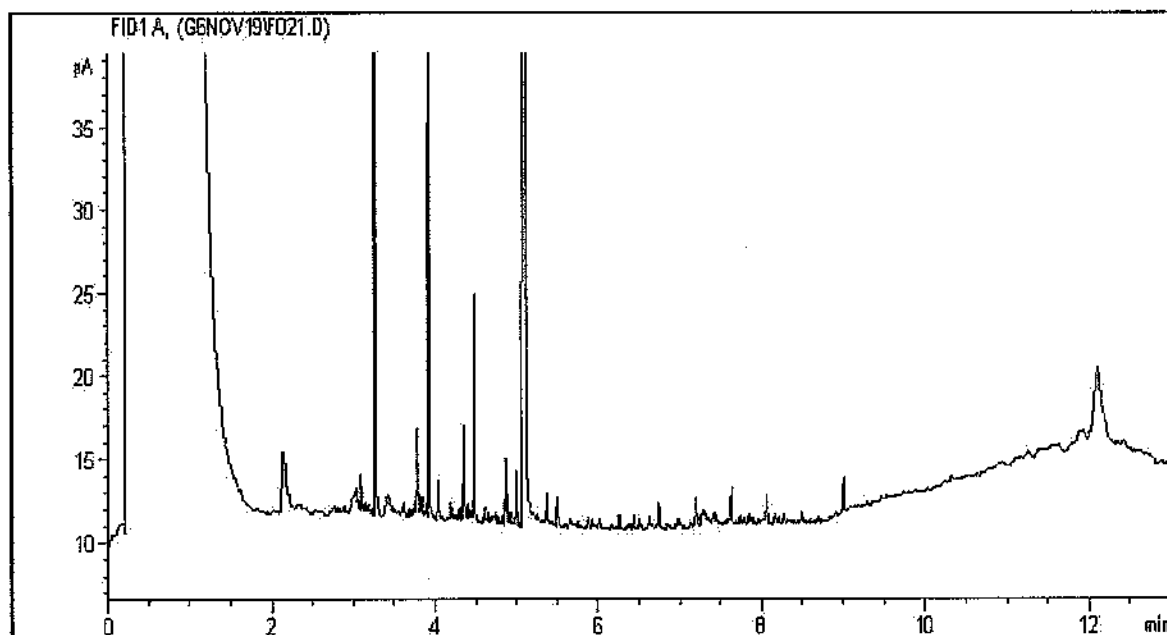
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	
Service Requested:	☐ RUSH (Contact lab to reserve) ☒ REGULAR (5 to 7 Days)

Sample ID	Depth (unit)	Matrix (GW / SW / Soil)	Date/Time Sampled (YYMMDD 24:00)	Regulated Metals (COME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	Other Analysis	# of Containers Submitted
1 BH14-1-3		SOIL	11/11/12	X				CEM PHTS CEM METALS FLUORINE	2
2 BH14-1-7									2
3 BH14-2-3									1
4 FDI									1
5 BH14-2-7									2
6 BH14-3-2									2
7 BH14-3-7									2
8 BH14-4-4									2
9 BH14-4-7									2
10 SBCOMP									2
11									
12									

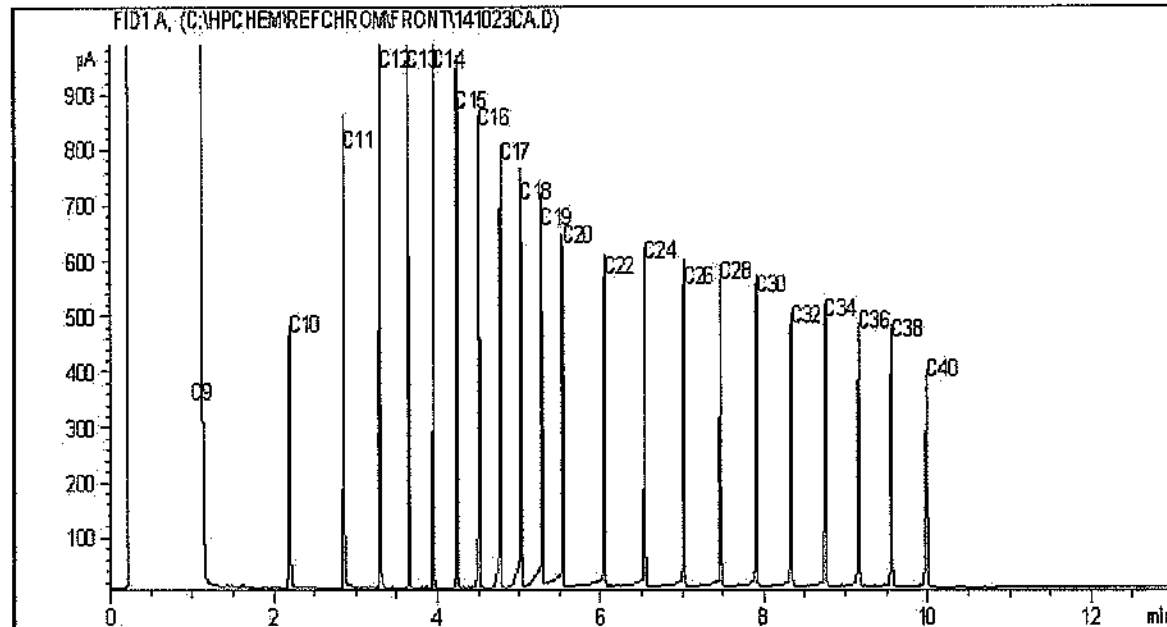
Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print):	Date (YYMMDD):	Time (24:00):
Relinquished By (Signature/Print):	Date (YYMMDD):	Time (24:00):
Special Instructions:	# of Jars Used & Not Submitted	

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



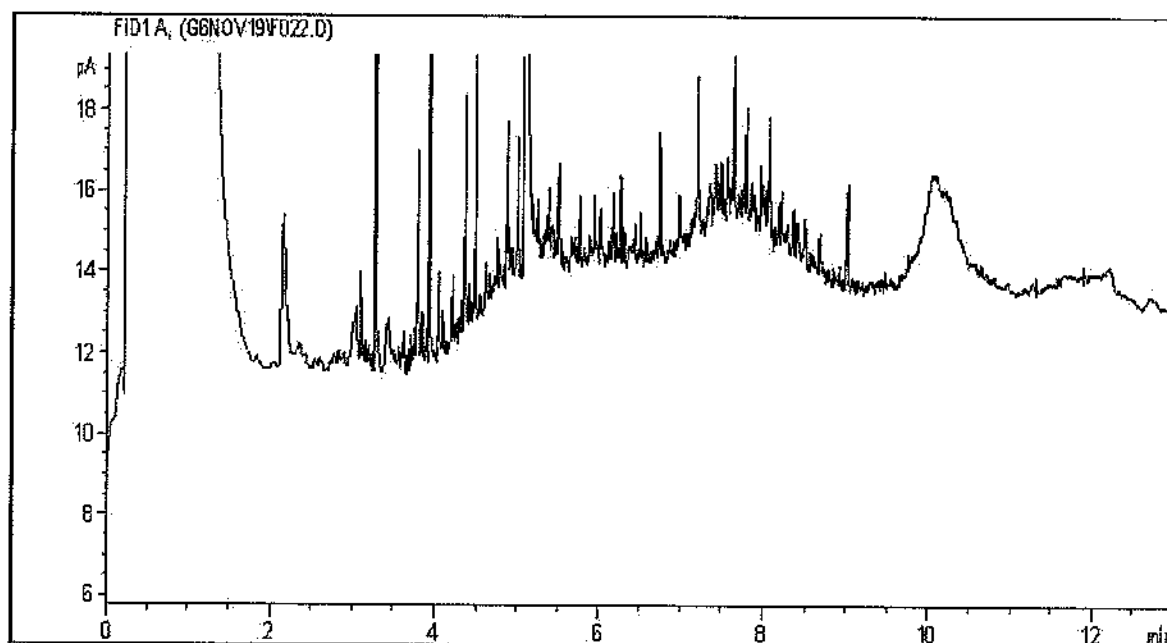
Carbon Range Distribution - Reference Chromatogram



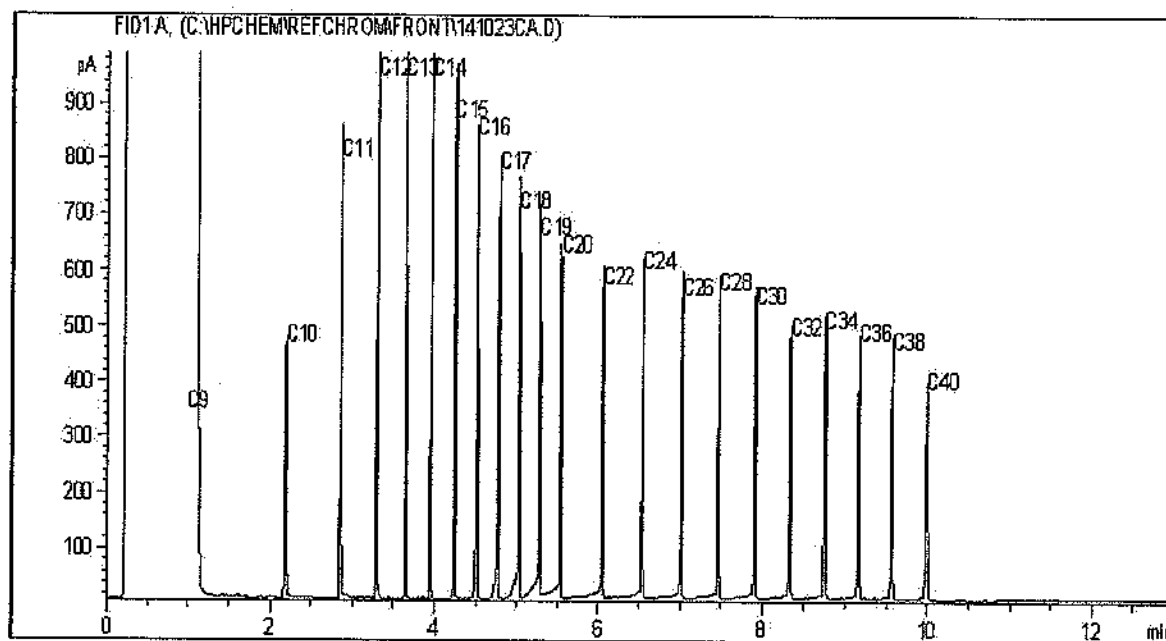
TYPICAL PRODUCT CARBON NUMBER RANGES

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Your Project #: 622653
Site#: BIOFARM
Site Location: SHELL TERMINAL WINNIPEG

Attention: RYAN BREIVIK

SNC-LAVALIN INC.
TORONTO - SHELL
SUITE 200 - 20 DEBOERS DRIVE
TORONTO, ON
CANADA M3J 0H1

Your C.O.C. #: C452220/C452501, 45222003, 45222002, 45250102,
45250101

Report Date: 2014/11/07
Report #: R1679662
Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B496608

Received: 2014/10/24, 11:30

Sample Matrix: Soil
Samples Received: 43

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE Soil LH, VH, F1 SIM/MS (1)	1	2014/10/27	2014/10/29	BBY8SOP-00010, BBY8SOP EPA 8260c R3 m -00011	
BTEX/MTBE Soil LH, VH, F1 SIM/MS (1)	11	2014/10/27	2014/10/30	BBY8SOP-00010, BBY8SOP EPA 8260c R3 m -00011	
BTEX/MTBE Soil LH, VH, F1 SIM/MS (1)	20	2014/10/27	2014/10/31	BBY8SOP-00010, BBY8SOP EPA 8260c R3 m -00011	
BTEX/MTBE Soil LH, VH, F1 SIM/MS (1)	3	2014/10/28	2014/10/30	BBY8SOP-00010, BBY8SOP EPA 8260c R3 m -00011	
BTEX/MTBE Soil LH, VH, F1 SIM/MS (1)	7	2014/10/28	2014/10/31	BBY8SOP-00010, BBY8SOP EPA 8260c R3 m -00011	
Volatile F1-BTEX (1)	1	N/A	2014/10/30	BBY WI-00033	Auto Calc
Volatile F1-BTEX (1)	41	N/A	2014/10/31	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	12	2014/10/27	2014/10/29	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	20	2014/10/27	2014/10/30	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	2	2014/10/28	2014/10/29	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1, 2)	8	2014/10/28	2014/10/30	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F4G in soil) (1)	11	2014/11/04	2014/11/07	BBY8SOP-00003	CCME CWS PHC
CCME Hydrocarbons (F4G in soil) (1)	7	2014/11/05	2014/11/07	BBY8SOP-00003	CCME CWS PHC
Moisture (1)	1	N/A	2014/10/21	BBY8SOP-00017	OMOE E3139 3.1 m
Moisture (1)	31	N/A	2014/10/28	BBY8SOP-00017	OMOE E3139 3.1 m
Moisture (1)	11	N/A	2014/10/29	BBY8SOP-00017	OMOE E3139 3.1 m
Ammonia-N (Available) (1)	40	2014/10/30	2014/10/31	BBY6SOP-00009	SM 22 4500-NH3- G m
Nitrate+Nitrite (N) (Available) (1)	40	N/A	2014/10/31	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) (Available) (soil) (1)	40	2014/10/30	2014/10/31	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N) (1)	40	N/A	2014/10/31		
pH (Soluble) (1)	20	2014/10/29	2014/10/29	BBY6SOP-00025	SM 22 4500-H+ B
pH (Soluble) (1)	20	2014/10/30	2014/10/30	BBY6SOP-00025	SM 22 4500-H+ B

Your Project #: 622653
Site#: BIOFARM
Site Location: SHELL TERMINAL WINNIPEG

Attention: RYAN BREIVIK

SNC-LAVALIN INC.
TORONTO - SHELL
SUITE 200 - 20 DEBOERS DRIVE
TORONTO, ON
CANADA M3J 0H1

Your C.O.C. #: C452220/C452501, 45222003, 45222002, 45250102,
45250101

Report Date: 2014/11/07
Report #: R1679662
Version: 3 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B496608

Received: 2014/10/24, 11:30

Sample Matrix: Soil
Samples Received: 43

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Available Phosphate (1)	40	2014/10/30	2014/10/31	BBY6SOP-00013	SM 22 4500-P E m
Saturated Paste (1)	20	2014/10/29	2014/10/29	BBY6SOP-00030	Carter 2nd 15.2.1 m
Saturated Paste (1)	20	2014/10/30	2014/10/30	BBY6SOP-00030	Carter 2nd 15.2.1 m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Vancouver

(2) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Encryption Key

Janelle Kochan

Janelle Kochan

07 Nov 2014 16:06:06 -06:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Janelle Kochan, B.Sc., Project Manager

Email: JKochan@maxxam.ca

Phone# (204)772-7276 Ext:2209

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		KY4960	KY4961	KY4962	KY4963	KY4964	KY4965		
Sampling Date		2014/10/22 13:30	2014/10/22 13:45	2014/10/22 13:55	2014/10/22 14:00	2014/10/22 14:30	2014/10/22 14:45		
COC Number		45222003	45222003	45222003	45222003	45222003	45222003		
	Units	P1-COMP-1	P1-COMP-2	P1-COMP-3	P1-COMP-4	P1-COMP-5	P2-COMP-1	RDL	QC Batch

ANIONS

Nitrite (N)	mg/kg	0.73	0.55	0.60	<0.50	0.73	0.55	0.50	7701796
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Calculated Parameters

Available (KCl) Nitrate (N)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.4	2.0	7692111
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Nutrients

Available (KCl) Ammonia (N)	mg/kg	7.31	7.74	3.06	6.76	6.73	4.78	0.50	7701933
Nitrate plus Nitrite (N)	ug/g	<2.0	<2.0	<2.0	<2.0	2.1	3.0	2.0	7701791
Available (Bicarb) Orthophosphate (P)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7702236

Soluble Parameters

Soluble pH	pH	7.97	7.86	8.02	7.92	7.97	8.07	N/A	7697564
Saturation %	%	93.5	106	70.1	80.6	77.3	70.7	1.0	7697550

RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam ID		KY4965	KY4966	KY4967	KY4968	KY4969	KY4970		
Sampling Date		2014/10/22 14:45	2014/10/22 14:55	2014/10/22 15:05	2014/10/22 15:20	2014/10/22 15:35	2014/10/22 15:45		
COC Number		45222003	45222003	45222003	45222003	45222003	45222002		
	Units	P2-COMP-1 Lab-Dup	P2-COMP-2	P2-COMP-3	P2-COMP-4	P2-COMP-5	P3-COMP-1	RDL	QC Batch

ANIONS

Nitrite (N)	mg/kg	<0.50	<0.50	<0.50	1.22	<0.50	<0.50	0.50	7701796
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Calculated Parameters

Available (KCl) Nitrate (N)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	2.0	7692111
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Nutrients

Available (KCl) Ammonia (N)	mg/kg	4.42	8.44	5.99	6.05	5.97	5.75	0.50	7701933
Nitrate plus Nitrite (N)	ug/g	2.7	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	7701791
Available (Bicarb) Orthophosphate (P)	ug/g	<0.50	50.7	14.3	5.66	3.87	78.9	0.50	7702236

Soluble Parameters

Soluble pH	pH		7.95	7.95	7.97	8.00	7.78	N/A	7697564
Saturation %	%		76.3	91.8	91.2	88.0	82.1	1.0	7697550

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		KY4970	KY4971	KY4972	KY4973	KY4974	KY4975		
Sampling Date		2014/10/22 15:45	2014/10/22 15:55	2014/10/22 16:05	2014/10/22 16:15	2014/10/22 16:20	2014/10/22 16:45		
COC Number		45222002	45222002	45222002	45222002	45222002	45222002		
	Units	P3-COMP-1 Lab-Dup	P3-COMP-2	P3-COMP-3	P3-COMP-4	P3-COMP-5	P4-COMP-1	RDL	QC Batch

ANIONS									
Nitrite (N)	mg/kg		<0.50	<0.50	<0.50	0.88	0.60	0.50	7701796
Calculated Parameters									
Available (KCl) Nitrate (N)	mg/kg		<2.0	<2.0	<2.0	<2.0	2.8	2.0	7692111
Nutrients									
Available (KCl) Ammonia (N)	mg/kg		5.25	8.07	7.72	11.8	6.21	0.50	7701933
Nitrate plus Nitrite (N)	ug/g		<2.0	<2.0	<2.0	<2.0	3.4	2.0	7701791
Available (Bicarb) Orthophosphate (P)	ug/g		17.4	10.6	19.0	9.67	60.8	0.50	7702236
Soluble Parameters									
Soluble pH	pH	7.82	8.10	8.13	8.06	8.15	7.97	N/A	7697564
Saturation %	%	81.9	92.3	87.2	81.6	79.1	77.2	1.0	7697550
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									
N/A = Not Applicable									

Maxxam ID		KY4976	KY4977		KY4978	KY4979			KY4980		
Sampling Date		2014/10/22 16:55	2014/10/22 17:05		2014/10/22 17:20	2014/10/22 17:25			2014/10/23 11:05		
COC Number		45222002	45222002		45222002	45222002			45250102		
	Units	P4-COMP-2	P4-COMP-3	RDL	P4-COMP-4	P4-COMP-5	RDL	QC Batch	P5-COMP-1	RDL	QC Batch

ANIONS											
Nitrite (N)	mg/kg	<0.50	0.92	0.50	0.60	0.77	0.50	7701796	1.02	0.50	7702222
Calculated Parameters											
Available (KCl) Nitrate (N)	mg/kg	<2.0	<2.0	2.0	<2.0	<2.0	2.0	7692111	<2.0	2.0	7692111
Nutrients											
Available (KCl) Ammonia (N)	mg/kg	6.13	8.53	0.50	3.38	5.96	0.50	7701933	6.15	0.50	7702320
Nitrate plus Nitrite (N)	ug/g	<2.0	2.8	2.0	2.6	2.6	2.0	7701791	2.4	2.0	7702216
Available (Bicarb) Orthophosphate (P)	ug/g	13.8	65.8	0.50	155	269	5.0	7702236	39.0	0.50	7702361
Soluble Parameters											
Soluble pH	pH	8.15	7.87	N/A	7.97	7.84	N/A	7697564	7.98	N/A	7699316
Saturation %	%	77.3	83.9	1.0	72.7	76.8	1.0	7697550	90.6	1.0	7699310
RDL = Reportable Detection Limit											
N/A = Not Applicable											

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		KY4980	KY4981	KY4982	KY4983	KY4984	KY4985		
Sampling Date		2014/10/23 11:05	2014/10/23 11:10	2014/10/23 11:15	2014/10/23 11:25	2014/10/23 11:30	2014/10/23 12:00		
COC Number		45250102	45250102	45250102	45250102	45250102	45250102		
	Units	P5-COMP-1 Lab-Dup	P5-COMP-2	P5-COMP-3	P5-COMP-4	P5-COMP-5	P6-COMP-1	RDL	QC Batch

ANIONS

Nitrite (N)	mg/kg		<0.50	<0.50	0.52	<0.50	<0.50	0.50	7702222
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Calculated Parameters

Available (KCl) Nitrate (N)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	2.0	7692111
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Nutrients

Available (KCl) Ammonia (N)	mg/kg		9.34	5.49	10.6	15.9	10.6	0.50	7702320
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Nitrate plus Nitrite (N)	ug/g		<2.0	<2.0	<2.0	<2.0	<2.0	2.0	7702216
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Available (Bicarb) Orthophosphate (P)	ug/g		15.2	9.52	10.0	9.37	20.4	0.50	7702361
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Soluble Parameters

Soluble pH	pH	7.97	7.99	8.13	8.05	8.08	8.07	N/A	7699316
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Saturation %	%	90.0	86.8	96.8	85.8	98.1	84.0	1.0	7699310
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RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam ID		KY4986	KY4987	KY4988	KY4989	KY4990	KY4990		
Sampling Date		2014/10/23 12:05	2014/10/23 12:10	2014/10/23 12:25	2014/10/23 12:35	2014/10/23 12:45	2014/10/23 12:45		
COC Number		45250102	45250102	45250102	45250102	45250101	45250101		
	Units	P6-COMP-2	P6-COMP-3	P6-COMP-4	P6-COMP-5	F-COMP-1	F-COMP-1 Lab-Dup	RDL	QC Batch

ANIONS

Nitrite (N)	mg/kg	0.57	<0.50	0.57	<0.50	0.56	<0.50	0.50	7702222
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Calculated Parameters

Available (KCl) Nitrate (N)	mg/kg	<2.0	<2.0	<2.0	<2.0	16		2.0	7692111
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Nutrients

Available (KCl) Ammonia (N)	mg/kg	6.28	5.43	5.42	3.92	6.11	5.98	0.50	7702320
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Nitrate plus Nitrite (N)	ug/g	<2.0	<2.0	<2.0	<2.0	16.2	16.1	2.0	7702216
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Available (Bicarb) Orthophosphate (P)	ug/g	4.15	4.87	4.88	8.07	15.5	15.1	0.50	7702361
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Soluble Parameters

Soluble pH	pH	8.19	8.22	8.23	8.22	8.11		N/A	7699316
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Saturation %	%	89.2	86.8	88.3	80.6	71.5		1.0	7699310
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RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		KY4991	KY4992	KY4993	KY4994	KY4995	KY4996		
Sampling Date		2014/10/23 12:50	2014/10/23 12:55	2014/10/23 13:00	2014/10/23 13:10	2014/10/23 13:30	2014/10/23 13:45		
COC Number		45250101	45250101	45250101	45250101	45250101	45250101		
	Units	F-COMP-2	F-COMP-3	F-COMP-4	F-COMP-5	WF-COMP-1	WF-COMP-2	RDL	QC Batch
ANIONS									
Nitrite (N)	mg/kg	0.52	<0.50	<0.50	<0.50	<0.50	0.61	0.50	7702222
Calculated Parameters									
Available (KCl) Nitrate (N)	mg/kg	11	6.4	<2.0	<2.0	2.6	<2.0	2.0	7692111
Nutrients									
Available (KCl) Ammonia (N)	mg/kg	7.86	8.22	8.28	10.6	5.65	9.57	0.50	7702320
Nitrate plus Nitrite (N)	ug/g	11.2	6.4	<2.0	<2.0	2.6	<2.0	2.0	7702216
Available (Bicarb) Orthophosphate (P)	ug/g	12.9	11.9	14.3	8.13	110	5.15	0.50	7702361
Soluble Parameters									
Soluble pH	pH	8.05	8.16	8.01	8.12	7.93	7.73	N/A	7699316
Saturation %	%	74.6	74.1	83.7	82.8	80.0	100	1.0	7699310
RDL = Reportable Detection Limit									
N/A = Not Applicable									

Maxxam ID		KY4997	KY4998	KY4999		
Sampling Date		2014/10/23 13:55	2014/10/23 14:20	2014/10/23 14:45		
COC Number		45250101	45250101	45250101		
	Units	WF-COMP-3	WF-COMP-4	WF-COMP-5	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/kg	<0.50	<0.50	<0.50	0.50	7702222
Calculated Parameters						
Available (KCl) Nitrate (N)	mg/kg	<2.0	<2.0	<2.0	2.0	7692111
Nutrients						
Available (KCl) Ammonia (N)	mg/kg	10.0	8.40	7.83	0.50	7702320
Nitrate plus Nitrite (N)	ug/g	<2.0	<2.0	<2.0	2.0	7702216
Available (Bicarb) Orthophosphate (P)	ug/g	5.89	3.73	2.98	0.50	7702361
Soluble Parameters						
Soluble pH	pH	7.73	7.87	7.94	N/A	7699316
Saturation %	%	89.3	94.7	85.9	1.0	7699310
RDL = Reportable Detection Limit						
N/A = Not Applicable						

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KY4960	KY4960	KY4961	KY4962	KY4963	KY4964		
Sampling Date		2014/10/22 13:30	2014/10/22 13:30	2014/10/22 13:45	2014/10/22 13:55	2014/10/22 14:00	2014/10/22 14:30		
COC Number		45222003	45222003	45222003	45222003	45222003	45222003		
	Units	P1-COMP-1	P1-COMP-1 Lab-Dup	P1-COMP-2	P1-COMP-3	P1-COMP-4	P1-COMP-5	RDL	QC Batch

Ext. Pet. Hydrocarbon

F2 (C10-C16 Hydrocarbons)	mg/kg	43	23	84	120	77	89	10	7698404
F3 (C16-C34 Hydrocarbons)	mg/kg	1100	1300	1400	4000	1000	2100	10	7698404
F4 (C34-C50 Hydrocarbons)	mg/kg	230	340	250	940	230	670	10	7698404
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	Yes	N/A	7698404

Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	104	108	102	92	106	93		7698404
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RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam ID		KY4965		KY4966	KY4967	KY4967		KY4968		
Sampling Date		2014/10/22 14:45		2014/10/22 14:55	2014/10/22 15:05	2014/10/22 15:05		2014/10/22 15:20		
COC Number		45222003		45222003	45222003	45222003		45222003		
	Units	P2-COMP-1	QC Batch	P2-COMP-2	P2-COMP-3	P2-COMP-3 Lab-Dup	QC Batch	P2-COMP-4	RDL	QC Batch

Ext. Pet. Hydrocarbon

F2 (C10-C16 Hydrocarbons)	mg/kg	61	7698404	240	<10		7698925	<10	10	7698404
F3 (C16-C34 Hydrocarbons)	mg/kg	4300	7698404	5100	360		7698925	89	10	7698404
F4 (C34-C50 Hydrocarbons)	mg/kg	1400	7698404	1800	140		7698925	31	10	7698404
Reached Baseline at C50	mg/kg	Yes	7698404	Yes	No		7698925	Yes	N/A	7698404

OIL & GREASE

F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg				950	830	7706090		100	
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Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	87	7698404	103	101		7698925	92		7698404
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RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KY4969		KY4970		KY4971	KY4971		
Sampling Date		2014/10/22 15:35		2014/10/22 15:45		2014/10/22 15:55	2014/10/22 15:55		
COC Number		45222003		45222002		45222002	45222002		
	Units	P2-COMP-5	QC Batch	P3-COMP-1	QC Batch	P3-COMP-2	P3-COMP-2 Lab-Dup	RDL	QC Batch

Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	7698404	68	7698925	640	430	10	7698840
F3 (C16-C34 Hydrocarbons)	mg/kg	49	7698404	7400	7698925	7300	5000	10	7698840
F4 (C34-C50 Hydrocarbons)	mg/kg	15	7698404	2600	7698925	1500	1000	10	7698840
Reached Baseline at C50	mg/kg	Yes	7698404	Yes	7698925	Yes	Yes	N/A	7698840

Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	104	7698404	113	7698925	78	87		7698840
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RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam ID		KY4972	KY4973		KY4974	KY4975		KY4976		
Sampling Date		2014/10/22 16:05	2014/10/22 16:15		2014/10/22 16:20	2014/10/22 16:45		2014/10/22 16:55		
COC Number		45222002	45222002		45222002	45222002		45222002		
	Units	P3-COMP-3	P3-COMP-4	QC Batch	P3-COMP-5	P4-COMP-1	QC Batch	P4-COMP-2	RDL	QC Batch

Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/kg	920	21	7698925	<10	310	7698840	<10	10	7698925
F3 (C16-C34 Hydrocarbons)	mg/kg	9400	700	7698925	87	4500	7698840	270	10	7698925
F4 (C34-C50 Hydrocarbons)	mg/kg	2000	220	7698925	25	1300	7698840	110	10	7698925
Reached Baseline at C50	mg/kg	Yes	No	7698925	Yes	Yes	7698840	No	N/A	7698925

OIL & GREASE

F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg		1100	7706090				5700	100	7706090
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Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	109	104	7698925	93	114	7698840	99		7698925
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RDL = Reportable Detection Limit

N/A = Not Applicable

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KY4977	KY4978	KY4979	KY4980		KY4981		
Sampling Date		2014/10/22 17:05	2014/10/22 17:20	2014/10/22 17:25	2014/10/23 11:05		2014/10/23 11:10		
COC Number		45222002	45222002	45222002	45250102		45250102		
	Units	P4-COMP-3	P4-COMP-4	P4-COMP-5	P5-COMP-1	QC Batch	P5-COMP-2	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	34	170	600	7698925	82	10	7698840
F3 (C16-C34 Hydrocarbons)	mg/kg	170	560	2700	14000	7698925	2500	10	7698840
F4 (C34-C50 Hydrocarbons)	mg/kg	110	220	740	2800	7698925	590	10	7698840
Reached Baseline at C50	mg/kg	No	No	Yes	Yes	7698925	Yes	N/A	7698840
OIL & GREASE									
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	2800	2100			7706090		100	
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	96	101	109	115	7698925	99		7698840
RDL = Reportable Detection Limit N/A = Not Applicable									

Maxxam ID		KY4982			KY4983		KY4984		KY4985		
Sampling Date		2014/10/23 11:15			2014/10/23 11:25		2014/10/23 11:30		2014/10/23 12:00		
COC Number		45250102			45250102		45250102		45250102		
	Units	P5-COMP-3	RDL	QC Batch	P5-COMP-4	QC Batch	P5-COMP-5	QC Batch	P6-COMP-1	RDL	QC Batch
Ext. Pet. Hydrocarbon											
F2 (C10-C16 Hydrocarbons)	mg/kg	2000 (1)	30	7698925	53	7698840	<10	7698925	59	10	7698840
F3 (C16-C34 Hydrocarbons)	mg/kg	18000 (1)	30	7698925	340	7698840	78	7698925	2400	10	7698840
F4 (C34-C50 Hydrocarbons)	mg/kg	3000 (1)	30	7698925	63	7698840	32	7698925	660	10	7698840
Reached Baseline at C50	mg/kg	Yes	N/A	7698925	No	7698840	Yes	7698925	Yes	N/A	7698840
OIL & GREASE											
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg				810	7706090				100	7706090
Surrogate Recovery (%)											
O-TERPHENYL (sur.)	%	110		7698925	99	7698840	90	7698925	107		7698840
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.											

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KY4986	KY4987	KY4988	KY4989		KY4990	KY4991		
Sampling Date		2014/10/23 12:05	2014/10/23 12:10	2014/10/23 12:25	2014/10/23 12:35		2014/10/23 12:45	2014/10/23 12:50		
COC Number		45250102	45250102	45250102	45250102		45250101	45250101		
	Units	P6-COMP-2	P6-COMP-3	P6-COMP-4	P6-COMP-5	QC Batch	F-COMP-1	F-COMP-2	RDL	QC Batch

Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	7698840	63	250	10	7698925
F3 (C16-C34 Hydrocarbons)	mg/kg	34	79	31	210	7698840	570	1000	10	7698925
F4 (C34-C50 Hydrocarbons)	mg/kg	20	35	17	70	7698840	130	130	10	7698925
Reached Baseline at C50	mg/kg	No	No	No	No	7698840	No	Yes	N/A	7698925

OIL & GREASE										
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	630	640	490	1000	7706090	4400		100	7706090
Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	104	96	84	96	7698840	111	111		7698925

RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam ID		KY4992		KY4993	KY4993		KY4994	KY4996		
Sampling Date		2014/10/23 12:55		2014/10/23 13:00	2014/10/23 13:00		2014/10/23 13:10	2014/10/23 13:45		
COC Number		45250101		45250101	45250101		45250101	45250101		
	Units	F-COMP-3	QC Batch	F-COMP-4	F-COMP-4 Lab-Dup	QC Batch	F-COMP-5	WF-COMP-2	RDL	QC Batch

Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/kg	350	7698840	<10		7698925	<10	<10	10	7698840
F3 (C16-C34 Hydrocarbons)	mg/kg	880	7698840	93		7698925	70	73	10	7698840
F4 (C34-C50 Hydrocarbons)	mg/kg	120	7698840	45		7698925	30	35	10	7698840
Reached Baseline at C50	mg/kg	Yes	7698840	No		7698925	No	No	N/A	7698840

OIL & GREASE										
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg			1100	1100	7708196	620	1100	100	7708196
Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	113	7698840	110		7698925	94	90		7698840

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KY4997	KY4998		KY4999		KY5000	KY5001		
Sampling Date		2014/10/23 13:55	2014/10/23 14:20		2014/10/23 14:45		2014/10/22 17:20	2014/10/23 11:05		
COC Number		45250101	45250101		45250101		45222003	45222003		
	Units	WF-COMP-3	WF-COMP-4	QC Batch	WF-COMP-5	QC Batch	FD1	FD2	RDL	QC Batch

Ext. Pet. Hydrocarbon

F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	7698840	<10	7698925	<10	420	10	7698840
F3 (C16-C34 Hydrocarbons)	mg/kg	78	50	7698840	45	7698925	190	7900	10	7698840
F4 (C34-C50 Hydrocarbons)	mg/kg	32	27	7698840	29	7698925	66	1500	10	7698840
Reached Baseline at C50	mg/kg	No	No	7698840	No	7698925	No	Yes	N/A	7698840

OIL & GREASE

F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	780	650	7708196	480	7708196	1800		100	7708196
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Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	94	89	7698840	99	7698925	88	103		7698840
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RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam ID		KY5002		
Sampling Date		2014/10/23 12:00		
COC Number		45222003		
	Units	FD3	RDL	QC Batch

Ext. Pet. Hydrocarbon

F2 (C10-C16 Hydrocarbons)	mg/kg	79	10	7698840
F3 (C16-C34 Hydrocarbons)	mg/kg	3000	10	7698840
F4 (C34-C50 Hydrocarbons)	mg/kg	850	10	7698840
Reached Baseline at C50	mg/kg	Yes	N/A	7698840

Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	92		7698840
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RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam Job #: B496608
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SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
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PHYSICAL TESTING (SOIL)

Maxxam ID		KY4960		KY4961	KY4962		KY4963	KY4964		
Sampling Date		2014/10/22 13:30		2014/10/22 13:45	2014/10/22 13:55		2014/10/22 14:00	2014/10/22 14:30		
COC Number		45222003		45222003	45222003		45222003	45222003		
	Units	P1-COMP-1	QC Batch	P1-COMP-2	P1-COMP-3	QC Batch	P1-COMP-4	P1-COMP-5	RDL	QC Batch

Physical Properties										
Moisture	%	26	7694806	27	20	7693913	21	18	0.30	7693920
RDL = Reportable Detection Limit										

Maxxam ID		KY4965	KY4966	KY4967	KY4968	KY4969	KY4970	KY4971		
Sampling Date		2014/10/22 14:45	2014/10/22 14:55	2014/10/22 15:05	2014/10/22 15:20	2014/10/22 15:35	2014/10/22 15:45	2014/10/22 15:55		
COC Number		45222003	45222003	45222003	45222003	45222003	45222002	45222002		
	Units	P2-COMP-1	P2-COMP-2	P2-COMP-3	P2-COMP-4	P2-COMP-5	P3-COMP-1	P3-COMP-2	RDL	QC Batch

Physical Properties										
Moisture	%	21	19	17	25	19	7.0	27	0.30	7693920
RDL = Reportable Detection Limit										

Maxxam ID		KY4972	KY4973	KY4974	KY4975		KY4976	KY4976		
Sampling Date		2014/10/22 16:05	2014/10/22 16:15	2014/10/22 16:20	2014/10/22 16:45		2014/10/22 16:55	2014/10/22 16:55		
COC Number		45222002	45222002	45222002	45222002		45222002	45222002		
	Units	P3-COMP-3	P3-COMP-4	P3-COMP-5	P4-COMP-1	QC Batch	P4-COMP-2	P4-COMP-2 Lab-Dup	RDL	QC Batch

Physical Properties										
Moisture	%	27	21	22	17	7693930	21	21	0.30	7693920
RDL = Reportable Detection Limit										
Lab-Dup = Laboratory Initiated Duplicate										

Maxxam ID		KY4977	KY4978	KY4979		KY4980		KY4981		
Sampling Date		2014/10/22 17:05	2014/10/22 17:20	2014/10/22 17:25		2014/10/23 11:05		2014/10/23 11:10		
COC Number		45222002	45222002	45222002		45250102		45250102		
	Units	P4-COMP-3	P4-COMP-4	P4-COMP-5	QC Batch	P5-COMP-1	QC Batch	P5-COMP-2	RDL	QC Batch

Physical Properties										
Moisture	%	21	23	22	7693913	20	7693920	21	0.30	7693913
RDL = Reportable Detection Limit										

PHYSICAL TESTING (SOIL)

Maxxam ID		KY4982		KY4983		KY4984		KY4985	KY4986		
Sampling Date		2014/10/23 11:15		2014/10/23 11:25		2014/10/23 11:30		2014/10/23 12:00	2014/10/23 12:05		
COC Number		45250102		45250102		45250102		45250102	45250102		
	Units	P5-COMP-3	QC Batch	P5-COMP-4	QC Batch	P5-COMP-5	QC Batch	P6-COMP-1	P6-COMP-2	RDL	QC Batch

Physical Properties											
Moisture	%	22	7693920	27	7693930	27	7693920	19	18	0.30	7693930
RDL = Reportable Detection Limit											

Maxxam ID		KY4986		KY4987		KY4988	KY4989		KY4990		
Sampling Date		2014/10/23 12:05		2014/10/23 12:10		2014/10/23 12:25	2014/10/23 12:35		2014/10/23 12:45		
COC Number		45250102		45250102		45250102	45250102		45250101		
	Units	P6-COMP-2 Lab-Dup	QC Batch	P6-COMP-3	QC Batch	P6-COMP-4	P6-COMP-5	QC Batch	F-COMP-1	RDL	QC Batch

Physical Properties											
Moisture	%	18	7693930	22	7693920	17	19	7693930	20	0.30	7693920
RDL = Reportable Detection Limit											
Lab-Dup = Laboratory Initiated Duplicate											

Maxxam ID		KY4991	KY4992	KY4993		KY4994		KY4995		
Sampling Date		2014/10/23 12:50	2014/10/23 12:55	2014/10/23 13:00		2014/10/23 13:10		2014/10/23 13:30		
COC Number		45250101	45250101	45250101		45250101		45250101		
	Units	F-COMP-2	F-COMP-3	F-COMP-4	QC Batch	F-COMP-5	QC Batch	WF-COMP-1	RDL	QC Batch

Physical Properties										
Moisture	%	20	17	22	7693920	24	7693930	19	0.30	7704601
RDL = Reportable Detection Limit										

Maxxam ID		KY4996		KY4997		KY4998	KY4998		
Sampling Date		2014/10/23 13:45		2014/10/23 13:55		2014/10/23 14:20	2014/10/23 14:20		
COC Number		45250101		45250101		45250101	45250101		
	Units	WF-COMP-2	QC Batch	WF-COMP-3	QC Batch	WF-COMP-4	WF-COMP-4 Lab-Dup	RDL	QC Batch

Physical Properties									
Moisture	%	29	7693913	30	7693920	21	22	0.30	7693913
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									

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PHYSICAL TESTING (SOIL)

Maxxam ID		KY4999		KY5000		KY5001		KY5002		
Sampling Date		2014/10/23 14:45		2014/10/22 17:20		2014/10/23 11:05		2014/10/23 12:00		
COC Number		45250101		45222003		45222003		45222003		
	Units	WF-COMP-5	QC Batch	FD1	QC Batch	FD2	QC Batch	FD3	RDL	QC Batch
Physical Properties										
Moisture	%	28	7693920	20	7693913	20	7693896	19	0.30	7693913
RDL = Reportable Detection Limit										

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY4960	KY4961	KY4962	KY4963		KY4964		
Sampling Date		2014/10/22 13:30	2014/10/22 13:45	2014/10/22 13:55	2014/10/22 14:00		2014/10/22 14:30		
COC Number		45222003	45222003	45222003	45222003		45222003		
	Units	P1-COMP-1	P1-COMP-2	P1-COMP-3	P1-COMP-4	QC Batch	P1-COMP-5	RDL	QC Batch
Calculated Parameters									
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	7691486	<10	10	7691486
Volatiles									
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	7700764	<0.0050	0.0050	7701637
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	7700764	<0.020	0.020	7701637
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	7700764	<0.010	0.010	7701637
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	7700764	<0.040	0.040	7701637
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	7700764	<0.040	0.040	7701637
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	7700764	<0.040	0.040	7701637
(C6-C10)	mg/kg	<10	<10	<10	<10	7700764	<10	10	7701637
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	104	104	105	104	7700764	105		7701637
4-Bromofluorobenzene (sur.)	%	106	105	105	105	7700764	98		7701637
D10-ETHYLBENZENE (sur.)	%	94	91	88	89	7700764	89		7701637
D4-1,2-Dichloroethane (sur.)	%	97	95	95	94	7700764	106		7701637
RDL = Reportable Detection Limit									

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY4964		KY4965	KY4966	KY4967		KY4968		
Sampling Date		2014/10/22 14:30		2014/10/22 14:45	2014/10/22 14:55	2014/10/22 15:05		2014/10/22 15:20		
COC Number		45222003		45222003	45222003	45222003		45222003		
	Units	P1-COMP-5 Lab-Dup	QC Batch	P2-COMP-1	P2-COMP-2	P2-COMP-3	QC Batch	P2-COMP-4	RDL	QC Batch

Calculated Parameters										
F1 (C6-C10) - BTEX	mg/kg		7691486	<10	<10	<10	7691486	<10	10	7691486
Volatiles										
Benzene	mg/kg	<0.0050	7701637	<0.0050	<0.0050	<0.0050	7700764	<0.0050	0.0050	7700877
Toluene	mg/kg	<0.020	7701637	<0.020	<0.020	<0.020	7700764	<0.020	0.020	7700877
Ethylbenzene	mg/kg	<0.010	7701637	<0.010	<0.010	<0.010	7700764	<0.010	0.010	7700877
m & p-Xylene	mg/kg	<0.040	7701637	<0.040	<0.040	<0.040	7700764	<0.040	0.040	7700877
o-Xylene	mg/kg	<0.040	7701637	<0.040	<0.040	<0.040	7700764	<0.040	0.040	7700877
Xylenes (Total)	mg/kg	<0.040	7701637	<0.040	<0.040	<0.040	7700764	<0.040	0.040	7700877
(C6-C10)	mg/kg	<10	7701637	<10	<10	<10	7700764	<10	10	7700877
Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	105	7701637	106	105	104	7700764	98		7700877
4-Bromofluorobenzene (sur.)	%	99	7701637	105	104	105	7700764	100		7700877
D10-ETHYLBENZENE (sur.)	%	90	7701637	88	88	89	7700764	112		7700877
D4-1,2-Dichloroethane (sur.)	%	108	7701637	97	96	95	7700764	112		7700877

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY4969	KY4970	KY4971	KY4972	KY4973		
Sampling Date		2014/10/22 15:35	2014/10/22 15:45	2014/10/22 15:55	2014/10/22 16:05	2014/10/22 16:15		
COC Number		45222003	45222002	45222002	45222002	45222002		
	Units	P2-COMP-5	P3-COMP-1	P3-COMP-2	P3-COMP-3	P3-COMP-4	RDL	QC Batch
Calculated Parameters								
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	<10	10	7691486
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7700764
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7700764
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7700764
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700764
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700764
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700764
(C6-C10)	mg/kg	<10	<10	<10	<10	<10	10	7700764
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	104	106	106	105	105		7700764
4-Bromofluorobenzene (sur.)	%	105	103	104	104	104		7700764
D10-ETHYLBENZENE (sur.)	%	92	88	92	90	92		7700764
D4-1,2-Dichloroethane (sur.)	%	96	99	101	94	95		7700764
RDL = Reportable Detection Limit								

Maxxam Job #: B496608

Report Date: 2014/11/07

SNC-LAVALIN INC.

Client Project #: 622653

Site Location: SHELL TERMINAL WINNIPEG

Sampler Initials: SP

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY4974	KY4975	KY4976	KY4977	KY4978	KY4979		
Sampling Date		2014/10/22 16:20	2014/10/22 16:45	2014/10/22 16:55	2014/10/22 17:05	2014/10/22 17:20	2014/10/22 17:25		
COC Number		45222002	45222002	45222002	45222002	45222002	45222002		
	Units	P3-COMP-5	P4-COMP-1	P4-COMP-2	P4-COMP-3	P4-COMP-4	P4-COMP-5	RDL	QC Batch

Calculated Parameters									
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	<10	<10	10	7691486

Volatiles									
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7700769
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7700769
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7700769
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700769
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700769
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700769
(C6-C10)	mg/kg	<10	<10	<10	<10	<10	<10	10	7700769

Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	103	104	103	104	102	103		7700769
4-Bromofluorobenzene (sur.)	%	108	107	107	106	108	106		7700769
D10-ETHYLBENZENE (sur.)	%	99	93	87	94	92	91		7700769
D4-1,2-Dichloroethane (sur.)	%	96	98	96	99	97	97		7700769

RDL = Reportable Detection Limit

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY4980	KY4980		KY4981	KY4982	KY4983		
Sampling Date		2014/10/23 11:05	2014/10/23 11:05		2014/10/23 11:10	2014/10/23 11:15	2014/10/23 11:25		
COC Number		45250102	45250102		45250102	45250102	45250102		
	Units	P5-COMP-1	P5-COMP-1 Lab-Dup	QC Batch	P5-COMP-2	P5-COMP-3	P5-COMP-4	RDL	QC Batch
Calculated Parameters									
F1 (C6-C10) - BTEX	mg/kg	<10		7691486	<10	<10	<10	10	7691486
Volatiles									
Benzene	mg/kg	<0.0050	<0.0050	7698081	<0.0050	<0.0050	<0.0050	0.0050	7700769
Toluene	mg/kg	<0.020	<0.020	7698081	<0.020	<0.020	<0.020	0.020	7700769
Ethylbenzene	mg/kg	<0.010	<0.010	7698081	<0.010	<0.010	<0.010	0.010	7700769
m & p-Xylene	mg/kg	<0.040	<0.040	7698081	<0.040	<0.040	<0.040	0.040	7700769
o-Xylene	mg/kg	<0.040	<0.040	7698081	<0.040	<0.040	<0.040	0.040	7700769
Xylenes (Total)	mg/kg	<0.040	<0.040	7698081	<0.040	<0.040	<0.040	0.040	7700769
(C6-C10)	mg/kg	<10	<10	7698081	<10	<10	<10	10	7700769
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	105	106	7698081	102	103	102		7700769
4-Bromofluorobenzene (sur.)	%	98	99	7698081	105	108	106		7700769
D10-ETHYLBENZENE (sur.)	%	96	93	7698081	94	91	98		7700769
D4-1,2-Dichloroethane (sur.)	%	100	100	7698081	99	99	99		7700769
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY4984	KY4985	KY4986	KY4987	KY4988	KY4989		
Sampling Date		2014/10/23 11:30	2014/10/23 12:00	2014/10/23 12:05	2014/10/23 12:10	2014/10/23 12:25	2014/10/23 12:35		
COC Number		45250102	45250102	45250102	45250102	45250102	45250102		
	Units	P5-COMP-5	P6-COMP-1	P6-COMP-2	P6-COMP-3	P6-COMP-4	P6-COMP-5	RDL	QC Batch
Calculated Parameters									
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	<10	<10	10	7691486
Volatiles									
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7700769
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7700769
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7700769
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700769
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700769
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700769
(C6-C10)	mg/kg	<10	<10	<10	<10	<10	<10	10	7700769
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	102	104	103	103	103	102		7700769
4-Bromofluorobenzene (sur.)	%	108	107	109	107	108	107		7700769
D10-ETHYLBENZENE (sur.)	%	96	92	97	94	95	97		7700769
D4-1,2-Dichloroethane (sur.)	%	96	96	95	96	97	99		7700769
RDL = Reportable Detection Limit									

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
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Sampler Initials: SP

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY4990	KY4991		KY4992		KY4993	KY4994		
Sampling Date		2014/10/23 12:45	2014/10/23 12:50		2014/10/23 12:55		2014/10/23 13:00	2014/10/23 13:10		
COC Number		45250101	45250101		45250101		45250101	45250101		
	Units	F-COMP-1	F-COMP-2	QC Batch	F-COMP-3	QC Batch	F-COMP-4	F-COMP-5	RDL	QC Batch
Calculated Parameters										
F1 (C6-C10) - BTEX	mg/kg	<10	<10	7691486	<10	7691486	<10	<10	10	7691486
Volatiles										
Benzene	mg/kg	0.0059	0.013	7700769	0.017	7700911	<0.0050	<0.0050	0.0050	7700764
Toluene	mg/kg	<0.020	<0.020	7700769	<0.020	7700911	<0.020	<0.020	0.020	7700764
Ethylbenzene	mg/kg	<0.010	<0.010	7700769	0.014	7700911	<0.010	<0.010	0.010	7700764
m & p-Xylene	mg/kg	<0.040	<0.040	7700769	<0.040	7700911	<0.040	<0.040	0.040	7700764
o-Xylene	mg/kg	<0.040	<0.040	7700769	<0.040	7700911	<0.040	<0.040	0.040	7700764
Xylenes (Total)	mg/kg	<0.040	<0.040	7700769	<0.040	7700911	<0.040	<0.040	0.040	7700764
(C6-C10)	mg/kg	<10	<10	7700769	<10	7700911	<10	<10	10	7700764
Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	103	102	7700769	102	7700911	104	105		7700764
4-Bromofluorobenzene (sur.)	%	106	107	7700769	109	7700911	106	105		7700764
D10-ETHYLBENZENE (sur.)	%	94	94	7700769	96	7700911	92	95		7700764
D4-1,2-Dichloroethane (sur.)	%	102	97	7700769	96	7700911	93	96		7700764
RDL = Reportable Detection Limit										

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY4996	KY4997	KY4998	KY4999	KY5000	KY5001		
Sampling Date		2014/10/23 13:45	2014/10/23 13:55	2014/10/23 14:20	2014/10/23 14:45	2014/10/22 17:20	2014/10/23 11:05		
COC Number		45250101	45250101	45250101	45250101	45222003	45222003		
	Units	WF-COMP-2	WF-COMP-3	WF-COMP-4	WF-COMP-5	FD1	FD2	RDL	QC Batch
Calculated Parameters									
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	<10	<10	10	7691486
Volatiles									
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7700911
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7700911
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7700911
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700911
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700911
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7700911
(C6-C10)	mg/kg	<10	<10	<10	<10	<10	<10	10	7700911
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	101	101	102	100	100	103		7700911
4-Bromofluorobenzene (sur.)	%	108	109	107	109	108	108		7700911
D10-ETHYLBENZENE (sur.)	%	97	99	98	100	94	97		7700911
D4-1,2-Dichloroethane (sur.)	%	98	99	99	101	100	99		7700911
RDL = Reportable Detection Limit									

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		KY5002		
Sampling Date		2014/10/23 12:00		
COC Number		45222003		
	Units	FD3	RDL	QC Batch
Calculated Parameters				
F1 (C6-C10) - BTEX	mg/kg	<10	10	7691486
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	7700911
Toluene	mg/kg	<0.020	0.020	7700911
Ethylbenzene	mg/kg	<0.010	0.010	7700911
m & p-Xylene	mg/kg	<0.040	0.040	7700911
o-Xylene	mg/kg	<0.040	0.040	7700911
Xylenes (Total)	mg/kg	<0.040	0.040	7700911
(C6-C10)	mg/kg	<10	10	7700911
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	102		7700911
4-Bromofluorobenzene (sur.)	%	106		7700911
D10-ETHYLBENZENE (sur.)	%	98		7700911
D4-1,2-Dichloroethane (sur.)	%	103		7700911
RDL = Reportable Detection Limit				

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

GENERAL COMMENTS

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

Package 1	8.2°C
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Sample KY4960-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4961-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4962-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4963-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4964-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4965-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4966-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4967-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4968-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4969-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4970-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4971-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4972-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4973-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4974-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4975-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4976-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4977-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4978-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4979-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4980-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4981-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4982-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4983-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4984-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

SNC-LAVALIN INC.
Client Project #: 622653
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GENERAL COMMENTS

Sample KY4985-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4986-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4987-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4988-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4990-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4991-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4992-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4993-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4994-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4995-01 : Sample extracted past recommended hold time (7 days) for Volatiles - Pot. Low bias

Sample KY4996-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4997-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4998-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY4999-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY5000-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY5001-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Sample KY5002-01 : Sample extracted past 48 hours from receipt of sample but within the 7 day extraction holdtime for Volatiles.

Results relate only to the items tested.

Maxxam Job #: B496608
Report Date: 2014/11/07

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7693896	AP8	RPD	Moisture	2014/10/28	5.1		%	20
7693913	AP8	RPD [KY4998-01]	Moisture	2014/10/28	6.6		%	20
7693920	AP8	RPD [KY4976-01]	Moisture	2014/10/28	1.4		%	20
7693930	AP8	RPD [KY4986-01]	Moisture	2014/10/29	0.55		%	20
7694806	AP8	RPD	Moisture	2014/10/21	4.0		%	20
7697550	JGD	QC Standard	Saturation %	2014/10/29		104	%	75 - 125
7697550	JGD	Method Blank	Saturation %	2014/10/29	<1.0		%	
7697550	JGD	RPD [KY4970-02]	Saturation %	2014/10/29	0.21		%	30
7697564	JGD	QC Standard	Soluble pH	2014/10/29		103	%	97 - 103
7697564	JGD	Spiked Blank	Soluble pH	2014/10/29		100	%	97 - 103
7697564	JGD	RPD [KY4970-02]	Soluble pH	2014/10/29	0.51		%	N/A
7698081	KPA	Matrix Spike [KY4980-01]	1,4-Difluorobenzene (sur.)	2014/10/30		96	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/30		98	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/30		89	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/30		92	%	70 - 130
			Benzene	2014/10/30		88	%	60 - 140
			Toluene	2014/10/30		94	%	60 - 140
			Ethylbenzene	2014/10/30		99	%	60 - 140
			m & p-Xylene	2014/10/30		95	%	60 - 140
			o-Xylene	2014/10/30		90	%	60 - 140
7698081	KPA	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/10/29		97	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/29		100	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/29		81	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/29		89	%	70 - 130
			Benzene	2014/10/29		86	%	60 - 140
			Toluene	2014/10/29		92	%	60 - 140
			Ethylbenzene	2014/10/29		97	%	60 - 140
			m & p-Xylene	2014/10/29		95	%	60 - 140
			o-Xylene	2014/10/29		89	%	60 - 140
			(C6-C10)	2014/10/29		111	%	60 - 140
7698081	KPA	Method Blank	1,4-Difluorobenzene (sur.)	2014/10/29		107	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/29		98	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/29		92	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/29		98	%	70 - 130
			Benzene	2014/10/29	<0.0050		mg/kg	
			Toluene	2014/10/29	<0.020		mg/kg	
			Ethylbenzene	2014/10/29	<0.010		mg/kg	
			m & p-Xylene	2014/10/29	<0.040		mg/kg	
			o-Xylene	2014/10/29	<0.040		mg/kg	
			Xylenes (Total)	2014/10/29	<0.040		mg/kg	
			(C6-C10)	2014/10/29	<10		mg/kg	
7698081	KPA	RPD [KY4980-01]	Benzene	2014/10/29	NC		%	40
			Toluene	2014/10/29	NC		%	40
			Ethylbenzene	2014/10/29	NC		%	40
			m & p-Xylene	2014/10/29	NC		%	40
			o-Xylene	2014/10/29	NC		%	40
			Xylenes (Total)	2014/10/29	NC		%	40
			(C6-C10)	2014/10/29	NC		%	40
7698404	TL2	Matrix Spike [KY4960-01]	O-TERPHENYL (sur.)	2014/10/30		79	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/30		93	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2014/10/30		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2014/10/30		76	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7698404	TL2	Spiked Blank	O-TERPHENYL (sur.)	2014/10/29		76	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/29		98	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2014/10/29		91	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2014/10/29		80	%	80 - 120
7698404	TL2	Method Blank	O-TERPHENYL (sur.)	2014/10/29		110	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/29	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2014/10/29	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2014/10/29	<10		mg/kg	
			Reached Baseline at C50	2014/10/29	YES		mg/kg	
7698404	TL2	RPD [KY4960-01]	F2 (C10-C16 Hydrocarbons)	2014/10/30	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2014/10/30	13		%	40
			F4 (C34-C50 Hydrocarbons)	2014/10/30	37		%	40
			Reached Baseline at C50	2014/10/30	NC		%	50
7698840	IT1	Matrix Spike [KY4971-01]	O-TERPHENYL (sur.)	2014/10/30		103	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/30		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2014/10/30		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2014/10/30		NC	%	50 - 130
7698840	IT1	Spiked Blank	O-TERPHENYL (sur.)	2014/10/30		88	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/30		94	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2014/10/30		104	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2014/10/30		103	%	80 - 120
7698840	IT1	Method Blank	O-TERPHENYL (sur.)	2014/10/30		89	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/30	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2014/10/30	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2014/10/30	<10		mg/kg	
			Reached Baseline at C50	2014/10/30	YES		mg/kg	
7698840	IT1	RPD [KY4971-01]	F2 (C10-C16 Hydrocarbons)	2014/10/30	39		%	40
			F3 (C16-C34 Hydrocarbons)	2014/10/30	37		%	40
			F4 (C34-C50 Hydrocarbons)	2014/10/30	38		%	40
			Reached Baseline at C50	2014/10/30	NC		%	50
7698925	IT1	Matrix Spike	O-TERPHENYL (sur.)	2014/10/29		102	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/29		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2014/10/29		111	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2014/10/29		110	%	50 - 130
7698925	IT1	Spiked Blank	O-TERPHENYL (sur.)	2014/10/29		96	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/29		96	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2014/10/29		103	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2014/10/29		104	%	80 - 120
7698925	IT1	Method Blank	O-TERPHENYL (sur.)	2014/10/29		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/10/29	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2014/10/29	<10		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2014/10/29	<10		mg/kg	
			Reached Baseline at C50	2014/10/29	YES		mg/kg	
7698925	IT1	RPD	F2 (C10-C16 Hydrocarbons)	2014/10/29	19		%	40
			F3 (C16-C34 Hydrocarbons)	2014/10/29	17		%	40
			F4 (C34-C50 Hydrocarbons)	2014/10/29	NC		%	40
			Reached Baseline at C50	2014/10/29	NC		%	50
7699310	JGD	QC Standard	Saturation %	2014/10/30		106	%	75 - 125
7699310	JGD	Method Blank	Saturation %	2014/10/30	<1.0		%	
7699310	JGD	RPD [KY4980-02]	Saturation %	2014/10/30	0.74		%	30
7699316	JGD	QC Standard	Soluble pH	2014/10/30		103	%	97 - 103
7699316	JGD	Spiked Blank	Soluble pH	2014/10/30		100	%	97 - 103

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7699316	JGD	RPD [KY4980-02]	Soluble pH	2014/10/30	0.13		%	N/A
7700764	KL	Matrix Spike	1,4-Difluorobenzene (sur.)	2014/10/30		94	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/30		108	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/30		88	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/30		84	%	70 - 130
			Benzene	2014/10/30		84	%	60 - 140
			Toluene	2014/10/30		92	%	60 - 140
			Ethylbenzene	2014/10/30		98	%	60 - 140
			m & p-Xylene	2014/10/30		95	%	60 - 140
			o-Xylene	2014/10/30		89	%	60 - 140
7700764	KL	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/10/30		94	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/30		107	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/30		83	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/30		86	%	70 - 130
			Benzene	2014/10/30		88	%	60 - 140
			Toluene	2014/10/30		95	%	60 - 140
			Ethylbenzene	2014/10/30		101	%	60 - 140
			m & p-Xylene	2014/10/30		98	%	60 - 140
			o-Xylene	2014/10/30		92	%	60 - 140
			(C6-C10)	2014/10/30		85	%	60 - 140
7700764	KL	Method Blank	1,4-Difluorobenzene (sur.)	2014/10/30		105	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/30		105	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/30		88	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/30		97	%	70 - 130
			Benzene	2014/10/30	<0.0050		mg/kg	
			Toluene	2014/10/30	<0.020		mg/kg	
			Ethylbenzene	2014/10/30	<0.010		mg/kg	
			m & p-Xylene	2014/10/30	<0.040		mg/kg	
			o-Xylene	2014/10/30	<0.040		mg/kg	
			Xylenes (Total)	2014/10/30	<0.040		mg/kg	
			(C6-C10)	2014/10/30	<10		mg/kg	
7700764	KL	RPD	Benzene	2014/10/30	NC		%	40
			Toluene	2014/10/30	NC		%	40
			Ethylbenzene	2014/10/30	NC		%	40
			m & p-Xylene	2014/10/30	NC		%	40
			o-Xylene	2014/10/30	NC		%	40
			Xylenes (Total)	2014/10/30	NC		%	40
			(C6-C10)	2014/10/30	NC		%	40
7700769	KL	Matrix Spike	1,4-Difluorobenzene (sur.)	2014/10/31		94	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/31		107	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/31		87	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/31		88	%	70 - 130
			Benzene	2014/10/31		85	%	60 - 140
			Toluene	2014/10/31		91	%	60 - 140
			Ethylbenzene	2014/10/31		97	%	60 - 140
			m & p-Xylene	2014/10/31		94	%	60 - 140
			o-Xylene	2014/10/31		90	%	60 - 140
7700769	KL	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/10/31		94	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/31		108	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/31		84	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/31		89	%	70 - 130
			Benzene	2014/10/31		89	%	60 - 140

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7700769	KL	Method Blank	Toluene	2014/10/31		96	%	60 - 140
			Ethylbenzene	2014/10/31		103	%	60 - 140
			m & p-Xylene	2014/10/31		100	%	60 - 140
			o-Xylene	2014/10/31		94	%	60 - 140
			(C6-C10)	2014/10/31		91	%	60 - 140
			1,4-Difluorobenzene (sur.)	2014/10/31		104	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/31		106	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/31		94	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/31		96	%	70 - 130
			Benzene	2014/10/31	<0.0050		mg/kg	
			Toluene	2014/10/31	<0.020		mg/kg	
			Ethylbenzene	2014/10/31	<0.010		mg/kg	
			m & p-Xylene	2014/10/31	<0.040		mg/kg	
			o-Xylene	2014/10/31	<0.040		mg/kg	
7700769	KL	RPD	Xylenes (Total)	2014/10/31	<0.040		mg/kg	
			(C6-C10)	2014/10/31	<10		mg/kg	
			Benzene	2014/10/31	NC		%	40
			Toluene	2014/10/31	NC		%	40
			Ethylbenzene	2014/10/31	NC		%	40
			m & p-Xylene	2014/10/31	NC		%	40
			o-Xylene	2014/10/31	NC		%	40
			Xylenes (Total)	2014/10/31	NC		%	40
			(C6-C10)	2014/10/31	NC		%	40
7700877	KL	Matrix Spike	1,4-Difluorobenzene (sur.)	2014/10/31		97	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/31		100	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/31		111	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/31		108	%	70 - 130
			Benzene	2014/10/31		113	%	60 - 140
			Toluene	2014/10/31		106	%	60 - 140
			Ethylbenzene	2014/10/31		108	%	60 - 140
			m & p-Xylene	2014/10/31		108	%	60 - 140
			o-Xylene	2014/10/31		106	%	60 - 140
			1,4-Difluorobenzene (sur.)	2014/10/31		97	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/31		100	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/31		96	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/31		103	%	70 - 130
			Benzene	2014/10/31		105	%	60 - 140
7700877	KL	Spiked Blank	Toluene	2014/10/31		100	%	60 - 140
			Ethylbenzene	2014/10/31		101	%	60 - 140
			m & p-Xylene	2014/10/31		102	%	60 - 140
			o-Xylene	2014/10/31		100	%	60 - 140
			(C6-C10)	2014/10/31		110	%	60 - 140
			1,4-Difluorobenzene (sur.)	2014/10/31		99	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/31		100	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/31		103	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/31		115	%	70 - 130
			Benzene	2014/10/31	<0.0050		mg/kg	
			Toluene	2014/10/31	<0.020		mg/kg	
			Ethylbenzene	2014/10/31	<0.010		mg/kg	
			m & p-Xylene	2014/10/31	<0.040		mg/kg	
			o-Xylene	2014/10/31	<0.040		mg/kg	
7700877	KL	Method Blank	Xylenes (Total)	2014/10/31	<0.040		mg/kg	

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7700877	KL	RPD		(C6-C10)	2014/10/31	<10		mg/kg	
				Benzene	2014/10/31	NC		%	40
				Toluene	2014/10/31	NC		%	40
				Ethylbenzene	2014/10/31	NC		%	40
				m & p-Xylene	2014/10/31	NC		%	40
				o-Xylene	2014/10/31	NC		%	40
				Xylenes (Total)	2014/10/31	NC		%	40
7700911	KL	Matrix Spike		(C6-C10)	2014/10/31	NC		%	40
				1,4-Difluorobenzene (sur.)	2014/10/31		85	%	70 - 130
				4-Bromofluorobenzene (sur.)	2014/10/31		129	%	70 - 130
				D10-ETHYLBENZENE (sur.)	2014/10/31		89	%	50 - 130
				D4-1,2-Dichloroethane (sur.)	2014/10/31		84	%	70 - 130
				Benzene	2014/10/31		81	%	60 - 140
				Toluene	2014/10/31		87	%	60 - 140
				Ethylbenzene	2014/10/31		97	%	60 - 140
				m & p-Xylene	2014/10/31		91	%	60 - 140
				o-Xylene	2014/10/31		95	%	60 - 140
7700911	KL	Spiked Blank		1,4-Difluorobenzene (sur.)	2014/10/31		91	%	70 - 130
				4-Bromofluorobenzene (sur.)	2014/10/31		110	%	70 - 130
				D10-ETHYLBENZENE (sur.)	2014/10/31		86	%	50 - 130
				D4-1,2-Dichloroethane (sur.)	2014/10/31		90	%	70 - 130
				Benzene	2014/10/31		89	%	60 - 140
				Toluene	2014/10/31		95	%	60 - 140
				Ethylbenzene	2014/10/31		102	%	60 - 140
				m & p-Xylene	2014/10/31		98	%	60 - 140
				o-Xylene	2014/10/31		94	%	60 - 140
				(C6-C10)	2014/10/31		98	%	60 - 140
7700911	KL	Method Blank		1,4-Difluorobenzene (sur.)	2014/10/31		101	%	70 - 130
				4-Bromofluorobenzene (sur.)	2014/10/31		106	%	70 - 130
				D10-ETHYLBENZENE (sur.)	2014/10/31		97	%	50 - 130
				D4-1,2-Dichloroethane (sur.)	2014/10/31		100	%	70 - 130
				Benzene	2014/10/31	<0.0050		mg/kg	
				Toluene	2014/10/31	<0.020		mg/kg	
				Ethylbenzene	2014/10/31	<0.010		mg/kg	
				m & p-Xylene	2014/10/31	<0.040		mg/kg	
				o-Xylene	2014/10/31	<0.040		mg/kg	
				Xylenes (Total)	2014/10/31	<0.040		mg/kg	
7700911	KL	RPD		(C6-C10)	2014/10/31	<10		mg/kg	
				Benzene	2014/10/31	NC (1)		%	40
				Toluene	2014/10/31	NC (1)		%	40
				Ethylbenzene	2014/10/31	3.8		%	40
				m & p-Xylene	2014/10/31	3.6		%	40
				o-Xylene	2014/10/31	5.8		%	40
				Xylenes (Total)	2014/10/31	4.2		%	40
7701637	KL	Matrix Spike [KY4964-01]		1,4-Difluorobenzene (sur.)	2014/10/31		102	%	70 - 130
				4-Bromofluorobenzene (sur.)	2014/10/31		99	%	70 - 130
				D10-ETHYLBENZENE (sur.)	2014/10/31		91	%	50 - 130
				D4-1,2-Dichloroethane (sur.)	2014/10/31		99	%	70 - 130
				Benzene	2014/10/31		93	%	60 - 140
				Toluene	2014/10/31		87	%	60 - 140
				Ethylbenzene	2014/10/31		89	%	60 - 140
				m & p-Xylene	2014/10/31		90	%	60 - 140

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7701637	KL	Spiked Blank	o-Xylene	2014/10/31		87	%	60 - 140
			1,4-Difluorobenzene (sur.)	2014/10/31		101	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/31		100	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/31		86	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/31		102	%	70 - 130
			Benzene	2014/10/31		95	%	60 - 140
			Toluene	2014/10/31		89	%	60 - 140
			Ethylbenzene	2014/10/31		91	%	60 - 140
			m & p-Xylene	2014/10/31		92	%	60 - 140
			o-Xylene	2014/10/31		89	%	60 - 140
7701637	KL	Method Blank	(C6-C10)	2014/10/31		101	%	60 - 140
			1,4-Difluorobenzene (sur.)	2014/10/31		102	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/10/31		98	%	70 - 130
			D10-ETHYLBENZENE (sur.)	2014/10/31		90	%	50 - 130
			D4-1,2-Dichloroethane (sur.)	2014/10/31		108	%	70 - 130
			Benzene	2014/10/31	<0.0050		mg/kg	
			Toluene	2014/10/31	<0.020		mg/kg	
			Ethylbenzene	2014/10/31	<0.010		mg/kg	
			m & p-Xylene	2014/10/31	<0.040		mg/kg	
			o-Xylene	2014/10/31	<0.040		mg/kg	
7701637	KL	RPD [KY4964-01]	Xylenes (Total)	2014/10/31	<0.040		mg/kg	
			(C6-C10)	2014/10/31	<10		mg/kg	
			Benzene	2014/10/31	NC		%	40
			Toluene	2014/10/31	NC		%	40
			Ethylbenzene	2014/10/31	NC		%	40
			m & p-Xylene	2014/10/31	NC		%	40
			o-Xylene	2014/10/31	NC		%	40
			Xylenes (Total)	2014/10/31	NC		%	40
			(C6-C10)	2014/10/31	NC		%	40
7701791	SF1	Matrix Spike [KY4965-02]	Nitrate plus Nitrite (N)	2014/10/31		89	%	70 - 130
7701791	SF1	Spiked Blank	Nitrate plus Nitrite (N)	2014/10/31		97	%	70 - 130
7701791	SF1	Method Blank	Nitrate plus Nitrite (N)	2014/10/31	<2.0		ug/g	
7701791	SF1	RPD [KY4965-02]	Nitrate plus Nitrite (N)	2014/10/31	NC		%	30
7701796	SF1	Matrix Spike [KY4965-02]	Nitrite (N)	2014/10/31		89	%	75 - 125
7701796	SF1	Spiked Blank	Nitrite (N)	2014/10/31		103	%	75 - 125
7701796	SF1	Method Blank	Nitrite (N)	2014/10/31	<0.50		mg/kg	
7701796	SF1	RPD [KY4965-02]	Nitrite (N)	2014/10/31	NC		%	30
7701933	IW1	Matrix Spike [KY4965-02]	Available (KCl) Ammonia (N)	2014/10/31		98	%	75 - 125
7701933	IW1	Spiked Blank	Available (KCl) Ammonia (N)	2014/10/31		103	%	75 - 125
7701933	IW1	Method Blank	Available (KCl) Ammonia (N)	2014/10/31	<0.50		mg/kg	
7701933	IW1	RPD [KY4965-02]	Available (KCl) Ammonia (N)	2014/10/31	7.8		%	30
7702216	SF1	Matrix Spike [KY4990-02]	Nitrate plus Nitrite (N)	2014/10/31		102	%	70 - 130
7702216	SF1	Spiked Blank	Nitrate plus Nitrite (N)	2014/10/31		94	%	70 - 130
7702216	SF1	Method Blank	Nitrate plus Nitrite (N)	2014/10/31	<2.0		ug/g	
7702216	SF1	RPD [KY4990-02]	Nitrate plus Nitrite (N)	2014/10/31	0.57		%	30
7702222	SF1	Matrix Spike [KY4990-02]	Nitrite (N)	2014/10/31		103	%	75 - 125
7702222	SF1	Spiked Blank	Nitrite (N)	2014/10/31		102	%	75 - 125
7702222	SF1	Method Blank	Nitrite (N)	2014/10/31	<0.50		mg/kg	
7702222	SF1	RPD [KY4990-02]	Nitrite (N)	2014/10/31	NC		%	30
7702236	ALJ	Matrix Spike [KY4965-02]	Available (Bicarb) Orthophosphate (P)	2014/10/31		106	%	75 - 125
7702236	ALJ	Spiked Blank	Available (Bicarb) Orthophosphate (P)	2014/10/31		91	%	75 - 125
7702236	ALJ	Method Blank	Available (Bicarb) Orthophosphate (P)	2014/10/31	<0.50		ug/g	

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7702236	ALJ	RPD [KY4965-02]	Available (Bicarb) Orthophosphate (P)	2014/10/31	NC		%	30
7702320	IW1	Matrix Spike [KY4990-02]	Available (KCl) Ammonia (N)	2014/10/31		NC	%	75 - 125
7702320	IW1	Spiked Blank	Available (KCl) Ammonia (N)	2014/10/31		119	%	75 - 125
7702320	IW1	Method Blank	Available (KCl) Ammonia (N)	2014/10/31	0.77, RDL=0.50		mg/kg	
7702320	IW1	RPD [KY4990-02]	Available (KCl) Ammonia (N)	2014/10/31	2.0		%	30
7702361		Matrix Spike [KY4990-02]	Available (Bicarb) Orthophosphate (P)	2014/10/31		94	%	75 - 125
7702361		Spiked Blank	Available (Bicarb) Orthophosphate (P)	2014/10/31		98	%	75 - 125
7702361		Method Blank	Available (Bicarb) Orthophosphate (P)	2014/10/31	<0.50		ug/g	
7702361		RPD [KY4990-02]	Available (Bicarb) Orthophosphate (P)	2014/10/31	2.8		%	30
7704601	RG9	Method Blank	Moisture	2014/11/04	<0.30		%	
7704601	RG9	RPD	Moisture	2014/11/04	4.1		%	20
7706090	MPE	Matrix Spike [KY4967-01]	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/11/07		91	%	70 - 130
7706090	MPE	Spiked Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/11/07		91	%	70 - 130
7706090	MPE	Method Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/11/07	<100		mg/kg	
7706090	MPE	RPD [KY4967-01]	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/11/07	13		%	30
7708196	MPE	Matrix Spike [KY4993-01]	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/11/07		95	%	70 - 130
7708196	MPE	Spiked Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/11/07		98	%	70 - 130
7708196	MPE	Method Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/11/07	<100		mg/kg	
7708196	MPE	RPD [KY4993-01]	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/11/07	2.1		%	30

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) RDL raised due to sample matrix interference.

SNC-LAVALIN INC.
Client Project #: 622653
Site Location: SHELL TERMINAL WINNIPEG
Sampler Initials: SP

VALIDATION SIGNATURE PAGE

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



Andy Lu, Data Validation Coordinator



David Huang, BBY Scientific Specialist



Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

[illegible]

[illegible]

INVOICE TO:				Report Information				Project Information				Laboratory Use Only			
Company Name				Company Name				Duration #				Billing Order #			
Contact Name				Contact Name				P.O. #				Project Manager			
Address				Address				Project #				Chain of Custody Record			
Phone				Phone				Project Name				Chain of Custody Record			
Fax				Fax				Site #				Chain of Custody Record			
Email				Email				Sampled By				Chain of Custody Record			
#10006 SNC-LAVALLIN INC.				RYAN BREVIK				623-653				623-653			
SHERI SCHEMBRI				RYAN BREVIK				623-653				623-653			
SUITE 200 - 20 DEBOERS DRIVE				SUITE 200 - 20 DEBOERS DRIVE				623-653				623-653			
TORONTO ON M3L 0H1				TORONTO ON M3L 0H1				623-653				623-653			
(416) 635-5887 x5811				(416) 635-5887 x5811				623-653				623-653			
sheri.schembri@snc-lavalin.com				ryan.brevik@snc-lavalin.com				623-653				623-653			
Regulatory Criteria				Special Instructions				Analysis Requested				Turnaround Time (TAT) Required			
Sample Electrode Label				Sample Location Identification				Date Sampled				Time Sampled			
Sample Electrode Label				Sample Location Identification				Date Sampled				Time Sampled			
PS - COMP-1				PS - COMP-1				11:05				11:05			
PS - COMP-2				PS - COMP-2				11:10				11:10			
PS - COMP-3				PS - COMP-3				11:15				11:15			
PS - COMP-4				PS - COMP-4				11:25				11:25			
PS - COMP-5				PS - COMP-5				11:30				11:30			
P ₂ - COMP-1				P ₂ - COMP-1				12:00				12:00			
P ₆ - COMP-2				P ₆ - COMP-2				12:05				12:05			
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P ₆ - COMP-10				P ₆ - COMP-10				13:00				13:00			
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P ₆ - COMP-34				P ₆ - COMP-34				15:00				15:00			
P ₆ - COMP-35				P ₆ - COMP-35				1							

Chain Of Custody Record

Page 4 of 5

Maxxam Maxxam Analytics International Corporation d/b/a Maxxam Analytics 6-675 Bery Street, Winnipeg, Manitoba Canada R3T 1X7 Tel (204) 772-7276 Toll-Free 800-553-5268 Fax (204) 772-7275 www.maxxam.ca		Report Information Company Name: RYAN BREIVIK Contact Name: RYAN BREIVIK Address: SUITE 200 - 20 DEBOERS DRIVE TORONTO ON M3J 2H1 Phone: (416) 635-5882 x811 Fax: (416) 635-5353 Email: sheri.schembri@sticlavallin.com		Project Information Project # 622653 Project Name: Shell Terminal Winnipeg Site # SP Project Manager: Janelle Kochan Chain Of Custody Record C0452501-01-01		Laboratory Use Only Maxxam Job # 8496600 Bottle Order # Project Manager: Janelle Kochan	
---	--	--	--	--	--	---	--

Regulatory Criteria Note: For regular and drinking water samples - please use the Drinking Water Chain of Custody Form Samples must be kept cool (< 10°C) from time of sampling until delivery to Maxxam		Special Instructions None		Analysis Requested Regular (Standard) TAT (not be applied if Rush TAT is not specified) Standard TAT = 57 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dissolved Oxygen are > 57 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Requested: Time Required: Rush Confirmation Number:	
Sample Information Sample Barcode Label: KY4990 Sample Location Identification: F-COMP-1 Date Sampled: 08/23/2014 Time Sampled: 12:45 Matrix: Soil Note: Field Filled? (Y/N) Regulated Drinking Water? (Y/N) Metals Field Filled? (Y/N)		Analysis Results # of Batches: 2 Comments: DUE TO THE NATURE OF THE MATERIALS, WE ASSURE ANALYSTS YOUR MAY BE PROBLEM. PLEASE PROCEED WITH ANALYSIS.		Chain of Custody Date: 14/10/24 Time: 11:30 Signature: [Signature] RECEIVED BY: (Signature/Print) [Signature] Date: 20/10/24 Time: 11:30 Signature: [Signature] RECEIVED BY: (Signature/Print) [Signature]	
1 KY4990 F-COMP-1 08/23/2014 12:45 Soil 2 91 F-COMP-2 12:50 3 92 F-COMP-3 12:55 4 93 F-COMP-4 13:00 5 94 F-COMP-5 13:10 6 95 WF-COMP-1 13:30 7 96 WF-COMP-2 13:45 8 97 WF-COMP-3 13:55 9 98 WF-COMP-4 14:20 10 99 WF-COMP-5 14:45		pH Conductivity Nitrate Nitrite Ammonia Orthophosphate Nitrogen Nitrate + Nitrite BTEX + PAHs		Time Sensitive Temperature (C) on Receipt Custody Seal Intact on Receipt While Maxxam Yes ☐ No ☐	

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation d/b/a Maxxam Analytics

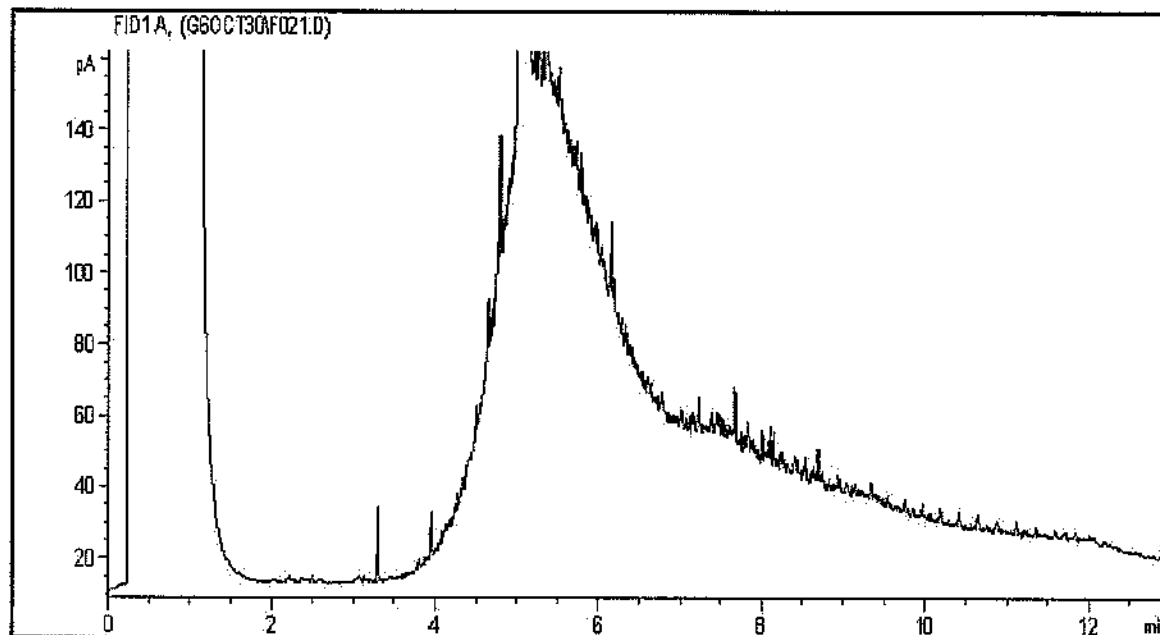
Chain of Custody Record

Maxxam Analytics International Corporation 1000 17th Ave S, Suite 200, Winnipeg, Manitoba R2M 1A7, Tel: (204) 772-7275 Fax: (204) 772-7275 www.maxxam.ca

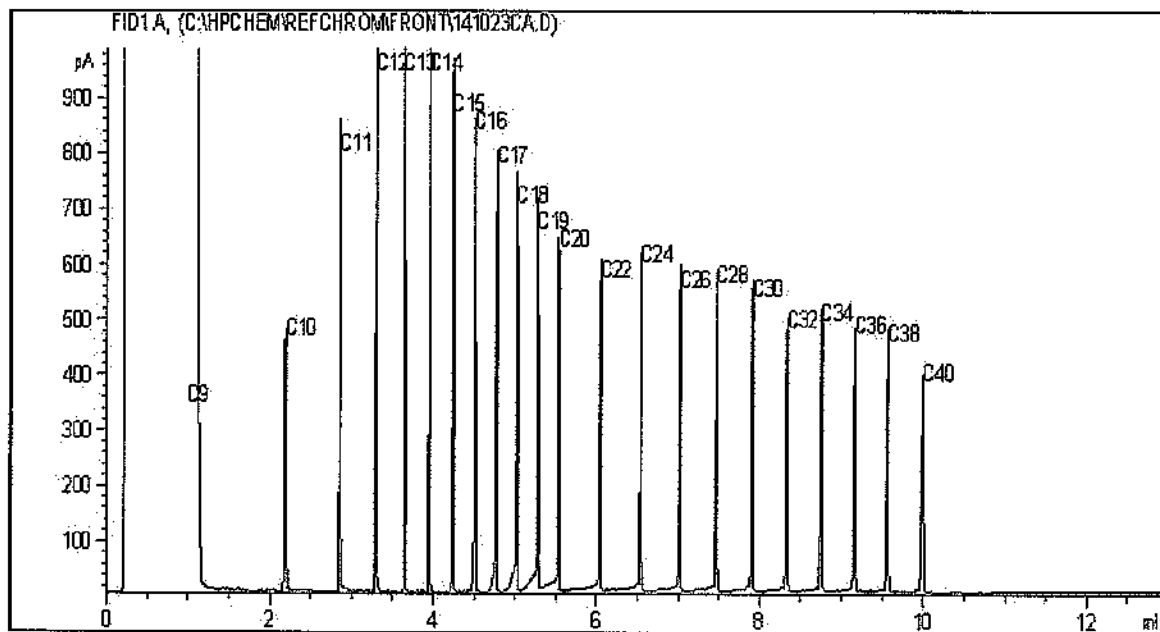
Page 55

Company Name: SHERI SCHEMBRI Contact Name: SHERI SCHEMBRI Address: SUITE 200 - 20 DEBOERS DRIVE TORONTO ON M3J 0H1 Phone: (416) 635-5882 Email: sheri.schembri@snc-lavalin.com				Company Name: RYAN BREVIK Contact Name: RYAN BREVIK Address: SUITE 200 - 20 DEBOERS DRIVE TORONTO ON M3J 0H1 Phone: (416) 635-5353 Email: ryan.brevik@snc-lavalin.com				Project Information Project #: 622653 Project Name: SHELL TERMINAL - WINNIPEG Site #: 8P				Report Information Duration #: 100005 Project #: 622653 Project Name: SHELL TERMINAL - WINNIPEG Site #: 8P				Laboratory Use Only Maxxam Job #: 8406608 Chain of Custody Record Project Manager: Janeta Kortan Job #: 046226-03-02																																																																			
Regulatory Criteria Special Instructions Notes: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form Sample Barcodes: KY5000, 101, 09 Date Sampled: OCT 22 2014, OCT 23 2014, OCT 24 2014 Time Sampled: 17:20, 11:05, 12:00 Matrix: SOIL												Analysis Requested ☒ Regular (Standard) TAT ☐ Job Specific TAT (if applies to entire submission) Turnaround Time (TAT) Required: 5 days (not to exceed 10 days) Comments: DUE TO THE NATURE OF THE AIRTEL, HANDOVERS AND/OR JOBS MAY BE PRESENTED TO THE LAB WITHIN 10 DAYS.																																																																							
Analysis Results <table border="1"> <thead> <tr> <th>Sample</th> <th>Parameter</th> <th>Result</th> <th>Unit</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Regulated Drinking Water (Y/N)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Metals Field Filtered (Y/N)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Polychlorinated Biphenyls in Water</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Sulphate by Automated Colorimetry</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Sulphide</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Total Suspended Solids</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>VOCs in Water by HS GC/MS</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Biochemical Oxygen Demand</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Chromium, Hexavalent</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Cyanide S&D (strong acid dissociable)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>ABN Compound (3,3-dichlorobenzidine only)</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>												Sample	Parameter	Result	Unit	Notes	1	Regulated Drinking Water (Y/N)				1	Metals Field Filtered (Y/N)				1	Polychlorinated Biphenyls in Water				1	Sulphate by Automated Colorimetry				1	Sulphide				1	Total Suspended Solids				1	VOCs in Water by HS GC/MS				1	Biochemical Oxygen Demand				1	Chromium, Hexavalent				1	Cyanide S&D (strong acid dissociable)				1	ABN Compound (3,3-dichlorobenzidine only)				Lab Use Only Temperature (°C) on Receipt: 84.90, 7.2 Custody Seal Intact on Cooler? Yes ☐ No ☐											
Sample	Parameter	Result	Unit	Notes																																																																															
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CCME Hydrocarbons (F2-F4 in soil) Chromatogram



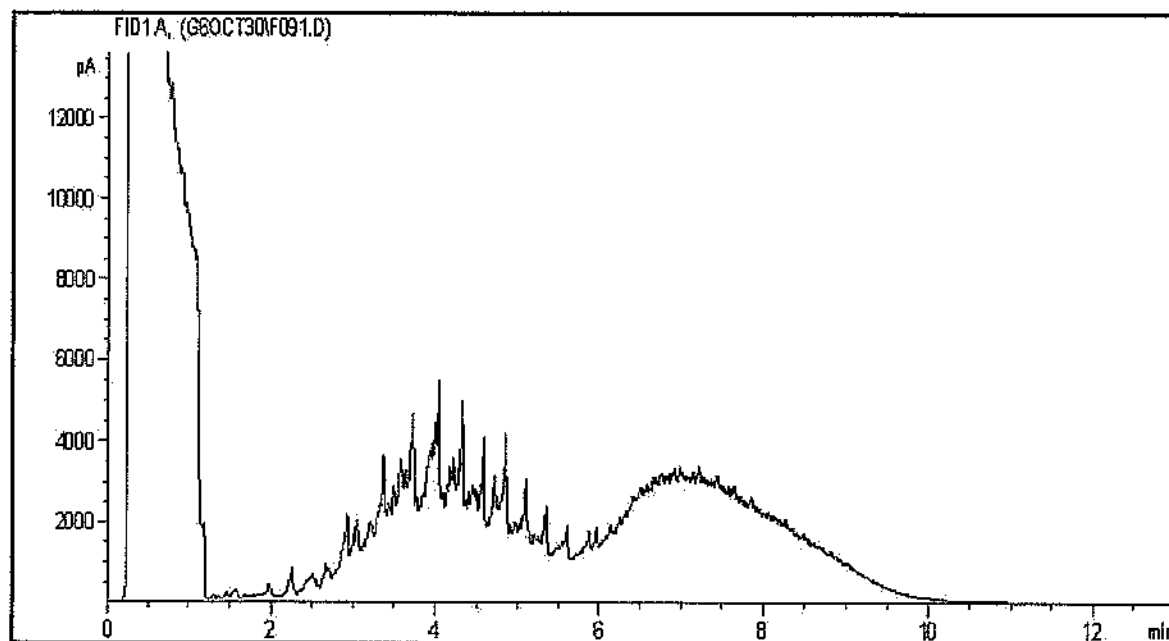
Carbon Range Distribution - Reference Chromatogram



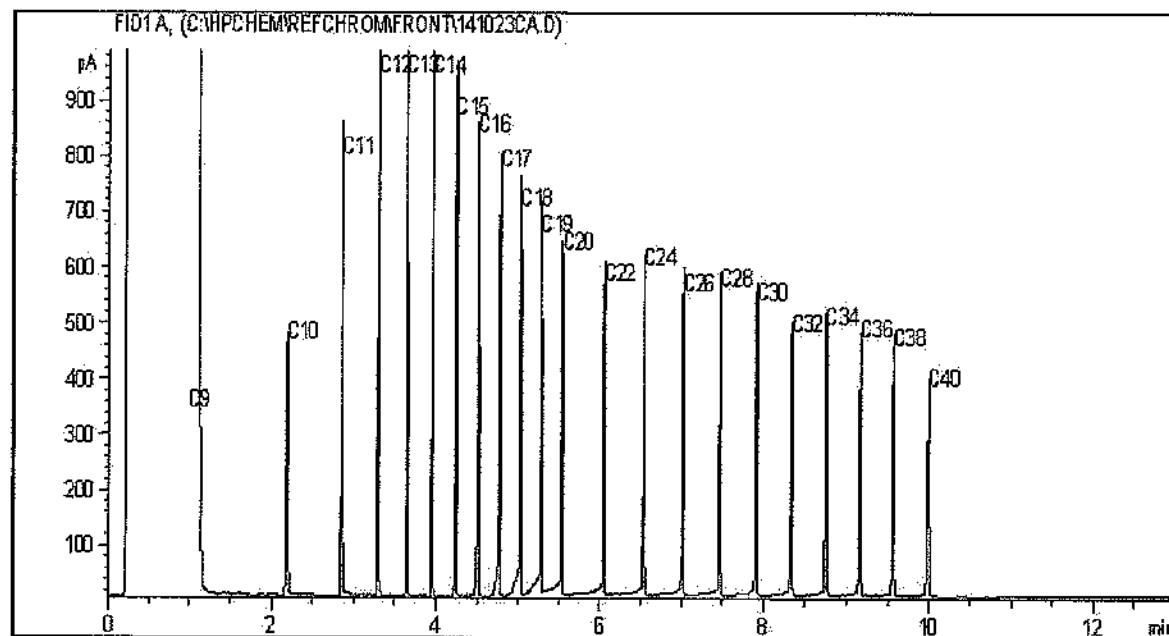
TYPICAL PRODUCT CARBON NUMBER RANGES

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



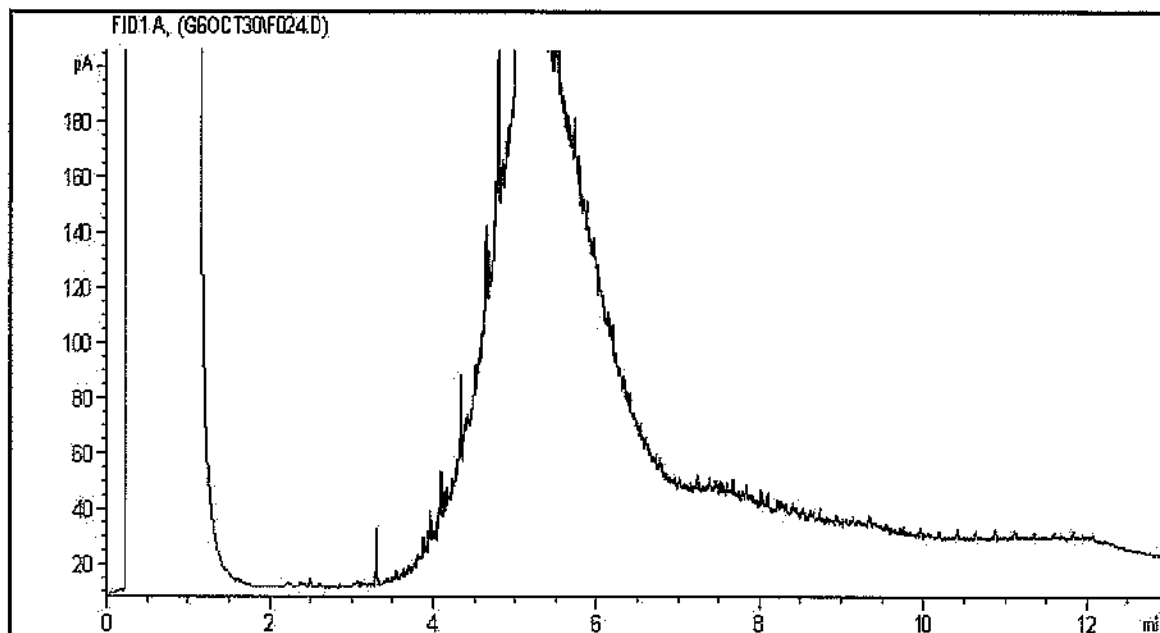
Carbon Range Distribution - Reference Chromatogram



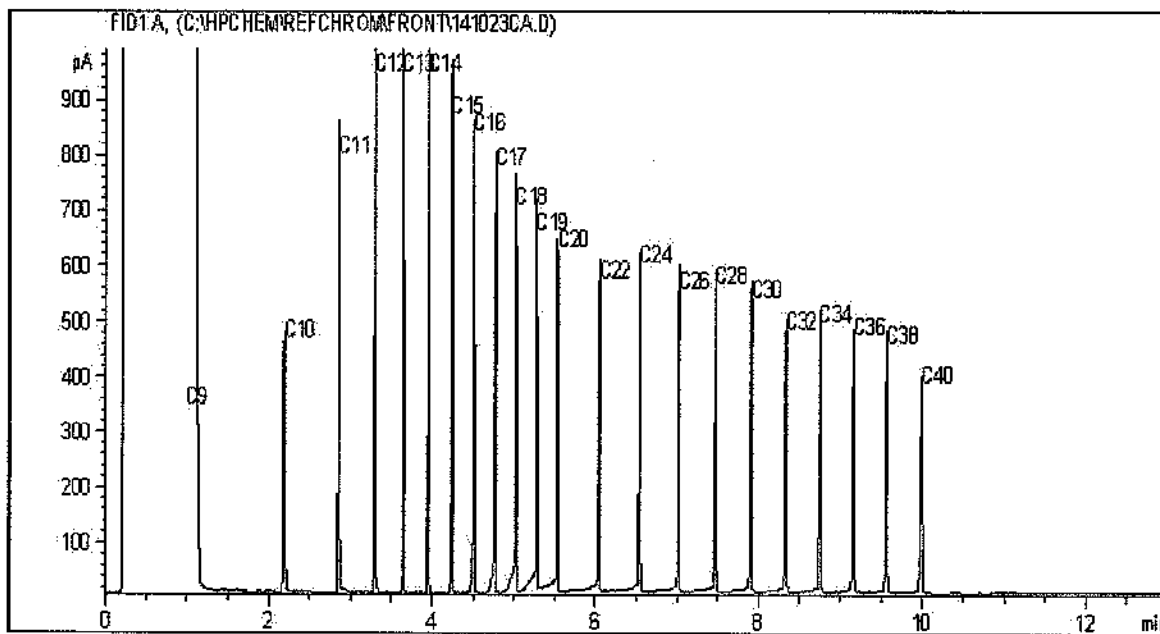
TYPICAL PRODUCT CARBON NUMBER RANGES

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CCME Hydrocarbons (F2-F4 in soil) Chromatogram



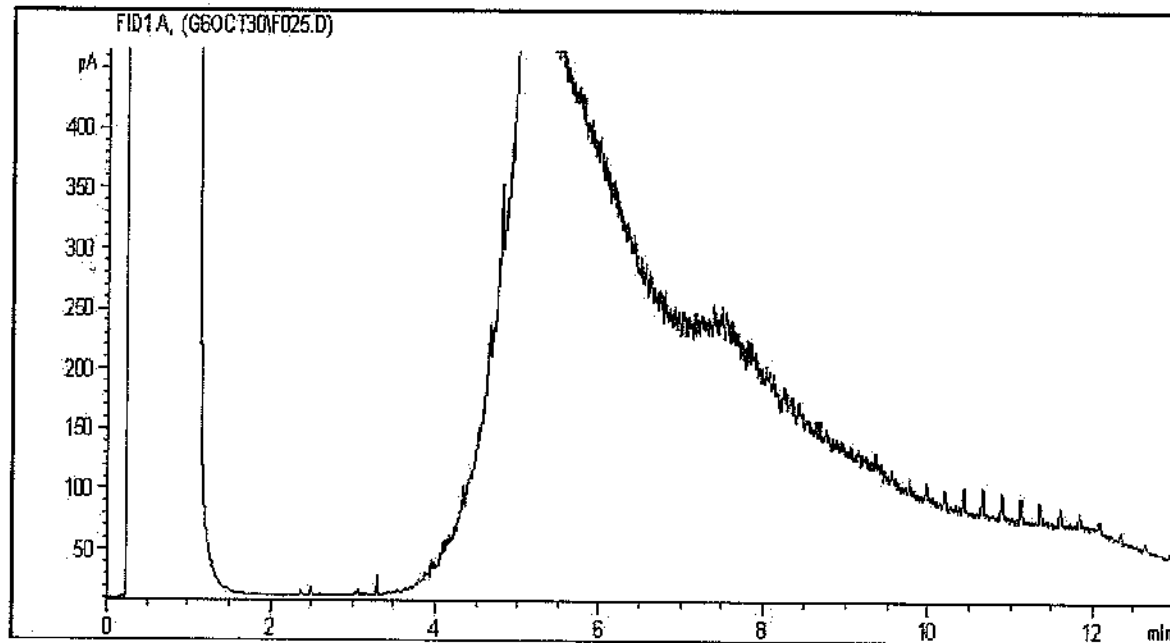
Carbon Range Distribution - Reference Chromatogram



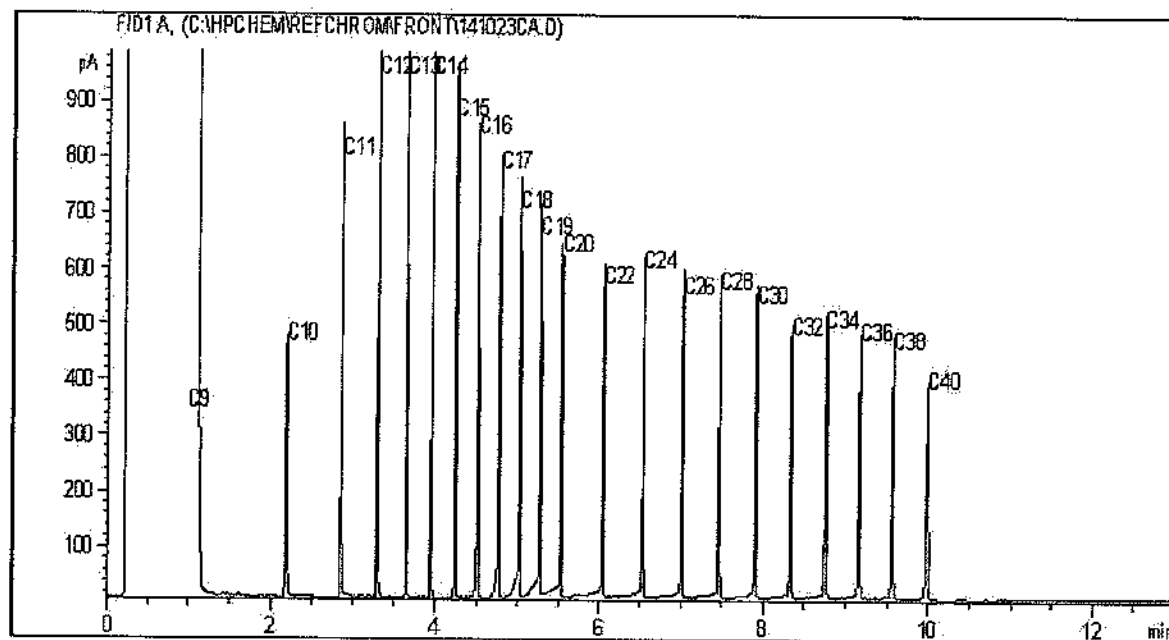
TYPICAL PRODUCT CARBON NUMBER RANGES

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CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



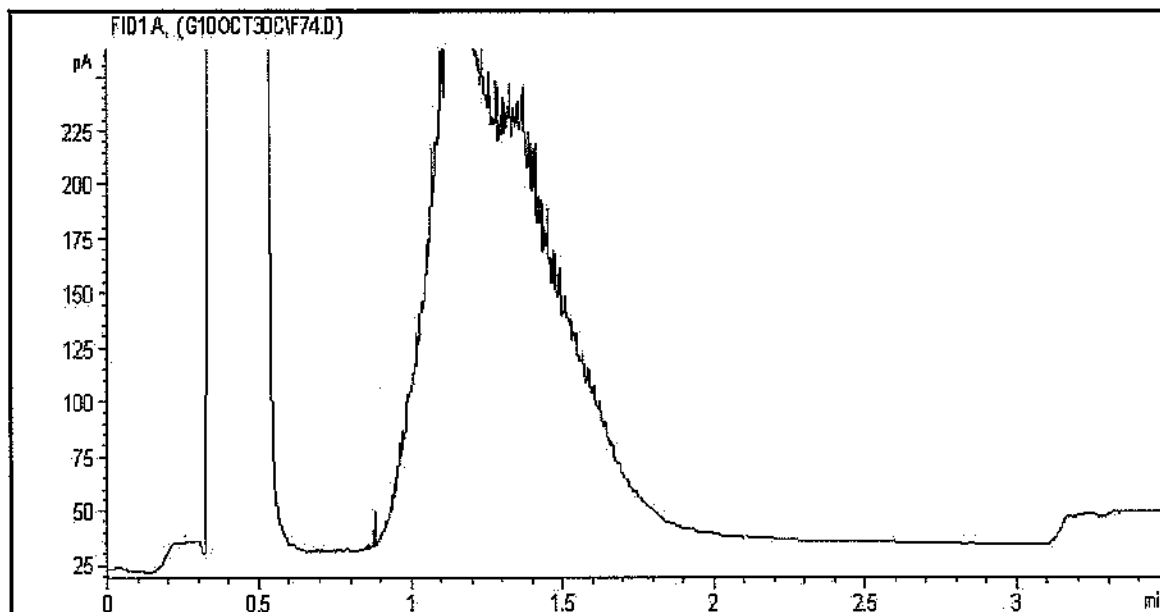
TYPICAL PRODUCT CARBON NUMBER RANGES

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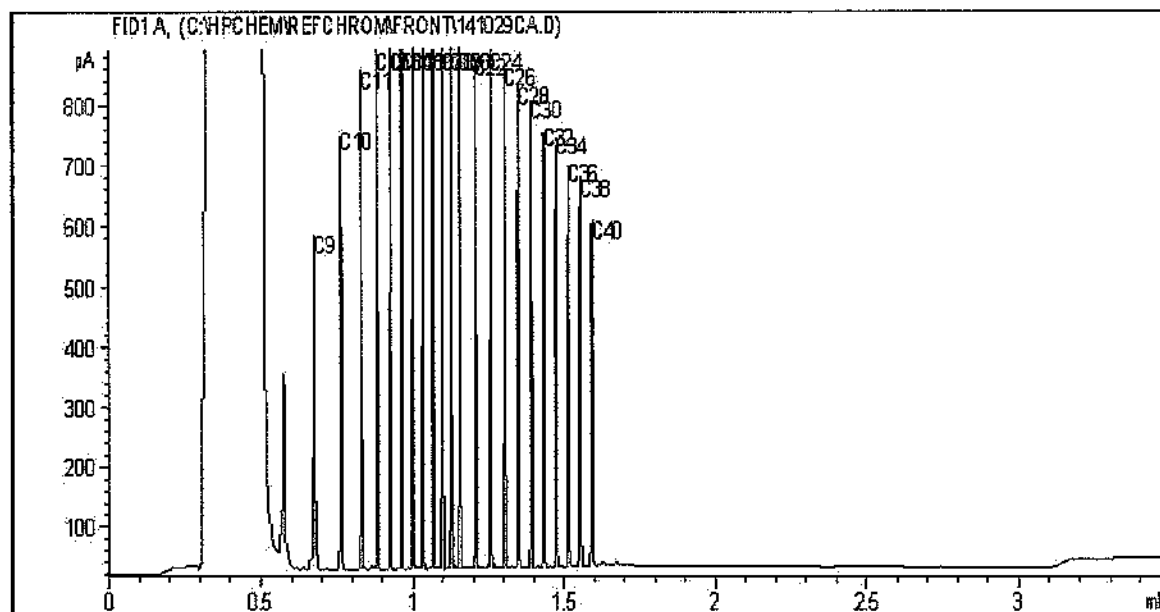
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4963

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P1-COMP-4

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

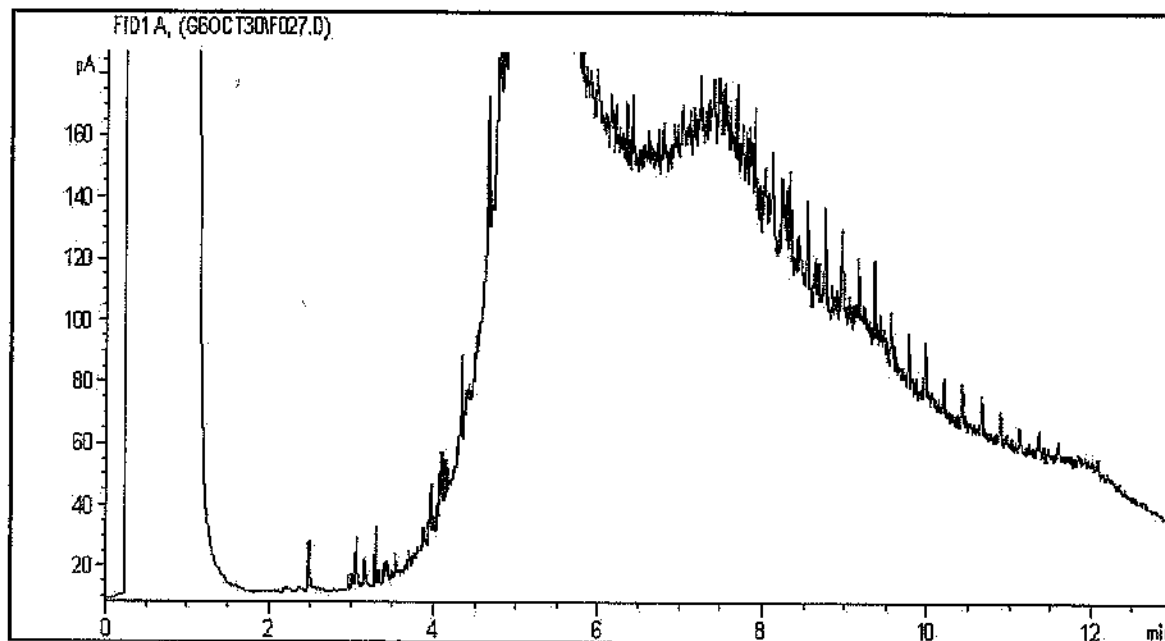


TYPICAL PRODUCT CARBON NUMBER RANGES

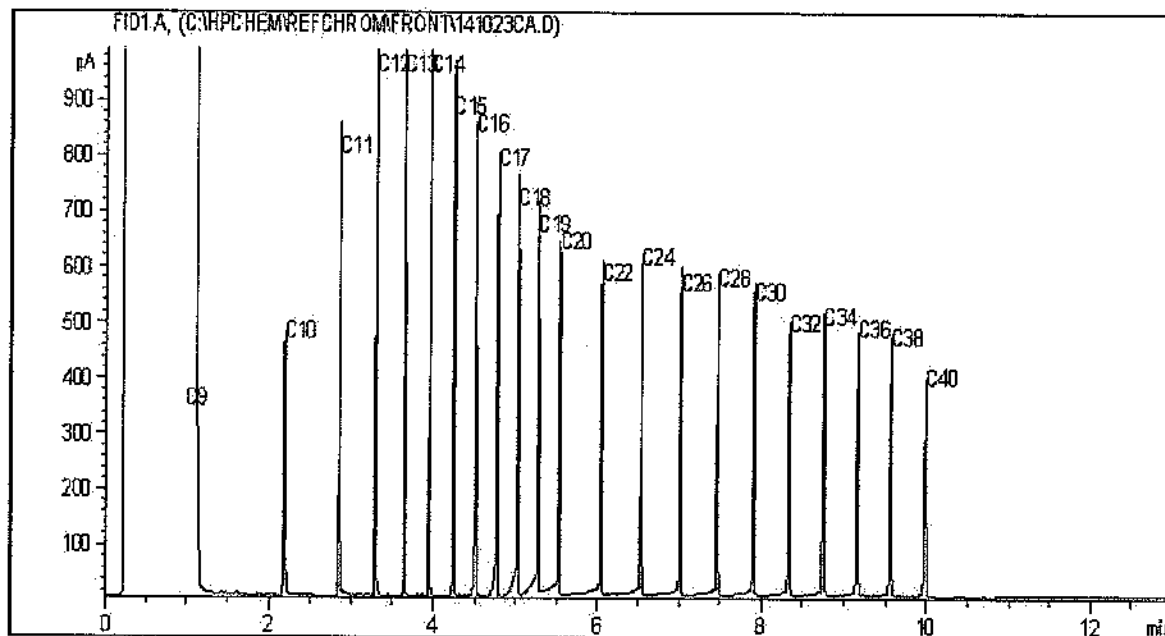
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



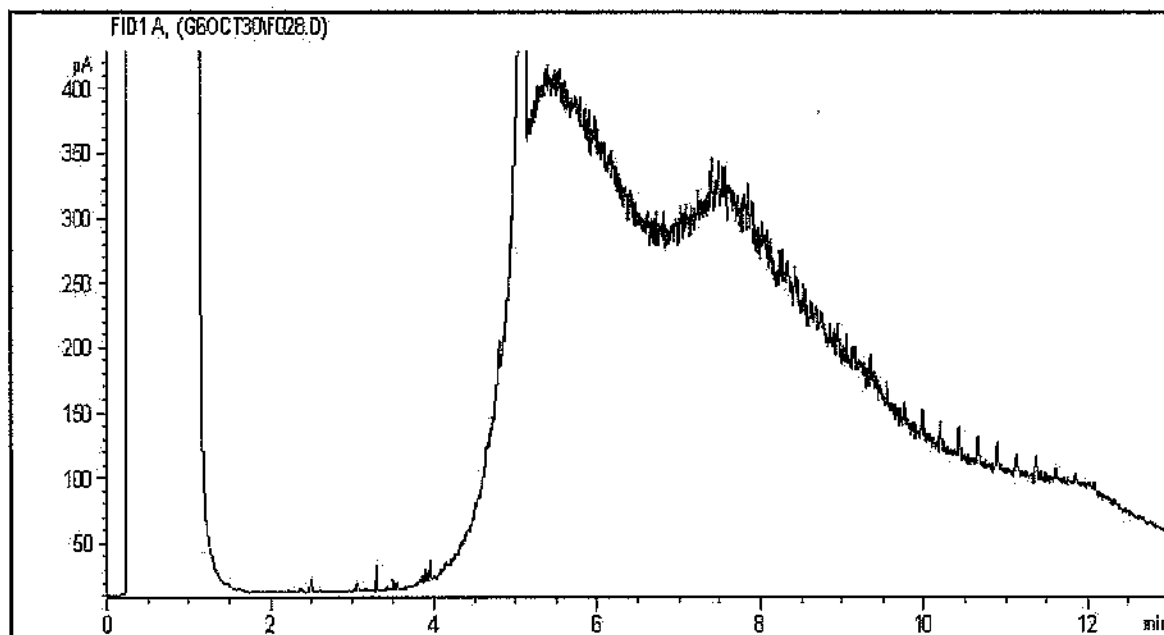
Carbon Range Distribution - Reference Chromatogram



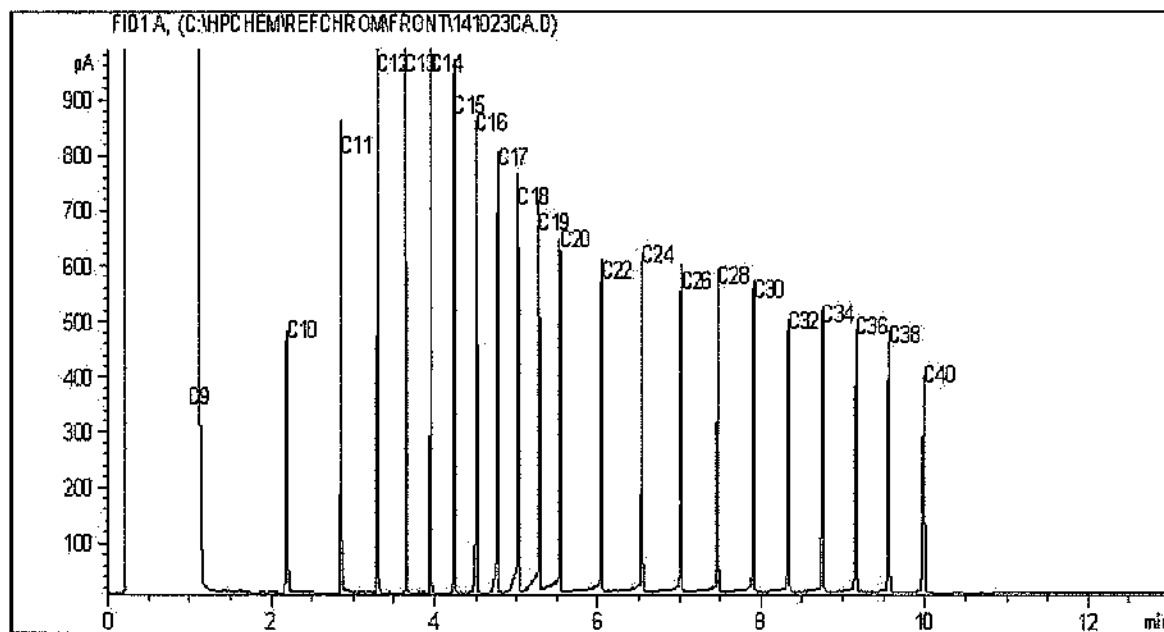
TYPICAL PRODUCT CARBON NUMBER RANGES

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CCME Hydrocarbons (F2-F4 in soil) Chromatogram



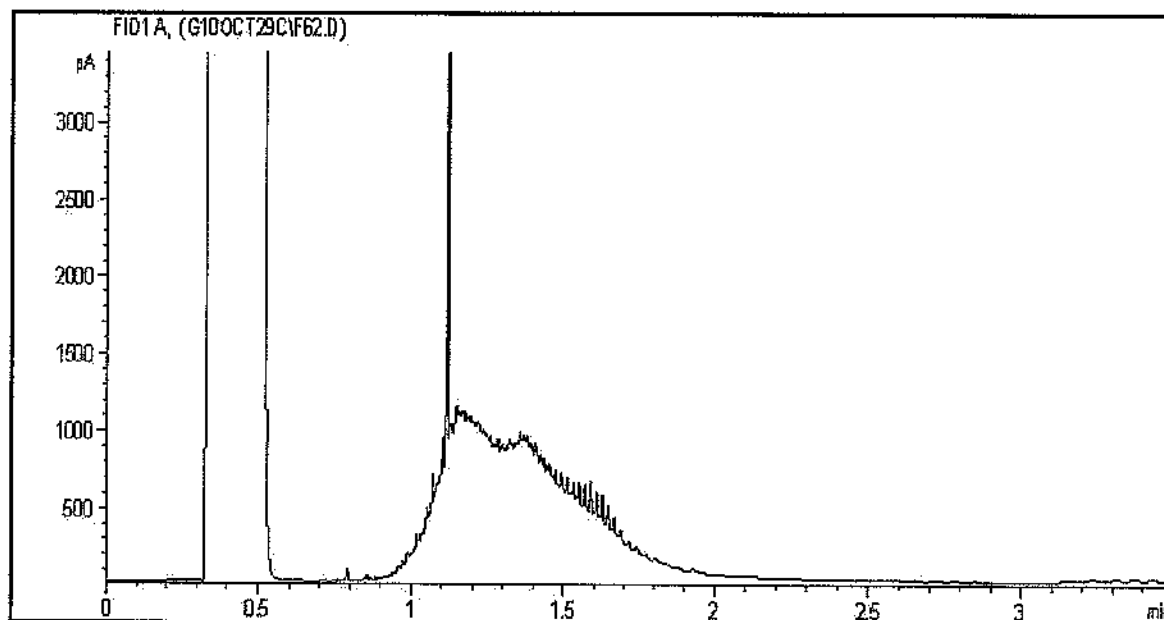
Carbon Range Distribution - Reference Chromatogram



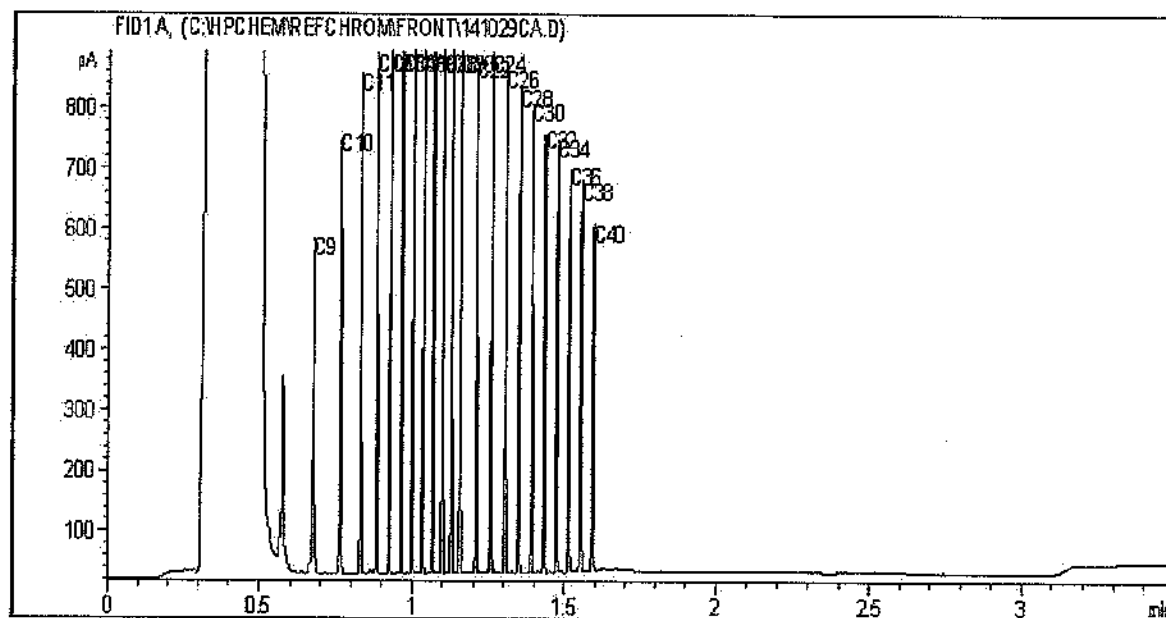
TYPICAL PRODUCT CARBON NUMBER RANGES

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CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

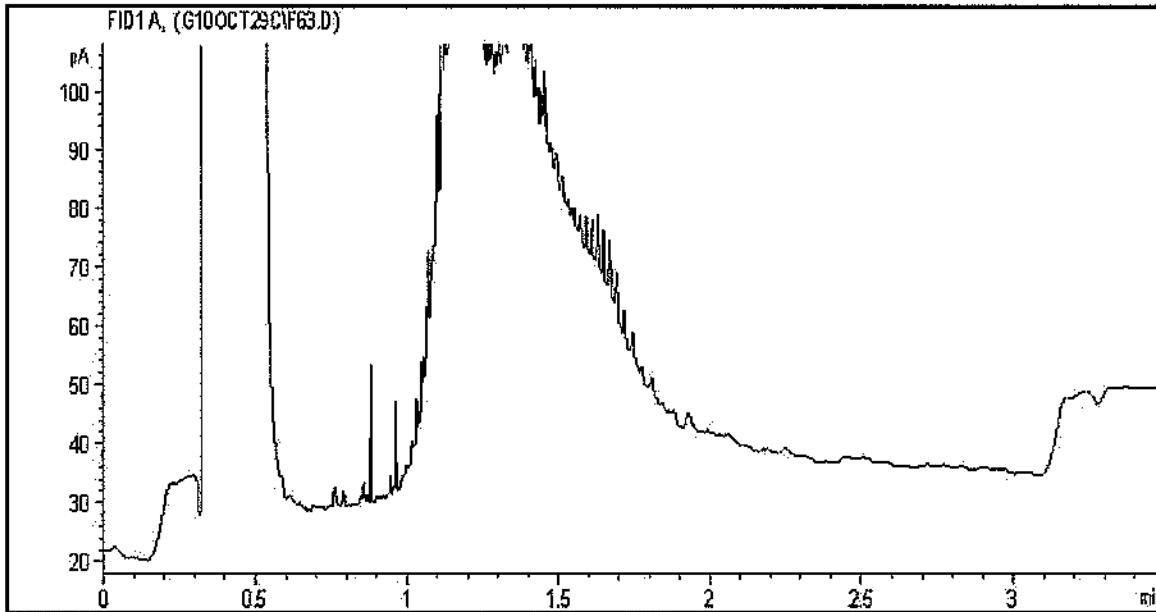
Diesel: C8 - C22

Varsol: C8 - C12

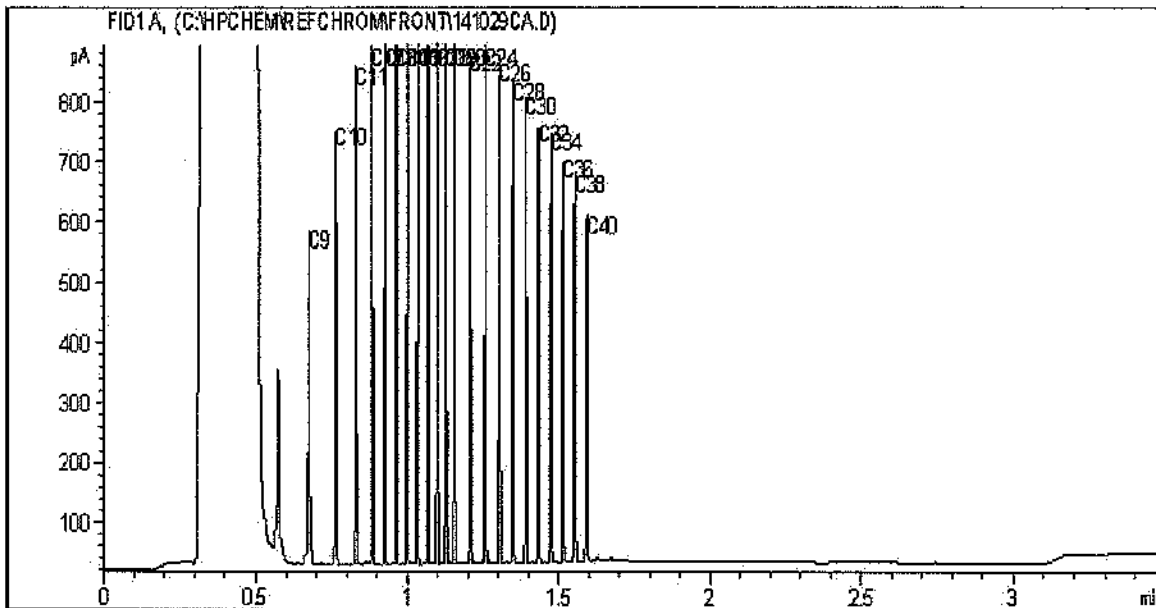
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

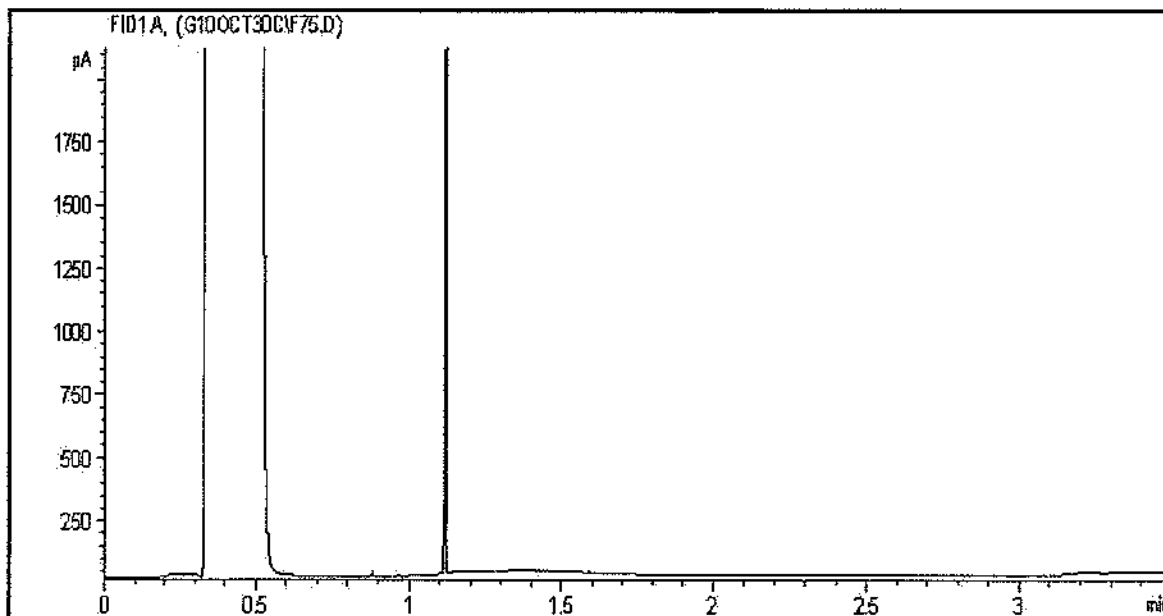


TYPICAL PRODUCT CARBON NUMBER RANGES

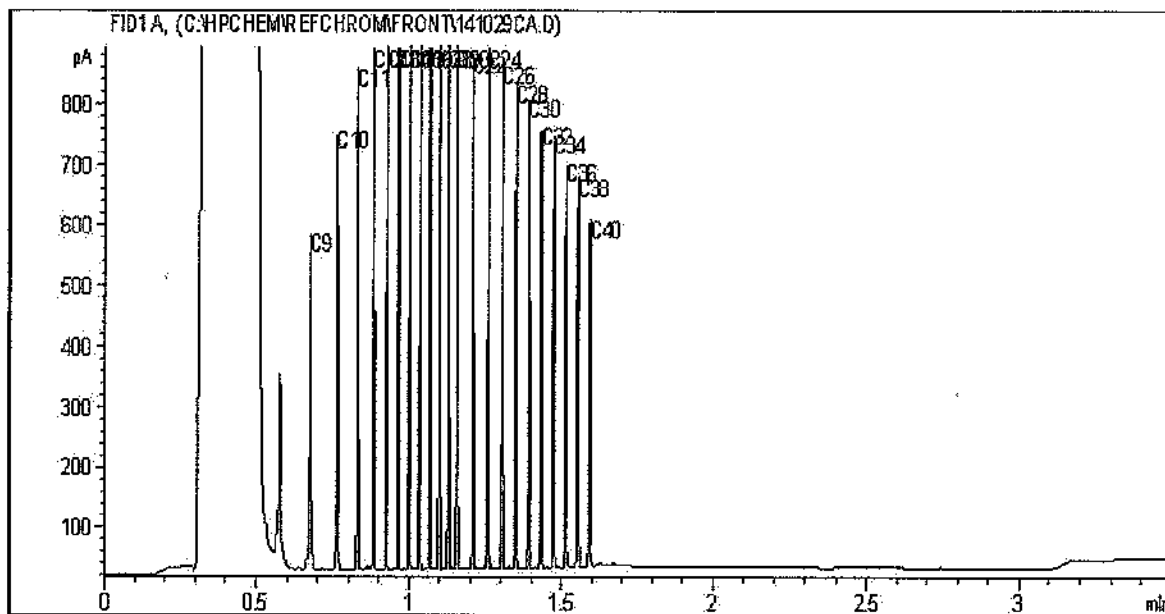
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

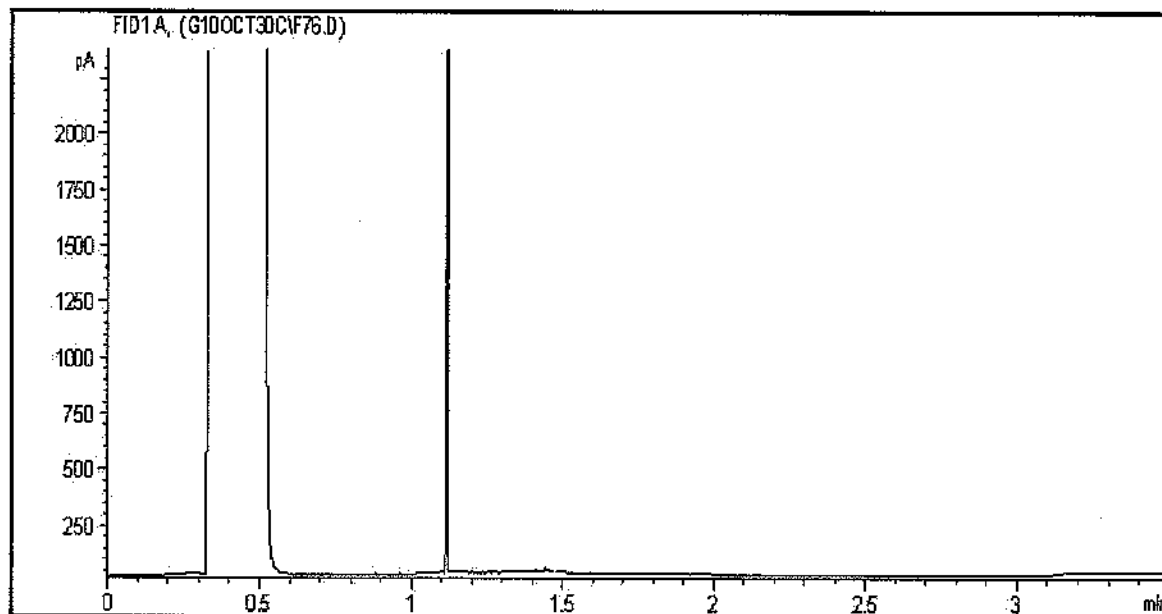
Lubricating Oils: C20 - C40

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

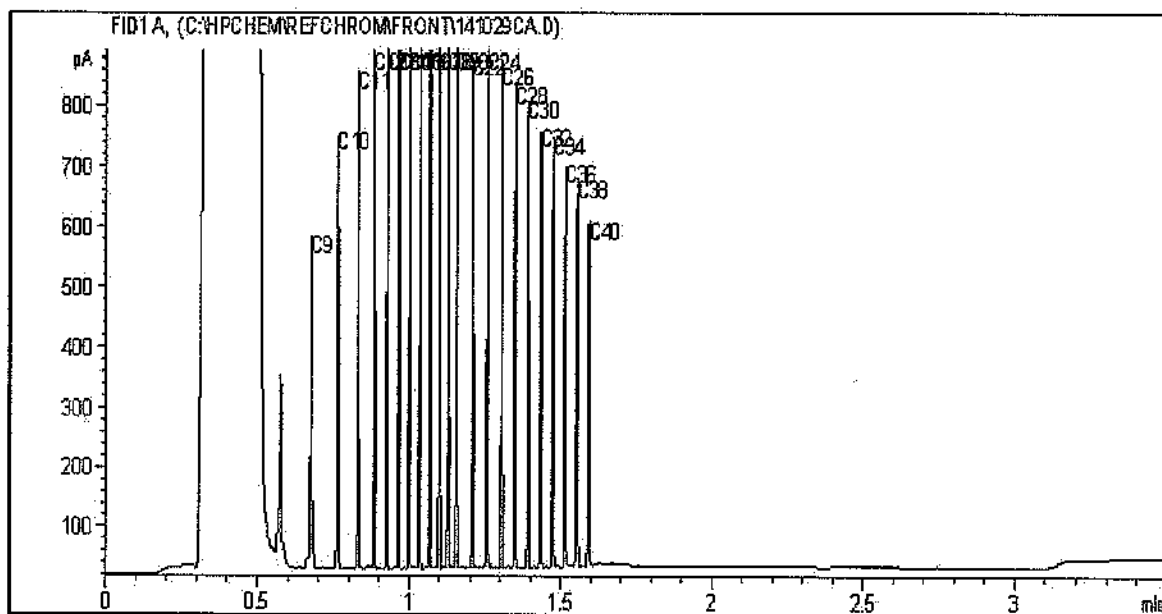
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4969

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P2-COMP-5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

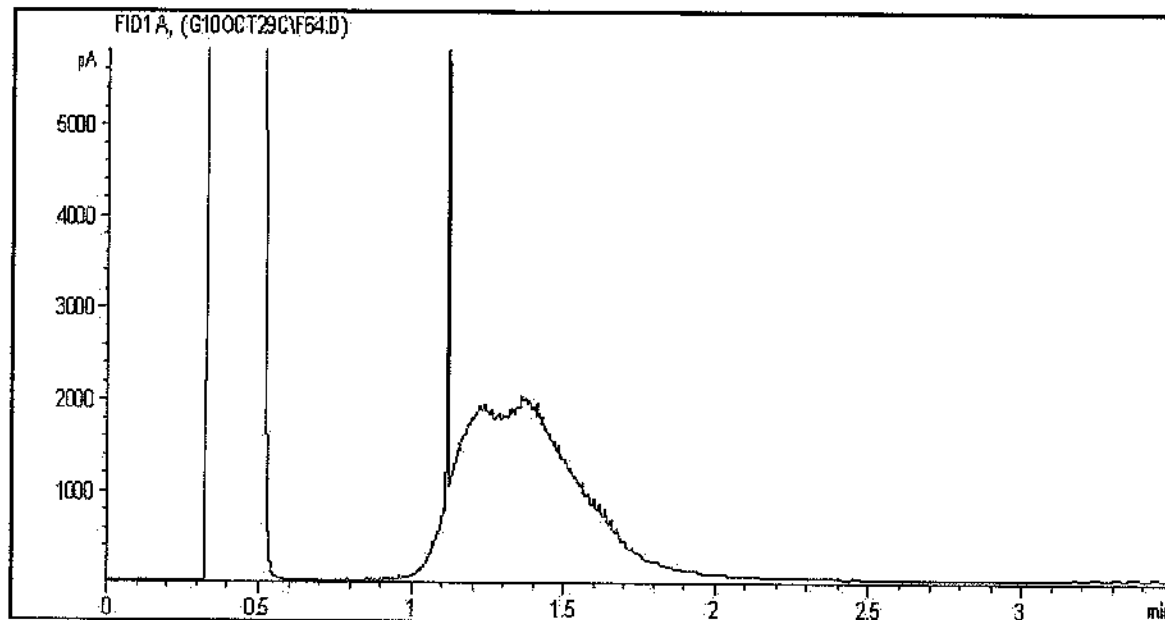
Diesel: C8 - C22

Varsol: C6 - C12

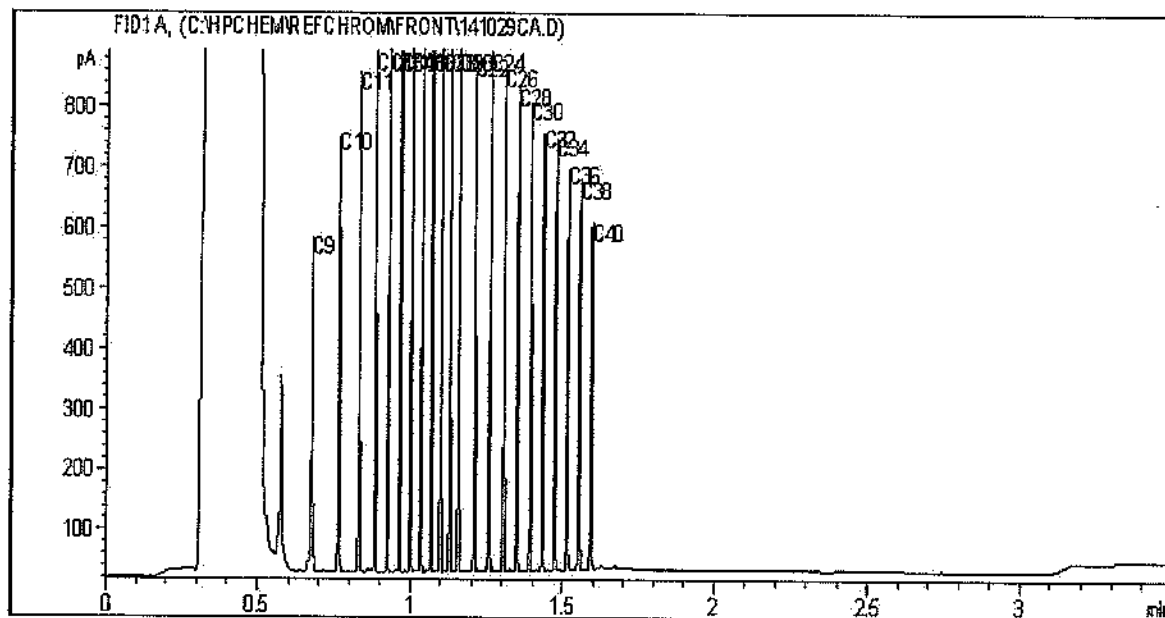
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C6 - C12

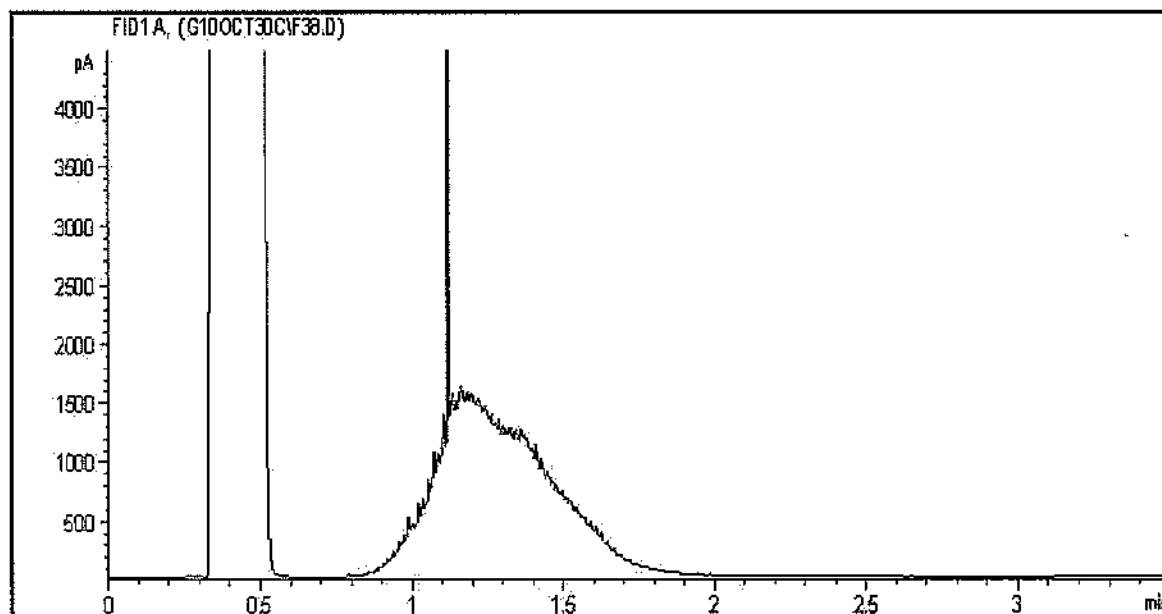
Lubricating Oils: C20 - C40

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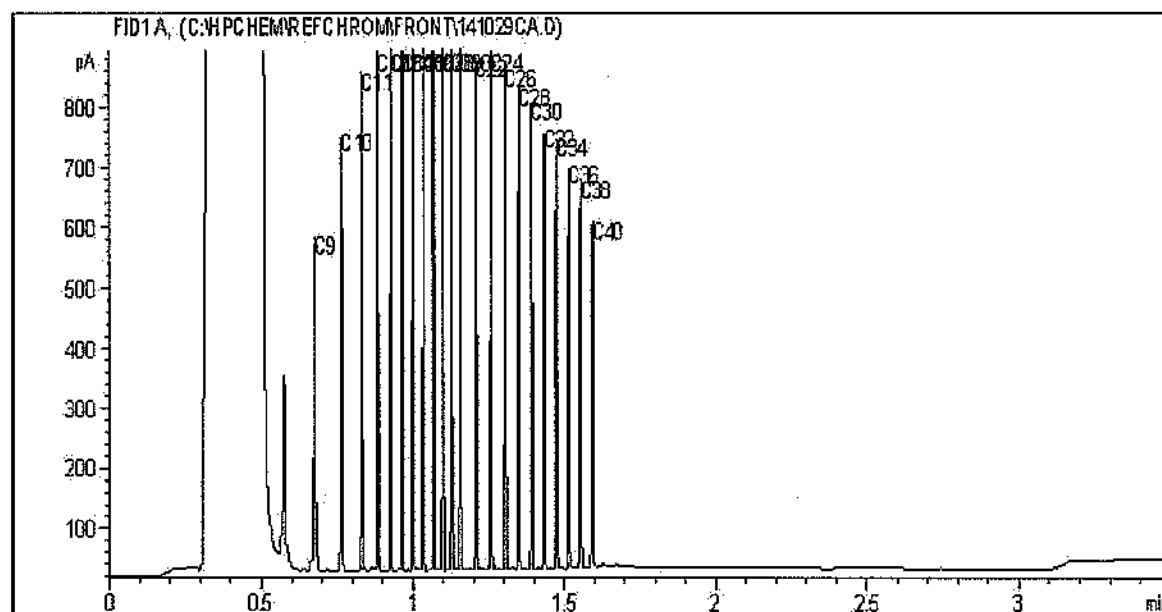
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4971

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P3-COMP-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

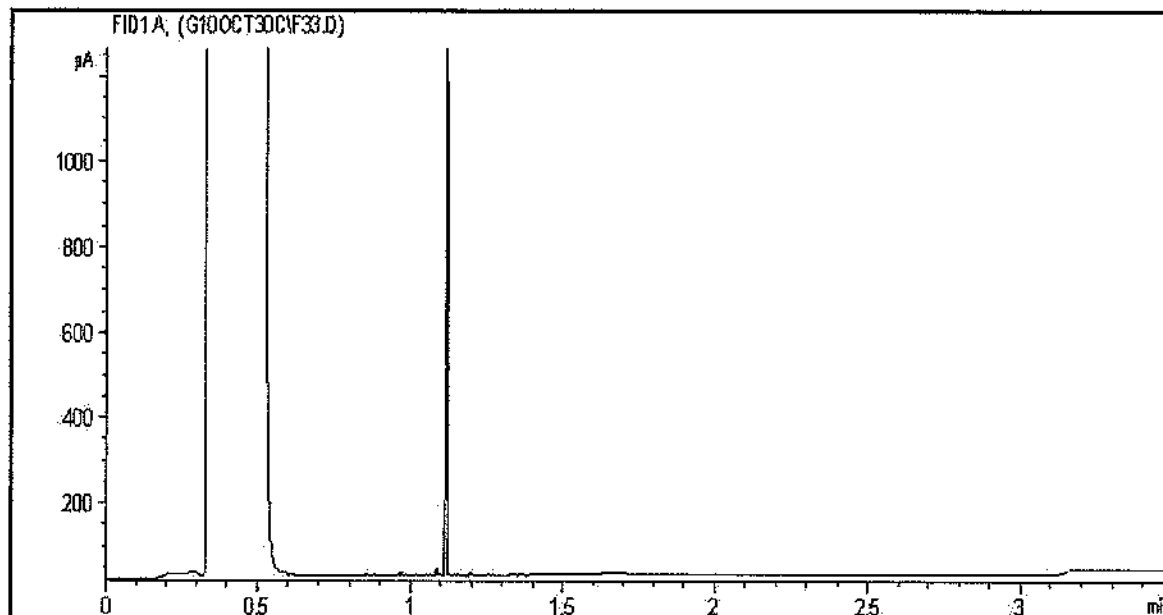


TYPICAL PRODUCT CARBON NUMBER RANGES

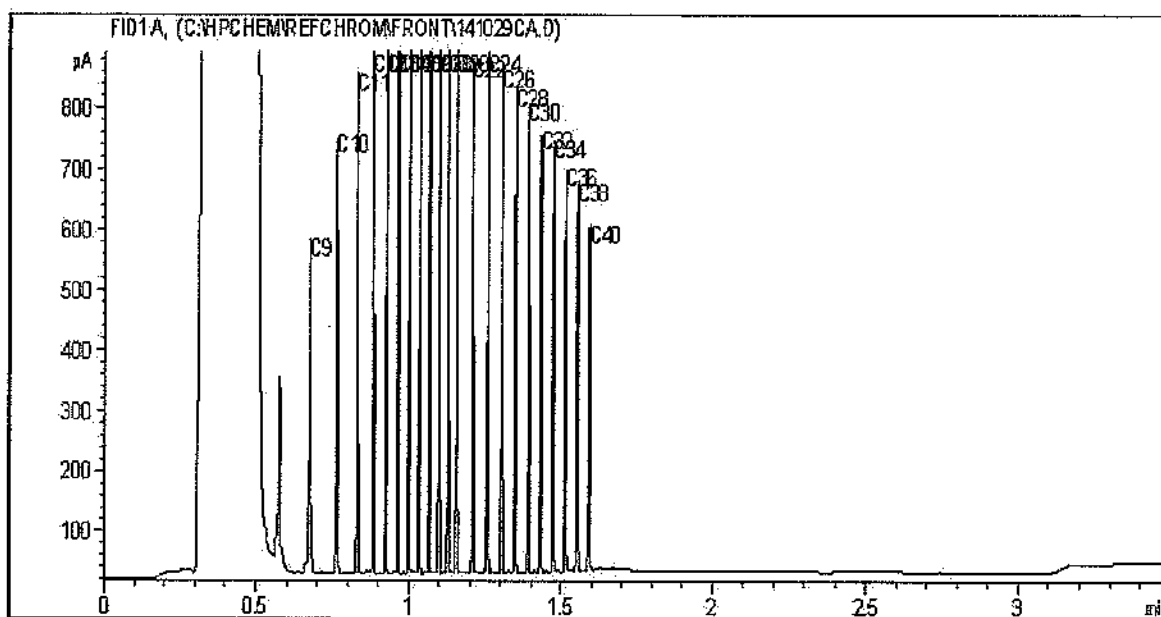
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel:

C8 - C22

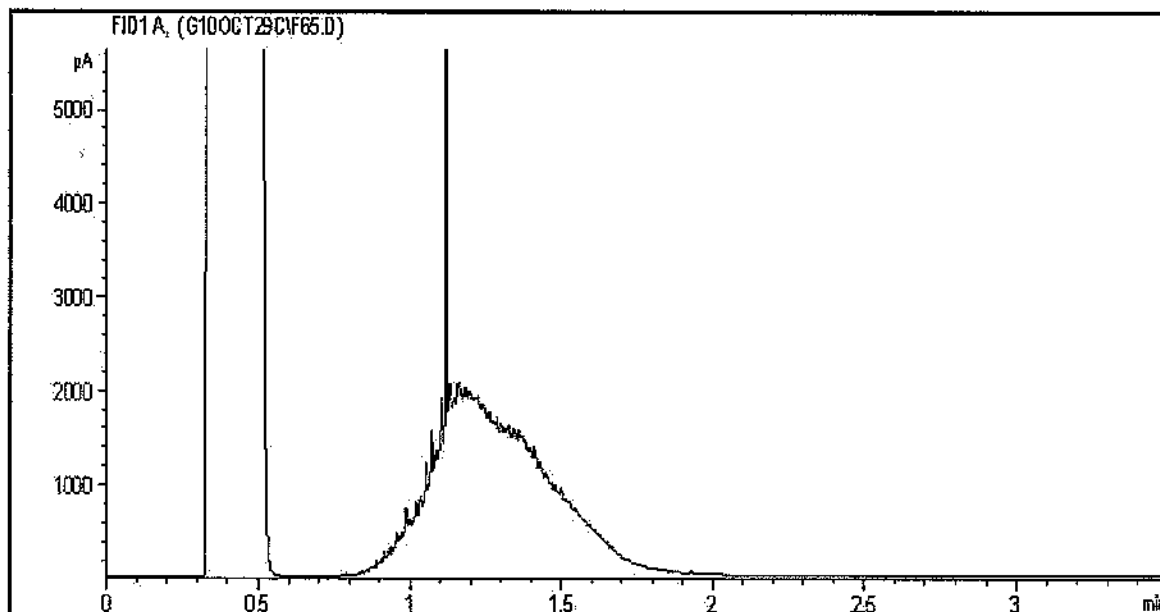
Varsol: C8 - C12

Lubricating Oils:

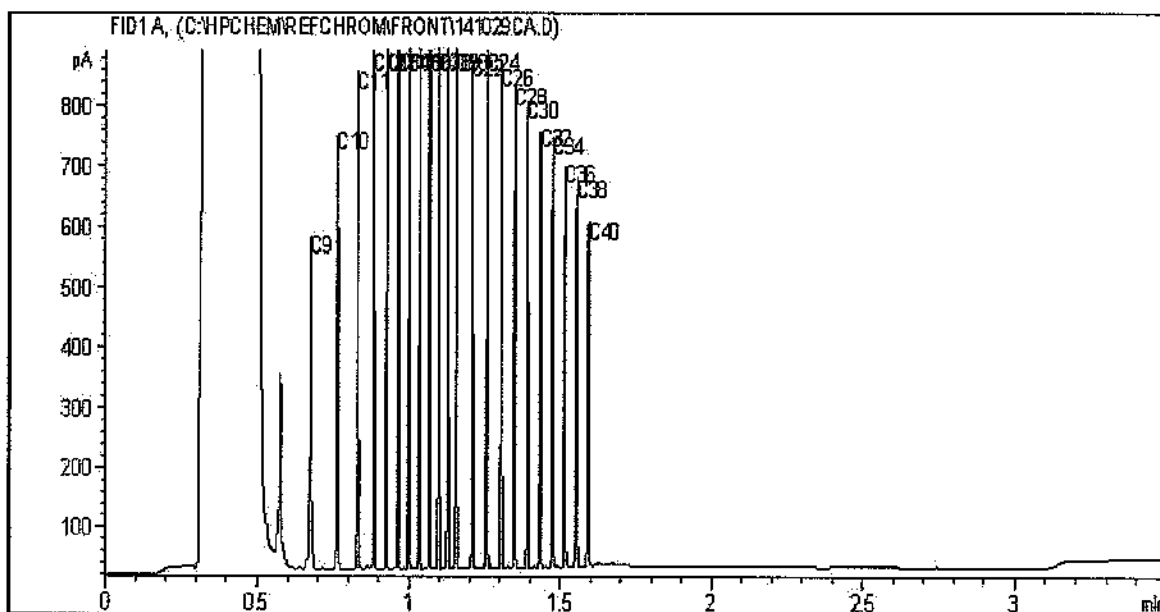
C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

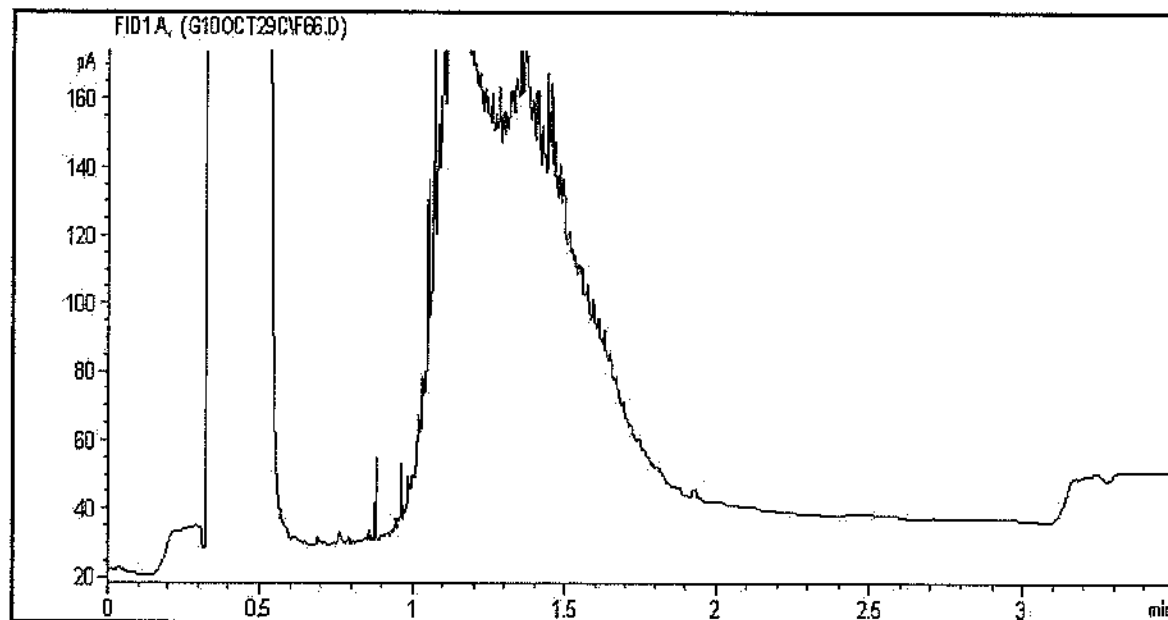
Lubricating Oils: C20 - C40

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

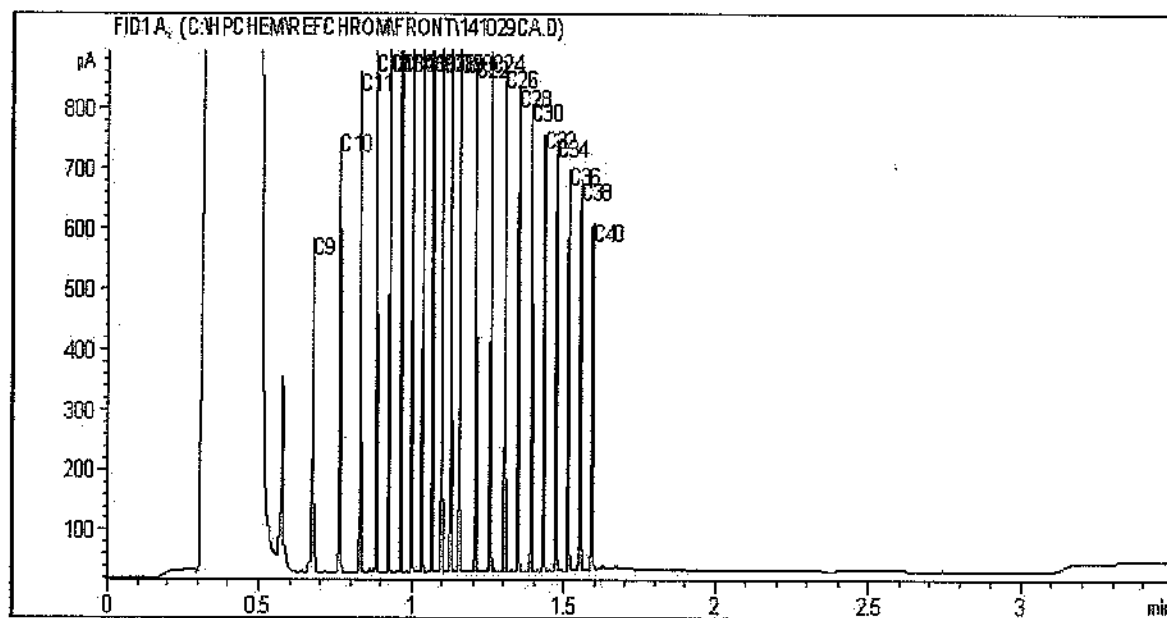
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4973

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P3-COMP-4

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

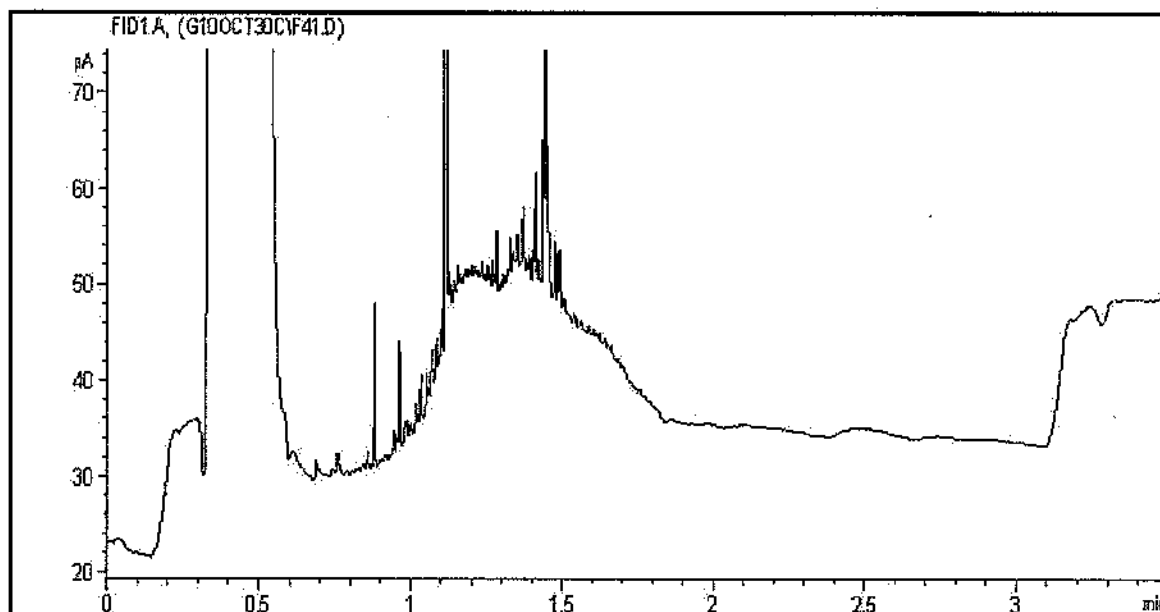
Lubricating Oils: C20 - C40

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

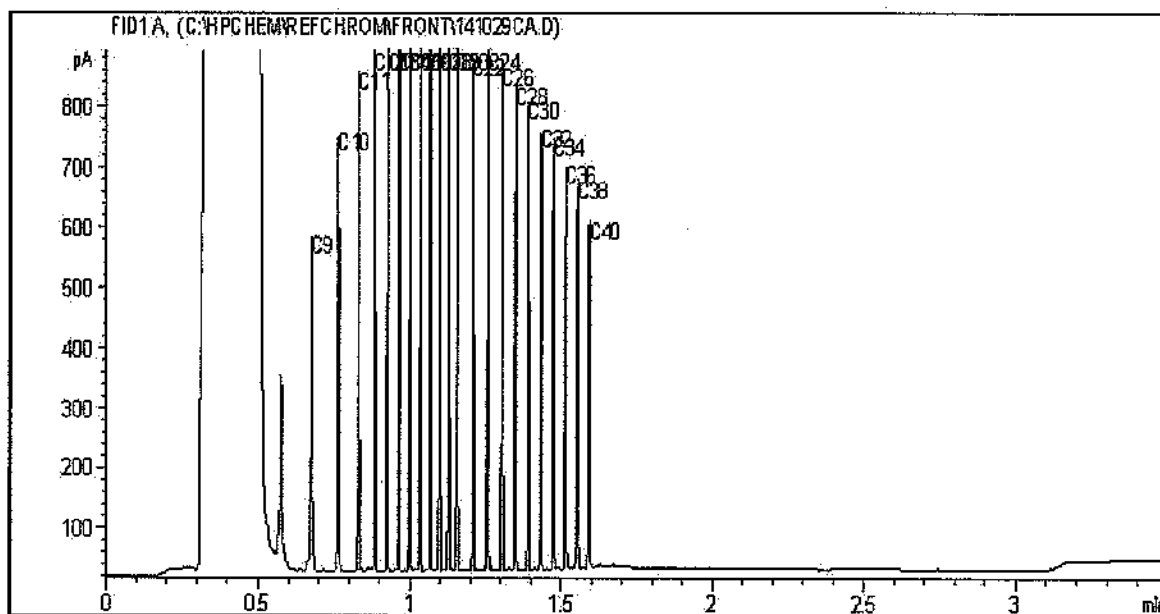
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4974

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P3-COMP-5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution -- Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

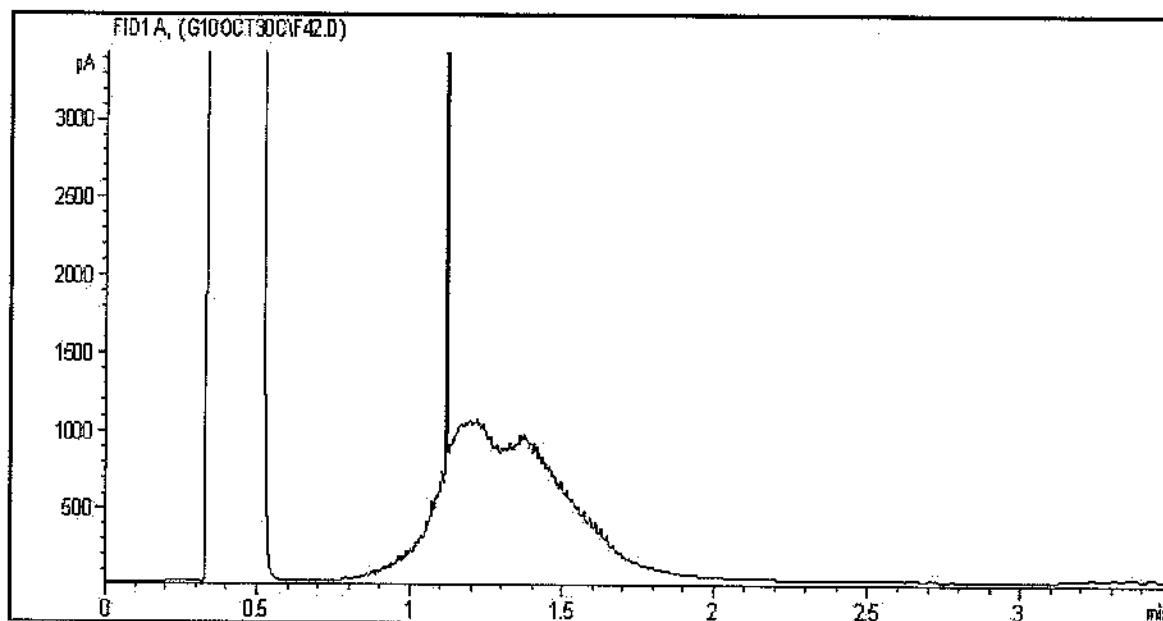
Diesel: C8 - C22

Varsol: C8 - C12

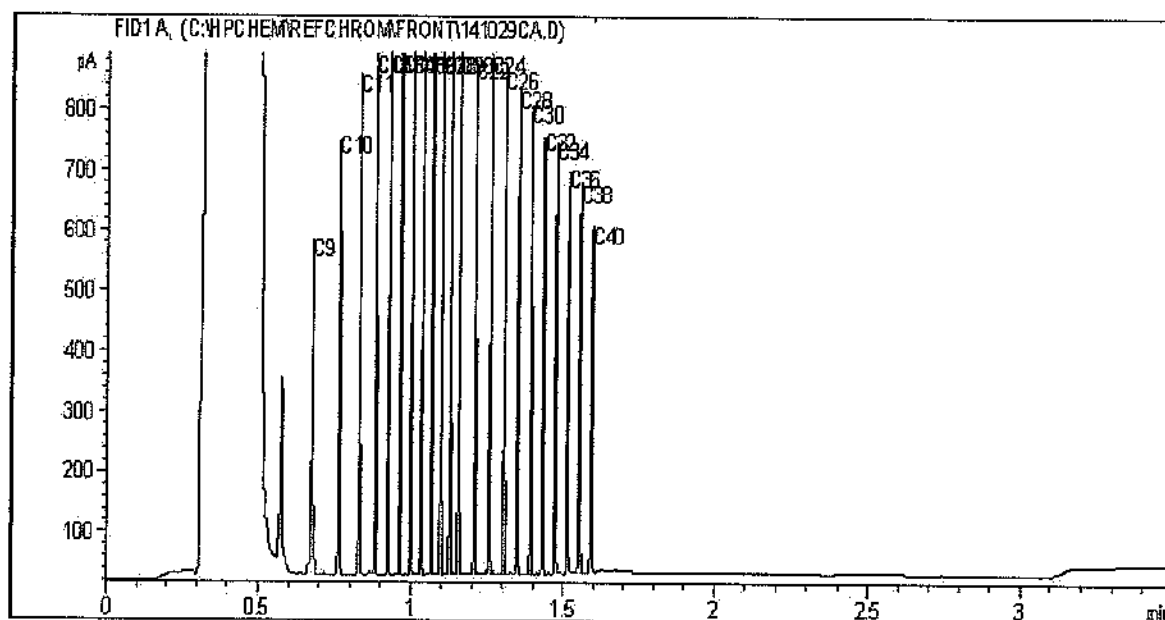
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution -- Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

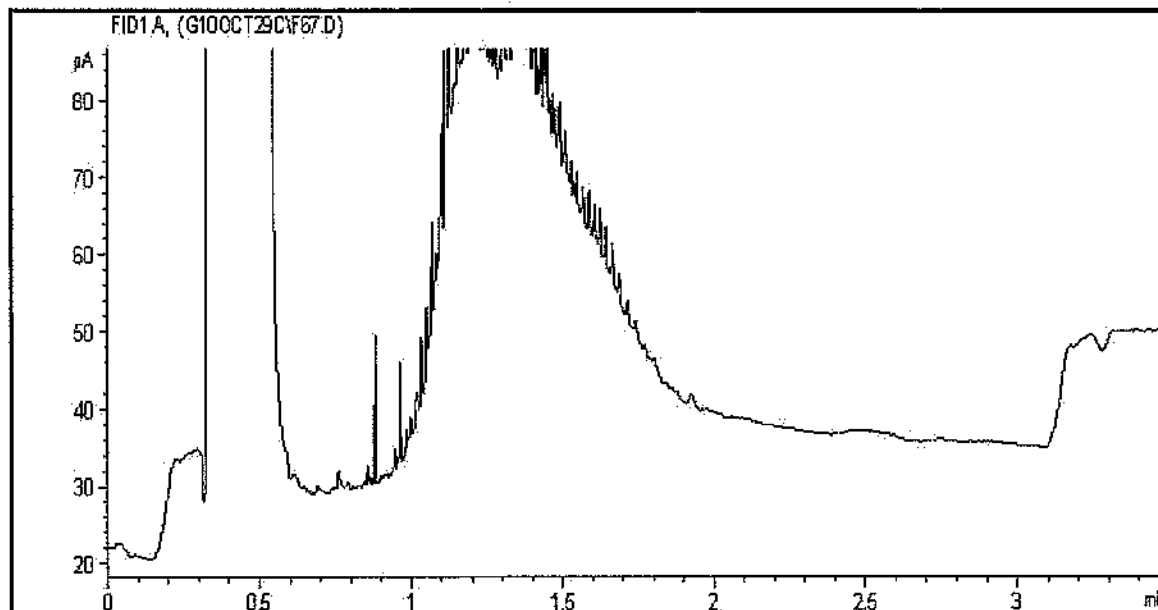
Diesel: C8 - C22

Varsol: C8 - C12

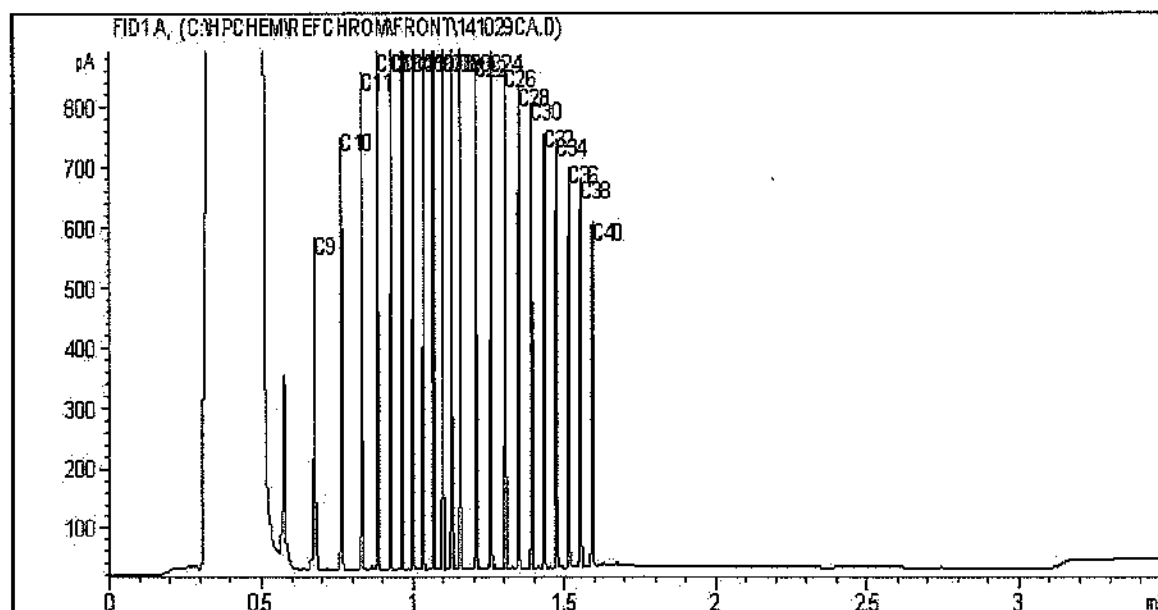
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

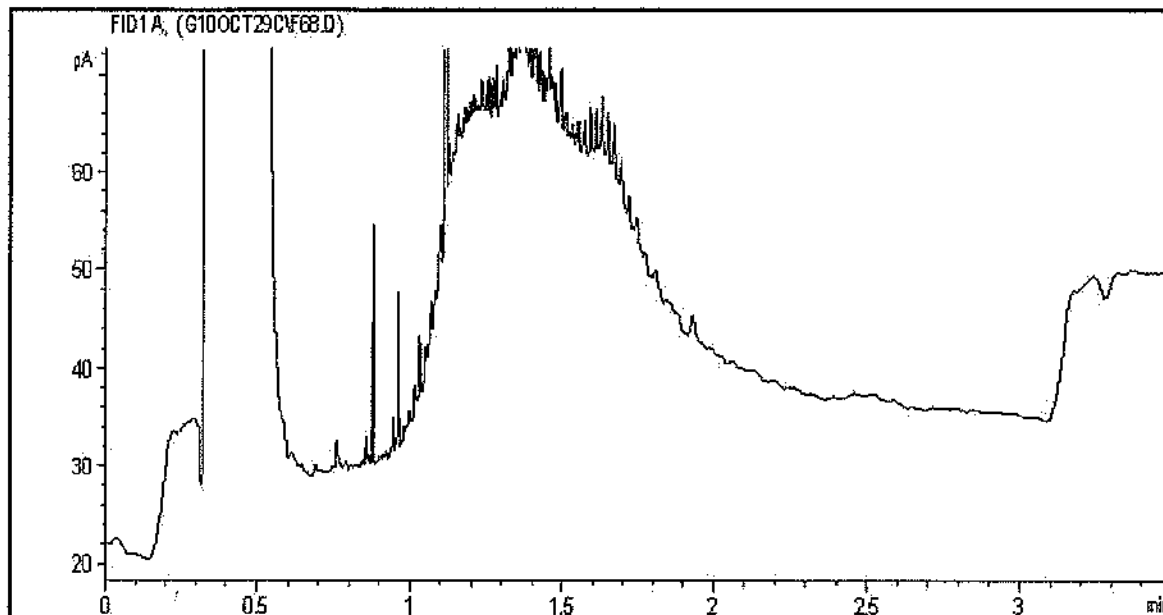


TYPICAL PRODUCT CARBON NUMBER RANGES

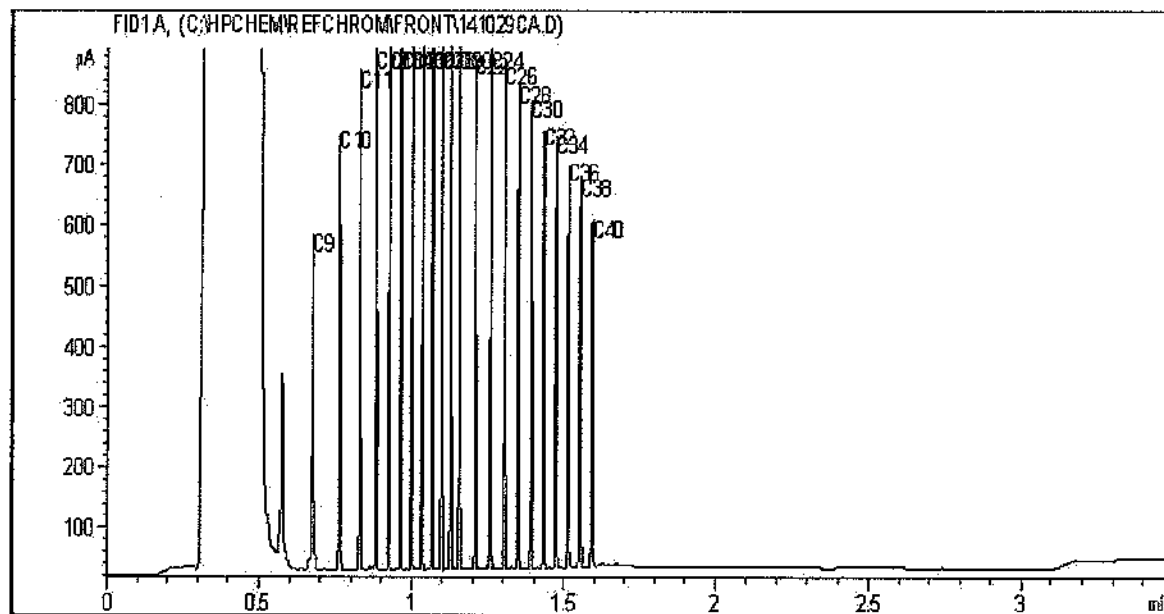
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

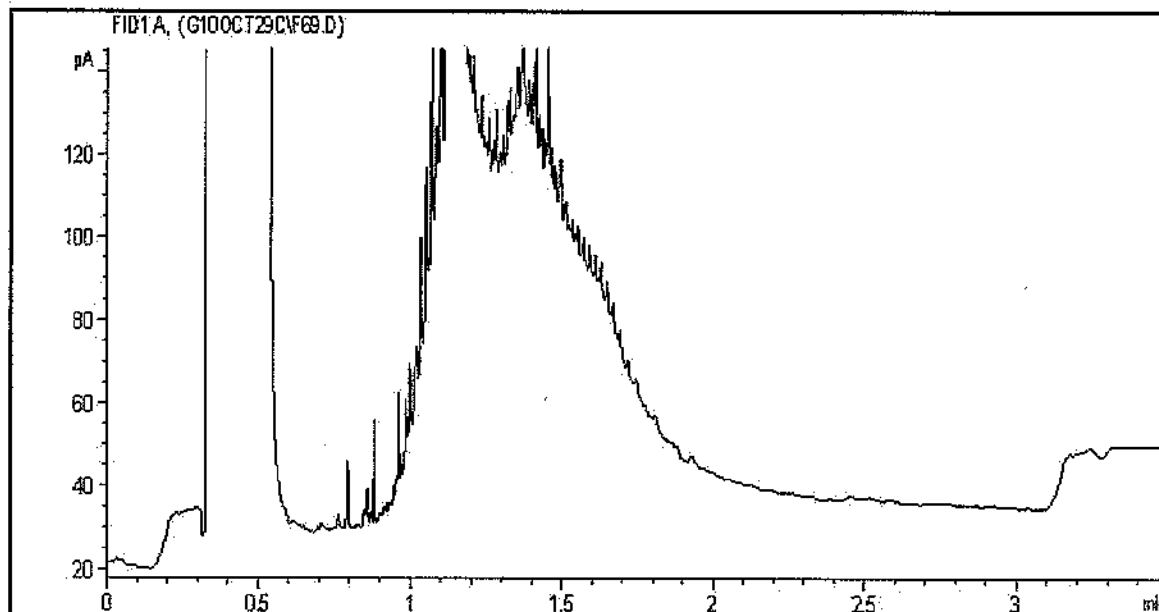
Lubricating Oils: C20 - C40

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

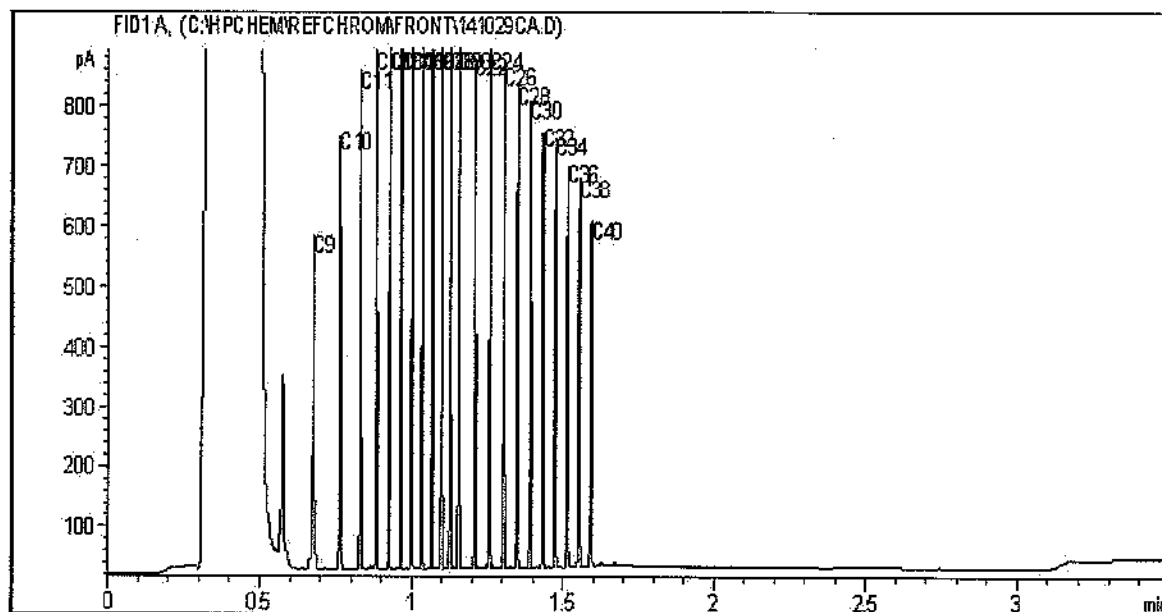
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4978

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P4-COMP-4

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

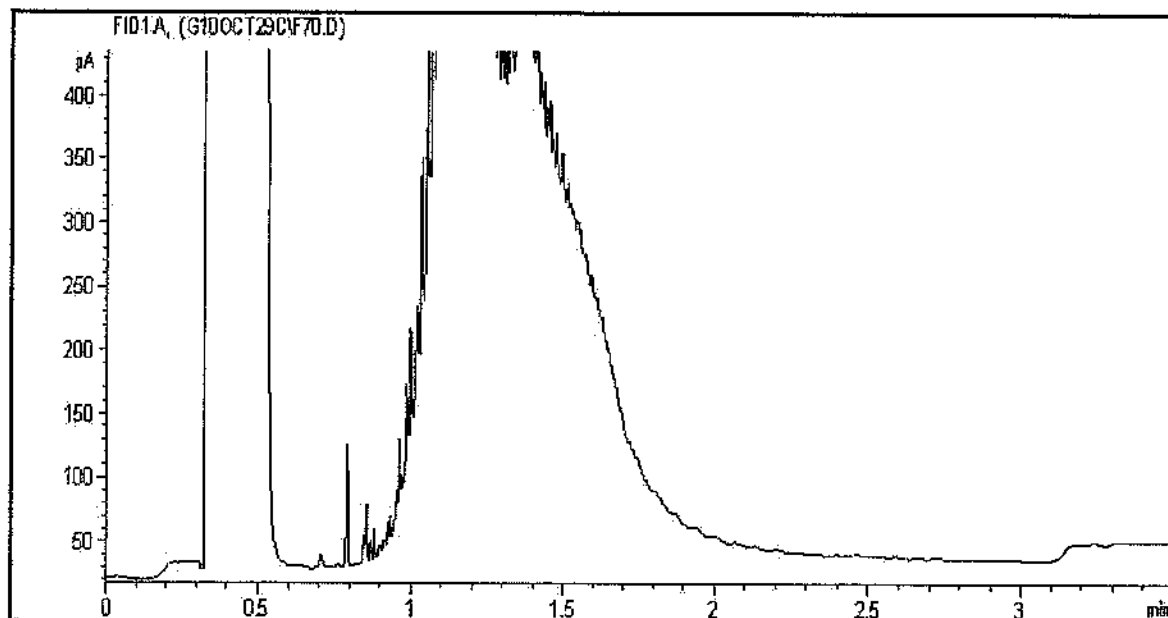
Diesel: C8 - C22

Varsol: C8 - C12

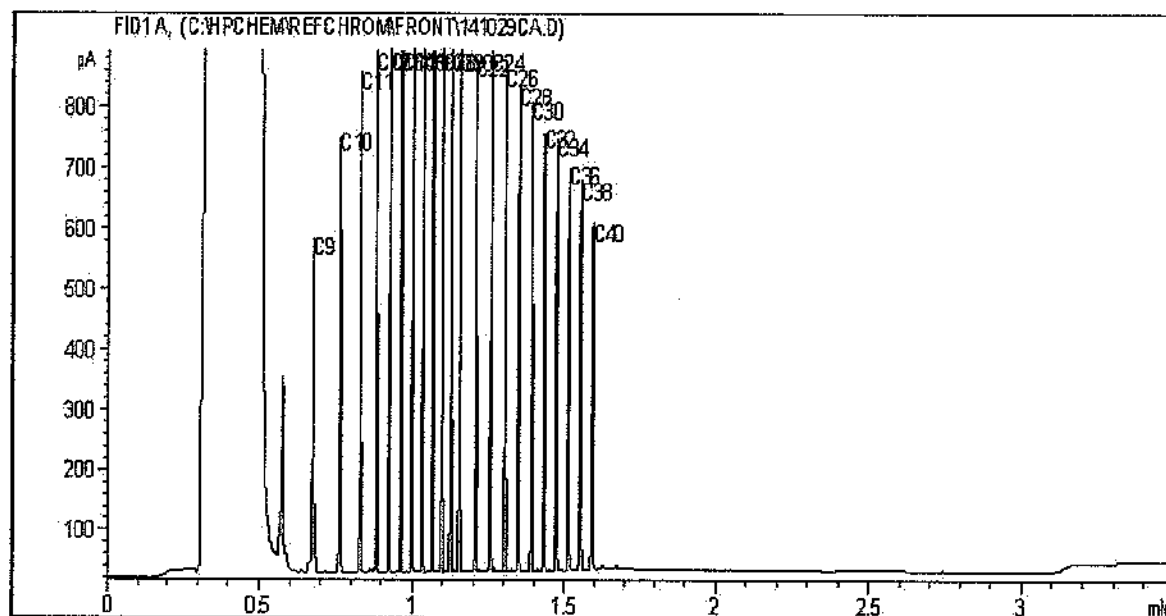
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

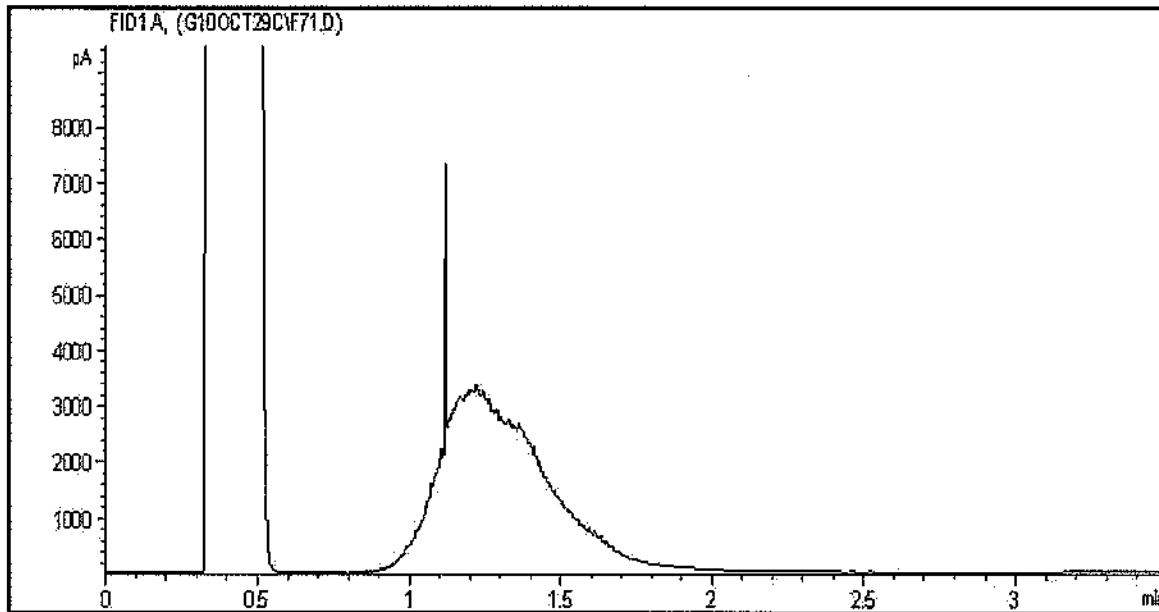
Lubricating Oils: C20 - C40

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

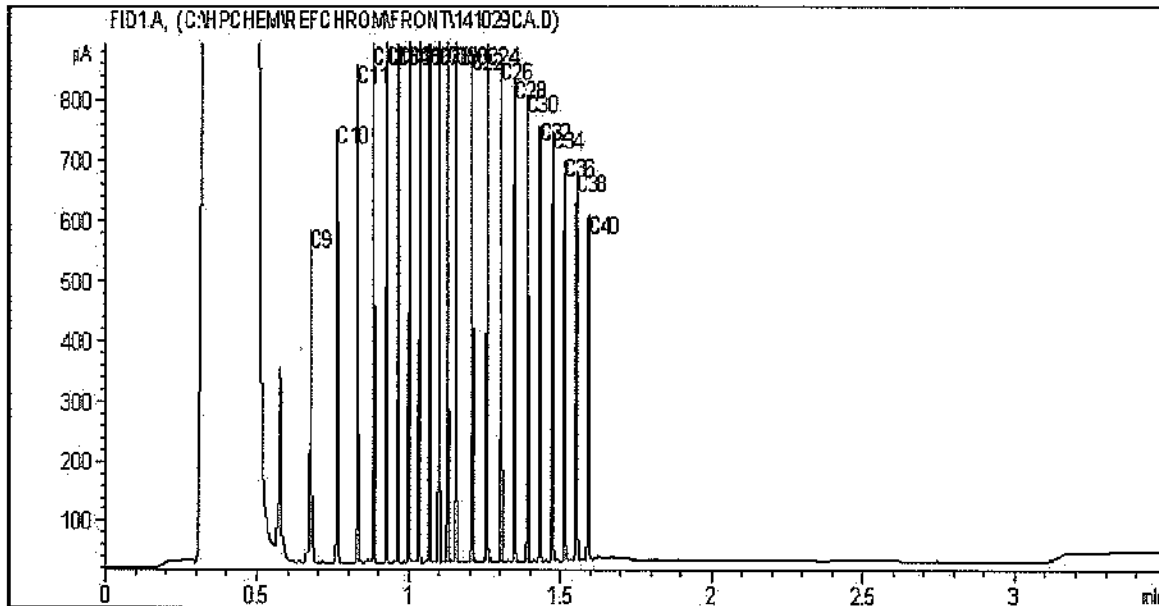
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4980

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P5-COMP-1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

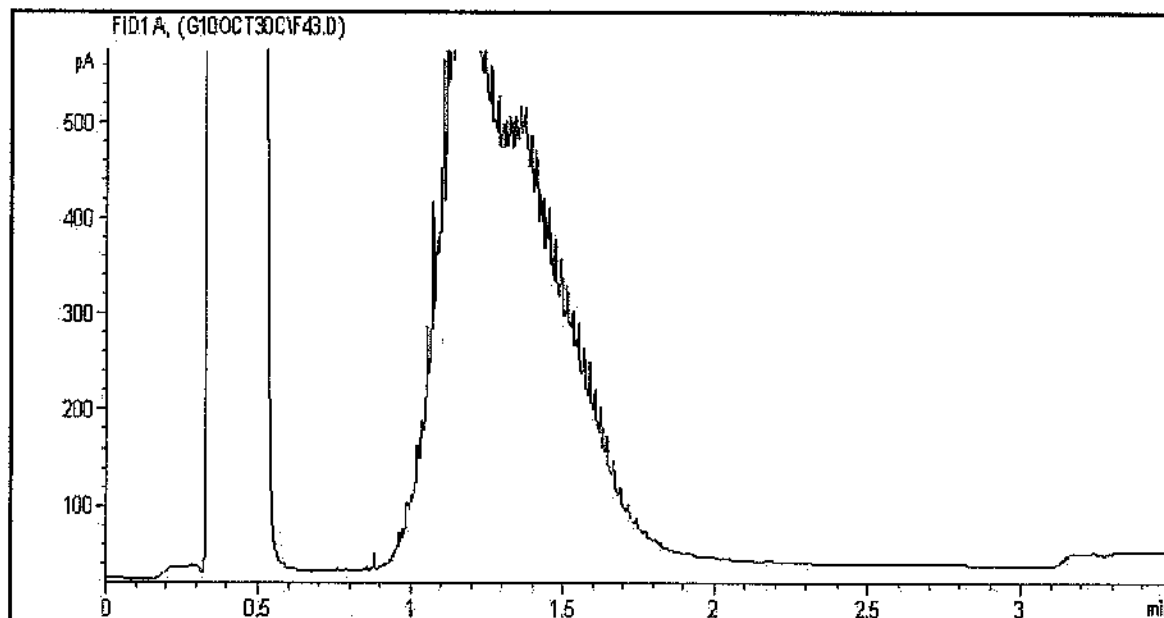
Lubricating Oils: C20 - C40

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

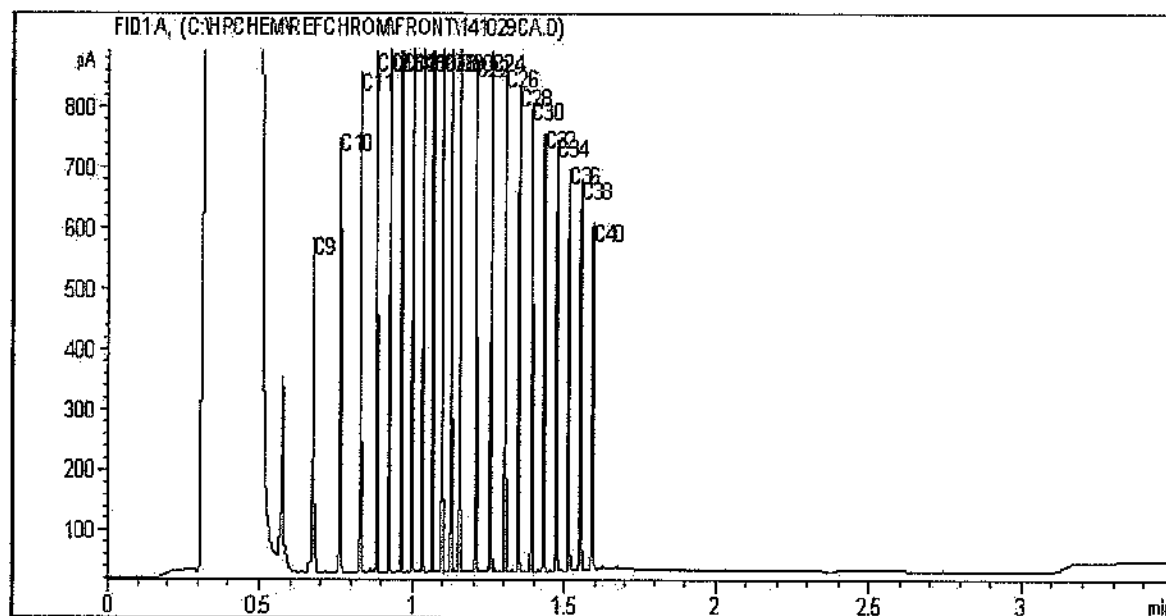
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4981

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: PS-COMP-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

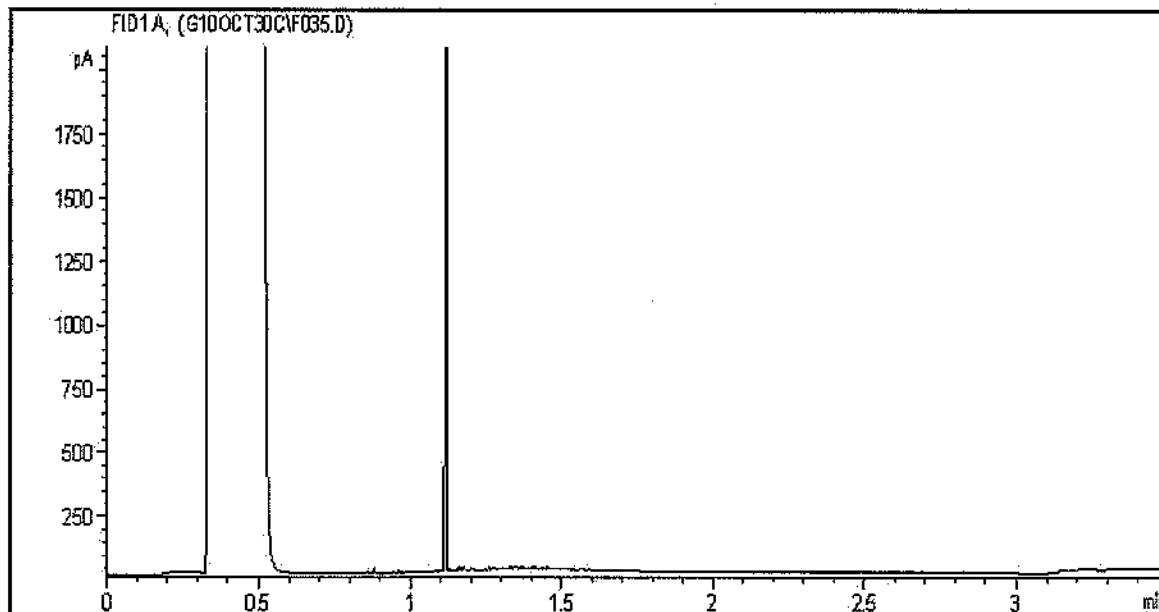
Diesel: C8 - C22

Varsol: C8 - C12

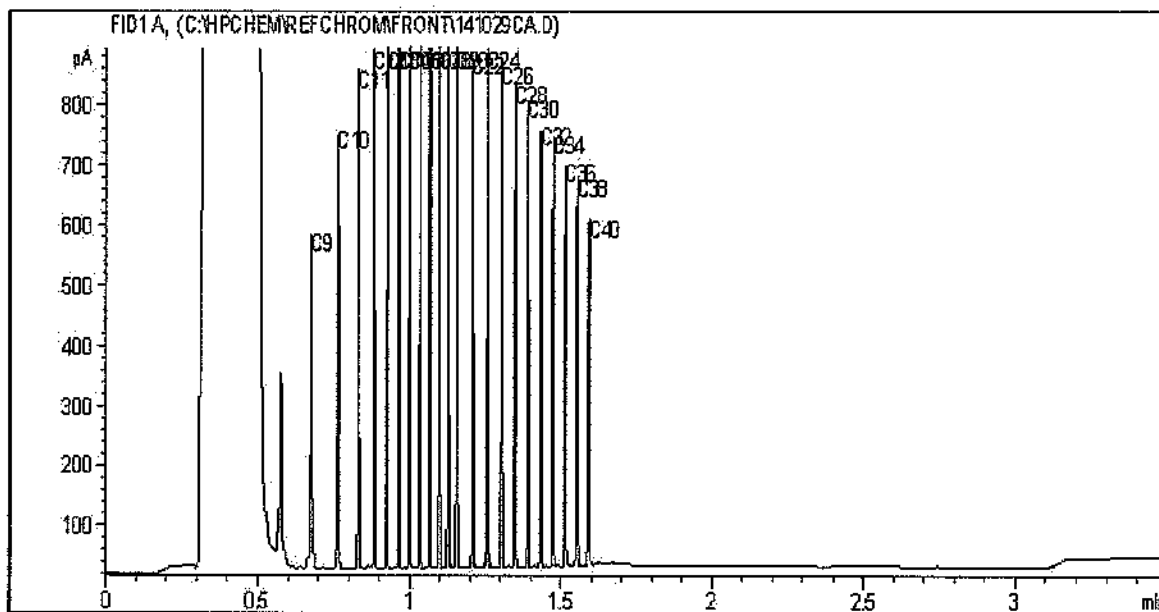
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

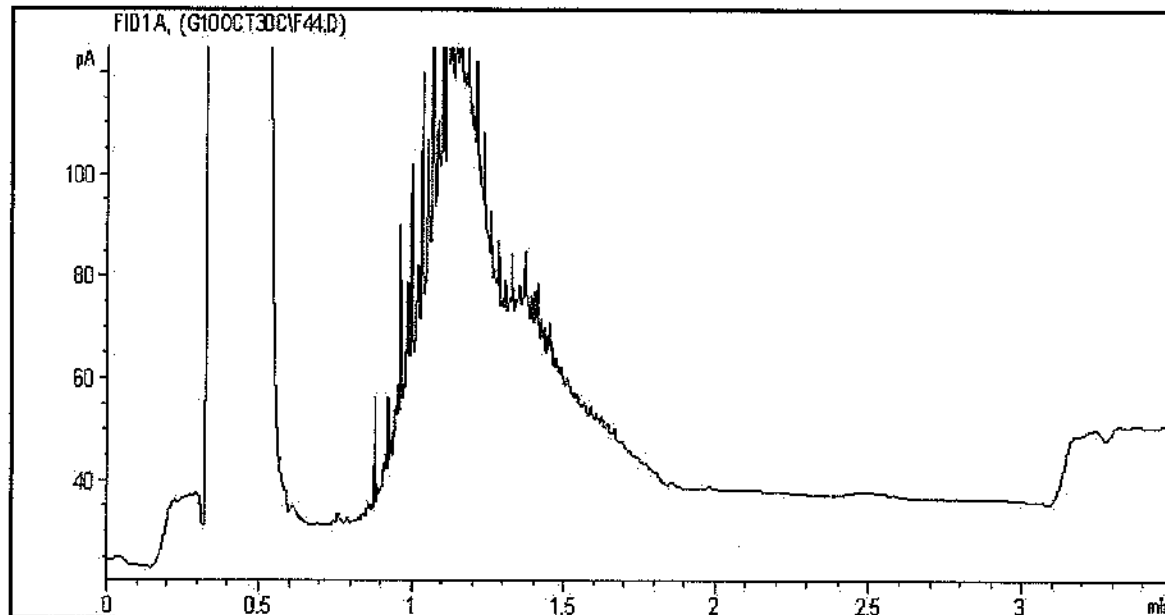


TYPICAL PRODUCT CARBON NUMBER RANGES

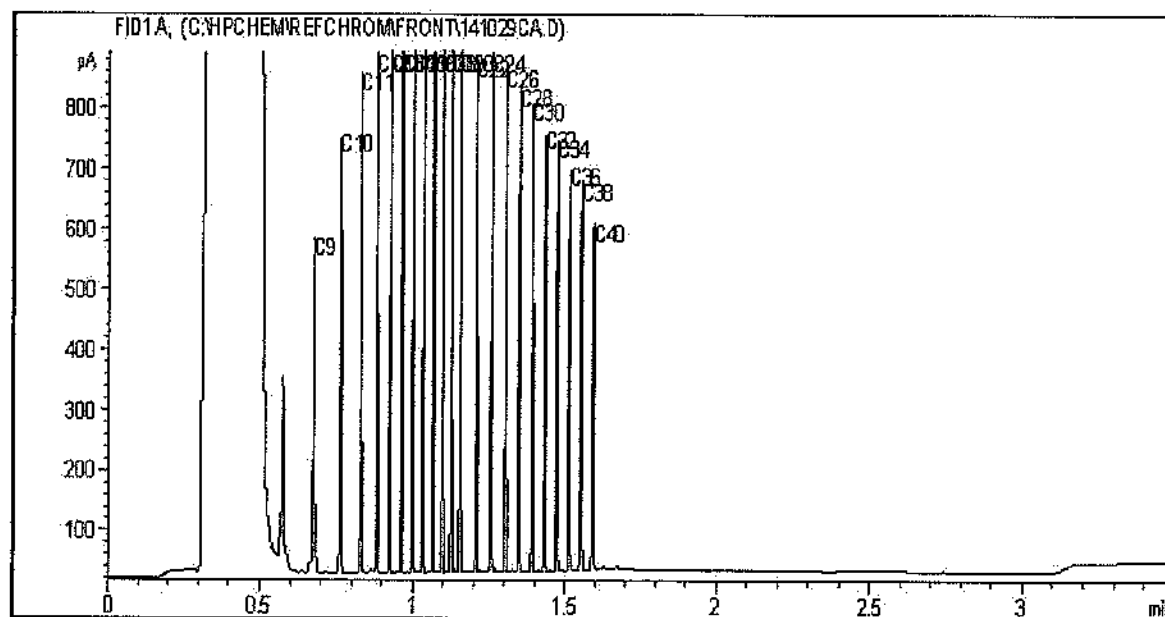
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating oils:	C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

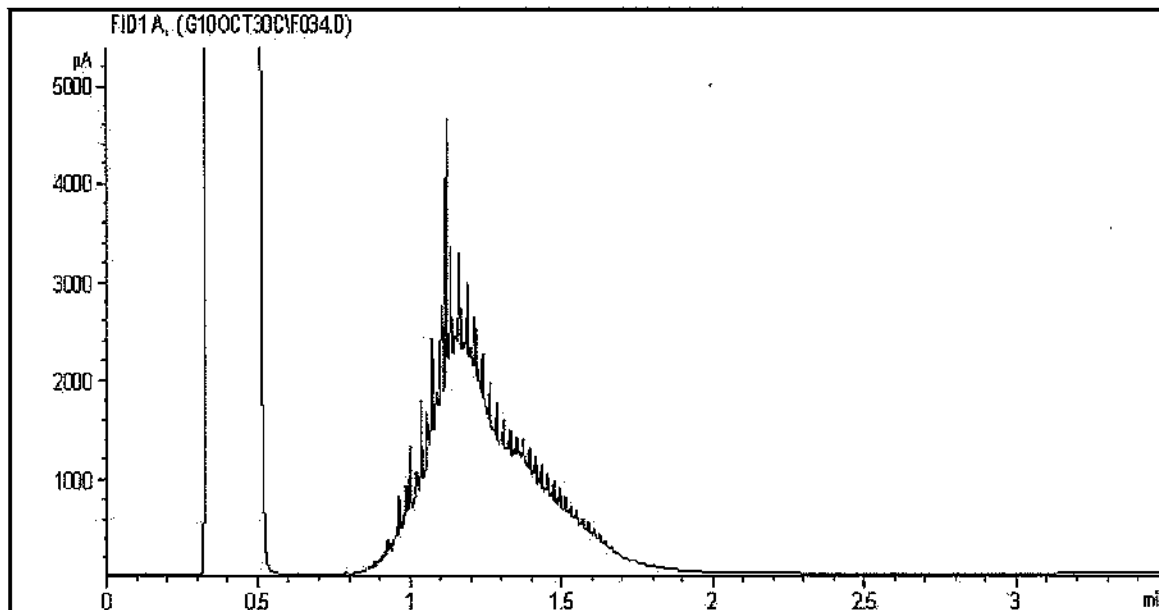
Lubricating Oils: C20 - C40

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

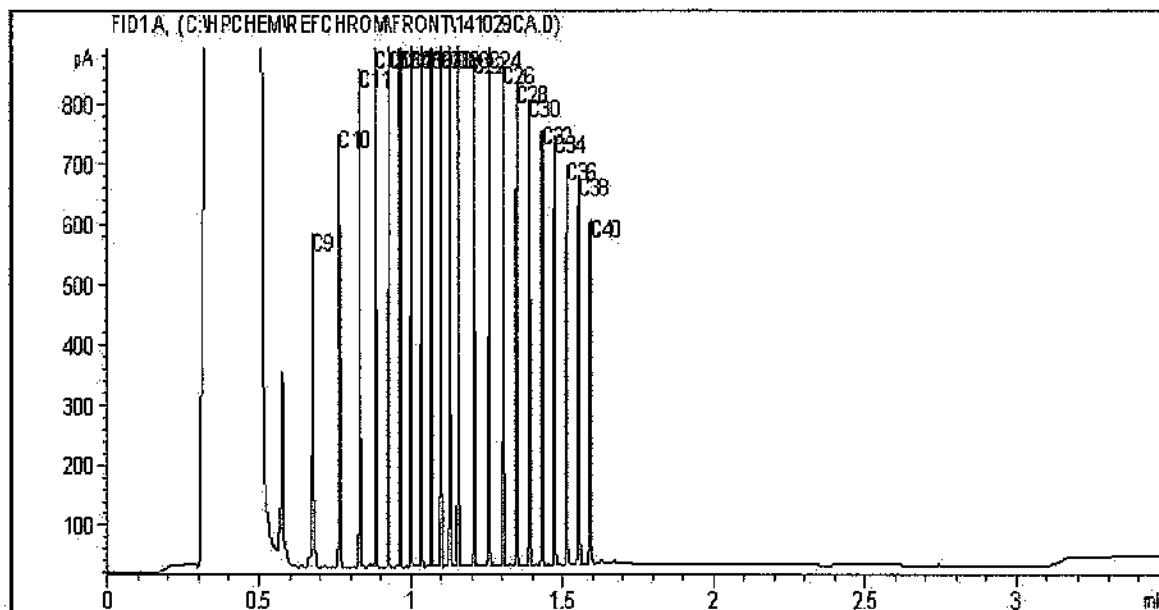
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4984

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P5-COMP-5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

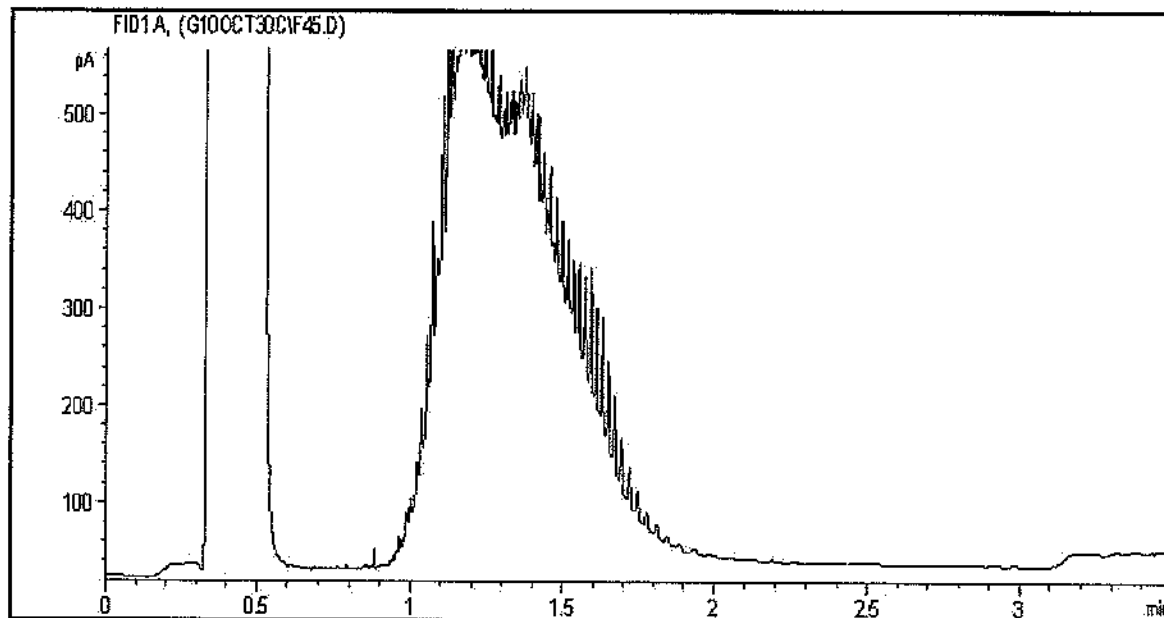
Diesel: C8 - C22

Varsol: C8 - C12

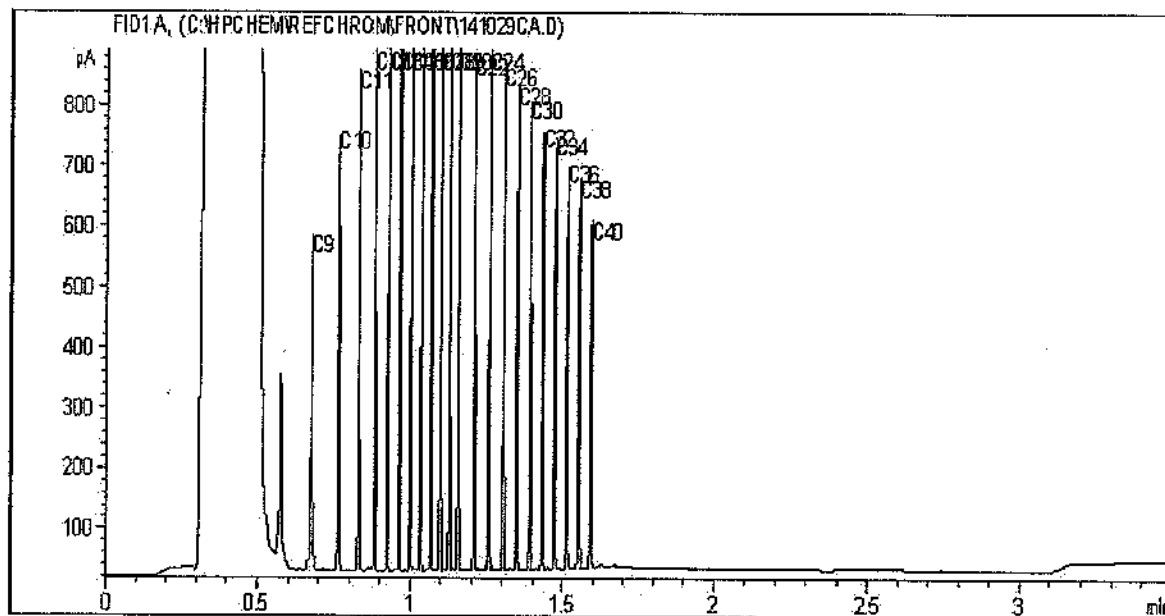
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel:

C8 - C22

Varsol: C8 - C12

Lubricating Oils:

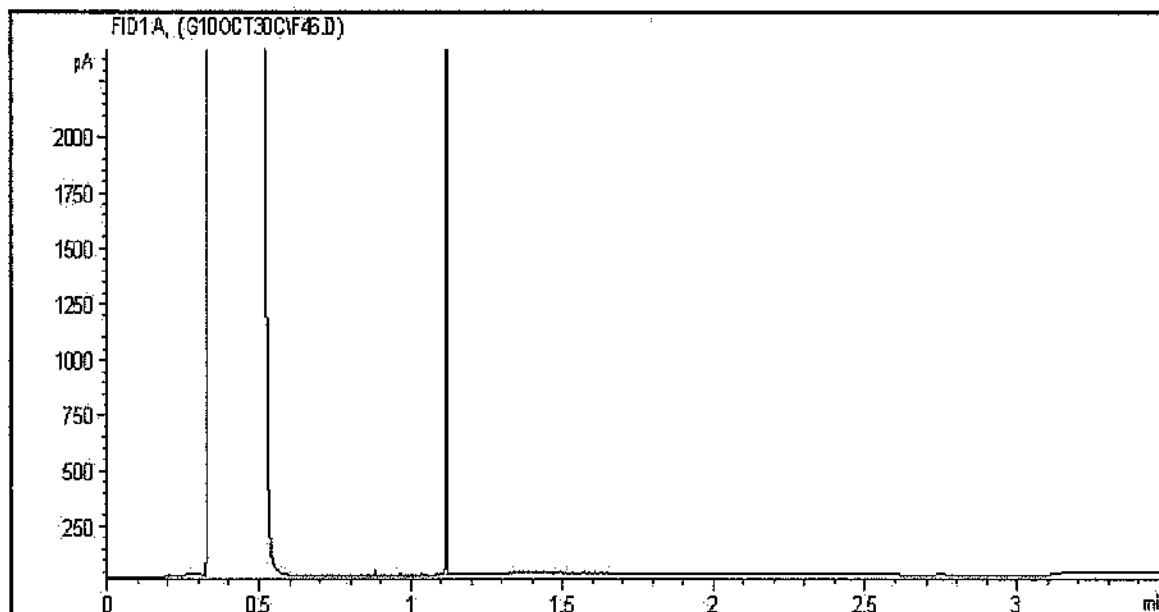
C20 - C40

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

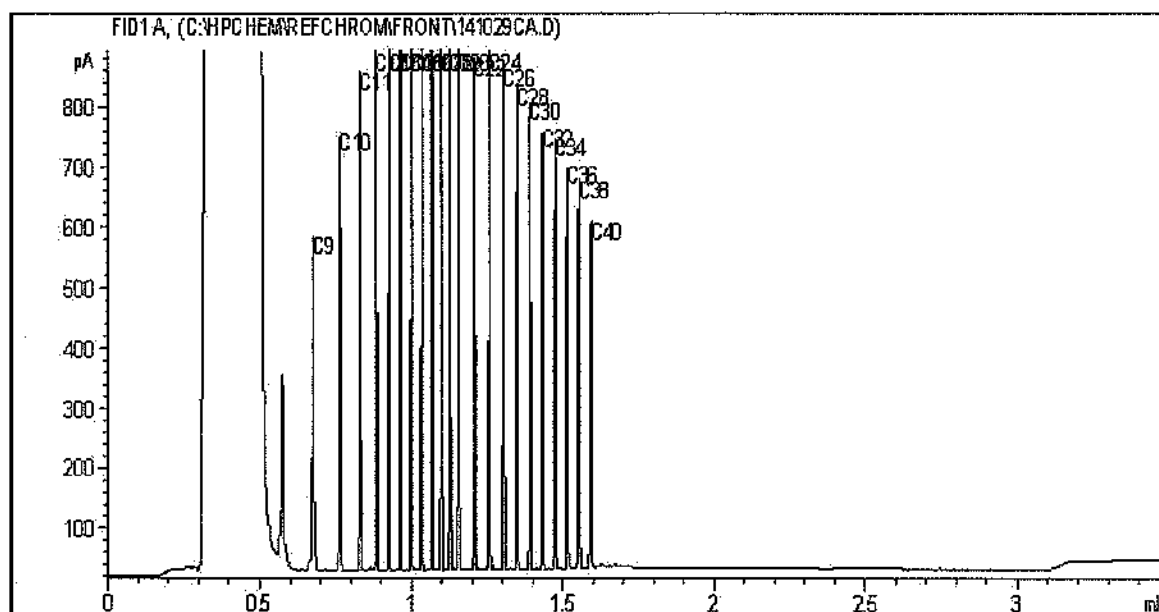
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4986

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: P6-COMP-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

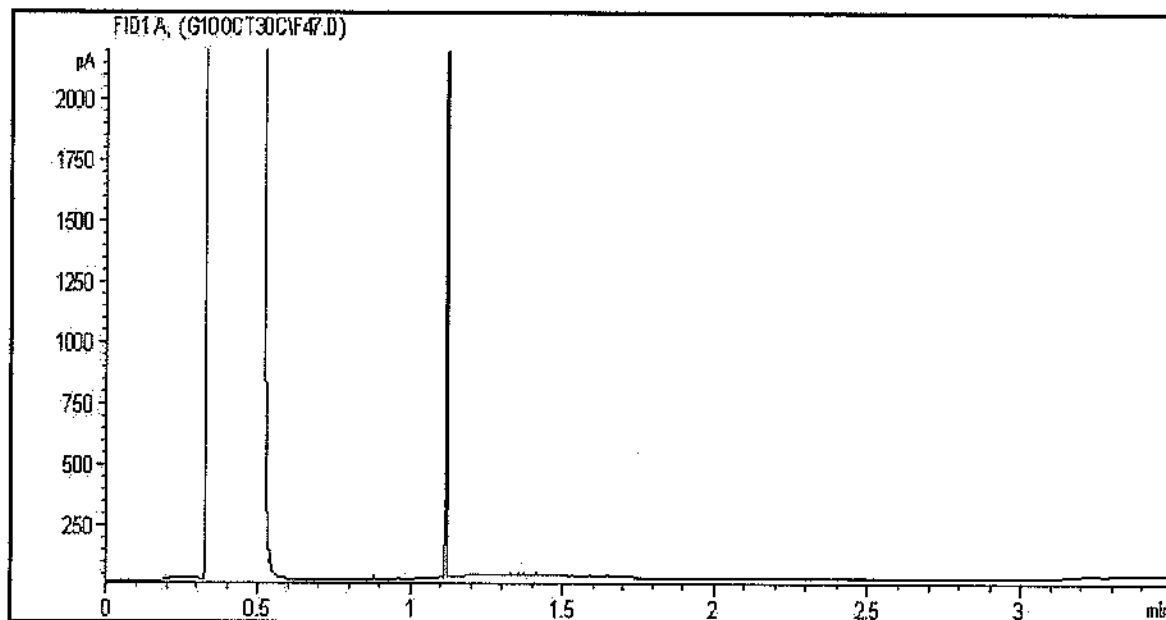
Diesel: C8 - C22

Varsol: C8 - C12

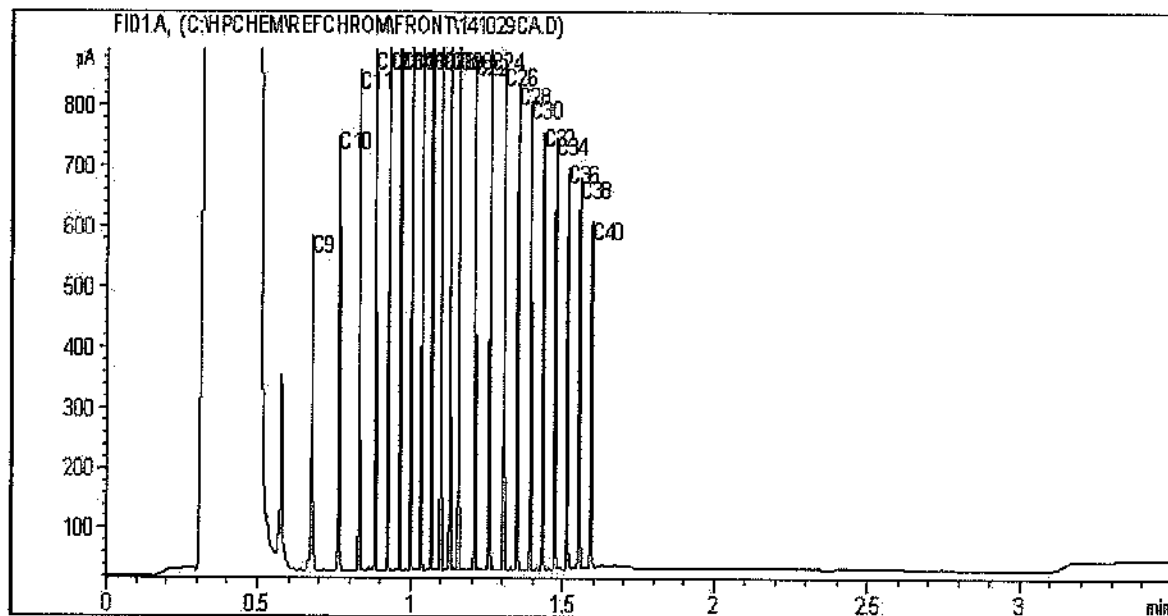
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

Lubricating Oils: C20 - C40

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

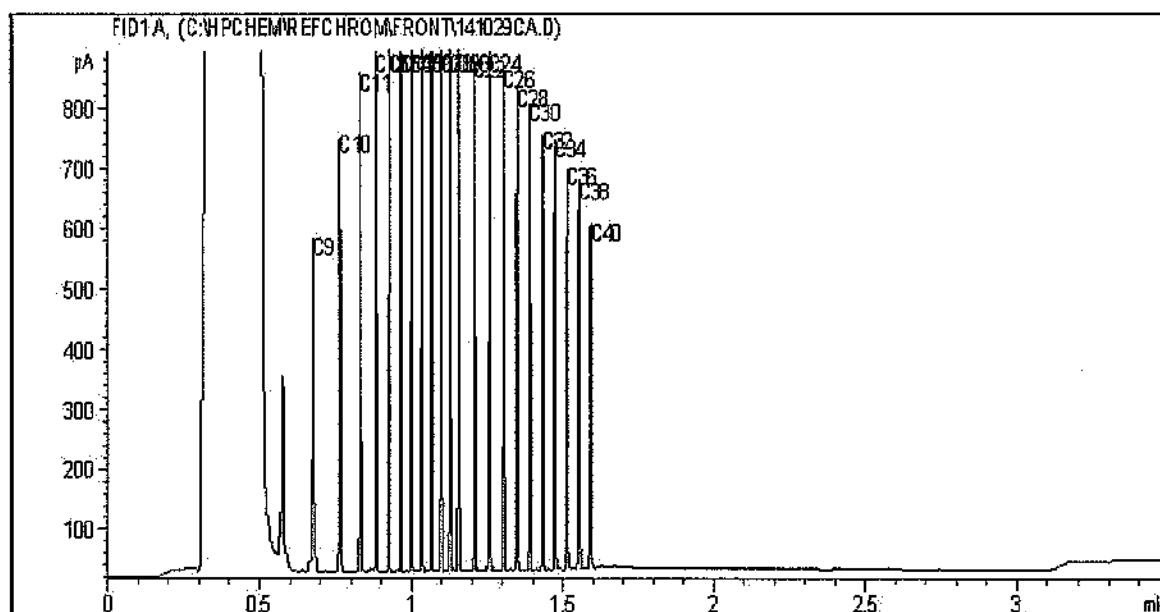
Maxxam Job #: 8496608
 Report Date: 2014/11/07
 Maxxam Sample: KY4988

SNC-LAVALIN INC.
 Client Project #: 622653
 Site Reference: SHELL TERMINAL WINNIPEG
 Client ID: P6-COMP-4

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

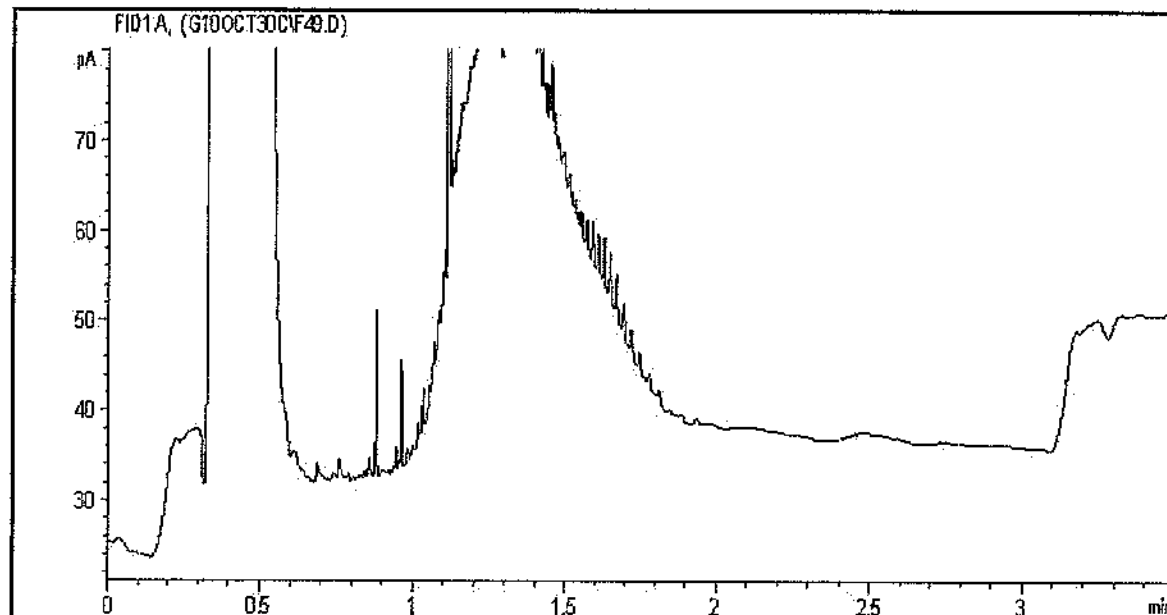


TYPICAL PRODUCT CARBON NUMBER RANGES

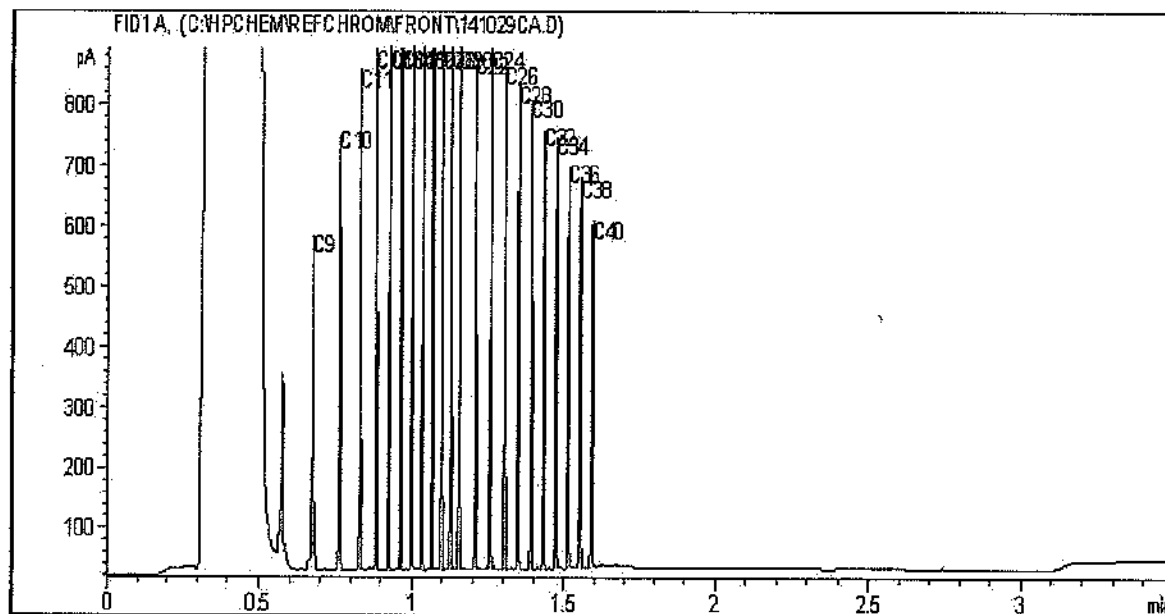
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

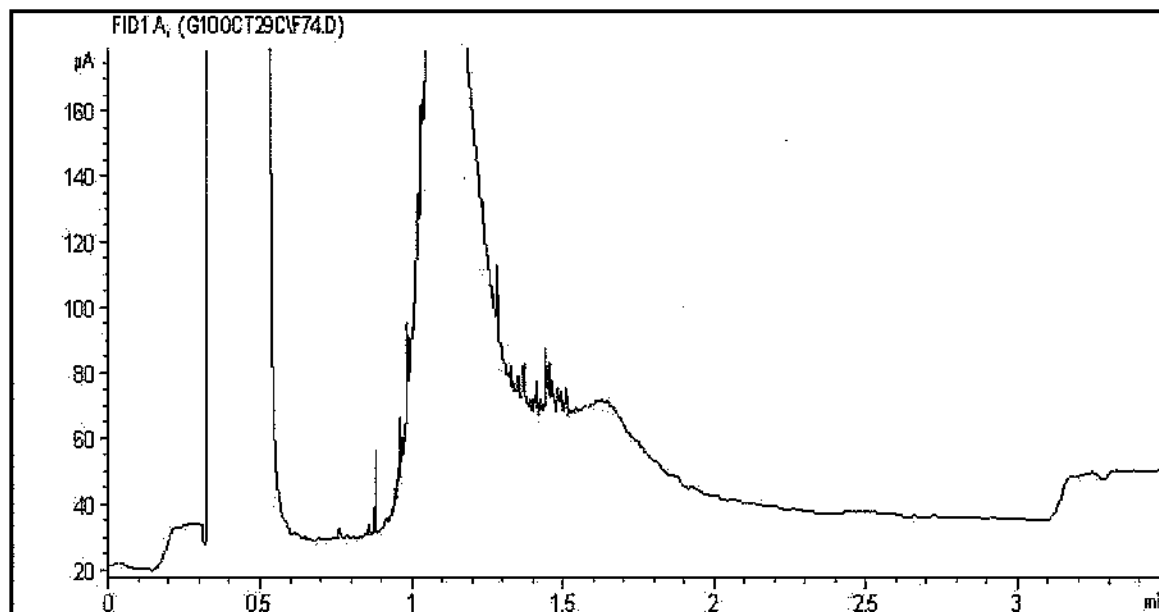
Lubricating Oils: C20 - C40

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

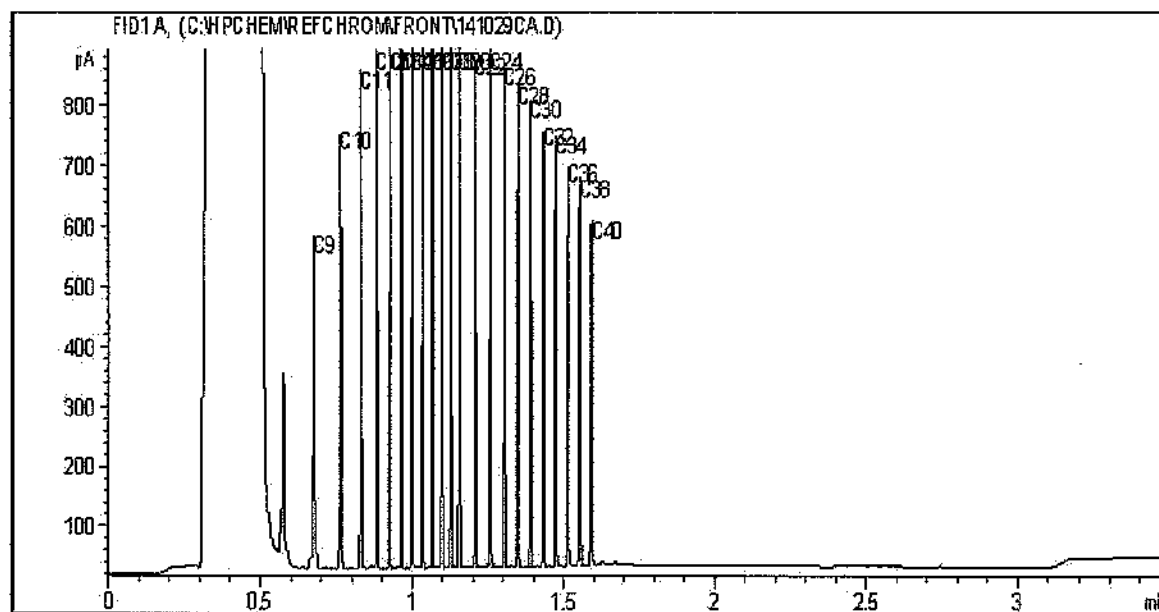
Maxxam Job #: 8496608
 Report Date: 2014/11/07
 Maxxam Sample: KY4990

SNC-LAVALIN INC.
 Client Project #: 622653
 Site Reference: SHELL TERMINAL WINNIPEG
 Client ID: F-COMP-1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

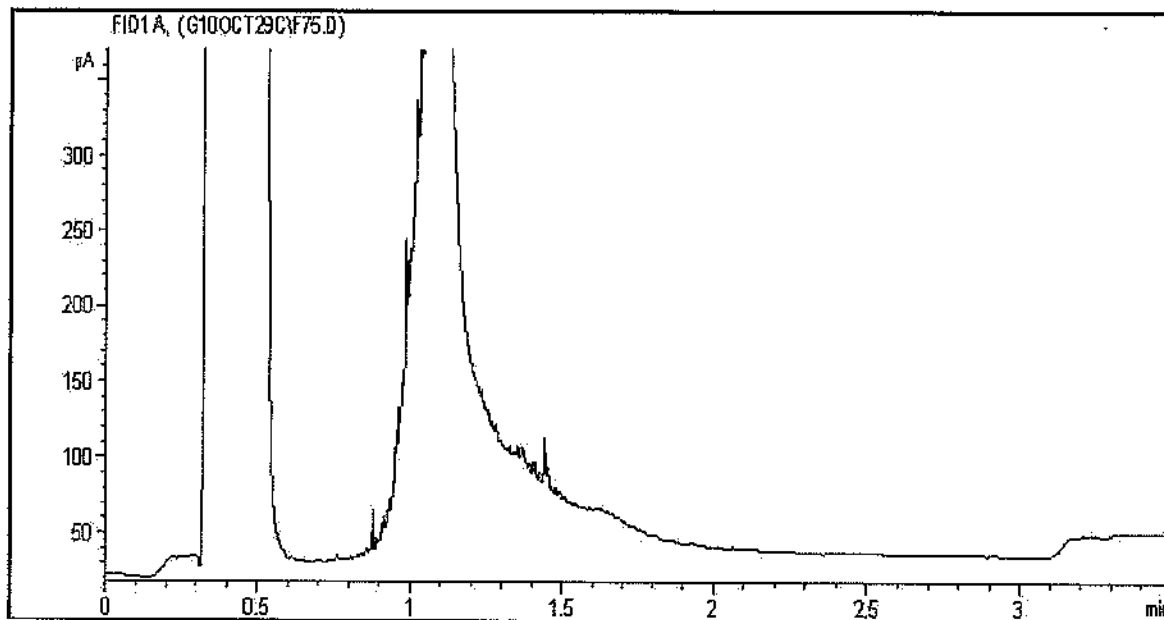


TYPICAL PRODUCT CARBON NUMBER RANGES

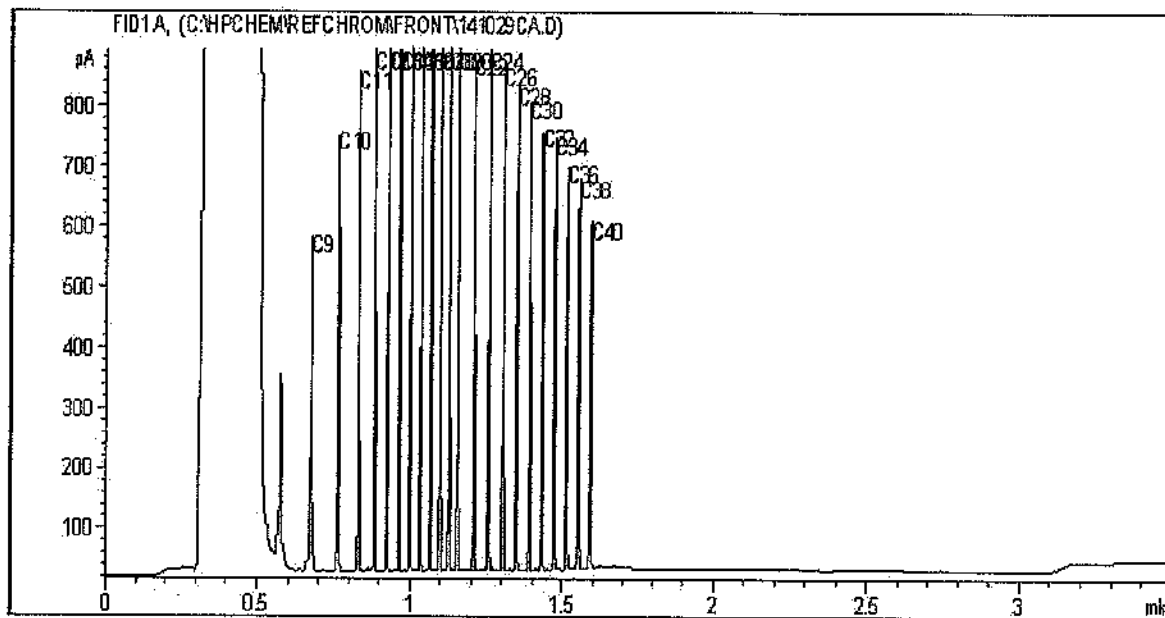
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

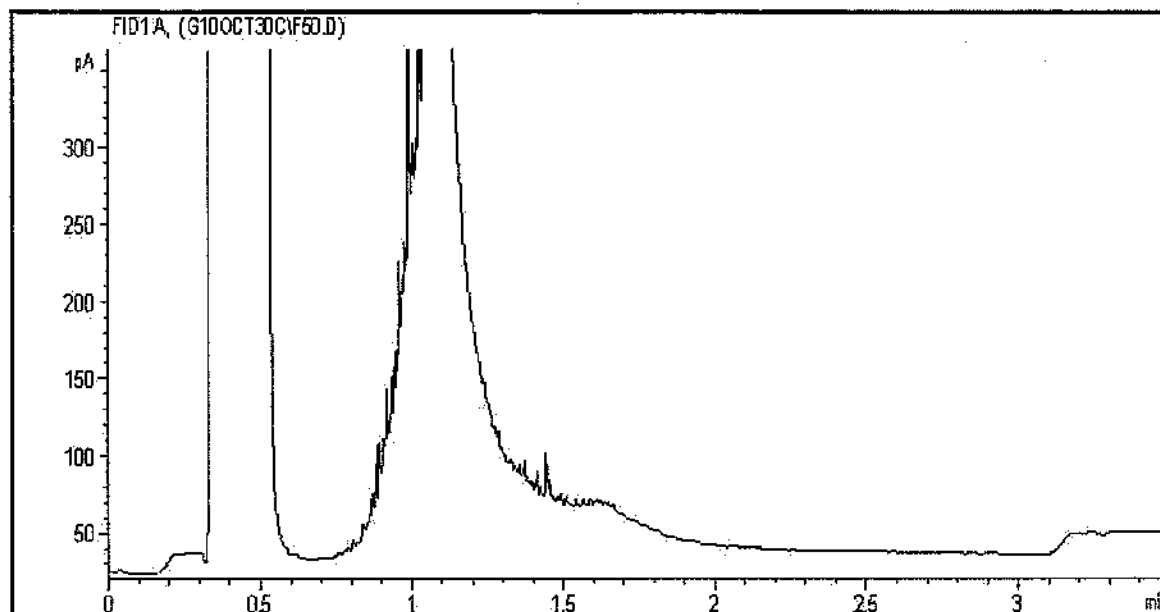
Lubricating Oils: C20 - C40

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

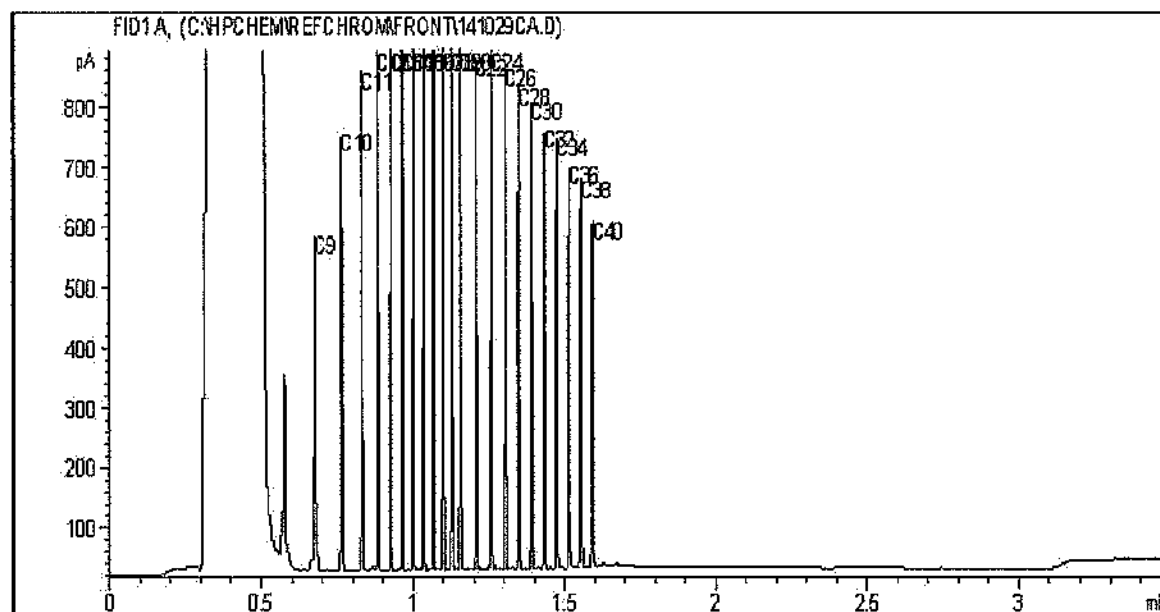
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4992

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: F-COMP-3

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

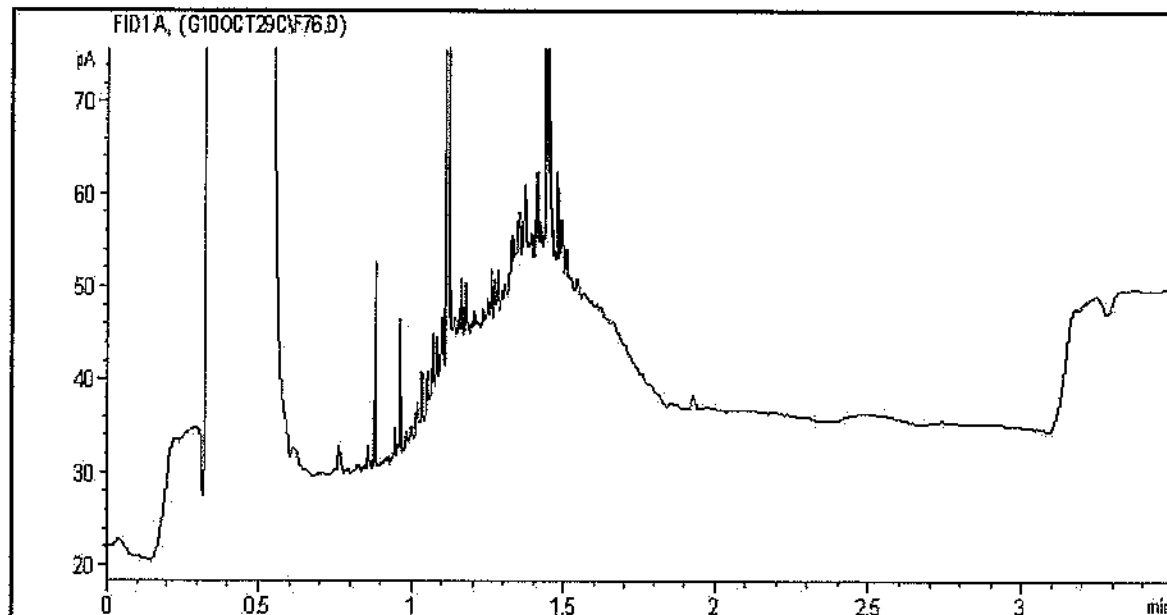


TYPICAL PRODUCT CARBON NUMBER RANGES

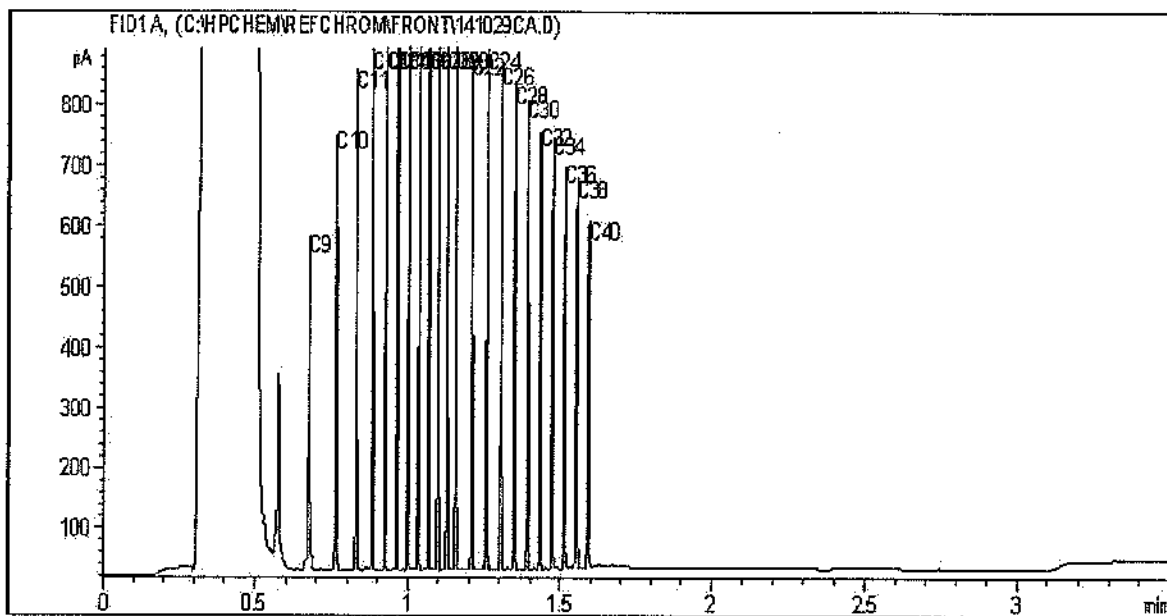
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

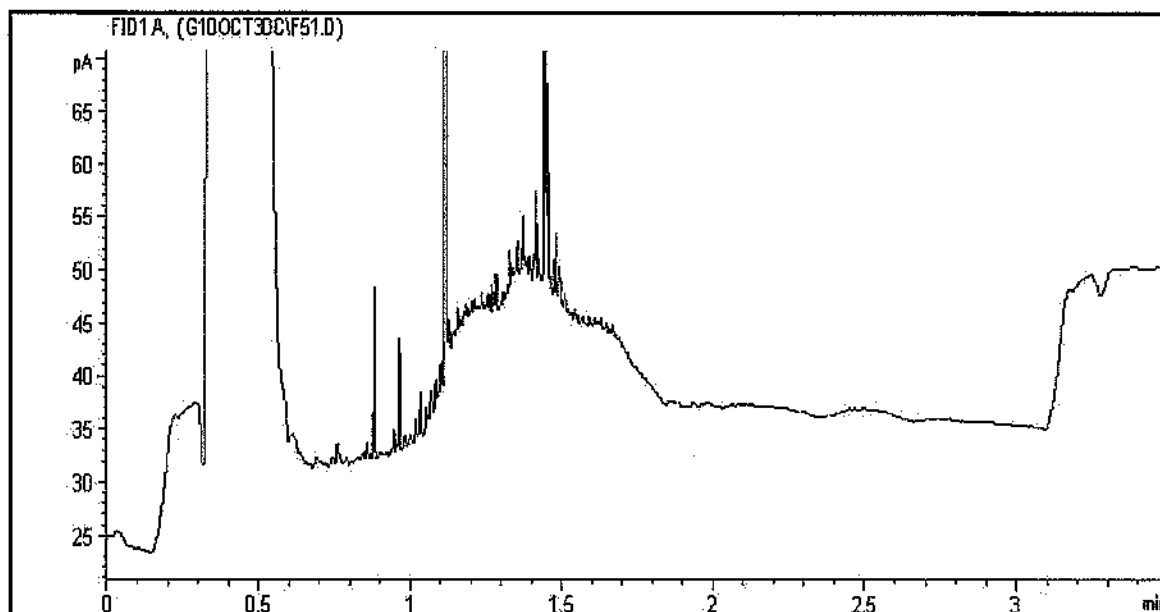
Lubricating Oils: C20 - C40

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

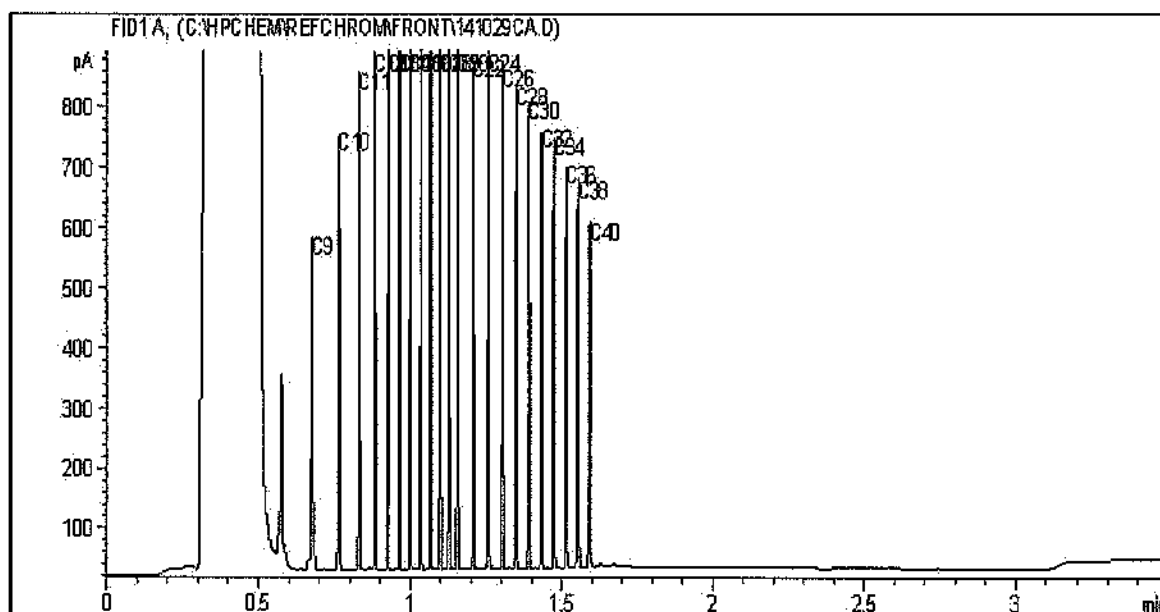
Maxxam Job #: B496608
 Report Date: 2014/11/07
 Maxxam Sample: KY4994

SNC-LAVALIN INC.
 Client Project #: 622653
 Site Reference: SHELL TERMINAL WINNIPEG
 Client ID: F-COMP-5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

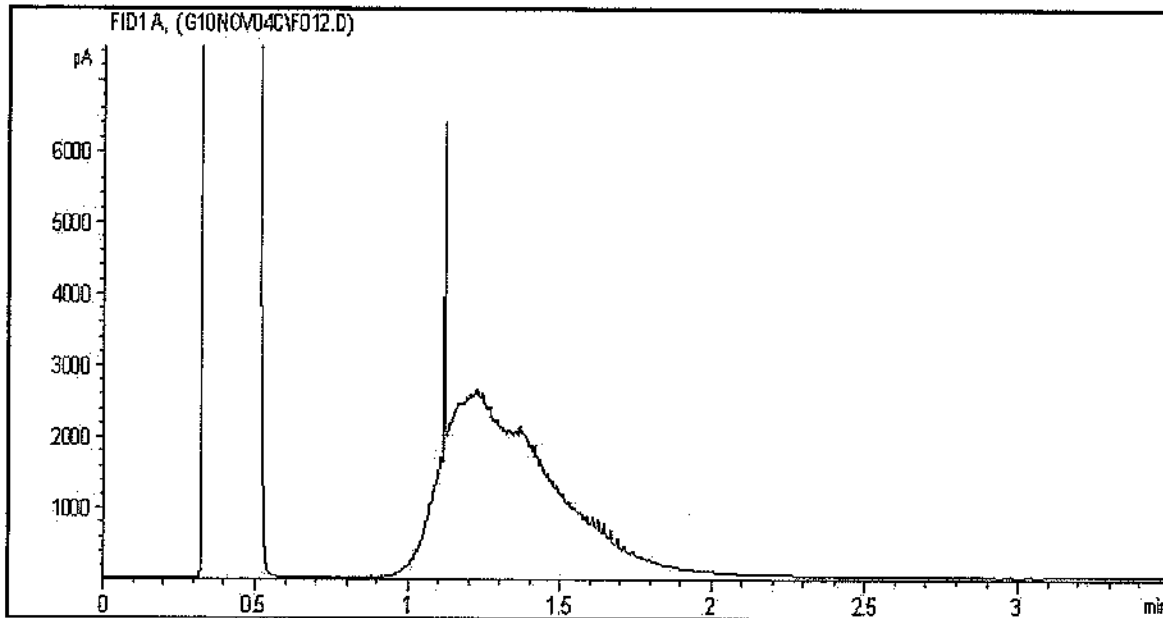
Diesel: C8 - C22

Varsol: C8 - C12

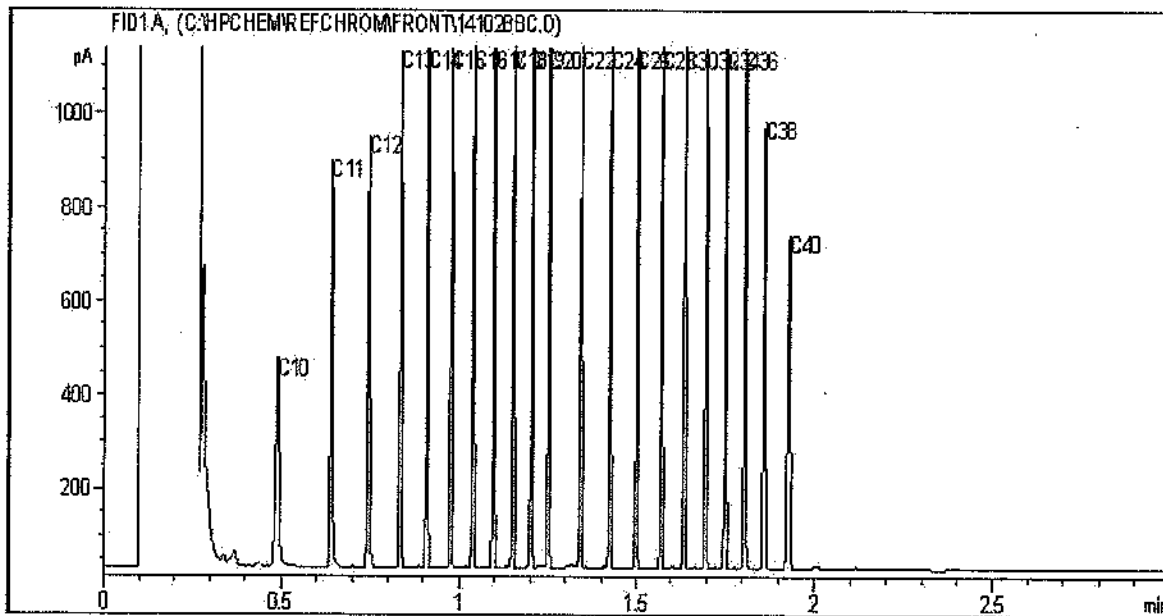
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

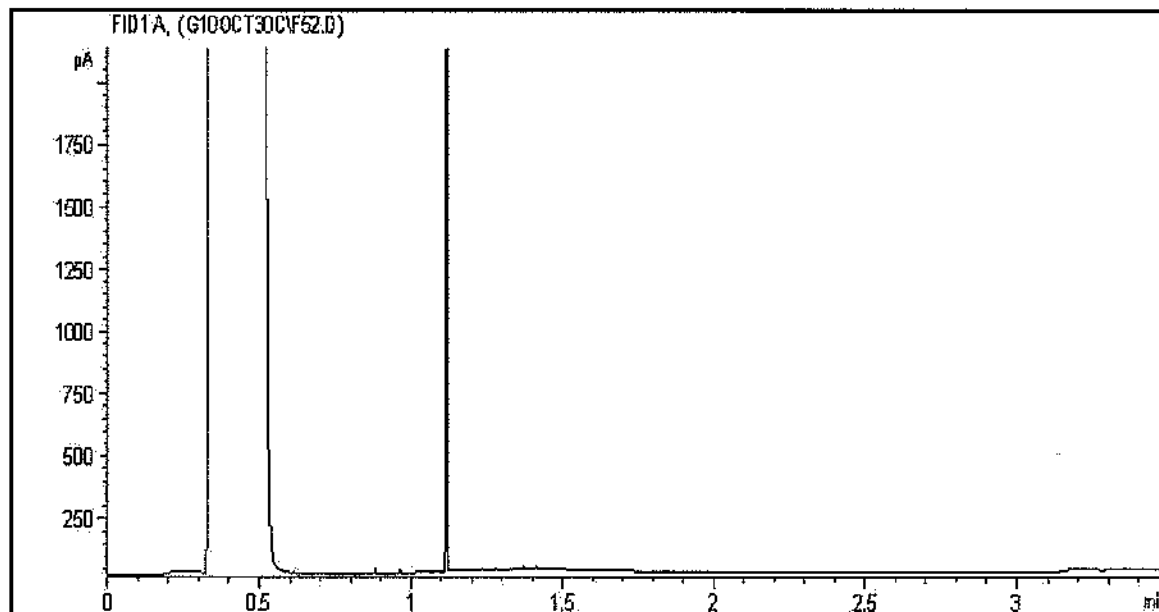
Lubricating Oils: C20 - C40

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

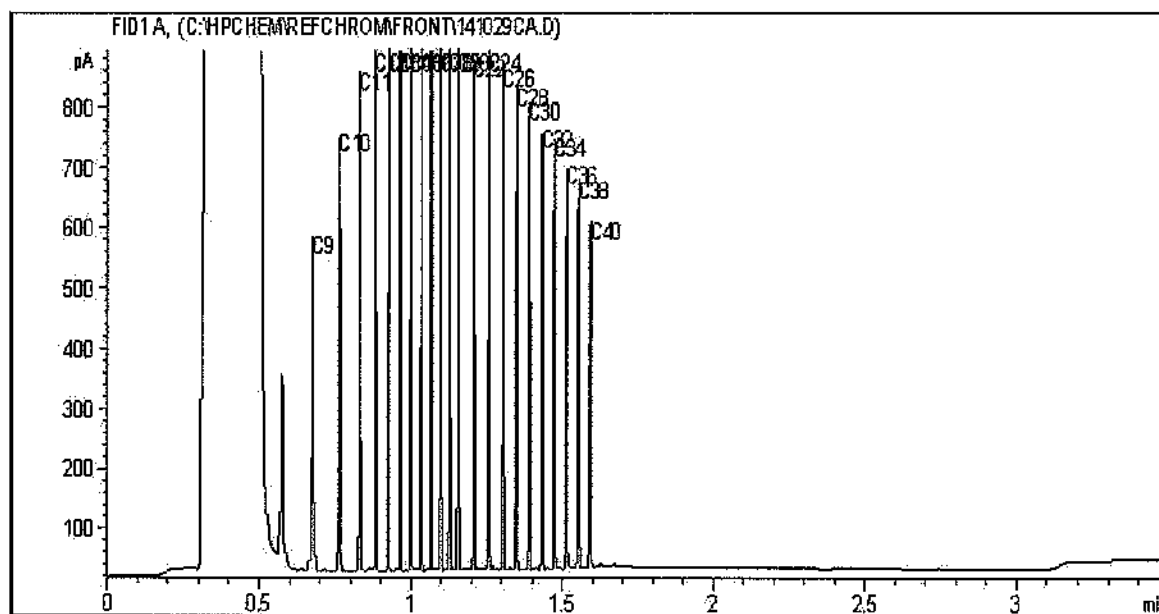
Maxxam Job #: B496608
Report Date: 2014/11/07
Maxxam Sample: KY4996

SNC-LAVALIN INC.
Client Project #: 622653
Site Reference: SHELL TERMINAL WINNIPEG
Client ID: WF-COMP-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

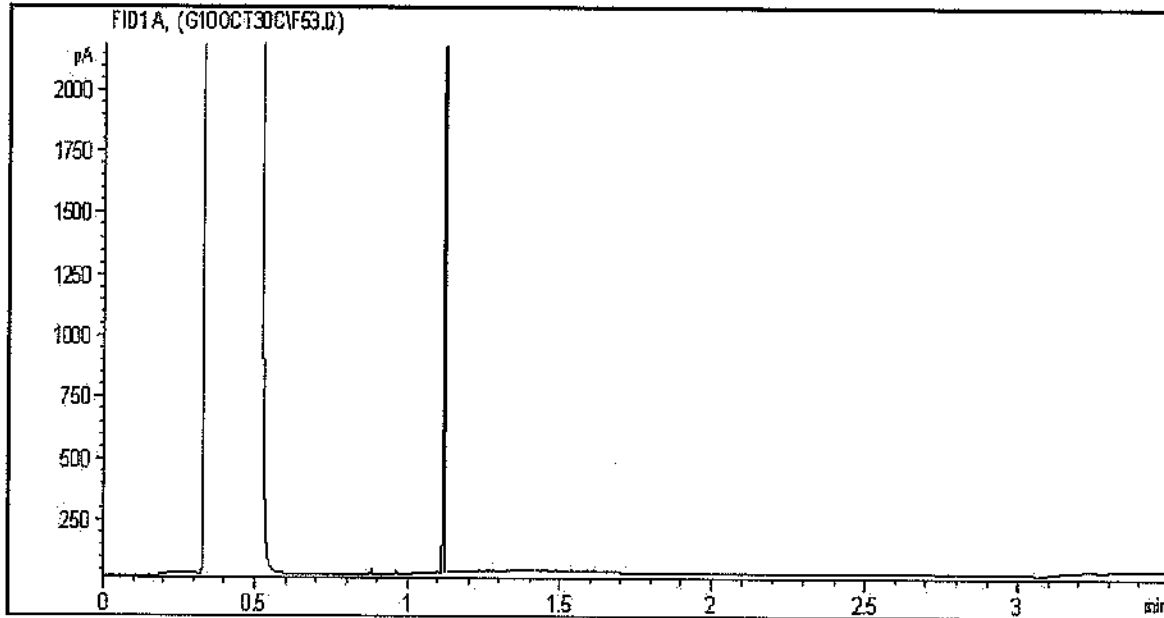
Diesel: C8 - C22

Varsol: C8 - C12

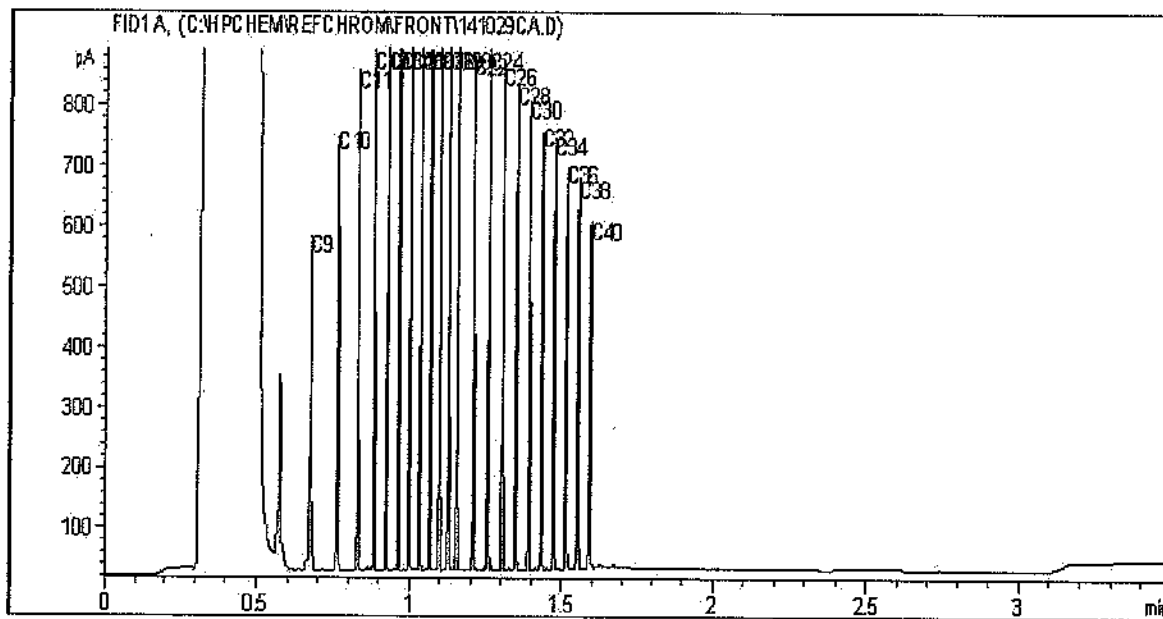
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

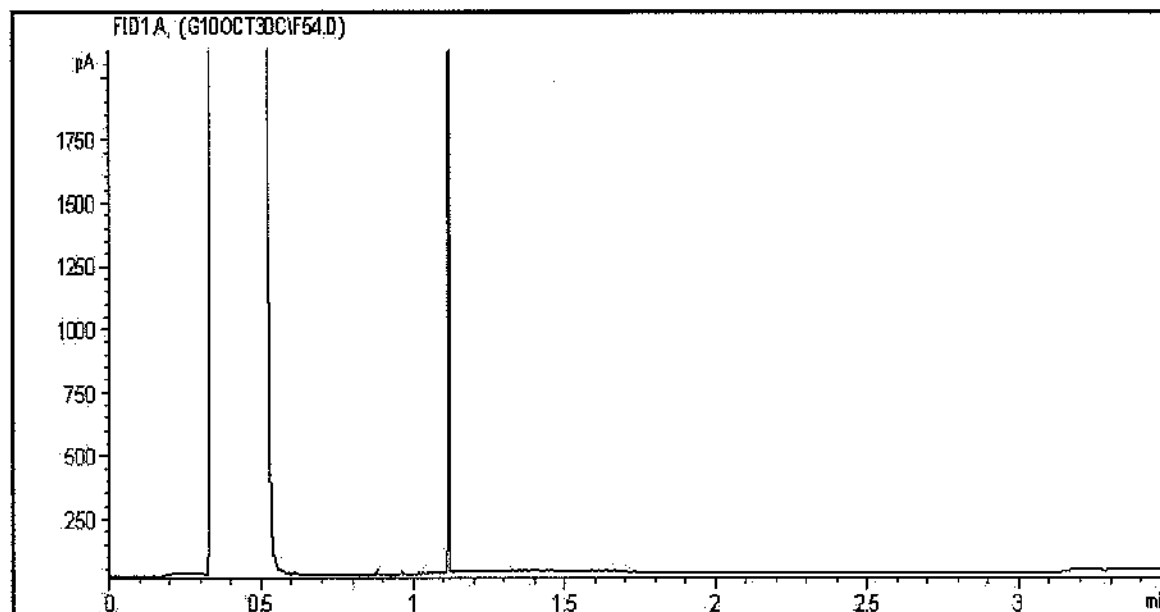
Lubricating Oils: C20 - C40

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

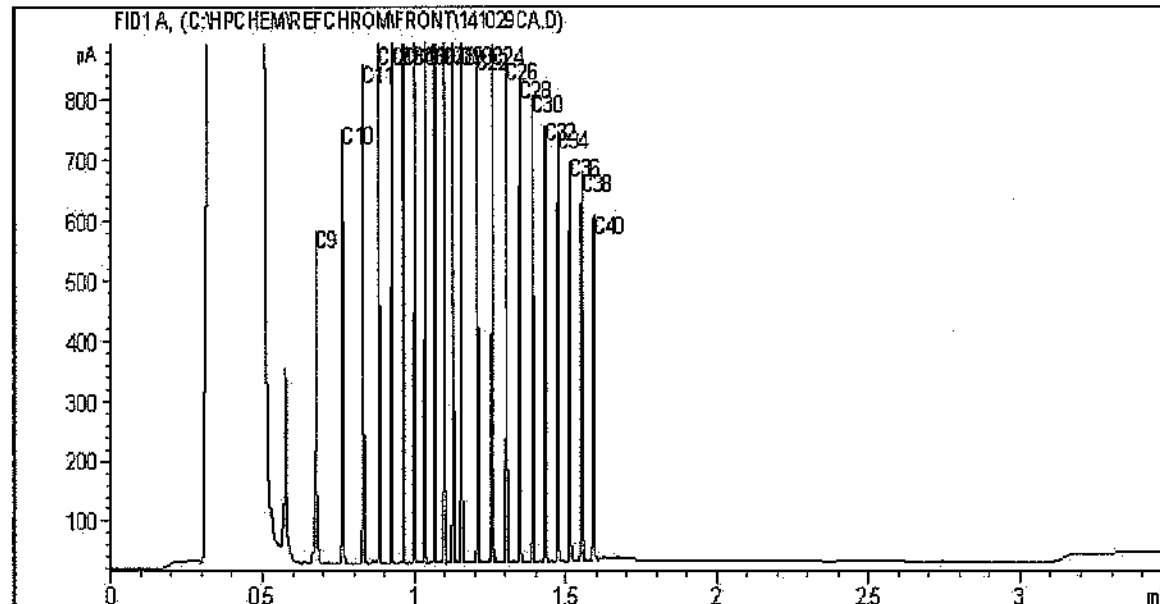
Maxxam Job #: B496608
 Report Date: 2014/11/07
 Maxxam Sample: KY4998

SNC-LAVALIN INC.
 Client Project #: 622653
 Site Reference: SHELL TERMINAL WINNIPEG
 Client ID: WF-COMP-4

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

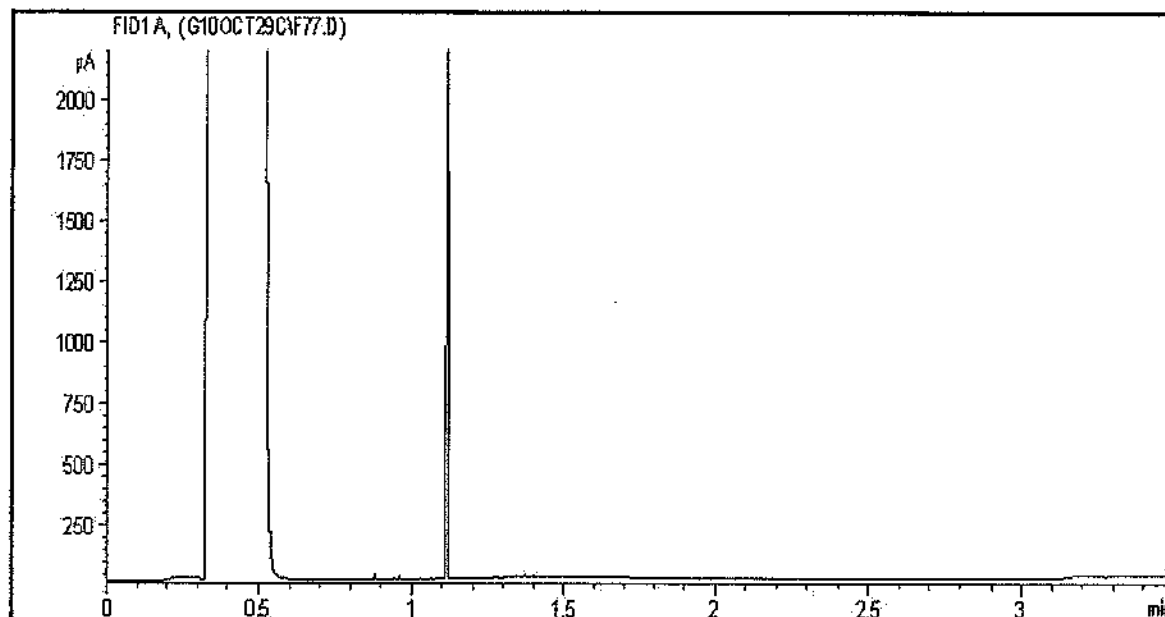


TYPICAL PRODUCT CARBON NUMBER RANGES

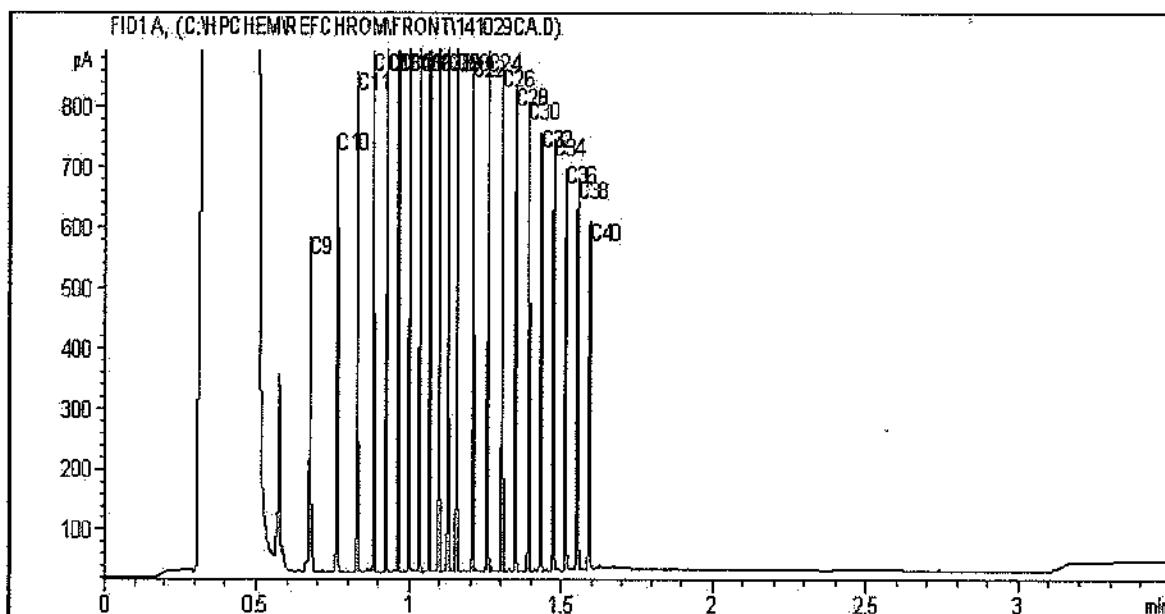
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel:

C8 - C22

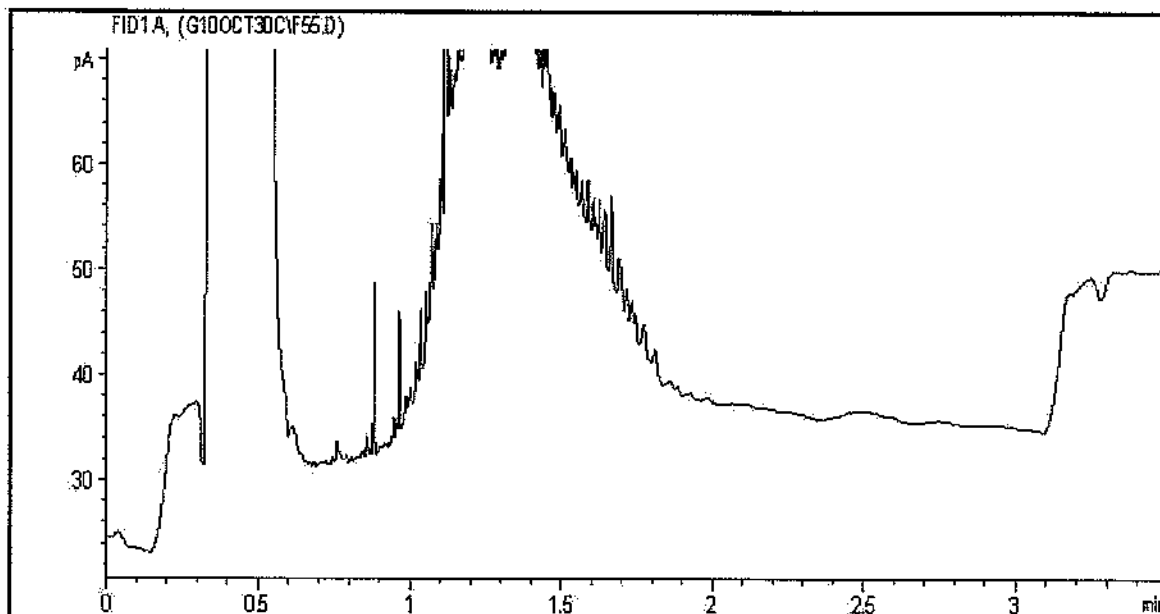
Varsol: C8 - C12

Lubricating Oils:

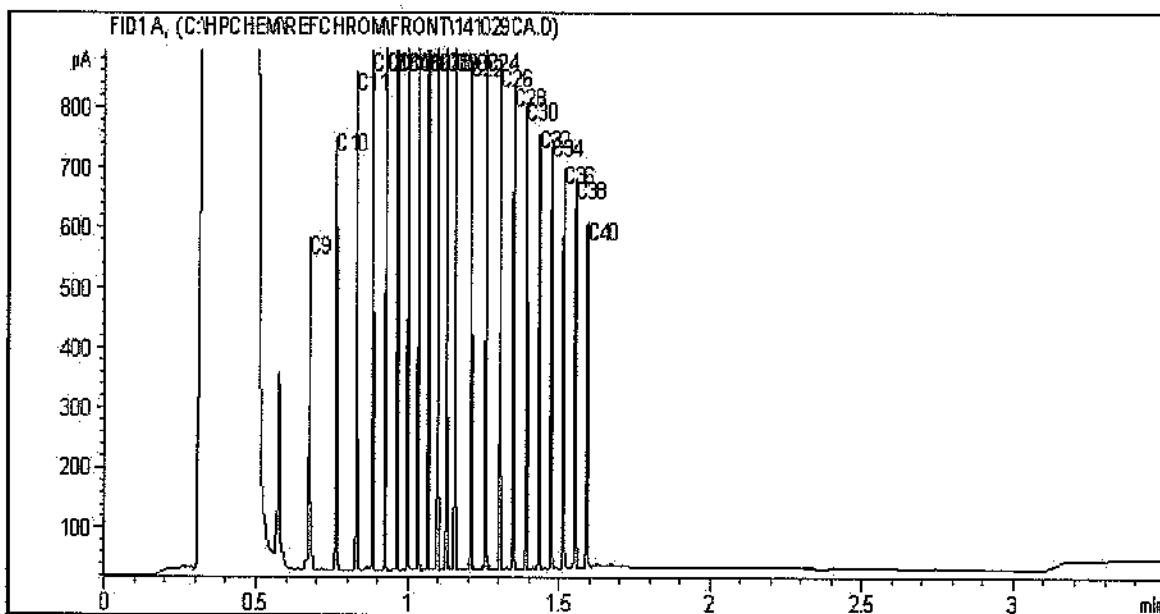
C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

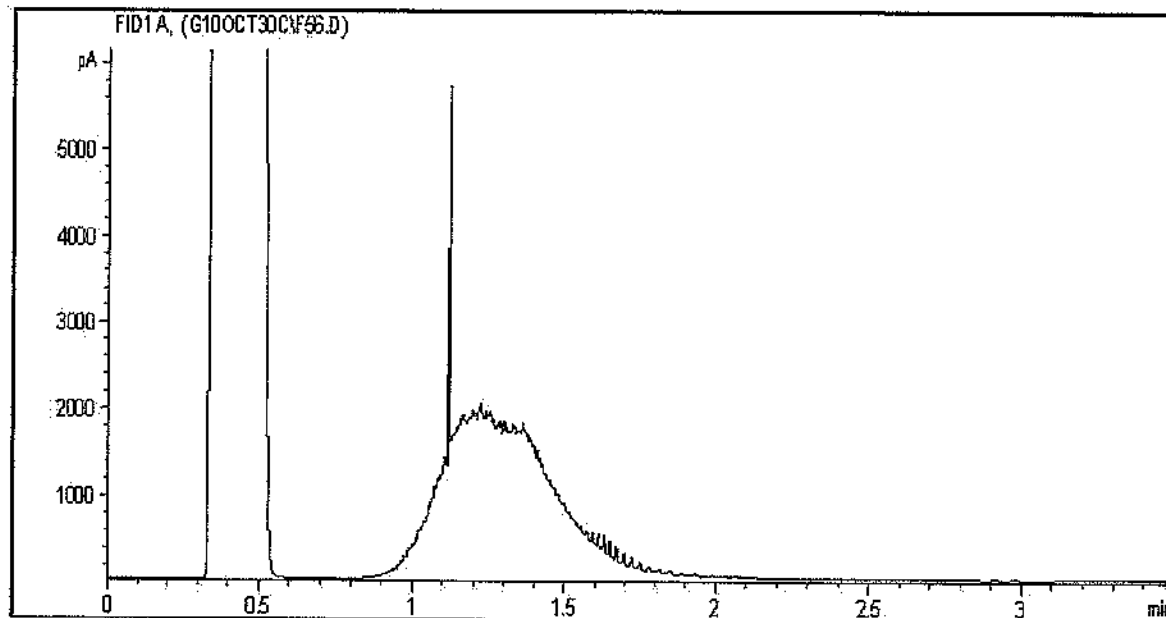
Diesel: C8 - C22

Varsol: C8 - C12

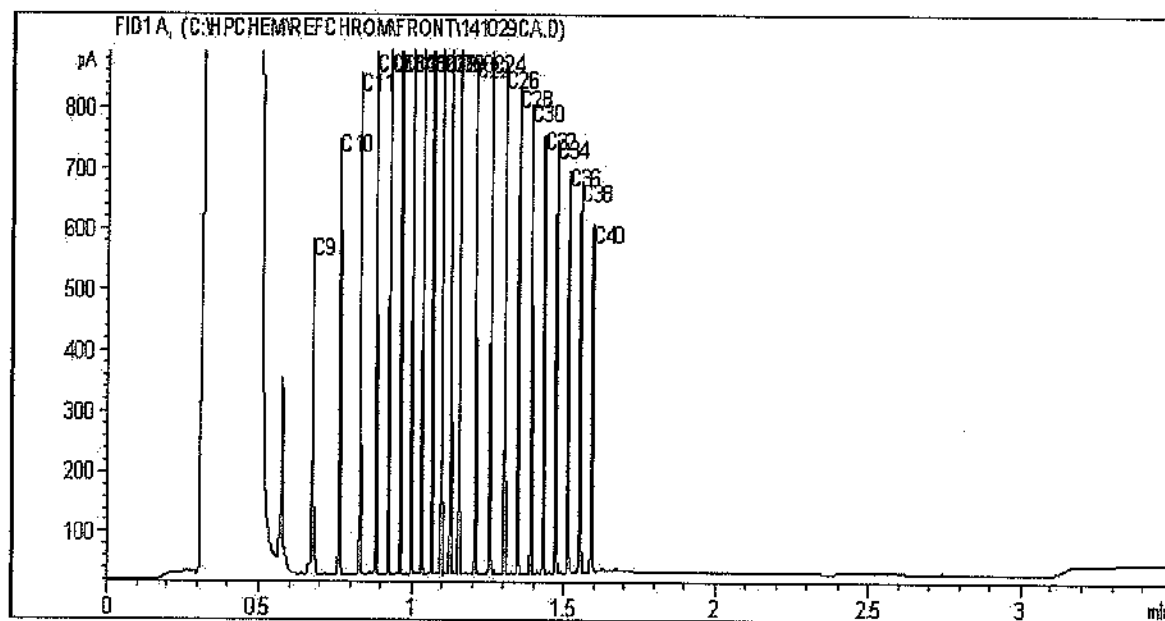
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

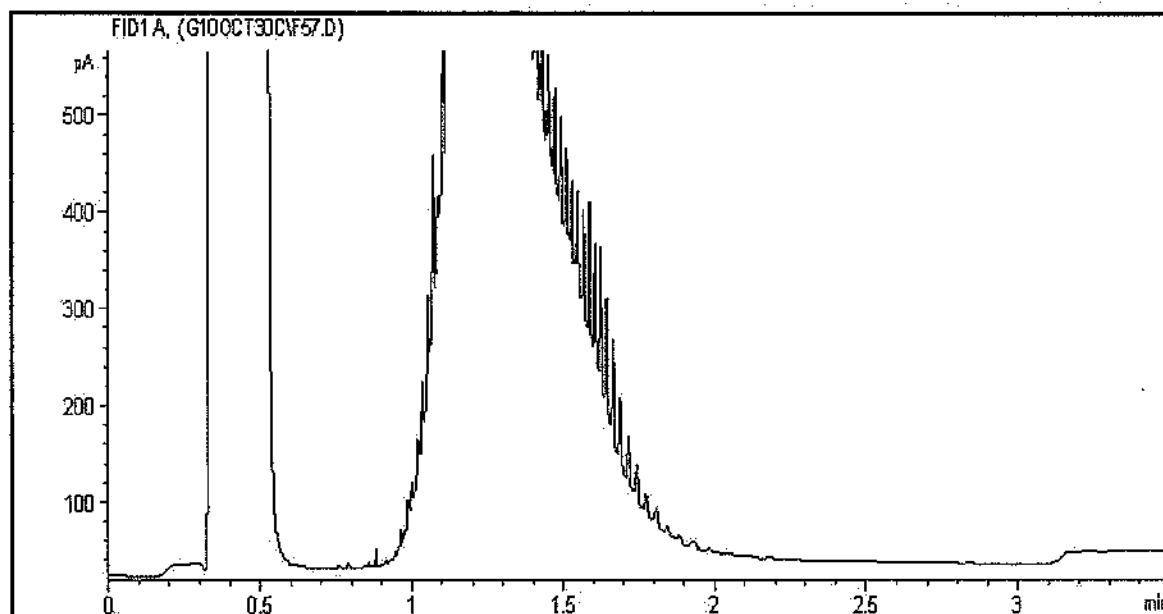
Diesel: C8 - C22

Varsol: C8 - C12

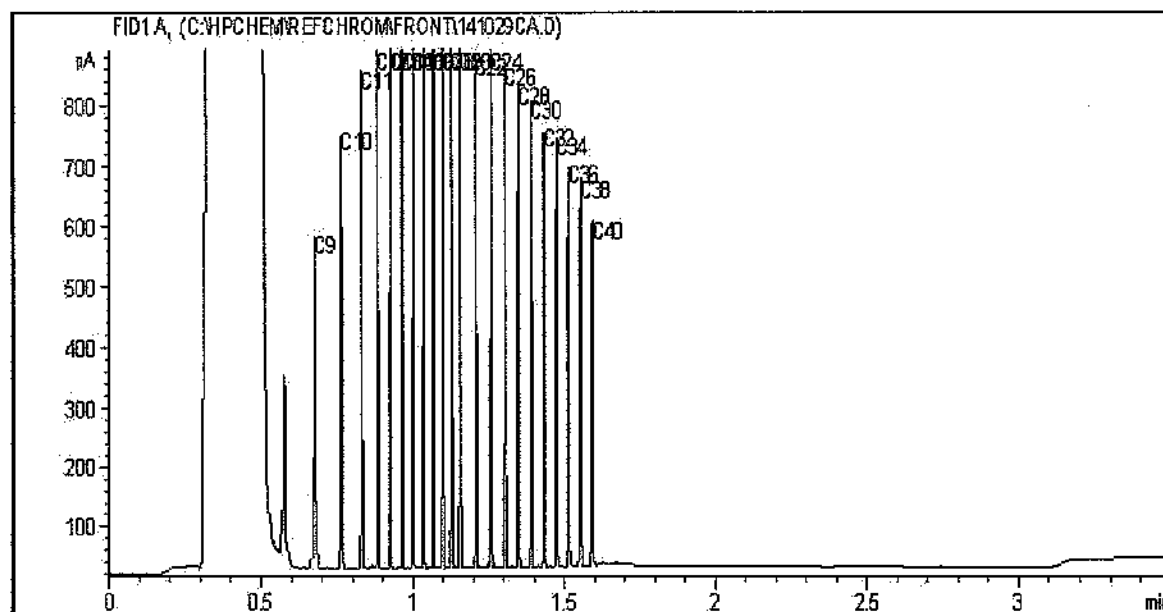
Lubricating Oils: C20 - C40

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

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

Laboratory Certificates of Analysis (Groundwater)

Your Project #: 622653
Site#: SHELL TERMINAL WINNIPEG
Your C.O.C. #: C#442294-07-01

Attention: RYAN BREIVIK

SNC-LAVALIN INC.
TORONTO - SHELL
SUITE 200 - 20 DEBOERS DRIVE
TORONTO, ON
CANADA M3J 0H1

Report Date: 2014/11/24
Report #: R1689113
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4A4396

Received: 2014/11/17, 11:45

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH, VH, F1 SIM/MS (1)	3	2014/11/19	2014/11/20	BBY8SOP-00010, BBY8SOP-00011	EPA 8260c R3 m
CCME Hydrocarbons (F2-F4 in water) (1)	3	2014/11/20	2014/11/20	BBY8SOP-00030	CCME PHC-CWS m
Nitrate + Nitrite (N) - Preserved (1)	3	N/A	2014/11/18	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N)	3	N/A	2014/11/18	WIN SOP-00016	Based on SM4500-NO2B
Nitrogen - Nitrate (as N) (1)	3	N/A	2014/11/19	BBY6SOP-00010	SM 22 4500-NO3 I m
Volatile F1-BTEX (1)	3	N/A	2014/11/20	BBY WI-00033	Auto Calc

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Vancouver

Encryption Key

 Janelle Kochan
24 Nov 2014 17:36:36 -08:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Janelle Kochan, B.Sc., Project Manager
Email: JKochan@maxxam.ca
Phone# (204) 772-7276 Ext:2209

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B4A4396
Report Date: 2014/11/24

SNC-LAVALIN INC.
Client Project #: 622653

Sampler Initials: SP

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		LD7646	LD7646	LD7647	LD7648		
Sampling Date		2014/11/12 14:20	2014/11/12 14:20	2014/11/12 14:45	2014/11/12 15:00		
COC Number		C#442294-07-01	C#442294-07-01	C#442294-07-01	C#442294-07-01		
	UNITS	MW14-1	MW14-1 Lab-Dup	MW4	MW5	RDL	QC Batch

Calculated Parameters							
Nitrate (N)	mg/L	<0.020		<0.020	<0.020	0.020	7721756
Nutrients							
Nitrate plus Nitrite (N)	mg/L	<0.020		<0.020	<0.020	0.020	7723708
Nitrite (N)	mg/L	<0.002	<0.002	<0.002	<0.002	0.002	7723151

RDL = Reportable Detection Limit

Maxxam ID		LD7648		
Sampling Date		2014/11/12 15:00		
COC Number		C#442294-07-01		
	UNITS	MW5 Lab-Dup	RDL	QC Batch

Nutrients				
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	7723708
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate				

Maxxam Job #: B4A4396
Report Date: 2014/11/24

SNC-LAVALIN INC.
Client Project #: 622653

Sampler Initials: SP

CCME BTEX/F1-F4 IN WATER (WATER)

Maxxam ID		LD7646	LD7646	LD7647	LD7648		
Sampling Date		2014/11/12 14:20	2014/11/12 14:20	2014/11/12 14:45	2014/11/12 15:00		
COC Number		C#442294-07-01	C#442294-07-01	C#442294-07-01	C#442294-07-01		
	UNITS	MW14-1	MW14-1 Lab-Dup	MW4	MW5	RDL	QC Batch

Calculated Parameters							
F1 (C6-C10) - BTEX	mg/L	<0.30		<0.30	<0.30	0.30	7721757
Extractable Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	mg/L	<0.15	<0.15	<0.15	<0.15	0.15	7725831
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20		<0.20	<0.20	0.20	7725831
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20		<0.20	<0.20	0.20	7725831
Volatiles							
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7724778
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7724778
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7724778
m & p-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7724778
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7724778
Xylenes (Total)	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	7724778
(C6-C10)	mg/L	<0.30	<0.30	<0.30	<0.30	0.30	7724778
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	100	99	99	98		7724778
4-Bromofluorobenzene (sur.)	%	96	96	96	98		7724778
D4-1,2-Dichloroethane (sur.)	%	109	113	112	113		7724778
O-TERPHENYL (sur.)	%	108	101	102	108		7725831

RDL = Reportable Detection Limit

Maxxam Job #: B4A4396
Report Date: 2014/11/24

SNC-LAVALIN INC.
Client Project #: 622653

Sampler Initials: SP

Package 1	6.3°C
-----------	-------

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

General Comments

Sample LD7646-01: Sample was past hold time for nitrite analysis when received.

Sample LD7647-01: Sample was past hold time for nitrite analysis when received.

Sample LD7648-01: Sample was past hold time for nitrite analysis when received.

Results relate only to the items tested.

SNC-LAVALIN INC.
Attention: RYAN BREIVIK
Client Project #: 622653
P.O. #:
Site Location:

Quality Assurance Report
Maxxam Job Number: NB4A4396

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7723151 KMP	Matrix Spike [LD7647-03]	Nitrite (N)	2014/11/18		93	%	80 - 120
	Method Blank	Nitrite (N)	2014/11/18	<0.002		mg/L	
	RPD [LD7646-03]	Nitrite (N)	2014/11/18	NC		%	12
7723708 IW1	Matrix Spike [LD7648-04]	Nitrate plus Nitrite (N)	2014/11/18		97	%	80 - 120
	Spiked Blank	Nitrate plus Nitrite (N)	2014/11/18		106	%	80 - 120
	Method Blank	Nitrate plus Nitrite (N)	2014/11/18	<0.020		mg/L	
	RPD [LD7648-04]	Nitrate plus Nitrite (N)	2014/11/18	NC		%	25
7724778 KL	Matrix Spike [LD7647-01]	1,4-Difluorobenzene (sur.)	2014/11/20		95	%	70 - 130
		4-Bromofluorobenzene (sur.)	2014/11/20		101	%	70 - 130
		D4-1,2-Dichloroethane (sur.)	2014/11/20		107	%	70 - 130
		Benzene	2014/11/20		120	%	70 - 130
		Toluene	2014/11/20		115	%	70 - 130
		Ethylbenzene	2014/11/20		120	%	70 - 130
		m & p-Xylene	2014/11/20		112	%	70 - 130
		o-Xylene	2014/11/20		121	%	70 - 130
	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/11/20		91	%	70 - 130
		4-Bromofluorobenzene (sur.)	2014/11/20		102	%	70 - 130
		D4-1,2-Dichloroethane (sur.)	2014/11/20		111	%	70 - 130
		Benzene	2014/11/20		123	%	70 - 130
		Toluene	2014/11/20		116	%	70 - 130
		Ethylbenzene	2014/11/20		124	%	70 - 130
		m & p-Xylene	2014/11/20		115	%	70 - 130
		o-Xylene	2014/11/20		124	%	70 - 130
		(C6-C10)	2014/11/20		110	%	70 - 130
	Method Blank	1,4-Difluorobenzene (sur.)	2014/11/20		95	%	70 - 130
		4-Bromofluorobenzene (sur.)	2014/11/20		100	%	70 - 130
		D4-1,2-Dichloroethane (sur.)	2014/11/20		112	%	70 - 130
		Benzene	2014/11/20	<0.00040		mg/L	
		Toluene	2014/11/20	<0.00040		mg/L	
		Ethylbenzene	2014/11/20	<0.00040		mg/L	
		m & p-Xylene	2014/11/20	<0.00040		mg/L	
		o-Xylene	2014/11/20	<0.00040		mg/L	
		Xylenes (Total)	2014/11/20	<0.00040		mg/L	
		(C6-C10)	2014/11/20	<0.30		mg/L	
	RPD [LD7646-01]	Benzene	2014/11/20	NC		%	30
		Toluene	2014/11/20	NC		%	30
		Ethylbenzene	2014/11/20	NC		%	30
		m & p-Xylene	2014/11/20	NC		%	30
		o-Xylene	2014/11/20	NC		%	30
		Xylenes (Total)	2014/11/20	NC		%	30
		(C6-C10)	2014/11/20	NC		%	30
7725831 TL2	Matrix Spike [LD7647-02]	F2 (C10-C16 Hydrocarbons)	2014/11/20		102	%	80 - 120
		O-TERPHENYL (sur.)	2014/11/20		97	%	50 - 130
	Spiked Blank	F2 (C10-C16 Hydrocarbons)	2014/11/20		106	%	80 - 120
		O-TERPHENYL (sur.)	2014/11/20		103	%	50 - 130
	Method Blank	F2 (C10-C16 Hydrocarbons)	2014/11/20	<0.15		mg/L	
		F3 (C16-C34 Hydrocarbons)	2014/11/20	<0.20		mg/L	
		F4 (C34-C50 Hydrocarbons)	2014/11/20	<0.20		mg/L	
		O-TERPHENYL (sur.)	2014/11/20		100	%	50 - 130
	RPD [LD7646-02]	F2 (C10-C16 Hydrocarbons)	2014/11/20	NC		%	40

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

SNC-LAVALIN INC.
Attention: RYAN BREIVIK
Client Project #: 622653
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: NB4A4396

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Validation Signature Page

Maxxam Job #: B4A4396

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



Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

INVOICE INFORMATION:

Company Name: #10005 SNC-LAVALIN INC.
 Contact Name: Shelli Schenbert
 Address: SUITE 200 - 20 DEBOERS DRIVE
 TORONTO ON M3J 0H1
 Phone: (416) 635-5882 x5811 Fax: (416) 635-5363
 Email: shelli.schenbert@snc-lavalin.com

Report Information

Company Name: #20332 SNC-LAVALIN INC.
 Contact Name: SHELDON PARRERA
 Address: 140 NATURE PARK WAY
 WINNIPEG MB R3P 0X7
 Phone: (204) 475-4133 x302 Fax: (204) 475-4133
 Email: sheldon.parrera@snc-lavalin.com

Project Information

Quotation #: 622653
 P.O. #: 622653
 Project #: 622653
 Project Name: Shell Terminal Winnipeg
 Sales Representative: SP
 Sampled By: Yoon, brevikos

Laboratory Use Only

Maxxam Job #: B44396
 Chain Of Custody Record
 Project Manager: Janelle Kopan
 C0442294-07-01

Regulatory Criteria

Special Instructions

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form.
 Samples must be kept cool (< 5°C) throughout the sampling and delivery to Maxxam.

Analysis Requested

Turnaround Time (TAT) Required: Regular (Standard) TAT (not be applied if Basin TAT is not specified)
 Standard TAT = 5-7 Working days for most tests.
 Please note: Standard TAT for certain tests such as BOD and Decons/Furans are > 5 days - contact your Project Manager for details.
 Job Specifics Rush TAT (if applies to entire submission)
 Date Requested: Rush Confirmation Number: (call us for #)

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	BTEX/F1-F4 in Water	Oil & Grease (Total, Mineral, Animal/Veg)	Alcohol in Water by GC/FID	Total Suspended Solids	Asbestos Identification	Nitrate	Nitrite	Nitrate + Nitrite	BTEX	# of Batches	Comments
LD7646	BH4-1	NOV 12, 2014	14:20	Water	N	N	X					X	X	X		87	
47	MW4		14:45		N	N	X					X	X	X		7	
48	MW5		15:00		N	N	X					X	X	X		7	
49	TRIP BLANK														X	5	
5																	
6																	
7																	
8																	
9																	
10																	

RELINQUISHED BY: (Signature/Print) Shelli Schenbert Date: (YY/MM/DD) 14/11/17 Time: 11:40
 RECEIVED BY: (Signature/Print) Sheldon Parrera Date: (YY/MM/DD) 20/11/17 Time: 11:45
 # Jars used and not submitted: 0
 Temperature (°C) on Receipt: 6.7 to 5.3
 Custody Seal Intact on Cooler? ☐ Yes ☐ No
 White Markers: 6.7 to 5.3
 Yellow Date: 6.7 to 5.3

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

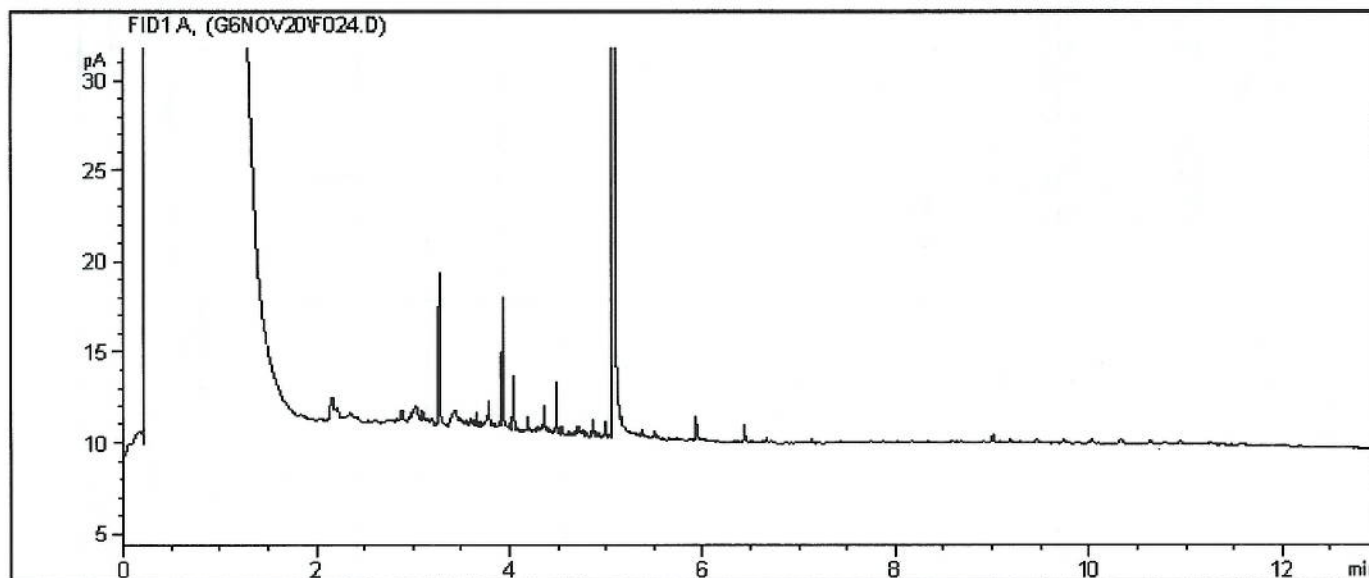
Maxxam Analytics International Corporation or a Maxxam Analytics

Report Date: 2014/11/24
Maxxam Job #: B4A4396
Maxxam Sample: LD7646

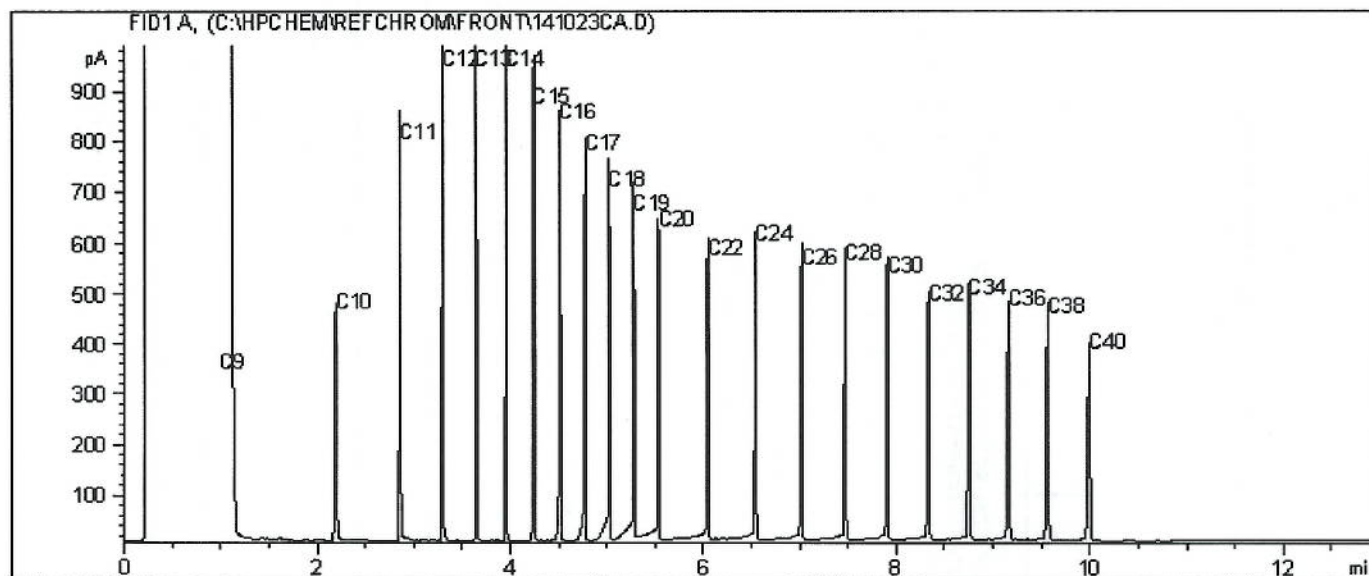
SNC-LAVALIN INC.
Client Project #: 622653

Client ID: MW14-1

CCME Hydrocarbons (F2-F4 in water) Chromatogram



Carbon Range Distribution - Reference Chromatogram



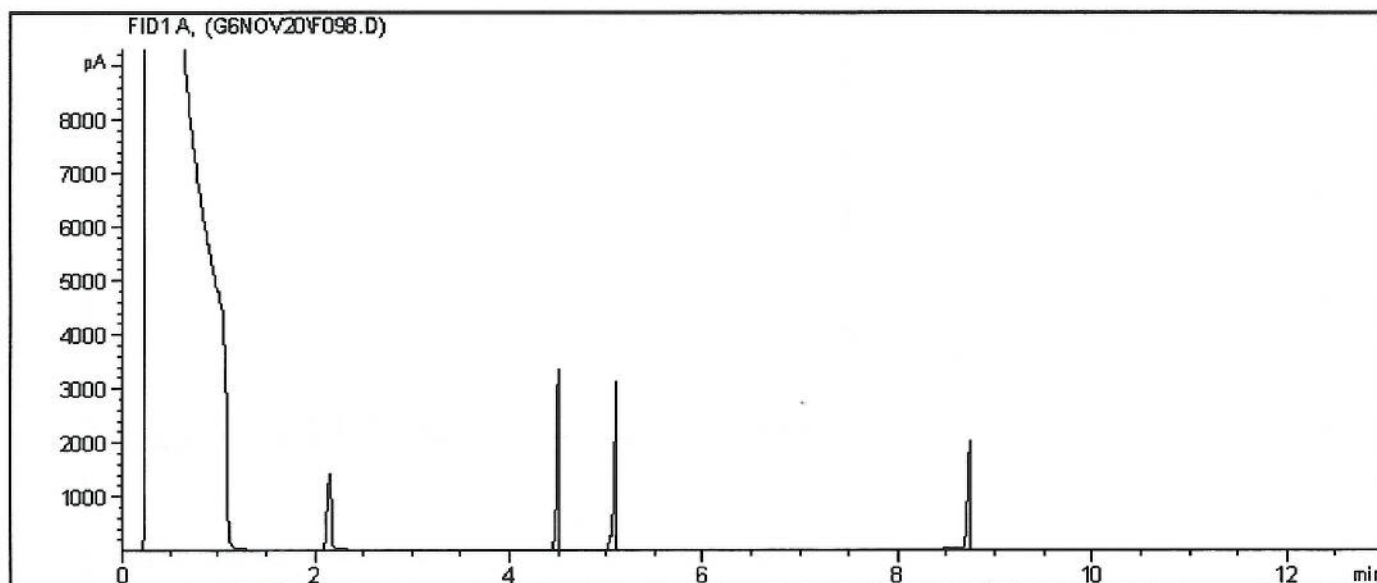
TYPICAL PRODUCT CARBON NUMBER RANGES

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

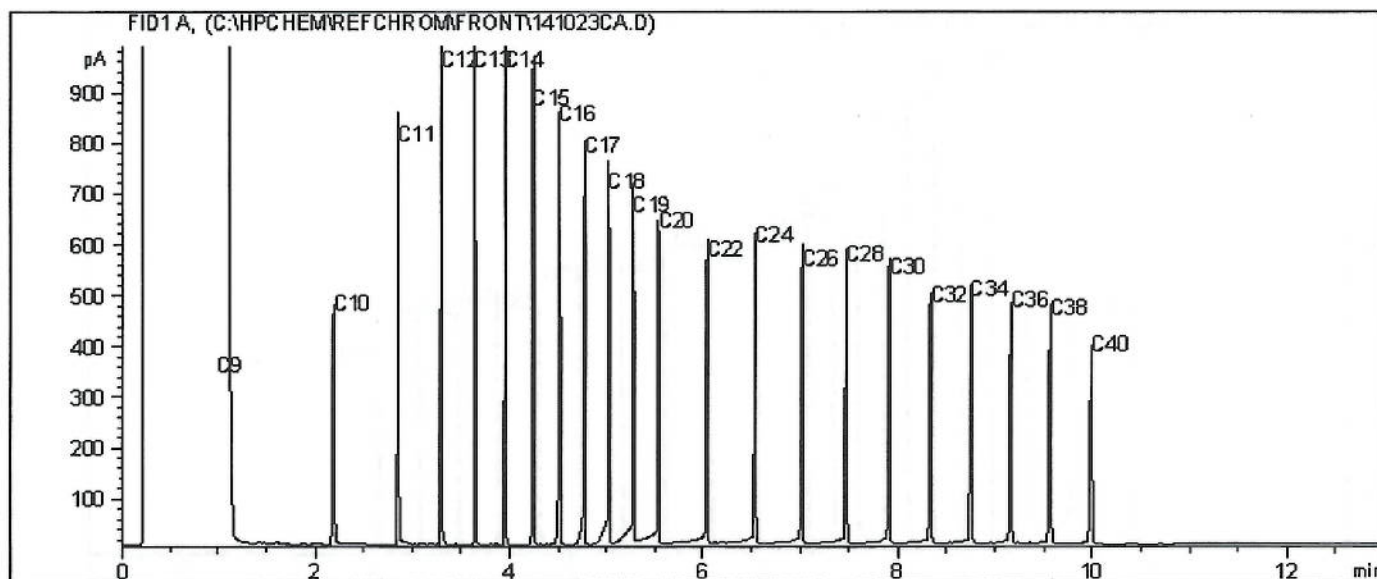
Report Date: 2014/11/24
Maxxam Job #: B4A4396
Maxxam Sample: LD7646 Lab-Dup

SNC-LAVALIN INC.
Client Project #: 622653
Client ID: MW14-1

CCME Hydrocarbons (F2-F4 in water) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

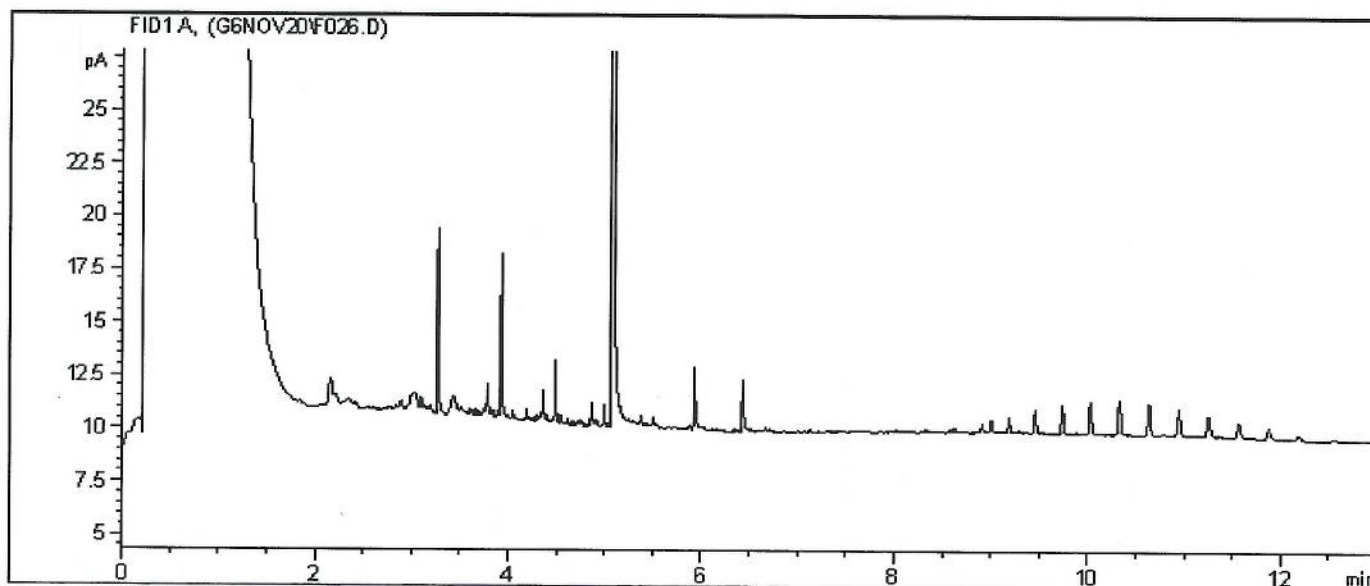
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2014/11/24
Maxxam Job #: B4A4396
Maxxam Sample: LD7647

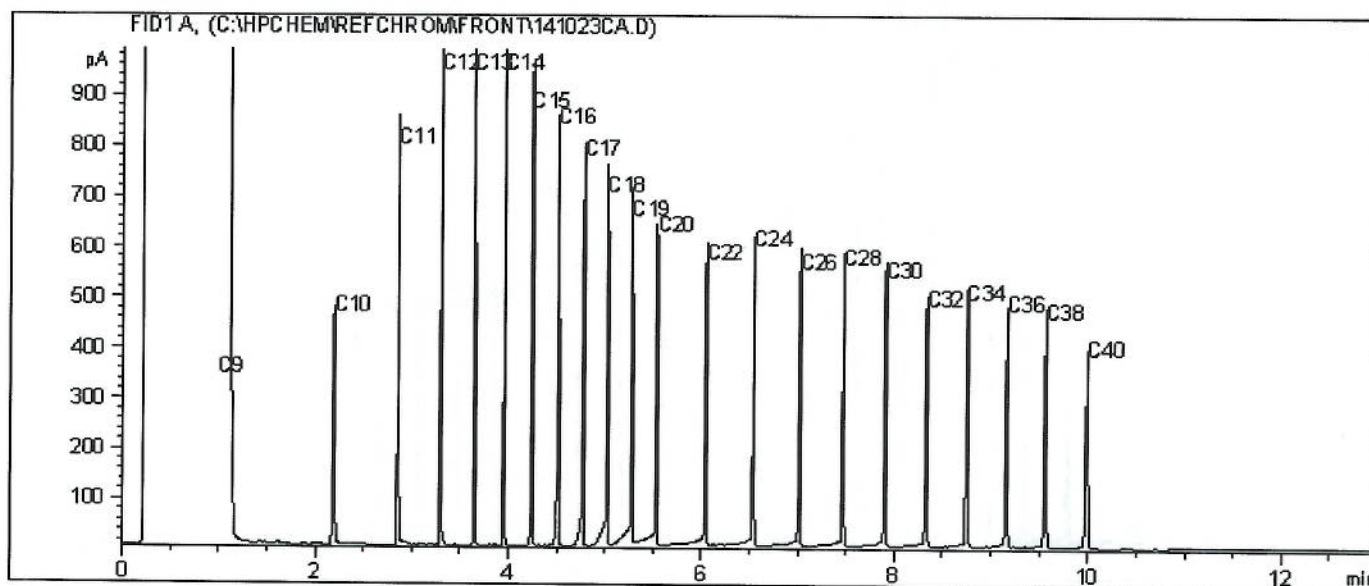
SNC-LAVALIN INC.
Client Project #: 622653

Client ID: MW4

CCME Hydrocarbons (F2-F4 in water) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

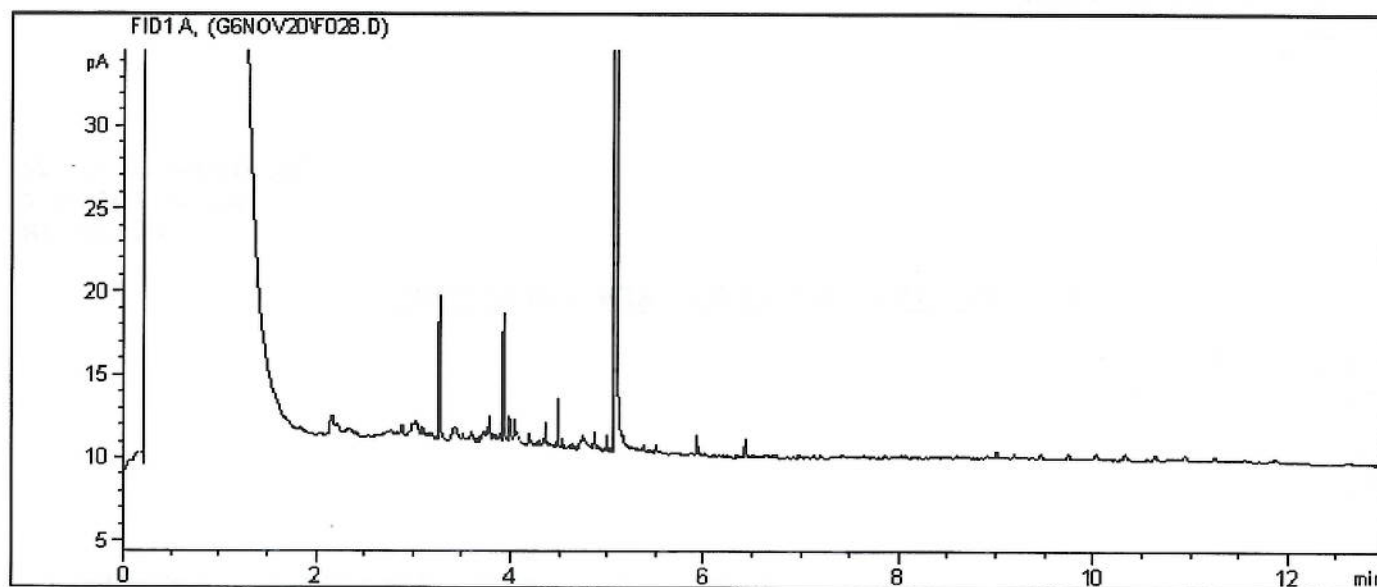
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2014/11/24
Maxxam Job #: B4A4396
Maxxam Sample: LD7648

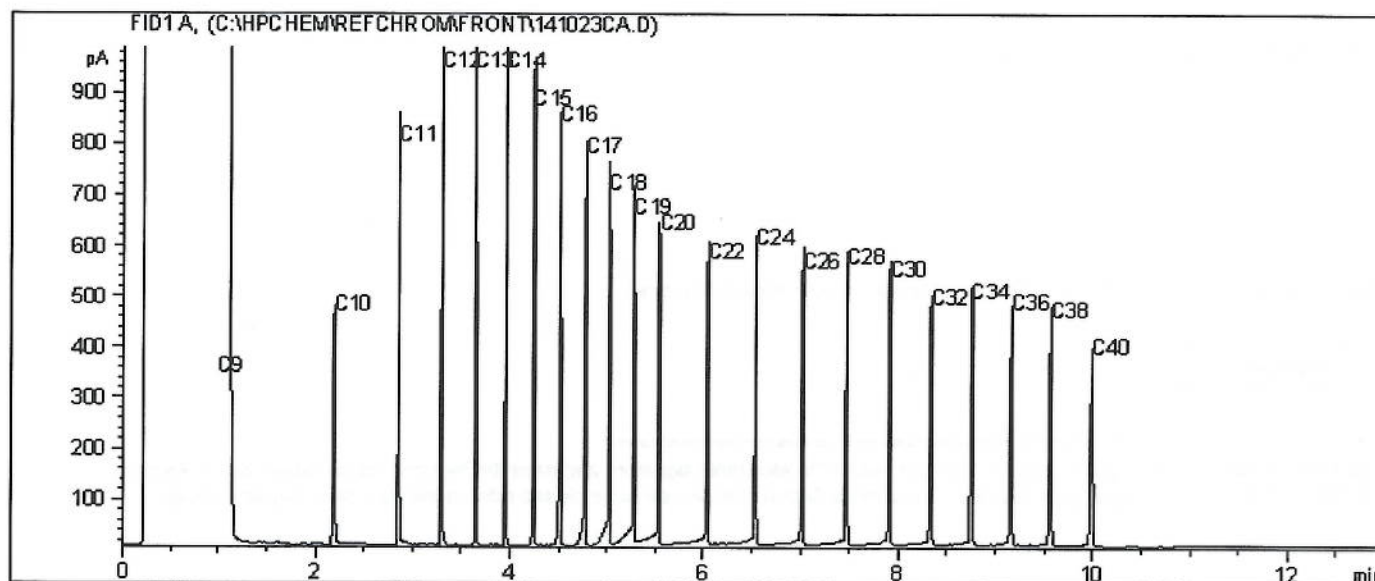
SNC-LAVALIN INC.
Client Project #: 622653

Client ID: MW5

CCME Hydrocarbons (F2-F4 in water) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Your Project #: 622653
Site#: SHELL TERMINAL WINNIPEG
Your C.O.C. #: C#442294-07-01

Attention: RYAN BREIVIK

SNC-LAVALIN INC.
TORONTO - SHELL
SUITE 200 - 20 DEBOERS DRIVE
TORONTO, ON
CANADA M3J 0H1

Report Date: 2014/11/24
Report #: R1689114
Version: 2R

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B4A4396

Received: 2014/11/17, 11:45

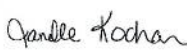
Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH, VH, F1 SIM/MS (1)	1	2014/11/19	2014/11/20	BBY8SOP-00010, BBY8SOP-00011	EPA 8260c R3 m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Vancouver

Encryption Key

 Janelle Kochan
24 Nov 2014 17:38:02 -08:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Janelle Kochan, B.Sc., Project Manager
Email: JKochan@maxxam.ca
Phone# (204) 772-7276 Ext:2209

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B4A4396
Report Date: 2014/11/24

SNC-LAVALIN INC.
Client Project #: 622653

Sampler Initials: SP

CCME BTEX/F1 IN WATER (WATER)

Maxxam ID		LD7649		
Sampling Date		2014/11/12		
COC Number		C#442294-07-01		
	UNITS	TRIP BLANK	RDL	QC Batch
Volatiles				
Benzene	mg/L	<0.00040	0.00040	7724778
Toluene	mg/L	<0.00040	0.00040	7724778
Ethylbenzene	mg/L	<0.00040	0.00040	7724778
m & p-Xylene	mg/L	<0.00040	0.00040	7724778
o-Xylene	mg/L	<0.00040	0.00040	7724778
Xylenes (Total)	mg/L	<0.00040	0.00040	7724778
(C6-C10)	mg/L	<0.30	0.30	7724778
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	98		7724778
4-Bromofluorobenzene (sur.)	%	96		7724778
D4-1,2-Dichloroethane (sur.)	%	109		7724778
RDL = Reportable Detection Limit				

Maxxam Job #: B4A4396
Report Date: 2014/11/24

SNC-LAVALIN INC.
Client Project #: 622653

Sampler Initials: SP

Package 1	6.3°C
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Each temperature is the average of up to three cooler temperatures taken at receipt

General Comments

Results relate only to the items tested.

SNC-LAVALIN INC.
Attention: RYAN BREIVIK
Client Project #: 622653
P.O. #:
Site Location:

Quality Assurance Report
Maxxam Job Number: NB4A4396

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7724778 KL	Matrix Spike [LD7647-01]	1,4-Difluorobenzene (sur.)	2014/11/20		95	%	70 - 130
		4-Bromofluorobenzene (sur.)	2014/11/20		101	%	70 - 130
		D4-1,2-Dichloroethane (sur.)	2014/11/20		107	%	70 - 130
		Benzene	2014/11/20		120	%	70 - 130
		Toluene	2014/11/20		115	%	70 - 130
		Ethylbenzene	2014/11/20		120	%	70 - 130
	Spiked Blank	m & p-Xylene	2014/11/20		112	%	70 - 130
		o-Xylene	2014/11/20		121	%	70 - 130
		1,4-Difluorobenzene (sur.)	2014/11/20		91	%	70 - 130
		4-Bromofluorobenzene (sur.)	2014/11/20		102	%	70 - 130
		D4-1,2-Dichloroethane (sur.)	2014/11/20		111	%	70 - 130
		Benzene	2014/11/20		123	%	70 - 130
	Method Blank	Toluene	2014/11/20		116	%	70 - 130
		Ethylbenzene	2014/11/20		124	%	70 - 130
		m & p-Xylene	2014/11/20		115	%	70 - 130
		o-Xylene	2014/11/20		124	%	70 - 130
		(C6-C10)	2014/11/20		110	%	70 - 130
		1,4-Difluorobenzene (sur.)	2014/11/20		95	%	70 - 130
		4-Bromofluorobenzene (sur.)	2014/11/20		100	%	70 - 130
		D4-1,2-Dichloroethane (sur.)	2014/11/20		112	%	70 - 130
		Benzene	2014/11/20	<0.00040		mg/L	
		Toluene	2014/11/20	<0.00040		mg/L	
		Ethylbenzene	2014/11/20	<0.00040		mg/L	
		m & p-Xylene	2014/11/20	<0.00040		mg/L	
		o-Xylene	2014/11/20	<0.00040		mg/L	
		Xylenes (Total)	2014/11/20	<0.00040		mg/L	
		(C6-C10)	2014/11/20	<0.30		mg/L	

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

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

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

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

Validation Signature Page

Maxxam Job #: B4A4396

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



Rob Reinert, Data Validation Coordinator

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