

Phase II Environmental Site Assessment
Rossdale Lands
9469 Rossdale Road NW &
10155 - 96th Avenue NW
Block OT; Plan NB
Edmonton, Alberta



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The City of Edmonton
Phase II ESA: Rossdale Lands
Block OT; Plan NB
Edmonton, Alberta



EXECUTIVE SUMMARY

Nichols Environmental has completed a Phase II Environmental Site Assessment (ESA) for the Property located at 9469 Rossdale Road NW & 10155 - 96th Avenue NW in Edmonton, Alberta. The Property has history dating back to 1802 and has encompassed a number of developments throughout the years. The Phase II ESA was initiated to provide further assessment of seven areas of concerns on the Property related to historical activities.

Area 1 - Mercury: Natural Gas Metering Station

Previous assessment work within this area had identified mercury-impacted soils, which were subsequently remediated in 1998. However, closure sampling of this excavation was done via composite samples, which identified elevated mercury concentrations. This subsequently raised the concern that a sub-sample component of the composite may not meet the current 2014 Alberta Tier 1 Guidelines for mercury.

In November 2014, three boreholes (one of which was completed as a groundwater monitoring well) were advanced within/surrounding the former excavation in order to assess current conditions with respect to mercury. Based on the results of the investigation, there do not appear to be any residual mercury impacts present within the soil or groundwater at the locations tested. Concentrations of boron were identified above the guideline in two samples from a silt material, but are not anticipated to pose a risk and could be addressed through a risk assessment and subsequently risk-managed. No other metals parameter concentrations exceeded the guidelines within the locations tested in Area 1. As such, Nichols Environmental has no further recommendations for assessment with regards to mercury for Area 1 at this time.

Area 2 - Creosote: Former Reactivator

An anticipated 514 30-foot long (approximately 9 m) creosote-treated piles are present on the northeast portion of the Property in the location of two former reactivators. Previous investigations conducted from 2004 to 2008 identified trace concentrations of creosote-related polycyclic aromatic hydrocarbons (PAHs), including fluoranthene in the soil, and dibenzofuran and pentachlorophenol (PCP) in groundwater. A letter from Alberta Environment and Sustainable Resource Development (AESRD) in 2004 to EPCOR Water Services indicates that leaving the creosote-treated piles in place beneath the former reactivators was acceptable as long as the site remained undisturbed.

At the time of assessment, three of the seven original monitoring wells remained present in Area 2. Nichols Environmental conducted monitoring and sampling of the wells in November 2014, for which all PAH and dibenzofuran parameters, as well as PCP, were below their respective laboratory method detection limits (MDLs) or guidelines (where applicable). However, there were detectable



concentrations of select dioxin parameters identified in one monitoring well, and select dibenzofuran parameters were identified in two monitoring wells.

Based on the results of the investigation, there do not appear to be any residual PAH impacts (above guidelines) present within the groundwater at the locations tested. Nichols Environmental has no further recommendations for assessment with regards to the creosote-treated piles within the former reactivator site in Area 2 at this time and as long as the site remains undisturbed. Further assessment may be required in the event of development of this area, as there is documentation that indicates there are PAH-impacted soils present in this area.

Area 3 - PAHs, Hydrocarbons & Metals: Former Burn Pit

This portion of the Property was formerly utilized by Fire Services, which including a fire training area (former burn pit) to the south of the current Watermark Building. In the early 2000s, a number of investigations were initiated to assess potential impacts from historical use, which confirmed impacts at 2.6 metres below grade (mbg) south of the Watermark Building and at 7.6 mbg further to the south of this location. The two areas are believed to be two separate plumes and are associated with historical fire burning.

In October 2014, six boreholes (one of which was completed as a groundwater monitoring well) were advanced to the south of the Watermark Building in order to delineate the previously identified hydrocarbon, metals, and PAH-impacted soils. Hydrocarbon odours were noted in three of the boreholes advanced, primarily within clay/sand fill or silt materials at depths ranging from surface to approximately 4.7 mbg.

Based on the results of the investigation, PAH and petroleum hydrocarbon-impacted soils appear to extend to a confirmed depth of at least 4.5 mbg within the northern contaminant plume, and may extend up to 6.1 mbg based on field observations. Lead-impacted soil was also identified within the northern contaminant plume. The estimated area of impact for the northern plume is approximately 560 m². However, closure has not been achieved to the west due to the presence of a utility corridor. The north and south hydrocarbon contaminant plumes do not appear to be connected, as observations and analytical results from two of the boreholes advanced to the south of the contaminant plume did not indicate the presence of petroleum hydrocarbons. However, PAH-impacted fill materials were noted, and based on a review of previous borehole logs, similar fill materials may be present further south toward the walking trail that borders this area. The highest concentrations of PAHs were identified within the northern contaminant plume, along with notable concentrations of lead, and are likely related to the former burning activities.

In November 2014 all accessible monitoring wells within Area 3 were monitored (six total), only one of which contained enough water for sampling. No non-aqueous phase liquids (NAPL) were identified in either of the two monitoring wells at the time of monitoring and all PAH and petroleum



hydrocarbon parameter concentrations were below guidelines (where applicable). Only concentrations of manganese, zinc, and chloride were identified above guidelines in the newly installed groundwater monitoring well and TDS in the previously existing monitoring well. These identified parameters are not anticipated to be indicative of impacts arising from anthropogenic sources.

The petroleum hydrocarbon parameters identified during this assessment within the northern contaminant plume are present in concentrations that would exceed guidelines protective of the domestic use aquifer (DUA), freshwater aquatic life (FWAL) receptors, vapour inhalation, and/or management limits. Taking this into consideration, remediation of these identified petroleum hydrocarbon impacts in the northern plume would be recommended. In the interim, a soil management plan should also be considered for any activities that may require ground disturbance in this area, to ensure that the soils are appropriately managed and measures are in place to protect workers.

During the course of the assessment, further documentation regarding potential petroleum hydrocarbon impacts to the west of the northern contaminant plume was also identified, from approximately 1.8 to 4.0 mbg based on field observations. No previous drilling has been conducted within this area. The source of this contamination is unknown at this time, and it is unknown if the identified impacts are related and/or connected to the existing plumes. As such, consideration should also be given to further investigative drilling in the southwest and southeast corners of this area.

With regards to the identified PAHs, the impacts appear to be widespread through fill materials within this area and would primarily pose a risk to FWAL receptors. The elevated PAHs identified near surface in association with the hydrocarbon impacts in the northern plume are likely related to former burn activities, and remediation of this area is recommended. The PAHs within the northern plume identified at depth may require risk assessment. Due to the widespread nature of the remaining fill materials beyond the northern plume, consideration could be given to conducting a risk assessment to determine what level of risk the PAHs pose to the applicable receptors, should the soils remain in place.

Area 4 - TCE: Former Hazardous Materials Storage

An investigation conducted in 2010 by Thurber Engineering Ltd. (Thurber) identified trichloroethene (TCE) concentrations above the guidelines at approximately 0 to 0.2 mbg within a fine-grained fill material in the former hazardous material storage area south of the former carpenters shop on the Property. Further test pitting and soil analysis were conducted in this area in 2013 in lieu of construction of a new building. Samples were submitted from three test pits in the vicinity of the identified TCE at approximately 0.1 mbg for testing of volatile organic compounds (VOCs), which did not identify any parameter concentrations above the guidelines.



However, the test pitting program confirmed that disturbed soils within this area were impacted with PAHs, metals, or petroleum hydrocarbons (one test pit). Based on the result of the assessments completed, Thurber concluded that the materials required for removal for construction of the new building would require disposal through a Class II Landfill and that measures would be required to help manage potential vapour migration and/or recontamination from the surrounding soils.

Due to construction activities, Nichols Environmental was not able to conduct further assessment of this area. In discussion with EPCOR, no further documentation was identified documenting disposal of the soils, confirmation testing following removal of the soils, or any mitigation measures. Given the nature of TCE, and that soils from below 0.2 mbg were not tested within this area for TCE, delineation may not have been achieved. EPCOR should be contacted to confirm the management strategy that was in place to address the impacted soils within this area during construction activities, and any mitigation that was put in place.

Area 5 - PAHs & Metals Across Site

A number of previous investigations conducted across the Property have identified impacted fill materials ranging from surface to 3.8 mbg or greater for metals and from surface to 2.9 mbg for PAHs. However, one area was confirmed to have PAH-impacted soil at approximately 7.6 mbg in the vicinity of the Watermark Building, which is likely associated with historical burn training. In October 2014, four boreholes (including two monitoring wells) were advanced on northern portions of the Property in order to establish background comparison locations as well as to assess the extent of fill materials.

Up to four additional drilling locations had also been proposed throughout the Property to confirm the presence of fill materials. However, based on potential utility conflicts or construction within these areas and documentation identified through the course of the assessment which confirmed the presence of fill materials, these locations were not completed. It should be noted that the proposed location to the west of the power plant may require assessment at a time that the area is not under construction.

Fill materials were identified at other drilling locations advanced on the Property during the course of the Phase II ESA. These included materials in Area 3, where a clay, silt, and/or sand mix of fill materials was identified to a maximum depth of 5.7 mbg, and Area 6 where debris was also encountered in three of the four boreholes at depths ranging from approximately 1.3 to 4.6 mbg. Anthracene concentrations above guidelines were also identified at approximately 1.0 mbg within a silt material identified in one of the boreholes in Area 1, but were delineated at approximately 1.5 mbg.



In November 2014 the two background monitoring wells were monitored and one of the two sampled. Concentrations of manganese were identified above guidelines in the background monitoring well and all other PAH and routine parameter concentrations were below their respective guidelines, where applicable.

Based on the results of the investigation, fill materials do not appear to be widespread into the northern portions of the Property where drilling was conducted. However, it appears to be widespread to variable depths on the southern portion of the Property in association with the water treatment plant and power plant infrastructure. Given the coverage of the potential fill materials on the Property, traditional remediation methods such as excavation would not be cost effective or feasible. Consideration could be given to conducting a risk assessment to determine what level of risk the identified PAHs/metals pose to the applicable receptors. In the interim, a soil management plan should also be considered for any activities that may require ground disturbance where fill materials have been identified to ensure that the soils are appropriately managed.

Potential PAH/metals impacts may also remain present in association with former rail lines adjacent to and/or formerly present on the Property as well as use of any creosote-treated timber piles for the buildings (including the confirmed creosote-treated piles beneath the power plant).

Area 6 - PAHs & Metals: Pump House #1 and #2

Past investigations completed by Thurber have identified between 6 and 9 metres of fill, including brick, clay tile, and concrete on the Property between the pump houses that are situated south of the power plant. Ash-like material was also reportedly encountered at approximately 4.0 mbg, which contained barium, beryllium, and copper concentrations that would exceed the 2014 Alberta Tier 1 Guidelines. The bottom ash likely originated from burning coal in the boilers of the power plant until 1949, after which time the boilers were converted to gas/oil.

In November 2014, four boreholes (two of which were completed as groundwater monitoring wells) were advanced between the pump houses. General soil lithology identified a mix of clay, silt, and sand fill layers extending to depths of approximately 6.6 to 7.5 mbg. Within these layers, debris such as brick, masonry, concrete, and glass were noted in three of the four boreholes, from depths ranging from 1.3 to 4.6 mbg. A coal or ash-like material containing slag (presumably bottom ash) was identified in one of the boreholes from approximately 2.5 to 4.2 mbg, and a sand with a high coal content was also noted in a second borehole from approximately 5.1 to 6.6 mbg.

Based on the results of the investigation, the fill materials identified between the two pump houses appear to have been impacted (PAHs and metals). Leachate analysis of PAHs (via synthetic precipitation leaching procedure (SPLP)) was completed for select samples, the results of which indicate that there is limited risk associated with PAH parameters leaching from the soil due to precipitation. With regards to the metals, elevated concentrations of barium and boron are likely



related to the identified high coal content and bottom ash, while the identified debris may be a source of the identified arsenic, copper, and lead.

The two monitoring wells were monitored and sampled in November 2014 and PAH parameter concentrations (anthracene, fluoranthene, pyrene, benzo(a)anthracene, and benzo(a)pyrene) were identified above guidelines in one or both of the monitoring wells. With regard to metals, the groundwater does not appear to have been impacted.

Removal of the soils within this area would likely not be feasible due to cost, location, and volume for removal. Should the area remain undisturbed, consideration could be given to completing a risk assessment to further define the level of risk posed by the identified metals and PAHs. However, further assessment of this area using the 2014 Alberta Tier 2 Guidelines should be completed due to the close proximity of identified impacts to the North Saskatchewan River.

Area 7 - Hydrocarbons: Watermark Building

A diesel underground storage tank (UST) was removed to the east of this building in 1989, at which time petroleum hydrocarbon impacts were identified in both the soil and groundwater, extending to bedrock at approximately 12 mbg (the area was excavated to approximately 5 mbg and backfilled). A vapour extraction system (VES) was subsequently installed in 1989/1990 and operated until it was decommissioned in 1994 following further assessment of the impacted area.

In October 2014, three boreholes (all completed as monitoring wells) were installed within the vicinity of the former diesel UST to confirm if the area has been adequately remediated. Groundwater samples were also collected from these monitoring wells in November/December 2014. Based on the results of the investigation, there do not appear to be any residual petroleum hydrocarbon impacts present within the soil or groundwater at the locations tested. Nichols Environmental has no further recommendations for assessment with regards to petroleum hydrocarbons at this time for Area 7, as the remediation work that was completed appears to have been effective.

Summary

A summary of the contaminants of concern (COCs) for each area, as well as the potential source, scope, results, and general conclusions and recommendations, is provided on the following page.



Area	COCs	Source/ Scope	Results	Conclusions/ Recommendations
1	Mercury	Historical spill/remediation at the natural gas metering station. Confirmation that all impacts have been remediated.	No residual mercury impacts, but boron above guidelines in soil. Groundwater not impacted.	No further assessment for mercury. Risk management for boron.
2	PAHs	Creosote-treated piles from former reactivators. Confirm current groundwater conditions.	No residual PAH impacts (above guidelines) in the groundwater.	No further assessment unless area is redeveloped. PAH-impacted soil known to be present near surface.
3	PAHs Hydrocarbons Metals	Two historical burn pits from fire training, south of the Watermark Building. Confirmation of depth of impacts/delineation of the northern plume and if the two plumes were connected.	Impacted soils present to depth of at least 4.5 mbg (potentially up to 6.1 mbg) in the northern plume. Closure to the west not obtained due to presence of a utility corridor. Two plumes do not appear to be connected. PAHs present in other fill materials identified outside of the northern plume. Groundwater not impacted.	Delineation of hydrocarbon impacts to the west and southwest of the northern plume. Remediation of PAHs and hydrocarbons within the northern plume (related to burn activities). Risk assessment to determine level of risk presented by PAHs within the identified fill materials. Development of a soil management plan for ground disturbance activities in this area.



Area	COCs	Source/ Scope	Results	Conclusions/ Recommendations
4	TCE	Former hazardous materials storage. Delineation of TCE.	Area under construction. Previous assessments identified PAH and metal-impacted fill materials in area.	Confirm with EPCOR documentation of removal of impacted soils prior to building construction and any mitigation measures implemented to manage identified contamination.
5	PAHs Metals	Fill materials across the Property. Confirmation of the extent of impacted fill materials present on the Property.	Impacted materials are widespread on the southern portion of Property in relation to the water and power plant.	Risk assessment to determine level of risk presented by the PAHs/metals. Development of a soil management plan for ground disturbance activities on the Property.
6	PAHs Metals	Fill (bottom ash) materials between Pump House # 1 and Pump House #2. Confirmation of the extent of impacts.	Impacted fill materials to a maximum depth of approximately 7.5 metres. Groundwater impacted by PAHs.	Tier 2 Risk assessment to determine level of risk presented by the PAHs/metals to the North Saskatchewan River.
7	Hydrocarbons	Former UST east of the Watermark Building. Confirmation of effectiveness of past remediation efforts (VES).	No residual petroleum hydrocarbon impacts in the soil or groundwater.	No further assessment with regards to petroleum hydrocarbons.

The statements made in this Executive Summary are subject to the same limitations included in Section 10.2, and are to be read in conjunction with the remainder of this report.



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1.0 INTRODUCTION

Nichols Environmental (Canada) Ltd. was retained by The City of Edmonton to conduct a Phase II ESA at 9469 Rosssdale Road NW & 10155 - 96th Avenue NW, located in Edmonton, Alberta, and legally described as Block OT; Plan NB (herein referred to as the "Property"). Figure 1 depicts the location of the Property relative to the surrounding area. As required by AESRD, a completed Record of Site Condition is presented in Appendix A. A photographic summary of the investigation can be found in Appendix B.

The purpose of a Phase II ESA is to confirm the presence of and characterize the substances of concern at a given site. Characterization may range from simple identification to a full delineation of the contamination on site. Phase II ESAs may be used to confirm the findings of a Phase I ESA, supplement previous iterations of a Phase II ESA, gather information in support of remedial measures or site development, make informed decisions about property transactions, or establish a baseline of environmental conditions (Canadian Standards Association Z769-00, Phase II Environmental Site Assessment).

1.1 Background

The Property has been under the ownership of The City of Edmonton since 1930, as based on a Phase I ESA completed by Thurber in 2013. The Property has history dating back to 1802 and has encompassed a number of developments throughout the years, as identified further in Section 3.0. Most recently, the Property includes Telus Field, a former power generating station (power plant), electrical substations and a transformer switch yard, a gas metering station, a water treatment plant and associated buildings operated by EPCOR, the Ross Flats Apartments, and the Rosssdale Community Hall.

As a part of this assessment, Nichols Environmental completed a review of the Phase I ESA completed by Thurber as well as available historical documentation, a full list for which is provided in Appendix C. Based on the findings of the Phase I ESA, Thurber initially identified a number of areas of concern on the Property related to historical activities.

Based on this review, and for the purpose of this assessment, the Property was divided into seven separate areas of concern, as provided below and in Figure 2.

- Area 1: Potential mercury-impacted soil in the vicinity of the natural gas metering station on lands that will be remaining under the ownership of The City of Edmonton;
- Area 2: Use of creosote-treated timber piles beneath the former reactivator site on lands that will be remaining undisturbed and under the ownership of The City of Edmonton;



- Area 3: PAH, hydrocarbon, and metals-impacted soils in the vicinity of a former burn pit area south of the Watermark Building on lands that will remain under the use of EPCOR;
- Area 4: Transportation, transfer and storage of bulk and hazardous chemicals in the water treatment plant and specifically within the former hazardous materials storage area on lands that will remain under the use of EPCOR;
- Area 5: A number of areas of concern for PAH and metals impacts on lands remaining under the ownership of The City of Edmonton as well as use by EPCOR. The areas were outlined as follows:
 - ▶ Former rail lines adjacent to the separated lot and entering the Property from the north at approximately 104th Street NW and extending alongside the power plant, with one extending toward the water treatment plant;
 - ▶ Use of creosote-treated timber piles beneath the power plant;
 - ▶ PAH-impacted soil in the vicinity of the former aboveground storage tank (AST) to the southeast of the water treatment plant;
 - ▶ PAH-impacted soil in the vicinity of the former ASTs south of the former High Pressure (HP) Plant;
 - ▶ Metals/PAH-impacted groundwater near the power plant; and
 - ▶ General quality of fill materials on the Property;
- Area 6: Metal-impacted fill materials located between Pump House #1 and Pump House #2 associated with bottom ash on lands that will be remaining under the ownership of The City of Edmonton; and
- Area 7: Hydrocarbon-impacted soil and groundwater in the vicinity of the Watermark Building associated with a former UST on lands that will remain under the use of EPCOR.

A summary of the findings for each of these areas, which document the potential COCs targeted for this assessment, is provided in the subsequent sections.

1.1.1 Area 1 - Mercury: Natural Gas Metering Station

In 1997, Komex International Ltd. (Komex) was retained by Northwest Utilities Limited (now ATCO) to complete an investigation at the natural gas metering station to the north of the power plant. The investigation subsequently documented the presence of mercury-impacted soils west of the natural gas metering station which had originated from a spill of elemental mercury. Remediation of this area included the removal of approximately 40 m³ of mercury-impacted soils in 1998. A composite closure sample was collected and submitted from the excavation which displayed elevated mercury concentrations. This raised the concern that a sub-sample component of the composite may not meet the current 2014 Alberta Tier 1 Guideline for mercury.



As such, Nichols Environmental recommended further sampling within Area 1 with regards to mercury.

1.1.2 Area 2 - Creosote: Former Reactivator

An anticipated 514 30-foot long (approximately 9 m) creosote-treated piles are present on the northeast portion of the Property in the location of the two former reactivators. In 2004, a Phase II ESA was completed by EBA Engineering Consultants Ltd. (EBA) to confirm if there was any potential impact from the use of the creosote-treated piles. As a result of the investigation, trace concentrations of creosote-related PAHs were identified, including fluoranthene at 1.5 mbg in soil and low-level concentrations of dibenzofuran in groundwater. A letter dated September 24, 2004 from AESRD to EPCOR Water Services indicated that leaving the creosote-treated piles in place beneath the former reactivators was acceptable as long as the site remained undisturbed. AESRD also recommended that annual groundwater monitoring be conducted within this area for at least three years. This recommendation was subsequently fulfilled with further groundwater monitoring conducted by EBA from 2006 to 2008, which also identified low-level concentrations of dibenzofuran (2006) and PCP (2008) in groundwater.

At the time of assessment, three of the seven original monitoring wells remained present on the Property (C1, C6, and C7). The remaining monitoring wells are believed to have either been destroyed or covered during construction of a walking path on the east portion of this area.

To the best of our knowledge, Nichols Environmental is not aware of any further investigative work that has been completed in Area 2 with regards to the creosote-treated piles. As such, Nichols Environmental recommended further groundwater sampling within Area 2 to confirm if concentrations of the identified COCs remained or were above guidelines.

1.1.3 Area 3 - PAHs, Hydrocarbons & Metals: Former Burn Pit

This portion of the Property was formerly utilized by Fire Services, which included a fire training area (former burn pits) to the south of the current Watermark Building as identified in aerial photographs from the 1950s. In the early 2000s, a number of investigations were initiated to assess potential impacts from historical use, as this area was slated to be transferred to EPCOR.

Investigations completed by EBA in 2001/2002 identified hydrocarbon, metals, and PAH-impacted soil to the south of the Watermark Building and Fire Hall (adjacent east). The impacts were confirmed at 2.6 mbg south of the Watermark Building (northern plume) and at 7.6 mbg further to the south of this location (southern plume). The two areas are believed to be two separate plumes as the contamination noted in the northern plume appeared to be shallower in nature, extending from surface to approximately 3 metres in depth, while that of the southern plume was identified at depth, beneath overburden. Previous drilling conducted between the two plumes has



not included a collection of soil samples for laboratory analysis. As such, it remained to be confirmed that the two plumes were not connected. Groundwater data as recent as 2005 has also confirmed the presence of metals in groundwater, specifically iron and manganese as well as selenium and silver.

Based on a review of the previous findings, Nichols Environmental proposed to complete confirmation drilling within Area 3 to confirm the depth of impacts and to determine if the two contaminant plumes were connected. Nichols Environmental is aware that a Tier 2 Risk Assessment was also conducted on the southern plume in 2014, which confirmed that the plume was stable.

It should also be noted that during the course of the assessment, further documentation regarding this portion of the Property was identified. A Geotechnical Investigation that was completed in 2010 by Stantec Consulting Ltd. (Stantec) identified the presence of hydrocarbon-impacted soils to the south of the Watermark Building, adjacent to Waste Stream #7 and to the west of any other previously investigated areas. Hydrocarbon-like odours were noted at this location from approximately 1.8 to 4.0 mbg. A composite sample from this borehole was submitted, which identified petroleum hydrocarbon (PHC) Fraction 3 concentrations above guidelines (4,900 parts per million (ppm)) as well as boron concentrations (3.2 ppm) above guidelines. Further assessment of this area was not included as a part of the scope of work for the Phase II ESA as the information was provided after the field work had been completed.

1.1.4 Area 4 - TCE: Former Hazardous Materials Storage

In 2010, Thurber completed a Phase II ESA of the Rossdale Power Generating Station which included the assessment of the former hazardous material storage area south of the former carpenters shop on the Property. As a result of the investigation in this area, TCE concentrations greater than the 2010 Alberta Tier 1 Guidelines (and 2014 Guidelines) were identified at the location of borehole TH10-10 at a depth of 0 to 0.2 mbg in a fine-grained fill material. At the time of preparation of the scope of work for this assessment, the impacts do not appear to have been further delineated within this area, though it appears that the building formerly situated within this area had been removed in 2011.

This area was under construction at the time of the assessment, which was prohibitive to further testing. Upon discussion with EPCOR, further documentation confirmed that Thurber had been retained in 2013 to conduct an additional assessment which included the excavation of ten test pits to depths of between 1.3 and 5.4 mbg. Samples collected at approximately 0.1 mbg from three test pits advanced in the vicinity of TH10-10 did not identify any VOC parameter concentrations that exceeded guidelines. However, a number of samples contained PAH and metal parameter concentrations above guidelines, and one sample had PHC Fraction 3 concentrations which exceeded guidelines.



Thurber concluded that the PAHs and metals were likely associated with all disturbed soils on the Property and that given the anticipated depth of excavation for the proposed building construction, the depth of disturbed soils, and the known depth of abandoned utilities, the entire volume of the excavation required for construction of the new building would require disposal at a Class II Landfill. Thurber also recommended the installation of a hydrocarbon-resistant liner or installation of a gravel bed system with slotted pipes to facilitate a vapour extraction system in order to manage potential vapour migration and/or recontamination from the surrounding soils.

No further documentation regarding removal of the soils or confirmation testing was available for review.

1.1.5 Area 5 - PAHs & Metals Across Site

Previous assessments had identified a number of locations across the Property with concentrations of metals and PAHs in the soil in excess of the 2014 Alberta Soil Remediation Guidelines. These locations have been associated with former ASTs, creosote-treated piles, a former rail spur, and fill materials.

The locations appeared to be widespread across the west and southern portion of the Property, with impacts ranging from surface to 3.8 mbg or greater for metals and from surface to 2.9 mbg for PAHs, though one area was confirmed to have PAH-impacted soil at 7.6 mbg (related to the Watermark Building and former fire training). Based on the available information, metals and PAHs concentrations present on the Property, Nichols Environmental suspects that the impacts may be related to the fill materials, as many of the documented locations have samples collected from either coarse or fine-grained fill near surface. As such, further sampling was recommended at other locations on the Property to confirm the presence/quality of the fill materials.

Through the course of the assessment further records were identified for the Property which identified the presence of fill materials. Specifically, the aforementioned geotechnical assessment in Section 1.1.3 conducted by Stantec also identified the presence of fill materials in all five of the boreholes advanced. The fill was characterized as clay with sand and gravel, containing occasional brick, wood, asphalt, and cobbles and extended to a maximum depth of approximately 3.4 mbg. The drilling locations were situated to the east and southeast of the AT Davies Building on the Property, as well as north, west and south of the Watermark Building. Further assessments from 2011 and 2012, conducted by Stantec and Thurber, respectively, also identified the presence of fill materials to the south of the main water plant building, to a depth of approximately 2.3 to 3.0 mbg.



1.1.6 Area 6 - PAHs & Metals: Pump House #1 and #2

According to a report summary provided in the Phase I ESA completed by Thurber, past investigations completed by Thurber have identified between 6 and 9 metres of fill, including brick, clay tile, and concrete on the Property between the pump houses that are situated south of the power plant. Ash-like material was also reportedly encountered at approximately 4.0 mbg and groundwater was at 9.0 mbg. One sample that was collected in 1992 from the bottom ash area at approximately 3.8 to 4.6 mbg contained barium, beryllium, and copper concentrations that exceed the 2014 Alberta Tier 1 Guidelines for Residential/Parkland Land Use. Based on the available reports for review, the bottom ash originated from burning coal in the boilers of the power plant until 1949, after which time the boilers were converted to gas/oil. The ash was formerly loaded into small railcars beneath the boilers and then transported to the south of the main plant with the aid of conveyor belts and hopper cars.

Based on this information, Nichols Environmental recommended additional delineation within this area to determine the extent of the identified fill materials between the two pump houses, as well as analysis of PAHs to determine potential impacts as a result of the presence of the bottom ash.

1.1.7 Area 7 – Hydrocarbons: Watermark Building

In 1989, diesel USTs were removed from the Watermark Building and Fire Hall under the supervision of EBA. Documentation regarding the removal of the UST from the Watermark Building indicated that petroleum hydrocarbon impacts were present in both the soil and groundwater, extending to bedrock at approximately 12 mbg (the area was excavated to approximately 5 mbg and backfilled). A VES was subsequently installed in 1989/1990 and operated until it was decommissioned in 1994 following further assessment of the impacted area.

Based on a review of the available information, petroleum hydrocarbon concentrations from groundwater sampling conducted in 1994 would exceed the current 2014 Alberta Tier 1 Guidelines within the vicinity of the former UST. Concentrations of petroleum hydrocarbons reported in the soils at approximately 5.5 and 8.2 mbg would also exceed the current guidelines.

As such, Nichols Environmental recommended confirmation drilling within the former UST area to determine the present status of the soil and groundwater in relation to petroleum hydrocarbons, to determine if the area has been adequately remediated.



2.0 SCOPE OF WORK

The proposed scope of work was presented to The City of Edmonton in a proposal dated July 14, 2014. The scope of work completed on the Property, as modified from the original scope, was as follows:

- Completed a review of the available documentation related to the Property;
- Prepared an Initial Project Review (IRP) for the scope of the Phase II ESA, following preliminary discussions regarding accessibility to the Property and finalization of drilling locations;
- Coordinated with The City of Edmonton and AMEC Foster Wheeler (retained through The City of Edmonton) the identification of areas on the Property requiring archeological supervision, which was subsequently provided by AMEC Foster Wheeler;
- Coordinated with EPCOR's onsite personnel access to drilling locations present within the boundaries of the EPCOR Water and power plants as well as reviewed drilling locations and known utility locations that may be in conflict with the work areas;
- Prepared a site-specific health and safety plan and completed a hazard assessment;
- Contacted Alberta One-Call to locate public utility lines in the work area;
- Engaged a qualified private utility location firm to estimate the location of private utility lines;
- Retained the services of a qualified drilling contractor to provide the necessary personnel and equipment to complete the drilling program, as outlined by area in the subsequent subsections;
- Collected soil samples from each borehole advanced at intervals specific to the locations as outlined below in the subsequent subsections for field vapour screening;
- Submitted soil samples for laboratory analysis, specific to locations as outlined below in the subsequent subsections, as well as one composite sample of the soil cuttings for landfill classification at Waste Management's West Edmonton Landfill;
- Mobilized to the Property a minimum of seven days after the monitoring wells were completed to field monitor the wells for water level, well headspace vapour concentrations, and presence of NAPL;



- Completed monitoring of field groundwater parameters, including pH, oxidation reduction potential (ORP), dissolved oxygen (DO), electrical conductivity (EC), and temperature using an In-Situ TROLL[®] 9500 flow-through meter and collected groundwater samples from the purged monitoring well;
- Coordinated with The City of Edmonton the surveying of all boreholes, groundwater monitoring wells and other relevant site features to a common reference point; and
- Prepared a report documenting the field observations and the analytical results. Recommendations for further assessment and/or remediation (if necessary) would be included in this report.

Authorization to proceed with the scope of work was provided by The City of Edmonton on August 12, 2014. Scopes of work specific to each area on the Property are provided below.

2.1 Area 1 - Mercury: Natural Gas Metering Station

The scope of work completed to address Area 1 was as follows:

- Obtained utility clearance from ATCO Pipelines to work within the vicinity of their abandoned high-pressure gas line in this area;
- Advanced two boreholes (A1: 14-19 and 14-20) to approximately 3.0 mbg. A third borehole was also advanced to approximately 10.5 mbg (A1: 14-18) and was completed as a flush-mount groundwater monitoring well;
- Collected soil samples from each borehole advanced at 0.5 m intervals, or at the discretion of Nichols Environmental's representative, for field vapour screening;
- Submitted six soil samples for laboratory analysis of metals and one for grain size; and
- Submitted a groundwater sample for laboratory analysis of metals.

As per requirements of the IPR, a tracked drilling rig was utilized for the advancement of these boreholes. Archeological supervision was identified as a requirement for Area 1 and was provided by AMEC Foster Wheeler during any ground disturbance work in this area.

2.2 Area 2 - Creosote: Former Reactivator

The scope of work completed to address Area 2 was as follows:



- Monitored, sampled, and surveyed the three existing monitoring wells present within Area 2 (wells C1, C6, and C7); and
- Submitted three groundwater samples for laboratory analysis of PAHs as well as dibenzofuran and PCP.

2.3 Area 3 - PAHs, Hydrocarbons & Metals: Former Burn Pit

The scope of work completed to address Area 3 was as follows:

- Advanced six boreholes to a maximum depth of 12.1 mbg in and surrounding the known northern plume to confirm depth and delineation (A3: 14-08 to 14-13), as well as between the north and south plumes. One of the boreholes was completed as a groundwater monitoring well with a flush-mount traffic box (A3: 14-09);
- Collected soil samples from each borehole advanced at 0.5 m intervals to approximately 3.0 mbg, and 0.75 m intervals thereafter, or at the discretion of Nichols Environmental's representative, for field vapour screening;
- Submitted soil samples for laboratory analysis as follows:
 - ▶ Twenty samples for PAHs;
 - ▶ Thirteen samples for benzene, toluene, ethylbenzene, xylenes (BTEX), and PHC Fractions 1 through 4; and
 - ▶ Seventeen samples for metals;
- In addition to the newly installed monitoring well, field monitoring was also conducted on all accessible previously existing wells, only one of which was identified to contain groundwater;
- Submitted groundwater samples for laboratory analysis as follows:
 - ▶ Two samples for PAHs;
 - ▶ Two samples for BTEX and PHC Fractions 1 to 3+;
 - ▶ Two samples for metals; and
 - ▶ Two samples for routine water parameters.

2.4 Area 4 - TCE: Former Hazardous Materials Storage

A scope of work to complete further delineation of the identified TCE was initially proposed for Area 4. However, this scope was not executed as the area was under construction at the time of the assessment. In consultation with EPCOR personnel, further documentation regarding Area 4 was identified, a summary for which was previously discussed in Section 1.1.4.



2.5 Area 5 - PAHs & Metals Across Site

The scope of work completed to address Area 5 was as follows:

- Advanced two boreholes to a maximum depth of 4.6 mbg (A5: 14-03 and 14-04). Two additional boreholes (A5: 14-01 and 14-02) were also advanced to a maximum depth of 10.0 mbg and were completed as monitoring wells with flush-mount traffic boxes for use as background locations;
- Collected soil samples from each borehole advanced at 0.5 m intervals to approximately 4.5 mbg, and 0.75 m intervals thereafter, or at the discretion of Nichols Environmental's representative, for field vapour screening;
- Submitted soil samples for laboratory analysis as follows:
 - ▶ A minimum of six samples for PAHs;
 - ▶ A minimum of six samples for metals;
- Submitted additional soil samples from where fill materials were encountered in Areas 1, 3 and 6, for analysis of metals and PAHs; and
- Submitted a groundwater sample from A5: 14-01 for laboratory analysis of PAHs, metals, and routine water parameters.

One borehole location had been proposed on the Property to the west of the power plant. However, the area was being utilized as a laydown yard for bridge construction, as such, the location was not completed. Three additional drilling locations had been proposed on the Property to assess fill materials to the east of the power plant as well as south and east of the Water Plant. However, upon consultation with EPCOR personnel, review of utility maps, as well as identification of further assessment work completed for the Property which identified the presence of fill materials in these general areas, the drilling locations were not completed. A discussion of the additional assessment work was previously discussed in Section 1.1.5.

2.6 Area 6 - PAHs & Metals: Pump House #1 and #2

The scope of work completed to address Area 6 was as follows:

- Advanced four boreholes, spaced approximately 15 metres apart along the bank, to a maximum depth of 10.0 to 12.0 mbg (A5: 14-14 to 14-17). Two would be completed as groundwater monitoring wells with stickup protective casings (A5: 14-15 and 14-17);



- Collected soil samples from each borehole advanced at 0.5 m intervals, or at the discretion of Nichols Environmental's representative, for field vapour screening;
- Submitted soil samples for laboratory analysis as follows:
 - ▶ Eleven samples for PAHs;
 - ▶ Thirteen samples for metals;
 - ▶ Nine samples for pH;
 - ▶ Two samples for grain size analysis; and
 - ▶ Four samples for leachate analysis for PAHs; and
- Submitted groundwater samples from each monitoring well for laboratory analysis of PAHs and metals.

As per requirements of the IPR, a tracked drilling rig was utilized for the advancement of these boreholes. Archeological supervision was identified as a requirement for Area 6 and was provided by AMEC Foster Wheeler during any ground disturbance work in this area.

2.7 Area 7 – Hydrocarbons: Watermark Building

The scope of work completed to address Area 7 was as follows:

- Retained a concrete coring contractor to provide access to two of the borehole locations within this area (A7: 14-05 and 14-06);
- Advanced three boreholes to a maximum depth of 12.1 mbg, all of which were completed as monitoring wells with flush-mount traffic boxes (A7: 14-05 to 14-07);
- Collected soil samples from each borehole advanced at 0.75 m intervals, or at the discretion of Nichols Environmental's representative, for field vapour screening;
- Submitted six soil samples for laboratory analysis of BTEX and PHC Fractions 1 through 4, and one sample for grain size; and
- Submitted groundwater samples from each monitoring well for laboratory analysis of BTEX and PHC Fractions 1 through 3+.



3.0 PROPERTY DESCRIPTION

3.1 Location and Development Details

Location of Site:	9469 Rossdale Road NW & 10155 - 96 th Avenue NW Edmonton, Alberta
Legal Description:	Block OT; Plan NB
Current Owner:	The City of Edmonton
Year Developed:	As based on the 2013 Thurber Phase I ESA, the Property has known history dating back to 1802. Development has varied through time and has included exhibition grounds (late 1800s to early 1900s), an apartment building (1911 to present), a community hall (1970s to present), football grounds (1920s to 1940s), and a ball diamond (1940s to present). Fire Services' service centre also operated on the Property from the 1950s to the 1990s, and the power plant and water treatment plant have been present on the Property since 1902.

3.2 Physical Description

The Property is located in the Rossdale neighbourhood of Edmonton, Alberta and is currently under a number of zoning uses, which are listed further in Section 6.2. The Property covers an approximate area of 19.5 hectares, and at the time of the investigation, was occupied by Telus Field, a former power plant, electrical substations and transformer switch yard, a gas metering station, a water treatment plant and associated buildings/infrastructure operated by EPCOR, the Ross Flats Apartments, and the Rossdale Community Hall.

A number of buildings were present on the Property at the time of inspection, and have also historically been present on the Property. During the assessment, construction activities were taking place at the location of a former carpenters' shop (Area 4), and the former high power (HP) plant on the west portion of the Property was being utilized as a laydown area for construction associated with Walterdale Bridge.

The main portion of the Property was accessed through a security gate off of Rossdale Road NW, which is situated to the west of the Property. Access to areas outside of EPCOR operations was via 96th Avenue NW to the north. Area 6 to the south of the Property was accessed via a walking trail that borders the North Saskatchewan River. Surrounding land uses are a mix of residential and parkland.



3.3 Geology, Topography, and Drainage

The near surface geology of the Edmonton area is characterized by glacial deposits which include, but are not limited to, tills and lacustrine deposits that vary in thickness across the city. Intermixed with these glacial deposits are sands, silts, and gravels that may be of fluvial origin. Below the surficial deposits within the Edmonton area is the Horseshoe Canyon Formation, which is the lower part of the Edmonton Group. The Horseshoe Canyon consists of sandstone, siltstone and shale with interbedded coal seams.

The Property itself is situated on a river terrace, which includes alluvial gravel, sand, and silt, and very little surficial deposits. Past investigations have identified a substantial amount of fill materials (up to 5 m) which overlay sand and gravel. The sand and gravel are followed by the aforementioned formation at a depth of approximately 10 to 14 mbg.

The North Saskatchewan River provides drainage for the Edmonton area and is located directly south of the Property. The North Saskatchewan River is more or less coincident with buried valleys containing sand and gravel deposits in the region. Groundwater flow systems can be controlled by the connection between the river and buried valley sand and gravel deposits, and by the incised nature of the valleys. Previous investigations have documented groundwater at approximately 9 to 10 mbg in areas closest to the river, with noted seasonal fluctuations closely tied to the river. Historically, groundwater flow has been assessed in a southerly direction, toward the river.

The local topography was primarily flat with a gradual slope away from the Property to catch basins and the river. Surface drainage on the Property is anticipated to be primarily via overland flow toward the catch basins present on the Property. No standing water was observed on the Property at the time of the investigation.



4.0 METHODOLOGY

4.1 Hazard Assessment and Utility Locations

Prior to completing any field work on the Property, Nichols Environmental completed a site-specific health and safety plan and hazard assessment. Included in the health and safety plan were requirements for personal protective equipment (PPE), an emergency contact section for situations where workers may require medical attention, and protocol for working around heavy equipment, rotating equipment, and traffic. Nichols Environmental personnel and relevant subcontractors also completed EPCOR's safety and site orientation prior to completion of the field work. A ground disturbance protocol to identify all potential buried underground utilities and structures was also put in place.

Alberta One-Call (ticket numbers 2014413259 and 2014412666) identified a number of buried utilities throughout the work areas, including buried power, gas, water, and sanitary/storm. In addition to Alberta One-Call, representatives from EPCOR and The City of Edmonton also provided identification of power/water/sewer lines on the Property as a part of the One-Call tickets. An abandoned ATCO Pipelines right-of-way (ROW) was also identified in Area 1, for which a crossing agreement (Crossing Number AP14/2752) was obtained from ATCO Pipelines.

Maverick Inspection Ltd. of Edmonton, Alberta was retained to identify private utilities within the work area. Those utility locations marked by Alberta One-Call were also confirmed.

Nichols Environmental also consulted with on-site EPCOR personnel to determine the location of other private utilities within the work areas, including waste stream lines, water, private power, and historical infrastructure. As previously discussed in Section 2.5, it was determined that three boreholes proposed for advancement to delineate the extent of fill materials within Area 5 were within high risk areas and were not necessary. Other remaining borehole locations situated nearby identified underground utilities were moved to safe distances where possible.

Where feasible, known utility locations within the work areas are provided in Figures 3 through 7.

4.2 Soil Sampling Program

Nichols Environmental completed the drilling program over five days in October and November 2014. These dates and associated areas included: October 27 (Area 5), October 28 (Area 7), October 30 (Area 3), November 3 (Area 6), and November 19 (Area 1).

Over the course of the drilling program, a total of 20 boreholes was advanced on the Property. Of the 20 boreholes, nine were completed as groundwater monitoring wells. The boreholes were advanced by All Service Drilling Inc. (October/November 2014) or Sun-Alta Drilling Ltd.



(November 19, 2014), under the supervision of Nichols Environmental, using either a truck or track-mounted drill rig and solid-stem augers.

Soil samples were collected from the auger at 0.5 or 0.75 m intervals (pending the requirement of the Area), or at the discretion of Nichols Environmental's representative, for field testing of organic vapour concentrations (OVCs), and potential laboratory analyses. Samples collected for OVC analysis were placed in large plastic freezer bags and sealed with approximately 50% vapour headspace. The OVCs were measured after the samples reached an ambient temperature (approximately 20°C) with a MiniRae™ photo-ionization device (PID). The PID was calibrated following protocols outlined by MiniRae™ using a known standard. Duplicate soil samples collected for potential laboratory analyses were placed into 125-mL glass jars which were filled to capacity with soil and fitted with screw-down, Teflon™-lined lids. All samples were kept on ice in a cooler to moderate temperature fluctuations prior to delivery to the laboratory.

4.3 Groundwater Sampling Program

Each groundwater monitoring well was constructed of 50.8-mm Schedule 40 polyvinyl chloride (PVC) standpipe. A 0.254-mm slot PVC screen was affixed to the bottom of each well casing, while solid PVC was used to bring each monitoring well to grade. A slip cap was placed on the bottom of each well to prevent sediment intrusion. The tubing connections consisted of flush-joint threaded couplings. The annular space around each well screen was filled with Sil-9 sand to a minimum of 0.3 m above the well screen. The Sil-9 sand was used to form a filter pack to ensure that formation water can pass easily into each monitoring well.

Above the sand, each borehole was backfilled with bentonite chips to within 300 mm of the ground surface. The bentonite was added to minimize surface water intrusion into each well bore. The groundwater monitoring wells were completed with 200 mm-diameter flush-mount, bolt-down traffic casings which were grouted into place (Area 1, Area 3, Area 5, and Area 7) or with steel, stick up protective casings (Area 6). The installation details are presented on the borehole logs in Appendix D.

On November 20 and 21, 2014, all newly installed and historical groundwater monitoring wells were monitored for well headspace OVCs using a MiniRae™ PID. Each well was then monitored for depth to groundwater, total depth and the presence or absence of NAPL. Nichols Environmental also returned to the Property on December 18, 2014 to monitor and sample wells A5: 14-02, A7: 14-07, A3: 14-09, and MW203.

Using an In-Situ Inc. TROLL® 9500 multi-parameter meter complete with a flow-through cell and a variable rate peristaltic pump (one of GeoPump Easy-Load II® or Spectra Field-Pro, unless a specialized pump is required), field readings for pH, ORP, DO, EC and temperature were collected. Readings were recorded every thirty seconds until stabilization had occurred. Stabilization of in



situ parameters was characterized by three consecutive measurements which met the following standards:

- pH = $\pm 10\%$ or ± 0.1 units;
- ORP = $\pm 10\%$ or ± 10 millivolts (mV);
- DO = $\pm 10\%$ or ± 0.1 milligrams per litre (mg/L);
- EC = $\pm 10\%$ or ± 5 microSiemens per centimetre ($\mu\text{S}/\text{cm}$); and
- Temperature = $\pm 10\%$ or $\pm 0.1^\circ\text{C}$.

The objective of low-flow sampling is to minimize stress (drawdown) to the groundwater system. Typically, flow rates in the order of 0.1 - 0.5 L/min are used. However, this is dependent on site-specific hydrogeology. Flow rates were adjusted during the initial pumping to determine a steady state flow rate sufficient for the specific site. Sufficient flow rates are characterized by groundwater drawdown of less than 30 cm during continued pumping. If groundwater recharge was not sufficient to complete low-flow sampling, manual purging of the monitoring wells was completed and then the monitoring wells were allowed to recharge. The pump was then utilized to pass groundwater through a multi-parameter meter to determine in situ groundwater parameter concentrations. Stabilization of the in situ parameters may not have been achieved if groundwater recharge was slow.

Once field stabilization occurred, the flow-through cell was disconnected from the pumping apparatus and groundwater samples were collected and placed into laboratory-specific bottles. Preservation and field filtering of groundwater samples were completed based on the type of laboratory analysis required and samples were stored in insulated coolers for transportation to the laboratory. The pump, associated tubing, and the flow-through cell were cleaned with distilled water after each sample was collected and prior to the next sample being collected, thus minimizing the risk of cross contamination. The pumping system was also allowed to condition to each groundwater monitoring well by initially allowing groundwater to pass through the system, prior to readings being completed.

The field protocols and QA/QC procedures utilized by Nichols Environmental were in accordance with standard industry protocols and all samples were transported under chain of custody protocols. EXOVA conducted all soil and groundwater laboratory analyses.

Detailed sampling methodology is presented in Appendix E.



4.4 Survey

All surveying requirements were co-ordinated through and completed by The City of Edmonton. The horizontal and vertical positions of each borehole and monitoring well advanced during the drilling program were measured to a common datum and locations of relevant site features were also collected. It should be noted that select monitoring well locations within Area 3 were not able to be surveyed due to the presence of vehicles over the borehole/monitoring well locations on the date of the survey.



5.0 SUBSOIL STRATIGRAPHY

The borehole logs are presented in Appendix D. A summary of each investigation area is provided in the subsequent subsection.

5.1 Area 1 - Mercury: Natural Gas Metering Station

In general, a sand and gravel fill cover was identified in all three boreholes to a maximum depth of approximately 1.2 mbg. The sand and gravel fill cover was followed by silt, which contained some clay and some sand, and was soft and dry to damp in moisture. The silt was noted to increase in clay content and firmness with increasing depth. White deposits were noted in the silt at approximately 1.6 mbg in all boreholes and bone fragments were identified at approximately 1.8 mbg in A1: 14-20. The silt extended to beyond borehole completion in A1: 14-19 and 14-20. In borehole A1: 14-18, the silt was followed by sand at approximately 4.0 mbg. The sand extended to beyond completion of this borehole, and was loose and damp, and became wet at approximately 8.2 mbg. Coal was encountered in the sand at approximately 7.5 mbg and gravel at approximately 9.1 mbg.

5.2 Area 3 - PAHs, Hydrocarbons & Metals: Former Burn Pit

Asphalt followed by sand and gravel fill was encountered at surface in boreholes A3: 14-08 to 14-11, and asphalt followed by clay fill containing brick debris was identified in A3: 14-12 to approximately 1.3 mbg. Clay fill containing concrete/brick debris was also noted in A3: 14-11 to approximately 1.6 mbg. Beneath the initial sand and gravel fill layer in A3: 14-10 was a mix of sand, silt, and clay fill to approximately 3.1 mbg.

A soft to firm, low to medium plasticity clay fill was identified in A3: 14-09 beneath the sand and gravel fill surface layer and in A3: 14-13 beginning at surface to approximately 5.7 mbg. This material was noted to increase in sand content with depth, and woody debris was noted in both at the clay fill/silt interfaces at 3.1 and 5.7 mbg, respectively.

Silt containing some clay and some sand was identified in all boreholes beneath the aforementioned layers, with starting depths ranging from approximately 1.0 mbg in A3: 14-09 to 5.7 mbg in A3: 14-13, and extending to a maximum depth of approximately 7.6 mbg in the same borehole, or beyond completion in A3: 14-08. Beneath the silt was a sand and gravel layer which was loose, brown to black in colour, and damp. Coal was also noted within this layer in all boreholes, including a seam at approximately 6.5 mbg in A3: 14-10. The sand and gravel in A3: 14-13 was also noted to contain some clay and some silt. Beneath this sand and gravel layer, a firm, blue to grey, and dry weathered bedrock was encountered in three of the boreholes (A3: 14-09, 14-11, and 14-12) at depths ranging from approximately 9.8 to 11.5 mbg. A



hydrocarbon odour was noted in the bedrock sample collected from A3: 14-12, though it is suspected this may be a result of smearing as the auger was pulled to surface.

A hydrocarbon odour was noted within sand layers in the clay fill in A3: 14-09 from approximately 0.5 to 0.9 mbg and 2.1 to 2.4 mbg, in A3: 14-12 from beneath the asphalt to approximately 4.7 mbg within both a clay fill then silt layer, and in A3: 14-13 at approximately 3.6 mbg within a clay fill layer.

5.3 Area 5 - PAHs & Metals Across Site

Variations of clay, silty clay, and/or silt were present near surface in all four boreholes, extending to a maximum depth of approximately 3.0 mbg. Of the boreholes, wood fragments were noted in A5: 14-03. Beneath these initial layers was a fine grained, loose, light brown or salt and pepper coloured, dry sand. Coal inclusions were also noted to be present in the sand, as well as a silt layer in A5: 14-04. This sand extended beyond completion in boreholes A5: 14-03 and 14-04.

In borehole A5: 14-01, the sand was followed by a clayey silt layer at approximately 6.4 to 9.2 mbg. This layer contained some sand, was soft, brown to grey in colour and was wet to saturated, with a noted decrease in moisture at approximately 7.2 mbg. Pebbles were also encountered within this layer at approximately 7.1 mbg. The clayey silt was followed by a hard, dense, low to medium plastic, grey and damp clay to beyond borehole completion. In borehole A5: 14-02, the sand was followed by a firm, low plastic, blue to grey, dry silt which started at approximately 7.6 and extended beyond the borehole completion depth.

5.4 Area 6 - PAHs & Metals: Pump House #1 and #2

A loose, dry, black to brown-coloured clay fill was encountered at surface in all four boreholes. The depth of this clay fill extended to a maximum depth of approximately 2.1 mbg in A6: 14-14 and a minimum depth of approximately 0.3 mbg in A6: 14-15. A loose, brown, and dry silty fill layer was identified beneath the clay fill in A6: 14-14 and a soft, low plastic, damp silt layer was identified in A6:14-17. In the remaining two boreholes, which were situated between the two aforementioned boreholes, a variation in silt and sand fill layers was identified beneath the surficial clay layer to a depth of approximately 2.5 mbg.

In borehole A6: 14-16, debris such as brick, masonry, and glass was identified from approximately 1.3 to 2.5 mbg within the sand/silt fill layer. Debris such as brick and concrete was also noted in A6: 14-14 at approximately 3.1 to 4.6 mbg within a clay fill layer that contained some sand and silt, and in A6: 14-15 at approximately 2.7 mbg in a sand layer that contained some silt and gravel.



In borehole A6: 14-14, beneath the surface layers a clay fill containing some sand and some silt as well as coal inclusions was noted to a depth of approximately 7.5 mbg. As previously mentioned, debris was noted in this clay fill. The clay fill increased in sand content with depth and became moist at approximately 4.6 mbg. This was the only borehole in which clay materials were encountered beyond 2 mbg.

In A6: 14-15 and A6: 14-17, sand was encountered to a maximum depth of approximately 6.6 mbg beneath the aforementioned silt/sand layers. As previously mentioned, the sand in A6:14-15 contained debris, and is believed to be fill material. In A6: 14-16, coal or ash-like material containing slag was encountered at approximately 2.5 to 4.2 mbg, which was followed by a silt containing some clay to approximately 6.6 mbg. A moist and soft silt layer containing some coal was also present at approximately 5.7 to 6.6 mbg in A6: 14-15. In A6: 14-17, a loose, dark brown and dry sand layer was noted to approximately 6.6 mbg, which became black and was noted to have a high coal content at approximately 5.1 mbg.

These discussed layers are believed to be characteristic of potential fill materials utilized between the two pump houses. Below these layers the boreholes were characterized by sand, or sand and gravel containing cobbles and/or pebbles, followed by weathered, damp to dry, blue to grey or black to grey to brown coloured bedrock with the exception of A6: 14-16, in which no bedrock was encountered.

5.5 Area 7 - Hydrocarbons: Watermark Building

Approximately 0.15 to 0.2 m of concrete was present in boreholes A7: 14-05 and A7: 14-06 at surface and up to 0.15 m of asphalt followed by 0.15 m of road crush and clay was identified at surface in A7: 14-07. Beneath these surface layers, silt containing some sand and clay was encountered to a maximum depth of approximately 7.0 mbg. This layer was characterized as being soft and brown in colour, with mottling noted in A7: 14-05. In all three boreholes, this layer was followed by gravel to an approximate maximum depth of 11 mbg. The gravel contained coal inclusions, some clay, sand and silt, and was loose and black to brown in colour. Weathered bedrock was encountered beneath the gravel layer and extended beyond completion in all boreholes. The bedrock was characterized as being firm, friable, grey in colour, and dry in A7: 14-06 and A7: 14-07, and soft and wet in A7: 15-05, where it was encountered at a lesser depth (approximately 10 mbg, as opposed to 11 mbg in the other two boreholes).

No olfactory or visual evidence of petroleum hydrocarbons was identified within the boreholes advanced.



6.0 ASSESSMENT GUIDELINES

6.1 Regulatory Framework

The analytical results for the Property are presented and discussed in context of the *Alberta Tier 1 and 2 Soil and Groundwater Remediation Guidelines*, as amended up to May 2014 (2014 Alberta Guidelines).

Under these guidelines, three management options are provided: Tier 1, Tier 2, and Exposure Control. Tier 1 guidelines are considered applicable for the majority of the sites in Alberta and are somewhat conservative as they have been developed for protection of the more sensitive land uses. Tier 2 guidelines allow for consideration of site-specific conditions through the modification of Tier 1 guidelines and/or by removing exposure pathways that may not be applicable to the site. The Tier 2 approach still provides the same level of protection to human and ecological receptor pathways as the Tier 1 approach, but must be done through the collection of more site-specific data. Exposure Control involves risk management through exposure barriers or administrative controls based on a site-specific risk management approach.

The above remediation criteria may be used as benchmarks to evaluate the need for further investigation, remediation or to guide in the establishment of land-use restrictions.

Surface soil guidelines for BTEX and PHC Fractions 1 through 4 must be applied up to and including a depth of 3.0 mbg. Subsoil guidelines for BTEX and PHC Fractions 1 through 4 must be applied below the depth of 3.0 mbg. The Tier 1 approach also allows the exclusion of the ecological direct soil contact pathway for soil and groundwater for PHC Fractions 1 through 4 for any land use below a depth of 3.0 mbg, while all other exposure pathways apply.

In some cases, a contaminated site may be located adjacent to a more sensitive land-use. In such instances, the guidelines for the more sensitive land-use would be considered applicable to the contaminated site within a 30-m buffer zone from the more sensitive land-use boundary. This is done as a means to protect receptors of the more sensitive land-use, specifically the vapour inhalation and groundwater direct ecological contact pathways.

Under the 2014 Alberta Guidelines, Tier 1 Guidelines for the protection of aquatic life assume a minimum separation of 10 m between the point that the concentration is measured and the discharge point. As such, the Tier 1 Guidelines only apply to soil or groundwater located at least 10 m from the nearest surface water body that is capable of supporting an aquatic ecosystem. Within this distance, a Tier 2 approach is required or in the case of groundwater guidelines, the corresponding surface water freshwater aquatic life guideline may be applied.



For the PAH leachate analysis, results are presented and discussed in context of Alberta's *Environmental Quality Guidelines for Alberta Surface Waters*, released July 2014 (2014 Alberta EQS), specifically in context of the protection of aquatic life.

6.2 Land Use Assessment

The Property is situated within an area of predominately residential and parkland land use. The Property itself is currently zoned as a Metropolitan Recreation Zone (A), Public Parks Zone (AP), Direct Development Control Provision Zone (DC1 (12800)), and Public Utility Zone (PU).

The 2014 Alberta Guidelines have remediation criteria for both coarse and fine-grained soil. Four soil samples were submitted for grain-size analyses: A1: 14-19 at 2.0 mbg (silt material; 12.7% retained in a 75- μ m sieve), A6: 14-14 at 3.5 mbg (clay with some sand and some silt; 42.6% retained in a 75- μ m sieve), A6: 14-16 at 7.5 mbg (sand and gravel; 81.3% retained in a 75- μ m sieve), and A7: 14-05 at 7.5 mbg (gravel with some clay; 71.2% retained in a 75- μ m sieve). Based on the grain-size analysis, the sand/gravel that appear to be present on the Property at greater depths would be considered coarse grained, while the shallower clay/silt materials appear to be fine grained.

The closest water body to the Property is the North Saskatchewan River, which borders the Property to the south.

6.3 Water Well Search

A potable water well search was conducted through AESRD's Groundwater Information System to identify any water wells that are in the area. In total, six wells were identified within a 0.5-km radius of the Property. Four of the wells, installed in 2013, were listed for irrigation use and were registered to the Strathcona Community League/Garden. The other two wells were drilled in 1922 and 1926 and their use was not listed. The well completion depths ranged from 60.96 to 106.68 mbg, while water levels ranged from 1.22 to 74.37 mbg.

The exact location of the wells and whether they are still in use is unknown. A copy of the water well reconnaissance report is presented in Appendix F.



6.4 Parameter Assessment

Based on the land-use assessment and grain-size analyses, the Property has been divided into different land use categories as follows:

- Residential/Parkland: in consideration of future unrestricted land use and/or close proximity of residential or parkland land uses, coarse-grained criteria for this land use has been applied to Areas 1, 2, and 6, as well as boreholes A5: 14-01 through 14-04;
- Commercial: the remaining Areas 3 and 7 will be evaluated against coarse-grained criteria for this land use, as they are located within areas utilized by EPCOR for the water treatment plant, which are not accessible to the general public; and
- 30-m Parkland Buffer: this will be applied to samples locations within 30 m of the publicly accessible walkway area that borders Area 3 to the south. Application of this buffer will bring into effect Residential/Parkland guideline values protective of vapour inhalation (soil and groundwater) as well as direct ecological contact (groundwater), which are active receptor pathways for PAHs and petroleum hydrocarbons.

Taking into consideration the close proximity of the North Saskatchewan River to Area 6, and more specifically the groundwater measured in Area 6, the Tier 1 Guidelines may not be protective of freshwater receptors. As such, the 2014 Alberta EQS for the protection of aquatic life for the groundwater have been provided as a comparison. For soils, a more detailed assessment may be necessary to derive site-specific risk assessment criteria.



7.0 FIELD AND ANALYTICAL RESULTS

7.1 Soil Results

7.1.1 Area 1 - Mercury: Natural Gas Metering Station

7.1.1.1 Organic Vapour Concentrations

All soil samples were field screened for OVCs, the results of which are presented in Table 1. Soil OVCs ranged from non-detectable (<0.01 parts per million by volume - ppmv) in three samples to 1.2 ppmv in A1: 14-18 at 6.0 mbg.

7.1.1.2 Soil Analysis - Metals

Six soil samples were collected and submitted for laboratory analysis of metals. The analytical results are presented in Table 2 and Figure 3. All of the analysed parameter concentrations were below their respective recommended guidelines except for two samples. Boron concentrations in A1: 14-20 at 1.0 mbg (5.90 ppm) and 1.5 mbg (3.96 ppm) exceeded the guideline of 2 ppm.

7.1.2 Area 3 - PAHs, Hydrocarbons & Metals: Former Burn Pit

7.1.2.1 Organic Vapour Concentrations

All soil samples were field screened for OVCs, the results of which are presented in Table 1. Soil OVCs ranged from 1.8 ppmv in A3: 14-08 to 3,662 ppmv in A3: 14-12 at 3.8 mbg.

7.1.2.2 Soil Analysis - Polycyclic Aromatic Hydrocarbons

Twenty soil samples were collected and submitted for laboratory analysis of PAHs. The analytical results are presented in Table 3 and Figures 4 and 5. All but ten of the analysed parameter concentrations were below their respective recommended guidelines, as summarized below:

- Acenaphthene concentrations exceeded the guideline of 0.38 ppm in two samples, A3: 14-12 at 1.0 mbg (0.39 ppm) and at 1.5 mbg (0.43 ppm);
- Anthracene concentrations exceeded the guideline of 0.0056 ppm in 13 samples, with concentrations above guidelines ranging from 0.0057 ppm in A3: 14-12 at 4.5 mbg to 1.41 ppm in A3: 14-12 at 1.0 mbg;



- Fluoranthene concentrations exceeded the guideline of 0.039 ppm in 12 samples, with concentrations above guidelines ranging from 0.05 ppm in A3: 14-13 at 0.5 mbg to 1.28 ppm in A3: 14-12 at 1.0 mbg;
- Fluorene concentrations exceeded the guideline of 0.34 ppm in two samples, A3: 14-12 at 1.0 mbg (1.37 ppm) and 1.5 mbg (1.36 ppm);
- Naphthalene concentrations exceeded the guideline of 0.017 ppm in 13 samples, with concentrations above guidelines ranging from 0.022 ppm in A3: 14-11 at 2.0 mbg to 19.6 ppm in A3: 14-12 at 1.5 mbg;
- Phenanthrene concentrations exceeded the guideline of 0.061 ppm in 13 samples, with concentrations above guidelines ranging from 0.07 ppm in A3: 14-13 at 7.5 mbg to 13.3 ppm in A3: 14-12 at 1.0 mbg;
- Pyrene concentrations exceeded the guideline of 0.040 ppm in 13 samples, with concentrations above guidelines ranging from 0.06 ppm in A3: 14-13 at 0.5 mbg to 10.4 ppm in A3: 14-12 at 1.0 mbg;
- IACR for coarse-grained soils in A3: 14-10 at 1.0 mbg (1.02), A3: 14-11 at 2.0 mbg (1.02), and A3: 14-12 at 1.0 mbg (1.08) and 1.5 mbg (1.36) exceeded the guideline of 1;
- IACR for fine-grained soils in A3: 14-09 at 1.0 mbg (1.02), A3: 14-10 at 1.0 mbg (1.97), A3: 14-11 at 1.0 mbg (1.54) and 2.0 mbg (1.97), and A3: 14-12 at 1.0 mbg (2.08) and 1.5 mbg (2.64) exceeded the guideline of 1; and
- Benzo(a)anthracene concentrations exceeded the guideline of 0.083 ppm in six samples, with concentrations above guidelines ranging from 0.13 ppm in A3: 14-09 at 0.5 mbg to 1.66 ppm in A3: 14-12 at 1.0 mbg.

7.1.2.3 Soil Analysis - Petroleum Hydrocarbons

Thirteen soil samples were collected and submitted for laboratory analysis of BTEX and PHC Fractions 1 through 4 based on field observations and OVC readings. The analytical results are presented in Table 4 and Figure 4, and are summarized below:

- Benzene concentrations were below the laboratory's MDL of 0.005 ppm in all submitted soil samples, and were also below the guideline of 0.073/0.078 ppm;
- Toluene concentrations ranged from below the laboratory's MDL of 0.02 ppm in nine samples to 1.81 ppm in A3: 14-12 at 3.8 mbg which exceeded the guideline of 0.12 ppm;



- Ethylbenzene concentrations ranged from below the laboratory's MDL of 0.010 ppm in ten samples to 2.49 ppm in A3: 14-12 at 3.8 mbg, which exceeded the guideline of 0.21 ppm;
- Xylenes concentrations ranged from below the laboratory's MDL of 0.03 ppm in nine samples to 28.0 ppm in A3: 14-12 at 3.8 mbg, which exceeded the subsoil guideline of 16 ppm, applied based on the 30-m buffer;
- PHC Fraction 1 concentrations ranged from below the laboratory's MDL of 10 ppm in ten samples to 1,380 ppm in A3: 14-12 at 3.9 mbg. PHC Fraction 1 concentrations in A3: 14-12 at 3.8 mbg exceeded the subsoil guideline of 440 ppm and A3: 14-13 at 3.8 mbg (38 ppm) exceeded the subsoil guideline of 30 ppm, applied based on the 30-m buffer;
- PHC Fraction 2 concentrations ranged from below the laboratory's MDL of 50 ppm in ten samples to 4,540 ppm in A3: 14-12 at 3.8 mbg. PHC Fraction 2 concentrations in A3: 14-12 at 3.8 mbg exceeded the subsoil guideline of 520 and A3: 14-13 at 3.8 mbg (278 ppm) exceeded the subsoil guideline of 160 ppm, applied based on the 30-m buffer;
- PHC Fraction 3 concentrations ranged from below the laboratory's MDL of 50 ppm in seven samples to 21,000 ppm in A3: 14-12 at 3.8 mbg. PHC Fraction 3 concentrations in A3: 14-11 at 0.5 mbg (1,890 ppm) exceeded the surface soil guideline of 1,700 ppm and A3: 14-12 at 3.8 mbg (21,000 ppm) and A3: 14-13 at 3.8 mbg (10,400 ppm) both exceeded the subsoil guideline of 3,500 ppm; and
- PHC Fraction 4 concentrations ranged from below the laboratory's MDL of 100 ppm in eight samples to 20,000 ppm in A3: 14-12 at 3.8 mbg, which exceeded the subsoil guideline of 10,000 ppm.

7.1.2.4 Soil Analysis - Metals

Seventeen soil samples were collected and submitted for laboratory analysis of metals. The analytical results are presented in Table 5 and Figures 4 and 5. All of the analysed parameter concentrations were below their respective recommended guidelines except for boron and lead, which is summarized below:

- Boron concentrations were above the guideline of 2 ppm in seven samples, with concentrations above guidelines ranging from 2.61 ppm in A3: 14-11 at 2.0 mbg to 11.7 ppm in A3: 14-12 at 1.0 mbg; and
- Lead concentrations were above the guideline of 260 ppm in A3: 14-12 at 1.0 mbg (309 ppm) and at 1.5 mbg (1,160 ppm).



7.1.3 Area 5 - PAHs & Metals Across Site

7.1.3.1 Organic Vapour Concentrations

All soil samples were field screened for OVCs, the results of which are presented in Table 1. Soil OVCs ranged from 5.1 ppmv in A5: 14-01 at 7.5 mbg to 53.8 ppmv in A5: 14-02 at 4.5 mbg.

7.1.3.2 Soil Analysis - Polycyclic Aromatic Hydrocarbons

Eight soil samples were collected and submitted for laboratory analysis of PAHs. The analytical results are presented in Table 6 and Figure 6. All parameter concentrations were below their respective recommended guidelines except for anthracene in one sample. Anthracene concentrations in A1: 14-20 at 1.0 mbg (0.007 ppm) exceeded the guideline of 0.0056 ppm.

7.1.3.3 Soil Analysis - Metals

Four soil samples were collected and submitted for laboratory analysis of metals. The analytical results are presented in Table 7 and Figure 6. All parameter concentrations were below their respective recommended guidelines except for boron in two samples. Boron concentrations in A5: 14-02 at 2.5 mbg (2.87 ppm) and A5: 14-04 at 1.0 mbg (6.11 ppm) exceeded the guideline of 2 ppm.

7.1.4 Area 6 - PAHs & Metals: Pump House #1 and #2

7.1.4.1 Organic Vapour Concentrations

All soil samples were field screened for OVCs, the results of which are presented in Table 1. Soil OVCs ranged from 3.2 ppmv in A6: 14-17 at 11.0 mbg to 60.5 ppmv in A6: 14-15 at 10.5 mbg.

7.1.4.2 Soil Analysis - Polycyclic Aromatic Hydrocarbons

Eleven soil samples were collected and submitted for laboratory analysis of PAHs. The analytical results are presented in Table 8 and Figure 7. All of the analysed parameter concentrations were below their respective recommended guidelines except for seven samples, as summarized below:

- Anthracene concentrations in A6: 14-14 at 4.0 mbg (0.078 ppm) and 5.0 mbg (0.102 ppm), A6: 14-15 at 3.0 mbg (0.153 ppm), A6: 14-16 at 1.5 mbg (0.058 ppm) and 2.5 mbg (0.061 ppm), and A6: 14-17 at 3.5 mbg (0.012 ppm) exceeded the guideline of 0.0056 ppm;



- Fluoranthene concentrations in A6: 14-14 at 4.0 mbg (0.31 ppm) and 5.0 mbg (0.19 ppm), A6: 14-15 at 3.0 mbg (0.52 ppm), A6: 14-16 at 1.5 mbg (0.19 ppm) and 2.5 mbg (0.4 ppm), and A6: 14-17 at 3.5 mbg (0.012 ppm) exceeded the guideline of 0.039 ppm;
- Naphthalene concentrations in A6: 14-14 at 4.0 mbg (0.024 ppm) and 5.0 mbg (0.027 ppm), A6: 14-15 at 3.0 mbg (0.034 ppm), A6: 14-16 at 1.5 mbg (0.075 ppm), and 2.5 and 4.5 mbg (0.019 ppm) exceeded the guideline of 0.017 ppm;
- Phenanthrene concentrations in A6: 14-14 at 4.0 and 5.0 mbg (0.24 ppm), A6: 14-15 at 3.0 mbg (0.39 ppm), A6: 14-16 at 1.5 mbg (0.17 ppm) and 2.5 mbg (0.15 ppm) exceeded the guideline of 0.061 ppm;
- Pyrene concentrations in A6: 14-14 at 4.0 mbg (0.29 ppm) and 5.0 mbg (0.21 ppm), A6: 14-15 at 3.0 mbg (0.52 ppm), A6: 14-16 at 1.5 mbg (0.15 ppm) and 2.5 mbg (0.46 ppm) exceeded the guideline of 0.040 ppm;
- IACR for fine-grained soils in A6: 14-14 at 4.0 mbg (1.23) and A6: 14-16 at 2.5 mbg (1.8) exceeded the guideline of 1. IACR in A6: 14-15 at 3.0 mbg (1.64) was also above the guideline. However, soils from this depth interval would be considered coarse grained. Therefore, the corresponding IACR would be (0.849), which is below 1; and
- Benzo(a)anthracene concentrations in A6: 14-14 at 4.0 mbg (0.16 ppm) and 5.0 mbg (0.11 ppm), A6: 14-15 at 3.0 mbg (0.26 ppm), and A6: 14-16 at 2.5 mbg (0.25 ppm) exceeded the guideline of 0.038 ppm.

7.1.4.3 Soil Analysis - Leachable Polycyclic Aromatic Hydrocarbons

Four soil samples (A6: 14-14 at 4.0 mbg, 14-15 at 3.0 mbg, 14-16 at 2.5 mbg, and 14-17 at 3.5 mbg) were collected and submitted for laboratory analysis of leachable PAHs based on the results of the PAH analysis. The analytical results are presented in Table 9. All of the analysed parameter concentrations were below their respective recommended guidelines for the protection of freshwater aquatic life.

7.1.4.4 Soil Analysis - Metals

Thirteen soil samples were collected and submitted for laboratory analysis of metals and nine samples for pH. The analytical results are presented in Table 10 and Figure 7. Analysed parameter concentrations were above their respective recommended guidelines except for one sample, as summarized below:



- pH in A6: 14-17 at 6.5 mbg was 5.7, which is lower than the recommended range of 6 - 8.5;
- Arsenic concentrations in A6: 14-16 at 1.5 mbg (41 ppm) exceeded the guideline of 17 ppm;
- Barium concentrations in A6: 14-15 at 3.0 mbg (856 ppm) and 6.0 mbg (702 ppm), A6: 14-16 at 1.5 mbg (1,630 ppm), 2.0 mbg (654 ppm), and 2.5 mbg (642 ppm), and A6: 14-17 at 5.5 mbg (1,460 ppm), and 6.5 mbg (1,750 ppm) exceeded the guideline of 500 ppm;
- Boron concentrations in all samples, excluding A6: 14-17 at 8.0 mbg, exceeded the guideline of 2 ppm. Concentrations in exceedance ranged from 9.56 ppm in A6: 14-17 at 3.5 mbg to 37.5 ppm in A6: 14-17 at 5.5 mbg;
- Copper concentrations in A6: 14-16 at 1.5 mbg (79.6 ppm) exceeded the guideline of 63 ppm;
- Lead concentrations in A6: 14-16 at 1.5 mbg (148 ppm) exceeded the guideline of 140 ppm;
- Molybdenum concentrations in A6: 14-16 at 1.5 mbg (4.5 ppm) and A6: 14-17 at 5.5 mbg (8.2 ppm), exceeded the guideline of 4 ppm; and
- Selenium concentrations in A6: 14-17 at 5.5 mbg (1.2 ppm) exceeded the guideline of 1 ppm.

A cross-section of the borehole logs for Area 6, depicting the location of the fill materials, is provided in Figure 8.

7.1.5 Area 7 - Hydrocarbons: Watermark Building

7.1.5.1 Organic Vapour Concentrations

All soil samples were field screened for OVCs, the results of which are presented in Table 1. Soil OVCs ranged from 2.4 ppmv in A7: 14-07 at 12.1 mbg to 51.8 ppmv in A7: 14-07 at 0.8 mbg.

7.1.5.2 Soil Analysis - Petroleum Hydrocarbons

Six soil samples were collected and submitted for laboratory analysis of BTEX and PHC Fractions 1 through 4 based on field observations and OVC readings. All parameter concentrations were below



their respective laboratory MDLs or guidelines. The analytical results are presented in Table 11, and borehole locations are provided in Figure 9.

A copy of the final signed soil laboratory reports is included in Appendix G.

7.2 Groundwater Results

7.2.1 Groundwater Field Monitoring

Nichols Environmental conducted a groundwater monitoring and sampling program on the Property on November 20 and 21, 2014, as well as additional monitoring/sampling on December 18, 2014. Groundwater monitoring well completion data and field monitoring results are presented in Table 12, and are summarized as follows:

- Of the previously existing monitoring well network proposed for monitoring/sampling (Area 3), six monitoring wells were identified (MW1, MW108, MW109, MW201, MW202, and MW203). Of these, only MW203 contained enough water for sampling;
- Well headspace OVCs ranged from non-detectable (<0.1 ppmv) in multiple monitoring wells to 0.6 ppmv in monitoring well MW1 in Area 3;
- The depth to groundwater ranged from 7.31 m from top of casing (mTOC) in A5: 14-01 to 10.55 mTOC in A6: 14-15. Average depth to groundwater of the wells monitored was 8.93 mTOC and the average elevation was 615.18 m;
- Groundwater flow on the Property appears to be to the southeast under a gradient of 0.006 m/m (Figure 10); and
- No NAPL was reported in any of the monitoring wells at the time of inspection.

If sufficient volumes of groundwater were available in their respective wells, groundwater wells sampled during the November 20 and 21, 2014 sampling program were monitored for in situ parameters, following protocols previously outlined in Section 4.3. Groundwater quality data are presented in Table 13 and are summarized below:

- pH ranged from 6.79 (A1: 14-18) to 7.06 (A7: 14-06);
- ORP ranged from 39 mV (A1: 14-18) to 195 mV (C7);
- DO concentrations ranged from 0.58 ppm (C1) to 5.77 ppm (A7: 14-06);



- EC ranged from 452.0 $\mu\text{S}/\text{cm}$ (A5: 14-01) to 2,921 $\mu\text{S}/\text{cm}$ (A1: 14-18); and
- Temperature ranged from 7.34 °C (A3: 14-09) to 10.47 °C (A7: 14-05).

7.2.2 Area 1 - Mercury: Natural Gas Metering Station

7.2.2.1 Groundwater Analyses - Dissolved Metals

One groundwater sample was collected from A1: 14-18 and submitted for laboratory analysis of dissolved metals. The analytical results are presented in Table 14 and Figure 3. All of the analysed parameter concentrations were below their respective recommended guidelines except for manganese (0.756 ppm, guideline of 0.05 ppm) and selenium (0.0011 ppm, guideline of 0.001 ppm).

7.2.3 Area 2 - Creosote: Former Reactivator

7.2.3.1 Groundwater Analyses - PAHs, Dibenzofuran & PCP

Groundwater samples were collected from monitoring wells C1, C6, and C7 within Area 2 (three samples in total) and were submitted for laboratory analysis of PAHs, dibenzofuran, and PCP. The analytical results are presented in Tables 15 and 16 and Figure 11. All of the analyzed parameter concentrations were below their respective laboratory MDLs or guidelines.

7.2.4 Area 3 - PAHs, Hydrocarbons & Metals: Former Burn Pit

7.2.4.1 Groundwater Analyses - PAHs

Groundwater samples were collected from monitoring wells A3: 14-09 and MW203 within Area 3 (two samples total) and were submitted for laboratory analysis of PAHs. The analytical results are presented in Table 15. All of the analyzed parameter concentrations were below their respective MDLs or guidelines.

7.2.4.2 Groundwater Analyses - Petroleum Hydrocarbons

Groundwater samples were collected from monitoring wells A3: 14-09 and MW203 within Area 3 (two samples total) and were submitted for laboratory analysis of BTEX and PHC Fractions 1 to 3+. The analytical results are presented in Table 17. All of the analyzed parameter concentrations were below their respective MDLs or guidelines (where applicable).



7.2.4.3 Groundwater Analyses - Dissolved Metals

Groundwater samples were collected from monitoring wells A3: 14-09 and MW203 within Area 3 (two samples total) and were submitted for laboratory analysis of dissolved metals. The analytical results are presented in Table 14 and Figure 5. All of the analyzed parameter concentrations were below their respective guidelines, with the exception of manganese (0.548 ppm) and zinc (0.062 ppm) in A3: 14-09, which exceeded their respective guidelines of 0.05 and 0.03 ppm.

7.2.4.4 Groundwater Analyses - Routine Parameters

Groundwater samples were collected from monitoring wells A3: 14-09 and MW203 within Area 3 (two samples total) and were submitted for laboratory analysis of routine parameters. The analytical results are presented in Table 18 and Figure 5. All of the analyzed parameter concentrations were below their respective guidelines, with the exception of total dissolved solids ((TDS) 540 ppm) in MW203 and chloride (159 ppm) in A3: 14-09.

7.2.5 Area 5 - PAHs & Metals Across Site

7.2.5.1 Groundwater Analyses - PAHs

Groundwater samples were collected from monitoring well A5: 14-01 within Area 5 and were submitted for laboratory analysis of PAHs. The analytical results are presented in Table 15. All of the analyzed parameter concentrations were below their respective MDLs or guidelines.

7.2.5.2 Groundwater Analyses - Dissolved Metals

Groundwater samples were collected from monitoring well A5: 14-01 within Area 5 and were submitted for laboratory analysis of dissolved metals. The analytical results are presented in Table 14 and Figure 6. All of the analyzed parameter concentrations were below their respective guidelines, with the exception of manganese (0.330 ppm) which exceeded the guideline of 0.05 ppm.

7.2.5.3 Groundwater Analyses - Routine Parameters

Groundwater samples were collected from monitoring well A5: 14-01 within Area 5 and were submitted for laboratory analysis of routine parameters. The analytical results are presented in Table 18. All of the analyzed parameter concentrations were below their respective guidelines.



7.2.6 Area 6 - PAHs & Metals: Pump House #1 and #2

7.2.6.1 Groundwater Analyses - Polycyclic Aromatic Hydrocarbons

Groundwater samples were collected from monitoring wells A6: 14-15 and A6: 14-17 within Area 6 (two samples total) and were submitted for laboratory analysis of PAHs. The analytical results are presented in Table 15 and Figure 7. All of the analyzed parameter concentrations were below their respective MDLs or guidelines, except for the following:

- Anthracene concentrations in A6: 14-15 (0.000035 ppm) exceeded the guideline of 0.000012 ppm;
- Fluoranthene concentrations in A6: 14-15 (0.00009 ppm) exceeded the guideline of 0.00004 ppm;
- Pyrene concentrations in A6: 14-15 (0.00010 ppm) and A6: 14-17 (0.00004 ppm) exceeded the guideline of 0.000025 ppm;
- Carcinogenic PAHs (as B(a)P Total Potency Equivalent (TPE)) in A6: 14-15 (0.00008 ppm) and A6: 14-17 (0.00002 ppm) exceeded the guideline of 0.00001 ppm;
- Benzo(a)anthracene concentrations in A6: 14-15 (0.00006 ppm) exceeded the guideline of 0.000018 ppm; and
- Benzo(a)pyrene concentrations in A6: 14-15 (0.000072 ppm) and A6: 14-17 (0.000020 ppm) exceeded the guideline of 0.000015 ppm.

7.2.6.2 Groundwater Analyses - Dissolved Metals

Groundwater samples were collected from monitoring wells A6: 14-15 and A6: 14-17 within Area 6 (two samples total) and were submitted for laboratory analysis of dissolved metals. The analytical results are presented in Table 14 and Figure 7. All of the analyzed parameter concentrations were below their respective MDLs or guidelines, except for manganese. Manganese concentrations in both monitoring wells (0.344 ppm and 1.29 ppm, respectively) exceeded the guideline of 0.05 ppm.



7.2.7 Area 7 - Hydrocarbons: Watermark Building

7.2.7.1 Groundwater Analyses - Petroleum Hydrocarbons

Three groundwater samples were collected and submitted for laboratory analysis of BTEX and PHC Fractions 1 through 3+. All parameter concentrations were below their respective laboratory MDLs or guidelines (where applicable). The analytical results are presented in Table 17.

A copy of the final signed groundwater laboratory reports is included in Appendix G.



8.0 CONCLUSIONS AND RECOMMENDATIONS

Nichols Environmental has completed a Phase II Environmental Site Assessment for the Property located at 9469 Rossdale Road NW & 10155 - 96th Avenue NW in Edmonton, Alberta. The field and analytical results are summarized as follows:

8.1 Area 1 - Mercury: Natural Gas Metering Station

- On November 19, 2014, three boreholes (one of which was completed as a groundwater monitoring well) were advanced within/surrounding the footprint of a former excavation in order to assess the current soil and groundwater conditions with relation to mercury;
- General soil lithology identified a sand and gravel fill, which was followed by silt containing some clay and some sand. The silt was followed by sand, which extended beyond borehole completion and was wet at approximately 8.2 mbg. Coal was encountered in the sand at approximately 7.5 mbg and gravel at approximately 9.1 mbg;
- Concentrations of boron in soil above the guideline of 2 ppm were identified in A1: 14-20 at approximately 1.0 mbg (5.90 ppm) and 1.5 mbg (3.96 ppm). Both samples were from a silt material, which was consistent with the other three boreholes completed in Area 1;
- Concentrations of manganese and selenium in groundwater above their respective guidelines were identified in monitoring well A1: 14-18. Concentrations of manganese were similar to those identified at other locations throughout the Property and selenium concentrations (0.0011 ppm) marginally exceeded the guideline of 0.001 ppm. Neither is believed to be a result of anthropogenic activities; and
- Mercury concentrations were below guidelines in all of the soil samples submitted. Those samples which were submitted were based on field evidence and an estimate of the final depths of the former excavation and/or periphery of the former excavation.

Based on the results of the investigation, there do not appear to be any residual mercury impacts present within the soil or groundwater at the locations tested. Nichols Environmental has no further recommendations for assessment with regards to mercury for Area 1 at this time.

The identified concentrations of boron in the soil could be addressed through a risk assessment and subsequently risk-managed. No other metals parameter concentrations exceeded the guidelines within the locations tested in Area 1.



8.2 Area 2 - Creosote: Former Reactivator

- On November 20, 2014, Nichols Environmental mobilized to the Property to monitor and sample previously existing monitoring wells C1, C6, and C7 within the former reactivator area for PAHs, PCP, and dibenzofuran which have historically been identified in wells C1 (PCP) and C6 (dibenzofuran);
- Average depth to groundwater was approximately 8.57 mTOC and the average elevation was 616.34 m. No NAPL was identified in any of the three monitoring wells at the time of monitoring; and
- Concentrations of the measured PAH and dibenzofuran parameters as well as PCP were either below their laboratory MDLs or below their respective guidelines (where applicable). However, detectable concentrations of select dioxin parameters were identified in monitoring well C6 and select dibenzofuran parameters were identified in monitoring wells C1 and C6.

Based on the results of the investigation, there do not appear to be any residual PAH impacts (above guidelines) present within the groundwater at the locations tested. Nichols Environmental has no further recommendations for assessment with regards to the creosote-treated piles within the former reactivator site in Area 2 at this time and as long as the site remains undisturbed. Further assessment may be required in the event of development of this area, as there is documentation that indicates there are PAH-impacted soils present in this area.

8.3 Area 3 - PAHs, Hydrocarbons & Metals: Former Burn Pit

- On October 30, 2014, six boreholes (one of which was completed as a groundwater monitoring well) were advanced to the south of the Watermark Building in order to delineate hydrocarbon, metals, and PAH-impacted soils associated with former burn pits that had historically been utilized by Fire Services. Based on investigations in the early 2000s, the impacts had been confirmed at 2.6 mbg south of the Watermark Building and at 7.6 mbg further to the south of this location. The two areas are believed to be two separate plumes;
- General soil lithology identified clay fill material or a mix of sand, silt, and clay fill materials in five of the six boreholes. Debris such as wood, concrete, and/or brick was identified in these fill materials in three of the six boreholes, at depths ranging from below surface to approximately 5.7 mbg. These fill materials were typically followed by silt containing some clay and some sand, with starting depths ranging from approximately 1.0 to 5.7 mbg and extending to a maximum depth of approximately 7.6 mbg. This silt was followed by a sand and gravel layer, then weathered bedrock;



- Field observations noted a hydrocarbon odour within the clay/sand fill materials of A3: 14-09 from approximately 0.5 to 0.9 mbg and 2.1 to 2.4 mbg, in A3: 14-12 from beneath the asphalt to approximately 4.7 mbg within both a clay fill then silt layer, and in A3: 14-13 at approximately 3.6 mbg within a clay layer. A hydrocarbon odour was also noted in the bedrock sample collected from A3: 14-12, though it is suspected this may be a result of smearing as the auger was pulled to surface;
- Soil samples were submitted based on field screening and observations as well as previously documented depths of impact. A number of PAH parameter concentrations (acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, and benzo(a)anthracene) were identified above guidelines in the submitted samples from all boreholes at depths ranging from 0.5 mbg (A3: 14-08, 14-09 and 14-13) to 10.5 mbg (A3: 14-12). Vertical delineation of PAHs was achieved in two of the boreholes at approximately 2.5 to 3.1 mbg, and the PAHs are believed to be related to the identified fill materials;
- Petroleum hydrocarbon concentrations above guidelines were identified within three of the six boreholes, one of which (A3: 14-12) was advanced within the plume in order to confirm vertical depth of impacts. Based on the analytical results, petroleum hydrocarbon impacts were confirmed at approximately 3.8 mbg, and based on field observations is anticipated to extend to the end of the silt layer at approximately 6.1 mbg. This is further than the previously indicated 2.8 mbg confirmed depth of impacts. The remaining two boreholes were present to the west (A3: 14-11) and south/southeast (A3: 14-13) of the known contaminant plume, the latter of the two being further removed. The location to the west identified impacts within the clay fill at approximately 0.5 mbg and is believed to be restricted to these materials to a depth of approximately 1.6 mbg as based on field observations. The location to the south/southeast identified impacts at approximately 3.8 mbg, with confirmed closure at approximately 5.3 mbg. These impacts were also within a clay fill material that extends to approximately 5.7 mbg at this location;
- Of the metals parameters analyzed, boron concentrations in five boreholes and lead concentrations in one of the boreholes exceeded their applicable guidelines. Based on field observations, the identified boron concentrations may be related to the fill materials. Lead concentrations above guidelines were only identified at approximately 1.0 and 1.5 mbg within A3: 14-12 which was advanced within the known contaminant plume. Lead concentrations above guidelines were delineated at approximately 3.1 mbg;
- On November 20/21, 2014 all accessible monitoring wells within Area 3 were monitored (six total). Of these, only one monitoring well plus the newly installed monitoring well contained enough water for sampling. No NAPL was identified in either of the two monitoring wells at the time of monitoring; and



- Concentrations of manganese, zinc, and chloride were identified above guidelines in the newly installed groundwater monitoring well and TDS in the previously existing well (MW203). All PAH and petroleum hydrocarbon concentrations were below their respective guidelines, where applicable. The identified parameters are not anticipated to be indicative of impacts arising from anthropogenic sources.

Based on the results of the investigation, PAH and petroleum hydrocarbon-impacted soils appear to extend to a confirmed depth of at least 4.5 mbg within the northern contaminant plume, as based on analytical results and field observations in A3: 14-12. The estimated plume of petroleum hydrocarbon impacts is approximately 560 m², based on current and historical investigations. However, closure has not been achieved to the west due to the presence of a utility corridor. The north and south hydrocarbon contaminant plumes do not appear to be connected, as observations and analytical from two of the boreholes advanced to the south of the contaminant plume did not indicate the presence of petroleum hydrocarbons. However, PAH-impacted fill materials were noted, and based on a review of previous borehole logs, similar fill materials may be present further south toward the walking trail that borders this area. The highest concentrations of PAHs were identified within the northern contaminant plume along with notable concentrations of lead, both of which are likely related to the former burning activities.

As discussed in Section 1.1.3, during the course of the assessment further documentation regarding potential petroleum hydrocarbon impacts to the west of the northern contaminant plume was identified, from approximately 1.8 to 4.0 mbg based on field observations. No previous drilling has been conducted within this area. The source of the contamination is unknown at this time, and it is unknown if the identified impacts are related and/or connected to the existing plumes.

The petroleum hydrocarbon parameters identified during this assessment at the location of A3: 14-12 within the known contaminant plume are present in concentrations that would exceed guidelines protective of the DUA, FWAL receptors, vapour inhalation, and/or management limits. Taking this into consideration, remediation of these identified petroleum hydrocarbon impacts in the northern plume would be recommended. In the interim, a soil management plan should also be considered for any activities that may require ground disturbance in this area to ensure that the soils are appropriately managed and measures are in place to protect workers. Consideration should also be given to further investigative drilling in the southwest and southeast corners of this area, where petroleum hydrocarbon impacts were identified in 2010 and through this most recent drilling program, respectively.

With regards to the identified PAHs, the impacts appear to be widespread through fill materials within this area and would primarily pose a risk to FWAL receptors. The elevated PAHs identified near surface in association with the hydrocarbon impacts are likely related to former burn activities, and remediation of this area is recommended. The PAHs at depth within the northern plume may require risk assessment. Due to the widespread nature of the remaining fill materials beyond the



northern plume, consideration could be given to conducting a risk assessment to determine what level of risk the PAHs pose to the applicable receptors, should the soils remain in place.

8.4 Area 4 - TCE: Former Hazardous Materials Storage

In 2010, Thurber had completed a Phase II ESA of the Rossdale Power Generating Station which included the assessment of the former hazardous material storage area south of the former carpenters shop on the Property. The investigation had identified TCE concentrations greater than the applicable guidelines at one location at a depth of approximately 0 to 0.2 mbg in a fine-grained fill material.

In 2013, a test pitting program was subsequently completed by Thurber within this general area in anticipation of construction of a new building. In total, ten test pits were advanced, three of which were within the vicinity of the location where the TCE had been identified. Samples were submitted from these three test pits at approximately 0.1 mbg for testing of VOCs, which did not identify any parameter concentrations above guidelines. However, the test pitting program confirmed that disturbed soils within this area were impacted with PAHs, metals, or petroleum hydrocarbons (one test pit). Based on the result of the assessments completed, Thurber concluded that the materials required for removal for construction of the new building would require disposal through a Class II Landfill and that measures would be required to help manage potential vapour migration and/or recontamination from the surrounding soils.

In discussion with EPCOR, no further documentation was identified regarding disposal of the soils, confirmation testing following removal of the soils, or any mitigation measures. Given the nature of TCE (DNAPL), and that soils from below 0.2 mbg were not tested within this area for TCE, delineation may not have been achieved. It should be confirmed with EPCOR the management strategy that was in place to address the impacted soils within this area during construction activities as well as any mitigation that was put in place.

8.5 Area 5 - PAHs & Metals Across Site

- On October 27, 2014, four boreholes (two of which were completed as a groundwater monitoring wells) were advanced on northern portions of the Property in order to establish background comparison locations as well as to determine if fill materials identified in previous investigations were present extending north. Previous investigations have identified impacted fill materials ranging from surface to 3.8 mbg or greater for metals and from surface to 2.9 mbg for PAHs, though one area was confirmed to have PAH-impacted soil at approximately 7.6 mbg in the vicinity of the Watermark Building (likely associated with historical burn activities);



- Up to four additional drilling locations had been proposed throughout the Property to confirm the presence of fill materials. Based on potential utility conflicts or construction within these areas and documentation identified through the course of the assessment which confirmed the presence of fill materials, these locations were not completed. The one location to the west of the power plant may require assessment at a time that the area is not under construction;
- General soil lithology in the boreholes advanced identified variations of clay, silty clay, and/or silt near surface, extending to a maximum depth of approximately 3.0 mbg. Of these boreholes, wood fragments were noted in A5: 14-03. Beneath these initial layers was a fine-grained, loose, light brown or salt-and-pepper-coloured, dry sand. In the two installed monitoring wells the sand was followed by either a clayey silt layer or silt, then clay. No evidence of fill materials characteristic of previous investigations was identified in any of the four boreholes;
- Fill materials were also identified at other drilling locations advanced on the Property during the course of the Phase II ESA. These included materials in Area 3, where a clay, silt, and/or sand mix of fill materials was identified to a maximum depth of 5.7 mbg, and Area 6, where debris was also encountered in three of the four boreholes at depths ranging from approximately 1.3 to 4.6 mbg;
- Soil samples were submitted based on field screening and observations as well as previously documented depths of fill materials from across the Property, including the submission of select samples from Area 1 for PAH analysis. Of the analyzed samples, anthracene concentrations above guidelines were identified at approximately 1.0 mbg in A1: 14-20, but were delineated at approximately 1.5 mbg. Concentrations of boron above guidelines were also identified in A5: 14-02 and 14-04 at approximately 2.5 and 1.0 mbg, respectively;
- On November 20/21, 2014, the two background monitoring wells installed as a part of the scope of work for Area 5 were monitored and sampled, one of which was determined to have insufficient amounts of water for sampling. No NAPL was identified in either of the two monitoring wells at the time of monitoring; and
- Concentrations of manganese were identified above guidelines in the background monitoring well in Area 5 (A5: 14-01) All other PAH and routine parameter concentrations were below their respective guidelines, where applicable.

Based on the results of the investigation, fill materials do not appear to be widespread in the northern portions of the Property where drilling was conducted. However, it appears to be widespread to variable depths on the southern portion of the Property in association with the water



treatment plant and power plant infrastructure. The provided Figure 6 outlines historical drilling locations where either PAH and/or metals-impacted fill materials have been identified, as well as select locations where just fill materials have been identified through other assessment work discussed in Section 1.1.5.

Given the scope of the potential fill materials on the Property, traditional remediation methods such as excavation would not be cost effective or feasible. Consideration could be given to conducting a risk assessment to determine what level of risk the identified PAHs/metals pose to the applicable receptors. In the interim, a soil management plan should also be considered for any activities that may require ground disturbance where fill materials have been identified to ensure that the soils are appropriately managed.

Potential PAH/metals impacts may also remain present in association with former rail lines adjacent to and/or formerly present on the Property as well as use of any creosote-treated timber piles for the buildings (including the confirmed creosote-treated piles beneath the power plant).

8.6 Area 6 - PAHs & Metals: Pump House #1 and #2

- On November 3, 2014, four boreholes (including two monitoring wells) were advanced between Pump House #1 and #2 to the south of the power plant building in order to delineate the extent of previously identified bottom ash within this area;
- General soil lithology identified a mix of clay, silt, and sand fill layers extending to depths of approximately 6.6 to 7.5 mbg. Within these layers, debris such as brick, masonry, concrete, and glass were noted in three of the four boreholes from depths ranging from 1.3 to 4.6 mbg. A coal or ash-like material containing slag (presumably bottom ash) was identified in one of the boreholes (A6: 14-16) from approximately 2.5 to 4.2 mbg. A sand with a high coal content was also noted in a second borehole (A6: 14-17) from approximately 5.1 to 6.6 mbg. Underlying soils are believed to be native to the area as they consisted of sand or sand/gravel followed by weathered bedrock;
- Soil samples were submitted based on field observations and previously documented depths of impacts. A number of PAH parameter concentrations (anthracene, fluoranthene, naphthalene, phenanthrene, pyrene, and benzo(a)anthracene) were identified above guidelines in the submitted samples from all boreholes at depths ranging from 1.5 mbg (A6: 14-16) to 5.0 mbg (A6: 14-14). Leachate analysis (via SPLP) was completed for select samples, the results for which indicate that there is limited risk associated with PAH parameters leaching from the soil due to precipitation;
- A number of metals parameter concentrations (arsenic, barium, boron, copper, lead, molybdenum, and selenium) were also identified above guidelines in the submitted



samples from all boreholes at depths ranging from 1.5 mbg (A6: 14-16) to 6.5 mbg (A6: 14-17). The elevated concentrations of barium and boron are likely related to the identified high coal content and bottom ash, while the identified debris may be a source of the identified arsenic, copper, and lead in one of the boreholes (A6: 14-16);

- Average depth to groundwater was approximately 10.44 mTOC and the average elevation was 615.54 m. No NAPL was identified in either of the two monitoring wells at the time of monitoring; and
- PAH parameter concentrations (anthracene, fluoranthene, pyrene, benzo(a)anthracene, and benzo(a)pyrene) were identified above guidelines in one or both of the monitoring wells sampled. With regards to metals, the groundwater does not appear to have been impacted.

Based on the results of the investigation, the fill materials identified between the two pump houses appear to have been impacted from former dumping activities in this area of bottom ash and other debris. PAH concentrations in excess of the guidelines were also identified in groundwater samples from both monitoring wells. Removal of the soils within this area would likely not be feasible due to cost, location, and volume for removal. Should the area be remaining undisturbed, consideration could be given to completing a risk assessment to further define the level of risk the identified metals and PAHs pose, should the soils remain in place.

Continued monitoring and sampling of the two installed groundwater monitoring wells are also recommended to document any seasonal fluctuations in the identified concentrations. Further assessment of this area using the 2014 Alberta Tier 2 Guidelines should also be completed due to the close proximity of the identified impacts to the North Saskatchewan River.

8.7 Area 7 - Hydrocarbons: Watermark Building

- On October 28, 2014, three boreholes and associated monitoring wells were installed within the vicinity of a former diesel UST to the east of the Watermark Building. The boreholes/monitoring wells were completed in order to assess current soil and groundwater conditions with respect to petroleum hydrocarbons to confirm if the area has been adequately remediated;
- General soil lithology identified a silt layer with some sand and clay beneath the initial surface layers in all boreholes, which extended to a maximum depth of approximately 7 mbg. Below this layer was gravel to a maximum depth of approximately 11 mbg followed by weathered bedrock. No olfactory or visual evidence of petroleum hydrocarbons was identified within the boreholes advanced;



- Soil samples were submitted based on field vapour readings and previously documented depths of impacts. Petroleum hydrocarbon parameter concentrations were below guidelines in all of the submitted soil samples;
- Average depth to groundwater was approximately 8.61 mTOC and the average elevation was 614.33 m. No NAPL was identified in any of the three monitoring wells at the time of monitoring; and
- Petroleum hydrocarbon parameter concentrations were below guidelines (where applicable) in the groundwater samples that were submitted from each monitoring well.

Based on the results of the investigation, there do not appear to be any residual petroleum hydrocarbon impacts present within the soil or groundwater at the locations tested. Nichols Environmental has no further recommendations for assessment with regards to petroleum hydrocarbons at this time for Area 7, as the remediation work that was completed appears to have been effective.



9.0 REFERENCES

Throughout this project, the following resources were used:

- Abacus Datagraphics Ltd. AbaData:
[http://www.abacusdatagraphics.com/;](http://www.abacusdatagraphics.com/)
- Alberta Environment and Sustainable Resource Development. 2014. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land and Forestry Policy Branch, Policy Division;
- Alberta Environment and Sustainable Resource Development. Alberta Water Well Information Database:
<http://www.environment.alberta.ca/01314.html;>
- Alberta One-Call;
- Dig Shaw;
- EPCOR;
- Google Earth;
- Government of Alberta, Spatial Information System (Spin 2):
[https://alta.registries.gov.ab.ca/spinii/logon.aspx;](https://alta.registries.gov.ab.ca/spinii/logon.aspx)
- Maverick Inspections Ltd.; and
- The City of Edmonton Maps, Zoning Detail:
[http://maps.edmonton.ca/.](http://maps.edmonton.ca/)



10.0 QUALIFICATIONS AND LIMITATIONS

10.1 Qualifications

Mr. Hans Bakker, B.Sc., Geol.I.T., coordinated all aspects of the project, including completion of the field program. [REDACTED]

Mrs. Tawnya Anderson, B.Sc., EP, coordinated all aspects of the project, including completion of the final report and provided project management for the field program [REDACTED]

Mr. Rob Dickie, P.Geol., R.E.T., EP, provided the senior project management and peer review of the entire project. [REDACTED]

10.2 Limitations

In conducting the Phase II Environmental Site Assessment at the Property and in rendering our conclusions on the potential presence or level of contamination, Nichols Environmental (Canada) Ltd. gives the benefit of its best judgment based on its experience and in accordance with generally accepted professional standards for this type of investigation. Our conclusions are limited by the following:

- Nichols Environmental spent only a limited amount of time on the Property. Thus, any activities conducted on the Property following the site inspection that Nichols Environmental is not aware of may have an impact on the conclusions and recommendations presented;
- The sampling areas were limited to the sample locations outlined in Figures 3 through 11; and
- It was not possible to test for all forms of contamination at each and every location in the study areas. Although site-specific locations were used during testing, it is our opinion that the information obtained is representative of the conditions at the time the assessment was conducted.



This report is intended to provide information to reduce, but not necessarily eliminate, uncertainty regarding the potential for contamination of a property. This report has been prepared for the exclusive use of The City of Edmonton for the purpose of assessing the current environmental conditions that may be present at the Property. Any uses which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Nichols Environmental (Canada) Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.




11.0 CLOSURE


We trust this meets with your current requirements. Should you have any questions or concerns, please contact the undersigned at your convenience.

Yours truly,

NICHOLS ENVIRONMENTAL (CANADA) LTD.
APEGA PERMIT TO PRACTICE NO. P6730


Tawnya Anderson, B.Sc., EP
Senior Project Manager

Reviewed by:

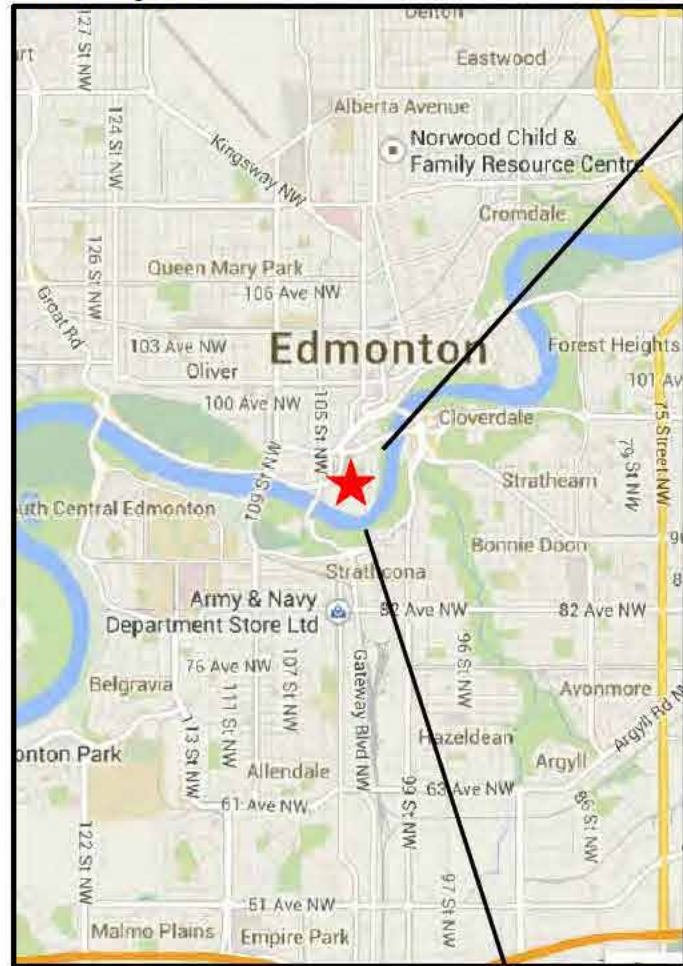

R.W. (Rob) Dickie, P.Geol., R.E.T., EP
President

Distribution

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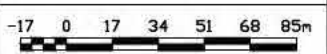
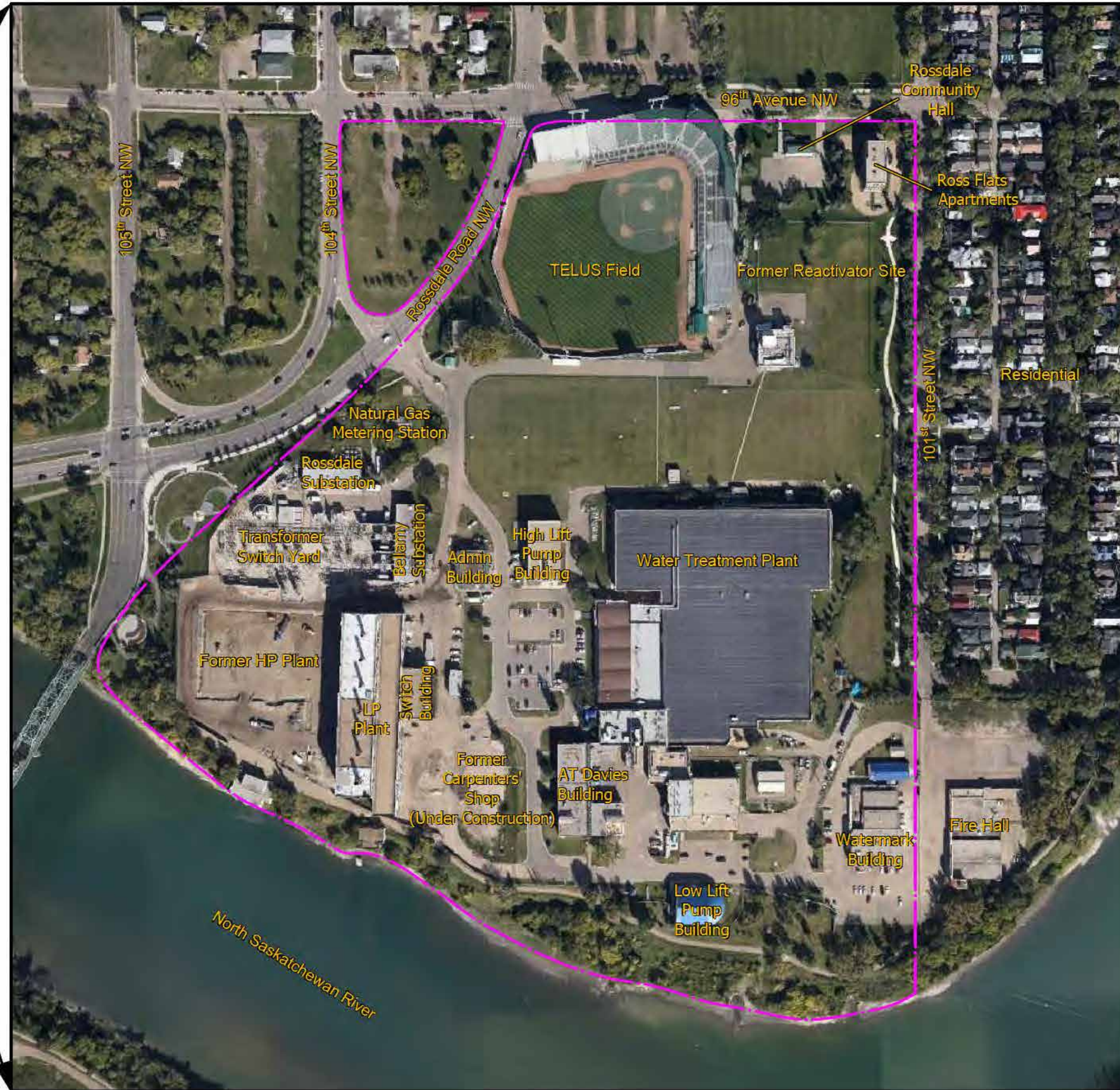
FIGURES

Reference image scale 1:85,000



Legend:

— Approximate Property Boundary



CLIENT
The City of Edmonton

PROJECT
Phase II ESA
9469 Rossdale Road NW &
10155 - 96th Avenue NW
Edmonton, Alberta

DRAWING TITLE
Site Location

BASE/SITE PLAN PROVIDED BY
Nichols Environmental (Canada) Ltd.

REVISION DATE
February 2015

SCALE
1:2,800

APPROVED
TAKK

PROJECT NO.
14-214-CRD

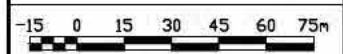
DRAWING NO.
Figure 1

2013 Air Photo Source: Google Earth

J:\2014\14-214-CRD\Drawings\14-214-CRD.dwg Original drawing in colour. Black and white copies may not interpret properly.

Legend:

Old Rail Spur



CLIENT
 The City of Edmonton

PROJECT
 Phase II ESA
 9469 Rosedale Road NW &
 10155 - 96th Avenue NW
 Edmonton, Alberta

DRAWING TITLE
 Areas of Concern

BASE/SITE PLAN PROVIDED BY
 Nichols Environmental (Canada) Ltd.

REVISION DATE
 February 2015

SCALE
 1:2,400

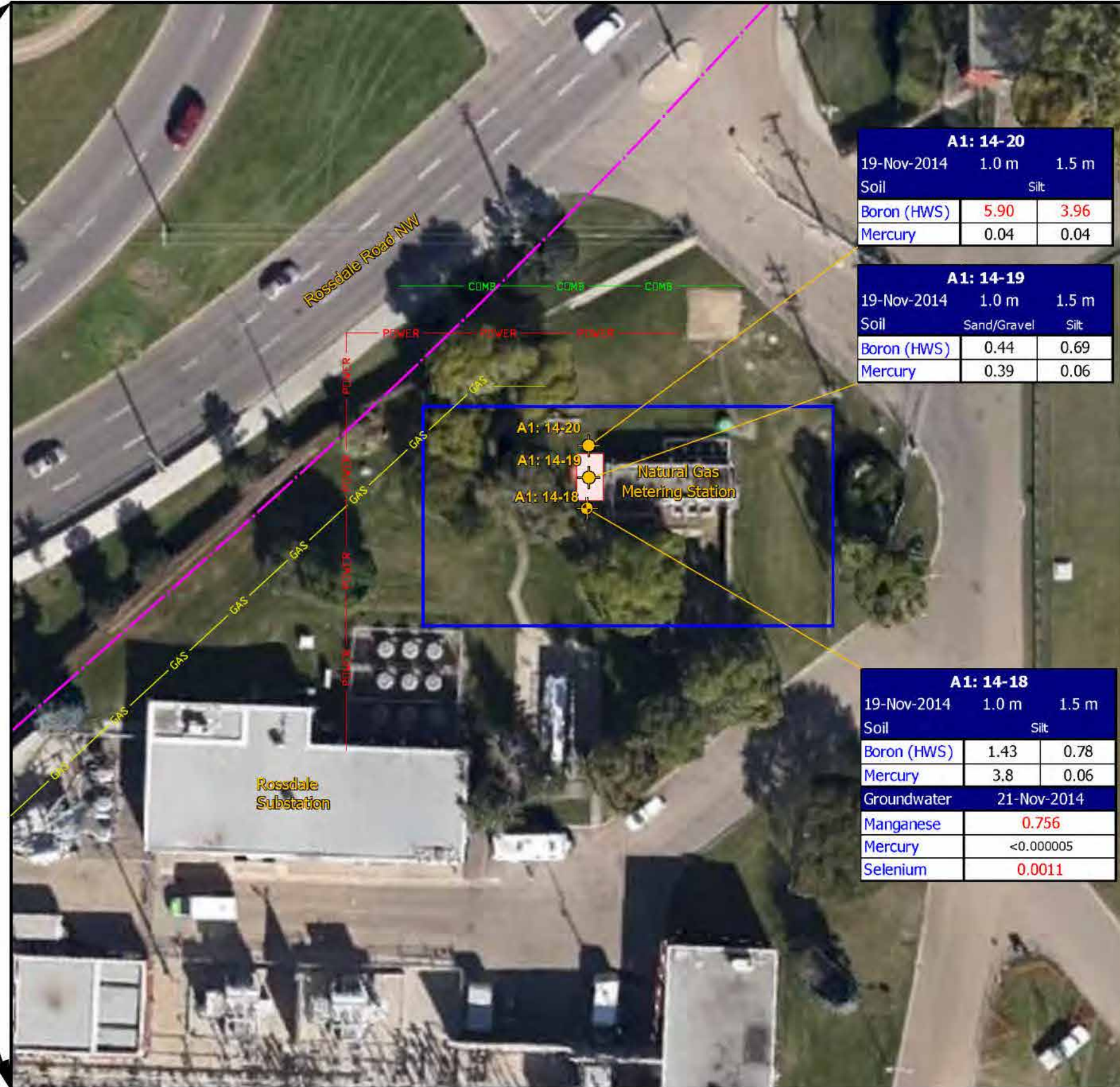
APPROVED
 TAJK

PROJECT NO.
 14-214-CRD

DRAWING NO.
 Figure 2

J:\2014\14-214-CRD\Drawings\14-214-CRD.dwg Original drawing in colour. Black and white copies may not interpret properly.

Reference image scale 1:9,000



- Legend:**
- Approximate Property Boundary
 - Borehole
 - Monitoring Well
 - Former Excavation Approximate Location
 - ATCO Gas Line (Abandoned)
 - Combination Sewer Line
 - Underground Power Duct

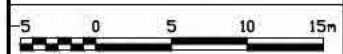
A1: 14-20		
19-Nov-2014	1.0 m	1.5 m
Soil	Silt	
Boron (HWS)	5.90	3.96
Mercury	0.04	0.04

A1: 14-19		
19-Nov-2014	1.0 m	1.5 m
Soil	Sand/Gravel	Silt
Boron (HWS)	0.44	0.69
Mercury	0.39	0.06

A1: 14-18		
19-Nov-2014	1.0 m	1.5 m
Soil	Silt	
Boron (HWS)	1.43	0.78
Mercury	3.8	0.06
Groundwater 21-Nov-2014		
Manganese	0.756	
Mercury	<0.000005	
Selenium	0.0011	



2014 Alberta Tier 1 Guidelines	
Soil	
Boron (HWS)	2
Mercury	6.6
Groundwater	
Manganese	0.05
Mercury	0.000005
Selenium	0.001



PROJECT
Phase II ESA
9469 Rossdale Road NW &
10155 - 96th Avenue NW
Edmonton, Alberta

DRAWING TITLE
Area 1 Detail,
Soil & Groundwater Data

BASE/SITE PLAN PROVIDED BY
Nichols Environmental (Canada) Ltd.

REVISION DATE
February 2015

SCALE 1:500 **APPROVED** TAJ/KK

PROJECT NO.
14-214-CRD

DRAWING NO.
Figure 3

2013 Air Photo Source: Google Earth

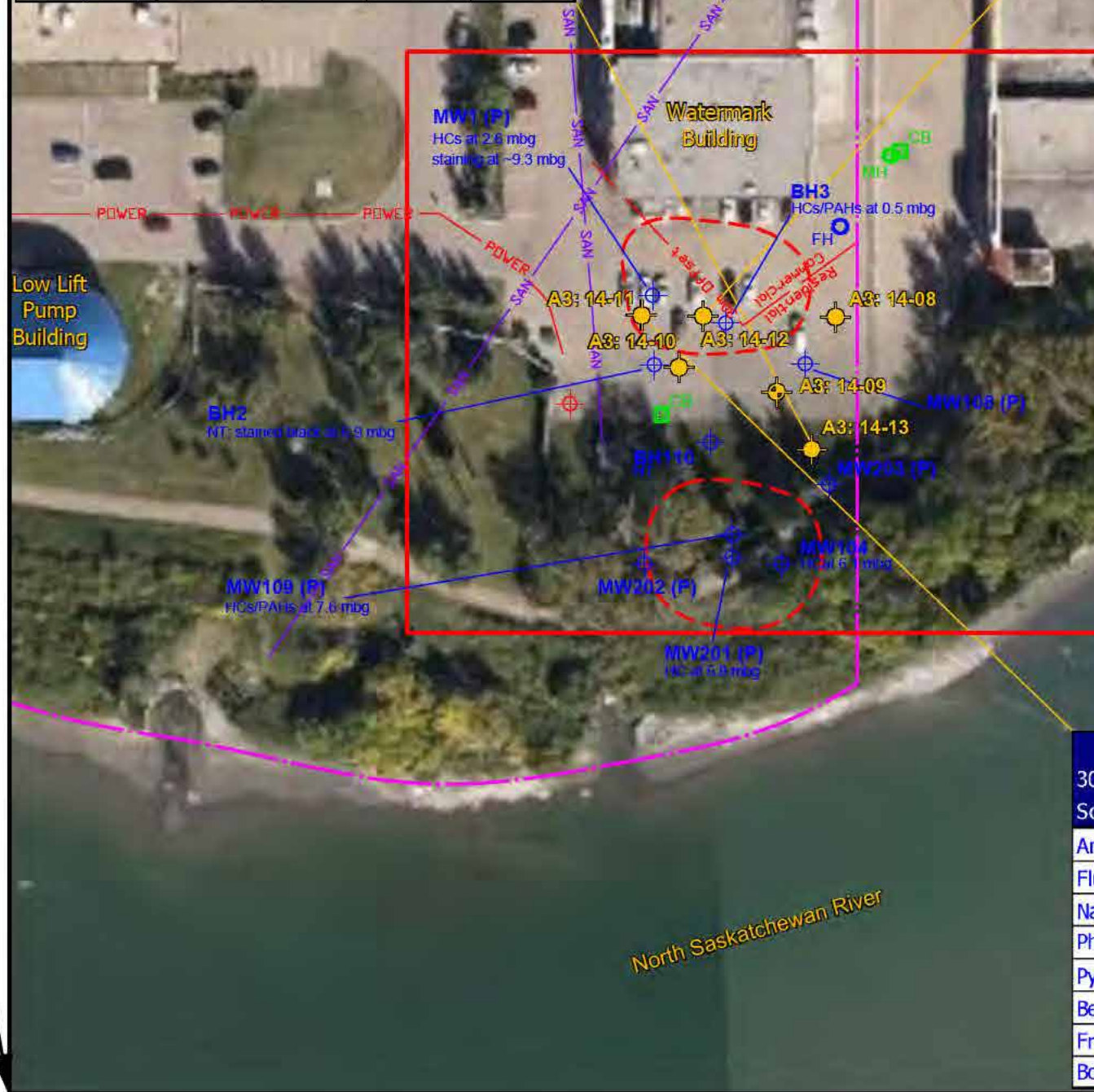
J:\2014\14-214-CRD\Drawings\14-214-CRD.dwg Original drawing in colour. Black and white copies may not interpret properly.

Reference image scale 1:9,000



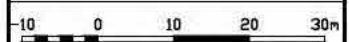
A3: 14-13				
30-Oct-2014	0.5 m	3.8 m	6.1 m	7.5 m
Soil	Clay Fill		Silt & Wood	
Anthracene	0.015	-	0.021	<0.003
Fluoroanthene	0.05	-	0.1	0.02
Naphthalene	<0.010	-	0.069	0.033
Phenanthrene	0.04	-	0.1	0.07
Pyrene	0.06	-	0.1	0.03
Fraction 1	-	38	-	-
Fraction 2	-	278	-	-
Fraction 3	-	10,400	-	-
Boron (HWS)	1.77	-	4.41	-

A3: 14-12						
30-Oct-2014	1.0 m	1.5 m	3.8 m	4.5 m	7.5 m	10.5 m
Soil	Clay Fill		Silt		S/G	Bedrock
Acenaphthene	0.39	0.43	-	0.07	<0.05	0.05
Anthracene	1.41	0.766	-	0.0057	<0.003	0.009
Fluoroanthene	1.28	1.02	-	0.14	<0.01	0.03
Fluorene	1.37	1.36	-	0.16	<0.05	<0.05
Naphthalene	0.957	19.6	-	6.22	0.036	0.858
Phenanthrene	13.3	6.8	-	0.43	<0.01	0.13
Pyrene	10.4	3.56	-	0.22	0.01	0.09
Benzo(a)anth.	1.66	0.65	-	0.08	<0.01	0.02
Toluene	-	-	1.81	-	0.04	0.03
Ethylbenzene	-	-	2.49	-	<0.010	0.033
Xylenes	-	-	28	-	<0.03	0.31
Fraction 1	-	-	1,380	-	<10	32
Fraction 2	-	-	4,540	-	<50	217
Fraction 3	-	-	21,000	-	64	1,500
Fraction 4	-	-	20,000	-	<100	1,250
Boron (HWS)	11.7	3.53	-	1.04	-	-
Lead	309	1,160	-	11.9	-	-



- Legend:**
- Approximate Property Boundary
 - A3: 14-11 Borehole
 - A3: 14-09 Monitoring Well
 - BHA/MW EBA Borehole/Monitoring Well
2001, max install 15.24 mbg (Gravel/Silt/Sand)
(P) indicates well was present and monitored
NT indicated location not previously tested
 - Estimated Plume (Pre-2014 Assessment)
 - Underground Power Line (240 kV)
 - Sanitary Sewer Line
 - CB Catch Basin
 - MH Manhole
 - FH Fire Hydrant
 - Stantec (2010) Geotechnical Borehole

A3: 14-11			
30-Oct-2014	0.5 m	1.0 m	2.0 m
Soil	Clay Fill w/Debris		Silt
Anthracene	-	0.113	0.165
Fluoroanthene	-	0.4	0.54
Naphthalene	-	0.026	0.022
Phenanthrene	-	0.41	0.51
Pyrene	-	0.49	0.49
Benzo(a)anth.	-	0.28	0.33
Fraction 3	1,890	-	-
Boron (HWS)	-	2.98	2.61



CLIENT
 The City of Edmonton

PROJECT
 Phase II ESA
 9469 Rosedale Road NW &
 10155 - 96th Avenue NW
 Edmonton, Alberta

DRAWING TITLE
 Area 3 Detail & Soil Data - PAHs,
 Metals & Hydrocarbons

BASE/SITE PLAN PROVIDED BY
 Nichols Environmental (Canada) Ltd.

REVISION DATE
 February 2015

SCALE
 1:1,000

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 TAU/KK

PROJECT NO.
 14-214-CRD

DRAWING NO.
 Figure 4

2013 Air Photo Source: Google Earth

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Reference image scale 1:9,000



- Legend:**
- Approximate Property Boundary
 - A3: 14-11 Borehole
 - A3: 14-09 Monitoring Well
 - BH/MW EBA Borehole/Monitoring Well
2001, max install 15.24 mbg (Gravel/Silt/Sand)
(P) indicates well was present and monitored
NT indicated location not previously tested
 - Estimated Plume (Pre-2014 Assessment)
 - POWER Underground Power Line (240 kV)
 - SAN Sanitary Sewer Line
 - CB Catch Basin
 - MH Manhole
 - FH Fire Hydrant
 - Stantec (2010) Geotechnical Borehole

A3: 14-10		
30-Oct-2014	1.0 m	1.5 m
Soil		Silt
Anthracene	0.292	0.026
Fluroanthene	0.47	0.1
Naphthalene	0.048	0.057
Phenanthrene	0.28	0.09
Pyrene	0.53	0.09
Benzo(a)anth.	0.292	0.026
Boron (HWS)	1.91	6.11

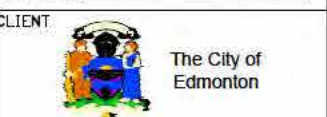
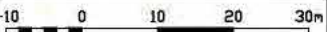
A3: 14-08	
30-Oct-2014	0.5 m
Soil	S/G Fill
Anthracene	0.082
Fluroanthene	0.17
Naphthalene	0.062
Phenanthrene	0.24
Pyrene	0.14

A3: 14-09			
30-Oct-2014	0.5 m	1.0 m	3.1 m
Soil	Clay Fill	Clay Fill	S/G Fill
Anthracene	0.041	0.066	<0.003
Fluroanthene	0.17	0.3	0.01
Naphthalene	0.011	0.042	<0.010
Phenanthrene	0.14	0.23	0.01
Pyrene	0.19	0.29	0.02
Benzo(a)anth.	0.13	<0.05	<0.05
Boron (HWS)	1.22	1.31	8.83
Groundwater	21-Nov-2014		
Manganese	0.548		
Zinc	0.062		
Chloride	159		

MW203	
Groundwater	21-Nov-2014
TDS	540



2014 Alberta Tier 1 Guidelines	
Soil	
Acenaphthene	0.38
Anthracene	0.0056
Fluroanthene	0.039
Fluorene	0.34
Naphthalene	0.017
Phenanthrene	0.061
Pyrene	0.04
Benzo(a)anth.	0.083
Toluene	0.12
Ethylbenzene	0.21
Xylenes (SS)	28/16
Fraction 1 (SS)	440/30
Fraction 2 (SS)	520/160
Fraction 3	1,700/3,500
Fraction 4	10,000
Boron	2
Lead	260
Groundwater	
Manganese	0.05
Zinc	0.03
TDS	500
Chloride	120



PROJECT
Phase II ESA
9469 Rosedale Road NW &
10155 - 96th Avenue NW
Edmonton, Alberta

DRAWING TITLE
Area 3, Detail, Soil &
Groudwater Data - PAHs & Metals

BASE/SITE PLAN PROVIDED BY
Nichols Environmental (Canada) Ltd.

REVISION DATE
February 2015

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PROJECT NO. 14-214-CRD

DRAWING NO. Figure 5

2013 Air Photo Source: Google Earth

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Legend:

-  A5: 14-03 Borehole
-  A5: 14-01 Monitoring Well
-  Old Rail Spur
-  PAH-Impacted Clay Fill Material (2011/2012)
-  Previous Drilling Locations with Fill Material (Approximate)
-  TH97-4 Previous Drilling Locations with Confirmed Impacted Fill Materials
-  POWER Underground Power Duct
-  GAS Gas Line
-  PP Power Pole
-  Fill Material (2014)



A5: 14-02	
27-Oct-2014	2.5 m
Soil	Silt
Boron	2.87

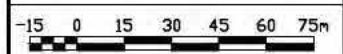
A5: 14-01	
Groundwater	20-Nov-2014
Manganese	0.330

A5: 14-04	
27-Oct-2014	1.0 m
Soil	Silty Clay
Boron	6.11

A1: 14-20	
19-Nov-2014	1.0 m
Soil	Silt
Anthracene	0.007



2014 Alberta Tier 1 Guidelines	
Soil	
Anthracene	0.0056
Boron	2
Groundwater	
Manganese	0.05



CLIENT
 The City of Edmonton

PROJECT
 Phase II ESA
 9469 Rosedale Road NW &
 10155 - 96th Avenue NW
 Edmonton, Alberta

DRAWING TITLE
 Area 5 Detail,
 Locations of Fill Material, and
 Soil & Groundwater Data

BASE/SITE PLAN PROVIDED BY
 Nichols Environmental (Canada) Ltd.

REVISION DATE
 February 2015

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 TAJKK

PROJECT NO.
 14-214-CRD

DRAWING NO.
 Figure 6

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Reference image scale 1:9,000



A6: 14-14			
3-Nov-2014	3.5 m	4.0 m	5.0 m
Soil	Clay Fill		
Anthracene	-	0.078	0.102
Fluroanthene	-	0.31	0.19
Naphthalene	-	0.024	0.027
Phenanthrene	-	0.24	0.24
Pyrene	-	0.29	0.21
Benzo(a)anth.	-	0.16	0.11
pH	7.7	-	8.2
Barium	469	-	325
Boron (HWS)	19.2	-	9.58

A6: 14-15		
3-Nov-2014	3.0 m	6.0 m
Soil	Sand/Debris	Silt
Anthracene	0.153	0.004
Fluroanthene	0.52	0.01
Naphthalene	0.034	<0.010
Phenanthrene	0.39	0.03
Pyrene	0.52	0.02
Benzo(a)anth.	0.26	<0.01
pH	7.4	7.8
Barium	856	702
Boron (HWS)	27.6	33.1

Groundwater 21-Nov-2014	
Anthracene	0.000035
Fluroanthene	0.00009
Pyrene	0.00010
Benzo(a)anth.	0.00006
Benzo(a)pyrene	0.000072
Manganese	0.344

A6: 14-16				
3-Nov-2014	1.5 m	2.0 m	2.5 m	4.5 m
Soil	Sand/Debris	Silt/Debris	Silt/Ash	Silt
Anthracene	0.058	-	0.061	<0.003
Fluroanthene	0.19	-	0.4	<0.01
Naphthalene	0.075	-	0.019	0.019
Phenanthrene	0.17	-	0.15	0.01
Pyrene	0.15	-	0.46	<0.01
Benzo(a)anth.	0.06	-	0.25	<0.01
pH	-	-	7.5	7.8
Arsenic	41	9.8	12.9	5.9
Barium	1,630	654	642	320
Boron (HWS)	17.6	15.4	18.2	29.6
Copper	79.6	31.5	25.8	21.7
Lead	148	43.4	49.8	16.5
Molybdenum	4.5	1.4	1.9	1.0

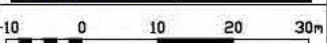
A6: 14-17			
3-Nov-2014	3.5 m	5.5 m	6.5 m
Soil	Silt	Sand/Coal	Coal/Silt
Anthracene	0.012	<0.003	<0.003
Fluroanthene	0.04	0.01	0.01
pH	8.0	6.2	5.7
Barium	320	1,460	1,750
Boron (HWS)	9.56	38	31
Molybdenum	<1.0	8.2	3.8
Selenium	0.4	1.2	0.8
Groundwater 21-Nov-2014			
Pyrene	0.00004		
Benzo(a)pyrene	0.000020		
Manganese	1.29		

- Legend:**
- Approximate Property Boundary
 - Borehole
 - Monitoring Well
 - Thurber Borehole (1992) 8.2 to 10.7 mbg
 - Underground Water Line



2014 Alberta Tier 1 Guidelines

Soil	
Anthracene	0.0056
Fluroanthene	0.039
Naphthalene	0.017
Phenanthrene	0.061
Pyrene	0.04
Benzo(a)anth.	0.083
pH	6 - 8.5
Arsenic	17
Barium	500
Boron (HWS)	2
Copper	63
Lead	140
Molybdenum	4
Selenium	1
Groundwater	
Anthracene	0.000012
Fluroanthene	0.00004
Pyrene	0.000025
Benzo(a)anth.	0.000018
Benzo(a)pyrene	0.000015
Manganese	0.05



CLIENT: The City of Edmonton

PROJECT: Phase II ESA
9469 Rosedale Road NW & 10155 - 96th Avenue NW
Edmonton, Alberta

DRAWING TITLE: Area 6 Detail, Soil & Groundwater Data

BASE/SITE PLAN PROVIDED BY: Nichols Environmental (Canada) Ltd.

REVISION DATE: February 2015

SCALE: 1:1,000 APPROVED: TAU/KK

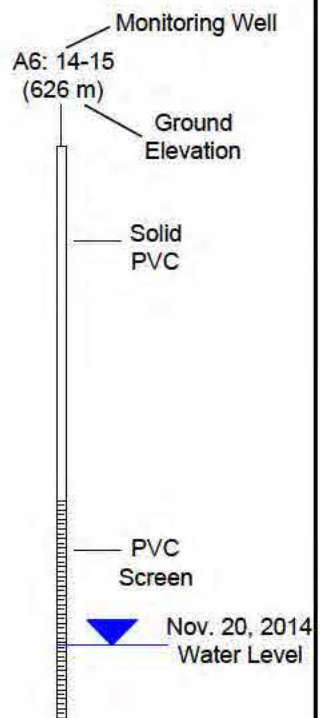
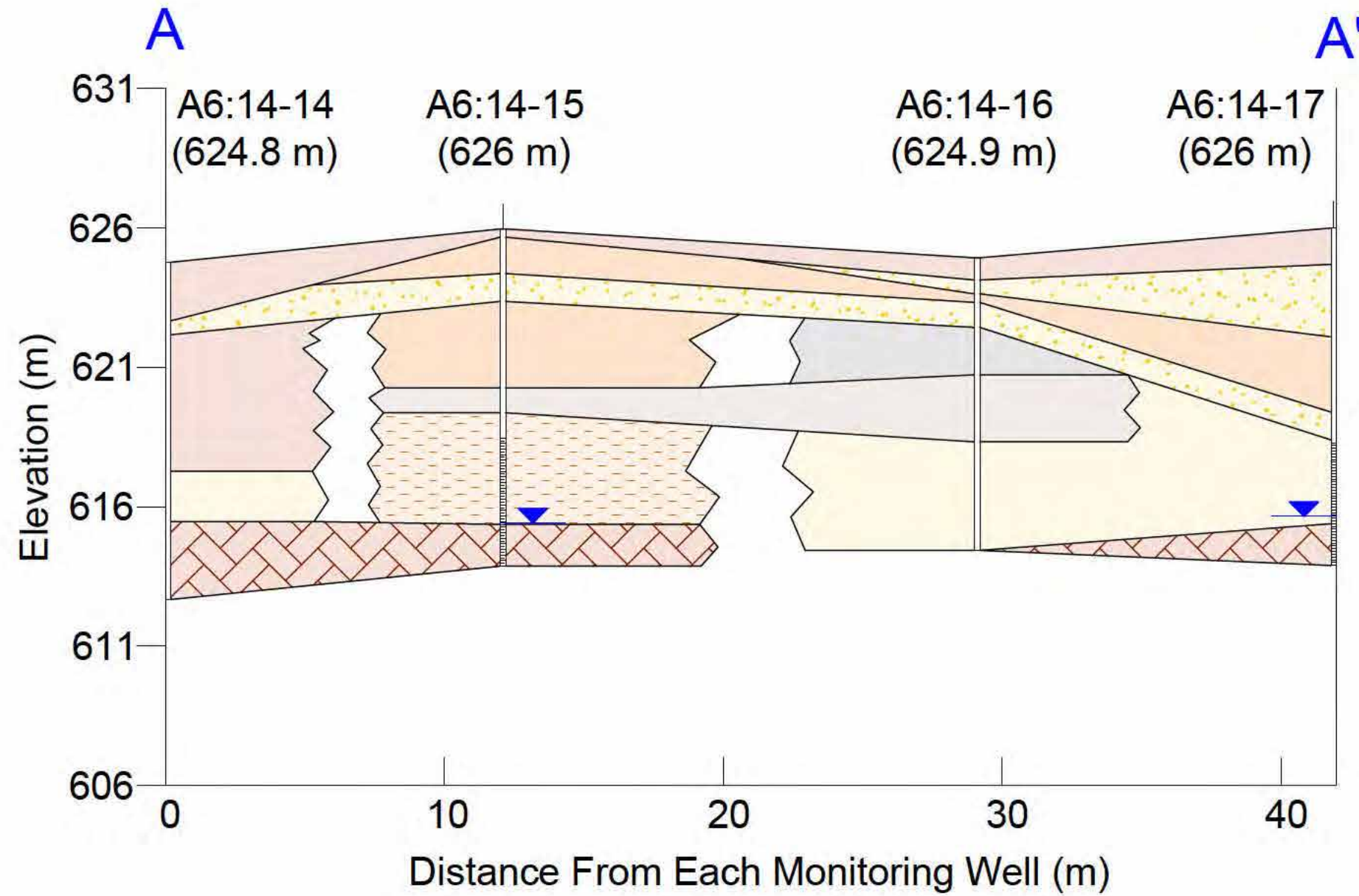
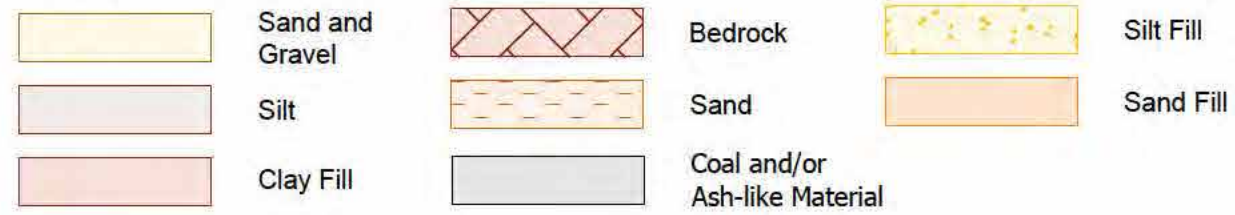
PROJECT NO.: 14-214-CRD

DRAWING NO.: Figure 7

2013 Air Photo Source: Google Earth

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Legend:



CLIENT
 The City of Edmonton

PROJECT
 Phase II ESA
 9469 Rosedale Road NW &
 10155 - 96th Avenue NW
 Edmonton, Alberta

DRAWING TITLE
 Cross-Section A-A'

BASE/SITE PLAN PROVIDED BY
 Nichols Environmental (Canada) Ltd.

REVISION DATE
 February 2015

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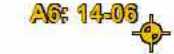



PROJECT NO.
 14-214-CRD

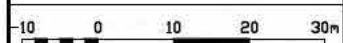
DRAWING NO.
 Figure 8

Reference image scale 1:9,000



Legend:

-  Approximate Property Boundary
-  Monitoring Well
-  Former UST (Approximate Location)
-  Gas Line
-  Sanitary Sewer Line



CLIENT
 The City of Edmonton

PROJECT
Phase II ESA
9469 Rosedale Road NW &
10155 - 96th Avenue NW
Edmonton, Alberta

DRAWING TITLE
Area 7 Detail

BASE/SITE PLAN PROVIDED BY
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REVISION DATE
February 2015

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PROJECT NO.
14-214-CRD

DRAWING NO.
Figure 9

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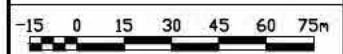
2013 Air Photo Source: Google Earth


Legend:

-  Groundwater Flow Direction
-  Groundwater Contour

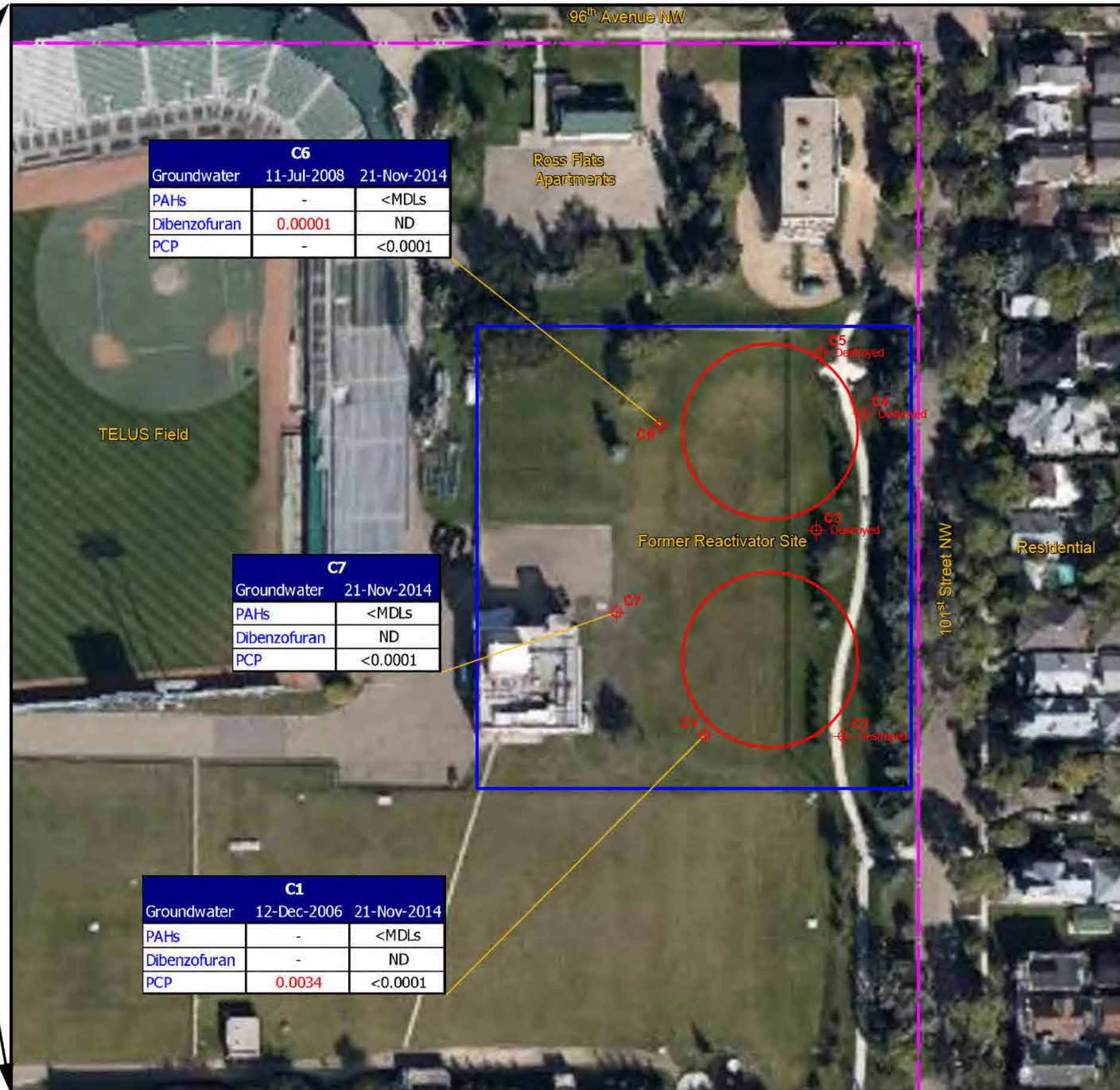


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CLIENT	
 The City of Edmonton	
PROJECT	
Phase II ESA 9469 Rosedale Road NW & 10155 - 96th Avenue NW Edmonton, Alberta	
DRAWING TITLE	
Groundwater Contours & Flow Direction (Entire Site)	
BASE/SITE PLAN PROVIDED BY	
Nichols Environmental (Canada) Ltd.	
REVISION DATE	
February 2015	
SCALE	APPROVED
1:2,400	TAKK
PROJECT NO.	
14-214-CRD	
DRAWING NO.	
Figure 10	

Reference image scale 1:9,000



C6		
Groundwater	11-Jul-2008	21-Nov-2014
PAHs	-	<MDLs
Dibenzofuran	0.00001	ND
PCP	-	<0.0001

C7		
Groundwater	21-Nov-2014	
PAHs	<MDLs	
Dibenzofuran	ND	
PCP	<0.0001	

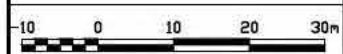
C1		
Groundwater	12-Dec-2006	21-Nov-2014
PAHs	-	<MDLs
Dibenzofuran	-	ND
PCP	0.0034	<0.0001

Legend:

- Approximate Property Boundary
- Approximate Location of Former Reactivator
- EBA Monitoring Well (2004)
Installed to 9.91 mbg (Gravel/Silt/Sand)



2014 Alberta Tier 1 Guidelines	
Groundwater	
PAHs	Varies
Dibenzofuran	1.2E-07
PCP	0.0005



CLIENT
 The City of Edmonton

PROJECT
 Phase II ESA
 9469 Rosedale Road NW &
 10155 - 96th Avenue NW
 Edmonton, Alberta

DRAWING TITLE
 Area 2 Detail and
 Groundwater Data

BASE/SITE PLAN PROVIDED BY
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REVISION DATE
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SCALE: 1:1,000
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PROJECT NO.
 14-214-CRD

DRAWING NO.
 Figure 11

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2013 Air Photo Source: Google Earth

TABLES



TABLE: 1
 TITLE: FIELD ORGANIC VAPOUR CONCENTRATIONS
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Area 1				
Borehole	14-18	14-19	14-20	
Date	19-Nov-2014			
Depth				
0.5	0.9	0.4	0.1	
1.0	0.9*	0.1*	0.1*	
1.5	0.5*	0.3*	ND*	
2.0	0.3	0.6	ND	
2.5	0.1	0.4	ND	
3.0	0.3	0.1	0.5	
3.5	0.4	--	--	
4.0	0.8	--	--	
4.5	0.6	--	--	
5.0	0.4	--	--	
5.5	0.6	--	--	
6.0	1.2	--	--	
6.5	0.4	--	--	
7.0	0.7	--	--	
7.5	1.0	--	--	
8.0	0.4	--	--	
8.5	0.1	--	--	
9.0	0.3	--	--	
9.5	0.5	--	--	
10.0	0.4	--	--	
10.5	NS	--	--	

Area 3							
Borehole	14-08	14-09	14-10	14-11	14-12	14-13	
Date	30-Oct-2014						
Depth							
0.5	4.5*	72.2*	17.8	61.6*	38.7*	43.9*	
1.0	1.8*	81.3*	16.1*	25.4*	381.3*	35.6	
1.5	3.7	6.3	17.8*	13.2	3,156	36.5*	
2.0	5.2*	2.7	19.1*	18.7*	2,377	5.4	
2.5	4.7*	12.0	8.7	17.8	2,812	39.8	
3.0	3.5	7.2*	16.8	11.6	2,079*	45.7	
3.8	3.6	10.4	18.8	20.7	3,662*	229.3*	
4.5	3.6	15.4	16.6	25.5*	3,188*	47.2	
5.3	--	5.9	17.6	19.2	512.4	48.5*	
6.1	--	22.4	20.6*	25.0	205.5	40.9*	
6.8	--	11.4	6.5	16.5	60.6*	31.5	
7.5	--	8.4	8.1	13.4	170.6*	27.0*	
8.3	--	33.1*	18.6	9.3	75.0	9.7	
9.1	--	31.0*	--	12.5	80.7	16.6	
9.8	--	4.5	--	42.7*	97.0	--	
10.5	--	11.7	--	--	311.8*	--	
11.3	--	18.5	--	--	--	--	
12.1	--	13.0	--	--	--	--	

Area 5					
Borehole	14-01	14-02	14-03	14-04	
Date	27-Oct-2014				
Depth					
0.5	5.5	19.3	18.3*	17.8	
1.0	7.0	35.4	33.4*	9.9*	
1.5	7.8*	20.2	15.3	10.3	
2.0	7.9	26.4*	19.7	9.4	
2.5	5.9	25.4*	25.7	12.2	
3.0	6.3	24.8	31.3	38.3*	
3.5	7.7	20.1	30.1	17.3	
4.0	8.3	22.6	26.6	34.4	
4.5	8.9	53.8	29.7	30.2	
5.3	7.9	45.6	--	--	
6.1	8.0	46.5	--	--	
6.8	6.2	40.3	--	--	
7.5	5.1	41.2	--	--	
8.3	15.5	16.7	--	--	
9.1	33.9	14.5	--	--	
9.8	22.2	--	--	--	

Area 6					
Borehole	14-14	14-15	14-16	14-17	
Date	3-Nov-2014				
Depth					
0.5	7.7	40.0	42.5	18.2	
1.0	8.5	32.0	50.4	21.4	
1.5	13.4	35.9	44.8*	21.2	
2.0	13.3	35.3	46.7*	25.4	
2.5	14.4	33.4	50.8*	26.8	
3.0	10.9	31.2*	36.0	32.6	
3.5	19.6*	15.7	22.2	34.2*	
4.0	31.1*	13.8	19.9	33.5	
4.5	NS	7.9	34.3*	25.6	
5.0	14.1*	15.1	43.2	32.8	
5.5	21.1	25.4	49.2	29.2*	
6.0	21.7	25.0*	38.2	27.1	
6.5	NS	8.1*	47.9	26.1*	
7.0	NS	NS	41.2	26.9	
7.5	NS	NS	51.4*	26.4	
8.0	NS	NS	33.2	27.0*	
8.5	17.0	NS	32.3	22.3	
9.0	NS	NS	24.9	35.7	
9.5	32.0	55.4	20.4	25.2	
10.0	32.6	58.6	16.1	19.4	
10.5	36.7	60.5	--	10.6	
11.0	18.9	24.9	--	3.2	
11.5	8.3	34.4	--	7.3	
12.0	NS	33.6	--	15.1	

Area 7				
Borehole	14-05	14-06	14-07	
Date	28-Oct-2014			
Depth				
0.8	15.8	16.6	51.8	
1.5	24.5	12.2	44.2	
2.3	29.3	25.7	50.6*	
3.1	34.7	28.4	21.1	
3.8	34.8*	25.2	38.5	
4.5	30.7	22.4	40.5	
5.3	27.0	28.1	5.2	
6.1	32.8	26.1	7.6	
6.8	20.0	25.7	24.1	
7.5	34.0*	22.8	28.4	
8.3	32.3	34.1*	16.9	
9.1	NS	26.1	20.0	
9.8	8.1	28.9*	30.4	
10.5	8.0	24.2	33.9*	
11.3	4.6	10.9	4.0	
12.1	11.8	13.0	2.4	

(All concentrations in parts per million by volume = ppmv, unless noted)
 Depth = metres below grade (mbg)
 * = Submitted for Laboratory Analysis
 ND = Non-detect (<0.1 ppmv OVC)



Nichols Environmental (Canada) Ltd.

TABLE: 2

TITLE: SOIL ANALYSES - METALS (AREA 1)

PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Depth (m)	SAMPLE IDENTIFICATION						2014 Alberta Tier 1 *				
	14-18		14-19		14-20		Coarse Grained				
	1.0	1.5	1.0	1.5	1.0	1.5	Land Use		Residential / Parkland		
Soil	Silt		Sand/Gravel		Silt						
Sample Date	19-Nov-2014						Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial
OVC	0.9	0.5	0.1	0.3	0.1	ND					
Antimony	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	20	20	20	40	40
Arsenic	4.4	5.8	3.3	6.7	6.4	5.1	17	17	17	26	26
Barium	166	151	104	108	217	129	750	750	500	2,000	2,000
Barite-barium	20.1	18.5	24.7	20.3	21.9	23.8	10,000	10,000	10,000	15,000	140,000
Beryllium	0.5	0.4	0.3	0.4	0.7	0.5	5	5	5	8	8
Boron (HWS)	1.43	0.78	0.44	0.69	5.90	3.96	2	2	2	2	2
Cadmium	0.19	0.17	0.11	0.15	0.27	0.17	3.8	1.4	10	22	22
Chromium (total)	12.4	13.4	6.4	11.5	17.7	12.0	64	64	64	87	87
Cr (VI)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.4	0.4	0.4	1.4	1.4
Cobalt	6.6	8.3	4.9	7.1	10.4	7.4	20	20	20	300	300
Copper	13.1	12.4	6.1	10.2	17.2	10.7	63	63	63	91	91
Lead	25.3	7.6	<5.0	6.4	11.9	7.0	70	70	140	260	600
Mercury (inorganic)	3.8	0.06	0.39	0.06	0.04	0.04	12	6.6	6.6	24	50
Molybdenum	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4	4	4	40	40
Nickel	17.8	20	11.3	17.2	24.6	18.5	50	50	50	50	50
Selenium	0.3	0.3	0.4	<0.3	0.6	<0.3	1	1	1	2.9	2.9
Silver	0.1	0.1	<0.1	0.1	0.2	0.1	20	20	20	40	40
Thallium	0.13	0.15	0.1	0.12	0.18	0.13	1	1	1	1	1
Tin	1.7	1.6	2.2	1.9	1.5	1.8	5	5	5	300	300
Uranium	0.8	0.7	0.6	0.6	0.8	0.6	33	23	23	33	300
Vanadium	21.0	25.2	13.6	21.7	31.5	21.8	130	130	130	130	130
Zinc	49	42	22	35	64	36	200	200	200	360	360

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.

(All concentrations in mg/kg = ppm, unless noted)

Grain size MUST PSA D50 > 75 um	12.7%	A1: 14-19 @ 2.0 m (fine-grained)
Grain size MUST PSA D50 > 75 um	42.6%	A6: 14-14 @ 3.5 m (fine-grained)
Grain size MUST PSA D50 > 75 um	81.3%	A6: 14-16 @ 7.5 m (coarse-grained)
Grain size MUST PSA D50 > 75 um	71.2%	A7:14-05 @ 7.5 m (coarse-grained)

HWS = Hot Water Soluble

OVC = Organic Vapour Concentration (ppmv)

ND = Non-detect (<0.1 ppmv OVC)



TABLE: 3
 TITLE: SOIL ANALYSES - POLYCYCLIC AROMATIC HYDROCARBONS (AREA 3)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Depth (m)	SAMPLE IDENTIFICATION																			2014 Alberta Tier 1 *																								
	14-08		14-09				14-10			14-11			14-12				14-13			Coarse Grained																								
	0.5	2.5	0.5	1.0	3.1	9.0	1.0	1.5	6.1	1.0	2.0	9.8	1.0	1.5	4.5	7.5	10.5	0.5	6.1	7.5	Land Use																							
Soil	S/G Fill	Silt	Clay Fill		Wood Debris	S/G Fill	Silt		Silt/S/G Interface	Clay Fill w/Debris	Silt	S/G	Clay Fill	Silt		S/G	Bedrock	Clay Fill	Silt & Wood Debris	Silt	Residential / Parkland Buffer**																							
Sample Date	30-Oct-2014																			Natural Area					Agricultural					Residential / Parkland					Commercial					Industrial				
OVC	4.5	4.7	72.2	81.3	7.2	31	16.1	17.8	20.6	25.4	18.7	42.7	381.3	3156	3188	170.6	311.8	43.9	40.9	27	IACR < 1.0																							
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.39	0.43	0.07	<0.05	0.05	<0.05	<0.05	<0.05	0.38	0.38	0.38	0.38	0.38																			
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	0.32	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----																			
Anthracene	0.082	<0.003	0.041	0.066	0.003	<0.003	0.292	0.026	<0.003	0.113	0.165	0.005	1.41	0.766	0.0057	<0.003	0.009	0.015	0.021	<0.003	0.0056	0.0056	0.0056	0.0056	0.0056																			
Fluoranthene	0.17	0.01	0.17	0.3	0.02	0.01	0.47	0.1	<0.01	0.4	0.54	0.03	1.28	1.02	0.14	<0.01	0.03	0.05	0.1	0.02	0.039	0.039	0.039	0.039	0.039																			
Fluorene	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	1.37	1.36	0.16	<0.05	<0.05	<0.05	<0.05	<0.05	0.34	0.34	0.34	0.34	0.34																			
Naphthalene	0.062	0.017	0.011	0.042	<0.010	<0.010	0.048	0.057	0.01	0.026	0.022	<0.010	0.957	19.6	6.22	0.036	0.858	<0.010	0.069	0.033	0.017	0.017	0.017	0.017	0.017																			
Phenanthrene	0.24	0.04	0.14	0.23	0.01	0.01	0.28	0.09	0.03	0.41	0.51	0.02	13.3	6.8	0.43	<0.01	0.13	0.04	0.1	0.07	0.061	0.061	0.061	0.061	0.061																			
Pyrene	0.14	0.02	0.19	0.29	0.02	0.02	0.53	0.09	0.01	0.49	0.49	0.04	10.4	3.56	0.22	0.01	0.09	0.06	0.1	0.03	0.040	0.040	0.040	0.040	0.040																			
Carcinogenic PAHs																				IACR < 1.0																								
IACR (Coarse)	0.097	<0.001	0.376	0.526	<0.001	<0.001	1.02	0.101	<0.001	0.799	1.02	0.003	1.08	1.36	0.096	<0.001	0.006	0.045	0.098	0.003																								
IACR (Fine)	0.187	<0.001	0.727	1.02	<0.001	<0.001	1.97	0.194	<0.001	1.54	1.97	0.006	2.08	2.64	0.184	<0.001	0.013	0.086	0.188	0.005																								
Benzo(a)anthracene	0.08	<0.01	0.13	<0.05	<0.05	<0.05	0.292	0.026	<0.003	0.28	0.33	0.01	1.66	0.65	0.08	<0.01	0.02	0.03	0.04	<0.01	0.083	0.083	0.083	0.083	0.083																			
Benzo(a)pyrene	0.06	<0.05	0.12	0.15	<0.05	<0.05	0.25	0.07	<0.05	0.3	0.33	<0.05	0.33	0.64	0.05	<0.05	<0.05	<0.05	0.06	<0.05	0.60	0.60	0.77	0.77	0.77																			
Benzo(b+j)fluoranthene	0.07	<0.05	0.13	0.21	<0.05	<0.05	0.32	0.09	<0.05	0.26	0.3	<0.05	0.37	0.42	0.07	<0.05	<0.05	0.05	0.09	<0.05	6.2	6.2	---	----	-----																			
Benzo(g,h,i)perylene	<0.05	<0.05	0.08	0.1	<0.05	<0.05	0.16	<0.05	<0.05	0.06	0.08	<0.05	0.38	0.36	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----																			
Benzo(k)fluoranthene	<0.05	<0.05	0.06	0.21	<0.05	<0.05	0.18	<0.05	<0.05	0.13	0.18	<0.05	<0.05	0.17	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6.2	6.2	---	----	-----																			
Chrysene	0.07	<0.05	0.17	0.19	<0.05	<0.05	0.26	0.06	<0.05	0.19	0.26	<0.05	1.81	1.32	0.1	<0.05	<0.05	<0.05	0.06	0.05	6.2	6.2	---	----	-----																			
Dibenzo(a,h)anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----																			
Indeno(1,2,3-c,d)pyrene	<0.05	<0.05	0.06	0.11	<0.05	<0.05	0.21	<0.05	<0.05	0.11	0.13	<0.05	0.29	0.24	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----																			

BOLD = Applicable Guideline Criteria
 BOLD = Parameter Exceeds Recommended Guideline Criteria

* Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.
 ** Soil Vapour Inhalation Guideline for Residential / Parkland Land Use Applied for 30-m Buffer (however, no changes)
 (All concentrations in mg/kg = ppm, unless noted)
 Grain size MUST PSA D50 > 75 um 12.7% A1: 14-19 @ 2.0 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 42.6% A6: 14-14 @ 3.5 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 81.3% A6: 14-16 @ 7.5 m (coarse-grained)
 Grain size MUST PSA D50 > 75 um 71.2% A7: 14-05 @ 7.5 m (coarse-grained)

IACR = Index of Additive Cancer Risk
 OVC = Organic Vapour Concentration (ppmv)
 S/G = Sand/Gravel
 --- = No value provided in guidelines



Nichols Environmental (Canada) Ltd.

TABLE: 4
 TITLE: SOIL ANALYSES - PETROLEUM HYDROCARBONS (AREA 3)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

		Coarse Grained	Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 4
2014 Alberta Tier 1*	Natural Area		0.078	0.12	0.21	28	210	150	300	2,800
	Agricultural		0.073	0.12	0.21	12	24	130	300	2,800
	Residential / Parkland		0.073	0.12	0.21	12	24	130	300	2,800
Surface Soil	Commercial		0.078	0.12	0.21	28	270	260	1,700	3,300
	Industrial		0.078	0.12	0.21	28	270	260	1,700	3,300

Surface Soil		Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 4			
Land Use	Commercial	0.078	0.12	0.21	28	270	260	1,700	3,300			
	Residential / Parkland Buffer**	0.073								12	130	
Sample ID	Depth (m)	Soil	Date	OVC								
Area 3												
14-08	2.0	Silt	30-Oct-2014	5.2	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100
14-09	1.0	Clay Fill		81.3	<0.005	<0.02	<0.010	<0.03	<10	<50	281	275
14-10	2.0	Clay Fill		19.1	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100
14-11	0.5	Clay Fill		61.6	<0.005	<0.02	<0.010	<0.03	<10	<50	1,890	1,230

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.
 **Soil Vapour Inhalation Guideline for Residential / Parkland Land Use Applied for 30-m Buffer
 (All concentrations in mg/kg = ppm, unless noted)

Grain size MUST PSA D50 > 75 um 12.7% A1: 14-19 @ 2.0 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 42.6% A6: 14-14 @ 3.5 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 81.3% A6: 14-16 @ 7.5 m (coarse-grained)
 Grain size MUST PSA D50 > 75 um 71.2% A7:14-05 @ 7.5 m (coarse-grained)

Fraction 1 = C₆ to C₁₀ (-BTEX) Fraction 3 = > C₁₆ to C₃₄
 Fraction 2 = > C₁₀ to C₁₆ Fraction 4 = C₃₅+
 OVC = Organic Vapour Concentration (ppmv)



Nichols Environmental (Canada) Ltd.

TABLE: 4
 TITLE: SOIL ANALYSES - PETROLEUM HYDROCARBONS (AREA 3)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

2014 Alberta Tier 1*	Coarse Grained				Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 4
		Natural Area				0.078	0.12	0.21	28	700	520	2,500
	Agricultural				0.078	0.12	0.21	16	30	160	2,500	10,000
	Residential / Parkland				0.078	0.12	0.21	16	30	160	2,500	10,000
Subsoil	Commercial				0.078	0.12	0.21	28	440	520	3,500	10,000
	Industrial				0.078	0.12	0.21	28	440	520	3,500	10,000

Subsoil					Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 4
Land Use					Commercial							
Residential / Parkland Buffer**					0.078	0.12	0.21	28	440	520	3,500	10,000
Sample ID	Depth (m)	Soil	Date	OVC								
Area 3												
14-09	8.3	Sand/Gravel	30-Oct-2014	33.1	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100
14-11	4.5	Silt		25.5	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100
	9.8	Sand/Gravel		42.7	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100
14-12	3.8	Silt		3662	0.045	1.81	2.49	28.0	1,380	4,540	21,000	20,000
	6.8	Sand/Gravel		60.6	<0.005	0.03	<0.010	<0.03	<10	<50	<50	<100
	7.5			170.6	<0.005	0.04	<0.010	<0.03	<10	<50	64	<100
	10.5	Bedrock		311.8	<0.005	0.03	0.033	0.31	32	217	1,500	1,250
14-13	3.8	Clay Fill		229.3	<0.005	<0.02	0.011	0.06	38	278	10,400	5,680
	5.3			48.5	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 3). May 2014.
 **Soil Vapour Inhalation Guideline for Residential / Parkland Land Use Applied for 30-m Buffer
 Ecological Direct Contact Pathway has been excluded for PHC Fractions 1 to 4.
 (All concentrations in mg/kg = ppm, unless noted)

Grain size MUST PSA D50 > 75 um	12.7%	A1: 14-19 @ 2 0 m	(fine-grained)
Grain size MUST PSA D50 > 75 um	42.6%	A6: 14-14 @ 3 5 m	(fine-grained)
Grain size MUST PSA D50 > 75 um	81.3%	A6: 14-16 @ 7 5 m	(coarse-grained)
Grain size MUST PSA D50 > 75 um	71.2%	A7:14-05 @ 7 5 m	(coarse-grained)

Fraction 1 = C₆ to C₁₀ (-BTEX) Fraction 3 = > C₁₆ to C₃₄
 Fraction 2 = > C₁₀ to C₁₆ Fraction 4 = C₃₅+
 OVC = Organic Vapour Concentration (ppmv)



TABLE: 5
 TITLE: SOIL ANALYSES - METALS (AREA 3)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Depth (m)	SAMPLE IDENTIFICATION																	2014 Alberta Tier 1 *				
	14-08			14-09			14-10		14-11		14-12				14-13			Coarse Grained				
	0.5	1.0	2.5	0.5	1.0	3.1	1.0	1.5	1.0	2.0	1.0	1.5	3.1	4.5	0.5	1.5	6.1	Commercial				
Soil	S/G Fill		Silt	Clay Fill		Wood Debris	Silt		Clay Fill w/Debris	Silt	Clay Fill	Silt			Clay Fill		Silt & Wood Debris	Residential / Parkland Buffer**				
Sample Date	30-Oct-2014																					
OVC	4.5	1.8	4.7	72.2	81.3	7.2	16.1	17.8	25.4	18.7	381.3	3,156	2,079	3,188	43.9	36.5	40.9	Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial
Antimony	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	20	20	20	40	40
Arsenic	4	6.5	5.8	3.1	4.1	5.1	5.2	7.1	6.4	5.4	5.3	5	5.7	5.6	5.6	5.0	5.3	17	17	17	26	26
Barium	221	168	227	146	248	209	368	261	284	255	507	557	248	222	257	172	250	750	750	500	2,000	2,000
Barite-barium	21.6	18.8	23.5	37.5	37.7	17.2	34.8	53.1	29.4	26.4	105	183	75.8	62.7	32.0	20.1	49.7	10,000	10,000	10,000	15,000	140,000
Beryllium	0.8	0.6	0.5	0.4	0.5	0.7	0.6	0.6	0.6	0.6	0.7	0.5	0.5	0.5	0.6	0.5	0.6	5	5	5	8	8
Boron (HWS)	0.91	1.14	0.42	1.22	1.31	8.83	1.91	6.11	2.98	2.61	11.7	3.53	1.34	1.04	1.77	1.51	4.41	2	2	2	2	2
Cadmium	0.18	0.17	0.31	0.39	0.39	0.22	0.43	0.25	0.25	0.21	0.66	1.83	0.27	0.22	0.25	0.15	0.23	3.8	1.4	10	22	22
Chromium (total)	15.5	23.1	17.3	10.8	11.1	16.6	14.3	14.9	19	13.4	14.9	14.6	16.4	14.7	18.9	13.9	14.7	64	64	64	87	87
Cr (VI)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.4	0.4	0.4	1.4	1.4
Cobalt	7.6	7.6	9	5.3	5.4	9.5	7.3	9	10.1	7.8	8.2	7.9	8.8	8.4	8.3	7.4	8.6	20	20	20	300	300
Copper	19	15.5	15.6	21.8	19.7	34.4	26.1	16.7	23	16.6	26.8	36.8	17.2	16.3	19.5	11.3	18.7	63	63	63	91	91
Lead	6.3	12.3	7.9	160	154	29.3	87.5	13.2	25.4	16.1	309	1,160	16.3	11.9	222	12.1	10.2	70	70	140	260	600
Mercury (inorganic)	0.06	0.02	0.03	0.05	0.09	0.03	0.09	0.04	0.23	0.03	0.3	0.05	0.04	0.04	0.04	0.03	0.05	12	6.6	6.6	24	50
Molybdenum	1.2	1.2	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	2.2	<1.0	2.3	1.2	1.0	<1.0	1.7	<1.0	<1.0	4	4	4	40	40
Nickel	29.5	26.5	23.7	16	21.4	24.4	22.3	24.5	24.3	21.2	24.2	23	23.5	23	23	20.1	23.9	50	50	50	50	50
Selenium	0.9	0.5	0.4	<0.3	<0.3	0.4	0.4	0.3	0.4	<0.3	0.4	<0.3	<0.3	0.3	0.4	0.3	<0.3	1	1	1	2.9	2.9
Silver	0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.2	<0.1	<0.1	0.1	<0.1	20	20	20	40	40
Thallium	0.17	0.12	0.17	0.11	0.09	0.2	0.17	0.17	0.2	0.16	0.17	0.16	0.19	0.17	0.15	0.13	0.16	1	1	1	1	1
Tin	2	2	1.5	2.1	2.7	1.3	1.9	1.5	1.8	1.7	2.1	2	1.8	1.5	1.7	1.7	1.5	5	5	5	300	300
Uranium	1.4	1.2	0.9	0.6	0.7	0.9	1.1	1	1.1	1	1.1	0.8	0.8	0.8	0.9	0.5	0.9	33	23	23	33	300
Vanadium	26.3	29	27	18.9	18.8	30.5	24.6	26.5	26.5	23.3	24.2	24.8	26.8	25.7	25.5	23.8	26	130	130	130	130	130
Zinc	43	42	60	57	62	62	106	61	65	49	123	138	60	50	64	46	56	200	200	200	360	360

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.
 **Soil Vapour Inhalation Guideline for Residential / Parkland Land Use Applied for 30-m Buffer (however, receptor not active for metals)
 (All concentrations in mg/kg = ppm, unless noted)
 Grain size MUST PSA D50 > 75 um 12.7% A1: 14-19 @ 2.0 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 42.6% A6: 14-14 @ 3.5 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 81.3% A6: 14-16 @ 7.5 m (coarse-grained)
 Grain size MUST PSA D50 > 75 um 71.2% A7:14-05 @ 7.5 m (coarse-grained)

HWS = Hot Water Soluble
 OVC = Organic Vapour Concentration (ppmv)
 S/G = Sand/Gravel



Nichols Environmental (Canada) Ltd.

TABLE: 6
 TITLE: SOIL ANALYSES - POLYCYCLIC AROMATIC HYDROCARBONS (AREAS 1 & 5)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

	SAMPLE IDENTIFICATION								2014 Alberta Tier 1 *								
	14-18				14-19				14-20				Coarse Grained				
	14-01	14-02	14-03	14-04	14-01	14-02	14-03	14-04	Land Use		Residential / Parkland						
Depth (m)	1.5	1.0	1.0	1.5	1.5	2.0	1.0	3.0									
Soil	Silt	Sand/Gravel	Silt		Silt	Silt	Silt	Silt									
Sample Date	19-Nov-2014				27-Oct-2014				Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial				
OVC	0.5	0.1	0.1	ND	7.8	26.4	33.4	38.3									
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.38	0.38	0.38	0.38	0.38				
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----				
Anthracene	<0.003	<0.003	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	0.0056	0.0056	0.0056	0.0056	0.0056				
Fluoranthene	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.039	0.039	0.039	0.039	0.039				
Fluorene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.34	0.34	0.34	0.34	0.34				
Naphthalene	0.01	<0.010	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	0.017	0.017	0.017	0.017	0.017				
Phenanthrene	0.03	<0.01	0.03	0.01	0.02	0.02	0.02	0.02	0.061	0.061	0.061	0.061	0.061				
Pyrene	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.040	0.040	0.040	0.040	0.040				
Carcinogenic PAHs									IACR < 1.0								
IACR (Coarse)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001									
IACR (Fine)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001									
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.083	0.083	0.083	0.083	0.083				
Benzo(a)pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.60	0.60	0.77	0.77	0.77				
Benzo(b+j)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6.2	6.2	---	----	-----				
Benzo(g,h,i)perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----				
Benzo(k)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6.2	6.2	---	----	-----				
Chrysene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6.2	6.2	---	----	-----				
Dibenzo(a,h)anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----				
Indeno(1,2,3-c,d)pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----				

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.
 (All concentrations in mg/kg = ppm, unless noted)
 Grain size MUST PSA D50 > 75 um 12.7% A1: 14-19 @ 2.0 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 42.6% A6: 14-14 @ 3.5 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 81.3% A6: 14-16 @ 7.5 m (coarse-grained)
 Grain size MUST PSA D50 > 75 um 71.2% A7: 14-05 @ 7.5 m (coarse-grained)

IACR = Index of Additive Cancer Risk
 OVC = Organic Vapour Concentration (ppmv)
 --- = No value provided in guidelines



Nichols Environmental (Canada) Ltd.

TABLE: 7
 TITLE: SOIL ANALYSES - METALS (AREA 5)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Depth (m) Soil	SAMPLE IDENTIFICATION				2014 Alberta Tier 1 *				
	14-01	14-02	14-03	14-04	Coarse Grained				
	1.5	2.5	0.5	1.0	Land Use		Residential / Parkland		
Sample Date	27-Oct-2014				Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial
OVC	7.8	25.4	18.3	9.8					
Antimony	<0.2	<0.2	<0.2	<0.2	20	20	20	40	40
Arsenic	5.5	5.5	6.9	6.3	17	17	17	26	26
Barium	194	198	189	328	750	750	500	2,000	2,000
Barite-barium	5.3	17.7	6.2	31.9	10,000	10,000	10,000	15,000	140,000
Beryllium	0.4	0.4	0.6	0.8	5	5	5	8	8
Boron (HWS)	0.7	2.87	1.87	6.11	2	2	2	2	2
Cadmium	0.18	0.22	0.13	0.25	3.8	1.4	10	22	22
Chromium (total)	15.4	14.8	18.7	20.4	64	64	64	87	87
Cr (VI)	<0.10	<0.10	<0.10	<0.10	0.4	0.4	0.4	1.4	1.4
Cobalt	8.2	7.8	10.4	11.9	20	20	20	300	300
Copper	18.4	17.2	20.6	23.9	63	63	63	91	91
Lead	7.7	7.5	9.6	11.9	70	70	140	260	600
Mercury (inorganic)	0.03	0.03	0.06	0.04	12	6.6	6.6	24	50
Molybdenum	<1.0	<1.0	<1.0	<1.0	4	4	4	40	40
Nickel	23.4	21.7	33.4	34.8	50	50	50	50	50
Selenium	0.3	<0.3	0.4	0.4	1	1	1	2.9	2.9
Silver	<0.1	<0.1	<0.1	<0.1	20	20	20	40	40
Thallium	0.16	0.15	0.2	0.25	1	1	1	1	1
Tin	1.8	1.7	1.7	1.4	5	5	5	300	300
Uranium	0.7	0.6	0.7	0.6	33	23	23	33	300
Vanadium	24	25.8	31.4	36.1	130	130	130	130	130
Zinc	45	44	51	75	200	200	200	360	360

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.
 (All concentrations in mg/kg = ppm, unless noted)

Grain size MUST PSA D50 > 75 um	12.7%	A1: 14-19 @ 2.0 m (fine-grained)
Grain size MUST PSA D50 > 75 um	42.6%	A6: 14-14 @ 3.5 m (fine-grained)
Grain size MUST PSA D50 > 75 um	81.3%	A6: 14-16 @ 7.5 m (coarse-grained)
Grain size MUST PSA D50 > 75 um	71.2%	A7: 14-05 @ 7.5 m (coarse-grained)

HWS = Hot Water Soluble
 OVC = Organic Vapour Concentration (ppmv)



TABLE: 8

TITLE: SOIL ANALYSES - POLYCYCLIC AROMATIC HYDROCARBONS (AREA 6)

PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Depth (m) Soil Sample Date OVC	SAMPLE IDENTIFICATION											2014 Alberta Tier 1 *				
	14-14		14-15		14-16				14-17			Coarse Grained				
	4.0 Clay Fill	5.0 Clay Fill	3.0 Sand/Debris	6.0 Silt	1.5 Sand/Debris	2.5 Silt/Ash	4.5 Silt	7.5 Sand/Gravel	3.5 Silt	5.5 Sand/Coal	6.5 Coal/Silt	Land Use		Residential / Parkland		
	3-Nov-2014											Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial
	31.1	14.1	31.2	25.0	44.8	50.8	34.3	51.4	34.2	29.2	26.1					
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.38	0.38	0.38	0.38	0.38
Acenaphthylene	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----
Anthracene	0.078	0.102	0.153	0.004	0.058	0.061	<0.003	<0.003	0.012	<0.003	<0.003	0.0056	0.0056	0.0056	0.0056	0.0056
Fluoranthene	0.31	0.19	0.52	0.01	0.19	0.4	<0.01	<0.01	0.04	0.01	0.01	0.039	0.039	0.039	0.039	0.039
Fluorene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.34	0.34	0.34	0.34	0.34
Naphthalene	0.024	0.027	0.034	<0.010	0.075	0.019	0.019	<0.010	0.015	0.015	0.013	0.017	0.017	0.017	0.017	0.017
Phenanthrene	0.24	0.24	0.39	0.03	0.17	0.15	0.01	<0.01	0.06	0.03	0.03	0.061	0.061	0.061	0.061	0.061
Pyrene	0.29	0.21	0.52	0.02	0.15	0.46	<0.01	<0.01	0.04	0.01	0.01	0.040	0.040	0.040	0.040	0.040
Carcinogenic PAHs																
IACR (Coarse)	0.64	0.464	0.849	<0.001	0.088	0.933	<0.001	<0.001	0.042	<0.001	<0.001	IACR < 1.0				
IACR (Fine)	1.23	0.896	1.64	<0.001	0.168	1.8	<0.001	<0.001	0.08	<0.001	<0.001					
Benzo(a)anthracene	0.16	0.11	0.26	<0.01	0.06	0.25	<0.01	<0.01	0.02	<0.01	<0.01	0.083	0.083	0.083	0.083	0.083
Benzo(a)pyrene	0.15	0.14	0.21	<0.05	<0.05	0.24	<0.05	<0.05	<0.05	<0.05	<0.05	0.60	0.60	0.77	0.77	0.77
Benzo(b+j)fluoranthene	0.2	0.12	0.28	<0.05	0.09	0.34	<0.05	<0.05	0.05	<0.05	<0.05	6.2	6.2	---	----	-----
Benzo(g,h,i)perylene	0.07	0.08	0.09	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----
Benzo(k)fluoranthene	0.12	0.09	0.15	<0.05	<0.05	0.16	<0.05	<0.05	<0.05	<0.05	<0.05	6.2	6.2	---	----	-----
Chrysene	0.18	0.12	0.25	<0.05	0.09	0.27	<0.05	<0.05	<0.05	<0.05	<0.05	6.2	6.2	---	----	-----
Dibenzo(a,h)anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----
Indeno(1,2,3-c,d)pyrene	0.08	0.08	0.11	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	-	--	---	----	-----

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.
 (All concentrations in mg/kg = ppm, unless noted)
 Grain size MUST PSA D50 > 75 um 42.6% A6: 14-14 @ 3.5 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 81.3% A6: 14-16 @ 7.5 m (coarse-grained)

IACR = Index of Additive Cancer Risk
 OVC = Organic Vapour Concentration (ppmv)
 -- = No value provided in guidelines



Nichols Environmental (Canada) Ltd.

TABLE: 9
 TITLE: LEACHATE ANALYSES - POLYCYCLIC AROMATIC HYDROCARBONS (AREA 6)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Location	SAMPLE IDENTIFICATION				2014 EQGSW*		
	14-14	14-15	14-16	14-17	Land Use:	Protection of Aquatic Life (PAL)	
	4.0	3.0	2.5	3.5	PAL	Agricultural: Irrigation	Agricultural: Livestock
Depth (m)	Clay Fill	Sand/Debris	Silt/Ash	Silt			
Sample Date	3-Nov-2014						
Acenaphthene	<0.0001	<0.0001	<0.0001	<0.0001	0.0058	---	----
Acenaphthylene	<0.0001	<0.0001	<0.0001	<0.0001	--	---	----
Acridine	<0.0001	<0.0001	<0.0001	<0.0001	0.0044	---	----
Anthracene	<0.000005	<0.000005	<0.000005	<0.000005	0.000012	---	----
Fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	0.00004	---	----
Fluorene	<0.0001	<0.0001	<0.0001	<0.0001	0.003	---	----
Naphthalene	<0.0001	<0.0001	<0.0001	<0.0001	0.001	---	----
Phenanthrene	<0.0001	<0.0001	<0.0001	<0.0001	0.0004	---	----
Pyrene	<0.00001	<0.00001	<0.00001	0.00001	0.000025	---	----
Carcinogenic PAHs (as B(a)P TPE)	<0.00001	<0.00001	<0.00001	<0.00001	--	---	----
Benzo(a)anthracene	<0.00001	<0.00001	<0.00001	<0.00001	0.000018	---	----
Benzo(a)pyrene	<0.000008	<0.000008	<0.000008	<0.000008	0.000015	---	----
Benzo(b+j)fluoranthene	<0.0001	<0.0001	<0.0001	<0.0001	--	---	----
Benzo(g,h,i)perylene	<0.00005	<0.00005	<0.00005	<0.00005	--	---	----
Benzo(k)fluoranthene	<0.0001	<0.0001	<0.0001	<0.0001	--	---	----
Chrysene	<0.0001	<0.0001	<0.0001	<0.0001	--	---	----
Dibenzo(a,h)anthracene	<0.00005	<0.00005	<0.00005	<0.00005	--	---	----
Indeno(1,2,3-c,d)pyrene	<0.00005	<0.00005	<0.00005	<0.00005	--	---	----
Quinoline	<0.0003	<0.0003	<0.0003	<0.0003	0.0034	---	----

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Environmental Quality Guidelines for Alberta Surface Waters (July 2014)
 (All concentrations in mg/L = ppm, unless noted)

--- = No value provided in guidelines



TABLE: 10
 TITLE: SOIL ANALYSES - METALS (AREA 6)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Depth (m)	2014 Alberta Tier 1 *												Coarse Grained					
	14-14		14-15			14-16				14-17				Land Use				
Soil	3.5	5.0	3.0	6.0	6.5	1.5	2.0	2.5	4.5	3.5	5.5	6.5	8.0	Residential / Parkland				
Sample Date	3-Nov-2014													Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial
OVC	19.6	14.1	31.2	25	8.1	44.8	46.7	50.8	34.3	34.2	29.2	26.1	27.0					
pH	7.7	8.2	7.4	7.8	NM	NM	NM	7.5	7.8	8.0	6.2	5.7	NM	6 - 8.5				
Antimony	<0.2	<0.2	0.2	<0.2	<0.2	0.7	<0.2	0.2	<0.2	<0.2	0.3	0.3	<0.2	20	20	20	40	40
Arsenic	6.8	7	9.7	9	5.3	41	9.8	12.9	5.9	6.8	4.9	5.2	5.5	17	17	17	26	26
Barium	469	325	856	702	284	1,630	654	642	320	320	1,460	1,750	387	750	750	500	2,000	2,000
Barite-barium	6.2	12	4.2	4.2	18.8	31.2	24.5	3.8	9.7	28.2	16.2	7.7	33.9	10,000	10,000	10,000	15,000	140,000
Beryllium	1	0.8	1.4	1.3	0.7	2.8	1.2	1.2	0.7	0.7	2.2	2.6	0.7	5	5	5	8	8
Boron (HWS)	19.2	9.58	27.6	33.1	11.6	17.6	15.4	18.2	29.6	9.56	37.5	30.9	3.42	2	2	2	2	2
Cadmium	0.26	0.3	0.33	0.33	0.16	3.16	0.60	0.42	0.25	0.29	0.09	0.11	0.16	3.8	1.4	10	22	22
Chromium (total)	15.3	19.2	13.8	16	13.8	19.2	17.2	13.7	14.9	17.5	4.7	5	11.1	64	64	64	87	87
Cr (VI)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.4	0.4	0.4	1.4	1.4
Cobalt	9.5	10.3	9.1	10.6	7.5	11.7	8.9	9.3	8.9	10	5.6	6.5	6.6	20	20	20	300	300
Copper	29.7	23.5	54.2	21.8	12.8	79.6	31.5	25.8	21.7	20.7	12	13.9	11.9	63	63	63	91	91
Lead	28.7	13.5	34.2	16.3	7.1	148	43.4	49.8	16.5	18.3	7.5	8.4	<4.9	70	70	140	260	600
Mercury (inorganic)	0.39	0.11	0.27	0.09	0.06	1.15	1.07	0.5	0.08	0.06	0.06	0.06	0.02	12	6.6	6.6	24	50
Molybdenum	1.1	1.0	1.5	2.5	1.1	4.5	1.4	1.9	1.1	<1.0	8.2	3.8	1.4	4	4	4	40	40
Nickel	25.9	28.4	25	26.4	28.1	38.2	40.0	26.2	23.5	28.9	17.4	18.6	27.9	50	50	50	50	50
Selenium	0.5	0.4	0.4	0.5	<0.3	0.7	0.5	0.6	0.3	0.4	1.2	0.8	<0.3	1	1	1	2.9	2.9
Silver	0.1	0.1	0.2	0.2	0.1	0.8	0.2	0.2	0.1	0.2	0.2	0.3	<0.1	20	20	20	40	40
Thallium	0.23	0.25	0.27	0.26	0.15	0.97	0.26	0.29	0.19	0.24	0.17	0.17	0.11	1	1	1	1	1
Tin	1.1	1.1	1.4	1.2	2.2	2.4	2.0	1.4	1.1	<1.0	2.3	2.3	3.1	5	5	5	300	300
Uranium	1.1	1	1.6	1.5	1.0	3.2	1.4	1.3	0.9	0.9	4.9	4.7	1.0	33	23	23	33	300
Vanadium	27.7	32.3	27.3	31.5	23.1	34.2	26.7	26.9	25.7	30.4	17	19.7	26.4	130	130	130	130	130
Zinc	72	73	88	67	41	147	73	69	53	74	11	13	27	200	200	200	360	360

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.
 (All concentrations in mg/kg = ppm, unless noted)
 Grain size MUST PSA D50 > 75 um 42.6% A6: 14-14 @ 3.5 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 81.3% A6: 14-16 @ 7.5 m (coarse-grained)

HWS = Hot Water Soluble
 OVC = Organic Vapour Concentration (ppmv)



Nichols Environmental (Canada) Ltd.

TABLE: 11
 TITLE: SOIL ANALYSES - PETROLEUM HYDROCARBONS (AREA 7)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

		Coarse Grained	Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 4
2014 Alberta Tier 1*	Natural Area		0.078	0.12	0.21	28	210	150	300	2,800
	Agricultural		0.073	0.12	0.21	12	24	130	300	2,800
	Residential / Parkland		0.073	0.12	0.21	12	24	130	300	2,800
Surface Soil	Commercial		0.078	0.12	0.21	28	270	260	1,700	3,300
	Industrial		0.078	0.12	0.21	28	270	260	1,700	3,300

Surface Soil					Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 4	
Land Use					Commercial	0.078	0.12	0.21	28	270	260	1,700	3,300
Sample ID	Depth (m)	Soil	Date	OVC									
Area 7													
14-07	2.3	Silt	28-Oct-2014	50.6	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100	

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 1). May 2014.
 (All concentrations in mg/kg = ppm, unless noted)
 Grain size MUST PSA D50 > 75 um 71.2% A7:14-05 @ 7.5 m (coarse-grained)

Fraction 1 = C₆ to C₁₀ (-BTX) Fraction 3 = > C₁₆ to C₃₄
 Fraction 2 = > C₁₀ to C₁₆ Fraction 4 = C₃₅+
 OVC = Organic Vapour Concentration (ppmv)



Nichols Environmental (Canada) Ltd.

TABLE: 11
 TITLE: SOIL ANALYSES - PETROLEUM HYDROCARBONS (AREA 7)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

		Coarse Grained	Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 4
2014 Alberta Tier 1*		Natural Area	0.078	0.12	0.21	28	700	520	2,500	10,000
		Agricultural	0.078	0.12	0.21	16	30	160	2,500	10,000
		Residential / Parkland	0.078	0.12	0.21	16	30	160	2,500	10,000
Subsoil		Commercial	0.078	0.12	0.21	28	440	520	3,500	10,000
		Industrial	0.078	0.12	0.21	28	440	520	3,500	10,000

Subsoil					Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 4
Land Use					0.078	0.12	0.21	28	440	520	3,500	10,000
Commercial					0.078	0.12	0.21	28	440	520	3,500	10,000
Sample ID	Depth (m)	Soil	Date	OVC								
Area 7												
14-05	3.8	Silt	28-Oct-2014	34.8	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100
	7.5	Gravel		34	<0.005	0.04	<0.010	<0.03	<10	<50	66	<100
14-06	8.3	Gravel		34.1	<0.005	<0.02	<0.010	0.03	<10	<50	<50	<100
	9.8	Gravel		28.9	<0.005	<0.02	<0.010	0.03	<10	<50	<50	<100
14-07	10.5	Gravel		33.9	<0.005	<0.02	<0.010	<0.03	<10	<50	<50	<100

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 3). May 2014.

Ecological Direct Contact Pathway has been excluded for PHC Fractions 1 to 4.

(All concentrations in mg/kg = ppm, unless noted)

Grain size MUST PSA D50 > 75 um 71.2% A7:14-05 @ 7.5 m (coarse-grained)

Fraction 1 = C₆ to C₁₀ (-BTEX) Fraction 3 = > C₁₆ to C₃₄

Fraction 2 = > C₁₀ to C₁₆ Fraction 4 = C₃₅+

OVC = Organic Vapour Concentration (ppmv)



Nichols Environmental (Canada) Ltd.

TABLE: 12
 TITLE: GROUNDWATER MONITORING DATA
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Monitoring Well	Installation Data								Monitoring Data							
	Install Date	Top of Casing Elevation (m)	Height of Stickup (m)*	Total Depth (mbg)	Well Screen				Monitor Date	Groundwater from Top of Casing (m)			OVC (ppmv)	Product Thickness (cm)		
					Depth		Elevation			Depth	Elevation	Total Depth*				
					Top	Bottom	Top	Bottom								
Area 1																
14-18	19-Nov-2014	624.935	-	10.5	7.5	-	10.5	617.44	-	614.44	20-Nov-2014	8.68	616.26	10.34	0.1	ND
Area 2																
C1	27-Jul-2004	624.893	0.54	9.67	5.1	-	9.67	619.79	-	615.22	20-Nov-2014	8.68	616.21	10.35	ND	ND
C6	27-Jul-2004	624.823	0.65	8.99	4.42	-	8.99	620.40	-	615.83	20-Nov-2014	8.40	616.42	8.87	ND	ND
C7	27-Jul-2004	625.008	0.65	8.82	4.25	-	8.82	620.76	-	616.19	20-Nov-2014	8.64	616.37	9.56	ND	ND
Area 3																
MW1	23-Jul-2001	NM	-	9.75	6.75	-	9.75	-	-	-	21-Nov-2014	dry	-	5.47	0.6	ND
MW108	12-Oct-2001	NM	-	9.14	6.14	-	9.14	-	-	-	21-Nov-2014	dry	-	7.68	ND	ND
MW109	12-Oct-2001	623.669	-	9.45	6.45	-	9.45	617.22	-	614.22	21-Nov-2014	9.53	614.14	9.54	ND	ND
MW201	6-Dec-2001	623.531	-	10.61	7.61	-	10.61	615.92	-	612.92	21-Nov-2014	9.32	614.21	9.42	ND	ND
MW202	6-Dec-2001	622.683	-	11.76	8.76	-	11.76	613.92	-	610.92	21-Nov-2014	10.47	612.21	10.69	ND	ND
MW203	6-Dec-2001	NM	-	11.11	8.11	-	11.11	-	-	-	21-Nov-2014	9.173	-	11.38	ND	ND
											18-Dec-2014	8.92	-	11.10	ND	ND
14-09	30-Oct-2014	622.472	-	11.6	8.6	-	11.6	613.87	-	610.87	21-Nov-2014	8.27	614.20	10.31	ND	ND
											18-Dec-2014	7.99	614.99	10.33	0.4	ND
Area 5																
14-01	27-Oct-2014	623.844	-	9.2	6.2	-	9.2	617.64	-	614.64	21-Nov-2014	7.31	616.53	9.04	ND	ND
14-02	27-Oct-2014	624.679	-	7.6	4.6	-	7.6	620.08	-	617.08	21-Nov-2014	7.62	617.06	7.66	ND	ND
											18-Dec-2014	7.62	615.36	7.67	0.4	ND
Area 6																
14-15	3-Nov-2014	625.968	0.89	10.7	7.7	-	10.7	617.38	-	614.38	20-Nov-2014	10.55	615.42	11.62	ND	ND
14-17	3-Nov-2014	625.994	0.95	10.7	7.7	-	10.7	617.34	-	614.34	20-Nov-2014	10.34	615.65	11.58	ND	ND
Area 7																
14-05	28-Oct-2014	622.958	-	11.0	8.0	-	11.0	614.96	-	611.96	21-Nov-2014	8.61	614.35	10.82	ND	ND
14-06	28-Oct-2014	622.980	-	11.0	8.0	-	11.0	614.98	-	611.98	21-Nov-2014	8.67	614.31	10.96	ND	ND
14-07	28-Oct-2014	622.875	-	11.0	8.0	-	11.0	614.88	-	611.88	21-Nov-2014	8.56	614.32	10.41	ND	ND
											18-Dec-2014	8.33	614.55	10.50	ND	ND

(All concentrations in parts per million by volume = ppmv, unless noted)
 * = Measured Depth on Date of Monitoring
 OVC = Organic Vapour Concentration
 ND = Non-detect (<0.1 ppmv OVC or < 1mm free product thickness)
 NM = Not Measured



Nichols Environmental (Canada) Ltd.

TABLE: 13
 TITLE: GROUNDWATER QUALITY DATA
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Sample ID	Sample Date	OVC (ppmv)	Parameter				
			pH	ORP	DO	EC	Temp (°C)
Area 1							
14-18	20-Nov-2014	0.1	6.79	39	5.15	2,921	7.61
Area 2							
C1	20-Nov-2014	ND	6.91	180	0.58	965.2	7.90
C6		ND	6.93	179	1.38	472.0	7.45
C7		ND	6.82	195	1.52	809.4	8.05
Area 3							
14-09	21-Nov-2014	ND	6.79	173	1.70	930.7	7.34
Area 5							
14-01	21-Nov-2014	ND	6.96	138	1.22	452.0	7.44
Area 7							
14-05	21-Nov-2014	ND	6.83	145	2.14	948.7	10.47
14-06		ND	7.06	141	5.77	1,014	10.30

OVC = Organic Vapour Concentration (ppmv)
 ORP = Oxygen Redox Potential (mV)
 DO = Dissolved Oxygen (mg/L)
 EC = Electrical Conductivity (µS/cm @25°C)
 ND = Non-detect (<0.1 ppm OVC or < 1mm free product thickness)
 NM = Not Measured



Nichols Environmental (Canada) Ltd.

TABLE: 14
 TITLE: GROUNDWATER ANALYSES - DISSOLVED METALS
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

	SAMPLE IDENTIFICATION						2014 Alberta Tier 1 *					2014 EQGSW***
	14-18	14-09	MW203	14-01	14-15	14-17	Coarse Grained					
Depth (m)	8.68	8.27	9.17	7.31	10.55	10.34	Land Use					Protection of Aquatic Life (Area 6)
Sample Date	21-Nov-2014	21-Nov-2014		21-Nov-2014	20-Nov-2014		Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial	
OVC	0.1	ND	ND	ND	ND	ND	-	--	---	----	-----	--
Hardness [CaCO ₃]	1,360	470	489	1,360	548	428	-	--	---	----	-----	--
pH	NM	7.47	7.61	7.91	NM	NM	6.5 - 8.5					6.5 - 9
Aluminum	<0.002	<0.002	<0.002	0.004	<0.002	<0.002	0.050	0.050	0.050	0.050	0.050	0.05
Antimony	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.006	0.006	0.006	0.006	0.006	--
Arsenic	0.0004	0.0003	<0.0002	0.0003	0.0003	0.0002	0.005	0.005	0.005	0.005	0.005	0.005
Barium	0.459	0.159	0.136	0.124	0.103	0.103	1	1	1	1	1	--
Boron	0.229	0.099	0.091	0.028	0.44	0.411	1.5	0.5	1.5	1.5	1.5	1.5
Cadmium	0.000136	0.000072	<0.00001	0.00001	0.000022	0.00003	0.00037	0.00037	0.00037	0.00037	0.00037	0.00037
Cr(III)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0089	0.0049	0.0089	0.0089	0.0089	0.0089
Cr(VI)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.001	0.001	0.001	0.001	0.001	0.001
Copper	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	0.007	0.007	0.007	0.007	0.007	0.007
Iron	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	0.3	0.3	0.3	0.3	0.3
Lead	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.007	0.007	0.007	0.007	0.007	0.007
Manganese	0.756	0.548	0.008	0.330	0.344	1.29	0.05	0.05	0.05	0.05	0.05	--
Mercury	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Nickel	0.0037	0.0024	0.0007	<0.0005	0.002	0.0015	0.177	0.177	0.177	0.177	0.177	0.177
Selenium	0.0011	0.0005	0.0005	0.0003	0.0006	<0.0002	0.001	0.001	0.001	0.001	0.001	0.001
Silver	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Uranium	0.0047	0.0019	0.0016	0.0012	0.0039	0.0037	0.015	0.01	0.015	0.015	0.015	0.015
Zinc	0.003	0.062	0.004	0.004	0.001	0.003	0.03	0.03	0.03	0.03	0.03	0.03

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

* Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 2). May 2014.
 ** Vapour Inhalation and Ecological Direct Contact Guidelines for Residential / Parkland Land Use Applied for 30-m Buffer (however, receptors not active for metals)
 *** Environmental Quality Guidelines for Alberta Surface Waters (July 2014)
 (All concentrations in mg/L = ppm, unless noted)
 Grain size MUST PSA D50 > 75 um 12.7% A1: 14-19 @ 2.0 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 42.6% A6: 14-14 @ 3.5 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 81.3% A6: 14-16 @ 7.5 m (coarse-grained)
 Grain size MUST PSA D50 > 75 um 71.2% A7: 14-05 @ 7.5 m (coarse-grained)

Note 1: Guideline value is Hardness Dependent = 10 raised to the power of (0.83[log(Hardness)]-2.46)
 NOTE: Mercury guideline is for total mercury.
 OVC = Organic Vapour Concentration (ppmv)
 ND = Non-detect (<0.1 ppmv OVC)
 --- = No value provided in guidelines



TABLE: 15
 TITLE: GROUNDWATER ANALYSES - POLYCYCLIC AROMATIC HYDROCARBONS
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

Depth (m)	SAMPLE IDENTIFICATION										2014 Alberta Tier 1 *					2014 EQGSW***				
	C1			C6			C7			14-01	14-15	14-17	Coarse Grained							
	8.68			8.40			8.64			7.31	10.55	10.34	Land Use							
Sample Date	21-Nov-2014									20-Nov-2014					Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial	Protection of Aquatic Life (Area 6)
OVC	ND			ND			ND			ND	ND	ND								
Pentachlorophenol	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0058		
Acenaphthene	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0058	0.0058	0.0058	0.0058	0.0058	0.0058		
Acenaphthylene	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	--	---	----	-----	-----		
Acridine	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	--	---	----	-----	0.0044		
Anthracene	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000012	0.000012	0.000012	0.000012	0.000012	0.000012		
Fluoranthene	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004		
Fluorene	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.003	0.003	0.003	0.003	0.003	0.003		
Naphthalene	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.001	0.001	0.001	0.001	0.001	0.001		
Phenanthrene	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004		
Pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.000025	0.000025	0.000025	0.000025	0.000025	0.000025		
Quinoline	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	-	--	---	----	-----	0.0034		
Carcinogenic PAHs (as B(a)P TPE)	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	--		
Benzo(a)anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.000018	0.000018	0.000018	0.000018	0.000018	0.000018		
Benzo(a)pyrene	<0.000008	<0.000008	<0.000008	<0.000008	<0.000008	<0.000008	<0.000008	<0.000008	<0.000008	<0.000008	<0.000008	<0.000008	0.000015	0.000015	0.000015	0.000015	0.000015	0.000015		
Benzo(b+j)fluoranthene	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	--	---	----	-----	--		
Benzo(g,h,i)perylene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	--	---	----	-----	--		
Benzo(k)fluoranthene	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	--	---	----	-----	--		
Chrysene	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	--	---	----	-----	--		
Dibenz(a,h)anthracene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	--	---	----	-----	--		
Indeno(1,2,3-c,d)pyrene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	--	---	----	-----	--		

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria
BOLD = Detectable Parameter Concentration

* Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 2), May 2014.
 ** Vapour Inhalation and Ecological Direct Contact Guidelines for Residential / Parkland Land Use Applied for 30-m Buffer (however, no changes)
 *** Environmental Quality Guidelines for Alberta Surface Waters (July 2014)
 (All concentrations in mg/L = ppm, unless noted)
 Grain size MUST PSA D50 > 75 um 12.7% A1: 14-19 @ 2.0 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 42.6% A6: 14-14 @ 3.5 m (fine-grained)
 Grain size MUST PSA D50 > 75 um 81.3% A6: 14-16 @ 7.5 m (coarse-grained)
 Grain size MUST PSA D50 > 75 um 71.2% A7: 14-05 @ 7.5 m (coarse-grained)
 OVC = Organic Vapour Concentration (ppmv)
 ND = Non-detect (<0.1 ppmv OVC)
 --- = No value provided n guidelines



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TABLE: 16
 TITLE: GROUNDWATER ANALYSES - POLYCHLORINATED DIBENZO(p)DIOXINS & DIBENZOFURANS (AREA 2)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

	SAMPLE IDENTIFICATION			2014 Alberta Tier 1 *				
	C1	C6	C7	Coarse Grained				
Depth (m)	8.68	8.4	8.64	Land Use Residential / Parkland				
Sample Date	21-Nov-2014			Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial
OVC	ND	ND	ND					
Total PCDD/F TEQ	ND	ND	1E-11					
Total Dioxin	ND	ND	1E-11					
2,3,7,8-TCDD	<1E-09	<1E-09	<1E-09					
Total TCDD	<1E-09	2.4E-09	<1E-09					
1,2,3,7,8-PeCDD	<2E-09	<2E-09	<2E-09					
Total PeCDD	<2E-09	3E-09	<2E-09					
1,2,3,4,7,8-HxCDD	<2E-09	<2E-09	<2E-09					
1,2,3,6,7,8-HxCDD	<2E-09	<2E-09	<2E-09					
1,2,3,7,8,9-HxCDD	<2E-09	<2E-09	<2E-09					
Total HxCDD	<2E-09	<2E-09	<2E-09					
1,2,3,4,6,7,8-HpCDD	<3E-09	<3E-09	<3E-09					
Total HpCDD	<3E-09	<3E-09	<3E-09					
OCDD	<4E-09	<4E-09	6.3E-09					
Total Furan	ND	ND	ND	1.2E-07	1.2E-07	1.2E-07	1.2E-07	1.2E-07
2,3,7,8-TCDF	<1E-09	<1E-09	<1E-09					
Total TCDF	<1E-09	3.7E-09	<1E-09					
1,2,3,7,8-PeCDF	<2E-09	<2E-09	<2E-09					
2,3,4,7,8-PeCDF	<2E-09	<2E-09	<2E-09					
Total PeCDF	<2E-09	<2E-09	<2E-09					
1,2,3,4,7,8-HxCDF	<2E-09	<2E-09	<2E-09					
1,2,3,6,7,8-HxCDF	<2E-09	<2E-09	<2E-09					
1,2,3,7,8,9-HxCDF	<2E-09	<2E-09	<2E-09					
2,3,4,6,7,8-HxCDF	<2E-09	<2E-09	<2E-09					
Total HxCDF	2.6E-09	<2E-09	<2E-09					
1,2,3,4,6,7,8-HpCDF	<3E-09	<3E-09	<3E-09					
1,2,3,4,7,8,9-HpCDF	<3E-09	<3E-09	<3E-09					
Total HpCDF	<3E-09	<3E-09	<3E-09					
OCDF	<4E-09	<4E-09	<4E-09					

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 2). May 2014.

(All concentrations in mg/L = ppm, unless noted)

Grain size MUST PSA D50 > 75 um	12.7%	A1: 14-19 @ 2.0 m (fine-grained)
Grain size MUST PSA D50 > 75 um	42.6%	A6: 14-14 @ 3.5 m (fine-grained)
Grain size MUST PSA D50 > 75 um	81.3%	A6: 14-16 @ 7.5 m (coarse-grained)
Grain size MUST PSA D50 > 75 um	71.2%	A7: 14-05 @ 7.5 m (coarse-grained)

TCDD/F = Tetrachlorodibenzo-*p*-dioxin/dibenzofuran
 PeCDD/F = Pentachlorodibenzo-*p*-dioxin/dibenzofuran
 HxCDD/F = Hexachlorodibenzo-*p*-dioxin/dibenzofuran
 HpCDD/F = Heptachlorodibenzo-*p*-dioxin/dibenzofuran
 OCDD/F = Octachlorodibenzo-*p*-dioxin/dibenzofuran

PCDD/F = Polychlorinated Dibenzo(p)dioxins and Dibenzofurans
 OVC = Organic Vapour Concentration (ppmv)
 ND = Non-detect (<0.1 ppmv OVC or non-detectable in analysis)
 TEQ = Toxic Equivalent
 --- = No value provided in guidelines



Nichols Environmental (Canada) Ltd.

TABLE: 17
 TITLE: GROUNDWATER ANALYSES - PETROLEUM HYDROCARBONS (AREAS 3 & 7)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rosedale Lands: 9469 Rosedale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

2014 Alberta Tier 1*	Coarse Grained			Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 3+
	Natural Area			0.005	0.021	0.0024	0.3	2.2	1.1	-	-
	Agricultural			0.005	0.021	0.0024	0.3	0.81	1.1	--	--
	Residential / Parkland			0.005	0.021	0.0024	0.3	0.81	1.1	---	---
	Commercial			0.005	0.021	0.0024	0.3	2.2	1.1	----	----
Industrial			0.005	0.021	0.0024	0.3	2.2	1.1	-----	-----	

Land Use				Benzene	Toluene	Ethylbenzene	Xylenes	Fraction 1	Fraction 2	Fraction 3	Fraction 3+
Sample ID				0.005	0.021	0.0024	0.3	0.81/2.2	1.1	----	----
Date											
OVC											
Area 3**											
MW203	8.92	18-Dec-2014	ND	<0.001	<0.0005	<0.001	<0.002	<0.1	<0.1	0.3	0.7
14-09	7.99		0.4	<0.001	<0.0005	<0.001	<0.002	<0.1	<0.1	<0.1	0.3
Area 7											
14-05	8.61	21-Nov-2014	ND	<0.001	<0.001	<0.001	<0.001	<0.2	<0.2	<0.1	<0.1
14-06	8.67		ND	<0.001	<0.001	<0.001	<0.001	<0.2	<0.2	<0.1	<0.1
14-07	8.33	18-Dec-2014	ND	<0.001	<0.0005	<0.001	<0.002	<0.1	<0.1	<0.1	0.3

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 2). May 2014.
 **Vapour Inhalation and Ecological Direct Contact Guidelines for Residential / Parkland Land Use Applied for 30-m Buffer (Fraction 1 affected)
 (All concentrations in mg/L = ppm, unless noted)

Grain size MUST PSA D50 > 75 um	12.7%	A1: 14-19 @ 2.0 m	(fine-grained)
Grain size MUST PSA D50 > 75 um	42.6%	A6: 14-14 @ 3.5 m	(fine-grained)
Grain size MUST PSA D50 > 75 um	81.3%	A6: 14-16 @ 7.5 m	(coarse-grained)
Grain size MUST PSA D50 > 75 um	71.2%	A7: 14-05 @ 7.5 m	(coarse-grained)

Fraction 1 = C₆ to C₁₀ (-BTEX)
 Fraction 2 = > C₁₀ to C₁₆
 OVC = Organic Vapour Concentration (ppmv)
 ND = Non-detect (<0.1 ppmv OVC)
 --- = No value provided in guidelines



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TABLE: 18
 TITLE: GROUNDWATER ANALYSES - ROUTINE PARAMETERS (AREAS 3 & 5)
 PROJECT#: 14-214-CRD
 CLIENT: The City of Edmonton
 PROJECT: Phase II Environmental Site Assessment
 SITE: Rossdale Lands: 9469 Rossdale Road NW & 10155 - 96th Avenue NW
 LOCATION: Edmonton, Alberta

	SAMPLE IDENTIFICATION			2014 Alberta Tier 1 *				
	14-09	MW203	14-01	Coarse Grained				
Depth (m)	8.27	9.17	7.31	Land Use				
Sample Date	21-Nov-2014		21-Nov-2014	Natural Area	Agricultural	Residential / Parkland	Commercial	Industrial
OVC	ND	ND	ND					
pH	7.47	7.61	7.91	6.5 - 8.5				
Bicarbonate	477	508	233	-	--	---	----	-----
Electrical Conductivity (µS/cm)	1210	831	452	-	1,000	---	----	-----
Total Dissolved Solids	470	540	285	500	500	500	500	500
Calcium	140	146	67.8	-	--	---	----	-----
Chloride	159	18.7	7.2	120	100	120	120	120
Potassium	5	2.3	2.3	-	--	---	----	-----
Magnesium	29.2	30.6	16.9	-	--	---	----	-----
Nitrate	1.59	1.01	0.27	3	3	3	3	3
Nitrate + Nitrite	1.6	1.01	0.27	-	--	---	----	-----
Nitrite	0.012	<0.005	<0.005	0.24	0.24	0.24	0.24	0.24
Sodium	126	15.4	13.7	200	200	200	200	200
Sulphate	75.2	77.8	61.9	429	429	429	429	429

BOLD = Applicable Guideline Criteria
BOLD = Parameter Exceeds Recommended Guideline Criteria

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Table 2). May 2014.
 **Vapour Inhalation and Ecological Direct Contact Guidelines for Residential / Parkland Land Use Applied for 30-m Buffer (however, receptors not active for listed parameters)
 (All concentrations in mg/kg = ppm, unless noted)

Grain size MUST PSA D50 > 75 µm	12.7%	A1: 14-19 @ 2.0 m	(fine-grained)
Grain size MUST PSA D50 > 75 µm	42.6%	A6: 14-14 @ 3.5 m	(fine-grained)
Grain size MUST PSA D50 > 75 µm	81.3%	A6: 14-16 @ 7.5 m	(coarse-grained)
Grain size MUST PSA D50 > 75 µm	71.2%	A7: 14-05 @ 7.5 m	(coarse-grained)

OVC = Organic Vapour Concentration (ppmv)
 ND = Non-detect (<0.1 ppmv OVC)
 --- = No value provided in guidelines

APPENDIX A

RECORD OF SITE CONDITION

1 REPORT AND FORM INFORMATION			
Title of report	Phase II Environmental Site Assessment		
Report date (dd-mon-yyyy)	10-Feb-2015	Record of Site Condition (RSC) ID No. ^ψ	

2 SITE IDENTIFICATION AND PHYSICAL LOCATION								
2.1 Site name		Rossdale Lands						
2.2 Address of site		9469 Rossdale Road NW & 10155 - 96 th Avenue NW						
		Municipality	Edmonton				Alberta	
2.3 Legal land description of site (if multiple, list all.)								
Plan, Block, Lot (PBL)			Alberta Township System (ATS)					
Plan	Block	Lot	LSD	Quarter	Section	Township	Range	Meridian
NB	OT							

3 STAKEHOLDERS			
3.1 Operator			
Company	The City of Edmonton	Contact person	Tami Dolen
Mailing address	Engineering Services, Transportation Services	Position held	Environmental Scientist
	11004 - 190 th Street NW	Business phone No.	780-496-6782
	Edmonton, Alberta T5S 0G9	Business fax No.	780-944-7653
		Business e-mail	tami.dolen@edmonton.ca
3.2 Consultant <input type="checkbox"/> Not applicable			
Company	Nichols Environmental (Canada) Ltd.	Contact person	Tawnya Anderson
Mailing address	17331 - 107 th Avenue NW Edmonton, Alberta T5S 1E5	Position held	Senior Project Manager
		Business phone No.	780-484-3377
		Business fax No.	780-484-5093
		Business e-mail	
3.3 Landowner(s)			
Land type	<input checked="" type="checkbox"/> Private <input type="checkbox"/> Special Areas <input type="checkbox"/> Parks and protected area <input type="checkbox"/> Public (if not private, provide Disposition No.: _____)		
Landowner(s)	<input checked="" type="checkbox"/> Same as operator <input type="checkbox"/> Other		

^ψ: Do not fill in. Reserved for internal administrative purposes only.

RECORD OF SITE CONDITION

3.4 Occupant(s)			
Are there occupants at the site?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> To be determined (TBD)
Occupant(s)	<input type="checkbox"/> Same as operator	<input type="checkbox"/> Same as landowner	<input checked="" type="checkbox"/> Other
What is the type of occupancy?	<input checked="" type="checkbox"/> Apartment building	<input type="checkbox"/> Town house	<input type="checkbox"/> Single detached house
	<input type="checkbox"/> Agricultural	<input type="checkbox"/> Industrial	<input checked="" type="checkbox"/> Commercial
	<input checked="" type="checkbox"/> Other (<i>specify</i>) <u>Telus Field, Community Centre, EPCOR Water & Power Plant</u>		

4 OPERATING STATUS	
<input checked="" type="checkbox"/> Operating	<input type="checkbox"/> Suspended
<input type="checkbox"/> Abandoned	<input type="checkbox"/> Decommissioning in progress
<input type="checkbox"/> Closed	<input type="checkbox"/> Reclaimed (<i>provide Reclamation Certificate No.(s):</i> _____)
<input type="checkbox"/> Not applicable	

5 TYPE OF ACTIVITY AND SITE

5.1 Petroleum Storage Tank Site	<input type="checkbox"/> Yes
--	------------------------------

5.1.1 AENV file No.(s)	PTMAA site No.	
------------------------	----------------	--

5.1.2 Types of activity				
<input type="checkbox"/> Retail gas station	<input type="checkbox"/> Aviation fuelling station	<input type="checkbox"/> Bulk fuel	<input type="checkbox"/> Other (<i>specify</i>): _____	

5.2 Upstream Oil and Gas Facility	<input type="checkbox"/> Yes
--	------------------------------

5.2.1 AENV file No.(s)	ERCB authorization No.(s)	
------------------------	---------------------------	--

5.2.2 ERCB authorization type	<input type="checkbox"/> Approval	<input type="checkbox"/> License	<input type="checkbox"/> Permit	<input type="checkbox"/> Order	<input type="checkbox"/> Other (<i>specify</i>): _____
--------------------------------------	-----------------------------------	----------------------------------	---------------------------------	--------------------------------	--

5.2.3 Types of activity					
<input type="checkbox"/> Wellsite and associated facility	<input type="checkbox"/> Satellite	<input type="checkbox"/> Battery	<input type="checkbox"/> Pipeline		
<input type="checkbox"/> Compressor and pumping station	<input type="checkbox"/> Other (<i>specify</i>): _____				

5.3 Approved Facility Under Environmental Protection and Enhancement Act (EPEA)	<input type="checkbox"/> Yes
--	------------------------------

5.3.1 AENV approval No.(s)	
----------------------------	--

5.3.2 Types of approved activity					
<input type="checkbox"/> Chemical manufacturing plant	<input type="checkbox"/> Enhanced recovery in-situ oil sands or heavy oil processing plant	<input type="checkbox"/> Fertilizer manufacturing plant	<input type="checkbox"/> Landfill		
<input type="checkbox"/> Metal manufacturing plant	<input type="checkbox"/> Oil refinery	<input type="checkbox"/> Oilsands processing plant	<input type="checkbox"/> Oil production site		
<input type="checkbox"/> Pesticide manufacturing plant	<input type="checkbox"/> Petrochemical manufacturing plant	<input type="checkbox"/> Pipeline	<input type="checkbox"/> Power plant		
<input type="checkbox"/> Pulp and paper processing plant	<input type="checkbox"/> Sour gas processing plant	<input type="checkbox"/> Sulphur manufacturing or processing plant	<input type="checkbox"/> Waste management facility		
<input type="checkbox"/> Wood treatment plant	<input type="checkbox"/> Other (<i>specify</i>): _____				

RECORD OF SITE CONDITION

<input checked="" type="checkbox"/>	Other organics	<input type="checkbox"/>	Radionuclides
<input type="checkbox"/>	Salt	<input type="checkbox"/>	Other (<i>specify</i>): _____
6.2.1.4 Did any past or current ESA relevant to this investigation identify an exceedance of the mandatory Tier 2 guidelines referred to in Section 6.2.1.3 (e.g. Tier 2 guidelines that are lower than the corresponding Tier 1 guidelines)?			
<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> TBD			
6.2.1.5 If you answered 'yes' in Section 6.2.1.4, have all relevant COPC been remediated to meet the mandatory Tier 2 guidelines?			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
6.2.2. Did any past or current ESA relevant to this investigation identify a drilling waste disposal area?			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (<i>→ proceed to Section 6.2.3.</i>)			
6.2.2.1 If a drilling waste disposal area was identified, did any past or current ESA identify non-compliance with the compliance options outlined in <i>Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification</i> (AENV, 2007), as amended?			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
6.2.2.2 If you answered 'yes' in Section 6.2.2.1, have all COPC been remediated to meet the compliance options outlined in <i>Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification</i> (AENV, 2007), as amended?			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
6.2.2.3 For any COPC that did not meet the compliance options in <i>Assessing Drilling Waste Disposal Areas</i>, identify the group of contaminants (<i>check of all that apply, see the Alberta Tier 1 guidelines, Tables 1-4 for detailed listing</i>).			
<input type="checkbox"/>	General and inorganic parameters	<input type="checkbox"/>	Metals
<input type="checkbox"/>	Hydrocarbons	<input type="checkbox"/>	Halogenated aliphatics
<input type="checkbox"/>	Chlorinated aromatics	<input type="checkbox"/>	Pesticides
<input type="checkbox"/>	Other organics	<input type="checkbox"/>	Radionuclides
<input type="checkbox"/>	Salt	<input type="checkbox"/>	Other (<i>specify</i>): _____
6.2.3 For all areas and COPCs not assessed under Sections 6.2.1 or 6.2.2, did any ESA relevant to this investigation identify an exceedance over the Alberta Tier 1 guidelines?			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (<i>→ proceed to Section 6.3.</i>)			
6.2.3.1 If you answered 'yes' in Section 6.2.3, have all COPC been remediated to meet the Alberta Tier 1 guidelines?			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> TBD			
6.2.3.2 For any COPC that exceeded Alberta Tier 1 guidelines in Section 6.2.3.1, identify the group of contaminants. (<i>check all that apply, see the Alberta Tier 1 guidelines, Tables 1-4 for detailed listing</i>).			
<input checked="" type="checkbox"/>	General and inorganic parameters	<input checked="" type="checkbox"/>	Metals
<input checked="" type="checkbox"/>	Hydrocarbons	<input type="checkbox"/>	Halogenated aliphatics
<input type="checkbox"/>	Chlorinated aromatics	<input type="checkbox"/>	Pesticides
<input checked="" type="checkbox"/>	Other organics	<input type="checkbox"/>	Radionuclides
<input type="checkbox"/>	Salt	<input type="checkbox"/>	Other (<i>specify</i>): _____

RECORD OF SITE CONDITION

6.3 Status of Investigation	
6.3.1 Identify soil and groundwater guidelines used to assess the COPCs that are the subject of this investigation (check all that apply).	
<input checked="" type="checkbox"/> Alberta Tier 1 Soil and Groundwater Remediation Guidelines – 2008, as amended <input checked="" type="checkbox"/> Coarse grained <input type="checkbox"/> Fine grained <input type="checkbox"/> Alberta Tier 2 Soil and Groundwater Remediation Guidelines – 2008, as amended <input type="checkbox"/> Pathway exclusion <input type="checkbox"/> Guideline adjustment <input type="checkbox"/> Site specific remediation objectives <input type="checkbox"/> Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification (AENV, 2007), as amended <input type="checkbox"/> Other (specify): _____	
6.3.2 What land use classification(s) is used?	
<input type="checkbox"/> Natural <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other (specify: _____)	
6.3.3 What is the outcome of the investigation? (check one only.)	
<input type="checkbox"/> For all COPCs on-site and off-site, no exceedance has been found above any applicable soil and groundwater guidelines in any prior and current assessments. <input type="checkbox"/> All contamination on-site and off-site has been completely remediated and meets the applicable soil and groundwater guidelines. <input checked="" type="checkbox"/> One or more COPC still exceeds the applicable soil or groundwater guidelines.	
6.3.4 How many contaminated areas are there currently at the site?	
_____ <input type="checkbox"/> None <input checked="" type="checkbox"/> TBD	
6.3.5 Are all contaminated areas and potential contaminated areas assessed during this investigation?	
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
6.3.6 For all areas of potential environmental concern, list the dates when the contamination was discovered (specify dd-mon-yyyy): <u>1989, 1992, 2000</u> ; _____	
6.3.7 For all areas that have been identified in Section 6.3.4, have all substance releases been reported to AENV?	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable	
6.3.8 If the answer to Section 6.3.7 is 'yes', list all Incident No.(s) (attach separate sheet if necessary):	
_____; _____ <input checked="" type="checkbox"/> Not assigned	
6.3.9 What is the approximate, cumulative amount of land area remaining exceeding applicable remediation guidelines? _____ (m ²) <input type="checkbox"/> None <input checked="" type="checkbox"/> TBD	
6.3.10 Is there non-aqueous phase liquid (NAPL) product remaining on site?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> TBD
6.3.11 Is there non-aqueous phase liquid (NAPL) product remaining off site?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> TBD
6.3.12 What is the remediation status of the contaminated areas at site?	
<input type="checkbox"/> No remediation required	<input type="checkbox"/> Site has exceedance but no remediation plan
<input type="checkbox"/> Remediation plan developed	<input type="checkbox"/> Active remediation
<input type="checkbox"/> Remediation completed	<input type="checkbox"/> Post remediation assessment completed
<input checked="" type="checkbox"/> Ongoing risk management plan – on-site	<input type="checkbox"/> Ongoing risk management plan – off-site
<input type="checkbox"/> Remediation Certificate issued for some area(s) (provide Remediation Certificate No.(s): _____)	
<input type="checkbox"/> Remediation Certificate cancelled for some area(s) (provide Remediation Certificate No.(s): _____)	

RECORD OF SITE CONDITION

Direction for Completing the Remainder of the Form

Attach the analytical summary tables of the COPCs that are the subject of this investigation and still present at this site. A detailed listing of COPCs can be found with Tables 1-4 in *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV, 2008), as amended. Refer to the *RSC User's Guide* for detailed information on format and other requirements regarding the summary table.

For the remainder of the form, follow the directions below:

- If the COPCs on-site and off-site have never exceeded any applicable soil and groundwater guidelines in any prior and current assessments, → proceed to Section 8, or
- If the COPCs on-site and off-site have been completely remediated and meet the applicable soil and groundwater guidelines, → proceed to Section 8, or
- For all other circumstances, continue with Section 6.4.

6.4 Key Transport Factors for Existing COPCs

6.4.1 What is the horizontal distance to the nearest water well from the edge of the nearest contaminated area?
 0-50 m 50-100 m 100-300 m 300-1000 m > 1000 m

6.4.2 What is the horizontal distance to the nearest surface water body from the edge of the contaminated area?
 ≤10 m 10-50 m 50-100 m 100-300 m 300-1000 m > 1000 m

6.4.3 Does delineation achieve closure above the groundwater water table that is nearest to the ground surface?
 Yes (→ go to Section 6.5.) No TBD

6.4.4 Is the groundwater that is nearest the ground surface a domestic use aquifer (DUA) as defined in Alberta Tier 2 guidelines?
 Yes No TBD Not required (NR)

6.4.5 Is there a hydraulic barrier, as defined in Alberta Tier 2 guidelines, between the base of the contaminated area and the DUA?
 Yes No TBD NR

6.4.6 If you answered 'yes' to Section 6.4.5, provide the measured largest value of the hydraulic conductivity (as value $\times 10^{-7}$ m/sec.) for the 5.0 m vertical layer from the bottom of the contaminated zone.
 _____ ($\times 10^{-7}$ m/sec.) TBD NR

6.5 On-site Characterization

6.5.1 What is the dominant soil texture that governs substance transport at the site?
 Coarse grained Fine grained TBD Not applicable (*must identify reason in Section 6.2.1.1.*)

6.5.2 What are the shallowest and deepest measured depths (meters below ground surface) of the water table at site?
 Shallowest: 7.31 (m) Deepest: 10.55(m) TBD NR (*specify max. depth assessed: _____(m)*)

6.5.3 What is the dominant horizontal direction of groundwater flow for the near surface water table?
 (*N, NW, etc.:* SE) TBD NR

6.5.4 What is the existing land use classification?
 Natural Agricultural Residential Commercial Industrial Other (*specify*) _____

6.5.5 What is the end land use classification?
 Natural Agricultural Residential Commercial Industrial Other (*specify*) _____

RECORD OF SITE CONDITION

6.5.6 Identify exposure pathways for which the applicable guidelines are exceeded on-site <i>(check all that apply).</i>			
<input checked="" type="checkbox"/>	Vapour inhalation	<input type="checkbox"/>	Soil ingestion
<input checked="" type="checkbox"/>	Ingestion of potable water	<input checked="" type="checkbox"/>	Soil dermal (skin) contact
<input checked="" type="checkbox"/>	Fresh water aquatic life	<input checked="" type="checkbox"/>	Soil contact for plants and invertebrates
<input type="checkbox"/>	TBD	<input type="checkbox"/>	Other <i>(specify):</i> _____

6.6 Off-site Characterization			
6.6.1 Are there COPCs off-site exceeding applicable soil or groundwater guidelines?			
<input type="checkbox"/> No (<i>→ if on-site contamination was reported, proceed to Section 7, otherwise, proceed to Section 8.</i>) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> TBD			
6.6.2 What is the current land use classification for any off-site area(s) identified in Section 6.6.1?			
<input type="checkbox"/> Natural <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other <i>(specify)</i> _____			
6.6.3 What is the end land use classification for any off-site area(s) identified in Section 6.6.1?			
<input type="checkbox"/> Natural <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other <i>(specify)</i> _____			
6.6.4 Is there any substance concentration under a road allowance exceeding the applicable soil or groundwater guidelines?			
<input type="checkbox"/> Yes <input type="checkbox"/> No (<i>→ proceed to Section 6.6.6.</i>) <input checked="" type="checkbox"/> TBD			
6.6.5 What is the most sensitive land use classification adjacent to the road allowance?			
<input type="checkbox"/> Natural <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other <i>(specify)</i> _____			
6.6.6 Identify exposure pathways for which the applicable guidelines are exceeded off-site <i>(check all that apply).</i>			
<input type="checkbox"/>	Vapour inhalation	<input type="checkbox"/>	Soil ingestion
<input type="checkbox"/>	Ingestion of potable water	<input type="checkbox"/>	Soil dermal (skin) contact
<input type="checkbox"/>	Fresh water aquatic life	<input type="checkbox"/>	Soil contact for plants and invertebrates
<input checked="" type="checkbox"/>	TBD	<input type="checkbox"/>	Other <i>(specify):</i> _____

RECORD OF SITE CONDITION

7 RISK MANAGEMENT PLAN (RMP)
7.1 What is the Plan for Contaminated Areas Still Remaining on and off the Site? (check one only.)

- Complete remediation (→ proceed to Section 8).
- Partial remediation with risk management for some residual contamination.
- Risk management for all remaining contamination.

7.2 Key Progress of RMP
7.2.1 If the site needs an on-going RMP, answer all the following questions that apply to the RMP.

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Are contaminated areas completely delineated horizontally and vertically in soil?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Are contaminated areas completely delineated horizontally and vertically in groundwater?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Is source identified and completely delineated?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Is source migrating or has migrated off-site?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Is source left as is?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Is source partially removed and residual source being managed?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Is source controlled with physical or administrative methods?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Are all pathways of concern identified?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Have all relevant receptors been identified and protected?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Is there a monitoring program in place to verify RMP success?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Are there third parties related to this RMP? (if the answer is 'no', skip the next question.)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	If there are third parties, have all of them accepted the RMP?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Is there a commitment from person(s) responsible to implement and monitor the RMP until final remediation guidelines are achieved?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Is there a contingency plan in place should the RMP fail?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Is the RMP implemented for the site?

Public Disclosure and Privacy Notification

The *Record of Site Condition* form is a public record that is disclosed in accordance with section 35 of the *Environmental Protection and Enhancement Act*, *Disclosure of Information Regulation*, and *Ministerial Order 23/2004*. Reasonable efforts have been made to minimize collection of personal information where possible. Personal information on the form is collected under the authority of section 12(c) and other provisions of the *Environmental Protection and Enhancement Act* and is in compliance with section 33(a) and 33(c) of the *Freedom of Information and Protection of Privacy Act* (FOIP). Personal information collected on this form will be used by Alberta Environment for the purposes of administering its programs.

Accuracy of Information

The information in this document has been submitted by persons other than Alberta Environment. The Department and the Government of Alberta cannot and do not warrant that the information in this document is current, accurate, complete, or free of errors. Persons accessing the information provided should not rely on it, and any reliance on the information provided is taken at the sole risk of the user. Users of this information are advised to conduct their own due diligence to satisfy themselves of the environmental condition of the property of interest.

8 DECLARATION

This *Record of Site Condition* form was prepared for the purpose of reporting on the state of environmental site conditions and, where applicable, for the purpose of remediation or reclamation, for:
Rossdale Lands (site name) (the "Site").

I, as the licensed operator or authorized representative, have reviewed all information that was used in preparation of this form and I am satisfied that it was prepared in a manner consistent with the Applicable Standard¹ together with any relevant additional guidance that is available from Alberta Environment as of this date for conducting environmental site assessments.

Having conducted reasonable inquiries to obtain all relevant information, to my knowledge, the statements made in this form are true as of this date. I have disclosed all pertinent information of which I am aware concerning the historical and current environmental condition of the Site to the Director.

Any use which a third party, other than the Crown in right of Alberta, makes of this form, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The undersigned accepts no responsibility for damages, if any, suffered by any third party, other than the Crown in right of Alberta, as a result of decisions made or actions based on this form. Any exclusions or disclaimers to the contrary contained in any attachment to this form are of no force or effect as against the Crown in right of Alberta.

Footnote ¹:

"Applicable Standard" means

- a) for the purposes of upstream oil and gas sites,
 - i) *Alberta Environment Phase I Environmental Site Assessment Guideline for Upstream Oil and Gas Sites* (AENV 2001),
 - ii) *CSA Standard Z769, Phase II Environmental Site Assessment*, as amended, for any Phase II site assessment information used in preparation of this form on all upstream oil and gas sites not included in a) i);
- b) for the purposes of all other sites, *CSA Standard Z768, Phase I Environmental Site Assessment*, as amended, for any Phase I site assessment information and with *CSA Standard Z769, Phase II Environmental Site Assessment*, as amended, for any Phase II site assessment information used in preparation of this form.

By signing below, I as the licensed operator or authorized representative, confirm the information provided herein is correct and complete, to the best of my knowledge and belief.

	Tawnya Anderson, B.Sc., EP	Senior Project Manager, Nichols Environmental (Canada) Ltd.		10-Feb-2015
Name of operator	Name of authorized representative	Title of authorized representative (e.g. officer, director)		Date (dd-mon-yyyy)

APPENDIX B



Photograph 1: Advancement of A3: 14-08 within Area 3, looking west.



Photograph 2: Advancement of A3: 14-10 within Area 3, looking southwest.



Photograph 3: Advancement of A3: 14-12 within Area 3, looking southeast.



Photograph 4: Advancement of A5: 14-01 within Area 5 (background location), looking north.



Photograph 5: Advancement of A5: 14-04 within Area 5, looking southeast.



Photograph 6: Advancement of A6: 14-14 within Area 6, looking west toward Pump House #2.



Photograph 7: Advancement of A6: 14-17 within Area 6, looking east toward Pump House #1.



Photograph 8: Concrete coring for access to boreholes to the east of the Watermark Building within Area 7, looking southwest.



Photograph 9: Advancement of A7: 14-05 within Area 7, looking south.



Photograph 10: Advancement of A7: 14-06 within Area 7, looking northwest.

APPENDIX C



LIST OF REVIEWED REPORTS

- Alberta Environment and Sustainable Resource Development. 1992. Fire Service Centre, Summary Report - 1991;
- Alberta Environment and Sustainable Resource Development. 1994. ERD Service Centre Vapour Extraction System;
- Alberta Environment and Sustainable Resource Development. 1998. Re: Mercury Contamination Release Report, NUL Rossdale Power Plant Regulating Station, 95 Avenue and 105 Street, Edmonton;
- Alberta Environment and Sustainable Resource Development. 2004. Rossdale Water Treatment Plant 3 Decommissioning, 101 Street and 95 Avenue, Edmonton;
- Alberta Environment and Sustainable Resource Development. 2004. Re: Phase I ESA and Surface Soil Testing, Proposed Rossdale Traditional Burial Ground, 105 Street and Rossdale Road, Edmonton;
- Alberta Environment and Sustainable Resource Development. 2006. Re: Soil and Groundwater Investigation for Creosote Impact, 9469 Rossdale Road Water Treatment Facility, Edmonton;
- CT & Associates Engineering Inc. June 2004. *Phase I Environmental Site Assessment, Property to Southeast of 105 Street and Rossdale Road, Edmonton, Alberta;*
- EBA Engineering Consultants Ltd. 1989. Contaminated Soil, Fire Service Centre, 94 Avenue, 101 Street - Edmonton, Alberta;
- EBA Engineering Consultants Ltd. 1989. Fire Station #21, Fire Department Service Centre, Underground Tank Removal, Soil Inspection;
- EBA Engineering Consultants Ltd. 1991. *Vapour Extraction System, Fire Service Centre, 94 Avenue and 101 Street, Edmonton;*
- EBA Engineering Consultants Ltd. 1992. Vapour Extraction System, Fire Service Centre, Summary Report - 1991;
- EBA Engineering Consultants Ltd. 1993. *Fire Service Centre Vapour Extraction System;*
- EBA Engineering Consultants Ltd. 1994. *Soil and Groundwater Sampling Program, Fire Department Service Centre, 94 Avenue and 101 Street;*
- EBA Engineering Consultants Ltd. 1995. *Monitoring Program, Vapour Extraction System, Fire Department Service Centre, 94 Avenue & 101 Street, Edmonton, Alberta.*



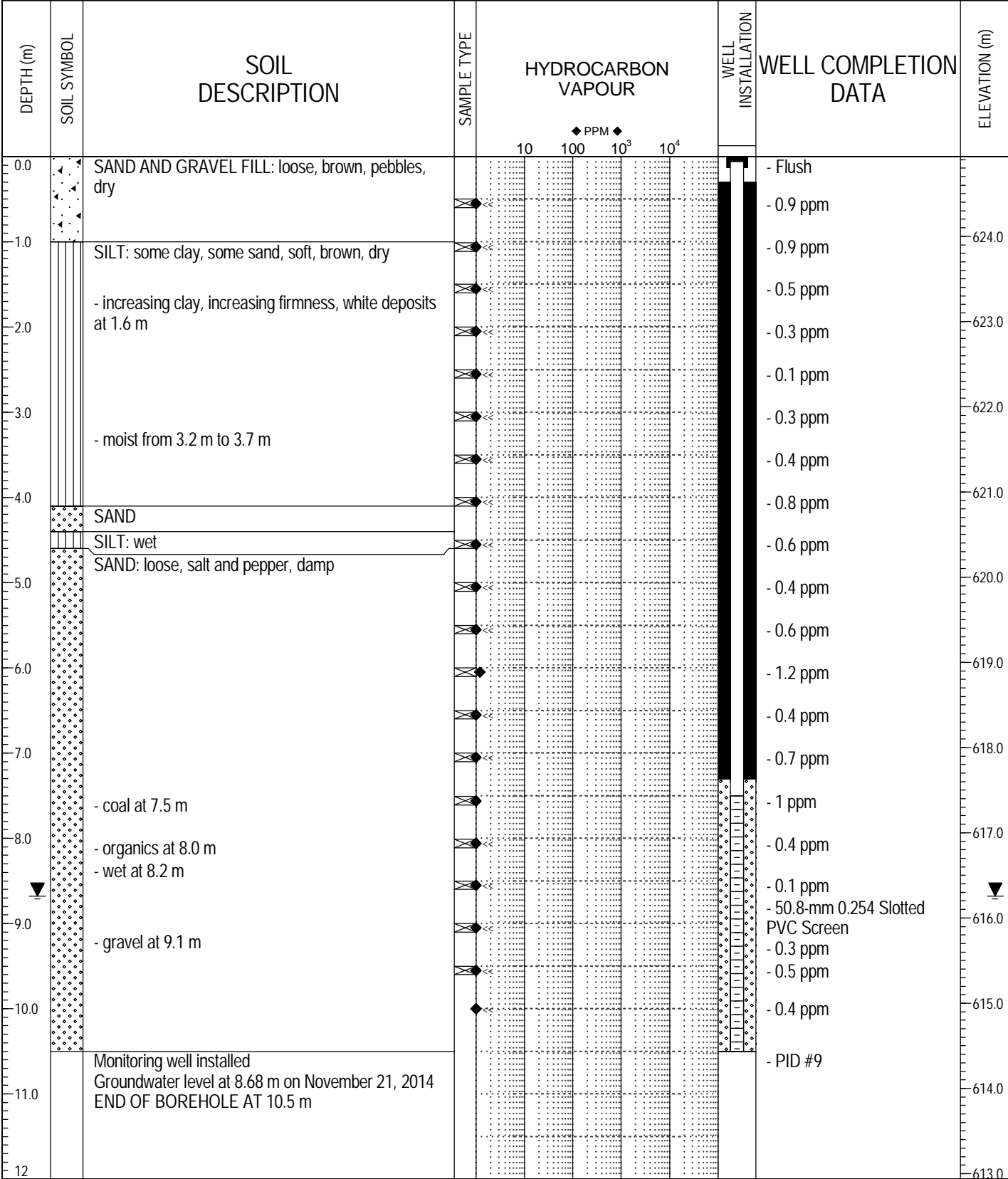
- EBA Engineering Consultants Ltd. 2001. *Phase II Environmental Site Assessment, Fire Hall – Rossdale Emergency Response Site, 94 Avenue/101 Street, Edmonton, Alberta;*
- EBA Engineering Consultants Ltd. 2002. *Phase 3 Environmental Site Assessment, Rossdale Emergency Response Site, 94 Avenue/101 Street, Edmonton, Alberta;*
- EBA Engineering Consultants Ltd. 2002. Preliminary Groundwater Monitoring Data, April 17 to July 10, 2002, Rossdale Emergency Response Department (ERD) Site, 94 Avenue and 101 Street, Edmonton, Alberta;
- EBA Engineering Consultants Ltd. 2003. Spring 2003 Groundwater Monitoring Data, Rossdale Emergency Response Department (ERD) Site, 94 Avenue and 101 Street, Edmonton, Alberta;
- EBA Engineering Consultants Ltd. 2004. *Soil and Groundwater Investigation for Creosote Impact, Rossdale Water Treatment Facility, 9469 Rossdale Road, Edmonton, Alberta;*
- EBA Engineering Consultants Ltd. 2005. *Groundwater Monitoring Summary – June 2005, Rossdale Emergency Response Department (ERD) Site, 94 Avenue and 101 Street, Edmonton, Alberta;*
- EBA Engineering Consultants Ltd. 2007. Groundwater Sampling and Analysis – Wells C1, C6 and C7 (June 2007), 9469 Rossdale Road, Edmonton, Alberta;
- EBA Engineering Consultants Ltd. 2007. Groundwater Re-Sampling – Well C1 (January 2007), 9469 Rossdale Road, Edmonton, Alberta;
- EBA Engineering Consultants Ltd. 2008. Groundwater Sampling and Analysis – July 2008. EPCOR Control Building Compound, 9469 Rossdale Road, Edmonton, Alberta;
- Komex International Ltd. 1998. *Final Report, Summary and Results, 1998 Mercury Investigation at Rossdale Power Plant, Edmonton, Alberta;*
- Stantec Consulting Ltd. 2010. *Geotechnical Site Investigation, Rossdale Water Treatment Plant Dechlorination Project, 9469 Rossdale Road, Edmonton, Alberta;*
- Stantec Consulting Ltd. 2011. Limited Environmental Site Assessment, Proposed WTP Sodium Hypochlorite Building, Rossdale Water Treatment Plant, Edmonton, AB;
- Thurber Environmental Consultants Ltd. 1992. *Preliminary Environmental Investigation Re: Bottom Ash and Groundwater at the Rossdale Treatment Plant, Edmonton, Alberta*
- Thurber Environmental Consultants Ltd. 1997. *Soil Monitoring at Rossdale Power Generating Station, Edmonton, Alberta;*



- Thurber Environmental Consultants Ltd. 1999. *Phase III Environmental Site Assessment, EPCOR, Rossdale Generating Station, Edmonton, Alberta;*
- Thurber Environmental Consultants Ltd. 2001. *Monitoring Wells Installation, Rossdale Power Plant, Edmonton, Alberta;*
- Thurber Environmental Consultants Ltd. 2002. *Groundwater Monitoring at EPCOR Rossdale Generating Station, Edmonton, Alberta;*
- Thurber Environmental Consultants Ltd. 2004. *2003 Groundwater Monitoring at EPCOR Rossdale Generating Station, Edmonton, Alberta;*
- Thurber Engineering Ltd. 2009. *Historical Data Review and Phase I Environmental Site Assessment, Rossdale Generating Station, 9469 Rossdale Road and 10155 – 96 Avenue, Edmonton, Alberta;*
- Thurber Engineering Ltd. 2010. *Phase II Environmental Site Assessment, Rossdale Generating Station, 9469 Rossdale Road and 10155 – 96 Avenue, Edmonton, Alberta;*
- Thurber Engineering Ltd. 2012. *Soil Investigation, Proposed Sodium Hypochlorite Building, 10155 – 96 Avenue, Edmonton, Alberta;*
- Thurber Engineering Ltd. 2013. *Environmental Impact Assessment & Site Location Study, Proposed EPCOR Water Quality Assurance Laboratory and Office Building, Rossdale Water Treatment Plant, 9469 Rossdale Road, Edmonton, Alberta;* and
- Thurber Engineering Ltd. 2013. *Phase III Environmental Site Assessment, Proposed EPCOR Water Quality Assurance Laboratory and Office Building, 9469 Rossdale Road NW, Edmonton, Alberta.*

APPENDIX D

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A1:14-18
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 624.935 m
SAMPLE TYPE	<input checked="" type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	



ENVIRONMENTAL 14-214-CRD A1.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 10.5 m
REVIEWED BY: T.A.	COMPLETED: 11/19/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A1:14-19
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 624.946 m
SAMPLE TYPE	<input checked="" type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	HYDROCARBON VAPOUR				COMMENTS	ELEVATION (m)
				10	100	10 ³	10 ⁴		
0.0		SAND AND GRAVEL FILL: loose, brown, pebbles, dry						- 0.4 ppm	
1.0								- 0.1 ppm	624.0
2.0		SILT: soft, loose, brown, damp - increasing clay, increasing firmness, light brown, white deposits at 1.6 m						- 0.3 ppm	623.0
2.5								- 0.6 ppm	623.0
3.0								- 0.4 ppm	622.0
3.0		Backfilled with cuttings to grade END OF BOREHOLE AT 3 m						- 0.1 ppm - PID #9	622.0
4.0									621.0
5.0									620.0
6.0									619.0
7.0									618.0
8.0									617.0
9.0									616.0
10.0									615.0
11.0									614.0
12.0									

ENVIRONMENTAL 14-214-CRD A1.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 3 m
REVIEWED BY: T.A.	COMPLETED: 11/19/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A1:14-20
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 625.068 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT	<input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND

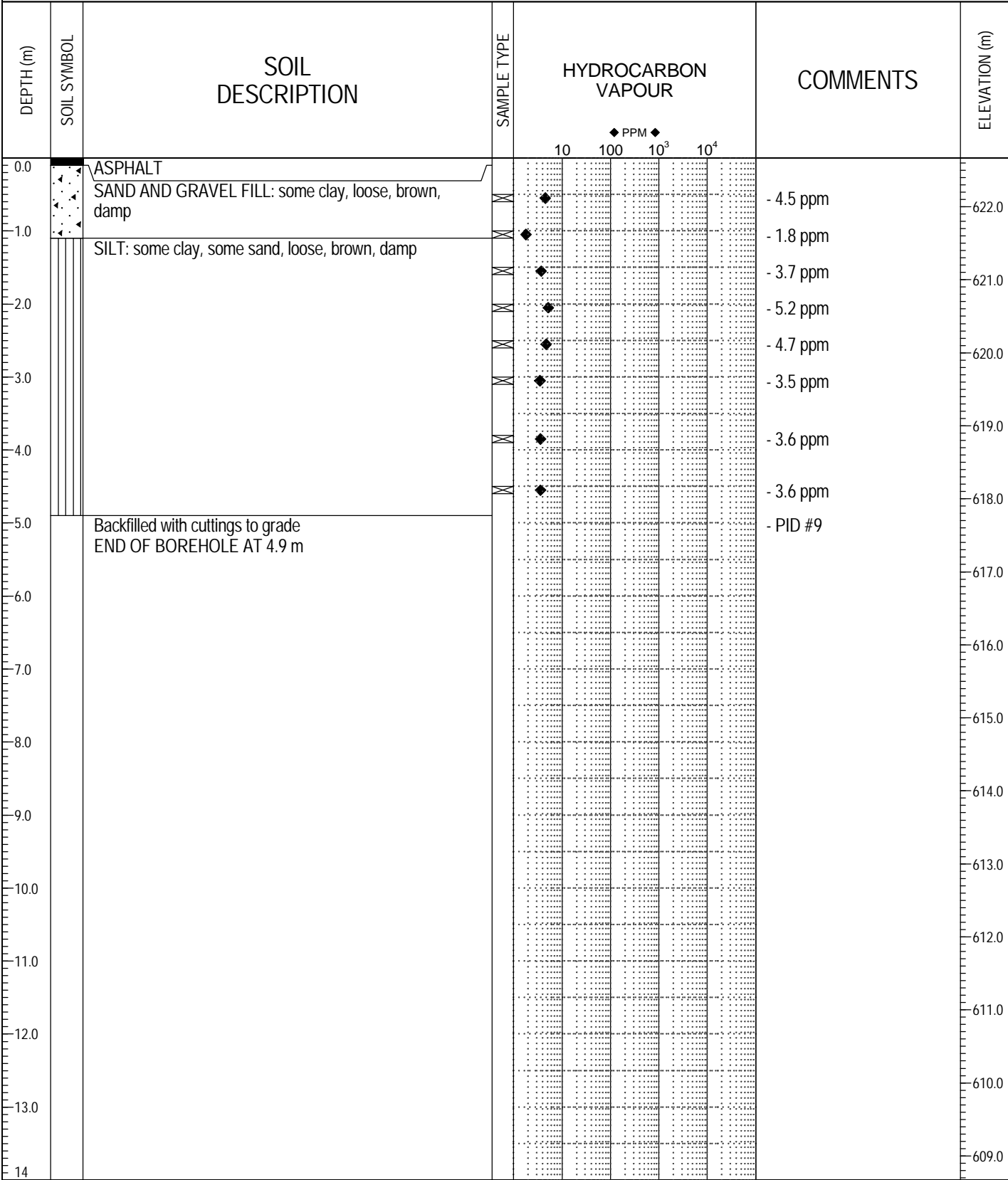
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	HYDROCARBON VAPOUR				COMMENTS	ELEVATION (m)
				10	100	10 ³	10 ⁴		
0.0		SAND AND GRAVEL FILL: loose, brown, pebbles, dry						- 0.1 ppm	625.0
1.0		SILT: some sand, some clay, soft, loose, brown, damp						- 0.1 ppm	624.0
2.0		- increasing clay, increasing firmness, light brown, white deposits at 1.6 m						- Non-Detect	623.0
3.0		- bone fragments at 1.8 m						- Non-Detect	623.0
3.0		Backfilled with cuttings to grade END OF BOREHOLE AT 3 m						- 0.5 ppm - PID #9	622.0
4.0									621.0
5.0									620.0
6.0									619.0
7.0									618.0
8.0									617.0
9.0									616.0
10.0									615.0
11.0									614.0
12.0									614.0

ENVIRONMENTAL 14-214-CRD A1.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

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	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A3:14-08
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 622.668 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

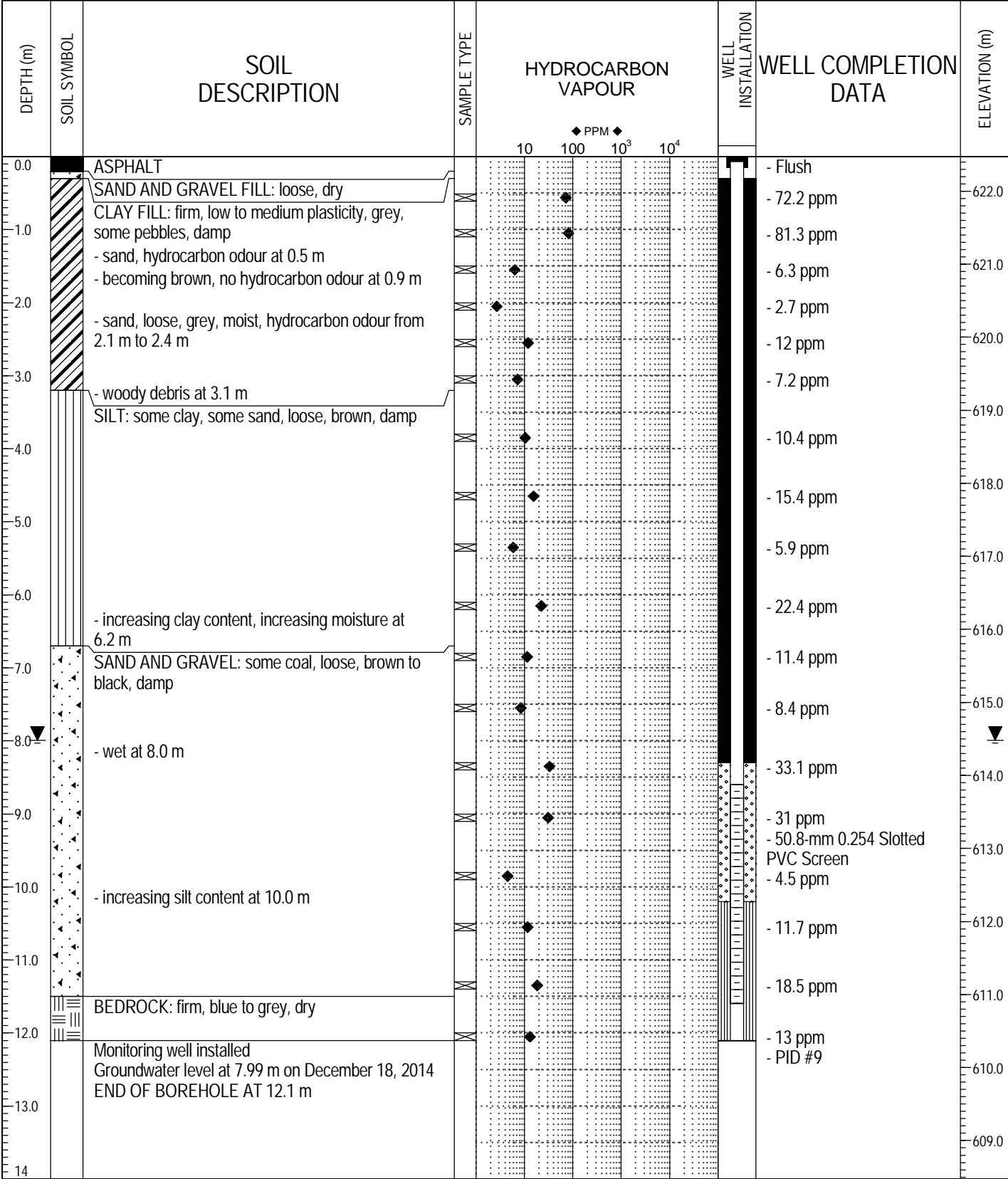


ENVIRONMENTAL 14-214-CRD A3.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

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Page 1 of 1	

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A3:14-09
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 622.472 m
SAMPLE TYPE	<input checked="" type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	



ENVIRONMENTAL 14-214-CRD A3.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

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REVIEWED BY: T.A.	COMPLETED: 10/30/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A3:14-10
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 622.494 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

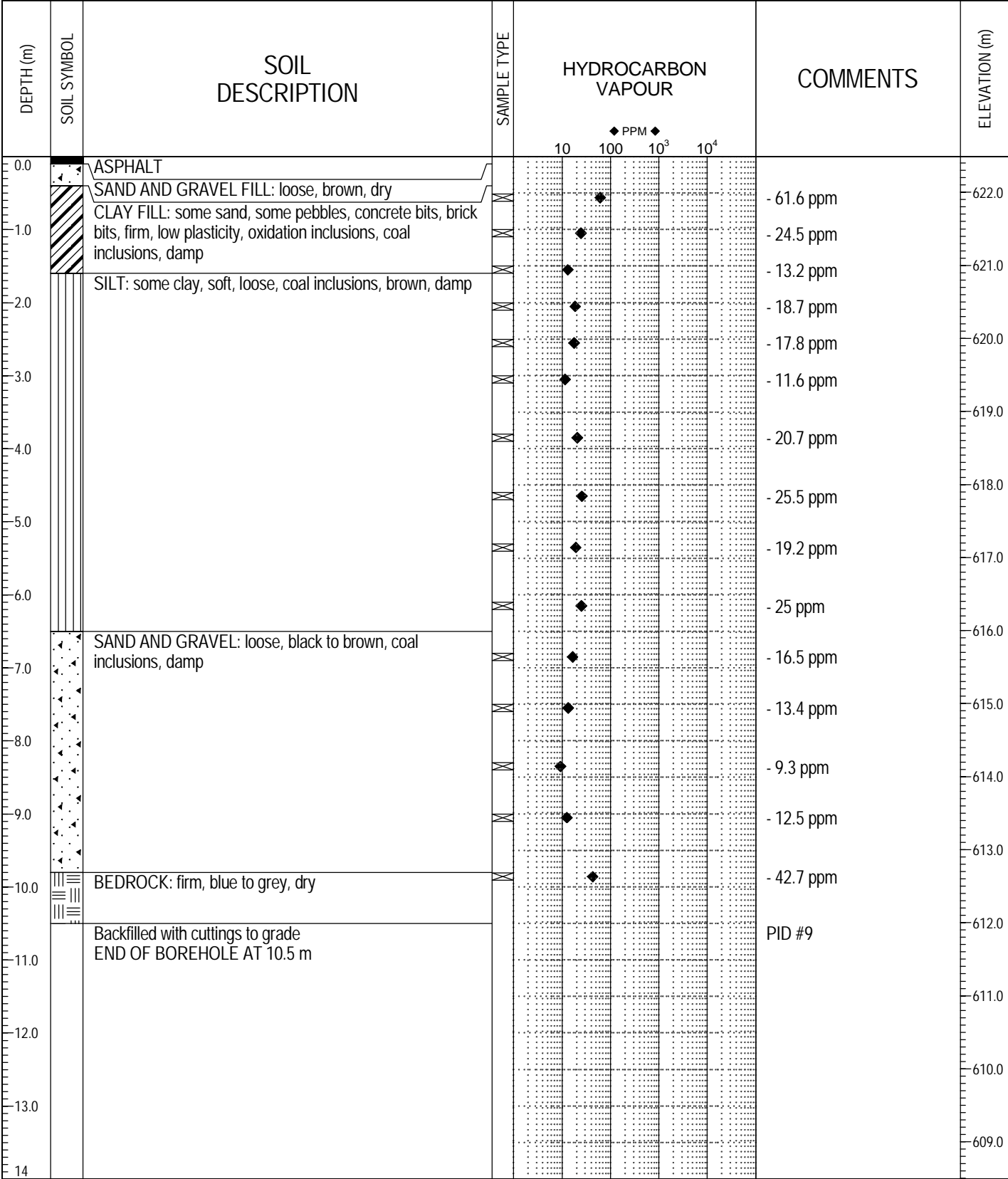
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	HYDROCARBON VAPOUR	COMMENTS	ELEVATION (m)
0.0		ASPHALT				
0.0 - 0.5		SAND AND GRAVEL FILL: some clay, loose, brown to grey, damp			- 17.8 ppm	622.0
0.5 - 1.0		SAND FILL: loose, grey, moist			- 16.1 ppm	
1.0 - 1.2		SILT FILL: some clay, some sand, soft, loose, brown, moist			- 17.8 ppm	621.0
1.2 - 2.0		CLAY FILL: 2% coarse fragment content, some sand, some silt, firm, low plasticity, grey, damp			- 19.1 ppm	
2.0 - 2.5		- becoming grey at 1.2 m			- 8.7 ppm	620.0
2.5 - 3.0					- 16.8 ppm	
3.0 - 4.0		SILT: some clay, some sand, loose, brown, damp			- 18.8 ppm	619.0
4.0 - 4.5					- 16.6 ppm	618.0
4.5 - 5.0					- 17.6 ppm	617.0
5.0 - 6.5					- 20.6 ppm	616.0
6.5 - 7.0		SAND AND GRAVEL: loose, brown to black, coal inclusions, damp			- 6.5 ppm	
7.0 - 7.5		- coal seam at 6.5 m			- 8.1 ppm	615.0
7.5 - 8.0					- 18.6 ppm	614.0
8.0 - 8.5		- wet at 8.0 m				
8.5 - 9.1		Backfilled with cuttings to grade			- PID #9	613.0
9.1 - 10.0		END OF BOREHOLE AT 9.1 m				612.0
10.0 - 11.0						611.0
11.0 - 12.0						610.0
12.0 - 13.0						609.0
13.0 - 14.0						

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	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A3:14-11
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 622.489 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT	<input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND

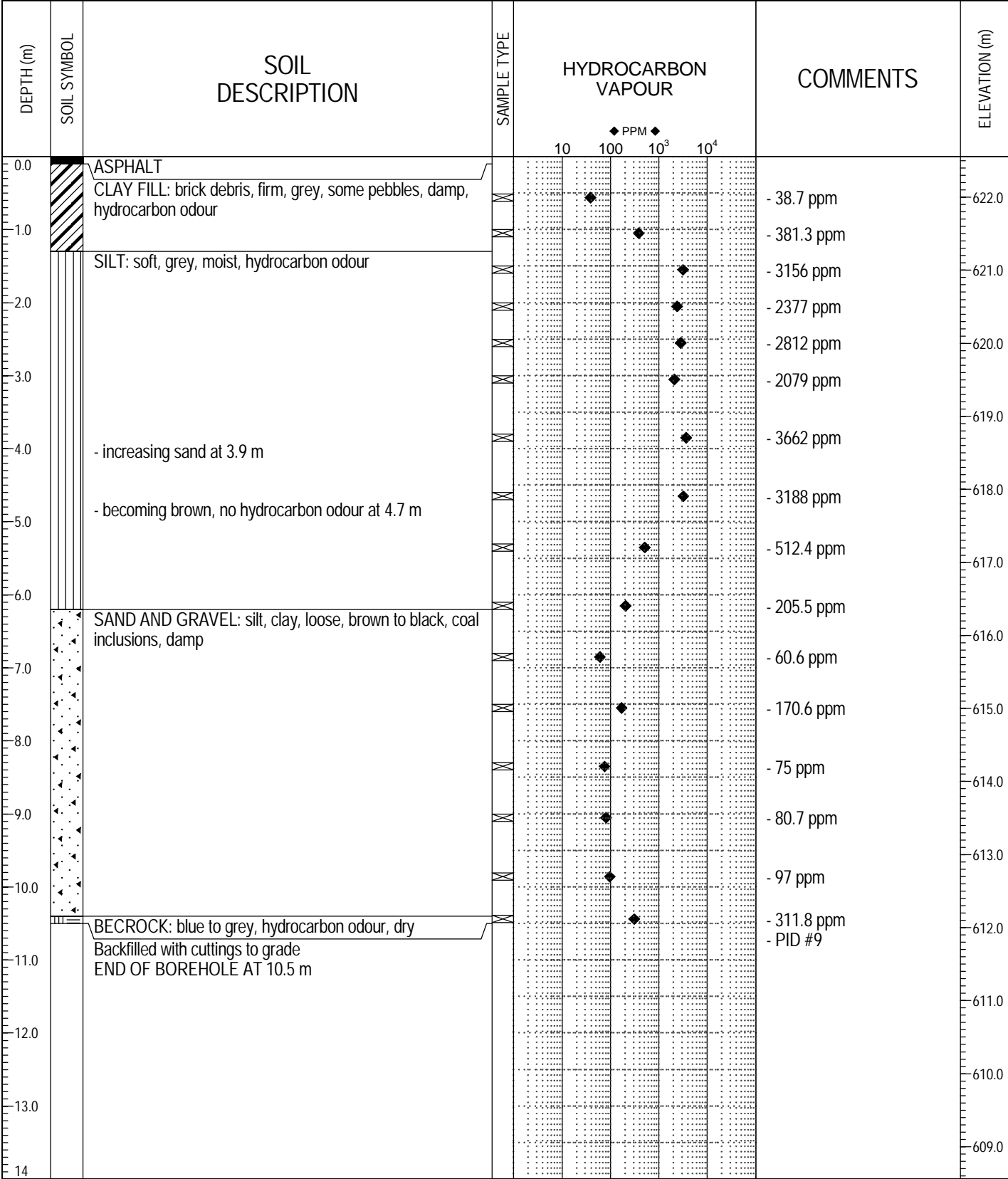


ENVIRONMENTAL 14-214-CRD A3.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

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	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A3:14-12
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 622.556 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

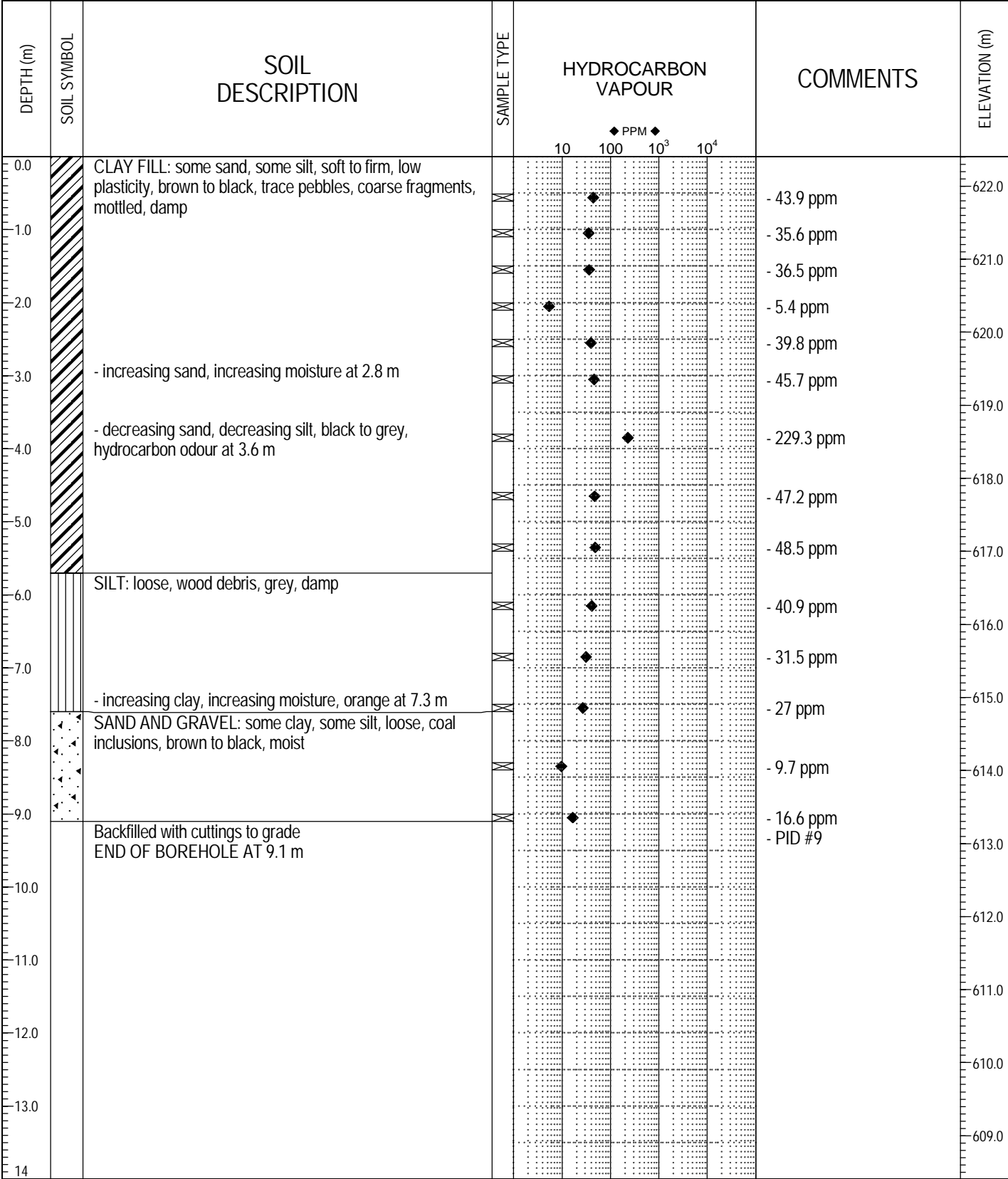


ENVIRONMENTAL 14-214-CRD A3.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

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REVIEWED BY: T.A.	COMPLETED: 10/30/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A3:14-13
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 622.405 m
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BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

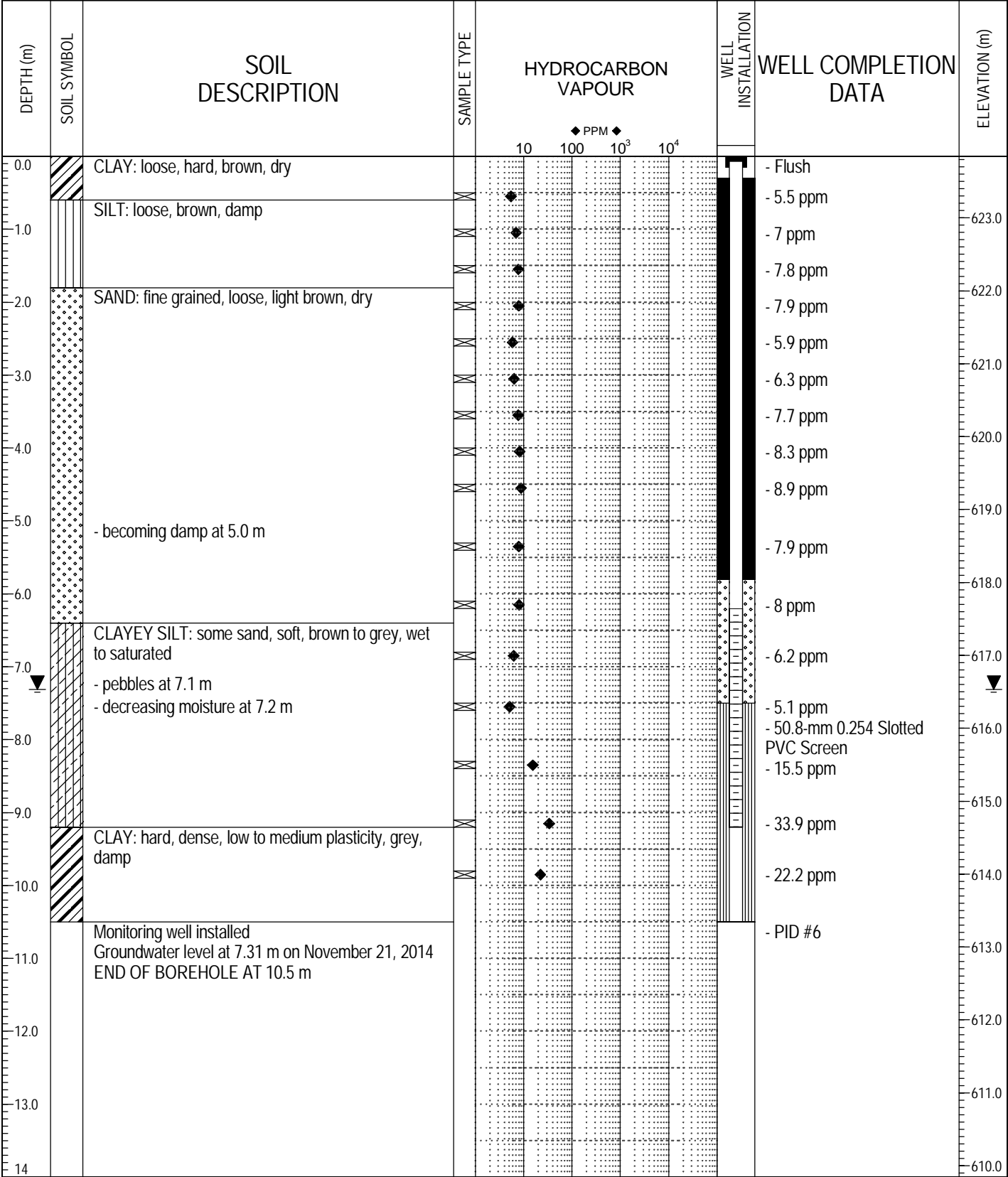


ENVIRONMENTAL 14-214-CRD A3.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

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LOGGED BY: H.B.	COMPLETION DEPTH: 9.1 m
REVIEWED BY: T.A.	COMPLETED: 10/30/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A5:14-01
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 623.844 m
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BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

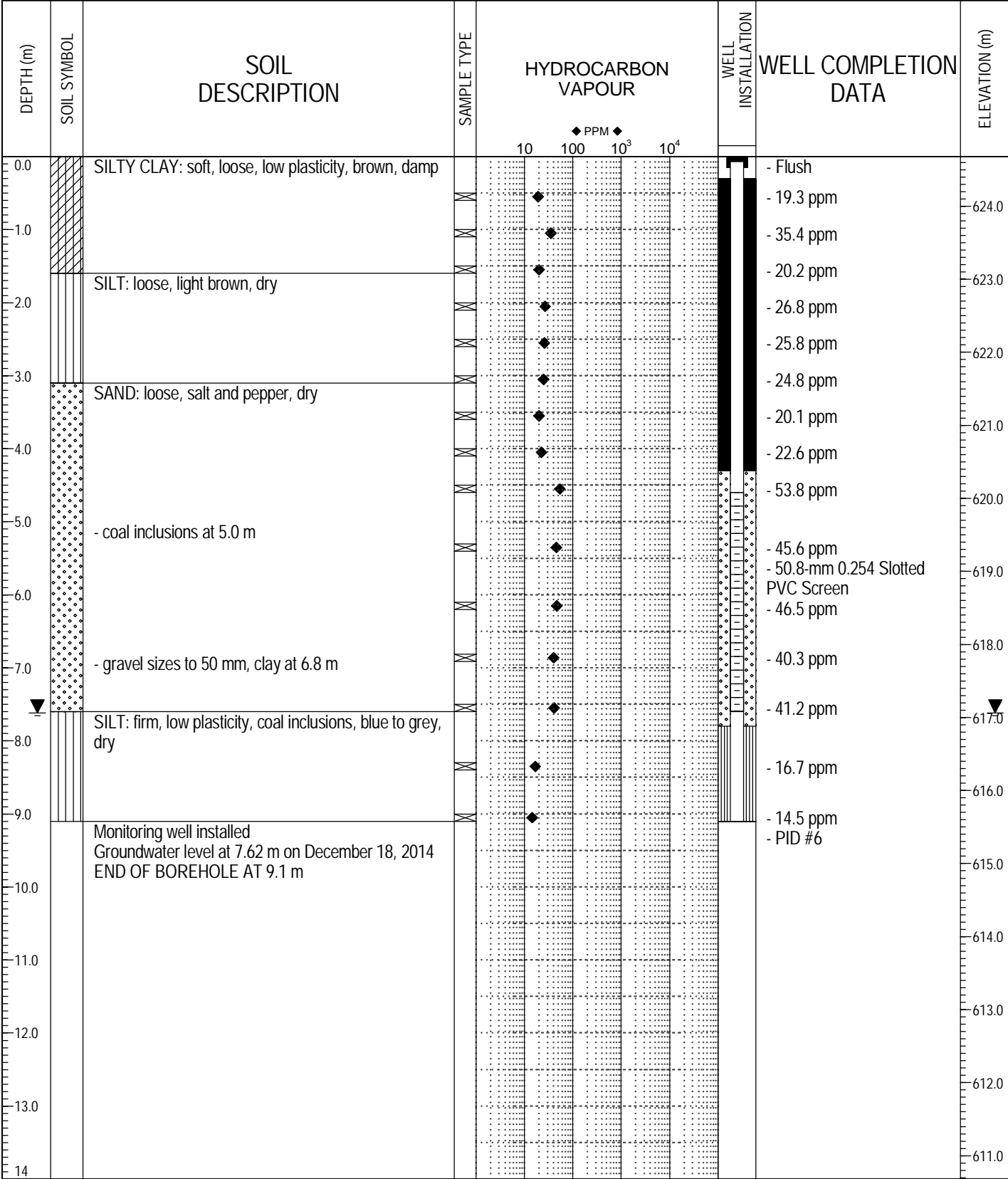


ENVIRONMENTAL 14-214-CRD ENV RO LOGS.GPJ NICHOLS ENVIRONMENTAL_GDT 2/9/15

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LOGGED BY: H.B.	COMPLETION DEPTH: 10.5 m
REVIEWED BY: T.A.	COMPLETED: 10/27/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A5:14-02
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 624.679 m
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BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT	<input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND

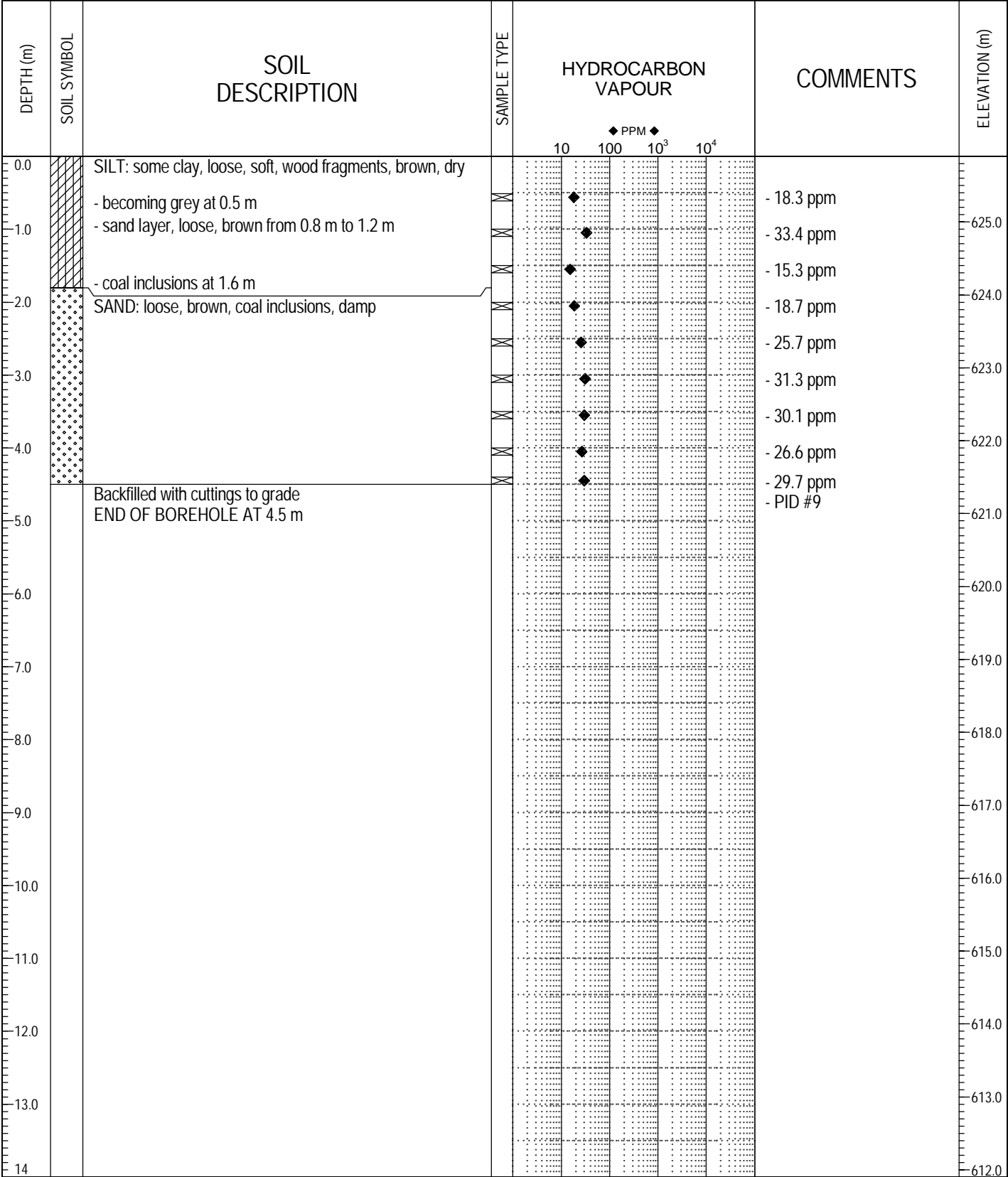


ENVIRONMENTAL 14-214-CRD ENV RO LOGS.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

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LOGGED BY: H.B.	COMPLETION DEPTH: 9.1 m
REVIEWED BY: T.A.	COMPLETED: 10/27/14
Page 1 of 1	

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A5:14-03
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 625.9 m
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BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

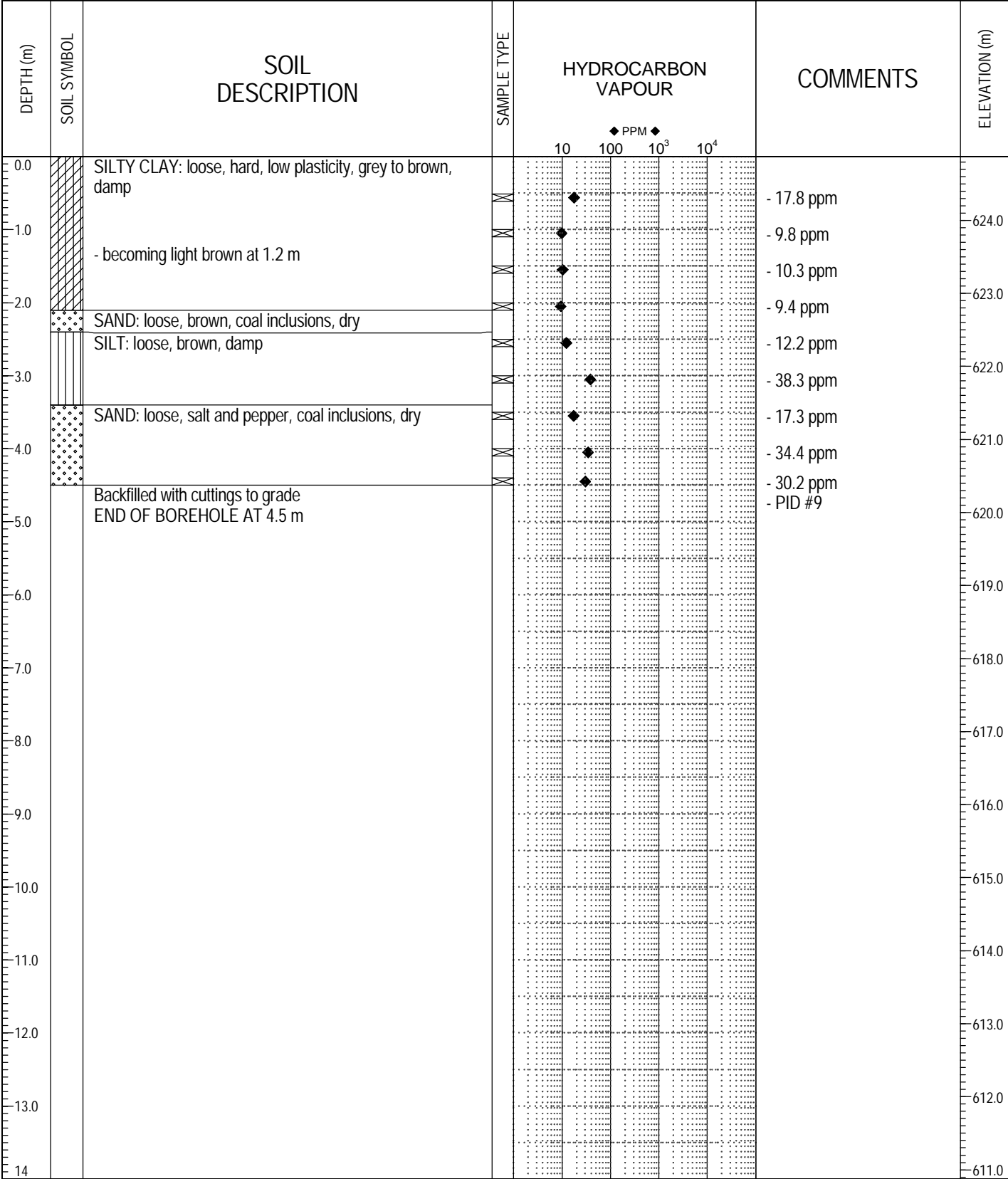


ENVIRONMENTAL 14-214-CRD ENV RO LOGS.GPJ NICHOLS ENVIRONMENTAL_GDT 2/9/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 4.5 m
REVIEWED BY: T.A.	COMPLETED: 10/27/14
Page 1 of 1	

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A5:14-04
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 624.872 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

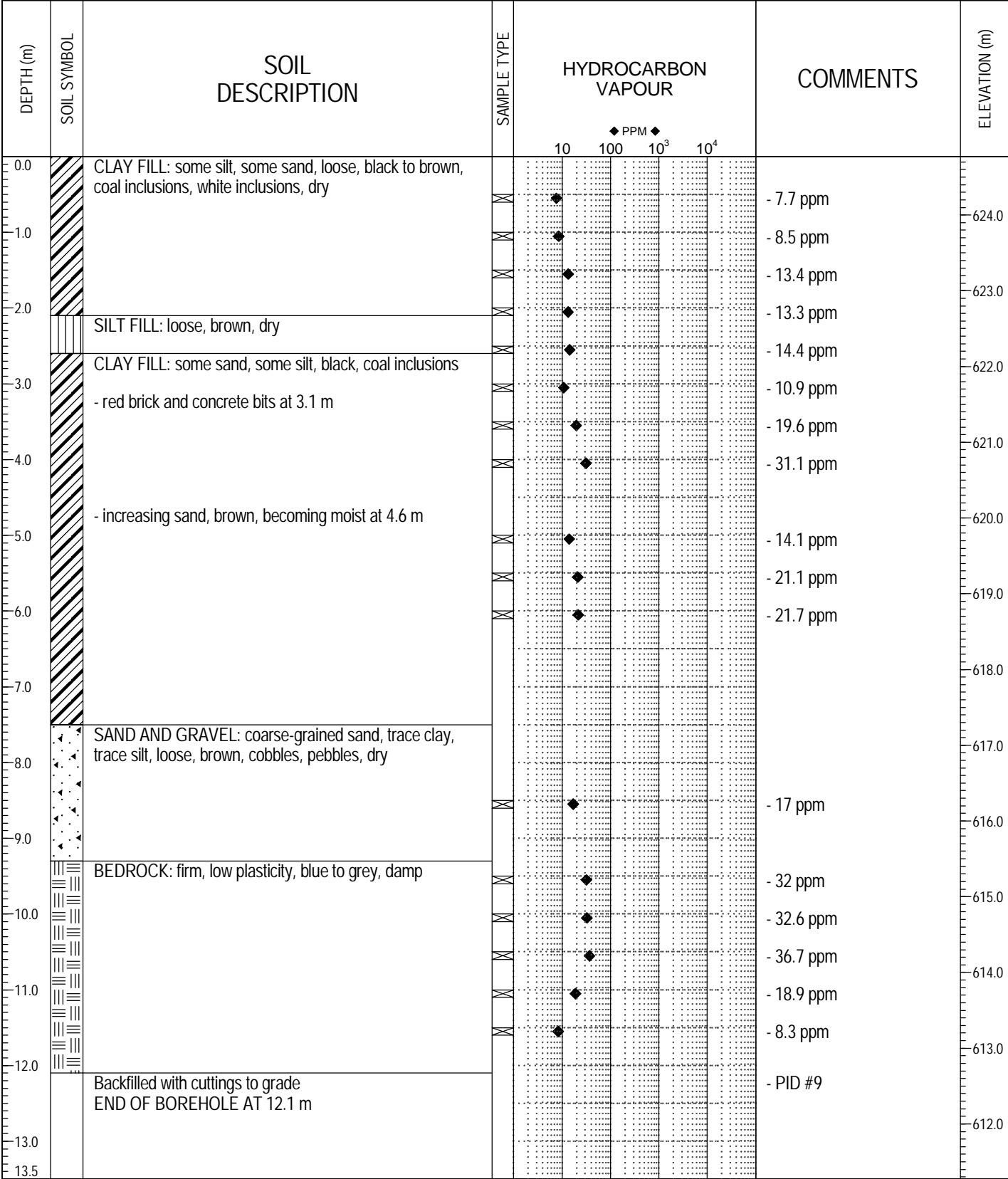


ENVIRONMENTAL 14-214-CRD ENV RO LOGS.GPJ NICHOLS ENVIRONMENTAL_GDT 2/9/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 4.5 m
REVIEWED BY: T.A.	COMPLETED: 10/27/14
Page 1 of 1	

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A6:14-14
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 624.771 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

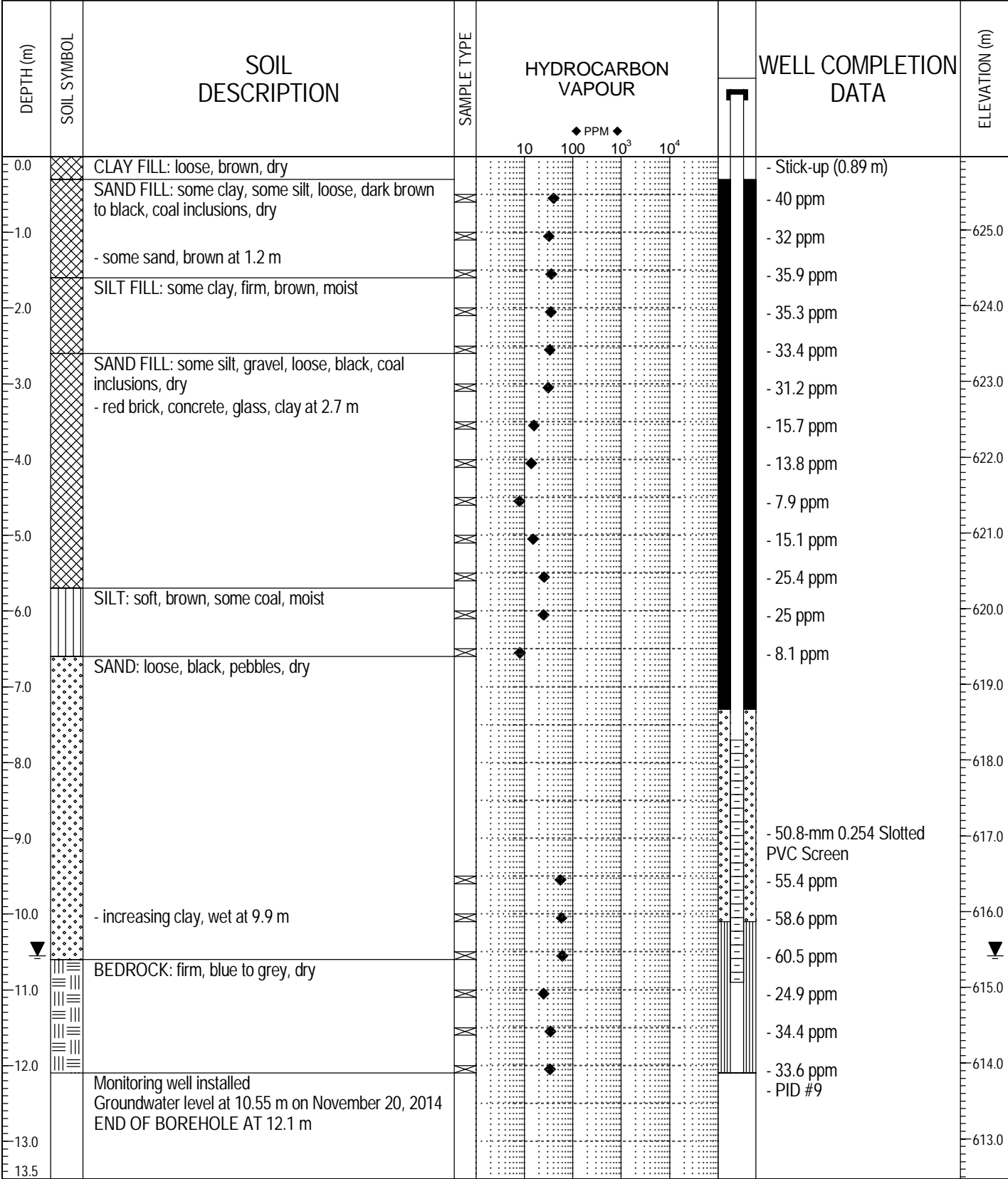


ENVIRONMENTAL 21-214-CRD A6.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

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LOGGED BY: H.B.	COMPLETION DEPTH: 12.1 m
REVIEWED BY: T.A.	COMPLETED: 11/3/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A6:14-15
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 625.968 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

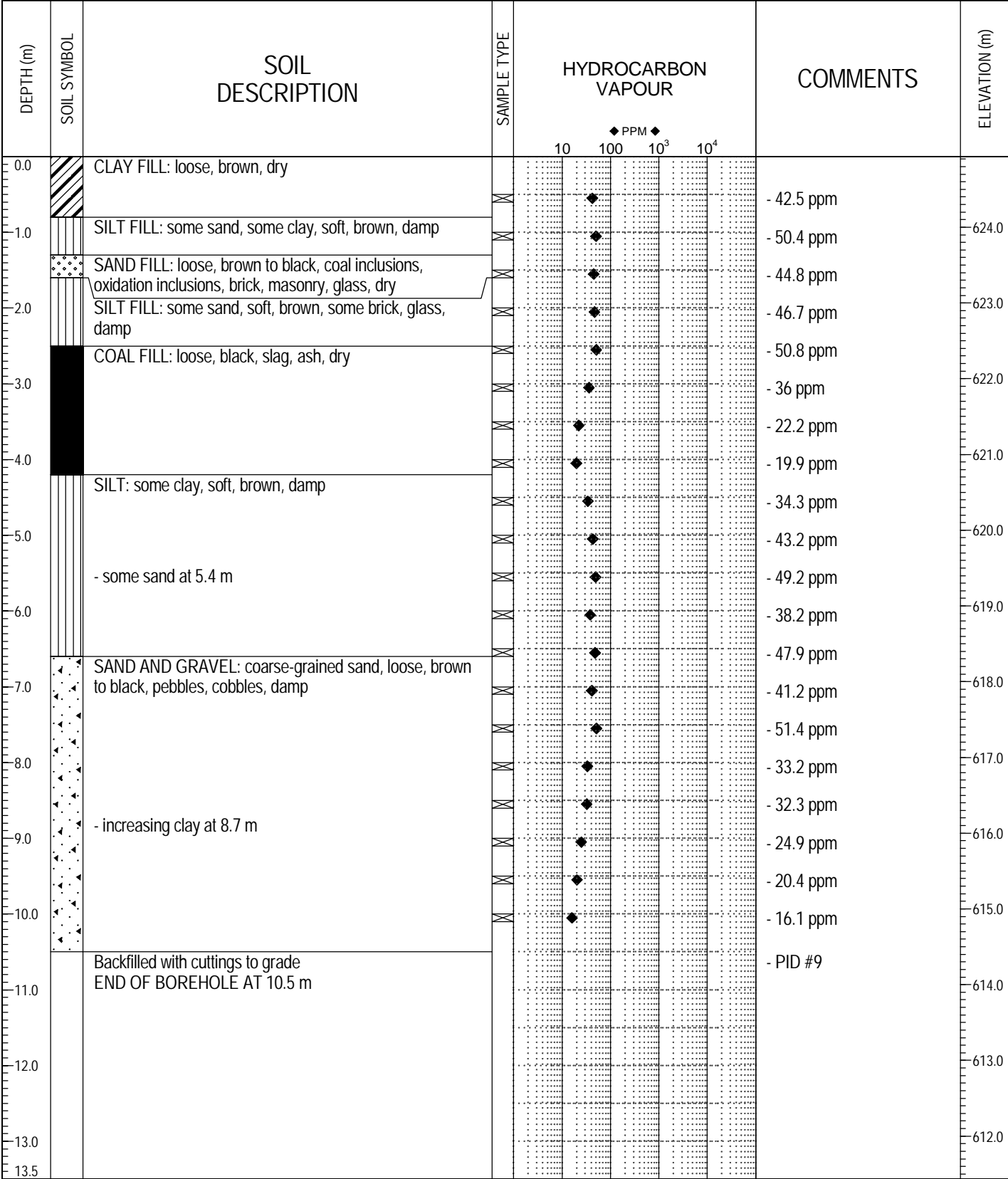


ENVIRONMENTAL 21-214-CRD A6.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 12.1 m
REVIEWED BY: T.A.	COMPLETED: 11/3/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A6:14-16
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 624.932 m
SAMPLE TYPE	<input checked="" type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING	<input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND

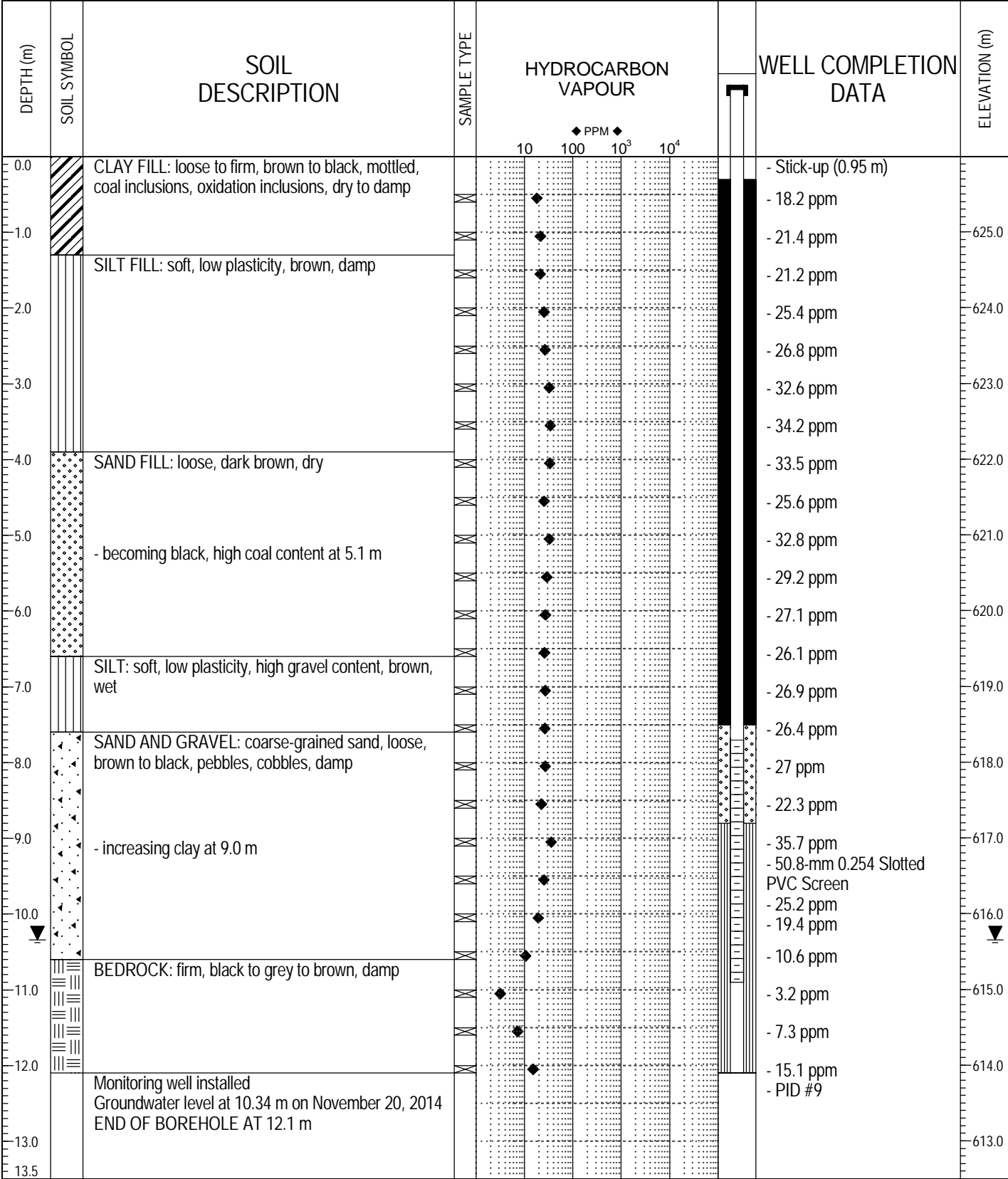


ENVIRONMENTAL 21-214-CRD A6.GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 10.5 m
REVIEWED BY: T.A.	COMPLETED: 11/3/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A6:14-17
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 625.994 m
SAMPLE TYPE	<input checked="" type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

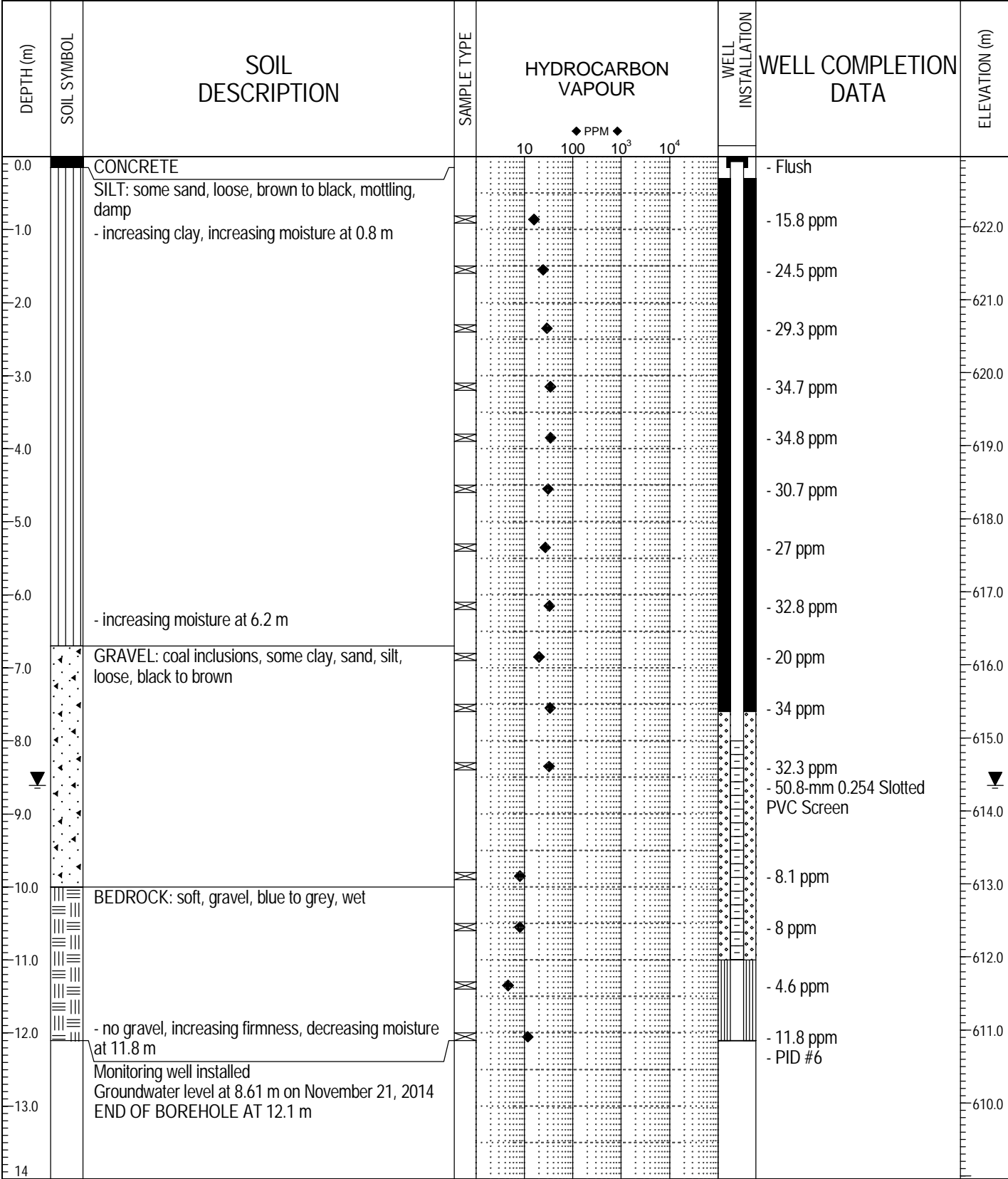


ENVIRONMENTAL 21-214-CRD A6:GPJ NICHOLS ENVIRONMENTAL.GDT 2/9/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 12.1 m
REVIEWED BY: T.A.	COMPLETED: 11/3/14
	Page 1 of 1

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A7:14-05
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 622.958 m
SAMPLE TYPE	<input checked="" type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

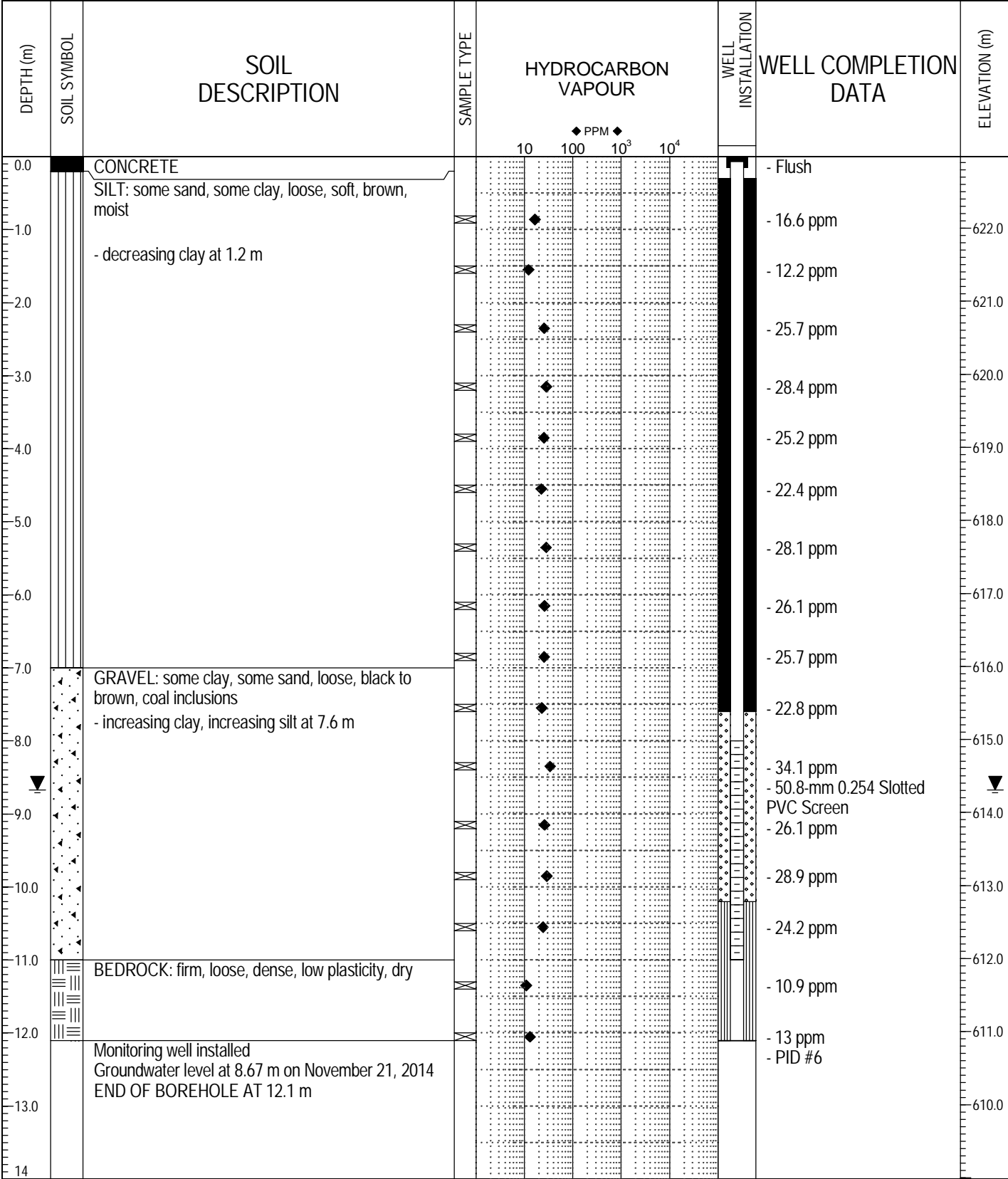


ENVIRONMENTAL 14-214-CRD ENV RO LOGS.GPJ NICHOLS ENVIRONMENTAL.GDT 2/8/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 12.1 m
REVIEWED BY: T.A.	COMPLETED: 10/28/14
Page 1 of 1	

CLIENT: The City of Edmonton	FIELD PERSONNEL: H. BAKKER	BOREHOLE NO: A7:14-06
PROJECT: Phase II ESA	DRILLING METHOD: Solid Stem Auger	PROJECT NO: 14-214-CRD
LOCATION: 9469 Rossdale Rd & 10155-96 Ave NW, Edm	CO-ORDINATES:	ELEVATION: 622.98 m
SAMPLE TYPE	<input type="checkbox"/> SPT <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> GRAB <input type="checkbox"/> A-CASING <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	



ENVIRONMENTAL 14-214-CRD ENV RO LOGS.GPJ NICHOLS ENVIRONMENTAL_GDT 2/9/15

Nichols Environmental (Canada) Ltd.

LOGGED BY: H.B.	COMPLETION DEPTH: 12.1 m
REVIEWED BY: T.A.	COMPLETED: 10/28/14
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APPENDIX E



FIELD INVESTIGATION METHODOLOGY - SOIL

Soil Sampling Procedure: Solid Stem Augers

The soils were logged using the Modified Unified Soil Classification system. Soil samples collected from boreholes are typically collected at 0.75 m intervals with any variation in sample collection depth noted on the borehole logs. The standard sampling procedure is as follows:

1. Samples collected from the auger were trimmed to remove the outer 5 mm to 10 mm to minimize cross contamination. A clean pair of latex gloves and putty knife were used for the procedure;
2. One half of the sample was transferred to a large plastic freezer bag and sealed for subsequent vapour measurement and/or laboratory analysis (inorganic);
3. The duplicate portion of the sample for laboratory analyses (organic), was transferred to 125 mL ESS glass jars, which were filled to capacity with soil and fitted with screw down, Teflon™ lined lids; and
4. Laboratory samples were stored in insulated coolers at approximately 4°C with the appropriate chain of custody information and transported to the analytical laboratory for chemical analyses.

Soil Sampling Procedure: Hollow Stem Augers

The soils were logged using the Modified Unified Soil Classification system. Soil samples were collected at various depth intervals, as depicted on the borehole logs. The sampling procedure is as follows:

1. The core sample collected from the A-Casing split spoon sampler was placed on a clean tray on the tailgate of the truck;
2. Samples collected from the A-Casing were trimmed to remove the outer 5 mm to 10 mm to minimize cross contamination. A clean pair of latex gloves and putty knife were used for the procedure;
3. One half of the sample was transferred to a large plastic freezer bag and sealed for subsequent vapour measurement and/or laboratory analysis;
4. The duplicate portion of the sample for laboratory analyses, was transferred to 125 mL ESS glass jars, which were filled to capacity with soil and fitted with screw down, Teflon™ lined lids; and
5. Laboratory samples were stored in insulated coolers with the appropriate chain of custody information and transported to the analytical laboratory for chemical analyses.



Soil Sampling Procedure: GeoProbe

The soils were logged using the Modified Unified Soil Classification system. Soil samples were collected continuously with the Geoprobe, as depicted on the borehole logs. The sampling procedure is as follows:

1. The core sample collection tube recovered using the Geoprobe was placed on a clean surface and the tube was split in half to expose the sample core. The sample collection tube was for one-time use only and was disposed of following sampling;
2. Using a clean pair of latex gloves and putty knife, samples were collected from the tube at various depth intervals;
3. One half of the sample was transferred to a large plastic freezer bag and sealed for subsequent vapour measurement and/or laboratory analysis;
4. The duplicate portion of the sample for laboratory analyses, was transferred to 125 mL ESS glass jars, which were filled to capacity with soil and fitted with screw down, Teflon™ lined lids; and
5. Laboratory samples were stored in insulated coolers with the appropriate chain of custody information and transported to the analytical laboratory for chemical analyses.

Soil Sampling Procedure: Excavation

The soil type is noted in field notes as per the Modified Unified Soil Classification system.

Soil samples are collected using the bucket of the excavator within excavations that extend deeper than 1.5 m. Each sample location is measured for depth and tied into a common reference point (reference or 0,0 co-ordinate). Samples along the excavation walls are typically collected every 0.75 m vertically and every 4 m to 5 m horizontally, while base samples are collected every 5 m.

The standard sampling procedure is as follows:

1. Samples collected from the bucket of the excavator are collected using a clean pair of latex gloves and putty knife;
2. One half of the sample was transferred to a large plastic freezer bag and sealed for subsequent vapour measurement and/or laboratory analysis;
3. The duplicate portion of the sample for laboratory analyses, was transferred to 125 mL ESS glass jars, which were filled to capacity with soil and fitted with screw down, Teflon™ lined lids; and
4. Laboratory samples were stored in insulated coolers with the appropriate chain of custody information and transported to the analytical laboratory for chemical analyses.



Hydrocarbon or Volatile Organic Compound Field Vapour Screening

Field subsoil samples are screened for hydrocarbon or volatile organic compound (VOC) vapour content using either a RKI Eagle or a Gastechtor 1238ME Hydrocarbon Surveyor (Gastech) - for hydrocarbons only - or a Photovac 2020 Photoionization Detector (PID) for VOCs - or equivalent detectors - calibrated with a known standard as defined in the operators manual. The screening procedure is as follows:

1. The field samples (plastic bag) were allowed to warm-up in ambient temperature conditions (20°C) for approximately 30 minutes to facilitate the release of hydrocarbon vapour or VOCs into the air space within the sample bag. During the winter months the samples are placed below the truck heater to warm them; and
2. The airspace is then tested for hydrocarbon or VOC vapour content using the appropriate instrument. The measured hydrocarbon or VOC vapour concentrations are expressed in parts-per-million by volume (ppmv).

NOTE: Additional soil samples may be collected for laboratory analysis on a project specific basis where numerous analyses are required. Soil bag samples may be collected where only trace metals analyses are to be conducted.

The above protocols were based on the following publications:

- Alberta Environment. 1996. Soil Monitoring Directive, Chemicals Assessment and Management Division, Environmental Regulatory Service; and
- Canadian Council of Ministers of the Environment. 1994. Subsurface Assessment Handbook for Contaminated Sites, The National Contaminated Sites Remediation Program.



FIELD INVESTIGATION METHODOLOGY - GROUNDWATER

Monitoring Well Installation

Groundwater monitoring wells are installed in boreholes as required to determine groundwater elevations and to assess groundwater quality.

Each monitoring well is typically constructed of 50 mm Schedule 40 polyvinyl chloride (PVC) pipe. A slip cap is placed on the bottom of the well to minimize sediment intrusion. A 0.254-mm slot PVC screen is then fixed to the bottom of the well casing as shown on the borehole logs, while solid PVC is used to bring the monitoring well to ground surface. Tubing connections consist of flush-joint threaded couplings. The annular space around the well screen is filled with Sil-9 sand to a minimum of 0.3 m above the well screen. The Sil-9 sand is used to form a filter pack that ensures that formation water can pass easily into the monitoring well.

Above the sand, the borehole is backfilled with bentonite chips to within 300 mm of ground surface. The bentonite is added in a dry chip form, which hydrates to form a seal. This seal allows collection of groundwater from the desired depth interval, and minimizes surface water intrusion.

Monitoring wells are typically completed with flush-mounted, bolt-down road boxes, unless otherwise noted on the borehole logs. Another option would be stickup completions with steel lockable casings. The monitoring well completion details are presented on the borehole logs.

Accessing a Monitoring Well

Prior to accessing a monitoring well, foreign liquids or other materials are cleared from the immediate vicinity of the well. If a monitoring well is submerged beneath water, water is removed from the immediate area. If the water cannot be removed or the well cannot be accessed, access issues are documented and reported directly to the project manager or client for further direction.

Prior to removing the well cap, surface water runoff is diverted or any water trapped within the annulus of the road box is removed. If required, a temporary extension to the top of the monitoring well can be added to prevent surface runoff from entering the monitoring well.

Vapour Screening

Prior to removing the well cap, the vapour screening instrumentation is turned on and allowed to reach the point where vapour concentrations are being measured.

The following is taken from the Nichols Environmental PID Operating Procedures document:

- Prior to removing the groundwater monitoring well cap, foreign liquids or materials are cleared from the immediate area surrounding the well;
- The well cap is removed and the probe/nozzle of the PID is inserted into the well, taking care not to insert the probe into the water and cause blockage or damage to the PID;



- The readings are allowed to stabilize, or come close to stabilization before recording a value;
- The value displayed on the PID screen is recorded; and
- The probe/nozzle of the PID is removed from the monitoring well and allowed to return to zero or ambient conditions.

Groundwater Elevation

The depth to groundwater is measured with a water tape or interface probe by placing the instrument in the well and measuring to either the top of casing or ground level. The measurement is taken to the nearest one hundredth of a metre.

The depth to groundwater is also measured as described above, prior to collecting the groundwater samples.

The groundwater elevation is determined by subtracting the depth to groundwater from the surface elevation. The groundwater surface elevation is determined by survey.

Free product in a monitoring well can be either a light non aqueous phase liquid (LNAPL) or dense non aqueous phase liquid (DNAPL). Free product accumulations are measured with an interphase probe. If free product (LNAPL) is encountered in the monitoring well, the top and bottom of the thickness is measured (which is equivalent to the thickness of free product). Free product accumulations are measured to the nearest centimetre.

DNAPL is typical of solvents and most commonly as chlorinated solvents, which are heavier than water and sink; hence the free product accumulation would be present in the bottom of the well. Therefore, free product measurement is from the bottom of the monitoring well up to get a thickness.

Groundwater Well Development

Following the installation of a groundwater monitoring well, the well must be developed by purging a minimum of ten well volumes of groundwater. The groundwater is purged using a dedicated, disposable bailing tube, Waterra foot valve pumping system, or submersible pump. Well development will ensure representative measurements of depth to water level and allow for proper groundwater sampling following purging.

Standard Groundwater Well Purging

The groundwater monitoring wells are purged of three well volumes prior to collecting the groundwater samples. The groundwater is purged using either a dedicated disposable bailing tube, Waterra, peristaltic, submersible or bladder pumps. Purging the wells prior to sample collection reduces the potential of sampling stagnant water and provides a more representative sample.



Standard Groundwater Sampling

Groundwater samples are collected from the monitoring wells after purging and recovery. The samples are collected using either a dedicated disposable bailing tube, Waterra, peristaltic, submersible or bladder pump. New sections of silicone or Waterra tubing used for each monitoring well. Groundwater samples are collected in sample bottles specific to the type of chemical analysis being conducted. Sample preservatives are also added depending on the type of chemical analysis conducted. The analytical laboratory provides sample bottles and associated preservatives.

Low-Flow Groundwater Sampling

Low-flow groundwater sampling differs from standard groundwater sampling primarily through the use of minimal or no purge methods. A pump (peristaltic, submersible, or bladder) and associated tubing is slowly lowered to approximately the middle of the installed well screen interval and groundwater is pumped at a slow rate (less than or equal to 1 L/min) through a multi-parameter meter until parameter concentrations stabilize. Stabilization of these parameters indicates that fresh groundwater is entering the monitoring well and that a sample could be collected.

The objective of low-flow sampling is to minimize stress (drawdown) to the groundwater system. Typically, flow rates in the order of 0.1 - 0.5 L/min are used. However, this is dependent on site-specific hydrogeology. Flow rates are adjusted during the initial pumping to determine a steady state flow rate sufficient for the specific site. Sufficient flow rates are characterized by groundwater drawdown of less than 30 cm during continued pumping.

If groundwater recharge on the site is not sufficient to complete low-flow sampling, manual purging of the monitoring wells is completed and then the monitoring wells are allowed to recharge. The pump is then utilized to pass groundwater through a multi-parameter meter to determine in situ groundwater parameter concentrations. Stabilization of the in situ parameters may not be achieved if groundwater recharge is slow. Samples are collected within two hours of purging and no more than 24 hours can elapse between purging and sampling.

Using an In-situ TROLL[®] 9500 multi-parameter meter complete with a flow-through cell and either a GeoPump Easy-Load II[®] or Spectra Field-Pro variable-rate peristaltic pump (unless a specialized pump is required), field readings for pH, oxidation reduction potential (ORP), temperature, electrical conductivity (EC), and dissolved oxygen (DO) are collected. Readings are taken every one to three minutes until stabilization occurs. Stabilization of in situ parameters is characterized by three consecutive measurements which meet the following standards:

- pH = $\pm 10\%$ or ± 0.1 units;
- ORP = $\pm 10\%$ or ± 10 millivolts (mV);
- Temperature = $\pm 5\%$ or $\pm 0.5^\circ\text{C}$;
- EC = $\pm 10\%$ or ± 5 microSiemens per centimetre ($\mu\text{S}/\text{cm}$);
- DO = $\pm 10\%$ or ± 0.2 milligrams per litre (mg/L);

Once field stabilization has occurred, the flow-through cell is disconnected from the pumping system and groundwater samples are collected into laboratory-specific bottles. There may be situations where geochemical parameters will not stabilize. As such, if the monitored parameters do not stabilize after purging three to five well volumes, a field note is made, purging is



discontinued and sampling is completed. Sample collection flow rates are less than 0.5 L/min and groundwater is transferred directly from the end of the tubing into the sample container.

Preservation Methodology

Preservation and field filtering of groundwater samples are completed based on the type of laboratory analysis required.

Instructions and protocols required by the laboratory for the samples to be submitted for analysis are reviewed. If preservative is required, the sample container is filled approximately three-quarters full with the groundwater sample before the preservative is added and then is filled to the top of the container with the remainder of the sample. The sample containers are kept closed until they are ready to be filled. All sample containers are filled as full as possible without overflow and without trapped airspace. Overfilling a sample container may result in the loss of the preservative. Airspace can potentially affect the pH of some groundwater samples. Larger sample bottles are filled first, and then the flow rates are reduced to approximately 0.1 L/min for volatiles and filtered samples.

The pump, associated tubing, and the flow-through cell are cleaned with distilled water after each sample is collected and prior to the next sample being collected. This minimizes the risk of cross-contamination of the groundwater samples.

Organics

All organic samples are collected and preserved in glass bottles.

Benzene, toluene, ethylbenzene and xylenes (BTEX) are collected in triplicate 40-mL clear glass vials with a penetrable septum. The samples are normally preserved with a sodium bisulphate tablet or with a preservative provided by the laboratory. Petroleum hydrocarbon (PHC) Fractions 1 through 4 are collected in a single 1-L amber bottle without preservative or in two 250-mL amber bottles with a sodium bisulphate tablet.

Volatile organic compounds (VOCs) are collected in triplicate 40-mL clear glass vials with a penetrable septum. The samples are normally preserved with sodium bisulphate or with a preservative provided by the laboratory.

All sample bottles are filled to capacity with no headspace and stored in coolers at approximately 4°C prior to and during transport to the analytical laboratory. If headspace is noted (bubbles larger than 1 mm are present), the sample is discarded and a new sample is collected in a new sample container.

Groundwater samples containing organic contaminants are not filtered. Aeration of the groundwater is avoided during transfer from the well to the sample container. Sample flow rates are between 0.1 and 0.2 L/min.



Inorganics

Inorganic samples are collected and preserved (if necessary) in plastic bottles. The only exception to this may be for dissolved oxygen.

There are two accepted field practices for the collection of metals samples depending on the type of analysis required. Dissolved metals analysis requires field filtering, followed by acidifying the sample. Extractable metals analysis requires acidifying without field filtering.

Lead groundwater samples are collected in a 100-mL polyethylene bottle. The samples are preserved with 1 mL of 1:3 nitric acid. Trace metals groundwater samples are collected in 250-mL polyethylene bottles. The samples are preserved with 5 mL of 1:5 nitric acid.

All sample bottles are filled to capacity with no headspace and stored in coolers at approximately 4°C prior to and during transport to the analytical laboratory.

Duplicate Samples

Duplicate groundwater samples are collected to determine the precision of field sampling methods, laboratory analytical methods, and environmental heterogeneity. To eliminate environmental heterogeneity errors, split samples are generally collected instead of duplicate sampling in series.

When duplicate groundwater samples are required for a project, sampling will be completed as a split sample from a common sample bottle. Groundwater can be sampled using either of the standard or low flow sampling methods described above. Groundwater is bailed or pumped into a common bottle of the same material that the destination sample bottles are made from (i.e., inorganic parameters are sampled from a common plastic bottle and organic parameters are sampled from a common glass bottle) and then inverted several times to allow the water to reach homogeneity. The common bottle is then split between two sample bottles: a sample bottle labeled with the monitoring well name, and a sample bottle labeled DUP. Duplicate groundwater samples are separated into the bottles sequentially (i.e., monitoring well routine bottle, then the duplicate routine bottle, monitoring well metals bottle, then the duplicate metals bottle). The common bottle is double the size of the largest sample bottle to avoid having to refill the common bottle more than once to fill the same set of sample/duplicate bottles.

When field filtering is required, the groundwater is field filtered prior to entering the common bottle. Preservation of the groundwater samples is completed after the groundwater sample has been split into each of the respective sampling bottles, as preservation chemical volumes are specifically measured to match the final sampling bottle volume. Once preservation chemicals have been added, each bottle is inverted several times to allow the preservative to thoroughly mix.

Field Blank Samples

Field blank samples determine if external sources of contamination, such as from the atmosphere, bottle media, preservatives, or sample preparation area, are present in a data set. Field blank samples are deionized or demineralized water which is subjected to the same sampling methods as the groundwater samples themselves. Field blanks can be prepared in the laboratory or in the field during sampling. Field blanks are completed in an area of the site where there is likely to be



the most airborne contamination (i.e., around fueling pumps, tank farms, discharging or dusty areas, etc.).

If field blanks are prepared by the laboratory, the sample bottles will be opened up once on the site, preferably in an area where airborne contaminants can be expected. The field blanks will remain open and secured while one or two groundwater monitoring wells in the area are sampled. This will help to catch any airborne contaminants in the area as well as any contaminants from the truck box or stationary equipment in the same area as the groundwater samples are being prepared. Preservatives are added to field blanks like any groundwater sample, followed by inverting of the sample several times to allow the preservative to mix thoroughly.

Preparing a field blank on site is the preferred method of preparation. Field blanks prepared in the field are prepared with deionized or demineralized water provided by the laboratory. Once on the site, and in area where airborne contaminants could be present, the deionized/demineralized water is poured into the sampling bottles and any required preservatives added. The field blank then remains open while one or two groundwater monitoring wells in the area are sampled.

Once the field blank has been completed, the bottles are closed and placed in the cooler. Field blanks are labeled as FB or FIELD BLANK so that they can be easily identified in a sampling set.

Trip Blank Samples

Trip blank samples are used to measure contamination resulting from the sampling bottle itself or volatile compounds which may be present inside of a laboratory-supplied cooler. Trip blanks are prepared by the laboratory, delivered to the consultant, travel to a site and then travel back to the laboratory. The difference between field blanks and trip blanks are that trip blanks are never opened, they are just left in the cooler throughout the entire sampling program. Trip blanks are never prepared in-house or on a site. Trip blanks are labelled as TB or TRIP BLANK so that they can be easily identified in a sample set.

Closing a Monitoring Well

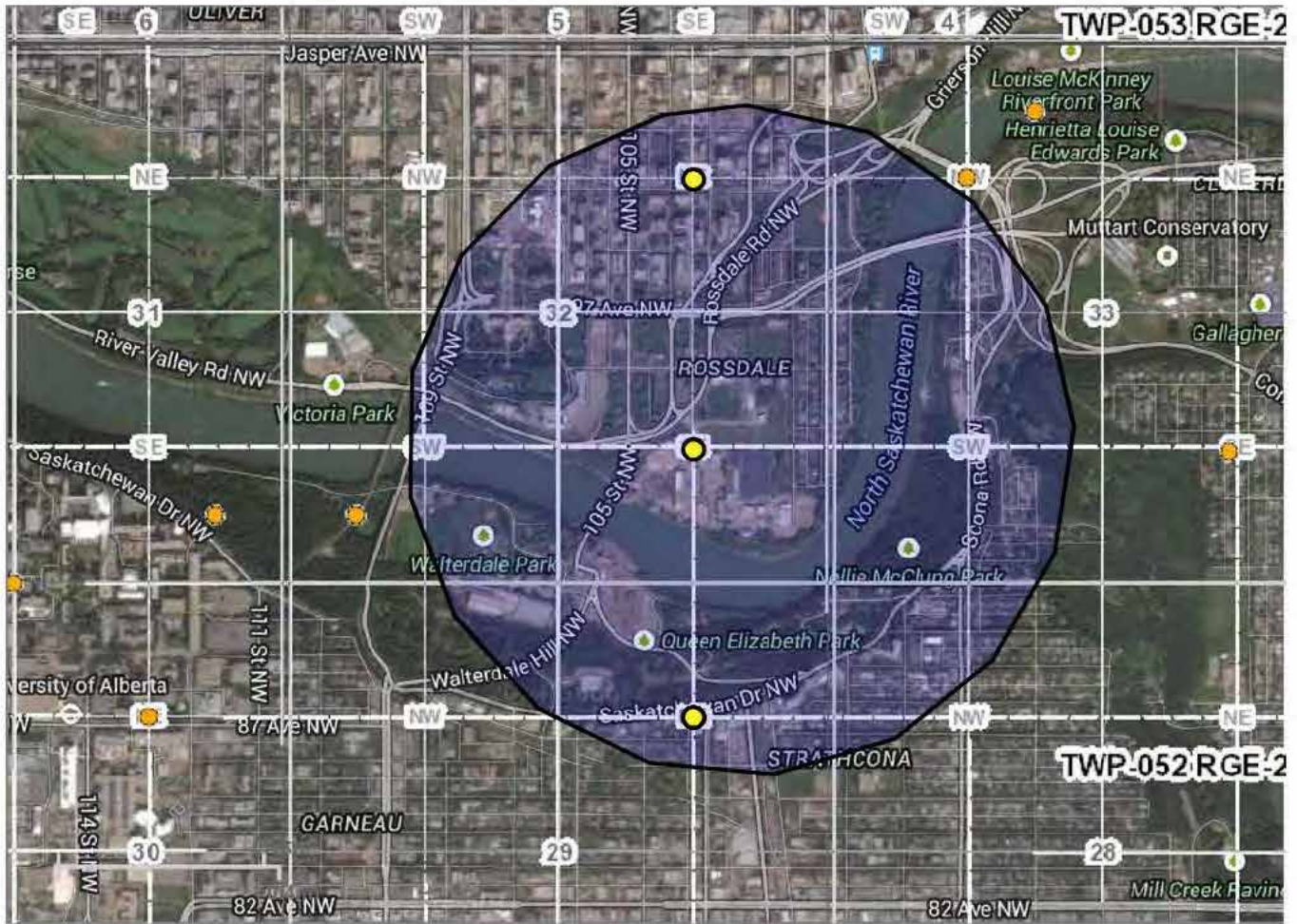
Prior to moving onto the next monitoring well or leaving a site, field staff ensure all monitoring wells are closed or locked as required. Minor monitoring well repairs (replacement of a well cap, flush-mount cover screws and/or plates, cutting down well casings which have been pushed up) are completed as required. The project manager or client will be contacted immediately for any monitoring wells which are damaged beyond minor repair.

References:

Canadian Council of Ministers of the Environment (CCME). 2011. Protocols Manual for Water Quality Sampling in Canada. PN 1461. ISBN 978-1-896997-7-0.

US EPA. 1996. Low Stress (low flow) purging and sampling procedure for the collection of ground water samples from monitoring wells. US Environmental Protection Agency. Revision 2.

APPENDIX F



Alberta Water Well Information Database Map

Projection

Web Mercator (Auxillary Sphere)

Datum

WGS 84

Date

1/14/2015 5:04:48 PM

Legend

- Groundwater Drilling Report
- ◆ Baseline Water Well Report

<http://groundwater.alberta.ca/WaterWells/d/>

Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

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Groundwater Wells

Please click the water Well ID to generate the Water Well Drilling Report.

Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)
1131130	NE	29	52	24	4	BIG IRON DRILLING LTD.	2013-10-15	106.68	New Well	Irrigation		16		STRATHCONA COMMUNITY LEAG	1.22	1.41
1131130	NE	29	52	24	4	BIG IRON DRILLING LTD.	2013-07-15	106.68	New Well	Irrigation		16	26	STATHCONA COMMUNITY GARDE	5.24	2.27
1131131	NE	29	52	24	4	BIG IRON DRILLING LTD.	2013-09-30	60.96	New Well	Irrigation		13		STRATHCONA COMMUNITY LEAG	39.44	1.00
1131131	NE	29	52	24	4	BIG IRON DRILLING LTD.	2013-09-30	60.96	New Well	Irrigation		13	26	STRATHCONA COMMUNITY GARD	38.84	2.27
2094596	SE	32	52	24	4	UNKNOWDRILLINGCOMP11	1926-06-30	89.61	Well Inventory	Unknown		10		NORTH WEST BREWING CO. LTD.	74.37	
2094719	NE	32	52	24	4	UNKNOWDRILLINGCOMP11	1922-08-03	71.63	Well Inventory	Unknown		26		CANADIAN NATIONAL RAILWAY		

APPENDIX G

Report Transmission Cover Page

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Contact & Affiliation	Address	Delivery Commitments
Tawnya Anderson Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Merge Reports On [Lot Creation] send (COR) by Email - Merge Reports
Kelly Goetz Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

Notes To Clients:

- Report was issued to include visible note to client about the review of phenanthrene concentrations as requested by Tawnya Anderson of Nichols Environmental on November 4, 2014. Previous Report #1964376.
- Report was issued to include addition of Chromatograms analysis on Samples 8-10 requested by Tawnya Anderson of Nichols on Nov 14th/14. Previous report 1968309.
- Phenanthrene hits were reviewed by the analyst and all calculations are correct with no reason to suspect false positives.

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Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036573-1	1036573-2	1036573-4		
	Sample Date	Oct 27, 2014	Oct 27, 2014	Oct 27, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A5:14-01 / 1.5 / m	A5:14-02 / 2.0 / m	A5:14-03 / 1.0 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	<0.010	<0.010	<0.010	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.02	0.02	<0.01	0.01
Anthracene	Dry Weight	mg/kg	<0.003	<0.003	<0.003	0.003
Fluoranthene	Dry Weight	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	Dry Weight	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		<0.001	<0.001	<0.001	0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001	<0.001	<0.001	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	103	123	102	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	102	100	100	30-130
p-Terphenyl-d14	PAH - Surrogate	%	100	106	114	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1036573-1	1036573-3	1036573-5	
		Sample Date	Oct 27, 2014	Oct 27, 2014	Oct 27, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A5:14-01 / 1.5 / m	A5:14-02 / 2.5 / m	A5:14-03 / 0.5 / m	
		Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	0.70	2.87	1.87	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.03	0.03	0.06	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	<0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	5.5	5.5	6.9	0.2
Barium	Strong Acid Extractable	mg/kg	194	198	189	1
Beryllium	Strong Acid Extractable	mg/kg	0.4	0.4	0.6	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.18	0.22	0.13	0.01
Chromium	Strong Acid Extractable	mg/kg	15.4	14.8	18.7	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.2	7.8	10.4	0.1
Copper	Strong Acid Extractable	mg/kg	18.4	17.2	20.6	1
Lead	Strong Acid Extractable	mg/kg	7.7	7.5	9.6	5
Molybdenum	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Nickel	Strong Acid Extractable	mg/kg	23.4	21.7	33.4	0.5
Selenium	Strong Acid Extractable	mg/kg	0.3	<0.3	0.4	0.3
Silver	Strong Acid Extractable	mg/kg	<0.1	<0.1	<0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.16	0.15	0.20	0.05
Tin	Strong Acid Extractable	mg/kg	1.8	1.7	1.7	1
Uranium	Strong Acid Extractable	mg/kg	0.7	0.6	0.7	0.5
Vanadium	Strong Acid Extractable	mg/kg	24.0	25.8	31.4	0.1
Zinc	Strong Acid Extractable	mg/kg	45	44	51	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	5.3	17.7	6.2	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number 1036573-6
Sample Date Oct 27, 2014
Sample Time NA
Sample Location
Sample Description A5:14-04 / 3.0 / m
Matrix Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil					
Naphthalene	Dry Weight	mg/kg	<0.010		0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05		0.05
Acenaphthene	Dry Weight	mg/kg	<0.05		0.05
Fluorene	Dry Weight	mg/kg	<0.05		0.05
Phenanthrene	Dry Weight	mg/kg	0.02		0.01
Anthracene	Dry Weight	mg/kg	<0.003		0.003
Fluoranthene	Dry Weight	mg/kg	<0.01		0.01
Pyrene	Dry Weight	mg/kg	<0.01		0.01
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01		0.01
Chrysene	Dry Weight	mg/kg	<0.05		0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05		0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05		0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05		0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05		0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05		0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05		0.05
IACR_Coarse	Index of Additive Cancer Risk		<0.001		0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001		0.001
PAH - Soil - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	119		23-130
2-Fluorobiphenyl	PAH - Surrogate	%	79		30-130
p-Terphenyl-d14	PAH - Surrogate	%	85		18-137

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1036573-7
Sample Date	Oct 27, 2014
Sample Time	NA
Sample Location	
Sample Description	A5:14-04 / 1.0 / m
Matrix	Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	6.11		0.2
Metals Strong Acid Digestion					
Mercury	Strong Acid Extractable	mg/kg	0.04		0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2		0.2
Arsenic	Strong Acid Extractable	mg/kg	6.3		0.2
Barium	Strong Acid Extractable	mg/kg	328		1
Beryllium	Strong Acid Extractable	mg/kg	0.8		0.1
Cadmium	Strong Acid Extractable	mg/kg	0.25		0.01
Chromium	Strong Acid Extractable	mg/kg	20.4		0.5
Cobalt	Strong Acid Extractable	mg/kg	11.9		0.1
Copper	Strong Acid Extractable	mg/kg	23.9		1
Lead	Strong Acid Extractable	mg/kg	11.9		5
Molybdenum	Strong Acid Extractable	mg/kg	<1.0		1
Nickel	Strong Acid Extractable	mg/kg	34.8		0.5
Selenium	Strong Acid Extractable	mg/kg	0.4		0.3
Silver	Strong Acid Extractable	mg/kg	<0.1		0.1
Thallium	Strong Acid Extractable	mg/kg	0.25		0.05
Tin	Strong Acid Extractable	mg/kg	1.4		1
Uranium	Strong Acid Extractable	mg/kg	0.6		0.5
Vanadium	Strong Acid Extractable	mg/kg	36.1		0.1
Zinc	Strong Acid Extractable	mg/kg	75		1
Barite Soil Analysis					
Barium	Extractable	mg/kg	31.9		0.05
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10		0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1036573-8
Sample Date	Oct 28, 2014
Sample Time	NA
Sample Location	
Sample Description	A7:14-05 / 7.5 / m
Matrix	Soil


Analyte	Units	Results	Results	Results	Nominal Detection Limit
Particle Size Analysis - Wet Sieve					
Texture			Coarse-Grained		
75 micron sieve	% Retained	% by weight	71.2		0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036573-8	1036573-9	1036573-10	
	Sample Date	Oct 28, 2014	Oct 28, 2014	Oct 28, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A7:14-05 / 7.5 / m	A7:14-06 / 8.3 / m	A7:14-07 / 10.5 / m	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Extraction Date	Volatiles	31-Oct-14	31-Oct-14	31-Oct-14	
Benzene	Dry Weight mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight mg/kg	0.04	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight mg/kg	<0.010	<0.010	<0.010	0.01
Total Xylenes (m,p,o)	Dry Weight mg/kg	<0.03	0.03	<0.03	0.03
Styrene	Dry Weight mg/kg	<0.010	<0.010	<0.010	0.010
Volatile Petroleum Hydrocarbons - Soil					
Extraction Date	Volatiles	31-Oct-14	31-Oct-14	31-Oct-14	
F1 C6-C10	Dry Weight mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil					
Extraction Date	Total Extractables	31-Oct-14	31-Oct-14	31-Oct-14	
F2c C10-C16	Dry Weight mg/kg	<50	<50	<50	50
F3c C16-C34	Dry Weight mg/kg	66	<50	<50	50
F4c C34-C50	Dry Weight mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight mg/kg	<100	<100	<100	100
% C50+	%	<5	<5	<5	
Silica Gel Cleanup					
Silica Gel Cleanup		Done	Done	Done	
Soil % Moisture					
Moisture	Soil % Moisture % by weight	17.90	13.00	17.40	

Approved by: 
Randy Neumann, BSc
Vice President



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Hot Water Soluble

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Boron	mg/L	0.0212194	-0.01	0.02	yes	
Date Acquired: October 31, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Boron	mg/kg	192	202	10	0.10	yes
Date Acquired: October 31, 2014						
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Boron	mg/kg	1.64	1.07	2.05	yes	
Date Acquired: October 31, 2014						
Boron	mg/kg	0.11	0.09	0.11	yes	
Date Acquired: October 31, 2014						

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Mercury	ug/L	-0.0475	-0.07	0.13	yes	
Antimony	ug/L	0.039	-0.1	0.2	yes	
Arsenic	ug/L	-0.008	-0.2	0.2	yes	
Barium	ug/L	0.171	-1	1	yes	
Beryllium	ug/L	-0.015	-0.1	0.1	yes	
Cadmium	ug/L	-0.01	-0.01	0.01	yes	
Chromium	ug/L	0.028	-0.5	0.5	yes	
Cobalt	ug/L	0.0063	-0.1	0.1	yes	
Copper	ug/L	0.034	-0.6	1.2	yes	
Lead	ug/L	0.016	-5.0	5.0	yes	
Molybdenum	ug/L	0.021	-1.0	1.0	yes	
Nickel	ug/L	0.109	-0.4	0.7	yes	
Selenium	ug/L	0.025	-0.3	0.3	yes	
Silver	ug/L	0.117	-0.09	0.14	yes	
Thallium	ug/L	-0.006	-0.04	0.04	yes	
Tin	ug/L	4.123	0.0	7.2	yes	
Uranium	ug/L	0.003	-0.5	0.5	yes	
Vanadium	ug/L	0.045	-0.1	0.1	yes	
Zinc	ug/L	0.267	-1	1	yes	
Date Acquired: October 31, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Mercury	mg/kg	0.02	0.03	10	0.03	yes
Date Acquired: October 31, 2014						
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Mercury	mg/kg	0.30	0.28	0.34	yes	
Antimony	mg/kg	40.7	36.1	43.9	yes	
Arsenic	mg/kg	41.5	36.7	44.3	yes	
Barium	mg/kg	208	185	215	yes	



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Beryllium	mg/kg	19.1	17.4	22.2	yes
Cadmium	mg/kg	2.04	1.80	2.20	yes
Chromium	mg/kg	102	92.2	105.8	yes
Cobalt	mg/kg	21.8	18.5	22.5	yes
Copper	mg/kg	189	176.3	207.3	yes
Lead	mg/kg	19.2	18.6	21.8	yes
Molybdenum	mg/kg	198	172.6	215.4	yes
Nickel	mg/kg	101	90.6	107.4	yes
Selenium	mg/kg	39.9	36.1	42.9	yes
Silver	mg/kg	20.0	16.69	21.97	yes
Thallium	mg/kg	10.4	9.57	11.23	yes
Tin	mg/kg	197	171.9	201.9	yes
Uranium	mg/kg	94.1	90.3	108.0	yes
Vanadium	mg/kg	19.2	16.3	20.3	yes
Zinc	mg/kg	191	180	220	yes
Date Acquired:	October 31, 2014				
Mercury	mg/kg	0.08	0.05	0.11	yes
Date Acquired:	October 31, 2014				
Mercury	mg/kg	0.36	0.15	0.42	yes
Antimony	mg/kg	1.0	0.3	1.1	yes
Arsenic	mg/kg	78.2	65.9	97.9	yes
Barium	mg/kg	241	213	270	yes
Beryllium	mg/kg	0.7	0.5	0.9	yes
Cadmium	mg/kg	2.00	1.50	2.64	yes
Chromium	mg/kg	37.5	27.4	39.2	yes
Cobalt	mg/kg	13.5	11.3	16.0	yes
Copper	mg/kg	200	162.7	222.9	yes
Lead	mg/kg	122	99.6	135.6	yes
Molybdenum	mg/kg	2.8	2.0	3.8	yes
Nickel	mg/kg	66.1	47.1	73.5	yes
Selenium	mg/kg	0.8	0.3	1.3	yes
Silver	mg/kg	0.9	0.25	1.15	yes
Thallium	mg/kg	0.33	0.26	0.40	yes
Tin	mg/kg	4.6	1.0	5.4	yes
Uranium	mg/kg	1.4	0.9	1.5	yes
Vanadium	mg/kg	43.8	31.5	56.1	yes
Zinc	mg/kg	471	355	550	yes
Date Acquired:	October 31, 2014				

Particle Size Analysis - Wet Sieve

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
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Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Particle Size Analysis - Wet Sieve

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
75 micron sieve	% by weight	29.7	25.4	34.5	yes
Date Acquired: November 03, 2014					

Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Barium	mg/L	0.00319662	-0.00	0.01	yes	
Date Acquired: October 31, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Barium	mg/kg	17.2	15.7	10	5.00	yes
Date Acquired: October 31, 2014						
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Barium	mg/kg	11.3	8.87	12.71	yes	
Date Acquired: October 31, 2014						
Barium	mg/kg	0.09	0.09	0.11	yes	
Date Acquired: October 31, 2014						

Water Soluble Parameters

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Chromium (VI)	mg/L	0.003	-0.10	0.10	yes	
Date Acquired: October 31, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Chromium (VI)	mg/kg	<0.10	<0.10	10	0.01	yes
Date Acquired: October 31, 2014						

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes
Date Acquired: October 31, 2014					
Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	85.00	85	115	yes
Toluene	ng	109.80	85	115	yes
Ethylbenzene	ng	103.80	85	115	yes
Total Xylenes (m,p,o)	ng	89.33	85	115	yes
Styrene	ng	86.40	85	115	yes
Date Acquired: October 31, 2014					

Volatile Petroleum Hydrocarbons - Soil



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired: October 31, 2014					

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	ug/mL	0	-10	10	yes
F3c C16-C34	ug/mL	0	-30	30	yes
F4c C34-C50	ug/mL	0	-20	20	yes
F4HTGCc C34-C50+	ug/mL	0	-20	20	yes
Date Acquired: October 31, 2014					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	ug/mL	105.11	85	115	yes
F3c C16-C34	ug/mL	104.55	85	115	yes
F4c C34-C50	ug/mL	99.22	85	115	yes
F4HTGCc C34-C50+	ug/mL	93.40	85	115	yes
Date Acquired: October 31, 2014					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	<50	<50	50	10	yes
F3c C16-C34	mg/kg	<50	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes
Date Acquired: October 31, 2014						

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	0	-0.010	0.010	yes
Acenaphthylene	ng/mL	0	-0.05	0.05	yes
Acenaphthene	ng/mL	0	-0.05	0.05	yes
Fluorene	ng/mL	0	-0.05	0.05	yes
Phenanthrene	ng/mL	0	-0.01	0.01	yes
Anthracene	ng/mL	0	-0.003	0.003	yes
Fluoranthene	ng/mL	0	-0.01	0.01	yes
Pyrene	ng/mL	0	-0.01	0.01	yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01	yes
Chrysene	ng/mL	0	-0.05	0.05	yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05	yes



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Polycyclic Aromatic Hydrocarbons - Soil -

Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05	yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05	yes

Date Acquired: October 31, 2014

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	90.20	80	120	yes
Acenaphthylene	ng/mL	88.00	80	120	yes
Acenaphthene	ng/mL	90.20	80	120	yes
Fluorene	ng/mL	93.00	80	120	yes
Phenanthrene	ng/mL	88.40	80	120	yes
Anthracene	ng/mL	89.60	80	120	yes
Fluoranthene	ng/mL	93.40	80	120	yes
Pyrene	ng/mL	94.60	80	120	yes
Benzo(a)anthracene	ng/mL	89.80	80	120	yes
Chrysene	ng/mL	88.40	80	120	yes
Benzo(b)fluoranthene	ng/mL	88.80	80	120	yes
Benzo(k)fluoranthene	ng/mL	94.80	80	120	yes
Benzo(a)pyrene	ng/mL	95.20	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	97.00	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	93.00	80	120	yes
Benzo(g,h,i)perylene	ng/mL	88.80	80	120	yes

Date Acquired: October 31, 2014

PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	124.72	23	130	yes
2-Fluorobiphenyl	%	88.88	30	130	yes
p-Terphenyl-d14	%	89.13	18	137	yes

Date Acquired: October 31, 2014

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosedale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
1:5 Water Soluble Extraction	McKeague	* Soluble Salts in Extracts of 1:5 Soil:Water Mixtures, 3.23	31-Oct-14	Exova Edmonton
Barium (Extractable) in soil (0.1 M CaCl ₂)	Ab Env	Analytical Method for Extractable Barium, 6.6.2	31-Oct-14	Exova Edmonton
Boron in general soil	McKeague	* Hot Water Soluble Boron - Azomethine-H Method, 4.61	31-Oct-14	Exova Edmonton
BTEX-CCME - Soil	CCME	* Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	31-Oct-14	Exova Calgary
BTEX-CCME - Soil	US EPA	* Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	31-Oct-14	Exova Calgary
Mercury (Hot Block) in Soil	US EPA	* Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	31-Oct-14	Exova Edmonton
Metals ICP-MS (Hot Block) in soil	SW-846	* Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	31-Oct-14	Exova Edmonton
PAH - Soil	AESRD	Index of Additive Cancer Risk (IACR), PAHs	31-Oct-14	Exova Calgary
PAH - Soil	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	31-Oct-14	Exova Calgary
Particle Size by Wet Sieve	ASTM	* Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing, C 117-04	30-Oct-14	Exova Edmonton
TEH-CCME-Soil (Shake)	CCME	* Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	31-Oct-14	Exova Calgary

* Reference Method Modified

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

References

Ab Env	Alberta Environment, Soil Quality Guidelines for Barite
AESRD	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
McKeague	Manual on Soil Sampling and Methods of Analysis
SW-846	Test Methods for Evaluating Solid Waste
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Report was issued to include visible note to client about the review of phenanthrene concentrations as requested by Tawnya Anderson of Nichols Environmental on November 4, 2014. Previous Report #1964376.
- Report was issued to include addition of Chromatograms analysis on Samples 8-10 requested by Tawnya Anderson of Nichols on Nov 14th/14. Previous report 1968309.
- Phenanthrene hits were reviewed by the analyst and all calculations are correct with no reason to suspect false positives.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10694
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 30, 2014
Edmonton, AB, Canada	Location: Rosedale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969157
Attn: Tawnya Anderson	P.O.: D913127A, C#142-14-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Petroleum Hydrocarbons in Soil

Batch Notes

1. The method used complies with the Reference Method for the Canada Wide Standards for Petroleum Hydrocarbons in Soil - Tier 1, April 2001, including Addendum 1, and is accredited for use in Exova.
2. Modifications of the method: See Notes and Methodology for nonconformances (if applicable).
3. Qualifications on results: See Notes and Methodology for nonconformances (if applicable).
4. Silica gel treatment is performed for fractions F2, F3, F4.
5. F1-BTEX: BTEX has been subtracted from the F1 fraction.
6. If analyzed, naphthalene has been subtracted from fraction F2 and selected PAHs have been subtracted from fraction F3.
7. F4HTGC is reported when more than 5% of the total carbon envelope elutes past C₅₀.
8. Exova does not routinely report Gravimetric Heavy Hydrocarbons (F4G or F4G-sg), F4HTGC through extended range high temperature GC is reported instead.
9. When both F4(C₃₄-C₅₀) and F4HTGC are reported, F4HTGC is the final F4 that is to be used for interpreting the CWS.
10. Quality criteria met for the batch: Data is reported in Quality Control Section of report (if requested).
 - nC₆ and nC₁₀ response factors (RF) are within 30% of RF for toluene
 - nC₁₀, nC₁₆ and nC₃₄ RFs are within 10% of each other
 - nC₅₀ RF is within 30% of the average RF for nC₁₀+nC₁₆+nC₃₄
 - linearity is within 15% for each of the calibrated carbon ranges
11. Batch data for analytical quality control are available on request.
12. Extraction and analysis holding times were met: See Notes and Methodology for nonconformances (if applicable).

Approved by:

Randy Neumann, BSc
Vice President

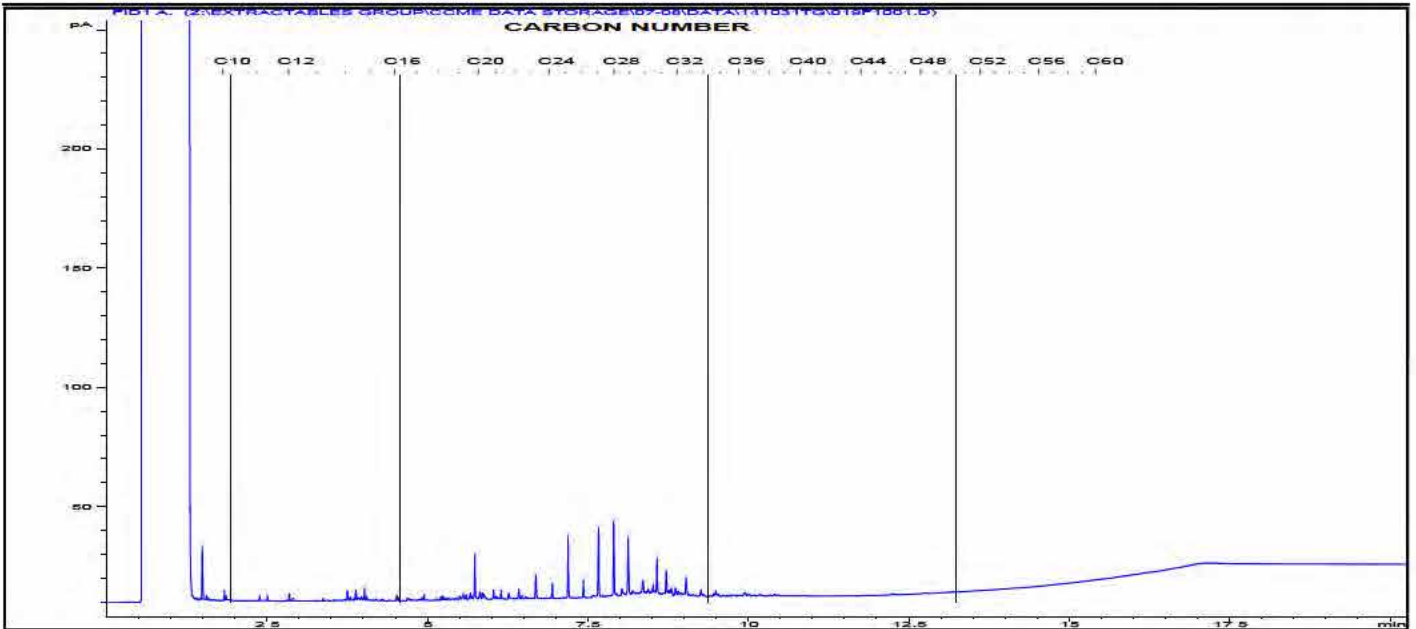
Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

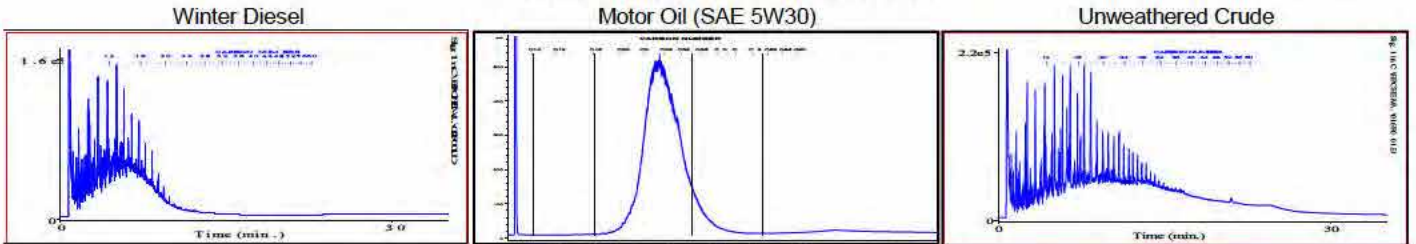
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10694
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 30, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969157
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036573-8 Sample Description: 7.5 A7:14-05 Silica Gel Treated
 Sample Date: Oct 28, 2014 m



TYPICAL PRODUCT CHROMATOGRAMS



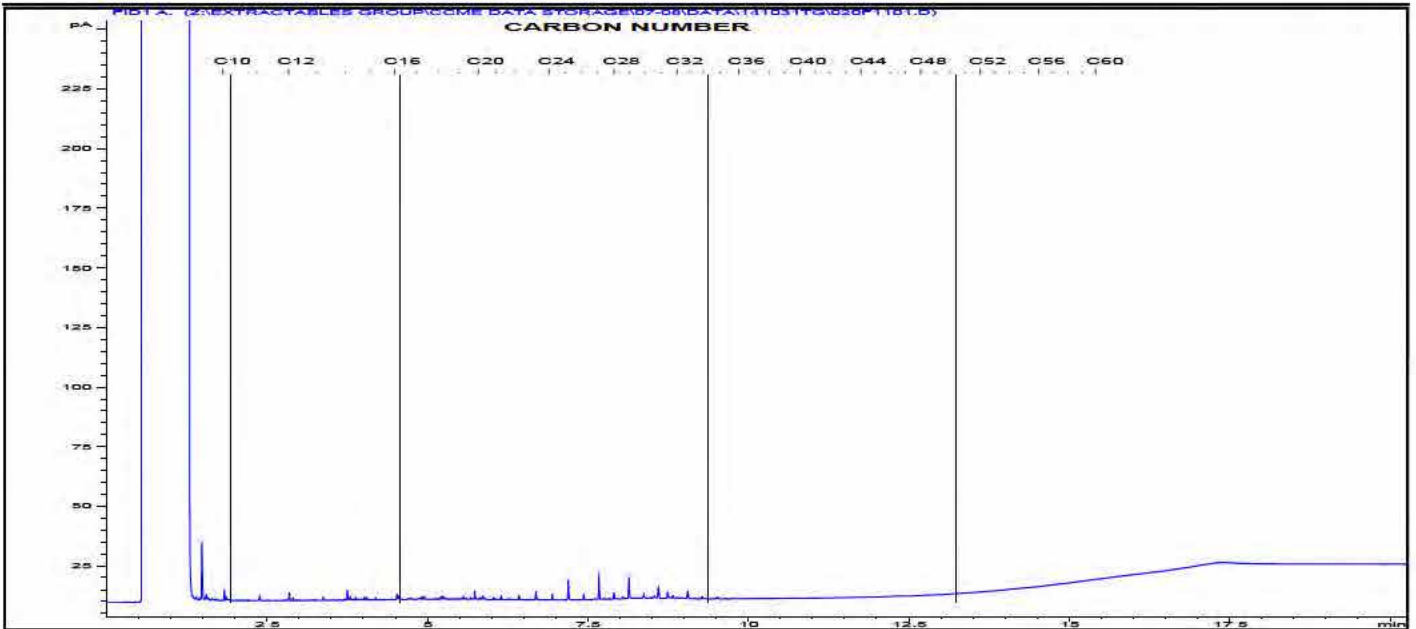
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

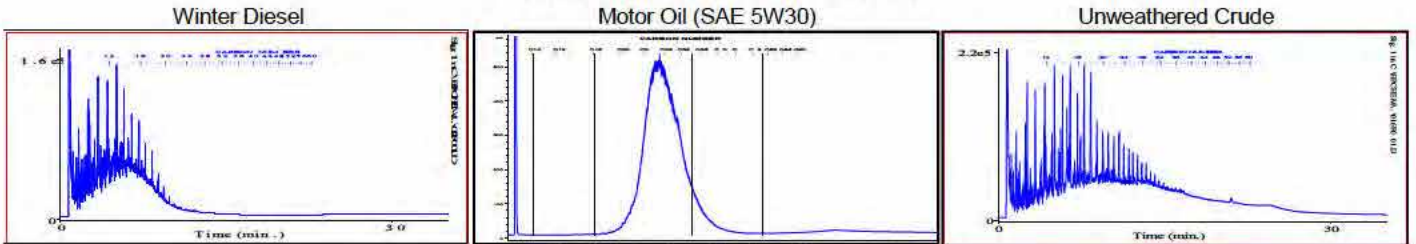
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10694
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 30, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969157
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036573-9 Sample Description: 8.3 A7:14-06 Silica Gel Treated
 Sample Date: Oct 28, 2014 m



TYPICAL PRODUCT CHROMATOGRAMS



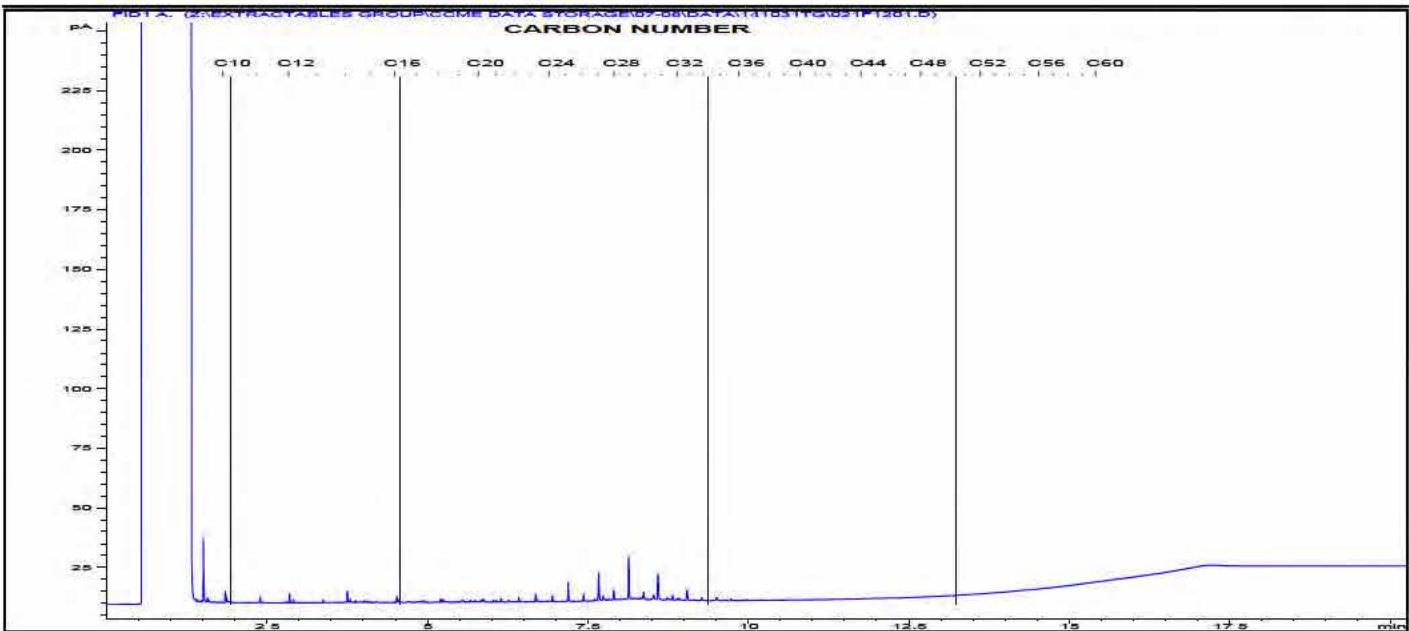
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

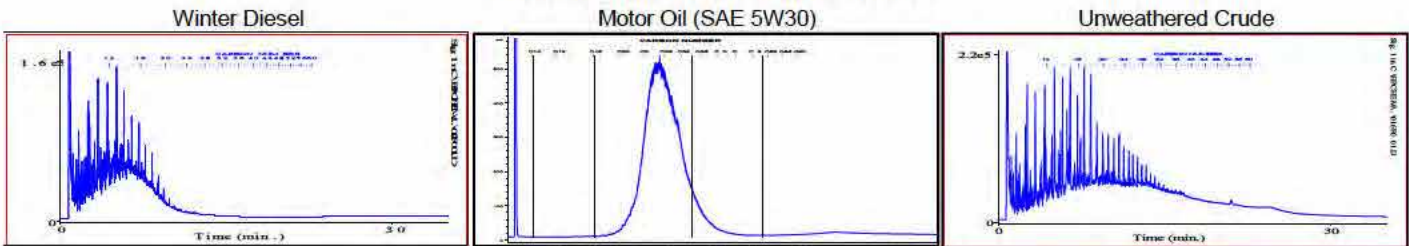
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036573
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10694
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 30, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969157
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036573-10 Sample Description: 10.5 A7:14-07 m Silica Gel Treated
 Sample Date: Oct 28, 2014



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

Report Transmission Cover Page

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Contact & Affiliation	Address	Delivery Commitments
Tawnya Anderson Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Single Report On [Report Approval] send (Test Report) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Single Report On [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Lot Creation] send (COR) by Email - Single Report
Kelly Goetz Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

Notes To Clients:

- Report was issued to include addition of Chromatogram analysis on samples 1-4,9,11,15,17,20,21,24,26-28,30-31 requested by Tawnya Anderson of Nichols on Nov 14th/14. Previous report 1964875.
- >130 - The surrogate recovery for PAH analysis is outside the range 23-130 % on samples #22,23,25 due to other sample material interfering with this surrogate.

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Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-1	1036919-2	1036919-3	
	Sample Date	Oct 28, 2014	Oct 28, 2014	Oct 28, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A7 / 14-05 / 3.8 / m	A7 / 14-06 / 9.8 / m	A7 / 14-07 / 2.3 / m	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
Benzene	Dry Weight	mg/kg	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.010	<0.010	0.01
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	0.03	0.03
Styrene	Dry Weight	mg/kg	<0.010	<0.010	0.010
Volatile Petroleum Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
F1 C6-C10	Dry Weight	mg/kg	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil					
Extraction Date	Total Extractables	3-Nov-14	3-Nov-14	3-Nov-14	
F2c C10-C16	Dry Weight	mg/kg	<50	<50	50
F3c C16-C34	Dry Weight	mg/kg	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	100
% C50+	%		<5	<5	
Silica Gel Cleanup					
Silica Gel Cleanup		Done	Done	Done	
Soil % Moisture					
Moisture	Soil % Moisture	% by weight	15.80	15.60	23.20

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-4	1036919-9	1036919-11	
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A3 / 14-08 / 2.0 / m	A3 / 14-09 / 1.0 / m	A3 / 14-09 / 8.3 / m	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
Benzene	Dry Weight	mg/kg	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.010	<0.010	0.01
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	0.03
Styrene	Dry Weight	mg/kg	<0.010	<0.010	0.010
Volatile Petroleum Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
F1 C6-C10	Dry Weight	mg/kg	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil					
Extraction Date	Total Extractables	3-Nov-14	3-Nov-14	3-Nov-14	
F2c C10-C16	Dry Weight	mg/kg	<50	<50	50
F3c C16-C34	Dry Weight	mg/kg	<50	281	50
F4c C34-C50	Dry Weight	mg/kg	<100	275	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	613	100
% C50+	%		<5	37.7	<5
Silica Gel Cleanup					
Silica Gel Cleanup		Done	Done	Done	
Soil % Moisture					
Moisture	Soil % Moisture	% by weight	15.00	8.91	10.10



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1036919-5	1036919-6	1036919-7	
		Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A3 / 14-08 / 0.5 / m	A3 / 14-08 / 1.0 / m	A3 / 14-08 / 2.5 / m	
		Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	0.91	1.14	0.42	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.06	0.02	0.03	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	<0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	4.0	6.5	5.8	0.2
Barium	Strong Acid Extractable	mg/kg	221	168	227	1
Beryllium	Strong Acid Extractable	mg/kg	0.8	0.6	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.18	0.17	0.31	0.01
Chromium	Strong Acid Extractable	mg/kg	15.5	23.1	17.3	0.5
Cobalt	Strong Acid Extractable	mg/kg	7.6	7.6	9.0	0.1
Copper	Strong Acid Extractable	mg/kg	19.0	15.5	15.6	1
Lead	Strong Acid Extractable	mg/kg	6.3	12.3	7.9	5
Molybdenum	Strong Acid Extractable	mg/kg	1.2	1.2	<1.0	1
Nickel	Strong Acid Extractable	mg/kg	29.5	26.5	23.7	0.5
Selenium	Strong Acid Extractable	mg/kg	0.9	0.5	0.4	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	<0.1	<0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.17	0.12	0.17	0.05
Tin	Strong Acid Extractable	mg/kg	2.0	2.0	1.5	1
Uranium	Strong Acid Extractable	mg/kg	1.4	1.2	0.9	0.5
Vanadium	Strong Acid Extractable	mg/kg	26.3	29.0	27.0	0.1
Zinc	Strong Acid Extractable	mg/kg	43	42	60	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	21.6	18.8	23.5	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-5	1036919-7	1036919-8		
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A3 / 14-08 / 0.5 / m	A3 / 14-08 / 2.5 / m	A3 / 14-09 / 0.5 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.062	0.017	0.011	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	0.05	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.24	0.04	0.14	0.01
Anthracene	Dry Weight	mg/kg	0.082	<0.003	0.041	0.003
Fluoranthene	Dry Weight	mg/kg	0.17	0.01	0.17	0.01
Pyrene	Dry Weight	mg/kg	0.14	0.02	0.19	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	0.08	<0.01	0.13	0.01
Chrysene	Dry Weight	mg/kg	0.07	<0.05	0.17	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.07	<0.05	0.13	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	0.06	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	0.06	<0.05	0.12	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05	0.06	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	<0.05	0.08	0.05
IACR_Coarse	Index of Additive Cancer Risk		0.097	<0.001	0.376	0.001
IACR_Fine	Index of Additive Cancer Risk		0.187	<0.001	0.727	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	76	104	68	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	123	103	106	30-130
p-Terphenyl-d14	PAH - Surrogate	%	102	98	88	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1036919-8	1036919-10	1036919-13	
		Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A3 / 14-09 / 0.5 / m	A3 / 14-09 / 3.1 / m	A3 / 14-10 / 1.0 / m	
		Matrix	Soil	Soil	Soil	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	1.22	8.83	1.91	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.05	0.03	0.09	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	0.3	0.2
Arsenic	Strong Acid Extractable	mg/kg	3.1	5.1	5.2	0.2
Barium	Strong Acid Extractable	mg/kg	146	209	368	1
Beryllium	Strong Acid Extractable	mg/kg	0.4	0.7	0.6	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.39	0.22	0.43	0.01
Chromium	Strong Acid Extractable	mg/kg	10.8	16.6	14.3	0.5
Cobalt	Strong Acid Extractable	mg/kg	5.3	9.5	7.3	0.1
Copper	Strong Acid Extractable	mg/kg	21.8	34.4	26.1	1
Lead	Strong Acid Extractable	mg/kg	160	29.6	87.5	5
Molybdenum	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Nickel	Strong Acid Extractable	mg/kg	16.0	24.4	22.3	0.5
Selenium	Strong Acid Extractable	mg/kg	<0.3	0.4	0.4	0.3
Silver	Strong Acid Extractable	mg/kg	<0.1	<0.1	<0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.11	0.20	0.17	0.05
Tin	Strong Acid Extractable	mg/kg	2.1	1.3	1.9	1
Uranium	Strong Acid Extractable	mg/kg	0.6	0.9	1.1	0.5
Vanadium	Strong Acid Extractable	mg/kg	18.9	30.5	24.6	0.1
Zinc	Strong Acid Extractable	mg/kg	57	62	106	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	37.5	17.2	34.8	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-9	1036919-10	1036919-12		
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A3 / 14-09 / 1.0 / m	A3 / 14-09 / 3.1 / m	A3 / 14-09 / 9.0 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.042	<0.010	<0.010	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.23	0.01	0.01	0.01
Anthracene	Dry Weight	mg/kg	0.066	0.003	<0.003	0.003
Fluoranthene	Dry Weight	mg/kg	0.30	0.02	0.01	0.01
Pyrene	Dry Weight	mg/kg	0.29	0.02	0.02	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	0.18	<0.01	<0.01	0.01
Chrysene	Dry Weight	mg/kg	0.19	<0.05	<0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.21	<0.05	<0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	0.08	<0.05	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	0.15	<0.05	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	0.11	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	0.10	<0.05	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		0.526	<0.001	<0.001	0.001
IACR_Fine	Index of Additive Cancer Risk		1.02	<0.001	<0.001	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	68	118	119	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	110	111	111	30-130
p-Terphenyl-d14	PAH - Surrogate	%	94	107	96	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-13	1036919-14	1036919-16		
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A3 / 14-10 / 1.0 / m	A3 / 14-10 / 1.5 / m	A3 / 14-10 / 6.1 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.048	0.057	0.010	0.01
Acenaphthylene	Dry Weight	mg/kg	0.15	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.28	0.09	0.03	0.01
Anthracene	Dry Weight	mg/kg	0.292	0.026	<0.003	0.003
Fluoranthene	Dry Weight	mg/kg	0.47	0.10	<0.01	0.01
Pyrene	Dry Weight	mg/kg	0.53	0.09	0.01	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	0.28	0.04	<0.01	0.01
Chrysene	Dry Weight	mg/kg	0.26	0.06	<0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.32	0.09	<0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	0.18	<0.05	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	0.25	0.07	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	0.21	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	0.16	<0.05	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		1.02	0.101	<0.001	0.001
IACR_Fine	Index of Additive Cancer Risk		1.97	0.194	<0.001	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	127	113	114	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	107	111	105	30-130
p-Terphenyl-d14	PAH - Surrogate	%	83	81	98	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1036919-14	1036919-18	1036919-19	
		Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A3 / 14-10 / 1.5 / m	A3 / 14-11 / 1.0 / m	A3 / 14-11 / 2.0 / m	
		Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	6.11	2.98	2.61	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.04	0.23	0.03	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	<0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	7.1	6.4	5.4	0.2
Barium	Strong Acid Extractable	mg/kg	261	284	255	1
Beryllium	Strong Acid Extractable	mg/kg	0.6	0.6	0.6	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.25	0.25	0.21	0.01
Chromium	Strong Acid Extractable	mg/kg	14.9	19.0	13.4	0.5
Cobalt	Strong Acid Extractable	mg/kg	9.0	10.1	7.8	0.1
Copper	Strong Acid Extractable	mg/kg	16.7	23.0	16.6	1
Lead	Strong Acid Extractable	mg/kg	13.2	25.4	16.1	5
Molybdenum	Strong Acid Extractable	mg/kg	<1.0	2.2	<1.0	1
Nickel	Strong Acid Extractable	mg/kg	24.5	24.3	21.2	0.5
Selenium	Strong Acid Extractable	mg/kg	0.3	0.4	<0.3	0.3
Silver	Strong Acid Extractable	mg/kg	<0.1	<0.1	<0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.17	0.20	0.16	0.05
Tin	Strong Acid Extractable	mg/kg	1.5	1.8	1.7	1
Uranium	Strong Acid Extractable	mg/kg	1.0	1.1	1.0	0.5
Vanadium	Strong Acid Extractable	mg/kg	26.5	26.5	23.3	0.1
Zinc	Strong Acid Extractable	mg/kg	61	65	49	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	53.1	29.4	26.4	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-15	1036919-17	1036919-20	
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A3 / 14-10 / 2.0 / m	A3 / 14-11 / 0.5 / m	A3 / 14-11 / 4.6 / m	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
Benzene	Dry Weight	mg/kg	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.010	<0.010	0.01
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	0.03
Styrene	Dry Weight	mg/kg	<0.010	<0.010	0.010
Volatile Petroleum Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
F1 C6-C10	Dry Weight	mg/kg	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil					
Extraction Date	Total Extractables	3-Nov-14	3-Nov-14	3-Nov-14	
F2c C10-C16	Dry Weight	mg/kg	<50	<50	50
F3c C16-C34	Dry Weight	mg/kg	<50	1890	50
F4c C34-C50	Dry Weight	mg/kg	<100	1230	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	1940	100
% C50+	%		13.0	18.6	<5
Silica Gel Cleanup					
Silica Gel Cleanup		Done	Done	Done	
Soil % Moisture					
Moisture	Soil % Moisture	% by weight	20.40	12.80	16.60



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-18	1036919-19	1036919-21		
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A3 / 14-11 / 1.0 / m	A3 / 14-11 / 2.0 / m	A3 / 14-11 / 9.8 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.026	0.022	<0.010	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	0.06	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.41	0.51	0.02	0.01
Anthracene	Dry Weight	mg/kg	0.113	0.165	0.005	0.003
Fluoranthene	Dry Weight	mg/kg	0.40	0.54	0.03	0.01
Pyrene	Dry Weight	mg/kg	0.49	0.49	0.04	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	0.28	0.33	0.01	0.01
Chrysene	Dry Weight	mg/kg	0.19	0.26	<0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.26	0.30	<0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	0.13	0.18	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	0.30	0.33	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	0.11	0.13	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	0.06	0.08	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		0.799	1.02	0.003	0.001
IACR_Fine	Index of Additive Cancer Risk		1.54	1.97	0.006	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	120	119	121	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	104	115	94	30-130
p-Terphenyl-d14	PAH - Surrogate	%	83	101	100	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-21	1036919-24	1036919-26	
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A3 / 14-11 / 9.8 / m	A3 / 14-12 / 3.8 / m	A3 / 14-12 / 6.9 / m	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
Benzene	Dry Weight	mg/kg	<0.005	0.045	<0.005
Toluene	Dry Weight	mg/kg	<0.02	1.81	0.03
Ethylbenzene	Dry Weight	mg/kg	<0.010	2.49	<0.010
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	28.0	<0.03
Styrene	Dry Weight	mg/kg	<0.010	<0.010	<0.010
Volatile Petroleum Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
F1 C6-C10	Dry Weight	mg/kg	<10	1410	<10
F1 -BTEX	Dry Weight	mg/kg	<10	1380	<10
Extractable Petroleum Hydrocarbons - Soil					
Extraction Date	Total Extractables	3-Nov-14	3-Nov-14	3-Nov-14	
F2c C10-C16	Dry Weight	mg/kg	<50	4540	<50
F3c C16-C34	Dry Weight	mg/kg	<50	21000	<50
F4c C34-C50	Dry Weight	mg/kg	<100	20000	<100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	30700	<100
% C50+	%		<5	18.9	<5
Silica Gel Cleanup					
Silica Gel Cleanup		Done	Done	Done	
Soil % Moisture					
Moisture	Soil % Moisture	% by weight	12.30	17.10	10.70



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1036919-22	1036919-23	1036919-25	
		Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
	Sample Description	A3 / 14-12 / 1.0 / m	A3 / 14-12 / 1.5 / m	A3 / 14-12 / 4.6 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	11.7	3.53	1.04	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.30	0.05	0.04	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	<0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	5.3	5.0	5.6	0.2
Barium	Strong Acid Extractable	mg/kg	507	557	222	1
Beryllium	Strong Acid Extractable	mg/kg	0.7	0.5	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.66	1.83	0.22	0.01
Chromium	Strong Acid Extractable	mg/kg	14.9	14.6	14.7	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.2	7.9	8.4	0.1
Copper	Strong Acid Extractable	mg/kg	26.8	36.8	16.3	1
Lead	Strong Acid Extractable	mg/kg	309	1160	11.9	5
Molybdenum	Strong Acid Extractable	mg/kg	2.3	1.2	<1.0	1
Nickel	Strong Acid Extractable	mg/kg	24.2	23.0	23.0	0.5
Selenium	Strong Acid Extractable	mg/kg	0.4	<0.3	0.3	0.3
Silver	Strong Acid Extractable	mg/kg	0.2	0.2	<0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.17	0.16	0.17	0.05
Tin	Strong Acid Extractable	mg/kg	2.1	2.0	1.5	1
Uranium	Strong Acid Extractable	mg/kg	1.1	0.8	0.8	0.5
Vanadium	Strong Acid Extractable	mg/kg	24.2	24.8	25.7	0.1
Zinc	Strong Acid Extractable	mg/kg	123	138	50	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	105	183	62.7	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.957	19.6	6.22	0.01
Acenaphthylene	Dry Weight	mg/kg	0.14	0.32	0.05	0.05
Acenaphthene	Dry Weight	mg/kg	0.39	0.43	0.07	0.05
Fluorene	Dry Weight	mg/kg	1.37	1.36	0.16	0.05
Phenanthrene	Dry Weight	mg/kg	13.3	6.80	0.43	0.01
Anthracene	Dry Weight	mg/kg	1.41	0.766	0.057	0.003
Fluoranthene	Dry Weight	mg/kg	1.28	1.02	0.14	0.01
Pyrene	Dry Weight	mg/kg	10.4	3.56	0.22	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	1.66	0.65	0.08	0.01
Chrysene	Dry Weight	mg/kg	1.81	1.32	0.10	0.05



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-22	1036919-23	1036919-25		
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A3 / 14-12 / 1.0 / m	A3 / 14-12 / 1.5 / m	A3 / 14-12 / 4.6 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil - Continued						
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.37	0.42	0.07	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	0.17	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	0.33	0.64	0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	0.29	0.24	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	0.15	0.07	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	0.38	0.36	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		1.08	1.36	0.096	0.001
IACR_Fine	Index of Additive Cancer Risk		2.08	2.64	0.184	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	>130	>130	>130	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	121	130	113	30-130
p-Terphenyl-d14	PAH - Surrogate	%	58	85	88	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-27	1036919-28	1036919-29		
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A3 / 14-12 / 7.5 / m	A3 / 14-12 / 10.5 / m	A3 / 14-13 / 0.5 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.036	0.858	<0.010	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	<0.01	0.13	0.04	0.01
Anthracene	Dry Weight	mg/kg	<0.003	0.009	0.015	0.003
Fluoranthene	Dry Weight	mg/kg	<0.01	0.03	0.05	0.01
Pyrene	Dry Weight	mg/kg	0.01	0.09	0.06	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	0.02	0.03	0.01
Chrysene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		<0.001	0.006	0.045	0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001	0.013	0.086	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	114	102	118	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	94	89	103	30-130
p-Terphenyl-d14	PAH - Surrogate	%	96	95	83	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1036919-27	1036919-28	1036919-30	
	Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A3 / 14-12 / 7.5 / m	A3 / 14-12 / 10.5 / m	A3 / 14-13 / 3.8 / m	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
Benzene	Dry Weight	mg/kg	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	0.03	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.010	0.033	0.011
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	0.31	0.06
Styrene	Dry Weight	mg/kg	<0.010	<0.010	0.010
Volatile Petroleum Hydrocarbons - Soil					
Extraction Date	Volatiles	3-Nov-14	3-Nov-14	3-Nov-14	
F1 C6-C10	Dry Weight	mg/kg	<10	32	10
F1 -BTEX	Dry Weight	mg/kg	<10	32	10
Extractable Petroleum Hydrocarbons - Soil					
Extraction Date	Total Extractables	3-Nov-14	3-Nov-14	3-Nov-14	
F2c C10-C16	Dry Weight	mg/kg	<50	217	50
F3c C16-C34	Dry Weight	mg/kg	64	1500	10400
F4c C34-C50	Dry Weight	mg/kg	<100	1250	5680
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	1820	8610
% C50+	%		8.2	16.1	15.2
Silica Gel Cleanup					
Silica Gel Cleanup		Done	Done	Done	
Soil % Moisture					
Moisture	Soil % Moisture	% by weight	11.00	14.10	22.80

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1036919-29	1036919-32	
		Sample Date	Oct 30, 2014	Oct 30, 2014	
		Sample Time	NA	NA	
		Sample Location			
		Sample Description	A3 / 14-13 / 0.5 / m	A3 / 14-13 / 6.1 / m	
		Matrix	Soil	Soil	
Analyte		Units	Results	Results	Nominal Detection Limit
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	1.77	4.41	0.2
Metals Strong Acid Digestion					
Mercury	Strong Acid Extractable	mg/kg	0.04	0.05	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	5.6	5.3	0.2
Barium	Strong Acid Extractable	mg/kg	257	250	1
Beryllium	Strong Acid Extractable	mg/kg	0.6	0.6	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.25	0.23	0.01
Chromium	Strong Acid Extractable	mg/kg	18.9	14.7	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.3	8.6	0.1
Copper	Strong Acid Extractable	mg/kg	19.5	18.7	1
Lead	Strong Acid Extractable	mg/kg	222	10.2	5
Molybdenum	Strong Acid Extractable	mg/kg	1.7	<1.0	1
Nickel	Strong Acid Extractable	mg/kg	23.0	23.9	0.5
Selenium	Strong Acid Extractable	mg/kg	0.4	<0.3	0.3
Silver	Strong Acid Extractable	mg/kg	<0.1	<0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.15	0.16	0.05
Tin	Strong Acid Extractable	mg/kg	1.7	1.5	1
Uranium	Strong Acid Extractable	mg/kg	0.9	0.9	0.5
Vanadium	Strong Acid Extractable	mg/kg	25.5	26.0	0.1
Zinc	Strong Acid Extractable	mg/kg	64	56	1
Barite Soil Analysis					
Barium	Extractable	mg/kg	32.0	49.7	0.05
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	0.1

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1036919-31
Sample Date	Oct 30, 2014
Sample Time	NA
Sample Location	
Sample Description	A3 / 14-13 / 5.3 / m
Matrix	Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Extraction Date	Volatiles		3-Nov-14		
Benzene	Dry Weight	mg/kg	<0.005		0.005
Toluene	Dry Weight	mg/kg	<0.02		0.02
Ethylbenzene	Dry Weight	mg/kg	<0.010		0.01
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03		0.03
Styrene	Dry Weight	mg/kg	<0.010		0.010
Volatile Petroleum Hydrocarbons - Soil					
Extraction Date	Volatiles		3-Nov-14		
F1 C6-C10	Dry Weight	mg/kg	<10		10
F1 -BTEX	Dry Weight	mg/kg	<10		10
Extractable Petroleum Hydrocarbons - Soil					
Extraction Date	Total Extractables		3-Nov-14		
F2c C10-C16	Dry Weight	mg/kg	<50		50
F3c C16-C34	Dry Weight	mg/kg	<50		50
F4c C34-C50	Dry Weight	mg/kg	<100		100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100		100
% C50+	%		<5		
Silica Gel Cleanup					
Silica Gel Cleanup			Done		
Soil % Moisture					
Moisture	Soil % Moisture	% by weight	11.40		




Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1036919-32	1036919-33
Sample Date	Oct 30, 2014	Oct 30, 2014
Sample Time	NA	NA
Sample Location		
Sample Description	A3 / 14-13 / 6.1 / m	A3 / 14-13 / 7.5 / m
Matrix	Soil	Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil					
Naphthalene	Dry Weight	mg/kg	0.069	0.033	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.10	0.07	0.01
Anthracene	Dry Weight	mg/kg	0.021	<0.003	0.003
Fluoranthene	Dry Weight	mg/kg	0.10	0.02	0.01
Pyrene	Dry Weight	mg/kg	0.10	0.03	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	0.04	<0.01	0.01
Chrysene	Dry Weight	mg/kg	0.06	0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.09	<0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	0.06	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		0.098	0.003	0.001
IACR_Fine	Index of Additive Cancer Risk		0.188	0.005	0.001
PAH - Soil - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	87	124	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	116	118	30-130
p-Terphenyl-d14	PAH - Surrogate	%	91	101	18-137

Approved by: 
Randy Neumann, BSc
Vice President

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).

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Quality Control

Bill To: City of Edmonton
Report To: Nichols Environmental (Canada)
17331-107 Ave NE
Edmonton, AB, Canada
T5S 1E5
Attn: Tawnya Anderson
Sampled By: HB
Company: NECL

Project:
ID: 14-214-CRD
Name: Phase II ESA
Location: Rosssdale
LSD:
P.O.: 14-214-CRD
Acct code:

Lot ID: **1036919**
Control Number: B10681
Date Received: Oct 31, 2014
Date Reported: Nov 17, 2014
Report Number: 1969162

Hot Water Soluble

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Boron	mg/L	0.022938	-0.01	0.02	yes	
Date Acquired: November 03, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Boron	mg/kg	0.59	0.62	10	0.10	yes
Date Acquired: November 03, 2014						
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Boron	mg/kg	1.37	1.07	2.05	yes	
Date Acquired: November 03, 2014						
Boron	mg/kg	0.11	0.09	0.11	yes	
Date Acquired: November 03, 2014						

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Mercury	ug/L	-0.06	-0.07	0.13	yes	
Antimony	ug/L	0.066	-0.1	0.2	yes	
Arsenic	ug/L	0.002	-0.2	0.2	yes	
Barium	ug/L	0.615	-1	1	yes	
Beryllium	ug/L	-0.007	-0.1	0.1	yes	
Cadmium	ug/L	-0.009	-0.01	0.01	yes	
Chromium	ug/L	0.002	-0.5	0.5	yes	
Cobalt	ug/L	0.0045125	-0.1	0.1	yes	
Copper	ug/L	0.022	-0.6	1.2	yes	
Lead	ug/L	0.025	-5.0	5.0	yes	
Molybdenum	ug/L	0.022	-1.0	1.0	yes	
Nickel	ug/L	0.088	-0.4	0.7	yes	
Selenium	ug/L	0.003	-0.3	0.3	yes	
Silver	ug/L	0.038	-0.09	0.14	yes	
Thallium	ug/L	-0.009	-0.04	0.04	yes	
Tin	ug/L	3.818	0.0	7.2	yes	
Uranium	ug/L	0.004	-0.5	0.5	yes	
Vanadium	ug/L	0.034	-0.1	0.1	yes	
Zinc	ug/L	0.257	-1	1	yes	
Date Acquired: November 03, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Mercury	mg/kg	0.11	0.12	10	0.03	yes
Antimony	mg/kg	<0.2	<0.2	20	0.4	yes
Arsenic	mg/kg	5.3	5.4	20	0.4	yes
Barium	mg/kg	507	529	20	2	yes
Beryllium	mg/kg	0.7	0.7	20	0.2	yes
Cadmium	mg/kg	0.66	0.62	20	0.02	yes
Chromium	mg/kg	14.9	15.1	20	1.1	yes



Quality Control

Bill To: City of Edmonton
Report To: Nichols Environmental (Canada)
17331-107 Ave NE
Edmonton, AB, Canada
T5S 1E5
Attn: Tawnya Anderson
Sampled By: HB
Company: NECL

Project:
ID: 14-214-CRD
Name: Phase II ESA
Location: Rosssdale
LSD:
P.O.: 14-214-CRD
Acct code:

Lot ID: **1036919**
Control Number: B10681
Date Received: Oct 31, 2014
Date Reported: Nov 17, 2014
Report Number: 1969162

Metals Strong Acid Digestion - Continued

Client Sample	Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Cobalt		mg/kg	8.2	9.5	20	0.2	yes
Copper		mg/kg	26.8	28.3	20	2.2	yes
Lead		mg/kg	309	308	20	0.2	yes
Molybdenum		mg/kg	2.3	2.4	20	2.2	yes
Nickel		mg/kg	24.2	25.6	20	1.1	yes
Selenium		mg/kg	0.4	0.3	20	0.7	yes
Silver		mg/kg	0.2	0.2	20	0.22	yes
Thallium		mg/kg	0.17	0.17	20	0.11	yes
Tin		mg/kg	2.1	2.1	20	2.2	yes
Uranium		mg/kg	1.1	1.1	20	1.1	yes
Vanadium		mg/kg	24.2	25.9	20	0.2	yes
Zinc		mg/kg	123	129	20	2	yes

Date Acquired: November 03, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Mercury	mg/kg	0.31	0.28	0.34	yes
Antimony	mg/kg	39.7	36.1	43.9	yes
Arsenic	mg/kg	39.7	36.7	44.3	yes
Barium	mg/kg	198	185	215	yes
Beryllium	mg/kg	19.1	17.4	22.2	yes
Cadmium	mg/kg	2.03	1.80	2.20	yes
Chromium	mg/kg	101	92.2	105.8	yes
Cobalt	mg/kg	19.0	18.5	22.5	yes
Copper	mg/kg	193	176.3	207.3	yes
Lead	mg/kg	19.3	18.6	21.8	yes
Molybdenum	mg/kg	188	172.6	215.4	yes
Nickel	mg/kg	100	90.6	107.4	yes
Selenium	mg/kg	39.5	36.1	42.9	yes
Silver	mg/kg	20.0	16.69	21.97	yes
Thallium	mg/kg	9.90	9.57	11.23	yes
Tin	mg/kg	192	171.9	201.9	yes
Uranium	mg/kg	90.5	90.3	108.0	yes
Vanadium	mg/kg	19.5	16.3	20.3	yes
Zinc	mg/kg	208	180	220	yes

Date Acquired: November 03, 2014

Mercury	mg/kg	0.08	0.05	0.11	yes
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Date Acquired: November 03, 2014

Mercury	mg/kg	0.25	0.15	0.42	yes
Antimony	mg/kg	0.9	0.3	1.1	yes
Arsenic	mg/kg	81.6	65.9	97.9	yes
Barium	mg/kg	243	213	270	yes
Beryllium	mg/kg	0.7	0.5	0.9	yes



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Cadmium	mg/kg	2.03	1.50	2.64	yes
Chromium	mg/kg	33.6	27.4	39.2	yes
Cobalt	mg/kg	13.1	11.3	16.0	yes
Copper	mg/kg	198	162.7	222.9	yes
Lead	mg/kg	105	99.6	135.6	yes
Molybdenum	mg/kg	2.5	2.0	3.8	yes
Nickel	mg/kg	61.8	47.1	73.5	yes
Selenium	mg/kg	0.7	0.3	1.3	yes
Silver	mg/kg	0.8	0.25	1.15	yes
Thallium	mg/kg	0.31	0.26	0.40	yes
Tin	mg/kg	3.8	1.0	5.4	yes
Uranium	mg/kg	1.1	0.9	1.5	yes
Vanadium	mg/kg	43.0	31.5	56.1	yes
Zinc	mg/kg	483	355	550	yes

Date Acquired: November 03, 2014

Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Barium	mg/L	0.0039	-0.00	0.01	yes

Date Acquired: November 03, 2014

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Barium	mg/kg	15.5	14.6	10	5.00	yes

Date Acquired: November 03, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Barium	mg/kg	11.2	8.87	12.71	yes
Barium	mg/kg	0.10	0.09	0.11	yes

Date Acquired: November 03, 2014

Water Soluble Parameters

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chromium (VI)	mg/L	0	-0.10	0.10	yes

Date Acquired: November 03, 2014

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Chromium (VI)	mg/kg	<0.10	<0.10	10	0.01	yes

Date Acquired: November 03, 2014

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Mono-Aromatic Hydrocarbons - Soil -

Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes

Date Acquired: November 02, 2014

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	112.40	85	115	yes
Toluene	ng	93.20	85	115	yes
Ethylbenzene	ng	86.80	85	115	yes
Total Xylenes (m,p,o)	ng	86.00	85	115	yes
Styrene	ng	102.00	85	115	yes

Date Acquired: November 02, 2014

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes

Date Acquired: November 02, 2014

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	109	80	120	yes

Date Acquired: November 02, 2014

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	ug/mL	0	-10	10	yes
F3c C16-C34	ug/mL	0	-30	30	yes
F4c C34-C50	ug/mL	0	-20	20	yes
F4HTGCc C34-C50+	ug/mL	0	-20	20	yes

Date Acquired: November 02, 2014

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	ug/mL	94.06	85	115	yes
F3c C16-C34	ug/mL	108.94	85	115	yes
F4c C34-C50	ug/mL	103.98	85	115	yes
F4HTGCc C34-C50+	ug/mL	93.58	85	115	yes

Date Acquired: November 02, 2014

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	<50	<50	50	10	yes
F3c C16-C34	mg/kg	<50	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes

Date Acquired: November 02, 2014



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Extractable Petroleum Hydrocarbons -

Soil - Continued

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	101	65	135	yes
F3c C16-C34	mg/kg	105	65	135	yes
F4c C34-C50	mg/kg	96	65	135	yes
F4HTGCc C34-C50+	mg/kg	93	65	135	yes

Date Acquired: November 02, 2014

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	0	-0.010	0.010	yes
Acenaphthylene	ng/mL	0	-0.05	0.05	yes
Acenaphthene	ng/mL	0	-0.05	0.05	yes
Fluorene	ng/mL	0	-0.05	0.05	yes
Phenanthrene	ng/mL	0	-0.01	0.01	yes
Anthracene	ng/mL	0	-0.003	0.003	yes
Fluoranthene	ng/mL	0	-0.01	0.01	yes
Pyrene	ng/mL	0	-0.01	0.01	yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01	yes
Chrysene	ng/mL	0	-0.05	0.05	yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05	yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05	yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05	yes

Date Acquired: November 02, 2014

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	90.20	80	120	yes
Acenaphthylene	ng/mL	88.00	80	120	yes
Acenaphthene	ng/mL	90.20	80	120	yes
Fluorene	ng/mL	93.00	80	120	yes
Phenanthrene	ng/mL	88.40	80	120	yes
Anthracene	ng/mL	89.60	80	120	yes
Fluoranthene	ng/mL	93.40	80	120	yes
Pyrene	ng/mL	94.60	80	120	yes
Benzo(a)anthracene	ng/mL	89.80	80	120	yes
Chrysene	ng/mL	88.40	80	120	yes
Benzo(b)fluoranthene	ng/mL	88.80	80	120	yes
Benzo(k)fluoranthene	ng/mL	94.80	80	120	yes
Benzo(a)pyrene	ng/mL	95.20	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	97.00	80	120	yes



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Polycyclic Aromatic Hydrocarbons - Soil -

Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Dibenzo(a,h)anthracene	ng/mL	93.00	80	120	yes
Benzo(g,h,i)perylene	ng/mL	88.80	80	120	yes

Date Acquired: November 02, 2014

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Naphthalene	mg/kg	0.858	0.681	50	0.020	yes
Acenaphthylene	mg/kg	<0.05	<0.05	50	0.10	yes
Acenaphthene	mg/kg	<0.05	<0.05	50	0.10	yes
Fluorene	mg/kg	<0.05	<0.05	50	0.10	yes
Phenanthrene	mg/kg	0.13	0.10	50	0.02	yes
Anthracene	mg/kg	0.009	0.008	50	0.006	yes
Fluoranthene	mg/kg	0.03	0.03	50	0.02	yes
Pyrene	mg/kg	0.09	0.09	50	0.02	yes
Benzo(a)anthracene	mg/kg	0.02	0.01	50	0.02	yes
Chrysene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(b)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(k)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(a)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Dibenzo(a,h)anthracene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(g,h,i)perylene	mg/kg	<0.05	<0.05	50	0.10	yes

Date Acquired: November 02, 2014

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	mg/kg	113	70	130	yes
Acenaphthylene	mg/kg	99	70	130	yes
Acenaphthene	mg/kg	111	70	130	yes
Fluorene	mg/kg	110	70	130	yes
Phenanthrene	mg/kg	104	70	130	yes
Anthracene	mg/kg	98	70	130	yes
Fluoranthene	mg/kg	112	70	130	yes
Pyrene	mg/kg	114	70	130	yes
Benzo(a)anthracene	mg/kg	94	70	130	yes
Chrysene	mg/kg	112	70	130	yes
Benzo(b)fluoranthene	mg/kg	92	70	130	yes
Benzo(k)fluoranthene	mg/kg	100	70	130	yes
Benzo(a)pyrene	mg/kg	87	70	130	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	104	70	130	yes
Dibenzo(a,h)anthracene	mg/kg	96	70	130	yes
Benzo(g,h,i)perylene	mg/kg	105	70	130	yes

Date Acquired: November 02, 2014

PAH - Soil - Surrogate Recovery



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	111.27	23	130	yes
2-Fluorobiphenyl	%	94.32	30	130	yes
p-Terphenyl-d14	%	108.53	18	137	yes
Date Acquired: November 02, 2014					

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
1:5 Water Soluble Extraction	McKeague	* Soluble Salts in Extracts of 1:5 Soil:Water Mixtures, 3.23	03-Nov-14	Exova Edmonton
Barium (Extractable) in soil (0.1 M CaCl ₂)	Ab Env	Analytical Method for Extractable Barium, 6.6.2	03-Nov-14	Exova Edmonton
Boron in general soil	McKeague	* Hot Water Soluble Boron - Azomethine-H Method, 4.61	03-Nov-14	Exova Edmonton
BTEX-CCME - Soil	CCME	* Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	02-Nov-14	Exova Calgary
BTEX-CCME - Soil	US EPA	* Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	02-Nov-14	Exova Calgary
Mercury (Hot Block) in Soil	US EPA	* Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	03-Nov-14	Exova Edmonton
Metals ICP-MS (Hot Block) in soil	SW-846	* Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	03-Nov-14	Exova Edmonton
PAH - Soil	AESRD	Index of Additive Cancer Risk (IACR), PAHs	02-Nov-14	Exova Calgary
PAH - Soil	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	02-Nov-14	Exova Calgary
TEH-CCME-Soil (Shake)	CCME	* Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	02-Nov-14	Exova Calgary

* Reference Method Modified

References

Ab Env	Alberta Environment, Soil Quality Guidelines for Barite
AESRD	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater
CCME	Canadian Council of Ministers of the Environment
McKeague	Manual on Soil Sampling and Methods of Analysis



Methodology and Notes

Bill To:	City of Edmonton	Project:		Lot ID:	1036919
Report To:	Nichols Environmental (Canada)	ID:	14-214-CRD	Control Number:	B10681
	17331-107 Ave NE	Name:	Phase II ESA	Date Received:	Oct 31, 2014
	Edmonton, AB, Canada	Location:	Rossdale	Date Reported:	Nov 17, 2014
	T5S 1E5	LSD:		Report Number:	1969162
Attn:	Tawnya Anderson	P.O.:	14-214-CRD		
Sampled By:	HB	Acct code:			
Company:	NECL				

SW-846	Test Methods for Evaluating Solid Waste
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Report was issued to include addition of Chromatogram analysis on samples 1-4,9,11,15,17,20,21,24,26-28,30-31 requested by Tawnya Anderson of Nichols on Nov 14th/14. Previous report 1964875.
- >130 - The surrogate recovery for PAH analysis is outside the range 23-130 % on samples #22,23,25 due to other sample material interfering with this surrogate.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10681
17331-107 Ave NE	Name: Phase II ESA	Date Received: Oct 31, 2014
Edmonton, AB, Canada	Location: Rosedale	Date Reported: Nov 17, 2014
T5S 1E5	LSD:	Report Number: 1969162
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Petroleum Hydrocarbons in Soil

Batch Notes

1. The method used complies with the Reference Method for the Canada Wide Standards for Petroleum Hydrocarbons in Soil - Tier 1, April 2001, including Addendum 1, and is accredited for use in Exova.
2. Modifications of the method: See Notes and Methodology for nonconformances (if applicable).
3. Qualifications on results: See Notes and Methodology for nonconformances (if applicable).
4. Silica gel treatment is performed for fractions F2, F3, F4.
5. F1-BTEX: BTEX has been subtracted from the F1 fraction.
6. If analyzed, naphthalene has been subtracted from fraction F2 and selected PAHs have been subtracted from fraction F3.
7. F4HTGC is reported when more than 5% of the total carbon envelope elutes past C₅₀.
8. Exova does not routinely report Gravimetric Heavy Hydrocarbons (F4G or F4G-sg), F4HTGC through extended range high temperature GC is reported instead.
9. When both F4(C₃₄-C₅₀) and F4HTGC are reported, F4HTGC is the final F4 that is to be used for interpreting the CWS.
10. Quality criteria met for the batch: Data is reported in Quality Control Section of report (if requested).
 - nC₆ and nC₁₀ response factors (RF) are within 30% of RF for toluene
 - nC₁₀, nC₁₆ and nC₃₄ RFs are within 10% of each other
 - nC₅₀ RF is within 30% of the average RF for nC₁₀+nC₁₆+nC₃₄
 - linearity is within 15% for each of the calibrated carbon ranges
11. Batch data for analytical quality control are available on request.
12. Extraction and analysis holding times were met: See Notes and Methodology for nonconformances (if applicable).

Approved by:



Randy Neumann, BSc
Vice President

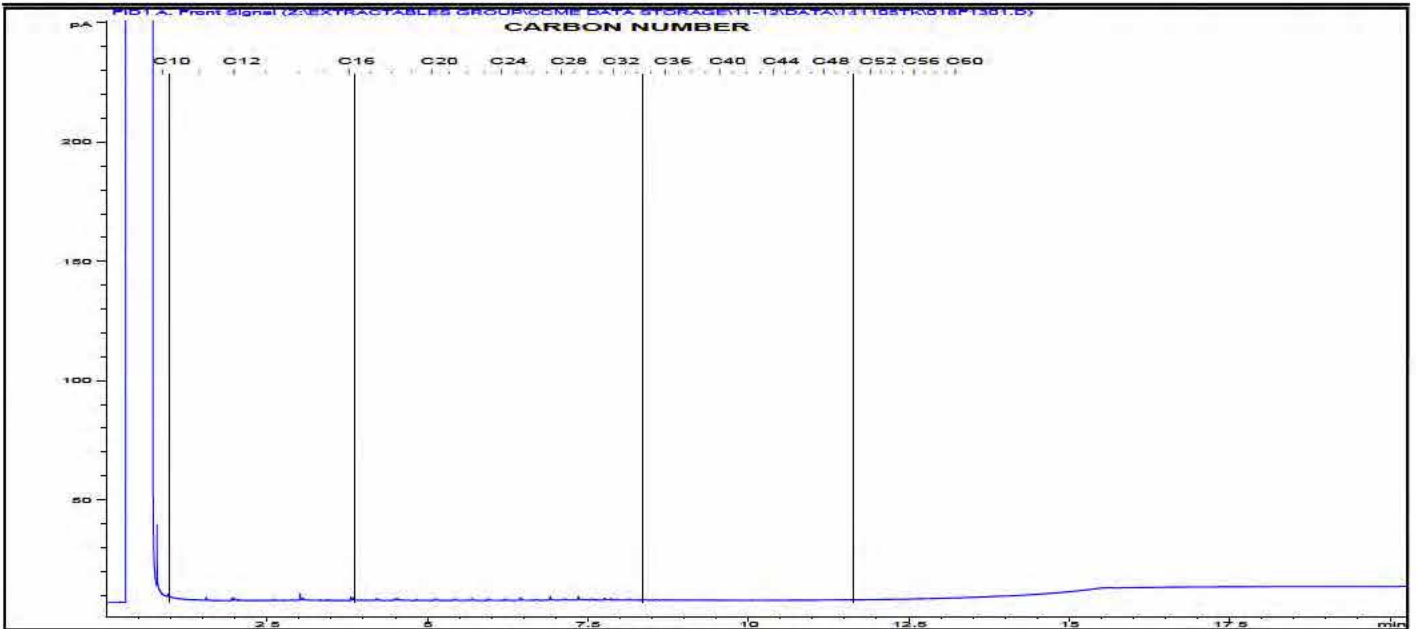
Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

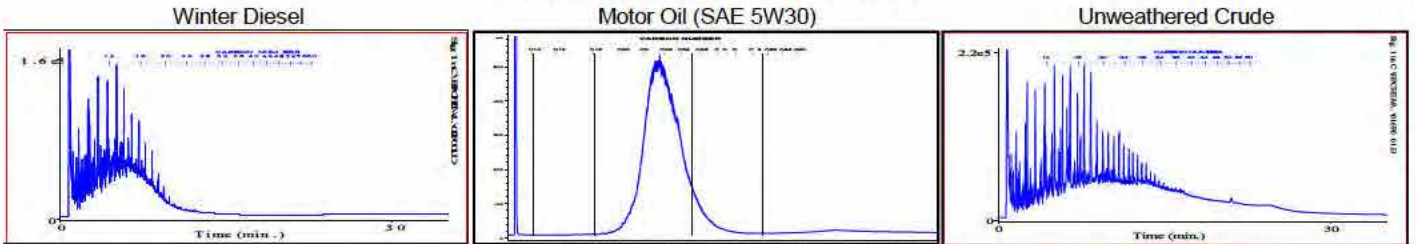
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-1 Sample Description: 3.8 A7 Silica Gel Treated
 Sample Date: Oct 28, 2014 14-05 m



TYPICAL PRODUCT CHROMATOGRAMS



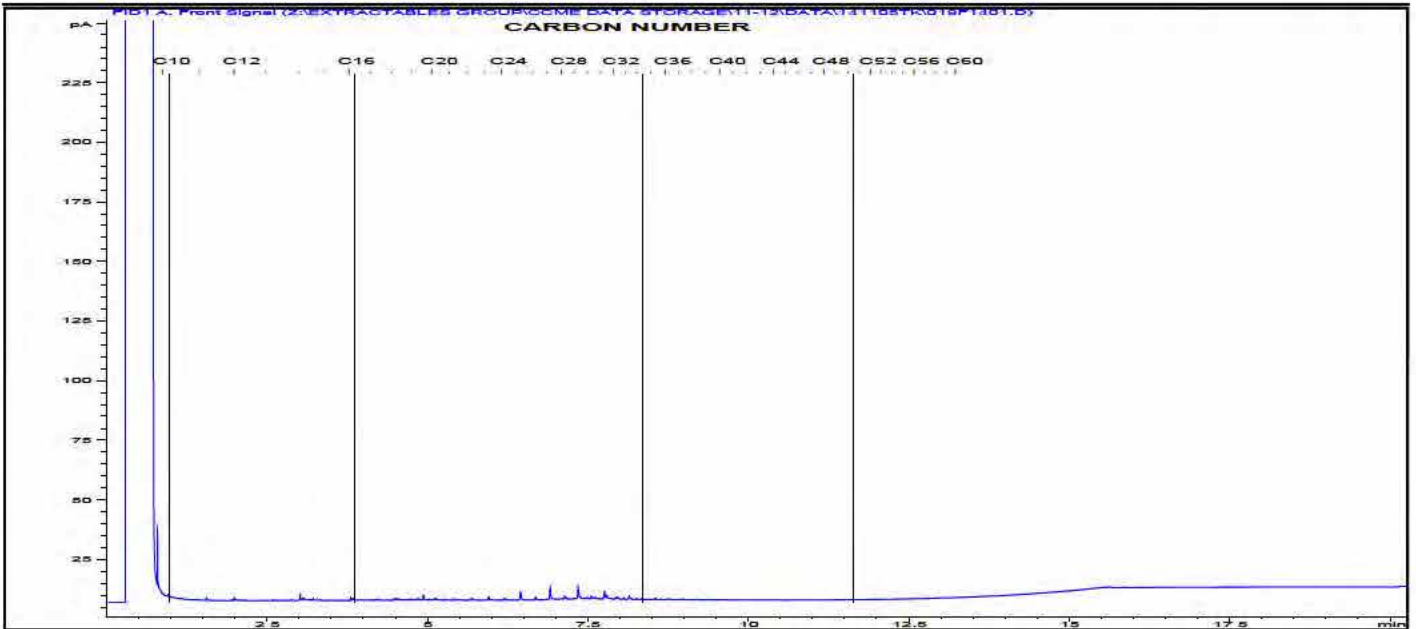
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

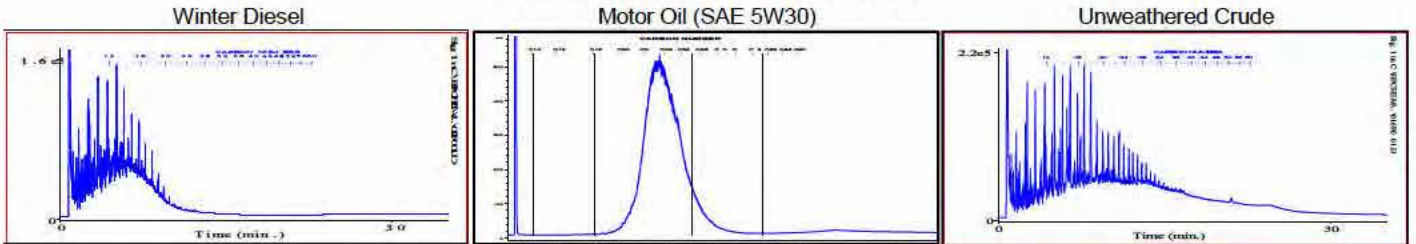
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-2 Sample Description: 9.8 A7 Silica Gel Treated
 Sample Date: Oct 28, 2014 14-06 m



TYPICAL PRODUCT CHROMATOGRAMS



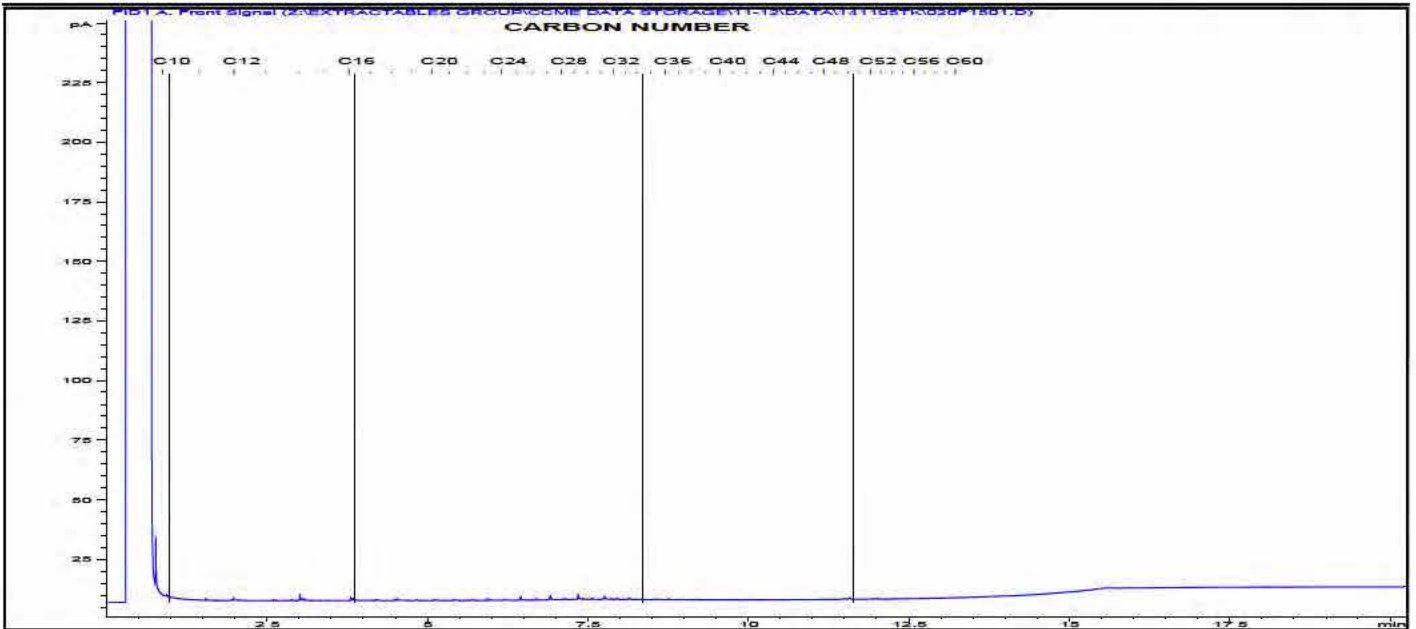
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

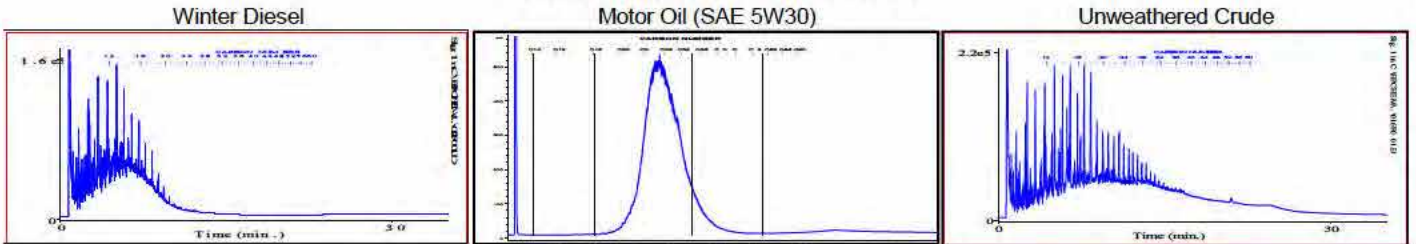
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-3 Sample Description: 2.3 A7 Silica Gel Treated
 Sample Date: Oct 28, 2014 14-07 m



TYPICAL PRODUCT CHROMATOGRAMS



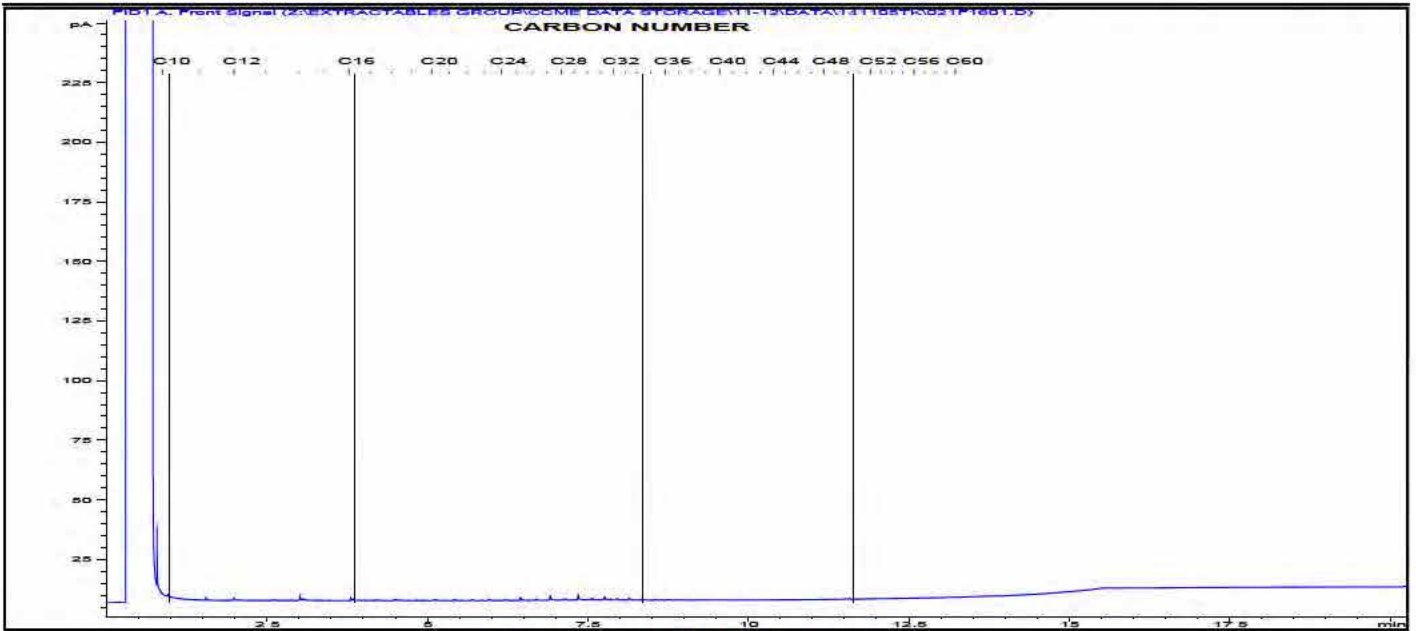
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

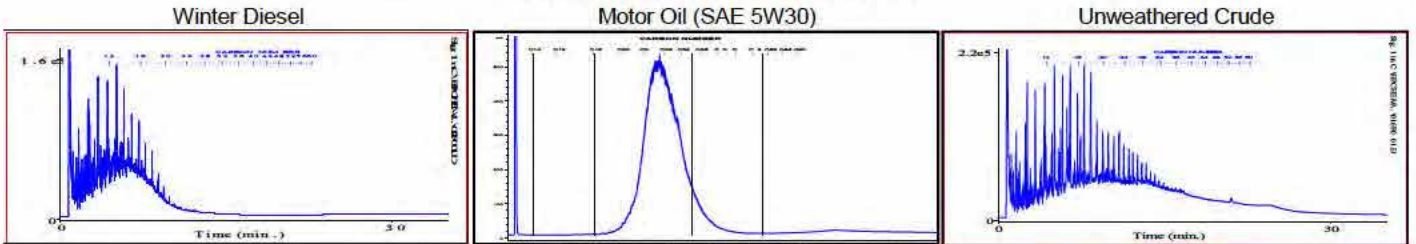
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-4 Sample Description: 2.0 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-08 m



TYPICAL PRODUCT CHROMATOGRAMS



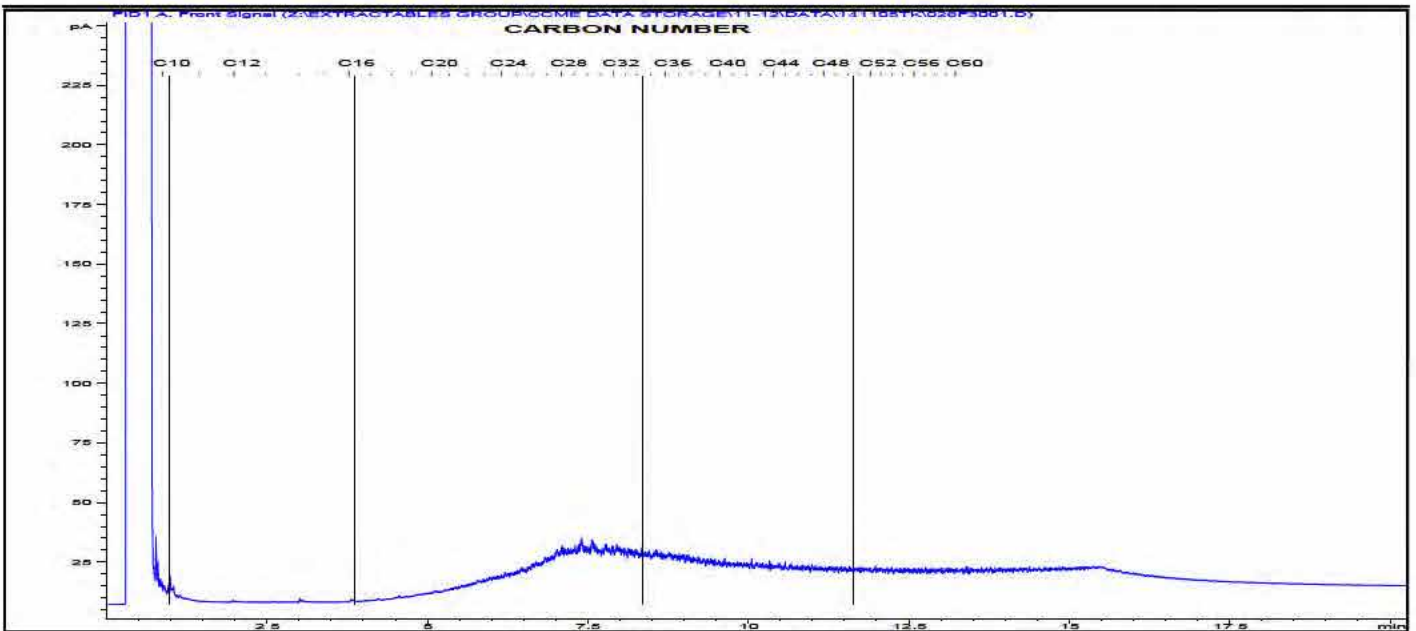
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

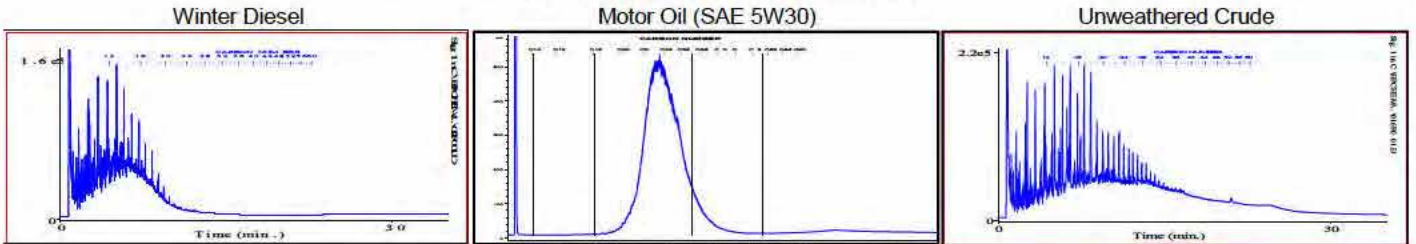
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-9 Sample Description: 1.0 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-09 m



TYPICAL PRODUCT CHROMATOGRAMS



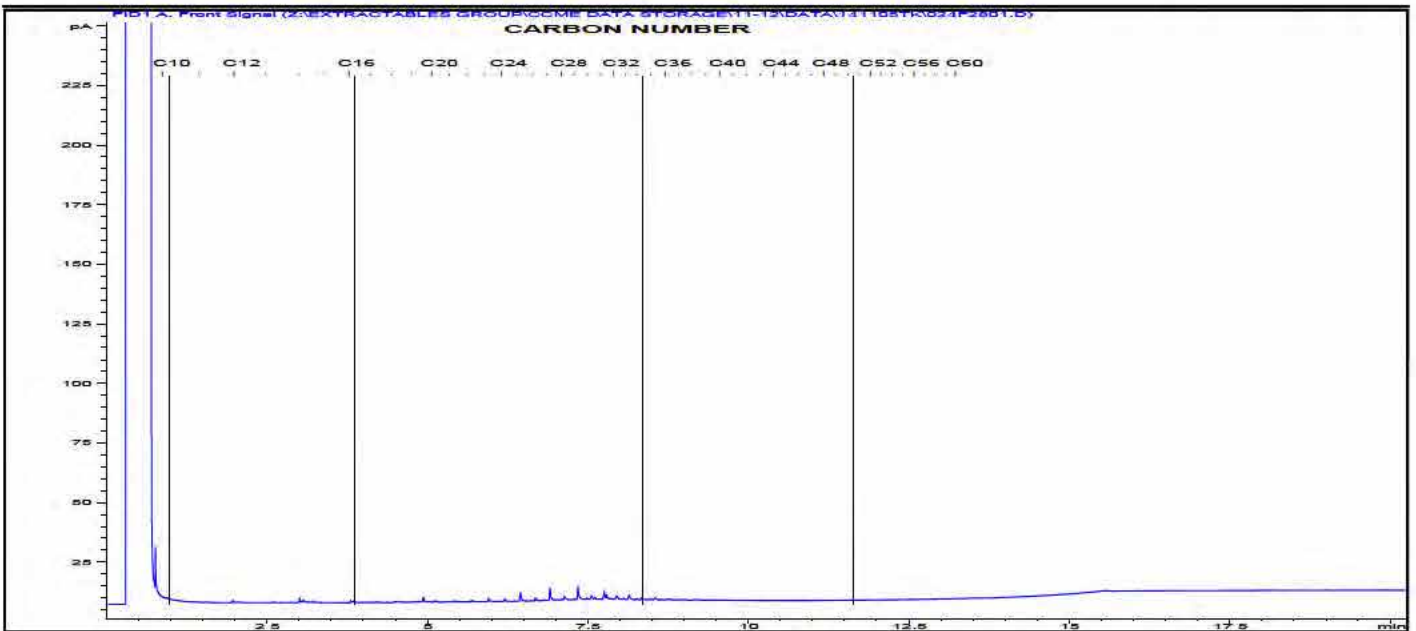
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

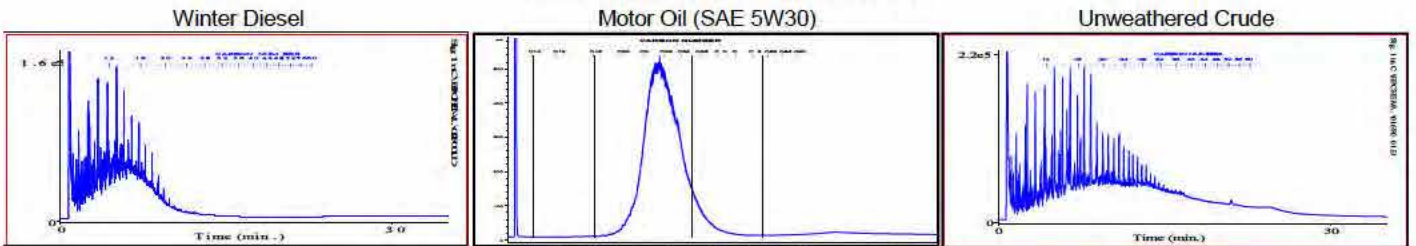
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-11 Sample Description: 8.3 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-09 m



TYPICAL PRODUCT CHROMATOGRAMS



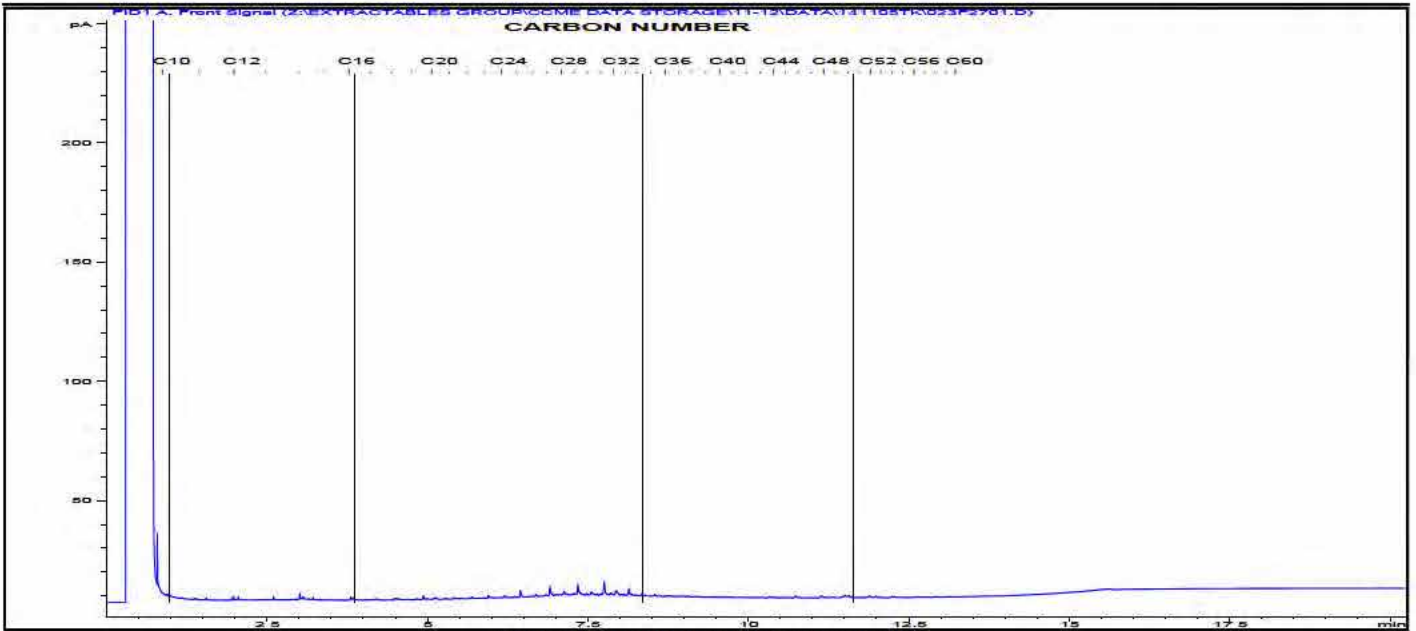
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

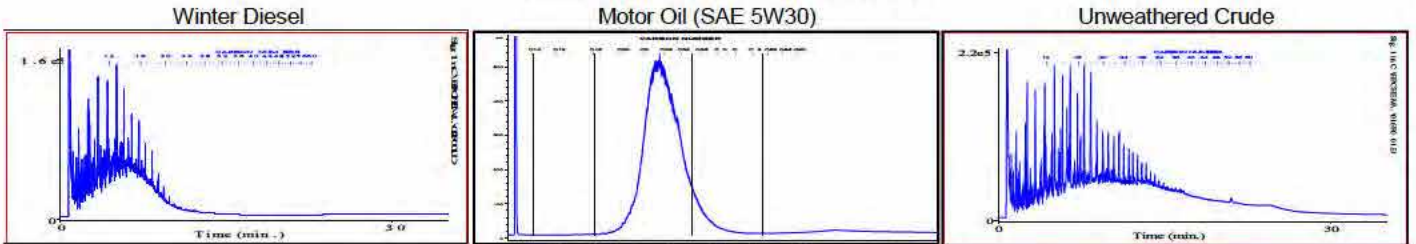
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-15 Sample Description: 2.0 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-10 m



TYPICAL PRODUCT CHROMATOGRAMS



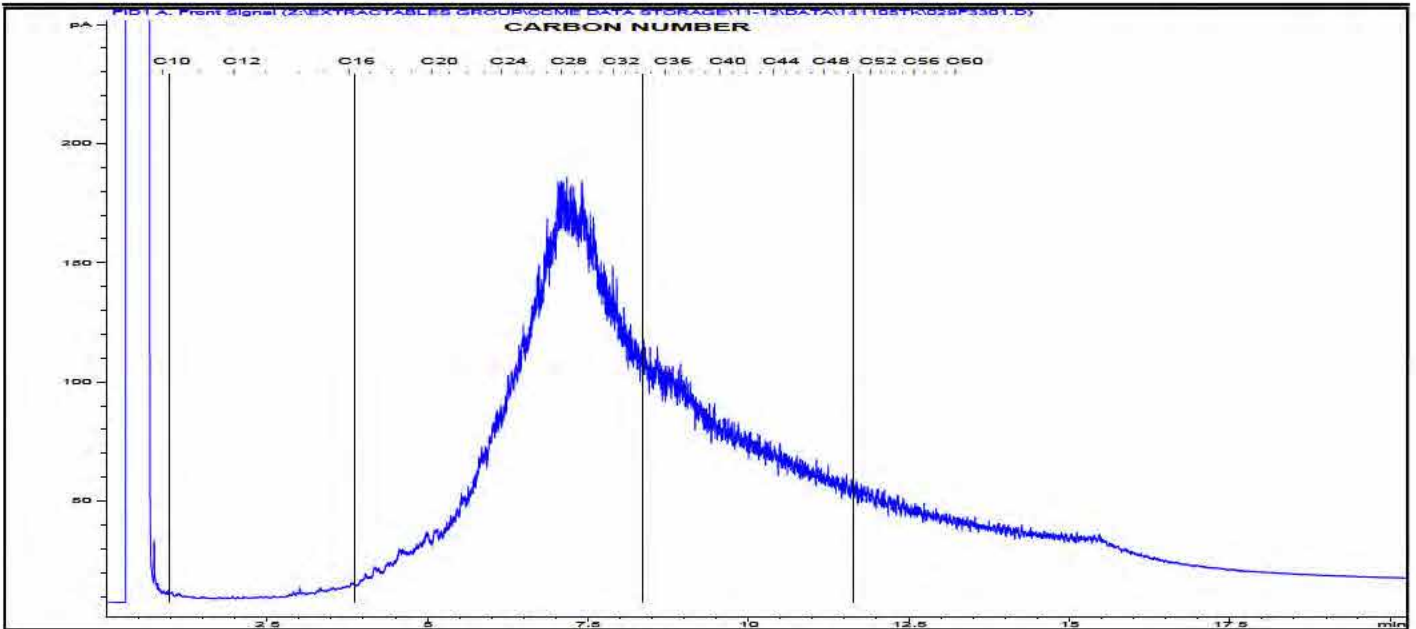
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

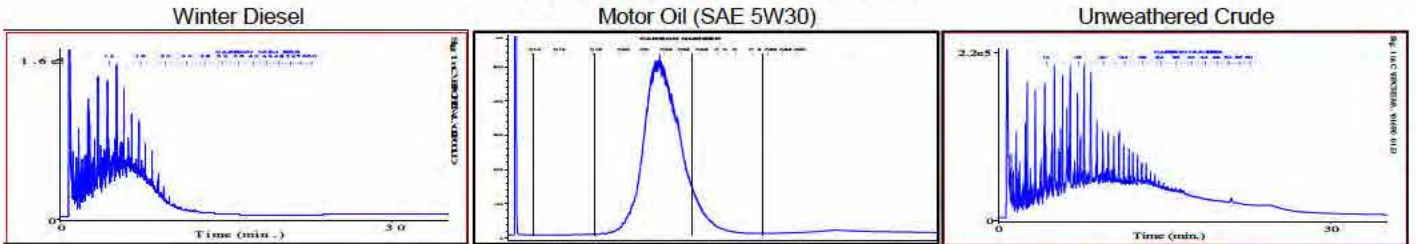
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-17 Sample Description: 0.5 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-11 m



TYPICAL PRODUCT CHROMATOGRAMS



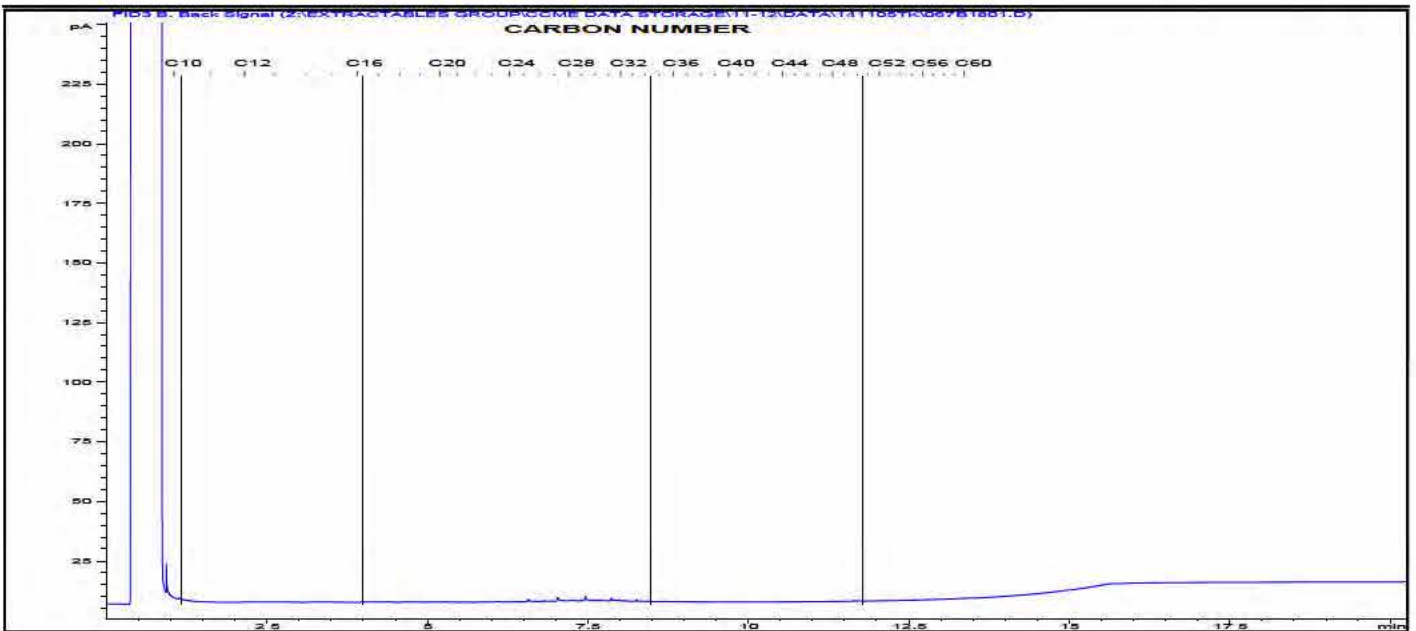
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

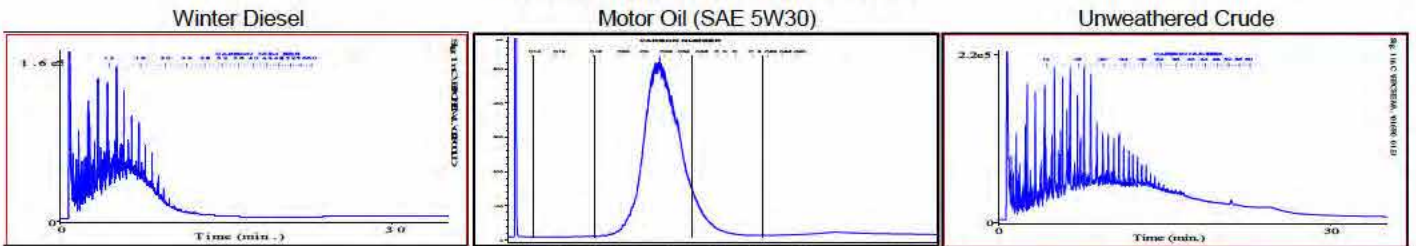
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-20 Sample Description: 4.6 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-11 m



TYPICAL PRODUCT CHROMATOGRAMS



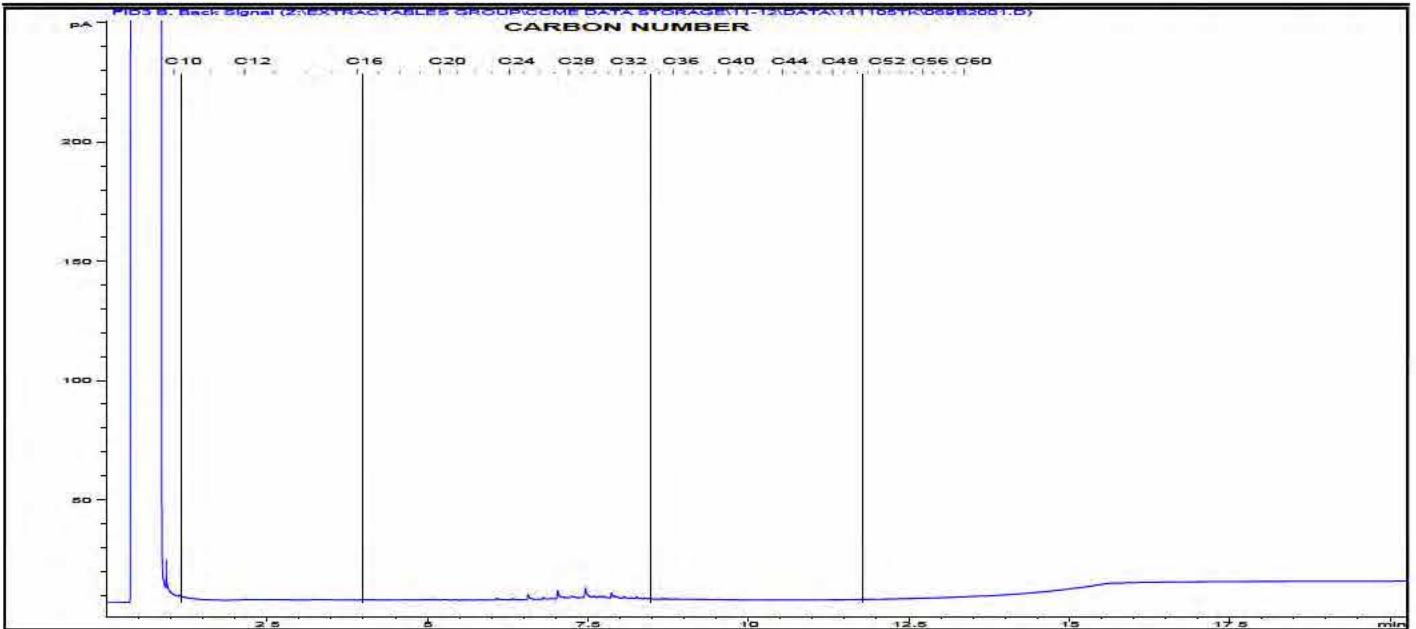
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

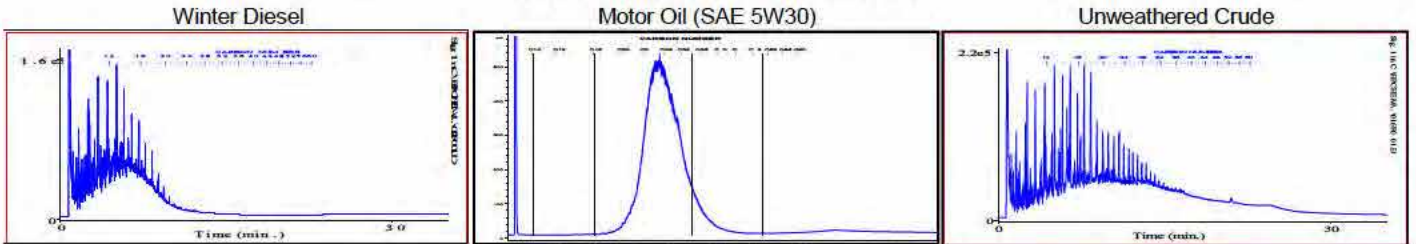
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-21 Sample Description: 9.8 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-11 m



TYPICAL PRODUCT CHROMATOGRAMS



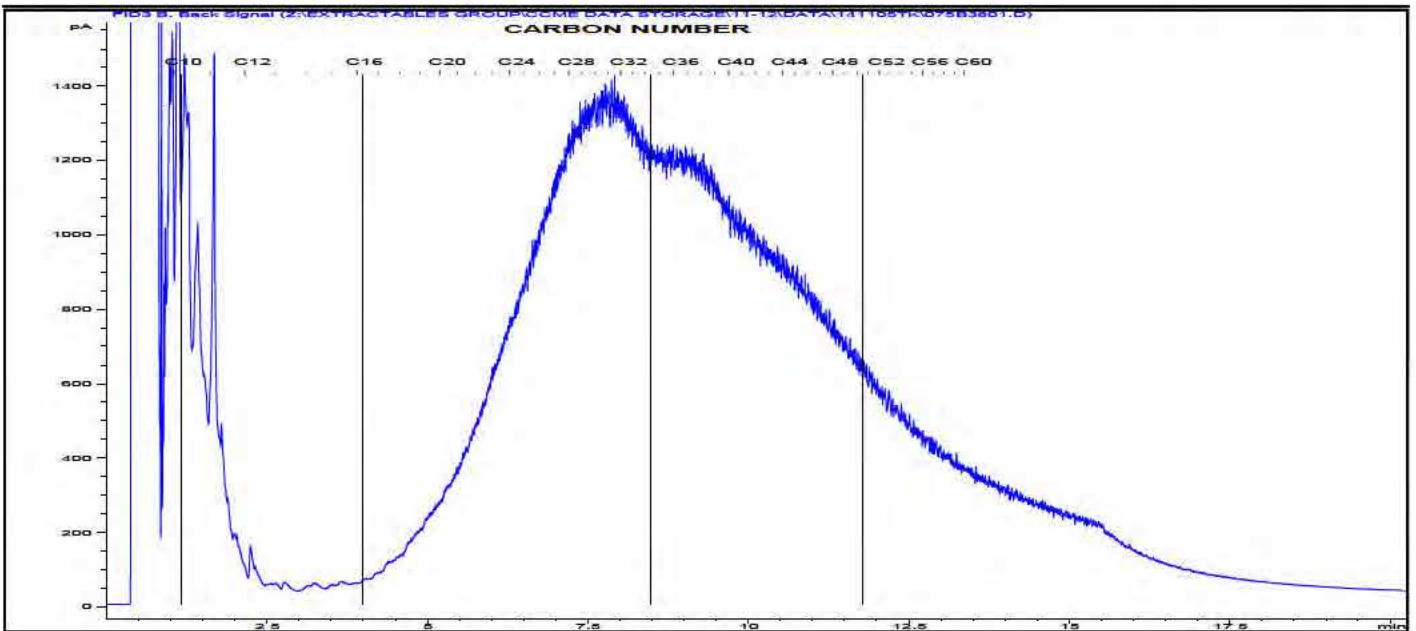
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

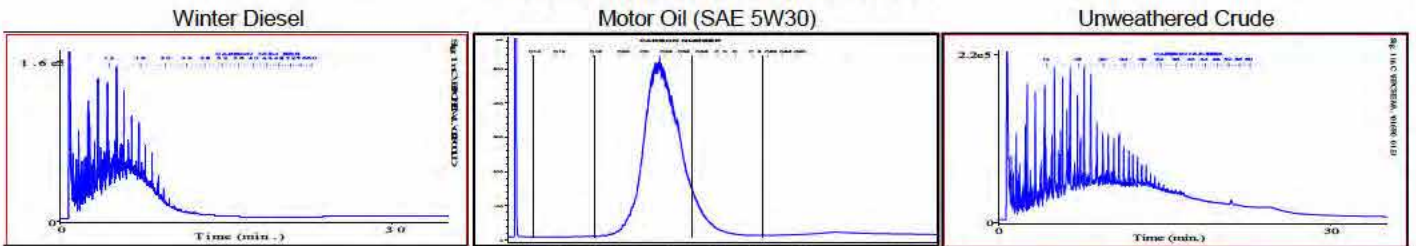
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-24 Sample Description: 3.8 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-12 m



TYPICAL PRODUCT CHROMATOGRAMS



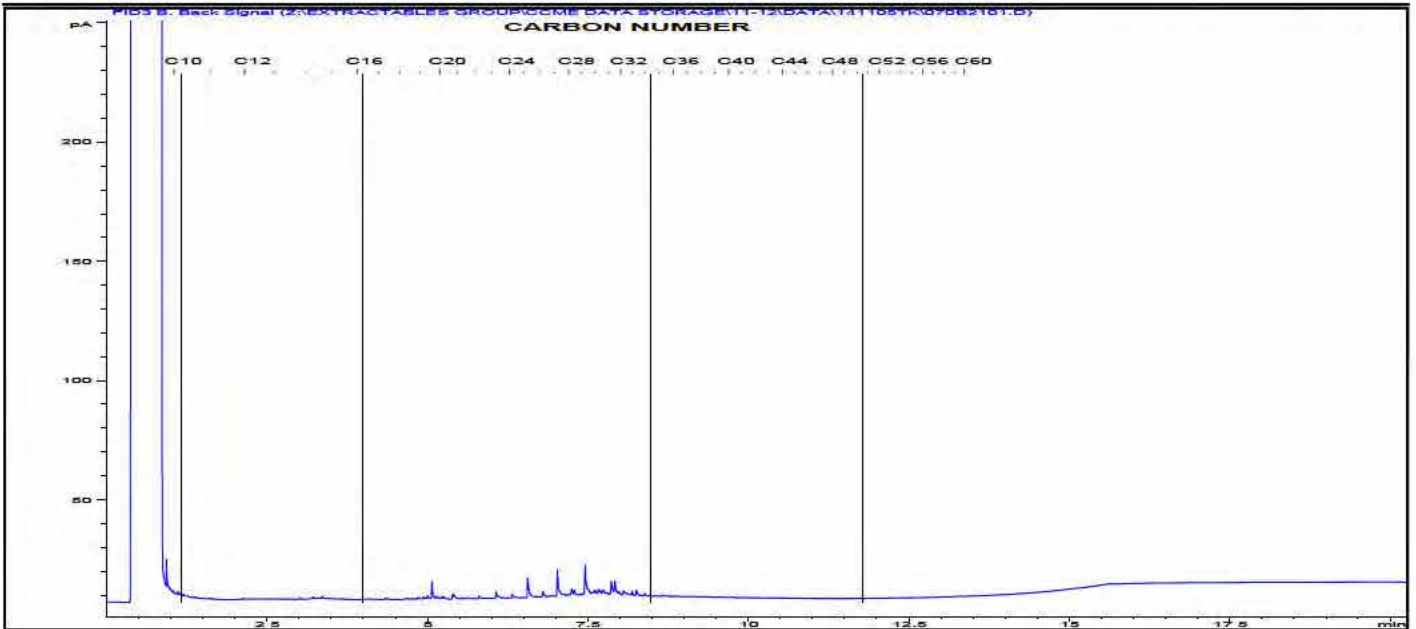
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

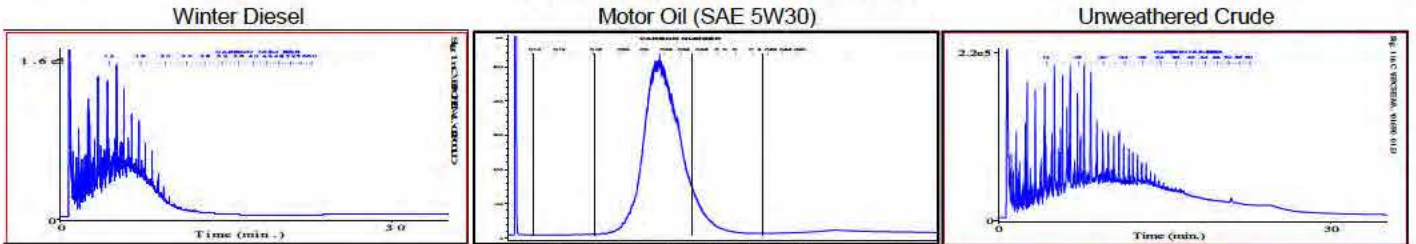
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-26 Sample Description: 6.9 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-12 m



TYPICAL PRODUCT CHROMATOGRAMS



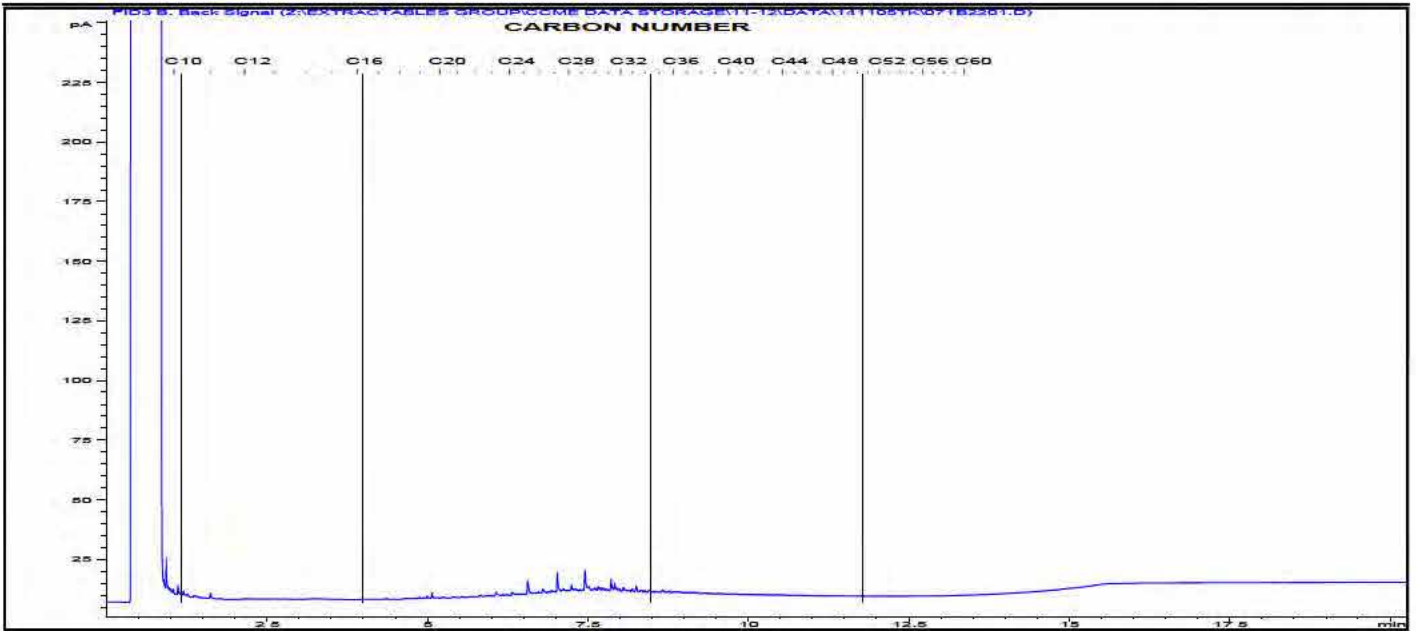
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

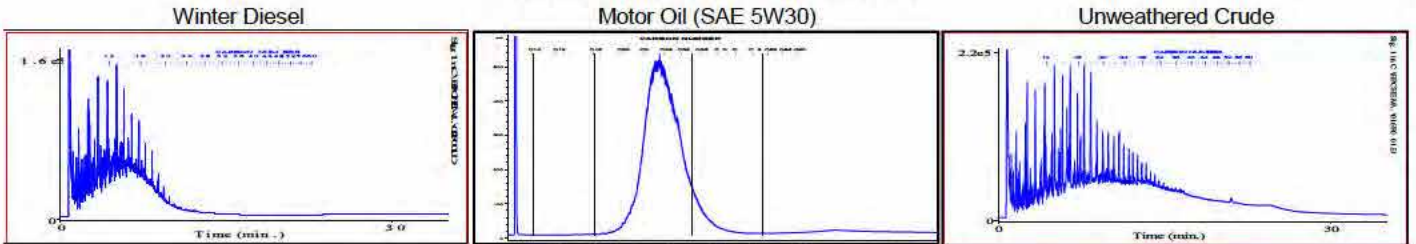
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-27 Sample Description: 7.5 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-12 m



TYPICAL PRODUCT CHROMATOGRAMS



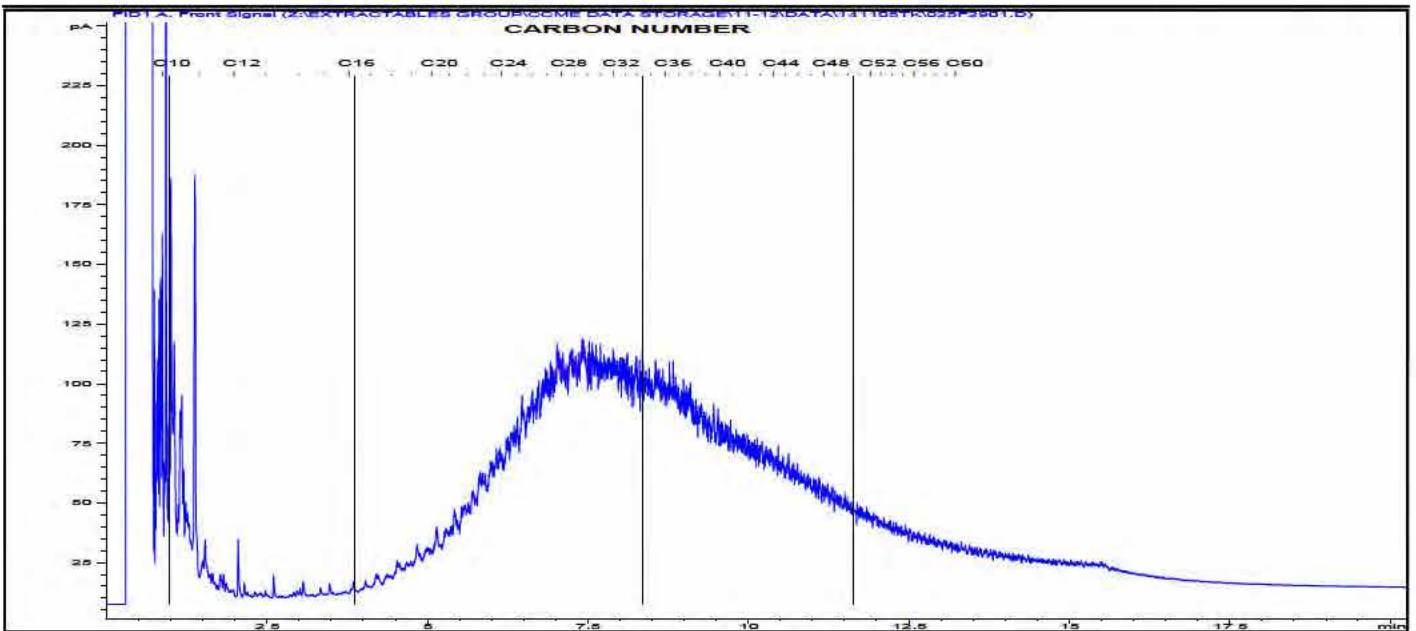
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

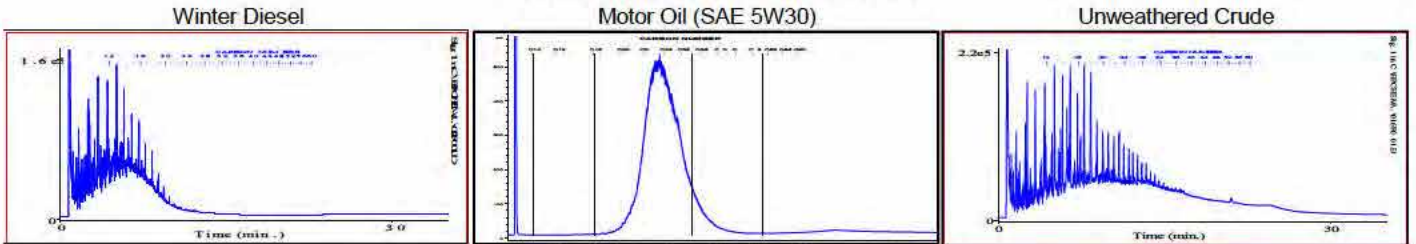
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-28 Sample Description: 10.5 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-12 m



TYPICAL PRODUCT CHROMATOGRAMS



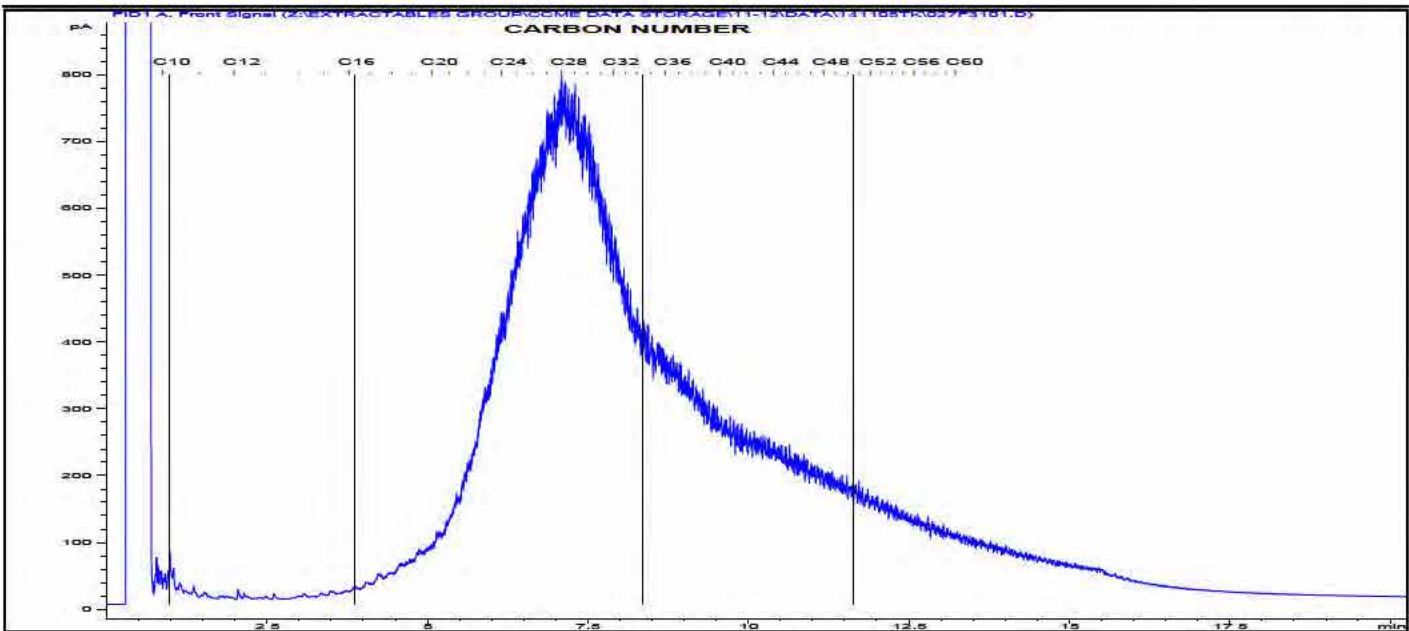
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

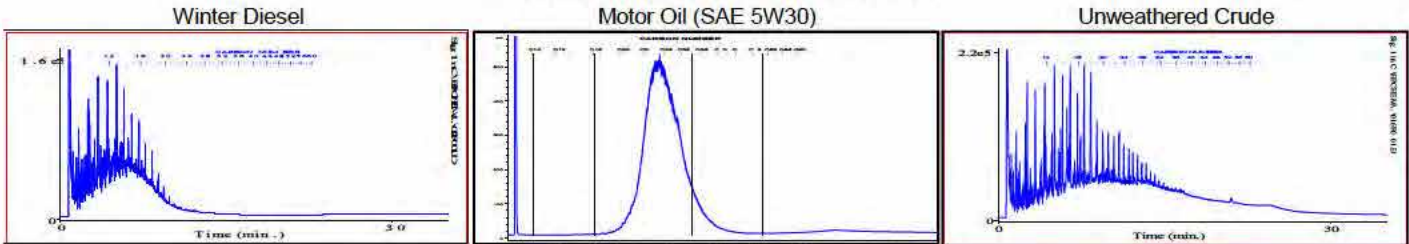
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-30 Sample Description: 3.8 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-13 m



TYPICAL PRODUCT CHROMATOGRAMS



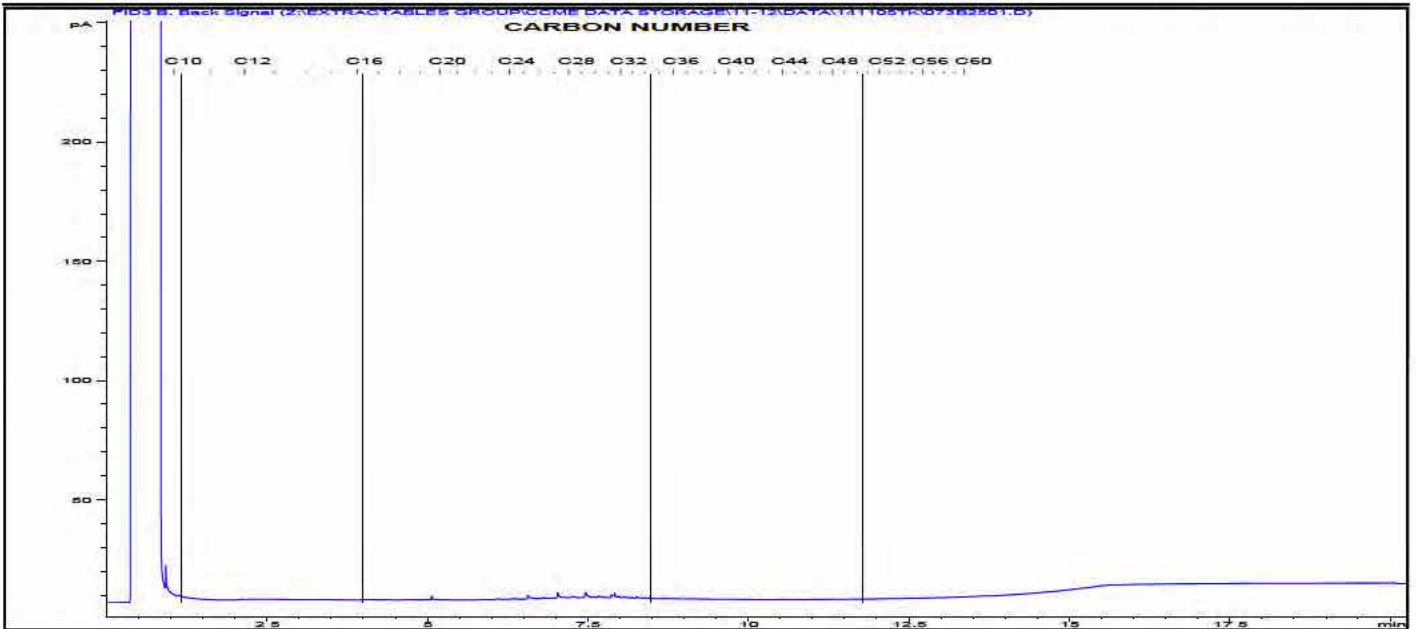
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

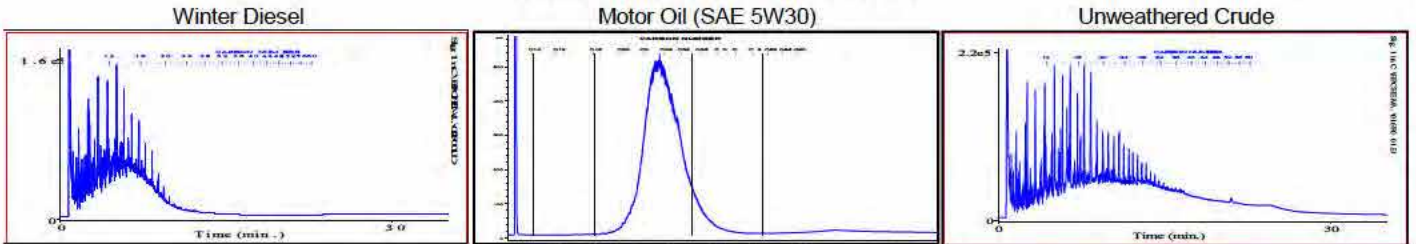
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1036919
Report To: Nichols Environmental (Canada)	Name: Phase II ESA	Control Number: B10681
17331-107 Ave NE	Location: Rosedale	Date Received: Oct 31, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 17, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1969162
Attn: Tawnya Anderson		
Sampled by: HB		
Company: NECL		

Exova Number: 1036919-31 Sample Description: 5.3 A3 Silica Gel Treated
 Sample Date: Oct 30, 2014 14-13 m



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

Report Transmission Cover Page

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Contact & Affiliation	Address	Delivery Commitments
Tawnya Anderson Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Single Report On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Lot Creation] send (COR) by Email - Single Report
Kelly Goetz Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

Notes To Clients:

- Report was issued to include addition of SPLP leachate and PAH1 analysis on the resultant leachate as requested by Tami Dolen of the City of Edmonton on November 18, 2014. Previous report 1966630.
- Report was issued to include addition of PS24 analysis on sample #1 requested by Tawnya Anderson of Nichols Environmental on November 19, 2014. Previous report 1966630.



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rosssdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1037841-1	1037841-3	1037841-4		
	Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A6:14-14 / 3.5 / m	A6:14-14 / 5.0 / m	A6:14-15 / 3.0 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	19.2	9.58	27.6	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.39	0.11	0.27	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	6.8	7.0	9.7	0.2
Barium	Strong Acid Extractable	mg/kg	469	325	856	1
Beryllium	Strong Acid Extractable	mg/kg	1.0	0.8	1.4	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.26	0.30	0.33	0.01
Chromium	Strong Acid Extractable	mg/kg	15.3	19.2	13.8	0.5
Cobalt	Strong Acid Extractable	mg/kg	9.5	10.3	9.1	0.1
Copper	Strong Acid Extractable	mg/kg	29.7	23.5	54.2	1
Lead	Strong Acid Extractable	mg/kg	28.7	13.5	34.2	5
Molybdenum	Strong Acid Extractable	mg/kg	1.1	1.0	1.5	1
Nickel	Strong Acid Extractable	mg/kg	25.9	28.4	25.0	0.5
Selenium	Strong Acid Extractable	mg/kg	0.5	0.4	0.4	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	0.2	0.1
Thallium	Strong Acid Extractable	mg/kg	0.23	0.25	0.27	0.05
Tin	Strong Acid Extractable	mg/kg	1.1	1.1	1.4	1
Uranium	Strong Acid Extractable	mg/kg	1.1	1.0	1.6	0.5
Vanadium	Strong Acid Extractable	mg/kg	27.7	32.3	27.3	0.1
Zinc	Strong Acid Extractable	mg/kg	72	73	88	1
Salinity						
pH	Saturated Paste	pH	7.7	8.2	7.4	
Barite Soil Analysis						
Barium	Extractable	mg/kg	6.2	12.0	4.2	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1037841-1	1037841-9
Sample Date	Nov 03, 2014	Nov 03, 2014
Sample Time	NA	NA
Sample Location		
Sample Description	A6:14-14 / 3.5 / m	A6:14-16 / 7.5 / m
Matrix	Soil	Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Particle Size Analysis - Wet Sieve					
Texture		Fine-Grained	Coarse-Grained		
75 micron sieve	% Retained	% by weight	42.6	81.3	0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rosssdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1037841-2	1037841-3	1037841-4	
		Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A6:14-14 / 4.0 / m	A6:14-14 / 5.0 / m	A6:14-15 / 3.0 / m	
		Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.024	0.027	0.034	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.24	0.24	0.39	0.01
Anthracene	Dry Weight	mg/kg	0.078	0.102	0.153	0.003
Fluoranthene	Dry Weight	mg/kg	0.31	0.19	0.52	0.01
Pyrene	Dry Weight	mg/kg	0.29	0.21	0.52	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	0.16	0.11	0.26	0.01
Chrysene	Dry Weight	mg/kg	0.18	0.12	0.25	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.20	0.12	0.28	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	0.12	0.09	0.15	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	0.15	0.14	0.21	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	0.08	0.08	0.11	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	0.07	0.08	0.09	0.05
IACR_Coarse	Index of Additive Cancer Risk		0.640	0.464	0.849	0.001
IACR_Fine	Index of Additive Cancer Risk		1.23	0.896	1.64	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	95	103	96	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	101	99	107	30-130
p-Terphenyl-d14	PAH - Surrogate	%	98	97	95	18-137

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rosssdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1037841-5	1037841-6	1037841-7	
		Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A6:14-15 / 6.0 / m	A6:14-16 / 1.5 / m	A6:14-16 / 2.5 / m	
		Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	33.1	17.6	18.2	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.09	1.15	0.50	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	0.7	0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	9.0	41.0	12.9	0.2
Barium	Strong Acid Extractable	mg/kg	702	1630	642	1
Beryllium	Strong Acid Extractable	mg/kg	1.3	2.8	1.2	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.33	3.16	0.42	0.01
Chromium	Strong Acid Extractable	mg/kg	16.0	19.2	13.7	0.5
Cobalt	Strong Acid Extractable	mg/kg	10.6	11.7	9.3	0.1
Copper	Strong Acid Extractable	mg/kg	21.8	79.6	25.8	1
Lead	Strong Acid Extractable	mg/kg	16.3	148	49.8	5
Molybdenum	Strong Acid Extractable	mg/kg	2.5	4.5	1.9	1
Nickel	Strong Acid Extractable	mg/kg	26.4	38.2	26.2	0.5
Selenium	Strong Acid Extractable	mg/kg	0.5	0.7	0.6	0.3
Silver	Strong Acid Extractable	mg/kg	0.2	0.8	0.2	0.1
Thallium	Strong Acid Extractable	mg/kg	0.26	0.97	0.29	0.05
Tin	Strong Acid Extractable	mg/kg	1.2	2.4	1.4	1
Uranium	Strong Acid Extractable	mg/kg	1.5	3.2	1.3	0.5
Vanadium	Strong Acid Extractable	mg/kg	31.5	34.2	26.9	0.1
Zinc	Strong Acid Extractable	mg/kg	67	147	69	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	4.2	31.2	3.8	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	<0.010	0.075	0.019	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.03	0.17	0.15	0.01
Anthracene	Dry Weight	mg/kg	0.004	0.058	0.061	0.003
Fluoranthene	Dry Weight	mg/kg	0.01	0.19	0.40	0.01
Pyrene	Dry Weight	mg/kg	0.02	0.15	0.46	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	0.06	0.25	0.01
Chrysene	Dry Weight	mg/kg	<0.05	0.09	0.27	0.05



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1037841-5	1037841-6	1037841-7		
	Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A6:14-15 / 6.0 / m	A6:14-16 / 1.5 / m	A6:14-16 / 2.5 / m		
	Matrix	Soil	Soil	Soil		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil - Continued						
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	0.09	0.34	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	0.16	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	<0.05	0.24	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05	0.15	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	<0.05	0.12	0.05
IACR_Coarse	Index of Additive Cancer Risk		<0.001	0.088	0.933	0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001	0.168	1.80	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	99	110	104	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	110	109	110	30-130
p-Terphenyl-d14	PAH - Surrogate	%	101	86	95	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1037841-5	1037841-7	1037841-8	
	Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A6:14-15 / 6.0 / m	A6:14-16 / 2.5 / m	A6:14-16 / 4.5 / m	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Salinity					
pH	Saturated Paste	pH	7.8	7.5	7.8



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rosssdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1037841-8	1037841-9	1037841-10	
		Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A6:14-16 / 4.5 / m	A6:14-16 / 7.5 / m	A6:14-17 / 3.5 / m	
		Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.019	<0.010	0.015	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.01	<0.01	0.06	0.01
Anthracene	Dry Weight	mg/kg	<0.003	<0.003	0.012	0.003
Fluoranthene	Dry Weight	mg/kg	<0.01	<0.01	0.04	0.01
Pyrene	Dry Weight	mg/kg	<0.01	<0.01	0.04	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	<0.01	0.02	0.01
Chrysene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		<0.001	<0.001	0.042	0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001	<0.001	0.080	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	96	93	106	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	93	94	106	30-130
p-Terphenyl-d14	PAH - Surrogate	%	46	79	95	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rosssdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1037841-8	1037841-10	1037841-11	
		Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A6:14-16 / 4.5 / m	A6:14-17 / 3.5 / m	A6:14-17 / 5.5 / m	
		Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	29.6	9.56	37.5	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.08	0.06	0.06	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	0.3	0.2
Arsenic	Strong Acid Extractable	mg/kg	5.9	6.8	4.9	0.2
Barium	Strong Acid Extractable	mg/kg	320	320	1460	1
Beryllium	Strong Acid Extractable	mg/kg	0.7	0.7	2.2	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.25	0.29	0.09	0.01
Chromium	Strong Acid Extractable	mg/kg	14.9	17.5	4.7	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.9	10.0	5.6	0.1
Copper	Strong Acid Extractable	mg/kg	21.7	20.7	12.0	1
Lead	Strong Acid Extractable	mg/kg	16.5	18.3	7.5	5
Molybdenum	Strong Acid Extractable	mg/kg	1.0	<1.0	8.2	1
Nickel	Strong Acid Extractable	mg/kg	23.5	28.9	17.4	0.5
Selenium	Strong Acid Extractable	mg/kg	0.3	0.4	1.2	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.2	0.2	0.1
Thallium	Strong Acid Extractable	mg/kg	0.19	0.24	0.17	0.05
Tin	Strong Acid Extractable	mg/kg	1.1	<1.0	2.3	1
Uranium	Strong Acid Extractable	mg/kg	0.9	0.9	4.9	0.5
Vanadium	Strong Acid Extractable	mg/kg	25.7	30.4	17.0	0.1
Zinc	Strong Acid Extractable	mg/kg	53	74	11	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	9.7	28.2	16.2	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1037841-10	1037841-11	1037841-12	
	Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A6:14-17 / 3.5 / m	A6:14-17 / 5.5 / m	A6:14-17 / 6.5 / m	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Salinity					
pH	Saturated Paste	pH	8.0	6.2	5.7



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1037841-11	1037841-12
Sample Date	Nov 03, 2014	Nov 03, 2014
Sample Time	NA	NA
Sample Location		
Sample Description	A6:14-17 / 5.5 / m	A6:14-17 / 6.5 / m
Matrix	Soil	Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil					
Naphthalene	Dry Weight	mg/kg	0.015	0.013	0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	0.03	0.03	0.01
Anthracene	Dry Weight	mg/kg	<0.003	<0.003	0.003
Fluoranthene	Dry Weight	mg/kg	0.01	0.01	0.01
Pyrene	Dry Weight	mg/kg	0.01	0.01	0.01
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	<0.01	0.01
Chrysene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	<0.05	0.05
IACR_Coarse	Index of Additive Cancer Risk		<0.001	<0.001	0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001	<0.001	0.001
PAH - Soil - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	100	99	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	106	111	30-130
p-Terphenyl-d14	PAH - Surrogate	%	77	86	18-137

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1037841-12
Sample Date	Nov 03, 2014
Sample Time	NA
Sample Location	
Sample Description	A6:14-17 / 6.5 / m
Matrix	Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	30.9		0.2
Metals Strong Acid Digestion					
Mercury	Strong Acid Extractable	mg/kg	0.06		0.01
Antimony	Strong Acid Extractable	mg/kg	0.3		0.2
Arsenic	Strong Acid Extractable	mg/kg	5.2		0.2
Barium	Strong Acid Extractable	mg/kg	1750		1
Beryllium	Strong Acid Extractable	mg/kg	2.6		0.1
Cadmium	Strong Acid Extractable	mg/kg	0.11		0.01
Chromium	Strong Acid Extractable	mg/kg	5.0		0.5
Cobalt	Strong Acid Extractable	mg/kg	6.5		0.1
Copper	Strong Acid Extractable	mg/kg	13.9		1
Lead	Strong Acid Extractable	mg/kg	8.4		5
Molybdenum	Strong Acid Extractable	mg/kg	3.8		1
Nickel	Strong Acid Extractable	mg/kg	18.6		0.5
Selenium	Strong Acid Extractable	mg/kg	0.8		0.3
Silver	Strong Acid Extractable	mg/kg	0.3		0.1
Thallium	Strong Acid Extractable	mg/kg	0.17		0.05
Tin	Strong Acid Extractable	mg/kg	2.3		1
Uranium	Strong Acid Extractable	mg/kg	4.7		0.5
Vanadium	Strong Acid Extractable	mg/kg	19.7		0.1
Zinc	Strong Acid Extractable	mg/kg	13		1
Barite Soil Analysis					
Barium	Extractable	mg/kg	7.7		0.05
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10		0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

	Reference Number	1037841-13	1037841-14	1037841-15	
	Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	SPLP Prep / A6:14-14 / 4.0 / m	SPLP Prep / A6:14-15 / 3.0 / m	SPLP Prep / A6:14-16 / 2.5 / m	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Naphthalene	ug/L	<0.1	<0.1	<0.1	0.1
Quinoline	ug/L	<0.3	<0.3	<0.3	0.3
Acenaphthylene	ug/L	<0.1	<0.1	<0.1	0.1
Acenaphthene	ug/L	<0.1	<0.1	<0.1	0.1
Fluorene	ug/L	<0.1	<0.1	<0.1	0.1
Phenanthrene	ug/L	<0.1	<0.1	<0.1	0.1
Anthracene	ug/L	<0.005	<0.005	<0.005	0.005
Acridine	ug/L	<0.1	<0.1	<0.1	0.1
Fluoranthene	ug/L	<0.01	<0.01	<0.01	0.01
Pyrene	ug/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	ug/L	<0.01	<0.01	<0.01	0.01
Chrysene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(b+j)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(k)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(a)pyrene	ug/L	<0.008	<0.008	<0.008	0.008
Indeno(1,2,3-c,d)pyrene	ug/L	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	ug/L	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	ug/L	<0.05	<0.05	<0.05	0.05
CB(a)P	Carcinogenic Potency Equivalent	ug/L	<0.01	<0.01	.01
PAH - Water - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	80	100	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	80	90	30-130
p-Terphenyl-d14	PAH - Surrogate	%	80	80	18-137

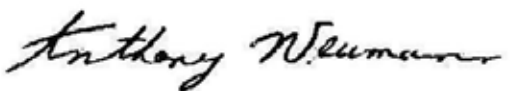


Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rosssdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number 1037841-16
Sample Date Nov 03, 2014
Sample Time NA
Sample Location
Sample Description SPLP Prep / A6:14-17 / 3.5 / m
Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Naphthalene	ug/L	<0.1			0.1
Quinoline	ug/L	<0.3			0.3
Acenaphthylene	ug/L	<0.1			0.1
Acenaphthene	ug/L	<0.1			0.1
Fluorene	ug/L	<0.1			0.1
Phenanthrene	ug/L	<0.1			0.1
Anthracene	ug/L	<0.005			0.005
Acridine	ug/L	<0.1			0.1
Fluoranthene	ug/L	<0.01			0.01
Pyrene	ug/L	0.01			0.01
Benzo(a)anthracene	ug/L	<0.01			0.01
Chrysene	ug/L	<0.1			0.1
Benzo(b+j)fluoranthene	ug/L	<0.1			0.1
Benzo(k)fluoranthene	ug/L	<0.1			0.1
Benzo(a)pyrene	ug/L	<0.008			0.008
Indeno(1,2,3-c,d)pyrene	ug/L	<0.05			0.05
Dibenzo(a,h)anthracene	ug/L	<0.05			0.05
Benzo(g,h,i)perylene	ug/L	<0.05			0.05
CB(a)P	Carcinogenic Potency Equivalent	ug/L	<0.01		.01
PAH - Water - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	100		23-130
2-Fluorobiphenyl	PAH - Surrogate	%	90		30-130
p-Terphenyl-d14	PAH - Surrogate	%	80		18-137

Approved by: 
 Anthony Neumann, MSc
 Laboratory Operations Manager

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
1:5 Water Soluble Extraction	McKeague	* Soluble Salts in Extracts of 1:5 Soil:Water Mixtures, 3.23	07-Nov-14	Exova Edmonton
1:5 Water Soluble Extraction	McKeague	* Soluble Salts in Extracts of 1:5 Soil:Water Mixtures, 3.23	10-Nov-14	Exova Edmonton
Barium (Extractable) in soil (0.1 M CaCl ₂)	Ab Env	Analytical Method for Extractable Barium, 6.6.2	07-Nov-14	Exova Edmonton
Barium (Extractable) in soil (0.1 M CaCl ₂)	Ab Env	Analytical Method for Extractable Barium, 6.6.2	10-Nov-14	Exova Edmonton
Boron in general soil	McKeague	* Hot Water Soluble Boron - Azomethine-H Method, 4.61	06-Nov-14	Exova Edmonton
Boron in general soil	McKeague	* Hot Water Soluble Boron - Azomethine-H Method, 4.61	10-Nov-14	Exova Edmonton
Mercury (Hot Block) in Soil	US EPA	* Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	07-Nov-14	Exova Edmonton
Mercury (Hot Block) in Soil	US EPA	* Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	10-Nov-14	Exova Edmonton
Metals ICP-MS (Hot Block) in soil	SW-846	* Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	07-Nov-14	Exova Edmonton
Metals ICP-MS (Hot Block) in soil	SW-846	* Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	10-Nov-14	Exova Edmonton
PAH - Soil	AESRD	Index of Additive Cancer Risk (IACR), PAHs	07-Nov-14	Exova Calgary
PAH - Soil	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	07-Nov-14	Exova Calgary
PAH - Water	AESRD	Carcinogenic PAHs Toxic Potency Equivalence (as B(a)P TPE), PAHw	24-Nov-14	Exova Calgary
PAH - Water	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	24-Nov-14	Exova Calgary
Particle Size by Wet Sieve	ASTM	* Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing, C 117-04	06-Nov-14	Exova Edmonton
Particle Size by Wet Sieve	ASTM	* Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing, C 117-04	20-Nov-14	Exova Edmonton
Saturated Paste in General Soil	Carter	* Electrical Conductivity and Soluble Ions, Chapter 15	07-Nov-14	Exova Edmonton

* Reference Method Modified

References

AESRD	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
McKeague	Manual on Soil Sampling and Methods of Analysis
Carter	Soil Sampling and Methods of Analysis.
SW-846	Test Methods for Evaluating Solid Waste

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1037841
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10683
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 5, 2014
Edmonton, AB, Canada	Location: Rossdale:Area 6	Date Reported: Nov 25, 2014
T5S 1E5	LSD:	Report Number: 1969892
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

US EPA	US Environmental Protection Agency Test Methods
APHA	Standard Methods for the Examination of Water and Wastewater
Ab Env	Alberta Environment, Soil Quality Guidelines for Barite

Comments:

- Report was issued to include addition of SPLP leachate and PAH1 analysis on the resultant leachate as requested by Tami Dolen of the City of Edmonton on November 18, 2014. Previous report 1966630.
- Report was issued to include addition of PS24 analysis on sample #1 requested by Tawnya Anderson of Nichols Environmental on November 19, 2014. Previous report 1966630.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.



Project Information

Project ID: 14-214-CRD
 Project Name: Phase II ESA
 Project Location: Rossdale Area 6
 Legal Location:
 PO/AFE#: 14-214-CRD
 Proj. Acct. Code:

Billing Information

Company: Nichols Env
 Address: 17331-107 Ave
Edm, AB
 Attention: T. Anderson
 Phone: 780-484-3377
 Cell:
 Fax:
 E-mail:
 Agreement ID:
 Copy of report:

Copy of Report To:

Company:
 Address:
 Attention:
 Phone:
 Cell:
 Fax:
 E-mail:

RUSH Priority

Upon filling out this section, client accepts that surcharges will be applied to the analysis

Date Required

As Indicated | All Analysis

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples.

Signature

Report Results

E-mail
 Mail

Online
 Fax

PDF
 Excel

QA/QC Report

Special Instructions/Comments (please include contact information including ph. # if different from above).

Please bill using City of Edmonton rates.

Include Regulatory Requirements Below:

Number of Containers

PAH2
 ARBIMET-S
 PH
 PS3H

Sample Custody (please print)

Sampled by: HB

Company: NECL

I authorize Exova to proceed with the work indicated on this form:

Date: Nov 5/14 Initial: TA

This section for Lab use only

Date/Time stamp:

NOV 5 PM 5:47

Sample Identification	Location	Depth IN CM (M)	Date/Time sampled	Matrix	Sampling Method	↓	Enter tests above (√ relevant samples below)										Indicate below any deficiencies in the condition of samples:					
1 A6:14-14		3.5	Nov. 3/14	soil	gmb	1																Were Exova supplies used?
2 A6:14-14		4.0				1	X	X	X													Was there any damage to the shipping container?
3 A6:14-14		5.0				2	X	X	X													Were the containers packaged well?
4 A6:14-15		3.0				2	X	X	X													Were any extra samples received (document below)?
5 A6:14-15		6.0				2	X	X	X													Are samples within recommended holding times/temp?
6 A6:14-16		1.5				2	X	X	X													
7 A6:14-16		2.5				2	X	X	X													
8 A6:14-16		4.5				2	X	X	X													
9 A6:14-16		7.5				1	X			X												
10 A6:14-17		3.5				2	X	X	X													
11 A6:14-17		5.5				2	X	X	X													
12 A6:14-17		6.5				2	X	X	X													
13						2	X	X	X													
14																						
15																						

Environmental Sample Information Sheet

Note: Proper completion of this form is required in order to proceed with analysis

Please indicate any potentially hazardous samples

Indicate lot number or affix lot label here:

1037841

Shipping:
 COD Y/N

and size of coolers received:

Cooler temp:

16.3

Delivery Method:

Waybill:

Received by:

Report Transmission Cover Page

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Contact & Affiliation	Address	Delivery Commitments
Tawnya Anderson Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports
Kelly Goetz Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

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Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-1
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-18 / 1.0 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	1.43	0.2	
Metals Strong Acid Digestion					
Mercury	Strong Acid	mg/kg	3.8	0.01	
	Extractable				
Antimony	Strong Acid	mg/kg	0.2	0.2	
	Extractable				
Arsenic	Strong Acid	mg/kg	4.4	0.2	
	Extractable				
Barium	Strong Acid	mg/kg	166	1	
	Extractable				
Beryllium	Strong Acid	mg/kg	0.5	0.1	
	Extractable				
Cadmium	Strong Acid	mg/kg	0.19	0.01	
	Extractable				
Chromium	Strong Acid	mg/kg	12.4	0.5	
	Extractable				
Cobalt	Strong Acid	mg/kg	6.6	0.1	
	Extractable				
Copper	Strong Acid	mg/kg	13.1	1	
	Extractable				
Lead	Strong Acid	mg/kg	25.3	5	
	Extractable				
Molybdenum	Strong Acid	mg/kg	<1.0	1	
	Extractable				
Nickel	Strong Acid	mg/kg	17.8	0.5	
	Extractable				
Selenium	Strong Acid	mg/kg	0.3	0.3	
	Extractable				
Silver	Strong Acid	mg/kg	0.1	0.1	
	Extractable				
Thallium	Strong Acid	mg/kg	0.13	0.05	
	Extractable				
Tin	Strong Acid	mg/kg	1.7	1	
	Extractable				
Uranium	Strong Acid	mg/kg	0.8	0.5	
	Extractable				
Vanadium	Strong Acid	mg/kg	21.0	0.1	
	Extractable				
Zinc	Strong Acid	mg/kg	49	1	
	Extractable				
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10	0.1	



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-1
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-18 / 1.0 / m
Sample Matrix	Soil

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Barite Soil Analysis						
Barium	Extractable	mg/kg	20.1	0.05		

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-2
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-18 / 1.5 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	0.78	0.2	
Metals Strong Acid Digestion					
Mercury	Strong Acid Extractable	mg/kg	0.06	0.01	
Antimony	Strong Acid Extractable	mg/kg	<0.2	0.2	
Arsenic	Strong Acid Extractable	mg/kg	5.8	0.2	
Barium	Strong Acid Extractable	mg/kg	151	1	
Beryllium	Strong Acid Extractable	mg/kg	0.4	0.1	
Cadmium	Strong Acid Extractable	mg/kg	0.17	0.01	
Chromium	Strong Acid Extractable	mg/kg	13.4	0.5	
Cobalt	Strong Acid Extractable	mg/kg	8.3	0.1	
Copper	Strong Acid Extractable	mg/kg	12.4	1	
Lead	Strong Acid Extractable	mg/kg	7.6	5	
Molybdenum	Strong Acid Extractable	mg/kg	<1.0	1	
Nickel	Strong Acid Extractable	mg/kg	20.0	0.5	
Selenium	Strong Acid Extractable	mg/kg	0.3	0.3	
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	
Thallium	Strong Acid Extractable	mg/kg	0.15	0.05	
Tin	Strong Acid Extractable	mg/kg	1.6	1	
Uranium	Strong Acid Extractable	mg/kg	0.7	0.5	
Vanadium	Strong Acid Extractable	mg/kg	25.2	0.1	
Zinc	Strong Acid Extractable	mg/kg	42	1	
Polycyclic Aromatic Hydrocarbons - Soil					
Naphthalene	Dry Weight	mg/kg	0.010	0.01	

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-2
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-18 / 1.5 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Polycyclic Aromatic Hydrocarbons - Soil - Continued					
Acenaphthylene	Dry Weight	mg/kg	<0.05	0.05	
Acenaphthene	Dry Weight	mg/kg	<0.05	0.05	
Fluorene	Dry Weight	mg/kg	<0.05	0.05	
Phenanthrene	Dry Weight	mg/kg	0.03	0.01	
Anthracene	Dry Weight	mg/kg	<0.003	0.003	
Fluoranthene	Dry Weight	mg/kg	<0.01	0.01	
Pyrene	Dry Weight	mg/kg	<0.01	0.01	
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	0.01	
Chrysene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	0.05	
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	0.05	
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	0.05	
IACR_Coarse	Index of Additive Cancer Risk		<0.001	0.001	
IACR_Fine	Index of Additive Cancer Risk		<0.001	0.001	
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10	0.1	
PAH - Soil - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	94	23-130	
2-Fluorobiphenyl	PAH - Surrogate	%	99	30-130	
p-Terphenyl-d14	PAH - Surrogate	%	87	18-137	
Barite Soil Analysis					
Barium	Extractable	mg/kg	18.5	0.05	

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-3
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-19 / 1.0 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	0.44	0.2	
Metals Strong Acid Digestion					
Mercury	Strong Acid Extractable	mg/kg	0.39	0.01	
Antimony	Strong Acid Extractable	mg/kg	<0.2	0.2	
Arsenic	Strong Acid Extractable	mg/kg	3.3	0.2	
Barium	Strong Acid Extractable	mg/kg	104	1	
Beryllium	Strong Acid Extractable	mg/kg	0.3	0.1	
Cadmium	Strong Acid Extractable	mg/kg	0.11	0.01	
Chromium	Strong Acid Extractable	mg/kg	6.4	0.5	
Cobalt	Strong Acid Extractable	mg/kg	4.9	0.1	
Copper	Strong Acid Extractable	mg/kg	6.1	1	
Lead	Strong Acid Extractable	mg/kg	<5.0	5	
Molybdenum	Strong Acid Extractable	mg/kg	<1.0	1	
Nickel	Strong Acid Extractable	mg/kg	11.3	0.5	
Selenium	Strong Acid Extractable	mg/kg	0.4	0.3	
Silver	Strong Acid Extractable	mg/kg	<0.1	0.1	
Thallium	Strong Acid Extractable	mg/kg	0.1	0.05	
Tin	Strong Acid Extractable	mg/kg	2.2	1	
Uranium	Strong Acid Extractable	mg/kg	0.6	0.5	
Vanadium	Strong Acid Extractable	mg/kg	13.6	0.1	
Zinc	Strong Acid Extractable	mg/kg	22	1	
Polycyclic Aromatic Hydrocarbons - Soil					
Naphthalene	Dry Weight	mg/kg	<0.010	0.01	

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-3
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-19 / 1.0 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Polycyclic Aromatic Hydrocarbons - Soil - Continued					
Acenaphthylene	Dry Weight	mg/kg	<0.05	0.05	
Acenaphthene	Dry Weight	mg/kg	<0.05	0.05	
Fluorene	Dry Weight	mg/kg	<0.05	0.05	
Phenanthrene	Dry Weight	mg/kg	<0.01	0.01	
Anthracene	Dry Weight	mg/kg	<0.003	0.003	
Fluoranthene	Dry Weight	mg/kg	<0.01	0.01	
Pyrene	Dry Weight	mg/kg	0.02	0.01	
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	0.01	
Chrysene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	0.05	
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	0.05	
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	0.05	
IACR_Coarse	Index of Additive Cancer Risk		<0.001	0.001	
IACR_Fine	Index of Additive Cancer Risk		<0.001	0.001	
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10	0.1	
PAH - Soil - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	93	23-130	
2-Fluorobiphenyl	PAH - Surrogate	%	106	30-130	
p-Terphenyl-d14	PAH - Surrogate	%	92	18-137	
Barite Soil Analysis					
Barium	Extractable	mg/kg	24.7	0.05	

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-4
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-19 / 1.5 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	0.69	0.2	
Metals Strong Acid Digestion					
Mercury	Strong Acid Extractable	mg/kg	0.06	0.01	
Antimony	Strong Acid Extractable	mg/kg	<0.2	0.2	
Arsenic	Strong Acid Extractable	mg/kg	6.7	0.2	
Barium	Strong Acid Extractable	mg/kg	108	1	
Beryllium	Strong Acid Extractable	mg/kg	0.4	0.1	
Cadmium	Strong Acid Extractable	mg/kg	0.15	0.01	
Chromium	Strong Acid Extractable	mg/kg	11.5	0.5	
Cobalt	Strong Acid Extractable	mg/kg	7.1	0.1	
Copper	Strong Acid Extractable	mg/kg	10.2	1	
Lead	Strong Acid Extractable	mg/kg	6.4	5	
Molybdenum	Strong Acid Extractable	mg/kg	<1.0	1	
Nickel	Strong Acid Extractable	mg/kg	17.2	0.5	
Selenium	Strong Acid Extractable	mg/kg	<0.3	0.3	
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	
Thallium	Strong Acid Extractable	mg/kg	0.12	0.05	
Tin	Strong Acid Extractable	mg/kg	1.9	1	
Uranium	Strong Acid Extractable	mg/kg	0.6	0.5	
Vanadium	Strong Acid Extractable	mg/kg	21.7	0.1	
Zinc	Strong Acid Extractable	mg/kg	35	1	
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10	0.1	



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-4
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-19 / 1.5 / m
Sample Matrix	Soil

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Barite Soil Analysis						
Barium	Extractable	mg/kg	20.3	0.05		



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-5
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-19 / 2.0 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Particle Size Analysis - Wet Sieve					
Texture		Fine-Grained			
75 micron sieve	% Retained	% by weight	12.7	0.1	

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-6
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-20 / 1.0 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	5.90	0.2	
Metals Strong Acid Digestion					
Mercury	Strong Acid Extractable	mg/kg	0.04	0.01	
Antimony	Strong Acid Extractable	mg/kg	<0.2	0.2	
Arsenic	Strong Acid Extractable	mg/kg	6.4	0.2	
Barium	Strong Acid Extractable	mg/kg	217	1	
Beryllium	Strong Acid Extractable	mg/kg	0.7	0.1	
Cadmium	Strong Acid Extractable	mg/kg	0.27	0.01	
Chromium	Strong Acid Extractable	mg/kg	17.7	0.5	
Cobalt	Strong Acid Extractable	mg/kg	10.4	0.1	
Copper	Strong Acid Extractable	mg/kg	17.2	1	
Lead	Strong Acid Extractable	mg/kg	11.9	5	
Molybdenum	Strong Acid Extractable	mg/kg	<1.0	1	
Nickel	Strong Acid Extractable	mg/kg	24.6	0.5	
Selenium	Strong Acid Extractable	mg/kg	0.6	0.3	
Silver	Strong Acid Extractable	mg/kg	0.2	0.1	
Thallium	Strong Acid Extractable	mg/kg	0.18	0.05	
Tin	Strong Acid Extractable	mg/kg	1.5	1	
Uranium	Strong Acid Extractable	mg/kg	0.8	0.5	
Vanadium	Strong Acid Extractable	mg/kg	31.5	0.1	
Zinc	Strong Acid Extractable	mg/kg	64	1	
Polycyclic Aromatic Hydrocarbons - Soil					
Naphthalene	Dry Weight	mg/kg	0.013	0.01	



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-6
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-20 / 1.0 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Polycyclic Aromatic Hydrocarbons - Soil - Continued					
Acenaphthylene	Dry Weight	mg/kg	<0.05	0.05	
Acenaphthene	Dry Weight	mg/kg	<0.05	0.05	
Fluorene	Dry Weight	mg/kg	<0.05	0.05	
Phenanthrene	Dry Weight	mg/kg	0.03	0.01	
Anthracene	Dry Weight	mg/kg	0.007	0.003	
Fluoranthene	Dry Weight	mg/kg	0.02	0.01	
Pyrene	Dry Weight	mg/kg	0.02	0.01	
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	0.01	
Chrysene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	0.05	
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	0.05	
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	0.05	
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	0.05	
IACR_Coarse	Index of Additive Cancer Risk		<0.001	0.001	
IACR_Fine	Index of Additive Cancer Risk		<0.001	0.001	
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10	0.1	
PAH - Soil - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	94	23-130	
2-Fluorobiphenyl	PAH - Surrogate	%	108	30-130	
p-Terphenyl-d14	PAH - Surrogate	%	96	18-137	
Barite Soil Analysis					
Barium	Extractable	mg/kg	21.9	0.05	

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-7
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-20 / 1.5 / m
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Hot Water Soluble					
Boron	Hot Water Soluble	mg/kg	3.96	0.2	
Metals Strong Acid Digestion					
Mercury	Strong Acid Extractable	mg/kg	0.04	0.01	
Antimony	Strong Acid Extractable	mg/kg	<0.2	0.2	
Arsenic	Strong Acid Extractable	mg/kg	5.1	0.2	
Barium	Strong Acid Extractable	mg/kg	129	1	
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.1	
Cadmium	Strong Acid Extractable	mg/kg	0.17	0.01	
Chromium	Strong Acid Extractable	mg/kg	12.0	0.5	
Cobalt	Strong Acid Extractable	mg/kg	7.4	0.1	
Copper	Strong Acid Extractable	mg/kg	10.7	1	
Lead	Strong Acid Extractable	mg/kg	7.0	5	
Molybdenum	Strong Acid Extractable	mg/kg	<1.0	1	
Nickel	Strong Acid Extractable	mg/kg	18.5	0.5	
Selenium	Strong Acid Extractable	mg/kg	<0.3	0.3	
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	
Thallium	Strong Acid Extractable	mg/kg	0.13	0.05	
Tin	Strong Acid Extractable	mg/kg	1.8	1	
Uranium	Strong Acid Extractable	mg/kg	0.6	0.5	
Vanadium	Strong Acid Extractable	mg/kg	21.8	0.1	
Zinc	Strong Acid Extractable	mg/kg	36	1	
Water Soluble Parameters					
Chromium (VI)	Water Soluble	mg/kg	<0.10	0.1	



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-7
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	A1: 14-20 / 1.5 / m
Sample Matrix	Soil

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Barite Soil Analysis						
Barium	Extractable	mg/kg	23.8	0.05		

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-8
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	LF-01
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	2.20	0.2		
Leachate Inorganic - TCLP						
Antimony	TCLP Leachate	mg/L	<0.005	0.005	500	Below Limit
Arsenic	TCLP Leachate	mg/L	0.003	0.002	5	Below Limit
Barium	TCLP Leachate	mg/L	1.75	0.05	100	Below Limit
Beryllium	TCLP Leachate	mg/L	<0.001	0.001	5	Below Limit
Boron	TCLP Leachate	mg/L	<0.2	0.2	500	Below Limit
Cadmium	TCLP Leachate	mg/L	0.001	0.001	1	Below Limit
Chromium	TCLP Leachate	mg/L	<0.005	0.005	5	Below Limit
Cobalt	TCLP Leachate	mg/L	0.023	0.001	100	Below Limit
Copper	TCLP Leachate	mg/L	<0.1	0.1	100	Below Limit
Iron	TCLP Leachate	mg/L	<0.1	0.1	1000	Below Limit
Lead	TCLP Leachate	mg/L	<0.05	0.05	5	Below Limit
Mercury	TCLP Leachate	mg/L	<0.001	0.001	0.2	Below Limit
Nickel	TCLP Leachate	mg/L	<0.05	0.050	5	Below Limit
Selenium	TCLP Leachate	mg/L	<0.002	0.002	1	Below Limit
Silver	TCLP Leachate	mg/L	<0.005	0.005	5	Below Limit
Thallium	TCLP Leachate	mg/L	<0.0005	0.0005	5	Below Limit
Uranium	TCLP Leachate	mg/L	<0.005	0.005	2.0	Below Limit
Vanadium	TCLP Leachate	mg/L	<0.01	0.01	100	Below Limit
Zinc	TCLP Leachate	mg/L	<0.1	0.1	500	Below Limit
Zirconium	TCLP Leachate	mg/L	<0.01	0.01	500	Below Limit
pH	Initial		9.5			
pH	Final		6.1			
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.04	0.01		
Antimony	Strong Acid Extractable	mg/kg	<0.2	0.2		
Arsenic	Strong Acid Extractable	mg/kg	6.2	0.2		
Barium	Strong Acid Extractable	mg/kg	232	1		
Beryllium	Strong Acid Extractable	mg/kg	0.7	0.1		
Cadmium	Strong Acid Extractable	mg/kg	0.26	0.01		
Chromium	Strong Acid	mg/kg	13.6	0.5		



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-8
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	LF-01
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Metals Strong Acid Digestion - Continued					
Cobalt	Extractable Strong Acid mg/kg	9.9	0.1		
Copper	Extractable Strong Acid mg/kg	19.4	1		
Lead	Extractable Strong Acid mg/kg	12.8	5		
Molybdenum	Extractable Strong Acid mg/kg	1.2	1		
Nickel	Extractable Strong Acid mg/kg	24.4	0.5		
Selenium	Extractable Strong Acid mg/kg	<0.3	0.3		
Silver	Extractable Strong Acid mg/kg	0.2	0.1		
Thallium	Extractable Strong Acid mg/kg	0.20	0.05		
Tin	Extractable Strong Acid mg/kg	1.9	1		
Uranium	Extractable Strong Acid mg/kg	1.3	0.5		
Vanadium	Extractable Strong Acid mg/kg	25.2	0.1		
Zinc	Extractable Strong Acid mg/kg	57	1		
Physical and Aggregate Properties					
Moisture	Wet Weight @ 105°C	%	19.9	0.1	
Salinity					
% Saturation		%	49		
Chloride	Saturated Paste	meq/L	1.53	0.06	
Chloride	Saturated Paste	mg/kg	26		
Soil Acidity					
pH	1:2 Soil:Water	pH	8.7	2-12.5	Within Range
Waste Characterization					
Flash Point		°C	>75	61	Within Limit
Flash			No		
Paint Filter	Interpretation		Solid Waste		
Extractable Petroleum Hydrocarbons - Soil					
Extraction Date	Total Extractables		21-Nov-14		




Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number	1040609-8
Sample Date	November 19, 2014
Sample Time	NA
Sample Location	
Sample Description	LF-01
Sample Matrix	Soil

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Extractable Petroleum Hydrocarbons - Soil - Continued					
Silica Gel Cleanup		Done			
F2c C10-C16	Dry Weight	mg/kg	<50	50	
F3c C16-C34	Dry Weight	mg/kg	<50	50	
F4c C34-C50	Dry Weight	mg/kg	<100	100	
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	100	
% C50+	%		<5		
Mono-Aromatic Hydrocarbons - Soil					
Extraction Date	Volatiles		21-Nov-14		
Benzene	Dry Weight	mg/kg	<0.005	0.005	
Toluene	Dry Weight	mg/kg	<0.04	0.02	
Ethylbenzene	Dry Weight	mg/kg	<0.01	0.01	
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	0.03	
Volatile Petroleum Hydrocarbons - Soil					
F1 C6-C10	Dry Weight	mg/kg	<10	10	
F1 -BTEX	Dry Weight	mg/kg	<10	10	
Mono-Aromatic Hydrocarbons - Leachate					
Benzene	TCLP Leachate	mg/L	<0.01	0.01	0.5 Below Limit
Toluene	TCLP Leachate	mg/L	<0.01	0.01	0.5 Below Limit
Ethylbenzene	TCLP Leachate	mg/L	<0.01	0.01	0.5 Below Limit
Total Xylenes (m,p,o)	TCLP Leachate	mg/L	<0.02	0.02	0.5 Below Limit

Approved by: 
Randy Neumann, BSc
Vice President

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).

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Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Hot Water Soluble

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Boron	mg/L	0.00133749	-0.01	0.02	yes	
Date Acquired: November 21, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Boron	mg/kg	0.84	0.89	10	0.10	yes
Date Acquired: November 21, 2014						
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Boron	mg/kg	1.37	1.07	2.05	yes	
Date Acquired: November 21, 2014						
Boron	mg/kg	0.09	0.09	0.11	yes	
Date Acquired: November 21, 2014						

Leachate Inorganic - TCLP

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Antimony	ug/L	-0.0287059	-0.501	0.501	yes	
Arsenic	ug/L	0.0216208	-0.201	0.201	yes	
Barium	ug/L	0.115281	-5.01	5.01	yes	
Beryllium	ug/L	0.018415	-0.099	0.099	yes	
Boron	ug/L	0.777936	-20.0	20.0	yes	
Cadmium	ug/L	0.00257825	-0.0990	0.0990	yes	
Chromium	ug/L	-0.208078	-0.501	0.501	yes	
Cobalt	ug/L	0.00629528	-0.099	0.099	yes	
Copper	ug/L	0.382848	-9.99	9.99	yes	
Iron	ug/L	1.74559	-10.0	10.0	yes	
Lead	ug/L	0.00716345	-5.010	5.010	yes	
Mercury	ug/L	0.00377837	-0.0990	0.0990	yes	
Nickel	ug/L	0.00224401	-0.501	0.501	yes	
Selenium	ug/L	-0.0133197	-0.201	0.201	yes	
Silver	ug/L	0.00933065	-0.501	0.501	yes	
Thallium	ug/L	0.00569227	-0.0501	0.0501	yes	
Uranium	ug/L	0.0121293	-0.501	0.501	yes	
Vanadium	ug/L	-0.168038	-1.00	1.00	yes	
Zinc	ug/L	1.38262	-9.99	9.99	yes	
Zirconium	ug/L	0.0120947	-0.99	0.99	yes	
Date Acquired: November 22, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/L	0.01	0.01	20	0.008	yes
Arsenic	mg/L	0.024	0.024	20	0.008	yes
Barium	mg/L	4.01	4.09	20	0.04	yes
Beryllium	mg/L	<0.001	<0.001	20	0.004	yes
Boron	mg/L	0.4	0.4	20	0.1	yes
Cadmium	mg/L	0.005	0.005	20	0.0004	yes



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosedale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Leachate Inorganic - TCLP - Continued

Client Sample	Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Chromium		mg/L	<0.005	<0.005	20	0.020	yes
Cobalt		mg/L	0.020	0.020	20	0.004	yes
Copper		mg/L	<0.1	<0.1	20	0.04	yes
Iron		mg/L	8.5	8.5	20	0.4	yes
Lead		mg/L	0.60	0.58	20	0.004	yes
Nickel		mg/L	<0.05	<0.05	20	0.020	yes
Selenium		mg/L	<0.002	<0.002	20	0.008	yes
Silver		mg/L	<0.005	<0.005	20	0.004	yes
Thallium		mg/L	0.0025	0.0025	20	0.0020	yes
Uranium		mg/L	<0.005	<0.005	20	0.020	yes
Vanadium		mg/L	<0.01	<0.01	20	0.00	yes
Zinc		mg/L	4.0	4.0	20	0.04	yes
Zirconium		mg/L	<0.01	<0.01	20	0.04	yes
pH			5.4	5.4	0	0.3	yes

Date Acquired: November 22, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/L	0.041	0.036	0.044	yes
Arsenic	mg/L	0.041	0.037	0.043	yes
Barium	mg/L	0.21	0.18	0.22	yes
Beryllium	mg/L	0.021	0.018	0.021	yes
Boron	mg/L	0.4	0.3	0.4	yes
Cadmium	mg/L	0.0021	0.0019	0.0022	yes
Chromium	mg/L	0.104	0.094	0.106	yes
Cobalt	mg/L	0.020	0.018	0.021	yes
Copper	mg/L	0.21	0.19	0.21	yes
Iron	mg/L	4.2	3.6	4.4	yes
Lead	mg/L	0.020	0.019	0.021	yes
Mercury	mg/L	0.0030	0.0026	0.0032	yes
Nickel	mg/L	0.103	0.092	0.106	yes
Selenium	mg/L	0.042	0.036	0.042	yes
Silver	mg/L	0.020	0.018	0.022	yes
Thallium	mg/L	0.0102	0.0092	0.0108	yes
Uranium	mg/L	0.104	0.089	0.109	yes
Vanadium	mg/L	0.02	0.02	0.02	yes
Zinc	mg/L	0.20	0.18	0.22	yes
Zirconium	mg/L	0.20	0.19	0.21	yes

Date Acquired: November 22, 2014

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Mercury	ug/L	-0.01	-0.07	0.13	yes
Antimony	ug/L	0.01785	-0.1	0.2	yes



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rosedale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Metals Strong Acid Digestion - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Arsenic	ug/L	0.04	-0.2	0.2	yes
Barium	ug/L	0.009	-1	1	yes
Beryllium	ug/L	-0.007	-0.1	0.1	yes
Cadmium	ug/L	-0.002	-0.01	0.01	yes
Chromium	ug/L	0.004	-0.5	0.5	yes
Cobalt	ug/L	0.0019	-0.1	0.1	yes
Copper	ug/L	0.021	-0.6	1.2	yes
Lead	ug/L	0.005	-5.0	5.0	yes
Molybdenum	ug/L	0.024	-1.0	1.0	yes
Nickel	ug/L	0.048	-0.4	0.7	yes
Selenium	ug/L	-0.064	-0.3	0.3	yes
Silver	ug/L	0.082	-0.09	0.14	yes
Thallium	ug/L	-0.01	-0.04	0.04	yes
Tin	ug/L	3.72	0.0	7.2	yes
Uranium	ug/L	0.002	-0.5	0.5	yes
Vanadium	ug/L	0.02625	-0.1	0.1	yes
Zinc	ug/L	0.686	-1	1	yes

Date Acquired: November 21, 2014

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Mercury	mg/kg	0.02	0.01	10	0.03	yes
Antimony	mg/kg	<0.2	<0.2	20	0.4	yes
Arsenic	mg/kg	3.9	4.0	20	0.4	yes
Barium	mg/kg	120	133	20	2	yes
Beryllium	mg/kg	0.5	0.5	20	0.2	yes
Cadmium	mg/kg	0.21	0.21	20	0.02	yes
Chromium	mg/kg	19.4	19.9	20	1.1	yes
Cobalt	mg/kg	7.3	7.4	20	0.2	yes
Copper	mg/kg	14.1	14.2	20	2.2	yes
Lead	mg/kg	6.5	6.7	20	0.2	yes
Molybdenum	mg/kg	<1.0	<1.0	20	2.2	yes
Nickel	mg/kg	19.1	18.7	20	1.1	yes
Selenium	mg/kg	0.3	0.3	20	0.7	yes
Silver	mg/kg	0.1	0.1	20	0.22	yes
Thallium	mg/kg	0.20	0.19	20	0.11	yes
Tin	mg/kg	1.7	1.6	20	2.2	yes
Uranium	mg/kg	1.1	1.1	20	1.1	yes
Vanadium	mg/kg	32.1	32.4	20	0.2	yes
Zinc	mg/kg	39	38	20	2	yes

Date Acquired: November 21, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Mercury	mg/kg	0.28	0.28	0.34	yes
Antimony	mg/kg	38.9	36.1	43.9	yes



Quality Control

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T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Arsenic	mg/kg	39.1	36.7	44.3	yes
Barium	mg/kg	191	185	215	yes
Beryllium	mg/kg	20.1	17.4	22.2	yes
Cadmium	mg/kg	2.03	1.80	2.20	yes
Chromium	mg/kg	102	92.2	105.8	yes
Cobalt	mg/kg	21.5	18.5	22.5	yes
Copper	mg/kg	192	176.3	207.3	yes
Lead	mg/kg	21.1	18.6	21.8	yes
Molybdenum	mg/kg	184	172.6	215.4	yes
Nickel	mg/kg	95.5	90.6	107.4	yes
Selenium	mg/kg	38.8	36.1	42.9	yes
Silver	mg/kg	18.8	16.69	21.97	yes
Thallium	mg/kg	10.1	9.57	11.23	yes
Tin	mg/kg	179	171.9	201.9	yes
Uranium	mg/kg	96.5	90.3	108.0	yes
Vanadium	mg/kg	18.2	16.3	20.3	yes
Zinc	mg/kg	193	180	220	yes
Date Acquired:	November 21, 2014				
Mercury	mg/kg	0.07	0.05	0.11	yes
Date Acquired:	November 21, 2014				
Mercury	mg/kg	0.27	0.15	0.42	yes
Antimony	mg/kg	0.7	0.3	1.1	yes
Arsenic	mg/kg	85.6	65.9	97.9	yes
Barium	mg/kg	228	213	270	yes
Beryllium	mg/kg	0.7	0.5	0.9	yes
Cadmium	mg/kg	1.92	1.50	2.64	yes
Chromium	mg/kg	35.6	27.4	39.2	yes
Cobalt	mg/kg	13.5	11.3	16.0	yes
Copper	mg/kg	193	162.7	222.9	yes
Lead	mg/kg	112	99.6	135.6	yes
Molybdenum	mg/kg	2.8	2.0	3.8	yes
Nickel	mg/kg	61.4	47.1	73.5	yes
Selenium	mg/kg	0.7	0.3	1.3	yes
Silver	mg/kg	0.8	0.25	1.15	yes
Thallium	mg/kg	0.32	0.26	0.40	yes
Tin	mg/kg	3.3	1.0	5.4	yes
Uranium	mg/kg	1.2	0.9	1.5	yes
Vanadium	mg/kg	44.1	31.5	56.1	yes
Zinc	mg/kg	462	355	550	yes
Date Acquired:	November 21, 2014				

Physical and Aggregate Properties



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
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T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Physical and Aggregate Properties

Client Sample	Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Moisture		%	14.7	14.9	10	0.3	yes
Date Acquired: November 21, 2014							

Particle Size Analysis - Wet Sieve

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
75 micron sieve	% by weight	27.0	25.4	34.5	yes
Date Acquired: November 21, 2014					

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	0	-0.010	0.010	yes
Acenaphthylene	ng/mL	0	-0.05	0.05	yes
Acenaphthene	ng/mL	0	-0.05	0.05	yes
Fluorene	ng/mL	0	-0.05	0.05	yes
Phenanthrene	ng/mL	0	-0.01	0.01	yes
Anthracene	ng/mL	0	-0.003	0.003	yes
Fluoranthene	ng/mL	0	-0.01	0.01	yes
Pyrene	ng/mL	0	-0.01	0.01	yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01	yes
Chrysene	ng/mL	0	-0.05	0.05	yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05	yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05	yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05	yes
Date Acquired: November 21, 2014					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	90.40	80	120	yes
Acenaphthylene	ng/mL	89.20	80	120	yes
Acenaphthene	ng/mL	86.00	80	120	yes
Fluorene	ng/mL	95.20	80	120	yes
Phenanthrene	ng/mL	98.60	80	120	yes
Anthracene	ng/mL	93.00	80	120	yes
Fluoranthene	ng/mL	97.60	80	120	yes
Pyrene	ng/mL	100.60	80	120	yes
Benzo(a)anthracene	ng/mL	112.40	80	120	yes
Chrysene	ng/mL	80.60	80	120	yes
Benzo(b)fluoranthene	ng/mL	118.80	80	120	yes
Benzo(k)fluoranthene	ng/mL	84.00	80	120	yes
Benzo(a)pyrene	ng/mL	97.20	80	120	yes



Quality Control

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Sampled By: HB	Acct code:	
Company: NECL		

Polycyclic Aromatic Hydrocarbons - Soil -

Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Indeno(1,2,3-c,d)pyrene	ng/mL	93.80	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	83.60	80	120	yes
Benzo(g,h,i)perylene	ng/mL	81.20	80	120	yes
Date Acquired: November 21, 2014					

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	1.5189	0	5	yes
Date Acquired: November 21, 2014					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m at 25 C	3.17	2.20	4.00	yes
% Saturation	%	62	56	68	yes
Chloride	mg/L	91	56	119	yes
Date Acquired: November 21, 2014					
Electrical Conductivity	dS/m at 25 C	32.0	26.80	35.20	yes
Chloride	mg/L	1940	1871	2231	yes
Date Acquired: November 21, 2014					

Soil Acidity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
pH	pH	6.7	5.3	7.2	yes	
Date Acquired: November 24, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH	pH	8.1	8.1	0	0.3	yes
Date Acquired: November 24, 2014						
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC	
pH	pH	7.2	7.0	7.4	yes	
Date Acquired: November 24, 2014						

Waste Characterization

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Flash Point	°C	51	50	55	yes
Date Acquired: November 21, 2014					

Water Soluble Parameters

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Chromium (VI)	mg/L	0	-0.10	0.10	yes	
Date Acquired: November 21, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Chromium (VI)	mg/kg	<0.10	<0.10	10	0.01	yes



Quality Control

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Edmonton, AB, Canada	Location: Rosssdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Water Soluble Parameters - Continued

Client Sample	Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Date Acquired:	November 21, 2014						

Extractable Petroleum Hydrocarbons - Soil

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	262	253	30	20	yes
F3c C16-C34	mg/kg	1040	988	30	20	yes
F4c C34-C50	mg/kg	326	310	30	30	yes
F4c+ C50+	mg/kg	<100	<100	30	20	yes

Date Acquired: November 21, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	96	79	121	yes
F3c C16-C34	mg/kg	142	122	158	yes
F4c C34-C50	mg/kg	199	170	230	yes

Date Acquired: November 21, 2014

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	89	65	135	yes
F3c C16-C34	mg/kg	105	65	135	yes
F4c C34-C50	mg/kg	104	65	135	yes

Date Acquired: November 21, 2014

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-1.650	1.650	yes
Toluene	ng	1.9	-8.01	8.01	yes
Ethylbenzene	ng	0	-3.99	3.99	yes
m,p-Xylene	ng	0	-3.99	3.99	yes
o-Xylene	ng	0	-3.99	3.99	yes

Date Acquired: November 21, 2014

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	0.910	0.899	20	0.004	yes
Toluene	mg/kg	0.93	0.92	20	0.01	yes
Ethylbenzene	mg/kg	0.94	0.93	20	0.01	yes
m,p-Xylene	mg/kg	1.89	1.86	20	0.01	yes
o-Xylene	mg/kg	0.95	0.93	20	0.01	yes

Date Acquired: November 21, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	1.29	1.063	1.438	yes
Toluene	mg/kg	1.42	1.06	1.44	yes
Ethylbenzene	mg/kg	1.40	1.06	1.44	yes
m,p-Xylene	mg/kg	2.85	2.12	2.88	yes



Quality Control

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Sampled By: HB	Acct code:	
Company: NECL		

Mono-Aromatic Hydrocarbons - Soil -

Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
o-Xylene	mg/kg	1.39	1.06	1.44	yes
Date Acquired: November 21, 2014					

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	675.02	-1599	1599	yes
Date Acquired: November 21, 2014					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	19	20	20	4	yes
Date Acquired: November 21, 2014						

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	18	14	21	yes
Date Acquired: November 21, 2014					

PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	110.3	23	130	yes
2-Fluorobiphenyl	%	109.87	30	130	yes
p-Terphenyl-d14	%	92.46	18	137	yes
Date Acquired: November 21, 2014					

Mono-Aromatic Hydrocarbons - Leachate

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-9.99	9.99	yes
Toluene	ng	0	-9.99	9.99	yes
Ethylbenzene	ng	0	-9.99	9.99	yes
m,p-Xylene	ng	0	-9.99	9.99	yes
o-Xylene	ng	0	-9.99	9.99	yes
Date Acquired: November 22, 2014					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	94.63	85	115	yes
Toluene	ng	106.03	85	115	yes
Ethylbenzene	ng	100.97	85	115	yes
m,p-Xylene	ng	100.60	85	115	yes
o-Xylene	ng	103.16	85	115	yes
Date Acquired: November 22, 2014					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/L	<0.01	<0.01	20	10.00	yes
Toluene	mg/L	<0.01	<0.01	20	10.00	yes
Ethylbenzene	mg/L	<0.01	<0.01	20	10.00	yes

Quality Control

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Company: NECL		

Mono-Aromatic Hydrocarbons - Leachate

- Continued

Client Sample	Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
m,p-Xylene		mg/L	<0.01	0.01	20	10.00	yes
o-Xylene		mg/L	<0.01	<0.01	20	10.00	yes

Date Acquired: November 22, 2014

Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Barium	mg/L	0.00310695	-0.00	0.01	yes

Date Acquired: November 21, 2014

Client Sample	Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Barium		mg/kg	12.1	12.0	10	5.00	yes

Date Acquired: November 21, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Barium	mg/kg	11.0	8.87	12.71	yes

Date Acquired: November 21, 2014

Barium	mg/kg	0.10	0.09	0.11	yes
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Date Acquired: November 21, 2014

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
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Company: NECL		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
1:5 Water Soluble Extraction	McKeague	* Soluble Salts in Extracts of 1:5 Soil:Water Mixtures, 3.23	21-Nov-14	Exova Edmonton
Barium (Extractable) in soil (0.1 M CaCl ₂)	Ab Env	Analytical Method for Extractable Barium, 6.6.2	21-Nov-14	Exova Edmonton
Boron in general soil	McKeague	* Hot Water Soluble Boron - Azomethine-H Method, 4.61	21-Nov-14	Exova Edmonton
Boron in general soil	McKeague	* Hot Water Soluble Boron - Azomethine-H Method, 4.61	24-Nov-14	Exova Edmonton
BTEX-CCME in Soil EDM	CCME	* Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	21-Nov-14	Exova Edmonton
BTEX-CCME in Soil EDM	US EPA	* US EPA method, 8260B/5035	21-Nov-14	Exova Edmonton
Flash Point (Closed cup)	ASTM	* Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester, D 93	21-Nov-14	Exova Edmonton
Leachate Inorganic (TCLP) ICP-MS	US EPA	* Toxicity Characteristic Leaching Procedure, SW-846, EPA 1311	22-Nov-14	Exova Edmonton
Leachate Organic (TCLP-BTEX)	US EPA	* Toxicity Characteristic Leaching Procedure, SW-846, EPA 1311	22-Nov-14	Exova Edmonton
Mercury (Hot Block) in Soil	US EPA	* Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	21-Nov-14	Exova Edmonton
Mercury (Hot Block) in Soil	US EPA	* Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	24-Nov-14	Exova Edmonton
Metals ICP-MS (Hot Block) in soil	SW-846	* Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	21-Nov-14	Exova Edmonton
Metals ICP-MS (Hot Block) in soil	SW-846	* Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	24-Nov-14	Exova Edmonton
Moisture	Carter	* Gravimetric Method with Oven Drying, 51.2	21-Nov-14	Exova Edmonton
PAH - Soil	AESRD	Index of Additive Cancer Risk (IACR), PAHs	21-Nov-14	Exova Calgary
PAH - Soil	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	21-Nov-14	Exova Calgary
Paint Filter Liquids Test	US EPA	* Paint Filter Liquids Test, 9095B	21-Nov-14	Exova Edmonton
Particle Size by Wet Sieve	ASTM	* Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing, C 117-04	21-Nov-14	Exova Edmonton
pH and Conductivity in general soil 1:2	McKeague	* 1:2 Soil:Water Ratio, 4.12	21-Nov-14	Exova Edmonton
Saturated Paste in General Soil	Carter	* Electrical Conductivity and Soluble Ions, Chapter 15	21-Nov-14	Exova Edmonton
TEH-CCME in Soil (Shake) EDM	CCME	* Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	21-Nov-14	Exova Edmonton

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1040609
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10684
17331-107 Ave NE	Name: Phase II ESA	Date Received: Nov 20, 2014
Edmonton, AB, Canada	Location: Rossdale: Area 1	Date Reported: Nov 26, 2014
T5S 1E5	LSD:	Report Number: 1970621
Attn: Tawnya Anderson	P.O.: D913127A, C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

** Reference Method Modified*

References

AESRD	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
McKeague	Manual on Soil Sampling and Methods of Analysis
ASTM	Annual Book of ASTM Standards
Carter	Soil Sampling and Methods of Analysis.
SW-846	Test Methods for Evaluating Solid Waste
US EPA	US Environmental Protection Agency Test Methods
APHA	Standard Methods for the Examination of Water and Wastewater
Ab Env	Alberta Environment, Soil Quality Guidelines for Barite

Guidelines

Guideline Description	Class 2 Landfill (AB)
Guideline Source	AENV Waste Control Regulation, Alberta Regulation 192/96
Guideline Comments	Limits for analytes that may be required for Class 2 Landfill Acceptance may not be presented in this report. Consult the AENV Waste Control Regulation for hazardous waste limits, and ERCB D058 for dangerous oilfield waste properties.

Comments:

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Hydrocarbon Chromatogram

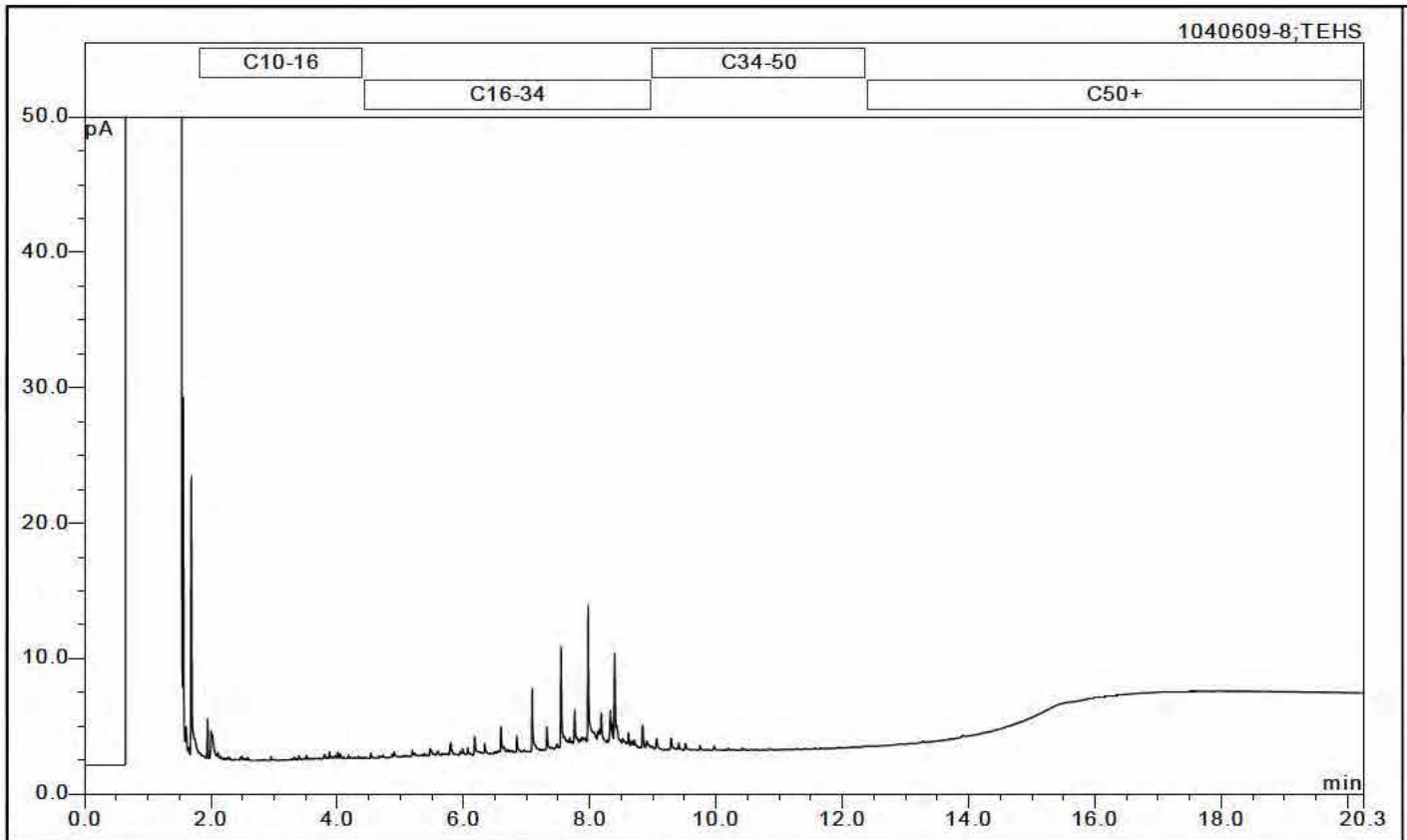
Bill To: Nichols Environmental (Canada)
 Report To: Nichols Environmental (Canada)
 17331-107 Ave NE
 Edmonton, AB, Canada
 T5S 1E5
 Attn: Tawnya Anderson
 Sampled by: HB
 Company: NECL

Project ID: 14-214-CRD
 Name: Phase II ESA
 Location: Rossdale: Area 1
 LSD:
 P.O.: D913127A, C#(required)

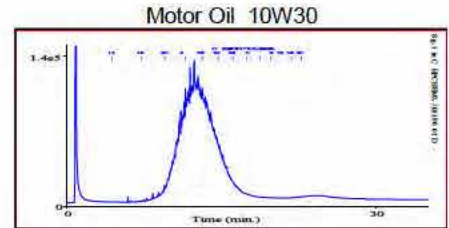
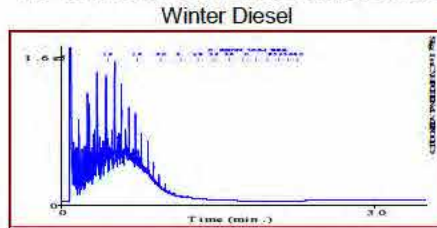
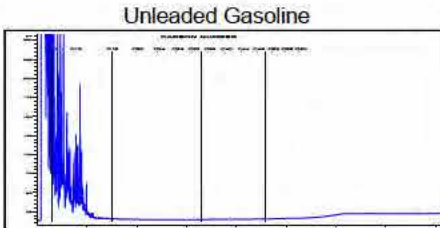
Lot ID: **1040609**
 Control Number: B10684
 Date Received: Nov 20, 2014
 Date Reported: Nov 21, 2014
 Report Number: 1970621

Exova Number: 1040609-8
 Sample Date: Nov 19, 2014

Sample Description: LF-01



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+



Project Information

Project ID: 14-214-CRD
 Project Name: Phase II ESA
 Project Location: Rossdale Area 1
 Legal Location:
 PO/AFE#: 14-214-CRD
 Proj. Acct. Code:

Billing Information
 Company: Nichols Env.
 Address: 17331-109th Ave NW
Edmonton
 Attention: T. Anderson
 Phone: 780-484-3377
 Cell:
 Fax:
 E-mail:
 Agreement ID:
 Copy of report:

Copy of Report To:
 Company:
 Address:
 Attention:
 Phone:
 Cell:
 Fax:
 E-mail:
 Copy of invoice:

RUSH Priority
 Upon filing out this section, client accepts that surcharges will be applied to the analysis.
 Date Required
 As Indicated | All Analysis
 When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples.
 Signature

Report Results E-mail Online
 Mail Fax PDF QA/QC Report
 Excel

Special Instructions/Comments (please include contact information including ph. # if different from above).
Please bill with City of Edmonton Rates

Include Regulatory Requirements Below:

Number of Containers	ASTMETS	PAND	PSOL	Washed Containers					
----------------------	---------	------	------	-------------------	--	--	--	--	--

Sample Custody (please print)
 Sampled by: HB
 Company: NECL
 I authorize Exova to proceed with the work indicated on this form:
 Date: Nov. 20/14 Initial: NA
This section for Lab use only
 Date/Time stamp:
NOV 20 14 4:00

Sample Identification	Location	Depth IN CM (M)	Date/Time sampled	Matrix	Sampling Method	Enter tests above (✓ relevant samples below)	Indicate below any deficiencies in the condition of samples:
1		1.0	Nov. 19, 2014	soil	gmb	X	Were Exova supplies used?
2		1.5	↓	↓	↓	X X	Was there any damage to the shipping container?
3		1.0	↓	↓	↓	X X	
4		1.5	↓	↓	↓	X X	Were the containers packaged well?
5		2.0	↓	↓	↓	X	
6		1.0	↓	↓	↓	X X	
7		1.5	↓	↓	↓	X	Were any extra samples received (document below)?
8			Nov. 19, 2014	soil	gmb	X	Are samples within recommended holding times/temp?
9							
10							
11							
12							
13							
14							
15							

Environmental Sample Information Sheet
 Note: Proper completion of this form is required in order to proceed with analysis.
 Please indicate any potentially hazardous samples.
 Page 1 of 1 Control # B10684

Indicate lot number or affix lot label here:
1040609
 Shipping: COD Y/N
 Cooler temp: 14.6
 # and size of coolers received:
 Delivery Method: HAND
 Waybill:
 Received by: ROY

CD 120-00

Report Transmission Cover Page

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Contact & Affiliation	Address	Delivery Commitments
Tawnya Anderson	17331-107 Ave NE	On [Lot Verification] send
Nichols Environmental (Canada) Ltd	Edmonton, Alberta T5S 1E5	(COA) by Email - Merge Reports
	Phone: (780) 484-3377	On [Report Approval] send
	Fax: (780) 484-5093	(Test Report, COC) by Email - Merge Reports
	Email [REDACTED]	On [Lot Creation] send
		(COR) by Email - Single Report

Notes To Clients:

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Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Reference Number 1042666-1
Sample Date Nov 19, 2014
Sample Time NA
Sample Location
Sample Description A1 / 14-20 / 1.5 / m
Matrix Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil					
Naphthalene	Dry Weight	mg/kg	<0.010		0.01
Acenaphthylene	Dry Weight	mg/kg	<0.05		0.05
Acenaphthene	Dry Weight	mg/kg	<0.05		0.05
Fluorene	Dry Weight	mg/kg	<0.05		0.05
Phenanthrene	Dry Weight	mg/kg	0.01		0.01
Anthracene	Dry Weight	mg/kg	<0.003		0.003
Fluoranthene	Dry Weight	mg/kg	<0.01		0.01
Pyrene	Dry Weight	mg/kg	<0.01		0.01
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01		0.01
Chrysene	Dry Weight	mg/kg	<0.05		0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05		0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05		0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05		0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05		0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05		0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05		0.05
IACR_Coarse	Index of Additive Cancer Risk		<0.001		0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001		0.001
PAH - Soil - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	83		23-130
2-Fluorobiphenyl	PAH - Surrogate	%	84		30-130
p-Terphenyl-d14	PAH - Surrogate	%	103		18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		


		Reference Number	1042666-2	1042666-3	1042666-4	
		Sample Date	Oct 30, 2014	Oct 30, 2014	Oct 30, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A3 / 14-09 / 1.0 / m	A3 / 14-12 / 3.1 / m	A3 / 14-13 / 1.5 / m	
		Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	1.31	1.34	1.51	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.09	0.04	0.03	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	<0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	4.1	5.7	5.0	0.2
Barium	Strong Acid Extractable	mg/kg	248	248	172	1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.5	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.39	0.27	0.15	0.01
Chromium	Strong Acid Extractable	mg/kg	11.1	16.4	13.9	0.5
Cobalt	Strong Acid Extractable	mg/kg	5.4	8.8	7.4	0.1
Copper	Strong Acid Extractable	mg/kg	19.7	17.2	11.3	1
Lead	Strong Acid Extractable	mg/kg	154	16.3	12.1	5
Molybdenum	Strong Acid Extractable	mg/kg	1.2	1.0	<1.0	1
Nickel	Strong Acid Extractable	mg/kg	21.4	23.5	20.1	0.5
Selenium	Strong Acid Extractable	mg/kg	<0.3	<0.3	0.3	0.3
Silver	Strong Acid Extractable	mg/kg	0.2	0.2	0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.09	0.19	0.13	0.05
Tin	Strong Acid Extractable	mg/kg	2.7	1.8	1.7	1
Uranium	Strong Acid Extractable	mg/kg	0.7	0.8	0.5	0.5
Vanadium	Strong Acid Extractable	mg/kg	18.8	26.8	23.8	0.1
Zinc	Strong Acid Extractable	mg/kg	62	60	46	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	37.7	75.8	20.1	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

		Reference Number	1042666-5	1042666-6	1042666-7	
		Sample Date	Nov 03, 2014	Nov 03, 2014	Nov 03, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A6 / 14-15 / 6.5 / m	A6 / 14-16 / 2.0 / m	A6 / 14-17 / 8.0 / m	
		Matrix	Soil	Soil	Soil	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	11.6	15.4	3.42	0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.06	1.07	0.02	0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2	<0.2	0.2
Arsenic	Strong Acid Extractable	mg/kg	5.3	9.8	5.5	0.2
Barium	Strong Acid Extractable	mg/kg	284	654	387	1
Beryllium	Strong Acid Extractable	mg/kg	0.7	1.2	0.7	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.16	0.60	0.16	0.01
Chromium	Strong Acid Extractable	mg/kg	13.8	17.2	11.1	0.5
Cobalt	Strong Acid Extractable	mg/kg	7.5	8.9	6.6	0.1
Copper	Strong Acid Extractable	mg/kg	12.8	31.5	11.9	1
Lead	Strong Acid Extractable	mg/kg	7.1	43.4	<4.9	5
Molybdenum	Strong Acid Extractable	mg/kg	1.1	1.4	1.4	1
Nickel	Strong Acid Extractable	mg/kg	28.1	40.0	27.9	0.5
Selenium	Strong Acid Extractable	mg/kg	<0.3	0.5	<0.3	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.2	<0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.15	0.26	0.11	0.05
Tin	Strong Acid Extractable	mg/kg	2.2	2.0	3.1	1
Uranium	Strong Acid Extractable	mg/kg	1.0	1.4	1.0	0.5
Vanadium	Strong Acid Extractable	mg/kg	23.1	26.7	26.4	0.1
Zinc	Strong Acid Extractable	mg/kg	41	73	27	1
Barite Soil Analysis						
Barium	Extractable	mg/kg	18.8	24.5	33.9	0.05
Water Soluble Parameters						
Chromium (VI)	Water Soluble	mg/kg	<0.10	<0.10	<0.10	0.1

Approved by: 
 Randy Neumann, BSc
 Vice President



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Hot Water Soluble

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	-0.0066	-0.01	0.02	yes
Date Acquired: December 04, 2014					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/kg	1.39	1.07	2.05	yes
Date Acquired: December 04, 2014					
Boron	mg/kg	0.09	0.09	0.11	yes
Date Acquired: December 04, 2014					

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Mercury	ug/L	0	-0.07	0.13	yes
Antimony	ug/L	0.069	-0.1	0.2	yes
Arsenic	ug/L	0.028	-0.2	0.2	yes
Barium	ug/L	0.646	-1	1	yes
Beryllium	ug/L	-0.01	-0.1	0.1	yes
Cadmium	ug/L	-0.007	-0.01	0.01	yes
Chromium	ug/L	0.053	-0.5	0.5	yes
Cobalt	ug/L	0.003	-0.1	0.1	yes
Copper	ug/L	0.036	-0.6	1.2	yes
Lead	ug/L	0.173	-5.0	5.0	yes
Molybdenum	ug/L	0.054	-1.0	1.0	yes
Nickel	ug/L	0	-0.4	0.7	yes
Selenium	ug/L	-0.066	-0.3	0.3	yes
Silver	ug/L	0.086	-0.09	0.14	yes
Thallium	ug/L	-0.005	-0.04	0.04	yes
Tin	ug/L	4.099	0.0	7.2	yes
Uranium	ug/L	0.02	-0.5	0.5	yes
Vanadium	ug/L	0.07	-0.1	0.1	yes
Zinc	ug/L	-0.142	-1	1	yes

Date Acquired: December 05, 2014

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Mercury	mg/kg	0.09	0.08	10	0.03	yes

Date Acquired: December 04, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Mercury	mg/kg	0.30	0.28	0.34	yes
Antimony	mg/kg	38.5	36.1	43.9	yes
Arsenic	mg/kg	38.4	36.7	44.3	yes
Barium	mg/kg	206	185	215	yes
Beryllium	mg/kg	20.1	17.4	22.2	yes
Cadmium	mg/kg	2.13	1.80	2.20	yes
Chromium	mg/kg	101	92.2	105.8	yes



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Cobalt	mg/kg	20.2	18.5	22.5	yes
Copper	mg/kg	189	176.3	207.3	yes
Lead	mg/kg	20.7	18.6	21.8	yes
Molybdenum	mg/kg	184	172.6	215.4	yes
Nickel	mg/kg	95.6	90.6	107.4	yes
Selenium	mg/kg	40.6	36.1	42.9	yes
Silver	mg/kg	20.2	16.69	21.97	yes
Thallium	mg/kg	10.9	9.57	11.23	yes
Tin	mg/kg	191	171.9	201.9	yes
Uranium	mg/kg	95.2	90.3	108.0	yes
Vanadium	mg/kg	17.4	16.3	20.3	yes
Zinc	mg/kg	201	180	220	yes
Date Acquired: December 05, 2014					
Mercury	mg/kg	0.08	0.05	0.11	yes
Date Acquired: December 04, 2014					
Mercury	mg/kg	0.29	0.15	0.42	yes
Antimony	mg/kg	0.8	0.3	1.1	yes
Arsenic	mg/kg	85.8	65.9	97.9	yes
Barium	mg/kg	247	213	270	yes
Beryllium	mg/kg	0.7	0.5	0.9	yes
Cadmium	mg/kg	2.06	1.50	2.64	yes
Chromium	mg/kg	34.5	27.4	39.2	yes
Cobalt	mg/kg	14.2	11.3	16.0	yes
Copper	mg/kg	199	162.7	222.9	yes
Lead	mg/kg	111	99.6	135.6	yes
Molybdenum	mg/kg	2.8	2.0	3.8	yes
Nickel	mg/kg	57.4	47.1	73.5	yes
Selenium	mg/kg	0.7	0.3	1.3	yes
Silver	mg/kg	0.8	0.25	1.15	yes
Thallium	mg/kg	0.32	0.26	0.40	yes
Tin	mg/kg	4.1	1.0	5.4	yes
Uranium	mg/kg	1.2	0.9	1.5	yes
Vanadium	mg/kg	42.1	31.5	56.1	yes
Zinc	mg/kg	476	355	550	yes
Date Acquired: December 05, 2014					

Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Barium	mg/L	0.0023084	-0.00	0.01	yes	
Date Acquired: December 05, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Barite Soil Analysis - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Barium	mg/kg	37.7	36.3	10	5.00	yes
Date Acquired: December 05, 2014						
Control Sample	Units	Measured	Lower Limit	Upper Limit		Passed QC
Barium	mg/kg	10.2	8.87	12.71		yes
Date Acquired: December 05, 2014						
Barium	mg/kg	0.11	0.09	0.11		yes
Date Acquired: December 05, 2014						

Water Soluble Parameters

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Chromium (VI)	mg/L	0.004	-0.10	0.10		yes
Date Acquired: December 05, 2014						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Chromium (VI)	mg/kg	<0.10	<0.10	10	0.01	yes
Date Acquired: December 05, 2014						

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Naphthalene	ng/mL	0	-0.010	0.010		yes
Acenaphthylene	ng/mL	0	-0.05	0.05		yes
Acenaphthene	ng/mL	0	-0.05	0.05		yes
Fluorene	ng/mL	0	-0.05	0.05		yes
Phenanthrene	ng/mL	0	-0.01	0.01		yes
Anthracene	ng/mL	0	-0.003	0.003		yes
Fluoranthene	ng/mL	0	-0.01	0.01		yes
Pyrene	ng/mL	0	-0.01	0.01		yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01		yes
Chrysene	ng/mL	0	-0.05	0.05		yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05		yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05		yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05		yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05		yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05		yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05		yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05		yes
Date Acquired: December 03, 2014						
Calibration Check	Units	% Recovery	Lower Limit	Upper Limit		Passed QC
Naphthalene	ng/mL	97.20	80	120		yes
Acenaphthylene	ng/mL	89.40	80	120		yes
Acenaphthene	ng/mL	93.00	80	120		yes
Fluorene	ng/mL	96.20	80	120		yes



Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Polycyclic Aromatic Hydrocarbons - Soil -

Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Phenanthrene	ng/mL	86.00	80	120	yes
Anthracene	ng/mL	96.60	80	120	yes
Fluoranthene	ng/mL	96.80	80	120	yes
Pyrene	ng/mL	101.60	80	120	yes
Benzo(a)anthracene	ng/mL	90.40	80	120	yes
Chrysene	ng/mL	103.20	80	120	yes
Benzo(b)fluoranthene	ng/mL	87.00	80	120	yes
Benzo(k)fluoranthene	ng/mL	82.40	80	120	yes
Benzo(a)pyrene	ng/mL	80.60	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	84.60	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	92.00	80	120	yes
Benzo(g,h,i)perylene	ng/mL	101.00	80	120	yes

Date Acquired: December 03, 2014

PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	97.53	23	130	yes
2-Fluorobiphenyl	%	97.13	30	130	yes
p-Terphenyl-d14	%	131.36	18	137	yes

Date Acquired: December 03, 2014



Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1042666
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: B10685
17331-107 Ave NE	Name: Phase II ESA	Date Received: Dec 2, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Dec 5, 2014
T5S 1E5	LSD:	Report Number: 1973472
Attn: Tawnya Anderson	P.O.: C#14-214-CRD	
Sampled By: HB	Acct code:	
Company: NECL		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
1:5 Water Soluble Extraction	McKeague	* Soluble Salts in Extracts of 1:5 Soil:Water Mixtures, 3.23	05-Dec-14	Exova Edmonton
Barium (Extractable) in soil (0.1 M CaCl2)	Ab Env	Analytical Method for Extractable Barium, 6.6.2	05-Dec-14	Exova Edmonton
Boron in general soil	McKeague	* Hot Water Soluble Boron - Azomethine-H Method, 4.61	04-Dec-14	Exova Edmonton
Mercury (Hot Block) in Soil	US EPA	* Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	04-Dec-14	Exova Edmonton
Metals ICP-MS (Hot Block) in soil	SW-846	* Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	05-Dec-14	Exova Edmonton
PAH - Soil	AESRD	Index of Additive Cancer Risk (IACR), PAHs	03-Dec-14	Exova Calgary
PAH - Soil	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	03-Dec-14	Exova Calgary

** Reference Method Modified*

References

Ab Env	Alberta Environment, Soil Quality Guidelines for Barite
AESRD	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater
McKeague	Manual on Soil Sampling and Methods of Analysis
SW-846	Test Methods for Evaluating Solid Waste
US EPA	US Environmental Protection Agency Test Methods

Comments:

Please direct any inquiries regarding this report to our Client Services group.
 Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.



Project Information

Project ID: 14-214-CRD
 Project Name: Phase II ESA
 Project Location: Rockdale
 Legal Location:
 PO/AFE#: 14-214-CRD
 Proj. Acct. Code:

Billing Information

Company: Nichols Edm.
 Address: 17331-107 Ave
Edm, AB
 Attention: T Anderson
 Phone: 780-484-3377
 Cell:
 Fax:
 E-mail:
 Agreement ID:
 Copy of report:

Copy of Report To:

Company:
 Address:
 Attention:
 Phone:
 Cell:
 Fax:
 E-mail:
 Copy of invoice:

RUSH Priority

Upon filling out this section, client accepts that surcharges will be applied to the analysis

Date Required
 As Indicated | All Analysis

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples.

Signature
 Sample Custody (please print)

Report Results: E-mail, Mail, Online, Fax, PDF, Excel, QA/QC Report

Special Instructions/Comments (please include contact information including ph. # if different from above).
Please bill at City of Edmonton Rates

Include Regulatory Requirements Below:

Number of Containers	PAH2	ABTNET-S																		
----------------------	------	----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sampled by: HB
 Company: NECL
 I authorize Exova to proceed with the work indicated on this form:
 Date: 14-214 Initial: TH
This section for Lab use only
 Date/Time stamp:
DEC 2 4:28

Sample Identification	Location	Depth IN CM (M)	Date/Time sampled	Matrix	Sampling Method	↓	Enter tests above (√ relevant samples below)										Indicate below any deficiencies in the condition of samples:			
1 A1:14-20		1.5	Nov. 19/14	soil	grab	1	X													Were Exova supplies used?
2 A3:14-09		1.0	Oct. 30/14	"	"	1	X													Were there any damage to the shipping container?
3 A3:14-12		3.0	Oct. 30/14	"	"	1	X													Were the containers packaged well?
4 A3:14-13		1.5	Oct. 30/14	"	"	1	X													Were any extra samples received (document below)?
5 A6:14-15		6.5	Nov. 3/14	"	"	1	X													Are samples within recommended holding times/temp?
6 A6:14-16		2.0	Nov. 3/14	"	"	1	X													
7 A6:14-17		8.0	Nov. 3/14	"	"	1	X													
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				

Environmental Sample Information Sheet

Note: Proper completion of this form is required in order to proceed with analysis

Please indicate any potentially hazardous samples

Indicate lot number or affix lot label here:

1042666

Shipping:

COD Y/N

Cooler temp:

114

and size of coolers received:

Delivery Method: Hand

Waybill:

Received by: uu

Report Transmission Cover Page

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

Contact & Affiliation	Address	Delivery Commitments
Tawnya Anderson Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (Test Report, COC, Test Report) by Email - Merge Reports
Kelly Goetz Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

Notes To Clients:

- Sample 1041068-3, 10 and 11 were past 48 hours holding time for Nitrite and Nitrate analyses.
- Dioxins and Furans analysis was performed by a subcontract laboratory. See attached 6 page report PR143092.

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Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

		Reference Number	1041068-3	1041068-6	1041068-10	
		Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A5 / 14-01 / 18.3°C	A1 / 14-18 / 18.3°C	A3 / 14-09 / 18.3°C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Inorganic Nonmetallic Parameters						
Chromium (VI)	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Chromium (III)	Calculated	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Metals Dissolved						
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	0.004	<0.002	<0.002	0.002
Antimony	Dissolved	mg/L	<0.0002	<0.0002	0.0002	0.0002
Arsenic	Dissolved	mg/L	0.0003	0.0004	0.0003	0.0002
Barium	Dissolved	mg/L	0.124	0.459	0.159	0.001
Boron	Dissolved	mg/L	0.028	0.229	0.099	0.002
Cadmium	Dissolved	mg/L	0.000010	0.000136	0.000072	0.00001
Chromium	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Copper	Dissolved	mg/L	<0.001	<0.001	0.002	0.001
Lead	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Nickel	Dissolved	mg/L	<0.0005	0.0037	0.0024	0.0005
Selenium	Dissolved	mg/L	0.0003	0.0011	0.0005	0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Uranium	Dissolved	mg/L	0.0012	0.0047	0.0019	0.0005
Zinc	Dissolved	mg/L	0.004	0.003	0.062	0.001
Subsample	Field Filtered		Field Filtered	Field Filtered	Field Filtered	
Routine Water						
pH			7.91		7.47	
Temperature of observed		°C	18.3		18.4	
pH						
Electrical Conductivity		µS/cm at 25 C	452		1210	1
Calcium	Dissolved	mg/L	67.8		140	0.2
Magnesium	Dissolved	mg/L	16.9		29.2	0.2
Sodium	Dissolved	mg/L	13.7		126	0.4
Potassium	Dissolved	mg/L	2.3		5.0	0.4
Iron	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Manganese	Dissolved	mg/L	0.330	0.756	0.548	0.005
Chloride	Dissolved	mg/L	7.2		159	0.4
Nitrate - N		mg/L	0.27		1.59	0.01
Nitrite - N		mg/L	<0.005		0.012	0.005
Nitrate and Nitrite - N		mg/L	0.27		1.60	0.01
Sulfate (SO4)	Dissolved	mg/L	61.9		75.2	0.9
Hydroxide		mg/L	<5		<5	5
Carbonate		mg/L	<6		<6	6



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-3	1041068-6	1041068-10	
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A5 / 14-01 / 18.3°C	A1 / 14-18 / 18.3°C	A3 / 14-09 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Routine Water - Continued					
Bicarbonate	mg/L	233		477	5
P-Alkalinity	as CaCO ₃ mg/L	<5		<5	5
T-Alkalinity	as CaCO ₃ mg/L	191		391	5
Total Dissolved Solids	Calculated mg/L	285		770	1
Hardness	Dissolved as CaCO ₃ mg/L	239	1360	470	
Ionic Balance	Dissolved %	102		107	

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-3	1041068-7	1041068-8	
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A5 / 14-01 / 18.3°C	A2 / C1 / 18.3°C	A2 / C6 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Naphthalene	ug/L	<0.1	<0.1	<0.1	0.1
Quinoline	ug/L	<0.3	<0.3	<0.3	0.3
Acenaphthylene	ug/L	<0.1	<0.1	<0.1	0.1
Acenaphthene	ug/L	<0.1	<0.1	<0.1	0.1
Fluorene	ug/L	<0.1	<0.1	<0.1	0.1
Phenanthrene	ug/L	<0.1	<0.1	<0.1	0.1
Anthracene	ug/L	<0.005	<0.005	<0.005	0.005
Acridine	ug/L	<0.1	<0.1	<0.1	0.1
Fluoranthene	ug/L	<0.01	<0.01	<0.01	0.01
Pyrene	ug/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	ug/L	<0.01	<0.01	<0.01	0.01
Chrysene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(b+j)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(k)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(a)pyrene	ug/L	<0.008	<0.008	<0.008	0.008
Indeno(1,2,3-c,d)pyrene	ug/L	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	ug/L	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	ug/L	<0.05	<0.05	<0.05	0.05
CB(a)P	Carcinogenic Potency Equivalent	ug/L	<0.01	<0.01	.01
PAH - Water - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	90	100	90
2-Fluorobiphenyl	PAH - Surrogate	%	100	120	100
p-Terphenyl-d14	PAH - Surrogate	%	90	100	70



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-4	1041068-5		
	Sample Date	Nov 21, 2014	Nov 21, 2014		
	Sample Time	NA	NA		
	Sample Location				
	Sample Description	A7 / 14-05 / 18.3°C	A7 / 14-06 / 18.3°C		
	Matrix	Water	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Water					
Benzene	mg/L	<0.001	<0.001		0.001
Toluene	mg/L	<0.001	<0.001		0.0004
Ethylbenzene	mg/L	<0.001	<0.001		0.001
Total Xylenes (m,p,o)	mg/L	<0.001	<0.001		0.001
Volatile Petroleum Hydrocarbons - Water					
F1 -BTEX	mg/L	<0.2	<0.2		0.1
F1 C6-C10	mg/L	<0.2	<0.2		0.1
F2 C10-C16	mg/L	<0.2	<0.2		0.1
Extractable Petroleum Hydrocarbons - Water					
F3 C16-C34	mg/L	<0.1	<0.1		0.1
F3+ C34+	mg/L	<0.1	<0.1		0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-7	1041068-8	1041068-9	
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A2 / C1 / 18.3°C	A2 / C6 / 18.3°C	A2 / C7 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Chlorinated Phenols - Water					
Pentachlorophenol	ug/L	<0.1	<0.1	<0.1	0.1
Chlorinated Phenols - Water - Surrogate Recovery					
2,4,6-Tribromophenol	PCP - Surrogate	%	58	67	84
Subcontracted Analysis					
Subcontractor Report Id	Pacific Rim	PR143092	PR143092	P143092	



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-9	1041068-10	1041068-11	
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A2 / C7 / 18.3°C	A3 / 14-09 / 18.3°C	A3 / MW203 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Naphthalene	ug/L	<0.1	<0.1	<0.1	0.1
Quinoline	ug/L	<0.3	<0.3	<0.3	0.3
Acenaphthylene	ug/L	<0.1	<0.1	<0.1	0.1
Acenaphthene	ug/L	<0.1	<0.1	<0.1	0.1
Fluorene	ug/L	<0.1	<0.1	<0.1	0.1
Phenanthrene	ug/L	<0.1	<0.1	<0.1	0.1
Anthracene	ug/L	<0.005	<0.005	<0.005	0.005
Acridine	ug/L	<0.1	<0.1	<0.1	0.1
Fluoranthene	ug/L	<0.01	<0.01	0.02	0.01
Pyrene	ug/L	<0.01	<0.01	0.01	0.01
Benzo(a)anthracene	ug/L	<0.01	<0.01	<0.01	0.01
Chrysene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(b+j)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(k)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(a)pyrene	ug/L	<0.008	<0.008	<0.008	0.008
Indeno(1,2,3-c,d)pyrene	ug/L	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	ug/L	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	ug/L	<0.05	<0.05	<0.05	0.05
CB(a)P	Carcinogenic Potency Equivalent	ug/L	<0.01	<0.01	.01
PAH - Water - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	90	90	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	90	100	30-130
p-Terphenyl-d14	PAH - Surrogate	%	90	100	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-11	1041068-12	1041068-13		
	Sample Date	Nov 21, 2014	Nov 20, 2014	Nov 20, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A3 / MW203 / 18.3°C	14-15 / 18.3°C	14-17 / 18.3°C		
	Matrix	Water	Water	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Inorganic Nonmetallic Parameters						
Chromium (VI)	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Chromium (III)	Calculated	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Metals Dissolved						
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	<0.002	<0.002	<0.002	0.002
Antimony	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Arsenic	Dissolved	mg/L	<0.0002	0.0003	0.0002	0.0002
Barium	Dissolved	mg/L	0.136	0.103	0.103	0.001
Boron	Dissolved	mg/L	0.091	0.440	0.411	0.002
Cadmium	Dissolved	mg/L	<0.00001	0.000022	0.000030	0.00001
Chromium	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Copper	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Lead	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Nickel	Dissolved	mg/L	0.0007	0.0020	0.0015	0.0005
Selenium	Dissolved	mg/L	0.0005	0.0006	<0.0002	0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Uranium	Dissolved	mg/L	0.0016	0.0039	0.0037	0.0005
Zinc	Dissolved	mg/L	0.004	0.001	0.003	0.001
Subsample	Field Filtered		Field Filtered	Field Filtered	Field Filtered	
Routine Water						
pH			7.61			
Temperature of observed		°C	18.3			
pH						
Electrical Conductivity		µS/cm at 25 C	831			1
Calcium	Dissolved	mg/L	146			0.2
Magnesium	Dissolved	mg/L	30.6			0.2
Sodium	Dissolved	mg/L	15.4			0.4
Potassium	Dissolved	mg/L	2.3			0.4
Iron	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Manganese	Dissolved	mg/L	0.008	0.344	1.29	0.005
Chloride	Dissolved	mg/L	18.7			0.4
Nitrate - N		mg/L	1.01			0.01
Nitrite - N		mg/L	<0.005			0.005
Nitrate and Nitrite - N		mg/L	1.01			0.01
Sulfate (SO4)	Dissolved	mg/L	77.8			0.9
Hydroxide		mg/L	<5			5
Carbonate		mg/L	<6			6



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-11	1041068-12	1041068-13	
	Sample Date	Nov 21, 2014	Nov 20, 2014	Nov 20, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A3 / MW203 / 18.3°C	14-15 / 18.3°C	14-17 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Routine Water - Continued					
Bicarbonate	mg/L	508			5
P-Alkalinity	as CaCO ₃ mg/L	<5			5
T-Alkalinity	as CaCO ₃ mg/L	417			5
Total Dissolved Solids	Calculated mg/L	540			1
Hardness	Dissolved as CaCO ₃ mg/L	489	548	428	
Ionic Balance	Dissolved %	100			



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Naphthalene	ug/L	<0.1	<0.1		0.1
Quinoline	ug/L	<0.3	<0.3		0.3
Acenaphthylene	ug/L	<0.1	<0.1		0.1
Acenaphthene	ug/L	<0.1	<0.1		0.1
Fluorene	ug/L	<0.1	<0.1		0.1
Phenanthrene	ug/L	<0.1	<0.1		0.1
Anthracene	ug/L	0.035	<0.005		0.005
Acridine	ug/L	<0.1	<0.1		0.1
Fluoranthene	ug/L	0.09	0.03		0.01
Pyrene	ug/L	0.10	0.04		0.01
Benzo(a)anthracene	ug/L	0.06	0.01		0.01
Chrysene	ug/L	<0.1	<0.1		0.1
Benzo(b+j)fluoranthene	ug/L	<0.1	<0.1		0.1
Benzo(k)fluoranthene	ug/L	<0.1	<0.1		0.1
Benzo(a)pyrene	ug/L	0.072	0.020		0.008
Indeno(1,2,3-c,d)pyrene	ug/L	<0.05	<0.05		0.05
Dibenzo(a,h)anthracene	ug/L	<0.05	<0.05		0.05
Benzo(g,h,i)perylene	ug/L	<0.05	<0.05		0.05
CB(a)P	Carcinogenic Potency Equivalent	ug/L	0.08	0.02	.01
PAH - Water - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	90	90	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	100	90	30-130
p-Terphenyl-d14	PAH - Surrogate	%	70	60	18-137

Approved by: 
Darlene Lintott, MSc
Consulting Scientist

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 19, 2014
T5S 1E5	LSD:	Report Number: 1971220
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	26-Nov-14	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	26-Nov-14	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	26-Nov-14	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	26-Nov-14	Exova Edmonton
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	24-Nov-14	Exova Edmonton
BTEX-CCME - Water	US EPA	* Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	26-Nov-14	Exova Calgary
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl-E	26-Nov-14	Exova Edmonton
Chromium (VI) in water	APHA	* Colorimetric Method, 3500-Cr B	26-Nov-14	Exova Edmonton
Mercury (Dissolved) in water	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	28-Nov-14	Exova Edmonton
Metals ICP-MS (Dissolved) in water	APHA/USEPA	* Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.2, 200.8	26-Nov-14	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	Hardness by Calculation, 2340 B	26-Nov-14	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	26-Nov-14	Exova Edmonton
PAH - Water	AESRD	Carcinogenic PAHs Toxic Potency Equivalence (as B(a)P TPE), PAHw	25-Nov-14	Exova Calgary
PAH - Water	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	25-Nov-14	Exova Calgary
PCP - Water	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	27-Nov-14	Exova Calgary
Sublet to Pacific Rim Labs	Ext. Lab	See attached test report,	29-Nov-14	Pacific Rim Laboratories Inc.
TEH-CCME - Water	EPA/CCME	* Separatory Funnel Liquid-liquid Extraction/CCME, EPA 3510/CCME	26-Nov-14	Exova Calgary

* Reference Method Modified

References

AESRD	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater
EPA/CCME	Environmental Protection Agency Test Methods - US/CCME
US EPA	US Environmental Protection Agency Test Methods

Methodology and Notes

Bill To:	City of Edmonton	Project:		Lot ID:	1041068
Report To:	Nichols Environmental (Canada)	ID:	14-214-CRD	Control Number:	C0018891
	17331-107 Ave NE	Name:		Date Received:	Nov 24, 2014
	Edmonton, AB, Canada	Location:		Date Reported:	Dec 19, 2014
	T5S 1E5	LSD:		Report Number:	1971220
Attn:	Tawnya Anderson	P.O.:	14-214-CRD		
Sampled By:	Hans B.	Acct code:			
Company:	NECL				

Comments:

- Sample 1041068-3, 10 and 11 were past 48 hours holding time for Nitrite and Nitrate analyses.
- Dioxins and Furans analysis was performed by a subcontract laboratory. See attached 6 page report PR143092.

Please direct any inquiries regarding this report to our Client Services group.

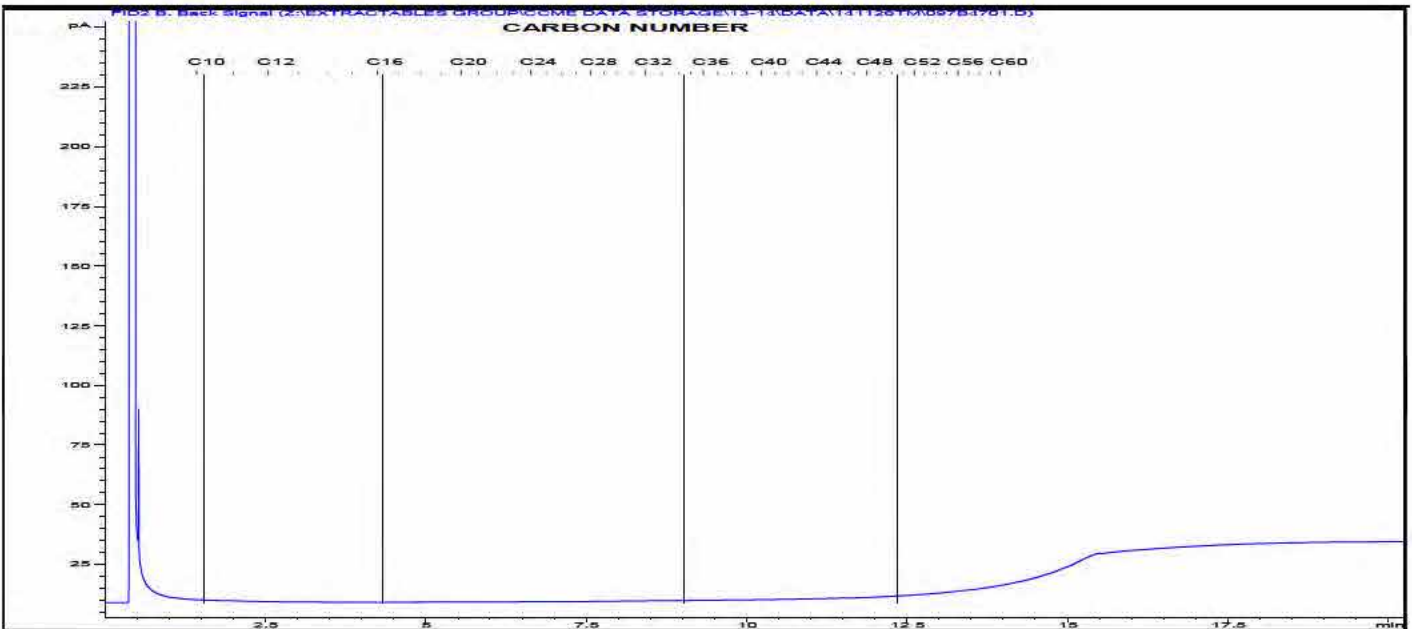
Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

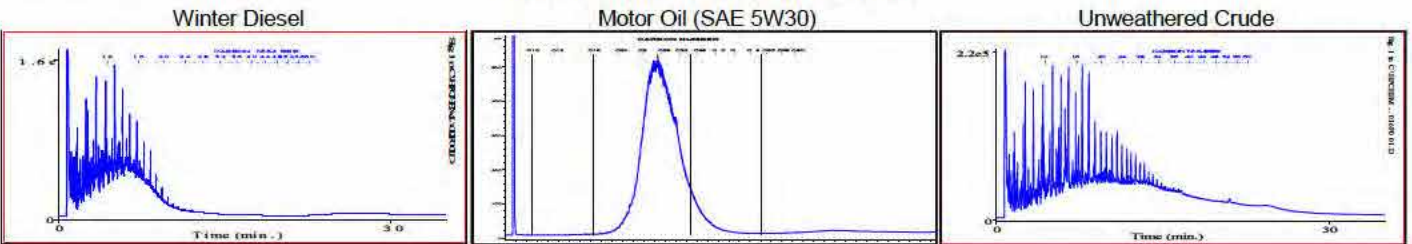
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	Name:	Control Number: C0018891
17331-107 Ave NE	Location:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 27, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1971285
Attn: Tawnya Anderson		
Sampled by: Hans B.		
Company: NECL		

Exova Number: 1041068-4 Sample Description: 18.3°C A7
 Sample Date: Nov 21, 2014 14-05



TYPICAL PRODUCT CHROMATOGRAMS



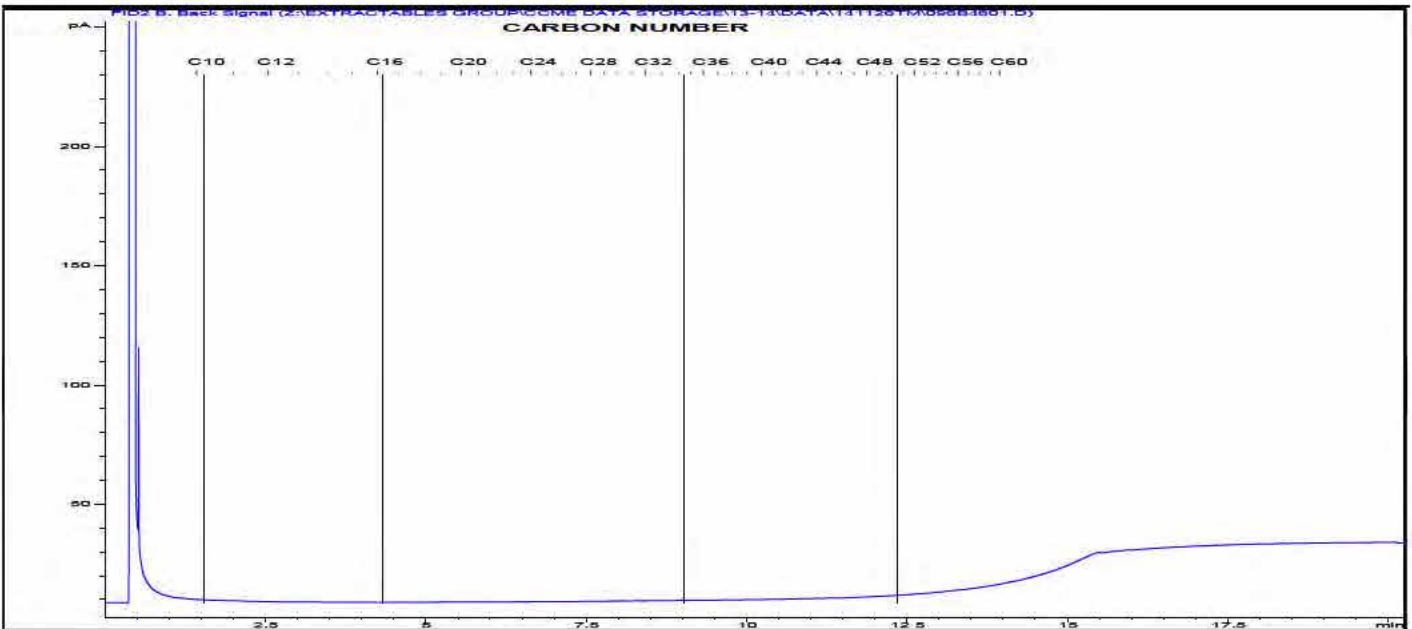
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

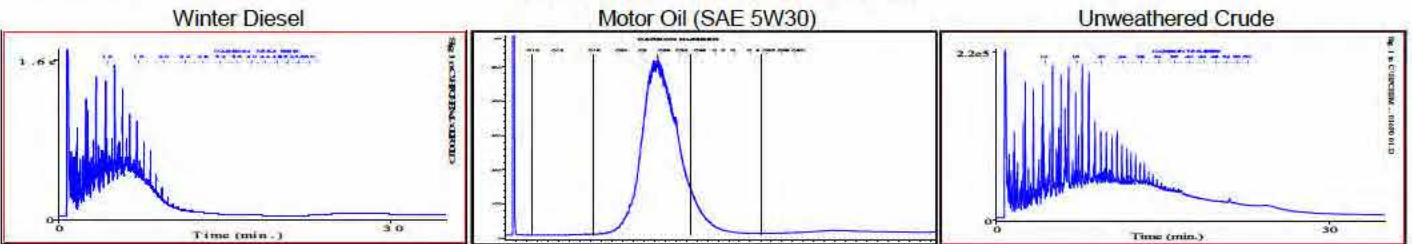
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	Name:	Control Number: C0018891
17331-107 Ave NE	Location:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 27, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1971285
Attn: Tawnya Anderson		
Sampled by: Hans B.		
Company: NECL		

Exova Number: 1041068-5 Sample Description: 18.3°C A7
 Sample Date: Nov 21, 2014 14-06



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

SAMPLE RECEIPT FORM / CHEMICAL ANALYSIS FORM

FILE #: PR143092

CLIENT: Exova
7217 Roper Road NW
Edmonton, AB
T6B 3J4

Phone: (780) 438-5522
Fax: (780) 434-8586
Email: Edmonton@exova.com

RECEIVED BY: M. Wright
CONDITION: good, 16.8°C

DATE/TIME: November 26, 2014 (9:00 a.m.)

<u># of Containers</u>	<u>Sample Type</u>	<u>Sample (Client Codes)</u>	<u>Lab Codes</u>	<u>Test Requested</u>
1	Water	1041068-7 Site ID: A2 / Description: C1	PR143092	PCDD/F
1	Water	1041068-8 Site ID: A2 / Description: C6	PR143093	PCDD/F
1	Water	1041068-9 Site ID: A2 / Description: C7	PR143094	PCDD/F

STORAGE: Stored at 4°C.

ANALYTES: HRGC/HRMS analysis for polychlorinated dibenzo(p)dioxins and dibenzofurans (PCDD/F).

SPECIAL INSTRUCTIONS: none

METHODOLOGY

Reference Method: PCDD/F: SOP LAB01; EPA Method 1613B

Data summarized in Data Report Attached

Report sent to: Client Services Date: December 17, 2014

Comments: Results relate only to items tested.

 David Hope PChem, CEO


DATA REPORT

Client: Exova
 Client ID: 1041068-7
 Site ID: A2 / Description: C1
 PRL ID: PR143092

Contact: Client Services
 Date Extracted: 8-Dec-14
 Date Analysed: 16-Dec-14

DIOXINS	Congeners	Conc.	DL	Surrogate Recoveries
		pg/L	pg/L	%
	2,3,7,8-TCDD	ND	1	50
	Total TCDD	ND	1	
	1,2,3,7,8-PeCDD	ND	2	40
	Total PeCDD	ND	2	
	1,2,3,4,7,8-HxCDD	ND	2	38
	1,2,3,6,7,8-HxCDD	ND	2	34
	1,2,3,7,8,9-HxCDD	ND	2	-
	Total HxCDD	ND	2	
	1,2,3,4,6,7,8-HpCDD	ND	3	34
	Total HpCDD	ND	3	
	OCDD	ND	4	78
Total Dioxin TEQ				

I-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.004
0.00	2.63

WHO-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	1
ND	2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.0004
0.00	3.63

FURANS	Congeners	pg/L	DL	Surrogate Recoveries
		pg/L	pg/L	%
	2,3,7,8-TCDF	ND	1	54
	Total TCDF	ND	1	
	1,2,3,7,8-PeCDF	ND	2	52
	2,3,4,7,8-PeCDF	ND	2	34
	Total PeCDF	ND	2	
	1,2,3,4,7,8-HxCDF	ND	2	34
	1,2,3,6,7,8-HxCDF	ND	2	38
	1,2,3,7,8,9-HxCDF	ND	2	40
	2,3,4,6,7,8-HxCDF	ND	2	34
	Total HxCDF	2.6	2	
	1,2,3,4,6,7,8-HpCDF	ND	3	34
	1,2,3,4,7,8,9-HpCDF	ND	3	30
	Total HpCDF	ND	3	
	OCDF	ND	4	-
Total Furan TEQ				

I-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	0.1
ND	0.1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.03
ND	0.004
0.00	2.06

WHO-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	0.1
ND	0.1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.03
ND	0.0004
0.00	2.06

Total PCDD/PCDF Toxic Equivalent

0.00 **4.70**

0.00 **5.69**

ND - none detected



DATA REPORT

Client: Exova
 Client ID: 1041068-8
 Site ID: A2 / Description: C6
 PRL ID: PR143093

Contact: Client Services
 Date Extracted: 8-Dec-14
 Date Analysed: 14-Dec-14

DIOXINS	Conc.	DL	Surrogate Recoveries
	pg/L	pg/L	%
2,3,7,8-TCDD	ND	1	152
Total TCDD	2.4	1	
1,2,3,7,8-PeCDD	ND	2	122
Total PeCDD	3	2	
1,2,3,4,7,8-HxCDD	ND	2	76
1,2,3,6,7,8-HxCDD	ND	2	64
1,2,3,7,8,9-HxCDD	ND	2	-
Total HxCDD	ND	2	
1,2,3,4,6,7,8-HpCDD	ND	3	60
Total HpCDD	ND	3	
OCDD	ND	4	92
Total Dioxin TEQ			

I-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.004
0.00	2.63

WHO-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	1
ND	2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.0004
0.00	3.63

FURANS	Conc.	DL	Surrogate Recoveries
	pg/L	pg/L	%
2,3,7,8-TCDF	ND	1	54
Total TCDF	3.7	1	
1,2,3,7,8-PeCDF	ND	2	136
2,3,4,7,8-PeCDF	ND	2	118
Total PeCDF	ND	2	
1,2,3,4,7,8-HxCDF	ND	2	70
1,2,3,6,7,8-HxCDF	ND	2	80
1,2,3,7,8,9-HxCDF	ND	2	70
2,3,4,6,7,8-HxCDF	ND	2	92
Total HxCDF	ND	2	
1,2,3,4,6,7,8-HpCDF	ND	3	90
1,2,3,4,7,8,9-HpCDF	ND	3	66
Total HpCDF	ND	3	
OCDF	ND	4	-
Total Furan TEQ			

I-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	0.1
ND	0.1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.03
ND	0.004
0.00	2.06

WHO-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	0.1
ND	0.1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.03
ND	0.0004
0.00	2.06

Total PCDD/PCDF Toxic Equivalent

0.00 **4.70**

0.00 **5.69**

ND - none detected



DATA REPORT

Client: Exova
 Client ID: 1041068-9
 Site ID: A2 / Description: C7
 PRL ID: PR143094

Contact: Client Services
 Date Extracted: 8-Dec-14
 Date Analysed: 16-Dec-14

DIOXINS	Congeners	Conc.	DL	Surrogate Recoveries
		pg/L	pg/L	%
	2,3,7,8-TCDD	ND	1	76
	Total TCDD	ND	1	
	1,2,3,7,8-PeCDD	ND	2	132
	Total PeCDD	ND	2	
	1,2,3,4,7,8-HxCDD	ND	2	100
	1,2,3,6,7,8-HxCDD	ND	2	100
	1,2,3,7,8,9-HxCDD	ND	2	-
	Total HxCDD	ND	2	
	1,2,3,4,6,7,8-HpCDD	ND	3	118
	Total HpCDD	ND	3	
	OCDD	6.3	4	158
Total Dioxin TEQ				

I-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.03
0.0063	0.0063
0.01	2.64

WHO-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	1
ND	2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
0.00063	0.00063
0.00	3.63

FURANS	Congeners	DL	Surrogate Recoveries
		pg/L	%
	2,3,7,8-TCDF	ND	64
	Total TCDF	ND	1
	1,2,3,7,8-PeCDF	ND	2
	2,3,4,7,8-PeCDF	ND	2
	Total PeCDF	ND	2
	1,2,3,4,7,8-HxCDF	ND	2
	1,2,3,6,7,8-HxCDF	ND	2
	1,2,3,7,8,9-HxCDF	ND	2
	2,3,4,6,7,8-HxCDF	ND	2
	Total HxCDF	ND	2
	1,2,3,4,6,7,8-HpCDF	ND	3
	1,2,3,4,7,8,9-HpCDF	ND	3
	Total HpCDF	ND	3
	OCDF	ND	4
Total Furan TEQ			

I-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	0.1
ND	0.1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.03
ND	0.004
0.00	2.06

WHO-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	0.1
ND	0.1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.03
ND	0.0004
0.00	2.06

Total PCDD/PCDF Toxic Equivalent

0.01 **4.70**

0.00 **5.69**

ND - none detected



QC REPORT - BLANK

Client: Exova
 Client ID: BLANK
 PRL ID: DF141015B

Contact: Client Services
 Date Extracted: 8-Dec-14
 Date Analysed: 12-Dec-14

DIOXINS		Conc.	DL	Surrogate Recoveries
Congeners	pg/L	pg/L	%	
2,3,7,8-TCDD	ND	1	80	
Total TCDD	ND	1		
1,2,3,7,8-PeCDD	ND	2	118	
Total PeCDD	ND	2		
1,2,3,4,7,8-HxCDD	ND	2	94	
1,2,3,6,7,8-HxCDD	ND	2	100	
1,2,3,7,8,9-HxCDD	ND	2	-	
Total HxCDD	ND	2		
1,2,3,4,6,7,8-HpCDD	ND	3	116	
Total HpCDD	ND	3		
OCDD	ND	4	118	
Total Dioxin TEQ				

I-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.004
0.00	2.63

WHO-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	1
ND	2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.0004
0.00	3.63

FURANS		Conc.	DL	Surrogate Recoveries
Congeners	pg/L	pg/L	%	
2,3,7,8-TCDF	ND	1	76	
Total TCDF	ND	1		
1,2,3,7,8-PeCDF	ND	2	104	
2,3,4,7,8-PeCDF	ND	2	120	
Total PeCDF	ND	2		
1,2,3,4,7,8-HxCDF	ND	2	90	
1,2,3,6,7,8-HxCDF	ND	2	92	
1,2,3,7,8,9-HxCDF	ND	2	94	
2,3,4,6,7,8-HxCDF	ND	2	92	
Total HxCDF	ND	2		
1,2,3,4,6,7,8-HpCDF	ND	3	112	
1,2,3,4,7,8,9-HpCDF	ND	3	118	
Total HpCDF	ND	3		
OCDF	ND	4	-	
Total Furan TEQ				

I-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	0.1
ND	0.1
ND	0.1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.03
ND	0.004
0.00	2.06

WHO-TEQs	
(ND=0)	(ND=DL)
pg/L	pg/L
ND	0.1
ND	0.1
ND	1
ND	0.2
ND	0.2
ND	0.2
ND	0.2
ND	0.03
ND	0.03
ND	0.0004
0.00	2.06

Total PCDD/PCDF Toxic Equivalent

0.00 4.70

0.00 5.69

ND - none detected



Acronyms used in reporting dioxins and furans:

TCDD = Tetrachlorodibenzo-*p*-dioxin
 PeCDD = Pentachlorodibenzo-*p*-dioxin
 HxCDD = Hexachlorodibenzo-*p*-dioxin
 HpCDD = Heptachlorodibenzo-*p*-dioxin
 OCDD = Octachlorodibenzo-*p*-dioxin

TCDF = Tetrachlorodibenzofuran
 PeCDF = Pentachlorodibenzofuran
 HxCDF = Hexachlorodibenzofuran
 HpCDF = Heptachlorodibenzofuran
 OCDF = Octachlorodibenzofuran

Acceptable recoveries for surrogates**EPA 1613**

	Min (%)	Max (%)
¹³ C ₁₂ -2,3,7,8-TCDD	25	164
¹³ C ₁₂ -1,2,3,7,8-PeCDD	25	181
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	32	141
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	28	130
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	23	140
¹³ C ₁₂ -OCDD	17	157
¹³ C ₁₂ -2,3,7,8-TCDF	24	169
¹³ C ₁₂ -1,2,3,7,8-PeCDF	24	185
¹³ C ₁₂ -2,3,4,7,8-PeCDF	21	178
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	26	152
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	26	123
¹³ C ₁₂ -1,2,3,7,8,9-HxCDF	29	147
¹³ C ₁₂ -2,3,4,6,7,8-HxCDF	28	136
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF	28	143
¹³ C ₁₂ -1,2,3,4,7,8,9-HpCDF	26	138



Report Transmission Cover Page

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

Contact & Affiliation	Address	Delivery Commitments
Tawnya Anderson Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: anderson@nicholsenvironmental.com	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (Test Report, COC, Test Report) by Email - Merge Reports
Kelly Goetz Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: goetz@nicholsenvironmental.com	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

Notes To Clients:

- Sample 1041068-3, 10 and 11 were past 48 hours holding time for Nitrite and Nitrate analyses.

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-3	1041068-6	1041068-10		
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014		
	Sample Time	NA	NA	NA		
	Sample Location					
	Sample Description	A5 / 14-01 / 18.3°C	A1 / 14-18 / 18.3°C	A3 / 14-09 / 18.3°C		
	Matrix	Water	Water	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Inorganic Nonmetallic Parameters						
Chromium (VI)	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Chromium (III)	Calculated	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Metals Dissolved						
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	0.004	<0.002	<0.002	0.002
Antimony	Dissolved	mg/L	<0.0002	<0.0002	0.0002	0.0002
Arsenic	Dissolved	mg/L	0.0003	0.0004	0.0003	0.0002
Barium	Dissolved	mg/L	0.124	0.459	0.159	0.001
Boron	Dissolved	mg/L	0.028	0.229	0.099	0.002
Cadmium	Dissolved	mg/L	0.000010	0.000136	0.000072	0.00001
Chromium	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Copper	Dissolved	mg/L	<0.001	<0.001	0.002	0.001
Lead	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Nickel	Dissolved	mg/L	<0.0005	0.0037	0.0024	0.0005
Selenium	Dissolved	mg/L	0.0003	0.0011	0.0005	0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Uranium	Dissolved	mg/L	0.0012	0.0047	0.0019	0.0005
Zinc	Dissolved	mg/L	0.004	0.003	0.062	0.001
Subsample	Field Filtered		Field Filtered	Field Filtered	Field Filtered	
Routine Water						
pH			7.91		7.47	
Temperature of observed		°C	18.3		18.4	
pH						
Electrical Conductivity		µS/cm at 25 C	452		1210	1
Calcium	Dissolved	mg/L	67.8		140	0.2
Magnesium	Dissolved	mg/L	16.9		29.2	0.2
Sodium	Dissolved	mg/L	13.7		126	0.4
Potassium	Dissolved	mg/L	2.3		5.0	0.4
Iron	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Manganese	Dissolved	mg/L	0.330	0.756	0.548	0.005
Chloride	Dissolved	mg/L	7.2		159	0.4
Nitrate - N		mg/L	0.27		1.59	0.01
Nitrite - N		mg/L	<0.005		0.012	0.005
Nitrate and Nitrite - N		mg/L	0.27		1.60	0.01
Sulfate (SO4)	Dissolved	mg/L	61.9		75.2	0.9
Hydroxide		mg/L	<5		<5	5
Carbonate		mg/L	<6		<6	6



Analytical Report

Bill To: City of Edmonton
Report To: Nichols Environmental (Canada)
17331-107 Ave NE
Edmonton, AB, Canada
T5S 1E5
Attn: Tawnya Anderson
Sampled By: Hans B.
Company: NECL

Project:
ID: 14-214-CRD
Name:
Location:
LSD:
P.O.: 14-214-CRD
Acct code:

Lot ID: **1041068**
Control Number: C0018891
Date Received: Nov 24, 2014
Date Reported: Dec 2, 2014
Report Number: 1971285

	Reference Number	1041068-3	1041068-6	1041068-10	
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A5 / 14-01 / 18.3°C	A1 / 14-18 / 18.3°C	A3 / 14-09 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Routine Water - Continued					
Bicarbonate	mg/L	233		477	5
P-Alkalinity	as CaCO3 mg/L	<5		<5	5
T-Alkalinity	as CaCO3 mg/L	191		391	5
Total Dissolved Solids	Calculated mg/L	285		770	1
Hardness	Dissolved as CaCO3 mg/L	239	1360	470	
Ionic Balance	Dissolved %	102		107	

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-3	1041068-7	1041068-8	
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A5 / 14-01 / 18.3°C	A2 / C1 / 18.3°C	A2 / C6 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Naphthalene	ug/L	<0.1	<0.1	<0.1	0.1
Quinoline	ug/L	<0.3	<0.3	<0.3	0.3
Acenaphthylene	ug/L	<0.1	<0.1	<0.1	0.1
Acenaphthene	ug/L	<0.1	<0.1	<0.1	0.1
Fluorene	ug/L	<0.1	<0.1	<0.1	0.1
Phenanthrene	ug/L	<0.1	<0.1	<0.1	0.1
Anthracene	ug/L	<0.005	<0.005	<0.005	0.005
Acridine	ug/L	<0.1	<0.1	<0.1	0.1
Fluoranthene	ug/L	<0.01	<0.01	<0.01	0.01
Pyrene	ug/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	ug/L	<0.01	<0.01	<0.01	0.01
Chrysene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(b+j)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(k)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(a)pyrene	ug/L	<0.008	<0.008	<0.008	0.008
Indeno(1,2,3-c,d)pyrene	ug/L	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	ug/L	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	ug/L	<0.05	<0.05	<0.05	0.05
CB(a)P	Carcinogenic Potency Equivalent	ug/L	<0.01	<0.01	.01
PAH - Water - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	90	100	90
2-Fluorobiphenyl	PAH - Surrogate	%	100	120	100
p-Terphenyl-d14	PAH - Surrogate	%	90	100	70



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-4	1041068-5		
	Sample Date	Nov 21, 2014	Nov 21, 2014		
	Sample Time	NA	NA		
	Sample Location				
	Sample Description	A7 / 14-05 / 18.3°C	A7 / 14-06 / 18.3°C		
	Matrix	Water	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Water					
Benzene	mg/L	<0.001	<0.001		0.001
Toluene	mg/L	<0.001	<0.001		0.0004
Ethylbenzene	mg/L	<0.001	<0.001		0.001
Total Xylenes (m,p,o)	mg/L	<0.001	<0.001		0.001
Volatile Petroleum Hydrocarbons - Water					
F1 -BTEX	mg/L	<0.2	<0.2		0.1
F1 C6-C10	mg/L	<0.2	<0.2		0.1
F2 C10-C16	mg/L	<0.2	<0.2		0.1
Extractable Petroleum Hydrocarbons - Water					
F3 C16-C34	mg/L	<0.1	<0.1		0.1
F3+ C34+	mg/L	<0.1	<0.1		0.1



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-7	1041068-8	1041068-9	
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A2 / C1 / 18.3°C	A2 / C6 / 18.3°C	A2 / C7 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Chlorinated Phenols - Water					
Pentachlorophenol	ug/L	<0.1	<0.1	<0.1	0.1
Chlorinated Phenols - Water - Surrogate Recovery					
2,4,6-Tribromophenol	PCP - Surrogate	%	58	67	84
					40-140

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

	Reference Number	1041068-9	1041068-10	1041068-11	
	Sample Date	Nov 21, 2014	Nov 21, 2014	Nov 21, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A2 / C7 / 18.3°C	A3 / 14-09 / 18.3°C	A3 / MW203 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Naphthalene	ug/L	<0.1	<0.1	<0.1	0.1
Quinoline	ug/L	<0.3	<0.3	<0.3	0.3
Acenaphthylene	ug/L	<0.1	<0.1	<0.1	0.1
Acenaphthene	ug/L	<0.1	<0.1	<0.1	0.1
Fluorene	ug/L	<0.1	<0.1	<0.1	0.1
Phenanthrene	ug/L	<0.1	<0.1	<0.1	0.1
Anthracene	ug/L	<0.005	<0.005	<0.005	0.005
Acridine	ug/L	<0.1	<0.1	<0.1	0.1
Fluoranthene	ug/L	<0.01	<0.01	0.02	0.01
Pyrene	ug/L	<0.01	<0.01	0.01	0.01
Benzo(a)anthracene	ug/L	<0.01	<0.01	<0.01	0.01
Chrysene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(b+j)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(k)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(a)pyrene	ug/L	<0.008	<0.008	<0.008	0.008
Indeno(1,2,3-c,d)pyrene	ug/L	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	ug/L	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	ug/L	<0.05	<0.05	<0.05	0.05
CB(a)P	Carcinogenic Potency Equivalent	ug/L	<0.01	<0.01	.01
PAH - Water - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	90	90	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	90	100	30-130
p-Terphenyl-d14	PAH - Surrogate	%	90	100	18-137



Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

		Reference Number	1041068-11	1041068-12	1041068-13	
		Sample Date	Nov 21, 2014	Nov 20, 2014	Nov 20, 2014	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	A3 / MW203 / 18.3°C	14-15 / 18.3°C	14-17 / 18.3°C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Inorganic Nonmetallic Parameters						
Chromium (VI)	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Chromium (III)	Calculated	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Metals Dissolved						
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	<0.002	<0.002	<0.002	0.002
Antimony	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Arsenic	Dissolved	mg/L	<0.0002	0.0003	0.0002	0.0002
Barium	Dissolved	mg/L	0.136	0.103	0.103	0.001
Boron	Dissolved	mg/L	0.091	0.440	0.411	0.002
Cadmium	Dissolved	mg/L	<0.00001	0.000022	0.000030	0.00001
Chromium	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Copper	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Lead	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Nickel	Dissolved	mg/L	0.0007	0.0020	0.0015	0.0005
Selenium	Dissolved	mg/L	0.0005	0.0006	<0.0002	0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Uranium	Dissolved	mg/L	0.0016	0.0039	0.0037	0.0005
Zinc	Dissolved	mg/L	0.004	0.001	0.003	0.001
Subsample	Field Filtered		Field Filtered	Field Filtered	Field Filtered	
Routine Water						
pH			7.61			
Temperature of observed		°C	18.3			
pH						
Electrical Conductivity		µS/cm at 25 C	831			1
Calcium	Dissolved	mg/L	146			0.2
Magnesium	Dissolved	mg/L	30.6			0.2
Sodium	Dissolved	mg/L	15.4			0.4
Potassium	Dissolved	mg/L	2.3			0.4
Iron	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Manganese	Dissolved	mg/L	0.008	0.344	1.29	0.005
Chloride	Dissolved	mg/L	18.7			0.4
Nitrate - N		mg/L	1.01			0.01
Nitrite - N		mg/L	<0.005			0.005
Nitrate and Nitrite - N		mg/L	1.01			0.01
Sulfate (SO4)	Dissolved	mg/L	77.8			0.9
Hydroxide		mg/L	<5			5
Carbonate		mg/L	<6			6



Analytical Report

Bill To: City of Edmonton
Report To: Nichols Environmental (Canada)
17331-107 Ave NE
Edmonton, AB, Canada
T5S 1E5
Attn: Tawnya Anderson
Sampled By: Hans B.
Company: NECL

Project:
ID: 14-214-CRD
Name:
Location:
LSD:
P.O.: 14-214-CRD
Acct code:

Lot ID: **1041068**
Control Number: C0018891
Date Received: Nov 24, 2014
Date Reported: Dec 2, 2014
Report Number: 1971285

	Reference Number	1041068-11	1041068-12	1041068-13	
	Sample Date	Nov 21, 2014	Nov 20, 2014	Nov 20, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	A3 / MW203 / 18.3°C	14-15 / 18.3°C	14-17 / 18.3°C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Routine Water - Continued					
Bicarbonate	mg/L	508			5
P-Alkalinity	as CaCO3 mg/L	<5			5
T-Alkalinity	as CaCO3 mg/L	417			5
Total Dissolved Solids	Calculated mg/L	540			1
Hardness	Dissolved as CaCO3 mg/L	489	548	428	
Ionic Balance	Dissolved %	100			

Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

Reference Number	1041068-12	1041068-13
Sample Date	Nov 20, 2014	Nov 20, 2014
Sample Time	NA	NA
Sample Location		
Sample Description	14-15 / 18.3°C	14-17 / 18.3°C
Matrix	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Naphthalene	ug/L	<0.1	<0.1		0.1
Quinoline	ug/L	<0.3	<0.3		0.3
Acenaphthylene	ug/L	<0.1	<0.1		0.1
Acenaphthene	ug/L	<0.1	<0.1		0.1
Fluorene	ug/L	<0.1	<0.1		0.1
Phenanthrene	ug/L	<0.1	<0.1		0.1
Anthracene	ug/L	0.035	<0.005		0.005
Acridine	ug/L	<0.1	<0.1		0.1
Fluoranthene	ug/L	0.09	0.03		0.01
Pyrene	ug/L	0.10	0.04		0.01
Benzo(a)anthracene	ug/L	0.06	0.01		0.01
Chrysene	ug/L	<0.1	<0.1		0.1
Benzo(b+j)fluoranthene	ug/L	<0.1	<0.1		0.1
Benzo(k)fluoranthene	ug/L	<0.1	<0.1		0.1
Benzo(a)pyrene	ug/L	0.072	0.020		0.008
Indeno(1,2,3-c,d)pyrene	ug/L	<0.05	<0.05		0.05
Dibenzo(a,h)anthracene	ug/L	<0.05	<0.05		0.05
Benzo(g,h,i)perylene	ug/L	<0.05	<0.05		0.05
CB(a)P	Carcinogenic Potency Equivalent	ug/L	0.08	0.02	.01
PAH - Water - Surrogate Recovery					
Nitrobenzene-d5	PAH - Surrogate	%	90	90	23-130
2-Fluorobiphenyl	PAH - Surrogate	%	100	90	30-130
p-Terphenyl-d14	PAH - Surrogate	%	70	60	18-137

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0018891
17331-107 Ave NE	Name:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	Location:	Date Reported: Dec 2, 2014
T5S 1E5	LSD:	Report Number: 1971285
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By: Hans B.	Acct code:	
Company: NECL		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	26-Nov-14	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	26-Nov-14	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	26-Nov-14	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	26-Nov-14	Exova Edmonton
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	24-Nov-14	Exova Edmonton
BTEX-CCME - Water	US EPA	* Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	26-Nov-14	Exova Calgary
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl-E	26-Nov-14	Exova Edmonton
Chromium (VI) in water	APHA	* Colorimetric Method, 3500-Cr B	26-Nov-14	Exova Edmonton
Mercury (Dissolved) in water	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	28-Nov-14	Exova Edmonton
Metals ICP-MS (Dissolved) in water	APHA/USEPA	* Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.2, 200.8	26-Nov-14	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	Hardness by Calculation, 2340 B	26-Nov-14	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	26-Nov-14	Exova Edmonton
PAH - Water	AESRD	Carcinogenic PAHs Toxic Potency Equivalence (as B(a)P TPE), PAHw	25-Nov-14	Exova Calgary
PAH - Water	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	25-Nov-14	Exova Calgary
PCP - Water	US EPA	* Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	27-Nov-14	Exova Calgary
TEH-CCME - Water	EPA/CCME	* Separatory Funnel Liquid-liquid Extraction/CCME, EPA 3510/CCME	26-Nov-14	Exova Calgary

* Reference Method Modified

References

EPA/CCME	Environmental Protection Agency Test Methods - US/CCME
AESRD	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
US EPA	US Environmental Protection Agency Test Methods
APHA	Standard Methods for the Examination of Water and Wastewater

Methodology and Notes

Bill To:	City of Edmonton	Project:		Lot ID:	1041068
Report To:	Nichols Environmental (Canada)	ID:	14-214-CRD	Control Number:	C0018891
	17331-107 Ave NE	Name:		Date Received:	Nov 24, 2014
	Edmonton, AB, Canada	Location:		Date Reported:	Dec 2, 2014
	T5S 1E5	LSD:		Report Number:	1971285
Attn:	Tawnya Anderson	P.O.:	14-214-CRD		
Sampled By:	Hans B.	Acct code:			
Company:	NECL				

Comments:

- Sample 1041068-3, 10 and 11 were past 48 hours holding time for Nitrite and Nitrate analyses.

Please direct any inquiries regarding this report to our Client Services group.

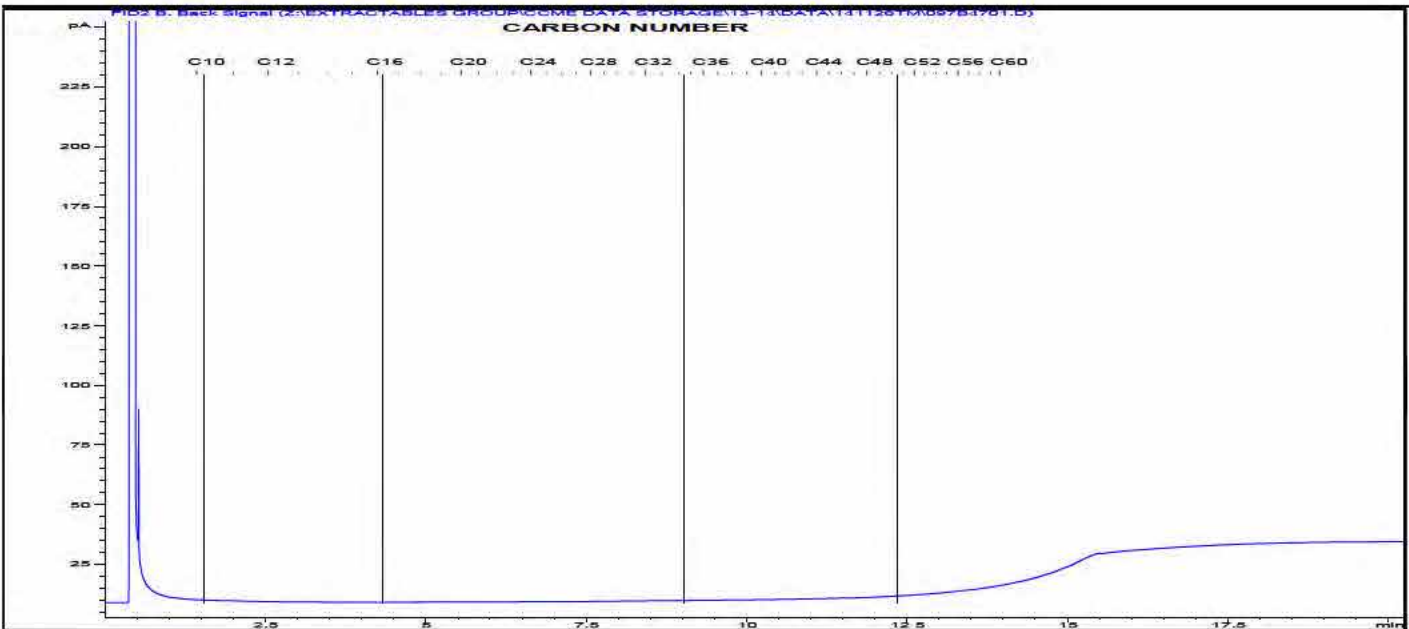
Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

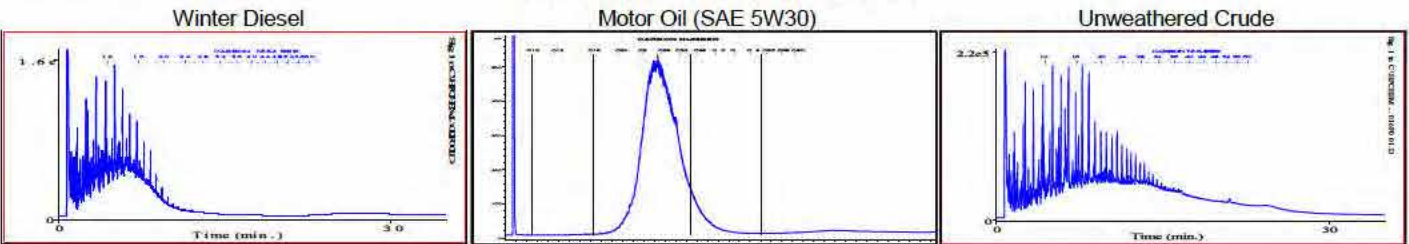
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	Name:	Control Number: C0018891
17331-107 Ave NE	Location:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 27, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1971285
Attn: Tawnya Anderson		
Sampled by: Hans B.		
Company: NECL		

Exova Number: 1041068-4 Sample Description: 18.3°C A7
 Sample Date: Nov 21, 2014 14-05



TYPICAL PRODUCT CHROMATOGRAMS



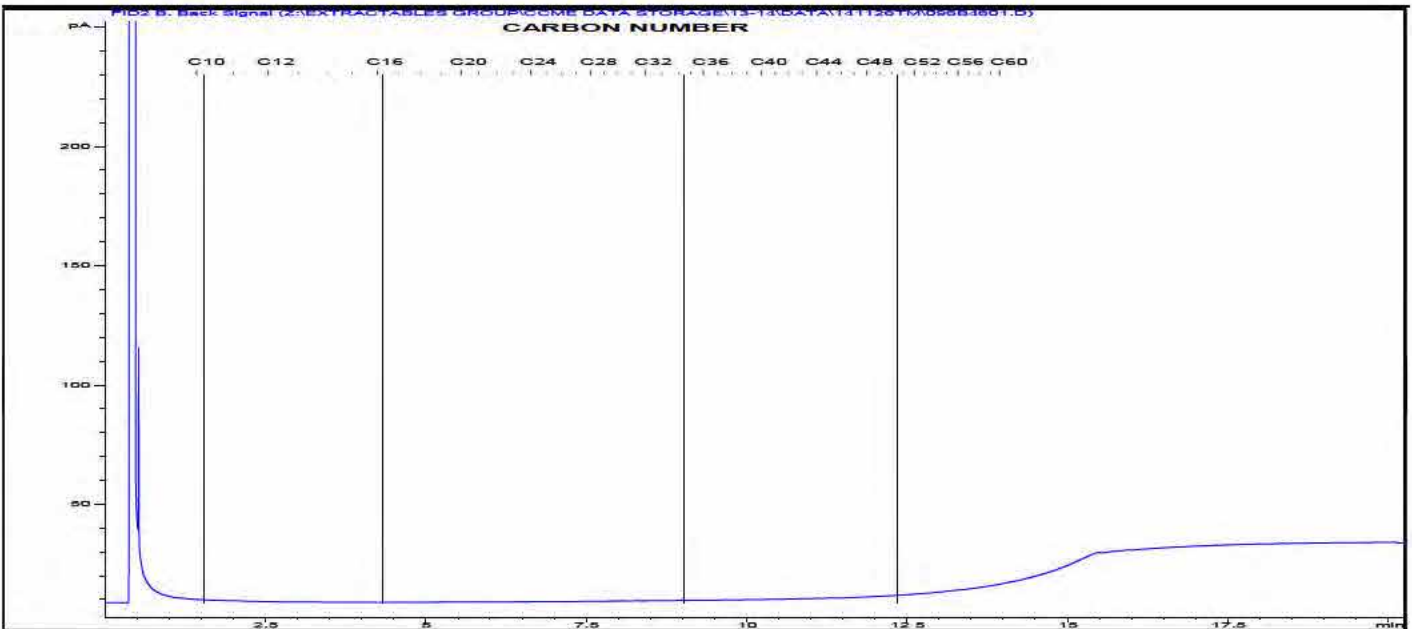
Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

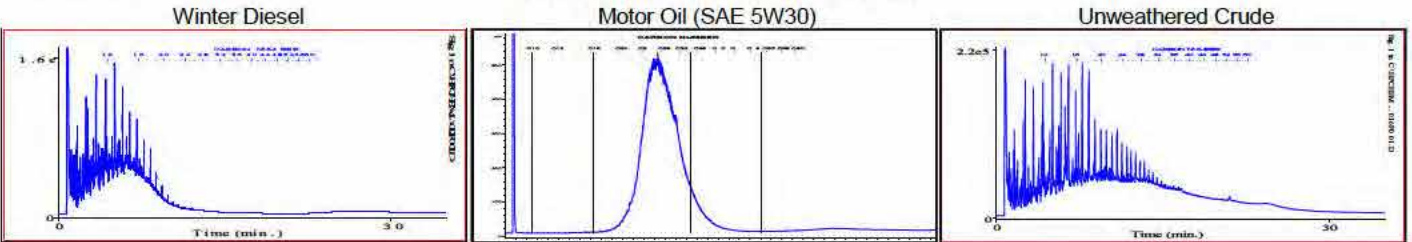
Hydrocarbon Chromatogram

Bill To: Nichols Environmental (Canada)	Project ID: 14-214-CRD	Lot ID: 1041068
Report To: Nichols Environmental (Canada)	Name:	Control Number: C0018891
17331-107 Ave NE	Location:	Date Received: Nov 24, 2014
Edmonton, AB, Canada	LSD:	Date Reported: Nov 27, 2014
T5S 1E5	P.O.: D913127A, C#(required)	Report Number: 1971285
Attn: Tawnya Anderson		
Sampled by: Hans B.		
Company: NECL		

Exova Number: 1041068-5 Sample Description: 18.3°C A7
 Sample Date: Nov 21, 2014 14-06



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

Project Information

Project ID: 14-214-000
 Project Name: _____
 Project Location: _____
 Legal Location: _____
 PO/AFE#: 14-214-000
 Proj. Acct. Code: _____
 Quote #: _____

Invoice to:

Company: City of Edmonton
 Address: _____
 Attention: Tammy Dolen
 Phone: _____
 Cell: _____
 Fax: _____
 E-mail: _____
 Agreement ID: _____
 Copy of report: _____

Report To:

Company: Nichols Environmental
 Address: _____
 Attention: Tammy Anderson
 Phone: _____
 Cell: _____
 Fax: _____
 E-mail 1: _____
 E-mail 2: _____
 Copy of invoice: _____

Report Results

E-Mail	<input checked="" type="checkbox"/>	HCDWQG	
Mail	<input type="checkbox"/>	Ab Tier 1	<input checked="" type="checkbox"/>
Online	<input type="checkbox"/>	SPIGEC	
Fax	<input type="checkbox"/>	BCCSR	
PDF	<input checked="" type="checkbox"/>	Other (list below)	
Excel	<input checked="" type="checkbox"/>		
QA/QC	<input checked="" type="checkbox"/>		

Regulatory Requirement

Sample Custody (please print)

Sampled by: Hans Baker

Company: NEEL

This section for Lab use only

Date/Time stamp:

NOV 22 AM 7:35

RUSH Priority

Emergency (contact lab for turnaround and pricing)
 Priority 1-2 working days (100% surcharge)
 Urgent 2-3 working days (50% surcharge)

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Number of Containers

AD TIER 1 - METAL
 PAN 1
 W10
 CCMW
 Diluted from
 Pentachloro Ethane

Date Required: _____ Signature: _____

Special Instructions/Comments (please include contact information including ph. # if different from above).

Please bill at City of Edmonton Rates but send invoice to Nichols for review

Site I.D.	Sample Description	Depth start in cm end in m	Date/Time Sampled	Matrix	Sampling Method	Enter tests above (√ relevant samples below)
1	A6	14-14	Nov 20, 2014	H ₂ O	low-in	3 ✓ ✓
2	A6	14-16	↓			3 ✓ ✓
3	A5	14-01	Nov 21, 2014			4 ✓ ✓ ✓
4	A7	14-05	↓			5 ✓ ✓
5	A7	14-06	↓			5 ✓ ✓
6	A1	14-18	↓			2 ✓
7	A3 A2	C1	Nov 20, 2014			3 ✓ ✓
8	A2	C6	↓			3 ✓ ✓
9	A2	C7	↓			3 ✓ ✓
10	A3	14-09	Nov 21, 2014			4 ✓ ✓ ✓
11	A3	MW203	↓			4 ✓ ✓ ✓
12	A					
13						
14						
15						

Indicate in the space allotted any deficiencies by the corresponding number.

1. Indicate any samples that were not packaged well
2. Indicate any samples not received in Exova supplies
3. Indicate any samples that were not clearly labeled
4. Indicate any samples not received within the required hold time or temp.
5. Indicate any missing or extra samples
6. Indicate any samples that were received broken
7. Indicate any samples where sufficient volume was not received
8. Indicate any samples received in an inappropriate container

Submission of this form acknowledges acceptance of Exova's Standard Terms and Conditions (<http://www.exova.com/about/terms-and-conditions/>)

Please indicate any potentially hazardous samples

Page 1 of 1

Control # **C 0018891**

LOT: 1041068

COC



Shipping: COD Y/ N

and size of coolers

Temp. received: 18.34

Delivery Method: Dropbox

Waybill:

Received by: Dosrosiers, T

Report Transmission Cover Page

Bill To: City of Edmonton	Project:	Lot ID: 1045739
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0035452
17331-107 Ave NE	Name: Phase II	Date Received: Dec 18, 2014
Edmonton, AB, Canada	Location: Rossdale	Date Reported: Dec 24, 2014
T5S 1E5	LSD:	Report Number: 1977739
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By:	Acct code:	
Company:		

Contact & Affiliation	Address	Delivery Commitments
Tawnya Anderson Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Lot Creation] send (COR) by Email - Single Report
Kelly Goetz Nichols Environmental (Canada) Ltd	17331-107 Ave NE Edmonton, Alberta T5S 1E5 Phone: (780) 484-3377 Fax: (780) 484-5093 Email: [REDACTED]	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

Notes To Clients:

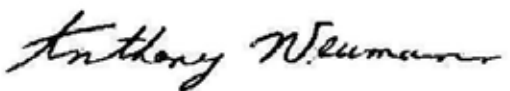
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Analytical Report

Bill To: City of Edmonton	Project:	Lot ID: 1045739
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0035452
17331-107 Ave NE	Name: Phase II	Date Received: Dec 18, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Dec 24, 2014
T5S 1E5	LSD:	Report Number: 1977739
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By:	Acct code:	
Company:		

	Reference Number	1045739-1	1045739-2	1045739-3	
	Sample Date	Dec 18, 2014	Dec 18, 2014	Dec 18, 2014	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	14-07	14-09	MW203	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Water					
Benzene	mg/L	<0.001	<0.001	<0.001	0.001
Toluene	mg/L	<0.0005	<0.0005	<0.0005	0.0004
Ethylbenzene	mg/L	<0.001	<0.001	<0.001	0.001
Total Xylenes (m,p,o)	mg/L	<0.002	<0.002	<0.002	0.002
Volatile Petroleum Hydrocarbons - Water					
F1 C6-C10	mg/L	<0.1	<0.1	<0.1	0.1
F1 -BTEX	mg/L	<0.1	<0.1	<0.1	0.1
Extractable Petroleum Hydrocarbons - Water					
F2 C10-C16	mg/L	<0.1	<0.1	<0.1	0.1
F3 C16-C34	mg/L	<0.1	<0.1	0.3	0.1
F3+ C34+	mg/L	0.3	0.3	0.7	0.1

Approved by: 
Anthony Neumann, MSc
Laboratory Operations Manager

Quality Control

Bill To: City of Edmonton	Project:	Lot ID: 1045739
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0035452
17331-107 Ave NE	Name: Phase II	Date Received: Dec 18, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Dec 24, 2014
T5S 1E5	LSD:	Report Number: 1977739
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By:	Acct code:	
Company:		

Mono-Aromatic Hydrocarbons - Water

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/L	0.025	0.026	20	0.002	yes
Toluene	mg/L	0.0262	0.0279	20	0.0020	yes
Ethylbenzene	mg/L	0.030	0.030	20	0.002	yes
m,p-Xylene	mg/L	0.059	0.059	20	0.002	yes
o-Xylene	mg/L	0.029	0.029	20	0.002	yes

Date Acquired: December 19, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	mg/L	0.051	0.042	0.058	yes
Toluene	mg/L	0.0521	0.0425	0.0575	yes
Ethylbenzene	mg/L	0.052	0.042	0.058	yes
m,p-Xylene	mg/L	0.105	0.085	0.115	yes
o-Xylene	mg/L	0.053	0.042	0.058	yes

Date Acquired: December 19, 2014

Volatile Petroleum Hydrocarbons - Water

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/L	0.7	0.6	0.8	yes

Date Acquired: December 19, 2014

Extractable Petroleum Hydrocarbons - Water

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2 C10-C16	mg/L	3.6	3.6	30	0.2	yes
F3 C16-C34	mg/L	12.1	12.1	30	0.2	yes
F3+ C34+	mg/L	3.7	3.9	30	0.2	yes

Date Acquired: December 23, 2014

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2 C10-C16	mg/L	94.7	69.4	124.0	yes
F3 C16-C34	mg/L	151	120.0	160.0	yes

Date Acquired: December 23, 2014

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2 C10-C16	mg/L	79	75	125	yes
F3 C16-C34	mg/L	118	75	125	yes
F3+ C34+	mg/L	86	75	125	yes

Date Acquired: December 23, 2014

Methodology and Notes

Bill To: City of Edmonton	Project:	Lot ID: 1045739
Report To: Nichols Environmental (Canada)	ID: 14-214-CRD	Control Number: C0035452
17331-107 Ave NE	Name: Phase II	Date Received: Dec 18, 2014
Edmonton, AB, Canada	Location: Rosssdale	Date Reported: Dec 24, 2014
T5S 1E5	LSD:	Report Number: 1977739
Attn: Tawnya Anderson	P.O.: 14-214-CRD	
Sampled By:	Acct code:	
Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
BTEX-CCME in Water EDM	US EPA	* Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	19-Dec-14	Exova Edmonton
TEH-CCME in Water EDM	MMCA	* Petroleum Hydrocarbons in Water, A108.0 <i>* Reference Method Modified</i>	23-Dec-14	Exova Edmonton

References

US EPA US Environmental Protection Agency Test Methods

Comments:

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Hydrocarbon Chromatogram

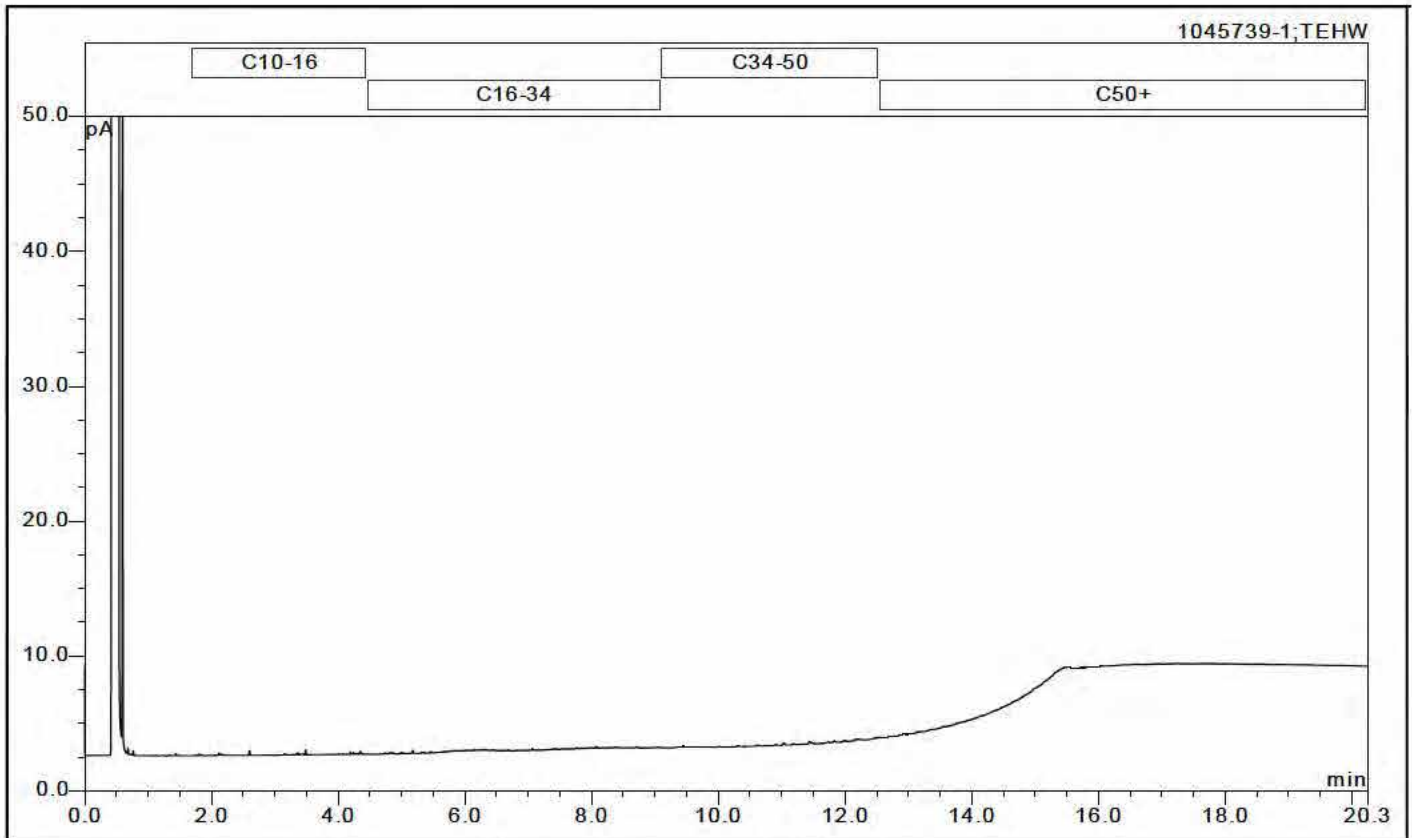
Bill To: Nichols Environmental (Canada)
 Report To: Nichols Environmental (Canada)
 17331-107 Ave NE
 Edmonton, AB, Canada
 T5S 1E5
 Attn: Tawnya Anderson
 Sampled by:
 Company:

Project ID: 14-214-CRD
 Name: Phase II
 Location: Rosedale
 LSD:
 P.O.: D913127A, C#(required)

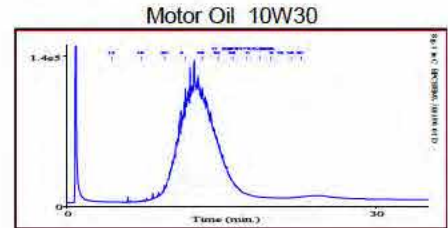
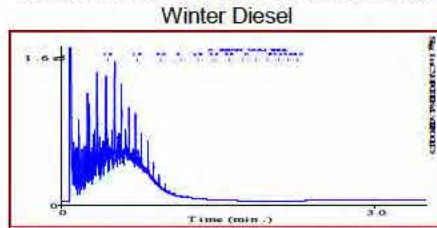
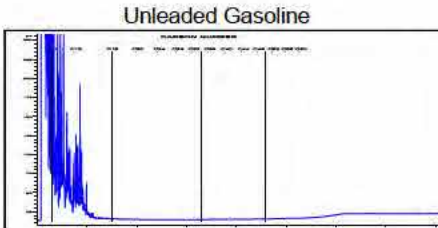
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 Control Number: C0035452
 Date Received: Dec 18, 2014
 Date Reported: Dec 24, 2014
 Report Number: 1977739

Exova Number: 1045739-1
 Sample Date: Dec 18, 2014

Sample Description: 14-07



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

Hydrocarbon Chromatogram

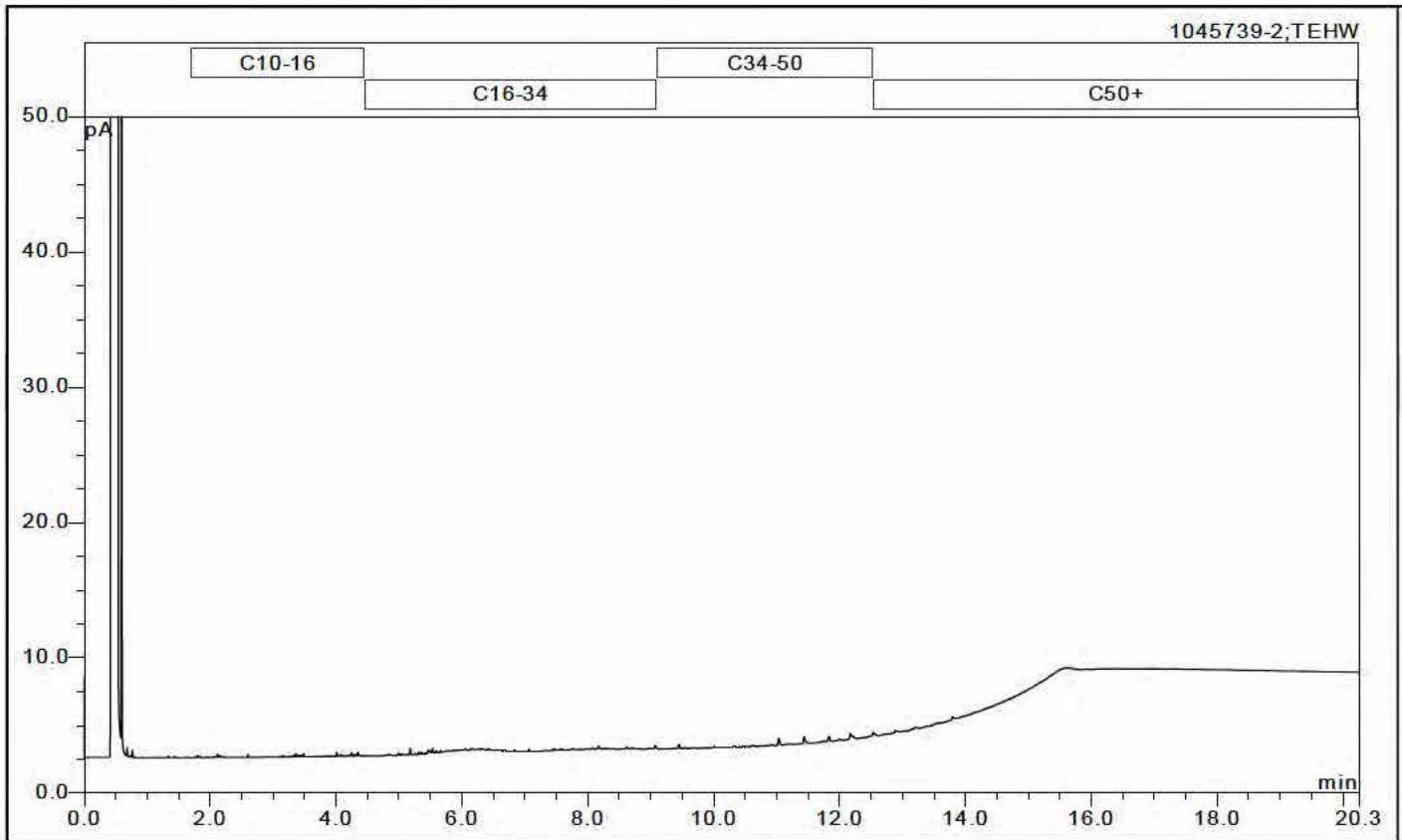
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 Report To: Nichols Environmental (Canada)
 17331-107 Ave NE
 Edmonton, AB, Canada
 T5S 1E5
 Attn: Tawnya Anderson
 Sampled by:
 Company:

Project ID: 14-214-CRD
 Name: Phase II
 Location: Rosedale
 LSD:
 P.O.: D913127A, C#(required)

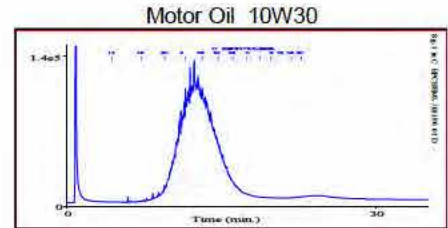
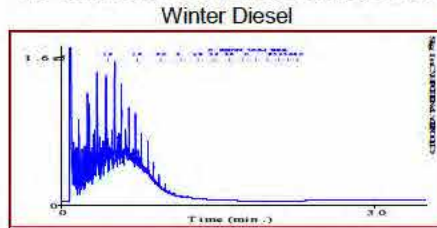
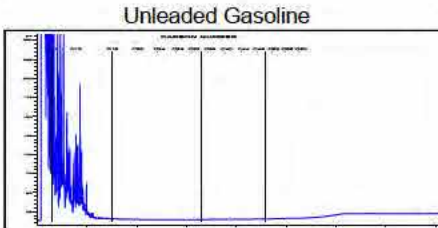
Lot ID: **1045739**
 Control Number: C0035452
 Date Received: Dec 18, 2014
 Date Reported: Dec 24, 2014
 Report Number: 1977739

Exova Number: 1045739-2
 Sample Date: Dec 18, 2014

Sample Description: 14-09



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

Exova
 7217 Roper Road NW
 Edmonton, Alberta
 T6B 3J4, Canada

T: +1 (780) 438-5522
 F: +1 (780) 434-8586
 E: Edmonton@exova.com
 W: www.exova.com



Hydrocarbon Chromatogram

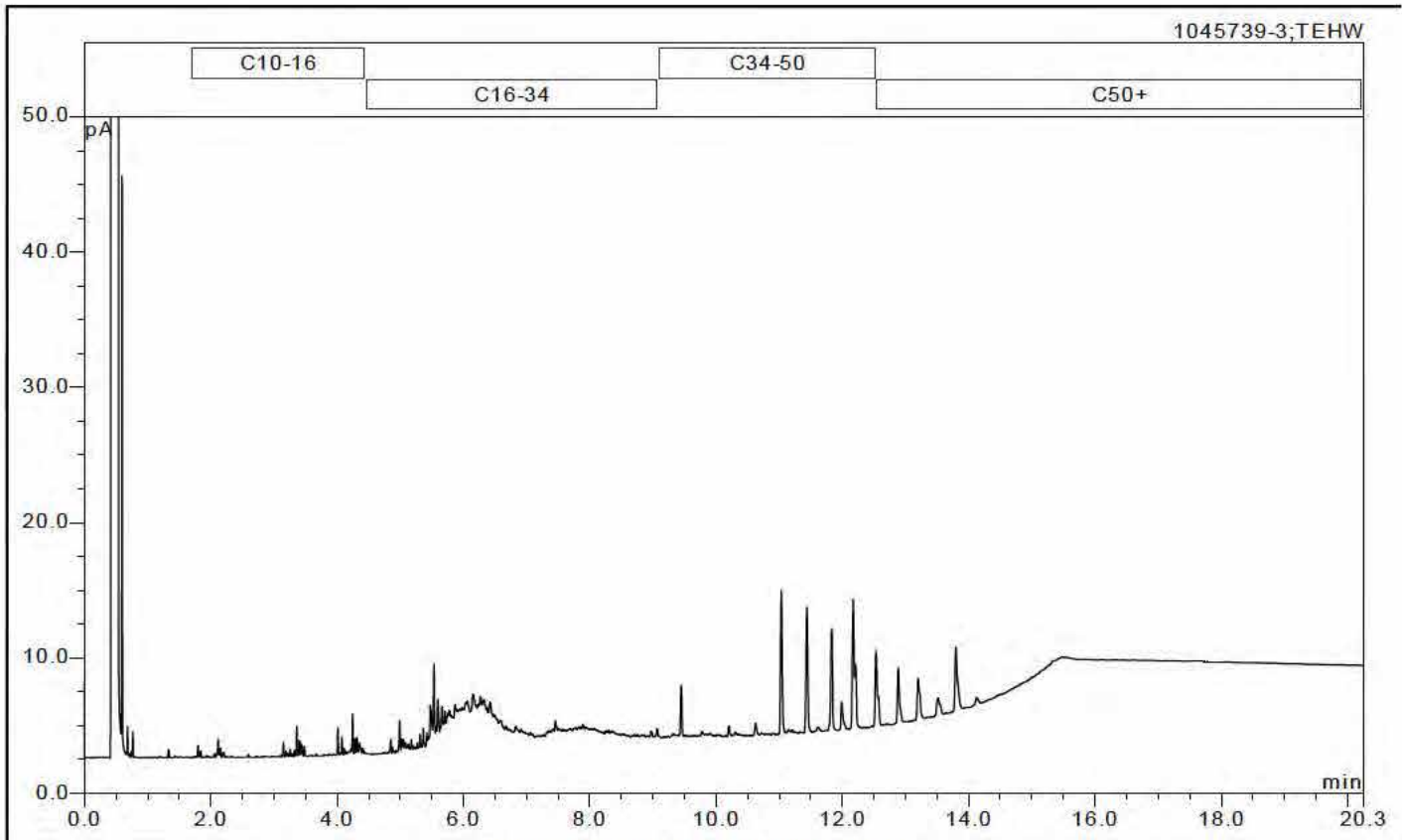
Bill To: Nichols Environmental (Canada)
 Report To: Nichols Environmental (Canada)
 17331-107 Ave NE
 Edmonton, AB, Canada
 T5S 1E5
 Attn: Tawnya Anderson
 Sampled by:
 Company:

Project ID: 14-214-CRD
 Name: Phase II
 Location: Rosedale
 LSD:
 P.O.: D913127A, C#(required)

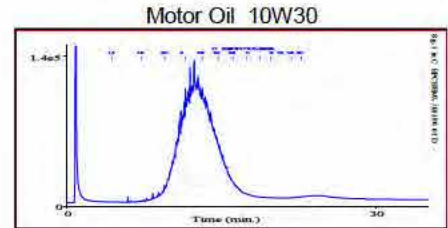
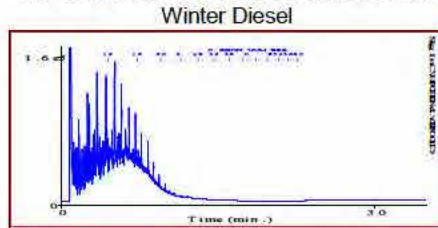
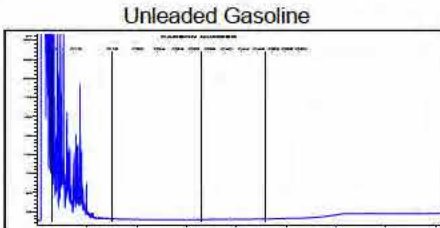
Lot ID: **1045739**
 Control Number: C0035452
 Date Received: Dec 18, 2014
 Date Reported: Dec 24, 2014
 Report Number: 1977739

Exova Number: 1045739-3
 Sample Date: Dec 18, 2014

Sample Description: MW203



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline C4-C12
 Varsol C8-C12

Kerosene C7-C16
 Diesel C8-C22

Lubricating Oils C20-C40
 Crude Oils C3-C60+

Project Information

Project ID: 14-214-COP
 Project Name: Phase II
 Project Location: Rosedale
 Legal Location:
 PO/APE#: 14-214-COP
 Proj. Acct. Code:
 Quote #

Invoice to:
 Company: Nichols Env
 Address: 17331-107 Ave
 Attention: T Anderson
 Phone: 780-484-3377
 Cell:
 Fax:
 E-mail:
 Agreement ID:
 Copy of report:

Report To:
 Company:
 Address:
 Attention:
 Phone:
 Cell:
 Fax:
 E-mail 1:
 E-mail 2:
 Copy of invoice:

Report Results	Regulatory Requirement
E-Mail <input checked="" type="checkbox"/>	HCDWQG
Mail <input type="checkbox"/>	Ab Tier 1 <input checked="" type="checkbox"/>
Online <input type="checkbox"/>	SPIGEC
Fax <input type="checkbox"/>	BCCSR
PDF <input checked="" type="checkbox"/>	Other (list below)
Excel <input checked="" type="checkbox"/>	
QA/QC <input checked="" type="checkbox"/>	

Sample Custody (please print)
 Sampled by:
 Company:

RUSH Priority

Emergency (contact lab for turnaround and pricing)
 Priority 1-2 working days (100% surcharge)
 Urgent 2-3 working days (50% surcharge)

When "ASAP" is requested, turnaround will default to a 100% RUSH priority, with pricing and turnaround time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Date Required: _____ Signature: _____

Special Instructions/Comments (please include contact information including ph. # if different from above):

Please bill @ City of Edmonton Rates

Site I.D.	Sample Description	Depth		Date/Time Sampled	Matrix	Sampling Method	Number of Containers	Enter tests above (✓ relevant samples below)														
		start in	end cm m																			
1	14-07			Dec 18, 2014	H ₂ O	Grabs	4	✓														
2	14-09						4	✓														
3	203						4	✓														
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						
13																						
14																						
15																						

This section for Lab use only
 Date/Time stamp:
DEC 15 PM 2:59

- Indicate in the space allotted any deficiencies by the corresponding number.
1. Indicate any samples that were not packaged well
 2. Indicate any samples not received in Exova supplies
 3. Indicate any samples that were not clearly labeled
 4. Indicate any samples not received within the required hold time or temp.
 5. Indicate any missing or extra samples
 6. Indicate any samples that were received broken
 7. Indicate any samples where sufficient volume was not received
 8. Indicate any samples received in an inappropriate container

Submission of this form acknowledges acceptance of Exova's Standard Terms and Conditions (<http://www.exova.com/about/terms-and-conditions/>)

Please indicate any potentially hazardous samples.

Page 1 of 1

Control # **C 0035452**

LOT: 1045739

COC



Shipping: COD Y/ N
 # and size of coolers 2 Small
 Temp. received: 2.7C Delivery Method: GDS
 Waybill: 0001267
 Received by: Bern