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# PHASE II ENVIRONMENTAL SITE ASSESSMENT GATHERCOLE SITE (405-3RD AVENUE SOUTH) AND ADJOINING RIVERFRONT LANDS SASKATOON, SASKATCHEWAN PMEL FILE NO. S03-4753.2 SEPTEMBER 19, 2003

PREPARED FOR:

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# 1.0 INTRODUCTION

As requested, P. Machibroda Engineering Ltd. (PMEL) has conducted a Phase II Environmental Site Assessment (ESA) for the Gathercole Property and the associated Riverfront Lands. The Gathercole Property is civically located at 405-3rd Avenue South. The Riverfront Property is located between the south boundary of the Gathercole Property and the north bank of the South Saskatchewan River, bordered by the Idylwyld Freeway to the west and Third Avenue South, to the east. The purpose of the Phase II ESA was to determine if the subject property had been impacted by releases (if any) of petroleum hydrocarbons and/or inorganic parameters (metals) resulting from past activities conducted at the site.

Written authorization (via facsimile) to conduct this investigation was provided by Mr. Stan Peakman, Project Manager, City of Saskatoon, on July 10, 2003. The Terms of Reference for this work were presented in PMEL Proposal No. 0707-2612, dated July 7, 2003.

The field drilling and soil sampling were conducted between July 29 and 31, 2003. Groundwater levels were monitored on August 6 and 8, 2003. Subsurface vapour concentrations were monitored on August 19, 2003.

# 2.0 BACKGROUND

## 2.1 Site Description

As shown on Drawing No. S03-4753.2, the study site is located at the southwest intersection of 3rd Avenue South and 19th Street East, Saskatoon, Saskatchewan. Development at the site includes the Gathercole Centre (former school and school board offices civically located at 405-3rd Avenue South), parking lots, landscaped areas, a paved bike path and a boat launch.

The Gathercole Centre is currently vacant. Historically, use of the Gathercole Centre and subject property has included the following: a school (Gathercole Centre) with an associated auto repair shop; an armoury building (demolished); a bottling plant (demolished); and a service station (demolished).

## 2.2 Previous Investigations

A Phase I ESA conducted at the Gathercole Property (see Grismer and Associates Ltd. Report No. 98233, dated March 23, 1998) identified a number of potential environmental concerns for the Gathercole property. Many of the potential environmental concerns pertained to the inside portions of the Gathercole Building (i.e., asbestos, PCBs in light fixtures and electrical equipment, peeling paint and pigeon droppings) and were not considered to be part of this investigation. Based on a review of the Phase I ESA, five potential areas of environmental concern were identified for the study site. These areas are shown on Drawing No. S03-4753.2-1, and summarized as follows:

1. The former Armoury Building, located proximate the southeast corner of the Gathercole Centre (metals);

2. The Auto Repair Shop area located within the "U" of the Gathercole Centre (petroleum hydrocarbons and metals);

3. The former service station tank bed located in the northeast corner of the site (petroleum hydrocarbons);

4. The bottling plant located in the far northwest corner of the site (metals); and

5. Soil fill along the river (south property line) of the site (metals).

## 3.0 ENVIRONMENTAL ASSESSMENT

### 3.1 Test Hole Drilling

Fifteen test holes, located as shown on the Site Plan, Drawing No. S03-4753.2-1, were dry drilled on July 29 to 31, 2003 using our truck mounted continuous flight auger drilling rig. The test holes were 150 mm in diameter and were extended to a maximum depth of 12.5 m below the existing ground surface.

Test hole drill logs were compiled during test drilling to record the soil stratification, the groundwater conditions, and the depths at which hydrocarbon contaminated soils, if any, were encountered. Disturbed samples of auger cuttings were recovered during test drilling for possible laboratory analysis and measurement of soil headspace vapour concentrations.

### 3.2 Soil Vapour Measurements

Soil headspace vapour concentrations were determined by placing a portion of the collected soil sample into a polyethylene bag and sealing the bag. The sample was agitated, the bag was punctured with a monitoring probe and the headspace vapour was measured for vapours using a Model 1238ME Gastech Tracetector (calibrated to a hexane standard and set to no methane response) and/or a Model PGM-7600 Mini Rae 2000 Photoionization Detector (PID), calibrated to a isobutylene standard. It should be recognized that the headspace test is a semi-quantitative screening test and can only be considered to represent relative contaminant concentrations. In other words exact concentrations are not determined using this field screening method.

## 3.3 Soil Sampling

### 3.3.1 Petroleum Hydrocarbons

Select duplicate samples to those used for headspace testing were chosen for possible laboratory analysis and placed immediately in two 125 mL laboratory supplied jars with Teflon lined lids to limit the loss of volatiles during sample recovery. The samples selected for laboratory analysis were stored in an ice-chilled cooler and submitted to Envirotest Laboratories (ETL), in Saskatoon, Saskatchewan.

Six soil samples were submitted for analysis of Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), Petroleum Hydrocarbon Fractions (F1 to F4, inclusive) and Lead as outlined in Saskatchewan Environment (2003). The soil samples were selected on the basis of soil vapour concentrations, observations made during drilling and/or location.

### 3.3.2 Metals (Inorganics)

Eight soil samples were selected for analysis of inorganic parameters (metals). The samples included both individual and composite samples. Composite samples were created by combining approximately equal portions of (individual) soil samples from various test holes and/or depths. The soil samples were then submitted to ETL for analyses of inorganic parameters (metals). The samples submitted for analysis of inorganic parameters were composed as follows:

| Sample No. | Test Hole Nos. | Individual Sample Nos. | Depth (metres) |
|---|---|---|---|
| C1 | 03-1, 03-2, 03-13, 03-4 | 1, 13, 24, 33 | 0.3 |
| C2 | 03-1, 03-2, 03-13, 03-4 | 2, 14, 25, 34 | 0.6 |
| C3 | 03-13, 03-14, 0-3-15 | 45, 54, 63 | 0.3 |
| C4 | 03-13, 03-14, 0-3-15 | 46, 55, 64 | 0.6 |
| C5 | 03-12 | 82 | 1.8 |
| C6 | 03-11, 03-12 | 73, 80 | 0.9 |
| C7 | 03-5, 03-6, 03-7 | 87, 94, 101 | 0.3 |
| C8 | 03-9 | 116, 117 | 0.3-0.8 |

## 3.4 Monitoring Wells

Monitoring wells (Piezometers), void of glues and primer, were installed in Test Hole Nos. 03-1 to 03-5, inclusive, 03-8, 03-12 and 03-14 to allow for monitoring of subsurface conditions and collection of groundwater samples. Each monitoring well consisted of a 50 mm diameter, Schedule 40, PVC machine slotted screen with a solid riser pipe. The annular spaces around the slotted screens were filled with silica sand and bentonite seals were placed around the solid riser pipes. The tops of the monitoring wells were protected using steel, flush-mounted (manhole) covers.

## 3.5 Site Monitoring

The monitoring wells were monitored for depth to groundwater and phase separated hydrocarbons on August 6 and 18, 2003. Subsurface vapour concentrations were measured using a Model 1238ME Gastech Tracetector (calibrated to a hexane standard and set to no methane response) on August 19, 2003.

## 3.6 Groundwater Sampling

Groundwater samples were recovered on August 6, 2003 from the monitoring wells located in Test Hole No. 03-4, 03-5, 03-8, 03-12, and 03-14. Approximately three well volumes were bailed from each monitoring well prior to collection of the samples. Each sample was collected using a dedicated inertia (Waterra) pump or a dedicated bailer. The metal samples were passed through dedicated 45μm filters prior to placing in laboratory supplied jars with the appropriate preservatives.

# 4.0 RESULTS OF INVESTIGATION

## 4.1 Soil Stratigraphy

Detailed descriptions of the site stratigraphy are presented on the Test Hole Logs, Drawing Nos. S03-4753.2-2 through 16, inclusive. In general, the site stratigraphy consisted of a thin surficial layer of gravel, asphalt and/or topsoil followed by fill underlain by sand and silt. The above deposits were underlain by glacial till extending to a depth of at least 12.5 m below grade (i.e., the maximum depth drilled at this site).

Results of a grain-size distribution test performed on a soil sample recovered from Test Hole No. 03-12 at a depth of approximately 2.3 m below grade are presented on Drawing No. S03-4753.2-17. Review of these results revealed that the median grain size ($D_{50}$) of this soil exceeded 0.075 μm. As such, the soil was considered to be coarse grained in accordance with Saskatchewan Environment (2003).

## 4.2 Remediation Criteria

A park and residential or commercial development have been proposed for the subject property. The subsurface soils are considered coarse grained. As such, residual hydrocarbon concentrations in the soil were referenced to the Saskatchewan Environment (2003) Residential Criteria for a coarse grained subsoil. Inorganic constituents (i.e., metals) were referenced to the CCME (2002) Residential/Parkland Criteria.

A visual review of the riverbank along the subject property did not reveal the presence of any springs (i.e., groundwater discharge points). As such, although the South Saskatchewan River is likely a discharge receptor of groundwater in the vicinity of the site, the groundwater likely filters through the overlying soils at the site prior to reaching the river. Based on the above, groundwater at the site was referenced to both the Saskatchewan Environment (2003) and the OMOE (1999) Non-Potable Groundwater Criteria. The OMOE (1999) criteria was used since it is a comprehensive list, and has been recognized by Saskatchewan Environment for use at similar sites.

## 4.3 Soil Sample Vapour Concentrations

The results of the vapour concentration measurements on the soil samples obtained during drilling are presented on the Test Hole Logs, Drawing Nos. S03-4753.2-2 through 16, inclusive. Soil vapour concentrations measured during drilling were low, not exceeding 2 % Lower Explosive Limit (LEL).

## 4.4 Soil Chemical Analysis

### 4.4.1 Petroleum Hydrocarbons and Lead

The soil chemistry test results for petroleum hydrocarbons and lead have been presented in Table I along with the Saskatchewan Environment (2003) Residential criteria for a coarse grained, subsurface soil, and the CCME (2002) Residential Criteria for lead. Complete laboratory reports listing the analyses methods are included in Appendix A. The concentrations of residual hydrocarbons and lead measured in the soil samples analyzed were below the referenced criteria.

**Table I. Results of Petroleum Hydrocarbon Chemical Analyses (Soil)**

| Test Hole No. | 03-1 | 03-5 | 03-8 | 03-10 | 03-12 | 03-14 | Detection | Saskatchewan |
|---|---|---|---|---|---|---|---|---|
| Sample No. | 11 | 90 | 114 | 126 | 82 | 61 | Limits | Environment (2003)[1] |
| Depth (metres) | 5.25 | 2.25 | 6.2 | 2.5 | 1.8 | 3.75 | | Residential |
| Soil Vapour Concentration (ppm | 225 | 55 | 45 | 52 | 20 | 40 | | Coarse Grained |
| Date Sampled | 29-Jul-03 | 31-Jul-03 | 31-Jul-03 | 31-Jul-03 | 30-Jul-03 | 30-Jul-03 | | (Subsurface Soil) |
| PARAMETER | | | | | | | | |
| Benzene | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 0.5 |
| Toluene | <0.01 | 0.01 | <0.01 | <0.01 | 0.01 | <0.01 | 0.01 | 3.0 |
| Ethylbenzene | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 5.0 |
| Xylene(s) | 0.01 | <0.01 | <0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 5.0 |
| Subsoil Fraction F1 | <5 | <5 | <5 | <5 | <5 | <5 | 5 | 40 |
| Subsoil Fraction F2 | 6 | 6 | 6 | 5 | 11 | 6 | 5 | 190 |
| Subsoil Fraction F3 | 13 | 8 | 48 | 79 | 440 | <5 | 5 | 2500 |
| Subsoil Fraction F4 | 21 | 43 | 16 | 19 | 540 | 6 | 5 | 10000 |
| Lead | 6 | 6 | 7 | <5 | 48 | <5 | 5 | 140[2] |

Results are expressed in milligrams per dry kilogram (ppm)

[1]Saskatchewan Environment, 2003. Interim Criteria of BTEX and PHC Fractions of Soils for the Year 2003. Regina, Saskatchewan.

[2]CCME (Canadian Council of Ministers of the Environment), 2002. Canadian Soil Quality Guidelines for Protection of Environmental and Human Health. Residential Criteria. Winnipeg, Manitoba.

### 4.4.2 Inorganic Parameters (Metals)

The soil chemistry test results for Inorganic Parameters (metals) have been presented in Table II along with the CCME (2002) Residential Criteria. Complete laboratory results listing the analyses methods are included in Appendix A. The concentrations of inorganic constituents detected in the soil samples analyzed were below the referenced criteria.

**Table II. Results of Metals Chemical Analyses (Soil)**

| Sample No. | C1 | C2 | C3 | C4 | 82 | C6 | C7 | C8 | Detection | CCME (2002)[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Hole Nos. | 1,2,3,4 | 1,2,3,4 | 13,14,15 | 13,14,15 | 12 | 11,12 | 5,6,7 | 9 | Limit | Residential/ |
| Depth (metres) | 0.3 | 0.6 | 0.3 | 0.6 | 1.8 | 0.75 | 0.3 | 0.3-0.75 | | Parkland |
| Date Sampled | July 29/03 | July 29/03 | July 30/03 | July 30/03 | July 30/03 | July 30/03 | July 31/03 | July 31/03 | | Criteria |
| PARAMETER | | | | | | | | | | |
| **Metals (Inorganics)** | | | | | | | | | | |
| Silver (Ag) | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 20 |
| Arsenic (As) | 4.1 | 4.1 | 4.3 | 3.6 | 4.2 | 4.1 | 3.5 | 4.0 | 0.2 | 12 |
| Barium (Ba) | 177 | 115 | 163 | 82 | 158 | 127 | 124 | 114 | 5 | 500 |
| Beryllium (Be) | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 4 |
| Cadmium (Cd) | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.5 | 10 |
| Cobalt (Co) | 5 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 1 | 50 |
| Chromium (Cr) | 10.0 | 9.4 | 8.7 | 6.0 | 7.3 | 6.3 | 6.4 | 8.0 | 0.5 | 64 |
| Copper (Cu) | 13 | 10 | 11 | 4 | 10 | 6 | 7 | 8 | 2 | 63 |
| Mercury (Hg) | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 6.6 |
| Molybdenum (Mo) | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 10 |
| Nickel (Ni) | 13 | 11 | 11 | 7 | 9 | 9 | 9 | 10 | 2 | 50 |
| Lead (Pb) | 43 | 44 | 36 | 12 | 79 | 15 | 24 | 22 | 5 | 140 |
| Antimony (Sb) | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 0.2 | 20 |
| Selenium (Se) | 0.2 | <0.2 | 0.2 | <0.2 | 0.3 | <0.2 | <0.2 | 0.2 | 0.2 | 3 |
| Tin (Sn) | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | 5 | 50 |
| Thallium (Tl) | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 1 |
| Uranium (U) | <40 | <40 | <40 | <40 | <40 | <40 | <40 | <40 | 40 | NC |
| Vanadium (V) | 15 | 13 | 14 | 9 | 13 | 12 | 12 | 14 | 1 | 130 |
| Zinc (Zn) | 70 | 50 | 40 | 30 | 70 | 30 | 30 | 60 | 10 | 200 |

Results are expressed in milligrams per dry kilogram (ppm)

[1]Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines, 1999, Updated 2001, Updated 2002.

NC - No Criterion

## 4.5 Groundwater Monitoring

### 4.5.1 Monitoring Results - Groundwater

A summary of the groundwater elevations is presented in Table III. The depth to groundwater on August 18, 2003 ranged from approximately 1.7 to 5.5 m below grade and the apparent direction of groundwater flow was southwards towards the South Saskatchewan River. It should be noted that groundwater levels can be locally affected by buried services, backfill areas, etc. and that the direction of groundwater flow may fluctuate seasonally.

### 4.5.2 Monitoring Results - Liquid Hydrocarbons

No phase separated liquid hydrocarbons were present in the monitoring wells on August 6 and/or 18, 2003.

### 4.5.3 Subsurface Vapour Concentrations

A summary of subsurface vapour concentrations measured on August 18, 2003 is presented in Table IV. Subsurface vapour concentrations measured on August 18, 2003 were low, not exceeding 1% LEL.

**Table III. Summary of Groundwater Elevations.**

| Test Hole No. | Ground Surface Elevation (metres) | Piezometer Rim Elevation (metres) | Groundwater Elevation (metres) | |
|---|---|---|---|---|
| | | | 06-Aug-03 | 18-Aug-03 |
| 03-2 | 98.5 | 98.5 | DRY | DRY |
| 03-3 | 98.6 | 98.5 | DRY | DRY |
| 03-4 | 100.5 | 100.4 | 94.69 | 95.01 |
| 03-5 | 103.7 | 103.7 | 100.14 | 100.12 |
| 03-8 | 104.1 | 104.0 | 102.43 | 102.40 |
| 03-12 | 105.4 | 105.4 | 101.82 | 102.02 |
| 03-14 | 105.2 | 105.1 | 101.43 | 101.87 |

**Table IV. Summary of Subsurface Vapour Concentrations.**

| Test Hole No. | Subsurface Vapour Concentrations (% LEL[1]) |
|---|---|
| | 19-Aug-03 |
| 03-2 | <1 |
| 03-3 | 1 |
| 03-4 | 1 |
| 03-5 | 1 |
| 03-8 | <1 |
| 03-12 | 1 |
| 03-14 | <1 |

[1]Lower Explosive Limit

## 4.6 Groundwater Laboratory Analysis

### 4.6.1 Petroleum Hydrocarbons

The results of the groundwater chemistry for the samples analyzed for petroleum hydrocarbons have been presented in Table V along with the Saskatchewan Environment (2003) Non-Potable Groundwater Criteria. Complete laboratory results listing the analyses methods are included in Appendix A. The concentrations of petroleum hydrocarbon constituents measured in the groundwater samples analyzed were below the above referenced criteria.

**Table V: Results of Petroleum Hydrocarbon Chemical Analysis (Groundwater)**

| Sample No. | 1 | 2 | 3 | 4 | | Saskatchewan |
|---|---|---|---|---|---|---|
| Test Hole No. | 03-4 | 03-5 | 03-8 | 03-12 | Detection Limits | Environment (2003)[1] Non-Potable |
| Date Sampled | Aug 6/03 | Aug 6/03 | Aug 6/03 | Aug 6/03 | | Groundwater Criteria |
| PARAMETER | | | | | | |
| Benzene | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | 1.9 |
| Toluene | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | 5.9 |
| Ehtylbenzene | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | 28 |
| Xylenes | <0.0005 | <0.0005 | <0.0005 | 0.0013 | 0.0005 | 5.6 |

Results are in milligrams per litre (ppm)

[1]Saskatchewan Environment, 2003. Interim Criteria of BTEX and PHC Fractions of Soils for the Year 2003. Regina, Saskatchewan.

### 4.6.2 Dissolved Inorganic Parameters (Metals)

The results of the groundwater chemistry for the samples analyzed for dissolved inorganic parameters (metals) have been presented in Table VI OMOE (1999) Non-Potable Groundwater Criteria. Complete laboratory results listing the analyses methods are included in Appendix A.

The concentrations of dissolved metal constituents detected in the groundwater samples analyzed were below the referenced criteria.

**Table VI: Results of Metals Chemical Analyses (Water)**

| Test Hole No.<br>Sample No.<br>Date Sampled<br>PARAMETER | 03-4<br>1<br>Aug 6/03 | 03-8<br>2<br>Aug 6/03 | 03-14<br>3<br>Aug 6/03 | Detection Limits | OMOE (1999)[1]<br>Non-Potable Groundwater Criteria |
|---|---|---|---|---|---|
| **Metals (Inorganics)** | | | | | |
| Aluminum (Al) | 0.02 | 0.01 | 0.08 | 0.01 | NC |
| Antimonty (Sb) | 0.002 | 0.0011 | 0.0009 | 0.0004 | 16 |
| Arsenic (As) | 0.0072 | 0.0009 | <0.0004 | 0.0004 | 0.48 |
| Barium (Ba) | 0.062 | 0.055 | 0.059 | 0.003 | 23 |
| Beryllium (Be) | <0.001 | <0.001 | <0.001 | 0.001 | 0.053 |
| Boron (B) | 1.89 | 0.17 | 1.15 | 0.05 | 50 |
| Cadmium (Cd) | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.011 |
| Chromium (Cr) | <0.005 | <0.005 | <0.005 | 0.005 | 0.110 |
| Cobalt (Co) | 0.008 | <0.002 | <0.002 | 0.002 | 0.1 |
| Copper (Cu) | 0.004 | 0.002 | 0.001 | 0.001 | 0.03 |
| Lead (Pb) | 0.0004 | 0.0008 | 0.0008 | 0.0001 | 0.032 |
| Lithium (Li) | 0.185 | 0.022 | 0.043 | 0.003 | NC |
| Mercury (Hg) | 0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.00012 |
| Molybdenum (Mo) | <0.005 | 0.007 | <0.005 | 0.005 | 7.3 |
| Nickel (Ni) | <0.002 | <0.002 | <0.002 | 0.002 | 1.6 |
| Selenium (Se) | 0.0078 | <0.0004 | 0.0062 | 0.0004 | 0.05 |
| Silver (Ag) | <0.0002 | <0.0002 | <0.0002 | 0.0002 | 0.0012 |
| Thallium (Tl) | 0.0003 | <0.0001 | <0.0001 | 0.0001 | 0.4 |
| Tin (Sn) | <0.05 | <0.05 | <0.05 | 0.05 | NC |
| Titanium (Ti) | 0.003 | 0.002 | 0.004 | 0.001 | NC |
| Uranium (U) | 0.0069 | 0.0015 | 0.0085 | 0.0001 | NC |
| Vanadium (V) | 0.003 | <0.001 | 0.001 | 0.001 | 0.2 |
| Zinc (Zn) | 0.022 | 0.009 | 0.01 | 0.002 | 1.1 |

Results are expressed in milligrams per litre (ppm)

[1]OMOE (Ontario Ministry of the Environment) , 1999. Guideline for Use at Contaminated Sites in Ontario.

NC - No Criterion

## 5.0 DISCUSSION OF RESULTS

Based on the results of the investigation the subject property has not been adversely impacted by releases of petroleum hydrocarbons and/or inorganic parameters (metals) resulting from past activities at the site. Soil vapour concentrations measured during drilling were low and none of the soil samples analyzed for petroleum hydrocarbon constituents and/or metals exceeded the Saskatchewan Environment (2003) and/or the CCME (2002) Residential/Parkland Criteria.

The concentration of dissolved hydrocarbon and inorganic constituents detected in the groundwater samples analyzed were below the Saskatchewan Environment (2003) and/or OMOE (1999) Non-Potable Groundwater criteria. The Ontario Environment criteria was used to reference the concentration of dissolved inorganic parameters since it is a comprehensive list, and has been recognized by Saskatchewan Environment for use at similar sites.

Subsurface vapour concentrations measured in the monitoring wells were low, not exceeding 1 % LEL.

## 6.0 CLOSURE

The presentation of the summary of the field drill logs and subsurface environmental considerations has been completed as authorized. Fifteen test holes were dry drilled using our truck mounted auger drill rig. A field drill log was compiled for each Test Hole during drilling, which we believe was representative of the subsurface conditions at the Test Hole locations at the time of test drilling. Variations in the subsurface conditions from that shown on the field drill logs at locations other than the exact Test Hole locations should be anticipated. It should be recognized that the subsurface conditions and soil/groundwater chemistry reported here may change with time at any specific test locations and may be different at locations other than the exact sampling locations.

This report has been prepared for the exclusive use of The City of Saskatoon, Crosby Hanna and Associates and their agents to the Gathercole Property (405-3rd Avenue South) and the associated Riverfront Lands. It has been prepared in accordance with generally accepted geoenvironmental engineering practices and no other warranty, express or implied, is made.

Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. P. Machibroda Engineering 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.

The subsurface investigation necessitated the drilling of deep test holes. Please be advised that some settlement of the backfill material will occur which may leave a depression or an open hole. It is the responsibility of the client to inspect the site and backfill, as required, to ensure that the ground surface at each Test Hole location is maintained level with the existing grade.

We trust that this report fulfills your requirements for this project. Should you require additional information, please contact us.

Yours very truly,

**P. MACHIBRODA ENGINEERING LTD.**

Association of Professional Engineers & Geoscientists of Saskatchewan
**CERTIFICATE OF AUTHORIZATION**
P. MACHIBRODA ENGINEERING LTD.
Number 172
Permission to Consult held by:

| Discipline | Sk. Reg. No. | Signature |
|---|---|---|
| Geoenvironmental | 6687 | |

Rob Dauk, Engineer-in-Training.

Ray Machibroda, P. Eng., M. Sc.

Terry Werbovetski, P. Eng.

RD:RM:TW:zz:clb

PROFESSIONAL ENGINEER
R.T. MACHIBRODA
MEMBER 6687
SASKATCHEWAN
YR. MNL DAY

## 7.0 REFERENCES

**CCME (Canadian Council of Ministers of the Environment). 2002.** Canadian Environmental Quality Guidelines. Councils of Ministers of the Environment, Winnipeg.

**OMOE (Ontario Ministry of the Environment). 1999.** Guideline for Use at Contaminated Sites in Ontario.

**Saskatchewan Environment, 2003.** Interim Criteria of BTEX and PHC Fractions for the Year 2003. Regina, Saskatchewan.

P. MACHIBRODA
ENGINEERING LTD.
CONSULTING
GEOTECHNICAL/GEOENVIRONMENTAL
ENGINEERS

# DRAWINGS


| AREA | DESCRIPTION | POTENTIAL ENVIRONMENTAL CONCERN |
|---|---|---|
| ① | FORMER ARMOURY BUILDING | METALS |
| ② | FORMER AUTO REPAIR SHOP | HYDROCARBONS & METALS |
| ③ | FORMER SERVICE STATION | HYDROCARBONS |
| ④ | FORMER BOTTLING PLANT | METALS |
| ⑤ | FILL | METALS |

NOTE:
1. THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

**LEGEND**

—PMEL TEST HOLE

—PMEL TEST HOLE (PIEZOMETER INSTALLED)

—BENCHMARK

—PROPERTY LINE


CONSULTING GEOENVIRONMENTAL GEOTECHNICAL ENGINEERS

**P. MACHIBRODA ENGINEERING LTD.**

2623 B FAITHFULL AVENUE
SASKATOON, SK


DRAWING TITLE:

## SITE PLAN - TEST HOLE LOCATIONS

PROJECT: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS SASKATOON, SK

SCALE: AS SHOWN

DRAWING NUMBER: S03-4753.2-1

DATE: AUGUST, 2003

P. MACHIBRODA ENGINEERING LTD.

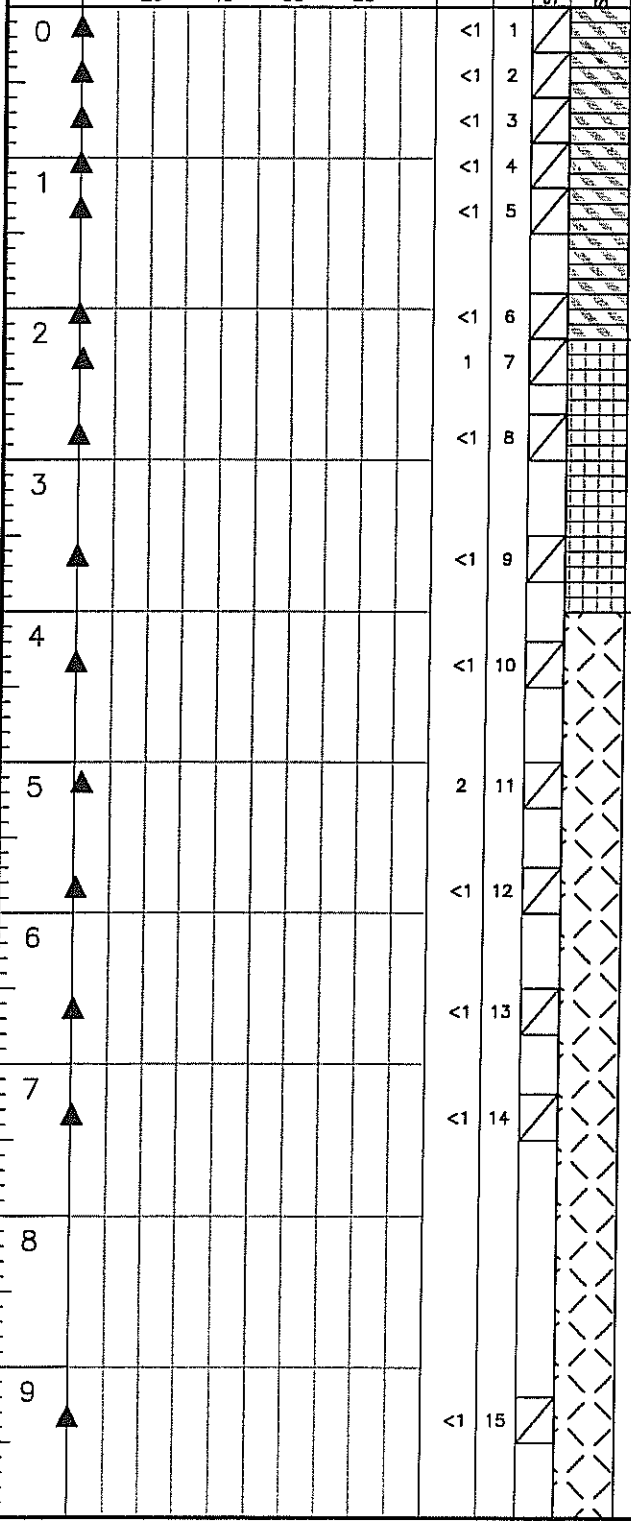
TEST HOLE NO.: 03-1
DRAWING NO.: S03-4753.2-2

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 29/03 | RD |

Ground Surface Elevation (m): 99.83
Top of Casing Elevation (m): N/A

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL




| % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION | PIEZOMETER INSTALLATION |
|---|---|---|---|---|---|
| <1 | 1 | | | **FILL,** clay, silty, some sand, trace gravel, stiff, low plastic, damp, olive brown, oxide stained. | |
| <1 | 2 | | | | |
| <1 | 3 | | | | |
| <1 | 4 | | | | |
| <1 | 5 | | | –sandy below 1.3 m.<br>–moist below 1.4 m. | |
| <1 | 6 | | | | |
| 1 | 7 | | | **FILL,** silt, sandy, some clay, trace gravel, stiff, low plastic, moist, brown, organics.<br>–asphalt concrete 2.5 to 2.8 m. | |
| <1 | 8 | | | –clayey below 3.2 m. | |
| <1 | 9 | | | –asphalt concrete 3.8 to 4.0 m.<br>–cobbles/boulders at 4.0 m. | |
| <1 | 10 | | | **GLACIAL TILL,** clay, silty, some sand, trace gravel, very stiff, medium plastic, damp, dark olive brown, oxide stained, gypsum crystals. | |
| 2 | 11 | | | –grey below 5.0 m. | |
| <1 | 12 | | | | |
| <1 | 13 | | | | |
| <1 | 14 | | | | |
| <1 | 15 | | | | |

P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-1
DRAWING NO.: S03-4753.2-2A

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 29/03 | RD |

| Ground Surface Elevation (m): | Top of Casing Elevation (m): |
|---|---|
| 99.83 | N/A |

☒ SPLIT SPOON ■ SHELBY ☒ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION | PIEZOMETER INSTALLATION |
|---|---|---|---|---|---|---|---|
| 10 | | | | | | **GLACIAL TILL,** clay, silty, some sand, trace gravel, very stiff, medium plastic, damp, dark olive brown, oxide stained, gypsum crystals. | |
| 11 | | | | | | –grey below 5.0 m. | |
| 12 | | | | | | | |
| 13 | | | | | | NOTE:<br>1. Test Hole drilled to 12.5 m and back filled.<br>2. Test Hole dry I.A.D. | |
| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |

# P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-2
DRAWING NO.: S03-4753.2-3

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

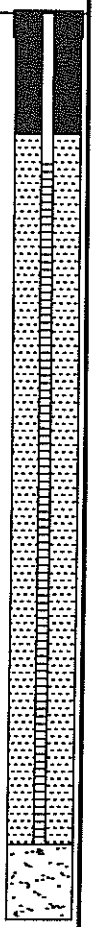
| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 29/03 | RD |

Ground Surface Elevation (m): 98.53
Top of Casing Elevation (m): 98.48

☒ SPLIT SPOON ■ SHELBY ⊘ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|
| 0 | | <1 | 13 | | | **FILL,** topsoil, silty, some sand, trace gravel, black, damp, brick pieces. |
| | | <1 | 14 | | | **FILL,** sand, loose, poorly graded, fine grained, damp, brown, sloughing. |
| | | <1 | 15 | | | |
| | | <1 | 16 | | | |
| 1 | | <1 | 17 | | | |
| | | | | | | **FILL,** clay, some silt, some sand, trace gravel, stiff, low plastic, damp, dark olive brown, oxide stained, gypsum crystals. |
| 2 | | 1 | 18 | | | |
| | | | | | | **GLACIAL TILL,** clay, some silt, some sand, trace gravel, very stiff, medium plastic, damp, dark grey, gypsum crystals. |
| | | <1 | 19 | | | |
| 3 | | | | | | |
| | | <1 | 20 | | | |
| 4 | | | | | | |
| | | <1 | 21 | | | |
| 5 | | | | | | |
| | | <1 | 22 | | | |
| | | <1 | 23 | | | |
| 6 | | | | | | NOTE:<br>1. Test Hole sloughed to 5.6 m and dry I.A.D. |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

PIEZOMETER INSTALLATION



03/08/18

LEGEND
- 50 mm ø PVC pipe
- 50 mm ø slotted PVC pipe
- bentonite seal
- clean silica sand backfill
- sloughed sand

P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-3
DRAWING NO.: S03-4753.2-4

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 29/03 | RD |

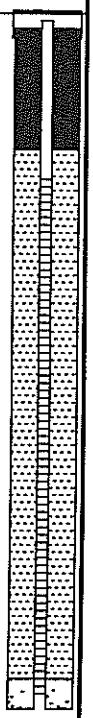
Ground Surface Elevation (m): 98.57
Top of Casing Elevation (m): N/A

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|
| 0 | | <1 | 24 | | | **FILL,** topsoil, silty, some sand, trace gravel, black, damp, brick pieces. |
| | | <1 | 25 | | | **FILL,** sand, loose, poorly graded, fine grained, damp, brown. |
| | | <1 | 26 | | | |
| 1 | | <1 | 27 | | | |
| | | <1 | 28 | | | |
| 2 | | <1 | 29 | | | **SAND,** medium dense, poorly graded, fine grained, moist, brown. |
| | | <1 | 30 | | | —wet below 2.8 m. |
| 3 | | <1 | 31 | | | **GLACIAL TILL,** clay, some silt, some sand, trace gravel, very stiff, medium plastic, damp, dark brown, gypsum crystals. |
| 4 | | <1 | 32 | | | —grey below 4.2 m. |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

NOTE:
1. Test Hole sloughed to 4.4 m and dry I.A.D.

PIEZOMETER INSTALLATION



03/08/18

LEGEND
- 50 mm ø PVC pipe
- 50 mm ø slotted PVC pipe
- bentonite seal
- clean silica sand backfill
- sloughed sand

# P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-4
DRAWING NO.: S03-4753.2-5

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 30/03 | RD |

Ground Surface Elevation (m): 100.55
Top of Casing Elevation (m): 100.44

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|
| 0 | | <1 | 33 | | | **FILL,** silt, clayey, sandy, trace gravel, stiff, low plastic, damp, brown. |
| | | <1 | 34 | | | –brown black seams. |
| | | <1 | 35 | | | |
| | | <1 | 36 | | | |
| 1 | | <1 | 37 | | | –brick, asphalt, concrete pieces 1.4 to 1.5 m. |
| | | | | | | –paper pieces at 1.5 m. |
| 2 | | <1 | 38 | | | |
| | | <1 | 39 | | | –wet below 2.9 m. |
| 3 | | <1 | 40 | | | **SAND,** silty, trace gravel, medium dense, poorly graded, fine to coarse grained, wet, brown, black organics, sloughing. |
| 4 | | <1 | 41 | | | |
| 5 | | <1 | 42 | | | |
| | | <1 | 43 | | | |
| 6 | | | | | | |
| 7 | | <1 | 44 | | | |
| | | <1 | 45 | | | **GLACIAL TILL,** clay, silty, some sand, trace gravel, very stiff, medium plastic, moist, green/grey. |
| 8 | | | | | | |
| 9 | | | | | | |

NOTE:
1. Test Hole sloughed to 5.2 m and dry I.A.D.

PIEZOMETER INSTALLATION

▼ 03/08/18

LEGEND
- 50 mm ø PVC pipe
- 50 mm ø slotted PVC pipe
- bentonite seal
- clean silica sand backfill
- sloughed sand

P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-5

DRAWING NO.: S03-4753.2-6

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS

Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 31/03 | RD |

Ground Surface Elevation (m): 103.71

Top of Casing Elevation (m): 103.67

☒ SPLIT SPOON ■ SHELBY ⧄ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|
| 0 | | <1 | 87 | | | **ASPHALT CONCRETE,** (75 mm) |
| | | <1 | 88 | | | **FILL,** sand and gravel, some silt, medium dense, well graded, fine to coarse grained, damp, brown/black, organics. |
| 1 | | <1 | 89 | | | **SAND,** some silt, medium dense, poorly graded, medium grained, damp, brown. |
| 2 | | <1 | 90 | | | —clay seam 2.2 to 2.3 m. |
| | | <1 | 91 | | | —silty, clayey below 2.3 m. |
| 3 | | <1 | 92 | | | **GLACIAL TILL,** silt, sandy, some clay, some gravel, stiff, medium plastic, moist, olive brown. —wet, seepage, gravel seam, sloughing 3.2 to 3.4 m. —clay, silty, some sand, trace gravel, very stiff, medium plastic, moist, olive brown, oxide stained below 3.4 m. |
| 4 | | <1 | 93 | | | |
| 5 | | | | | | NOTE: 1. Test Hole sloughed to 3.6 m and dry I.A.D. |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

PIEZOMETER INSTALLATION

▼ 03/08/18

LEGEND

- 50 mm ø PVC pipe
- 50 mm ø slotted PVC pipe
- bentonite seal
- clean silica sand backfill
- sloughed sand

P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-6

DRAWING NO.: S03-4753.2-7

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS

Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 31/03 | RD |

| Ground Surface Elevation (m): | Top of Casing Elevation (m): |
|---|---|
| 103.72 | N/A |

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION | PIEZOMETER INSTALLATION |
|---|---|---|---|---|---|---|---|
| 0 | | <1 | 94 | | | **ASPHALT CONCRETE,** (75 mm) | |
| | | | | | | **FILL,** sand and gravel, organics. | |
| | | <1 | 95 | | | **SAND,** some silt, medium dense, poorly graded, medium grained, moist, brown/black, organics. | |
| 1 | | <1 | 96 | | | | |
| 2 | | <1 | 97 | | | **GLACIAL TILL,** clay, silty, trace sand, trace gravel, stiff, medium plastic, moist, olive brown, oxide stained. | |
| | | | | | | –cobbles/boulders at 2.2 m. | |
| | | <1 | 98 | | | **SAND,** medium dense, poorly graded, medium grained, moist, brown, oxide stained. | |
| 3 | | | | | | –wet, seepage, sloughing below 3.2 m. | |
| | | <1 | 99 | | | | |
| 4 | | <1 | 100 | | | **GLACIAL TILL,** clay, silty, some sand, trace gravel, very stiff, medium plastic, moist, olive brown. | |
| 5 | | | | | | NOTE: 1. Test Hole sloughed to 3.2 m I.A.D. | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |

P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-7

DRAWING NO.: S03-4753.2-8

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS

Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 31/03 | RD |

Ground Surface Elevation (m): 103.92

Top of Casing Elevation (m): N/A

☒ SPLIT SPOON ■ SHELBY ⊘ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION | PIEZOMETER INSTALLATION |
|---|---|---|---|---|---|---|---|
| 0 | | <1 | 101 | | | **ASPHALT CONCRETE,** (75 mm) | |
| | | | | | | **FILL,** sand and gravel. | |
| | | <1 | 102 | | | **SAND,** medium dense, poorly graded, medium grained, damp to moist, dark brown, organics, sloughing. | |
| 1 | | <1 | 103 | | | | |
| 2 | | <1 | 104 | | | **GLACIAL TILL,** sand, silty, clayey, trace gravel, stiff, medium plastic, damp, olive brown. | |
| | | <1 | 105 | | | | |
| 3 | | <1 | 106 | | | | |
| 4 | | <1 | 107 | | | –sand lense, seepage at 4.2 m. | |
| 5 | | | | | | NOTE:<br>1. Test Hole sloughed to 4.0 m I.A.D. | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |

# P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-8
DRAWING NO.: S03-4753.2-9

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 31/03 | RD |

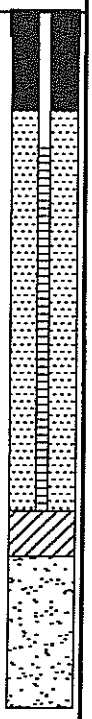
Ground Surface Elevation (m): 104.06
Top of Casing Elevation (m): 104.05

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|
| 0 | | <1 | 108 | | | **TOPSOIL,** organic, black, rootlets. |
| | | | | | | **FILL,** clay, silty, sandy, trace gravel. |
| | | <1 | 109 | | | **SAND,** silty, medium dense, poorly graded, damp, dark brown, sloughing. |
| | | <1 | 110 | | | |
| 1 | | <1 | 111 | | | **SILT,** sandy, clayey, stiff, medium plastic, moist to wet, light brown, seepage, sloughing. |
| | | | | | | ▼ 03/08/18 |
| 2 | | <1 | 112 | | | **GLACIAL TILL,** clay, sandy, silty, trace gravel, very stiff, medium plastic, moist, light olive brown. |
| | | <1 | 113 | | | |
| 3 | | | | | | —sand seam, seepage, sloughing at 3.2 m. |
| | | <1 | 114 | | | |
| 4 | | <1 | 115 | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

NOTE:
1. Test Hole sloughed to 3.6 m and dry I.A.D.

PIEZOMETER INSTALLATION



LEGEND
- 50 mm ø PVC pipe
- 50 mm ø slotted PVC pipe
- bentonite seal
- clean silica sand backfill
- sloughed sand

P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-9

DRAWING NO.: S03-4753.2-10

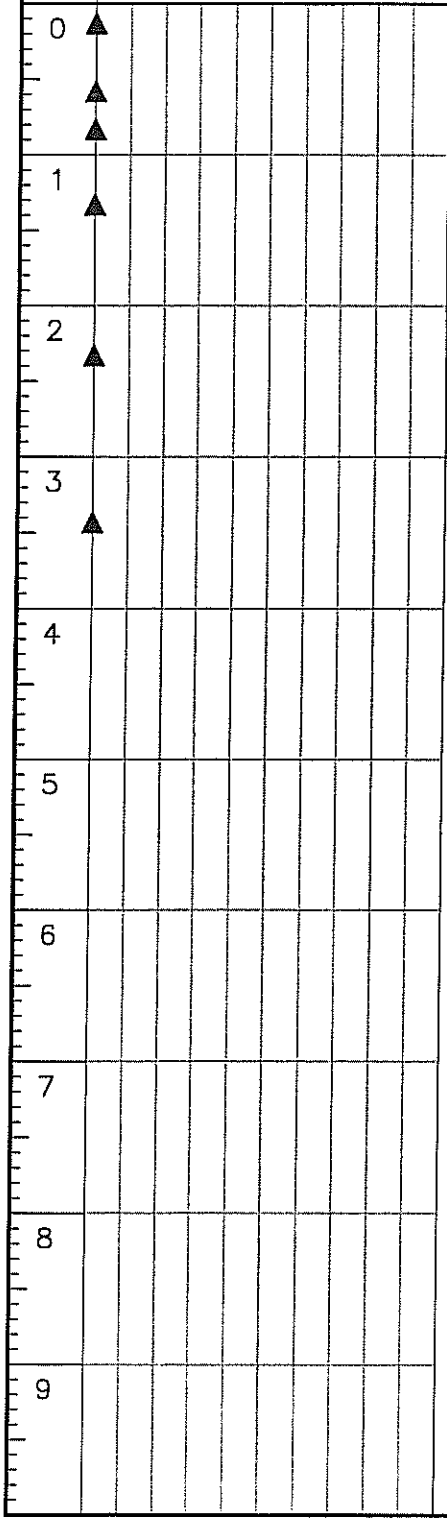
Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS

Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 31/03 | RD |

| Ground Surface Elevation (m): | Top of Casing Elevation (m): |
|---|---|
| 103.85 | N/A |

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL




| % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION | PIEZOMETER INSTALLATION |
|---|---|---|---|---|---|
| <1 | 116 | | | **TOPSOIL** | |
| <1 | 117 | | | **FILL,** silt, clayey, trace gravel, organics, rootlets, glass pieces. | |
| <1 | 118 | | | **SAND,** some silt, medium dense, poorly graded, medium grained, moist, dark brown. | |
| <1 | 119 | | | —wet, seepage, sloughing below 1.5 m. | |
| <1 | 120 | | | **GLACIAL TILL,** clay, sandy, silty, trace gravel, very stiff, medium plastic, damp, light olive brown, oxide stained. | |
| <1 | 121 | | | | |

NOTE:
1. Test Hole sloughed to 3.3 m and dry I.A.D.

P. MACHIBRODA ENGINEERING LTD.

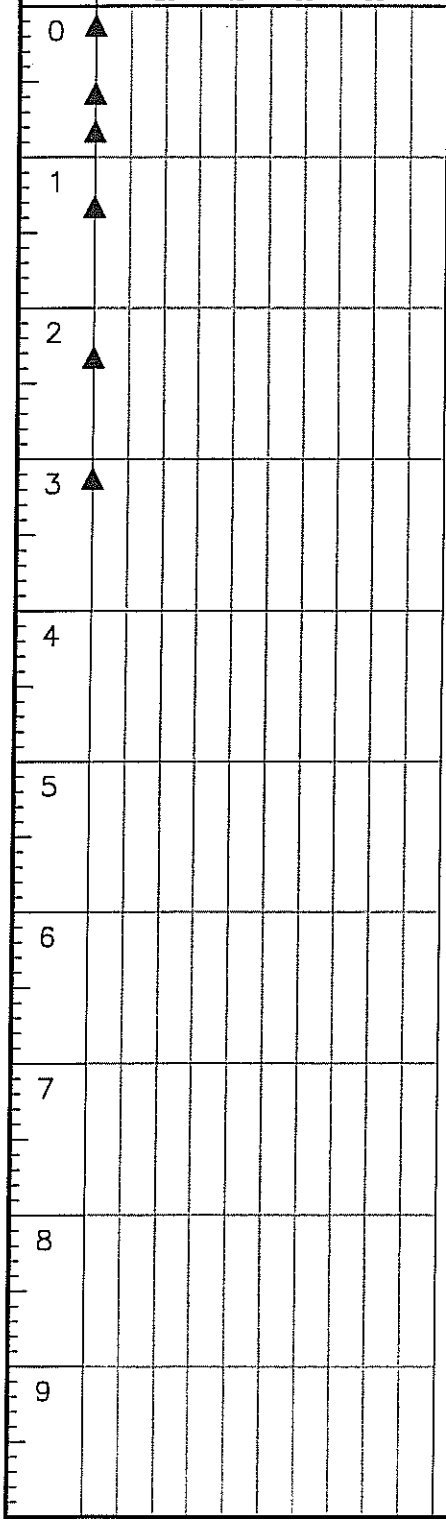
TEST HOLE NO.: 03-10
DRAWING NO.: S03-4753.2-11

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 31/03 | RD |

Ground Surface Elevation (m): 103.93
Top of Casing Elevation (m): N/A

☒ SPLIT SPOON ■ SHELBY ⊘ CUTTINGS ▼ WATER LEVEL




| % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION | PIEZOMETER INSTALLATION |
|---|---|---|---|---|---|
| <1 | 122 | | | **TOPSOIL** | |
| | | | | **SAND,** medium dense, poorly graded, medium grained, damp, dark brown, organics. | |
| <1 | 123 | | | | |
| <1 | 124 | | | | |
| <1 | 125 | | | **SILT,** sandy, clayey, firm, low plastic, moist, light olive brown. | |
| | | | | —wet, seepage, sloughing 2.0 to 2.2 m. | |
| <1 | 126 | | | **GLACIAL TILL,** clay, silty, some sand, trace gravel, very stiff, medium plastic, moist, light olive brown. | |
| <1 | 127 | | | | |

NOTE:
1. Test Hole sloughed to 2.0 m and dry I.A.D.

P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-11
DRAWING NO.: S03-4753.2-12

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 30/03 | RD |

Ground Surface Elevation (m): 105.57
Top of Casing Elevation (m): N/A

☒ SPLIT SPOON ■ SHELBY ☑ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION | PIEZOMETER INSTALLATION |
|---|---|---|---|---|---|---|---|
| 0 | | <1 | 72 | | | **ASPHALT CONCRETE** (50 mm). **FILL,** gravel, base material. | |
| | | <1 | 73 | | | **FILL,** sand, medium dense, poorly graded, medium grained, damp, brown, organics. | |
| 1 | | <1 | 74 | | | | |
| 2 | | <1 | 75 | | | | |
| | | <1 | 76 | | | **SILT,** sandy, clayey, stiff, low plastic, moist, brown. | |
| 3 | | <1 | 77 | | | —wet, seepage at 3.6 m. | |
| 4 | | <1 | 78 | | | **GLACIAL TILL,** clay, sandy, silty trace gravel, stiff, medium plastic, moist, light brown. | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |

# P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-12
DRAWING NO.: S03-4753.2-13

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 30/03 | RD |

Ground Surface Elevation (m): 105.44
Top of Casing Elevation (m): 105.37

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|
| 0 | | <1 | 79 | | | **ASPHALT CONCRETE** (75 mm). |
| | | <1 | 80 | | | **FILL,** sand, gravelly, medium dense, well graded, fine to coarse grained, moist, brown, black. |
| 1 | | <1 | 81 | | | –organics, wood pieces at 1.3 m. |
| | | <1 | 82 | | | –black, wood pieces 1.8 to 2.2 m. |
| 2 | | <1 | 83 | | | **SAND AND SILT,** medium dense, poorly graded, medium grained, wet, light brown. |
| | | <1 | 84 | | | –seepage, sloughing below 3.0 m. |
| 3 | | <1 | 85 | | | |
| 4 | | <1 | 86 | | | **GLACIAL TILL,** clay, sandy, silty, trace gravel, stiff, medium plastic, moist, light brown. –sand seam, seepage, sloughing at 3.9 m. |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

NOTE:
1. Test Hole sloughed to 3.9 m and dry I.A.D.

PIEZOMETER INSTALLATION

03/08/18

LEGEND
- 50 mm ø PVC pipe
- 50 mm ø slotted PVC pipe
- bentonite seal
- clean silica sand backfill
- sloughed sand

P. MACHIBRODA ENGINEERING LTD.

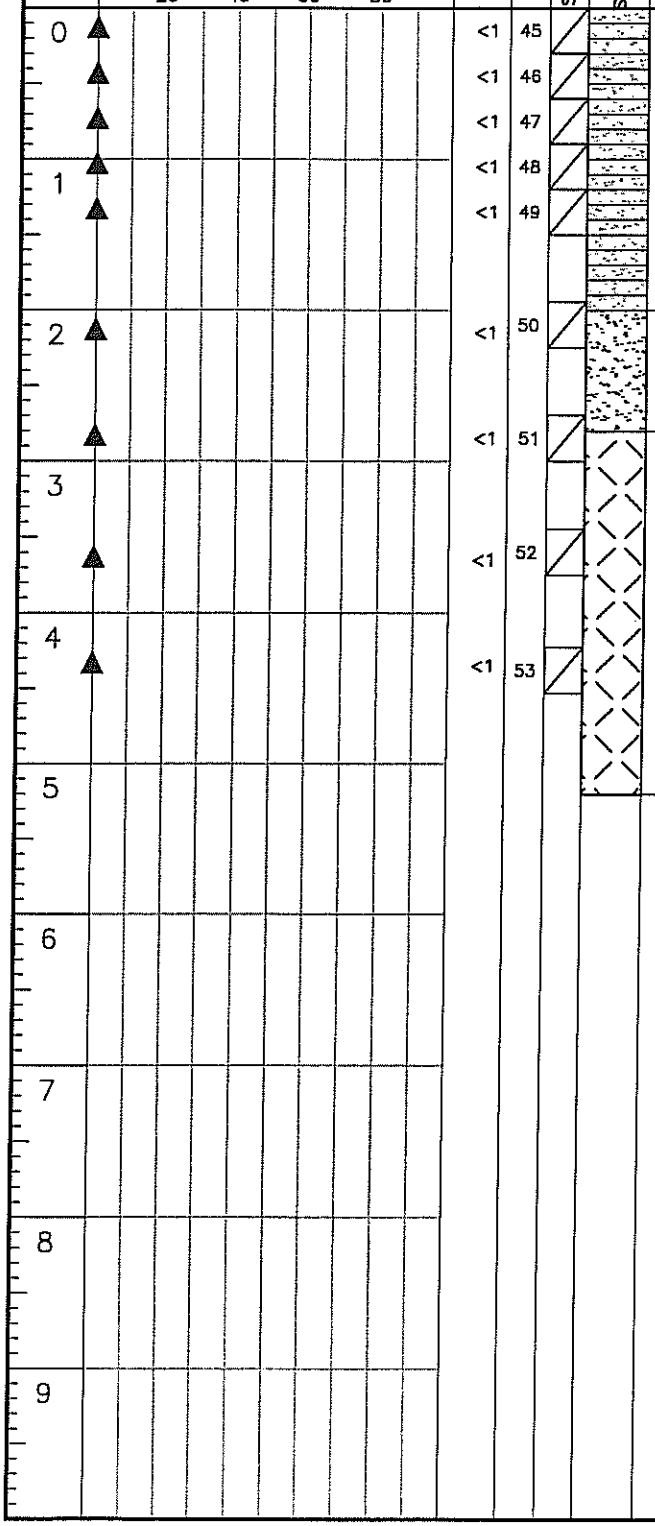
TEST HOLE NO.: 03-13
DRAWING NO.: S03-4753.2-14

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 30/03 | RD |

Ground Surface Elevation (m): 105.03
Top of Casing Elevation (m): N/A

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL




| % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION | PIEZOMETER INSTALLATION |
|---|---|---|---|---|---|
| <1 | 45 | | | **FILL,** sand, clayey, silty, trace gravel, loose, well graded, fine to coarse grained, damp, brown. | |
| <1 | 46 | | | | |
| <1 | 47 | | | –black, organics below 300 mm. | |
| <1 | 48 | | | | |
| <1 | 49 | | | | |
| <1 | 50 | | | **SAND,** silty, medium dense, poorly graded, fine grained, moist, mottled brown/grey, oxide stained. | |
| <1 | 51 | | | **GLACIAL TILL,** clay, silty, sandy, trace gravel, stiff, medium plastic, moist, olive brown, oxide stained. | |
| <1 | 52 | | | –some sand below 4.0 m. | |
| <1 | 53 | | | –grey below 5.0 m. | |

NOTE:
1. Test Hole sloughed to 5.0 m I.A.D.

P. MACHIBRODA ENGINEERING LTD.

TEST HOLE NO.: 03-14
DRAWING NO.: S03-4753.2-15

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 30/03 | RD |

Ground Surface Elevation (m): 105.16
Top of Casing Elevation (m): 105.07

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL

| DEPTH (m) | HYDROCARBON VAPOUR LEVEL (% LEL) 20 40 60 80 | % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|
| 0 | | <1 | 54 | | | **FILL,** sand, silty, loose, poorly graded, fine grained, damp, grey/black, organics. |
| | | <1 | 55 | | | |
| | | <1 | 56 | | | |
| | | <1 | 57 | | | |
| 1 | | <1 | 58 | | | —some silt, medium dense, medium grained, damp, brown, organics, topsoil below 1.3 m. |
| | | | | | | **SAND,** some silt, medium dense, poorly graded, medium grained, moist, brown. |
| 2 | | <1 | 59 | | | **CLAY,** silty, sandy, stiff, low plastic, moist, olive brown, gypsum crystals. |
| | | | 60 | | | **GLACIAL TILL,** clay, silty, sandy, trace gravel, stiff, medium plastic, moist, olive green/grey. |
| 3 | | <1 | 61 | | | **SAND,** medium dense, poorly graded, medium grained, wet, brown, seepage, sloughing. |
| | | | | | | **GLACIAL TILL,** clay, silty, sandy, trace gravel, stiff, medium plastic, moist, olive brown. |
| 4 | | <1 | 62 | | | |
| 5 | | | | | | NOTE: 1. Test Hole sloughed to 4.0 m I.A.D. |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

PIEZOMETER INSTALLATION

▼ 03/08/18

LEGEND
- 50 mm ø PVC pipe
- 50 mm ø slotted PVC pipe
- bentonite seal
- clean silica sand backfill
- sloughed sand

P. MACHIBRODA ENGINEERING LTD.

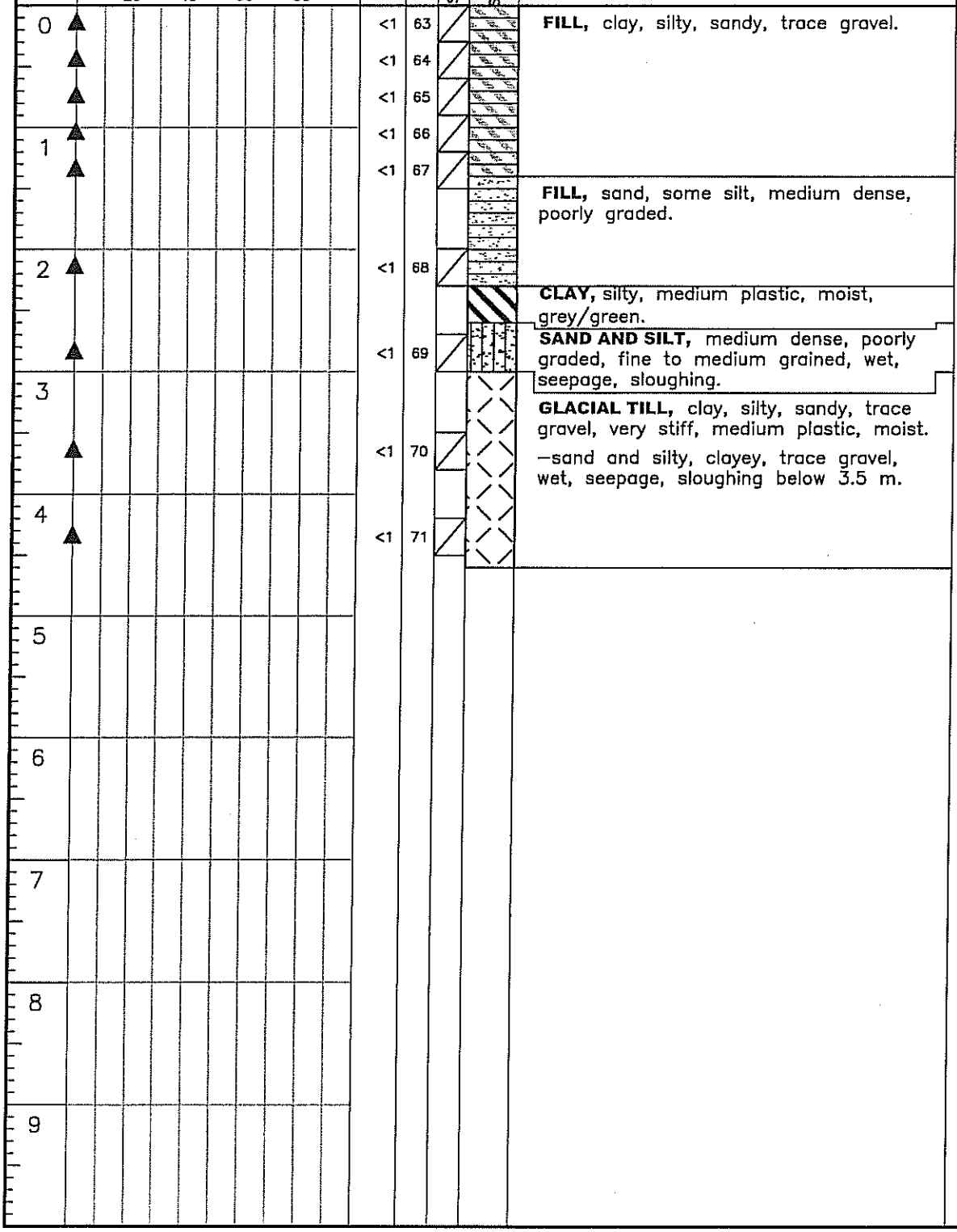
TEST HOLE NO.: 03-15
DRAWING NO.: S03-4753.2-16

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS
Location: SASKATOON, SK

| Drilling Method: | Diameter (mm): | Project No.: | Date Drilled: | Logged By: |
|---|---|---|---|---|
| Continuous Flight | 150 mm | S03-4753.2 | JULY 30/03 | RD |

Ground Surface Elevation (m): 105.11
Top of Casing Elevation (m): N/A

☒ SPLIT SPOON ■ SHELBY ▨ CUTTINGS ▼ WATER LEVEL




| % LEL | SAMPLE NO. | SAMPLE TYPE | STRATIGRAPHY | SOIL DESCRIPTION |
|---|---|---|---|---|
| <1 | 63 | | | **FILL,** clay, silty, sandy, trace gravel. |
| <1 | 64 | | | |
| <1 | 65 | | | |
| <1 | 66 | | | |
| <1 | 67 | | | |
| | | | | **FILL,** sand, some silt, medium dense, poorly graded. |
| <1 | 68 | | | |
| | | | | **CLAY,** silty, medium plastic, moist, grey/green. |
| <1 | 69 | | | **SAND AND SILT,** medium dense, poorly graded, fine to medium grained, wet, seepage, sloughing. |
| | | | | **GLACIAL TILL,** clay, silty, sandy, trace gravel, very stiff, medium plastic, moist. |
| <1 | 70 | | | —sand and silty, clayey, trace gravel, wet, seepage, sloughing below 3.5 m. |
| <1 | 71 | | | |

PIEZOMETER INSTALLATION

# GRAIN SIZE DISTRIBUTION TEST REPORT

Project: PHASE II ESA, GATHERCOLE SITE AND RIVERFRONT LANDS

Project No.: S03-4753.2

Date Tested: AUGUST 12, 2003

Test Hole No.: 03-12

Sample No.: 83

Depth (m): 2.3

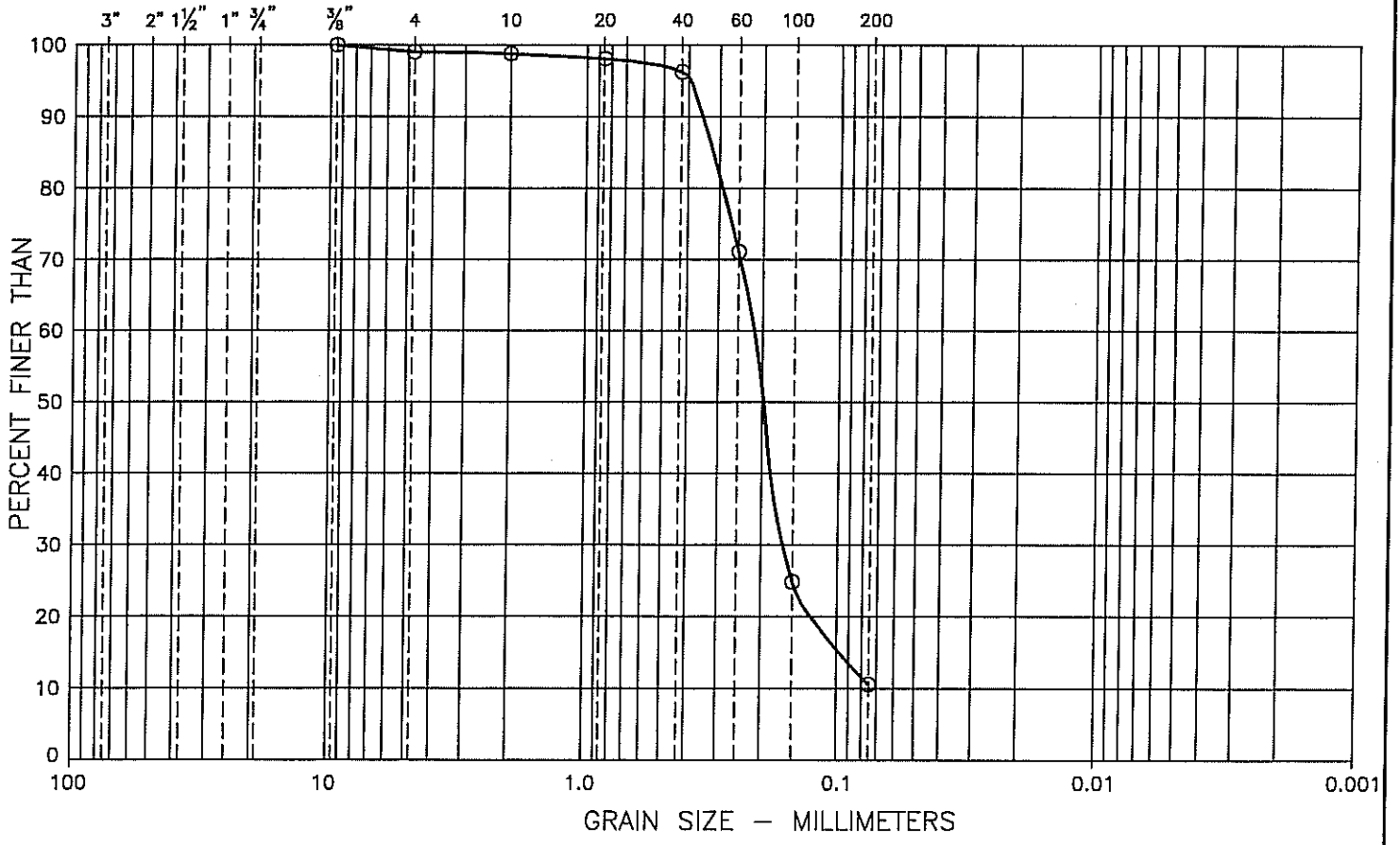
Remarks:

| SIEVE SIZE | PERCENT PASSING |
|---|---|
| No. 4 | 99.1 |
| No. 10 | 98.8 |
| No. 20 | 98.1 |
| No. 40 | 96.3 |
| No. 60 | 71.1 |
| No. 100 | 24.9 |
| No. 200 | 10.6 |

Material Description

| % Gravel Sizes | % Sand Sizes | % Silt and Clay Sizes |
|---|---|---|
| 1 | 88 | 11 |

| GRAVEL SIZES | | SAND SIZES | | | SILT AND CLAY SIZES |
|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | |
| INCHES | | SIEVE SIZES | | | |




P. MACHIBRODA ENGINEERING LTD.

DRAWING NO.

S03-4753.2-17

# APPENDIX A

Laboratory Reports

ETL Enviro-Test
LABORATORIES
A DIVISION OF *ETL CHEMSPEC ANALYTICAL LIMITED*

## ANALYTICAL REPORT

P.MACHIBRODA ENGINEERING LTD
ATTN: RAY MACHIBRODA
2623 B FAITHFULL AVENUE
SASKATOON SK S7K 5W2

DATE: 08-AUG-03 05:01 PM

**Lab Work Order #:** L122959 **Sampled By:** **Date Received:** 01-AUG-03

**P.O. #:**

**Job #:** 4753.2

**Comments:**

RECEIVED
AUG 21 RECD
Ans'd

**APPROVED BY:**

KAREN BONNIE MALANOWICH
**Project Manager**



LABORATORY ACCREDITATIONS:
- STANDARDS COUNCIL OF CANADA IN COOPERATION WITH THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL) FOR SPECIFIC TESTS AS REGISTERED BY THE COUNCIL (EDMONTON, CALGARY, GRANDE PRAIRIE, SASKATOON, WINNIPEG, THUNDER BAY, WATERLOO)
- AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA) IN THE INDUSTRIAL HYGIENE PROGRAM (EDMONTON, WINNIPEG)
- STANDARDS COUNCIL OF CANADA IN COOPERATION WITH THE CANADIAN FOOD INSPECTION AGENCY (CFIA) FOR FERTILIZER AND FEED TESTING (SASKATOON) AND FOR MICROBIOLOGICAL TESTING IN FOOD (WINNIPEG)

LABORATORY RECOGNITIONS:
- STANDARDS COUNCIL OF CANADA - GLP COMPLIANT FACILITY (EDMONTON, OTTAWA)

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L122959-3 45,54,63 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **Metals in Soil - CCME List** | | | | | | | | |
| Barium (Ba) | 163 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Beryllium (Be) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cadmium (Cd) | <0.5 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cobalt (Co) | 4 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Chromium (Cr) | 8.7 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Copper (Cu) | 11 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Mercury (Hg) | <0.05 | | 0.05 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Molybdenum (Mo) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Nickel (Ni) | 11 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Lead (Pb) | 36 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Antimony (Sb) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Selenium (Se) | 0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Tin (Sn) | <5 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Thallium (Tl) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Uranium (U) | <40 | | 40 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Vanadium (V) | 14 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Zinc (Zn) | 40 | | 10 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| L122959-4 46,55,64 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **Metals in Soil - CCME List** | | | | | | | | |
| Silver (Ag) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Arsenic (As) | 3.6 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Barium (Ba) | 82 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Beryllium (Be) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cadmium (Cd) | <0.5 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cobalt (Co) | 3 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Chromium (Cr) | 6.0 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Copper (Cu) | 4 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Mercury (Hg) | <0.05 | | 0.05 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Molybdenum (Mo) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Nickel (Ni) | 7 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Lead (Pb) | 12 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Antimony (Sb) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Selenium (Se) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Tin (Sn) | <5 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Thallium (Tl) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Uranium (U) | <40 | | 40 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Vanadium (V) | 9 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Zinc (Zn) | 30 | | 10 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| L122959-5 82 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **Metals in Soil - CCME List** | | | | | | | | |
| Silver (Ag) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Arsenic (As) | 4.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Barium (Ba) | 158 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Beryllium (Be) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L122959-5 82 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **Metals in Soil - CCME List** | | | | | | | | |
| Cadmium (Cd) | <0.5 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cobalt (Co) | 4 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Chromium (Cr) | 7.3 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Copper (Cu) | 10 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Mercury (Hg) | <0.05 | | 0.05 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Molybdenum (Mo) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Nickel (Ni) | 9 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Lead (Pb) | 79 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Antimony (Sb) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Selenium (Se) | 0.3 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Tin (Sn) | <5 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Thallium (Tl) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Uranium (U) | <40 | | 40 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Vanadium (V) | 13 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Zinc (Zn) | 70 | | 10 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| L122959-6 73,80 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **Metals in Soil - CCME List** | | | | | | | | |
| Silver (Ag) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Arsenic (As) | 4.1 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Barium (Ba) | 127 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Beryllium (Be) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cadmium (Cd) | <0.5 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cobalt (Co) | 4 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Chromium (Cr) | 6.3 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Copper (Cu) | 6 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Mercury (Hg) | <0.05 | | 0.05 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Molybdenum (Mo) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Nickel (Ni) | 9 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Lead (Pb) | 15 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Antimony (Sb) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Selenium (Se) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Tin (Sn) | <5 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Thallium (Tl) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Uranium (U) | <40 | | 40 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Vanadium (V) | 12 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Zinc (Zn) | 30 | | 10 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| L122959-7 87,94,101 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **Metals in Soil - CCME List** | | | | | | | | |
| Silver (Ag) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Arsenic (As) | 3.5 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Barium (Ba) | 124 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Beryllium (Be) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cadmium (Cd) | <0.5 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cobalt (Co) | 3 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L122959-7 87,94,101 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **Metals in Soil - CCME List** | | | | | | | | |
| Chromium (Cr) | 6.4 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Copper (Cu) | 7 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Mercury (Hg) | <0.05 | | 0.05 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Molybdenum (Mo) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Nickel (Ni) | 9 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Lead (Pb) | 24 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Antimony (Sb) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Selenium (Se) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Tin (Sn) | <5 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Thallium (Tl) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Uranium (U) | <40 | | 40 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Vanadium (V) | 12 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Zinc (Zn) | 30 | | 10 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| L122959-8 116,117 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **Metals in Soil - CCME List** | | | | | | | | |
| Silver (Ag) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Arsenic (As) | 4.0 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Barium (Ba) | 114 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Beryllium (Be) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cadmium (Cd) | <0.5 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Cobalt (Co) | 4 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Chromium (Cr) | 8.0 | | 0.5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Copper (Cu) | 8 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Mercury (Hg) | <0.05 | | 0.05 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Molybdenum (Mo) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Nickel (Ni) | 10 | | 2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Lead (Pb) | 22 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Antimony (Sb) | <0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Selenium (Se) | 0.2 | | 0.2 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Tin (Sn) | <5 | | 5 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Thallium (Tl) | <1 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Uranium (U) | <40 | | 40 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Vanadium (V) | 14 | | 1 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| Zinc (Zn) | 60 | | 10 | mg/kg | | 06-AUG-03 | ZG | R136258 |
| L122959-9 TH12 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **CCME TVHs and TEHs** | | | | | | | | |
| **CCME Total Hydrocarbons** | | | | | | | | |
| F1 (C6-C10) | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F1-BTEX | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F2 (C10-C16) | 11 | | 5 | mg/kg | | 08-AUG-03 | | |
| F3 (C16-C34) | 440 | | 5 | mg/kg | | 08-AUG-03 | | |
| F4 (C34-C50) | 540 | | 5 | mg/kg | | 08-AUG-03 | | |
| Total Hydrocarbons (C6-C50) | 990 | | 5 | mg/kg | | 08-AUG-03 | | |
| Chromatogram to baseline at nC50 | Yes | | | | | 08-AUG-03 | | |
| **CCME Total Extractable Hydrocarbons** | | | | | | | | |

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L122959-9 TH12 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **CCME TVHs and TEHs** | | | | | | | | |
| **CCME Total Extractable Hydrocarbons** | | | | | | | | |
| Prep/Analysis Dates | | | | | 06-AUG-03 | 06-AUG-03 | IGH | R136441 |
| **CCME BTEX** | | | | | | | | |
| Benzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Toluene | 0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Ethylbenzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Xylenes | 0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| % Moisture | 8.7 | | 0.1 | % | 05-AUG-03 | 05-AUG-03 | WAS | R136141 |
| Lead (Pb) | 48 | | 5 | mg/kg | 07-AUG-03 | 07-AUG-03 | BEM | R136455 |
| L122959-10 TH5 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **CCME TVHs and TEHs** | | | | | | | | |
| **CCME Total Hydrocarbons** | | | | | | | | |
| F1 (C6-C10) | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F1-BTEX | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F2 (C10-C16) | 6 | | 5 | mg/kg | | 08-AUG-03 | | |
| F3 (C16-C34) | 8 | | 5 | mg/kg | | 08-AUG-03 | | |
| F4 (C34-C50) | 43 | | 5 | mg/kg | | 08-AUG-03 | | |
| Total Hydrocarbons (C6-C50) | 57 | | 5 | mg/kg | | 08-AUG-03 | | |
| Chromatogram to baseline at nC50 | Yes | | | | | 08-AUG-03 | | |
| **CCME Total Extractable Hydrocarbons** | | | | | | | | |
| Prep/Analysis Dates | | | | | 06-AUG-03 | 06-AUG-03 | IGH | R136441 |
| **CCME BTEX** | | | | | | | | |
| Benzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Toluene | 0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Ethylbenzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Xylenes | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| % Moisture | 17 | | 0.1 | % | 05-AUG-03 | 05-AUG-03 | WAS | R136141 |
| Lead (Pb) | 6 | | 5 | mg/kg | 07-AUG-03 | 07-AUG-03 | BEM | R136455 |
| L122959-11 TH10 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **CCME TVHs and TEHs** | | | | | | | | |
| **CCME Total Hydrocarbons** | | | | | | | | |
| F1 (C6-C10) | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F1-BTEX | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F2 (C10-C16) | 5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F3 (C16-C34) | 79 | | 5 | mg/kg | | 08-AUG-03 | | |
| F4 (C34-C50) | 19 | | 5 | mg/kg | | 08-AUG-03 | | |
| Total Hydrocarbons (C6-C50) | 100 | | 5 | mg/kg | | 08-AUG-03 | | |
| Chromatogram to baseline at nC50 | Yes | | | | | 08-AUG-03 | | |
| **CCME Total Extractable Hydrocarbons** | | | | | | | | |
| Prep/Analysis Dates | | | | | 06-AUG-03 | 06-AUG-03 | IGH | R136441 |
| **CCME BTEX** | | | | | | | | |
| Benzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Toluene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Ethylbenzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Xylenes | 0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L122959-11 TH10 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| % Moisture | 11 | | 0.1 | % | 05-AUG-03 | 05-AUG-03 | WAS | R136141 |
| Lead (Pb) | <5 | | 5 | mg/kg | 07-AUG-03 | 07-AUG-03 | BEM | R136455 |
| L122959-12 TH8 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **CCME TVHs and TEHs** | | | | | | | | |
| **CCME Total Hydrocarbons** | | | | | | | | |
| F1 (C6-C10) | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F1-BTEX | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F2 (C10-C16) | 6 | | 5 | mg/kg | | 08-AUG-03 | | |
| F3 (C16-C34) | 48 | | 5 | mg/kg | | 08-AUG-03 | | |
| F4 (C34-C50) | 16 | | 5 | mg/kg | | 08-AUG-03 | | |
| Total Hydrocarbons (C6-C50) | 70 | | 5 | mg/kg | | 08-AUG-03 | | |
| Chromatogram to baseline at nC50 | Yes | | | | | 08-AUG-03 | | |
| **CCME Total Extractable Hydrocarbons** | | | | | | | | |
| Prep/Analysis Dates | | | | | 06-AUG-03 | 06-AUG-03 | IGH | R136441 |
| **CCME BTEX** | | | | | | | | |
| Benzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Toluene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Ethylbenzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Xylenes | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| % Moisture | 15 | | 0.1 | % | 05-AUG-03 | 05-AUG-03 | WAS | R136141 |
| Lead (Pb) | 7 | | 5 | mg/kg | 07-AUG-03 | 07-AUG-03 | BEM | R136455 |
| L122959-13 TH1 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **CCME TVHs and TEHs** | | | | | | | | |
| **CCME Total Hydrocarbons** | | | | | | | | |
| F1 (C6-C10) | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F1-BTEX | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F2 (C10-C16) | 6 | | 5 | mg/kg | | 08-AUG-03 | | |
| F3 (C16-C34) | 13 | | 5 | mg/kg | | 08-AUG-03 | | |
| F4 (C34-C50) | 21 | | 5 | mg/kg | | 08-AUG-03 | | |
| Total Hydrocarbons (C6-C50) | 40 | | 5 | mg/kg | | 08-AUG-03 | | |
| Chromatogram to baseline at nC50 | Yes | | | | | 08-AUG-03 | | |
| **CCME Total Extractable Hydrocarbons** | | | | | | | | |
| Prep/Analysis Dates | | | | | 06-AUG-03 | 06-AUG-03 | IGH | R136441 |
| **CCME BTEX** | | | | | | | | |
| Benzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Toluene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Ethylbenzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Xylenes | 0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| % Moisture | 12 | | 0.1 | % | 05-AUG-03 | 05-AUG-03 | WAS | R136141 |
| Lead (Pb) | 6 | | 5 | mg/kg | 07-AUG-03 | 07-AUG-03 | BEM | R136455 |
| L122959-14 TH14 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **CCME TVHs and TEHs** | | | | | | | | |
| **CCME Total Hydrocarbons** | | | | | | | | |

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L122959-14 TH14 | | | | | | | | |
| Sample Date: | | | | | | | | |
| Matrix: SIL | | | | | | | | |
| **CCME TVHs and TEHs** | | | | | | | | |
| **CCME Total Hydrocarbons** | | | | | | | | |
| F1 (C6-C10) | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F1-BTEX | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F2 (C10-C16) | 6 | | 5 | mg/kg | | 08-AUG-03 | | |
| F3 (C16-C34) | <5 | | 5 | mg/kg | | 08-AUG-03 | | |
| F4 (C34-C50) | 6 | | 5 | mg/kg | | 08-AUG-03 | | |
| Total Hydrocarbons (C6-C50) | 12 | | 5 | mg/kg | | 08-AUG-03 | | |
| Chromatogram to baseline at nC50 | Yes | | | | | 08-AUG-03 | | |
| **CCME Total Extractable Hydrocarbons** | | | | | | | | |
| Prep/Analysis Dates | | | | | 06-AUG-03 | 06-AUG-03 | IGH | R136441 |
| **CCME BTEX** | | | | | | | | |
| Benzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Toluene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Ethylbenzene | <0.01 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| Xylenes | 0.03 | | 0.01 | mg/kg | 07-AUG-03 | 07-AUG-03 | IGH | R136729 |
| % Moisture | 12 | | 0.1 | % | 05-AUG-03 | 05-AUG-03 | WAS | R136141 |
| Lead (Pb) | <5 | | 5 | mg/kg | 07-AUG-03 | 07-AUG-03 | BEM | R136455 |

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

# Reference Information

**Methods Listed (if applicable):**

| ETL Test Code | Matrix | Test Description | Preparation Method Reference(Based On) | Analytical Method Reference(Based On) |
|---|---|---|---|---|
| ETL-BTX,TVH-CCME-SK | Soil | CCME BTEX | | CCME CWS-PHC Dec-2000 - Pub# 1310 |
| ETL-TEH-CCME-SK | Soil | CCME Total Extractable Hydrocarbons | | CCME CWS-PHC Dec-2000 - Pub# 1310 |
| METAL-CCME-ED | Soil | Metals in Soil - CCME List | EPA 3050 | EPA 6020 |
| PB-MUST-SK | Soil | Lead (Pb) | | SW846/3050/6010B |
| PREP-MOISTURE-SK | Soil | % Moisture | | Oven dry 105C-Gravimetric |

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

L122959

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

| Laboratory Definition Code | Laboratory Location | Laboratory Definition Code | Laboratory Location |
|---|---|---|---|
| ED | Enviro-Test Laboratories - Edmonton, Alberta, Canada | SK | Enviro-Test Laboratories - Saskatoon, Saskatchewan, Canada |

*GLOSSARY OF REPORT TERMS*
*Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds. The reported surrogate recovery value provides a measure of method efficiency. The Laboratory warning units are determined under column heading D.L.*
*mg/kg (units) - unit of concentration based on mass, parts per million*
*mg/L (units) - unit of concentration based on volume, parts per million*
*< - Less than*
*D.L. - Detection Limit*
*N/A - Result not available. Refer to qualifier code and definition for explanation*

*Test results reported relate only to the samples as received by the laboratory.*
*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*
*UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.*
*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.*

*Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.*

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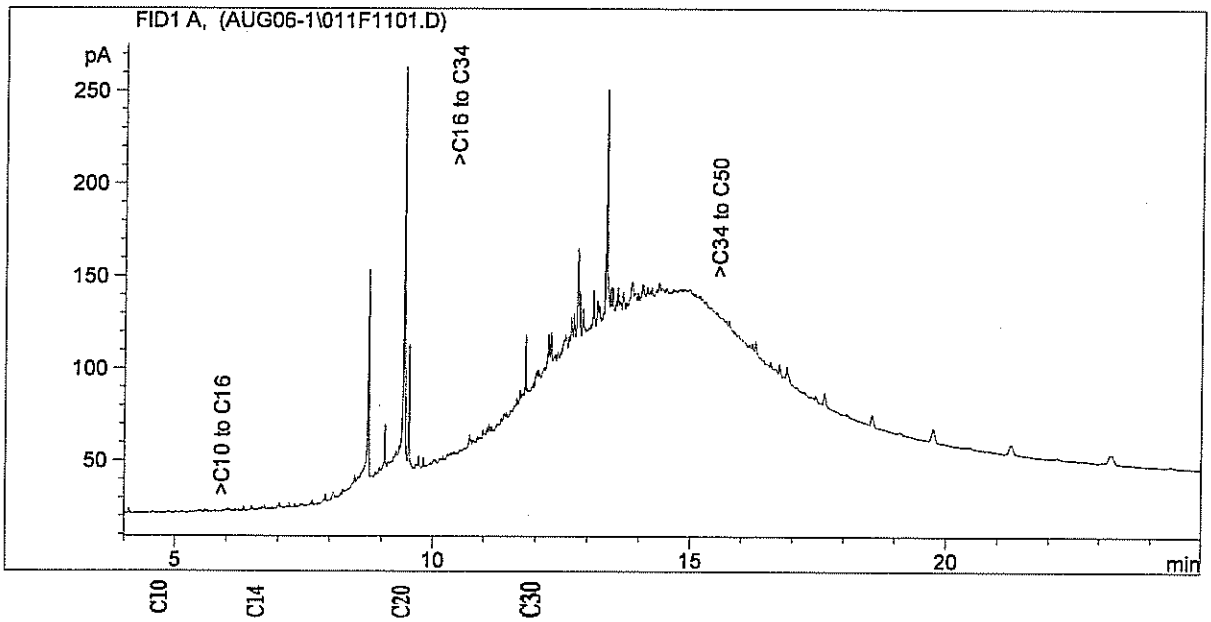
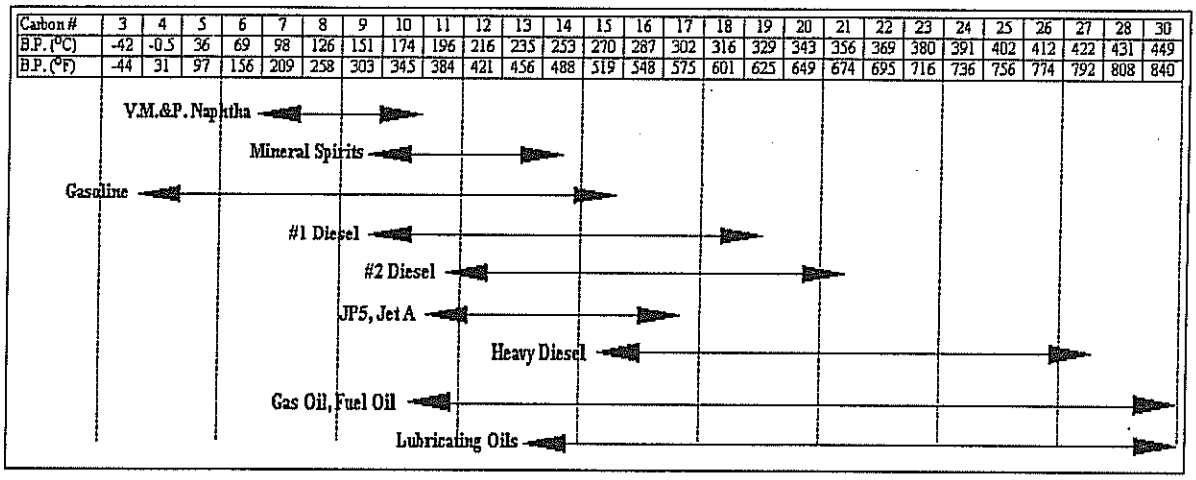
Client ID: TH12

Sample ID: L122959-9
Injection Date: 8/7/03 2:34:22 AM
Injection Time: 8/7/03 2:34:22 AM
Instrument ID: GC1
Operator:



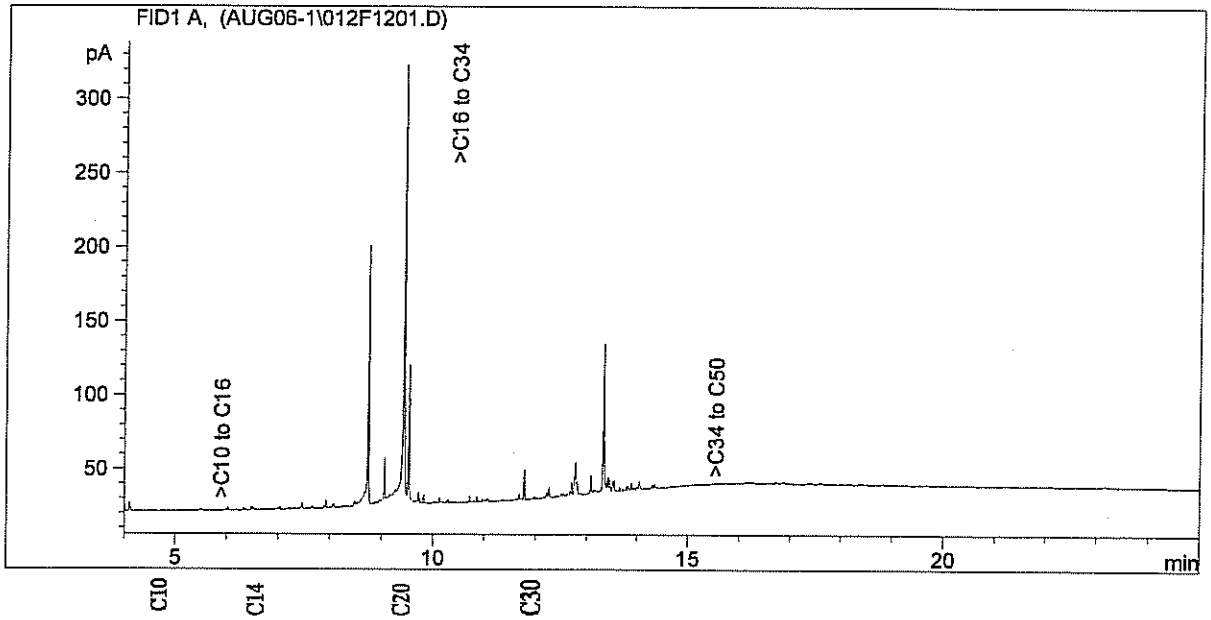




## Boiling Point Distribution Range for Petroleum Based Fuel Products

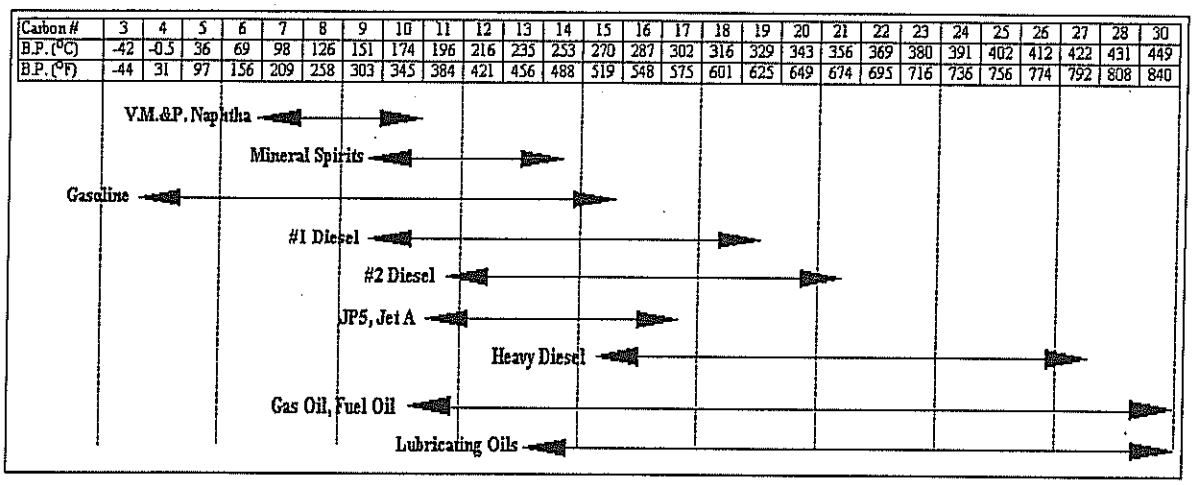
Adapted from: Drews, A.W.., ED; Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadephia, PA, 1989: p XVIII

Client ID: TH5

Sample ID: L122959-10
Injection Date: 8/7/03 3:24:33 AM
Injection Time: 8/7/03 3:24:33 AM
Instrument ID: GC1
Operator:




| Carbon # | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.P. (°C) | -42 | -0.5 | 36 | 69 | 98 | 126 | 151 | 174 | 196 | 216 | 235 | 253 | 270 | 287 | 302 | 316 | 329 | 343 | 356 | 369 | 380 | 391 | 402 | 412 | 422 | 431 | 449 |
| B.P. (°F) | -44 | 31 | 97 | 156 | 209 | 258 | 303 | 345 | 384 | 421 | 456 | 488 | 519 | 548 | 575 | 601 | 625 | 649 | 674 | 695 | 716 | 736 | 756 | 774 | 792 | 808 | 840 |

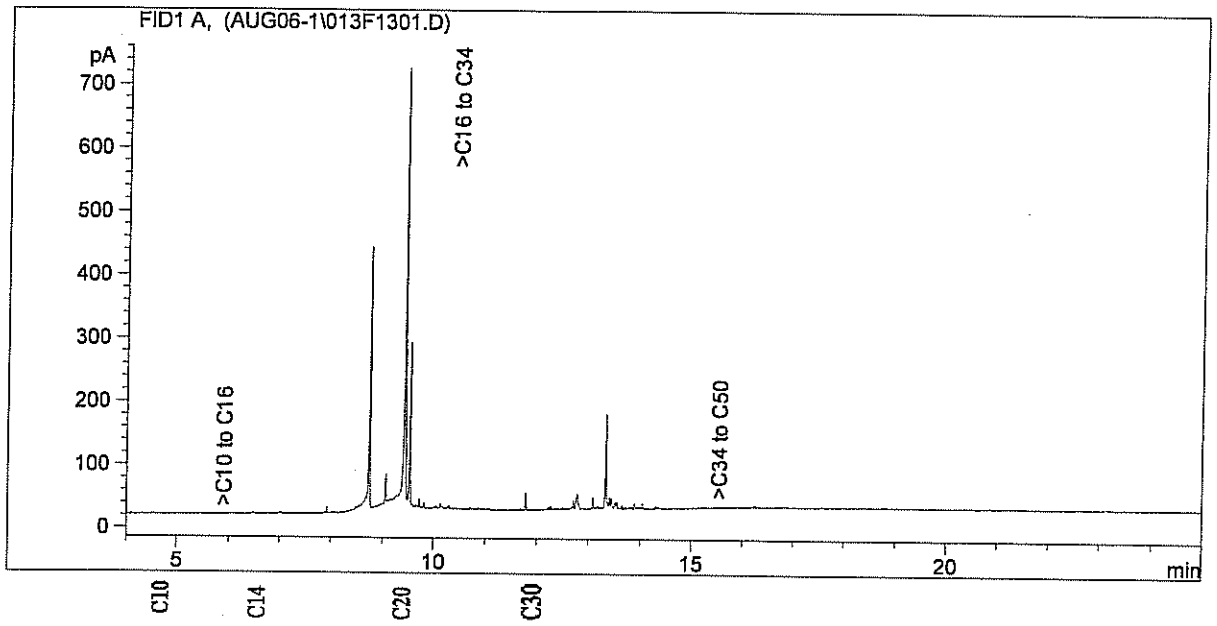



## Boiling Point Distribution Range for Petroleum Based Fuel Products

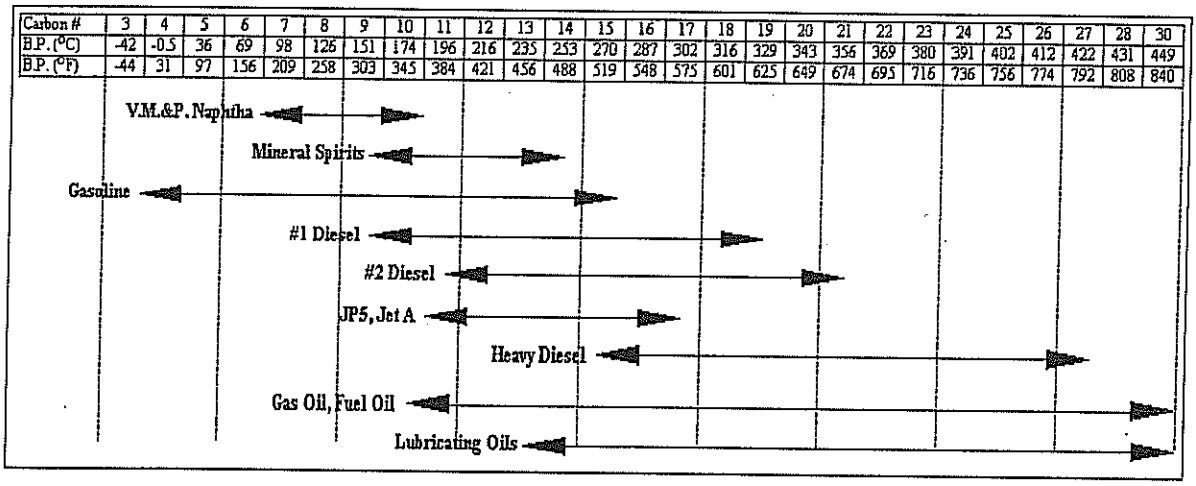
Adapted from: Drews, A.W.., ED; Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadephia, PA, 1989: p XVIII

Client ID: TH10

Sample ID: L122959-11
Injection Date: 8/7/03 4:14:36 AM
Injection Time: 8/7/03 4:14:36 AM
Instrument ID: GC1
Operator:




| Carbon # | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.P. (°C) | -42 | -0.5 | 36 | 69 | 98 | 126 | 151 | 174 | 196 | 216 | 235 | 253 | 270 | 287 | 302 | 316 | 329 | 343 | 356 | 369 | 380 | 391 | 402 | 412 | 422 | 431 | 449 |
| B.P. (°F) | -44 | 31 | 97 | 156 | 209 | 258 | 303 | 345 | 384 | 421 | 456 | 488 | 519 | 548 | 575 | 601 | 625 | 649 | 674 | 695 | 716 | 736 | 756 | 774 | 792 | 808 | 840 |




## Boiling Point Distribution Range for Petroleum Based Fuel Products

Adapted from: Drews, A.W.., ED; Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadephia, PA, 1989: p XVIII

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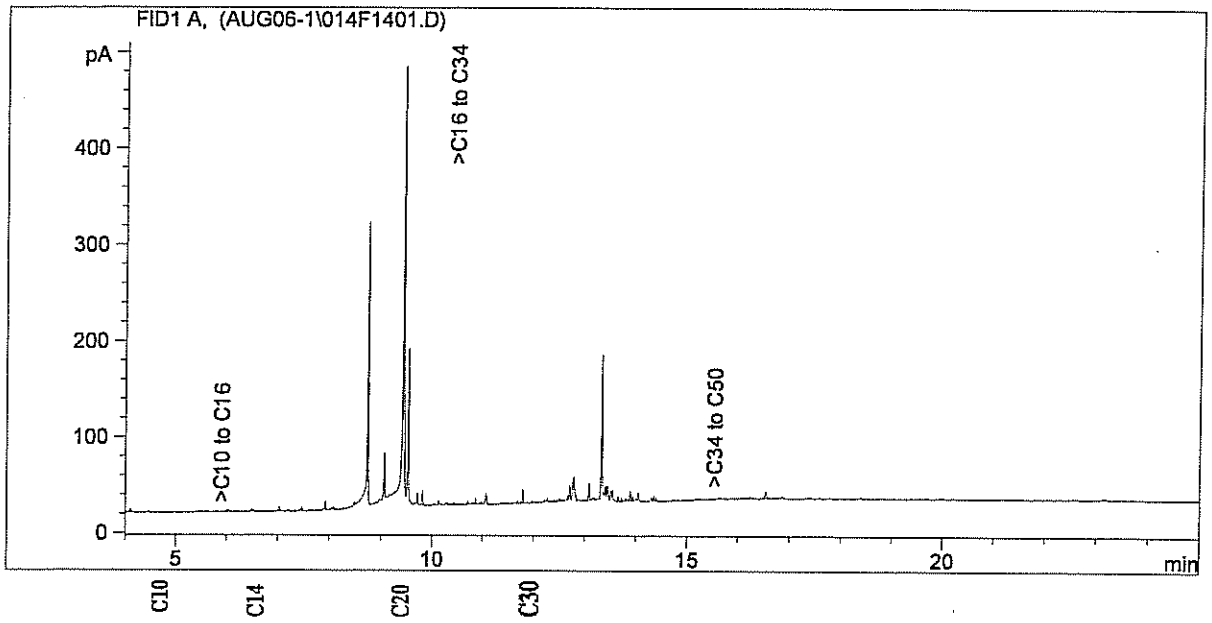
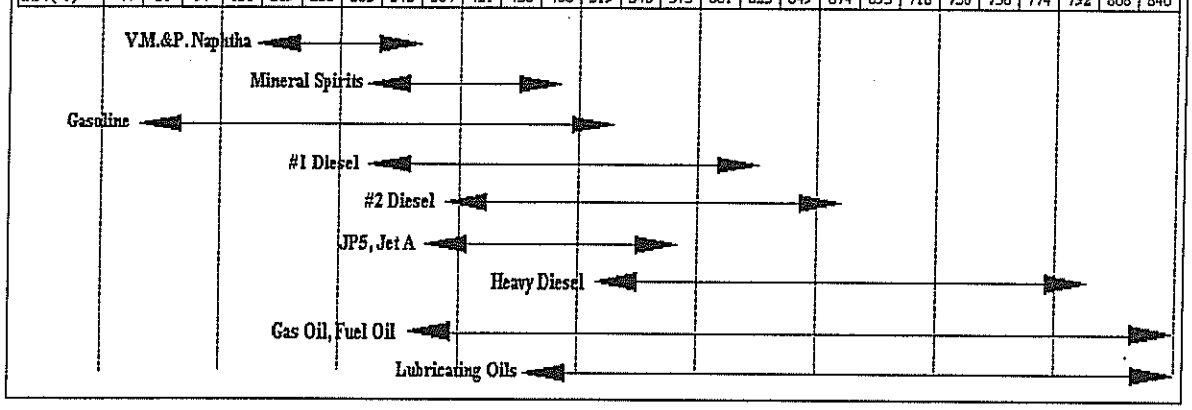
Client ID: TH8

Sample ID: L122959-12
Injection Date: 8/7/03 5:04:36 AM
Injection Time: 8/7/03 5:04:36 AM
Instrument ID: GC1
Operator:




| Carbon # | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.P. (°C) | -42 | -0.5 | 36 | 69 | 98 | 126 | 151 | 174 | 196 | 216 | 235 | 253 | 270 | 287 | 302 | 316 | 329 | 343 | 356 | 369 | 380 | 391 | 402 | 412 | 422 | 431 | 449 |
| B.P. (°F) | -44 | 31 | 97 | 156 | 209 | 258 | 303 | 345 | 384 | 421 | 456 | 488 | 519 | 548 | 575 | 601 | 625 | 649 | 674 | 695 | 716 | 736 | 756 | 774 | 792 | 808 | 840 |

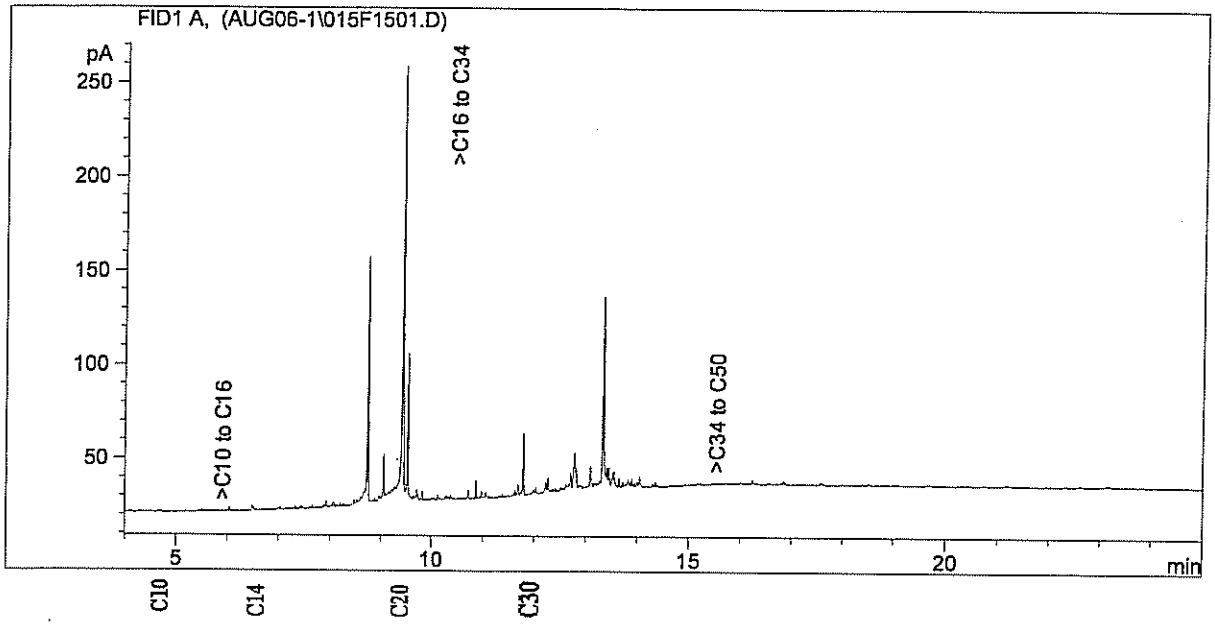



## Boiling Point Distribution Range for Petroleum Based Fuel Products

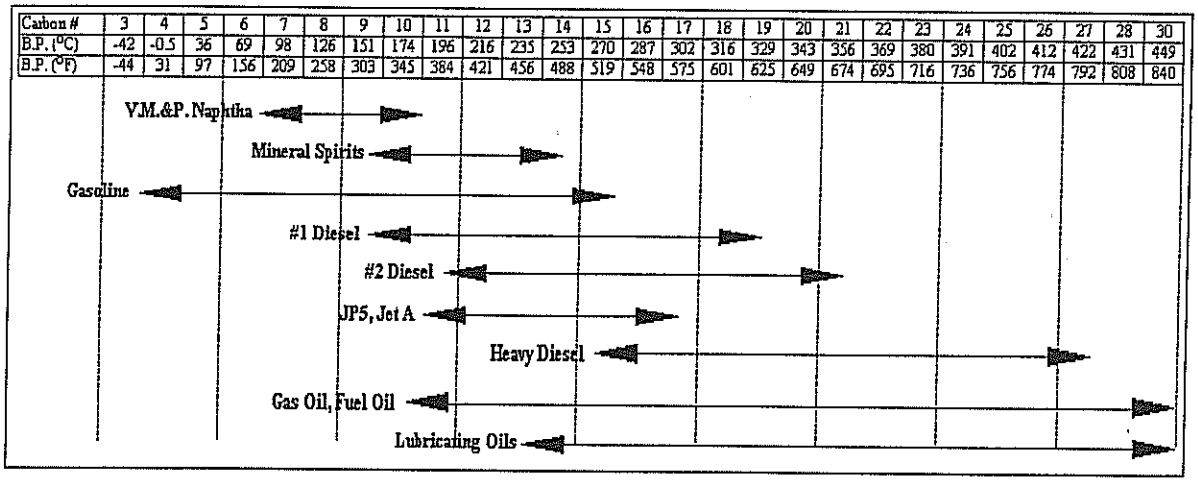
Adapted from: Drews, A.W.., ED; Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadephia, PA, 1989: p XVIII

Client ID: TH1

Sample ID: L122959-13
Injection Date: 8/7/03 5:54:45 AM
Injection Time: 8/7/03 5:54:45 AM
Instrument ID: GC1
Operator:




| Carbon # | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.P. (°C) | -42 | -0.5 | 36 | 69 | 98 | 126 | 151 | 174 | 196 | 216 | 235 | 253 | 270 | 287 | 302 | 316 | 329 | 343 | 356 | 369 | 380 | 391 | 402 | 412 | 422 | 431 | 449 |
| B.P. (°F) | -44 | 31 | 97 | 156 | 209 | 258 | 303 | 345 | 384 | 421 | 456 | 488 | 519 | 548 | 575 | 601 | 625 | 649 | 674 | 695 | 716 | 736 | 756 | 774 | 792 | 808 | 840 |



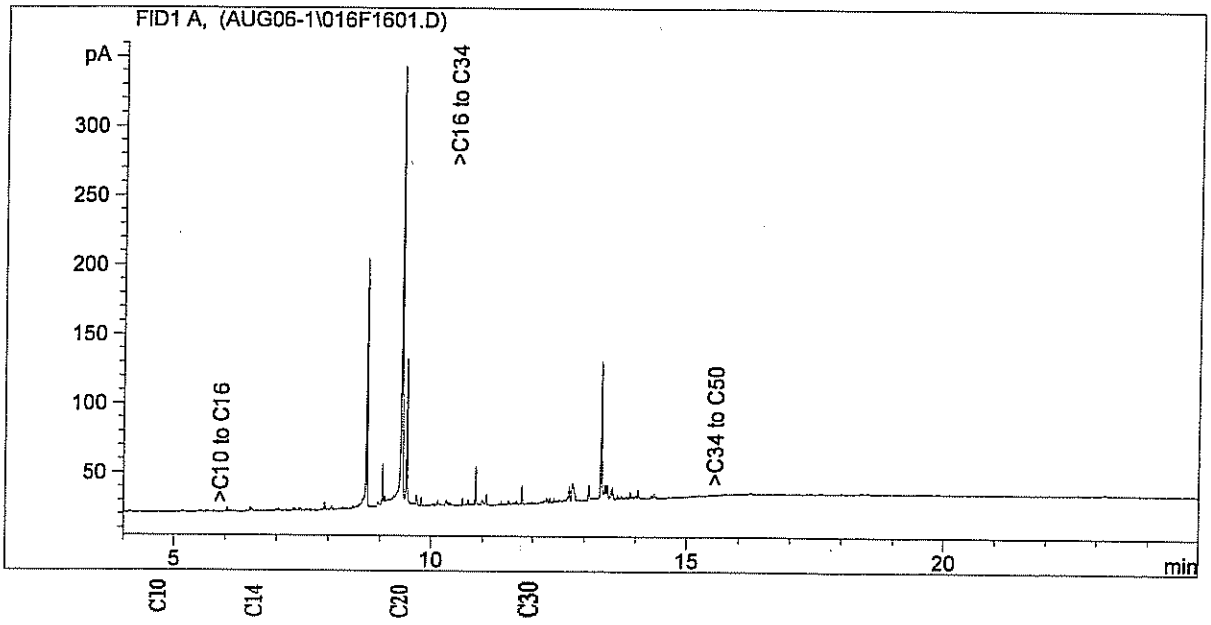

## Boiling Point Distribution Range for Petroleum Based Fuel Products

Adapted from: Drews, A.W.., ED; Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadephia, PA, 1989: p XVIII

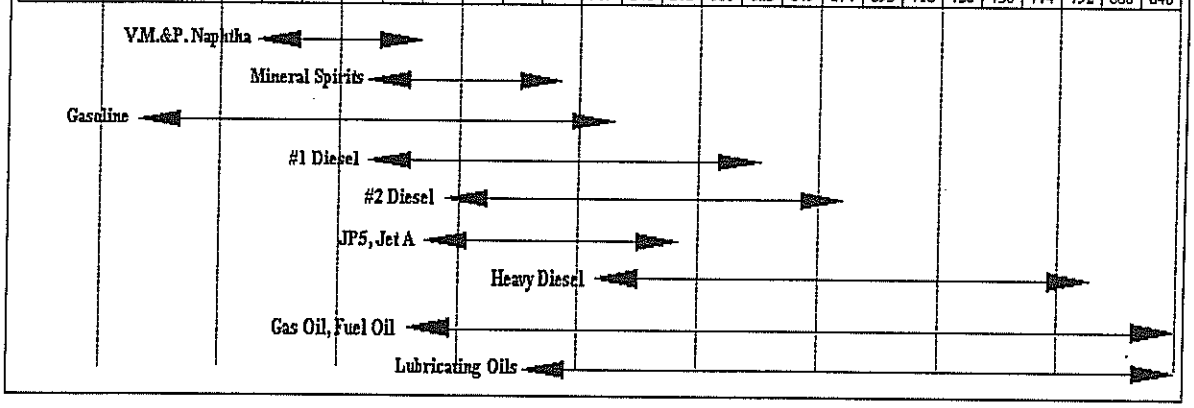
Enviro • Test
LABORATORIES
A DIVISION OF ETL CHEMSPEC ANALYTICAL LIMITED

Client ID: TH14

Sample ID: L122959-14
Injection Date: 8/7/03 6:44:43 AM
Injection Time: 8/7/03 6:44:43 AM
Instrument ID: GC1
Operator:




| Carbon # | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.P.(°C) | -42 | -0.5 | 36 | 69 | 98 | 126 | 151 | 174 | 196 | 216 | 235 | 253 | 270 | 287 | 302 | 316 | 329 | 343 | 356 | 369 | 380 | 391 | 402 | 412 | 422 | 431 | 449 |
| B.P.(°F) | -44 | 31 | 97 | 156 | 209 | 258 | 303 | 345 | 384 | 421 | 456 | 488 | 519 | 548 | 575 | 601 | 625 | 649 | 674 | 695 | 716 | 736 | 756 | 774 | 792 | 808 | 840 |




## Boiling Point Distribution Range for Petroleum Based Fuel Products

Adapted from: Drews, A.W., ED; Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadephia, PA, 1989: p XVIII

ETL Enviro-Test
LABORATORIES
A DIVISION OF *ETL CHEMSPEC ANALYTICAL LIMITED*

## ANALYTICAL REPORT

P.MACHIBRODA ENGINEERING LTD
ATTN: RAY MACHIBRODA
2623 B FAITHFULL AVENUE
SASKATOON SK S7K 5W2

DATE: 12-AUG-03 06:12 PM

Lab Work Order #: L123809 Sampled By: RD Date Received: 07-AUG-03
P.O. #:
Job #: 4753.2
Comments:

RECEIVED
AUG 18 RECD
Ans'd .....

APPROVED BY:

KAREN BONNIE MALANOWICH
**Project Manager**



LABORATORY ACCREDITATIONS:
- STANDARDS COUNCIL OF CANADA IN COOPERATION WITH THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL) FOR SPECIFIC TESTS AS REGISTERED BY THE COUNCIL (EDMONTON, CALGARY, GRANDE PRAIRIE, SASKATOON, WINNIPEG, THUNDER BAY, WATERLOO)
- AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA) IN THE INDUSTRIAL HYGIENE PROGRAM (EDMONTON, WINNIPEG)
- STANDARDS COUNCIL OF CANADA IN COOPERATION WITH THE CANADIAN FOOD INSPECTION AGENCY (CFIA) FOR FERTILIZER AND FEED TESTING (SASKATOON) AND FOR MICROBIOLOGICAL TESTING IN FOOD (WINNIPEG)

LABORATORY RECOGNITIONS:
- STANDARDS COUNCIL OF CANADA - GLP COMPLIANT FACILITY (EDMONTON, OTTAWA)

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L123809-1 TH 12 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **BTEX, TVH and TEH** | | | | | | | | |
| TEH (C11-C30) | <0.05 | | 0.05 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137337 |
| **BTEX and TVH (C5-C10)** | | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Toluene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Ethylbenzene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Xylenes | 0.0013 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Total Volatiles | <0.1 | | 0.1 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| L123809-2 TH 8 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **BTEX, TVH and TEH** | | | | | | | | |
| TEH (C11-C30) | <0.05 | | 0.05 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137337 |
| **BTEX and TVH (C5-C10)** | | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Toluene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Ethylbenzene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Total Volatiles | <0.1 | | 0.1 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| L123809-3 TH 5 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **BTEX, TVH and TEH** | | | | | | | | |
| TEH (C11-C30) | <0.05 | | 0.05 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137337 |
| **BTEX and TVH (C5-C10)** | | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Toluene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Ethylbenzene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Total Volatiles | <0.1 | | 0.1 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| L123809-4 TH 4 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **BTEX, TVH and TEH** | | | | | | | | |
| TEH (C11-C30) | <0.05 | | 0.05 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137337 |
| **BTEX and TVH (C5-C10)** | | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Toluene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Ethylbenzene | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| Total Volatiles | <0.1 | | 0.1 | mg/L | 11-AUG-03 | 11-AUG-03 | IGH | R137289 |
| L123809-5 TH 8 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **Dissolved Metals - CCME** | | | | | | | | |
| **Dissolved Trace Metals** | | | | | | | | |
| Silver (Ag) | <0.0002 | | 0.0002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Aluminum (Al) | 0.01 | | 0.01 | mg/L | | 08-AUG-03 | JY | R136704 |

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L123809-5 TH 8 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **Dissolved Metals - CCME** | | | | | | | | |
| **Dissolved Trace Metals** | | | | | | | | |
| Arsenic (As) | 0.0009 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |
| Boron (B) | 0.17 | | 0.05 | mg/L | | 08-AUG-03 | JY | R136704 |
| Barium (Ba) | 0.055 | | 0.003 | mg/L | | 08-AUG-03 | JY | R136704 |
| Beryllium (Be) | <0.001 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Cadmium (Cd) | <0.0001 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Cobalt (Co) | <0.002 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Chromium (Cr) | <0.005 | | 0.005 | mg/L | | 08-AUG-03 | JY | R136704 |
| Copper (Cu) | 0.002 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Mercury (Hg) | <0.0001 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Lithium (Li) | 0.022 | | 0.003 | mg/L | | 08-AUG-03 | JY | R136704 |
| Molybdenum (Mo) | 0.007 | | 0.005 | mg/L | | 08-AUG-03 | JY | R136704 |
| Nickel (Ni) | <0.002 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Lead (Pb) | 0.0008 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Antimony (Sb) | 0.0011 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |
| Selenium (Se) | <0.0004 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |
| Tin (Sn) | <0.05 | | 0.05 | mg/L | | 08-AUG-03 | JY | R136704 |
| Titanium (Ti) | 0.002 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Thallium (Tl) | <0.0001 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Uranium (U) | 0.0015 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Vanadium (V) | <0.001 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Zinc (Zn) | 0.009 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| **Dissolved Major Metals** | | | | | | | | |
| Calcium (Ca) | 50.9 | | 0.5 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Potassium (K) | 12.4 | | 0.1 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Magnesium (Mg) | 23.2 | | 0.01 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Sodium (Na) | 21.8 | | 0.5 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Iron (Fe) | 0.026 | | 0.005 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Manganese (Mn) | <0.001 | | 0.001 | mg/L | | 08-AUG-03 | HAS | R137014 |
| L123809-6 TH 4 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **Dissolved Metals - CCME** | | | | | | | | |
| **Dissolved Trace Metals** | | | | | | | | |
| Silver (Ag) | <0.0002 | | 0.0002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Aluminum (Al) | 0.02 | | 0.01 | mg/L | | 08-AUG-03 | JY | R136704 |
| Arsenic (As) | 0.0072 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |
| Boron (B) | 1.89 | | 0.05 | mg/L | | 08-AUG-03 | JY | R136704 |
| Barium (Ba) | 0.062 | | 0.003 | mg/L | | 08-AUG-03 | JY | R136704 |
| Beryllium (Be) | <0.001 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Cadmium (Cd) | <0.0001 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Cobalt (Co) | 0.008 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Chromium (Cr) | <0.005 | | 0.005 | mg/L | | 08-AUG-03 | JY | R136704 |
| Copper (Cu) | 0.004 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Mercury (Hg) | 0.0001 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Lithium (Li) | 0.185 | | 0.003 | mg/L | | 08-AUG-03 | JY | R136704 |
| Molybdenum (Mo) | <0.005 | | 0.005 | mg/L | | 08-AUG-03 | JY | R136704 |
| Nickel (Ni) | <0.002 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Lead (Pb) | 0.0004 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Antimony (Sb) | 0.0020 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L123809-6 TH 4 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **Dissolved Metals - CCME** | | | | | | | | |
| **Dissolved Trace Metals** | | | | | | | | |
| Selenium (Se) | 0.0078 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |
| Tin (Sn) | <0.05 | | 0.05 | mg/L | | 08-AUG-03 | JY | R136704 |
| Titanium (Ti) | 0.003 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Thallium (Tl) | 0.0003 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Uranium (U) | 0.0069 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Vanadium (V) | 0.003 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Zinc (Zn) | 0.022 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| **Dissolved Major Metals** | | | | | | | | |
| Calcium (Ca) | 637 | | 0.5 | mg/L | | 11-AUG-03 | HAS | R137095 |
| Potassium (K) | 33.7 | | 0.1 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Magnesium (Mg) | 217 | | 0.01 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Sodium (Na) | 944 | | 0.5 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Iron (Fe) | 12.7 | | 0.005 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Manganese (Mn) | 5.61 | | 0.001 | mg/L | | 08-AUG-03 | HAS | R137014 |
| L123809-7 TH 14 | | | | | | | | |
| Sample Date: 06-AUG-03 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **Dissolved Metals - CCME** | | | | | | | | |
| **Dissolved Trace Metals** | | | | | | | | |
| Silver (Ag) | <0.0002 | | 0.0002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Aluminum (Al) | 0.08 | | 0.01 | mg/L | | 08-AUG-03 | JY | R136704 |
| Arsenic (As) | <0.0004 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |
| Boron (B) | 1.15 | | 0.05 | mg/L | | 08-AUG-03 | JY | R136704 |
| Barium (Ba) | 0.059 | | 0.003 | mg/L | | 08-AUG-03 | JY | R136704 |
| Beryllium (Be) | <0.001 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Cadmium (Cd) | <0.0001 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Cobalt (Co) | <0.002 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Chromium (Cr) | <0.005 | | 0.005 | mg/L | | 08-AUG-03 | JY | R136704 |
| Copper (Cu) | 0.001 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Mercury (Hg) | <0.0001 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Lithium (Li) | 0.043 | | 0.003 | mg/L | | 08-AUG-03 | JY | R136704 |
| Molybdenum (Mo) | <0.005 | | 0.005 | mg/L | | 08-AUG-03 | JY | R136704 |
| Nickel (Ni) | <0.002 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| Lead (Pb) | 0.0008 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Antimony (Sb) | 0.0009 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |
| Selenium (Se) | 0.0062 | | 0.0004 | mg/L | | 08-AUG-03 | JY | R136704 |
| Tin (Sn) | <0.05 | | 0.05 | mg/L | | 08-AUG-03 | JY | R136704 |
| Titanium (Ti) | 0.004 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Thallium (Tl) | <0.0001 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Uranium (U) | 0.0085 | | 0.0001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Vanadium (V) | 0.001 | | 0.001 | mg/L | | 08-AUG-03 | JY | R136704 |
| Zinc (Zn) | 0.010 | | 0.002 | mg/L | | 08-AUG-03 | JY | R136704 |
| **Dissolved Major Metals** | | | | | | | | |
| Calcium (Ca) | 139 | | 0.5 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Potassium (K) | 6.0 | | 0.1 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Magnesium (Mg) | 48.7 | | 0.01 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Sodium (Na) | 58.8 | | 0.5 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Iron (Fe) | 0.127 | | 0.005 | mg/L | | 08-AUG-03 | HAS | R137014 |
| Manganese (Mn) | 0.008 | | 0.001 | mg/L | | 08-AUG-03 | HAS | R137014 |

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| Refer to Referenced Information for Qualifiers (if any) and Methodology | | | | | | | | |

# Reference Information

**Methods Listed (if applicable):**

| ETL Test Code | Matrix | Test Description | Preparation Method Reference(Based On) | Analytical Method Reference(Based On) |
|---|---|---|---|---|
| BTX,TVH-SK | Water | BTEX and TVH (C5-C10) | | EPA 5030/8015&8021B-P&T GC-PID & FID |
| MET1-DIS-CCME-ED | Water | Dissolved Trace Metals | | EPA 6020 |
| MET2-DIS-ED | Water | Dissolved Major Metals | | EPA 200.7 |
| TEH-SK | Water | TEH (C11-C30) | | EPA 3510/8000-GC-FID |

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

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

| Laboratory Definition Code | Laboratory Location | Laboratory Definition Code | Laboratory Location |
|---|---|---|---|
| ED | Enviro-Test Laboratories - Edmonton, Alberta, Canada | SK | Enviro-Test Laboratories - Saskatoon, Saskatchewan, Canada |

*GLOSSARY OF REPORT TERMS*
*Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.*
*The reported surrogate recovery value provides a measure of method efficiency. The Laboratory warning units are determined under column heading D.L.*
*mg/kg (units) - unit of concentration based on mass, parts per million*
*mg/L (units) - unit of concentration based on volume, parts per million*
*< - Less than*
*D.L. - Detection Limit*
*N/A - Result not available. Refer to qualifier code and definition for explanation*

*Test results reported relate only to the samples as received by the laboratory.*
*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*
*UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.*
*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.*

*Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.*