Parks Canada Parcs Canada

FINAL REPORT

Phase II Environmental Site Assessment
Pine Lake Dry Dump,
Wood Buffalo National Park
Alberta

PARKS CANADA

PROJECT NO. 1013548

Jacques Whitford AXYS

PROJECT NO. 1013548

FINAL REPORT TO: **Parks Canada**
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FOR: **Phase II Environmental Site Assessment**
Pine Lake Dry Dump, Wood Buffalo National Park
Alberta

November 15, 2006

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EXECUTIVE SUMMARY

Jacques Whitford Limited (Jacques Whitford) was retained by Parks Canada (Parks) to conduct a Phase II Environmental Site Assessment (ESA) at the Pine Lake Dry Dump (Pine Lake), located in Wood Buffalo National Park (WBNP) in Alberta. The scope of work required the assessment of potential impacts in soil and groundwater related to former aviation fuel storage in a wooded are near Pine Lake. The Chemicals of Concern (COCs) identified for the site were petroleum hydrocarbons, volatile organic compound (VOCs), metals and glycols. The site assessment included the excavation of three (3) test pits and drilling of three (3) boreholes (each completed as monitor wells). The following is a summary of the Phase II ESA:

1. The assessment guidelines for the site are the CCME Guidelines (2005), CCME CWS (2001) and AENV PST Guidelines for Parkland/Residential land use and fine-grained soil.

2. Site stratigraphy observed during drilling consisted of sand and silty sand overlying silty clay to a maximum depth of 11.3 mbg.

3. The groundwater wells installed at the site were dry at the time of monitoring. No phase-separated liquids or elevated vapours were detected in any of the monitoring wells. The anticipated groundwater flow direction is to the south.

4. Petroleum hydrocarbons, VOCs, metals and glycol in soil were either not detected or detected at concentrations that satisified the applicable guidelines;

5. It is unlikely that groundwater and the adjacent aquatic receptors (Salt River) have been adversely affected by the residual impacts at the Pine Lake site based on the detected concentrations of petroleum hydrocarbons and metals measured at the Site.

Based on the observations made and analytical results obtained, Jacques Whitford offers the following recommendation:

- Detected concentrations of hydrocarbons and metals in soil satisfied the applicable guidelines however, the presence of these contaminants of concern result in scoring of the Site as a Class 3 site (a score of 44.7) using the FCSAAP Contaminated Sites Classification System indicating that action may be required. Jacques Whitford recommends that surface stained soil be removed from the site and the abandoned drums of aviation fuel at the site be disposed in accordance with regulations. No further investigation is recommended at the site at this time.

Table of Contents

EXECUTIVE SUMMARY i

1.0 INTRODUCTION 1
- 1.1 General 1
- 1.2 Objectives 1

2.0 SCOPE OF WORK 1

3.0 BACKGROUND 2
- 3.1 General 2
- 3.2 Site Description 2
- 3.3 Local Setting 3
- 3.4 Geology 3
- 3.5 Topography and Drainage 3

4.0 REGULATORY FRAMEWORK 3
- 4.1 CCME Canadian Environmental Quality Guidelines 4
- 4.2 CCME Canada-Wide Standards 4
- 4.3 Alberta Environment Risk Management Guidelines for Petroleum Storage Tank Sites 5

5.0 SITE INVESTIGATION RESULTS 6
- 5.1 Health and Safety 6
- 5.2 Soil Assessment 6
- 5.3 Test Pit Excavation and Borehole Drilling 6
- 5.4 Soil Stratigraphy 7
- 5.5 Vapour Screening 7
- 5.6 Soil Laboratory Analysis 7
- 5.7 Soil Hydrocarbon Chemistry 7
- 5.8 Soil VOCs Chemistry 8
- 5.9 Soil Metals Chemistry 8
- 5.10 Soil Glycol Chemistry 8
- 5.11 Groundwater Assessment 8
- 5.12 Groundwater Monitoring 8
- 5.13 Quality Assurance/Quality Control 9
- 5.14 FCSAAP Contaminated Sites Classification System 10

6.0 DISCUSSION 10

7.0 CONCLUSIONS 10

8.0 RECOMMENDATIONS 10

9.0 CLOSURE 11

List of Tables

Table 1: Soil Vapour Measurements ..... Appendix B
Table 2: Soil Analytical Results – Petroleum Hydrocarbons Constituents ..... Appendix B
Table 3: Soil Analytical Results – Volatile Organic Compounds Vocs) ..... Appendix B
Table 4: Soil Analytical Results – Metals ..... Appendix B
Table 5: Soil Analytical Results – Glycols ..... Appendix B
Table 6: Groundwater Monitoring Results ..... Appendix B
Table 7: QA/QC Samples – Soil Analytical Results – PHCs ..... Appendix B
Table 8: QA/QC Samples – Groundwater Analytical Results – PHCs ..... Appendix B
Table 9: QA/QC Samples – Groundwater Analytical Results – PAHs ..... Appendix B

List of Drawings

Drawing 1: Site Location Plan ..... Appendix A
Drawing 2: Site Plan ..... Appendix A

List of Appendices

APPENDIX A Drawings
APPENDIX B Analytical Summary Tables and Laboratory Certificates of Analysis
APPENDIX C Methodology
APPENDIX D Borehole/Monitor Well Records
APPENDIX E Site Photographs
APPENDIX F FCSAAP Scoring Sheets

1.0 INTRODUCTION

1.1 General

Jacques Whitford Limited (Jacques Whitford) was retained by Parks Canada (Parks) to conduct a Phase II Environmental Site Assessment (ESA) at the Pine Lake Dry Dump (Pine Lake), located in Wood Buffalo National Park (WBNP) in Alberta. Drawing 1 in **Appendix A** provides general location and topography of the area surrounding the Pine Lake. The work at this site was completed as per Jacques Whitford Technical and Cost Proposals (No. 1012828), May 15, 2006 in response to the Parks' Request for Proposal (RFP) and Statement of Work (SOW) for Contaminated Sites Assessments (Solicitation No. 5P420-06-5007). The scope of work required the assessment of potential impacts in soil and groundwater related to former aviation fuel storage in a wooded are near Pine Lake, herein referred to as the 'Site'.

This report is organized in nine sections. Section 1 presents an introduction and the purpose of the assessment. Section 2 provides the scope of work. Section 3 discusses the background of the site. Section 4 explains the regulatory guidelines and their applicability. Section 5 provides the results of the field work and Section 6 discusses the results of the assessment. Section 7 provides conclusions and recommendations are provided in Section 8. Section 9 is a closure statement. Supporting information is provided in the appendices following Section 9.

1.2 Objectives

The objective of this project was to assess potential soil and groundwater impacts resulting from historical storage of expired 45 gallon drums of Jet A and Jet B fuel from the Wood Buffalo National Park Fire Management program. Potential chemicals of concern (COCs) identified at the site included: petroleum hydrocarbons, volatile organic compounds (VOCs), metals and glycols. Jacques Whitford is unaware of any previous assessment work at the site.

2.0 SCOPE OF WORK

To meet the objectives discussed above, the ESA included:

1. Development of a work plan for an intrusive site investigation to assess potential impacts related to the potential COCs at the site;

2. Completion of an intrusive site assessment designed to obtain the information necessary to meet the objectives described above including the following:

    - Private and public underground utility locates prior to ground disturbance;
    - Advancement of a total of three(3) boreholes, each completed as monitor wells and the excavation of three (3) test pits in the area of the former drum cache;
    - Field screening and measurement of combustible and volatile soil vapour concentrations in soil samples collected during the borehole program;

- Submission of select soil samples from boreholes for laboratory analysis of petroleum hydrocarbon parameters, VOCs, metals, glycols and grain size;
- Monitoring of the newly installed and previously installed monitor wells to determine depth to groundwater, hydraulic conductivity, combustible vapour concentrations, volatile vapour concentrations, and presence of light non-aqueous phase liquids (LNAPL) or dense non-aqueous phase liquids (DNAPL); and
- Collection of groundwater samples from each of the newly installed monitor wells and submission of each to Maxxam for laboratory analysis of petroleum hydrocarbon parameters VOCs, and glycols.

3. Submission of a report summarizing the findings of the field investigation and a discussion of the results in the context of the applicable Canadian Council of Ministers of the Environment (CCME) and Alberta Environment (AENV) guidelines.

3.0 BACKGROUND

3.1 General

Pine Lake is situated in WBNP in Alberta, approximately 60 km south of Fort Smith, Northwest Territories. The WBNP headquarters is located in Fort Smith. The site is accessible via a gravel road from Fort Smith and short access side roads leading west off the main gravel road. The site was formerly used as an aviation fuel cache (drums) for helicopter operations in the Park. It is unknown if drums of other products were ever stored at the site. The site is in a wooded area approximately 100 m west of main gravel access road and also includes a refuse burning area for the nearby Pine Lake fire fighting facility (approximately 5 km south of the site).

3.2 Site Description

The Pine Lake site is located in a relatively remote location in WBNP with no nearby dwellings. The site consists of an access side road leading from the main access road. The access side road terminates at a refuse burning area (from Park fire fighting operations nearby). The former drum cache is located opening in the woods on the south side of the refuse burning area. Forest surrounded the refuse burning area and former drum cache. At the time of the site visit, five (5) abandoned drums were located at the former drum cache and one (1) abandoned drum was located on the west side of the access road near the refuse burning area. One of the drums was marked as Jet A-1 and one as Jet B (aviation fuel). Labels were not observed on the other drums as they were in poor condition and there was concern they could leak if rolled, turned, etc. All of the drums contained liquid, but none were full. The former drum cache area was covered in grass and other low-growth vegetation and surrounded by undeveloped forest. Several small areas (less than 1 m^2) of surficial staining were observed at the site. Soil at the stained areas exhibited a moderate to strong weathered hydrocarbon odour. No buildings, structures or tanks were observed at the site. Potable water systems (wells or municipal) were not observed in the area.

3.3 Local Setting

3.4 Geology

Surficial Geology in the Pine Lake area consists of sand, sandy silts and clay. Based on available geology maps, bedrock in the Pine Lake area comprises of limestone of the Nyarling Formation[1]. Bedrock was not encountered during this investigation.

3.5 Topography and Drainage

Local topography at the Pine Lake site consists of relatively flat terrain with a slight slope towards the refuse burning area. In the wooded area beyond the Site, moderate slopes lead to the south and east (towards the main access road). No engineered drainage (catch basins, drains, manholes, etc.) were observed at the site.

This site assessment was completed during the summer. No runoff or standing water was observed at the site. Based on site observations, precipitation in the area would tend to infiltrate. Groundwater was not encountered during the investigation. The nearest surface water body is the Salt River located approximately 250 to 500 m to the south of the site.

4.0 REGULATORY FRAMEWORK

The guidelines referenced in this report are summarized in the following subsections. Applicable regulatory guidelines/standards/criteria are presented in the analytical summary tables in **Appendix B** for comparison to the various parameters/media investigated as part of this assessment. The site is located within WBNP and subsequently falls within Federal jurisdiction. The analytical results were evaluated in the context of the following regulatory guidelines:

- Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines, 2005 (CCME Guidelines (2005)); and

- CCME Petroleum Hydrocarbons in Soil – Canada Wide Standard (CWS), April 2001 (CCME CWS {2001}).

In addition, the following provincial guidelines were referenced in the case where CCME guidelines have yet to be developed:

- Alberta Environment (AENV) AENV Risk Management Guidelines for Petroleum Storage Tank Sites, 2001 (AENV PST Guidelines);

[1] February 15, 1999. *Geological Map of Alberta*. Alberta Energy and Utilities Board/Alberta Geological Survey, 1:1,000,000

4.1 CCME Canadian Environmental Quality Guidelines

Benzene, toluene, ethylbenzenes and xylene petroleum hydrocarbons, VOCs, metals and glycols analytical results in soil and/or groundwater were evaluated using the CCME Guidelines (2005). The CCME Canadian Environmental Quality Guidelines provide limits for contaminants in soil and water and is intended to maintain, improve, and/or protect environmental quality and human health at contaminated sites in general. These criteria include numerical values for the assessment and remediation of soil and water in the context of agricultural, residential/parkland, commercial, and industrial land uses. Environmental soil and water quality guidelines are derived using toxicological data to determine the threshold level to key receptors. These criteria include the recommended Canadian Soil Quality Guidelines (SQG) and the Canadian Water Quality Guidelines (CWQG). The CCME Criteria include two sets of numerical values for soil and water quality: assessment criteria and remediation criteria. The assessment criteria are approximate background concentrations or approximate analytical detection limits for contaminants in soil and water. Remediation criteria are intended for generic use and do not address site-specific conditions. They are considered generally protective of human and environmental health for specified uses of soil and water at impacted sites.

The selection of soil guidelines is based on land use; the current and foreseeable land use at the site is parkland therefore the CCME SQG for Residential/Parkland SQGs are recommended for evaluation of environmental impacts to soils. The selection of guidelines for BTEX constituents is also based on soil type and depth, and consideration of human health and ecological receptor pathways. In general, the soil type has been defined as coarse-grained for surface soils (<1.5 meters below grade) and fine-grained for sub-surface soil (>1.5 meters below grade) based on a laboratory grain-size analysis. Guidelines have been established for human soil ingestion, dermal contact, vapour inhalation, protection of groundwater for potable use and freshwater aquatic life, and ecological soil contact. The human vapour inhalation pathway is deemed to not be applicable as there are no structures in the vicinity of the site. The protection of potable water is not considered to be applicable; groundwater aquifers underlying the site are not currently used for potable water and are unlikely to be developed in the future based on the current and foreseeable land use. In addition, a water well search of the area surrounding the sites indicated that there are no active water wells within a 500 m radius of the site. The human soil ingestion, dermal contact, protection of groundwater for freshwater aquatic life and ecological soil contact pathways are considered to be the applicable to the site. The most stringent guidelines for these pathways have been selected for comparison of results at the Site.

Groundwater was not found at the Site, however, the CCME guidelines for the protection of Freshwater Aquatic Life (FAL) are deemed applicable for comparison of groundwater results as a surface water body is within 300 m downgradient of the site. There are currently no Federal guidelines for petroleum hydrocarbon fractions and xylenes in groundwater for the protection of FAL. A discussion on reference guidelines for these parameters is provided in Section 4.3.

4.2 CCME Canada-Wide Standards

The CCME CWS (2001) are typically used as a preliminary means of evaluating petroleum hydrocarbons in soil at federal sites. CWS criteria are dependent on the nature of the hydrocarbon type. That is, the CWS group petroleum hydrocarbons into four practical fractions (F1, F2, F3 and F4)

with different criteria for each. CWS guidelines have been developed based on land use, soil type and soil depth. Different generic levels exist for “Agricultural”, “Residential”, “Commercial” and “Industrial” sites and are based on coarse-grained soil versus fine-grained soil. The standards also change with depth of soil as related to exposure. Allowable concentrations for surface soil (less than 1.5 metres below grade) are different from those for subsurface soil (that which is deeper than 1.5 metres below grade).

Concentrations of volatile and extractable petroleum hydrocarbons (Fractions F1 to F4) in soil were compared to the CCME (2001) CWS based on Residential/Parkland SQG and coarse-grained for surface soils (<1.5 meters below grade) and fine-grained for sub-surface soil (>1.5 meters below grade). Similar to the CCME Guidelines (2005), the most stringent guideline of the applicable the CCME CWS (2001) guidelines (human soil ingestion, dermal contact, protection of groundwater for freshwater aquatic life and ecological soil contact) have been selected for comparison of results at the Site.

4.3 Alberta Environment Risk Management Guidelines for Petroleum Storage Tank Sites

In the event that groundwater is sampled at the Site, there are currently no Federal guidelines for petroleum hydrocarbon fractions in groundwater. The AENV Risk Management Guidelines for Petroleum Storage Tank Sites, 2001 should be used as reference guidelines as the potential impacts at the Site are the result of storage of fuel drums. These guidelines are the generally accepted criteria for the assessment and remediation of petroleum storage tank sites in Alberta are the AENV Risk Management Guidelines for Petroleum Storage Tank Sites, 2001.

The AENV Guidelines have been developed through the use of a risk-based approach with respect to human health, safety and the environment. The remediation process essentially consists of the following alternatives:

- Remediate to the strictest de minimus criteria which allows for a sites unrestricted land use;
- Undertake a Land Use Assessment and remediate to specified generic criteria; or
- Conduct a risk assessment to develop site-specific remediation criteria and/or risk management plan.

The remediation criteria are dependent on the nature of the hydrocarbon type, land use and soil type. That is, different criteria exist based on land use (Residential versus Commercial/Industrial) and soil grain-size. Different criteria also exist considering freshwater aquatic life as a potential receptor and for groundwater ingestion as a human exposure pathway.

The AENV Risk Management Guidelines for Petroleum Storage Tank Sites for groundwater at residential sites (generic, fine-grained soil) and for the groundwater ingestion pathway should be used for comparison to groundwater water F1 and F2 hydrocarbon fractions and xylenes in the event that groundwater is sampled at the Site.

5.0 SITE INVESTIGATION RESULTS

The site assessment was completed on June 19 (test pit excavation) and June 20 (borehole drilling), 2006 by Stephen Bourn, P.Eng. of Jacques Whitford. Groundwater monitoring was completed by Jeff Hunter, C.E.T. on July 12, 2006. Ms. Sharon Irwin of Parks Canada was onsite during test pit excavation activities on June 20, 2006.

Prior to conducting the site assessment, the drums at the site were moved to the refuse burning area to facilitate site access for backhoe and drill rig. The site assessment included the excavation of three (3) test pits and drilling of three (3) boreholes (each completed as monitor wells) at the locations shown on Drawing No. 2 in **Appendix A**. The locations were selected based on visual observation of surface staining and location of the abandoned drums. Field methodologies are discussed in detail in **Appendix C**. Photographs taken during the assessment are provided in **Appendix D**. Drilling services and monitor well materials were provided by Mobile Augers and Research Limited of Edmonton, AB. Armagh Construction of Fort Smith provided excavation services for test pitting activities.

5.1 Health and Safety

A project specific Health and Safety Plan (HSP) was prepared in conjunction with the project Work Plan and submitted to Parks for review prior to conducting the site assessment. A copy of the HSP was maintained on-site for the duration of the site assessment. Prior to conducting the site assessment, a 'tailgate' health and safety meeting was completed with the contractor and client. The contractor was made aware of the HSP, the location of emergency contract numbers and site specific hazards. A satellite telephone was maintained on-site for the duration of the site assessment. Daily health and safety meetings were conducted (the work at this site was completed along with assessment of other Parks sites over several days) to review previously identified hazardous and to identify any new concerns.

Jacques Whitford field personnel complied with applicable internal Safe Work Practices for the field tasks completed. Public utility locates were completed by Alberta1stCall prior to initiation of the field work.

5.2 Soil Assessment

5.3 Test Pit Excavation and Borehole Drilling

Three (3) test pits were advanced at the site to a maximum depth of 3.0 m below grade (mbg) using a rubber tire backhoe. Three (3) boreholes were advanced at the site to a maximum depth of 11.3 m below grade (mbg) using a stand augers on a truck mounted drill rig. Each borehole was completed as monitor well to facilitate groundwater sampling and monitoring.

Soil samples were collected continuously from test pits and boreholes at 0.75 m intervals or based field observations of changes in soil composition and/or the apparent presence of impacts. Samples were collected directly from open test pits and augers (during borehole drilling) for logging material characteristics, monitoring of soil vapour levels and potential laboratory analysis.

5.4 Soil Stratigraphy

Site stratigraphy observed during drilling consisted of sand and silty sand overlying silty clay to a maximum depth of 11.3 mbg. Detailed descriptions of the soil conditions encountered are presented in the Test Pit and Borehole/Monitoring Well Records in **Appendix E**.

5.5 Vapour Screening

Field screening for the presence of combustible soil vapours (CSV) in the soil samples was conducted using a portable GasTechtor 1238ME (GasTechtor) calibrated to a hexane standard with methane elimination and volatile soil vapours (VSV) using a portable photoionization detector (PID) calibrated to an isobutylene standard.

CSV concentrations ranged from <10 parts per million (ppm) to 50 ppm. VSV concentrations measured in soil samples ranged from a maximum of 3.8 ppm to 28.9 ppm. The soil sample locations and field vapour screening results are presented on the In Table 1 in **Appendix B**.

There are no regulatory criteria for combustible soil vapours, however, elevated vapour concentrations (CSV greater than 500 ppm and VSV greater than 25 ppm) are generally indicative of the presence of volatile petroleum products (i.e., gasoline, and to a lesser extent, diesel and fuel oil). Concentrations vary with both hydrocarbon type and age, and it should be noted that the readings are intended as a field screening tool to provide only a qualitative indication of hydrocarbon levels and are not directly equivalent to soil analytical results.

5.6 Soil Laboratory Analysis

Six (6) soil samples were submitted to Maxxam in Maxxam Analytics (Maxxam) in Edmonton, AB for analysis of petroleum hydrocarbons and VOCs. Three (3) of the above referenced samples were analysed for metals and two (2) were analysed for glycols. Surface (grade to 1.5 mbg) and sub-surface (>1.5 mbg) composite soil samples (one of each), comprised of sub-samples from each borehole and test pit were submitted for grain size analysis. The grain size analysis indicated that surface soils were defined as coarse grained and subsurface soils were defined as fine grained. Samples submitted for analysis were generally taken from suspected worst case zones of contamination, as determined by field observation and field vapour screening results. The purpose of grain size analysis was for selection of guidelines.

5.7 Soil Hydrocarbon Chemistry

Six (6) soil samples were submitted for petroleum hydrocarbon analysis. Soil analytical results are summarized in Table 2 in **Appendix B**. Copies of Laboratory Certificates of Analyses are also included in **Appendix B**. The results indicate that petroleum hydrocarbon constituents (BTEX and F1-F4) were either not detected or satisfied the applicable guidelines.

5.8 Soil VOCs Chemistry

Six (6) soil samples were submitted for VOC analysis. Soil analytical results are summarized in Table 3 in **Appendix B**. Copies of Laboratory Certificates of Analyses are also included in **Appendix B**. VOCs were not detected in any of the samples submitted for analysis.

5.9 Soil Metals Chemistry

Three (3) soil samples were submitted for metals analysis. Soil analytical results are summarized in Table 4 in **Appendix B**. Copies of Laboratory Certificates of Analyses are also included in **Appendix B**. Metals parameters were either not detected or satisfied the applicable guidelines in all of the samples submitted for analysis.

5.10 Soil Glycol Chemistry

Two (2) soil samples were submitted for glycols analysis. Soil analytical results are summarized in Table 5 in **Appendix B**. Copies of Laboratory Certificates of Analyses are also included in **Appendix B**. Glycols were not detected in either of the samples submitted for analysis.

5.11 Groundwater Assessment

Monitoring wells were installed in the three (3) boreholes drilled at the site. The monitoring wells were installed to determine groundwater flow direction and gradient, determine the hydraulic conductivity of soil at the site and monitor the site for the presence of free phase petroleum hydrocarbons and sample the groundwater for laboratory analysis.

5.12 Groundwater Monitoring

The newly installed groundwater monitoring wells were monitored for combustible and/or volatile headspace vapour concentrations, depth to groundwater and the presence of phase-separated petroleum hydrocarbons on July 12, 2006. The monitoring results are summarized in Table 6, **Appendix B**.

Combustible headspace concentrations measured with a Gastech 1238ME in the monitoring wells were 100 ppm and is not considered to be significant. Volatile headspace concentrations measured with a PID in the monitoring wells ranged from 0.5 ppm to 2.7 ppm and is not considered to be significant. No phase-separated liquids or were detected in any of the monitoring wells as the wells were dry during the monitoring event. It should be noted that field observations during drilling indicated that the groundwater table had not been reached. It was decided in consultation with Parks that it was very unlikely that potential impacts at the site had migrated to a depth below 11.3 mbg and therefore the borehole drilling was terminated at this depth. The anticipated groundwater flow direction is to the south.

5.13 Quality Assurance/Quality Control

The quality assurance/quality control (QA/QC) program for this project was combined two other site assessments completed simultaneously for Parks in the WBNP and Fort Smith by Jacques Whitford. The purpose of the QA/QC program is to assess the reliability of the data for the purposes of the site assessment. The review consisted of evaluating sample collection/handling methodology, holding times, general laboratory comments, field (blind) duplicate samples, and laboratory duplicate samples. Samples collected during the site investigation were submitted to an accredited by the Canadian Association for Environmental Analytical Laboratories (CAEAL).

All samples were collected following strict Jacques Whitford sampling procedures. Samples were uniquely labelled and control was maintained through use of chain of custody forms. All samples were collected in laboratory supplied containers and preserved in insulated coolers. Appropriate sampling QA/QC procedures were adhered to at all times.

The relative percent difference (RPD) is used to evaluate the sample result variability and is calculated by the following equation:

$$RPD = \left[\frac{|S1 - S2|}{S3} \right] \times 100$$

where:

RPD = relative percent difference
S1 = original soil or groundwater sample concentration
S2 = duplicate soil or groundwater sample concentration
S3 = average concentration = (S1 + S2)/2

Average RPD values of less than 100% for soil samples and 30% for groundwater samples are considered an indication of acceptable duplicate sample variability. For groundwater samples, an RPD of greater than 30% may reflect difference in sample turbidity or variance in the sampling procedures. Individual RPD values greater than 50% are not considered to reflect acceptable variability. RPD values are not used to evaluate those compounds that are present at concentrations less than five times the method detection limit (MDL).

The QA/QC analytical results are included in the Tables 7 to 9 in **Appendix B**. As shown on Table 7, **Appendix B**, the RPD value was 6% for the field duplicate soil sample analyzed for petroleum hydrocarbon parameters. Based on this result, the analytical data for the soil samples is considered technically and statistically valid. During the collection of the groundwater samples, a field duplicates were collected. As shown on Table 8 and 9, **Appendix B**, the RPDs for petroleum hydrocarbon parameters ranged from 20% to 40% and the RPDs for the detected PAHs parameter was 67%. The generally acceptable duplicate sample variability is 30% for groundwater samples, however the concentrations of hydrocarbons and PAHs are less than five times the method detection limit (MDL) and therefore these RPD values are not recommended to be used to evaluate the variability of those compounds.

5.14 FCSAAP Contaminated Sites Classification System

The Site has been scored utilizing the FCSAAP Contaminated Sites Classification System. The Site is classified as a Class 3 site with a score of 44.7 indicating that action may be required. The evaluation sheets are provided in **Appendix F**.

6.0 DISCUSSION

Based the results from this assessment, impacts at the Pine Lake Dry Dump Site appear to be limited to surficial hydrocarbon staining resulting from residual aviation fuel stored at the Site. It is unlikely that groundwater and the adjacent aquatic receptors (Salt River) have been adversely affected by the residual impacts at the Pine Lake site based on the detected concentrations of petroleum hydrocarbons and metals measured at the Site.

7.0 CONCLUSIONS

The following is a summary of the Phase II ESA:

1. The assessment guidelines for the site are the CCME Guidelines (2005), CCME CWS (2001) and AENV PST Guidelines for Parkland/Residential land use and fine-grained soil.

2. Site stratigraphy observed during drilling consisted of sand and silty sand overlying silty clay to a maximum depth of 11.3 mbg.

3. The groundwater wells installed at the site were dry at the time of monitoring. No phase-separated liquids or elevated vapours were detected in any of the monitoring wells. The anticipated groundwater flow direction is to the south.

4. Petroleum hydrocarbons, VOCs, metals and glycol in soil were not detected or detected at concentrations that satisfied the applicable guidelines.

5. It is unlikely that groundwater and the adjacent aquatic receptors (Salt River) have been adversely affected by the residual impacts at the Pine Lake site based on the detected concentrations of petroleum hydrocarbons and metals measured at the Site.

8.0 RECOMMENDATIONS

Based on the observations made and analytical results obtained, Jacques Whitford offers the following recommendation:

- Detected concentrations of hydrocarbons and metals in soil satisfied the applicable guidelines however, the presence of these contaminants of concern result in scoring of the Site as a Class 3 site (a score of 44.7) using the FCSAAP Contaminated Sites Classification System indicating that action may be required. Jacques Whitford recommends that surface stained soil be removed from the site and the abandoned drums of aviation fuel at the site be disposed in accordance with regulations. No further investigation is recommended at the site at this time.

9.0 CLOSURE

This report has been prepared for the sole benefit of Parks Canada. The report may not be used by any other person or entity without the express written consent of Jacques Whitford and Parks Canada.

Any use, which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Jacques Whitford 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 information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the best technical judgment of Jacques Whitford based on the data obtained from the work. The conclusions are based on the site conditions encountered by Jacques Whitford at the time the work was performed at the specific testing and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on the soil and groundwater conditions, as well as the history of the site reflecting natural, construction and other activities. In addition, analysis has been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, Jacques Whitford cannot warrant against undiscovered environmental liabilities.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

This report was prepared by Stephen Bourn, P.Eng. and Steven Mossman, P.Eng. Senior technical review was completed by Stella Brimo, B.Comm., M.Sc. We trust that this information meets your requirements at this time. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours truly,

JACQUES WHITFORD LIMITED

Original signed by Stephen Bourn

Stephen Bourn, P.Eng.
Site Assessor

Original signed by Steven Mossman

Steven Mossman, P.Eng.
Project Engineer

Original signed by Stella Brimo

Stella Brimo, B.Comm., M.Sc.
Group Leader, Site Assessment and Remediation

SB:SM:SB/cc

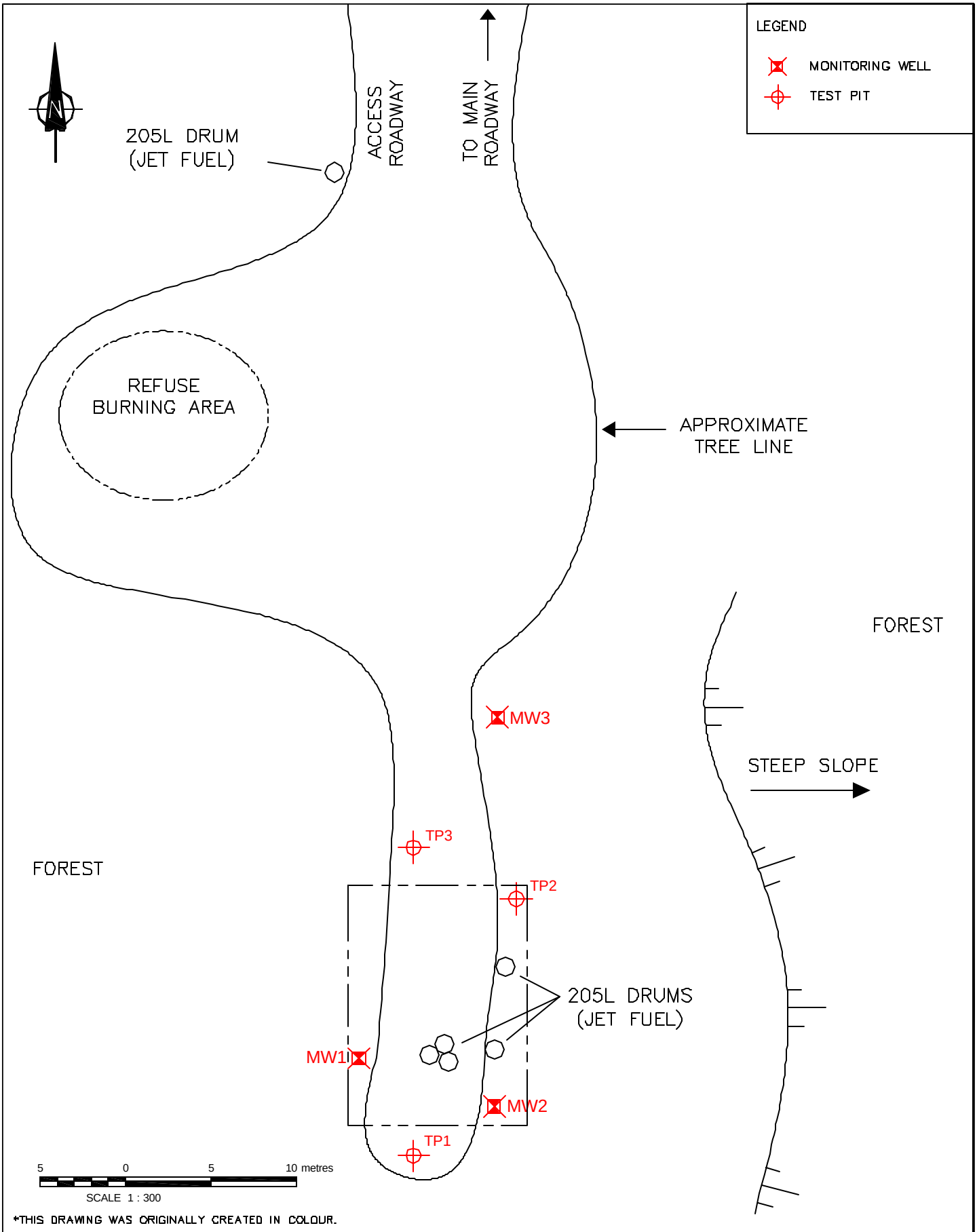
APPENDIX A

Drawings

*IMAGE REFERENCE: MAPART PUBLISHING, ALBERTA ROAD ATLAS, 2003
**THIS DRAWING WAS ORIGINALLY CREATED IN COLOUR.

Jacques Whitford	SCALE: 1 : 2 000 000 DATE: 16/08/06 DRAWN BY: SEA APPROVED BY:	CLIENT : PARKS CANADA TITLE : PHASE II ENVIRONMENTAL SITE ASSESSMENT **SITE LOCATION PLAN** PINE LAKE DRY DUMP WOOD BUFFALO NATIONAL PARK, AB	DRAWING NO. 1

\\CMIC\1013548\Phase_03\1013548-1_p03_PINE_LAKE.dwg 16/08/06



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Jacques Whitford	SCALE: 1 : 300 DATE: 26/07/06 DRAWN BY: SEA APPROVED BY:	CLIENT : PARKS CANADA TITLE : PHASE III ENVIRONMENTAL SITE ASSESSMENT **SITE PLAN** PINE LAKE WOOD BUFFALO NATIONAL PARK, AB	DRAWING NO. 2

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APPENDIX B

Analytical Summary Tables and Laboratory Certificates of Analysis

Table 1: Soil Vapour Measurements

Sample ID	Sample Depth	CSV[1]	VSV[2]
PL-TP1			
SA1	0 - 0.4	15	6.9
SA2	0.4 - 1.2	15	6.8
SA3	1.2 - 2	5	7.8
SA4	2 - 2.8	15	4.3
PL-TP2			
SA1	0 - 0.5	10	6.8
SA2	0.6 - 1.2	15	8.3
SA3	1.5 - 3	50	8.6
PL-TP3			
SA1	0 - 0.6	5	8.9
SA2	0.6 - 1.5	35	6.6
SA3	1.5 - 2.9	10	10.2
PL-MW1			
SA1	0 - 0.75	10	4
SA2	0.75 - 1.5	10	10.3
SA3	1.5 - 2.25	10	4.3
SA4	2.25 - 3	5	5.4
SA5	3 - 3.75	5	5.2
SA6	3.75 - 4.5	10	5.2
SA7	4.5 - 5.25	5	4.3
SA8	5.25 - 6	15	8.6
SA9	6 - 6.75	10	7.3
SA10	6.75 - 7.5	10	6.8
SA11	7.5 - 8.25	10	7
SA12	8.25 - 9	10	12.2
SA13	9 - 9.75	5	6.9
SA14	9.7 - 10.5	10	7.2
SA15	10.5 - 11.25	10	5.7
PL-MW2			
SA1	0 - 0.75	10	8.3
SA2	0.75 - 1.5	10	9.2
SA3	1.5 - 2.25	10	6.8
SA4	2.25 - 3	15	6.7
SA5	3 - 3.75	10	4.3
SA6	3.75 - 4.5	10	2.8
SA7	4.5 - 5.25	5	5.2
SA8	5.25 - 6	5	6.8
SA9	6 - 6.75	10	7.3
SA10	6.75 - 7.5	10	6.3
SA11	7.5 - 8.25	10	4.9
SA12	8.25 - 9	5	4.8
SA13	9 - 9.75	5	5.5
SA14	9.75 - 10.5	5	6.8
SA15	10.5 - 11.25	10	4.2

Table 1: Soil Vapour Measurements

Sample ID	Sample Depth	CSV[1]	VSV[2]
PL-MW3			
SA1	0 - 0.75	5	6.4
SA2	0.75 - 1.5	15	7.3
SA3	1.5 - 2.25	15	7.4
SA4	2.25 - 3	10	8.2
SA5	3 - 3.75	5	8.2
SA6	3.75 - 4.5	10	6.6
SA7	4.5 - 5.25	10	3.8
SA8	5.25 - 6	15	4.8
SA9	6 - 6.75	15	6.6
SA10	6.75 - 7.5	10	5.9
SA11	7.5 - 8.25	10	5.6
SA12	8.25 - 9	10	7.1
SA13	9 - 9.75	10	6
SA14	9.75 - 10.5	5	4.2
SA15	10.5 - 11.25	10	8.1

Notes:

All results expressed as ppm

[1] – Combustible soil vapour measured with GasTechtor 1238ME (GasTech) calibrated to hexane and set to methane elimination.

[2] – Volatile soil vapour measured with MiniRae 2000 Photoionization Detector (PID)

Table 2: Soil Analytical Results - Petroleum Hydrocarbons Constituents

Location	Sample Depth (m)	Date	CSV[1] (ppm)	VSV[2] (ppm)	Benzene	Toluene	Ethyl-benzene	Xylenes (o, m & p)	F1 (C_6-C_{10})	F2 (>C_{10}-C_{16})	F3 (>C_{16}-C_{34})	F4 (>C_{34})
PL-TP1-SA3	1.2-2.0	20-Jun-06	5	7.8	<0.04	<0.1	<0.1	<0.1	<10	13	<10	21
PL-TP2-SA2	0.6-1.2	20-Jun-06	15	8.3	<0.04	<0.1	<0.1	<0.1	<10	<10	<10	17
PL-TP3-SA1	0.0-0.6	20-Jun-06	5	8.9	<0.04	<0.1	<0.1	<0.1	<10	<10	14	20
PL-TP2-SA2 (Field Duplicate)	0.6-1.2	20-Jun-06	15	8.3	<0.04	<0.1	<0.1	<0.1	<10	<10	<10	16
PL-MW1-SA6	3.75-4.5	20-Jun-06	10	5.2	<0.04	<0.1	<0.1	<0.1	<10	<10	18	28
PL-MW2-SA2	0.75-1.5	20-Jun-06	10	9.2	<0.04	<0.1	<0.1	<0.1	<10	<10	<10	16
PL-MW3-SA1	0.0-0.75	20-Jun-06	5	6.4	<0.04	<0.1	<0.1	<0.1	<10	<10	37	25
Guidelines												
CCME (2004) Soil Quality Guidelines[3] Residential/Parkland Coarse-Grained[5] Surface soil (<1.5 m)	Soil Ingestion				11	22000	10000	150000	-	-	-	-
	Dermal Contact				25	220000	58000	>1000000	-	-	-	-
	Soil Inhalation				-	-	-	-	-	-	-	-
	Vapour Inhalation (basement)[6]				0.015	200	88	22	-	-	-	-
	Vapour Inhalation (slab-on-grade)[6]				0.0095	120	55	14	-	-	-	-
	Protection of Potable Groundwater[6]				0.030	0.37	0.082	11	-	-	-	-
	Protection of GW for Aquatic Life				1.0	0.10	50	37	-	-	-	-
	Eco Soil Contact				31	75	55	95	-	-	-	-
CCME (2001) Canada Wide Standards for Residential Land Use[4] Coarse-grained[5] Surface soil (<1.5 m)	Soil Ingestion				-	-	-	-	15000	8000	18000	25000
	Dermal Contact				-	-	-	-	RES	RES	RES	RES
	Vapour Inhalation (basement)[6]								50	150	NA	NA
	Vapour Inhalation (slab-on-grade)[6]				-	-	-	-	30	150	NA	NA
	Protection of Potable Groundwater[6]				-	-	-	-	860	1200	NA	NA
	Protection of GW for Aquatic Life				-	-	-	-	230	150	NA	NA
	Eco Soil Contact				-	-	-	-	130	450	400	2,800
CCME (2004) Soil Quality Guidelines[3] Residential/Parkland Fine -Grained[5] Subsoil (>1.5 m)	Soil Ingestion				-	-	-	-	-	-	-	-
	Dermal Contact				-	-	-	-	-	-	-	-
	Soil Inhalation				-	-	-	-	-	-	-	-
	Vapour Inhalation (basement)[6]				0.21	2600	1300	320	-	-	-	-
	Vapour Inhalation (slab-on-grade)[6]				0.22	2800	1400	340	-	-	-	-
	Protection of Potable Groundwater[6]				0.0068	0.08	0.018	2.4	-	-	-	-
	Protection of GW for Aquatic Life				-	-	-	-	-	-	-	-
	Eco Soil Contact				120	220	240	130	-	-	-	-
CCME (2001) Canada Wide Standards for Residential Land Use[4] Fine -Grained[5] Subsoil (>1.5 m)	Soil Ingestion				-	-	-	-	RES	RES	RES	RES
	Dermal Contact				-	-	-	-	RES	RES	RES	RES
	Vapour Inhalation (slab-on-grade)[6]				-	-	-	-	940	5200	NA	NA
	Protection of Potable Groundwater[6]				-	-	-	-	180	250	NA	NA
	Protection of GW for Aquatic Life				-	-	-	-	TBD	TBD	NA	NA
	Eco Soil Contact				-	-	-	-	750	2200	3500	10,000

Notes:

All results expressed in mg/kg or µg/g (ppm)

ND – below laboratory method detection limit

- applicable guidelines

- ' = no guideline established

nm – not monitored

[1] – Combustible soil vapour measured with GasTechtor 1238ME (GasTech) calibrated to hexane and set to methane elimination.

[2] – Volatile soil vapour measured with MiniRae 2000 Photoionization Detector (PID)

[3] – Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines Soil Quality Guidelines (1991, last updated 2004)

[4] – CCME, 2001. *Canada-Wide Standards for Petroleum Hydrocarbons (PHC) for Soil* in Coarse-Grained Soil for Residentidal Land Use

[5] – Surface soil: Coarse-grained soil defined as having a median grain size (D50) >=75 microns; Subsurface soil: Fine-grained soil defined as having a median grain size (D50) <75 microns;

[6] – Pathway not considered applicable

BOLD and Shaded = exceeds the applicable guidelines

Table 3: Soil Analytical Results – Volatile Organic Compounds (VOCs)

Parameter	Site/Sample Number/Depth (mbg)/Date						CCME 2004 SQG[2] Residential/ Parkland
	PL-TP1-SA3	PL-TP2-SA2	PL-TP3-SA1	PL-MW1-SA6	PL-MW2-SA2	PL-MW3-SA1	
	1.2-2.0	0.6-1.2	0.0-0.6	3.75-4.5	0.75-1.5	0.0-0.75	
	19-Jun-06	19-Jun-06	19-Jun-06	19-Jun-06	19-Jun-06	19-Jun-06	
Soil Vapours[1] (ppm)	**7.8**	**8.3**	**8.9**	**5.2**	**9.2**	**6.4**	
1,1,1,2-tetrachloroethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
1,1,1-trichloroethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
1,1,2,2-tetrachloroethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
1,1,2-trichloroethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
1,1-dichloroethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
1,1-dichloroethene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
1,2,3-trichlorobenzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2
1,2,4-trichlorobenzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2
1,2-dibromoethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
1,2-dichlorobenzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1
1,2-dichloroethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
1,2-dichloropropane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
1,3-dichlorobenzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1
1,4-dichlorobenzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1
Bromodichloromethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Bromoform	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Bromomethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-
Carbon tetrachloride	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
Chlorobenzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1
Chlorodibromomethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Chloroethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Chloroform	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
Chloromethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-
cis-1,2-dichloroethene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
cis-1,3-dichloropropene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Dichloromethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
Styrene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
Tetrachloroethene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
trans-1,2-dichloroethene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5
trans-1,3-dichloropropene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Trichloroethene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3
Trichlorofluoromethane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Vinyl chloride	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-

Notes:

All results expressed in mg/kg (ppm)

nc = no guideline established

< – less than laboratory method detection limit

[1] – Volatile soil vapour measured with MiniRae 2000 Photoionization Detector (PID)

[2] – Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines Soil Quality Guidelines (1991, Last updated 2004) - parkland land use guidelines

Table 4: Soil Analytical Results - Metals

Parameter	Site/Sample Number/Depth (mbg)/Date			CCME 2004 SQG[1] Residential/ Parkland
	PL-TP2-SA2	PL-MW1-SA6	PL-MW3-SA1	
	0.6-1.2	3.75-4.5	0-0.75	
	20-Jun-06	20-Jun-06	20-Jun-06	
Aluminum	848	9030	3510	-
Antimony	<2	<2	<2	20
Arsenic	<1	8	2	12
Barium	9.4	216	48.9	500
Beryllium	<0.1	0.5	0.2	4
Bismuth	<10	<10	<10	-
Boron	<0.1	0.2	0.1	-
Cadmium	<0.2	0.9	<0.2	10
Calcium	29000	23300	22800	-
Chromium	2	18	6	64
Cobalt	0.9	10.2	2.5	50
Copper	<2	25	<2	63
Iron	1770	23100	9940	-
Lead	<10	12	<10	140
Lithium	1.6	11.7	3.4	-
Magnesium	3820	9580	5890	-
Manganese	56.9	339	143	-
Molybdenum	<0.5	1.3	<0.5	10
Nickel	<4	30	6	50
Phosphorus	73	798	206	-
Potassium	168	1140	429	-
Selenium	<0.5	<0.5	<0.5	1
Silver	<1	<1	<1	20
Sodium	22	106	24	-
Strontium	14.7	48.4	16.4	-
Sulphur	71	135	81	-
Thallium	<1	<1	<1	1
Tin	<2	<2	<2	50
Titanium	41.6	150	88.2	-
Uranium	<0.2	1.3	0.2	-
Vanadium	3	35	12	130
Zinc	3.0	83	14	200
Zirconium	<1	3	<1	-

Notes:

All units expressed in mg/kg dry weight unless otherwise noted.

nc - no guideline established

< – below laboratory method detection limit

[1] – Canadian Council of Ministers of the Environment "Canadian Environmental Quality Guidelines - Soil Quality Guidelines" (1991, last updated 2004)

nd = not detected

Table 5: Soil Analytical Results - Glycols

Parameter	Site/Sample Number/Depth (mbg)/Date		CCME 2004 SQG[1] Residential/ Parkland
	PL-TP2-SA2	PL-MW2-SA2	
	0.6-1.2	0.75-1.5	
	20-Jun-06	20-Jun-06	
Ethylene Glycol	<2.1	<2.1	960
Diethylene Glycol	<3.2	<3.2	-
Triethylene Glycol	<6.4	<6.4	-
Tetraethylene Glycol	<11	<11	-
Propylene Glycol	<11	<11	-

Notes:

All units expressed in mg/kg dry weight unless otherwise noted.

nc - no guideline established

< – below laboratory method detection limit

[1] – Canadian Council of Ministers of the Environment "Canadian Environmental Quality Guidelines - Soil Quality Guidelines" (1991, last updated 2004)

nd = not detected

Table 6: Groundwater Monitoring Results

Monitoring Well	Date	Well Elevation[1] (m)	VHV[2] (ppm)	CHV[3] (ppm)	Depth to Groundwater (mbtop)	Apparent Thickness of PSL[4] (m)	Groundwater Elevation (m)
Pine Lake - Wood Buffalo National Park							
PL-MW1	12-Jul-06	100.75	0.5	100	dry		
PL-MW2	12-Jul-06	100.58	1.8	100	dry		
PL-MW3	12-Jul-06	100.68	2.7	100	dry		

Notes:

mbtop – metres below top of pipe

nd – not detected

[1] – Well elevation measured with respect to an assumed benchmark.

[2] – Volatile headspace vapour measured with MiniRae 2000 Photoionization Detector (PID)

[3] – Combustible headspace vapour measured with Gastechtor 1238 ME

[4] – PSL = Phase-separated liquid

Table 7: QA/QC Samples - Soil Analytical Results - Petroleum Hydrocarbons Constituents

Location	Benzene	Toluene	Ethyl-benzene	Xylenes (o, m & p)	F1 (C_6-C_{10})	F2 (>C_{10}-C_{16})	F3 (>C_{16}-C_{34})	F4 (>C_{34})
PL-TP2-SA2	<0.04	<0.1	<0.1	<0.1	<10	<10	<10	17
PL-TP2-SA2 (Field Duplicate)	<0.04	<0.1	<0.1	<0.1	<10	<10	<10	16
RPD (%)	0	0	0	0	0	0	0	6

Table 8 – QA/QC Samples - Groundwater Analytical Results - Petroleum Hydrocarbons Constituents

Location	Benzene	Toluene	Ethyl-benzene	Xylenes	F1 (C_6-C_{10})	F2 (>C_{10}-C_{16})
HC-MW13	0.0005	<0.0005	0.0011	<0.001	<0.1	0.2
HC-MW13 (Field Duplicate)	<0.0005	<0.0005	0.0009	<0.001	<0.1	0.3
RPD (%)	0	0	20	0	0	40

Table 9 – QA/QC Samples - Groundwater Analytical Results - Polycyclic Aromatic Hydrocarbons

Parameters	Site/Sample Number/Date		RPD (%)
	HC-MW13	HC-MW13 (Field Duplicate)	
	13-Jul-06	13-Jul-06	
Naphthalene	1	2	67
Quinoline	<0.1	<0.1	0
Acenaphthylene	<0.1	<0.1	0
Acenaphthene	<0.1	<0.1	0
Fluorene	<0.1	<0.1	0
Phenanthrene	<0.3	<0.3	0
Anthracene	<0.1	<0.1	0
Acridine	<0.1	<0.1	0
Fluoranthene	<0.1	<0.1	0
Pyrene	<0.1	<0.1	0
Benzo(a)anthracene	<0.1	<0.1	0
Chrysene	<0.1	<0.1	0
Benzo(b&j)fluoranthene	<0.1	<0.1	0
Benzo(k)fluoranthene	<0.1	<0.1	0
Benzo(a)pyrene	<0.01	<0.01	0
Indeno(1,2,3-cd)pyrene	<0.1	<0.1	0
Dibenz(a,h)anthracene	<0.1	<0.1	0
Benzo(g,h,i)perylene	<0.1	<0.1	0

Maxxam Analytics Inc

Your Project #: 1013548 WOOD BUFFALO
Coding # NSD016400
Your C.O.C. #: 133575

Attention: STEVE MOSSMAN
JACQUES WHITFORD LTD.
500,708-11AVE S.W
CALGARY, AB
CANADA T2R 0E4

Report Date: 2006/07/20

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A630861
Received: 2006/07/14, 15:50

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX in Water by HS GC/MS	3	2006/07/18	2006/07/18	EENVSOP-00004 V.2	EPA SW 846 8260 B
F1-BTEX Water Calc	6	2006/07/15	2006/07/15		
CCME Hydrocarbons (F1; HSGC/MS)	1	2006/07/17	2006/07/18	EENVSOP-00002 V.5	
CCME Hydrocarbons (F1; HSGC/MS)	5	2006/07/18	2006/07/18	EENVSOP-00002 V.5	
CCME Hydrocarbons in Water (F2; C10-C16)	6	2006/07/19	2006/07/19	OR-414 v1.0	EPA 8015D SW846
Mercury (Dissolved)	3	2006/07/19	2006/07/19	EENVSOP-00031 V.1	EPA 245.1
Elements by ICP-AES (dissolved)	3	2006/07/18	2006/07/18	EENVSOP-00034 V.1	EPA SW846 6010B
ICPMS - Fresh Aquatic Life - Dissolved	3	N/A	2006/07/17	EENVSOP-00123 V.1	EPA SW 846 6020 A
PAH in Water by GC/MS (Extended)	3	2006/07/17	2006/07/19	OR-405 v2.1	EPA 3510C/8270D
VOCs in Water by P&T GC/MS (Std List)	3	N/A	2006/07/19	EENVSOP-00003 V.3	EPA SW846 8260B

Encryption Key Sisavath Phonharath 20 Jul 2006 06:54:14 -06:00

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

SISAVATH PHONHARATH, Project Manager
Email: sisavath.phonharath@maxxamanalytics.com
Phone# (780) 465-1212

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For Service Group specific validation please refer to the Validation Signature Page

Maxxam Analytics Inc

Maxxam Job #: A630861
Report Date: 2006/07/20

JACQUES WHITFORD LTD.
Client Project #: 1013548 WOOD BUFFALO
Site Reference:
Sampler Initials: JPH

CCME METALS (WATER)

Maxxam ID		C00843	C00844	C00845		
Sampling Date		2006/07/13	2006/07/13	2006/07/13		
COC Number		133575	133575	133575		
	Units	**PC-MW4**	**PC-MW1**	**PC-MW3**	**RDL**	**QC Batch**
Elements						
Dissolved Silver (Ag)	ug/L	0.2	<0.1	<0.1	0.1	1199078
Dissolved Aluminum (Al)	ug/L	<5	135	563	5	1199078
Dissolved Arsenic (As)	ug/L	<5	<5	<5	5	1199078
Dissolved Cadmium (Cd)	ug/L	0.07	0.07	0.14	0.01	1199078
Dissolved Copper (Cu)	ug/L	<2	<2	5	2	1199078
Dissolved Lead (Pb)	ug/L	<1	<1	3	1	1199078
Dissolved Antimony (Sb)	ug/L	<1	<1	<1	1	1199078
Dissolved Selenium (Se)	ug/L	8	<1	9	1	1199078
Dissolved Thallium (Tl)	ug/L	<0.8	<0.8	<0.8	0.8	1199078
Dissolved Uranium (U)	ug/L	67	2	4	1	1199078
Dissolved Metals by ICP						
Dissolved Barium (Ba)	mg/L	0.497	0.144	0.185	0.003	1200671
Dissolved Beryllium (Be)	mg/L	<0.001	<0.001	<0.001	0.001	1200671
Dissolved Bismuth (Bi)	mg/L	<0.2	<0.2	<0.2	0.2	1200671
Dissolved Boron (B)	mg/L	0.05	<0.05	0.13	0.05	1200671
Dissolved Calcium (Ca)	mg/L	267	259	125	0.05	1200671
Dissolved Chromium (Cr)	mg/L	<0.007	<0.007	<0.007	0.007	1200671
Dissolved Cobalt (Co)	mg/L	0.007	0.007	<0.005	0.005	1200671
Dissolved Iron (Fe)	mg/L	2.10	2.39	3.10	0.006	1200671
Dissolved Lithium (Li)	mg/L	0.05	<0.02	<0.02	0.02	1200671
Dissolved Magnesium (Mg)	mg/L	141	30.6	24.9	0.05	1200671
Dissolved Manganese (Mn)	mg/L	1.64	1.77	0.340	0.001	1200671
Dissolved Molybdenum (Mo)	mg/L	<0.006	<0.006	<0.006	0.006	1200671
Dissolved Nickel (Ni)	mg/L	0.017	0.008	0.009	0.008	1200671
Dissolved Phosphorus (P)	mg/L	<0.1	<0.1	0.2	0.1	1200671
Dissolved Potassium (K)	mg/L	4.1	6.8	2.0	0.2	1200671
Dissolved Silicon (Si)	mg/L	7.00	6.04	5.67	0.05	1200671
Dissolved Sodium (Na)	mg/L	252	30.9	26.7	0.05	1200671
Dissolved Strontium (Sr)	mg/L	1.44	0.47	0.24	0.01	1200671
Dissolved Sulphur (S)	mg/L	19.6	77.7	14.6	0.2	1200671
Dissolved Tin (Sn)	mg/L	<0.04	<0.04	<0.04	0.04	1200671
Dissolved Titanium (Ti)	mg/L	<0.006	<0.006	0.013	0.006	1200671
Dissolved Vanadium (V)	mg/L	<0.05	<0.05	<0.05	0.05	1200671

RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A630861
Report Date: 2006/07/20

JACQUES WHITFORD LTD.
Client Project #: 1013548 WOOD BUFFALO
Site Reference:
Sampler Initials: JPH

CCME METALS (WATER)

Maxxam ID		C00843	C00844	C00845		
Sampling Date		2006/07/13	2006/07/13	2006/07/13		
COC Number		133575	133575	133575		
	Units	**PC-MW4**	**PC-MW1**	**PC-MW3**	**RDL**	**QC Batch**
Dissolved Zinc (Zn)	mg/L	<0.005	<0.005	0.012	0.005	1200671
Dissolved Zirconium (Zr)	mg/L	<0.005	<0.005	<0.005	0.005	1200671
Mercury by CVAA						
Dissolved Mercury (Hg)	ug/L	<0.05	<0.05	<0.05	0.05	1202679

RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A630861
Report Date: 2006/07/20

JACQUES WHITFORD LTD.
Client Project #: 1013548 WOOD BUFFALO
Site Reference:
Sampler Initials: JPH

CCME PHC WATER PACKAGE (WATER)

Maxxam ID		C00846	C00847	C00848		
Sampling Date		2006/07/13	2006/07/13	2006/07/13		
COC Number		133575	133575	133575		
	Units	**HC-MW16**	**HC-MW13**	**HC-DUP**	**RDL**	**QC Batch**
Hydrocarbons						
F1 (C06-C10) - BTEX	ug/L	<100	<100	<100	100	1198957
F1 (C06-C10)	ug/L	<100	<100	<100	100	1200486
F2 (C10-C16 Hydrocarbons)	mg/L	<0.1	0.2	0.3	0.1	1202290
Volatiles						
Benzene	ug/L	<0.5	0.5	<0.5	0.5	1201031
Toluene	ug/L	<0.5	<0.5	<0.5	0.5	1201031
Ethylbenzene	ug/L	<0.5	1.1	0.9	0.5	1201031
o-Xylene	ug/L	<0.5	<0.5	<0.5	0.5	1201031
m & p-Xylene	ug/L	<1	<1	<1	1	1201031
Xylenes (Total)	ug/L	<1	<1	<1	1	1201031
Surrogate Recovery (%)						
4-BROMOFLUOROBENZENE (sur.)	%	73	90	91	N/A	1200486
O-TERPHENYL (sur.)	%	92	93	93	N/A	1202290
4-BROMOFLUOROBENZENE (sur.)	%	104	105	105	N/A	1201031
D4-1,2-DICHLOROETHANE (sur.)	%	123	126	125	N/A	1201031
D8-TOLUENE (sur.)	%	98	97	97	N/A	1201031

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A630861
Report Date: 2006/07/20

JACQUES WHITFORD LTD.
Client Project #: 1013548 WOOD BUFFALO
Site Reference:
Sampler Initials: JPH

PAHS WATER CCME DRINKING WATER (WATER)

Maxxam ID		C00846	C00847	C00848		
Sampling Date		2006/07/13	2006/07/13	2006/07/13		
COC Number		133575	133575	133575		
	Units	**HC-MW16**	**HC-MW13**	**HC-DUP**	**RDL**	**QC Batch**
Polycyclic Aromatics						
Naphthalene	ug/L	<1	1	2	1	1200095
Quinoline	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Acenaphthylene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Acenaphthene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Fluorene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Phenanthrene	ug/L	<0.3	<0.3	<0.3	0.3	1200095
Anthracene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Acridine	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Pyrene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Benzo(a)anthracene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Chrysene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Benzo(b&j)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Benzo(k)fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Benzo(a)pyrene	ug/L	<0.01	<0.01	<0.01	0.01	1200095
Indeno(1,2,3-cd)pyrene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Dibenz(a,h)anthracene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Benzo(g,h,i)perylene	ug/L	<0.1	<0.1	<0.1	0.1	1200095
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	54	30	74	N/A	1200095
D12-BENZO(A)PYRENE (sur.)	%	42	30	62	N/A	1200095
D8-ACENAPHTHYLENE (sur.)	%	30	24 (1)	42	N/A	1200095
TERPHENYL-D14 (sur.)	%	29 (1)	23 (1)	42	N/A	1200095

N/A = Not Applicable
RDL = Reportable Detection Limit
(1) Please note that the recovery of some compounds are outside control limits however the overall quality control for this analysis meets our acceptability criteria.

Maxxam Analytics Inc

Maxxam Job #: A630861
Report Date: 2006/07/20

JACQUES WHITFORD LTD.
Client Project #: 1013548 WOOD BUFFALO
Site Reference:
Sampler Initials: JPH

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		C00843	C00844	C00845		
Sampling Date		2006/07/13	2006/07/13	2006/07/13		
COC Number		133575	133575	133575		
	Units	**PC-MW4**	**PC-MW1**	**PC-MW3**	**RDL**	**QC Batch**
Hydrocarbons						
F1 (C06-C10) - BTEX	ug/L	<100	<100	<100	100	1198957

RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A630861
Report Date: 2006/07/20

JACQUES WHITFORD LTD.
Client Project #: 1013548 WOOD BUFFALO
Site Reference:
Sampler Initials: JPH

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		C00843		C00844	C00845		
Sampling Date		2006/07/13		2006/07/13	2006/07/13		
COC Number		133575		133575	133575		
	Units	**PC-MW4**	**QC Batch**	**PC-MW1**	**PC-MW3**	**RDL**	**QC Batch**
Hydrocarbons							
F1 (C06-C10)	ug/L	<100	1199662	<100	<100	100	1200486
F2 (C10-C16 Hydrocarbons)	mg/L	<0.1	1202290	<0.1	<0.1	0.1	1202290
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	89	1199662	89	76	N/A	1200486
O-TERPHENYL (sur.)	%	98	1202290	98	93	N/A	1202290

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A630861
Report Date: 2006/07/20

JACQUES WHITFORD LTD.
Client Project #: 1013548 WOOD BUFFALO
Site Reference:
Sampler Initials: JPH

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		C00843	C00844	C00845		
Sampling Date		2006/07/13	2006/07/13	2006/07/13		
COC Number		133575	133575	133575		
	Units	**PC-MW4**	**PC-MW1**	**PC-MW3**	**RDL**	**QC Batch**
Volatiles						
Benzene	ug/L	<0.5	14.8	<0.5	0.5	1202311
Bromodichloromethane	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Bromoform	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Bromomethane	ug/L	<2	<2	<2	2	1202311
Carbon tetrachloride	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Chlorobenzene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Chlorodibromomethane	ug/L	<1	<1	<1	1	1202311
Chloroethane	ug/L	<1	<1	<1	1	1202311
Chloroform	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Chloromethane	ug/L	<2	<2	<2	2	1202311
1,2-dibromoethane	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,2-dichlorobenzene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,3-dichlorobenzene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,4-dichlorobenzene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,1-dichloroethane	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,2-dichloroethane	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,1-dichloroethene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
cis-1,2-dichloroethene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
trans-1,2-dichloroethene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Dichloromethane	ug/L	<2	<2	<2	2	1202311
1,2-dichloropropane	ug/L	<0.5	<0.5	<0.5	0.5	1202311
cis-1,3-dichloropropene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
trans-1,3-dichloropropene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Ethylbenzene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Styrene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,1,1,2-tetrachloroethane	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,1,2,2-tetrachloroethane	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Tetrachloroethene	ug/L	<0.5	<0.5	0.9	0.5	1202311
Toluene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
1,1,1-trichloroethane	ug/L	<0.5	<0.5	9.2	0.5	1202311
1,1,2-trichloroethane	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Trichloroethene	ug/L	<0.5	<0.5	4.5	0.5	1202311
Trichlorofluoromethane	ug/L	<0.5	<0.5	<0.5	0.5	1202311

RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A630861
Report Date: 2006/07/20

JACQUES WHITFORD LTD.
Client Project #: 1013548 WOOD BUFFALO
Site Reference:
Sampler Initials: JPH

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		C00843	C00844	C00845		
Sampling Date		2006/07/13	2006/07/13	2006/07/13		
COC Number		133575	133575	133575		
	Units	**PC-MW4**	**PC-MW1**	**PC-MW3**	**RDL**	**QC Batch**
Vinyl chloride	ug/L	<2	<2	<2	2	1202311
Xylenes (Total)	ug/L	<1	<1	<1	1	1202311
m & p-Xylene	ug/L	<1	<1	<1	1	1202311
o-Xylene	ug/L	<0.5	<0.5	<0.5	0.5	1202311
Total Trihalomethanes	ug/L	<0.5	<0.5	13.6	0.5	1202311
Surrogate Recovery (%)						
4-BROMOFLUOROBENZENE (sur.)	%	111	113	118	N/A	1202311
D4-1,2-DICHLOROETHANE (sur.)	%	103	104	103	N/A	1202311
D8-TOLUENE (sur.)	%	103	77	93	N/A	1202311

N/A = Not Applicable
RDL = Reportable Detection Limit

PAHS WATER CCME DRINKING WATER (WATER) Comments

MATRIX SPIKE PAH in Water by GC/MS (Extended): D8-ACENAPHTHYLENE AND TERPHENYL-D14 SURROGATES OUTSIDE ACCEPTANCE CRITERIA DUE TO MATRIX INTERFERENCE

Sample C00846-01 PAH in Water by GC/MS (Extended): TERPHENYL-D14 SURROGATE OUTSIDE ACCEPTANCE CRITERIA DUE TO MATRIX INTERFERENCE

Sample C00847-01 PAH in Water by GC/MS (Extended): D8-ACENAPHTHYLENE AND TERPHENYL-D14 SURROGATES OUTSIDE ACCEPTANCE CRITERIA DUE TO MATRIX INTERFERENCE

Results relate only to the items tested.

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE MOSSMAN
Client Project #: 1013548 WOOD BUFFALO
P.O. #:
Site Reference:

Quality Assurance Report

Maxxam Job Number: EA630861

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1199078 MS2	Calibration Check	Dissolved Silver (Ag)	2006/07/17		98	%	85 - 115
		Dissolved Aluminum (Al)	2006/07/17		96	%	85 - 115
		Dissolved Arsenic (As)	2006/07/17		102	%	85 - 115
		Dissolved Cadmium (Cd)	2006/07/17		100	%	85 - 115
		Dissolved Copper (Cu)	2006/07/17		105	%	85 - 115
		Dissolved Lead (Pb)	2006/07/17		102	%	85 - 115
		Dissolved Antimony (Sb)	2006/07/17		98	%	85 - 115
		Dissolved Selenium (Se)	2006/07/17		104	%	85 - 115
		Dissolved Thallium (Tl)	2006/07/17		102	%	85 - 115
		Dissolved Uranium (U)	2006/07/17		99	%	85 - 115
	MATRIX SPIKE	Dissolved Arsenic (As)	2006/07/17		103	%	80 - 120
		Dissolved Cadmium (Cd)	2006/07/17		94	%	80 - 120
		Dissolved Lead (Pb)	2006/07/17		97	%	80 - 120
		Dissolved Selenium (Se)	2006/07/17		106	%	80 - 120
		Dissolved Thallium (Tl)	2006/07/17		101	%	80 - 120
	BLANK	Dissolved Silver (Ag)	2006/07/17	<0.1		ug/L	
		Dissolved Aluminum (Al)	2006/07/17	<5		ug/L	
		Dissolved Arsenic (As)	2006/07/17	<5		ug/L	
		Dissolved Cadmium (Cd)	2006/07/17	<0.01		ug/L	
		Dissolved Copper (Cu)	2006/07/17	<2		ug/L	
		Dissolved Lead (Pb)	2006/07/17	<1		ug/L	
		Dissolved Antimony (Sb)	2006/07/17	<1		ug/L	
		Dissolved Selenium (Se)	2006/07/17	<1		ug/L	
		Dissolved Thallium (Tl)	2006/07/17	<0.8		ug/L	
		Dissolved Uranium (U)	2006/07/17	<1		ug/L	
	RPD	Dissolved Silver (Ag)	2006/07/17	NC		%	25
		Dissolved Aluminum (Al)	2006/07/17	NC		%	25
		Dissolved Arsenic (As)	2006/07/17	NC		%	25
		Dissolved Cadmium (Cd)	2006/07/17	NC		%	25
		Dissolved Copper (Cu)	2006/07/17	NC		%	25
		Dissolved Lead (Pb)	2006/07/17	NC		%	25
		Dissolved Antimony (Sb)	2006/07/17	NC		%	25
		Dissolved Selenium (Se)	2006/07/17	NC		%	25
		Dissolved Thallium (Tl)	2006/07/17	NC		%	25
		Dissolved Uranium (U)	2006/07/17	NC		%	25
1199662 KO	MATRIX SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		81	%	70 - 130
		F1 (C06-C10)	2006/07/18		85	%	70 - 130
	SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		73	%	70 - 130
		F1 (C06-C10)	2006/07/18		106	%	80 - 120
	BLANK	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		109	%	70 - 130
		F1 (C06-C10)	2006/07/18	<100		ug/L	
	RPD	F1 (C06-C10)	2006/07/18	NC		%	40
1200095 HG	MATRIX SPIKE [C00846-01]	D10-ANTHRACENE (sur.)	2006/07/19		51	%	30 - 130
		D12-BENZO(A)PYRENE (sur.)	2006/07/19		36	%	30 - 130
		D8-ACENAPHTHYLENE (sur.)	2006/07/19		27 (1)	%	30 - 130
		TERPHENYL-D14 (sur.)	2006/07/19		25 (1)	%	30 - 130
		Naphthalene	2006/07/19		68	%	30 - 130
		Quinoline	2006/07/19		45	%	30 - 130
		Acenaphthylene	2006/07/19		40	%	30 - 130
		Acenaphthene	2006/07/19		45	%	30 - 130
		Fluorene	2006/07/19		41	%	30 - 130
		Phenanthrene	2006/07/19		46	%	30 - 130
		Anthracene	2006/07/19		46	%	30 - 130
		Acridine	2006/07/19		34	%	30 - 130
		Fluoranthene	2006/07/19		41	%	30 - 130

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE MOSSMAN
Client Project #: 1013548 WOOD BUFFALO
P.O. #:
Site Reference:

Quality Assurance Report (Continued)

Maxxam Job Number: EA630861

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1200095 HG	MATRIX SPIKE						
	[C00846-01]	Pyrene	2006/07/19		42	%	30 - 130
		Benzo(a)anthracene	2006/07/19		41	%	30 - 130
		Chrysene	2006/07/19		45	%	30 - 130
		Benzo(b&j)fluoranthene	2006/07/19		45	%	30 - 130
		Benzo(k)fluoranthene	2006/07/19		41	%	30 - 130
		Benzo(a)pyrene	2006/07/19		44	%	30 - 130
		Indeno(1,2,3-cd)pyrene	2006/07/19		45	%	30 - 130
		Dibenz(a,h)anthracene	2006/07/19		61	%	30 - 130
		Benzo(g,h,i)perylene	2006/07/19		43	%	30 - 130
	SPIKE	D10-ANTHRACENE (sur.)	2006/07/19		61	%	30 - 130
		D12-BENZO(A)PYRENE (sur.)	2006/07/19		59	%	30 - 130
		D8-ACENAPHTHYLENE (sur.)	2006/07/19		51	%	30 - 130
		TERPHENYL-D14 (sur.)	2006/07/19		47	%	30 - 130
		Naphthalene	2006/07/19		38	%	30 - 130
		Quinoline	2006/07/19		33	%	30 - 130
		Acenaphthylene	2006/07/19		34	%	30 - 130
		Acenaphthene	2006/07/19		40	%	30 - 130
		Fluorene	2006/07/19		39	%	30 - 130
		Phenanthrene	2006/07/19		42	%	30 - 130
		Anthracene	2006/07/19		41	%	30 - 130
		Acridine	2006/07/19		36	%	30 - 130
		Fluoranthene	2006/07/19		38	%	30 - 130
		Pyrene	2006/07/19		38	%	30 - 130
		Benzo(a)anthracene	2006/07/19		35	%	30 - 130
		Chrysene	2006/07/19		43	%	30 - 130
		Benzo(b&j)fluoranthene	2006/07/19		40	%	30 - 130
		Benzo(k)fluoranthene	2006/07/19		39	%	30 - 130
		Benzo(a)pyrene	2006/07/19		40	%	30 - 130
		Indeno(1,2,3-cd)pyrene	2006/07/19		41	%	30 - 130
		Dibenz(a,h)anthracene	2006/07/19		56	%	30 - 130
		Benzo(g,h,i)perylene	2006/07/19		40	%	30 - 130
	BLANK	D10-ANTHRACENE (sur.)	2006/07/19		53	%	30 - 130
		D12-BENZO(A)PYRENE (sur.)	2006/07/19		51	%	30 - 130
		D8-ACENAPHTHYLENE (sur.)	2006/07/19		45	%	30 - 130
		TERPHENYL-D14 (sur.)	2006/07/19		40	%	30 - 130
		Naphthalene	2006/07/19	<1		ug/L	
		Quinoline	2006/07/19	<0.1		ug/L	
		Acenaphthylene	2006/07/19	<0.1		ug/L	
		Acenaphthene	2006/07/19	<0.1		ug/L	
		Fluorene	2006/07/19	<0.1		ug/L	
		Phenanthrene	2006/07/19	<0.3		ug/L	
		Anthracene	2006/07/19	<0.1		ug/L	
		Acridine	2006/07/19	<0.1		ug/L	
		Fluoranthene	2006/07/19	<0.1		ug/L	
		Pyrene	2006/07/19	<0.1		ug/L	
		Benzo(a)anthracene	2006/07/19	<0.1		ug/L	
		Chrysene	2006/07/19	<0.1		ug/L	
		Benzo(b&j)fluoranthene	2006/07/19	<0.1		ug/L	
		Benzo(k)fluoranthene	2006/07/19	<0.1		ug/L	
		Benzo(a)pyrene	2006/07/19	<0.01		ug/L	
		Indeno(1,2,3-cd)pyrene	2006/07/19	<0.1		ug/L	
		Dibenz(a,h)anthracene	2006/07/19	<0.1		ug/L	
		Benzo(g,h,i)perylene	2006/07/19	<0.1		ug/L	
	RPD	Naphthalene	2006/07/19	5.4		%	40
		Quinoline	2006/07/19	31.9		%	40

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE MOSSMAN
Client Project #: 1013548 WOOD BUFFALO
P.O. #:
Site Reference:

Quality Assurance Report (Continued)

Maxxam Job Number: EA630861

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1200095 HG	RPD	Acenaphthylene	2006/07/19	NC		%	40
		Acenaphthene	2006/07/19	NC		%	40
		Fluorene	2006/07/19	24.2		%	40
		Phenanthrene	2006/07/19	NC		%	40
		Anthracene	2006/07/19	NC		%	40
		Acridine	2006/07/19	NC		%	40
		Fluoranthene	2006/07/19	NC		%	40
		Pyrene	2006/07/19	2.6		%	40
		Benzo(a)anthracene	2006/07/19	NC		%	40
		Chrysene	2006/07/19	NC		%	40
		Benzo(b&j)fluoranthene	2006/07/19	NC		%	40
		Benzo(k)fluoranthene	2006/07/19	NC		%	40
		Benzo(a)pyrene	2006/07/19	24.1		%	40
		Indeno(1,2,3-cd)pyrene	2006/07/19	NC		%	40
		Dibenz(a,h)anthracene	2006/07/19	NC		%	40
		Benzo(g,h,i)perylene	2006/07/19	NC		%	40
1200486 KO	MATRIX SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		105	%	70 - 130
		F1 (C06-C10)	2006/07/18		88	%	70 - 130
	SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		114	%	70 - 130
		F1 (C06-C10)	2006/07/18		100	%	80 - 120
	BLANK	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		109	%	70 - 130
		F1 (C06-C10)	2006/07/18	<100		ug/L	
	RPD	F1 (C06-C10)	2006/07/18	NC		%	40
1200671 MC3	Calibration Check	Dissolved Barium (Ba)	2006/07/18		100	%	90 - 110
		Dissolved Beryllium (Be)	2006/07/18		106	%	90 - 110
		Dissolved Bismuth (Bi)	2006/07/18		102	%	90 - 110
		Dissolved Boron (B)	2006/07/18		104	%	90 - 110
		Dissolved Calcium (Ca)	2006/07/18		97	%	90 - 110
		Dissolved Chromium (Cr)	2006/07/18		101	%	90 - 110
		Dissolved Cobalt (Co)	2006/07/18		99	%	90 - 110
		Dissolved Iron (Fe)	2006/07/18		96	%	90 - 110
		Dissolved Lithium (Li)	2006/07/18		97	%	90 - 110
		Dissolved Magnesium (Mg)	2006/07/18		101	%	90 - 110
		Dissolved Manganese (Mn)	2006/07/18		100	%	90 - 110
		Dissolved Molybdenum (Mo)	2006/07/18		100	%	90 - 110
		Dissolved Nickel (Ni)	2006/07/18		101	%	90 - 110
		Dissolved Phosphorus (P)	2006/07/18		98	%	90 - 110
		Dissolved Potassium (K)	2006/07/18		100	%	90 - 110
		Dissolved Silicon (Si)	2006/07/18		110	%	90 - 110
		Dissolved Sodium (Na)	2006/07/18		104	%	90 - 110
		Dissolved Strontium (Sr)	2006/07/18		102	%	90 - 110
		Dissolved Tin (Sn)	2006/07/18		99	%	90 - 110
		Dissolved Titanium (Ti)	2006/07/18		98	%	90 - 110
		Dissolved Vanadium (V)	2006/07/18		101	%	90 - 110
		Dissolved Zinc (Zn)	2006/07/18		100	%	90 - 110
		Dissolved Zirconium (Zr)	2006/07/18		98	%	90 - 110
	MATRIX SPIKE	Dissolved Barium (Ba)	2006/07/18		100	%	80 - 120
		Dissolved Beryllium (Be)	2006/07/18		107	%	80 - 120
		Dissolved Boron (B)	2006/07/18		105	%	80 - 120
		Dissolved Chromium (Cr)	2006/07/18		83	%	80 - 120
		Dissolved Cobalt (Co)	2006/07/18		94	%	80 - 120
		Dissolved Lithium (Li)	2006/07/18		93	%	80 - 120
		Dissolved Manganese (Mn)	2006/07/18		103	%	80 - 120
		Dissolved Molybdenum (Mo)	2006/07/18		92	%	80 - 120
		Dissolved Nickel (Ni)	2006/07/18		101	%	80 - 120
		Dissolved Silicon (Si)	2006/07/18		100	%	80 - 120

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
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Site Reference:

Quality Assurance Report (Continued)

Maxxam Job Number: EA630861

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1200671 MC3	MATRIX SPIKE	Dissolved Strontium (Sr)	2006/07/18		102	%	80 - 120
		Dissolved Tin (Sn)	2006/07/18		93	%	80 - 120
		Dissolved Titanium (Ti)	2006/07/18		99	%	80 - 120
		Dissolved Vanadium (V)	2006/07/18		94	%	80 - 120
		Dissolved Zinc (Zn)	2006/07/18		95	%	80 - 120
	BLANK	Dissolved Barium (Ba)	2006/07/18	<0.003		mg/L	
		Dissolved Beryllium (Be)	2006/07/18	<0.001		mg/L	
		Dissolved Bismuth (Bi)	2006/07/18	<0.2		mg/L	
		Dissolved Boron (B)	2006/07/18	<0.05		mg/L	
		Dissolved Calcium (Ca)	2006/07/18	<0.05		mg/L	
		Dissolved Chromium (Cr)	2006/07/18	<0.007		mg/L	
		Dissolved Cobalt (Co)	2006/07/18	<0.005		mg/L	
		Dissolved Iron (Fe)	2006/07/18	<0.006		mg/L	
		Dissolved Lithium (Li)	2006/07/18	<0.02		mg/L	
		Dissolved Magnesium (Mg)	2006/07/18	<0.05		mg/L	
		Dissolved Manganese (Mn)	2006/07/18	<0.001		mg/L	
		Dissolved Molybdenum (Mo)	2006/07/18	<0.006		mg/L	
		Dissolved Nickel (Ni)	2006/07/18	<0.008		mg/L	
		Dissolved Phosphorus (P)	2006/07/18	<0.1		mg/L	
		Dissolved Potassium (K)	2006/07/18	<0.2		mg/L	
		Dissolved Silicon (Si)	2006/07/18	<0.05		mg/L	
		Dissolved Sodium (Na)	2006/07/18	<0.05		mg/L	
		Dissolved Strontium (Sr)	2006/07/18	<0.01		mg/L	
		Dissolved Sulphur (S)	2006/07/18	<0.2		mg/L	
		Dissolved Tin (Sn)	2006/07/18	<0.04		mg/L	
		Dissolved Titanium (Ti)	2006/07/18	<0.006		mg/L	
		Dissolved Vanadium (V)	2006/07/18	<0.05		mg/L	
		Dissolved Zinc (Zn)	2006/07/18	<0.005		mg/L	
		Dissolved Zirconium (Zr)	2006/07/18	<0.005		mg/L	
	RPD	Dissolved Barium (Ba)	2006/07/18	2.1		%	25
		Dissolved Beryllium (Be)	2006/07/18	NC		%	25
		Dissolved Bismuth (Bi)	2006/07/18	NC		%	25
		Dissolved Boron (B)	2006/07/18	1.6		%	25
		Dissolved Calcium (Ca)	2006/07/18	3.7		%	25
		Dissolved Chromium (Cr)	2006/07/18	NC		%	25
		Dissolved Cobalt (Co)	2006/07/18	2.0		%	25
		Dissolved Iron (Fe)	2006/07/18	2.3		%	25
		Dissolved Lithium (Li)	2006/07/18	NC		%	25
		Dissolved Magnesium (Mg)	2006/07/18	4.4		%	25
		Dissolved Manganese (Mn)	2006/07/18	2.5		%	25
		Dissolved Molybdenum (Mo)	2006/07/18	NC		%	25
		Dissolved Nickel (Ni)	2006/07/18	2.7		%	25
		Dissolved Phosphorus (P)	2006/07/18	11.9		%	25
		Dissolved Potassium (K)	2006/07/18	2.4		%	25
		Dissolved Silicon (Si)	2006/07/18	1.9		%	25
		Dissolved Sodium (Na)	2006/07/18	1.4		%	25
		Dissolved Strontium (Sr)	2006/07/18	2.4		%	25
		Dissolved Sulphur (S)	2006/07/18	3.7		%	25
		Dissolved Tin (Sn)	2006/07/18	NC		%	25
		Dissolved Titanium (Ti)	2006/07/18	NC		%	25
		Dissolved Vanadium (V)	2006/07/18	NC		%	25
		Dissolved Zinc (Zn)	2006/07/18	NC		%	25
		Dissolved Zirconium (Zr)	2006/07/18	0.08		%	25
1201031 CD1	MATRIX SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		105	%	70 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2006/07/18		121	%	70 - 130
		D8-TOLUENE (sur.)	2006/07/18		97	%	70 - 130

Maxxam Analytics Inc

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P.O. #:
Site Reference:

Quality Assurance Report (Continued)

Maxxam Job Number: EA630861

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1201031 CD1	MATRIX SPIKE	Benzene	2006/07/18		87	%	70 - 130
		Toluene	2006/07/18		96	%	70 - 130
		Ethylbenzene	2006/07/18		87	%	70 - 130
		o-Xylene	2006/07/18		98	%	70 - 130
		m & p-Xylene	2006/07/18		81	%	70 - 130
	SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		104	%	70 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2006/07/18		119	%	70 - 130
		D8-TOLUENE (sur.)	2006/07/18		100	%	70 - 130
		Benzene	2006/07/18		94	%	70 - 130
		Toluene	2006/07/18		98	%	70 - 130
		Ethylbenzene	2006/07/18		94	%	70 - 130
		o-Xylene	2006/07/18		97	%	70 - 130
		m & p-Xylene	2006/07/18		100	%	70 - 130
	BLANK	4-BROMOFLUOROBENZENE (sur.)	2006/07/18		103	%	70 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2006/07/18		116	%	70 - 130
		D8-TOLUENE (sur.)	2006/07/18		100	%	70 - 130
		Benzene	2006/07/18	<0.5		ug/L	
		Toluene	2006/07/18	<0.5		ug/L	
		Ethylbenzene	2006/07/18	<0.5		ug/L	
		o-Xylene	2006/07/18	<0.5		ug/L	
		m & p-Xylene	2006/07/18	<1		ug/L	
		Xylenes (Total)	2006/07/18	<1		ug/L	
	RPD	Benzene	2006/07/18	0.2		%	40
		Toluene	2006/07/18	NC		%	40
		Ethylbenzene	2006/07/18	NC		%	40
		o-Xylene	2006/07/18	2.5		%	40
		m & p-Xylene	2006/07/18	NC		%	40
		Xylenes (Total)	2006/07/18	NC		%	40
1202290 JM5	MATRIX SPIKE [C00844-01]	O-TERPHENYL (sur.)	2006/07/19		97	%	70 - 130
		F2 (C10-C16 Hydrocarbons)	2006/07/19		83	%	70 - 130
	SPIKE	O-TERPHENYL (sur.)	2006/07/19		96	%	70 - 130
		F2 (C10-C16 Hydrocarbons)	2006/07/19		84	%	80 - 120
	BLANK	O-TERPHENYL (sur.)	2006/07/19		92	%	70 - 130
		F2 (C10-C16 Hydrocarbons)	2006/07/19	<0.1		mg/L	
	RPD [C00843-01]	F2 (C10-C16 Hydrocarbons)	2006/07/19	NC		%	40
1202311 MC1	MATRIX SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/07/19		97	%	70 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2006/07/19		99	%	70 - 130
		D8-TOLUENE (sur.)	2006/07/19		97	%	70 - 130
		Benzene	2006/07/19		96	%	70 - 130
		Bromodichloromethane	2006/07/19		98	%	70 - 130
		Bromoform	2006/07/19		98	%	70 - 130
		Bromomethane	2006/07/19		90	%	70 - 130
		Carbon tetrachloride	2006/07/19		95	%	70 - 130
		Chlorobenzene	2006/07/19		98	%	70 - 130
		Chlorodibromomethane	2006/07/19		94	%	70 - 130
		Chloroethane	2006/07/19		98	%	70 - 130
		Chloroform	2006/07/19		98	%	70 - 130
		Chloromethane	2006/07/19		119	%	70 - 130
		1,2-dibromoethane	2006/07/19		93	%	70 - 130
		1,2-dichlorobenzene	2006/07/19		95	%	70 - 130
		1,3-dichlorobenzene	2006/07/19		92	%	70 - 130
		1,4-dichlorobenzene	2006/07/19		95	%	70 - 130
		1,1-dichloroethane	2006/07/19		93	%	70 - 130
		1,2-dichloroethane	2006/07/19		95	%	70 - 130
		1,1-dichloroethene	2006/07/19		99	%	70 - 130

Maxxam Analytics Inc

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Attention: STEVE MOSSMAN
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P.O. #:
Site Reference:

Quality Assurance Report (Continued)

Maxxam Job Number: EA630861

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1202311 MC1	MATRIX SPIKE	cis-1,2-dichloroethene	2006/07/19		96	%	70 - 130
		trans-1,2-dichloroethene	2006/07/19		92	%	70 - 130
		Dichloromethane	2006/07/19		77	%	70 - 130
		1,2-dichloropropane	2006/07/19		96	%	70 - 130
		cis-1,3-dichloropropene	2006/07/19		91	%	70 - 130
		trans-1,3-dichloropropene	2006/07/19		91	%	70 - 130
		Ethylbenzene	2006/07/19		86	%	70 - 130
		Styrene	2006/07/19		98	%	70 - 130
		1,1,1,2-tetrachloroethane	2006/07/19		96	%	70 - 130
		1,1,2,2-tetrachloroethane	2006/07/19		97	%	70 - 130
		Tetrachloroethene	2006/07/19		95	%	70 - 130
		Toluene	2006/07/19		94	%	70 - 130
		1,1,1-trichloroethane	2006/07/19		99	%	70 - 130
		1,1,2-trichloroethane	2006/07/19		103	%	70 - 130
		Trichloroethene	2006/07/19		102	%	70 - 130
		Trichlorofluoromethane	2006/07/19		103	%	70 - 130
		Vinyl chloride	2006/07/19		108	%	70 - 130
		m & p-Xylene	2006/07/19		96	%	70 - 130
		o-Xylene	2006/07/19		99	%	70 - 130
	SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/07/19		101	%	70 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2006/07/19		99	%	70 - 130
		D8-TOLUENE (sur.)	2006/07/19		98	%	70 - 130
		Benzene	2006/07/19		89	%	70 - 130
		Bromodichloromethane	2006/07/19		90	%	70 - 130
		Bromoform	2006/07/19		88	%	70 - 130
		Bromomethane	2006/07/19		86	%	70 - 130
		Carbon tetrachloride	2006/07/19		89	%	70 - 130
		Chlorobenzene	2006/07/19		90	%	70 - 130
		Chlorodibromomethane	2006/07/19		87	%	70 - 130
		Chloroethane	2006/07/19		91	%	70 - 130
		Chloroform	2006/07/19		92	%	70 - 130
		Chloromethane	2006/07/19		121	%	70 - 130
		1,2-dibromoethane	2006/07/19		86	%	70 - 130
		1,2-dichlorobenzene	2006/07/19		90	%	70 - 130
		1,3-dichlorobenzene	2006/07/19		90	%	70 - 130
		1,4-dichlorobenzene	2006/07/19		91	%	70 - 130
		1,1-dichloroethane	2006/07/19		117	%	70 - 130
		1,2-dichloroethane	2006/07/19		92	%	70 - 130
		1,1-dichloroethene	2006/07/19		90	%	70 - 130
		cis-1,2-dichloroethene	2006/07/19		91	%	70 - 130
		trans-1,2-dichloroethene	2006/07/19		105	%	70 - 130
		Dichloromethane	2006/07/19		90	%	70 - 130
		1,2-dichloropropane	2006/07/19		87	%	70 - 130
		cis-1,3-dichloropropene	2006/07/19		85	%	70 - 130
		trans-1,3-dichloropropene	2006/07/19		86	%	70 - 130
		Ethylbenzene	2006/07/19		84	%	70 - 130
		Styrene	2006/07/19		89	%	70 - 130
		1,1,1,2-tetrachloroethane	2006/07/19		90	%	70 - 130
		1,1,2,2-tetrachloroethane	2006/07/19		86	%	70 - 130
		Tetrachloroethene	2006/07/19		94	%	70 - 130
		Toluene	2006/07/19		86	%	70 - 130
		1,1,1-trichloroethane	2006/07/19		90	%	70 - 130
		1,1,2-trichloroethane	2006/07/19		92	%	70 - 130
		Trichloroethene	2006/07/19		92	%	70 - 130
		Trichlorofluoromethane	2006/07/19		91	%	70 - 130
		Vinyl chloride	2006/07/19		98	%	70 - 130

Maxxam Analytics Inc

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P.O. #:
Site Reference:

Quality Assurance Report (Continued)

Maxxam Job Number: EA630861

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1202311 MC1	SPIKE	m & p-Xylene	2006/07/19		88	%	70 - 130
		o-Xylene	2006/07/19		90	%	70 - 130
	BLANK	4-BROMOFLUOROBENZENE (sur.)	2006/07/19		107	%	70 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2006/07/19		108	%	70 - 130
		D8-TOLUENE (sur.)	2006/07/19		104	%	70 - 130
		Benzene	2006/07/19	<0.5		ug/L	
		Bromodichloromethane	2006/07/19	<0.5		ug/L	
		Bromoform	2006/07/19	<0.5		ug/L	
		Bromomethane	2006/07/19	<2		ug/L	
		Carbon tetrachloride	2006/07/19	<0.5		ug/L	
		Chlorobenzene	2006/07/19	<0.5		ug/L	
		Chlorodibromomethane	2006/07/19	<1		ug/L	
		Chloroethane	2006/07/19	<1		ug/L	
		Chloroform	2006/07/19	<0.5		ug/L	
		Chloromethane	2006/07/19	<2		ug/L	
		1,2-dibromoethane	2006/07/19	<0.5		ug/L	
		1,2-dichlorobenzene	2006/07/19	<0.5		ug/L	
		1,3-dichlorobenzene	2006/07/19	<0.5		ug/L	
		1,4-dichlorobenzene	2006/07/19	<0.5		ug/L	
		1,1-dichloroethane	2006/07/19	<0.5		ug/L	
		1,2-dichloroethane	2006/07/19	<0.5		ug/L	
		1,1-dichloroethene	2006/07/19	<0.5		ug/L	
		cis-1,2-dichloroethene	2006/07/19	<0.5		ug/L	
		trans-1,2-dichloroethene	2006/07/19	<0.5		ug/L	
		Dichloromethane	2006/07/19	<2		ug/L	
		1,2-dichloropropane	2006/07/19	<0.5		ug/L	
		cis-1,3-dichloropropene	2006/07/19	<0.5		ug/L	
		trans-1,3-dichloropropene	2006/07/19	<0.5		ug/L	
		Ethylbenzene	2006/07/19	<0.5		ug/L	
		Styrene	2006/07/19	<0.5		ug/L	
		1,1,1,2-tetrachloroethane	2006/07/19	<0.5		ug/L	
		1,1,2,2-tetrachloroethane	2006/07/19	<0.5		ug/L	
		Tetrachloroethene	2006/07/19	<0.5		ug/L	
		Toluene	2006/07/19	<0.5		ug/L	
		1,1,1-trichloroethane	2006/07/19	<0.5		ug/L	
		1,1,2-trichloroethane	2006/07/19	<0.5		ug/L	
		Trichloroethene	2006/07/19	<0.5		ug/L	
		Trichlorofluoromethane	2006/07/19	<0.5		ug/L	
		Vinyl chloride	2006/07/19	<2		ug/L	
		Xylenes (Total)	2006/07/19	<1		ug/L	
		m & p-Xylene	2006/07/19	<1		ug/L	
		o-Xylene	2006/07/19	<0.5		ug/L	
		Total Trihalomethanes	2006/07/19	<0.5		ug/L	
	RPD	Benzene	2006/07/19	NC		%	40
		1,2-dibromoethane	2006/07/19	NC		%	40
		1,2-dichloroethane	2006/07/19	NC		%	40
		Ethylbenzene	2006/07/19	NC		%	40
		Toluene	2006/07/19	NC		%	40
		Xylenes (Total)	2006/07/19	NC		%	40
		m & p-Xylene	2006/07/19	NC		%	40
		o-Xylene	2006/07/19	NC		%	40
1202679 YY1	Calibration Check	Dissolved Mercury (Hg)	2006/07/19		106	%	85 - 115
	MATRIX SPIKE	Dissolved Mercury (Hg)	2006/07/19		95	%	85 - 115
	BLANK	Dissolved Mercury (Hg)	2006/07/19	<0.05		ug/L	
	RPD	Dissolved Mercury (Hg)	2006/07/19	NC		%	25

NC = Non-calculable

Edmonton: 9331 - 48th Street T6B 2R4 Telephone(780) 468-3500 FAX(780) 466-3332
Edmonton: 9619 - 42 Avenue T6E 5R2 Telephone(780) 465-1212 FAX(780) 450-4187

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE MOSSMAN
Client Project #: 1013548 WOOD BUFFALO
P.O. #:
Site Reference:

Quality Assurance Report (Continued)

Maxxam Job Number: EA630861

RPD = Relative Percent Difference
(1) Please note that the recovery of some compounds are outside control limits however the overall quality control for this analysis meets our acceptability criteria.

Edmonton: 9331 - 48th Street T6B 2R4 Telephone(780) 468-3500 FAX(780) 466-3332
Edmonton: 9619 - 42 Avenue T6E 5R2 Telephone(780) 465-1212 FAX(780) 450-4187

Maxxam Analytics Inc

Validation Signature Page

Maxxam Job #: A630861

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

HEATHER GROVES,

MICHELLE COX,

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CAEAL have approved this reporting process and electronic report format.

1546/4831

Maxxam Analytics Inc

☐ Calgary: 2021 – 41st Ave. NE, T2E 6P2 Ph: (403) 291-3077 Fax: (403) 291-9468 Toll-free: (800) 386-7247
☒ Edmonton: 9619 – 42 Ave., T6E 5R2 Ph: (780) 465-1212 Fax: (780) 450-4187 Toll-free: (877) 465-8889
www.maxxamanalytics.com

ANALYTICAL REQUEST FORM

Page: 1 of 1

Invoice To: Require Report? Yes ☒ No ☐

Company Name: JACQUES WHITFORD
Contact Name: STEVE MOSSMAN
Address: CALGARY
PC:
Phone / Fax #: Ph: 403-781-5458 Fax: 403-268-7116

Report To:
STEVE MOSSMAN
JW · CALGARY
PC:
Ph: Fax:

PO # / AFE #:
Quotation #:
Project #: 1013548
Project Name: WOOD BUFFALO
Location:
Sampler's Initials: JPH

REGULATORY REQUIREMENTS:
☐ AT1 - Soil Contamination ☐ PST
☐ CCME ☐ CDWQG
☐ CCME FWAL ☐ G50
☐ Regulatory Limits to appear on Final report

REPORT DISTRIBUTION:
☐ Mail ☐ Fax
☒ PDF ☐ Excel ☐ Other:
☐ Email: smossman@jacqueswhitford.com

SERVICE REQUESTED:
☐ RUSH (Please ensure you contact the lab)
Date Required:
☒ REGULAR Turnaround

METALS: (WATERS):
☐ Total ☐ Extractable ☒ Dissolved

ANALYSIS REQUESTED

	Sample Identification	Matrix	Date/Time Sampled	Sample Type Grab/Comp	Hold > 60 Days	Sample Container #	Dissolved metals	BTEX	F1	F2	VOC	PAH
1	PC-MW4	GW	July 13/06			6	X	X	X	X	X	
2	PC-MW1	↓	↓			6	X	X	X	X	X	
3	PC-MW3	↓	↓			6	X	X	X	X	X	
4												
5	HC-MW16	GW	July 13/06			7		X	X	X		X
6	HC-MW13	↓	↓			7		X	X	X		X
7	HC-DUP	↓	↓			7		X	X	X		X
8												
9												
10												
11												
12												

Handwritten on analysis columns: BTEX, F1, F2 – CCME PHC w/ turnoff BTEX; T-ICPDE-W; T-VOCPT-W; PAHWCCME

**For water samples, please indicate if sample container has been preserved (P) and/or filtered (F).

Relinquished By: JEFF HUNTER Date/Time: July 14/06
Signature: [signature]

COMMENTS/SPECIAL INSTRUCTIONS: Dissolved metals samples were field filtered & preserved (HNO3)

Received: July 14/06 3:50 RS

Temperature: 0, 2, 2

C of C# 133575

Maxxam Analytics Inc

Your Project #: 1013548
Site: PINE LAKE/WOOD BUFFALO PARK
Coding # NSD016300
Your C.O.C. #: 133604

Attention: STEVE BOURN
JACQUES WHITFORD LTD.
YELLOWKNIFE
PO BOX 1680
Suite 201 5103 51 Avenue
Yellowknife, NT
Canada X1A 2P3

Report Date: 2006/06/30

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A626999
Received: 2006/06/23, 17:15

Sample Matrix: Leachate
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX in Leachates by P&T GC/MS	1	2006/06/27	2006/06/28	EENVSOP-00003 V.3	EPA SW846 EPA 1311
Mercury (Leachable)	1	2006/06/27	2006/06/27	EENVSOP-00031 V.1	EPA 245.1
ICP Metals on leachate	1	N/A	2006/06/27	EENVSOP-00034 V.1	EPA SW846 6010B

Sample Matrix: Soil
Samples Received: 27

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	6	N/A	2006/06/27	EENVSOP-00034 V.1	SSMA 12.2.2
BTEX by HS GC/MS (MeOH extract)	10	2006/06/25	2006/06/27	EENVSOP-00004 V.2	EPA SW-846 8260B/502
Chloride by IC (Soluble)	1	N/A	2006/06/26	EENVSOP-00055 V.1	SM 4110 B
Chromium, Hexavalent (soil)	6	2006/06/27	2006/06/27	EENVSOP-00067 V.2	SM
F1-BTEX Soil Cal	19	2006/06/26	2006/06/26		
CCME Hydrocarbons (F1; MeOH; HSGC)	9	2006/06/25	2006/06/27	EENVSOP-00002 V.5	
CCME Hydrocarbons (F1; MeOH; HSGC)	7	2006/06/25	2006/06/28	EENVSOP-00002 V.5	
CCME Hydrocarbons (F1; MeOH; HSGC)	3	2006/06/27	2006/06/27	EENVSOP-00002 V.5	
CCME Hydrocarbons (F2-F4 in soil)	8	2006/06/27	2006/06/27	OR-412 v1.0	CWS PHCS Tier 1
CCME Hydrocarbons (F2-F4 in soil)	11	2006/06/27	2006/06/28	OR-412 v1.0	CWS PHCS Tier 1
Flash Point	1	2006/06/26	2006/06/26	EENVSOP-00079 V.1	ASTM D3828-93
Free Liquid	1	N/A	2006/06/27	CAL SOP# 0043	GRAVIMETRIC
Ethylene, Di, Tri & Tetraethylene glycol (1)	2	N/A	2006/06/27	CAL SOP# 0058	GC/FID-EXTRACTION
Mercury in Soil by CVAA	6	N/A	2006/06/28	EENVSOP-00032 V.1	EPA SW846 7471B
Elements by ICPMS (total) - Partial	6	N/A	2006/06/28	EENVSOP-00123 V.1	EPA SW 846 6020 A
ICP - Acid Extractable - Soil	6	2006/06/27	2006/06/27	EENVSOP-00034 V.1	EPA SW846 6010B
Moisture	27	N/A	2006/06/27	GL107 v 4.0	SSMA 51.2
PAH in Soil by GC/MS (Extended)	7	2006/06/26	2006/06/28	OR-405 v 2.1	EPA 3510C/8270D
pH (1:1 Extract)	1	2006/06/26	2006/06/26	EENVSOP-00053 V.1	SM 4500 H
Particle Size by Sieve (75 micron)	4	2006/06/27	2006/06/27	EENVSOP-00077 V.1	SSMA 47.4
Saturated Paste	1	2006/06/26	2006/06/26	EENVSOP-00046 V.1	SSMA 18.2.2
Hydrocarbon by IR (Mineral oil & grease) (2)	1	N/A	2006/06/28	CAL SOP# 0064, EDM SOP# 0050	Mod. EPA 3550, 9071A
VOCs in Soil by P&T GC/MS (Std List)	9	N/A	2006/06/27	EENVSOP-00003 V.3	EPA SW843 8260 B

../2

Maxxam Analytics Inc

Your Project #: 1013548
Site: PINE LAKE/WOOD BUFFALO PARK
Coding # NSD016300
Your C.O.C. #: 133604

Attention: STEVE BOURN
JACQUES WHITFORD LTD.
YELLOWKNIFE
PO BOX 1680
Suite 201 5103 51 Avenue
Yellowknife, NT
Canada X1A 2P3

Report Date: 2006/06/30

CERTIFICATE OF ANALYSIS

(1) This test was performed by Maxxam Calgary
(2) TPH by IR is reported on a wet weight basis.

Encryption Key

Sisavath Phonharath
30 Jun 2006 09:28:13 -06:00

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

SISAVATH PHONHARATH, Project Manager
Email: sisavath.phonharath@maxxamanalytics.com
Phone# (780) 465-1212

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME METALS - FULL REG. (SOIL)

Maxxam ID		B76150	B76153	B76155	B76170		
Sampling Date		2006/06/19	2006/06/20	2006/06/20	2006/06/22		
COC Number		133604	133604	133604	133604		
	Units	**PL-TP2-SA2**	**PL-MW1-SA6**	**PL-MW3-SA1**	**PC-MW1-SA1**	**RDL**	**QC Batch**
Elements							
Soluble (Hot water) Boron (B)	mg/kg	ND	0.2	0.1	0.3	0.1	1178286
Mercury (Hg)	mg/kg	ND	0.08	ND	ND	0.05	1179256
Metals							
Soluble (5:1) Hex. Chromium (Cr 6+)	mg/kg	ND	ND	ND	ND	0.3	1177537
Elements							
Total Aluminum (Al)	mg/kg	848	9030	3510	6100	10	1178287
Total Antimony (Sb)	mg/kg	ND	ND	ND	ND	2	1178287
Total Arsenic (As)	mg/kg	ND	8	2	4	1	1177914
Total Barium (Ba)	mg/kg	9.4	216	48.9	97.8	0.2	1178287
Total Beryllium (Be)	mg/kg	ND	0.5	0.2	0.3	0.1	1178287
Total Bismuth (Bi)	mg/kg	ND	ND	ND	ND	10	1178287
Total Cadmium (Cd)	mg/kg	ND	0.9	ND	ND	0.2	1178287
Total Calcium (Ca)	mg/kg	29000	23300	22800	7470	20	1178287
Total Chromium (Cr)	mg/kg	2	18	6	13	1	1178287
Total Cobalt (Co)	mg/kg	0.9	10.2	2.5	6.2	0.4	1178287
Total Copper (Cu)	mg/kg	ND	25	ND	8	2	1178287
Total Iron (Fe)	mg/kg	1770	23100	9940	15500	10	1178287
Total Lead (Pb)	mg/kg	ND	12	ND	ND	10	1178287
Total Lithium (Li)	mg/kg	1.6	11.7	3.4	6.5	0.4	1178287
Total Magnesium (Mg)	mg/kg	3820	9580	5890	3730	10	1178287
Total Manganese (Mn)	mg/kg	56.9	339	143	316	0.4	1178287
Total Molybdenum (Mo)	mg/kg	ND	1.3	ND	0.9	0.5	1177914
Total Nickel (Ni)	mg/kg	ND	30	6	18	4	1178287
Total Phosphorus (P)	mg/kg	73	798	206	574	4	1178287
Total Potassium (K)	mg/kg	168	1140	429	625	20	1178287
Total Selenium (Se)	mg/kg	ND	ND	ND	ND	0.5	1177914
Total Silver (Ag)	mg/kg	ND	ND	ND	ND	1	1178287
Total Sodium (Na)	mg/kg	22	106	24	53	10	1178287
Total Strontium (Sr)	mg/kg	14.7	48.4	16.4	20.1	0.4	1178287
Total Sulphur (S)	mg/kg	71	135	81	87	40	1178287
Total Thallium (Tl)	mg/kg	ND	ND	ND	ND	1	1177914
Total Tin (Sn)	mg/kg	ND	ND	ND	ND	2	1178287

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME METALS - FULL REG. (SOIL)

Maxxam ID		B76150	B76153	B76155	B76170		
Sampling Date		2006/06/19	2006/06/20	2006/06/20	2006/06/22		
COC Number		133604	133604	133604	133604		
	Units	**PL-TP2-SA2**	**PL-MW1-SA6**	**PL-MW3-SA1**	**PC-MW1-SA1**	**RDL**	**QC Batch**
Total Titanium (Ti)	mg/kg	41.6	150	88.2	196	0.8	1178287
Total Uranium (U)	mg/kg	ND	1.3	0.2	0.5	0.2	1177914
Total Vanadium (V)	mg/kg	3	35	12	25	2	1178287
Total Zinc (Zn)	mg/kg	3	83	14	52	2	1178287
Total Zirconium (Zr)	mg/kg	ND	3	ND	ND	1	1178287

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME METALS - FULL REG. (SOIL)

Maxxam ID		B76172	B76175		
Sampling Date		2006/06/22	2006/06/22		
COC Number		133604	133604		
	Units	**PC-BH2-SA2**	**PC-MW4-SA2**	**RDL**	**QC Batch**
Elements					
Soluble (Hot water) Boron (B)	mg/kg	0.2	0.5	0.1	1178286
Mercury (Hg)	mg/kg	ND	0.06	0.05	1179256
Metals					
Soluble (5:1) Hex. Chromium (Cr 6+)	mg/kg	ND	ND	0.3	1177537
Elements					
Total Aluminum (Al)	mg/kg	7060	12000	10	1178287
Total Antimony (Sb)	mg/kg	ND	ND	2	1178287
Total Arsenic (As)	mg/kg	5	7	1	1177914
Total Barium (Ba)	mg/kg	92.0	298	0.2	1178287
Total Beryllium (Be)	mg/kg	0.4	0.6	0.1	1178287
Total Bismuth (Bi)	mg/kg	ND	ND	10	1178287
Total Cadmium (Cd)	mg/kg	ND	0.6	0.2	1178287
Total Calcium (Ca)	mg/kg	11000	33200	20	1178287
Total Chromium (Cr)	mg/kg	15	22	1	1178287
Total Cobalt (Co)	mg/kg	7.5	12.1	0.4	1178287
Total Copper (Cu)	mg/kg	15	25	2	1178287
Total Iron (Fe)	mg/kg	19600	27800	10	1178287
Total Lead (Pb)	mg/kg	ND	13	10	1178287
Total Lithium (Li)	mg/kg	8.6	16.7	0.4	1178287
Total Magnesium (Mg)	mg/kg	4970	9590	10	1178287
Total Manganese (Mn)	mg/kg	241	452	0.4	1178287
Total Molybdenum (Mo)	mg/kg	0.7	1.3	0.5	1177914
Total Nickel (Ni)	mg/kg	25	34	4	1178287
Total Phosphorus (P)	mg/kg	685	758	4	1178287
Total Potassium (K)	mg/kg	933	1300	20	1178287
Total Selenium (Se)	mg/kg	ND	ND	0.5	1177914
Total Silver (Ag)	mg/kg	ND	ND	1	1178287
Total Sodium (Na)	mg/kg	88	1180	10	1178287
Total Strontium (Sr)	mg/kg	32.7	80.7	0.4	1178287
Total Sulphur (S)	mg/kg	66	135	40	1178287
Total Thallium (Tl)	mg/kg	ND	ND	1	1177914
Total Tin (Sn)	mg/kg	ND	ND	2	1178287

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME METALS - FULL REG. (SOIL)

Maxxam ID		B76172	B76175		
Sampling Date		2006/06/22	2006/06/22		
COC Number		133604	133604		
	Units	**PC-BH2-SA2**	**PC-MW4-SA2**	**RDL**	**QC Batch**
Total Titanium (Ti)	mg/kg	174	162	0.8	1178287
Total Uranium (U)	mg/kg	0.6	0.9	0.2	1177914
Total Vanadium (V)	mg/kg	28	38	2	1178287
Total Zinc (Zn)	mg/kg	56	78	2	1178287
Total Zirconium (Zr)	mg/kg	3	4	1	1178287

RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME PHC SOIL PACKAGE (SOIL)

Maxxam ID		B76159		
Sampling Date		2006/06/21		
COC Number		133604		
	Units	**HC-MW13-SA4**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F1 (C06-C10)	mg/kg	222	10	1175942
F1 (C06-C10) - BTEX	mg/kg	220	10	1175965
F2 (C10-C16 Hydrocarbons)	mg/kg	4500	10	1178132
F3 (C16-C34 Hydrocarbons)	mg/kg	733	10	1178132
F4 (C34-C50 Hydrocarbons)	mg/kg	27	10	1178132
Reached Baseline at C50	mg/kg	Yes	1	1178132
Volatiles				
Extractable (MeOH) Benzene	mg/kg	ND	0.04	1175941
Extractable (MeOH) Toluene	mg/kg	ND	0.1	1175941
Extractable (MeOH) Ethylbenzene	mg/kg	1.2	0.1	1175941
Extractable (MeOH) m & p-Xylene	mg/kg	1.2	0.1	1175941
Extractable (MeOH) o-Xylene	mg/kg	ND	0.1	1175941
Extractable (MeOH) Xylenes (Total)	mg/kg	1.2	0.1	1175941
Surrogate Recovery (%)				
4-BROMOFLUOROBENZENE (sur.)	%	89	N/A	1175942
O-TERPHENYL (sur.)	%	79	N/A	1178132
Extractable (MeOH) 4-BROMOFLUOROBENZENE (sur.)	%	91	N/A	1175941
Extractable (MeOH) D10-ETHYLBENZENE (sur.)	%	101	N/A	1175941
Extractable (MeOH) D4-1,2-DICHLOROETHANE (sur.)	%	125	N/A	1175941
Extractable (MeOH) D8-TOLUENE (sur.)	%	94	N/A	1175941

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME PHC SOIL PACKAGE (SOIL)

Maxxam ID		B76160		
Sampling Date		2006/06/21		
COC Number		133604		
	Units	**HC-MW13-SA9**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F1 (C06-C10)	mg/kg	13	10	1175942
F1 (C06-C10) - BTEX	mg/kg	13	10	1175965
F2 (C10-C16 Hydrocarbons)	mg/kg	17	10	1178141
F3 (C16-C34 Hydrocarbons)	mg/kg	77	10	1178141
F4 (C34-C50 Hydrocarbons)	mg/kg	29	10	1178141
Reached Baseline at C50	mg/kg	Yes	1	1178141
Volatiles				
Extractable (MeOH) Benzene	mg/kg	ND	0.04	1175941
Extractable (MeOH) Toluene	mg/kg	ND	0.1	1175941
Extractable (MeOH) Ethylbenzene	mg/kg	ND	0.1	1175941
Extractable (MeOH) m & p-Xylene	mg/kg	ND	0.1	1175941
Extractable (MeOH) o-Xylene	mg/kg	ND	0.1	1175941
Extractable (MeOH) Xylenes (Total)	mg/kg	ND	0.1	1175941
Surrogate Recovery (%)				
4-BROMOFLUOROBENZENE (sur.)	%	94	N/A	1175942
O-TERPHENYL (sur.)	%	108	N/A	1178141
Extractable (MeOH) 4-BROMOFLUOROBENZENE (sur.)	%	100	N/A	1175941
Extractable (MeOH) D10-ETHYLBENZENE (sur.)	%	100	N/A	1175941
Extractable (MeOH) D4-1,2-DICHLOROETHANE (sur.)	%	114	N/A	1175941
Extractable (MeOH) D8-TOLUENE (sur.)	%	97	N/A	1175941

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME PHC SOIL PACKAGE (SOIL)

Maxxam ID		B76163	B76163		
Sampling Date		2006/06/21	2006/06/21		
COC Number		133604	133604		
	Units	**HC-MW16-SA7**	**HC-MW16-SA7 Lab-Dup**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon					
F1 (C06-C10)	mg/kg	11	ND	10	1175944
F1 (C06-C10) - BTEX	mg/kg	11	N/A	10	1175965
F2 (C10-C16 Hydrocarbons)	mg/kg	45	N/A	10	1178141
F3 (C16-C34 Hydrocarbons)	mg/kg	50	N/A	10	1178141
F4 (C34-C50 Hydrocarbons)	mg/kg	20	N/A	10	1178141
Reached Baseline at C50	mg/kg	Yes	N/A	1	1178141
Volatiles					
Extractable (MeOH) Benzene	mg/kg	ND	ND	0.04	1175943
Extractable (MeOH) Toluene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) Ethylbenzene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) m & p-Xylene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) o-Xylene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) Xylenes (Total)	mg/kg	ND	ND	0.1	1175943
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	85	74	N/A	1175944
O-TERPHENYL (sur.)	%	104	N/A	N/A	1178141
Extractable (MeOH) 4-BROMOFLUOROBENZENE (sur.)	%	102	101	N/A	1175943
Extractable (MeOH) D10-ETHYLBENZENE (sur.)	%	112	110	N/A	1175943
Extractable (MeOH) D4-1,2-DICHLOROETHANE (sur.)	%	92	92	N/A	1175943
Extractable (MeOH) D8-TOLUENE (sur.)	%	101	100	N/A	1175943

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME PHC SOIL PACKAGE (SOIL)

Maxxam ID		B76164	B76165		
Sampling Date		2006/06/21	2006/06/21		
COC Number		133604	133604		
	Units	**HC-BH17-SA5**	**HC-BH18-SA4**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon					
F1 (C06-C10)	mg/kg	36	458	10	1175944
F1 (C06-C10) - BTEX	mg/kg	36	455	10	1175965
F2 (C10-C16 Hydrocarbons)	mg/kg	209	5760	10	1178141
F3 (C16-C34 Hydrocarbons)	mg/kg	51	678	10	1178141
F4 (C34-C50 Hydrocarbons)	mg/kg	ND	10	10	1178141
Reached Baseline at C50	mg/kg	Yes	Yes	1	1178141
Volatiles					
Extractable (MeOH) Benzene	mg/kg	ND	ND	0.04	1175943
Extractable (MeOH) Toluene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) Ethylbenzene	mg/kg	ND	1.8	0.1	1175943
Extractable (MeOH) m & p-Xylene	mg/kg	ND	1.1	0.1	1175943
Extractable (MeOH) o-Xylene	mg/kg	ND	0.4	0.1	1175943
Extractable (MeOH) Xylenes (Total)	mg/kg	ND	1.5	0.1	1175943
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	79	86	N/A	1175944
O-TERPHENYL (sur.)	%	104	114	N/A	1178141
Extractable (MeOH) 4-BROMOFLUOROBENZENE (sur.)	%	101	105	N/A	1175943
Extractable (MeOH) D10-ETHYLBENZENE (sur.)	%	114	112	N/A	1175943
Extractable (MeOH) D4-1,2-DICHLOROETHANE (sur.)	%	95	96	N/A	1175943
Extractable (MeOH) D8-TOLUENE (sur.)	%	101	99	N/A	1175943

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME PHC SOIL PACKAGE (SOIL)

Maxxam ID		B76166	B76167		
Sampling Date		2006/06/21	2006/06/21		
COC Number		133604	133604		
	Units	**HC-BH19-SA5**	**HC-BH14-SA5**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon					
F1 (C06-C10)	mg/kg	36	ND	10	1175944
F1 (C06-C10) - BTEX	mg/kg	36	ND	10	1175965
F2 (C10-C16 Hydrocarbons)	mg/kg	223	67	10	1178141
F3 (C16-C34 Hydrocarbons)	mg/kg	51	39	10	1178141
F4 (C34-C50 Hydrocarbons)	mg/kg	12	13	10	1178141
Reached Baseline at C50	mg/kg	Yes	Yes	1	1178141
Volatiles					
Extractable (MeOH) Benzene	mg/kg	ND	ND	0.04	1175943
Extractable (MeOH) Toluene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) Ethylbenzene	mg/kg	0.1	ND	0.1	1175943
Extractable (MeOH) m & p-Xylene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) o-Xylene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) Xylenes (Total)	mg/kg	ND	ND	0.1	1175943
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	85	79	N/A	1175944
O-TERPHENYL (sur.)	%	91	104	N/A	1178141
Extractable (MeOH) 4-BROMOFLUOROBENZENE (sur.)	%	100	100	N/A	1175943
Extractable (MeOH) D10-ETHYLBENZENE (sur.)	%	118	122	N/A	1175943
Extractable (MeOH) D4-1,2-DICHLOROETHANE (sur.)	%	80	102	N/A	1175943
Extractable (MeOH) D8-TOLUENE (sur.)	%	101	103	N/A	1175943

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

CCME PHC SOIL PACKAGE (SOIL)

Maxxam ID		B76168	B76176		
Sampling Date		2006/06/21	2006/06/22		
COC Number		133604	133604		
	Units	**HC-BH15-SA4**	**PC-MW5-SA5**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon					
F1 (C06-C10)	mg/kg	27	ND	10	1175944
F1 (C06-C10) - BTEX	mg/kg	27	ND	10	1175965
F2 (C10-C16 Hydrocarbons)	mg/kg	370	ND	10	1178141
F3 (C16-C34 Hydrocarbons)	mg/kg	55	ND	10	1178141
F4 (C34-C50 Hydrocarbons)	mg/kg	ND	ND	10	1178141
Reached Baseline at C50	mg/kg	Yes	Yes	1	1178141
Volatiles					
Extractable (MeOH) Benzene	mg/kg	ND	ND	0.04	1175943
Extractable (MeOH) Toluene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) Ethylbenzene	mg/kg	0.2	ND	0.1	1175943
Extractable (MeOH) m & p-Xylene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) o-Xylene	mg/kg	ND	ND	0.1	1175943
Extractable (MeOH) Xylenes (Total)	mg/kg	ND	ND	0.1	1175943
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	78	80	N/A	1175944
O-TERPHENYL (sur.)	%	94	97	N/A	1178141
Extractable (MeOH) 4-BROMOFLUOROBENZENE (sur.)	%	100	100	N/A	1175943
Extractable (MeOH) D10-ETHYLBENZENE (sur.)	%	124	118	N/A	1175943
Extractable (MeOH) D4-1,2-DICHLOROETHANE (sur.)	%	99	99	N/A	1175943
Extractable (MeOH) D8-TOLUENE (sur.)	%	103	104	N/A	1175943

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

PAHS SOIL CCME (SOIL)

Maxxam ID		B76160	B76163	B76164	B76165		
Sampling Date		2006/06/21	2006/06/21	2006/06/21	2006/06/21		
COC Number		133604	133604	133604	133604		
	Units	**HC-MW13-SA9**	**HC-MW16-SA7**	**HC-BH17-SA5**	**HC-BH18-SA4**	**RDL**	**QC Batch**
Polycyclic Aromatics							
Naphthalene	mg/kg	ND	0.06	0.91	14	0.05	1176320
2-Methylnaphthalene	mg/kg	0.06	0.09	1.4	51	0.05	1176320
Acenaphthylene	mg/kg	ND	ND	0.05	0.34	0.05	1176320
Acenaphthene	mg/kg	ND	ND	0.10	1.1	0.05	1176320
Fluorene	mg/kg	ND	ND	0.35	2.5	0.05	1176320
Phenanthrene	mg/kg	0.06	0.07	0.43	1.3	0.05	1176320
Anthracene	mg/kg	ND	ND	ND	ND	0.05	1176320
Fluoranthene	mg/kg	ND	ND	ND	ND	0.05	1176320
Pyrene	mg/kg	ND	ND	ND	ND	0.05	1176320
Benzo(a)anthracene	mg/kg	ND	ND	ND	ND	0.05	1176320
Chrysene	mg/kg	ND	ND	ND	ND	0.05	1176320
Benzo(b&j)fluoranthene	mg/kg	ND	ND	ND	ND	0.05	1176320
Benzo(k)fluoranthene	mg/kg	ND	ND	ND	ND	0.05	1176320
Benzo(a)pyrene	mg/kg	ND	ND	ND	ND	0.05	1176320
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	ND	ND	0.05	1176320
Dibenz(a,h)anthracene	mg/kg	ND	ND	ND	ND	0.05	1176320
Benzo(g,h,i)perylene	mg/kg	ND	ND	ND	ND	0.05	1176320
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	107	108	109	112	N/A	1176320
D12-BENZO(A)PYRENE (sur.)	%	92	88	79	81	N/A	1176320
D8-ACENAPHTHYLENE (sur.)	%	97	106	100	109	N/A	1176320
TERPHENYL-D14 (sur.)	%	121	118	113	115	N/A	1176320

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

PAHS SOIL CCME (SOIL)

Maxxam ID		B76166	B76167	B76168		
Sampling Date		2006/06/21	2006/06/21	2006/06/21		
COC Number		133604	133604	133604		
	Units	HC-BH19-SA5	HC-BH14-SA5	HC-BH15-SA4	RDL	QC Batch
Polycyclic Aromatics						
Naphthalene	mg/kg	2.7	ND	2.7	0.05	1176320
2-Methylnaphthalene	mg/kg	5.3	0.07	4.6	0.05	1176320
Acenaphthylene	mg/kg	ND	ND	ND	0.05	1176320
Acenaphthene	mg/kg	0.05	ND	ND	0.05	1176320
Fluorene	mg/kg	0.17	ND	0.14	0.05	1176320
Phenanthrene	mg/kg	0.19	0.06	0.14	0.05	1176320
Anthracene	mg/kg	ND	ND	ND	0.05	1176320
Fluoranthene	mg/kg	ND	ND	ND	0.05	1176320
Pyrene	mg/kg	ND	ND	ND	0.05	1176320
Benzo(a)anthracene	mg/kg	ND	ND	ND	0.05	1176320
Chrysene	mg/kg	ND	ND	ND	0.05	1176320
Benzo(b&j)fluoranthene	mg/kg	ND	ND	ND	0.05	1176320
Benzo(k)fluoranthene	mg/kg	ND	ND	ND	0.05	1176320
Benzo(a)pyrene	mg/kg	ND	ND	ND	0.05	1176320
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	ND	0.05	1176320
Dibenz(a,h)anthracene	mg/kg	ND	ND	ND	0.05	1176320
Benzo(g,h,i)perylene	mg/kg	ND	ND	ND	0.05	1176320
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	102	101	100	N/A	1176320
D12-BENZO(A)PYRENE (sur.)	%	75	81	77	N/A	1176320
D8-ACENAPHTHYLENE (sur.)	%	100	96	98	N/A	1176320
TERPHENYL-D14 (sur.)	%	109	112	108	N/A	1176320

ND = Not detected
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RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

RESULTS OF CHEMICAL ANALYSES OF LEACHATE

Maxxam ID		B76158		
Sampling Date		2006/06/20		
COC Number		133604		
	Units	**LFD-1**	**RDL**	**QC Batch**
Elements				
Leachable Silver (Ag)	mg/L	ND	0.5	1178746
Leachable Arsenic (As)	mg/L	ND	0.5	1178746
Leachable Boron (B)	mg/L	ND	50	1178746
Leachable Barium (Ba)	mg/L	ND	10	1178746
Leachable Beryllium (Be)	mg/L	ND	0.5	1178746
Leachable Cadmium (Cd)	mg/L	ND	0.1	1178746
Leachable Cobalt (Co)	mg/L	ND	10	1178746
Leachable Chromium (Cr)	mg/L	ND	0.5	1178746
Leachable Copper (Cu)	mg/L	ND	10	1178746
Leachable Iron (Fe)	mg/L	ND	100	1178746
Leachable Nickel (Ni)	mg/L	ND	0.5	1178746
Leachable Lead (Pb)	mg/L	ND	0.5	1178746
Leachable Antimony (Sb)	mg/L	ND	50	1178746
Leachable Selenium (Se)	mg/L	ND	0.1	1178746
Leachable Thallium (Tl)	mg/L	ND	0.5	1178746
Leachable Uranium (U)	mg/L	ND	0.5	1178746
Leachable Vanadium (V)	mg/L	ND	5	1178746
Leachable Zinc (Zn)	mg/L	ND	50	1178746
Leachable Zirconium (Zr)	mg/L	ND	50	1178746

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

ELEMENTS BY ATOMIC SPECTROSCOPY (LEACHATE)

Maxxam ID		B76158		
Sampling Date		2006/06/20		
COC Number		133604		
	Units	**LFD-1**	**RDL**	**QC Batch**
Elements				
Leachable Mercury (Hg)	ug/L	ND	0.05	1177915

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

BTEX BY GC-MS (LEACHATE)

Maxxam ID		B76158		
Sampling Date		2006/06/20		
COC Number		133604		
	Units	**LFD-1**	**RDL**	**QC Batch**
Monocyclic Aromatics				
Leachable (ZH) Benzene	ug/L	ND	10	1178439
Leachable (ZH) Ethylbenzene	ug/L	ND	10	1178439
Leachable (ZH) m & p-Xylene	ug/L	ND	20	1178439
Leachable (ZH) o-Xylene	ug/L	ND	10	1178439
Leachable (ZH) Toluene	ug/L	ND	10	1178439
Leachable (ZH) Xylenes (Total)	ug/L	ND	20	1178439
Surrogate Recovery (%)				
Leachable (ZH) 4-BROMOFLUOROBENZENE (sur.)	%	101	N/A	1178439
Leachable (ZH) D4-1,2-DICHLOROETHANE (sur.)	%	81	N/A	1178439
Leachable (ZH) D8-TOLUENE (sur.)	%	102	N/A	1178439

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		B76147	B76147	B76150	B76151		
Sampling Date		2006/06/19	2006/06/19	2006/06/19	2006/06/19		
COC Number		133604	133604	133604	133604		
	Units	**PL-TP1-SA3**	**PL-TP1-SA3 Lab-Dup**	**PL-TP2-SA2**	**PL-TP3-SA1**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	2.8	2.6	2.3	5.9	0.3	1176385

RDL = Reportable Detection Limit

Maxxam ID		B76152	B76153	B76154	B76155		
Sampling Date		2006/06/19	2006/06/20	2006/06/20	2006/06/20		
COC Number		133604	133604	133604	133604		
	Units	**PL-TP4-SA2**	**PL-MW1-SA6**	**PL-MW2-SA2**	**PL-MW3-SA1**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	1.6	17.2	4.8	3.7	0.3	1176385

RDL = Reportable Detection Limit

Maxxam ID		B76156	B76157	B76158	B76158		
Sampling Date		2006/06/20	2006/06/20	2006/06/20	2006/06/20		
COC Number		133604	133604	133604	133604		
	Units	**PL-GS-FINE**	**PL-GS-COARSE**	**LFD-1**	**LFD-1 Lab-Dup**	**RDL**	**QC Batch**
FOR OIL ANALYSES							
Flash point	°C	N/A	N/A	>61	N/A	23	1176700
Misc. Organics							
Total Petroleum Hydrocarbon	mg/kg	N/A	N/A	124	122	50	1179249
Soluble Parameters							
Soluble (1:1) pH	N/A	N/A	N/A	7.9	N/A	0.1	1176876
Saturation %	%	N/A	N/A	84	N/A	1	1176497
Soluble Chloride (Cl)	mg/L	N/A	N/A	178	N/A	10	1177042
Physical Properties							
Free Liquid	ml/kg	N/A	N/A	ND	N/A	10	1177778
Moisture	%	18.8	5.0	12.3	N/A	0.3	1176385
Sieve - #200 (>0.075mm)	%	0.6	93.2	N/A	N/A	0.1	1177773
Sieve - <200 Mesh	%	99.4	6.8	N/A	N/A	0.1	1177773

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		B76159	B76160	B76163	B76164		
Sampling Date		2006/06/21	2006/06/21	2006/06/21	2006/06/21		
COC Number		133604	133604	133604	133604		
	Units	**HC-MW13-SA4**	**HC-MW13-SA9**	**HC-MW16-SA7**	**HC-BH17-SA5**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	24.8	28.4	28.1	23.3	0.3	1176385

RDL = Reportable Detection Limit

Maxxam ID		B76165	B76166	B76167	B76168		
Sampling Date		2006/06/21	2006/06/21	2006/06/21	2006/06/21		
COC Number		133604	133604	133604	133604		
	Units	**HC-BH18-SA4**	**HC-BH19-SA5**	**HC-BH14-SA5**	**HC-BH15-SA4**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	24.1	25.5	24.3	24.5	0.3	1176385

RDL = Reportable Detection Limit

Maxxam ID		B76169	B76170		B76171		
Sampling Date		2006/06/21	2006/06/22		2006/06/22		
COC Number		133604	133604		133604		
	Units	**HC-GS**	**PC-MW1-SA1**	**QC Batch**	**PC-MW1-SA5**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	25.7	8.5	1176385	23.8	0.3	1176390
Sieve - #200 (>0.075mm)	%	0.3	N/A	1177773	N/A	0.1	N/A
Sieve - <200 Mesh	%	99.7	N/A	1177773	N/A	0.1	N/A

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		B76172	B76173	B76174	B76175		
Sampling Date		2006/06/22	2006/06/22	2006/06/22	2006/06/22		
COC Number		133604	133604	133604	133604		
	Units	**PC-BH2-SA2**	**PC-BH2-SA5**	**PC-MW3-SA5**	**PC-MW4-SA2**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	17.3	21.8	20.2	20.9	0.3	1176390

RDL = Reportable Detection Limit

Maxxam ID		B76176	B76177		
Sampling Date		2006/06/22	2006/06/22		
COC Number		133604	133604		
	Units	**PC-MW5-SA5**	**PC-GS**	**RDL**	**QC Batch**
Physical Properties					
Moisture	%	21.1	21.5	0.3	1176390
Sieve - #200 (>0.075mm)	%	N/A	29.5	0.1	1177773
Sieve - <200 Mesh	%	N/A	70.5	0.1	1177773

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

PETROLEUM HYDROCARBONS (CCME)

✓ DUP OF TP2-SA2

Maxxam ID		B76147	B76150	B76151	B76152		
Sampling Date		2006/06/19	2006/06/19	2006/06/19	2006/06/19		
COC Number		133604	133604	133604	133604		
	Units	**PL-TP1-SA3**	**PL-TP2-SA2**	**PL-TP3-SA1**	**PL-TP4-SA2**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F1 (C06-C10)	mg/kg	ND	ND	ND	ND	10	1175942
F1 (C06-C10) - BTEX	mg/kg	ND	ND	ND	ND	10	1175965
F2 (C10-C16 Hydrocarbons)	mg/kg	13	ND	ND	ND	10	1178132
F3 (C16-C34 Hydrocarbons)	mg/kg	ND	ND	14	ND	10	1178132
F4 (C34-C50 Hydrocarbons)	mg/kg	21	17	20	16	10	1178132
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	1	1178132
Surrogate Recovery (%)							
4-BROMOFLUOROBENZENE (sur.)	%	96	88	81	86	N/A	1175942
O-TERPHENYL (sur.)	%	67	68	73	71	N/A	1178132

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam ID		B76153	B76154	B76155		
Sampling Date		2006/06/20	2006/06/20	2006/06/20		
COC Number		133604	133604	133604		
	Units	**PL-MW1-SA6**	**PL-MW2-SA2**	**PL-MW3-SA1**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F1 (C06-C10)	mg/kg	ND	ND	ND	10	1175942
F1 (C06-C10) - BTEX	mg/kg	ND	ND	ND	10	1175965
F2 (C10-C16 Hydrocarbons)	mg/kg	ND	ND	ND	10	1178132
F3 (C16-C34 Hydrocarbons)	mg/kg	18	ND	37	10	1178132
F4 (C34-C50 Hydrocarbons)	mg/kg	28	16	25	10	1178132
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	1	1178132
Surrogate Recovery (%)						
4-BROMOFLUOROBENZENE (sur.)	%	97	80	72	N/A	1175942
O-TERPHENYL (sur.)	%	76	71	72	N/A	1178132

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		B76171	B76173	B76174		
Sampling Date		2006/06/22	2006/06/22	2006/06/22		
COC Number		133604	133604	133604		
	Units	**PC-MW1-SA5**	**PC-BH2-SA5**	**PC-MW3-SA5**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F1 (C06-C10)	mg/kg	ND	16	ND	10	1177924
F1 (C06-C10) - BTEX	mg/kg	ND	16	ND	10	1176999
F2 (C10-C16 Hydrocarbons)	mg/kg	ND	34	ND	10	1178141
F3 (C16-C34 Hydrocarbons)	mg/kg	27	26	ND	10	1178141
F4 (C34-C50 Hydrocarbons)	mg/kg	ND	ND	ND	10	1178141
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	1	1178141
Surrogate Recovery (%)						
4-BROMOFLUOROBENZENE (sur.)	%	89	97	79	N/A	1177924
O-TERPHENYL (sur.)	%	102	95	94	N/A	1178141

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

GLYCOLS BY GC-FID (SOIL)

Maxxam ID		B76150		B76154		
Sampling Date		2006/06/19		2006/06/20		
COC Number		133604		133604		
	Units	**PL-TP2-SA2**	**RDL**	**PL-MW2-SA2**	**RDL**	**QC Batch**
Glycols						
Extractable (Water) Ethylene Glycol	mg/kg	ND	2.1	ND	2.1	1176883
Extractable (Water) Diethylene Glycol	mg/kg	ND	3.1	ND	3.2	1176883
Extractable (Water) Triethylene Glycol	mg/kg	ND	6.2	ND	6.4	1176883
Extractable (Water) Tetraethylene Glycol	mg/kg	ND	10	ND	11	1176883
Extractable (Water) Propylene Glycol	mg/kg	ND	10	ND	11	1176883
Surrogate Recovery (%)						
Extractable (Water) SULFOLANE (sur.)	%	100	N/A	97	N/A	1176883

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76147	B76147		
Sampling Date		2006/06/19	2006/06/19		
COC Number		133604	133604		
	Units	**PL-TP1-SA3**	**PL-TP1-SA3 Lab-Dup**	**RDL**	**QC Batch**
Volatiles					
Benzene	mg/kg	ND	ND	0.04	1175945
Bromodichloromethane	mg/kg	ND	ND	0.1	1175945
Bromoform	mg/kg	ND	ND	0.1	1175945
Bromomethane	mg/kg	ND	ND	0.2	1175945
Carbon tetrachloride	mg/kg	ND	ND	0.1	1175945
Chlorobenzene	mg/kg	ND	ND	0.1	1175945
Chlorodibromomethane	mg/kg	ND	ND	0.1	1175945
Chloroethane	mg/kg	ND	ND	0.1	1175945
Chloroform	mg/kg	ND	ND	0.1	1175945
Chloromethane	mg/kg	ND	ND	0.2	1175945
1,2-dibromoethane	mg/kg	ND	ND	0.1	1175945
1,2-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,3-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,4-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,1-dichloroethane	mg/kg	ND	ND	0.1	1175945
1,2-dichloroethane	mg/kg	ND	ND	0.1	1175945
1,1-dichloroethene	mg/kg	ND	ND	0.1	1175945
cis-1,2-dichloroethene	mg/kg	ND	ND	0.1	1175945
trans-1,2-dichloroethene	mg/kg	ND	ND	0.1	1175945
Dichloromethane	mg/kg	ND	ND	0.1	1175945
1,2-dichloropropane	mg/kg	ND	ND	0.1	1175945
cis-1,3-dichloropropene	mg/kg	ND	ND	0.1	1175945
trans-1,3-dichloropropene	mg/kg	ND	ND	0.1	1175945
Ethylbenzene	mg/kg	ND	ND	0.1	1175945
Styrene	mg/kg	ND	ND	0.1	1175945
1,1,1,2-tetrachloroethane	mg/kg	ND	ND	0.1	1175945
1,1,2,2-tetrachloroethane	mg/kg	ND	ND	0.1	1175945
Tetrachloroethene	mg/kg	ND	ND	0.1	1175945
Toluene	mg/kg	ND	ND	0.1	1175945
1,1,1-trichloroethane	mg/kg	ND	ND	0.1	1175945
1,1,2-trichloroethane	mg/kg	ND	ND	0.1	1175945
Trichloroethene	mg/kg	ND	ND	0.1	1175945

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76147	B76147		
Sampling Date		2006/06/19	2006/06/19		
COC Number		133604	133604		
	Units	**PL-TP1-SA3**	**PL-TP1-SA3 Lab-Dup**	**RDL**	**QC Batch**
Trichlorofluoromethane	mg/kg	ND	ND	0.1	1175945
Vinyl chloride	mg/kg	ND	ND	0.1	1175945
Xylenes (Total)	mg/kg	ND	ND	0.1	1175945
m & p-Xylene	mg/kg	ND	ND	0.1	1175945
o-Xylene	mg/kg	ND	ND	0.1	1175945
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	103	102	N/A	1175945
D10-ETHYLBENZENE (sur.)	%	102	102	N/A	1175945
D4-1,2-DICHLOROETHANE (sur.)	%	114	111	N/A	1175945
D8-TOLUENE (sur.)	%	101	101	N/A	1175945

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76150	B76151		
Sampling Date		2006/06/19	2006/06/19		
COC Number		133604	133604		
	Units	PL-TP2-SA2	PL-TP3-SA1	RDL	QC Batch
Volatiles					
Benzene	mg/kg	ND	ND	0.04	1175945
Bromodichloromethane	mg/kg	ND	ND	0.1	1175945
Bromoform	mg/kg	ND	ND	0.1	1175945
Bromomethane	mg/kg	ND	ND	0.2	1175945
Carbon tetrachloride	mg/kg	ND	ND	0.1	1175945
Chlorobenzene	mg/kg	ND	ND	0.1	1175945
Chlorodibromomethane	mg/kg	ND	ND	0.1	1175945
Chloroethane	mg/kg	ND	ND	0.1	1175945
Chloroform	mg/kg	ND	ND	0.1	1175945
Chloromethane	mg/kg	ND	ND	0.2	1175945
1,2-dibromoethane	mg/kg	ND	ND	0.1	1175945
1,2-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,3-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,4-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,1-dichloroethane	mg/kg	ND	ND	0.1	1175945
1,2-dichloroethane	mg/kg	ND	ND	0.1	1175945
1,1-dichloroethene	mg/kg	ND	ND	0.1	1175945
cis-1,2-dichloroethene	mg/kg	ND	ND	0.1	1175945
trans-1,2-dichloroethene	mg/kg	ND	ND	0.1	1175945
Dichloromethane	mg/kg	ND	ND	0.1	1175945
1,2-dichloropropane	mg/kg	ND	ND	0.1	1175945
cis-1,3-dichloropropene	mg/kg	ND	ND	0.1	1175945
trans-1,3-dichloropropene	mg/kg	ND	ND	0.1	1175945
Ethylbenzene	mg/kg	ND	ND	0.1	1175945
Styrene	mg/kg	ND	ND	0.1	1175945
1,1,1,2-tetrachloroethane	mg/kg	ND	ND	0.1	1175945
1,1,2,2-tetrachloroethane	mg/kg	ND	ND	0.1	1175945
Tetrachloroethene	mg/kg	ND	ND	0.1	1175945
Toluene	mg/kg	ND	ND	0.1	1175945
1,1,1-trichloroethane	mg/kg	ND	ND	0.1	1175945
1,1,2-trichloroethane	mg/kg	ND	ND	0.1	1175945
Trichloroethene	mg/kg	ND	ND	0.1	1175945

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76150	B76151		
Sampling Date		2006/06/19	2006/06/19		
COC Number		133604	133604		
	Units	**PL-TP2-SA2**	**PL-TP3-SA1**	**RDL**	**QC Batch**
Trichlorofluoromethane	mg/kg	ND	ND	0.1	1175945
Vinyl chloride	mg/kg	ND	ND	0.1	1175945
Xylenes (Total)	mg/kg	ND	ND	0.1	1175945
m & p-Xylene	mg/kg	ND	ND	0.1	1175945
o-Xylene	mg/kg	ND	ND	0.1	1175945
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	103	105	N/A	1175945
D10-ETHYLBENZENE (sur.)	%	99	100	N/A	1175945
D4-1,2-DICHLOROETHANE (sur.)	%	111	114	N/A	1175945
D8-TOLUENE (sur.)	%	101	102	N/A	1175945

ND = Not detected
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Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

Dup of TP2-SA2

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76152	B76153		
Sampling Date		2006/06/19	2006/06/20		
COC Number		133604	133604		
	Units	**PL-TP4-SA2**	**PL-MW1-SA6**	**RDL**	**QC Batch**
Volatiles					
Benzene	mg/kg	N/A	ND	0.04	1175945
Extractable (MeOH) Benzene	mg/kg	ND	N/A	0.04	1175941
Bromodichloromethane	mg/kg	N/A	ND	0.1	1175945
Extractable (MeOH) Toluene	mg/kg	ND	N/A	0.1	1175941
Bromoform	mg/kg	N/A	ND	0.1	1175945
Extractable (MeOH) Ethylbenzene	mg/kg	ND	N/A	0.1	1175941
Bromomethane	mg/kg	N/A	ND	0.2	1175945
Extractable (MeOH) m & p-Xylene	mg/kg	ND	N/A	0.1	1175941
Extractable (MeOH) o-Xylene	mg/kg	ND	N/A	0.1	1175941
Carbon tetrachloride	mg/kg	N/A	ND	0.1	1175945
Chlorobenzene	mg/kg	N/A	ND	0.1	1175945
Extractable (MeOH) Xylenes (Total)	mg/kg	ND	N/A	0.1	1175941
Chlorodibromomethane	mg/kg	N/A	ND	0.1	1175945
Chloroethane	mg/kg	N/A	ND	0.1	1175945
Chloroform	mg/kg	N/A	ND	0.1	1175945
Chloromethane	mg/kg	N/A	ND	0.2	1175945
1,2-dibromoethane	mg/kg	N/A	ND	0.1	1175945
1,2-dichlorobenzene	mg/kg	N/A	ND	0.1	1175945
1,3-dichlorobenzene	mg/kg	N/A	ND	0.1	1175945
1,4-dichlorobenzene	mg/kg	N/A	ND	0.1	1175945
1,1-dichloroethane	mg/kg	N/A	ND	0.1	1175945
1,2-dichloroethane	mg/kg	N/A	ND	0.1	1175945
1,1-dichloroethene	mg/kg	N/A	ND	0.1	1175945
cis-1,2-dichloroethene	mg/kg	N/A	ND	0.1	1175945
trans-1,2-dichloroethene	mg/kg	N/A	ND	0.1	1175945
Dichloromethane	mg/kg	N/A	ND	0.1	1175945
1,2-dichloropropane	mg/kg	N/A	ND	0.1	1175945
cis-1,3-dichloropropene	mg/kg	N/A	ND	0.1	1175945
trans-1,3-dichloropropene	mg/kg	N/A	ND	0.1	1175945
Ethylbenzene	mg/kg	N/A	ND	0.1	1175945
Styrene	mg/kg	N/A	ND	0.1	1175945
1,1,1,2-tetrachloroethane	mg/kg	N/A	ND	0.1	1175945

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76152	B76153		
Sampling Date		2006/06/19	2006/06/20		
COC Number		133604	133604		
	Units	**PL-TP4-SA2**	**PL-MW1-SA6**	**RDL**	**QC Batch**
1,1,2,2-tetrachloroethane	mg/kg	N/A	ND	0.1	1175945
Tetrachloroethene	mg/kg	N/A	ND	0.1	1175945
Toluene	mg/kg	N/A	ND	0.1	1175945
1,1,1-trichloroethane	mg/kg	N/A	ND	0.1	1175945
1,1,2-trichloroethane	mg/kg	N/A	ND	0.1	1175945
Trichloroethene	mg/kg	N/A	ND	0.1	1175945
Trichlorofluoromethane	mg/kg	N/A	ND	0.1	1175945
Vinyl chloride	mg/kg	N/A	ND	0.1	1175945
Xylenes (Total)	mg/kg	N/A	ND	0.1	1175945
m & p-Xylene	mg/kg	N/A	ND	0.1	1175945
o-Xylene	mg/kg	N/A	ND	0.1	1175945
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	N/A	101	N/A	1175945
Extractable (MeOH) 4-BROMOFLUOROBENZENE (sur.)	%	102	N/A	N/A	1175941
D10-ETHYLBENZENE (sur.)	%	N/A	103	N/A	1175945
Extractable (MeOH) D10-ETHYLBENZENE (sur.)	%	97	N/A	N/A	1175941
D4-1,2-DICHLOROETHANE (sur.)	%	N/A	110	N/A	1175945
Extractable (MeOH) D4-1,2-DICHLOROETHANE (sur.)	%	129	N/A	N/A	1175941
D8-TOLUENE (sur.)	%	N/A	100	N/A	1175945
Extractable (MeOH) D8-TOLUENE (sur.)	%	99	N/A	N/A	1175941

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Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76154	B76155		
Sampling Date		2006/06/20	2006/06/20		
COC Number		133604	133604		
	Units	PL-MW2-SA2	PL-MW3-SA1	RDL	QC Batch
Volatiles					
Benzene	mg/kg	ND	ND	0.04	1175945
Bromodichloromethane	mg/kg	ND	ND	0.1	1175945
Bromoform	mg/kg	ND	ND	0.1	1175945
Bromomethane	mg/kg	ND	ND	0.2	1175945
Carbon tetrachloride	mg/kg	ND	ND	0.1	1175945
Chlorobenzene	mg/kg	ND	ND	0.1	1175945
Chlorodibromomethane	mg/kg	ND	ND	0.1	1175945
Chloroethane	mg/kg	ND	ND	0.1	1175945
Chloroform	mg/kg	ND	ND	0.1	1175945
Chloromethane	mg/kg	ND	ND	0.2	1175945
1,2-dibromoethane	mg/kg	ND	ND	0.1	1175945
1,2-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,3-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,4-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,1-dichloroethane	mg/kg	ND	ND	0.1	1175945
1,2-dichloroethane	mg/kg	ND	ND	0.1	1175945
1,1-dichloroethene	mg/kg	ND	ND	0.1	1175945
cis-1,2-dichloroethene	mg/kg	ND	ND	0.1	1175945
trans-1,2-dichloroethene	mg/kg	ND	ND	0.1	1175945
Dichloromethane	mg/kg	ND	ND	0.1	1175945
1,2-dichloropropane	mg/kg	ND	ND	0.1	1175945
cis-1,3-dichloropropene	mg/kg	ND	ND	0.1	1175945
trans-1,3-dichloropropene	mg/kg	ND	ND	0.1	1175945
Ethylbenzene	mg/kg	ND	ND	0.1	1175945
Styrene	mg/kg	ND	ND	0.1	1175945
1,1,1,2-tetrachloroethane	mg/kg	ND	ND	0.1	1175945
1,1,2,2-tetrachloroethane	mg/kg	ND	ND	0.1	1175945
Tetrachloroethene	mg/kg	ND	ND	0.1	1175945
Toluene	mg/kg	ND	ND	0.1	1175945
1,1,1-trichloroethane	mg/kg	ND	ND	0.1	1175945
1,1,2-trichloroethane	mg/kg	ND	ND	0.1	1175945
Trichloroethene	mg/kg	ND	ND	0.1	1175945

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76154	B76155		
Sampling Date		2006/06/20	2006/06/20		
COC Number		133604	133604		
	Units	**PL-MW2-SA2**	**PL-MW3-SA1**	**RDL**	**QC Batch**
Trichlorofluoromethane	mg/kg	ND	ND	0.1	1175945
Vinyl chloride	mg/kg	ND	ND	0.1	1175945
Xylenes (Total)	mg/kg	ND	ND	0.1	1175945
m & p-Xylene	mg/kg	ND	ND	0.1	1175945
o-Xylene	mg/kg	ND	ND	0.1	1175945
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	103	105	N/A	1175945
D10-ETHYLBENZENE (sur.)	%	102	101	N/A	1175945
D4-1,2-DICHLOROETHANE (sur.)	%	111	113	N/A	1175945
D8-TOLUENE (sur.)	%	102	102	N/A	1175945

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76171	B76173		
Sampling Date		2006/06/22	2006/06/22		
COC Number		133604	133604		
	Units	**PC-MW1-SA5**	**PC-BH2-SA5**	**RDL**	**QC Batch**
Volatiles					
Benzene	mg/kg	0.13	ND	0.04	1175945
Bromodichloromethane	mg/kg	ND	ND	0.1	1175945
Bromoform	mg/kg	ND	ND	0.1	1175945
Bromomethane	mg/kg	ND	ND	0.2	1175945
Carbon tetrachloride	mg/kg	ND	ND	0.1	1175945
Chlorobenzene	mg/kg	ND	ND	0.1	1175945
Chlorodibromomethane	mg/kg	ND	ND	0.1	1175945
Chloroethane	mg/kg	ND	ND	0.1	1175945
Chloroform	mg/kg	ND	ND	0.1	1175945
Chloromethane	mg/kg	ND	ND	0.2	1175945
1,2-dibromoethane	mg/kg	ND	ND	0.1	1175945
1,2-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,3-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,4-dichlorobenzene	mg/kg	ND	ND	0.1	1175945
1,1-dichloroethane	mg/kg	ND	ND	0.1	1175945
1,2-dichloroethane	mg/kg	ND	ND	0.1	1175945
1,1-dichloroethene	mg/kg	ND	ND	0.1	1175945
cis-1,2-dichloroethene	mg/kg	ND	ND	0.1	1175945
trans-1,2-dichloroethene	mg/kg	ND	ND	0.1	1175945
Dichloromethane	mg/kg	ND	ND	0.1	1175945
1,2-dichloropropane	mg/kg	ND	ND	0.1	1175945
cis-1,3-dichloropropene	mg/kg	ND	ND	0.1	1175945
trans-1,3-dichloropropene	mg/kg	ND	ND	0.1	1175945
Ethylbenzene	mg/kg	ND	ND	0.1	1175945
Styrene	mg/kg	ND	ND	0.1	1175945
1,1,1,2-tetrachloroethane	mg/kg	ND	ND	0.1	1175945
1,1,2,2-tetrachloroethane	mg/kg	ND	ND	0.1	1175945
Tetrachloroethene	mg/kg	ND	ND	0.1	1175945
Toluene	mg/kg	ND	ND	0.1	1175945
1,1,1-trichloroethane	mg/kg	ND	ND	0.1	1175945
1,1,2-trichloroethane	mg/kg	ND	ND	0.1	1175945
Trichloroethene	mg/kg	ND	ND	0.1	1175945

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76171	B76173		
Sampling Date		2006/06/22	2006/06/22		
COC Number		133604	133604		
	Units	**PC-MW1-SA5**	**PC-BH2-SA5**	**RDL**	**QC Batch**
Trichlorofluoromethane	mg/kg	ND	ND	0.1	1175945
Vinyl chloride	mg/kg	ND	ND	0.1	1175945
Xylenes (Total)	mg/kg	ND	ND	0.1	1175945
m & p-Xylene	mg/kg	ND	ND	0.1	1175945
o-Xylene	mg/kg	ND	ND	0.1	1175945
Surrogate Recovery (%)					
4-BROMOFLUOROBENZENE (sur.)	%	102	102	N/A	1175945
D10-ETHYLBENZENE (sur.)	%	101	102	N/A	1175945
D4-1,2-DICHLOROETHANE (sur.)	%	111	114	N/A	1175945
D8-TOLUENE (sur.)	%	102	100	N/A	1175945

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76174		
Sampling Date		2006/06/22		
COC Number		133604		
	Units	**PC-MW3-SA5**	**RDL**	**QC Batch**
Volatiles				
Benzene	mg/kg	ND	0.04	1175945
Bromodichloromethane	mg/kg	ND	0.1	1175945
Bromoform	mg/kg	ND	0.1	1175945
Bromomethane	mg/kg	ND	0.2	1175945
Carbon tetrachloride	mg/kg	ND	0.1	1175945
Chlorobenzene	mg/kg	ND	0.1	1175945
Chlorodibromomethane	mg/kg	ND	0.1	1175945
Chloroethane	mg/kg	ND	0.1	1175945
Chloroform	mg/kg	ND	0.1	1175945
Chloromethane	mg/kg	ND	0.2	1175945
1,2-dibromoethane	mg/kg	ND	0.1	1175945
1,2-dichlorobenzene	mg/kg	ND	0.1	1175945
1,3-dichlorobenzene	mg/kg	ND	0.1	1175945
1,4-dichlorobenzene	mg/kg	ND	0.1	1175945
1,1-dichloroethane	mg/kg	ND	0.1	1175945
1,2-dichloroethane	mg/kg	ND	0.1	1175945
1,1-dichloroethene	mg/kg	ND	0.1	1175945
cis-1,2-dichloroethene	mg/kg	ND	0.1	1175945
trans-1,2-dichloroethene	mg/kg	ND	0.1	1175945
Dichloromethane	mg/kg	ND	0.1	1175945
1,2-dichloropropane	mg/kg	ND	0.1	1175945
cis-1,3-dichloropropene	mg/kg	ND	0.1	1175945
trans-1,3-dichloropropene	mg/kg	ND	0.1	1175945
Ethylbenzene	mg/kg	ND	0.1	1175945
Styrene	mg/kg	ND	0.1	1175945
1,1,1,2-tetrachloroethane	mg/kg	ND	0.1	1175945
1,1,2,2-tetrachloroethane	mg/kg	ND	0.1	1175945
Tetrachloroethene	mg/kg	ND	0.1	1175945
Toluene	mg/kg	ND	0.1	1175945
1,1,1-trichloroethane	mg/kg	ND	0.1	1175945
1,1,2-trichloroethane	mg/kg	ND	0.1	1175945
Trichloroethene	mg/kg	ND	0.1	1175945

ND = Not detected
RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A626999
Report Date: 2006/06/30

JACQUES WHITFORD LTD.
Client Project #: 1013548
Site Reference: PINE LAKE/WOOD BUFFALO PARK
Sampler Initials: SB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		B76174		
Sampling Date		2006/06/22		
COC Number		133604		
	Units	**PC-MW3-SA5**	**RDL**	**QC Batch**
Trichlorofluoromethane	mg/kg	ND	0.1	1175945
Vinyl chloride	mg/kg	ND	0.1	1175945
Xylenes (Total)	mg/kg	ND	0.1	1175945
m & p-Xylene	mg/kg	ND	0.1	1175945
o-Xylene	mg/kg	ND	0.1	1175945
Surrogate Recovery (%)				
4-BROMOFLUOROBENZENE (sur.)	%	102	N/A	1175945
D10-ETHYLBENZENE (sur.)	%	101	N/A	1175945
D4-1,2-DICHLOROETHANE (sur.)	%	110	N/A	1175945
D8-TOLUENE (sur.)	%	103	N/A	1175945

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit

RESULTS OF CHEMICAL ANALYSES OF SOIL Comments

Hydrocarbon by IR (Mineral oil & grease): FTIR results are based on a wet weight for solids.

Results relate only to the items tested.

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE BOURN
Client Project #: 1013548
P.O. #:
Site Reference: PINE LAKE/WOOD BUFFALO PARK

Quality Assurance Report

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1175941 LM4	MATRIX SPIKE	Extractable (MeOH) 4-BROMOFLUOROBEN	2006/06/27		101	%	60 - 140
		Extractable (MeOH) D10-ETHYLBENZENE (	2006/06/27		100	%	60 - 130
		Extractable (MeOH) D4-1,2-DICHLOROETH	2006/06/27		125	%	60 - 140
		Extractable (MeOH) D8-TOLUENE (sur.)	2006/06/27		100	%	60 - 140
		Extractable (MeOH) Benzene	2006/06/27		90	%	60 - 140
		Extractable (MeOH) Toluene	2006/06/27		92	%	60 - 140
		Extractable (MeOH) Ethylbenzene	2006/06/27		86	%	60 - 140
		Extractable (MeOH) m & p-Xylene	2006/06/27		85	%	60 - 140
		Extractable (MeOH) o-Xylene	2006/06/27		81	%	60 - 140
	SPIKE	Extractable (MeOH) 4-BROMOFLUOROBEN	2006/06/27		104	%	60 - 140
		Extractable (MeOH) D10-ETHYLBENZENE (	2006/06/27		97	%	60 - 130
		Extractable (MeOH) D4-1,2-DICHLOROETH	2006/06/27		123	%	60 - 140
		Extractable (MeOH) D8-TOLUENE (sur.)	2006/06/27		100	%	60 - 140
		Extractable (MeOH) Benzene	2006/06/27		93	%	60 - 140
		Extractable (MeOH) Toluene	2006/06/27		90	%	60 - 140
		Extractable (MeOH) Ethylbenzene	2006/06/27		87	%	60 - 140
		Extractable (MeOH) m & p-Xylene	2006/06/27		84	%	60 - 140
		Extractable (MeOH) o-Xylene	2006/06/27		73	%	60 - 140
	BLANK	Extractable (MeOH) 4-BROMOFLUOROBEN	2006/06/27		102	%	60 - 140
		Extractable (MeOH) D10-ETHYLBENZENE (	2006/06/27		96	%	60 - 130
		Extractable (MeOH) D4-1,2-DICHLOROETH	2006/06/27		130	%	60 - 140
		Extractable (MeOH) D8-TOLUENE (sur.)	2006/06/27		100	%	60 - 140
		Extractable (MeOH) Benzene	2006/06/27	ND, RDL=0.04		mg/kg	
		Extractable (MeOH) Toluene	2006/06/27	ND, RDL=0.1		mg/kg	
		Extractable (MeOH) Ethylbenzene	2006/06/27	ND, RDL=0.1		mg/kg	
		Extractable (MeOH) m & p-Xylene	2006/06/27	ND, RDL=0.1		mg/kg	
		Extractable (MeOH) o-Xylene	2006/06/27	ND, RDL=0.1		mg/kg	
		Extractable (MeOH) Xylenes (Total)	2006/06/27	ND, RDL=0.1		mg/kg	
	RPD	Extractable (MeOH) Benzene	2006/06/27	NC		%	50
		Extractable (MeOH) Toluene	2006/06/27	NC		%	50
		Extractable (MeOH) Ethylbenzene	2006/06/27	NC		%	50
		Extractable (MeOH) m & p-Xylene	2006/06/27	NC		%	50
		Extractable (MeOH) o-Xylene	2006/06/27	NC		%	50
		Extractable (MeOH) Xylenes (Total)	2006/06/27	NC		%	50
1175942 KO	MATRIX SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		95	%	60 - 130
		F1 (C06-C10)	2006/06/27		93	%	60 - 130
	SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		96	%	60 - 130
		F1 (C06-C10)	2006/06/27		104	%	80 - 120
	BLANK	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		88	%	60 - 130
		F1 (C06-C10)	2006/06/27	ND, RDL=10		mg/kg	
	RPD	F1 (C06-C10)	2006/06/27	NC		%	50
1175943 LM4	MATRIX SPIKE [B76164-01]						
		Extractable (MeOH) 4-BROMOFLUOROBEN	2006/06/27		101	%	60 - 140
		Extractable (MeOH) D10-ETHYLBENZENE (	2006/06/27		115	%	60 - 130
		Extractable (MeOH) D4-1,2-DICHLOROETH	2006/06/27		92	%	60 - 140
		Extractable (MeOH) D8-TOLUENE (sur.)	2006/06/27		101	%	60 - 140
		Extractable (MeOH) Benzene	2006/06/27		106	%	60 - 140
		Extractable (MeOH) Toluene	2006/06/27		98	%	60 - 140
		Extractable (MeOH) Ethylbenzene	2006/06/27		104	%	60 - 140
		Extractable (MeOH) m & p-Xylene	2006/06/27		103	%	60 - 140
		Extractable (MeOH) o-Xylene	2006/06/27		100	%	60 - 140
	SPIKE	Extractable (MeOH) 4-BROMOFLUOROBEN	2006/06/27		103	%	60 - 140
		Extractable (MeOH) D10-ETHYLBENZENE (	2006/06/27		108	%	60 - 130
		Extractable (MeOH) D4-1,2-DICHLOROETH	2006/06/27		90	%	60 - 140
		Extractable (MeOH) D8-TOLUENE (sur.)	2006/06/27		101	%	60 - 140
		Extractable (MeOH) Benzene	2006/06/27		101	%	60 - 140

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE BOURN
Client Project #: 1013548
P.O. #:
Site Reference: PINE LAKE/WOOD BUFFALO PARK

Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1175943 LM4	SPIKE	Extractable (MeOH) Toluene	2006/06/27		98	%	60 - 140
		Extractable (MeOH) Ethylbenzene	2006/06/27		95	%	60 - 140
		Extractable (MeOH) m & p-Xylene	2006/06/27		95	%	60 - 140
		Extractable (MeOH) o-Xylene	2006/06/27		92	%	60 - 140
	BLANK	Extractable (MeOH) 4-BROMOFLUOROBEN	2006/06/27		105	%	60 - 140
		Extractable (MeOH) D10-ETHYLBENZENE (	2006/06/27		123	%	60 - 130
		Extractable (MeOH) D4-1,2-DICHLOROETH	2006/06/27		90	%	60 - 140
		Extractable (MeOH) D8-TOLUENE (sur.)	2006/06/27		115	%	60 - 140
		Extractable (MeOH) Benzene	2006/06/27	ND, RDL=0.04		mg/kg	
		Extractable (MeOH) Toluene	2006/06/27	ND, RDL=0.1		mg/kg	
		Extractable (MeOH) Ethylbenzene	2006/06/27	ND, RDL=0.1		mg/kg	
		Extractable (MeOH) m & p-Xylene	2006/06/27	ND, RDL=0.1		mg/kg	
		Extractable (MeOH) o-Xylene	2006/06/27	ND, RDL=0.1		mg/kg	
		Extractable (MeOH) Xylenes (Total)	2006/06/27	ND, RDL=0.1		mg/kg	
	RPD [B76163-01]	Extractable (MeOH) Benzene	2006/06/27	NC		%	50
		Extractable (MeOH) Toluene	2006/06/27	NC		%	50
		Extractable (MeOH) Ethylbenzene	2006/06/27	NC		%	50
		Extractable (MeOH) m & p-Xylene	2006/06/27	NC		%	50
		Extractable (MeOH) o-Xylene	2006/06/27	NC		%	50
		Extractable (MeOH) Xylenes (Total)	2006/06/27	NC		%	50
1175944 MA	MATRIX SPIKE						
	[B76164-01]	4-BROMOFLUOROBENZENE (sur.)	2006/06/28		78	%	60 - 130
		F1 (C06-C10)	2006/06/28		91	%	60 - 130
	SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/06/28		80	%	60 - 130
		F1 (C06-C10)	2006/06/28		97	%	80 - 120
	BLANK	4-BROMOFLUOROBENZENE (sur.)	2006/06/28		85	%	60 - 130
		F1 (C06-C10)	2006/06/28	ND, RDL=10		mg/kg	
	RPD [B76163-01]	F1 (C06-C10)	2006/06/28	NC		%	50
1175945 LM4	MATRIX SPIKE						
	[B76150-01]	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		105	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2006/06/27		97	%	60 - 140
		D4-1,2-DICHLOROETHANE (sur.)	2006/06/27		114	%	60 - 140
		D8-TOLUENE (sur.)	2006/06/27		99	%	60 - 140
		Benzene	2006/06/27		95	%	60 - 140
		Bromodichloromethane	2006/06/27		93	%	60 - 140
		Bromoform	2006/06/27		82	%	60 - 140
		Bromomethane	2006/06/27		82	%	60 - 140
		Carbon tetrachloride	2006/06/27		74	%	60 - 140
		Chlorobenzene	2006/06/27		90	%	60 - 140
		Chlorodibromomethane	2006/06/27		79	%	60 - 140
		Chloroethane	2006/06/27		92	%	60 - 140
		Chloroform	2006/06/27		100	%	60 - 140
		Chloromethane	2006/06/27		87	%	60 - 140
		1,2-dibromoethane	2006/06/27		94	%	60 - 140
		1,2-dichlorobenzene	2006/06/27		92	%	60 - 140
		1,3-dichlorobenzene	2006/06/27		85	%	60 - 140
		1,4-dichlorobenzene	2006/06/27		93	%	60 - 140
		1,1-dichloroethane	2006/06/27		102	%	60 - 140
		1,2-dichloroethane	2006/06/27		106	%	60 - 140
		1,1-dichloroethene	2006/06/27		100	%	60 - 140
		cis-1,2-dichloroethene	2006/06/27		101	%	60 - 140
		trans-1,2-dichloroethene	2006/06/27		98	%	60 - 140
		Dichloromethane	2006/06/27		101	%	60 - 140
		1,2-dichloropropane	2006/06/27		89	%	60 - 140
		cis-1,3-dichloropropene	2006/06/27		81	%	60 - 140
		trans-1,3-dichloropropene	2006/06/27		82	%	60 - 140

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE BOURN
Client Project #: 1013548
P.O. #:
Site Reference: PINE LAKE/WOOD BUFFALO PARK

Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1175945 LM4	MATRIX SPIKE						
	[B76150-01]	Ethylbenzene	2006/06/27		86	%	60 - 140
		Styrene	2006/06/27		80	%	60 - 140
		1,1,1,2-tetrachloroethane	2006/06/27		83	%	60 - 140
		1,1,2,2-tetrachloroethane	2006/06/27		92	%	60 - 140
		Tetrachloroethene	2006/06/27		83	%	60 - 140
		Toluene	2006/06/27		87	%	60 - 140
		1,1,1-trichloroethane	2006/06/27		95	%	60 - 140
		1,1,2-trichloroethane	2006/06/27		98	%	60 - 140
		Trichloroethene	2006/06/27		92	%	60 - 140
		Trichlorofluoromethane	2006/06/27		98	%	60 - 140
		Vinyl chloride	2006/06/27		83	%	60 - 140
		m & p-Xylene	2006/06/27		87	%	60 - 140
		o-Xylene	2006/06/27		87	%	60 - 140
	SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		99	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2006/06/27		95	%	60 - 140
		D4-1,2-DICHLOROETHANE (sur.)	2006/06/27		116	%	60 - 140
		D8-TOLUENE (sur.)	2006/06/27		94	%	60 - 140
		Benzene	2006/06/27		91	%	60 - 140
		Bromodichloromethane	2006/06/27		94	%	60 - 140
		Bromoform	2006/06/27		91	%	60 - 140
		Bromomethane	2006/06/27		73	%	60 - 140
		Carbon tetrachloride	2006/06/27		71	%	60 - 140
		Chlorobenzene	2006/06/27		88	%	60 - 140
		Chlorodibromomethane	2006/06/27		85	%	60 - 140
		Chloroethane	2006/06/27		90	%	60 - 140
		Chloroform	2006/06/27		97	%	60 - 140
		Chloromethane	2006/06/27		86	%	60 - 140
		1,2-dibromoethane	2006/06/27		102	%	60 - 140
		1,2-dichlorobenzene	2006/06/27		95	%	60 - 140
		1,3-dichlorobenzene	2006/06/27		89	%	60 - 140
		1,4-dichlorobenzene	2006/06/27		89	%	60 - 140
		1,1-dichloroethane	2006/06/27		94	%	60 - 140
		1,2-dichloroethane	2006/06/27		105	%	60 - 140
		1,1-dichloroethene	2006/06/27		94	%	60 - 140
		cis-1,2-dichloroethene	2006/06/27		97	%	60 - 140
		trans-1,2-dichloroethene	2006/06/27		92	%	60 - 140
		Dichloromethane	2006/06/27		98	%	60 - 140
		1,2-dichloropropane	2006/06/27		94	%	60 - 140
		cis-1,3-dichloropropene	2006/06/27		87	%	60 - 140
		trans-1,3-dichloropropene	2006/06/27		87	%	60 - 140
		Ethylbenzene	2006/06/27		84	%	60 - 140
		Styrene	2006/06/27		86	%	60 - 140
		1,1,1,2-tetrachloroethane	2006/06/27		85	%	60 - 140
		1,1,2,2-tetrachloroethane	2006/06/27		105	%	60 - 140
		Tetrachloroethene	2006/06/27		81	%	60 - 140
		Toluene	2006/06/27		83	%	60 - 140
		1,1,1-trichloroethane	2006/06/27		93	%	60 - 140
		1,1,2-trichloroethane	2006/06/27		100	%	60 - 140
		Trichloroethene	2006/06/27		91	%	60 - 140
		Trichlorofluoromethane	2006/06/27		93	%	60 - 140
		Vinyl chloride	2006/06/27		61	%	60 - 140
		m & p-Xylene	2006/06/27		85	%	60 - 140
		o-Xylene	2006/06/27		87	%	60 - 140
	BLANK	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		99	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2006/06/27		103	%	60 - 140

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE BOURN
Client Project #: 1013548
P.O. #:
Site Reference: PINE LAKE/WOOD BUFFALO PARK

Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1175945 LM4	BLANK	D4-1,2-DICHLOROETHANE (sur.)	2006/06/27		114	%	60 - 140
		D8-TOLUENE (sur.)	2006/06/27		100	%	60 - 140
		Benzene	2006/06/27	ND, RDL=0.04		mg/kg	
		Bromodichloromethane	2006/06/27	ND, RDL=0.1		mg/kg	
		Bromoform	2006/06/27	ND, RDL=0.1		mg/kg	
		Bromomethane	2006/06/27	ND, RDL=0.2		mg/kg	
		Carbon tetrachloride	2006/06/27	ND, RDL=0.1		mg/kg	
		Chlorobenzene	2006/06/27	ND, RDL=0.1		mg/kg	
		Chlorodibromomethane	2006/06/27	ND, RDL=0.1		mg/kg	
		Chloroethane	2006/06/27	ND, RDL=0.1		mg/kg	
		Chloroform	2006/06/27	ND, RDL=0.1		mg/kg	
		Chloromethane	2006/06/27	ND, RDL=0.2		mg/kg	
		1,2-dibromoethane	2006/06/27	ND, RDL=0.1		mg/kg	
		1,2-dichlorobenzene	2006/06/27	ND, RDL=0.1		mg/kg	
		1,3-dichlorobenzene	2006/06/27	ND, RDL=0.1		mg/kg	
		1,4-dichlorobenzene	2006/06/27	ND, RDL=0.1		mg/kg	
		1,1-dichloroethane	2006/06/27	ND, RDL=0.1		mg/kg	
		1,2-dichloroethane	2006/06/27	ND, RDL=0.1		mg/kg	
		1,1-dichloroethene	2006/06/27	ND, RDL=0.1		mg/kg	
		cis-1,2-dichloroethene	2006/06/27	ND, RDL=0.1		mg/kg	
		trans-1,2-dichloroethene	2006/06/27	ND, RDL=0.1		mg/kg	
		Dichloromethane	2006/06/27	ND, RDL=0.1		mg/kg	
		1,2-dichloropropane	2006/06/27	ND, RDL=0.1		mg/kg	
		cis-1,3-dichloropropene	2006/06/27	ND, RDL=0.1		mg/kg	
		trans-1,3-dichloropropene	2006/06/27	ND, RDL=0.1		mg/kg	
		Ethylbenzene	2006/06/27	ND, RDL=0.1		mg/kg	
		Styrene	2006/06/27	ND, RDL=0.1		mg/kg	
		1,1,1,2-tetrachloroethane	2006/06/27	ND, RDL=0.1		mg/kg	
		1,1,2,2-tetrachloroethane	2006/06/27	ND, RDL=0.1		mg/kg	
		Tetrachloroethene	2006/06/27	ND, RDL=0.1		mg/kg	
		Toluene	2006/06/27	ND, RDL=0.1		mg/kg	
		1,1,1-trichloroethane	2006/06/27	ND, RDL=0.1		mg/kg	
		1,1,2-trichloroethane	2006/06/27	ND, RDL=0.1		mg/kg	
		Trichloroethene	2006/06/27	ND, RDL=0.1		mg/kg	
		Trichlorofluoromethane	2006/06/27	ND, RDL=0.1		mg/kg	
		Vinyl chloride	2006/06/27	ND, RDL=0.1		mg/kg	
		Xylenes (Total)	2006/06/27	ND, RDL=0.1		mg/kg	
		m & p-Xylene	2006/06/27	ND, RDL=0.1		mg/kg	
		o-Xylene	2006/06/27	ND, RDL=0.1		mg/kg	
	RPD [B76147-01]	Benzene	2006/06/27	NC		%	50
		Bromodichloromethane	2006/06/27	NC		%	50
		Bromoform	2006/06/27	NC		%	50
		Bromomethane	2006/06/27	NC		%	50
		Carbon tetrachloride	2006/06/27	NC		%	50
		Chlorobenzene	2006/06/27	NC		%	50
		Chlorodibromomethane	2006/06/27	NC		%	50
		Chloroethane	2006/06/27	NC		%	50
		Chloroform	2006/06/27	NC		%	50
		Chloromethane	2006/06/27	NC		%	50
		1,2-dibromoethane	2006/06/27	NC		%	50
		1,2-dichlorobenzene	2006/06/27	NC		%	50
		1,3-dichlorobenzene	2006/06/27	NC		%	50
		1,4-dichlorobenzene	2006/06/27	NC		%	50
		1,1-dichloroethane	2006/06/27	NC		%	50
		1,2-dichloroethane	2006/06/27	NC		%	50
		1,1-dichloroethene	2006/06/27	NC		%	50

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
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Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1175945 LM4	RPD [B76147-01]	cis-1,2-dichloroethene	2006/06/27	NC		%	50
		trans-1,2-dichloroethene	2006/06/27	NC		%	50
		Dichloromethane	2006/06/27	NC		%	50
		1,2-dichloropropane	2006/06/27	NC		%	50
		cis-1,3-dichloropropene	2006/06/27	NC		%	50
		trans-1,3-dichloropropene	2006/06/27	NC		%	50
		Ethylbenzene	2006/06/27	NC		%	50
		Styrene	2006/06/27	NC		%	50
		1,1,1,2-tetrachloroethane	2006/06/27	NC		%	50
		1,1,2,2-tetrachloroethane	2006/06/27	NC		%	50
		Tetrachloroethene	2006/06/27	NC		%	50
		Toluene	2006/06/27	NC		%	50
		1,1,1-trichloroethane	2006/06/27	NC		%	50
		1,1,2-trichloroethane	2006/06/27	NC		%	50
		Trichloroethene	2006/06/27	NC		%	50
		Trichlorofluoromethane	2006/06/27	NC		%	50
		Vinyl chloride	2006/06/27	NC		%	50
		Xylenes (Total)	2006/06/27	NC		%	50
		m & p-Xylene	2006/06/27	NC		%	50
		o-Xylene	2006/06/27	NC		%	50
1176320 KB4	MATRIX SPIKE	D10-ANTHRACENE (sur.)	2006/06/28		112	%	30 - 130
		D12-BENZO(A)PYRENE (sur.)	2006/06/28		122	%	30 - 130
		D8-ACENAPHTHYLENE (sur.)	2006/06/28		81	%	30 - 130
		TERPHENYL-D14 (sur.)	2006/06/28		121	%	30 - 130
		Naphthalene	2006/06/28		102	%	30 - 130
		2-Methylnaphthalene	2006/06/28		49	%	30 - 130
		Acenaphthylene	2006/06/28		91	%	30 - 130
		Acenaphthene	2006/06/28		99	%	30 - 130
		Fluorene	2006/06/28		79	%	30 - 130
		Phenanthrene	2006/06/28		-50 (1)	%	30 - 130
		Anthracene	2006/06/28		60	%	30 - 130
		Fluoranthene	2006/06/28		98	%	30 - 130
		Pyrene	2006/06/28		67	%	30 - 130
		Benzo(a)anthracene	2006/06/28		103	%	30 - 130
		Chrysene	2006/06/28		-250 (1)	%	30 - 130
		Benzo(b&j)fluoranthene	2006/06/28		55	%	30 - 130
		Benzo(k)fluoranthene	2006/06/28		71	%	30 - 130
		Benzo(a)pyrene	2006/06/28		42	%	30 - 130
		Indeno(1,2,3-cd)pyrene	2006/06/28		34	%	30 - 130
		Dibenz(a,h)anthracene	2006/06/28		41	%	30 - 130
		Benzo(g,h,i)perylene	2006/06/28		11 (1)	%	30 - 130
	SPIKE	D10-ANTHRACENE (sur.)	2006/06/28		96	%	30 - 130
		D12-BENZO(A)PYRENE (sur.)	2006/06/28		91	%	30 - 130
		D8-ACENAPHTHYLENE (sur.)	2006/06/28		44	%	30 - 130
		TERPHENYL-D14 (sur.)	2006/06/28		101	%	30 - 130
		Naphthalene	2006/06/28		72	%	30 - 130
		2-Methylnaphthalene	2006/06/28		73	%	30 - 130
		Acenaphthylene	2006/06/28		64	%	30 - 130
		Acenaphthene	2006/06/28		72	%	30 - 130
		Fluorene	2006/06/28		74	%	30 - 130
		Phenanthrene	2006/06/28		77	%	30 - 130
		Anthracene	2006/06/28		75	%	30 - 130
		Fluoranthene	2006/06/28		78	%	30 - 130
		Pyrene	2006/06/28		76	%	30 - 130
		Benzo(a)anthracene	2006/06/28		79	%	30 - 130
		Chrysene	2006/06/28		73	%	30 - 130

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Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1176320 KB4	SPIKE	Benzo(b&j)fluoranthene	2006/06/28		77	%	30 - 130
		Benzo(k)fluoranthene	2006/06/28		73	%	30 - 130
		Benzo(a)pyrene	2006/06/28		65	%	30 - 130
		Indeno(1,2,3-cd)pyrene	2006/06/28		66	%	30 - 130
		Dibenz(a,h)anthracene	2006/06/28		75	%	30 - 130
		Benzo(g,h,i)perylene	2006/06/28		66	%	30 - 130
	BLANK	D10-ANTHRACENE (sur.)	2006/06/28		90	%	30 - 130
		D12-BENZO(A)PYRENE (sur.)	2006/06/28		85	%	30 - 130
		D8-ACENAPHTHYLENE (sur.)	2006/06/28		42	%	30 - 130
		TERPHENYL-D14 (sur.)	2006/06/28		103	%	30 - 130
		Naphthalene	2006/06/28	ND, RDL=0.05		mg/kg	
		2-Methylnaphthalene	2006/06/28	ND, RDL=0.05		mg/kg	
		Acenaphthylene	2006/06/28	ND, RDL=0.05		mg/kg	
		Acenaphthene	2006/06/28	ND, RDL=0.05		mg/kg	
		Fluorene	2006/06/28	ND, RDL=0.05		mg/kg	
		Phenanthrene	2006/06/28	ND, RDL=0.05		mg/kg	
		Anthracene	2006/06/28	ND, RDL=0.05		mg/kg	
		Fluoranthene	2006/06/28	ND, RDL=0.05		mg/kg	
		Pyrene	2006/06/28	ND, RDL=0.05		mg/kg	
		Benzo(a)anthracene	2006/06/28	ND, RDL=0.05		mg/kg	
		Chrysene	2006/06/28	ND, RDL=0.05		mg/kg	
		Benzo(b&j)fluoranthene	2006/06/28	ND, RDL=0.05		mg/kg	
		Benzo(k)fluoranthene	2006/06/28	ND, RDL=0.05		mg/kg	
		Benzo(a)pyrene	2006/06/28	ND, RDL=0.05		mg/kg	
		Indeno(1,2,3-cd)pyrene	2006/06/28	ND, RDL=0.05		mg/kg	
		Dibenz(a,h)anthracene	2006/06/28	ND, RDL=0.05		mg/kg	
		Benzo(g,h,i)perylene	2006/06/28	ND, RDL=0.05		mg/kg	
	RPD	Naphthalene	2006/06/28	NC		%	50
		2-Methylnaphthalene	2006/06/28	26.1		%	50
		Acenaphthylene	2006/06/28	NC		%	50
		Acenaphthene	2006/06/28	NC		%	50
		Fluorene	2006/06/28	NC		%	50
		Phenanthrene	2006/06/28	21.3		%	50
		Anthracene	2006/06/28	6.6		%	50
		Fluoranthene	2006/06/28	NC		%	50
		Pyrene	2006/06/28	9.9		%	50
		Benzo(a)anthracene	2006/06/28	10.7		%	50
		Chrysene	2006/06/28	5.6		%	50
		Benzo(b&j)fluoranthene	2006/06/28	0.07		%	50
		Benzo(k)fluoranthene	2006/06/28	11.6		%	50
		Benzo(a)pyrene	2006/06/28	1.4		%	50
		Indeno(1,2,3-cd)pyrene	2006/06/28	3.0		%	50
		Dibenz(a,h)anthracene	2006/06/28	18.4		%	50
		Benzo(g,h,i)perylene	2006/06/28	15.6		%	50
1176385 CN1	BLANK	Moisture	2006/06/27	ND, RDL=0.3		%	
	RPD [B76147-01]	Moisture	2006/06/27	6.3		%	20
1176390 CN1	BLANK	Moisture	2006/06/27	ND, RDL=0.3		%	
	RPD	Moisture	2006/06/27	4.7		%	20
1176497 JR1	BLANK	Saturation %	2006/06/26	ND, RDL=1		%	
	RPD	Saturation %	2006/06/26	8.9		%	25
1176700 YP1	BLANK	Flash point	2006/06/26	>61, RDL=23		°C	
	RPD	Flash point	2006/06/26	NC		%	N/A
1176876 YP1	Calibration Check	Soluble (1:1) pH	2006/06/26		100	%	80 - 120
	RPD	Soluble (1:1) pH	2006/06/26	4.6		%	25
1176883 LQ	Calibration Check	Extractable (Water) Ethylene Glycol	2006/06/27		119	%	80 - 120
		Extractable (Water) Diethylene Glycol	2006/06/27		101	%	80 - 120

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Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1176883 LQ	Calibration Check	Extractable (Water) Triethylene Glycol	2006/06/27		81	%	80 - 120
		Extractable (Water) Tetraethylene Glycol	2006/06/27		82	%	80 - 120
		Extractable (Water) Propylene Glycol	2006/06/27		107	%	80 - 120
	MATRIX SPIKE	Extractable (Water) SULFOLANE (sur.)	2006/06/27		99	%	48 - 123
		Extractable (Water) Ethylene Glycol	2006/06/27		122	%	30 - 130
		Extractable (Water) Diethylene Glycol	2006/06/27		103	%	30 - 130
		Extractable (Water) Triethylene Glycol	2006/06/27		96	%	30 - 130
		Extractable (Water) Tetraethylene Glycol	2006/06/27		91	%	30 - 130
		Extractable (Water) Propylene Glycol	2006/06/27		108	%	30 - 130
	SPIKE	Extractable (Water) SULFOLANE (sur.)	2006/06/27		99	%	48 - 123
		Extractable (Water) Ethylene Glycol	2006/06/27		117	%	30 - 130
		Extractable (Water) Diethylene Glycol	2006/06/27		99	%	30 - 130
		Extractable (Water) Triethylene Glycol	2006/06/27		85	%	30 - 130
		Extractable (Water) Tetraethylene Glycol	2006/06/27		74	%	30 - 130
		Extractable (Water) Propylene Glycol	2006/06/27		106	%	30 - 130
	BLANK	Extractable (Water) SULFOLANE (sur.)	2006/06/27		108	%	48 - 123
		Extractable (Water) Ethylene Glycol	2006/06/27	ND, RDL=2.0		mg/kg	
		Extractable (Water) Diethylene Glycol	2006/06/27	ND, RDL=3.0		mg/kg	
		Extractable (Water) Triethylene Glycol	2006/06/27	ND, RDL=6.1		mg/kg	
		Extractable (Water) Tetraethylene Glycol	2006/06/27	ND, RDL=10		mg/kg	
		Extractable (Water) Propylene Glycol	2006/06/27	ND, RDL=10		mg/kg	
	RPD	Extractable (Water) Ethylene Glycol	2006/06/27	NC		%	40
		Extractable (Water) Diethylene Glycol	2006/06/27	NC		%	40
		Extractable (Water) Triethylene Glycol	2006/06/27	NC		%	40
		Extractable (Water) Tetraethylene Glycol	2006/06/27	NC		%	40
		Extractable (Water) Propylene Glycol	2006/06/27	NC		%	40
1177042 JP2	Calibration Check	Soluble Chloride (Cl)	2006/06/26		106	%	80 - 120
	MATRIX SPIKE	Soluble Chloride (Cl)	2006/06/26		109	%	75 - 125
	BLANK	Soluble Chloride (Cl)	2006/06/26	ND, RDL=10		mg/L	
	RPD	Soluble Chloride (Cl)	2006/06/26	1.5		%	35
1177537 AL2	Calibration Check	Soluble (5:1) Hex. Chromium (Cr 6+)	2006/06/27		101	%	75 - 125
	MATRIX SPIKE	Soluble (5:1) Hex. Chromium (Cr 6+)	2006/06/27		94	%	75 - 125
	BLANK	Soluble (5:1) Hex. Chromium (Cr 6+)	2006/06/27	ND, RDL=0.3		mg/kg	
	RPD	Soluble (5:1) Hex. Chromium (Cr 6+)	2006/06/27	NC		%	35
1177773 YP1	BLANK	Sieve - #200 (>0.075mm)	2006/06/27	ND, RDL=0.1		%	
		Sieve - <200 Mesh	2006/06/27	ND, RDL=0.1		%	
	RPD	Sieve - #200 (>0.075mm)	2006/06/27	NC		%	40
		Sieve - <200 Mesh	2006/06/27	0.00006		%	40
1177778 YP1	RPD	Free Liquid	2006/06/27	NC		%	25
1177914 AC4	Calibration Check	Total Arsenic (As)	2006/06/28		103	%	80 - 120
		Total Molybdenum (Mo)	2006/06/28		102	%	80 - 120
		Total Selenium (Se)	2006/06/28		101	%	80 - 120
		Total Thallium (Tl)	2006/06/28		104	%	80 - 120
		Total Uranium (U)	2006/06/28		104	%	80 - 120
	MATRIX SPIKE	Total Arsenic (As)	2006/06/28		111	%	80 - 120
		Total Selenium (Se)	2006/06/28		111	%	80 - 120
		Total Thallium (Tl)	2006/06/28		109	%	80 - 120
	BLANK	Total Arsenic (As)	2006/06/28	ND, RDL=1		mg/kg	
		Total Molybdenum (Mo)	2006/06/28	ND, RDL=0.5		mg/kg	
		Total Selenium (Se)	2006/06/28	ND, RDL=0.5		mg/kg	
		Total Thallium (Tl)	2006/06/28	ND, RDL=1		mg/kg	
		Total Uranium (U)	2006/06/28	ND, RDL=0.2		mg/kg	
	RPD	Total Arsenic (As)	2006/06/28	2.7		%	35
		Total Molybdenum (Mo)	2006/06/28	NC		%	35
		Total Selenium (Se)	2006/06/28	NC		%	35
		Total Thallium (Tl)	2006/06/28	NC		%	35

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Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1177914 AC4	RPD	Total Uranium (U)	2006/06/28	7.8		%	35
1177915 YY1	Calibration Check	Leachable Mercury (Hg)	2006/06/27		99	%	85 - 115
	MATRIX SPIKE	Leachable Mercury (Hg)	2006/06/27		100	%	85 - 115
	LEACHATE BLAN	Leachable Mercury (Hg)	2006/06/27	ND, RDL=0.05		ug/L	
	RPD	Leachable Mercury (Hg)	2006/06/27	NC		%	35
1177924 KO	MATRIX SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		85	%	60 - 130
		F1 (C06-C10)	2006/06/27		102	%	60 - 130
	SPIKE	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		80	%	60 - 130
		F1 (C06-C10)	2006/06/27		113	%	80 - 120
	BLANK	4-BROMOFLUOROBENZENE (sur.)	2006/06/27		89	%	60 - 130
		F1 (C06-C10)	2006/06/27	ND, RDL=10		mg/kg	
	RPD	F1 (C06-C10)	2006/06/27	7.2		%	50
1178132 KB4	MATRIX SPIKE	O-TERPHENYL (sur.)	2006/06/27		78	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2006/06/27		88	%	50 - 130
		F3 (C16-C34 Hydrocarbons)	2006/06/27		83	%	50 - 130
		F4 (C34-C50 Hydrocarbons)	2006/06/27		82	%	50 - 130
	SPIKE	O-TERPHENYL (sur.)	2006/06/27		78	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2006/06/27		83	%	80 - 120
		F3 (C16-C34 Hydrocarbons)	2006/06/27		81	%	80 - 120
		F4 (C34-C50 Hydrocarbons)	2006/06/27		81	%	80 - 120
	BLANK	O-TERPHENYL (sur.)	2006/06/27		61	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2006/06/27	ND, RDL=10		mg/kg	
		F3 (C16-C34 Hydrocarbons)	2006/06/27	ND, RDL=10		mg/kg	
		F4 (C34-C50 Hydrocarbons)	2006/06/27	14, RDL=10		mg/kg	
		Reached Baseline at C50	2006/06/27	YES, RDL=1		mg/kg	
	RPD	F2 (C10-C16 Hydrocarbons)	2006/06/27	NC		%	50
		F3 (C16-C34 Hydrocarbons)	2006/06/27	NC		%	50
		F4 (C34-C50 Hydrocarbons)	2006/06/27	NC		%	50
		Reached Baseline at C50	2006/06/27	NC		%	50
1178141 KB4	MATRIX SPIKE	O-TERPHENYL (sur.)	2006/06/28		87	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2006/06/28		97	%	50 - 130
		F3 (C16-C34 Hydrocarbons)	2006/06/28		87	%	50 - 130
		F4 (C34-C50 Hydrocarbons)	2006/06/28		86	%	50 - 130
	SPIKE	O-TERPHENYL (sur.)	2006/06/28		79	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2006/06/28		87	%	80 - 120
		F3 (C16-C34 Hydrocarbons)	2006/06/28		80	%	80 - 120
		F4 (C34-C50 Hydrocarbons)	2006/06/28		83	%	80 - 120
	BLANK	O-TERPHENYL (sur.)	2006/06/28		81	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2006/06/28	ND, RDL=10		mg/kg	
		F3 (C16-C34 Hydrocarbons)	2006/06/28	ND, RDL=10		mg/kg	
		F4 (C34-C50 Hydrocarbons)	2006/06/28	ND, RDL=10		mg/kg	
		Reached Baseline at C50	2006/06/28	YES, RDL=1		mg/kg	
	RPD	F2 (C10-C16 Hydrocarbons)	2006/06/28	NC		%	50
		F3 (C16-C34 Hydrocarbons)	2006/06/28	8.1		%	50
		F4 (C34-C50 Hydrocarbons)	2006/06/28	1.6		%	50
		Reached Baseline at C50	2006/06/28	NC		%	50
1178286 MC3	Calibration Check	Soluble (Hot water) Boron (B)	2006/06/27		103	%	N/A
	MATRIX SPIKE [B76172-01]	Soluble (Hot water) Boron (B)	2006/06/27		96	%	80 - 120
	SPIKE	Soluble (Hot water) Boron (B)	2006/06/27		105	%	85 - 115
	BLANK	Soluble (Hot water) Boron (B)	2006/06/27	ND, RDL=0.1		mg/kg	
	RPD	Soluble (Hot water) Boron (B)	2006/06/27	NC		%	35
1178287 MC3	Calibration Check	Total Aluminum (Al)	2006/06/27		106	%	80 - 120
		Total Antimony (Sb)	2006/06/27		105	%	80 - 120
		Total Barium (Ba)	2006/06/27		102	%	80 - 120
		Total Beryllium (Be)	2006/06/27		107	%	80 - 120

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Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1178287 MC3	Calibration Check	Total Bismuth (Bi)	2006/06/27		99	%	80 - 120
		Total Cadmium (Cd)	2006/06/27		106	%	80 - 120
		Total Calcium (Ca)	2006/06/27		102	%	80 - 120
		Total Chromium (Cr)	2006/06/27		104	%	80 - 120
		Total Cobalt (Co)	2006/06/27		102	%	80 - 120
		Total Copper (Cu)	2006/06/27		105	%	80 - 120
		Total Iron (Fe)	2006/06/27		95	%	80 - 120
		Total Lead (Pb)	2006/06/27		102	%	80 - 120
		Total Lithium (Li)	2006/06/27		100	%	80 - 120
		Total Magnesium (Mg)	2006/06/27		105	%	80 - 120
		Total Manganese (Mn)	2006/06/27		104	%	80 - 120
		Total Nickel (Ni)	2006/06/27		105	%	80 - 120
		Total Phosphorus (P)	2006/06/27		102	%	80 - 120
		Total Potassium (K)	2006/06/27		101	%	80 - 120
		Total Silver (Ag)	2006/06/27		104	%	80 - 120
		Total Sodium (Na)	2006/06/27		102	%	80 - 120
		Total Strontium (Sr)	2006/06/27		103	%	80 - 120
		Total Tin (Sn)	2006/06/27		100	%	80 - 120
		Total Titanium (Ti)	2006/06/27		100	%	80 - 120
		Total Vanadium (V)	2006/06/27		104	%	80 - 120
		Total Zinc (Zn)	2006/06/27		103	%	80 - 120
		Total Zirconium (Zr)	2006/06/27		97	%	80 - 120
	MATRIX SPIKE	Total Antimony (Sb)	2006/06/27		97	%	75 - 125
		Total Barium (Ba)	2006/06/27		118	%	75 - 125
		Total Beryllium (Be)	2006/06/27		102	%	75 - 125
		Total Cadmium (Cd)	2006/06/27		103	%	75 - 125
		Total Chromium (Cr)	2006/06/27		102	%	75 - 125
		Total Cobalt (Co)	2006/06/27		89	%	75 - 125
		Total Copper (Cu)	2006/06/27		101	%	75 - 125
		Total Lead (Pb)	2006/06/27		95	%	75 - 125
		Total Lithium (Li)	2006/06/27		104	%	75 - 125
		Total Manganese (Mn)	2006/06/27		95	%	75 - 125
		Total Nickel (Ni)	2006/06/27		90	%	75 - 125
		Total Sodium (Na)	2006/06/27		107	%	75 - 125
		Total Strontium (Sr)	2006/06/27		97	%	75 - 125
		Total Titanium (Ti)	2006/06/27		102	%	75 - 125
		Total Vanadium (V)	2006/06/27		117	%	75 - 125
		Total Zinc (Zn)	2006/06/27		93	%	75 - 125
	SPIKE	Total Antimony (Sb)	2006/06/27		97	%	N/A
		Total Barium (Ba)	2006/06/27		93	%	N/A
		Total Beryllium (Be)	2006/06/27		99	%	N/A
		Total Cadmium (Cd)	2006/06/27		94	%	N/A
		Total Chromium (Cr)	2006/06/27		90	%	N/A
		Total Cobalt (Co)	2006/06/27		89	%	N/A
		Total Copper (Cu)	2006/06/27		93	%	N/A
		Total Lead (Pb)	2006/06/27		91	%	N/A
		Total Lithium (Li)	2006/06/27		90	%	N/A
		Total Manganese (Mn)	2006/06/27		91	%	N/A
		Total Nickel (Ni)	2006/06/27		92	%	N/A
		Total Sodium (Na)	2006/06/27		92	%	N/A
		Total Strontium (Sr)	2006/06/27		90	%	N/A
		Total Titanium (Ti)	2006/06/27		90	%	N/A
		Total Vanadium (V)	2006/06/27		90	%	N/A
		Total Zinc (Zn)	2006/06/27		92	%	N/A
	BLANK	Total Aluminum (Al)	2006/06/27	ND, RDL=10		mg/kg	
		Total Antimony (Sb)	2006/06/27	ND, RDL=2		mg/kg	

JACQUES WHITFORD LTD.
Attention: STEVE BOURN
Client Project #: 1013548
P.O. #:
Site Reference: PINE LAKE/WOOD BUFFALO PARK

Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1178287 MC3	BLANK	Total Barium (Ba)	2006/06/27	ND, RDL=0.2		mg/kg	
		Total Beryllium (Be)	2006/06/27	ND, RDL=0.1		mg/kg	
		Total Bismuth (Bi)	2006/06/27	ND, RDL=10		mg/kg	
		Total Cadmium (Cd)	2006/06/27	ND, RDL=0.2		mg/kg	
		Total Calcium (Ca)	2006/06/27	ND, RDL=20		mg/kg	
		Total Chromium (Cr)	2006/06/27	ND, RDL=1		mg/kg	
		Total Cobalt (Co)	2006/06/27	ND, RDL=0.4		mg/kg	
		Total Copper (Cu)	2006/06/27	ND, RDL=2		mg/kg	
		Total Iron (Fe)	2006/06/27	ND, RDL=10		mg/kg	
		Total Lead (Pb)	2006/06/27	ND, RDL=10		mg/kg	
		Total Lithium (Li)	2006/06/27	ND, RDL=0.4		mg/kg	
		Total Magnesium (Mg)	2006/06/27	ND, RDL=10		mg/kg	
		Total Manganese (Mn)	2006/06/27	ND, RDL=0.4		mg/kg	
		Total Nickel (Ni)	2006/06/27	ND, RDL=4		mg/kg	
		Total Phosphorus (P)	2006/06/27	ND, RDL=4		mg/kg	
		Total Potassium (K)	2006/06/27	ND, RDL=20		mg/kg	
		Total Silver (Ag)	2006/06/27	ND, RDL=1		mg/kg	
		Total Sodium (Na)	2006/06/27	ND, RDL=10		mg/kg	
		Total Strontium (Sr)	2006/06/27	ND, RDL=0.4		mg/kg	
		Total Sulphur (S)	2006/06/27	ND, RDL=40		mg/kg	
		Total Tin (Sn)	2006/06/27	ND, RDL=2		mg/kg	
		Total Titanium (Ti)	2006/06/27	ND, RDL=0.8		mg/kg	
		Total Vanadium (V)	2006/06/27	ND, RDL=2		mg/kg	
		Total Zinc (Zn)	2006/06/27	ND, RDL=2		mg/kg	
		Total Zirconium (Zr)	2006/06/27	ND, RDL=1		mg/kg	
	RPD	Total Aluminum (Al)	2006/06/27	0.2		%	35
		Total Antimony (Sb)	2006/06/27	NC		%	35
		Total Barium (Ba)	2006/06/27	0.1		%	35
		Total Beryllium (Be)	2006/06/27	0.3		%	35
		Total Bismuth (Bi)	2006/06/27	NC		%	35
		Total Cadmium (Cd)	2006/06/27	NC		%	35
		Total Calcium (Ca)	2006/06/27	0.2		%	35
		Total Chromium (Cr)	2006/06/27	0.05		%	35
		Total Cobalt (Co)	2006/06/27	0.5		%	35
		Total Copper (Cu)	2006/06/27	0.03		%	35
		Total Iron (Fe)	2006/06/27	4.1		%	35
		Total Lead (Pb)	2006/06/27	NC		%	35
		Total Lithium (Li)	2006/06/27	0.3		%	35
		Total Magnesium (Mg)	2006/06/27	0.2		%	35
		Total Manganese (Mn)	2006/06/27	0.2		%	35
		Total Nickel (Ni)	2006/06/27	5.0		%	35
		Total Phosphorus (P)	2006/06/27	0.4		%	35
		Total Potassium (K)	2006/06/27	0.3		%	35
		Total Silver (Ag)	2006/06/27	NC		%	35
		Total Sodium (Na)	2006/06/27	0.3		%	35
		Total Strontium (Sr)	2006/06/27	0.7		%	35
		Total Sulphur (S)	2006/06/27	0.5		%	35
		Total Tin (Sn)	2006/06/27	NC		%	35
		Total Titanium (Ti)	2006/06/27	0.2		%	35
		Total Vanadium (V)	2006/06/27	1.2		%	35
		Total Zinc (Zn)	2006/06/27	0.1		%	35
		Total Zirconium (Zr)	2006/06/27	NC		%	35
1178439 LM4	MATRIX SPIKE [B76158-00]	Leachable (ZH) Benzene	2006/06/28		100	%	70 - 130
		Leachable (ZH) Ethylbenzene	2006/06/28		94	%	70 - 130
		Leachable (ZH) m & p-Xylene	2006/06/28		97	%	70 - 130

Maxxam Analytics Inc

JACQUES WHITFORD LTD.
Attention: STEVE BOURN
Client Project #: 1013548
P.O. #:
Site Reference: PINE LAKE/WOOD BUFFALO PARK

Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1178439 LM4	MATRIX SPIKE						
	[B76158-00]	Leachable (ZH) o-Xylene	2006/06/28		97	%	70 - 130
		Leachable (ZH) Toluene	2006/06/28		95	%	70 - 130
		Leachable (ZH) 4-BROMOFLUOROBENZEN	2006/06/28		100	%	60 - 140
		Leachable (ZH) D4-1,2-DICHLOROETHANE	2006/06/28		85	%	60 - 140
		Leachable (ZH) D8-TOLUENE (sur.)	2006/06/28		97	%	60 - 140
	SPIKE	Leachable (ZH) Benzene	2006/06/28		100	%	N/A
		Leachable (ZH) Ethylbenzene	2006/06/28		98	%	N/A
		Leachable (ZH) m & p-Xylene	2006/06/28		102	%	N/A
		Leachable (ZH) o-Xylene	2006/06/28		101	%	N/A
		Leachable (ZH) Toluene	2006/06/28		98	%	N/A
		Leachable (ZH) 4-BROMOFLUOROBENZEN	2006/06/28		99	%	60 - 140
		Leachable (ZH) D4-1,2-DICHLOROETHANE	2006/06/28		81	%	60 - 140
		Leachable (ZH) D8-TOLUENE (sur.)	2006/06/28		101	%	60 - 140
	BLANK	Leachable (ZH) Benzene	2006/06/28	ND, RDL=10		ug/L	
		Leachable (ZH) Ethylbenzene	2006/06/28	ND, RDL=10		ug/L	
		Leachable (ZH) m & p-Xylene	2006/06/28	ND, RDL=20		ug/L	
		Leachable (ZH) o-Xylene	2006/06/28	ND, RDL=10		ug/L	
		Leachable (ZH) Toluene	2006/06/28	ND, RDL=10		ug/L	
		Leachable (ZH) Xylenes (Total)	2006/06/28	ND, RDL=20		ug/L	
		Leachable (ZH) 4-BROMOFLUOROBENZEN	2006/06/28		100	%	60 - 140
		Leachable (ZH) D4-1,2-DICHLOROETHANE	2006/06/28		79	%	60 - 140
		Leachable (ZH) D8-TOLUENE (sur.)	2006/06/28		103	%	60 - 140
	RPD	Leachable (ZH) Benzene	2006/06/28	NC		%	50
		Leachable (ZH) Ethylbenzene	2006/06/28	NC		%	50
		Leachable (ZH) m & p-Xylene	2006/06/28	NC		%	50
		Leachable (ZH) o-Xylene	2006/06/28	NC		%	50
		Leachable (ZH) Toluene	2006/06/28	NC		%	50
		Leachable (ZH) Xylenes (Total)	2006/06/28	NC		%	50
1178746 MC3	Calibration Check	Leachable Silver (Ag)	2006/06/27		104	%	80 - 120
		Leachable Arsenic (As)	2006/06/27		103	%	80 - 120
		Leachable Boron (B)	2006/06/27		104	%	80 - 120
		Leachable Barium (Ba)	2006/06/27		102	%	80 - 120
		Leachable Beryllium (Be)	2006/06/27		107	%	80 - 120
		Leachable Cadmium (Cd)	2006/06/27		106	%	80 - 120
		Leachable Cobalt (Co)	2006/06/27		102	%	80 - 120
		Leachable Chromium (Cr)	2006/06/27		103	%	80 - 120
		Leachable Copper (Cu)	2006/06/27		104	%	80 - 120
		Leachable Iron (Fe)	2006/06/27		95	%	80 - 120
		Leachable Nickel (Ni)	2006/06/27		105	%	80 - 120
		Leachable Lead (Pb)	2006/06/27		102	%	80 - 120
		Leachable Antimony (Sb)	2006/06/27		104	%	80 - 120
		Leachable Selenium (Se)	2006/06/27		103	%	80 - 120
		Leachable Thallium (Tl)	2006/06/27		102	%	80 - 120
		Leachable Uranium (U)	2006/06/27		98	%	80 - 120
		Leachable Vanadium (V)	2006/06/27		103	%	80 - 120
		Leachable Zinc (Zn)	2006/06/27		103	%	80 - 120
		Leachable Zirconium (Zr)	2006/06/27		98	%	80 - 120
	MATRIX SPIKE	Leachable Arsenic (As)	2006/06/27		106	%	75 - 125
		Leachable Beryllium (Be)	2006/06/27		93	%	75 - 125
		Leachable Cadmium (Cd)	2006/06/27		102	%	75 - 125
		Leachable Chromium (Cr)	2006/06/27		88	%	75 - 125
		Leachable Nickel (Ni)	2006/06/27		87	%	75 - 125
		Leachable Lead (Pb)	2006/06/27		88	%	75 - 125
		Leachable Selenium (Se)	2006/06/27		119	%	75 - 125
		Leachable Thallium (Tl)	2006/06/27		82	%	75 - 125

JACQUES WHITFORD LTD.
Attention: STEVE BOURN
Client Project #: 1013548
P.O. #:
Site Reference: PINE LAKE/WOOD BUFFALO PARK

Quality Assurance Report (Continued)

Maxxam Job Number: EA626999

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1178746 MC3	BLANK	Leachable Silver (Ag)	2006/06/27	ND, RDL=0.5		mg/L	
		Leachable Arsenic (As)	2006/06/27	ND, RDL=0.5		mg/L	
		Leachable Boron (B)	2006/06/27	ND, RDL=50		mg/L	
		Leachable Barium (Ba)	2006/06/27	ND, RDL=10		mg/L	
		Leachable Beryllium (Be)	2006/06/27	ND, RDL=0.5		mg/L	
		Leachable Cadmium (Cd)	2006/06/27	ND, RDL=0.1		mg/L	
		Leachable Cobalt (Co)	2006/06/27	ND, RDL=10		mg/L	
		Leachable Chromium (Cr)	2006/06/27	ND, RDL=0.5		mg/L	
		Leachable Copper (Cu)	2006/06/27	ND, RDL=10		mg/L	
		Leachable Iron (Fe)	2006/06/27	ND, RDL=100		mg/L	
		Leachable Nickel (Ni)	2006/06/27	ND, RDL=0.5		mg/L	
		Leachable Lead (Pb)	2006/06/27	ND, RDL=0.5		mg/L	
		Leachable Antimony (Sb)	2006/06/27	ND, RDL=50		mg/L	
		Leachable Selenium (Se)	2006/06/27	ND, RDL=0.1		mg/L	
		Leachable Thallium (Tl)	2006/06/27	ND, RDL=0.5		mg/L	
		Leachable Uranium (U)	2006/06/27	ND, RDL=0.5		mg/L	
		Leachable Vanadium (V)	2006/06/27	ND, RDL=5		mg/L	
		Leachable Zinc (Zn)	2006/06/27	ND, RDL=50		mg/L	
		Leachable Zirconium (Zr)	2006/06/27	ND, RDL=50		mg/L	
	RPD	Leachable Lead (Pb)	2006/06/27	NC		%	35
1179249 RTA	Calibration Check	Total Petroleum Hydrocarbon	2006/06/28		102	%	82 - 117
	QC STANDARD	Total Petroleum Hydrocarbon	2006/06/28		97	%	N/A
	BLANK	Total Petroleum Hydrocarbon	2006/06/28	ND, RDL=50		mg/kg	
	RPD [B76158-02]	Total Petroleum Hydrocarbon	2006/06/28	NC		%	40
1179256 YY1	Calibration Check	Mercury (Hg)	2006/06/28		100	%	85 - 115
	QC STANDARD	Mercury (Hg)	2006/06/28		98	%	N/A
	BLANK	Mercury (Hg)	2006/06/28	ND, RDL=0.05		mg/kg	
	RPD	Mercury (Hg)	2006/06/28	NC		%	35

ND = Not detected
N/A = Not Applicable
NC = Non-calculable
RPD = Relative Percent Difference
(1) Please note that the recovery of some compounds are outside control limits however the overall quality control for this analysis meets our acceptability criteria.

APPENDIX C

Methodology

PHASE II ESA METHODOLOGY

1.0 PRE-DRILLING SITE INVESTIGATIONS

1.1 Service and Utility Locates

The locations of services and utilities were established prior to the drilling and sampling phase of the investigation. The locations of underground utilities were confirmed prior to drilling through Alberta 1st Call.

2.0 SUBSURFACE INVESTIGATION

2.1 Test Pits

Three (3) test pits were advanced at the site to a maximum depth of 3.0 m below grade (mbg) using a rubber tire backhoe.

2.1 Drilling

Boreholes were advanced to maximum depths of 11.3 m below ground surface using a truck-mounted auger drilling rig. Disturbed samples were collected from the solid stem augers for logging the characteristics of the materials and for field monitoring of soil vapour level.

2.2 Vapour Monitoring

Field screening for the presence of combustible soil vapours (CSV) in the soil samples was conducted using a portable GasTechtor 1238ME (GasTechtor) calibrated to a hexane standard and volatile soil vapours (VSV) using a portable photoionization detector (PID) calibrated to an isobutylene standard.

The soil samples subjected to vapour screening were transferred to sealable plastic bags. Each bag was approximately half filled with soil to provide adequate headspace for the accumulation of released vapours. Samples were broken by hand to increase surface area and permit vapour release. The samples were transferred quickly to minimize vapour loss. The plastic bag was then left to stand upright and undisturbed for a period of at least five minutes at ambient air temperature.

The concentration of accumulated hydrocarbon and organic vapours in the headspace was then measured by inserting the probe of the GasTech into the headspace of the bag. The CSV concentrations were measured in parts per million (ppm) or percent of the Lower Explosive Limit (% LEL) relative to hexane. The measurements were recorded on a field log for comparison with subsequent samples and boreholes.

The concentration of accumulated hydrocarbon and organic vapours in the headspace was then measured by inserting the probe of the PID into the headspace of the bag. The VSV concentrations were measured in parts per million (ppm) relative to isobutylene. The measurements were recorded on a field log for comparison with subsequent samples and boreholes.

2.3 Borehole Logging

Materials retrieved from the drilling operation were logged by Jacques Whitford personnel. The texture and composition of materials, stratigraphic boundaries, saturation, and the presence of hydrocarbon vapours or other indications of contamination were recorded.

2.4 Soil Sampling

Soil samples were collected continuously from the boreholes at approximately 0.75 m intervals (where possible) directly from the standard augers. One half of the sample was field tested for combustible / volatile vapours and the other half was placed in laboratory supplied containers for potential laboratory analyses.

2.5 Soil Analysis

Soil samples collected during the drilling of boreholes were analyzed by Maxxam Analytics Inc. (Maxxam) of Edmonton, Alberta. Soil samples were analyzed for BTEX, petroleum hydrocarbon fractions F1-F4 and VOCs, metals and glycols.

The samples were generally taken from suspected worst case zones of contamination, as determined by field observation and field vapour screening results.

2.6 Establishment of Monitoring Wells

Monitor wells were constructed using 50 mm diameter schedule 40 PVC casing and 20 slot PVC screen. The annular space around the screen was filled with *Envirowell Gravel 4-8 Mesh* (coarse silica sand) and the wells were sealed above the sand pack with a 0.60 m thick layer of bentonite chips. The monitor wells were completed with above grade lockable steel protectors and slip caps. Monitor well construction details are provided on the Monitor Records in **Appendix B**.

3.0 BOREHOLE AND WELL SURVEY

3.1 Survey Well Elevations

Each test pit and borehole were horizontally located relative to a benchmark (a spike nailed into the base of a tree stump at the north end of the former fuel cache) to develop an accurate aerial plan of the site showing sampling locations. An elevation survey of the grade surface and top of each monitor casing were established relative to the benchmark using standard surveying methods.

3.2 Establish Static Elevations and Gradients

The elevations of water and product, if detected, were determined under conditions where no pumping or other activity, which would influence water levels, was being conducted. These measurements are necessary for the establishment of potential gradients, which are used in establishing the pattern of contaminant migration.

Water levels and depth to product, if present, were measured using a interface probe. The interface probe was rinsed between monitoring wells using distilled water.

4.0 GROUNDWATER SAMPLING

4.1 Well Development, Purging and Sampling

Groundwater was not found in the monitor wells following completion of the wells and the subsequent monitoring event on July 12, 2006.

APPENDIX D

Borehole/Monitor Well Records

CLIENT: **PARKS CANADA**
PROJECT: **Pine Lake**
Wood Buffalo Park

BOREHOLE RECORD

JW PROJECT NO: **1013548**
SURFACE ELEVATION: **99.92 m**
SITE DATUM: **Local**

BOREHOLE NO: **PL-MW1**

DEPTH [m]	SOIL DESCRIPTION	SAMPLE TYPE	COMBUSTIBLE VAPOUR LEVEL [ppmv]	SAMPLE ID / Analysis [If Requested]	COMPLETION NOTES	ELEVATION [m]
-0.6 to 0.0	Ground Surface				stickup, jplug	100.0
0.0–0.5	**SAND** orange brown, dry	Auger	10	SA1	backfilled with drill cuttings	
0.5–0.9	**gravelly SAND** light brown, dry	Auger			bentonite seal	
0.9–3.7	**SAND** fine, light brown, dry	Auger	10	SA2		99.0
		Auger	10	SA3		98.0
	Grey fine sand at 2.25 meters	Auger	5	SA4		97.0
		Auger	5	SA5	sandy cuttings	
3.7–6.8	**SILT** greenish brown and greyish brown, moist	Auger	10	SA6		96.0
		Auger	5	SA7		95.0
		Auger	15	SA8 BTEX, Metals, VOC		94.0
		Auger	10	SA9	sandy cuttings	
6.8–9.0	**silty CLAY** grey, moist	Auger	10	SA10		93.0
		Auger	10	SA11		92.0
		Auger	10	SA12		91.0
9.0–9.8	**SILT** grey, dry	Auger	5	SA13	50 mm 010 slot PVC pipe	
9.8–11.3	**silty CLAY** grey, wet	Auger	10	SA14	envirowell gravel 4-8 mesh	90.0
		Auger	10	SA15		89.0
11.3					end cap	

End of borehole at 11.3 m

Completion Information:
Screened interval from 5.3 m to 11.3 m below surface
Top of Pipe (TOP) Elevation = **100.750** m

INVESTIG. METHOD: Solid Stem Auger
INVESTIG. DATE: June 20, 2006
LOGGED BY: SB

Sample Notes: Auger Sample

Sheet 1 of 1

Jacques Whitford

CLIENT: **PARKS CANADA**
PROJECT: **Pine Lake**
Wood Buffalo Park

BOREHOLE RECORD

JW PROJECT NO: **1013548**
SURFACE ELEVATION: **99.74 m**
SITE DATUM: **Local**

BOREHOLE NO: **PL-MW2**

DEPTH [m]	SOIL DESCRIPTION
0.0	Ground Surface
0.0 – 0.1	**TOPSOIL** roots
0.1 – 0.5	**SAND** orange brown, dry
0.5 – 2.2	**silty SAND** brown, dry
2.2 – 4.5	**SILT** brown, dry
4.5 – 6.8	**SILT and CLAY** brown grey, moist
6.8 – 11.3	**silty CLAY** grey, moist

SAMPLE TYPE	COMBUSTIBLE VAPOUR LEVEL [ppmv]	SAMPLE ID / Analysis [If Requested]
Auger Sample	10	**SA1**
Auger Sample	10	**SA2**
Auger Sample	10	**SA3** BTEX, Metals, VOCs
Auger Sample	15	**SA4**
Auger Sample	10	**SA5**
Auger Sample	10	**SA6**
Auger Sample	5	**SA7**
Auger Sample	5	**SA8**
Auger Sample	10	**SA9**
Auger Sample	10	**SA10**
Auger Sample	10	**SA11**
Auger Sample	5	**SA12**
Auger Sample	5	**SA13**
Auger Sample	5	**SA14**
Auger Sample	10	**SA15**

COMPLETION NOTES:
- stickup, jplug
- backfilled with drill cuttings
- bentonite seal
- sandy cuttings
- backfilled with drill cuttings
- 50 mm 010 slot PVC pipe
- envirowell gravel 4-8 mesh
- end cap

End of borehole at 11.3 m

Completion Information:
Screened interval from 5.3 m to 11.3 m below surface
Top of Pipe (TOP) Elevation = **100.577** m

INVESTIG. METHOD: Solid Stem Auger
INVESTIG. DATE: June 20, 2006
LOGGED BY: SB

Sample Notes: Auger Sample

Sheet 1 of 1

CLIENT: **PARKS CANADA**
PROJECT: **Pine Lake**
Wood Buffalo Park

BOREHOLE RECORD

JW PROJECT NO: **1013548**
SURFACE ELEVATION: **99.76 m**
SITE DATUM: **Local**

BOREHOLE NO:
PL-MW3

DEPTH [m]	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	BLOW COUNT	COMBUSTIBLE VAPOUR LEVEL [ppmv] (1 10 100 1000 10000)	SAMPLE ID / Analysis [If Requested]	WELL COMPLETION	WATER LEVEL	COMPLETION NOTES	ELEVATION [m]
-0.8									stickup, jplug	
-0.6										
-0.4										
-0.2		Ground Surface								100.0
0.0										
0.2		**TOPSOIL**							backfilled with drill cuttings	
0.4		roots								
0.6		**SAND**								
0.8		orange brown, dry							bentonite seal	
1.0		Light brown sand at 0.6 meters								99.0
1.2		**silty SAND**								
1.4		light brown, dry								
1.6										
1.8										
2.0										98.0
2.2										
2.4		**SILT**								
2.6		light brown, dry								
2.8										97.0
3.0									sandy cuttings	
3.2										
3.4										
3.6										96.0
3.8										
4.0										
4.2										
4.4										95.0
4.6										
4.8										
5.0										
5.2										94.0
5.4										
5.6										
5.8										
6.0										93.0
6.2										
6.4										
6.6										
6.8		**silty CLAY**								
7.0		grey, dry								
7.2										92.0
7.4										
7.6										
7.8										
8.0										
8.2										91.0
8.4		Moist brown silty clay at 8.25 meters								
8.6										
8.8										
9.0		Moist to wet grey silty clay at 9.0 meters							50 mm 010 slot PVC pipe	
9.2										90.0
9.4										
9.6										
9.8										
10.0									envirowell gravel 4-8 mesh	
10.2										
10.4										89.0
10.6										
10.8										
11.0										
11.2									end cap	

5	SA1	BTEX, Metals, VOCs	
15	SA2		
15	SA3		
10	SA4		
5	SA5		
10	SA6		
10	SA7		
15	SA8		
15	SA9		
10	SA10		
10	SA11		
10	SA12		
10	SA13		
5	SA14		
10	SA15		

End of borehole at 11.3 m

Completion Information:
Screened interval from 5.2 m to 11.3 m below surface
Top of Pipe (TOP) Elevation = **100.675** m

INVESTIG. METHOD: Solid Stem Auger
INVESTIG. DATE: June 20, 2006
LOGGED BY: SB

Sample Notes: Auger Sample

Sheet 1 of 1

JWEL EE 2005 PINE LAKE.GPJ EE DATA TEMPLATE V5.GDT 08/16/06

CLIENT: **PARKS CANADA**
PROJECT: **Pine Lake**
Wood Buffalo Park

BOREHOLE RECORD

JW PROJECT NO: **1013548**
SURFACE ELEVATION: **N/A**
SITE DATUM: **N/A**

BOREHOLE NO:
PL-TP1

DEPTH [m]	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	BLOW COUNT	COMBUSTIBLE VAPOUR LEVEL [ppmv] (1 / 10 / 100 / 1000 / 10000)	SAMPLE ID / Analysis [If Requested]	TEST PIT COMPLETION	WATER LEVEL	COMPLETION NOTES	DEPTH [m]
0.0		**TOPSOIL**								
		roots								
0.2		**silty SAND** orange brown, dry			15	SA1				
0.4		Light brown at 0.4 meters								
0.6										
0.8					15	SA2				
1.0										1.0
1.2										
1.4									backfilled with cuttings	
1.6					5	SA3 BTEX, VOC				
1.8										
2.0		Brownish grey at 2.0 meters								2.0
2.2										
2.4					15	SA4				
2.6										
2.8		End of borehole at 2.8 m								

INVESTIG. METHOD: Backhoe
INVESTIG. DATE: June 19, 2006
LOGGED BY: SB

Sample Notes: ■ Grab Sample

Jacques Whitford

CLIENT: **PARKS CANADA**
PROJECT: **Pine Lake**
Wood Buffalo Park

BOREHOLE RECORD

JW PROJECT NO: **1013548**
SURFACE ELEVATION: **N/A**
SITE DATUM: **N/A**

BOREHOLE NO:
PL-TP2

DEPTH [m]	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	BLOW COUNT	COMBUSTIBLE VAPOUR LEVEL [ppmv] (1 / 10 / 100 / 1000 / 10000)	SAMPLE ID / Analysis [If Requested]	TEST PIT COMPLETION	WATER LEVEL	COMPLETION NOTES	DEPTH [m]
0.0		**TOPSOIL** roots								0.0
0.2		**SAND** orange brown, dry			10	**SA1**				0.2
0.4										0.4
0.6		**gravelly SAND** light brown, moist								0.6
0.8						**SA2** BTEX, VOCs, Metals, Glycol; Dup for BTEX/F1-F4				0.8
1.0					15					1.0
1.2										1.2
1.4										1.4
1.6		**SILT** grey, moist							backfilled with cuttings	1.6
1.8										1.8
2.0										2.0
2.2					50	**SA3**				2.2
2.4										2.4
2.6										2.6
2.8										2.8
3.0		End of borehole at 3.0 m								3.0

INVESTIG. METHOD: Backhoe
INVESTIG. DATE: June 19, 2006
LOGGED BY: SB

Sample Notes: ■ Grab Sample

Jacques Whitford

CLIENT: **PARKS CANADA**
PROJECT: **Pine Lake**
Wood Buffalo Park

BOREHOLE RECORD

JW PROJECT NO: **1013548**
SURFACE ELEVATION: **N/A**
SITE DATUM: **N/A**

BOREHOLE NO:
PL-TP3

DEPTH [m]	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	BLOW COUNT	COMBUSTIBLE VAPOUR LEVEL [ppmv] (1 / 10 / 100 / 1000 / 10000)	SAMPLE ID / Analysis [If Requested]	TEST PIT COMPLETION	WATER LEVEL	COMPLETION NOTES	DEPTH [m]
0.0		**TOPSOIL** roots								
0.2		**SAND** orange brown, dry			5	**SA1** BTEX, VOCs				
0.4										
0.6		**silty SAND** light brown, moist								
0.8										
1.0					35	**SA2**				1.0
1.2										
1.4									backfilled with cuttings	
1.6										
1.8										
2.0										2.0
2.2					10	**SA3**				
2.4										
2.6										
2.8										
		End of borehole at 2.9 m								

INVESTIG. METHOD: Backhoe
INVESTIG. DATE: June 19, 2006
LOGGED BY: SB

Sample Notes: ■ Grab Sample

Jacques Whitford

APPENDIX E

Site Photographs

Photo 1: *Removing Aviation Fuel Drums from the Former Fuel Cache Area*

Photo 2: *Surficial Staining at the Former Fuel Cache Area*

Photo 3: *Abandoned Aviation Fuel Drum from the Former Fuel Cache*

Photo 4: *Open Test Pit Showing Stratigraphy*

Photo 5: *Drilling Monitor Well PL-MW2*

Photo 6: *Former Drum Cache Following the Site Assessment (Facing South)*

APPENDIX F

FCSAAP Scoring

1 Read Sections 1.0, 2.0, and 3.0 of the CCME (1992) *National Classification System for Contaminated Sites* document as well as Sections 1.0 and 3.0 of the Franz Environmental Inc. (2003) *FCSAAP Contaminated Site Classification Guidance Document.* These documents provide relevant background information on the contaminated site classification systems and details on how to select scores for the various evaluation factors.

2 Obtain the following site information to complete the classification (list from CCME 1992):

- Description of site location
- Type of contaminants or materials likely to be present at site (and/or description of historical activities)
- Approximate size of site and quantity of contaminants
- Approximate depth to water table
- Geological map or survey information (soil, overburden, and bedrock information)
- Annual rainfall data (can be inferred from rainfall map of Canada)
- Surface cover information
- Proximity to surface water
- Topographic information
- Flood potential of site
- Proximity to drinking water supply
- Uses of adjacent water resources
- Land use information (on-site and surrounding)

3 Complete Worksheets 1 - 6 by documenting the relevant site information, the sources of the information, the scores, and the rationale for selecting those scores. Enter the site information, sources, and scoring rationale in the large blue cells of the worksheets. Providing this information will facilitate the review of scores by the FCSAP expert support departments. Select scores after consulting the *FCSAAP Contaminated Site Classification Guidance Document* and enter the appropriate scores in the green cells of the worksheets. Values in yellow cells will be calculated automatically.

Note: Factors for "Exposure Pathways" (Worksheets 2 - 4) and "Receptors" (Worksheets 5 - 6) may be scored based on contamination and impacts that are ***known*** to have occurred or on those that may ***potentially*** occur. Only one of either the known or potential scores is used to calculate the classification score for the site. However, if values are entered for both the known and potential scores for a given factor, the higher value will be used to calculate the site score.

Note: Scores for "Contaminant Characteristics" and potential scores for "Exposure Pathways" and "Receptors" can be based either on "Speculation" or "Data". As long as sufficient site information is available (see Point 2 above), most scores should be based on data. In such cases, this should be indicated by selecting "Data" from the dropdown menu to the right of the cell containing the numerical score. However, if sufficient site information is not available to assign a score to a particular factor, it should be assigned a score that is one-half the maximum score for that factor. Such scores should be identified by selecting "Speculation" from the dropdown menu. Scores will not be included in the site score unless either "Data" or "Speculation" is chosen from the associated dropdown menu.

Note: If specific site conditions have not been addressed by the evaluation factors, positive or negative special consideration scores may be added. Use of special consideration scores should be the exception rather than the rule and justification for such scores should be documented in the associated blue cells.

Note: Additional instructions are included in the worksheets in bold, blue text.

I. Contaminant Characteristics (max. 33) Complete A, B, C, and Special Considerations.		Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
A. Degree of Hazard (max. 14)					Contaminants of concern include various contaminants of high concern such as benzene and lead. The concentrations of these contaminants were all low. (Phase II ESA)
High concern contaminants - high concentrations		14			
High concern contaminants - low concentrations		11			
Medium concern contaminants - high concentrations		8			
Medium concern contaminants - low concentrations		5			
Low concern contaminants (high or low concentrations)		3			
	A. Site Score		11	Data	
B. Contaminant Quantity (max. 10)					No contaminated soils were identified. (Phase II ESA)
>10 ha or 5000 m^3		10			
2 to 10 ha or 1000 to 5000 m^3		6			
<2 ha or 1000 m^3		2			
	B. Site Score		2	Data	
C. Physical State (max. 9)					Low mobility of contaminants based on low concentrations. Low potential for erosion as the site is relatively flat and surrounded by trees. (Phase II ESA)
Highly mobile contaminants or high potential for mobility by erosion		9			
Moderately mobile contaminants		7			
Low to immobile contaminants or low potential for mobility by erosion		3			
	C. Site Score		3	Data	
Special Considerations (max. 6)		-6 to +6	-2		No elevated concentrations detected.

Score Based on Data	16
Score Based on Speculation	0
Score from Special Considerations	-2
Total Site Score for Contaminant Characteristics	14

II. Exposure Pathways

A. Groundwater (max. 11)

Complete 1 (Known) or 2 (Potential), and Special Considerations.

	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
1. Known contamination and operable groundwater pathway within and/or beyond the property boundary (max. 11)				
For potable groundwater environments, 1) groundwater concentrations exceed background concentrations and the CCME Canadian Drinking Water Guidelines (CDWG) by 2X or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater impacts.	11			
For nonpotable environments (typically urban environments with municipal services), 1) groundwater concentrations exceed 2X the appropriate nonpotable guidelines or modified generic guidelines (which excludes ingestion of drinking water pathway) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater impacts.				
For potable water environments, groundwater concentrations exceed background concentrations and the CDWG 1 to 2X.				
For nonpotable environments, groundwater concentrations exceed by 1 to 2X the appropriate nonpotable guidelines or modified generic guidelines (which excludes ingestion of drinking water pathway).	6			
Meets CDWG for potable environments; meets nonpotable criteria or modified generic (excludes ingestion of drinking water pathway) for nonpotable environments, or Absence of groundwater exposure pathway.	0			
A1. Site Score				
2. Potential for Groundwater Contamination. Complete a, b, c, d, and e.				
2a. Engineered Subsurface Containment (max. 4)				
No containment	4			
Partial containment	2			
Full containment or direct, monitored evidence of natural attenuation processes	0			
A2a. Site Score		4	Data	Field observations (Phase II ESA)
2b. Thickness of confining later over aquifer of concern or groundwater exposure pathway (max. 1.5)				
3 m or less including no or discontinuous confining layer or unknown	1.5			
3 to 10 m	1			
>10 m	0			
A2b. Site Score		1.5		Unknown thickness.

II. Exposure Pathways

A. Groundwater (max. 11) **Complete 1 (Known) or 2 (Potential), and Special Considerations.**	**Scoring Guideline**	**Site Score**	**Information Source**	**Document relevant site information, the source of that information, and the rationale for selecting the site score.**
2c. Hydraulic conductivity of confining layer (max. 1.5)				
>10^{-4} cm/s or no confining layer or unknown	1.5			
10^{-4} to 10^{-6} cm/sec	1			
<10^{-6} cm/sec	0.5			
A2c. Site Score		0.5		Native stratigraphy assumed to be fine grained. (Phase II ESA)
2d. Annual precipitation (max. 1)				
>1000 mm and moderately to highly permeable surface material	1			
600 mm and moderately to highly permeable surface material	0.6			
400 mm and low to moderately permeable surface material	0.4			
200 mm and low permeability surface material	0.2			<500mm precipitation/year in Wood Buffalo. (Agricultural Land Resource Atlas of Alberta)
A2d. Site Score		0.4	Data	
2e. Hydraulic conductivity of aquifer of concern (max. 3)				
>10^{-2} cm/sec	3			
10^{-2} to 10^{-4} cm/sec	1.5			
<10^{-4} cm/sec	0.5			
A2e. Site Score		1.5	Speculation	Unknown.
Special Considerations (max. 4)	-4 to +4	-2		No soil impacts identified. (Phase II ESA)

Score Based on Data	4.4
Score Based on Speculation	1.5
Score from Special Considerations	-2
Total Site Score for Exposure Pathways/ Groundwater	3.9

II. Exposure Pathways B. Surface Water (max. 11). Complete 1 (Known) or 2 (Potential), and Special Considerations.	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
1. Observed or measured contamination, above background conditions of surface water/effluent near the site which is considered an operable exposure pathway (max. 11)				
Known concentrations of surface water:				
1) Concentrations exceed background concentrations and exceed CCME CWQG - Protection of Aquatic Life Guidelines by 2X; or 2) There is known contact of contaminants with surface water based on physical evidence; or 3) In the absence of CWQG, chemicals have been proven to be toxic based on site specific testing (e.g. toxicity testing, bioassay testing or other indicator testing of exposure).	11			
Known concentrations of surface water which are above background and between 1 and 2X CWQG.	6			
Meets CWQG or absence of surface water exposure pathway	0			
B1. Site Score				
2. Potential for Surface Water Contamination. Complete a, b, c, d, and e.				
2a. Surface Containment (max. 5)				
No containment	5			
Partial containment	3			
Full containment	0.5			
B2a. Site Score		5	Data	No surface water containment.
2b. Distance to Perennial Surface Water (max. 3)				
0 to <100 m	3			
100 to 300 m	2			
>300 m	0.5			Nearest surface water body is the Salt River, approximately 250 m to 500 m south of the site. (Phase II ESA)
B2b. Site Score		2	Data	
2c. Topography (max. 1.5)				
Contaminants above ground level and slope is steep	1.5			
Contaminants at or below ground level and slope is steep	1.2			
Contaminants above ground level and slope is flat	0.8			
Contaminants at or below ground level and slope is flat	0			
B2c. Site Score		0	Data	No contaminants identified. (Phase II ESA)
2d. Run-off Potential (max. 1)				
>1000 mm precipitation and low permeability surface material	1			
500 - 1000 mm precipitation and moderately permeable surface materia	0.6			
<500 mm precipitation and highly permeable surface material	0.2			<500mm precipitation/year in Wood Buffalo. (Agricultural Land Resource Atlas of Alberta)
B2d. Site Score		0.2	Data	

II. Exposure Pathways B. Surface Water (max. 11). Complete 1 (Known) or 2 (Potential), and Special Considerations.	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
2e. Flood Potential (max. 0.5)				
1 in 2 years	0.5			
1 in 10 years	0.3			
1 in 50 years	0.1			
B2e. Site Score		0.1	Data	Based on location of the site and the nearby surface water body.
Special Considerations (max. 4)	-4 to +4			

Score Based on Data	7.3
Score Based on Speculation	0
Score from Special Considerations	0
Total Site Score for Exposure Pathways/ Surface Water	7.3

II. Exposure Pathways

C. Direct Contact (max. 11).

Complete 1 (Known) or 2 (Potential), and Special Considerations.

	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
1. Known contamination of media by direct contact (max. 11)				
Known contamination of media (soil, sediments and air):				
1) Concentrations exceed background concentrations and exceed 2X applicable environmental quality criteria (EQC) for the appropriate land use on/near the site; or 2) There is known contact of contaminants with media based on physical evidence; or 3) There is known vapour migration into indoor air environment (building).	11			
Known contamination of media (soil, sediments, and air) with concentrations exceeding background and exceeding by 1 to 2 X applicable EQC for the appropriate land use on/near the site.	6			
No exceedance of applicable EQC for appropriate land use on/near the site; or no physical evidence of contamination of the media; or absence of direct contact exposure pathway.	0			No elevated concentrations of the contaminants of concern were identified. (Phase II ESA)
C1. Site Score		0		
2. Potential for Direct Human and/or Animal Contact. Complete a, b, and c.				
2a. Vapour Emissions (gases, subsurface and surface generated vapours, contaminated dust; max. 5)				
Suspected vapour migration with a potential for exposure to impact on an indoor air environment (building on-site or near site).	5			
Evidence of significant dust generated and impacting on-site and off-site potential or known receptors.	3			
No vapour emissions and/or no dust generated	0			
C2a. Site Score				
2b. Accessibility of Site (ability to contact materials; max. 4)				
Limited barriers to prevent site access; contamination not covered	4			
Moderate access or no intervening barriers; contaminants are covered; remote locations in which contaminants are not covered	3			
Controlled access or remote location and contaminants are covered	0			
C2b. Site Score				

II. Exposure Pathways

C. Direct Contact (max. 11).

Complete 1 (Known) or 2 (Potential), and Special Considerations.

	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
2c. Hazardous Soil Gas Migration and Explosive Potential from the Site (max. 2)				
Contaminants are volatile, mobile in the gas/vapour phase and are a potential explosion hazard; soil permeability is high	2			
Contaminants are volatile, mobile in the gas/vapour phase and are a potential explosion hazard. Soil permeability is low and/or groundwater is <2 m from surface.	1			
Contaminants are neither volatile nor mobile in the gas/vapour phase. No risk of explosive hazard.	0			
C2c. Site Score				
Special Considerations (max. 4)	-4 to +4			

Score Based on Data	0
Score Based on Speculation	0
Score from Special Considerations	0
Total Site Score for Exposure Pathways/ Direct Contact	0

	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
III. Receptors				
A. Human and Animal Uses (max. 18).				
Complete 1 (Known) or 2 (Potential), and Special Considerations.				
1. Known adverse impact on humans or animals (domestic or documented traditional food source) as a result of the contaminated site (max. 18)				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to humans or animals (domestic or documented traditional food source) as a result of the contaminated site.	18			
Suspected adverse impact or moderately high exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to humans or animals (domestic or documented traditional food source) as a result of the contaminated site.	15			
No quantified or suspected exposures/impacts in humans or animals	0			
A1. Site Score				
2. Potential for impacts on humans and animals Complete a, b, and c.				
a) Drinking water supply (max. 9). Complete i (Known) or ii (Potential).				
i) Known impact on drinking water supply (max. 9)				
Known contamination of drinking water supply (groundwater or surface water) with (1) concentrations above background and CDWG, or (2) there is physical evidence of drinking water contamination.	9			
Measurable concentrations of contaminants in the drinking water supply (groundwater or surface water) but concentrations are less than the CDWG or there is a significant potential for CDWG exceedances of the water supply in the near future	7			
Drinking water supply is known not to be contaminated	0			
A2ai. Site Score				
ii) Potential for impact on drinking water supply (max. 9) Complete both sections.				
Proximity to drinking water supply (max. 6)				
0 to <100 m	6			
100 to <300 m	5			
300 m to <1 km	4			
1 to 5 km	3			
A2aii(Part1). Site Score		3	Data	Groundwater in the area is not used as a potable source. (Phase II ESA)

III. Receptors	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
A. Human and Animal Uses (max. 18).				
Complete 1 (Known) or 2 (Potential), and Special Considerations.				
Availability of alternative drinking water supply (max. 3)				
Alternative drinking water supply is not available	3			
Alternative drinking water supply difficult to obtain	2			
Alternative drinking water supply available	0.5			
A2aii(Part2). Site Score		0.5	Speculation	Site is Remote and no potable water use is anticipated at the Site. (Phase II ESA)
2a. Site Score Based on Data		3		
2a. Site Score Based on Speculation		0.5		
2a. Site Score		3.5		
b) Other water resources (max. 4). Complete i (Known) or ii (Potential)				
i) Water resources (i.e. recreational, commercial, livestock, irrigation or other food chain uses) known to be adversely affected as a result of site contamination (max. 4)				
Known contamination of water resource (1) to concentrations above background and above the appropriate environmental quality criteria (EQC) as required based on the water resources usage or (2) there is physical evidence of water resources contamination	4			
Chemical concentrations are currently below the appropriate EQC as required based on the water resources usage but strongly suspect potential for future EQC exceedances	3			
Water resource is not known to be contaminated	0			
A2bi. Site Score		0		No impacts identified at the site. Therefore, the nearby Salt River is not known to be contaminated. (Phase II ESA)
ii) Potential for impact on water resources (max. 4). Complete both sections.				
Proximity to water resources (max. 2)				
0 to <100 m	2			
100 to <300 m	1.5			
300 m to <1 km	1			
1 to 5 km	0.5			
A2bii(Part1). Site Score				

III. Receptors

A. Human and Animal Uses (max. 18).

Complete 1 (Known) or 2 (Potential), and Special Considerations.

	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.

Use of water resources (max. 2). If multiple uses, give the highest score automatically (use following table)

Water Use	Frequent Use	Occasional Use
Recreational (swimming, fishing, etc.)	2	1
Commercial food preparation	1.5	0.8
Livestock watering	1	0.5
Irrigation	1	0.5
Other domestic or food chain uses	0.5	0.3
Not currently used but likely future use	0.5	0.2

A2bii(Part2). Site Score

2b. Site Score Based on Data 0

2b. Site Score Based on Speculation 0

2b. Site Score 0

c) Direct human exposure (max. 5). Complete i (Known) or ii (Potential)

i) Known contamination of land used by humans (max. 5)

Known contamination of land used for agricultural (AG) or residential/parkland/school purposes (R/P) above AG or R/P CCME Environmental Quality Criteria (EQC).	5
Known contamination of land used for commercial or industrial (C/I) purposes above C/I CCME EQC.	
Land is known not to be contaminated above background concentrations	0

A2ci. Site Score 0

The concentrations of the contaminants of concern were generally below the method detection limit. The concentrations of metals satisfied the applicable criteria. (Phase II ESA)

ii) Potential human exposure through land use (give highest score to worst case scenario; max. 5)

Determine use(s) of land at and surrounding site and assign score using following table:

Land Use	Distance from Site		
	0-<300 m	300 m-<1 km	1-5 km
residential	5	4.5	3
agricultural	5	4	2.5
parkland/school	4	3	1.5
commercial/industrial	3	1	0.5

A2cii. Site Score

III. Receptors A. Human and Animal Uses (max. 18). Complete 1 (Known) or 2 (Potential), and Special Considerations.	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
2c. Site Score Based on Data		0		
2c. Site Score Based on Speculation		0		
2c. Site Score		0		
Special Considerations (max. 5)	-5 to +5			
Score Based on Data		3		
Score Based on Speculation		0.5		
Score from Special Considerations		0		
Total Site Score for Receptors/ Human and Animal Uses		3.5		

III. Receptors B. Environmental Receptors (max. 16) Complete 1 (Known) or 2 (Potential), and Special Considerations.	Scoring Guideline	Site Score	Information Source	Document relevant site information, the source of that information, and the rationale for selecting the site score.
1. Known impacts on the environment as a result of the contaminated site (max. 16)				
Known adverse effect on environmental receptors including fish habitat	16			
Visual physical evidence of stress on aquatic species or vegetative stress on trees, crops or plant life located on the site or off-site with impacts related to the contaminated site	12			
No known environmental receptors within 1 km of contaminated site and no known adverse effects.	0			
B1. Site Score				
2. Potential for Impact on Environmental Receptors. Complete a and b.				
a) Distance from the site to the nearest environmental receptor (max. 10)				
0 to <300 m	10			
300 m to <1 km	6			
1 km to <5 km	2			
>5 km	0.5			
B2a. Site Score		10	Data	**The site is located within Wood Buffalo National Park, which is considered to be an environmental receptor. (Phase III ESA)**
b) Distance to an important or susceptible groundwater or surface water resource (max. 6)				
0 to <300 m	6			
300 m to <1 km	4			
1 km to <5 km	2			
>5 km	1			
B2b. Site Score		6	Data	**The Slave River is situated approximately 250 m east of the site. (Phase III ESA)**
Special Considerations (max. 5)	-5 to +5			

Score Based on Data	16
Score Based on Speculation	0
Score from Special Considerations	0
Total Site Score for Receptors/ Environmental Receptors	16

Factor Categories	Known and Potential Scores Based on Data	Potential Scores Based on Speculation	Scores from Special Considerations	Total Category Scores
I. Contaminant Characteristics (max. 33)	16	0	-2	14
II. Exposure Pathways (max. 33)				
A. Groundwater (max. 11)	4.4	1.5	-2	3.9
B. Surface Water (max. 11)	7.3	0	0	7.3
C. Direct Contact (max. 11)	0	0	0	0
III. Receptors (max. 34)				
A. Human and Animal (max. 18)	3	0.5	0	3.5
B. Environment (max. 16)	16	0	0	16
Total Scores for the Site	46.7	2	-4	44.7

Site Classification Class 3 - Action May Be Required

Class 1 (Score 70 to 100): Action Required

Class 2 (Score 50 to 69.9): Action Likely Required

Class 3 (Score 37 to 49.9): Action May Be Required

Class N (Score <37): Action Not Likely Required

Class I (Speculation Score ≥15): Insufficient Information

Note: This worksheet can be copied for inclusion in site reports or other documents.