SOIL AND GROUNDWATER REMEDIATION STUDY

VALE FACILITIES
THOMPSON, MANITOBA

FINAL REPORT

Submitted to:
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Thompson, Manitoba
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1.0 INTRODUCTION

AMEC Environment & Infrastructure, a Division of AMEC Americas Limited (AMEC) of Winnipeg, Manitoba was retained by Vale Canada Limited (Vale), to conduct a Soil and Groundwater Remediation Study (Study) of Vale's facilities located at the Vale Thompson mine site. This report outlines the results of the Study conducted in the area of the subject properties designated as the plant area (including the south yard, refinery, smelter, mill, slag pile, and former landfill, subsequently referred to as the 'Plant Site'), Birchtree Mine area (subsequently referred to as the 'Birchtree Site'), T-3 Headframe (subsequently referred to as the 'T-3 Site'), and Maintenance Shed area (subsequently referred to as the 'Maintenance Shed Site')

The location of the Sites is shown on Figure 1, Appendix A. The purpose of the Study was to assess the current subsurface soil and groundwater conditions at the Sites with respect to metal and petroleum hydrocarbon impacts and to identify transport mechanisms and recommend preferred solutions for remediation.

2.0 BACKGROUND AND SCOPE OF WORK

On 17 November 2010, Vale announced plans to permanently close its Smelting and Refining Operations located in Thompson at the end of 2014. Due to this closure announcement and the results of an internal environmental audit performed in 2010, it was concluded that it is necessary to gain a full understanding of the level of contamination within the Site and begin to formulate short and long term remediation plans for the Site. Vale expanded the scope to include all of the Thompson facilities; including the Slag Pile, Copper Ponds, Birchtree Mine, Landfill and Fuel Storage sites.

Several studies and assessments have been completed in the Plant Site previously by various groups which have identified elevated dissolved metals in groundwater at the Site, particularly nickel in the vicinity of the refinery building.

The study included the following components:

- A review of past data and reports to assess work to date and define data gaps and areas requiring assessment or refining existing assessments;
- An assessment of historical aerial photographs for the Sites from Vale. The aerial photograph review concentrated on potential impact source facilities that may have moved or been decommissioned in the lifetime of the Sites;
- An initial field investigation to identify impacts to the soil and groundwater. The field study focused primarily on previously identified potential or known impacted areas requiring new or additional assessment, areas of potentially impacting facilities, and areas of reported releases or spills;
- A secondary field investigation to delineate or refine impacts to the soil and groundwater identified during the initial field investigation;

- Laboratory analysis of samples collected during the Study to determine the concentrations of metals and/or petroleum hydrocarbon compounds (PHC) in soil and groundwater;
- Preliminary field testing to reaffirm order of magnitude hydraulic conductivity for the various hydrostratigraphic units encountered;
- Identify and recommend preferred engineering/environmental solutions for final remediation of impacts; and,
- Provide budget estimates for various remedial systems, including estimates of the volumes required treatment/storage volumes and duration of required treatment.

The scope of work was conducted without significant deviations, with the exceptions of a third mobilization to the Sites to complete the secondary field investigation.

3.0 INVESTIGATIVE METHODOLOGY

3.1 HISTORICAL AND PREVIOUS INVESTIGATION REVIEW

A significant volume of information was reviewed by AMEC in preparation for the Study. The review documentation was divided into five general categories, as follows:

- In-house, independent, unreferenced (excerpt) and other consultant environmental assessments and monitoring reports;
- HBT AGRA Limited, 1990 – Environmental Site Assessment;
- Dillon Consulting Limited (Dillon), 1996 – 1998 - Environmental Site Assessment, management planning, and follow-up monitoring;
- AMEC 2002 – Groundwater assessment and management planning in area of refinery and smelter; and,
- AMEC 2003 and updates – Closure Plan.

In addition to the reports, all available background or historical documentation regarding the Sites was reviewed. Aerial photographs were obtained from Vale and the Province of Manitoba to assess any obvious changes to facilities or overall Site orientation since development.

The results of the reviews are included in Section 5.1.

3.2 HAZARD ASSESSMENT AND SERVICE LOCATIONS

Prior to the start of the intrusive investigation, AMEC completed a site specific checklist to identify hazards, project health and safety requirements, the work site classification and decontamination procedures for personnel protective equipment.

As part of the checklist, Vale personnel cleared the location of each test hole for all public and private underground utilities.

3.3 TEST HOLE DRILLING AND SOIL SAMPLING PROGRAMS

Test hole programs were designed to provide information on the stratigraphy and environmental condition of the soils at the Sites. The test hole programs were conducted between 23 September and 4 October 2011, 26 and 28 October 2011, and 6 and 9 December 2011. Figures 2 and 3, Appendix A, shows the location of the AMEC test holes as well as past test holes from previous studies.

A total of 111 test holes were completed at the Sites. A Cantera truck mounted drill rig operated by Paddock Drilling Limited of Brandon, Manitoba, employing 125 mm diameter solid stem augers was used to advance the test holes. The augers were cleaned between holes.

Soil samples were recovered from the augers during drilling at 0.8 m and selected stratigraphic intervals. Disturbed soils from the outside of the grab samples were removed to minimize potential cross contamination. Soil samples were classified according to the Modified Unified Soil Classification system and observed for visual evidence of impacts. In areas where PHC were the suspected contaminants of concern, soil samples were split; one portion was placed in laboratory prepared glass jars (for possible laboratory analyses) and the other portion was placed in re-sealable plastic bags (for field screening). In areas where metals were the suspected contaminants of concern, soil samples were placed in re-sealable plastic bags (for field screening and possible laboratory analyses).

In potential PHC impacted areas, soil samples were field screened for combustible organic vapours (COV) using ambient temperature headspace (ATH) techniques and an Eagle RKI combustible organic vapour analyzer, set in the no methane response mode. The ATH method involved half filling and sealing the plastic bag with soil and allowing the vapours to accumulate for approximately twenty minutes prior to analyzing the headspace. Accumulated vapours were measured in parts per million total COV (ppm_v).

In potential metals impacted areas, soil samples were field screened for metal concentrations using x-ray fluorescent (XRF) detection methodology with a Thermo Niton XLp 703A (Niton). The XRF method involved an auto-calculation of background metal concentrations on the sample holding medium (wooden clipboard), the placement and spreading of an approximately 2 mm thickness of sample on the clipboard, and the measurement of metal concentrations in the spread sample with the Niton, allowing for stabilization of readings which occurred in approximately 30 seconds. Metal concentrations were measured in parts per million (ppm).

Soil samples were stored in an insulated cooler while on Site and during transport to the laboratory. The field protocols and QA/QC procedures utilized by AMEC were in accordance with standard industry protocols.

3.4 MONITOR WELL INSTALLATION AND GROUNDWATER SAMPLING

As part of the Study, a total of 57 test holes were completed as groundwater monitor wells. The wells were installed in order to monitor subsurface vapour levels, establish the groundwater conditions at the Site and to allow for groundwater sampling. The monitor wells were constructed with 50 mm diameter Schedule 40 PVC, number 10 slot well screen and 50 mm diameter Schedule 40 PVC solid riser pipe to the surface. Flush mount or aboveground steel casings were installed over the wells for protection.

The groundwater monitoring program included the following (in order) for each of the newly installed monitor wells:

- Measurement of monitor well combustible organic vapour (COV) concentrations;
- Determination of the presence and measurement of the thickness of light non-aqueous phase liquid (LNAPL);
- Measurement of groundwater elevations;
- Measurement of groundwater headspace COV concentrations; and,
- Collection of groundwater samples for laboratory analysis.

COV concentrations were measured with a RKI Eagle set in the methane elimination mode and groundwater levels were measured with an ORS electronic interface probe.

Groundwater samples were placed in clean certified bottles provided by the laboratory and stored in an insulated cooler while on Site and during transport to the laboratory. As with the soil sampling program, the field protocols and QA/QC procedures utilized by AMEC during Site monitoring were in accordance with standard industry protocols.

Hydraulic conductivity tests were performed on select monitoring wells considered representative of the various groundwater regimes using rising head methodologies. A bail test, or rising head test, which included recording the static water level in the well, removing a disposable bailer (approximately 750 ml) volume of water, and monitoring the rate of recovery of the water level using a water level meter over specific time frequencies, was conducted on each of these wells. Hydraulic conductivity tests were analyzed using the Hvorslev methodology.

The boreholes were horizontally located with a Magellan GPS unit. A vertical survey of the monitoring wells was not conducted.

3.5 LABORATORY ANALYSIS

A total of 118 soil samples (49 for PHC analysis and 69 for metals/nickel analysis) and 52 groundwater samples (15 for PHC analysis and 37 metals analysis) were submitted for laboratory analysis at AMEC's laboratory in Edmonton, Alberta. One soil sample was also submitted for polycyclic aromatic hydrocarbon (PAH) analysis following the observation of wood debris in one test hole with what appeared to be creosote staining in the soil. For areas where PHCs were the contaminant of concern, the soil and groundwater laboratory analysis program was developed to include benzene, toluene, ethylbenzene, and xylenes (BTEX) and PHC fractions F1-F4. The metal analysis in soil and groundwater consisted of ICP metal scans. Nickel and/or copper were solely targeted in soils at areas adjacent to known nickel impacts or adjacent to former and present copper ponds. The Canadian Association Laboratory Accreditation Inc. (CALA) has accredited AMEC's labs for testing including petroleum hydrocarbon parameters and metals. The laboratory QA/QC protocol is provided in Appendix D.

4.0 ASSESSMENT CRITERIA

4.1 GENERAL

Environmental assessment in Manitoba is based on the assessment criteria as developed by the Canadian Council of Ministers of the Environment (CCME) and Manitoba Conservation (MC). The following documents produced by the CCME and MC were considered applicable to the Site, based on the contaminants of concern.

- CCME, 1999 (updated in 2011). Canadian Environmental Quality Guidelines (EQGs).
- CCME, 2001 (revised 2008). Canada-Wide Standards for Petroleum Hydrocarbons in Soil (CWS PHC)
- MC, 2011. Manitoba Water Quality Standards, Objectives, and Guidelines

Based on the above current CCME and MC documents (and their precursors), AMEC conducted an evaluation of the applicable exposure pathways, land uses, key receptors and a visual evaluation of the predominant soil texture at the site. The sensitivity assessment was conducted in accordance with current CCME guidelines and did not include the modification or recalculation of the formulas used to derive the criteria values.

4.2 LAND USE DESIGNATION

The CCME guidelines have been developed for four generic land uses: 1) agricultural; 2) residential/parkland; 3) commercial; and, 4) industrial. A generic land use scenario is envisioned for each category based on the normal activities on these lands. The four land uses are defined by CCME as follows:

***Agricultural lands*:** where the primary land use is growing crops or tending livestock. This also includes agricultural lands that provide habitat for resident and transitory wildlife and native flora. The portion of a farm that houses people is considered a residential land use.

***Residential/Parkland*:** where the primary activity is residential or recreational activity. The ecologically-based approach assumes parkland is used as a buffer between areas of residency, but this does not include wild lands such as national or provincial parks.

Commercial: where the primary activity is commercial (*e.g.*, shopping mall) and there is free access to all members of the public, including children. The use may include, for example, commercial day-care centres. It does not include operations where food is grown.

Industrial: where the primary activity involves the production, manufacture or construction of goods. Public access is restricted and children are not permitted continuous access or occupancy.

The Site is currently zoned for industrial land use and, according to the Vale Closure Plan for the facility, will remain designated as industrial/commercial property following the closure of the facility. The surrounding properties are all undeveloped lands. As the potential for future industrial or commercial developments at the Site is likely, AMEC will apply the commercial land use category, for Site assessment purposes.

4.3 GRAIN SIZE DESIGNATION

The CCME guidelines for PHC assessment are prescribed for coarse-grained and fine-grained soils. Fine-grained soils are defined as having a median grain size of less than or equal to 75 µm; coarse-grained soils have a median grain size of greater than 75 µm. Where both fine and coarse grained strata are present, the dominant soil particle size is determined by the stratum governing horizontal and vertical migration to a receptor. Metal assessment is independent of soil grain size.

As part of this investigation, two grain size analyses were conducted. The soil samples from TH11-15 (3.0 m - Clay) and TH11-38 (5.3 m – Silt) had 89% and 63% passing the 75 µm screen respectively, indicating that the majority of the overburden soils observed at the Site would be classified as fine grained soils for the purposes of this assessment. As previous studies have indicated, and as observed during the intrusive investigation for this Study, a lower sand/gravel deposit is located in a bedrock depression over portions of the Site. Based on evidence provided in the past assessments, the lower sand/gravel deposit does not appear to be continuous or connected throughout most of the Site and therefore would not be considered the preferential contaminant pathway. Copies of the grain size analyses are included in Appendix D.

4.4 APPLICABLE EXPOSURE PATHWAYS

CCME recognizes two soil horizons for PHC assessment; surface soil (≤ 1.5 m depth) and subsoils (>1.5 m depth). Exposure pathways are assessed individually for both horizons. It should be noted that metal and PAH assessment is independent of soil depth.

4.4.1 HUMAN EXPOSURE PATHWAYS

Potential human exposure pathways include soil ingestion, soil dermal contact, vapour inhalation, irrigation use and protection of potable groundwater. The applicability of each of these potential exposure pathways are discussed in the following sections.

4.4.1.1 Soil Ingestion Pathway

The soil ingestion pathway would be considered applicable to the surface soil horizon at this Site as the majority of the potential sources of impacts are located aboveground or immediately below ground surface (bgs) and the Site is approximately 75% gravel surfaced, not providing protection from airborne migration and ingestion of soil particles. As ingestion of soils below the 1.5 m depth interval is not considered realistic, the ingestion pathway would not be considered applicable to the subsoil horizon.

4.4.1.2 Dermal Contact Pathway

The dermal contact pathway would be considered applicable to the surface soil horizon at this Site as the majority of the potential sources of impacts are located aboveground or immediately below ground surface and the Site is approximately 75% gravel surfaced, not providing protection from direct dermal contact with soils. As continued direct dermal contact of soils below the 1.5 m depth interval is not considered realistic, the dermal contact pathway would not be considered applicable to the subsoil horizon.

4.4.1.3 Vapour Inhalation Pathway

The vapour inhalation (indoor) pathway would be considered applicable to both the surface and subsoil horizons as there currently are occupied on-Site buildings and any future site development may be expected to include a commercial building.

4.4.1.4 Irrigation Use of Groundwater

As there are no agricultural operations within 500 m of the Site and any commercial irrigation watering would most probably be conducted through a municipal water supply originating from the Burntwood River, approximately 3 km from the Site. The use of groundwater for irrigation is not considered applicable to the Site.

4.4.1.5 Protection of Potable Groundwater

A water well survey was conducted by AMEC through Manitoba Water Stewardship to include an area within 500m of the Site. Nine wells were reported to have been drilled in the search area. The wells listed consisted of the test wells completed in 1967 by International Water Supply and are not employed for extraction of potable water.

CCME considers all water bearing units as a potential potable groundwater resource; however, CCME considers a water bearing unit as having a hydraulic conductivity of greater than 10^{-4} cm/s. Based on past and present hydraulic conductivity testing of the soils at the Site, the predominant clay and silt deposits do not have sufficient hydraulic conductivity to meet the CCME standard.

Based on the lack of a shallow permeable unit to be employed as a potable water resource and the installation of a municipal supplied potable water system, negating the need to employ groundwater for potable uses, the potable groundwater exposure pathway is not considered to be applicable to the Site.

4.4.1.6 Livestock Watering

There are no livestock operations, sloughs capable of providing livestock drinking water, or registered agricultural wells within 500 m of the Site. As such, the livestock drinking water exposure pathway is not considered applicable.

4.4.2 ECOLOGICAL EXPOSURE PATHWAYS

Potential ecological exposure pathways include the ecological soil contact and protection of aquatic life pathways.

4.4.2.1 Ecological Soil Contact Pathway

The ecological soil contact pathway would be considered applicable as ecological receptor exposure, from terrestrial and subterranean organisms and plant root systems, to soils in the surface soil horizon is feasible at the Site. Ecological receptor exposure to soils in the subsoil horizon is not considered realistic.

4.4.2.2 Freshwater Aquatic Life Pathway

CCME states that the freshwater aquatic life pathway may be excluded in cases where there is no surface water body within 500 m of a site classified as coarse grained or 10 m of a site classified as fine grained. The closest surface water body capable of sustaining aquatic life is the Burntwood River, located approximately 3 km west of the Site. As such, AMEC considers the freshwater aquatic life pathway to not be applicable to the Site.

4.4.3 MISCELLANEOUS CRITERIA

As commercial land use criteria are applicable to the Site, non-toxic soil management limits and off-site migration check as produced by CCME are required to be assessed. As well, CCME produced interim criteria in 1991 for many metal constituents in which no final guidelines have been developed.

4.4.3.1 Management Limit

The management limits applies for all soils in the surface soil and subsoil horizons.

4.4.3.2 Off-Site Migration Check

The neighbouring lands consist of undeveloped natural woodlands and would qualify as more sensitive land usage. As such, the off-site migration check does apply to the Site.

4.4.3.3 CCME 1991 Interim Criteria

CCME initially developed interim criteria for many potential contaminants in 1991. With the publishing of the Canadian Environmental Quality Guidelines in 1999 (and subsequent updates), CCME adopted a risk based scientific approach to determining soil quality guidelines. While many of the interim criteria have been superseded by scientifically derived guidelines, there are still contaminants, including several metals and PAHs, in which new guidelines have not yet been developed for all exposure pathways and, in some cases, the interim criteria still remain as the only guideline for assessment comparison. Note that even though some interim criteria are more stringent, the scientifically derived guidelines are considered more defensible and therefore will take precedent over the interim criteria.

4.5 SUMMARY

Given the potential future commercial zoning of the Site, the fine grained nature of the soil and the applicable exposure pathways as outlined in the previous sections, AMEC determined assessment guidelines for each contaminant of concern. The most stringent of the applicable exposure pathway guideline values as produced by CCME was employed for each contaminant for both the surface soil and subsoil horizons.

AMEC has chosen the following applicable risk guideline criteria for the Site:

<u>Soil</u>:

Surface Soil (≤1.5 m bgs):

- commercial values for fine grained surface soil in a non-potable situation as limited by the:
    - inhalation of indoor air check (slab on grade) exposure pathway for benzene;
    - ecological soil contact exposure pathway for toluene, ethylbenzene, xylenes, PHC F1 – F4, anthracene, benzo[a]pyrene, fluoranthene, cadmium, chromium, copper, nickel, selenium, vanadium, and zinc;
    - direct contact (ingestion, inhalation, and dermal contact) for PAHs, Benzo[a]pyrene, and Total Potency Equivalent (B[a]P TPE);
    - soil ingestion exposure pathway for arsenic, lead, mercury, thallium, and uranium; and,
    - CCME interim criteria for benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenzo[a,h]anthracene, indeno[1,2,3-cd], naphthalene, phenanthrene, pyrene, barium, beryllium, cobalt, and molybdenum.

Subsoil (> 1.5 m bgs):

- commercial values for fine grained subsoil in a non-potable situation as limited by the:
  - inhalation of indoor air check (slab on grade) human health exposure pathway for benzene, toluene, ethylbenzene and xylenes;
  - Management Limits for F1 – F4;
  - ecological soil contact exposure pathway for anthracene, benzo[a]pyrene, benzo[k]fluoranthene, fluoranthene, cadmium, chromium, copper, nickel, selenium, vanadium, and zinc;
  - direct contact (ingestion, inhalation, and dermal contact) for PAHs, and B[a]P TPE;
  - soil ingestion exposure pathway for arsenic, lead, mercury, thallium, and uranium; and
  - CCME interim criteria for benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenzo[a,h]anthracene, indeno[1,2,3-cd], naphthalene, phenanthrene, pyrene, barium, beryllium, cobalt, and molybdenum.

In addition to the ecological soil contact risk guideline, Dillon's groundwater contaminant transport model was employed to determine a suitable concentration in soil which would minimize groundwater loading over time. Dillon's model indicated that a source equating to 600,000 kg nickel over a 40,000 m^2 source area (equal to 5,000 µg/g nickel) would impart a 250 mg/L nickel "slug" (one-time load) in groundwater. The transport of the slug to a point 500 m down-gradient from the source in the lower sand/gravel unit did not result in a significant increase in concentration for 50,000 years. Based on the modeling results, AMEC has chosen a value of 500 µg/g nickel in soil, one tenth of the model parameter, as a conservative estimate of a nickel concentration which will not produce appreciable groundwater loading. The 500 µg/g criteria will be employed as a guideline to delineate impacted and non-impacted surficial fill.

<u>Water:</u>
The sensitivity ranking for groundwater at the Site was based on the following:

- The Site is connected to a municipal domestic water supply;
- The Site is overlain by low hydraulically conductive overburden (fine grained clays and silts), with discontinuous sand and gravel deposits, overlying granitic bedrock. The soils below the site are not classified as an adequate water bearing unit as defined by CCME;
- There are no water bodies capable of sustaining aquatic life within 500 m of the Site; and,
- There are no livestock watering or irrigation capabilities within 500 m of the Site.

As there are no appreciable risk based usages of the shallow groundwater at the Site, there are no applicable pathways for groundwater exposure under CCME and MC protocols at the Site. The minimal risk of groundwater impact to human health and the environment was reflected in Dillon's risk assessment and the AMEC Closure Plan for the Site, in which it was theorized that impacted groundwater would eventually enter the open pit mine to be flooded northwest of the Site and would dilute and naturally attenuate over time. As the recovery of metal from impacted groundwater would constitute a preferred beneficial use, AMEC will assess groundwater impacts in terms of sufficient concentrations and accessibility to feasibly recover impacting metals.

A summary of the applicable assessment guidelines are included in Table 1, Appendix B.

5.0 ASSESSMENT RESULTS

5.1 REPORT REVIEW

The results and conclusions of previous environmental studies, which mainly regard the Plant Site, are outlined below:

In-house, independent, unreferenced (excerpt) and other consultant reports

- A soil investigation was undertaken and is reported graphically on a drawing by the International Nickel Company of Canada in 1967 prior to the construction of the Plant Site buildings. Cross sections of the soil investigation indicate that the general trending of bedrock is downward to the west-southwest. Discontinuous deposits of “loose to compact silty sand and pebble gravel” are located in the low points of the bedrock. A series of boreholes completed by Geocon in 1974 in an approximate 120 by 120 m area immediately south and west of the smelter are also included on the drawing and indicate that the depth to bedrock is highly variable, ranging from 1.5 to 9.2 m within that area.
- A survey conducted by Atlis Geomatics in 2001 outlines the extent of the slag pile and indicates that 6,456,413 m^3 of slag is present in the pile.
- A table with no reference dated March 2002 summarizes the slag pile produced volume between March 2001 and February 2002, as well as the concentration of individual constituents in the slag. Nickel concentrations are reported between 0.29 and 0.47 percent and copper concentrations are reported between 0.02 and 0.04 percent of the slag material.
- A drawing labeled as Plant Site Plan dated 2005 outlines the location of previous and current (as of 2005) facilities in the Plant Site. Several petroleum storage tanks are present at locations including northwest and east of the smelter, northwest and north of the mill, east and west of the refinery, east of the crusher receiving building, and in the central portion of the south yard. Copper ponds and waste and scrap storage areas in the south yard are also shown.
- A report and figure compiled by INCO Manitoba for various spills and releases at the Plant Site from 1996 to 2001.

HBT AGRA LTD - 1990

- The hydrogeological conditions beneath the Plant Site were previously investigated by HBT Agra Limited (now AMEC) in 1990. As part of the subsurface investigation, a total of 23 boreholes at 14 site locations were drilled within the Plant Site and surrounding areas.
- Wells were installed in each of the boreholes and, in most cases, were nested at differing depths. Hydraulic conductivity testing was performed on most of the wells to characterize subsurface conditions.

- Soils were classified as glaciolacustrine silts and clays overlying localized sand and gravel on top of bedrock.
- Groundwater monitoring was conducted annually from 1990 to 1996 by INCO personnel. The monitoring indicated that elevated nickel concentrations in groundwater were detect at wells 90-2B in the south yard, 90-4 adjacent the copper pond southwest of the smelter, and 90-6A, adjacent to the southwest side of the refinery. Groundwater in the vicinity of the copper arsenate ponds southeast of the Plant Site does not appear to be impacted by nickel or copper.
- Hydraulic conductivities were classified as low in the glaciolacustrine deposits, medium to high in the lower sand and gravel, and high in the slag material.
- The investigation concluded that a northeast/southwest trending bedrock valley traversed the Plant Site and passed beneath the refinery.

Dillon Consulting Limited - 1996

- Dillon conducted a baseline risk assessment, consisting of a hydrogeological evaluation, contaminant distribution, and contaminant fate and mobility model employing the data collected by HBT AGRA LTD.
- Dillon concluded that the bedrock valley is in-filled with a discontinuous sequence of glacial deposits of sand and gravel ranging in thickness from approximately 1 m to 8 m. Dillon employs elevation data of the lower deposit to demonstrate the discontinuities.
- Perched groundwater conditions appear to exist in the upper granular fill unit. As such, the topography and gradient of the interface between the granular fill and underlying clay units were expected to influence the direction of groundwater flow, areas of pooling and discharge zones.
- The Dillon reports suggest that the direction of groundwater flow in the clay unit was vertically downwards towards the lower sand and gravel unit, in which flow was mainly horizontal.
- A contaminant transport model was developed to determine the extent of impact migration based on the conditions at the Plant Site. The results of the model indicated that there would be no significant increase in metal concentrations in groundwater at a point 500 m from the impacting source for 50,000 years.
- Based on the results of the baseline risk assessment, Dillon concluded that there was no appreciable risk to nearby human or ecological receptors imbued by the metal impacts in groundwater.

Dillon Consulting Limited - 1998

- Dillon conducted additional borehole drilling, monitoring, and further hydrogeological assessment to confirm conclusions reached in the 1996 study.
- Boreholes were completed at 8 locations, with the majority of the wells nested at differing depths in these locations
- Soil and groundwater samples were collected from the borehole locations. Soil samples indicated low concentrations of nickel with exception of adjacent to the refinery. Groundwater samples verified that impacts appear to be in “hot spots”.

- A 30 minute pumping test indicated that the lower sand and gravel deposits appear to be discontinuous. Dillon's contaminant transport model was re-run using the hydraulic conductivity determined in the pumping test. The model was consistent with the first model from 1996 and Dillon's conclusion regarding the low risk from groundwater impacts was reconfirmed.

AMEC - 2002

- AMEC conducted a study of the groundwater conditions immediately adjacent to the refinery.
- AMEC completed a preliminary study in May 2002 to identify possible solutions to reducing the elevated nickel concentrations within the refinery sewer system, the results of which were submitted to INCO in a report dated 27 May 2002. The report identified a number of possible solutions and the relative advantages and disadvantages of each option.
- Based on the previous investigations and recent studies conducted by INCO, the groundwater beneath the refinery was confirmed to be impacted by refinery electrolyte, which is characterized by elevated nickel concentrations. The electrolyte appears to have infiltrated into the subsurface soils as a result of plugged sump units in the refinery basement.
- Nickel concentrations in soil ranging from 0.02 to 2.9 percent (200 to 29,000 µg/g) were detected in the granular fill. Nickel concentrations in the clay and lower sand did not exceed 0.13 percent (1,300 µg/g).
- The maximum concentration of dissolved nickel detected in the groundwater samples from the granular fill was 38,282 mg/L. The maximum concentration of dissolved nickel detected in groundwater samples from the lower sand and gravel was approximately 60.6 mg/L, on the west side of the refinery.

AMEC - 2003

- AMEC completed a closure plan from the entire Thompson Mine site, including the plant.
- The closure plan outlined remedial or rehabilitation measures for the Plant Site following the closure of mining activities.
- The slag material was concluded to be a chemically inert material with little leachate potential and remedial measures were not recommended for the slag.
- The closure plan indicated that assessment of potential impacted areas would be required to formulize specific remediation measures, but theorized that PHC impacted soils would be treated by land farming at a facility near the southwest corner of the tailings basin.
- The closure plan indicated that the groundwater was not a risk and would not be directly addressed. Groundwater was expected to flow into the future flooded open pit at a relatively low mass flux rate. It was concluded that natural attenuation in the new pit lake would address any impacts in the groundwater.

5.2 SOIL CONDITIONS

5.2.1 Stratigraphy

The information obtained in this investigation was used to supplement the existing database for the Site. Three general stratigraphic regimes are present at the Site and each is discussed below. Detailed stratigraphic information is shown on the test hole logs included in Appendix C.

Granular Fill

The granular fill zone ranges in thickness from approximately 0.3 to 4 m, with the deeper extents mainly in the vicinity of the refinery. The fill mainly consists of sands and gravels, but is sometimes amended with mine waste slag. Areas of clay fill are also observed on the Sites. The fill is normally unsaturated with the exception of deeper portions in the vicinity of the refinery. In addition, the area of T-3 Site contained sand and gravel fill which extended to the inferred bedrock surface at an average depth of 5.2 m.

Silty Clay

The clay unit ranges in thickness from approximately 2.5 to 16 m at the Site. The clay is medium to high plastic, containing varying amount of silt and with abundant silt interbedds or varves. The clay had previously been divided into two distinct units, divisible by the silt content and plasticity; however, AMEC's investigation did not recognize two distinct units. The clay appears to resemble till material near the contact with bedrock.

Lower Silt/Sand/Gravel

The lower silt/sand/gravel unit was only observed at the Plant Site and ranged in thickness from approximately 0 to 4.5 m. As previously mentioned, these lower deposits appear to have an irregular and discontinuous distribution throughout their extent. The observed silt deposits can be sandy, clayey or as a till. The sand deposits were silty or with some gravel. All lower units were saturated.

5.2.2 Field Metals Assessment

A total of 68 test holes were field screened for metal concentrations to aid in the selection of soil samples for laboratory analysis. Field screening was conducted using XRF methodologies as described in Section 3.3. The results of the field screening are summarized in Table 2, Appendix B.

As shown in Table 2, metal concentrations in most of the test holes were higher in the most shallow soil samples collected (0.8 m bgs), however in TH11-11, TH11-13, and TH11-14 metal concentrations increased with depth to between 1.5 and 3.8 m bgs, suggesting the possible presence of buried fill or other metal containing materials. In TH11-18, metal concentrations increased with depth to 2.3 m bgs. TH11-18 was advanced in the vicinity of a former copper pond and the metal concentrations at depth are consistent with the presence of a former excavated pond..

Nickel concentrations, where detected with the field XRF, were generally at concentrations of the same order of magnitude as the laboratory nickel analysis.

5.2.3 Soil Laboratory Metal Analysis

A total of 69 soil samples were submitted for laboratory analysis of total metals or copper and/or nickel. The results of the laboratory analysis conducted on the selected soil samples are summarized in Table 3, Appendix B. The location of samples which exceeded the assessment guidelines are shown on Figure 4, Appendix A. The analytical certificates are included in Appendix D.

As shown in Table 3 and Figure 4, the majority of surficial (≤1.5 m depth) samples in the south yard and adjacent to the smelter and west side of the refinery exceeded the assessment guidelines for nickel. Exceedances of nickel were also detected from samples collected adjacent to the former landfill and below the slag pile. Delineation of the south yard area was achieved to the south (with exception of the former landfill area), north, and east, with the slag pile preventing delineation to the west. Samples collected from test holes completed along the northern portion of the plant area east of the mill, in the vicinity of the underground effluent sewer lines originating from the refinery, and immediately east of the sewer lines adjacent to the refinery, were all below the assessment guidelines or the surficial fill criteria (500 µg/g). Samples collected in the vicinity of the copper arsenate storage pond, southeast of the general yard, were also below the assessment guidelines. Exceedances of the guidelines were detected near the former crusher receiver building on the east side of the yard. The exceedances in this area appear to be related to fill materials used for construction of the roads at the Site.

Two distinct areas were detected in which metal impacts extended to depths exceeding 1.5 m bgs, in the area of TH11-11 to TH11-14 and the area of TH11-18. As noted above, field measurements indicate that these areas are reflective of buried fill or metal materials or a former copper storage pond. Metal exceedances were detected as deep as 3.1 m in TH11-11 and 2.3 m in TH11-18.

Metal exceedances were also detected in TH11-42 at a depth of 7.6 m in the lower sand/gravel unit. It is assumed that the exceedances are the result of the dissolution of nickel from impacted groundwater which historically migrated from the refinery basement via an inferred "short circuit" of the clay deposits adjacent to piles or other subsurface infrastructure.

5.2.4 Field Petroleum Hydrocarbon Assessment

A total of 53 test holes were field screened for volatile vapours to aid in the selection of soil samples for laboratory analysis. Field screening was conducted using ATH methodologies as described in Section 3.3. The results of the field screening are summarized in the test hole logs in Appendix C.

As the main fuel source at the Sites is diesel fuel, vapour concentrations in soils were expected to be low due to the lower volatility characteristics of diesel. Measured soil vapour concentrations ranged from no detection (<5 ppm_v) in many test holes to a maximum of 700 ppm_v in TH11-19. The majority of higher vapour concentrations were in the areas of the previous or existing petroleum or waste oil storage tanks northwest of the smelter, north of the mill, east of the refinery, east of the Birchtree facilities, and southeast of the T-3 headframe.

5.2.5 Soil Laboratory Petroleum Hydrocarbon Analysis

A total of 39 soil samples were submitted for laboratory analysis of PHC constituent concentrations. One sample (TH11-80 at 3.8 m depth) was also analyzed for PAHs. The results of the laboratory analysis conducted on the selected soil samples are summarized in Table 4, Appendix B. The results of the laboratory analysis for PAHs conducted on the selected soil sample are summarized in Table 5, Appendix B. The location of samples which exceeded the assessment guidelines are shown on Figures 5 and 6, Appendix A. The analytical certificates are included in Appendix D.

As shown on Tables 4 and 5, and Figures 5 and 6, exceedances of the assessment guidelines were detected at:

- The former barrel storage area in the southern portion of the south yard at TH11-12 and TH11-13;
- The bunker oil and furnace oil aboveground storage tanks (ASTs) at the northwest corner of the smelter at TH11-19, TH11-20, TH11-79, and TH11-80. Note that the sample from TH11-80 also exceeded the assessment guidelines for PAHs;
- The bulk diesel ASTs located north of the mill at TH11-25, TH11-76, and TH11-77;
- The bulk diesel AST located northeast of the mill at TH11-66;
- The former diesel AST located between the smelter and refinery at TH11-39;
- The bulk diesel and gasoline ASTs located east of the refinery at TH11-67;
- The waste oil AST located on the eastern extent of the Birchtree Site; and
- The diesel AST located southeast of the T-3 Headframe.

Delineation of the PHC impacted areas was achieved in all areas with exception of the southern yard portion, waste oil AST at the Birchtree Site, and diesel AST at the T-3 Headframe Site. It is expected that the impacts in south yard area are limited to the area of the disturbed soil discussed in the previous metal analysis section. The waste oil impacts at the Birchtree Site could not be delineated as the AST is located adjacent to undeveloped heavy forest to the east. Delineation test holes to the north and southwest would indicate that the impacts are limited to the area of the AST. The diesel AST at the T-3 Headframe site was located between the headframe and various outbuildings. Delineation could only be achieved southwest and northeast of the detected impacts. Based on the results of the delineation test holes, it is expected that the impacts are limited to the area of TH11-70.

5.3 GROUNDWATER CONDITIONS

5.3.1 Hydrogeology

The three stratiographic units were also the main hydrogeological regimes present at the Site and each is discussed below.

Granular Fill

Hydraulic conductivity for this material near the refinery have been reported to be in the order of $1x10^{-3}$ cm/s to $1x10^{-2}$ cm/s. Since this relatively permeable zone is underlain by clay, perched groundwater conditions can exist. As such, the topography of the fill/clay interface will control where the impacts initially collect and will influence its subsequent migration. As the greatest depth of granular fill occurs adjacent to the refinery, a basinal effect occurs which likely causes groundwater impacted with electrolyte to pool beneath the refinery. The pooled groundwater will infiltrate into any perforations along the extent of the sewer piping and be carried to the tailings pond. Additionally, the sewer trench provides a preferential migration pathway to the north. If the groundwater level in the fill beneath the refinery increases to an elevation greater than approximately 211.5 m, it may spill over the basinal geometry in the fill/clay interface and flow towards the west.

Silty Clay

Hydraulic conductivity of the clay unit has been reported to be in the order of $1x10^{-7}$ cm/s to $1x10^{-5}$ cm/s, which is consistent with the values measured during this investigation (see next section). Given the low permeability and lateral continuity of this unit, it will act as an aquitard and provide some degree of natural containment. Impacts will preferentially migrate downward through any fractures in the clay and then laterally along silt varves.

Lower Silt/Sand/Gravel

Based on the assessment by Dillon, the elevations of the granular units vary across the Site and indications of barrier boundary conditions have been observed in pumping tests, reaffirming that the granular deposits are most likely not continuous over the valley. Hydraulic conductivity of the lower deposits have been reported to be in the range of $1x10^{-5}$ cm/s to $1x10^{-2}$ cm/s, which is consistent with the test conducted on the lower sand unit during this investigation (see next section). The lateral extent of the lower deposits appears to be confined to a valley in the bedrock that trends in a northeast/southwest orientation. A high point in the bedrock is located directly beneath the refinery. From this high point, the aquifer dips northeast towards the open pit and southwest towards the slag pile. This creates a saddle in the overburden that appears to result in a groundwater divide, with groundwater flow to the northeast (towards the open pit) and the west (towards the slag pile).

5.3.2 Groundwater Monitoring

Monitoring wells were monitored and sampled within one to three days following installation. The results of the well monitoring are summarized in Table 6, Appendix B.

As Table 6 indicates, nine of the wells were dry following the completion of field activities at the Site. LNAPL was not detected in any wells. Maximum vapour concentrations measured in the well headspace and groundwater headspace were 510 ppm_v at TH11-18 and 180 ppm_v at TH11-11, respectively.

5.3.2.1 Hydraulic Conductivity Testing

A total of three hydraulic conductivity tests were to be completed as part of this investigation. The wells assessed for hydraulic conductivity included TH11-25 (completed in clay), TH11-35 (completed in silty sand and silt till), and TH11-51 (completed in sand). Due to the depth to water and quick recharge, a bail test could not be satisfactorily performed on TH11-35.

The results of the hydraulic conductivity testing were as follows:

- Clay unit - 9.17×10^{-7} cm/sec (TH11-25); and,
- Sand unit - 1.06×10^{-4} cm/sec (TH11-51).

The values determined in AMEC's investigation are comparable to the ranges determined in previous investigations for these units. The hydraulic conductivity calculations are included in Appendix E.

5.3.3 Groundwater Sample Metals Analysis

A total of 37 groundwater samples, and an additional four blind duplicates, were submitted for analysis of dissolved metals. The results of the laboratory analyses are summarized in Table 7, Appendix B.

As previously stated, there are no applicable risk based guidelines to compare with the analysis.

Based on the results, there appears to be three areas in which metals, and specifically nickel, are elevated in groundwater in comparison with the remaining results. The areas include:

- TH11-07, TH11-11, and TH11-16 – Indications that potential buried materials or fill in the area of TH11-11 were present. A reported former copper holding pond was also present northeast of TH11-07 and southwest of TH11-16. TH11-07 and TH11-16 contained low nickel concentrations in soil in comparison to TH11-11;
- TH11-18 – A former copper holding pond was present adjacent to TH11-18. Concentrations of copper in the TH11-18 groundwater sample were three orders of magnitude above concentrations in TH11-07 and five to six orders of magnitude above concentrations in other samples; and,

- TH11-37 and TH11-42 – TH11-37 is completed in the shallow fill adjacent to the refinery and TH11-42 is completed in the lower sand unit adjacent to the refinery in close proximity to each other. TH11-35 and TH11-36, both completed in the lower sand unit in proximity of TH11-42, have concentrations of dissolved nickel three orders of magnitude less than TH11-42.

5.3.4 Groundwater Sample PHC Analysis

A total of 11 groundwater samples, and one additional blind duplicate, were submitted for analysis of PHC constituents. The results of the laboratory analyses are summarized in Table 8, Appendix B.

As previously stated, there are no applicable risk based guidelines to compare with the analysis.

Results indicate that the locations of relatively elevated PHC concentrations in groundwater are limited to areas in which PHC soil impacts have already been identified.

6.0 ASSESSMENT CONCLUSIONS

Soil

Based on the results of the soil investigation, the surficial fill and shallow soils in the majority of the south yard of the Plant Site are impacted with metal concentrations above the assessment guidelines. The estimated extent of the metal impacted soils is shown on Figure 7, Appendix A. The impacts appear to extend from the former landfill and areas of bedrock outcrop in the south to the southern portion of the smelter. The impacts also extend beneath the slag pile to the west. As well, nickel impacts have been detected in the fill and lower silt and sand deposits immediately adjacent to and below the refinery. In total, the spatial extent of the metals impacted area in the south yard encompasses approximately 317,500 m^2. It should be noted that this estimate is based upon the premise that the impacted fill does not extend much further than the test holes completed in the slag pile. Based on the results of the test hole drilling, it appears that the impacts in the south yard extend to an average of 1.5 m bgs, equating to approximately 476,300 m^3 of impacted fill and soil. The exposed extent (area not underneath the slag pile or buildings) is approximately 237,100 m^2, equating to a volume of approximately 355,700 m^3.

As previously stated, metal impacted soils are present in the deeper sand and silt deposits adjacent to and below the refinery. An estimated volume of the impacts could not be calculated based on the limited space for sampling and assessing these soils. It would appear based on previous assessments that the impacts in these deeper deposits are limited to the immediate area of the refinery.

Two areas were present in the south yard in which metal impacts appeared to have extended deeper than the surficial fills and shallow soils. One of the areas consists of TH11-11 to TH11-

14 test hole locations. It has been theorized that buried fill or metals are present in this area which accounts for the deeper detected impacts. A former copper storage pond was present to the north of this area, however test holes completed at the boundary of the pond did not have elevated measured XRF metal concentrations beyond the upper 1.5 m depth, suggesting that the former pond is not the source of metals in the deeper soils. The metal impacts appear to extend to between 2.3 and 3.1 m bgs at this area. The second area consists of TH11-18 test hole location. The TH11-18 location is adjacent to a former copper storage pond and the XRF and analytical data from TH11-18 suggest that the former pond is the source for the deeper impacts. Impacts in this location also appear to extend to 2.3 m bgs.

An area of approximately 18,100 m^2 of fill is impacted near the former crusher receiver building. This area is considered to be a minimum value as it appears that the road materials in this area are constructed of impacted fill and may extend well into other portions of the mine facilities. Alternatively, it was reported to AMEC by Vale that impacted soil near the former crusher building may be the result of the haulage and stockpiling of ore at this location over many years.

There are eight distinct areas of PHC impacts in soil at the Sites, six at the Plant Site, one at the T-3 Site, and one at the Birchtree Site, as shown on Figures 8 and 9, Appendix A. The sources for each of these areas are present or former storage tanks, with the exception of the TH11-12 and TH11-13 area on the south portion of the south yard at the Plant Site. The source of the PHC impacts in this area may be related to the former storage of barrels in this area or the potential buried objects (drums) similarly associated with the metal impacts in the same area. The estimated extent of PHC impacts in each of the areas is estimated to be:

- TH11-12 and TH11-13 – spatial extent of 4,100 m^2 and depth of 2.4 m equaling 9,840 m^3 of soil;
- TH11-19, TH11-20, TH11-79, and TH11-80 - spatial extent of 3,400 m^2 and depth of 3.1 m (average depth of bedrock surface) equaling 10,540 m^3 of soil. Note that the sample from TH11-80 also exceeded the assessment guidelines for PAHs;
- TH11-25, TH11-76, and TH11-77 - spatial extent of 2,130 m^2 and depth of 4.9 m (average depth of bedrock surface) equaling 10,440 m^3 of soil. Note that vapour concentrations and observations during drilling indicate that the upper 1.5 m in this area may not be impacted, resulting in a volumetric reduction of impacted soil to 7,240 m^3;
- TH11-66 - spatial extent of 320 m^2 and depth of 1.5 m (depth of bedrock) equaling 480 m^3 of soil;
- TH11-39 - spatial extent of 370 m^2 and depth of 6.7 m (depth of bedrock) equaling 2,480 m^3 of soil. Note that vapour concentrations and observations during drilling indicate that the upper 3.1 m in this area may not be impacted, resulting in a volumetric reduction of impacted soil to 1,320 m^3;
- TH11-67 - spatial extent of 320 m^2 and depth of 4.5 m equaling 1,440 m^3 of soil. Note that vapour concentrations and observations during drilling indicate that the upper 3.1 m in this area may not be impacted, resulting in a volumetric reduction of impacted soil to 480 m^3;
- TH11-70 – spatial extent of 360 m^2 and depth of 5.3 m equaling 1900 m^3 of soil; Note that vapour concentrations and observations during drilling indicate that the upper 2.3 m

in this area may not be impacted, resulting in a volumetric reduction of impacted soil to 1080 m^3; and

- TH11-75 - spatial extent of 650 m^2 and depth of 1.0 m equaling 650 m^3 of soil.

In addition, AMEC was unable to assess the area of a former diesel tank at the Birchtree Mine Site as there are a network of pipes and electrical cables in this area that provide essential services to the Birchtree Mining Complex. It was reported to AMEC by Vale that, during an excavation in this area in 2009, indications of diesel fuel were detected in the soil. These indications included free phase product, staining patterns and vapours/odour. Vale's Thompson Environmental department was notified at that time and is aware of the impacts in this area. Vale requested that AMEC include this area as a contaminated area to be addressed. AMEC did assess the area around the former tank (TH11-57 through TH11-59) and has determined that the impacts detected during the excavation appear to be limited to the immediate area. The area is designated as impacted on Figure 9, Appendix A, and is estimated to be approximately 1500 m^3 of impacted soil.

Groundwater

As previously stated, there are no applicable risk based guidelines for groundwater at the Site as there are no associated risks to current or future human or ecological receptors. Past studies have iterated and confirmed that the groundwater at the Site is not an environmental concern due to the lack of receptors and transport and fate assessment. Assessment of groundwater is limited to deriving areas of suitable hydrogeology to allow for, and/or concentrations of metals sufficiently elevated to warrant the potential recapture of dissolved metals in the groundwater.

There appears to be three areas in which metals, and specifically nickel, are suitably elevated in groundwater for potential recapture. The areas include TH11-07, TH11-11, and TH11-16; TH11-18; and TH11-37 and TH11-42. The stratigraphy observed during test hole drilling in the TH11-07, TH11-11, and TH11-16 area and the TH11-18 area both indicate that granular surface fill is limited to between 0.7 and 1.5 m depth. Groundwater elevations for these wells indicate that the groundwater table is below the fill materials, within the silty clay deposits. The TH11-37 and TH11-42 area consists of deeper surficial fill at the refinery periphery (up to 3.4 m depth) and the lower sand and silt deposits in the bedrock valley. The measured groundwater elevation for TH11-37 indicates that the groundwater table is within the fill materials. The groundwater elevation for TH11-42 indicates that artesian conditions are present in the lower sand and silt deposits. A cross-sectional representation of the stratigraphy below the refinery is given on Figure 10, Appendix A.

Elevated PHC concentrations in groundwater were detected at the locations of determined impacted soil at TH11-11, TH11-25, TH11-39, TH11-76, and TH11-77.

AMEC has prepared a Remedial Action Plan for the Sites under a different cover.

7.0 CLOSURE

The Canadian Standards Association notes that no environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. Performance of a standardized environmental site assessment protocol is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with the property, given reasonable limits of time and cost. The findings of this investigation are based on the interpretation of data from a limited number of test holes and analytical results pertaining to specific samples. The evaluation and interpretations do not preclude the existence of chemical substances other than those identified herein, or the possibility that contamination levels can vary between the areas of the investigation.

This report was prepared for the exclusive use of Vale Canada Limited and is intended to provide a Environmental Baseline Study for the Site located in Thompson, Manitoba at the time of the Site visits. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third party. Should additional parties require reliance on this report, written authorization from AMEC will be required. With respect to third parties, AMEC has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The report is based on data and information collected during the Environmental Baseline Study of the property conducted by AMEC. It is based solely on the conditions of the Site encountered at the time of the Site visits in 2011, supplemented by a review of historical information and data obtained by AMEC as described in this report and discussion with a representative of the owner/occupant, as reported herein. Except as otherwise maybe specified, AMEC disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to AMEC after the time during which AMEC conducted the Environmental Baseline Study.

In evaluating the property, AMEC has relied in good faith on information provided by other individuals noted in this report. AMEC has assumed that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the current owner/occupant. AMEC accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

AMEC makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

This Report is also subject to the further General Conditions contained in Appendix F.

We trust that the information presented in this report meets your current requirements. Should you have any questions, or concerns, please do not hesitate to contact the undersigned.

Respectively submitted,
AMEC Environment & Infrastructure
A division of AMEC Americas Ltd

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Senior Environmental Engineer
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Reviewed by:

David Raymond, M.Sc., P.Geo.
Senior Remediation Specialist

Tim McBride, B.Sc., P.Geo.
Environmental Hydrogeologist

MTB/mtb

Dist: (2) Addressee

APPENDIX A

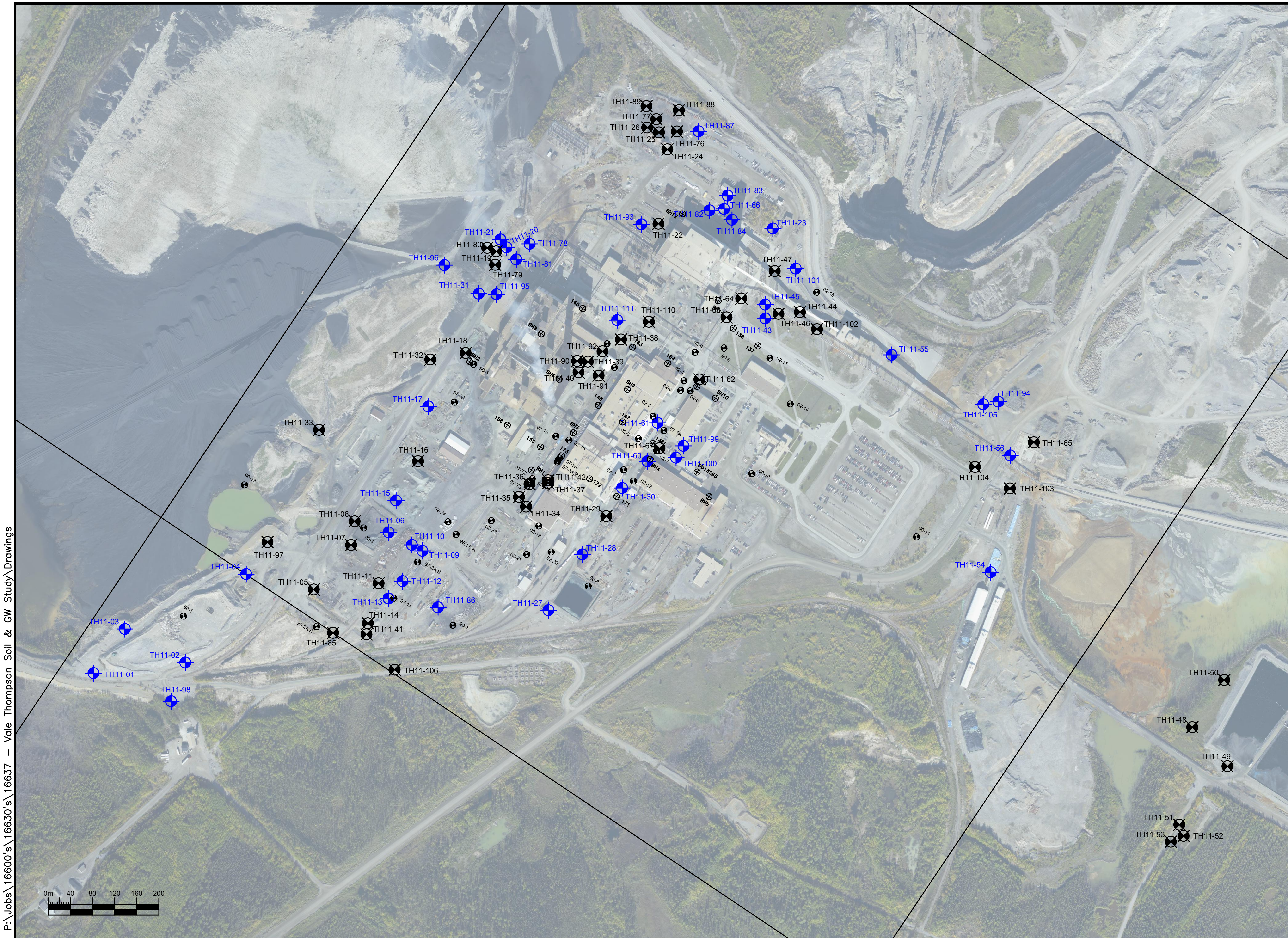
FIGURES

amec
ENVIRONMENT AND INFRASTRUCTURE

VALE LIMITED

SITE LOCATION PLAN
SOIL AND GROUNDWATER STUDY
THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

DRAWN: MD	SCALE: NTS	DATE: FEB.2012	PROJECT NO: WX16637	FIGURE: 1



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WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

CLIENT:

VALE LIMITED

LEGEND

TEST HOLE

MONITORING WELL

TEST HOLE/MONITORING WELL BY OTHER

NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

TEST HOLE LOCATION PLAN
(PLANT SITE)

SCALE:	AS SHOWN
DATE:	FEBRUARY 2012
DRAWN BY:	MD
PROJECT NO.:	WX16637

FIGURE 2

P:\Jobs\16600's\16630's\16637 – Vale Thompson Soil & GW Study\Drawings

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WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

CLIENT:

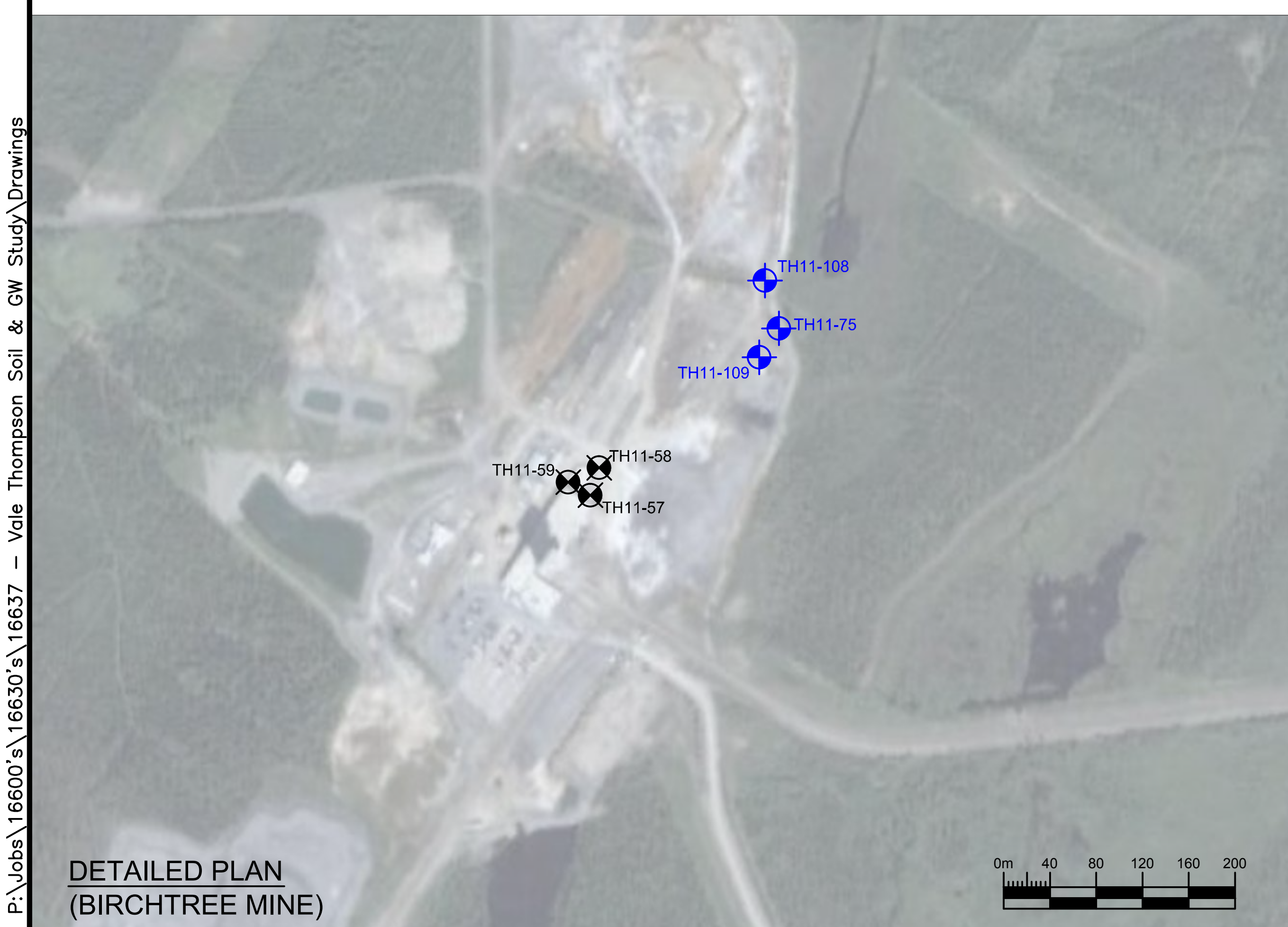
VALE LIMITED

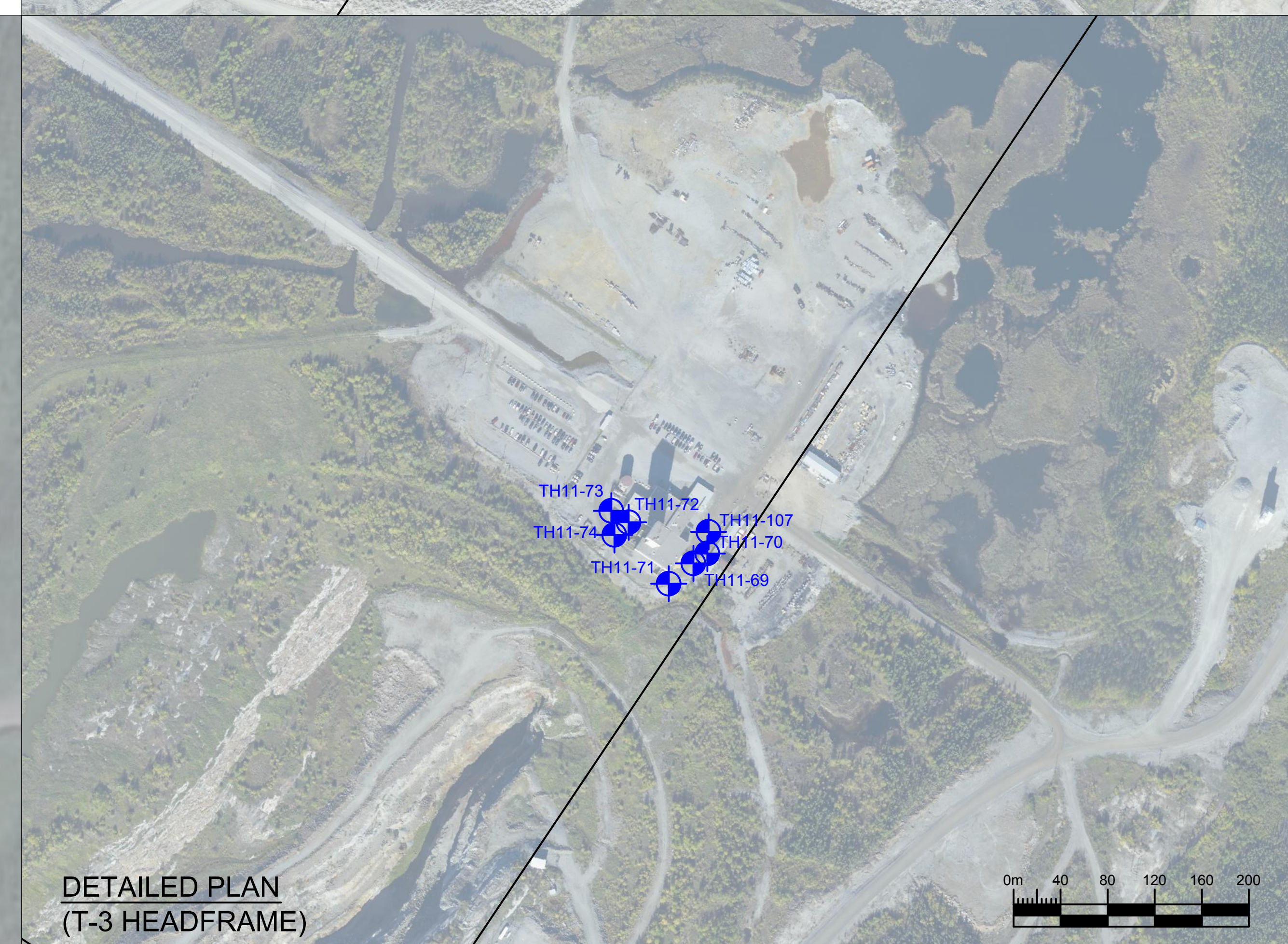
LEGEND

TEST HOLE

MONITORING WELL

TEST HOLE/MONITORING WELL BY OTHER





NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

TEST HOLE LOCATION PLAN
(BIRCHTREE MINE, T-3 HEADFRAME, AND MAINTENANCE SHED AREA)

SCALE:	AS SHOWN
DATE:	FEBRUARY 2012
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PROJECT NO.:	WX16637

FIGURE 3

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CLIENT:

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LEGEND

TEST HOLE

MONITORING WELL

TEST HOLE/MONITORING WELL BY OTHER

"RED" EXCEEDS GUIDELINES

"GREEN" BELOW GUIDELINES

"ORANGE" <500mg/g DELINEATION CRITERIA

NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

SOIL ANALYTICAL RESULTS
METALS (PLANT SITE)

SCALE:	AS SHOWN	FIGURE 4
DATE:	FEBRUARY 2012	
DRAWN BY:	MD	
PROJECT NO.:	WX16637	

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CLIENT:

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LEGEND

TEST HOLE

MONITORING WELL

"RED" EXCEEDS GUIDELINES

"GREEN" BELOW GUIDELINES

NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

SOIL ANALYTICAL RESULTS
PHCs (PLANT SITE)

SCALE:	AS SHOWN	FIGURE 5
DATE:	FEBRUARY 2012	
DRAWN BY:	MD	
PROJECT NO.:	WX16637	

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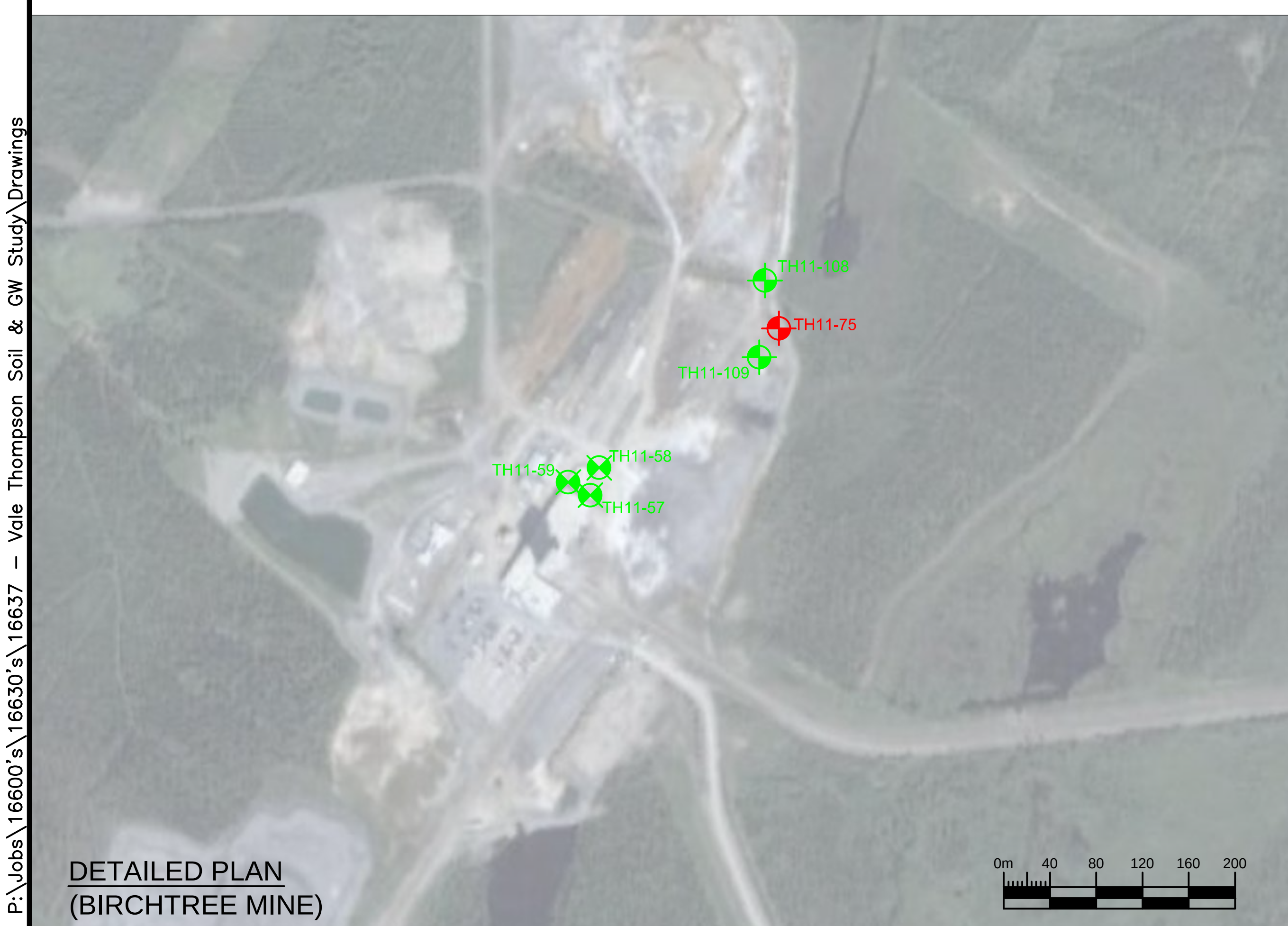

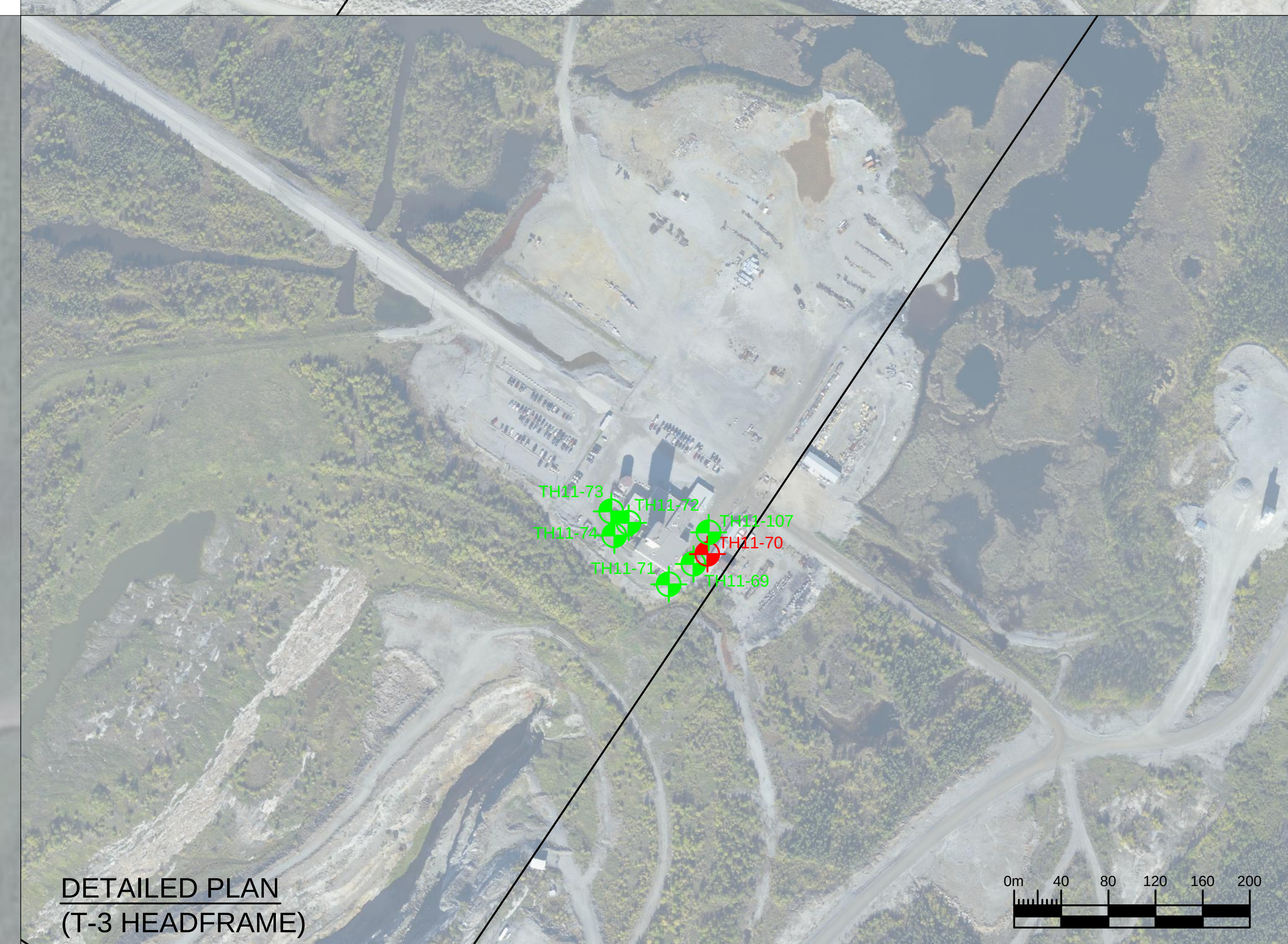

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CLIENT:

VALE LIMITED

LEGEND

TEST HOLE

MONITORING WELL

"RED" EXCEEDS GUIDELINES

"GREEN" BELOW GUIDELINES

NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

SOIL ANALYTICAL RESULTS - PHCs
(BIRCHTREE MINE, T-3 HEADFRAME, AND MAINTENANCE SHED AREA)

SCALE:	AS SHOWN	FIGURE 6
DATE:	FEBRUARY 2012	
DRAWN BY:	MD	
PROJECT NO.:	WX16637	

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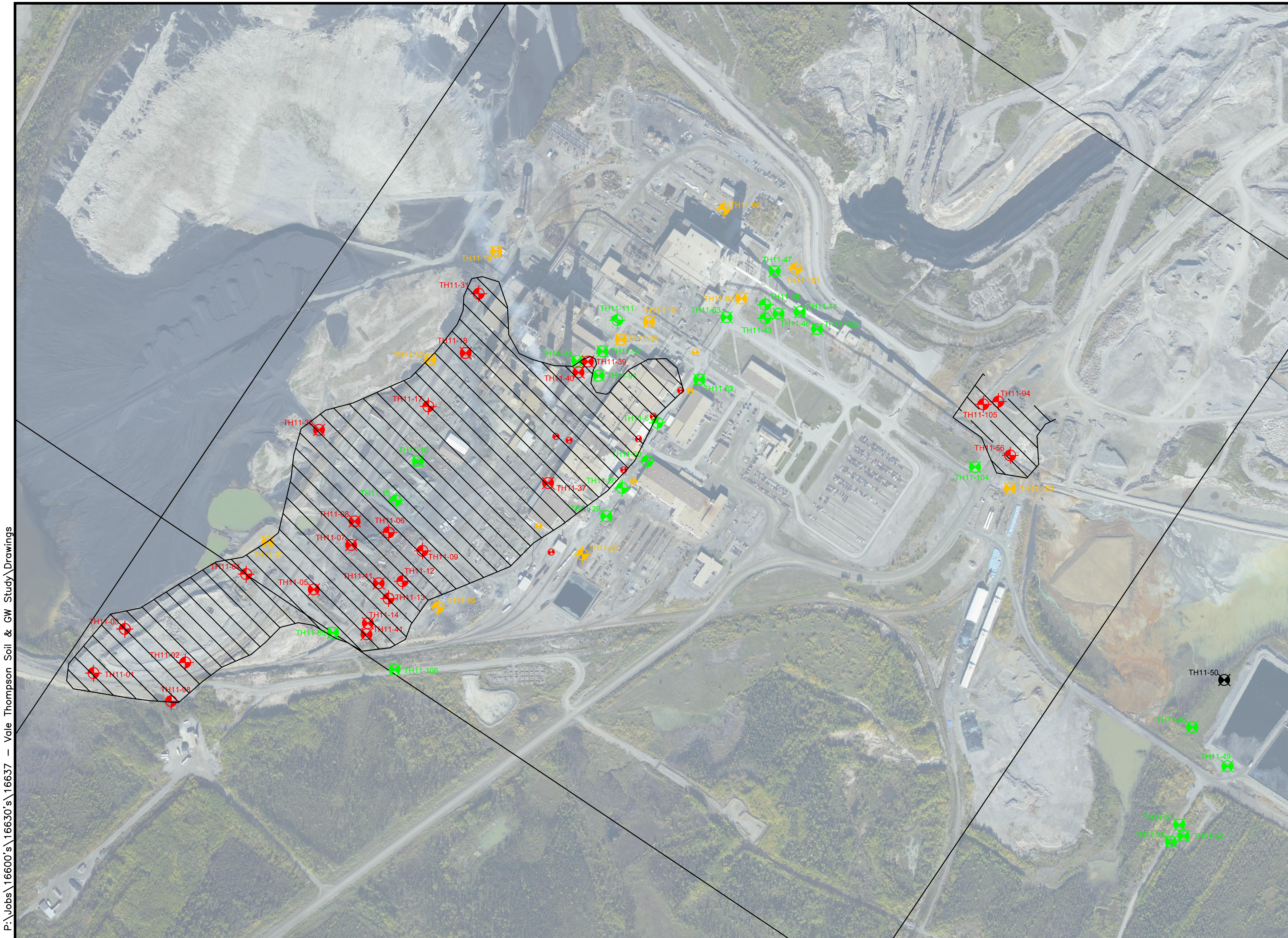

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PHONE: 204.488.2997 FAX:204.489.8261

CLIENT:

VALE LIMITED

LEGEND

- TEST HOLE
- MONITORING WELL
- TEST HOLE/MONITORING WELL BY OTHER
- "RED" EXCEEDS GUIDELINES
- "GREEN" BELOW GUIDELINES
- "ORANGE" <500mg/g DELINEATION CRITERIA
- ESTIMATED IMPACT EXTENT

NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

EXTENT OF SOIL IMPACTS
METALS (PLANT SITE)

SCALE:	AS SHOWN	FIGURE 7
DATE:	FEBRUARY 2012	
DRAWN BY:	MD	
PROJECT NO.:	WX16637	

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CLIENT:

VALE LIMITED

LEGEND

TEST HOLE

MONITORING WELL

"RED" EXCEEDS GUIDELINES

"GREEN" BELOW GUIDELINES

ESTIMATED IMPACT EXTENT

NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

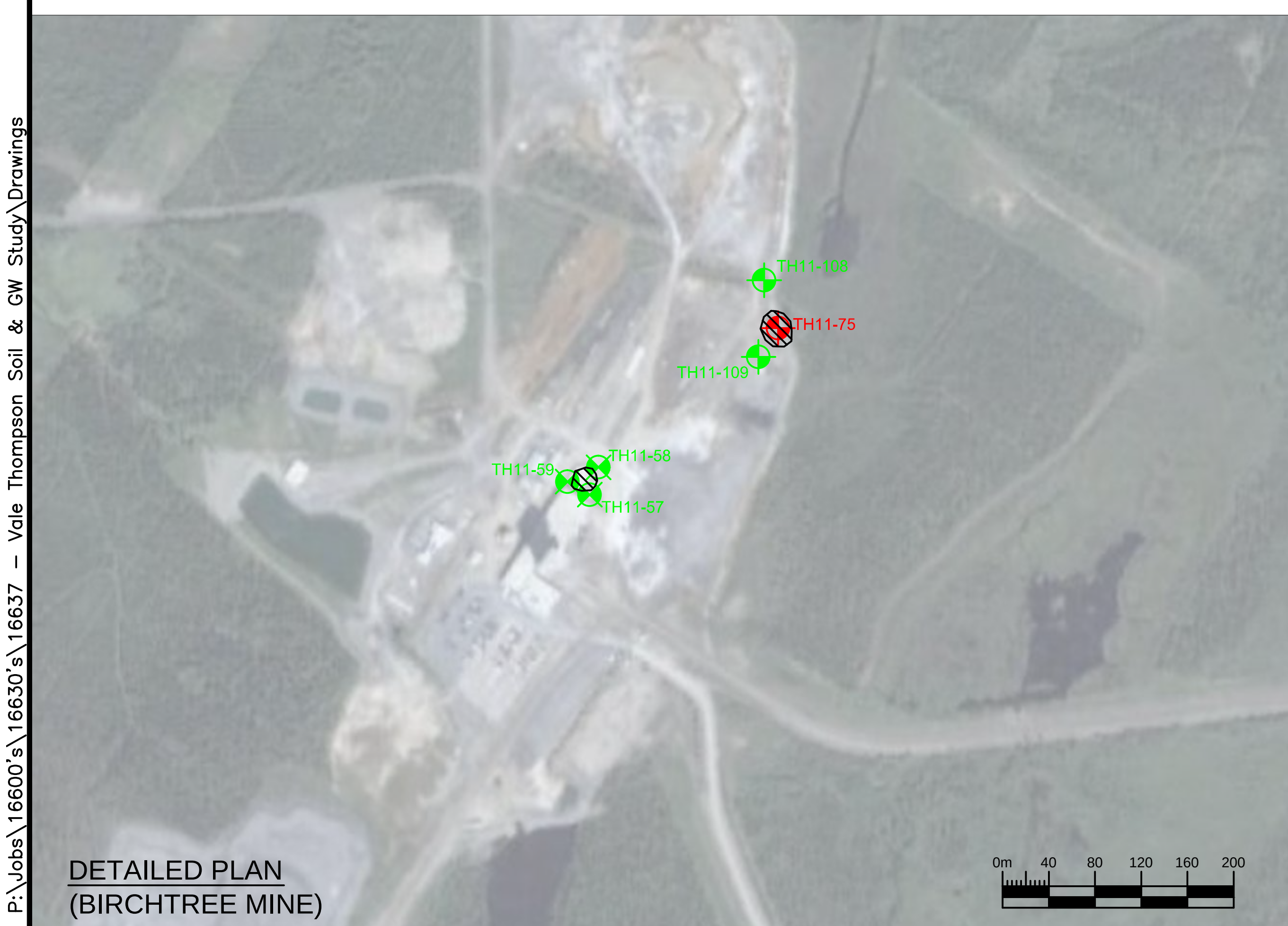
SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

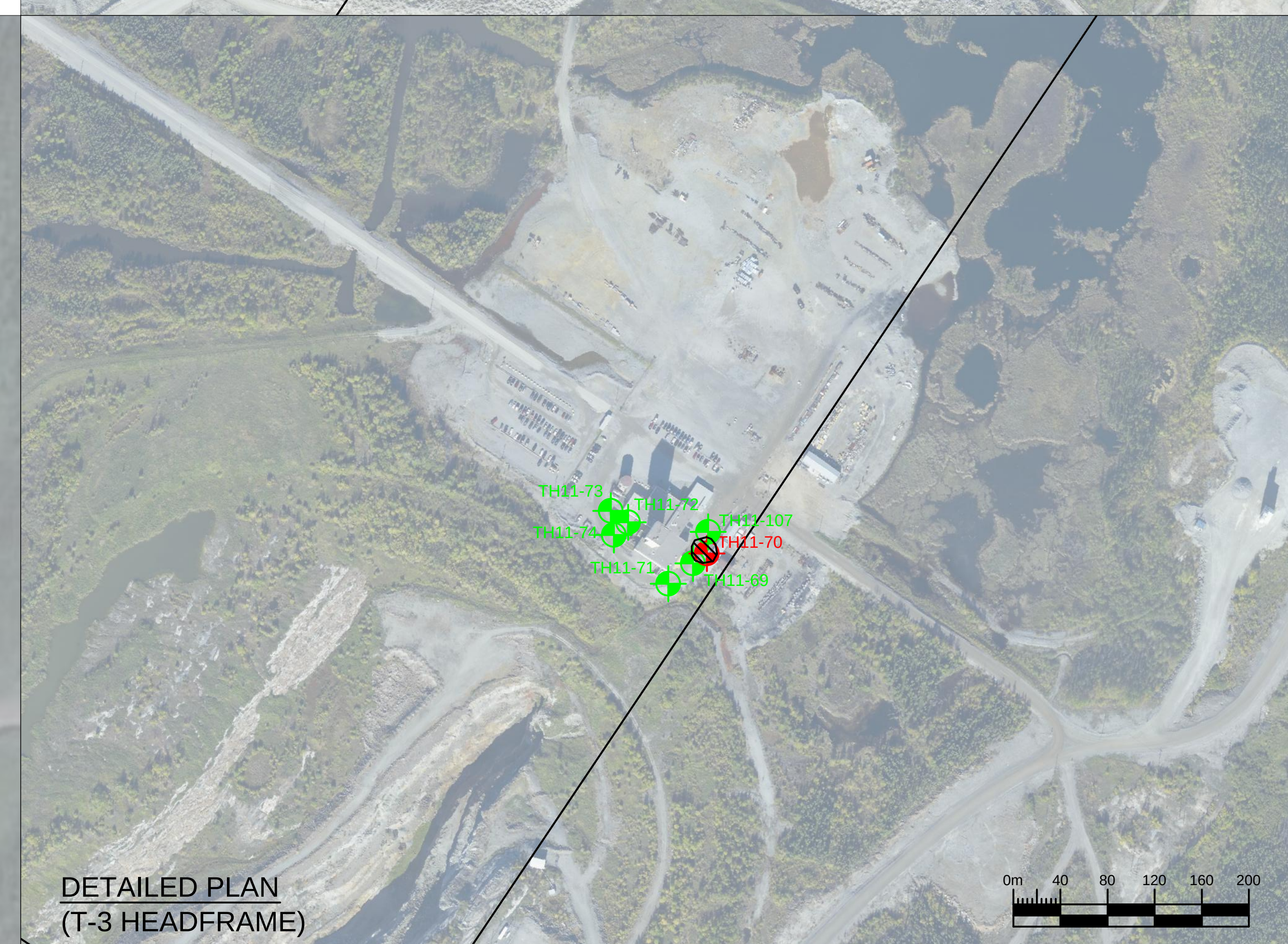
EXTENT OF SOIL IMPACTS
PHCs (PLANT SITE)

SCALE:	AS SHOWN	FIGURE 8
DATE:	FEBRUARY 2012	
DRAWN BY:	MD	
PROJECT NO.:	WX16637	

DETAILED PLAN
(MAINTENANCE SHED AREA)



DETAILED PLAN
(BIRCHTREE MINE)



DETAILED PLAN
(T-3 HEADFRAME)

amec
AMEC Environment & Infrastructure
440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

CLIENT:

VALE LIMITED

LEGEND

TEST HOLE

MONITORING WELL

"RED" EXCEEDS GUIDELINES

"GREEN" BELOW GUIDELINES

ESTIMATED IMPACT EXTENT

NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

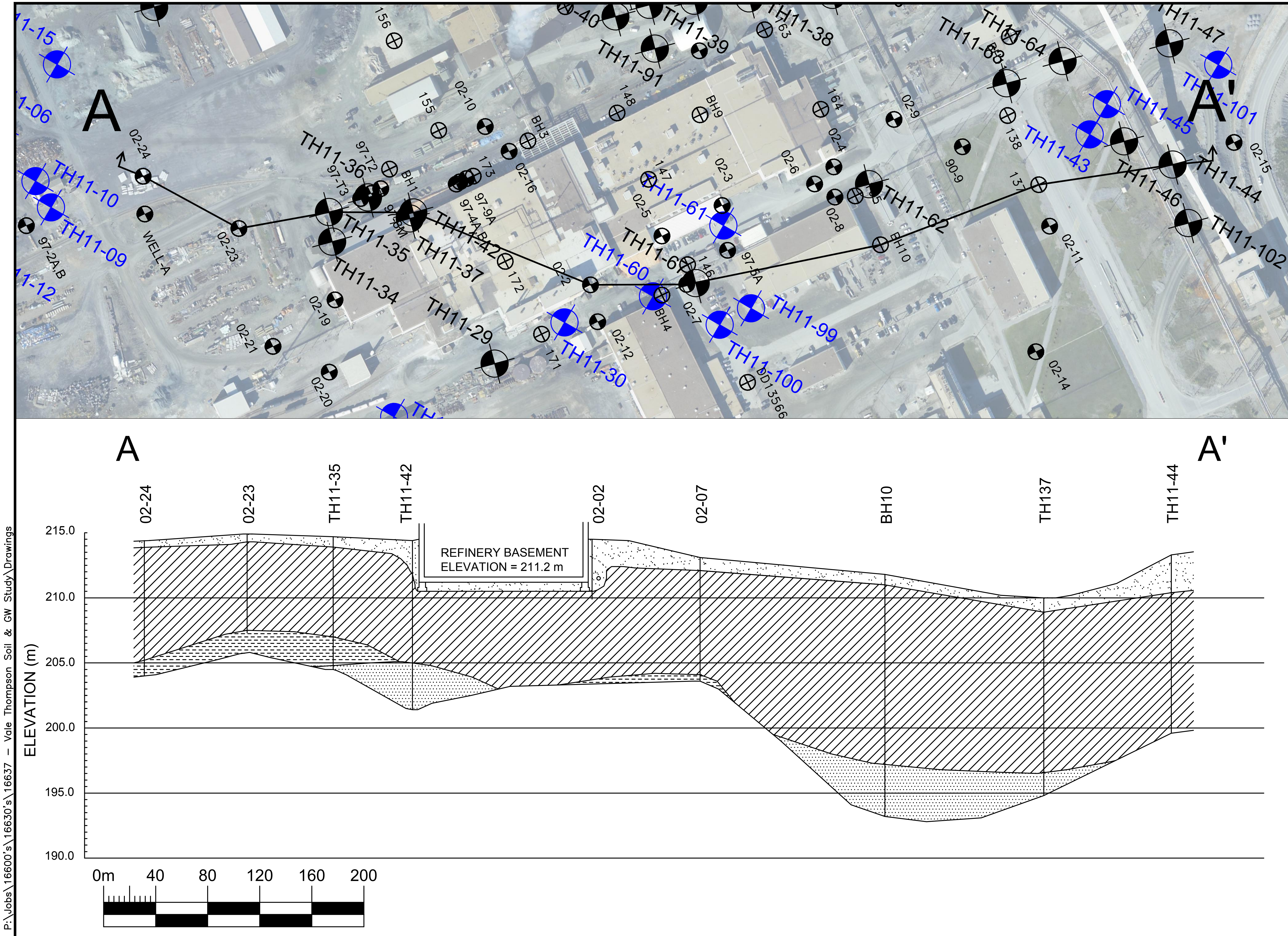
SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

EXTENT OF SOIL IMPACTS - PHCs
(BIRCHTREE MINE, T-3 HEADFRAME, AND MAINTENANCE SHED AREA)

SCALE:	AS SHOWN	FIGURE 9
DATE:	FEBRUARY 2012	
DRAWN BY:	MD	
PROJECT NO.:	WX16637	

P:\Jobs\16600's\16630's\16637 – Vale Thompson Soil & GW Study\Drawings



P:\Jobs\16600's\16630's\16637 – Vale Thompson Soil & GW Study\Drawings

amec
AMEC Environment & Infrastructure
440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

CLIENT:

VALE LIMITED

LEGEND

- TEST HOLE
- MONITORING WELL
- TEST HOLE/MONITORING WELL BY OTHER
- GRANULAR SURFACE FILL
- CLAY
- SILT
- SAND

NOTE: SITE FEATURE LOCATIONS ARE APPROXIMATE

NO.	REVISION	DATE	BY

SOIL AND GROUNDWATER STUDY

THOMPSON FACILITIES
THOMPSON MINE VALE LIMITED
MANITOBA DIVISION

CROSS-SECTION BELOW REFINERY

SCALE:	AS SHOWN	FIGURE 10
DATE:	FEBRUARY 2012	
DRAWN BY:	MD	
PROJECT NO.:	WX16637	

APPENDIX B

TABLES

TABLE 1: ASSESSMENT GUIDELINES

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (PHCs)							
		Benzene	Toluene	Ethylbenzene	Xylenes	PHC (F1)	PHC (F2)	PHC (F3)	PHC (F4)
Commercial (≤ 1.5 m depth)	Soil Ingestion	110	82000	36000	560000	19000*	10000*	23000*	RES*,**
	Dermal Contact	250	790000	210000	NA				
	Indoor Vapour Inhalation	2.8	13000	6500	1600	4600	23000	NA	NA
	Ecological Soil Contact	310	330	430	230	320	260	2500	6600
	Management Limits	NG	NG	NG	NG	800	1000	3500	10000
Commercial (> 1.5 m depth)	Indoor Vapour Inhalation	2.9	13000	6700	1600	4600	23000	NA	NA
	Management Limits	NG	NG	NG	NG	800	1000	3500	10000

Land Use	Exposure Pathway	Soil Guidelines (ug/g) (Metals)***							
		Arsenic	Barium	Berylium	Cadmium	Chromium	Cobolt	Copper	Lead
Commercial	Soil Ingestion	12	NG	NG	49	630	NG	4000	260
	Indoor Vapour Inhalation	NG	NG	NG	NG	NG	NG	NG	NG
	Ecological Soil Contact	26	NG	NG	22	87	NG	91	600
	Interim Criteria****	50	2000	8	20	800	300	500	1000

Land Use	Exposure Pathway	Soil Guidelines (ug/g) (Metals)***							
		Mercury	Molybdenum	Nickel	Selenium	Thallium	Uranium	Vanadium	Zinc
Commercial	Soil Ingestion	24	NG	NG	300	1	33[a]	NG	NG
	Indoor Vapour Inhalation	NG	NG	NG	NG	NG	NG	NG	NG
	Ecological Soil Contact	50	NG	50	2.9	3.6	2000	130	360[b]
	Interim Criteria****	10	40	500	10	NG	NG	NG	1500

Land Use	Exposure Pathway	Soil Guidelines (ug/g) (PAHs)***							
		Anthracene	Benzo[a] anthracene	Benzo[a] pyrene	Benzo[b+i] fluoranthene	Benzo[k] fluoranthene	Dibenzo[a,h] anthracene	Fluoranthene	Indeno[1,2,3-cd]pyrene
Commercial	Direct Contact*	NG	NG	NG	NG	NG	NG	NG	NG
	Ecological Soil Contact	32	NG	72	NG	NG	NG	180	NG
	Interim Criteria****	NG	10	NG	10	10	10	NG	10

Land Use	Exposure Pathway	Soil Guidelines (ug/g) (PAHs)***			
		Naphthalene	Phenanthrene	Pyrene	B(a)p TEP
Commercial	Direct Contact*	NG	NG	NG	0.6
	Ecological Soil Contact	NG	NG	NG	NG
	Interim Criteria****	22	50	100	NG

Notes:

* Combined values for soil injestion and dermal contact for exposure pathway

** RES - residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility limit for PHC fraction.

*** Metals and PAH guidelines are independent of soil grain size or sample depth. Note - only metal and PAH parameters with guidelines included in CCME documentation are included in guideline table

**** Interim Criteria based on non-scientific rational. In the case where a scientific defensible value established for an exposure pathway is greater than the interim criteria value, the scientific defenible value will be considered applicable.

[a] Uranium soil ingestion pathway includes cumulative effects of soil ingestion, inhalation, and dermal contact

[b] Zinc ecological soil pathway derived as geometric mean of ecological contact and nutrient cycling check and will supersede Nutrient Cycle Check if Ecological Soil Contact pathway is present.

- ug/g - concentration in micrograms per gram
- mg/L - concentration inmilligrams per litre
- **BOLD** – selected guideline
- PHC (F1) - volatile petroleum hydrocarbons (C_6 – C_{10})
- PHC (F2) - extractable petroleum hydrocarbons (C_{10} – C_{16})
- PHC (F3) - extractable petroleum hydrocarbons (C_{16} – C_{34})
- PHC (F4) - extractable petroleum hydrocarbons (C_{34} – C_{50})
- NA - not appalicable, calculated value exceeds 1,000,000 mg/kg
- NG - no guideline available
- CCME EQG Criteria – commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) " Canadian Environmental Quality Guidelines", 1999 (updated 2009). The benzene concentration is based on one hundred thousand (10-5) incremental risk of cancer.
- CCME CWS PHC Criteria - commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) " Canada-Wide Standards for Hydrocarbons in Soil", 2001, revised 2008.

TABLE 2: FIELD SCREENING SOIL RESULTS - METALS

Test Hole	Depth (m)	Arsenic (ppm)	Cobalt (ppm)	Copper (ppm)	Chromium (ppm)	Iron (ppm)	Lead (ppm)	Manganese (ppm)	Mercury (ppm)	Molybdenum (ppm)	Nickel (ppm)	Rubidium (ppm)	Selenium (ppm)	Strontium (ppm)	Zinc (ppm)	Ziroconium (ppm)
TH11-1	0.8	---	---	---	---	41000	---	---	---	---	867.4	94.3	---	80.6	117.9	173.2
TH11-2	0.8	---	---	230.3	---	51800	---	798.1	---	---	4421	61.7	---	94.2	---	110.8
	1.5	---	---	236.8	---	46500	---	866.3	---	---	4459	59.9	---	103.2	92.8	130.3
	2.3	71.4	---	715.2	---	67400	---	1582	---	---	10100	55.7	---	100.1	---	113.8
TH11-3	0.8	---	---	349.8	---	88400	---	2421	---	---	731.4	82.4	---	129	98.7	165.4
	1.5	---	---	180.7	---	65100	---	1341	---	---	786.1	80.4	---	128.3	86.1	161.2
	2.3	---	---	---	---	57800	---	---	---	---	422	68.5	---	183.4	65.6	185.2
	3.1	---	---	153	---	55900	---	1411	---	---	447.1	59.1	---	171	---	138
TH11-4	0.8	107.3	---	1573	---	52700	---	929.7	---	---	7112	45.3	---	200.7	---	138.2
TH11-5	0.8	80.6	---	884.7	---	95.8	---	---	---	---	3519	52.2	---	175.1	---	113.3
	1.5	---	---	---	---	13200	---	---	---	---	1386	62.8	---	161	93.1	205.7
	2.3	---	---	73.4	---	10800	---	723.1	---	---	---	47.9	---	141.8	---	146.3
	3.1	---	---	87.9	---	24500	---	---	---	---	151.9	80.2	---	145.4	72	184.9
	3.8	---	---	---	---	18300	---	650	---	---	198	67.2	---	134.9	65.8	135.7
	4.6	---	---	98.3	---	16400	---	482	---	---	269.7	65.9	---	154.2	56.3	107.5
	5.3	---	288	---	---	16600	---	1058	---	---	140.8	76.1	---	138.3	85.8	135.6
	6.1	---	---	---	---	15900	---	453.9	---	---	---	69.5	---	148.1	71.4	132.8
	6.8	---	---	---	---	25800	41.4	584.2	---	---	299.1	85.9	---	128	66	112.7
	7.6	---	---	---	---	11500	---	---	---	---	---	45.6	---	160.6	---	126.8
	8.4	---	---	---	---	10200	---	398.7	---	---	---	31.8	---	166.4	---	155.6
	9.2	---	87	---	---	11900	---	---	---	---	127.3	38.8	---	201	87.2	160.8
TH11-6	0.8	2161	---	5812	3312	260400	726.1	---	---	14.6	29400	39.5	---	91.9	---	64.5
	1.5	2101	---	3167	---	104000	79.1	2014	---	10.3	23000	54.4	---	151.5	---	101.1
	2.3	---	---	---	---	33100	---	742.8	---	---	673.3	110.8	---	134.7	---	170.9
	3.1	---	---	---	---	18000	---	---	---	---	175.1	63.2	---	152.9	---	118.8
	3.8	---	---	---	---	23400	---	---	---	---	---	92.1	---	161.5	76.8	137.7
	4.6	21.6	---	80.1	---	15700	---	---	---	---	178.4	58.2	---	148.8	---	133.3
	5.3	---	---	---	---	31000	---	---	---	---	---	1192	---	131.1	88.8	189.5
	6.1	---	---	---	---	25500	33.7	---	---	---	157	98.9	---	141	73.5	138.6
TH11-7	0.8	6183	---	4673	1498	34700	---	---	---	---	15700	34.4	---	160.9	---	60.6
	1.5	183.3	---	148.4	---	23700	---	---	---	---	2129	73.9	---	148.9	---	138.4
	2.3	188.8	---	267.3	---	21.4	---	---	---	---	652.7	72.3	---	154.3	65.8	127.8
	3.1	218.6	---	291.4	---	21100	---	---	---	---	1112	79.9	---	145.3	63.5	131.5
	3.8	---	---	---	---	19800	---	490	---	---	243.7	77.1	---	159.1	67.2	125.9
	4.6	---	---	103.1	---	18.6	---	---	---	---	350.6	82.1	---	133.3	61.1	145.3
	5.3	---	---	---	---	17300	---	---	---	---	150.9	69.7	---	149.2	94.5	196.4
	6.1	46.1	---	150.7	---	31500	---	---	---	---	480.9	113	---	161.3	81.3	198.4
	6.8	45.5	---	156	---	30100	---	---	---	---	408.5	95.9	---	140	90.1	141.1
	7.6	---	---	129.6	---	27400	---	547.9	---	---	171.6	80.1	---	148.5	76.3	146.4
TH11-8	0.8	509.9	---	4215	---	33600	---	---	---	---	7639	77.9	---	152.4	---	134.4
	1.5	52.1	---	---	---	31700	---	---	---	---	3730	95.9	---	158.2	---	150
	2.3	---	---	---	---	25500	---	859.2	---	---	182.1	98.1	---	159.1	109.2	192.1
	3.1	---	---	---	---	29100	---	959.9	---	---	---	93.6	---	144.2	103.1	164.8
	3.8	---	390.4	106.7	---	17300	---	583.6	---	---	---	65	---	157.4	84.3	138.6
	4.6	51.5	---	125.8	---	17900	---	550.5	---	---	154.3	68.5	---	161.2	---	176.6
	5.3	---	---	---	---	19900	---	---	31.1	---	166.7	75.8	---	135.3	90.2	137.7
	6.1	---	---	---	---	19700	---	---	---	---	---	89.4	---	124.4	63.4	154.1
TH11-9	0.8	46.1	---	605	---	15.3	34.6	389.6	---	---	3210	11.8	18.3	58.1	---	37.4
	1.5	---	---	504.6	---	14300	---	490.6	---	---	3383	43.3	---	179.9	---	112.1
	2.3	---	430.9	96	---	18100	27.3	678.9	---	---	2217	73.2	---	161.9	---	136.3
	3.1	---	---	---	---	32.2	51.2	---	---	---	505.7	17.1	---	124.3	---	155.5
	3.8	---	---	71.1	---	26.8	---	---	---	---	134.3	98.8	---	131.5	96.7	137.3
	4.6	---	---	112.3	---	---	---	21100	---	---	351	81.8	---	149.5	---	135.9
TH11-11	0.8	120.8	---	1914		41100	50.1	---		---	7571	68.6	---	168	---	192.4
	1.5	43	338.9	851		22200	---	---		33.4	6399	43	24.7	162.6	---	63.7
	2.3	---	---	---		12900	---	487.3		---	3610	55.4	---	146.2	---	124.2
	3.1	---	296.6	164		6531	---	293.3		---	20100	24.1	---	47.1	---	32.8
	3.8	---	---	---		23300	---	1109		---	---	80	---	134	96.4	149.7
	4.6	---	---	---		21700	---	590.4		---	---	78.3	---	146.7	104.8	132.7
	5.3	---	---	---		16900	---	---		---	---	83.7	---	180.6	---	109.4
	6.1	---	---	---		24000	---	---			190.6	85.2	---	157.2	96.7	126.9
TH11-12	0.8	5848	6743	217700	---	60300	174.1	---	---	---	55300	21.1	152.8	88.9	---	---
	1.5	---	309	309	---	19900	101.2	50.6	---	---	4658	71.6	---	162.5	101.2	157.3
	2.3	---	---	188.7	---	31500	---	692.57	---	---	6094	96	---	138.8	88.8	133.5
	3.1	---	---	114.3	---	36200	---	---	---	---	3125	102.7	---	131.9	84.3	176.9
	3.8	---	358.6	349.4	---	27700	---	---	---	---	55.6	87.2	---	133.5	62.4	127.8
	4.6	---	---	368.1	---	26300	31.9	820.3	---	---	310.4	96.5	---	147.4	82.4	148.8
	5.3	21.1	---	557.4	---	21200	---	727	---	---	322.4	79.3	---	154.1	74.4	127.8
	6.1	---	---	101.7	---	13700	---	478.3	---	---	134.5	60.4	---	160.7	94.4	126
	6.8	---	---	119.9	---	20700	---	---	29.9	---	200.6	73.8	---	153	80.2	135.9
TH11-13	0.8	195.8	---	14100	---	42100	---	---	---	---	6974	70	---	286.2	---	120.4
	1.5	77.1	---	10300	---	37300	---	2291	---	---	9687	74.5	---	158.4	---	114.9
	2.3	---	---	232.7	---	20100	---	---	---	---	6963	83.9	---	173.9	109.1	123.5
	3.1	---	---	178.8	---	28600	---	---	---	---	8378	97.6	---	134.5	96.4	145.9
	3.8	---	---	---	---	31300	---	---	---	---	5116	109.5	---	156.2	94.3	138.5
	4.6	---	---	207.3	---	29600	---	711.2	---	---	208.6	89.9	---	150.3	75	141.5
	5.3	---	---	---	---	25800	26	---	---	---	155.6	82.7	---	137.6	95.3	126.8
	6.1	---	---	393.2	---	18700	---	---	---	---	254.3	75.2	---	159.8	---	153
TH11-14	0.8	43.3	---	769.1	---	26200	---	---	---	---	1580	89	---	145.7	108	163.7
	1.5	247.5	3764	5730	---	603300	---	---	---	---	8012	---	---	131.2	309.6	74.3
	2.3	154.2	2931	1037	---	446800	---	---	---	---	18100	---	---	62.2	---	81.6
	3.1	102.1	3478	1635	---	291300	---	---	---	---	16400	18.8	---	51.2	---	71.6
	3.8	---	---	255.2	---	30200	---	619.3	---	---	3812	96.4	---	157.2	97.1	138.5
	4.6	---	---	---	---	25900	---	---	---	---	---	79.3	---	1227	---	163.5
TH11-15	0.8	103.8	855.7	2985		41100	---	885.1	---	---	37700	61.6	---	166.5	---	109.8
	1.5	54.5	---	1209		32600	---	---	---	---	13600	67.9	---	231.8	---	140.7
	2.3	---	---	---		11200	---	---	---	---	210.8	57.6	---	153.2	---	148.4
	3.1	---	---	---		31300	---	---	---	---	---	99.6	---	156.3	100.2	153.6
	3.8	---	---	---		26000	---	---	28.6	---	172.2	78.5	---	136.5	91.7	137.1
	4.6	---	---	---		18700	---	---	---	---	336	67.6	---	149.5	52.6	138.8
TH11-16	0.8	23.5	---	---	---	45300	---	---	---	---	5085	32.2	---	213.2	79.3	110.9
	1.5	---	---	---	---	32600	---	882.7	---	---	1404	100.2	---	139.1	119.2	137.3
	2.3	---	---	---	---	16100	---	---	---	---	302.3	59.6	---	157.2	---	131.1
	3.1	---	---	93.9	---	15600	---	---	---	---	1104	60.5	---	164.7	91	182.4
	3.8	---	---	---	---	22700	---	---	---	---	481.2	68	---	153.8	64.6	131.9
	4.6	---	335.9	---	---	18000	28.1	---	25.1	---	460.4	73.3	---	150.7	76.7	141.9
	5.3	---	---	---	---	25000	---	---	---	---	212.3	94.6	---	148.1	---	148.5
	6.1	---	---	---	---	28700	---	903.4	---	---	318	97.3	---	143.9	88.5	144.8

TABLE 2: FIELD SCREENING SOIL RESULTS - METALS

Test Hole	Depth (m)	Arsenic (ppm)	Cobalt (ppm)	Copper (ppm)	Chromium (ppm)	Iron (ppm)	Lead (ppm)	Manganese (ppm)	Mercury (ppm)	Molybdenum (ppm)	Nickel (ppm)	Rubidium (ppm)	Selenium (ppm)	Strontium (ppm)	Zinc (ppm)	Ziroconium (ppm)
TH11-17	0.8	40.9	388.3	264.4	---	35000	---	817.4	---	---	2370	42.9	---	257	---	190.9
	1.5	---	---	---	---	32000	29	---	---	---	---	95.1	---	145.1	100.8	162.3
	2.3	---	---	---	---	31800	---	693.7	---	---	---	88.7	---	140.7	68.7	134.2
	3.1	---	---	---	---	18300	---	---	---	---	---	65.7	---	173.6	91.2	152.2
	3.8	---	---	---	---	22600	---	---	---	---	123	85.7	---	124.4	67.6	134.6
	4.6	---	---	---	---	20700	---	578.8	---	---	---	91.4	---	155.6	119.7	134.6
TH11-18	0.8	11000	---	44800	---	53600	87.2	---	---	---	6506	49.4	---	193.7	---	125.4
	1.5	2081	---	60200	---	22900	---	---	---	---	4694	53	---	167.9	---	53.8
	2.3	886.9	---	20400	---	28700	---	889	---	---	8137	92.4	---	118	---	119.8
	3.1	34.2	---	150.1	---	28700	---	---	---	---	169.1	94.6	---	132	---	158.6
	3.8	67.8	---	542.6	---	31100	---	---	---	---	---	103.7	---	143.2	68.7	157.8
	4.6	25.4	---	174.1	---	23300	---	---	---	---	---	80.5	---	164.6	77.8	129
	5.3	36.9	---	361.2	---	27600	---	705.4	---	---	254.9	89.9	---	149.5	60.5	128.3
TH11-19	0.8	---	---	---	---	29100	---	705.3	---	---	226.7	52.4	---	270.1	---	97.2
	1.5	---	---	---	739.3	25600	---	687.3	---	---	194.1	47.3	---	317.4	---	138.8
	2.3	---	---	---	---	24100	---	---	---	---	192	32.4	---	211.5	---	89.1
	3.1	---	---	---	---	30300	---	647.5	---	---	268.2	30.5	---	273.1	---	79.4
	3.8	---	---	82.3	---	25700	---	---	---	---	174.7	34.7	---	211.5	---	111.8
TH11-20	0.8	---	---	---	---	18400	---	490.4	---	---	---	41	---	282.5	---	70.4
	1.5	---	---	---	---	16900	---	---	---	---	---	37	---	329.9	---	104.6
	2.3	---	---	---	---	21600	30.7	---	---	---	---	55.4	---	201	---	200.5
TH11-21	0.8	---	---	---	---	20500	---	946.5	---	---	---	45.6	---	231.5	102	94.2
	1.5	---	---	---	---	17400	---	---	---	---	142.8	41.9	---	244.7	---	167.9
	2.3	---	---	---	---	22200	---	524.4	---	---	---	37.5	---	266.5	---	86.4
	3.1	---	---	---	---	27100	---	657.8	---	---	---	---	---	263.9	---	126.4
TH11-22	0.8	---	---	---	---	16700	56.8	548.6	---	---	1560	43	---	185.4	65.7	128.6
	1.5	---	---	---	---	13700	---	---	---	---	408.3	30.9	---	207.4	---	175.8
	2.3	---	---	---	---	10400	---	---	---	---	319.4	20.5	---	177.7	---	193.8
TH11-24	0.8	---	---	---	---	24300	---	---	---	---	---	90.9	---	138.9	---	127.5
	1.5	---	---	---	---	20100	33.4	---	---	---	---	77.1	---	133.7	69.9	142.1
	2.3	---	---	---	---	23400	---	107.6	---	---	---	83.2	---	137	85.6	137
	3.1	---	---	---	---	10700	---	---	---	---	---	45.2	---	156.3	406.3	144.6
	3.8	---	---	---	---	19300	---	520.4	---	---	---	52.3	---	162.1	---	182.2
	4.6	---	---	---	---	10600	---	502.6	---	---	---	39.5	---	189.2	---	154.3
TH11-25	0.8	---	---	---	---	23200	---	---	---	---	---	53	---	174	---	114.2
	1.5	---	---	---	---	30200	---	787.1	---	---	---	91.5	---	153.6	70.1	162.3
	2.3	---	---	---	---	15500	---	---	---	---	---	58.3	---	144.1	---	123.2
	3.1	---	---	---	---	15800	---	592.4	---	---	---	67.6	---	162.5	---	123.5
	3.8	---	---	---	---	14100	---	---	---	---	---	47.6	---	184.9	---	191.9
TH11-26	0.8	28.1	---	---	---	40700	---	674.1	---	---	500.4	71.6	---	192.1	81.3	151
	1.5	---	---	---	---	23400	---	799	---	---	---	84.2	---	121.3	59.2	140.2
	2.3	---	273.9	---	---	16500	---	642.3	---	---	---	60.8	---	162	72.9	155.2
	3.1	---	---	---	---	11000	---	---	---	---	104.6	53.4	---	168	52.6	164.6
	3.8	---	---	---	---	12100	---	---	---	---	---	38.5	---	185.4	---	136
TH11-27	0.8	---	---	---	---	28600	---	802.7	---	---	1668	42.3	---	315.3	99.2	117.8
TH11-28	0.8	---	---	---	---	18.2	---	---	---	---	326.8	43.4	---	251.3	---	119.6
	1.5	---	---	---	---	20.8	---	---	---	---	---	84.7	---	395.9	104.5	214.7
TH11-29	0.8	---	---	---	---	21600	---	507.6	---	---	2183	38	---	273.9	---	83.7
	1.5	---	---	---	---	16800	---	---	---	---	---	71.7	---	152.1	---	134.3
	2.3	---	243.9	150.7	---	16500	---	619.8	---	---	---	67.1	---	158	98.8	130.9
	3.1	---	---	---	---	19900	---	541.9	---	---	222.9	86	---	153.3	70.5	144.3
	3.8	---	810.6	---	---	14100	---	816	---	---	605.5	51	---	152.2	76.5	137
TH11-30	0.8	---	---	---	---	8289	---	---	---	---	---	46.4	---	167.1	---	148.5
	1.5	---	---	---	---	19.8	---	1055	---	---	---	83.9	---	136.3	112.2	163
	2.3	---	---	---	---	14900	---	531.7	---	---	---	64.1	---	159.6	---	132.1
	3.1	---	---	---	---	9217	---	---	---	---	---	48.8	---	137.8	66.9	105.5
	3.8	---	---	---	---	16500	---	519.9	---	---	---	42.4	---	167.6	---	119.9
	4.6	---	---	---	---	17500	---	---	---	---	---	52	---	136.5	---	126
TH11-31	0.8	75.3	---	639.7	---	189300	---	2277	---	---	13000	38.8	---	176.6	---	97.1
	1.5	---	---	129.9	---	22100	---	804.9	---	---	1411	38.2	---	253	---	107.8
TH11-32	0.8	265.4	---	---	---	710400	---	---	---	---	2022	42.3	---	87.4	203.8	134.1
	1.5	559.2	3217	---	---	776300	---	---	---	---	1175	40	---	106.6	191.4	119.4
	2.3	198.7	---	---	---	794800	---	---	---	---	2507	44.3	---	105.8	---	124.9
	3.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	3.8	---	---	---	---	33000	---	---	---	---	175	89.3	---	152.2	72.8	122.5
	4.6	---	---	---	---	29100	---	---	---	---	---	88.2	---	162.7	92.8	161.2
	5.3	---	---	---	---	24000	---	---	---	---	220.6	69	---	128.5	---	129.2
	6.1	---	714.1	135.8	---	46100	---	---	---	---	445	75.8	---	147.8	98.8	125.7
TH11-33	0.8	121.2	3529	533.4	---	578300	---	---	---	29.4	1705	41.7	---	115	---	118.7
	1.5	244.5	---	1277	41000	740300	---	---	---	---	16200	---	---	93.4	---	70.9
	2.3	87.8	726.4	426.1	---	94900	---	---	---	---	1674	51.6	---	192	---	206.7
	3.1	---	---	---	689.4	22800	---	---	---	---	226.1	68	---	169.1	---	190.4
	3.8	42.1	---	221.4	---	54100	---	---	---	---	1121	54	---	183.5	---	104.6
	4.6	290.7	---	---	---	516500	---	---	---	---	1938	---	---	114.6	---	114.5
	5.3	---	---	---	739.4	30900	---	---	---	---	---	62.3	---	164.1	---	141.9
	6.1	---	---	---	---	44600	---	---	---	---	474.8	58.4	---	144.6	---	113.3
	6.8	---	---	---	---	27900	---	762.4	---	---	159.9	85.9	---	150	158.3	129.8
	7.6	---	---	---	---	---	---	---	---	---	---	93.5	---	138.1	61.4	136.6
TH11-34	0.8	---	---	---	---	25100	---	---	---	---	275.2	87.3	---	141	98.4	149.4
	1.5	---	---	---	---	20600	---	828.5	---	---	289.2	80.7	---	147.9	79.2	116.4
	2.3	---	---	---	---	24200	40.9	---	26.9	---	185.8	86.4	---	167.8	84.2	139.2
	3.1	---	---	---	---	25700	---	---	---	---	184.3	89	---	155.2	62	140.7
	3.8	---	---	---	---	9552	---	473.5	---	---	150.9	41	---	167.6	---	131.4
	4.6	---	---	---	---	19800	---	571.2	---	---	---	76.7	---	143	80	124
	5.3	---	---	---	---	12600	---	569.7	---	---	147.4	44.9	---	164.8	54	146
	6.1	---	---	---	---	12700	---	---	---	---	---	59.7	---	167.6	---	126.7
	6.8	---	---	---	---	109000	---	---	---	---	139.8	32.7	---	180.3	62.7	148.1
	7.6	---	---	---	---	12000	---	---	---	---	---	42.1	---	183.9	---	166.4
	8.4	---	---	---	---	9945	---	801.1	---	---	---	30.5	---	192.6	---	165.2
	9.2	---	---	---	---	8939	---	---	---	---	217	25.2	---	185	---	171
TH11-36	0.8	36.8	---	408.1	---	23500	---	1197	42.5	---	8668	41.5	---	246.5	---	116.6
	1.5	---	---	---	---	18400	---	---	---	---	367	66.4	---	156.4	72.8	143.8
	2.3	---	---	---	---	10800	---	433.1	---	---	---	45.6	---	168.9	97	115.5
	3.1	---	---	---	---	17400	---	---	---	---	300.1	72.8	---	145.3	64.4	141.5
	3.8	---	---	---	---	15800	---	---	---	---	165.1	65.4	---	157.1	83.9	133.3
	4.6	---	---	---	---	9800	---	359.7	---	---	168	36.9	---	152.4	57	128
	5.3	---	---	---	---	18600	---	---	---	---	194	68.2	---	128.7	80.5	128.7
	6.1	---	---	---	---	13300	---	748.1	---	---	---	47.8	---	153.5	---	119.9
	6.8	---	304.7	---	---	13500	---	---	---	---	299.5	47	---	153.6	---	120.2
	7.6	---	---	---	---	14700	---	---	---	---	---	65.1	---	150.1	---	129.9
	8.4	---	---	177.5	---	15000	---	---	---	---	419	55.5	---	157.5	---	111.8
	9.1	---	---	---	---	13200	---	---	---	---	191.8	45.2	---	181.6	91.3	140.1
	9.9	---	---	---	---	9175	---	---	---	---	296	25.8	---	242.8	---	157.6

TABLE 2: FIELD SCREENING SOIL RESULTS - METALS

Test Hole	Depth (m)	Arsenic (ppm)	Cobalt (ppm)	Copper (ppm)	Chromium (ppm)	Iron (ppm)	Lead (ppm)	Manganese (ppm)	Mercury (ppm)	Molybdenum (ppm)	Nickel (ppm)	Rubidium (ppm)	Selenium (ppm)	Strontium (ppm)	Zinc (ppm)	Ziroconium (ppm)
TH11-37	0.8	51.7	472.1	462.1	---	18200	---	---	---	---	5887	44	---	194.2	91.9	149.9
	1.5	237.8	---	375.4	---	18900	---	---	---	---	8213	32.8	---	167.8	---	82.8
	2.3	173.1	---	389.5	---	17100	---	---	---	---	6916	34.8	---	217.7	---	134.4
	3.1	46	---	---	---	14600	---	---	---	---	7248	22.5	---	217	---	98.7
TH11-38	0.8	---	---	398	---	20500	---	---	---	---	6676	46.6	---	236.8	---	129.3
	1.5	---	---	---	---	23900	---	673.7	---	---	1881	77.9	---	157.1	---	114.6
	2.3	---	---	---	---	21300	---	661.4	---	---	375.2	76	---	165.5	83.9	139.4
	3.1	---	---	---	---	13500	---	---	---	---	---	62.2	---	144.5	83.2	147
	3.8	---	---	---	---	22400	---	---	---	---	520.4	68.2	---	155.6	---	111.6
	4.6	---	---	129.3	---	9318	---	---	---	---	176.7	41.4	---	156.5	---	101.1
	5.3	---	---	---	---	12200	---	---	---	---	---	49.6	---	154.8	---	98.4
	6.1	---	---	---	---	13900	---	582.2	---	---	---	68.4	---	161.6	76.6	128.5
TH11-39	0.8	---	---	199.3	---	39000	---	---	---	---	2306	48.2	---	169.6	---	128.5
	1.5	---	---	1083	---	33600	---	---	---	---	9014	213.6	---	106.7	---	851.3
	2.3	---	---	---	---	19900	---	---	---	---	1328	44.6	---	243.9	---	100.7
	3.1	---	---	---	---	32500	---	---	44.7	---	222.1	96.1	---	151.7	---	139.4
	3.8	---	---	---	---	16200	---	---	---	---	388.4	34.9	---	292.2	---	85.3
	4.6	---	---	---	---	15400	---	549.8	---	---	372	37.4	---	215.8	89.5	117
	5.3	---	---	---	---	12200	---	---	---	---	505.9	31.5	---	240.9	---	95.1
	6.1	---	---	---	---	12100	---	---	---	---	580.9	26.7	---	232	---	113.1
	6.8	---	---	---	---	12100	---	384.2	50.1	---	1100	27	---	193.4	---	100.2
TH11-40	0.8	---	---	---	---	35300	---	---	---	---	1494	52.7	---	160.2	---	195.3
	1.5	---	---	---	---	31600	---	---	---	---	592.1	83.5	---	165.9	118.2	133
	2.3	---	---	---	---	17900	---	---	---	---	---	70.8	---	162.9	---	139.6
	3.1	---	---	---	---	26900	---	540.6	---	---	207.5	82.8	---	147.6	---	145.8
	3.8	---	---	---	---	19400	---	---	---	---	255.3	76.4	---	155.9	70.8	134.8
	4.6	---	---	---	---	14900	---	1183	---	---	---	50.4	---	165.9	---	117.7
	5.3	---	---	---	---	14900	---	---	---	---	304.6	41.8	---	151.5	---	114.4
	6.1	---	---	---	---	15600	---	---	---	---	---	50.7	---	120.2	---	105.6
TH11-41	0.8	235.3	650.6	3569	---	41100	---	1153	---	---	8478	47.8	---	202.9	---	97.6
	1.5	---	---	1002	---	23400	---	---	---	---	13400	43.9	---	194.9	---	116.3
	2.3	---	---	---	748.2	30000	---	---	---	---	193.3	87.3	---	136	93.2	148
	3.1	---	---	---	---	17300	---	782.1	---	---	213.1	69.2	---	180.2	117.2	142.7
	3.8	---	---	---	---	26100	---	612	---	---	178.3	87.9	---	157.6	---	129.7
	4.6	---	---	---	---	18600	---	828.9	---	---	186.5	73.9	---	168	---	121.5
	5.3	---	---	79.6	---	18600	---	---	---	---	274.9	70.3	---	167.6	92.4	133
	6.1	---	---	89.7	---	19700	---	511.1	---	---	237.1	80.6	---	158.2	62.3	146.4
	6.8	---	---	---	---	16.2	---	---	---	---	171.5	61.6	---	155.7	---	123.8
	7.6	---	---	---	---	14900	---	---	---	---	419.2	61.4	---	134.4	---	125.6
TH11-42	0.8	---	---	---	---	18500	---	---	---	---	6926	49.4	---	153.2	---	130.6
	1.5	---	---	---	---	16100	---	611.1	---	---	4438	66	---	129.2	---	108.7
	2.3	---	---	---	---	20800	---	---	---	---	386.8	87	---	165.5	---	135.4
	3.1	---	---	---	---	18000	---	---	---	---	343.9	66.4	---	133.4	---	161.9
	3.8	---	---	---	---	16700	---	---	---	---	506.8	58	---	175.7	---	164.2
	4.6	---	---	---	---	11100	---	---	---	---	---	32.4	---	147.2	---	105.9
	5.3	---	---	---	---	11800	---	---	---	---	212.1	41.7	---	140.3	94.6	163.2
	6.1	---	---	---	---	13900	---	---	---	---	3024	44.5	---	160.2	---	158.3
	6.8	---	---	---	---	11600	---	---	---	---	187.9	30.2	---	214.7	---	174
	7.6	---	---	---	---	10600	---	---	---	---	1313	40.1	---	227.5	---	150.4
TH11-43	0.8	---	---	---	---	23700	---	---	---	---	230.8	66.9	---	188.7	73.7	136.8
	1.5	---	---	---	---	30000	---	---	---	---	---	90.8	---	132.9	98.7	146.9
	2.3	---	---	---	---	16100	---	518.3	---	---	110.6	35.4	---	208.3	---	119.3
	3.1	---	---	---	---	23700	---	655.2	---	---	---	80.3	---	138.9	95.3	125.6
	3.8	---	---	---	---	18000	---	---	---	---	---	69	---	147.8	---	117.8
	4.6	---	---	---	---	18800	---	---	---	---	---	63.5	---	154.1	---	136
TH11-44	0.8	22.1	---	136.7	---	52900	---	710.5	---	---	2344	56.3	---	185.2	---	87.5
	1.5	24.4	---	125.2	---	43800	---	812.6	---	---	2994	67.2	---	146.9	122.4	128.8
	2.3	44.8	---	253.6	---	67500	---	1348	---	---	2998	55.1	---	177.7	151	137.6
	3.1	36.2	---	148.1	---	39000	---	---	41.6	---	1771	64.6	24.3	209	---	112.3
	3.8	---	---	---	---	16300	---	---	---	---	---	67.5	---	155.3	---	129.4
	4.6	---	---	---	---	21300	---	---	---	---	---	69.4	---	149.9	67.2	128.8
	5.3	---	---	---	---	24300	37.3	---	---	---	---	83.6	---	148	69.6	136.7
	6.1	---	---	69.9	---	20100	---	---	---	---	---	78.8	---	160.9	64.7	142.2
	6.8	22.5	---	96.8	---	26300	---	539.5	---	---	713.9	53.6	17.6	169.8	79.4	155.7
	7.6	---	---	---	---	13800	---	630.5	---	---	---	63.3	---	147.4	79.9	133.3
	8.4	---	---	---	---	34700	28.6	---	---	---	---	110.8	---	139	75.3	163.1
	9.1	---	---	---	---	32000	---	---	---	---	---	98.1	---	131.9	67.2	151.1
	9.9	---	---	---	---	22800	---	---	---	---	---	74.3	---	149.8	86.7	192.5
	10.7	---	---	---	---	22000	24.3	---	---	---	189.3	74.4	---	169.4	84.7	121.6
	11.4	---	---	---	---	20000	---	---	---	---	113	58.7	---	140.9	75.7	116.7
	12.2	---	---	---	---	18900	---	---	---	---	---	66.5	---	168	70.8	123.7
	13.0	---	---	---	---	13400	---	---	---	---	---	45.8	---	150.6	64.4	123.8
	13.7	---	---	---	---	14200	---	---	---	---	---	38.6	---	161.7	---	125.3
TH11-45	0.8	---	---	---	---	19400	---	---	---	---	---	53.1	---	276	---	111.6
	1.5	---	---	---	---	24300	---	1265	---	---	185.7	101.2	---	143	117.6	170.3
	2.3	---	329	---	---	31200	---	826.7	---	---	128.9	94.5	---	158.1	93.1	139
	3.1	---	---	---	---	22800	---	---	---	---	---	85.2	---	151.8	76.8	148.3
TH11-46	0.8	---	---	---	---	18500	---	---	---	---	---	46.5	---	179.7	129.1	113.8
	1.5	---	385.6	---	---	30800	---	912.8	---	---	---	92.1	---	139	129	170.7
	2.3	---	---	---	---	31200	38.9	---	---	---	---	99.3	---	117.4	71.4	181.1
	3.1	---	---	---	---	23800	---	544.9	---	---	---	88.3	---	130.8	77	148.8
	3.8	---	---	---	---	16000	---	---	---	---	---	52.4	---	187.2	108	137.5
	4.6	---	---	---	---	19900	---	---	---	---	---	90.5	---	143.8	---	128.8
	5.3	---	---	---	---	18600	---	---	---	---	---	61.9	---	138.1	96.8	136.7
	6.1	---	---	---	---	29300	---	---	---	---	113.7	91.4	---	124	113.7	125.5
	6.8	---	---	---	---	28200	32.9	631.9	---	---	---	94.5	---	135.4	73.9	150.6
	7.6	---	---	---	---	15800	---	---	---	---	---	61.7	---	170.8	---	114.4
	8.4	---	---	---	---	22500	34.5	671.8	---	---	---	77.4	---	134.3	---	127.5
	9.1	---	---	---	---	16900	47.1	---	---	---	---	77.4	---	151.7	96	141.6
	9.9	---	---	---	---	11200	---	614.5	---	---	---	39.6	---	168.8	---	103.5
	10.7	---	---	---	---	14500	---	573	---	---	---	73.2	---	164	---	114.4
	11.4	---	---	---	---	20200	---	531.3	---	---	---	77.3	---	137.5	96.4	124.4
	12.2	---	---	---	---	19600	---	---	---	---	---	68.7	---	128.1	---	126.4
	13.0	---	---	---	---	11200	---	---	---	---	---	42.8	---	170.9	---	125.3
	13.7	---	---	---	1628	11200	---	---	---	---	---	41.7	---	198	---	127.8

TABLE 2: FIELD SCREENING SOIL RESULTS - METALS

Test Hole	Depth (m)	Arsenic (ppm)	Cobalt (ppm)	Copper (ppm)	Chromium (ppm)	Iron (ppm)	Lead (ppm)	Manganese (ppm)	Mercury (ppm)	Molybdenum (ppm)	Nickel (ppm)	Rubidium (ppm)	Selenium (ppm)	Strontium (ppm)	Zinc (ppm)	Ziroconium (ppm)
TH11-47	0.8	---	---	---	---	29200	---	---	---	---	2568	46.5	---	213.7	---	147.9
	1.5	---	---	---	---	27700	---	---	---	---	986.7	86.7	---	172.9	---	127.3
	2.3	---	---	---	---	20300	---	---	33.2	---	---	79.9	---	146.7	65.6	144.8
	3.1	---	---	---	---	10900	---	581.4	---	---	---	60	---	168	91.9	125.2
	3.8	---	---	---	---	27700	---	831.8	---	---	243.9	86.3	---	133.3	85	154.7
	4.6	---	---	---	---	20200	---	---	---	---	---	85.1	---	152.1	---	134.7
	5.3	---	---	---	---	22900	---	1111	---	---	---	86.5	---	144.2	93.9	149.2
	6.1	---	---	---	---	13300	---	492.3	37.9	---	---	62.3	---	159.2	---	129
	6.8	---	---	---	---	8502	---	572.8	---	---	---	44.7	---	188.9	---	126.4
	7.6	---	---	---	---	16200	---	---	---	---	---	54.3	---	149.2	---	116.3
	8.4	---	---	---	---	14500	---	507	---	---	---	46.5	---	159.6	---	123.1
	9.1	---	---	---	---	9588	---	687	---	---	---	25.8	---	165.1	---	131.9
TH11-48	0.8	---	---	---	---	21200	---	---	---	---	---	63.1	---	124.2	77.1	149.4
	1.5	---	---	---	---	21300	---	---	---	---	---	79.8	---	141.3	---	152.9
	2.3	---	---	---	---	12300	---	---	---	---	---	42	---	157.8	---	127
	3.1	---	---	---	---	17900	---	---	---	---	---	61.9	---	149.1	---	141.5
	3.8	---	288.9	---	---	9519	---	505.3	---	---	---	23.2	---	241.7	---	231.1
	4.6	---	---	---	---	17800	---	---	---	---	---	26	---	248.5	75.4	100
	5.3	---	---	---	---	6824	---	---	---	---	---	33.7	---	311.5	---	40
	6.1	---	696	---	---	10800	---	---	---	---	---	27.8	---	328.4	---	116.6
	6.8	---	---	---	---	10900	---	---	---	---	174.8	35	---	297.5	---	105.7
TH11-49	0.8	---	---	---	---	26400	---	---	---	---	198.7	78.9	---	145.4	---	138.9
	1.5	---	---	---	---	9762	---	---	---	---	---	53	---	183.1	---	124.8
	2.3	---	---	---	---	16700	---	519.2	---	---	---	62.4	---	162.5	66.4	141.5
	3.1	---	---	---	---	8505	---	---	---	---	166.9	45.1	---	148.2	---	130.9
	3.8	---	---	---	---	9005	---	---	---	---	---	55.1	---	206.1	---	115.7
TH11-50	0.8	---	---	---	---	152300	---	---	---	---	---	72.3	---	152.2	---	105.2
	1.5	---	---	---	---	18300	---	---	---	---	---	66.2	---	134	---	112.8
	2.3	---	---	---	---	10300	---	---	---	---	---	53.4	---	150.6	---	141.4
	3.1	---	---	---	---	19500	---	444	24.6	---	---	79.6	---	135.8	33.6	123.5
	3.8	---	---	---	---	13400	---	651	---	---	---	53.8	---	145.9	62.8	123
	4.6	---	---	---	---	12800	---	---	---	---	---	30.2	---	233.6	---	191.2
	5.3	---	---	---	---	12200	---	---	---	---	---	17.6	---	216.4	---	217.2
TH11-51	0.8	---	---	---	---	32000	---	---	---	---	1102	79.1	---	113.5	103.3	139.3
	1.5	---	---	---	---	29600	---	815.6	---	---	199.5	92	---	141.4	72.7	146.9
	2.3	---	---	---	---	30300	---	---	---	---	---	96.8	---	139.8	91.4	146
	3.1	---	---	---	---	24600	34.7	---	---	---	136.5	76.2	---	149.1	73.7	131
	3.8	---	---	---	---	10200	---	---	---	---	---	50.4	---	168	---	130.6
	4.6	---	---	---	---	13100	---	421	---	---	---	59.9	---	152.3	---	110.4
	5.3	---	245	---	---	12200	---	---	---	---	---	38.4	---	231	78.6	129
TH11-52	0.8	---	---	---	---	38900	36.1	618.1	---	---	---	130.9	---	132.9	65.3	19.1
	1.5	---	---	---	---	28300	---	623.9	---	---	276.2	95.4	---	130.2	90.3	151.4
	2.3	---	---	---	---	16400	---	---	---	---	---	78.6	---	137.9	65.7	119.6
	3.1	---	---	---	---	13400	---	---	---	---	---	55.4	---	157.1	---	120.8
	3.8	---	269	---	---	17300	---	489.7	24.4	---	---	71.1	---	131.6	96.4	145.3
	4.6	---	---	---	---	25	---	---	---	---	---	102.5	---	132.9	---	132.5
	5.3	---	---	---	---	15700	28.5	519.2	---	---	---	62	---	149.2	48.7	128.2
	6.1	---	---	---	---	12900	---	---	---	---	---	81.5	---	191.2	200.6	122.3
TH11-53	0.8	---	---	80.3	---	33300	---	---	---	---	---	105.6	---	119.8	65.3	185.7
	1.5	---	---	---	---	11500	---	526.4	---	---	---	63.9	---	141.9	---	119.9
	2.3	---	---	---	---	15500	---	---	---	---	160.6	52.5	---	169.7	---	117.5
	3.1	---	---	---	---	11200	---	460.9	---	---	---	57.8	---	147.8	74.7	134.8
	3.8	---	---	---	---	10300	---	452.4	---	---	---	38.6	---	173.2	84	120.3
	4.6	---	---	---	---	11900	---	---	---	---	---	25.2	---	200.7	---	118.5
TH11-54	0.8	---	---	285.3	---	34000	---	---	---	---	1927	44.4	---	258.8	---	108.6
	1.5	77.9	---	1573	---	51900	---	---	---	---	3476	72	---	281.6	123.4	131
	2.3	275.6	---	---	---	671900	---	---	---	---	2635	---	---	83.7	242.7	145.3
	3.1	293.8	---	---	---	490400	---	---	---	---	2091	56.4	---	105.3	824.2	163.5
	3.8	---	---	---	---	23900	34.7	---	---	---	188	92.9	---	160.5	90.4	150.7
	4.6	23.1	---	---	---	22500	---	1481	---	---	---	72.7	---	163.8	76.4	155.1
	5.3	---	---	---	---	32100	---	---	---	---	---	104.2	---	141.2	92.9	170.1
	6.1	---	---	---	---	29800	---	---	---	---	---	98.7	---	124	---	154.4
	6.8	---	---	---	---	25500	---	---	---	---	---	84.6	---	154.3	---	139.2
	7.6	---	---	206.4	---	28.5	---	---	---	---	233.9	73.2	---	150.8	119.8	121.3
TH11-55	0.8	216.2	---	---	---	360.8	---	4027	---	---	1873	47.7	---	104.3	159.3	137.1
	1.5	---	---	---	---	33300	---	---	---	---	246.9	33.5	---	285.4	---	84.6
	2.3	---	---	---	---	18500	---	---	---	---	153.8	65.8	---	140.5	65.6	124.6
	3.1	---	---	---	---	34800	---	---	---	---	---	88.6	---	138.7	80.9	148.4
	3.8	---	---	---	---	28900	---	849.7	---	---	169.5	90.6	---	142.9	92.5	146.4
	4.6	---	---	---	---	27700	---	---	---	---	---	88.2	---	142.5	71.2	139.7
TH11-56	0.8	---	---	478.8	---	142600	---	---	---	---	11000	107.6	---	153.8	---	212.4
	1.5	---	---	159	---	40500	---	---	---	---	1558	95.4	---	138.2	---	180.4
	2.3	---	---	---	---	21500	---	---	---	---	---	80.3	---	155.1	73.2	136.9
	3.1	---	---	---	---	30800	---	---	---	---	---	90	---	143.5	83.5	133.5
	3.8	---	---	---	939.5	28100	---	---	---	---	---	90.8	---	139.1	---	132.9
	4.6	---	413.6	---	---	28900	---	413.6	---	---		93.7	---	132.8	---	158.3
	5.3	250.4	3307	---	---	64000	---	3307	6890	---	1011	44.1	---	147.9	117.8	144.2
	6.1	65.7	---	---	---	144200	---	---	2213	---	625.6	55.6	---	161.4	---	173.9
TH11-60	0.8	---	---	119.4	---	25000	---	---	---	---	1254	76.3	---	175.7	70.1	141.7
	1.5	---	---	---	---	27500	---	---	---	---	216.6	84.5	---	158.3	112.3	125.4
	2.3	---	---	---	---	25500	---	768.1	---	---	---	89.3	---	130.9	77.6	161.5
	3.1	---	---	---	---	23700	---	---	---	---	256.2	86.2	---	137.2	91	134.3
	3.8	---	---	---	---	12400	---	---	---	---	---	47.7	---	139.1	---	123
	4.6	---	---	---	---	18200	---	---	---	---	179.9	66.8	---	149.5	75.9	128.3
TH11-61	0.8	---	---	---	---	17700	---	---	---	---	---	37.3	---	196.9	---	137
	1.5	---	---	---	---	20100	---	---	---	---	---	48.1	---	331.6	---	107.4
	2.3	---	---	---	---	21000	---	547.3	---	---	---	46.3	---	267.2	63.2	90.8
	3.1	---	---	---	---	24900	---	893.4	---	---	---	80.6	---	146.7	86.7	119.4
	3.8	---	---	---	---	18200	---	481.7	---	---	---	72.2	16.3	165	72.4	114.6
	4.6	---	---	---	---	28200	---	757.4	---	---	---	96.5	---	144	108	117.8

TABLE 2: FIELD SCREENING SOIL RESULTS - METALS																
Test Hole	Depth (m)	Arsenic (ppm)	Cobalt (ppm)	Copper (ppm)	Chromium (ppm)	Iron (ppm)	Lead (ppm)	Manganese (ppm)	Mercury (ppm)	Molybdenum (ppm)	Nickel (ppm)	Rubidium (ppm)	Selenium (ppm)	Strontium (ppm)	Zinc (ppm)	Ziroconium (ppm)
TH11-62	0.8	---	---	---	---	21200	---	764.3	---	---	635	46	---	307.6	90.6	120.1
	1.5	---	---	---	---	14100	---	---	---	---	---	57.2	---	149.8	---	152.6
	2.3	---	---	---	---	31100	---	---	---	---	---	101.5	---	162.5	78.9	168.9
	3.1	---	---	---	---	30800	---	815.9	---	---	---	134.6	---	130.8	97.4	171
	3.8	---	---	---	---	27300	---	---	---	---	---	90.1	---	131.4	70.5	133.3
	4.6	---	---	---	---	27200	30.1	---	---	---	---	90.9	---	144.3	79.4	133.2
	5.3	---	---	---	---	22900	---	571.7	---	---	---	80.1	33.1	153.2	80.7	137.3
	6.1	---	---	77.6	---	25200	---	598.7	---	---	---	88.8	---	137.6	83.6	127.1
	6.8	---	---	---	---	10900	---	510.1	---	---	---	56.3	---	158.5	---	127.7
	7.6	---	---	---	---	21500	---	642.6	---	---	189.4	88.8	---	134.7	103.4	105.1
	8.4	---	306.2	---	---	18800	---	540.3	---	---	---	70	---	136.5	---	111.8
	9.1	---	---	---	---	17700	---	---	---	---	212.9	65.7	---	146.1	---	142.3
	9.9	---	---	---	---	24700	---	---	---	---	---	75.2	---	131.7	---	134.7
	10.7	---	---	---	---	17900	---	---	---	---	---	65	---	155	---	127.5
TH11-63	0.8	---	---	---	---	29000	---	882.8	---	---	450.8	72.8	---	187.2	---	174.8
	1.5	---	---	---	---	21900	---	---	---	---	233.6	76.2	---	154.3	89.8	163.5
	2.3	---	---	---	---	22500	---	---	---	---	---	80.2	---	152.2	---	142.6
	3.1	---	---	---	---	26500	39.4	1104	---	---	---	115	---	124.8	75.8	121.6
	3.8	---	---	---	---	33400	---	---	---	---	---	99.6	---	126.2	---	137.1
	4.6	---	---	---	---	30000	---	---	---	---	---	88.3	---	130.5	90.3	150.8
	5.3	---	---	---	---	25900	---	---	---	---	---	93.9	---	158.1	84	138.5
	6.1	---	---	---	---	28000	---	---	---	---	---	96.7	---	167.7	108.3	126.5
	6.8	---	---	---	---	21000	---	---	---	---	---	76.7	---	150.1	---	125.4
	7.6	---	---	---	---	23000	---	---	---	---	---	80.1	---	128.1	109	138.2
	8.4	---	---	---	---	15400	---	---	---	---	---	52.3	---	154.3	77.9	118.6
	9.1	---	---	---	---	18800	---	---	---	---	---	71.4	---	113.1	84.9	110.9
	9.9	---	---	---	---	15800	---	---	---	---	---	59.8	---	138.5	---	119.2
	10.7	---	---	---	---	19900	---	---	---	---	---	68.3	---	152.4	67.7	129.3
	11.4	---	---	---	---	13800	---	---	---	---	---	46.4	---	158.8	---	152.9
	12.2	---	---	---	---	12100	---	---	---	---	---	40.3	---	191.5	---	163.5
TH11-64	0.8	---	---	72	---	25700	---	523.4	---	---	312.1	62.9	---	168.9	81.7	149.1
	1.5	---	289.9	---	---	24000	---	755.4	---	---	138.5	67.1	---	225.7	73	118.9
	2.3	---	---	---	---	21100	---	---	---	---	161.3	52.2	---	253.9	76.8	128.3
	3.1	---	495.1	---	---	26000	---	781.7	---	---	---	104.5	---	126.6	102.7	169.4
	3.8	---	---	---	---	28100	---	---	---	---	---	94.4	---	139.7	69.6	139.5
	4.6	---	---	---	686.7	30100	---	538.6	---	---	---	102.1	---	169.8	93.5	139.1
	5.3	---	---	---	---	23200	---	843.2	---	---	119.7	89.5	---	146.3	103.6	146.8
	6.1	---	---	---	---	17600	---	---	---	---	125.7	73.8	---	154.2	---	109
	6.8	---	---	---	---	116100	---	---	---	---	---	52.4	---	160.4	---	102.5
	7.6	---	---	---	---	10500	---	---	---	---	---	47.4	---	149.3	49.1	128.6
	8.4	---	---	---	---	88300	---	---	---	---	---	55.6	---	155	17800	120.7
	9.1	---	---	---	---	16600	---	499.4	---	---	---	68.7	---	149.8	82.8	131.5
TH11-65	6.1	130.1	2446	---	---	522900	---	---	---	---	916.3	32.3	---	97.8	---	114.9
	6.8	29.6	---	---	---	81100	---	1492	---	---	733.5	32.1	---	256	106.1	103.2
	7.6	51.5	---	223.4	---	80100	---	---	---	---	573.4	80.8	---	161.4	---	321.2
TH11-66	0.8	---	---	---	---	31.8	---	---	---	---	323.3	79.7	---	285.6	83.4	159.5
	1.5	---	---	---	---	26200	---	751.4	---	---	215.8	73.3	---	310.1	---	178.9
TH11-101	0.8	---	---	---	---	25000	---	---	---	---	305	70.3	---	146.3	---	170
	1.5	---	---	---	---	34600	---	---	---	---	668.4	91.3	---	116.7	---	164.9
	2.3	---	---	---	---	13200	---	---	---	---	---	62.2	---	161.5	---	128.5
	3.1	---	---	---	---	18200	---	---	---	---	---	68.3	---	122.3	---	137.1
	3.8	---	---	---	---	20600	---	---	---	---	---	72.2	---	143.8	87.9	149.2
TH11-102	0.8	95.8	---	389.2	---	102600	---	---	---	---	3468	57.5	---	150.1	245.1	116.8
	1.5	212.5	---	---	---	668500	---	---	---	---	---	---	---	102.2	---	165.8
	2.3	---	---	---	---	23400	---	---	---	---	---	67.6	---	118.3	---	162
	3.1	---	---	---	---	21300	---	---	---	---	---	64.2	---	143.6	---	80.1
	3.8	---	---	---	---	21300	---	984.8	---	---	---	70.7	---	122.8	---	142.3
	4.6	---	---	---	---	25500	---	---	---	---	---	78.5	---	123.8	---	119.4
	5.3	---	---	---	---	23200	---	---	---	---	---	71.8	---	148.3	---	125.5
	6.1	---	---	---	---	21000	---	---	---	---	---	72.6	---	87.8	---	104.7
	6.8	---	---	---	---	23800	---	---	---	---	---	85	---	1431.3	93.7	155.8
	7.6	---	---	---	---	11700	---	607.9	---	---	---	43.7	---	77.2	---	112.7
	8.4	---	---	---	---	20400	---	---	---	---	---	68	---	103.4	---	112.9
	9.1	---	---	---	---	17800	---	---	---	---	---	84.6	---	116.9	80.3	133
	9.9	---	---	---	---	26900	---	---	---	---	---	104.1	---	149.5	---	109.5
	10.7	---	---	---	---	15200	---	---	---	---	---	63.6	---	150.4	---	107.5
	11.4	---	---	---	---	18700	---	---	---	---	---	59	---	143.9	---	107.6
	12.2	---	---	---	---	23900	---	---	---	---	---	68.9	---	122.6	---	115.8
	13.0	---	---	---	---	12500	---	---	---	---	---	43.1	---	133.9	---	110.3
	13.7	---	---	---	---	23800	---	---	---	---	---	91.4	---	143.2	---	145.2
	14.5	---	---	---	---	11200	---	---	---	---	---	48.3	---	150.6	---	110.9
	15.2	---	---	---	---	18500	---	---	---	---	---	67.8	---	137.2	103.8	119.5
	16.0	---	---	---	---	8938	---	---	---	---	---	29	---	177.9	---	128
	16.8	---	---	---	---	10200	---	640.8	---	---	---	31.3	---	177.5	---	170.8
	17.5	---	---	---	---	12500	---	---	---	---	---	20.4	---	216.4	---	202.5
	18.2	---	---	---	---	12700	---	---	---	---	---	34.4	---	197.9	---	175.3
TH11-103	0.8	---	---	---	---	23700	---	---	---	---	---	41.2	---	260.4	---	128.4
	1.5	---	---	---	---	29300	---	---	---	---	---	30.9	---	306.4	---	84.9
	2.3	---	---	---	---	35400	---	---	---	---	---	48.2	---	259.9	---	97.4
	3.1	---	---	---	---	21700	---	---	---	---	---	72.9	---	137.2	146.9	127
	3.8	---	---	---	---	20100	---	---	---	---	---	86.9	---	142.7	---	102.7
	4.6	---	---	---	---	23900	---	---	---	---	---	73.4	---	155.2	---	112.9
	5.3	---	---	---	---	32500	---	---	---	---	---	133.9	---	147.6	116.3	207.3
	6.1	---	---	---	---	30700	---	---	---	---	---	99.4	---	133.6	---	141.8
	6.8	---	---	---	---	24900	---	---	---	---	---	80.3	---	117.2	---	113.4
	7.6	---	---	---	---	26900	---	---	---	---	---	70	---	123	---	109.7
	8.4	---	---	---	---	15900	---	---	---	---	---	59	---	155.6	---	119.8
	9.1	---	---	---	---	17100	---	---	---	---	---	51	---	147.2	---	89.9
	9.9	---	---	---	---	16700	---	---	---	---	---	60	---	145.8	---	101.2
	10.7	---	---	---	---	12100	---	---	---	---	---	42.6	---	139.4	---	122.9
TH11-104	0.8	---	---	---	---	45600	---	---	---	---	1881	68.8	---	127	---	117.1
	1.5	---	---	---	---	16600	---	---	---	---	245.2	29.5	---	154.6	---	107
	2.3	---	---	---	---	18500	---	---	---	---	---	63.2	---	140	---	145
	3.1	---	---	---	---	24900	---	---	---	---	---	79.2	---	156.2	---	131
	3.8	---	---	---	---	17700	---	---	---	---	---	63.4	---	146.4	153.3	118.7
	4.6	---	---	---	---	14000	---	---	---	---	---	57.2	---	141.5	131.8	135.9
	5.3	---	---	---	---	10100	---	---	---	---	---	48.6	---	155.1	---	109.4
	6.1	---	---	---	---	11000	---	---	---	---	---	45.1	---	162.5	---	145.2
	6.8	---	---	---	---	12700	---	---	---	---	---	51.8	---	146.4	---	145.4

TABLE 2: FIELD SCREENING SOIL RESULTS - METALS

Test Hole	Depth (m)	Arsenic (ppm)	Cobalt (ppm)	Copper (ppm)	Chromium (ppm)	Iron (ppm)	Lead (ppm)	Manganese (ppm)	Mercury (ppm)	Molybdenum (ppm)	Nickel (ppm)	Rubidium (ppm)	Selenium (ppm)	Strontium (ppm)	Zinc (ppm)	Ziroconium (ppm)
TH11-106	0.8	---	---	---	---	23100	---	---	---	---	---	77.1	---	153.2	---	133.5
	1.5	---	---	---	---	32300	---	---	---	---	---	75.9	---	119.9	---	168.2
	2.3	---	---	---	---	28000	---	---	---	---	---	96.6	---	136.8	---	138.6
	3.1	---	---	---	---	24700	---	---	---	---	---	76.7	---	156.8	---	131.1
	3.8	---	---	---	---	26500	---	---	---	---	---	55.9	---	152.4	---	116.2
	4.6	---	---	---	---	20900	---	---	---	---	---	75.9	---	131.8	---	135.6
	5.3	---	---	---	---	24600	---	---	---	---	---	66	---	146.4	---	159
	6.1	---	---	---	---	20000	---	---	---	---	---	78.5	---	117.4	---	128.5
	6.8	---	---	---	---	17600	---	---	---	---	---	59.5	---	118.7	---	117.7
	7.6	---	---	---	---	19100	---	---	---	---	---	73.2	---	151.5	---	133
	8.4	---	---	---	---	18600	---	---	---	---	---	57.8	---	131.2	---	101.4
	9.1	---	---	---	---	22500	---	1015	---	---	348.1	92.6	---	195.4	---	148
	9.9	---	---	---	---	17500	---	684.4	---	---	---	61.6	---	161.5	---	145.1
	10.7	---	---	---	---	13000	---	---	---	---	---	48.5	---	160.7	---	98.2
	11.4	---	---	---	---	10200	---	---	---	---	---	38.6	---	169.4	---	219.5
TH11-110	0.8	---	---	99.5	---	28800	---	---	---	---	334.8	53.8	---	213.1	---	143.3
	1.5	---	---	---	---	40100	---	---	---	---	---	118.7	---	114.6	---	168.5
	2.3	---	---	---	---	14900	---	---	---	---	---	73.6	---	149.9	---	133.4
	3.1	---	---	---	---	19400	---	---	---	---	---	69	---	127.2	---	133.7
	3.8	---	---	---	---	21900	---	---	---	---	---	90.4	---	147	---	96.9
	4.6	---	397	---	---	24500	---	---	---	---	---	83.2	---	121.3	87.9	124
	5.3	---	---	---	---	24600	---	---	---	---	---	88.1	---	116.5	---	131.5
	6.1	---	---	---	---	17500	---	---	---	---	---	63.5	---	125.1	---	103.5
	6.8	---	---	---	---	11000	---	---	---	---	---	49.6	---	174.6	---	142.2
	7.6	---	---	---	---	15100	---	---	---	---	---	69.3	---	143.2	---	140.7
	8.4	---	---	---	---	13700	---	---	---	---	---	40.2	---	173.7	124.3	143.3
TH11-111	0.8	---	---	---	---	35400	---	---	---	---	2346	41.1	---	171.2	---	200.3
	1.5	---	---	---	---	12300	---	---	---	---	---	51	---	141.5	---	131.6
	2.3	---	---	---	---	8484	---	628.8	---	---	---	40.1	---	159.8	---	106.8
	3.1	---	---	---	---	11800	---	---	---	---	---	53	---	160.1	---	161
	3.8	---	---	---	---	12500	---	---	---	---	353.2	55.1	---	258.5	---	134.5
CCME EQG (Commercial)																

Table 5 Notes:

- < - less than the analytical detection limit
- NG – no guideline
- CCME EQG Criteria – commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canadian Environmental Quality Guidelines", 1999 (updated 2009).
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC Edmonton Laboratory.

TABLE 3: SOIL ANALYTICAL RESULTS - METALS

Test Hole	Depth (m)	Aluminum (µg/g)	Antimony (µg/g)	Arsenic (µg/g)	Barium (µg/g)	Beryllium (µg/g)	Cadmium (µg/g)	Calcium (µg/g)	Chromium (µg/g)	Cobalt (µg/g)	Copper (µg/g)	Iron (µg/g)	Lead (µg/g)	Magnesium (µg/g)	Manganese (µg/g)	Mercury (µg/g)	Molybdenum (µg/g)	Nickel (µg/g)	Phosphorus (µg/g)	Potassium (µg/g)	Selenium (µg/g)	Sodium (µg/g)	Silver (µg/g)	Thallium (µg/g)	Tin (µg/g)	Vanadium (µg/g)	Uranium (µg/g)	Zinc (µg/g)
TH11-01	0.8	11400	< 0.5	3.5	38	0.1	< 0.2	12900	34.2	28.6	84.5	28300	4.8	6990	152	< 0.2	1.8	1140	147	4830	< 0.5	470	< 0.1	< 0.5	< 0.5	17.7	< 15.0	33.7
TH11-02	1.5	11400	< 0.5	25.1	47	0.1	0.3	16300	51.2	133	423	56700	8.5	8750	171	< 0.2	1.9	7850	130	4500	1	543	0.2	< 0.5	< 0.5	19.2	< 15.0	72.2
TH11-03	3.1	13000	< 0.5	12.5	62	< 0.1	0.2	4410	56	59.5	144	43600	7.1	5190	154	< 0.2	2.9	736	140	5200	< 0.5	423	< 0.1	< 0.5	< 0.5	24.7	< 15.0	34.4
TH11-04	0.8	6750	< 0.5	131	49	0.1	1.1	21800	39.5	276	7870	38100	9.4	8280	142	< 0.2	1.7	9040	156	2270	15.3	721	2.3	< 0.5	< 0.5	15.8	< 15.0	78.4
TH11-05					73	0.4	< 0.2	103000	25.5	40.6	21.1	19000	5.8	24400	302	< 0.2	< 0.5	2750	371	3200	< 0.5	1340	< 0.1	< 0.5	< 0.5	23.3	< 15.0	47
TH11-06	1.5	---	---	---	---	---	---	---	---	---	44.9	---	---	---	---	---	---	10700	---	---	---	---	---	---	---	---	---	---
TH11-07	1.5	---	---	---	---	---	---	---	---	---	27.6	---	---	---	---	---	---	2550	---	---	---	---	---	---	---	---	---	---
TH11-08	0.8	---	---	---	---	---	---	---	---	---	1780	---	---	---	---	---	---	9950	---	---	---	---	---	---	---	---	---	---
TH11-09	1.5	15600	< 0.5	4.9	75	0.4	< 0.2	88100	25.7	170	146	22200	6.2	21100	306	< 0.2	< 0.5	5840	357	3140	< 0.5	1190	< 0.1	< 0.5	< 0.5	23	< 15.0	61.3
TH11-11	3.1	34100	< 0.5	4	181	0.9	< 0.2	12400	48.9	288	32.4	38400	13.4	10400	469	< 0.2	< 0.5	18800	403	4430	0.5	2430	0.1	< 0.5	< 0.5	44.3	< 15.0	175
TH11-12	2.3	23900	< 0.5	6.6	110	0.6	< 0.2	90300	35.5	19.9	96.9	31900	8.7	19600	420	< 0.2	< 0.5	3890	415	4270	< 0.5	2740	0.1	< 0.5	< 0.5	34.2	< 15.0	72.6
TH11-13	1.5	15300	< 0.5	254	129	0.3	2	29700	43.7	202	11600	35300	11	10200	249	< 0.2	1.3	7340	370	5120	3.4	1110	2.1	< 0.5	< 0.5	25.5	< 15.0	82.8
TH11-14	1.5	35300	< 0.5	197	205	0.4	1.5	14100	300	1010	2830	328000	17.9	14700	223	< 0.2	8.2	10200	98	15000	< 0.5	5920	0.6	< 0.5	< 0.5	30.1	< 15.0	257
TH11-15	2.3	---	---	---	---	---	---	---	---	---	22.3	---	---	---	---	---	---	46	---	---	---	---	---	---	---	---	---	---
TH11-16	3.1	---	---	---	---	---	---	---	---	---	29.1	---	---	---	---	---	---	39.7	---	---	---	---	---	---	---	---	---	---
TH11-17	0.8	8080	< 0.5	226	52	0.2	1.7	41800	38.9	30.1	234	23400	4	10600	169	< 0.2	0.5	2730	288	2060	< 0.5	903	< 0.1	< 0.5	< 0.5	19.1	< 15.0	35.3
TH11-18	2.3	25400	< 0.5	1610	104	0.7	11.2	49800	39.6	46.6	65500	34200	10.4	13600	292	< 0.2	0.8	13500	89	4780	2.8	1490	< 0.1	< 0.5	< 0.5	38.1	< 15.0	149
TH11-19	3.1	5610	< 0.5	8.7	35	< 0.1	< 0.2	13300	31.7	29	33.1	24900	3.4	8180	101	< 0.2	0.6	179	215	1600	< 0.5	710	< 0.1	< 0.5	< 0.5	12.4	< 15.0	22.6
TH11-28	0.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	205	---	---	---	---	---	---	---	---	---	---
TH11-29	1.5	22200	< 0.5	3.6	115	0.6	< 0.2	91100	36.5	11.7	23.5	28200	8.3	20600	390	< 0.2	< 0.5	50	453	4930	< 0.5	1650	< 0.1	< 0.5	< 0.5	34	< 15.0	58.7
TH11-30	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	25.9	---	---	---	---	---	---	---	---	---	---
TH11-31	1.5	5160	< 0.5	3.2	43	< 0.1	< 0.2	13700	37.8	25.3	45.3	14800	3.2	7130	128	< 0.2	1.2	1260	292	1950	< 0.5	508	< 0.1	< 0.5	< 0.5	13.8	< 15.0	21.5
TH11-32	6.1	25100	< 0.5	41.9	136	0.6	0.6	63900	77.2	78.9	87.2	98300	10.1	16300	370	< 0.2	2.2	553	362	5620	< 0.5	1730	0.1	< 0.5	< 0.5	34.8	< 15.0	77
TH11-33	2.3	16800	< 0.5	79.1	102	0.3	0.9	49300	74	175	412	97800	18.5	12200	260	< 0.2	2.8	2000	256	4350	< 0.5	1770	0.3	< 0.5	< 0.5	22.6	< 15.0	82.6
TH11-34	8.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	23.8	---	---	---	---	---	---	---	---	---	---
	9.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	48.6	---	---	---	---	---	---	---	---	---	---
TH11-35	6.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	21.5	---	---	---	---	---	---	---	---	---	---
TH11-36	9.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	26.3	---	---	---	---	---	---	---	---	---	---
TH11-37	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8260	---	---	---	---	---	---	---	---	---	---
TH11-38	1.5	30200	< 0.5	4.8	146	0.8	< 0.2	75200	44.6	14.1	30.1	39800	10.4	23000	435	< 0.2	< 0.5	71.2	447	4710	< 0.5	1360	0.1	< 0.5	< 0.5	41.1	< 15.0	73.7
TH11-39	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8560	---	---	---	---	---	---	---	---	---	---
TH11-40	0.8	12900	< 0.5	5.4	70	0.2	< 0.2	23400	40.4	30.5	82.7	27700	5.7	10300	233	< 0.2	1.2	2610	258	4440	< 0.5	526	< 0.1	< 0.5	< 0.5	25	< 15.0	50.1
TH11-41	0.8	13700	< 0.5	507	73	0.3	3.7	36900	48.7	263	8150	47900	11.8	11300	186	< 0.2	1.6	7690	193	3060	3.9	1200	3.6	< 0.5	< 0.5	20.3	< 15.0	76.2
TH11-42	7.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1450	---	---	---	---	---	---	---	---	---	---
TH11-43	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	38.2	---	---	---	---	---	---	---	---	---	---
TH11-44	2.3	12300	< 0.5	39.7	69	0.2	0.7	33900	95.5	222	781	92300	14.7	17000	201	< 0.2	3	8490	190	4140	< 0.5	621	< 0.1	< 0.5	< 0.5	23.6	< 15.0	96.8
TH11-45	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	36.1	---	---	---	---	---	---	---	---	---	---
TH11-46	2.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	49	---	---	---	---	---	---	---	---	---	---
TH11-47	2.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	39.2	---	---	---	---	---	---	---	---	---	---
TH11-48	6.1	---	---	---	---	---	---	---	---	---	13	---	---	---	---	---	---	22.8	---	---	---	---	---	---	---	---	---	---
TH11-49	3.1	---	---	---	---	---	---	---	---	---	13.1	---	---	---	---	---	---	15.7	---	---	---	---	---	---	---	---	---	---
TH11-50	5.3	---	---	---	---	---	---	---	---	---	11.2	---	---	---	---	---	---	21	---	---	---	---	---	---	---	---	---	---
TH11-51	2.3	---	---	---	---	---	---	---	---	---	27.8	---	---	---	---	---	---	31.7	---	---	---	---	---	---	---	---	---	---
TH11-52	6.1	---	---	---	---	---	---	---	---	---	15.3	---	---	---	---	---	---	20.1	---	---	---	---	---	---	---	---	---	---
TH11-53	4.6	---	---	---	---	---	---	---	---	---	15	---	---	---	---	---	---	16.2	---	---	---	---	---	---	---	---	---	---
TH11-56	5.3	27600	< 0.5	152	187	0.4	1.1	15100	204	463	59.2	272000	9.7	7120	193	< 0.2	6.2	1510	117	13400	< 0.5	4510	0.2	< 0.5	< 0.5	26.6	< 15.0	83.3
TH11-60	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	38.4	---	---	---	---	---	---	---	---	---	---
TH11-61	2.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	37.9	---	---	---	---	---	---	---	---	---	---
TH11-62	2.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	36.8	---	---	---	---	---	---	---	---	---	---
TH11-63	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	40	---	---	---	---	---	---	---	---	---	---
TH11-64	2.3	7680	< 0.5	2.4	57	0.1	< 0.2	22600	118	9	27.9	26600	3.8	9070	188	< 0.2	7.9	126	209	2570	< 0.5	528	< 0.1	< 0.5	< 0.5	21.6	< 15.0	25.2
TH11-66	1.5	9850	< 0.5	5	142	0.1	< 0.2	15800	33.5	17.8	43.9	34400	4.1	9000	224	< 0.2	1.4	285	755	9640	< 0.5	378	< 0.1	< 0.5	0.5	23.3	< 15.0	48.6
TH11-85	3.1	19400	< 0.5	4.5	122	0.6	< 0.2	10100	36.5	10.8	26.6	31400	8.7	19800	460	< 0.2	0.8	31.2	444	4540	< 0.5	2400	< 0.1	< 0.5	< 0.5	37	< 15.0	59.8
TH11-86	0.8	25500	< 0.5	26.1	143	0.7	0.4	60000	70.7	141	142	78600	12.6	18200	365	< 0.2	2.2	548	395	7800	< 0.5	2580	< 0.1	< 0.5	0.6	41.8	< 15.0	90.8
TH11-90	2.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	24.9	---	---	---	---	---	---	---	---	---	---
TH11-91	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	47.8	---	---	---	---	---	---	---	---	---	---
TH11-92	3.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	37.8	---	---	---	---	---	---	---	---	---	---
TH11-94	1.5	13600	< 0.5	49.7	93	0.2	0.6	16600	96.7	223	602	118000	7.2	8600	225	< 0.2	3	11600	236	4330	< 0.5	1650	< 0.1	< 0.5	< 0.5	31.8	< 15.0	82.9
TH11-97	3.8	18400	< 0.5	4.1	115	0.6	< 0.2	101000	35.4	11.4	30.9	29200	8.1	20700	374	< 0.2	0.7	390	427	4320	< 0.5	2770	< 0.1	< 0.5	0.6	34.2	< 15.0	54.7
TH11-98	0.8	17300	< 0.5	8.5	92	0.1	< 0.2	13000	92.8	44.8	149	63400	8.6	9970	234	< 0.2	2.5	2540	134	9010	< 0.5	302	< 0.1	< 0.5	< 0.5	43.7	< 15.0	63.5
TH11-101	1.5	16300	<0.5	6.4	82	0.1	<0.2	12000	289	38	61.9	35600	4.3	13000	305	<0.2	15	572	383	9860	<0.5	483	<0.1	<0.5	<0.5	26	<15.0	59.9
TH11-102	7.6	26600	<0.5	4.4	120	0.7	<0.2	83300	39.5	12.1	23.9	35500	8	20100	370	<0.2	0.9	36.6	416	6260	<0.5	2260	<0.1	<0.5	<0.5	36	<15.0	56.6
TH11-103	5.3	42600	<0.5	6.6	211	1.2	<0.2	7340	65	17.6	38.9	60900	13.6	16200	528	<0.2	1.1	51.4	501	7980	<0.5	657	<0.1	<0.5	1.1	56.2	<15.0	92.2
TH11-104	3.1	18100	<0.5	3.5	91	0.4	<0.2	131000	27.4	8.3	20.9	25600	5.9	22700	312	<0.2	0.6	30.7	404	5270	<0.5	3340	<0.1	<0.5	<0.5	25.3	<15.0	42.8
TH11-105	0.8	15300	<0.5	12.3	50	0.1	0.4	8620	64.4	180	606	106000	9.2	9210	148	<0.2	3.5	4890	88	7690	<0.5	458	<0.1	<0.5	<0.5	41.6	<15.0	169
TH11-106	2.3	32800	<0.5	5.5	146	0.8	<0.2	64000	49.2	14.3	31.3	46800	10.1	19800	406	<0.2	0.9	40.5	480	7740	<0.5	1940	<0.1	<0.5	<0.5	44.6	<15.0	79.4
	6.1	21900	<0.5	3.6	111	0.5	<0.2	111000	32.9	9.8	21.5	31800	7	22000	350	<0.2	0.7	24.2	445	6430	<0.5	2740	<0.1	<0.5	<0.5	30.2	<15.0	55.1
TH11-110	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	194	---	---	---	---	---	---	---	---	---	---
TH11-111	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	34.8	---	---	---	---	---	---	---	---	---	---
CCME EQG (Commercial)		NG	40	12	2000	8	22	NG	87	300	91	NG	600	NG	NG	50	40	50	NG	NG	2.9	NG	40	1	300	300	130	360

Table 5 Notes:

- < - less than the analytical detection limit
- NG – no guideline
- CCME EQG Criteria – commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canadian Environmental Quality Guidelines", 1999 (updated 2009).
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC Edmonton Laboratory.

TABLE 4: SOIL ANALYTICAL RESULTS - PHCs

Test Hole	Depth (m)	Soil Vapour Concentration (ppm_v)	Benzene (µg/g)	Toluene (µg/g)	Ethyl benzene (µg/g)	Xylenes (µg/g)	PHC F1 (µg/g)	PHC F2 (µg/g)	PHC F3 (µg/g)	PHC F4 (µg/g)
TH11-10	1.1	60	<0.005	<0.03	<0.01	<0.03	5.88	266	108	<30
TH11-13	1.5	400	<0.005	0.83	1.49	13.8	**334**	**2240**	627	<30
TH11-20	1.5	55	<0.005	<0.03	<0.01	<0.03	29.3	**781**	687	<30
TH11-22	1.5	35	< 0.005	< 0.03	< 0.01	< 0.03	< 5.00	< 30	166	294
TH11-26	1.5	ND	<0.005	<0.03	<0.01	<0.03	<5.0	<30	50	<30
TH11-55	1.5	170	< 0.005	< 0.03	< 0.01	< 0.03	< 5.00	< 30	64	< 30
TH11-57	0.8	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	60	< 30
TH11-58	0.8	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	61	< 30
TH11-65	1.5	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.00	< 30	< 30	< 30
TH11-66	1.2	30	< 0.005	< 0.03	< 0.01	< 0.03	< 5.00	**560**	798	< 30
TH11-68	1.5	5	0.007	< 0.03	0.01	< 0.03	< 5.00	< 30	< 30	< 30
TH11-75	0.8	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	**2640**	1420
TH11-81	1.2	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH11-84	0.8	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH11-93	0.5	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH11-95	0.8	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	245	66
TH11-108	1.5	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	245	66
TH11-109	1.5	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	245	66
CCME Commercial EQG (≤1.5m depth)			**2.8**	**330**	**430**	**230**	**NG**	**NG**	**NG**	**NG**
CCME Commercial CWS PHC – fine grained soils (≤1.5m depth below grade)							**320**	**260**	**2,500**	**6,600**
TH11-9	2.3	ND	<0.005	<0.03	<0.01	<0.03	<5.00	<30	<30	<30
TH11-12	1.8	25	0.009	0.12	1.83	8.87	643	**4880**	891	<30
TH11-19	3.5	700	<0.005	<0.03	0.94	1.56	268	**2770**	1040	<30
TH11-20	2.3	85	<0.005	<0.03	<0.01	0.24	60.1	**1460**	798	<30
TH11-21	3.1	ND	<0.005	<0.03	<0.01	<0.03	<5.0	90	137	<30
TH11-24	4.6	45	<0.005	<0.03	0.01	<0.03	31.7	332	68	<30
TH11-25	2.3	200	0.01	<0.03	1.19	5.51	303	**5870**	1050	<30
TH11-39	5.3	210	<0.005	<0.03	<0.01	0.09	117	**1880**	619	<30
TH11-54	3.0	5	<0.005	<0.03	0.01	<0.03	<5.00	<30	<30	<30
TH11-59	4.3	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH11-67	3.8	430	**4.17**	22.4	5.67	32.4	215	757	201	< 30
TH11-69	5.3	15	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	609	690	< 30
TH11-70	4.6	45	< 0.005	< 0.03	< 0.01	< 0.03	6.1	**2980**	2330	< 30
TH11-72	4.6	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	160	113	< 30
TH11-73	2.1	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH11-74	4.3	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	306	274	< 30
TH11-76	5.2	100	0.02	< 0.03	0.35	0.41	146	**1220**	234	< 30
TH11-77	5.5	150	< 0.005	< 0.03	0.85	1.13	224	**3100**	532	< 30
TH11-79	2.4	30	0.019	< 0.03	0.72	3.97	127	**1470**	1980	257
TH11-80	3.8	50	0.015	0.27	0.66	2.88	34.4	**3850**	**22300**	3680
TH11-82	2.4	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	51	< 30
TH11-87	2.3	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	<30	< 30
TH11-88	6.9	50	< 0.005	< 0.03	< 0.01	< 0.03	39.6	641	153	< 30
TH11-89	2.3	10	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	<30	< 30
TH11-90	5.3	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	<30	< 30
TH11-91	6.1	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	<30	< 30
TH11-92	5.3	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	<30	< 30
TH11-96	26.4	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	<30	< 30
TH11-99	4.6	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	<30	< 30
TH11-100	4.6	ND	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	<30	< 30
TH11-107	3.8	50	< 0.005	< 0.03	< 0.01	< 0.03	17.7	1240	625	< 30
CCME Commercial EQG (>1.5m depth)			**2.9**	**13000**	**6700**	**1600**	**NG**	**NG**	**NG**	**NG**
CCME Commercial CWS PHC – fine grained soils (>1.5m depth below grade)							**800**	**1,000**	**3,500**	**10,000**

Notes:

- ppm_v – parts per million organic vapour
- (µg/g) – micrograms per gram
- **BOLD** – exceeds the referenced guideline
- NG - No Guideline
- PHC FI – volatile petroleum hydrocarbons (C_6-C_{10})
- PHC F2 – extractable petroleum hydrocarbons (C_{10}-C_{16})
- PHC F3 – extractable petroleum hydrocarbon (C_{16}-C_{34})
- PHC F4 – extractable petroleum hydrocarbons (C_{34}-C_{50})
- < - less than the method detection limit
- CCME EQG Criteria – commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canadian Environmental Quality Guidelines", 1999 (updated 2009). The benzene concentration is based on one hundred thousand (10-5) incremental risk of cancer.
- CCME CWS PHC Criteria - commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canada-Wide Standards for Hydrocarbons in Soil", 2001, revised 2008.
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC Laboratory.

TABLE 5 : SOIL ANALYTICAL RESULTS - PAH		
Parameter	TH11-80 (3.8 m depth)	**GUIDELINE[1]**
2-Methylnaphthalene (µg/g)	130	**NG**
Acenaphthene (µg/g)	78	**NG**
Acenaphthylene (µg/g)	2.8	**NG**
Anthracene (µg/g)	31	**32**
Benzo(a)anthracene (µg/g)	18	**10**
Benzo(a)pyrene (µg/g)	13	**72**
Benzo(b+i)fluoranthene (µg/g)	5.37	**10**
Benzo(c)phenanthrene (µg/g)	< 0.1	**NG**
Benzo(g,h,i)perylene (µg/g)	4.5	**NG**
Benzo(k)fluoranthene (µg/g)	3.6	**10**
Chrysene (µg/g)	25	**NG**
Dibenzo(a,h)anthracene (µg/g)	1.1	**10**
Dibenzo(a,h)pyrene (µg/g)	< 0.1	**NG**
Dibenzo(a,i)pyrene (µg/g)	< 0.1	**NG**
Dibenzo(a,l)pyrene (µg/g)	< 0.1	**NG**
7,12 Dimethyl benzanthracene (µg/g)	< 0.1	**NG**
Fluoranthene	62	**180**
Fluorene (µg/g)	67	**NG**
Indeno(1,2,3-cd)pyrene (µg/g)	0.9	**10**
Naphthalene (µg/g)	320	**22**
Phenanthrene (µg/g)	210	**50**
Pyrene (µg/g)	47	**100**
B(a)p TEP	16.82	**0.5**

Notes:

- (µg/g) – micrograms per gram
- **BOLD** – exceeds the referenced guideline
- NG - No Guideline
- < - less than the method detection limit
- CCME EQG Criteria – commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canadian Environmental Quality Guidelines", 1999 (updated 2009). The benzene concentration is based on one hundred thousand (10-5) incremental risk of cancer.
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC Laboratory.

TABLE 6 SITE MONITORING RESULTS					
Monitor Well No.	Depth to Water (m B.TOP)	Well Depth (m B.TOP)	LNAPL Thickness (mm)	Combustible Vapours Well Headspace ppm_v	Combustible Vapours Groundwater Headspace ppm_v
MW 11-5	3.37	9.74	0	5	<5
MW 11-7	1.67	6.78	0	20	<5
MW 11-8	4.64	7.14	0	250	<5
MW 11-11	1.50	2.73	0	250	180
MW 11-14	2.49	3.94	0	100	<5
MW 11-16	1.49	6.69	0	<5	<5
MW 11-18	1.45	4.61	0	510	<5
MW 11-19	Dry	4.20	0	<5	<5
MW 11-22	2.08	NM	0	100	<5
MW 11-24	3.55	6.0	0	135	120
MW11-25	2.68	4.89	0	150	<5
MW 11-26	2.97	4.54	0	10	110
MW 11-29	4.52	4.61	0	<5	<5
MW 11-32	5.11	6.93	0	140	<5
MW 11-33	6.16	8.72	0	40	<5
MW 11-34	6.16	9.28	0	190	<5
MW 11-35	7.98	10.64	0	20	<5
MW 11-36	7.96	8.95	0	25	<5
MW 11-37	1.87	3.44	0	170	<5
MW 11-38	DRY	7.13	NM	NM	NM
MW 11-39	5.30	7.67	0	130	230
MW 11-40	6.72	7.45	0	<5	<5
MW 11-41	7.62	8.95	0	25	<5
MW 11-42	8.68	13.15	0	160	<5
MW11-44	14.66	15.40	0	<5	<5
MW 11-46	DRY	NM	NM	NM	NM
MW 11-47	9.38	10.50	0	<5	<5
MW 11-48	2.24	5.86	0	<5	<5
MW 11-49	1.68	6.18	0	<5	<5
MW 11-50	0.70	6.26	0	<5	<5
MW11-51	2.93	5.35	0	<5	<5
MW 11-52	2.95	7.0	0	<5	<5
MW 11-53	3.37	5.55	0	<5	<5
MW11-57	4.93	NM	0	<5	<5
MW11-58	5.74	NM	0	<5	<5
MW11-59	5.46	NM	0	<5	<5
MW 11-62	7.78	11.60	NM	NM	NM
MW 11-63	DRY	NM	NM	NM	NM
MW 11-64	8.71	9.15	0	<5	<5
MW 11-65	7.23	8.56	0	<5	<5
MW 11-67	DRY	NM	NM	NM	NM
MW 11-76	4.59	6.13	0	25	5
MW 11-77	3.315	NM	0	140	20
MW 11-79	DRY	NM	NM	30	NM
MW 11-80	DRY	NM	NM	45	NM
MW 11-85	6.45	7.10	0	NM	NM
MW 11-88	DRY	7.60	0	5	NM

TABLE 6 SITE MONITORING RESULTS					
Monitor Well No.	Depth to Water (m B.TOP)	Well Depth (m B.TOP)	LNAPL Thickness (mm)	Combustible Vapours Well Headspace ppm_v	Combustible Vapours Groundwater Headspace ppm_v
MW11-89	4.17	6.40	0	15	<5
MW11-90	4.94	7.60	0	5	<5
MW11-91	9.29	11.74	0	100	<5
MW11-92	7.94	8.01	0	10	<5
MW11-97	2.86	NM	0	NM	NM
MW11-102	16.80	19.60	0	<5	<5
MW11-103	9.90	11.64	0	<5	<5
MW11-104	7.32	7.70	0	<5	<5
MW11-106	5.18	NM	0	<5	<5
MW11-110	DRY	8.09	0	<5	<5

Notes:

- m - meters
- m B.TOP - meters below top of pipe
- ppm_v - parts per million organic vapour
- LNAPL - light non-aqueous phase liquids
- mm - millimeters
- NM - not measured

TABLE 7: GROUNDWATER ANALYTICAL RESULTS - METALS										
Test Hole	Depth (m)	Aluminum (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)
TH11-05		9	< 0.05	1.8	59.5	< 0.1	266	0.07	< 0.3	6.8
TH11-07		*< 20	8.98	97.8	36.3	*< 1.0	10300	4.58	*< 3.0	28100
TH11-08		3	0.1	22.1	179	< 0.1	450	0.219	0.8	95.9
TH11-11		10	1.24	72.1	29.3	< 0.1	14300	7.57	< 0.3	6100
TH11-14		<2	0.95	20.1	23.5	<0.1	8660	<0.015	<0.3	351
TH11-16		*< 20	*< 0.50	81.8	102	*< 1.0	1040	1.21	*< 3.0	17500
TH11-18		6550	14.7	43200	56.3	3.2	38800	17.2	*< 3.0	24600
TH11- 29		3	0.4	4.6	29.9	< 0.1	1750	0.322	< 0.3	1370
TH11-32		68	0.13	4.1	37.1	< 0.1	89	0.101	0.9	14.7
TH11-33		2	< 0.05	10	22.5	< 0.1	80	0.176	< 0.3	0.55
TH11-34		10	0.07	3.5	92.1	< 0.1	478	0.117	< 0.3	16.5
TH11-35		644	0.08	5.1	86.3	< 0.1	466	0.131	2.6	82.4
TH11-36		3	0.08	4.7	121	< 0.1	2280	0.02	< 0.3	2.77
TH11-37		*< 20	0.97	24.1	51.4	*<1.0	26800	1.56	*<3.0	3020
TH11-39		5	0.15	2.4	75.9	< 0.1	607	0.204	0.5	16.1
TH11-40		3	0.33	4.2	143	< 0.1	191	0.137	0.4	8.59
TH11-41		4	0.33	8	181	<0.1	188	<0.015	<0.3	2.86
TH11-42		3	0.59	7.2	62	< 0.1	13100	0.274	< 0.3	545
TH11-44		< 2	0.05	0.9	68.9	< 0.1	104	0.065	0.4	15.7
TH11-47		2	0.06	1.3	62.9	< 0.1	137	0.233	< 0.3	8.52
TH11-48		6	< 0.05	0.4	60.9	< 0.1	78	0.045	< 0.3	5.4
TH11-49		9	0.95	0.5	54.9	< 0.1	31	0.056	9.5	1.47
TH11-50		< 2	< 0.05	0.2	118	< 0.1	60	0.07	< 0.3	7.9
TH11-51		16	< 0.05	0.4	28.9	< 0.1	66	0.111	0.4	6.52
TH11-52		17	< 0.05	0.4	93.8	< 0.1	172	0.061	< 0.3	2.25
TH11-53		6	< 0.05	0.5	68.1	< 0.1	103	0.085	0.5	0.97
TH11-62		< 2	0.29	4.4	103	< 0.1	148	0.093	< 0.3	1.77
TH11-64		3	0.26	1.1	128	< 0.1	180	0.035	< 0.3	2.69
TH11-65		6	0.13	1	81.5	< 0.1	88	0.262	< 0.3	87.1
TH11-85		3	0.34	2.1	157	< 0.1	76	0.194	< 0.3	0.3
TH11-90		3	0.15	3.7	169	<0.1	452	0.191	<0.3	1.75
TH11-91		2	0.23	7.7	188	<0.1	241	0.237	<0.3	84.6
TH11-97		2	0.06	25.3	0.05	< 0.1	1350	0.171	< 0.3	13.6
TH11-102		2	0.09	3.5	118	<0.1	126	0.115	<0.3	0.99
TH11-103		3	0.24	4.4	128	<0.1	95	<0.015	<0.3	1.91
TH11-104		4	0.14	0.5	76.4	<0.1	117	0.23	0.3	16.2
TH11-106		2	0.11	4.9	152	<0.1	113	0.17	<0.3	0.7
x-DUP 2 (11-51)		18	< 0.05	0.6	29.8	< 0.1	62	0.083	0.5	6.68
x-DUP 3 (11-49)		11	1.18	0.6	54.5	< 0.1	34	0.071	9	1.72
x-DUP4 (11-07)		*< 20	9.05	97.8	35.6	*< 1.0	10700	4.49	*< 3.0	28200
x-DUP5 (11-65)		5	0.12	1	80.5	< 0.1	87	0.094	< 0.3	85.2

TABLE 7: GROUNDWATER ANALYTICAL RESULTS - METALS										
Test Hole	Depth (m)	Copper (µg/L)	Lead (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Thallium (µg/L)	Uranium (µg/L)
TH11-05		16.5	< 0.05	< 0.008	2.38	793	0.8	< 0.05	< 0.05	12.3
TH11-07		3390	*< 0.50	< 0.008	7.67	3770000	487	*< 0.50	*< 0.50	2.17
TH11-08		173	< 0.05	0.012	1.26	14400	5	< 0.05	< 0.05	4.19
TH11-11		374	0.17	< 0.008	6.48	323000	233	< 0.05	0.15	0.28
TH11-14		0.6	<0.05	<0.008	13.1	11500	0.7	<0.05	<0.05	0.28
TH11-16		86.8	*< 0.50	< 0.008	1.94	4000000	*< 6.0	*< 0.50	*< 0.50	20.5
TH11-18		5440000	1.85	0.068	1.68	4950000	6250	*< 0.50	*< 0.50	3.03
TH11-29		29.6	< 0.05	< 0.008	1.01	97500	9.5	< 0.05	< 0.05	4.46
TH11-32		27.9	0.07	< 0.008	5.95	2460	8.8	< 0.05	< 0.05	2.08
TH11-33		0.8	< 0.05	< 0.008	196	40.1	< 0.6	< 0.05	< 0.05	0.14
TH11-34		22.9	< 0.05	< 0.008	2.45	2890	< 0.6	< 0.05	< 0.05	2.67
TH11-35		7.7	0.96	0.008	4.78	830	< 0.6	< 0.05	< 0.05	1.24
TH11-36		1	< 0.05	< 0.008	1.27	515	< 0.6	< 0.05	< 0.05	0.17
TH11-37		29.5	*<0.50	<0.008	7.45	1170000	9.9	*<0.50	*<0.50	*<0.50
TH11-39		1.4	0.12	< 0.008	12.5	20600	9.8	< 0.05	< 0.05	19.9
TH11-40		51.1	0.07	< 0.008	2.49	3670	3.4	< 0.05	< 0.05	0.51
TH11-41		3.9	0.05	<0.008	1.91	373	0.7	<0.05	<0.05	2.12
TH11-42		1.1	< 0.05	< 0.008	6.23	465000	3.3	< 0.05	< 0.05	1.3
TH11-44		9.3	0.05	< 0.008	0.57	2080	3.2	< 0.05	< 0.05	1.1
TH11-47		4.5	0.06	< 0.008	2.42	891	< 0.6	< 0.05	< 0.05	21.2
TH11-48		2.8	< 0.05	< 0.008	10.1	87.9	1	< 0.05	< 0.05	3.39
TH11-49		9.5	< 0.05	< 0.008	2.07	280	0.8	< 0.05	< 0.05	8.88
TH11-50		4.8	< 0.05	0.01	2.94	233	< 0.6	< 0.05	< 0.05	33.2
TH11-51		3.6	< 0.05	0.012	3.67	298	0.9	< 0.05	< 0.05	102
TH11-52		2.4	< 0.05	< 0.008	5.55	408	2.7	< 0.05	< 0.05	22.9
TH11-53		2.2	< 0.05	< 0.008	4.57	128	< 0.6	< 0.05	< 0.05	34.8
TH11-62		7.1	< 0.05	< 0.008	3.36	248	1.6	< 0.05	< 0.05	1.18
TH11-64		4.6	< 0.05	< 0.008	7.94	242	< 0.6	< 0.05	< 0.05	3.96
TH11-65		0.9	< 0.05	< 0.008	1.65	5720	9.2	< 0.05	< 0.05	11.5
TH11-85		2.6	< 0.05	< 0.008	2.81	11.1	< 0.6	< 0.05	< 0.05	6.01
TH11-90		1.4	<0.05	<0.008	2.21	191	<0.6	<0.05	<0.05	5.63
TH11-91		1.9	<0.05	<0.008	2.12	18800	26.7	<0.05	<0.05	1.04
TH11-97		2.2	< 0.05	< 0.008	0.58	2480	< 0.6	0.05	0.05	0.05
TH11-102		1.2	<0.05	<0.008	3.03	52.2	<0.6	<0.05	<0.05	0.52
TH11-103		6.5	0.05	0.012	3.75	47.6	<0.6	<0.05	<0.05	3.3
TH11-104		2.6	<0.05	0.008	4.14	1360	1	<0.05	<0.05	32.6
TH11-106		0.9	<0.05	<0.008	4.17	6.74	<0.6	<0.05	<0.05	1.19
x-DUP 2 (11-51)		4.8	< 0.05	< 0.008	3.76	3	1	< 0.05	< 0.05	105
x-DUP 3 (11-49)		11.1	< 0.05	< 0.008	2.05	330	0.8	< 0.05	< 0.05	8.99
x-DUP4 (11-07)		3490	*< 0.50	< 0.008	7.6	3850000	499	*< 0.50	*< 0.50	2.15
x-DUP5 (11-65)		< 0.1	< 0.05	< 0.008	1.52	5590	8.5	< 0.05	< 0.05	11.3

TABLE 7: GROUNDWATER ANALYTICAL RESULTS - METALS											
Test Hole	Depth (m)	Vanadium (µg/L)	Zinc (µg/L)	Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Silicon (mg/L)	Sodium (mg/L)
TH11-05		0.19	2.5	240	0.06	92.7	0.49	< 0.01	5.7	7.22	35.6
TH11-07		*< 0.50	1120	498	0.75	373	19	*< 0.10	27.1	12.8	361
TH11-08		0.18	28.3	505	5.15	130	5.04	0.03	6	12.3	33.9
TH11-11		< 0.05	192	561	0.72	174	3.96	0.01	41.7	15	206
TH11-14		<0.05	7.1	374	56.9	160	0.59	< 0.01	45.1	8.37	152
TH11-16		*< 0.50	333	542	2930	787	22.4	0.29	173	15.9	2330
TH11-18		*< 0.50	1320	553	7.89	1150	43.7	*< 0.10	37.8	32.3	1080
TH11-29		< 0.05	4.7	478	< 0.01	57.1	0.42	0.02	26.6	5.72	217
TH11-32		0.46	6.8	92	0.91	20.9	0.01	0.02	4.7	4.33	100
TH11-33		< 0.05	2.7	122	0.1	39.2	0.09	< 0.01	14.1	2.84	197
TH11-34		0.44	8.3	158	0.07	50.3	0.34	< 0.01	8.6	8.63	48.4
TH11-35		2.29	7	192	5.85	62.4	0.26	0.06	9.5	10.1	40.4
TH11-36		0.35	1.5	203	2.63	68.5	0.16	< 0.01	6.7	10.2	99.8
TH11-37		*<0.50	10.1	566	*< 0.10	47.8	2.11	*< 0.10	35.7	14	1080
TH11-39		4.42	2.2	587	0.33	132	0.71	0.02	33.4	9.11	168
TH11-40		0.36	15	137	< 0.01	57.1	0.08	0.04	9.2	4.42	34.4
TH11-41		1.31	2.8	102	0.12	51.5	0.06	0.02	5.4	6.72	30.5
TH11-42		0.24	3.7	365	0.07	89.4	1.34	0.02	17.8	7.54	437
TH11-44		0.1	7.3	333	< 0.01	77.8	0.27	0.11	12.9	4.98	39.8
TH11-47		0.29	8.3	435	< 0.01	104	0.55	0.02	11.3	6.74	145
TH11-48		0.21	1.3	90.5	< 0.01	28.3	0.34	0.01	5.9	6.14	14.2
TH11-49		0.32	14.1	73	0.01	22.9	< 0.01	0.04	3.4	6.8	8
TH11-50		0.28	3.2	165	< 0.01	47.1	0.19	0.01	4.4	7.53	13.8
TH11-51		0.34	6.5	458	0.03	179	0.3	0.02	8.8	6.98	25.1
TH11-52		0.37	3	139	0.02	49.2	0.07	0.01	5.7	7.44	23.3
TH11-53		0.05	2.8	227	0.02	57.6	0.07	< 0.01	6.4	6.54	12
TH11-62		0.73	1.5	67	< 0.01	19.1	0.07	< 0.01	3.8	4.45	56.4
TH11-64		0.7	24.2	110	0.02	48.1	0.2	0.02	7.4	4.74	51.6
TH11-65		< 0.05	12.9	381	0.62	167	0.97	< 0.01	33.2	11.2	76.5
TH11-85		1.63	7.2	110	0.02	48.1	0.2	0.02	7.4	4.74	51.6
TH11-90		0.07	5.2	275	0.6	89.3	0.35	<0.01	12.9	8.01	76.4
TH11-91		0.27	4.3	305	0.17	163	0.24	0.02	10.4	6.72	107
TH11-97		0.05	0.5	634	7.83	132	3.24		20.8	9.56	77.6
TH11-102		0.54	5.3	84.4	0.17	48.7	0.22	0.03	6.3	8.21	34.7
TH11-103		1.56	5.3	105	<0.01	52	0.15	0.05	8.1	8.33	28.3
TH11-104		0.17	22.5	485	0.01	153	0.74	0.01	30.7	9.01	312
TH11-106		0.43	2.4	97.8	0.08	48.2	0.22	0.03	6.8	9.08	39
x-DUP 2 (11-51)		0.35	5.8	455	0.04	177	0.3	0.03	8.9	6.97	25.1
x-DUP 3 (11-49)		0.29	13.9	72.2	0.01	22.5	< 0.01	0.05	3.3	6.79	8
x-DUP4 (11-07)		*< 0.50	1150	511	0.76	385	19.5	*< 0.10	27.8	13	374
x-DUP5 (11-65)		< 0.05	1.3	377	0.61	164	1.02	< 0.01	32.9	11.1	74.1

Notes:

- (µg/l) – micrograms per litre
- (mg/l) – milligrams per litre
- < - less than the analytical detection limit
- * - analytical detection limit raised due to matrix interference
- NG – no guideline
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC Edmonton Laboratory.

TABLE 8: GROUNDWATER ANALYTICAL RESULTS - PHCs									
Well ID	Groundwater Headspace Vapour Concentration (ppmv)	Benzene (µg/L)	Toluene (µg/L)	Ethyl benzene (µg/L)	Xylenes (µg/L)	F1 (mg/L)	F2 (mg/L)	F3 (mg/L)	F4 (mg/L)
TH11-11	180	32	203	152	894	3.560	19.200	9.440	0.092
TH11-22	<5	1	<1	<1	<3	12.900	<0.030	<0.030	<0.030
TH11-24	120	<1	<1	<1	<3	<0.050	0.883	0.101	<0.030
TH11-25	<5	4	<1	19	72	0.702	6.050	1.060	<0.030
TH11-26	110	<1	<1	<1	<3	<0.050	<0.030	<0.030	<0.030
TH11-39	230	<1	<1	<1	4	0.361	52.700	18.700	0.088
TH11-57	<5	<1	<1	<1	<3	<0.050	<0.030	<0.030	<0.030
TH11-58	<5	<1	<1	<1	<3	<0.050	<0.030	<0.030	<0.030
TH11-59	<5	<1	<1	<1	<3	<0.050	<0.030	<0.030	<0.030
TH11-76	5	19	<1	29	31	0.356	2.070	0.225	<0.030
TH11-77	20	1	<1	26	33	0.903	15.100	2.250	<0.030
TH11-89	<5	<1	<1	<1	<3	<0.050	<0.030	<0.030	<0.030
TH11-90	<5	<1	<1	<1	<3	<0.050	<0.030	<0.030	<0.030
TH11-91	<5	<1	<1	<1	<3	<0.050	<0.030	<0.030	<0.030
DUP 1 (TH11-25)	--	3	<1	21	77	0.872	5.200	0.836	<0.030

Notes:

- ppm_v – parts per million organic vapour
- (µg/l) – micrograms per litre
- (mg/l) – milligrams per litre
- PHC FI – volatile petroleum hydrocarbons (C_6-C_{10})
- PHC F2 – extractable petroleum hydrocarbons (C_{10}-C_{16})
- PHC F3 – extractable petroleum hydrocarbon (C_{16}-C_{34})
- PHC F4 – extractable petroleum hydrocarbons (C_{34}-C_{50})
- < - less than the method detection limit
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC Laboratory.