WorleyParsons Komex

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SHELL CANADA LIMITED

Jackpine Mine Expansion and Pierre River Mine Project

Base Case Report

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Environment & Water Resources

Suite 705, 10240 – 124 Street
Edmonton, AB T5N 3W6 Canada
Telephone: +1 780 496 9055
Toll Free: 1 877 566 3933
Facsimile: +1 780 496 9575
worleyparsons.com

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EXECUTIVE SUMMARY

Shell Canada Limited is proposing to develop the Jackpine Mine Expansion and Pierre River Mine Project (the Project). This report presents the baseline information for hydrogeology at the Project, and encompasses both the Jackpine Expansion Mining Area (JEMA) and the Pierre River Mining Area (PRMA) Local Study Areas (LSAs).

Geology

Several literature sources detail the geology of the Athabasca oil sands area. The basement consists of Precambrian metasedimentary and granitic rocks, which are usually considered to be of low hydraulic conductivity. These formations are expected to form an effectively impermeable base in the Regional Study Area (RSA). Overlying the Precambrian surface are Devonian-aged shales, dolomites, limestones and siltstones of the Elk Point Group and Beaverhill Lake Group.

The deposition of the oldest Cretaceous Formation, the McMurray Formation, was largely controlled by the topography of the pre-Cretaceous erosional surface, corresponding to the top of the Beaverhill Lake Group, and correspondingly the top of the Devonian Formations. The McMurray Formation consists of four members. The Pre-McMurray Beds, rarely found in the RSA, consist of coarse-grained, cemented quartzose sandstone. In most places, the Lower Member of the McMurray Formation overlies the erosional surface on the Devonian strata, and its lowest beds consist of residual clays formed from weathering of Devonian limestones. These are overlain by continental mudstones and medium- to coarse-grained sands (the “Basal Aquifer”), whose thickness is largely controlled by the topography of the erosional surface on the Devonian sequence. The Middle and Upper Members of the McMurray Formation constitute the ore body proposed to be mined at the Project and consist mainly of oil-cemented quartz sand, interbedded with lenticular beds of micaceous silts, shales and, in places, clay.

The Clearwater Formation conformably overlies the McMurray Formation, but is generally absent from the Local Study Areas (LSAs). Where present, it consists of black to greenish-grey shales and greenish, glauconitic sands and silts. The Grand Rapids Formation is not present in the area of the JEMA and PRMA LSAs, but where it does occur in the RSA it is described as deltaic to marine in origin and is generally a “salt and pepper” sand.

The surficial geology of the area mainly consists of glacial and fluvial deposits of Pleistocene and Recent age. These “drift” deposits range from lacustrine clays through a range of glacial (till) and fluvial (sand and gravel) deposits to aeolian sand. The thickness of the drift varies throughout the RSA, from areas where drift is largely absent (i.e., within the Athabasca and Clearwater River valleys and tributaries), to about 200 m thick on the Birch Mountains and Muskeg Mountain. A series of buried channels and/or valleys have been identified throughout the RSA, the most significant of which is the Pleistocene Channel, which trends southwest to northeast, and south to north across the JEMA LSA.

Hydrogeology - Jackpine Expansion Mining Area

Thirty-one groundwater monitoring wells were installed in the JEMA in 2006 and 2007 as part of the current investigation. The wells were installed in the Devonian Waterways Formation, the Cretaceous McMurray Basal Aquifer, and the Quaternary deposits. Groundwater samples were collected from the wells in 2006 and 2007.

The Waterways Formation is the uppermost Devonian Formation over the JEMA LSA, and is expected to act as an effective barrier to vertical flow, except in areas where prominent fracturing has occurred. Groundwater elevations within the Waterways Formation were found to range from about 266 to 330 meters above sea level (masl). The hydrochemical type of the groundwater within the Waterways Formation was generally calcium-bicarbonate dominant, with groundwater mineralization ranging from approximately 300 to 4,940 mg/L as TDS.

The only significant aquifer of Cretaceous age in the Project mining areas is the Basal Aquifer. Basal Aquifer groundwater surface elevations within the JEMA LSA were found to range from approximately 260 masl in the vicinity of the Muskeg River Mine, to 333 masl on the slopes of the Muskeg Mountain. The groundwater flow direction across the LSA is generally to the west and northwest, which is consistent with the regional groundwater flow direction. The lateral hydraulic gradient over the LSA ranges from 0.001 to 0.007 meters/meter across the LSA with an estimated lateral groundwater flow velocity from 3 to 20 m/year (mean hydraulic conductivity: 2.2×10^{-5} m/s). The groundwater hydrochemical type in the Basal Aquifer over the LSA ranged from calcium/sodium-bicarbonate dominant in the northeast, to sodium-chloride and sodium-bicarbonate/chloride dominant in the southeast. Groundwater mineralization ranged from approximately 250 to 3,000 mg/L as TDS, with the higher TDS groundwater noted in the southeast of the LSA.

Within the Quaternary deposits, including the Pleistocene Channel, groundwater surface elevations over the LSA ranged from about 280 to 337 masl. Groundwater flow in the both the shallow and deeper Quaternary deposits is away from local upland areas (e.g., Muskeg Mountain, Fort Hills), toward the Muskeg River valley. The hydraulic gradient within the Quaternary deposits ranges from 0.0004 to 0.04 m/m, with the higher gradients measured on the slopes of the Fort Hills and Muskeg Mountain. The groundwater velocity within the Muskeg River valley was calculated to range from less than one to 15 m/year (mean hydraulic conductivity: 3×10^{-6} m/s). Along the slopes of the Fort Hills and Muskeg Mountain shallow groundwater is expected to discharge as seeps and springs. Based on the surface water drainage patterns, it appears that shallow groundwater from the lenticular fen and possibly the southern portion of the patterned fen discharges to the Muskeg River valley. The northern part of the patterned fen likely drains to the north, away from the Muskeg River valley. The groundwater flow pattern in the deeper Quaternary deposits within the JEMA (including the Pleistocene Channel) was similar to the flow pattern in the shallow Quaternary deposits. Groundwater levels within the Pleistocene Channel wells show a similar hydraulic head distribution to that noted in the surrounding Quaternary deposits, indicating that groundwater within the Pleistocene Channel discharges to the Muskeg River. The groundwater within the Quaternary deposits generally had calcium-bicarbonate dominant hydrochemical types; although a higher percentage sodium was noted in some groundwater

samples from the Pleistocene Channel and deeper Quaternary deposits. Groundwater mineralization ranged from approximately 46 to 1,600 mg/L as TDS.

The vertical components of the hydraulic gradient indicate the potential for downward movement of groundwater flow from the Quaternary deposits to the Basal Aquifer across the LSA. Between the Basal Aquifer and the Devonian Waterways Formation, the vertical component of the hydraulic gradient was variable. In some areas, the presence of relatively large hydraulic head differences between the Basal Aquifer and Devonian Formations suggested the units are separated by low-permeability material. It appears that groundwater levels within the Basal Aquifer over the southern portion of the LSA are being influenced by Basal Aquifer depressurization at the Muskeg River Mine and Aurora North Projects. The vertical component of groundwater flow in the Quaternary deposits was variable across the LSA. In general, an upward component of groundwater flow (or discharging conditions) was noted over the lowlands (i.e., within the Muskeg River valley), and a downward component of flow (or recharging conditions) was noted on the highlands (i.e., Muskeg Mountain and within the Fort Hills area).

Hydrogeology – Pierre River Mining Area

A total of 25 monitoring wells were installed within the PRMA, with 19 wells installed in 2006 and six wells installed in 2007

The Waterways Formation is the uppermost Devonian Formation over most of the LSA, and is expected to act as an effective barrier to vertical flow, except in areas where prominent fracturing has occurred. Groundwater elevations measured within the Waterways Formation were about 233 and 234 masl. The groundwater hydrochemical types were Na-Ca-HCO_3-Cl-SO_4 and Na-Cl, with mineralization ranging from about 1,000 to 30,000 mg/L as TDS.

Basal Aquifer groundwater surface elevations over the PRMA ranged from about 230 to 278 masl. The groundwater flow direction is to the east, toward the Athabasca River. The lateral hydraulic gradient ranged from 0.005 to 0.01 m/m across the LSA with an estimated lateral groundwater flow velocity from 9 to 19 m/year (hydraulic conductivity: 1.5×10^{-5}). The groundwater in the Basal Aquifer was generally sodium-chloride dominant, with mineralization ranging from 1,800 to 85,800 mg/L as TDS. In general, Basal Aquifer groundwater from the PRMA Lease 9 exhibited less mineralization (3,500 to 9,000 mg/L as TDS) than that measured over the eastern portion of Lease 17 (5,200 to 85,800 mg/L as TDS). The elevated TDS values in Lease 17 may be the result of a closer hydraulic communication between the Basal Aquifer and the deeper Devonian Formations in this area.

Within the Quaternary deposits in Lease 9, groundwater surface elevations ranged from approximately 252 to 295 masl. Groundwater flow in the both the shallow and deeper Quaternary deposits was away from slopes of the Birch Mountains in the west, toward the Athabasca River in the east. No wells are currently completed in the Quaternary deposits in Lease 17. The hydraulic gradient within the Quaternary deposits in Lease 9 was on the order of 0.005 m/m, with an estimated groundwater flow velocity of about 2 m/year (mean hydraulic conductivity: 2.9×10^{-6} m/s). The groundwater samples from

the Quaternary deposits were generally calcium-bicarbonate dominant hydrochemical types with mineralization ranging from about 330 to 3,300 mg/L as TDS.

Between the Basal Aquifer and the Devonian Waterways Formation, the vertical component of groundwater flow was variable, with upward flow indicated at one location, and downward flow indicated at the other. The vertical hydraulic gradient between the Basal Aquifer and the Quaternary deposits (measured at one location) indicated a potential for downward groundwater flow from the Quaternary deposits to the Basal Aquifer.

The vertical component of groundwater flow within in the Quaternary deposits was variable in the PRMA. The observed pattern of upward and downward groundwater flow across Lease 9 is typical for shallow flow systems, where areas of groundwater recharge (which translates into downward flow) typically develop in the topographically higher areas, and areas of groundwater discharge (which translates into upward flow) develop in low-lying areas.

Groundwater Recharge and Groundwater-Surface Water Interactions

The groundwater recharge rate is estimated to range from about 12 to 33 mm/year for JEMA and 19 mm/year for PRMA (5% of precipitation), corresponding to an estimated annual average groundwater recharge over the JEMA lease area ranging from of 2.44×10^6 to 6.83×10^6 m^3/year, and 2.84×10^6 m^3/yr over the PRMA lease areas (Lease 9 and Lease 17).

The Muskeg River forms the base of drainage for the Quaternary deposits over most of the JEMA lease areas. The total contribution to baseflow in the Muskeg River from the Quaternary deposits across the JEMA lease area is estimated to range from 0.126 to 0.18 m^3/s (or about 11,300 to 15,874 m^3/d). For comparison, mean annual discharge of the Muskeg River from the JEMA lease area is estimated to be 1.45 m^3/s (or 125,280 m^3/d). The maximum estimated baseflow from the JEMA is about 12.6% of the mean annual discharge.

Two large lakes are present within or near the JEMA leases: Kearl Lake and McClelland Lake. The water surface in Kearl Lake is higher than nearby groundwater surface elevations, indicating a contribution to groundwater recharge from Kearl Lake. Groundwater data are sparse near McClelland Lake, immediately northwest of the JEMA LSA. The inferred groundwater surface elevation in the Basal Aquifer is close to the McClelland Lake water level. The inferred direction of the vertical hydraulic gradient between McClelland Lake and the Basal Aquifer is variable, with both recharge and discharge conditions indicated to be occurring across the lake area.

The Athabasca River forms the base of drainage for the PRMA lease area. The total estimated contribution to baseflow in the Athabasca River from the Quaternary deposits and Basal Aquifer across the PRMA lease area is estimated to range from 0.023 to 0.097 m^3/s (or 2,021 to 8,381 m^3/d). For comparison, mean annual discharge of the Athabasca River below Eymundson Creek is 656 m^3/s (or 5.67×10^7 m^3/d). The maximum estimated baseflow from the PRMA is about 0.015% of the mean annual discharge.

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1. INTRODUCTION

This Environmental Setting Report (ESR) provides the groundwater bas case information for the Hydrogeology Environmental Impact Assessment (EIA) for the Shell Jackpine Expansion and Pierre River Mining Areas Project (the "Project"). The ESR encompasses both the Jackpine Expansion Mining Area (JEMA) and the Pierre River Mining Area (PRMA), and provides a description of the local and regional groundwater flow systems and quality. Base case information is used to quantify current groundwater conditions, systems and interactions. This information will be used in an EIA to evaluate future changes in groundwater conditions that might result from the Project activities.

1.1 Study Objectives and Scope of Work

The objectives of the hydrogeology ESR are to:

- establish background hydrogeological conditions (i.e., characterize hydraulic properties of various sediments and formations, groundwater surface elevations, groundwater flow, and groundwater quality) in the area;
- identify groundwater recharge and discharge areas; and
- evaluate potential groundwater-surface water interactions, particularly with respect to wetlands areas, McClelland Lake, Kearl Lake, Muskeg River and the Athabasca River.

Based on the above objectives, the scope of work for the ESR was as follows:

- review background information;
- install a network of groundwater monitoring wells within the JEMA and PRMA lease areas, with wells completed in the shallow Quaternary deposits, deeper Quaternary deposits, the Pleistocene Channel, the McMurray Formation, and Basal Aquifer and the uppermost Devonian strata;
- develop, test hydraulic conductivity, and sample each monitoring well once for groundwater quality;
- describe local and regional groundwater flow and groundwater quality, identifying and characterizing major aquifers and aquitards; and
- determine groundwater flow regimes, particularly with respect to wetlands areas, McClelland Lake, Kearl Lake, Muskeg River, and the Athabasca River.

1.2 Study Areas

1.2.1 Regional Study Area

The Project consists of two separate developments: JEMA (east of the Athabasca River) and PRMA (west of the Athabasca River; Figure 1). The Regional Study Area (RSA) was developed to encompass both

project mining areas, and surrounding areas. The surrounding area was defined to capture the large-scale systems and processes, such as rainfall, surface water interactions and geology, which affect groundwater quality and flow systems in the region. The RSA includes portions of (Figure 1):

- Townships 89 through 102; and
- Ranges 3 to 14 (W4M).

Several existing and approved projects that may influence the regional hydrogeological system are already located in or near the RSA (Figure 1). These include:

- Muskeg River Mine and Muskeg River Mine Expansion – Albian Sands Energy Inc. (Albian Sands);
- Kearl Oil Sands Project - Imperial Oil Resources Ventures Limited (Imperial Oil);
- Aurora Mine (South and North) – Syncrude Canada Ltd. (Syncrude);
- Firebag Project – Suncor Energy Inc. (Suncor);
- Steepbank and Millennium Mines – Suncor;
- Fort Hills Mining Project – Petro Canada Oil Sands Inc. (PCOSI);
- Horizon Oil Sands Project – Canadian Natural Resources Limited (Canadian Natural);
- Jackpine Mine – Phase 1 – Shell Canada Limited (Shell);
- Joslyn Creek Steam-Assisted Gravity Drainage (SAGD) Project – Total E&P Canada Ltd. (Total);
- MacKay River Project – PCOSI;
- Dover SAGD In-situ & Pilot Project – PCOSI; and
- Sunrise Thermal Project – Husky Energy Inc. (Husky).

1.2.2 Local Study Area for Jackpine Expansion Mining Area

To study groundwater quality and flow systems at the local scale as they pertain directly to both the JEMA and the PRMA, smaller Local Study Areas (LSAs) have been defined (Figure 1). For the JEMA, the LSA includes:

- Portions of Townships 94 and 98;
- Township 95 through 97; and
- Ranges 7 through 9 (W4M).

For the JEMA LSA, where possible, natural hydrogeologic boundaries were chosen to define the edges of the LSA. Examples of hydrogeologic boundaries include major topographic highs (Muskeg Mountain, Fort Hills), inferred groundwater flow lines (such that no flow would occur across the lines), and the Firebag River. Where natural hydrogeologic boundaries were not present, the LSA boundaries were chosen to be

beyond the expected effects of local-scale mine development. The LSA was also defined to encompass significant surface water features, including McClelland Lake and Kearl Lake.

1.2.3 Local Study Area for Pierre River Mining Area

For the PRMA (Figure 1), the LSA includes:

- Portions of Townships 96 and 100;
- Township 97 through 99; and
- Ranges 9 through 12 W4M.

For the PRMA LSA, natural hydrogeologic boundaries were chosen to define the edges of the LSA. Examples of hydrogeologic boundaries include the Athabasca River, major topographic highs (Birch Mountains), and inferred groundwater flow lines (such that no flow would occur across the lines). Where natural hydrogeologic boundaries were not present, the LSA boundaries were chosen to be beyond the expected effects of local-scale mine development.

2. METHODS

2.1 Previous Studies

Sproule (1974) provides the first general description of the hydrogeology of the Athabasca Oil Sands Region. Between 1975 and 1979, the Alberta Research Council (ARC) conducted a large-scale hydrogeological study in the Athabasca Oil Sands Region. Several observation wells were installed, and existing oil industry exploration wells were used for groundwater monitoring by ARC (Hackbarth 1977a).

A detailed evaluation of the groundwater monitoring network for the Athabasca Oil Sands Region is given in Piteau Associates Ltd. (Piteau; 1983). Papers of a regional nature include:

- Andriashek and Atkinson (2007);
- Bachu et al. (1992);
- Bachu and Underschultz (1993);
- Hackbarth (1971, 1977a, 1977b, 1978a and 1978b);
- Hackbarth and Nastasa (1979);
- Ozoray (1977);
- Ozoray and Lytviak (1980); and
- Ozoray et al. (1980).

Numerous hydrogeological investigations, including base case hydrogeology studies and EIAs have been conducted for projects in the RSA. For a summary of the various projects, see Table A.

In addition to base case and EIA studies, groundwater quality monitoring programs have been developed for both the Muskeg River Mine Pilot Extraction Plant and Muskeg River Mine (Komex International Ltd. [Komex] 1998a, 1999a). Groundwater monitoring results also have been reported for the Muskeg River Mine extraction plant (Komex 1999b, 2000a) and the mine (Komex 2001, 2002a, 2003, 2004a, 2005, 2006; WorleyParsons Komex 2007).

Table A Summary of Selected Regional Oil Sands Projects

Project	Company	Location	References
Steepbank and Millennium Mines	Suncor	Townships 91 and 92, Range 7 W4M	Suncor [1998] Klohn-Crippen Consultants Ltd. [Klohn-Crippen; 1996a] Klohn-Crippen [1996b]
Firebag Project	Suncor	Townships 94 and 95, Ranges 5 and 6 W4M	Suncor [2000]

Project	Company	Location	References
Aurora Mine [North and South]	Syncrude	Townships 94 to 96, Ranges 8 to 11 W4M	Golder Associates Ltd. [Golder; 1996] Bovar Environmental Ltd. [Bovar; 1996] Syncrude [1997a] Syncrude [1997b]
Fort Hills Oil Sands Project	UTS Energy Corporation	Townships 96 to 98, Ranges 9 to 10 W4M	TrueNorth Energy [TrueNorth; 2001]
Muskeg River Mine	Albian Sands	Township 95, Ranges 9 and 10 W4M	Komex [1997] Shell [1997] Komex [1998b]
Jackpine Mine - Phase 1	Shell	Township 95, Ranges 8 and 9 W4M	Terracon Geotechnique Ltd. [Terracon; 1985] Terracon [1986] Terracon [1990] Terracon [1991] Komex [2002b] Shell [2002] Komex [2002c]
MacKay River Project	Petro-Canada	Townships 91 to 93, Ranges 12 and 13, W4M	Petro-Canada Oil and Gas [1998]
Northern Lights Mining and Extraction Project	Synenco	Townships 98 to 99, Ranges 5 to 7, W4M	Synenco Energy Ltd. [Synenco; 2006]
Kearl Oil Sands Project	Imperial Oil	Townships 97 and 98, Ranges 7 and 8	Imperial Oil [2006]
Horizon Oil Sands Project	Canadian Natural Resources Limited	Townships 96 and 97, Ranges 11 and 12 W4M	Canadian Natural Resources Limited [2002]

2.2 Hydrogeology

2.2.1 Data Sources

As part of the initial stage of the base case investigation, a search of existing data sources was made to identify documents and studies relevant to the Project. Data sources included the following:

- government publications (e.g., Alberta Environment, Alberta Energy and Utilities Board, Alberta Geological Survey, Alberta Research Council);
- other oil sands projects:
  - base case Investigations (e.g., Kearl Project, Horizon Project, Jackpine Mine – Phase 1);
  - on-going Groundwater Monitoring Programs (e.g., Muskeg River Mine); and
- scientific publications and reference books.

2.2.2 Field Investigation

The field program for the Project was conducted over two field seasons. A total of 56 monitoring wells were installed as part of the Project. Of these, 47 monitoring wells were installed between February 1 and March 19, 2006, and nine monitoring wells were installed between February 9 and March 12, 2007 (Table B).

Table B 2006 and 2007 Monitoring Well Installations

Formation	Jackpine Expansion Mining Area		Pierre River Mining Area	
	2006	2007	2006	2007
Devonian	3	0	1	1
McMurray	6	1	4	5
Quaternary	19	2	14	0
Total	**28**	**3**	**19**	**6**

Geologic logs and/or detailed well logs have been completed for each well borehole (see Appendix 1A). Monitoring well installation methods are also presented in Appendix 1A.

Several different naming conventions have been used during installation of the monitoring wells at both the JEMA and PRMA. To simplify the discussion of the monitoring results in this report, the wells were renamed using a consistent nomenclature. The well names were derived as follows:

- **P**06-1801-SQ/**SH**06-1801-DQ – the first letters denote the type of installation. "**P**"-series wells were installed using an auger rig. "**SH**"-series wells were installed using a mud-rotary coring rig or sonic drilling rig. "P"-series wells are generally completed in the shallow and deep Quaternary formations. "SH"-series wells are generally completed in deeper formations.
- SH**06**-1862-BS/ SH**07**-1805-BS – denotes the year of completion, either 2006 ("**06**") or 2007 ("**07**").
- SH06-**1862**-BS – denotes the well lease the monitoring well is completed in. Note that a different well lease numbering scheme was used between 2006 and 2007.
- P06-1801-**SQ**/SH06-1801-**DQ** – denotes the formation of completion:
  - SQ – shallow Quaternary;
  - DQ – deep Quaternary;
  - PC – Pleistocene Channel;
  - BS – McMurray Formation Basal Aquifer; and

- D – Devonian Formation.

The “shallow” and “deep” Quaternary designations generally refer to the relative position of these wells, rather than an absolute depth. The shallow wells are generally intended to have the screened interval intersecting the water table.

The JEMA and PRMA field programs are described in detail in Section 4 and Section 5, respectively. Groundwater levels were collected in March 2006 from the wells installed in 2006, and in March 2007 from the wells installed in 2007. A complete set of measured groundwater levels, from all wells installed in 2006 and 2007, was collected May 25, 2007. Groundwater samples were collected between February 23 and March 12, 2006, for the 2006 wells, and between March 10 and March 19, 2007, for the 2007 wells. Groundwater sampling protocols are presented in Appendix 1B. Laboratory analytical data are also presented in Appendix 1B.

Single well response tests to determine hydraulic conductivity were conducted on the installed wells after development and purging and before groundwater sampling. Protocols for single well response tests and hydraulic conductivity interpretation test results are presented in Appendix 1C.

2.2.3 Methods of Analysis

Data obtained from the Bas case investigation were analyzed in several ways:

- Comparison to standards: laboratory analytical data were compared to provincial and federal standards for groundwater quality. Where multiple guidelines were applicable, professional judgment was used to identify the relevant standard(s). The guidelines used include:
  - 2007 Health Canada Guidelines for Canadian Drinking Water Quality (Health Canada 2007); and
  - 2001 AENV (Alberta Environment) Soil and Water Quality Guidelines for Hydrocarbons at Upstream Oil and Gas Facilities (Draft), (AENV 2001).

These guidelines were used for comparison purposes only, and were not meant to represent compliance or remediation targets for the Project. A detailed discussion of the guideline section is presented in Appendix 1B.

- Comparison to background information: background data provided by other studies in the RSA were used to assess the expected range of both hydrogeological and hydrochemical data in the Project area.
- Standard analytical techniques: hydrogeological data from the Project area were evaluated using various standard analytical methods (e.g., hydraulic conductivity analysis using Bouwer-Rice analysis, Springer and Gelhar analysis, and Butler analysis). A discussion of the analytical techniques used is presented in Appendix 1C.

3. REGIONAL RESULTS

3.1 Regional Topography, Drainage and Climate

The RSA falls within the Saskatchewan Plain division of the Interior Plains physiographic region (Bostock 1967). Adjacent to the northeast edge of the area is the Athabasca Plain, a subdivision of the Canadian Shield major physiographic region.

3.1.1 Topography and Drainage

In the RSA, the Muskeg Mountain Plateau in the southeast and the Birch Mountains in the northwest are the major topographic features (Figure 2). The Muskeg Mountain Plateau rises to an elevation in excess of 550 metres above sea level (masl) and the Birch Mountains rise to an elevation of about 800 masl. Figure 3 shows a regional schematic geologic cross-section (the location of which is shown in Figure 2). The ground surface declines from both the Muskeg Mountain Plateau and the Birch Mountains to the Athabasca River Valley, at an elevation of about 230 masl. The Fort Hills form a local upland in the central part of the RSA, with elevations up to about 350 masl (Figures 2 and 3). The JEMA LSA ranges in elevation from about 285 masl in the Muskeg River valley to about 350 masl in the Fort Hills area and the slopes of the Muskeg Mountain. The PRMA lease area ranges in elevation from about 220 masl in the Athabasca River Valley to 320 masl on the slopes of the Birch Mountains.

The Athabasca River generally flows from south to north through the RSA in a deeply incised valley, about 10 km west of the JEMA and immediately east of the PRMA. The water level in the river fluctuates seasonally. Approximate water elevation ranges from 220 to 240 m above sea level between Townships 92 and 99. An escarpment about 45 m high is present along the east bank of the river.

The RSA has many surface drainage features, all of which eventually drain to the Athabasca River (Figure 2). In the JEMA LSA, most of the creeks and rivers flow into the Muskeg River Valley, joining the Muskeg River. However, over portions of the Fort Hills area drainage is to McClelland Lake, and several smaller waterbodies located within the Fort Hills area. In the PRMA lease area several rivers, including Pierre River, Asphalt Creek, First Creek and Eymundson Creek provide drainage from the uplands located to the west. All these rivers and creeks eventually discharge to the Athabasca River.

3.1.2 Climate

The climate of the Fort McMurray area is characterized by long, cold winters and short, cool summers. Golder (2007) summarizes meteorological data for the region. The following is a summary.

Mean daily temperature varies between -20.1°C in January and 16.6°C in July. Average temperatures recorded over the same period fall between extreme values of -33 and 19.3°C.

Average monthly precipitation ranges from about 16 to 78 mm at the Fort McMurray airport. The average annual precipitation in the RSA is 439 mm, of which about 75% (329 mm) falls as rain and the remainder

as snow. Precipitation is typically greater in summer than in winter. There is typically snow on the ground between October and April.

The dominant wind at the Fort McMurray Airport climate station is an easterly wind, with the highest probability of occurrence (20%). The mean wind speed is about 9.5 km/h. The westerly wind typically has the highest speed, with a mean value of about 13 km/h.

The average annual potential evapotranspiration is estimated to be 795 mm for the RSA, 466 mm greater than the mean annual precipitation. Average annual potential evaporation is estimated to be 820 mm for the RSA. Average annual lake evaporation is estimated to be about 597 mm, which is lower than the potential evaporation because blowing air has a cooling effect over a large lake surface area. Lake evaporation is affected by lake depth and varies by month, peaking in July with a monthly evaporation of approximately 132 mm.

3.2 Geology

Several regional-scale studies on the geology of the Fort McMurray area have been done (Greiner 1956; Carrigy 1959, 1966, 1973a, 1973b; Norris 1973; McPherson and Kathol 1977; Alberta Geological Survey 1991; Mossop and Shetsen 1994; Andriashek and Atkinson 2007).

The first comprehensive survey of the geology of the Athabasca oil sands area was conducted by Carrigy (1959). The following summary of the geology of this area is based on that work, except where indicated. Regional bedrock geology over the RSA is shown in Figures 4A and 4B and surficial geology is shown in Figures 5A and 5B. Figure 6 shows the stratigraphic column over the RSA.

3.2.1 Precambrian

The Precambrian shield outcrop occurs about 20 km northeast of the JEMA. Metasedimentary and granitic rocks are the dominant types. The Precambrian rocks are usually considered to be of low hydraulic conductivity and are expected to form an effectively impermeable base in the RSA. The Precambrian surface dips uniformly to the southwest at 4 to 5 m/km (Bachu et al. 1991). Local relief on the Precambrian surface varies up to 50 m. In the RSA, the elevation of the top of the Precambrian ranges between 100 masl to 400 metres below sea level (mbsl; Bachu et al. 1993).

3.2.2 Devonian

The Paleozoic rocks in the RSA are Devonian in age, and represent continental margin deposition. The paleotopography of the Devonian formations (Figure 7) influenced the deposition of the overlying Cretaceous-aged McMurray Formation. The Devonian formations subcrop along the Athabasca River Valley (Figure 4A) and at the north-central edge of the RSA. The La Loche Formation, a coarse-grained arkosic sandstone, unconformably overlies the Precambrian basement and varies in thickness up to 40 m (Sproule 1974). This formation forms the oldest Devonian rocks in the RSA. Formations of the Elk Point Group, within the Middle Devonian, consist of shales, dolomites, carbonates and evaporites. The shale,

siltstone and dolostone beds of the McLean River Formation (20 to 50 m thick) conformably overlie the La Loche Formation.

The oldest rocks of the Upper Elk Point Subgroup belong to the Methy Formation, also called the Winnipegosis Formation, which consists of reefal dolostone, conformably overlying the McLean River Formation. Sproule (1974) indicates formation thickness up to 80 m with top elevations of about 50 to 100 masl. The regional dip of the Methy Formation is about 5 m/km to the southwest (Bachu et al. 1991).

The Prairie Evaporite Formation, capped by the Muskeg Formation, overlies the Methy Formation. The Prairie Evaporite Formation is a succession of evaporites (halite and anhydrite), carbonates and shale. The Muskeg Formation consists of evaporites and carbonates. Extensive removal of salt by subsurface dissolution has resulted in collapse breccias (Grobe 2000). In areas unaffected by salt dissolution, the Prairie Evaporite Formation dips gently to the southwest.

The youngest unit of the Upper Elk Point Subgroup is the Watt Mountain Formation, which disconformably overlies the Prairie Evaporite. This unit is primarily dolomitic shale, about 15 m thick (Sproule 1974).

The Beaverhill Lake Group comprises the Upper Devonian strata within the RSA, and subcrops along the sub-Cretaceous unconformity. The thickness of the Beaverhill Lake Group varies between 50 and 100 m (Bachu et al. 1991). Within this Group are the Slave Point Formation and the Waterways Formation. The Slave Point Formation is a thin rock unit (less than 15 m thick) consisting of limestone, silty limestone and siltstone. Mossop and Shetsen (1994) indicate that the Slave Point Formation is Middle Devonian in age. The Slave Point Formation is bounded top and bottom by paraconformities.

The Waterways Formation overlies the Slave Point Formation and is the main Upper Devonian rock unit present within the RSA. Crickmay (1957) subdivided the Waterways Formation into five members. In ascending order, they are the: Firebag, Calumet, Christina, Moberly and Mildred Members. The different members of the Waterways Formation form an alternating series of calcareous shales and carbonates (Bachu et al. 1991).

The elevation of the top of the Devonian formations in the RSA is shown in Figure 7. Within the RSA, the Devonian surface is highest in the southwest and northeast (approximately 280 to 320 masl), decreasing to about 120 masl in the central portion of the RSA.

3.2.3 Cretaceous

The Lower Cretaceous rocks present in the RSA belong to the Mannville Group, which consists of (from oldest to youngest): the McMurray Formation, the Clearwater Formation and the Grand Rapids Formation. The Mannville Group formations subcrop across most of the RSA (Figure 4A).

The deepest Cretaceous strata in the RSA are rocks of the McMurray Formation. These strata are separated from the underlying Devonian succession by a major erosional unconformity. Deposition of the McMurray Formation was largely controlled by the topography of the pre-Cretaceous erosional surface (Wightman et al. 1995). Together with the overlying Wabiskaw Member of the Clearwater Formation, the McMurray formation forms a mould of the pre-Cretaceous erosional surface, infilling the valleys with sand (Wightman et al. 1995). The present stream profile of the lower Athabasca River is controlled by the

pre-Cretaceous erosional surface. The McMurray Formation contains the oil sands that are to be mined at the Project. The McMurray Formation has been divided into four stratigraphic units by Carrigy (1959):

- The pre-McMurray Beds are a coarse grained, cemented quartzose sandstone thought to unconformably underlie the McMurray Formation (Carrigy 1966), but are not commonly found in the RSA.
- The Lower Member of the McMurray Formation overlies the erosional surface on the Devonian strata, and its lowest beds consist of residual clays formed from weathering of Devonian limestones. These are overlain by continental mudstones and medium- to coarse-grained sands whose thickness is largely controlled by the topography of the erosional surface on the Devonian deposits. The Lower Member is oil cemented in places. Where the Lower McMurray Formation sand deposits are water-saturated they are referred to as the “Basal Aquifer”. These sands are reported to contain large fragments of uncarbonized wood, well-rounded quartz grains, numerous feldspar cleavage fragments, and small amounts of mica. A black or dark grey carbonaceous shale (the “basal clays”) containing wood fragments is found at the top of this stratigraphic unit. The distribution of the Basal Aquifer in the RSA is shown in Figure 8, and generally ranges from 20 to 40 m in thickness, and up to 60 m in some areas. This interval is generally thickest and most continuous east of the Athabasca River.
- The Middle and Upper Members of the McMurray Formation consist mainly of an oil-cemented quartz sand, interbedded with lenticular beds of micaceous silts, shales and, in places, clay. It is characterized by frequent, primary sedimentary structures. The Middle Member, which generally occurs between elevations of 230 and 280 masl, is characterized by frequent primary sedimentary structures, particularly current-bedding. The Upper Member is more commonly horizontally bedded. The thickness of the Middle and Upper McMurray Members (Figure 9) varies from less than 20 m in the southwest of the RSA to as much as 140 m in the central portion of the RSA. A structure map of the top of the McMurray Formation is provided in Figure 10. The elevation of the surface of the McMurray Formation ranges from a high of greater than 340 masl in the southeast, to a low of about 220 masl in the Athabasca River valley.

The Clearwater Formation conformably overlies the McMurray Formation, and consists of black to greenish-grey shales and greenish, glauconitic sands and silts. The most recent drilling information suggests that the Clearwater Formation is present along the west, south and east portions of the RSA, being largely absent from the lowlands surrounding the Athabasca River (Figure 11). Although Hamilton (1999) indicates the Clearwater Formation extends beneath the western portion of PRMA (Figure 4A), drilling in the area suggests the Clearwater Formation is only intermittently present, except over the east portion of Lease 17 (Figure 11). Data control for this formation is poor over Lease 17 and areas to the north. Further drilling will refine understanding of bedrock geology in this area. Structurally, the top of the Clearwater Formation in the RSA dips gently toward the Athabasca River basin from uplands in the Birch Mountains and Muskeg Mountain.

Hamilton (1999) indicates that the Grand Rapids Formation is absent over much of the RSA (Figure 4A). The Grand Rapids Formation does subcrop beneath Muskeg Mountain, and on the flanks of the Birch

Mountains, near or along the western edge of the PRMA LSA. Where it occurs, it is described as deltaic to marine in origin and is generally described as a “salt and pepper” sand: uncemented and consisting of fragments of quartz, feldspar, glauconite, chert, muscovite and biotite, with interbeds of dark grey to black shale. The Grand Rapids is informally divided into upper and lower units, with the upper unit containing more inter-bedded silt and shale compared to the relatively uniform lower sand unit. Bachu et al. (1991) state that the total thickness of the Grand Rapids Formation ranges up to about 100 m.

Deposits of the Colorado and Smoky Groups constitute the youngest Cretaceous rocks in the RSA, and are only found beneath the Birch Mountains (Figure 4A). The Colorado Group, which consists of the Joli Fou, Pelican, Shaftesbury, Dunvegan and LaBiche Formations, generally consists of thick successions of shale (Joli Fou, Shaftesbury and LaBiche Formations) interspersed with sand/sandstone intervals (Pelican and Dunvegan Formations). The Smoky Group, which was undifferentiated by Hamilton (1999), consists of shale and silty shale sequences. Data control over the Birch Mountains area is poor, with little geologic information available west of the PRMA LSA. The relative position of the upper Cretaceous rocks beneath the Birch Mountains indicated in Figure 3 is largely inferred from data presented in Hamilton (1999) and Andriashek and Atkinson (2007). Figure 12 shows the structure of the Cretaceous surface (or the bottom of the Quaternary deposits) across the RSA.

3.2.4 Quaternary

The surficial geology of the area mainly consists of glacial and fluvial deposits of Pleistocene and Recent age. These “drift” deposits include lacustrine clays, glacial (till) and fluvial (sand and gravel) deposits, and aeolian sand. Bayrock (2006), Bayrock and Reimchen (2005) and Turchenek and Lindsay (1982) show the distribution of types of surficial deposits over the RSA (Figures 5A and 5B).

Figure 13 shows the distribution of Quaternary deposits within the RSA, as presented in Andriashek and Atkinson (2007). The thickness of the drift varies throughout the RSA, from areas where drift is largely absent (i.e. within the Athabasca and Clearwater river valleys and tributaries), to about 200 m thick beneath the Birch Mountains and Muskeg Mountain. Areas of white shown within the coloured portion of the map correspond to areas of thin to no drift. No data was available north of about Township 100.

A series of buried channels and/or valleys have been identified throughout the RSA (Figure 13; Andriashek and Atkinson 2007). In regards to the Project, the most significant buried channel is the Pleistocene Channel (identified as the “Kearl Channel” by Andriashek and Atkinson [2007]), which trends southwest to northeast, and south to north across the JEMA LSA (Figure 13). This channel is described by Andriashek and Atkinson (2007) as a complex network of channel segments that are either disconnected from, or cross-cut, one main channel. The Pleistocene Channel complex varies in thickness between about 25 and 70 m, with sand and gravel forming as much as 75% of the channel sequence. The Pleistocene Channel extends from Township 95 Range 9 to Township 97 Range 7, passing beneath Kearl Lake. Andriashek and Atkinson (2007) also identifies two channel thalwegs within the Fort Hills area: the Fort Hills Channel and an “unnamed” channel (Figure 13).

3.2.5 Structure

Hackbarth and Nastasa (1979) discuss two faults affecting the Precambrian surface, one of which, the Sewetakun Fault trending from Township 81, Range 3, W4M to Township 97, Range 12, W4M, is important to the hydrogeology of the region (Figure 2). Hydraulic heads in Middle Devonian aquifers near the Sewetakun Fault are observed to decrease near this structural feature (Hackbarth and Nastasa 1979). This suggests that the Sewetakun Fault is associated with a zone of higher hydraulic conductivity.

3.3 Hydrogeology

The following four groundwater-bearing intervals (listed from oldest to youngest) are considered to be of regional importance in the Athabasca Oil Sands Region:

- La Loche Formation, also called the Granite Wash Formation;
- Methy Formation, also called the Winnipegosis Formation;
- water-bearing sand at the base of the McMurray Formation (Basal Aquifer); and
- Quaternary deposits (surficial aquifers).

In the Project RSA, the Upper Devonian Waterways Formation is expected to act as a hydraulic barrier between the deeper Devonian aquifers (Methy and La Loche Formations) and overlying Cretaceous and surficial aquifers. The following discussion focuses on intervals from the Methy Formation to ground surface.

Hackbarth and Nastasa (1979) completed one of the more extensive regional hydrogeological studies. The following is a summary of their work, except where indicated.

3.3.1 Devonian

The Methy Formation consists of reef and non-reef limestones or dolomites (Cotterhill and Hamilton 1995). Husky Sunrise (2004) reports a hydraulic conductivity range of 2×10^{-7} to 1×10^{-6} m/s for reefal dolomites, in contrast to a hydraulic conductivity of 1×10^{-10} m/s for the non-reef limestone or dolomite. WorleyParsons Komex (2006) reported hydraulic conductivity values in the Methy Formation ranging from 1×10^{-6} to 1×10^{-10} m/s. For the Methy Formation, Husky Sunrise (2004) reports groundwater mineralization in a range of 2,000 to 3,000 mg/L as TDS.

The Prairie Evaporite Formation is expected to form a significant barrier to flow between the Methy Formation and the Upper Devonian Beaverhill Lake Group (Bachu et. al. 1993). The hydraulic conductivity of the Prairie Evaporite Formation is reported to be 1×10^{-11} m/s. The Prairie Evaporite Formation is only present over the western portion of the RSA, generally west of the Athabasca River.

The Waterways Formation is the uppermost Devonian formation over most of the RSA. The reported hydraulic conductivity for the Waterways Formation ranges from 9×10^{-12} to 1×10^{-8} m/s (Table C). Hackbarth and Nastasa (1979) refer to the Waterways Formation as part of the D2 hydrostratigraphic unit. The D2 unit is expected to act as an effective barrier to vertical flow, except in areas where prominent

fracturing has occurred. The groundwater flow rates of the D2 unit are not expected to be very high (Hackbarth and Nastasa 1979).

Table C Regional Hydrogeologic Parameters – Devonian Formations

Geologic Unit	Study [Project]	Storativity[a]	Hydraulic Conductivity [m/s]
Waterways Formation			
	Imperial Oil [2006] [Imperial Oil Kearl Project]	n/a	1×10^{-9} to 1×10^{-8}
	Bachu et al. [1992]	n/a	3×10^{-9}
	Clifton [2001] [Fort Hills Oil Sands Project]	n/a	9×10^{-12} to 5×10^{-10}

NOTES:

n/a Not available.

(a) Storativity refers to the amount of water released from the aquifer as the hydraulic head is reduced.

Hydrochemical data for the Waterways Formation is available from several sources (Table D; Sproule 1974; Clifton 2001; Golder 1996). The wide range of Total Dissolved Solids (TDS) values reported for the Waterways Formation groundwater by Sproule (1974) is largely dependent upon the proximity to the Sewetakun Fault. Groundwater salinity decreases rapidly from a value of about 100,000 mg/L close to the Sewetakun Fault to a value of less than 1,000 mg/L within about 10 km of the Sewetakun Fault.

Some recharge to the Waterways Formation in the region has been interpreted to occur by infiltration in upland areas east of the Athabasca River basin. Groundwater in the Devonian aquifers in the region is interpreted to flow generally westward, dissolving the salt deposits of the Prairie Evaporite Formation. Through geologic time, this has caused the westerly migration of the eastern edge of the Devonian salt deposits. It is possible that the resulting salt dissolution caused fracture permeability in the Upper Devonian and mixing of Devonian and McMurray waters (Sproule 1974).

3.3.2 Cretaceous

Cretaceous aquifers in the RSA include:

- McMurray Formation Basal Aquifer;
- minor intra-orebody aquifers within the McMurray Formation;
- Wabiskaw Member of the Clearwater Formation; and
- Grand Rapids Formation.

Hydraulic properties have been reported across the RSA for both the McMurray Formation Basal Aquifer and the McMurray Formation oil sands (Table E). Hackbarth and Nastasa (1979) report a wide range of

hydraulic conductivities for the McMurray Formation. The higher range of hydraulic conductivity values is assumed to be for the Basal Aquifer, while the lower range of values is assumed to be for actual oil sands.

Table D Regional Hydrochemical Parameters - Devonian Formations

Geologic Unit	Study [Project]	Hydrochemical Types	Total Dissolved Solids [mg/L]
Waterways Formation			
	Current Study	$Ca\text{-}Mg\text{-}Na\text{-}HCO_3$ $Ca\text{-}Na\text{-}Mg\text{-}HCO_3\text{-}Cl\text{-}SO_4$ $Na\text{-}Ca\text{-}HCO_3\text{-}Cl\text{-}SO_4$; Na-Cl	780 to 29,900
	Imperial Oil [2006] [Imperial Oil Kearl Project]	$Na\text{-}Ca\text{-}HCO_3\text{-}SO_4$ $Na\text{-}Ca\text{-}Mg\text{-}HCO_3\text{-}Cl$ $Na\text{-}Ca\text{-}HCO_3\text{-}Cl\text{-}SO_4$ $Ca\text{-}Na\text{-}Mg\text{-}HCO_3$ $Ca\text{-}Mg\text{-}HCO_3$	400 to 1,000
	Sproule [1974]	Na-Cl	1,000 to 100,000
	Clifton [2001] [Fort Hills Oil Sands Project]	$Na\text{-}Cl\text{-}HCO_3$ $Na\text{-}Ca\text{-}HCO_3\text{-}Cl\text{-}SO_4$	450 to 4,800
	Golder [1996; Syncrude Aurora Mine [North and South]]	$Na\text{-}Cl\text{-}HCO_3$	2,000 to 6,000

Groundwater mineralization and hydrochemical types have been reported for both the Basal Aquifer and the McMurray Formation, and are provided in Table F. Throughout much of the region the Basal Aquifer is present between the top of Devonian formations and the base of the McMurray Formation oil-bearing sands (Figure 3). However, its thickness and distribution are controlled by the topography on the Devonian erosional surface, and show wide variation throughout the area (Figure 8).

Figure 14 presents a groundwater model-simulated representation of the regional groundwater flow pattern in the Basal Aquifer prior to oil sands development. In the JEMA LSA, the pre-development groundwater flow in the Basal Aquifer was generally to the northwest and west, across the lease area. A local high in the potentiometric surface is present in the Basal Aquifer beneath the Fort Hills (Figure 14). Over the PRMA LSA, groundwater flow in the Basal Aquifer was from generally west to east, toward the Athabasca River. The regional distribution of hydraulic heads in the Basal Aquifer indicates discharge to the Athabasca River. Ongoing Basal Aquifer depressurization at the Albian Muskeg River Mine (and at Syncrude Aurora North) has led to declining Basal Aquifer groundwater levels in the immediate vicinity of the Muskeg River Mine pit by as much as about 45 m since 2000 (WorleyParsons Komex 2007). Hydraulic heads in the Basal Aquifer about 1 km west of Kearl Lake (10 km east of Muskeg River Mine) are reported to have declined by about 1.3 m since 2000 (WorleyParsons Komex 2007).

Table E Regional Hydrogeologic Parameters – Cretaceous Formations

Geologic Unit	Study [Project]	Storativity	Hydraulic Conductivity [m/s]
Clearwater Formation			
	Bachu and Undershultz [1993]	n/a	5×10^{-9} to 5×10^{-5}
	CNRL [2002] [Horizon Project]	n/a	3.4×10^{-7}
	Clifton [2001] [Fort Hills Oil Sands Project]	n/a	1×10^{-8} to 1×10^{-7}
	Komex [2000b] [MacKay River Project]	n/a	7×10^{-9} to 3×10^{-7}
McMurray Formation			
Undifferentiated	Hackbarth and Nastasa [1979]	n/a	1×10^{-9} to 1×10^{-4}
Oil sands	Imperial Oil [2006] [Imperial Oil Kearl Project]	n/a	4×10^{-8}
	CNRL [2002] [Horizon Project]	n/a	3.9×10^{-8}
	Clark [1960]	n/a	5×10^{-7}
Basal Aquifer	Current Study	n/a	7×10^{-6} to 1×10^{-4}
	Imperial Oil [2006] [Imperial Oil Kearl Project]	5.6×10^{-5} to 9.7×10^{-5}	2.2×10^{-5} to 8.2×10^{-5} [geometric mean 4.3×10^{-5}]
	CNRL [2002] [Horizon Project]	n/a	1.0×10^{-7} to 1.5×10^{-7}
	Clifton [2001] [Fort Hills Oil Sands Project]	1×10^{-5} to 4×10^{-5}	1×10^{-6} to 5×10^{-5}
	Golder [1996] [Syncrude Aurora [North and South] Mine]	5.7×10^{-5} to 3.2×10^{-4}	2.2×10^{-5} to 1×10^{-4}
	Komex [2003] [Albian Sands Muskeg River Mine]	2.3×10^{-11} to 3.9×10^{-3} [1×10^{-4} typical]	1×10^{-5} to 1×10^{-4}
	Komex [2002b] [Shell Jackpine Mine – Phase 1]	n/a	1.8×10^{-7} to 2.8×10^{-4}

NOTES:

n/a Not available.

Table F Regional Hydrochemical Parameters – Cretaceous Formations

Geologic Unit	Study [Project]	Hydrochemical Types	Total Dissolved Solids [mg/L]
Clearwater Formation			
Undifferentiated	CNRL [2002] [Horizon Project]	Na-Cl-HCO_3	13,308
	Golder [1996; Syncrude Aurora Mine [North and South]]	Na-Mg-HCO_3	350 to 3,000
	Komex [2000b] [MacKay River Project]	Na-Ca-Mg-HCO_3 Na-HCO_3-SO_4 Na-SO_4-HCO_3 Na-HCO_3-Cl-SO_4	500 to 4,300
McMurray Formation			
Undifferentiated	Sproule [1974]	Na-Cl, Ca-HCO_3 Na-HCO_3-Cl Na-Cl-HCO_3	<100 to 15,000[a]
	Clifton [2001] [Fort Hills Oil Sands Project]	Na-Cl-HCO_3 Na-HCO_3-Cl	1,200 to 11,500
	Hackbarth and Nastasa [1979]	n/a	1,000 to 5,000
Basal Aquifer	Current Study	Na-HCO_3-Cl Na-Cl-HCO_3 Na-Cl	400 to 85,800
	Imperial Oil [2006] [Imperial Oil Kearl Project]	Ca-Mg-Na-HCO_3 Na-Ca-Mg-HCO_3-Cl Na-Ca-Mg-HCO_3 Na-HCO_3-Cl	330 to 2,000
	CNRL [2002] [Horizon Project]	Na-Cl Na-HCO_3-Cl Na-HCO_3-Cl	5,000 to 278,000
	Clifton [2001] [Fort Hills Oil Sands Project]	Na-Cl Na-Cl-HCO_3 Na-Ca-Mg-HCO_3 Na-Ca-Mg-HCO_3-Cl Ca-Na-Mg-HCO_3	500 to 2,700
	Golder [1996; Syncrude Aurora Mine [North and South]]	Na-HCO_3-Cl Na-Mg-Ca-HCO_3-Cl	300 to 2,000
	Komex [2003] [Albian Sands Muskeg River Mine]	Na-HCO_3-Cl	2,000 to 3,000

Geologic Unit	Study [Project]	Hydrochemical Types	Total Dissolved Solids [mg/L]
McMurray Formation Cont'd			
Basal Aquifer	Komex [2002b] [Shell Jackpine Mine – Phase 1]	Na-HCO_3-Cl Na-Cl-HCO_3	1,000 to 4,000

NOTES:

(a) Median value.

The median hydraulic conductivity of the oil-bearing sand formations, calculated from laboratory measurements on re-packed oil sands samples, was reported to be 5×10^{-7} m/s (Table E). Water-bearing lenses within the oil sands are generally of limited extent as the majority of the groundwater in the McMurray Formation occurs within the Basal Aquifer.

The Clearwater Formation is the major aquitard isolating the oil-bearing McMurray Formation from the overlying Quaternary sediments in the RSA. Little regional hydraulic information is available for the Clearwater Formation. The hydraulic conductivity of this formation is reported to range from 5×10^{-9} to 5×10^{-5} m/s (Table E). Groundwater mineralization and hydrochemical types in the Clearwater Formation are variable (Table F).

Regionally, the Wabiskaw Member of the Clearwater Formation is expected to be of minor importance as an aquifer. Where present, it has been treated together with the McMurray Formation.

The Grand Rapids Formation is porous, permeable and water-bearing. Bachu et al. (1992) indicate that no regional groundwater surface elevation or hydrochemical data are available for the Grand Rapids Formation. Where the Grand Rapids Formation is present in the region, it is expected that the groundwater flow regime is controlled by topography and the local-scale hydraulic conductivity distribution. Groundwater is expected to flow from the upland areas in the southeast and northwest to the lower areas in the central portion of the RSA, likely discharging at subcrops and/or outcrops, particularly along river valleys and steep slopes.

3.3.3 Quaternary

Andriashek and Atkinson (2007) show the Quaternary drift thickness varying up to about 200 m within the RSA, with bedrock outcropping (i.e., little to no Quaternary deposits present) in some areas (Figure 13). As shown in Figure 5A, the surficial geology of the RSA is variable, with Quaternary deposits ranging from fine-grained glaciolacustrine silt and clay, to coarse-grained, glaciofluvial sand and gravel. Portions of the Quaternary strata composed of coarser-grained material are expected to form local aquifers. Although numerous, relatively small-scale Quaternary aquifers are expected to occur throughout the RSA. The most significant regional-scale Quaternary aquifers are buried channel and valley systems.

Andriashek and Atkinson (2007) provide a detailed summary of the distribution and characteristics of the known buried channel and valley systems within the RSA, the locations of which are shown in Figure 13. Andriashek and Atkinson (2007) note that depending on the geologic processes involved in their formation, the buried channels and valleys may be in-filled with coarse- or fine-grained deposits. Figure 15

presents a groundwater model-simulated representation of the regional groundwater flow pattern in the Quaternary deposits prior to oil sands development. The groundwater flow pattern generally reflects topographic control, with groundwater in the Quaternary deposits expected to flow from regional topographic highs to topographic lows, ultimately discharging to the Athabasca River.

Table G summarizes the available hydrogeological data for Quaternary deposits in the RSA, including the Pleistocene Channel, most of which lies within the JEMA LSA. The wide range of hydraulic conductivity values in the Quaternary deposits in the region reflects the stratigraphic variability in the deposits.

Table G Regional Hydrogeologic Parameters – Quaternary Deposits

Geologic Unit	Study [Project]	Storativity[a]	Hydraulic Conductivity [m/s]
Quaternary			
Undifferentiated	large number of studies across the region	n/a	1×10^{-9} to $>1 \times 10^{-5}$
Pleistocene Channel Aquifer	current study	n/a	2×10^{-5} to 1.1×10^{-3}
	Komex [2002b] [Jackpine Mine – Phase 1]	n/a	1.3×10^{-7} to 9.2×10^{-5}
	Imperial Oil [2006] [Kearl Project]	1.5×10^{-4} to 2.3×10^{-3}	1.6×10^{-4} to $2.2\ 10^{-4}$
	Hackbarth and Nastasa [1979]	n/a	1×10^{-5}[b]

NOTES:

n/a Not available.

(a) Storativity refers to the amount of water released from the aquifer as the hydraulic head is reduced.

(b) Median value.

The hydrochemistry of the Quaternary deposits is generally typical of shallow groundwater flow systems, with Ca-Mg-HCO_3 as the dominant hydrochemical type (Table H). Sproule (1974) concluded that waters of this type generally had a mineralization of less than 1,000 mg/L Total Dissolved Solids (TDS). With depth, the chemistry changes quite rapidly to a Na-HCO_3 type, with mineralization values between 1,000 and 3,000 mg/L as TDS.

Table H Regional Hydrochemical Parameters – Quaternary Deposits

Geologic Unit	Study [Project]	Hydrochemical Types	Total Dissolved Solids [mg/L]
Quaternary			
Undifferentiated	current study	$Ca\text{-}Mg\text{-}HCO_3$ $Ca\text{-}Mg\text{-}HCO_3\text{-}SO_4$ $Ca\text{-}Mg\text{-}Na\text{-}HCO_3$	330 to 3,300
	Imperial Oil [2006] [Imperial Oil Kearl Project]	$Ca\text{-}Mg\text{-}HCO_3$ $Ca\text{-}Mg\text{-}Na\text{-}HCO_3$ $Ca\text{-}Mg\text{-}Na\text{-}HCO_3\text{-}SO_4$	50 to 1,300
	CNRL [2002] [Horizon Project]	$Mg\text{-}Ca\text{-}HCO_3\text{-}Cl$ $Na\text{-}Mg\text{-}SO_4\text{-}Cl$ $Mg\text{-}Ca\text{-}HCO_3$	100 to 3,300
	Sproule [1974]	$Ca\text{-}Mg\text{-}HCO_3$ to $Na\text{-}HCO_3$	<1,000 to 3,000
Undifferentiated	Clifton [2001] [Fort Hills Oil Sands Project]	$Ca\text{-}Mg\text{-}HCO_3$ $Ca\text{-}Mg\text{-}HCO_3\text{-}SO_4$ $Ca\text{-}Na\text{-}Mg\text{-}HCO_3\text{-}SO_4$ $Na\text{-}Ca\text{-}HCO_3\text{-}SO_4$	53 to 6,000
	Golder [1996; Syncrude Aurora Mine [North and South]]	$Ca\text{-}Mg\text{-}Na\text{-}HCO_3$ $Ca\text{-}Na\text{-}Mg\text{-}HCO_3$	<800
	Imperial Oil [2006] [Kearl Project]	$Ca\text{-}Mg\text{-}HCO_3$ $Ca\text{-}Mg\text{-}Na\text{-}HCO_3$ $Ca\text{-}Mg\text{-}Na\text{-}HCO_3\text{-}SO_4$	50 to 1,300
Pleistocene Channel Aquifer	current study	$Ca\text{-}Mg\text{-}HCO_3$	300 to 800
	Komex [2002b] [Jackpine Mine – Phase 1]	$Ca\text{-}Mg\text{-}HCO_3$ $Ca\text{-}Mg\text{-}HCO_3\text{-}SO_4$ $Na\text{-}Ca\text{-}Mg\text{-}HCO_3$	250 to 1,500

3.4 Present Groundwater Use

Alberta Environment's open file records show 399 well records within the RSA (Appendix 2; Figures A2-1 and A2-2). These well records can be categorized by reported use as follows:

- dewatering – 14;
- domestic – 25;
- industrial – 115;
- investigation – 53;
- monitoring – 13;
- municipal – 1;

- observation – 130;
- other – 10; and
- unknown – 38.

The median well depth is about 42 mbgs, with depths ranging from about 2.5 to 1,344 mbgs. Most of the wells are listed for industrial use or for use as observation wells. Only five of the domestic well records fall within either the JEMA or PRMA LSAs (Appendix 2). Two domestic use wells owned by OSOWN (Oil Sands OBS Well), which were installed in 1984, are located near the southern edge of the JEMA LSA, at 3-28-94-09 W4M. The remaining three domestic use wells are owned by Canstar Oilsands Camp (and Office), and are located at 4-25-097-11 W4M, south of the PRMA leases. All well locations are approximate.

3.5 Groundwater Recharge and Groundwater-Surface Water Interactions

3.5.1 Recharge and Discharge

Published studies of groundwater recharge rates for till-covered settings in the Plains Region of North America range from 1.5% of precipitation in Dalmeny Saskatchewan (Fortin et al. 1991) to 9% of precipitation in North Dakota (Rehm et al. 1982). Meyboom (1967) provided groundwater recharge estimates for 14 sites in Manitoba and Saskatchewan. The average of the 14 sites was 4.4% of precipitation, with recharge at individual sites ranging from 0.5 to 7.5% of precipitation. Smerdon (2007) found that in areas of sandy, glacial outwash soils near Utikuma Lake, Alberta, groundwater recharge appeared to depend on the depth to the water table. Groundwater recharge in this area ranged from an average of 5% of precipitation when the water table was within 2 to 3 m of ground surface, and up to an average of 17% of precipitation when the water table was greater than 6 mbgs.

Based on the observed vertical hydraulic gradients at both the JEMA and PRMA leases, and the general topography of each area, groundwater recharge from precipitation would be expected to occur over much of each LSA.

For the RSA, the mean annual precipitation is 439 mm (Golder 2007). Estimated groundwater recharge rates for the till (i.e., fine-grained deposits) covered areas range from 6.6 mm/year (1.5% of precipitation) to 39.5 mm/year (9% of precipitation), with an intermediate rate of 17.6 mm/year (4.4% of precipitation). For areas with sandy, or coarse-grained surficial deposits, the groundwater recharge rate is estimated to range from 22 mm/year (5% of precipitation) to 74.6 mm/s (17% of precipitation).

3.5.2 Groundwater-Surface Water Interactions

The Athabasca River forms the regional base of drainage for the Devonian formations and younger overlying sediments. The Basal Aquifer contributes baseflow to the Athabasca River over the area of outcrop, a distance of about 40 km from about the southern boundary of Township 95 to the northern boundary of Township 98 (Figure 4A).

The average Basal Aquifer thickness along the outcrop is 12 m, based on information from Clifton (2001) and Golder (1996). The average regional Basal Aquifer hydraulic conductivity is estimated to be in the range of 1×10^{-5} to 1×10^{-4} m/s; and the regional hydraulic gradient is about 2×10^{-3} (Figure 14). The resulting estimated baseflow contribution from the Basal Aquifer to the Athabasca River within the region is 1×10^{-2} to 0.1 m^3/s (corresponding to 900 to 9,000 m^3/d). Mean annual discharge of the Athabasca River below the Muskeg River is 638 m^3/s (corresponding to 5.51×10^7 m^3/d) (Golder 2007). The Basal Aquifer therefore contributes less than 0.02% of mean annual discharge to the Athabasca River.

4. JACKPINE EXPANSION MINING AREA

4.1 Field Investigation

The field program for the JEMA was conducted over two field seasons. A total of 31 monitoring wells were installed within the JEMA (Figure 16). Of these, 28 monitoring wells were installed between February 1 and March 19, 2006, and three monitoring wells were installed between March 9 and March 12, 2007. The disposition of these wells, by major stratigraphic interval, is provided in Table I.

Table I Monitoring Well Installations at Jackpine Expansion Mining Area

Formation	Jackpine Expansion Mining Area	
	2006	2007
Devonian	3	0
McMurray	6	1
Quaternary	19	2
Total	**28**	**3**

Groundwater levels were collected in March 2006 from the wells installed in 2006, and in March 2007 from the wells installed in 2007. A complete set of groundwater levels from all the wells was collected May 25, 2007.

Groundwater samples were collected between February 22 and March 21, 2006, for the 2006 wells, and on March 19, 2007, for the 2007 wells. During each sampling event, and for each of the monitoring wells, the following data was collected:

- hydraulic conductivity;
- field-measured parameters;
- selected indicator parameters;
- petroleum hydrocarbons;
- dissolved metals;
- trace elements; and
- polycyclic aromatic hydrocarbons (PAHs) and Polycyclic Aromatic Nitrogen Heterocycles (PANHs).

4.2 Geology

Figure 16 shows the distribution of groundwater monitoring wells installed within the Shell oil sands leases and includes wells installed as part of the JEMA, Jackpine Mine – Phase 1 Project, Muskeg River Mine, and Muskeg River Mine Expansion. Wells installed as part of the hydrogeology base case investigation at the Kearl Oil Sands Project (Imperial Oil, 2006) are also included on Figure 16. Three cross-sections, the locations of which are shown on Figure 16, were developed to illustrate stratigraphic variation across the JEMA LSA (Figures 17, 18 and 19). Different naming conventions have been used for the monitoring wells installed at the different projects over the years, including those installed as part of the Project. To simplify the discussion of the monitoring results, the wells installed as part of the JEMA ESR were renamed using a consistent nomenclature (Section 2.2.2). Table 1 presents the list of original installation names for the JEMA monitoring wells, and the revised names that are used throughout this report.

Within the JEMA LSA, the Devonian surface (Waterways Formation) is generally at the highest elevation in the east and southeast (Figure 7), and varies from about 140 masl in the west portion of the LSA, adjacent to the Athabasca River, up to about 240 masl in the east, near Muskeg Mountain (Figure 7). Between the eastern and western extents of the LSA, the Devonian surface undulates between elevations of approximately 160 to 240 masl (Figures 17, 18 and 19)

The McMurray Formation unconformably overlies the Devonian Waterways Formation in the JEMA LSA. The elevation of the top of the McMurray Formation varies from about 250 to 340 masl across the LSA, and generally slopes downward to the northwest (Figure 10). Lows within the McMurray Formation surface have been incised by contemporary fluvial drainage features. Within the JEMA LSA, the Basal Aquifer thickness varies up to about 40 m, with thicker intervals coincident with lows in the Devonian surface, while the Basal Aquifer thins or is absent where the Devonian surface rises (Figures 17, 18 and 19).The Basal Aquifer appears to be relatively continuous and connected over the majority of the LSA (Figure 8).

The Basal Aquifer generally consists of fine-grained to coarse-grained water-saturated sand, typically well-sorted and angular, with some silt and coal fragments.

The Middle and Upper Members of the McMurray Formation contain the oil-bearing deposits in the LSA. The thickness of the non-water saturated McMurray Formation (oil sands and clay) varies from approximately 20 to 130 m within the LSA and lease area (Figure 9). It appears to be thinnest in the northern portion of the LSA (less than 10 m; Figures 17, 18) and within the JEMA, and thickest in the south and west of the LSA (thickness of 75 to greater than 130 m; Figures 17, 18 and 19).

With the exception of the extreme south and southeast portions of the LSA, The Clearwater Formation is largely absent from the JEMA LSA (Figures 11 and 19).

With the exception of the areas where the Clearwater Formation is present, unconsolidated Quaternary deposits unconformably overly the McMurray Formation (Figures 17, 18 and 19). The Quaternary deposits have been subdivided into the following five subgroups based on texture and location within the stratigraphic column (Figures 17, 18 and 19):

- Undifferentiated Quaternary deposits (Fort Hills);

- Undifferentiated muskeg and upper fine-grained deposits;
- Upper Quaternary sand deposits;
- Lower Quaternary fine-grained deposits; and
- Pleistocene Channel and lower Quaternary sand deposits.

Figure 20 shows the distribution of upper and lower Quaternary sand deposits, including the Pleistocene Channel, within the JEMA LSA, and Figure 21 shows the distribution of fine-grained Quaternary deposits within the JEMA LSA. The Quaternary deposits in the LSA form several distinct features:

- Fort Hills;
- Pleistocene Channel;
- Fort Hills Channel; and
- glacial kame.

The Fort Hills comprise the thickest Quaternary deposits within the LSA, varying in thickness up to about 60 m (Figure 17). TrueNorth (2001) describes Quaternary deposits within the Fort Hills as consisting of till, ice-contact glaciofluvial silt, sand and gravel, outwash sand and gravel and organic soil/muskeg. Andriashek and Atkinson (2007) describe drift deposits within the Fort Hills as generally composed of thick sand with discontinuous thick beds of clay, which overlies till, which in turn overlies either bedrock, or thick sand on top of bedrock. They also note the large variability in lithology and thickness of similar units in adjacent boreholes. This heterogeneous distribution of sediments within the Fort Hills is generally distinct from the surrounding Quaternary deposits, which tend to exhibit some degree of lateral continuity.

The Pleistocene Channel trends along the southeast and east portion of the LSA, passing underneath Kearl Lake (Figure 20). The term Pleistocene Channel is generally used to describe the entire buried channel complex, including the main channel and numerous side channels (Andriashek and Atkinson 2007). The Pleistocene Channel deposits are up to about 70 m thick, although they are generally 40 m thick or less (Figure 20). The Pleistocene Channel has been in-filled as much as 75% with coarse-grained deposits (sand and gravel), with the remainder being till (Andriashek and Atkinson 2007). Andriashek and Atkinson (2007) also note that not all the side-channels or channel segments contain sand and gravel, and may be in-filled with fine-grained deposits.

Figure 22 illustrates the structure of the Cretaceous bedrock surface (or bottom of the Quaternary deposits). The orientation of incised channels within the Cretaceous surface (Figure 22), and the distribution of sand and gravel deposits (Figure 20), were used to determine the location of the Pleistocene Channel complex within the LSA. The interpretation of the Pleistocene Channel distribution within the LSA in this study is in general agreement with the regional distribution of the Pleistocene Channel presented by Andriashek and Atkinson (2007). Minor discrepancies between the interpretations are likely due to variability in the available geologic data sets at the time of writing, and differences in professional interpretation of the geology.

Andriashek and Atkinson (2007) identifies two channel thalwegs within the Fort Hills area; the Fort Hills Channel and an “unnamed” channel (Figure 13). Available data on the “unnamed” channel is sparse, so the bedrock topography and channel orientation and characteristics remain open to interpretation. The Fort Hills Channel is reported to range in elevation from about 245 to 260 masl. The channel is relatively broad (1 to 1.3 km) and is incised about 10 to 12 m into the McMurray Formation.

A glacial kame is present just east of the northeast edge of the LSA, where it just intrudes into the LSA (Figure 20). The kame is one of the ice-contact deposits in the area described by Bayrock and Reimchen (1973) as consisting of a range of material including sand and gravel, and gravel with large boulders. Limited drilling within the kame area was conducted as part of Imperial Oil (2006). Shallow drilling on the kame (less than 12 mbgs) indicated the shallow Quaternary deposits consisted of muskeg, overlying silty clay, clay and sand deposits.

4.3 Hydrogeology

The following section presents the hydrogeological data for the JEMA LSA. The data are presented by stratigraphic unit (Devonian, McMurray Formation, and Quaternary). Each sub-section presents a summary of the available hydrogeologic and hydrochemical data obtained in this study, as well as data from the Jackpine Mine - Phase 1 and Kearl Oil Sands Project base case investigations (Figure 1; Shell, 2002; Imperial Oil, 2006). Complete hydrogeological and hydrochemical results are presented in:

- Table 2 (hydraulic data);
- Table 3 (field-measured parameters);
- Table 4 (indicator parameters);
- Table 5 (petroleum hydrocarbons);
- Table 6 (polycyclic aromatic hydrocarbons); and
- Table 7 (dissolved trace elements).

Several of the monitoring wells within the JEMA LSA exhibited groundwater chemistry which varied considerably from the other wells in the same formations (SH06-1655-D, ARC7-594, 01-911, ARC7-933, SH07-1712-DQ, and P08079707D). Each well yielded relatively high pH values (Tables 3 and/or 4), suggesting that they may be influenced by the drilling and/or well completion fluids. Therefore, chemistry data collected from these wells is not included in the following discussion.

4.3.1 Devonian

Thirteen monitoring wells were completed within the Devonian Waterways Formation across the JEMA LSA, three of which were completed as part of this study. For a summary of the available groundwater data from the Waterways Formation see Table J. Detailed data are presented in Tables 2 through 7.

Within the south central portion of the LSA, the lateral groundwater flow direction is radial, with flow in the south, west and northward directions (Figure 23). In the central portion of the LSA, groundwater flow

direction is northward (Figure 23). These results contrast with the north-eastward groundwater flow direction reported by (Hackbarth and Nastasa 1979).

The hydrochemical types identified in the Waterways Formation within the JEMA include:

- Ca-Mg- HCO_3;
- Ca-Mg-Na-HCO_3;
- Ca-Na-Mg-HCO_3-Cl-SO_4; and
- Na-Ca-Mg-HCO_3.

Figure 24A shows the hydrochemical types defined for both the Devonian and Cretaceous Formations. Figures 24B and 24C show the hydrochemical types in the Devonian Waterways Formation and Cretaceous McMurray Basal Aquifer, respectively. Groundwater salinity generally increases from east to west (from the Kearl Project toward Jackpine Mine-Phase 1), ranging from approximately 300 to 4,000 mg/L as TDS. The cation and anion content of the groundwater also changes from east to west. Groundwater goes from being generally calcium-carbonate dominated at the Kearl Project and JEMA, to sulphate-sodium dominated at Jackpine Mine - Phase 1. This trend is consistent with the expected pattern for hydrochemical evolution of groundwater in large sedimentary basins (Freeze and Cherry, 1979).

One groundwater sample is available from the deeper Devonian Formations (ARC6-310; Watt Mountain Formation). The hydrochemical type from this well is Na-Cl-HCO_3, with a groundwater mineralization of 3,690 mg/L, as TDS.

Table J Hydrogeological and Hydrochemical Parameters from the Devonian Waterways Formation at Jackpine Expansion Mining Area

Hydrogeologic and Hydrochemical Parameters	Total Number of Samples	Concentration/ Value Range	Number of Samples Above Guidelines
Hydraulic Parameters			
groundwater surface elevation [d]	28	266.77 to 330 masl	n/a
hydraulic conductivity	5	1.5×10^{-8} to 1.8×10^{-14} m/s	n/a
Field - Measured Parameters			
pH	9	7.09 to 8.84	0
electrical conductivity [EC]	9	617 to 6,640 µS/cm	n/a
temperature	9	8.4 to 10.8°C	n/a

Hydrogeologic and Hydrochemical Parameters	Total Number of Samples	Concentration/ Value Range	Number of Samples Above Guidelines
Selected Indicators			
total dissolved solids	11	394 to 4,940 mg/L	6[a]
chloride	13	<0.5 to 806 mg/L	3[a]
sodium	13	6 to 1,410 mg/L	5[a]
phenols	13	<0.001 to 0.077 mg/L	n/a
naphthenic acids	3	<1 mg/L	n/a
Petroleum Hydrocarbons			
benzene	6	<0.0005 to 0.007	0
toluene	6	<0.0005 to 0.094	2[b]
ethylbenzene	6	<0.0005	0
xylenes	6	<0.0005 to 0.0005	0
F1[C_6 to C_{10}]	4	<0.1	0
F2 [$C_{>10}$ to C_{16}]	4	<0.05 to 0.12	0
Polycyclic Aromatic Hydrocarbons	4	[c]	0

NOTES:

(a) Value exceeds Health Canada (2007) Aesthetic Objective.

(b) Value exceeds AENV (2001) guideline.

(c) Multiple parameters.

(d) Range of values only includes measurements from 2007.

n/a Not applicable.

In addition to the parameters indicated in Table J, manganese concentrations were generally above the Health Canada (2007) guidelines at wells completed within the Devonian Waterways Formation (Table 4).

In addition to the petroleum hydrocarbon results summarised in Table J, historical hydrocarbon analyses [TVH (C_5-C_{10}), TEH (C_{11}-C_{30}), and TPH (C_{11}-C_{60}); Table 5] indicate hydrocarbons have been found in groundwater within the Devonian deposits within the JEMA LSA.

Groundwater samples from the Waterways Formation submitted for dissolved trace element analysis yielded concentrations that were generally within their respective guidelines for all parameters, except barium at 5-24-96-8 (D) and SH06-1655-D, and chromium at SH06-1655-D (Table 7).

Each sample collected from the Waterways Formation and submitted for PAH and PANH analysis showed detectable concentrations of several of these compounds (Table 6). Most of these compounds have no applicable groundwater concentration guidelines. The parameters detected included C_2-substituted naphthalene, C_3-substituted naphthalene, C_2-substituted phenanthrene/anthracene, methyl

dibenzothiophene, acenaphthene, anthracene, fluorene, phenanthrene, naphthalene, pyrene, and methyl-naphthalene.

In addition to the wells installed within the Devonian Waterways Formation, four wells within the LSA are completed within deeper Devonian Formations; two within the Watt Mountain Formation, and two within the La Loche Formation. Due to suspected cement contamination (Table 3), chemistry results from these wells will not be discussed.

4.3.2 Cretaceous

The majority of the wells installed within Cretaceous deposits of the JEMA LSA are completed within the Basal Aquifer, which is the only laterally continuous aquifer of Cretaceous age in the area. A total of 37 wells are completed within the Basal Aquifer in the LSA, seven of which were completed as part of this study. For a summary of the available groundwater data see Table K. Detailed data are presented in Tables 2 through 7. Six wells in the JEMA LSA are completed within the oil sands deposits. Hydrogeological and hydrochemical data from these wells is not included in Table K.

In 2007, the depth to groundwater in the Basal Aquifer within the JEMA ranged from about 1 mbgs within the Muskeg River Valley to 71 mbgs in the Fort Hills Uplands. The three wells (SH06-1641, SH06-1672, SH06-1712) that have deeper water levels (>60 mbgs) are all located on the Fort Hills upland, in the northwest of the JEMA LSA.

Figure 25 shows the groundwater flow pattern in the Basal Aquifer within and around the JEMA LSA. The lateral groundwater flow direction within the Basal Aquifer across the JEMA LSA is to the west and northwest. This is generally consistent with the model simulated pre-development regional groundwater flow direction in the Basal Aquifer (Figure 14), although the local groundwater high predicted beneath the Fort Hills was not noted within the JEMA LSA. The effects of Basal Aquifer depressurization at the Muskeg River Mine and Aurora North Mine are evident in the groundwater flow pattern on the east side of the LSA. The lateral hydraulic gradient ranges over the LSA varies from about 0.001 to 0.007 m/m. The geometric mean hydraulic conductivity of the Basal Aquifer within the JEMA LSA is 2.2×10^{-5} m/s. The measured hydraulic conductivity values (Table 2) are consistent with others reported for the Basal Aquifer (Table E). Based on values for sand and sandstone from Freeze and Cherry (1979), an effective porosity of 25% can be applied to the Basal Aquifer. Based on the measured hydraulic gradient, the geometric mean hydraulic conductivity and the effective porosity, the estimated lateral groundwater flow velocity ranged from 8.8×10^{-8} to 6.2×10^{-7} m/s, which corresponds a range to between about 3 and 20 m/year (metres per year).

Table K Hydrogeological and Hydrochemical Parameters from the McMurray Formation Basal Aquifer at Jackpine Expansion Mining Area

Hydrogeologic and Hydrochemical Parameters	Total Number of Samples	Concentration or Value Range	Number of Samples Above Guidelines
Hydraulic Parameters			
groundwater surface elevation [e]	9	273 to 292 masl	n/a
hydraulic conductivity	22	9×10^{-10} to 2.1×10^{-4} m/s	n/a
Field – Measured Parameters			
pH	32	6.8 to 8.5	0
electrical conductivity	32	530 to 7,300 µS/cm	n/a
temperature	32	2 to 9°C	n/a
Select Indicators			
total dissolved solids	59	330 to 3,988 mg/L	35[a]
chloride	65	1 to 1,500 mg/L	18[a]
sodium	70	28 to 1,600 mg/L	46[a]
phenols	55	<0.001 to 0.27 mg/L	n/a
naphthenic acids	7	<1 to 8 mg/L	n/a
Petroleum Hydrocarbons			
benzene	39	<0.0004 to 0.0011	0
toluene	39	<0.0005 to 0.044	1[b]
ethylbenzene	39	<0.0004	0
xylenes	39	<0.0005 to 0.0041	0
F1[C_6 to C_{10}]	22	<0.1	0
F2 [$C_{>10}$ to C_{16}]	22	<0.05 to 0.4	0
Polycyclic Aromatic Hydrocarbons	25	[c]	1[d]

NOTES:

(a) Value exceeds Health Canada (2007) Aesthetic Objective.

(b) Value exceeds AENV (2001) guideline.

(c) Multiple parameters.

(d) The PAH that exceeded the AENV (2001) Guideline was benzo(a)pyrene.

(e) Range of values only includes measurements from 2007.

F1 and F2 Petroleum hydrocarbon fractions.

n/a Not applicable.

Hydrochemical types identified in the Basal Aquifer within the JEMA (Figure 24C) include:

- Ca-Mg-Na-HCO_3;
- Na-HCO_3-Cl;
- Na-HCO_3; and
- Na-Cl-HCO_3.

Groundwater within the Basal Aquifer exhibits a general trend of increasing salinity (i.e., increasing TDS, chloride and sodium concentrations) moving from the east (Kearl Oil Sands Project) to west (Jackpine Mine - Phase 1). As with the Devonian Waterways Formation (Section 4.3.1), this pattern is consistent with the expected pattern of groundwater hydrochemical evolution in large sedimentary basins (Freeze and Cherry 1979).

In addition to the results presented in Table K, the following parameters yielded concentrations above their respective guidelines at some wells (Tables 4 and 7):

- dissolved iron (0.014 to 2.58 mg/L);
- dissolved manganese (<0.001 to 0.371 mg/L);
- fluoride (0.41 to 2.48 mg/L); and
- sulphide (<0.003 to 9.29 mg/L).

In addition to the petroleum hydrocarbon results summarized in Table K, historical hydrocarbon analyses [TEH (C_{11}-C_{30}), TEH (C_{11}-C_{60}) and TPH (C_{11}-C_{60}); Table 5] indicate hydrocarbons have been found in Basal Aquifer groundwater across the JEMA LSA.

Nearly all the groundwater samples from the Basal Aquifer submitted for dissolved trace element analysis yielded concentrations within their respective guidelines for all parameters (except sulphide, as indicated above). Trace element concentrations above their respective guidelines were noted at P04179707B (arsenic, barium and selenium), P16069707B (arsenic and selenium) and W08059707B (selenium). Each of these wells is located within the Imperial Kearl Oil Sands Project.

The samples collected from the Basal Aquifer, and submitted for PAH (and PANH) analysis yielded detectable concentrations of a number of compounds (Table 6), including C_2-, C_3- and C_4- substituted naphthalene, methyl dibenzothiophene, acenaphthene, fluorene, naphthalene, phenanthrene, pyrene, methyl anthracenes and methyl naphthalene. The majority of these compounds were detected at the Jackpine Mine - Phase 1 Project, while relatively few were noted at the JEMA or Kearl Oil Sands Project. Only one sample, from SH06-1712-BS, yielded a sample with a benzo[a]pyrene concentration above the applicable guideline.

4.3.3 Quaternary

Twenty-one monitoring wells were installed within the Quaternary deposits within the JEMA LSA as part of this study (11 shallow Quaternary wells, six deep Quaternary wells, and four Pleistocene Channel wells).

The Jackpine Mine - Phase 1 base case investigation included an additional 22 Quaternary wells and 21 Pleistocene Channel wells. The Kearl Oil Sands Project included 50 Quaternary wells. Table L presents a summary of the groundwater data from the three projects. Detailed data are presented in Tables 2 through 7.

Table L Hydrogeological and Hydrochemical Parameters from the Quaternary Deposits (including the Pleistocene Channel) at Jackpine Expansion Mining Area

Hydrogeologic and Hydrochemical Parameters	Total Number of Samples	Concentration/ Value Range	Number of Samples Above Guidelines
Hydraulic Parameters			
groundwater surface elevation[e]	57	285 to 330 masl	n/a
hydraulic conductivity	120	2×10^{-9} m/s to 2.2×10^{-3} m/s	n/a
Field Measured Parameters			
pH	95	6.0 to 8.5	0
electrical conductivity	95	395 to 1,700 µS/cm	n/a
temperature	95	1 and 15°C	n/a
Select Indicators			
total dissolved solids	116	46 to 1,600 mg/L	29[a]
chloride	128	<1 to 61 mg/L	1[a]
sodium	125	0.5 to 425 mg/L	4[a]
phenols	111	<0.001 to 0.77 mg/L	n/a
naphthenic acids	23	<1 to 11 mg/L	n/a
Petroleum Hydrocarbons			
benzene	98	<0.0005 to 0.235 mg/L	2[b]
toluene	98	<0.0005 to 0.154 mg/L	3[b]
ethylbenzene	98	<0.0005 to 0.309 mg/L	4[b]
xylenes	98	<0.0005 to 0.21 mg/L	0
F1[C_6 to C_{10}]	71	<0.1 to 0.2	0
F2 [$C_{>10}$ to C_{16}]	71	<0.05 to 0.9	0
Polycyclic Aromatic Hydrocarbons	66	[c]	3[d]

NOTES:

(a) Value exceeds Health Canada (2007) Aesthetic Objective.

(b) Value exceeds AENV (2001) guideline.

(c) Multiple parameters.

(d) The PAH that exceeded the AENV (2001) Guideline was benzo(a)pyrene.

(e) Range of values only includes measurements from 2007.

n/a Not applicable.

Depth to groundwater in the Quaternary deposits within the JEMA was found to range from 0.07 m above ground surface to about 29 mbgs. The groundwater surface elevation within the Quaternary deposits ranged from approximately 280 masl in the Muskeg River Valley to 337 masl on the slope of the Muskeg Mountain. Figure 26A shows the groundwater flow pattern in the shallow Quaternary deposits over the LSA. For clarity, wells names for the shallow Quaternary wells are shown in Figure 26B. The lateral groundwater flow direction in the shallow Quaternary deposits generally mirrors the topography of the JEMA, with flow from the uplands (Fort Hills and slopes of Muskeg Mountain) toward the Muskeg River valley (Figure 26). The lenticular fen and patterned fen are located in the northeast corner of the JEMA LSA. Based on the available topographic and hydrologic data, a groundwater flow divide likely occurs in this area, although the precise location is difficult to determine. Based on the available surface water drainage patterns (Figure 26A), shallow groundwater from the lenticular fen and possibly the southern portion of the patterned fen discharges to the Muskeg River valley. The northern part of the patterned fen likely drains to the north, away from the Muskeg River valley.

The pattern of shallow groundwater flow reflecting topographic control is evident across the JEMA LSA, with groundwater from the shallow Quaternary deposits expected to discharge to the Muskeg River. The lateral hydraulic gradient in the shallow Quaternary deposits within the JEMA LSA ranges from about 0.0004 to 0.04 m/m. The higher gradients occur on the steep slopes along the edge of the Fort Hills and the shallower gradients occur within the Muskeg River Valley. The measured hydraulic conductivity values for the shallow Quaternary deposits within the JEMA LSA range from approximately 5×10^{-8} to 1×10^{-3} m/s, with a geometric mean hydraulic conductivity of is 3×10^{-6} m/s. The measured range of hydraulic conductivity values within the Jackpine Mine – Phase 1 Project are generally lower than measured at JEMA and the Kearl Oil Sands Project. Using an effective porosity of 25%, the estimated groundwater velocity in the Quaternary deposits within the Muskeg River valley in the JEMA ranges from less than one to about 15 m/year. Along the slopes of the Fort Hills shallow groundwater is expected to discharge as seeps and springs. Note that these velocities only represent average flow conditions. It is expected that on a local scale, groundwater flow will tend to be faster through coarse-grained deposits and slower through fine-grained deposits.

Figure 27A shows the groundwater flow pattern in the deeper Quaternary deposits and Pleistocene Channel. For clarity, the associated well names are shown in Figure 27B. The groundwater flow pattern in the deep Quaternary deposits in the JEMA (Figure 27A), is generally similar to the groundwater flow pattern in the shallow Quaternary deposits. Groundwater levels within the Pleistocene Channel wells show a similar hydraulic head distribution to that noted in the surrounding Quaternary deposits, indicating that groundwater within the Pleistocene Channel discharges to the Muskeg River. Note that well SH06-1663-PC appears to lie beyond the limits of the Pleistocene Channel. The Pleistocene Channel

Aquifer becomes less well defined north of the Muskeg River, with thick quaternary sand deposits across the Muskeg River Valley in this area.

Figure 28A shows the hydrochemical classification for groundwater samples from all the Quaternary wells (shallow and deep Quaternary, and Pleistocene Channel; Table 4). Figures 28B, 28C and 28D show the separate hydrochemical classification for the shallow Quaternary wells, deep Quaternary wells, and Pleistocene Channel wells, respectively. For all the Quaternary wells, the majority of the groundwater has calcium as the dominant cation and bicarbonate as the dominant anion. Within the JEMA, of the majority of the Quaternary groundwater samples had the following hydrochemical types (Figure 28):

- Ca-Mg-HCO_3;
- Ca-Mg-Na-HCO_3;
- Ca Mg-Na-HCO_3-SO_4;
- Ca-Na-Mg-HCO_3; and
- Na-Ca-Mg-HCO_3.

Generally, calcium-bicarbonate dominant groundwater indicates recently-recharged groundwater in an active flow system. Several groundwater samples from the deeper Quaternary and Pleistocene Channel (Figures 28B and 28D) have sodium as the dominant cation, perhaps reflecting the influence of deeper, sodium-rich bedrock units. Groundwater mineralization within the deeper Quaternary deposits (Figure 28C) ranges from approximately 200 to 1,500 mg/L as TDS, which is slightly higher than the range noted for the shallow Quaternary deposits (approximately 150 to 700 mg/L; Figure 28B). The range of groundwater mineralization within the Pleistocene Channel (approximately 200 to 1,500 mg/L as TDS; Figure 28D) is similar to that noted for both the deep Quaternary deposits.

In addition to the indicator parameters presented in Table L, the following parameters yielded concentrations above their respective guidelines at some wells (Tables 4 and 7):

- dissolved iron (<0.005 to 43.8 mg/L);
- dissolved manganese (<0.001 to 2.35 mg/L); and
- sulphide (<0.003 to 12.9 mg/L).

In addition to the petroleum hydrocarbon results summarised in Table L, historical hydrocarbon analyses [TVH (C_5-C_{10}), TEH (C_{11}-C_{30}), TEH (C_{11}-C_{60}) and TPH (C_{11}-C_{60}); Table 5] indicate hydrocarbons have been found in groundwater within the Quaternary deposits across the JEMA LSA.

The majority of the groundwater samples from the Quaternary deposits submitted for dissolved trace element analysis yielded concentrations within the respective guidelines for all parameters. Exceptions include sulphide as noted above, arsenic (1390214) and barium (P01-906A and P01-910A). Cadmium, lead and mercury concentrations above the Health Canada (2007) guidelines were noted at wells 1390502 (PG2) and/or 1390508 (PG1), however these were extractable, rather than dissolved concentrations.

Many of the samples collected from the Quaternary deposits and submitted for PAH (and PANH) analysis, yielded detectable concentrations of one or more of these compounds (Table 6). Most of these compounds have no applicable groundwater concentration guidelines. The parameters detected included C_2-substituted B(A)a/chrysene, C_2-substituted biphenyl, C_2-, C_3- and C_4- substituted naphthalene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)-perylene, chrysene, naphthalene, phenanthrene and pyrene. Benzo(a) pyrene concentrations were above the guidelines in samples from wells P06-1623-SQ, P06-1650-SQ and P06-1699-DQ.

4.3.4 Inter-Aquifer Groundwater Flow

The following sets of nested groundwater monitoring wells were completed within the JEMA:

- P06-1620-SQ/SH06-1620-BS;
- P06-1629-SQ/ P06-1629-DQ;
- P06-1641-SQ/SH06-1641-DQ;
- P06-1650-SQ/P06-1650-DQ;
- P06-1655-SQ/SH06-1655-BS/SH06-1655-D;
- P06-1672-SQ/SH06-1672-DQ/SH06-1672-BS;
- P06-1699-SQ/ P06-1699-DQ/SH06-1699-BS/SH06-1699-D; and
- SH07-1712-DQ/SH07-1712-BS.

The vertical component of groundwater flow between the Devonian and Cretaceous formations was identified as downward at both well nests within the JEMA with a Basal Aquifer and Devonian well (1655 and 1699). The hydraulic gradient between the Basal Aquifer and the Devonian Waterways Formation ranged from 0.73 m/m (at 1699) to 1.5 m/m (at 1655). These relatively large hydraulic gradients suggest hydraulic separation (that is, separation by low-permeability sediments) between the Basal Aquifer and the upper Devonian Formations.

For the Basal Aquifer, the vertical component of groundwater flow from the Quaternary deposits was identified as downward at all applicable well nests (1620, 1655, 1672, 1699, and 1712). The vertical component of the hydraulic gradient between the Quaternary deposits and the Basal Aquifer ranged from about 0.04 to 0.7 m/m. Artesian conditions were not encountered at any Basal Aquifer wells within the JEMA lease area. Hydraulic heads measured in the Basal Aquifer in 2004 at the Imperial Kearl Oil Sands Project, east of the JEMA LSA, were above the elevation of the ground surface at several wells, although the vertical component of groundwater flow between the Quaternary deposits and the Basal Aquifer was variable across the site (Imperial Oil 2006).

Full-scale Basal Aquifer depressurization began at the Muskeg River Mine in March 2002. Ongoing monitoring of Basal Aquifer depressurization effects at Muskeg River Mine includes collection of groundwater levels from two Basal Aquifer wells completed within about 2 km of the west side of Kearl Lake (ASE00-310 and ASE96-801), and about 10 km east of Muskeg River Mine (WorleyParsons

Komex 2007). Well ASE00-310 has shown a downward trend with a water level decline of approximately 1.3 m from May 2000 to September 2006. Basal Aquifer depressurization is also occurring at the Aurora North Project, about 3.5 km west of the JEMA (Figure 1). Since the west edge of the JEMA is closer to both Muskeg River Mine and Aurora North Project than Kearl Lake, it is possible that hydraulic heads within the Basal Aquifer in the JEMA are experiencing some influence from both depressurization operations. No pre-depressurization hydraulic head measurements are available within the JEMA.

The vertical components of groundwater flow in the Quaternary deposits above the McMurray Formation are variable across the JEMA. Out of five well nests, two indicated upward components of groundwater flow (1629 and 1650); one showed a downward component of flow (1641); and two indicated neither upward nor downward components of flow (1672 and 1699). The observed pattern of upward and downward groundwater flow indicates discharging conditions within the Muskeg River valley, while recharging conditions were noted within the Fort Hills area. This pattern of groundwater flow is typical for shallow flow systems, where areas of groundwater recharge (which translates into downward flow) typically develop in the topographically higher areas, and areas of local groundwater discharge (which translates into upward flow) develop in the low-lying areas. A similar pattern of vertical flow within the Quaternary deposits has been noted at Jackpine Mine – Phase 1 (Komex 2002b). At the Kearl Oil Sands Project, the vertical component of groundwater flow within the Quaternary deposits is variable, with both upward and downward components of flow noted at various locations (Imperial Oil 2006). The observed pattern of vertical flow is likely influenced by local-scale topographic variations and the topography of the underlying McMurray Formation (Imperial Oil 2006).

In the area of the lenticular and patterned fens, there appears to be a thinning of the Middle and Upper Members of the McMurray Formation (Figures 9 and 18). In addition to thinner oil sands and clay deposits, the overburden deposits in the area are predominately coarse-grained (Figure 20), with fine-grained deposits relatively thin, or absent, beneath the fen area (Figure 21). These factors suggest that the potential exists for a stronger hydraulic connection between the shallow groundwater-bearing zones in the fen area, and deeper aquifers, including the Basal Aquifer. However, the nearest Quaternary/Basal Aquifer well nest (1699) is about 3.5 km away from the fens. Therefore, the vertical component of groundwater flow cannot be determined immediately within the fen area.

4.4 Groundwater Recharge and Groundwater-Surface Water Interactions

4.4.1 Recharge and Discharge

Based on the observed vertical hydraulic gradients at the JEMA LSA, and the general topography of the area, groundwater recharge from precipitation would be expected to occur over much of the lease area. Over most of the LSA, the depth to groundwater is generally less than 2 to 3 mbgs (Table 2).

Surficial deposits over the JEMA LSA include both fine- and coarse-grained material. Based on the range of recharge rates presented in Section 3.5.1 for both till-covered settings, and sandy glacial outwash soils with relative shallow depth to groundwater, an average recharge rate of 5% can be applied to the JEMA LSA. Note that recharge may be higher where the groundwater table is deeper (e.g., the Fort Hills). The

calculated total precipitation rate over the JEMA LSA ranges from 242 to 676 mm/year, with an average of 439 mm/year (Golder 2007). Applying a recharge rate that is 5% of precipitation to the JEMA (about 205 km^2), gives an annual groundwater recharge ranging from 2.48×10^6 to 6.93×10^6 m^3/year.

4.4.2 Groundwater-Surface Water Interactions

Muskeg River

The Muskeg River ranges in elevation from about 285 to 320 masl across the JEMA. The river flows across the JEMA, and forms the base of drainage for most of the site. Lateral groundwater flow in the shallow Quaternary deposits generally converges to the centre of the JEMA, toward this major surface drainage feature (Figure 26).

Within the JEMA LSA, two distinct flow patterns, or drainage areas, are evident in the Quaternary deposits (Figure 26). A steep hydraulic gradient is inferred along the flank of the Fort Hills area, northwest of the Muskeg River valley. Shallow groundwater flow in this area is expected to discharge as baseflow to the Muskeg River, and discharge to creeks and from seeps along the flanks of the Fort Hills. A groundwater flow divide is also inferred to exist along the axis of the Fort Hills (Figure 26). Based on the surface water drainage patterns, it appears that surface water (and shallow groundwater) northwest and north of the flow divide discharges to McClelland Lake and fen complex.

Over the remainder of the JEMA LSA, groundwater is inferred to flow toward the Muskeg River valley with a shallower hydraulic gradient that reflects the relatively flat topography across the area. The majority of this flow is expected to discharge to the Muskeg River and associated wetlands.

A detailed discussion of the flow and discharge calculations is appended (Appendix 1C). For the JEMA, the discharge rate to the Muskeg River from the slopes of the Muskeg Mountain is about 0.104 m^3/s (corresponding to 9,014 m^3/d). The calculated discharge rate to the Muskeg River from the Fort Hills area ranges from about 0.026 to 0.08 m^3/s (which corresponds to 2,286 and 6,860 m^3/d).

The total contribution to baseflow in the Muskeg River from the Quaternary deposits across the remainder of the JEMA lease area is estimated to range from 0.126 to 0.18 m^3/s (or about 11,300 to 15,874 m^3/d). For comparison, mean annual water yield of the Muskeg River from the JEMA lease area is estimated to be 1.45 m^3/s (or 125,280 m^3/d; monitoring station S5; Golder 2007). The estimated baseflow from the JEMA is therefore about 12.6% of the mean annual discharge.

Kearl Lake

Kearl Lake is located in the southeastern portion of the JEMA LSA. Calculations of groundwater flux from Kearl Lake are discussed in Imperial Oil (2006) as part of the Kearl Project hydrogeology background investigation. The following is summarized from Imperial Oil (2006), except where indicated.

Kearl Lake has a mean water surface elevation of 331 masl (Golder 2007). The groundwater surface elevation in the underlying Pleistocene Channel is expected to be between 314 to 322 masl. Therefore, Kearl Lake contributes water to the Pleistocene Channel. With about 12 m of till between Kearl Lake and

the Pleistocene Channel, the calculated vertical component of the hydraulic gradient in the till is 0.75 to 1.4. With an estimated vertical hydraulic conductivity of 1×10^{-9} to 1×10^{-8} m/s for the till, the seepage rate from Kearl Lake to the Pleistocene Channel was calculated to range from 7.5×10^{-10} to 1.4×10^{-8} m/s.

Kearl Lake, with an area of 5.5×10^{6} m^2, therefore has an estimated total seepage to the Pleistocene Channel of between 0.004 to 0.077 m^3/s under natural conditions (corresponding to about 350 to 6,650 m^3/d).

McClelland Lake

McClelland Lake is located in the northwest of the JEMA LSA, and is underlain by 20 to 40 m of Quaternary deposits and about 40 m of McMurray Formation oil sands and clay (Figure 8). The available stratigraphic information indicates surficial deposits around McClelland Lake are predominately sand and gravel (Figures 5A). The oil sands are assumed to be less permeable than the surficial deposits, with an estimated vertical hydraulic conductivity of 1×10^{-9} to 1×10^{-8} m/s. The oil sands deposits would therefore control deep seepage rates between McClelland Lake and the Basal Aquifer (the uppermost regional aquifer).

The average elevation of McClelland Lake is 294.44 masl (Golder 2007), compared to an groundwater model-predicted Basal Aquifer groundwater surface elevation of 290 to 300 masl (Figure 13). Assuming the Quaternary groundwater surface elevations adjacent to the lake are the same as the McClelland Lake elevation, the vertical hydraulic gradient in the oil sands beneath McClelland Lake would be about 0.1 (downward flow) to -0.1 (upward flow). The resulting maximum seepage rate through the oil sands would range from 1×10^{-10} m/s to 1×10^{-9} m/s.

McClelland Lake has an area of 2.99×10^{7} m^2. Thus, the seepage rate is estimated to range from about 0.06 m^3/s (corresponding to 5,200 m^3/d) downward from McClelland Lake to the Basal Aquifer to 0.03 m^3/s (corresponding to 2,600 m^3/d) upward into McClelland Lake from the Basal Aquifer. By comparison, the seepage estimate from McClelland Lake for the Fort Hills Project was about 0.01 m^3/s (corresponding to 840 m^3/d; TrueNorth 2001).

5. PIERRE RIVER MINING AREA

5.1 Field Investigation

The field program for the PRMA was conducted over two field seasons. A total of 25 monitoring wells were installed within the PRMA (Figure 29). Of these, 19 monitoring wells were installed between February 7 and March 4, 2006, and six monitoring wells were installed between February 16 and March 8, 2007 (Table M).

Table M Monitoring Well Installations at Pierre River Mining Area

Formation	Pierre River Mining Area	
	2006	2007
Devonian	1	1
McMurray	4	5
Quaternary	14	0
Total	**19**	**6**

Groundwater levels were collected in March 2006 from the wells installed in 2005/2006, and in March 2007 from the wells installed in 2006/2007. A complete set of groundwater levels was collected from all the wells on May 25, 2007.

Groundwater samples were collected between February 23 and March 12, 2006, for the 2006 wells, and between March 10 and March 21, 2007, for the 2007 wells. During each sampling event, and for each of the monitoring wells, the following data was collected:

- hydraulic parameters;
- field-measured parameters;
- selected indicator parameters;
- petroleum hydrocarbons;
- dissolved metals;
- trace elements; and
- PAHs.

5.2 Geology

Figure 29 shows the groundwater monitoring network installed at the PRMA LSA. Four cross-sections, with locations shown on Figure 29, were developed to illustrate stratigraphic variation across the PRMA LSA (Figures 30, 31, 32 and 33). Several different naming schemes were used during installation of the PRMA monitoring wells. To simplify the discussion of the monitoring results, the wells were renamed using a consistent nomenclature (Section 2.2.2). Table 8 presents the list of original installation names for the PRMA wells, and the revised names used throughout this report.

The Devonian surface is highest over the western portion of the PRMA LSA (Figure 6), with the top of the Devonian surface varying from about 160 masl, in the east portion of Lease 17 (Figure 31), to 250 masl in the west (Figure 32). The elevation of the Devonian surface declines from a high beneath the Birch Mountains in the west, to the lowest elevation near the Athabasca River (Figures 31 and 32). A local paleotopographic low is present on the Devonian surface over the eastern portion of Lease 17, adjacent to the Athabasca River (Figure 31).

Within the LSA, the McMurray Formation unconformably overlies the Devonian Waterways Formation. The elevation of the top of the McMurray Formation varies from about 220 to 300 masl across the LSA (Figures 31 and 32). The surface of the McMurray Formation is highest on the flanks of the Birch Mountains, with a paleotopographic low in the Cretaceous surface in the north east of the PRMA lease area (Figure 10). Hamilton et al. (1999) indicates that the outcrop of the McMurray Formation is located immediately northeast of the PRMA LSA (Figure 4A).

The Basal Aquifer is unevenly distributed over the LSA (Figure 8). A relatively continuous area of Basal Aquifer is present beneath the east side of Lease 17, extending to northeast corner of Lease 9 (Figure 30). The Basal Aquifer thickness in this area is generally between 10 and 20 m (Figure 30). The Basal Aquifer is largely absent over the majority of Lease 9 and the west portion of Lease 17 (Figures 31 and 32). The Basal Aquifer is also noted along the southwest edge of the PRMA LSA (Figure 8). The distribution of Basal Aquifer within the PRMA leases appears to loosely correlate with areas where the Devonian surface is lowest (Figure 7). Conversely, the Basal Aquifer is generally thinner or absent where the Devonian surface is higher.

The McMurray Formation contains the oil-bearing deposits in the LSA. The thickness of the non-water saturated McMurray Formation (oil sands and clay) generally varies from 30 to 80 m within the LSA (Figure 9).

The Clearwater Formation is relatively thin (less than 10 m), and generally absent over most of Lease 9 (Figures 11, and 31, 32 and 33).The Clearwater Formation appears thickest in the PRMA leases in the northeast corner of Lease 17 (Figures 11 and 30), although available data over Lease 17 and areas to the north is relatively sparse. The Clearwater Formation is reported to subcrop over the west portion of the LSA, with the formation thickness increasing to the west, beneath the Birch Mountains (Hamilton et al. 1999).

Unconsolidated Quaternary deposits unconformably overlie the Cretaceous bedrock. Figure 13 shows the thickness of the regional Quaternary deposits (isopach) as presented in Andriashek and Atkinson (2007).

Figures 30, 31, 32 and 33 indicate that the Quaternary deposits over the lease areas varies from about 10 to 40 m. Regional surficial geology information in the PRMA indicates that Quaternary deposits over the eastern portion of Lease 9 and 17 largely consist of glaciofluvial sand and gravel and aeolian sand (Figure 5A). The western portion of the leases is described as alluvial fan material. Quaternary geology data from Lease 9 indicates inter-layered coarse- and fine-grained deposits across the lease area. Coarse-grained deposits (i.e., sand) appear to be less abundant in the northeast portion of Lease 9, and more abundant over the central and western portion of Lease 9. The available Quaternary geology data available from Lease 17 suggests that the Quaternary deposits over the western portion of the lease are predominately fine-grained (clay and silt). Coarse-grained deposits (sand and gravel) are generally thicker and more continuous closer to the Athabasca River.

The Eymundson Sinkholes Environmentally Significant Area (ESA), located on the west side of the PRMA Lease 9 (Figures 29 and 33), is identified in Sweetgrass Consultants (Sweetgrass; 1997). Very little information has been published on this area. Sweetgrass (1997) describes the Eymundson sinkholes as an area of sinkhole lakes, which in their view was considered a rare feature in Alberta. The information provided in Sweetgrass (1997) is derived from Westworth (1990). A more detailed discussion of the Eymundson Sinkholes ESA is presented in Section 5.4.3.

5.3 Hydrogeology

The following section presents the hydrogeological data for the PRMA. The data are presented by stratigraphic unit (Devonian, McMurray Formation Basal Aquifer and Quaternary). Each sub-section presents a summary of selected hydrogeologic and hydrochemical data obtained from this study. Complete hydrogeological and hydrochemical results for the PRMA are presented in:

- Table 9 (hydraulic data);
- Table 10 (field-measured parameters);
- Table 11 (indicator parameters);
- Table 12 (petroleum hydrocarbons);
- Table 13 (polycyclic aromatic hydrocarbons); and
- Table 14 (dissolved trace elements).

5.3.1 Devonian

Two wells were completed in Waterways Formation within the PRMA lease area (Figure 34). For a summary of the available groundwater data see Table N.

Because only two wells were installed in the Waterways Formation in the area of the PRMA, it was not possible to determine the lateral groundwater flow direction (Figure 34). Hackbarth and Nastasa (1979) indicate that the groundwater flow pattern in the Beaverhill Lake aquifer system in the area is towards the Athabasca River, from the west and northwest. The depth to groundwater within the Devonian Waterways

Formation ranged from about 48 to 49 mbgs yielding groundwater surface elevations of 233.11 masl and 234.75 masl (Table 9). Note that groundwater surface elevations measured at well SH06-1848-D on March 12, 2006 and May 25, 2007 are not thought to represent static conditions within the Waterways Formation. The groundwater chemistry measured at well SH06-1848-D in 2006 appears atypical for the Waterways Formation in this area, with a TDS value (940 mg/L) lower than expected, especially considering the TDS value of the Basal Aquifer well completed in a shallower formation at the same location (4,900 mg/L). It is possible that the groundwater sample collected in 2006 was affected by residual water from the drilling process.

The hydrochemical types identified in the Devonian Waterways Formation (Figure 35) include:

- Na-Ca-HCO_3-Cl-SO_4; and
- Na-Cl.

Table N Hydrogeological and Hydrochemical Parameters from the Devonian Waterways Formation – Pierre River Mining Area

Devonian Waterways Formation	Total Number of Samples	Concentration or Value Range	Number of Samples Above Guidelines
Hydraulic Parameters			
groundwater surface elevation	2	222.52 and 233.11 masl	n/a
hydraulic conductivity	0	---	n/a
Field – Measured Parameters			
pH	2	7.10 and 8.96	0
electrical conductivity	2	1,700 and 44,100 µS/cm	n/a
temperature	2	2.1 and 2.3°C	n/a
Select Indicators			
total dissolved solids	2	940 and 29,900 mg/L	2[a]
chloride	2	129 and 16,500 mg/L	1[a]
sodium	2	253 and 10,500 mg/L	2[a]
phenols	1	0.008 mg/L	0
naphthenic acids	2	3 and 4 mg/L	n/a
Petroleum Hydrocarbons			
benzene	2	<0.0005	0
toluene	2	<0.0005 and 0.0012	0
ethylbenzene	2	<0.0005	0

Devonian Waterways Formation	Total Number of Samples	Concentration or Value Range	Number of Samples Above Guidelines
xylenes	2	<0.0005	0
F1[C_6 to C_{10}]	2	<0.1	0
F2 [$C_{>10}$ to C_{16}]	2	<0.05 and 0.35	0
Polycyclic Aromatic Hydrocarbons	2	[b]	0

NOTES:

(a) Value exceeds Health Canada (2007) Aesthetic Objective.

(b) Multiple parameters.

F1 and F2 Petroleum hydrocarbon fractions.

n/a Not applicable.

Numerous PAHs (and PANHs) were detected in the groundwater samples from the Devonian Waterways Formation (Table 13). Most of these compounds have no applicable groundwater concentration guidelines. The PAHs detected included fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, biphenyl and methylanthracenes.

All the groundwater samples from the Devonian Waterways Formation submitted for analysis of dissolved trace elements yielded concentrations within their respective guidelines for all parameters (Table 14).

5.3.2 Cretaceous

A total of nine wells were completed within the Basal Aquifer in the PRMA leases (Figure 36). For a summary of the available groundwater chemistry data see Table O.

In 2007 the groundwater depth in the Basal Aquifer ranged from about 3 mbgs to 53 mbgs (Table 9), with three wells over the east portion of Lease 17 (SH07-1805, SH07-1814, SH07-1826) having noticeably greater depth to groundwater (about 50 mbgs) than the other wells (3 to 28 mbgs). Basal Aquifer groundwater surface elevations over the PRMA ranged from 230 to 278 masl.

The lateral groundwater flow direction within the Basal Aquifer across the PRMA lease area was generally to the east (Figure 36). The lateral hydraulic gradient ranged from about 0.005 to 0.01 m/m. A single hydraulic conductivity value (1.5×10^{-5} m/s) was available from the Basal Aquifer (Table 9). Freeze and Cherry (1979) give the porosity of sand as ranging from 25 to 50%, and sandstone as ranging from 0 to 30%. Assuming an effective porosity of 25%, the lateral groundwater flow velocity ranges from 3×10^{-7} to 6×10^{-7} m/s, which corresponds to between about 9 to 19 m/year.

Table O Hydrogeological and Hydrochemical Parameters from the McMurray Formation Basal Aquifer – Pierre River Mining Area

McMurray Formation – Basal Aquifer	Total Number of Samples	Concentration or Value Range	Number of Samples Above Guidelines
Hydraulic Parameters			
groundwater surface elevation	9	230 to 278 masl	n/a
hydraulic conductivity	1	1.5×10^{-5} to 3.2×10^{-5} m/s	n/a
Field Measured Parameters			
pH	4	7.9 to 8.1	0
electrical conductivity	7	3,470 to 94,900 µS/cm	n/a
temperature	7	3 to 5°C	n/a
Select Indicators			
total dissolved solids	9	1,800 to 85,800 mg/L	9[a]
chloride	9	400 to 47,400 mg/L	9[a]
sodium	9	567 to 31,500 mg/L	9[a]
phenols	7	<0.001 to 0.2 mg/L	n/a
naphthenic acids	9	<1 to 21 mg/L	n/a
Petroleum Hydrocarbons			
benzene	9	<0.0005	0
toluene	9	<0.0005 to 0.0006	0
ethylbenzene	9	<0.0005	0
xylenes	9	<0.0005	0
F1[C_6 to C_{10}]	9	<0.1	0
F2 [$C_{>10}$ to C_{16}]	9	<0.05 to 0.39	0
Polycyclic Aromatic Hydrocarbons	9	[b]	0

NOTES:

(a) Value exceeds Health Canada (2007) Aesthetic Objective.

(b) Multiple parameters.

F1 and F2 Petroleum hydrocarbon fractions.

n/a Not applicable.

Ranges are approximate.

Hydrochemical types identified in the Basal Aquifer (Figure 35) include:

- Na-HCO_3-Cl;
- Na-Cl-HCO_3; and
- Na-Cl.

In addition to the results presented in Table O, the following parameters yielded concentrations above their respective guidelines at some wells (Table 11):

- iron (<0.005 to 0.504 mg/L);
- manganese (0.019 to 0.656 mg/L); and
- sulphate (<0.5 to 4,860 mg/L).

All the samples collected from the Basal Aquifer, and submitted for PAH (and PANH) analysis, yielded detectable concentrations of one or more of these compounds (Table 13). Most of these compounds have no applicable groundwater concentration guidelines. The parameters detected included C_2-, C_3-, and C_4-substituted naphthalene, naphthalene, phenanthrene, pyrene and methylanthracenes.

All the groundwater samples from the Basal Aquifer submitted for dissolved trace element analysis yielded concentrations within their respective guidelines for all parameters (Table 14). Exceptions included boron, which was present at concentrations above the Health Canada (2007) guideline at wells SH06-1824-BS and SH06-1848-BS, and sulphide, which was above the Health Canada (2007) guideline at all wells, except SH06-1824-BS and SH07-1830-BS.

Groundwater chemistry in the Basal Aquifer at PRMA shows distinct spatial variability. Groundwater samples from Lease 9 yielded TDS values in the range of about 3,500 to 9,300 mg/L. In Lease 17, Basal Aquifer TDS values ranged from about 5,200 to 85,800 mg/L, with values increasing closer to the Athabasca River. This zone of elevated Basal Aquifer salinity coincides with a depression in the Devonian surface (Figure 31; Section 5.2).

At the Canadian Natural Horizon Project, located about 20 km south of PRMA Lease 17 (Figure 1), a similar, though more marked pattern has been noted. At the Horizon Project, a significant topographic depression in the Devonian surface, called the Devonian collapse (CNRL 2002), is located adjacent to the Athabasca River (Figure 7). In this area the Basal Aquifer is considerably thicker, and groundwater salinity in the porewater increases, from about 5,000 mg/L as TDS elsewhere in the area, to 278,000 mg/L as TDS in the area of the Devonian collapse (CNRL 2002). In this area it is thought that dissolution of the underlying Prairie evaporite formations led to the collapse in the Devonian surface (Carrigy 1959), and closer mingling of deeper, saline Devonian water with the Basal Aquifer groundwater. The increase in TDS concentrations within the area of the Devonian depression at the PRMA is lower than noted at the Horizon Project. However, in each case a similar effect may be occurring, where the Basal Aquifer overlying the depression in the Devonian surface is in closer hydraulic communication with the Upper Devonian Formations than elsewhere in the area.

5.3.3 Quaternary

Fourteen wells (ten shallow and four deep) were completed in the Quaternary deposits within the PRMA (Figures 37 and 38). All the existing Quaternary wells are situated within the Lease 9 area of the PRMA. No Quaternary wells have been installed in Lease 17. For a summary of the available groundwater chemistry data see Table P.

In 2007, the groundwater depth ranged from about 0.2 mbgs to 16 mbgs in the shallow Quaternary deposits (Table 9), and from about 16 mbgs to 0.2 metres above ground surface in the deep Quaternary deposits. At each of the nested Quaternary wells (P06-1801, P06-1830, P06-1853, and P06-1861), the depth to groundwater within the deep Quaternary wells was within 0.6 m or less of the depth to groundwater in the shallow Quaternary wells (Table 9). Within the Quaternary deposits, groundwater surface elevations ranged from 252 to 295 masl.

The lateral groundwater flow direction within the shallow Quaternary deposits across the PRMA Lease 9 area is to the southeast, toward the Athabasca River (Figure 37). A similar groundwater flow pattern occurs within the deeper Quaternary deposits (Figure 38). Both flow patterns reflect the general topographic control across Lease 9. There is no noticeable variation in the groundwater flow pattern in the Eymundson Sinkholes ESA.

The lateral hydraulic gradient within the Quaternary deposits at Lease 9 was on the order of 0.005 m/m. The geometric mean hydraulic conductivity of the Quaternary deposits was 2.9×10^{-6} m/s (Table 9). Assuming an effective porosity of 25%, the lateral groundwater flow velocity is about 5.8×10^{-8} m/s, which corresponds to about 2 m/year.

Table P Hydrogeological and Hydrochemical Parameters from the Quaternary Deposits – Pierre River Mining Area

Quaternary Deposits	Total Number of Samples	Concentration or Value Range	Number of Samples Above Guidelines
Hydraulic Parameters			
groundwater surface elevation	14	252 to 295 masl	n/a
hydraulic conductivity	6	1×10^{-7} to 4×10^{-5} m/s	n/a
Field – Measured Parameters			
pH	13	6.4 to 8.8	0
Electrical conductivity	13	520 to 3,900 µS/cm	n/a
temperature	13	1 to 4°C	n/a
Select Indicators			
total dissolved solids	13	330 to 3,300 mg/L	4[a]
chloride	13	2 to 65 mg/L	0

Quaternary Deposits	Total Number of Samples	Concentration or Value Range	Number of Samples Above Guidelines
sodium	13	2 to 437 mg/L	2[a]
phenols	13	<0.001 to 0.02 mg/L	n/a
naphthenic acids	13	<1 to 8 mg/L	n/a
Petroleum Hydrocarbons			
benzene	13	<0.0005	0
toluene	13	<0.0005 to 0.0015	0
ethylbenzene	13	<0.0005	0
xylenes	13	<0.0005	0
F1[C_6 to C_{10}]	13	<0.1	0
F2 [$C_{>10}$ to C_{16}]	13	<0.05 to 0.77	0
Polycyclic Aromatic Hydrocarbons	13	[b]	2 [c]

NOTES:

(a) Value exceeds Health Canada (2007) Aesthetic Objective.

(b) Multiple parameters.

(c) The PAH that exceeded the AENV (2001) Guideline was benzo(a)pyrene.

F1 and F2 Petroleum hydrocarbon fractions.

n/a Not applicable.

Ranges are approximate.

Most of the groundwater was of the following hydrochemical types (Figure 39):

- Ca-Mg-HCO_3;
- Ca-Mg-Na-HCO_3; and
- Ca-Mg-Na-HCO_3-SO_4.

The hydrochemistry generally suggests recently recharged groundwater in an active flow system.

Most of the samples collected from the Quaternary deposits, and submitted for PAH (and PANH) analysis, yielded detectable concentrations of one or more of these compounds (Table 13). One sample, from well P06-1821-SQ, yielded detectable concentrations of nearly all the PANH and PAHs analyzed. Most of these compounds have no applicable groundwater concentration guidelines.

All the groundwater samples from the Quaternary deposits submitted for dissolved trace element analysis yielded concentrations within their respective guidelines for all parameters (Table 14). One exception was sulphide, which was present at concentrations above the Health Canada (2007) guideline at wells P06-1821-SQ, P06-1840-SQ, P06-1861-SQ, and P06-1862-SQ.

5.3.4 Inter-Aquifer Groundwater Flow

The following sets of nested groundwater monitoring wells are completed within the PRMA lease area (Figure 29):

- P06-1801-SQ/SH06-1801-DQ;
- P06-1830-SQ/P06-1830-DQ;
- SH06-1848-BS/SH06-1848-D;
- P06-1853-SQ/P06-1853-DQ;
- P06-1861-SQ/P06-1861-DQ;
- P06-1862-SQ/SH06-1862-BS; and
- SH07-1826-BS/SH07-1826-D.

The vertical component of groundwater flow between the Basal Aquifer and Devonian formations was downward at well nest 1848, and upward at well nest 1826. The hydraulic gradient between these intervals ranged from 0.08 m/m (at 1826) to 2.3 m/m (at 1848). The relatively large hydraulic gradient at well nest 1848 suggests hydraulic separation (that is, separation by low-permeability material) between the Basal Aquifer and the upper Devonian Formations in this area. The relatively small vertical hydraulic gradient measured at well nest 1826 may indicate a closer hydraulic connection between the Basal Aquifer and Devonian formations in this area, or it may be coincidental.

The vertical component of groundwater flow between the Basal Aquifer and the Quaternary deposits, as measured at well nest 1862, was downward with a calculated hydraulic gradient of 0.05.

The vertical component of groundwater flow within the Quaternary deposits were variable in the PRMA. Out of four Quaternary well nests, one (1861) showed an upward component of groundwater flow; two indicated downward components of groundwater flow (1801 and 1853); and one indicated neither upward nor downward components of flow (1848). The observed pattern of upward and downward groundwater flow across Lease 9 is typical for shallow flow systems, where areas of groundwater recharge (which translates into downward flow) typically develop in the topographically higher areas, and areas of groundwater discharge (which translates into upward flow) develop in low-lying areas. In this case, recharging conditions are expected to occur along the flanks of the Birch Mountains. The recharging water will then flow eastward, down the topographic slope, either as groundwater flow, or as baseflow discharge to the smaller creeks and streams that drain the area. Ultimately, drainage across Lease 9 and Lease 17, for both groundwater and surface water, is to the Athabasca River.

5.4 Groundwater Recharge and Groundwater-Surface Water Interactions

5.4.1 Recharge and Discharge

Based on the measured vertical hydraulic gradients across the PRMA leases, and the general topography of the area, groundwater recharge from precipitation would be expected to occur over much of the LSA and lease areas. The average depth to groundwater over Lease 9 is about 1 mbgs (Table 9), and is likely similar over Lease 17.

Surficial deposits over the PRMA leases include both fine- and coarse-grained material. Based on the range of recharge rates presented in Section 3.5.1 for both till-covered settings and sandy glacial outwash soils, an average recharge rate of 5% may be reasonable for the PRMA leases. Applying this recharge rate to the PRMA leases (about 62 km^2 for Lease 9 and 90 km^2 for Lease 17) and using an average annual precipitation rate over the LSA of 374 mm/year (Golder 2007), gives a total annual average groundwater recharge of 1.16 x 10^6 m^3/year for Lease 9, and 1.68 x 10^6 m^3/year for Lease 17.

In areas where coarse-grained deposits occur at or near surface, recharge rates may be higher than indicated above. Groundwater recharge may also occur between shallow and deeper aquifers, although the presence of low permeability, bitumen-saturated oil sands (and non-oil sands aquitards) will limit the movement of water (i.e., flux) between the units.

5.4.2 Groundwater-Surface Water Interactions

Athabasca River

The elevation of the Athabasca River, which forms the base of drainage for the PRMA lease area, is about 220 masl in the vicinity of the PRMA leases (Figure 25). Lateral groundwater flow in the Quaternary deposits and Basal Aquifer is generally west to east, across the leases toward that major drainage feature.

The discharge rate to the Athabasca River valley from the Quaternary deposits at the PRMA Leases is about 0.0074 m^3/s (or 639 m^3/d). The discharge rate from the Basal Aquifer to the Athabasca River within the PRMA ranges from about 0.016 to 0.09 m^3/s (corresponding to 1,417 and 7,872 m^3/d). A detailed discussion of the flux calculations is appended (Appendix 1C).

The total contribution to baseflow in the Athabasca River from the Quaternary deposits and Basal Aquifer across the PRMA lease area is estimated to range from 0.023 to 0.097 m^3/s (or 2,021 to 8,381 m^3/d). For comparison, mean annual discharge of the Athabasca River below Eymundson Creek is 656 m^3/s (or 5.67 x 10^7 m^3/d; Golder 2007). The maximum estimated baseflow from the PRMA is about 0.015% of the mean annual discharge.

5.4.3 Eymundson Sinkholes Environmentally Sensitive Area

The Eymundson Sinkholes ESA is described in Westworth (1990) as including “a pair of large sinkholes in Township 98 Range 10, and one sinkhole in Township 98 Range 11”. The description provided by Sweetgrass (1997) identified the Eymundson Sinkholes ESA (Figure 29) as “significant sinkhole lakes, a rare feature in Alberta”. Topography in the area is described as karst. Under a section titled “Management Considerations”, Sweetgrass (1997) suggests disturbance in surrounding areas could affect the aquifers that supply the sinkholes. Another set of sinkholes, within the McClelland Lake Sinkholes ESA, were also identified by Sweetgrass (1997). These sinkholes are located east of the Athabasca River, north of McClelland Lake.

Bayrock (1971) identifies up to forty-six sinkholes, which in a number of cases are water-filled, in the area from Range 7 to Range 10, and Township 98 to Township 101. These sinkholes tend to occur along the west side of the Athabasca River, the Fort Hills area, and north of McClelland Lake. Several of these sinkholes are in the general area defined by Westworth (1990) and appear to coincide with the two most prominent lakes in the area. However, both lakes are located outside the Eymundson Sinkholes ESA, as designated by Sweetgrass (1997) (Figure 29). The sinkholes occurring north and northwest of McClelland Lake are also formally identified in Sweetgrass (1997) as part of the separate McClelland Lake Sinkholes ESA.

Karst topography typically occurs in areas where soluble rocks (i.e., carbonate, evaporites) are present at or near the surface. Where dissolution of these rocks occurs as a result of groundwater flow, dissolution features may occur at surface, including sinkholes, depressions, sinking streams, etc. Available geological information from the Lease 9 area is summarized as follows.

Devonian Formations In the Eymundson Sinkhole ESA the elevation of the Devonian surface ranges from approximately 205 masl to 250 masl. The Devonian surface is higher over the west side of the ESA, which coincides with a ridge in the Devonian surface, oriented north-south, which occurs along the western edge of Lease 9. A sharp topographic slope is evident in the Devonian surface along the edge of the ridge. The uppermost Devonian-aged unit is the Waterways Formation. The different members of the Waterways Formation form an alternating series of calcareous shales and carbonates (Bachu et al. 1991). Deeper Devonian Formations in the Lease 9 area include the Upper Devonian Slave Point (anhydrite/dolomite) Middle Devonian Prairie Evaporite (salt and anhydrite) Formations.

Cretaceous Formations. The Cretaceous-aged McMurray Formation overlies the Devonian surface. The thickness of the McMurray Formation ranges from approximately 15 to 60 m over the Eymundson Sinkholes ESA. The topography of the McMurray surface over the Eymundson Sinkholes ESA slopes gradually downward from west to east, ranging in elevation from approximately 250 masl to 275 masl. The surface topography of the McMurray Formation does not reflect the sharp changes noted in the topography of the Devonian surface.

Quaternary Deposits Unconsolidated Quaternary deposits unconformably overlie the Cretaceous bedrock. Quaternary geology data from Lease 9 indicates inter-layered coarse- and fine-grained deposits across the lease area. Coarse-grained deposits (i.e., sand) appear to be less abundant in the northeast portion of Lease 9, and more abundant over the central and western portion of the lease.

The lateral groundwater flow direction within the shallow Quaternary deposits across the PRMA Lease 9 area is to the southeast, toward the Athabasca River. A similar groundwater flow pattern occurs within the deeper Quaternary deposits. Both flow patterns reflect the general topographic control across Lease 9. The Eymundson Sinkholes ESA does not appear to exhibit a marked influence on the groundwater flow pattern in the Quaternary deposits. Bathymetry data from two of the rounded ponds near the Eymundson Sinkholes ESA indicates they are 30 and 40 m deep, and roughly funnel shaped. The lower portions of the ponds may intersect the McMurray Formation. The vertical component of groundwater flow within in the Quaternary deposits above the McMurray Formation are variable in the PRMA, however the observed pattern of upward and downward groundwater flow across Lease 9 is typical for shallow flow systems, with recharging conditions occurring at higher elevations closer to the flanks of the Birch Mountains, and discharging conditions occurring in the lowlands closer to the Athabasca River.

6. SUMMARY

Jackpine Expansion Mining Area

The Waterways Formation is the uppermost Devonian Formation over the JEMA LSA. Groundwater elevations within the Waterways Formation in were found to range from about 266 to 330 masl. The hydrochemical type of the groundwater within the Waterways Formation was generally calcium-bicarbonate dominant, with groundwater mineralization ranging from approximately 300 to 4,940 mg/L as TDS.

The only significant aquifer of Cretaceous age in the Project development area is the Basal Aquifer. Basal Aquifer groundwater surface elevations within the JEMA LSA were found to range from approximately 260 masl in the vicinity of the Muskeg River Mine, to 333 masl on the slopes of the Muskeg Mountain. The groundwater flow direction across the LSA was generally to the west and northwest, which was consistent with the regional groundwater flow direction. The estimated lateral groundwater flow velocity in the Basal Aquifer ranged from 3 to 20 m/year. The groundwater hydrochemical type in the Basal Aquifer over the LSA ranged from calcium/sodium-bicarbonate dominant in the northeast, to sodium-chloride and sodium-bicarbonate/chloride dominant in the southeast. Groundwater mineralization ranged from approximately 250 to 3,000 mg/L as TDS, with the higher TDS groundwater noted in the southeast of the LSA.

Within the Quaternary deposits, including the Pleistocene Channel, groundwater surface elevations over the LSA ranged from about 280 to 337 masl. Groundwater flow in the both the shallow and deeper Quaternary deposits was away from upland areas and toward the Muskeg River valley. The hydraulic gradient within the Quaternary deposits ranged from 0.0004 to 0.04 m/m, with the higher gradients measured on the steeper slopes. The groundwater velocity within the Muskeg River valley was calculated to range from less than one to 15 m/year. Along the slopes of the Fort Hills and Muskeg Mountain shallow groundwater is expected to discharge as seeps and springs. Based on the surface water drainage patterns, it appears that shallow groundwater from the lenticular fen and possibly the southern portion of the patterned fen discharges to the Muskeg River valley. The northern part of the patterned fen likely drains to the north, away from the Muskeg River valley. The groundwater flow pattern in the deeper Quaternary deposits within the JEMA (including the Pleistocene Channel) was similar to the flow pattern in the shallow Quaternary deposits, indicating that the deeper Quaternary deposits discharge to the Muskeg River. The groundwater within the Quaternary deposits generally had calcium-bicarbonate dominant hydrochemical types; although a higher percentage sodium was noted in some groundwater samples from the Pleistocene Channel and deeper Quaternary deposits. Groundwater mineralization ranged from approximately 46 to 1,600 mg/L as TDS.

The vertical components of the hydraulic gradient indicate the potential for downward movement of groundwater flow from the Quaternary deposits to the Basal Aquifer across the LSA. Between the Basal Aquifer and the Devonian Waterways Formation, the vertical component of the hydraulic gradient was variable. It appears that groundwater levels within the Basal Aquifer over the southern portion of the LSA

are being influenced by Basal Aquifer depressurization at the Muskeg River Mine and Aurora North Projects. The vertical component of groundwater flow within the Quaternary deposits was variable across the LSA. In general, an upward component of groundwater flow (or discharging conditions) was noted over the lowlands (i.e., within the Muskeg River valley), and a downward component of flow (or recharging conditions) was noted on the highlands (i.e., Muskeg Mountain and within the Fort Hills area).

Pierre River Mining Area

The Waterways Formation was the uppermost Devonian Formation over most of the LSA, and was expected to act as an effective barrier to vertical flow, except in areas where prominent fracturing has occurred. Groundwater elevations measured within the Waterways Formation were about 233 and 234 masl. The groundwater hydrochemical types were Na-Ca-HCO_3-Cl-SO_4 and Na-Cl, with mineralization ranging from about 1,000 to 30,000 mg/L as TDS.

Basal Aquifer groundwater surface elevations over the PRMA ranged from 230 to 278 masl. The lateral groundwater flow direction is to the east, toward the Athabasca River. The lateral groundwater flow velocity in the Basal Aquifer ranged from about 9 to 19 m/year. The groundwater in the Basal Aquifer was generally sodium-chloride dominant, with mineralization ranging from 1,800 to 85,800 mg/L as TDS. In general, Basal Aquifer groundwater from Lease 9 exhibited less mineralization (3,500 to 9,000 mg/L as TDS) than that measured over the eastern portion of Lease 17 (5,200 to 85,800 mg/L as TDS). The elevated TDS values in Lease 17 may be the result of a closer hydraulic communication between the Basal Aquifer and the deeper Devonian Formations in this area.

Within the Quaternary deposits in Lease 9, groundwater surface elevations ranged from approximately 252 to 295 masl. Groundwater flow in the both the shallow and deeper Quaternary deposits was away from slopes of the Birch Mountains in the west, toward the Athabasca River in the east. No wells are currently completed in the Quaternary deposits in Lease 17. The estimated average groundwater flow velocity in the Quaternary deposits was about 2 m/year. The groundwater samples from the Quaternary deposits were generally calcium-bicarbonate dominant hydrochemical types with mineralization ranging from about 330 to 3,300 mg/L as TDS.

Between the Basal Aquifer and the Devonian Waterways Formation, the vertical component of groundwater flow was variable, with upward flow indicated at one location, and downward flow indicated at the other. The vertical hydraulic gradient between the Basal Aquifer and the Quaternary deposits (measured at one location) indicated a potential for downward groundwater flow from the Quaternary deposits to the Basal Aquifer.

The vertical component of groundwater flow within in the Quaternary deposits was variable in the PRMA with areas of groundwater recharge (which translates into downward flow) noted in the topographically higher areas, and areas of groundwater discharge (which translates into upward flow) noted in low-lying areas.

Groundwater Recharge and Groundwater-Surface Water Interactions

The groundwater recharge rate is estimated to range from about 12 to 33 mm/year for JEMA and 19 mm/year for PRMA (5% of precipitation), corresponding to an estimated annual average groundwater recharge over the JEMA lease area ranging from of 2.44×10^6 to 6.83×10^6 m^3/year, and 2.84×10^6 m^3/yr over the PRMA lease areas (Lease 9 and Lease 17).

The Muskeg River forms the base of drainage for the Quaternary deposits over most of the JEMA lease areas. The total contribution to baseflow in the Muskeg River from the Quaternary deposits across the JEMA lease area is estimated to range from 0.126 to 0.18 m^3/s (or about 11,300 to 15,874 m^3/d). For comparison, mean annual discharge of the Muskeg River from the JEMA lease area is estimated to be 1.45 m^3/s (or 125,280 m^3/d). The maximum estimated baseflow from the JEMA is about 12.6% of the mean annual discharge.

Two large lakes are present within or near the JEMA leases: Kearl Lake and McClelland Lake. The water surface in Kearl Lake is higher than nearby groundwater surface elevations, indicating a contribution to groundwater recharge from Kearl Lake. Groundwater data are sparse near McClelland Lake, immediately northwest of the JEMA LSA. The inferred groundwater surface elevation in the Basal Aquifer is close to the McClelland Lake water level. The inferred direction of the vertical hydraulic gradient between McClelland Lake and the Basal Aquifer is variable, with both recharge and discharge conditions indicated to be occurring across the lake area.

The Athabasca River forms the base of drainage for the PRMA lease area. The total estimated contribution to baseflow in the Athabasca River from the Quaternary deposits and Basal Aquifer across the PRMA lease area is estimated to range from 0.023 to 0.097 m^3/s (or 2,021 to 8,381 m^3/d). For comparison, mean annual discharge of the Athabasca River below Eymundson Creek is 656 m^3/s (or 5.67×10^7 m^3/d). The maximum estimated baseflow from the PRMA is about 0.015% of the mean annual discharge.

7. CLOSURE

We trust that this report satisfies your current requirements and provides suitable documentation for your records. If you have any questions or require further details, please contact the undersigned at any time.

Report prepared by
WorleyParsons Komex

David Dillon, M.Sc.
Staff Groundwater Scientist

Brent Mooder, M.Sc., P.Eng.
Senior Hydrogeologist

Senior Review by:

PROFESSIONAL ENGINEER ALBERTA JOÃO A. KÜPPER 30 Nov 2007

João Küpper, Ph.D., P.Eng.
Principal Hydrogeologist

PROFESSIONAL GEOLOGIST ALBERTA JON W. FENNELL 2007/11/30

Jon Fennell, M.Sc., P.Geol., P.Geo., P.Eng
Director, Water Resources

PERMIT TO PRACTICE
WORLEYPARSONS CANADA LTD.
Signature
Date 30 Nov 2007
PERMIT NUMBER: P 2306
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

8. GLOSSARY OF TERMS

Aeolian Sedimentary deposits arranged by wind, such as sand and other loose substrates in dunes.

Alluvial Applying to the environments, actions, and products of rivers or streams.

Aquifer Any water-saturated body of geological material from which enough water can be drawn at a reasonable cost for the purpose required. An aquifer is only a relative term determined largely by economics and is best illustrated by extreme examples. An aquifer in an arid prairie area required to supply water to a single farm may be adequate if it can supply 1 m^3/day. This would not be considered an aquifer by any industry looking for cooling water in volumes of 10,000 m^3/day. A common usage of the term aquifer is to indicate the water-bearing material in any area from which water is most easily extracted.

Aquitard A water-saturated sediment or rock whose permeability is so low it cannot transmit any useful amount of water. An aquitard allows some measure of leakage between the aquifers it separates.

Artesian A condition which applies to aquifers which are confined by layers of low-permeability, and where the hydraulic head in the aquifer is higher than the overlying ground surface. Wells penetrating such aquifers may result in groundwater flowing at the surface without pumping.

Bedrock The solid rock that underlies gravel, soil, or other superficial material.

Bitumen A highly viscous, tarry, black hydrocarbon material having an API gravity of about 9 (specific gravity about 1.0). It is a complex mixture of organic compounds. Carbon accounts for 80 to 85% of the elemental composition of bitumen, hydrogen 10%, sulphur 5%, and nitrogen, oxygen and trace elements form the remainder.

Cretaceous A period of the Mesozoic era thought to have covered the span of time between 140 and 65 million years ago; also, the corresponding system of rocks.

Depressurization The lowering of the groundwater piezometric surface over the desired area of a mine or construction site, using a well system.

Devonian A period of the Paleozoic era thought to have covered the span of time between 400 and 345 million years ago; also, the corresponding system of rocks.

Dewatering Removal of groundwater from geological formation using wells or drainage ditch system.

Drift Deposits Any sediment laid down by, or in association with, the activity of glaciers and ice sheets.

Effective Porosity The percentage of the total volume of a given mass of soil or rock that consists of interconnected voids.

Evaporites General lithologic term applied to rocks which have formed by the precipitation of salts from natural brines due to evaporation.

Evapotranspiration The process by which water is discharged to the atmosphere as a result of evaporation from the soil and surface-water bodies, and transpiration by plants. Transpiration is the process by which water passes through living organisms, primarily plants, into the atmosphere.

Fen Minerotropic peat-forming wetlands that receives surface moisture from precipitation and groundwater. Fens are less acidic than bogs, deriving most of their water from groundwater rich in calcium and magnesium.

Fluvial Deposits Particles of minerals or rocks which are transported by a river and deposited along its valley.

Glacial Till A general term for the coarsely graded and extremely heterogeneous sediments of glacial origin. Glacial till is that part of glacial drift which was deposited directly by the glacier. It may vary from clays to mixtures of clay, sand, gravel and boulders.

Glauconitic Containing glauconite, a greenish mineral of the mica group, typically found in shallow marine sedimentary rocks.

Groundwater All the water contained in the pores/voids within rocks (unconsolidated and consolidated).

Hydraulic Conductivity The permeability of soil or rock to water. A coefficient ("k") depends on the physical properties of formation and fluid. It describes the "ease" with which a fluid will flow through a porous material. "k" is the rate of flow per unit cross-sectional area under the influence of a unit gradient, and has the dimension of length^3/length^2 x time or length/time (e.g., m/s).

Hydraulic Gradient The change in groundwater elevation per unit of distance in a given direction. If not specified, the direction generally is understood to be that of the maximum rate of decrease in head. This coefficient is dimensionless (metres/meter).

Hydraulic Head A measure of the potential energy of a fluid. For groundwater, the hydraulic head at a point is the level to which groundwater would rise above a fixed datum (usually sea level) in an observation well. The hydraulic head in systems under atmospheric pressure may be identified with a potential expressed in terms of the height of a water column. More specifically, it can be identified with the sum of gravitational and capillary potentials, and may be termed the hydraulic potential.

Hydrochemical Type The definition of a chemical composition of groundwater based on the relative percentages of major cation and anion concentrations.

Hydrogeology The science that relates to groundwater. Groundwater as used here includes all water in the zone of saturation beneath the earth's surface, except water chemically combined in minerals.

Hydrostratigraphic Unit A group of water-saturated porous materials with similar hydraulic properties treated collectively as a single aquifer, aquitard, or aquiclude.

Infiltration The flow or movement of precipitation or surface water through the ground surface into the subsurface. Infiltration is the main factor in recharge of groundwater reserves.

Intra-orebody Aquifers Isolated water-saturated sand bodies, typically a few metres thick and up to a few tens of metres long, occurring within the oil sands.

Kame An irregular short mound, hill, or ridge of poorly sorted sand and gravel deposited by melt water in contact with glacial ice.

Lithology The systematic description of sediment and rocks, in terms of composition and texture.

Marine Of or related to the sea or ocean.

Mineralization of Groundwater Synonym of total dissolved solid concentration.

Monitoring Well A constructed controlled point of access to an aquifer which allows groundwater observations. Small diameter observation wells are often called piezometers.

Oil Sands Sand and rock material which is impregnated with crude bitumen (a heavy, viscous form of crude oil).

Overburden Any loose material which overlies bedrock (often used as a synonym for Quaternary sediments and/or surficial deposits) or any barren material, consolidated or loose, that overlies an ore body.

Paleotopography Ancient topography.

Paraconformity An uncertain or obscure unconformity in which no erosion surface is discernible or in which the contact is a simple bedding plane and in which the beds above and below the break are parallel.

Patterned Fen A peatland with a distinctive net-like pattern of low peat ridges topped by shrubs or trees and elongate pools and low spots occupied by sedges.

Permeability A physical property of the porous medium. Has dimensions Length^2. When measured in cm^2, the value of permeability is very small, therefore more practical units are commonly used - darcy (D) or millidarcy (mD). One darcy is equivalent to 9.86923×10^{-9} cm^2.

pH (from potential of Hydrogen) the logarithm of the reciprocal of hydrogen-ion concentration in gram atoms per litre; provides a measure on a scale from 0 to 14 of the acidity or alkalinity of a solution (where 7 is neutral and greater than 7 is more basic and less than 7 is more acidic).

Piezometer See Monitoring Well.

Pleistocene An epoch of the Cenozoic era covering the span of time between about 1.8 million and 11,000 years ago; also, the corresponding system of unconsolidated deposits.

Polycyclic Aromatic Hydrocarbons (PAH) A group of over 100 different organic compounds composed of several benzene rings.

Potentiometric Surface An imaginary surface that everywhere coincides with the static level of the water in a given water bearing formation. The surface to which the water from a given interval will rise under its full hydraulic head.

Recharge Water added to the saturated zone from any source. This term is commonly combined with other terms to indicate some specific mode of recharge such as recharge well, recharge area, or artificial recharge.

Storativity The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer, per unit change in head. It is equal to the product of specific storage and aquifer thickness. In an unconfined aquifer, the storativity is equal to the specific yield.

Stratigraphy The geological science concerned with the study of sedimentary rocks in terms of time and space.

Subcrop Bedrock unit occurring at the bedrock surface but covered by surficial deposits.

Surficial Deposits See Overburden.

Thalweg The line defining the lowest points along the length of a river bed or valley. Also the line defining the central (long) axis of a buried channel or valley, and coincides with the location of the thickest sedimentary deposits.

Total Dissolved Solids Concentration of all substances dissolved in water (solids remaining after evaporation of a water sample).

Transmissivity The product of the average coefficient of hydraulic conductivity (or permeability) and the thickness of the aquifer. Consequently, transmissivity is the rate of flow under a hydraulic gradient equal to unity through a cross-section of unit width over the whole thickness of the aquifer. It is designated by the symbol T. It has the dimension of length^3/time x length or length^2/time (e.g., m^2/day).

Unconfined Aquifer A permeable bed only partly filled with water and overlying a layer of lower hydraulic conductivity. Its upper boundary is formed by a free water table where pore pressure is equal to atmospheric pressure. Water in a well penetrating an unconfined aquifer does not, in general, rise above the water surface.

Upland Elevated (e.g., mountainous) land.

Water-bearing Containing water within void spaces.

9. UNITS AND ABBREVIATIONS

<	Less than
>	More than
AENV	Alberta Environment
AEP	Alberta Environmental Protection
AEPEA or EPEA	Alberta Environmental Protection and Enhancement Act
AEUB or EUB	Alberta Energy and Utilities Board
ARC	Alberta Research Council
asl or ASL	Above sea level
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Ca	Calcium
CCME	Canadian Council of Ministers of the Environment
cm	Centimetre
cm/s	Centimetres per second
CNRL	Canadian Natural Resources Ltd.
d	Day
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
e.g.	For example
EIA	Environmental Impact Assessment
ESR	Environmental Setting Report
et al.	Group of authors
Golder	Golder Associates Ltd.
h or hr	Hour
H_2S	Hydrogen sulphide
i.e.	That is
JEMA	Jackpine Expansion Mining Area
K	Potassium

kg	Kilogram
km	Kilometre
L	Litre
LSA	Local Study Area
m/m	Metres/metre
m/s	Metres per second
m^2	Square metres
m^3	Cubic metres
m^3/year	Cubic metres per year
m^3/d	Cubic metres per day
m^3/s	Cubic metres per second
masl	Metres above sea level
mbsl	Metres below sea level
mbgs	Metres below ground surface
MDL	Method detection limit
meq	Milliequivalents
Mg	Magnesium
mg	Milligrams
mg/L	Milligrams per litre
N	Nitrogen
N/A and n/a	Not applicable
Na	Sodium
ND	Not detected
P	Phosphorus
PAH	Polycyclic Aromatic Hydrocarbons
PANH	Polycyclic aromatic nitrogen heterocycles
PHCs	Petroleum Hydrocarbons
PRMA	Pierre River Mining Area

ppm	Parts per million
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
RSA	Regional Study Area
s	Second
SAGD	Steam Assisted Gravity Drainage
SO_4	Sulphate
Suncor	Suncor Energy Inc.
Syncrude	Syncrude Canada Ltd.
TDS	Total Dissolved Solids
TEH	Total Extractable Hydrocarbons
TPH	Total Petroleum Hydrocarbons
Twp.	Township
VOC	Volatile Organic Compound
W4M	West of the Fourth Meridian
µS/cm	Microsiemens per centimetre
°C	Temperature in degrees Celsius

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Tables

WorleyParsons Komex

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Table 1

Jackpine Expansion Mining Area - Monitoring Well Names

PROJECT NO.: F35772801

Installation Name	Revised Name	Northing	Easting
Shallow Quaternary			
P06-1620-4	P06-1620-SQ	6354386.05	480363.79
P06-1623-4	P06-1623-SQ	6354943.14	478551.2
P06-1629-4	P06-1629-SQ	6355831.65	483697.68
P06-1639-4	P06-1639-SQ	6359166.82	486419.46
P06-1641-21	P06-1641-SQ	6359224.89	477356
P06-1650-11	P06-1650-SQ	6360444.477	480954.78
P06-1655-5	P06-1655-SQ	6360967.62	485222.9
P06-1664-5	P06-1664-SQ	6361568.5	483411.46
P06-1672-25	P06-1672-SQ	6362877.87	478325.55
P06-1699-5	P06-1699-SQ	6364613.76	482408.45
1721	SH07-1721-SQ	6364907.44	486635.09
Deep Quaternary			
P06-1629-13	P06-1629-DQ	6355830.44	483698.81
SH06-1641-DQ	SH06-1641-DQ	6359204.12	477332.88
P06-1650-19	P06-1650-DQ	6360443.688	480952.0713
SH06-1672-DQ	SH06-1672-DQ	6362857.6	478339.66
P06-1699-14	P06-1699-DQ	6364611.96	482406.83
1712-Quat	SH07-1712-DQ	6365284.55	480308.85
Pleistocene Channel			
SH06-1638	SH06-1638-PC	6358657.85	483998.19
SH06-1663	SH06-1663-PC	6361636.084	482801.928
SH06-1698	SH06-1698-PC	6364086.72	488266.09
SH06-1720	SH06-1720-PC	6366535.75	486441.49
Basal Aquifer			
SH06-1620	SH06-1620-BS	6354355.22	480346.07
SH06-1636	SH06-1636-BS	6358647.43	482797.76
SH06-1641-BS	SH06-1641-BS	6359206.13	477325.59
SH06-1655-D	SH06-1655-BS	6361003.79	485235.62
SH06-1672-BS	SH06-1672-BS	6362859.18	478332.73
SH06-1699-BS	SH06-1699-BS	6364629.11	482386.63
SH07-1712-Basal	SH07-1712-BS	6365281.39	480318.43
Devonian			
SH06-1641-D	SH06-1641-D	6359203.89	477345.11
SH06-1655-E	SH06-1655-D	6360987.938	485239.18
SH06-1699-D	SH06-1699-D	6364632.84	482393.92

NOTES:

"SQ" series wells denote shallow quaternary completion.
"DQ" series wells denote deep quaternary completion.
"PC" series wells denote Pleistocene Channel completion.
"BS" series wells denote Basal Aquifer completion.
"D" series wells denote Devonian completion.

Table 2

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
Jackpine Expansion Mining Area											
QUATERNARY											
Shallow											
P06-1620-SQ	288.03	288.92	0.89	5.25	2.1-5.25	14-Mar-06	0.96	0.07	287.96	1.0E-04	Muskeg
						25-May-07	0.88	-0.01	288.04		
P06-1623-SQ	285.66	286.76	1.10	4.50	1.35-4.50	15-Mar-06	2.57	1.47	284.20	6.5E-04	Sand and Gravel
						25-May-07	1.24	0.14	285.52		
P06-1629-SQ	294.00	294.93	0.93	3.75	1.00-3.75	14-Mar-06	1.25	0.32	293.68	4.3E-05	Muskeg
						25-May-07	0.97	0.04	293.96		
P06-1639-SQ	294.90	295.94	1.04	3.75	1.90-3.75	15-Mar-06	1.12	0.07	294.83	1.7E-04	Muskeg
						25-May-07	1.02	-0.02	294.92		
P06-1641-SQ	347.71	348.43	0.72	20.70	16.65-20.70	17-Mar-06	18.50	17.78	329.93	1.1E-04	Sand
						25-May-07	18.66	17.94	329.77		
P06-1650-SQ	288.78	289.42	0.64	11.60	7.70-11.60	15-Mar-06	1.43	0.78	288.00	1.2E-03	Sand and Gravel
						25-May-07	1.27	0.63	288.15		
P06-1655-SQ	292.92	293.57	0.65	5.13	1.12-5.13	14-Mar-06	1.85	1.20	291.72	2.5E-04	Sand
						25-May-07	1.10	0.45	292.47		
P06-1664-SQ	288.36	289.76	1.40	5.25	3.5-5.25	14-Mar-06	1.63	0.23	288.14	4.0E-05	Silty Sand
						25-May-07	1.54	0.14	288.22		
P06-1672-SQ	350.02	350.75	0.73	24.95	11.75-24.95	13-Mar-06	21.56	20.83	329.20	3.5E-04	Sand
						25-May-07	21.50	20.77	329.25		
P06-1699-SQ	291.50	292.17	0.67	5.64	2.25-5.64	15-Mar-06	0.94	0.27	291.23	3.6E-04	Sand
						25-May-07	0.91	0.24	291.26		
SH07-1721-SQ	292.19	293.01	0.82	13.00	8.0-13.0	20-Mar-07	1.48	0.66	291.53	2.2E-03	N/A
						25-May-07	1.16	0.34	291.85		
Deep											
P06-1629-DQ	294.04	294.74	0.70	13.25	11.40-13.25	14-Mar-06	1.22	0.52	293.52	N/M	Clayey Sand (Oilsand)
						25-May-07	0.63	-0.07	294.11		
SH06-1641-DQ	347.35	348.17	0.82	55.60	46.30-55.60	22-Mar-06	23.44	22.62	324.74	6.7E-04	N/A
						25-May-07	23.40	22.58	324.77		
P06-1650-DQ	288.71	289.14	0.43	19.32	16.85-19.32	15-Mar-06	1.15	0.72	287.99	1.1E-04	Sand and Gravel
						25-May-07	0.99	0.56	288.15		
SH06-1672-DQ	350.04	350.80	0.76	64.30	51.9-64.3	23-Mar-06	21.63	20.87	329.17	4.8E-05	N/A
						25-May-07	21.56	20.80	329.24		

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
P06-1699-DQ	291.53	292.36	0.83	14.40	2.5-14.40	15-Mar-06	1.21	0.38	291.15	5.4E-04	Sand
						25-May-07	1.17	0.34	291.19		
SH07-1712-DQ	339.35	340.22	0.87	60.00	50.0-60.0	19-Mar-07	29.97	29.10	310.25	N/M	N/A
						25-May-07	30.00	29.13	310.22		
PLEISTOCENE CHANNEL											
SH06-1638-PC	291.50	292.50	1.00	20.73	16.46-20.73	15-Mar-06	1.29	0.29	291.22	2.4E-04	Sand and Gravel
						25-May-07	1.01	0.01	291.49		
SH06-1663-PC	288.89	289.76	0.87	16.76	13.77-16.76	15-Mar-06	1.21	0.34	288.55	4.5E-04	Sand
						25-May-07	1.04	0.17	288.72		
SH06-1698-PC	293.39	294.28	0.89	32.51	30.05-32.51	15-Mar-06	1.93	1.04	292.36	2.0E-05	Sand
						25-May-07	0.89	0.00	293.39		
SH06-1720-PC	292.49	293.39	0.90	25.91	22.55-25.91	17-Mar-06	1.36	0.46	292.04	1.1E-03	Sand
						25-May-07	1.15	0.25	292.24		
McMURRAY FORMATION											
Basal Aquifer											
SH06-1620-BS	288.01	288.78	0.77	91.40	86.4-91.40	14-Mar-06	3.51	2.74	285.28	1.4E-04	Sand
						25-May-07	3.71	2.94	285.07		
SH06-1636-BS	289.20	289.99	0.79	74.80	61.10-74.80	15-Mar-06	2.18	1.39	287.81	N/A	Sand
						25-May-07	2.02	1.23	287.97		
SH06-1641-BS	347.49	348.23	0.74	113.79	106.9-113.79	22-Mar-06	65.58	64.84	282.66	N/M	Sand
						25-May-07	66.10	65.36	282.13		
SH06-1655-BS	293.08	293.81	0.73	66.50	55.0-66.5	14-Mar-06	4.67	3.94	289.14	4.6E-05	Sand
						25-May-07	4.71	3.98	289.10		
SH06-1672-BS	349.90	350.52	0.62	162.00	99.5-162.0	23-Mar-06	71.54	70.92	278.98	7.2E-06	Sand
						25-May-07	72.24	71.62	278.28		
SH06-1699-BS	291.69	292.54	0.85	66.00	55.5-66.0	23-Mar-06	4.81	3.96	287.73	2.1E-04	Sand
						25-May-07	4.97	4.12	287.57		
SH07-1712-BS	339.39	340.49	1.10	137.00	118.0-137.0	20-Mar-07	61.92	60.82	278.57	6.3E-05	Sand
						25-May-07	61.94	60.84	278.55		
DEVONIAN											
Waterways											
SH06-1641-D	347.30	348.13	0.83	136.54	118.24-136.54	22-Mar-06	73.44	72.61	274.69	N/M	Limestone
						25-May-07	78.94	78.11	269.19		
SH06-1655-D	292.81	293.66	0.85	92.70	80.7-82.7	15-Mar-06	13.90	13.05	279.76	N/M	Limestone

Table 2

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
						25-May-07	26.89	26.04	266.77		
SH06-1699-D	291.35	292.42	1.07	92.50	82.45-92.5	23-Mar-06	85.68	84.61	206.74	N/M	Limestone
						25-May-07	16.90	15.83	275.52		
Jackpine Mine - Phase 1											
QUATERNARY											
P01-903A	319.66	320.46	0.80	10.84	7.47-10.84**	16-Sep-01	9.11	8.31	311.35	5.7E-05	
						25-Jun-07	10.56	9.76	309.90		
P01-903B	319.55	320.35	0.80	19.35	7.92-20.6**	16-Sep-01	9.01	8.21	311.34	6.5E-04	
P01-904A	318.26	319.12	0.86	10.78	7.39-10.78**	14-Sep-01	9.78	8.92	309.34	3.1E-05	
						11-Feb-02	9.78	8.92	309.34		
P01-905A	305.77	306.66	0.89	3.21	1.2-3.21**	16-Sep-01	1.04	0.15	305.62	2.0E-07	
						26-Jun-07	3.27	2.38	303.39		
P01-905B	305.73	306.6	0.87	5.94	4.24-5.94**	14-Sep-01	0.95	0.08	305.65	3.8E-06	
						26-Jun-07	3.14	2.27	303.46		
P01-906A	289.64	290.64	1.00	3.35	1.52-3.35**	13-Sep-01	1.01	0.01	289.63	2.4E-07	
P01-909A	307.00	307.70	0.70	3.67	1.93-3.67**	12-Sep-01	2.28	1.58	305.42	2.4E-06	
						11-Feb-02	2.57	1.87	305.13		
P01-909B	307.04	307.86	0.82	6.09	4.27-6.09**	12-Sep-01	2.81	1.99	305.05	7.5E-06	
						11-Feb-02	2.99	2.17	304.87		
P01-910A	280.37	281.02	0.65	3.86	1.37-5.30**	13-Sep-01	0.895	0.25	280.13	3.5E-05	
1390006 (PG1) [4]	320.74	321.94	1.20	2.40	1.3-2.4**	5-Mar-90	1.80	0.60	320.14	1.1E-07	
			1.62			2-Aug-01	1.64	0.44	320.30		
1390006 (PG2) [4]	320.74	321.64	0.90	10.00	7.8-10.0**	5-Mar-90	1.78	0.88	319.86	2.7E-08	
			1.08			2-Aug-01	1.18	0.28	319.56		
1390008 (PG1) [4]	322.88	323.92	1.04	4.10	3.1-4.1**	10-Mar-90	1.50	0.46	322.42	1.4E-07	
						26-Jun-07	1.50	0.46	322.42		
1390008 (PG2) [4]	322.86	324.37	1.51	7.90	5.9-7.9**	10-Mar-90	1.75	0.24	322.62	2.3E-08	
						26-Jun-07	1.54	0.03	322.83		
1390202 (PG1) [4]	319.68	320.68	1.00	4.37	1.37-4.37**	23-Feb-90	2.01	1.01	318.67	8.7E-08	
						3-Aug-01	1.06	0.06	319.62		
						26-Jun-07	1.10	0.10	319.58		
1390202 (PG2) [4]	319.79	320.84	1.05	7.60	4.2-7.6**	23-Feb-90	1.40	0.35	319.44	6.3E-08	
						3-Aug-01	1.30	0.25	319.54		
						26-Jun-07	1.34	0.29	319.50		

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1390211 (PG1) [4]	324.87	326.19	1.32	2.90	2.2-2.9**	5-Mar-90	1.77	0.45	324.42	N/A	
			1.34			8-Aug-01	1.39	0.07	324.80		
1390211 (PG2) [4]	324.84	325.95	1.11	4.30	3.3-4.3**	5-Mar-90	1.66	0.55	324.29	N/A	
1390214 (PG1) [4]	318.35	319.39	1.04	3.00	2.0-3.0**	18-Apr-90	1.36	0.32	318.03	9.3E-07	
						3-Aug-01	1.15	0.11	318.24		
						26-Jun-07	1.19	0.15	318.20		
1390214 (PG2) [4]	318.43	319.68	1.25	4.20	3.20-4.20**	18-Apr-90	1.66	0.41	318.02	1.9E-07	
1390501 (PG2) [4]	325.97	327.26	1.29	4.63	3.20-4.63**	17-Apr-90	1.95	0.66	325.31	8.1E-08	
1390502 (PG2) [4]	323.28	324.53	1.25	5.10	4.0-5.10**	23-Feb-90	1.94	0.69	322.59	N/A	
1390503 (PG1) [4]	321.63	322.67	1.04	3.37	1.92-3.50**	6-Mar-90	1.33	0.29	321.34	1.1E-07	
1390503 (PG2) [4]	321.78	322.70	0.92	18.50	9.5-19.8**	6-Mar-90	1.41	0.49	321.29	1.8E-09	
1390504 (PG1) [4]	318.33	318.69	0.36	3.60	2.6-3.6**	6-Mar-90	0.72	0.36	317.97	6.1E-08	
1390504 (PG2) [4]	318.21	319.71	1.50	6.00	4.5-6.0**	7-Mar-90	2.08	0.58	317.63	3.3E-07	
1390505 (PG1) [4]	324.46	325.51	1.05	2.75	0.75-2.75**	18-Apr-90	2.20	1.15	323.31	3.1E-08	
						26-Jun-07	1.47	0.42	324.04		
1390505 (PG2) [4]	324.47	325.52	1.05	16.20	6.2-16.2**	18-Apr-90	2.10	1.05	323.42	9.0E-09	
1390506 (PG1) [4]	322.16	323.07	0.91	3.00	1.0-3.4**	2-Mar-90	1.91	1.00	321.16	7.1E-08	
1390506 (PG2) [4]	322.02	323.01	0.99	4.40	3.7-4.4**	2-Mar-90	1.87	0.88	321.14	1.0E-07	
1390508 (PG1) [4]	319.24	320.41	1.17	2.80	1.8-2.8**	28-Feb-90	2.17	1.00	318.24	8.5E-07	
						26-Jun-07	2.21	1.04	318.20		
1390704-#3 [4]	327.35	328.40	1.05	2.00	0.4-2.10**	17-Apr-90	2.97	1.92	325.43	7.4E-06	
1390704-#4 (PN) [4]	327.36	328.28	0.92	3.95	3.2-4.0**	17-Apr-90	2.72	1.8[†]	325.56	N/A	
1390705 (PG1) [4]	329.40	330.47	1.07	5.00	3.5-5.0**	17-Apr-90	3.43	2.36	327.04	2.4E-08	
						26-Jun-07	1.72	0.65	328.75		
1390705-#3 (PN) [4]	329.58	330.78	1.20	12.00	11.5-12.5**	17-Apr-90	7.79	6.59[†]	322.99	N/A	
						26-Jun-07	8.16	6.96	322.62		
3089505 (PG2) [4]	326.20	326.80	0.60	6.00	1.50-6.00**	19-Apr-90	1.00	0.40	325.80	3.4E-07	
3089508 (PG2) [4]	330.90	331.60	0.70	6.90	1.50-6.90**	19-Apr-90	1.52	0.82	330.08	1.0E-07	
3089510 (PG1) [4]	335.20	335.54	0.34	3.90	1.5-3.9**	19-Apr-90	0.70	0.36	334.84	2.2E-05	
3090005 (PG1) [4]	334.00	334.65	0.65	2.75	1.5-2.75**	4-Mar-90	1.62	0.97	333.03	3.2E-07	
3090005 (PG2) [4]	333.99	335.19	1.20	15.10	9.1-15.1**	4-Mar-90	1.50	0.30	333.69	6.4E-09	

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3090211 (PG1) [4]	326.48	327.58	1.10	3.05	1.1-3.1**	5-Mar-90	2.02	0.92	325.56	7.4E-07	
3090211 (PG2) [4]	326.57	327.32	0.75	7.45	6.9-7.5**	10-Mar-90	1.49	0.74	325.83	1.4E-08	
3090500 (PG1) [4]	323.01	324.11	1.10	3.00	1.45-3.05**	3-Mar-90	1.52	0.42	322.59	9.5E-07	
3090500 (PG2) [4]	323.12	324.22	1.10	4.32	3.70-4.37**	3-Mar-90	1.65	0.55	322.57	6.9E-07	
3090501 (PG1) [4]	327.14	328.34	1.20	2.82	1.40-2.87**	3-Mar-90	1.69	0.49	326.65	3.6E-07	
3090501 (PG2) [4]	327.10	328.10	1.00	9.66	4.83-9.66**	3-Mar-90	1.38	0.38	326.72	6.9E-08	
3090502 (PG1) [4]	320.91	321.96	1.05	2.90	1.9-2.9**	3-Mar-90	1.99	0.94	319.97	9.3E-07	
3090502 (PG2) [4]	322.11	323.31	1.20	25.80	24.0-25.8**	3-Mar-90	2.21	1.01	321.10	3.0E-08	
3090503 (PG1) [4]	326.04	327.06	1.02	3.00	1.50-3.05**	3-Mar-90	1.75	0.73	325.31	2.7E-07	
3090503 (PG2) [4]	326.08	327.26	1.18	12.10	10.8-12.1**	3-Mar-90	1.50	0.32	325.76	6.7E-08	
3090504 (PG1) [4]	325.34	326.44	1.10	4.00	2.9-4.0**	4-Mar-90	1.67	0.57	324.77	3.0E-08	
3090504 (PG2) [4]	325.29	326.19	0.90	5.90	4.4-6.0**	4-Mar-90	1.77	0.87	324.42	8.0E-09	
3090505 (PG1) [4]	328.63	329.83	1.20	2.80	2.3-3.0**	9-Mar-90	2.34	1.14	327.49	3.6E-08	
3090505 (PG2) [4]	328.57	329.58	1.01	7.40	4.2-7.4**	9-Mar-90	2.17	1.16	327.41	4.6E-08	
3090506 (PG1) [4]	330.85	331.75	0.90	2.50	1.5-2.5**	19-Apr-90	1.67	0.77	330.08	5.1E-08	
3090506 (PG2) [4]	330.81	331.81	1.00	12.00	8.0-12.2**	19-Apr-90	1.50	0.50	330.31	2.7E-06	
3189220 (PG2) [4]	328.30	329.01	0.71	6.19	4.25-6.19**	23-Feb-90	1.46	0.75	327.55	6.4E-07	
ARC7-32 [2]	324.41	326.56	2.15	9.75	6.75-9.75**	8-Aug-01	2.52	0.37	324.04	N/A	
SH06-4004B	325.04	325.84	0.80	10.7	7.6-10.7	19-Mar-06	2.66	1.86	323.18	N/A	
SH06-4007	321.32	322.44	1.12	8.1	5-8.1	19-Mar-06	2.33	1.21	320.11	N/A	
SH06-4009B	319.15	320.06	0.91	8.2	5.5-8.2	N/A	N/A	N/A	N/A	N/A	
SH06-4014	314.71	315.54	0.83	10.7	7.6-10.7	11-Mar-06	1.29	0.46	314.25	N/A	
SH06-4017	316.16	316.93	0.77	27.1	21.4-27.1	19-Mar-06	8.05	7.28	308.88	N/A	
SH06-4020	314.07	314.87	0.80	4.4	3.5-4.4	19-Mar-06	2.92	2.12	311.95	N/A	
SH06-4021	313.77	314.55	0.78	9.1	6.1-9.1	19-Mar-06	1.96	1.18	312.59	N/A	
SH06-4022	311.66	312.57	0.91	5.8	4.6-5.8	19-Mar-06	2.27	1.36	310.30	N/A	
SH06-4024	314.11	315.00	0.89	41.8	38.7-41.8	19-Mar-06	2.71	1.82	312.29	N/A	
SH06-4029B	316.48	317.26	0.78	9.8	6.7-9.8	19-Mar-06	N/M	flowing	N/A	N/A	
SH06-4030B	318.88	319.64	0.76	6.4	3.4-6.4	19-Mar-06	1.99	1.23	317.65	N/A	

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
SH06-4033	323.69	324.63	0.94	12.8	9.8-12.8	19-Mar-06	1.39	0.45	323.24	N/A	
SH06-4035	326.35	327.05	0.70	12.2	9.1-12.2	19-Mar-06	1.78	1.08	325.27	N/A	
SH06-4036	326.44	327.3	0.86	7	4.0-7.0	19-Mar-06	N/M	frozen	N/A	N/A	
SH06-4041	325.79	326.67	0.88	5.8	5.3-5.8	19-Mar-06	N/M	frozen	N/A	N/A	
SH06-4046	325.98	326.86	0.88	7.9	6.4-7.9	19-Mar-06	0.88	0.00	325.98	N/A	
SH06-4053B	321.67	322.65	0.98	16	13.0-16.0	19-Mar-06	4.63	3.65	318.02	N/A	
SH06-4066	316.9	317.95	1.05	17.3	14.2-17.3	2-Mar-06	2.18	1.12	315.78	N/A	
SH07-4059	315.33	316.43	1.10	10.8	7.8-10.8	28-Mar-07	3.42	2.32	313.01	N/A	
SH07-4061	314.33	314.96	0.63	11.9	8.8-11.9	30-Mar-07	2.50	1.87	312.46	N/A	
SH07-4062	313.69	314.72	1.03	6.3	4.7-6.3	28-Mar-07	1.52	0.49	313.20	N/A	
SH07-4089	313.75	314.56	0.81	7	5.5-7.0	29-Mar-07	3.28	2.47	311.28	N/A	
SH07-4090	315.46	317.85	2.39	48.9	48.3-48.9	26-Mar-07	N/M	flowing	N/A	N/A	
PLEISTOCENE CHANNEL											
1389013 [3 4]	N/A	N/A	N/A	N/A	N/A	24-Feb-90	N/A	N/A	317.93	N/A	
1389020 [3 4]	N/A	N/A	N/A	N/A	N/A	24-Feb-90	N/A	N/A	317.88	N/A	
1389204 [3 4]	Pleistocene Channel Aquifer Well, Completion details and groundwater levels not available										
1389504 [3 4]	Pleistocene Channel Aquifer Well, Completion details and groundwater levels not available										
1389222 (PFS) [3 4]	322.41	323.52	1.11	29.36	9.0-35.4**	17-Apr-90	5.48	4.37	318.04	1.9E-05	
						27-Jun-07	6.58	5.47	316.94		
1390008 (PFS) [3 4]	322.79	323.63	0.84	42.40	8.8-42.4**	18-Apr-90	4.98	4.14	318.65	5.0E-06	
						27-Jun-07	5.70	4.86	317.93		
1390202 (PFS) [3 4]	319.77	320.32	0.55	24.40	9.0-26.7**	17-Apr-90	2.89	2.34	317.43	4.0E-07	
						3-Aug-01	2.72	2.17	317.60		
						26-Jun-07	3.69	3.14	316.63		
1390500 (PFS) [3 4]	320.74	321.49	0.75	35.81	2.70-35.81**	17-Apr-90	3.68	2.93	317.81	2.1E-07	
						26-Jun-07	4.71	3.96	316.78		
1390501 (PFS) [3 4]	325.86	326.51	0.65	32.60	14.6-32.6**	17-Apr-90	8.45	7.80	318.06	2.7E-05	
						26-Jun-07	9.62	8.97	316.89		
1390502 (PFS) [3 4]	323.25	324.51	1.26	32.57	11.58-37.64**	17-Apr-90	6.38	5.12	318.13	5.1E-07	
1390503 (PFS) [3 4]	321.51	322.36	0.85	31.40	20.1-35.0**	17-Apr-90	3.96	3.11	318.40	9.6E-06	
1390700 [3 4]	327.15	327.80	0.65	37.70	17.1-37.7**	N/A	9.82	9.17	317.98	N/A	

Table 2

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
						26-Jun-07	10.70	10.05	317.10		
1390701 (PFS) [3 4]	327.08	327.89	0.81	42.10	17.4-42.1**	17-Apr-90	9.88	9.07	318.01	7.5E-05	
						3-Aug-01	9.86	9.05	318.03		
						26-Jun-07	10.71	9.90	317.18		
1390701-#1 (PN) [3 4]	326.87	327.95	1.08	14.30	13.9-14.81**	17-Apr-90	9.50	8.42†	318.45	N/A	
1390701-#2 [3 4]	326.84	327.93	1.09	7.72	5.40-8.12**	17-Apr-90	7.03	5.94	320.90	2.1E-06	
						3-Aug-01	2.57	1.48	325.36		
						26-Jun-07	7.75	6.66	320.18		
1390701-#3 [3 4]	326.95	328.01	1.06	14.74	11-15**	17-Apr-90	7.57	6.51	320.44	5.0E-07	
						3-Aug-01	7.63	6.57	320.38		
1390702 (PFS) [3 4]	327.20	327.94	0.74	43.60	12.2-44.8**	17-Apr-90	9.92	9.18	318.02	2.9E-05	
1390702-#1 (PN) [3 4]	327.21	327.79	0.58	12.25	11.87-12.50**	17-Apr-90	7.38	6.8†	320.41	N/A	
1390702-#2 [3 4]	327.28	327.98	0.70	11.96	10.33-11.96**	17-Apr-90	7.61	6.91	320.37	2.5E-08	
1390702-#3 [3 4]	327.33	328.17	0.84	10.22	8.70-10.22**	17-Apr-90	7.38	6.54	320.79	1.3E-07	
1390703 (PFS) [3 4]	326.42	327.20	0.78	50.60	12.0-50.6**	17-Apr-90	9.14	8.36	318.06	4.0E-06	
1390704 (PFS) [3 4]	327.34	328.12	0.78	39.60	11.6-40.8**	17-Apr-90	10.14	9.36	317.98	5.3E-05	
1390704-#1 (PN) [3 4]	327.38	328.12	0.74	14.40	14.15-14.60**	17-Apr-90	N/A	7.1†	320.28	N/A	
1390704-#2 [3 4]	327.44	328.39	0.95	12.00	7.3-12.0**	17-Apr-90	5.31	4.36	323.08	1.1E-08	
						26-Jun-07	8.07	7.12	320.32		
1390705 (PFS) [3 4]	329.49	330.43	0.94	47.20	18.9-47.2**	17-Apr-90	12.40	11.46	318.03	9.2E-05	
						26-Jun-07	10.94	10.00	319.49		
1390705-#2 (PN) [3 4]	329.58	330.16	0.58	7.50	7.0-7.9**	17-Apr-90	3.18	2.6†	326.98	N/A	
3089217 (PFS/PG2) [4]	324.70	325.30	0.60	6.19	2.59-6.19**	19-Apr-90	0.70	0.10	324.60	9.2E-07	
3189211 [3 4]	Pleistocene Channel Aquifer Well, Completion details and groundwater levels not available										
3189214 [3 4]	Pleistocene Channel Aquifer Well, Completion details and groundwater levels not available										
3189221 [3 4]	N/A	N/A	N/A	N/A	N/A	24-Feb-90	N/A	N/A	323.46	N/A	
3189230 (PFS) [3 4]	335.70	336.58	0.88	32.60	8.90-32.60**	18-Apr-90	6.80	5.92	329.78	1.9E-08	
3190016 (PFS) [4]	330.25	331.23	0.98	40.20	12.6-40.2**	1-Feb-90	12.40	11.42	318.83	N/A	
3190326 (PFS) [3 4]	335.97	336.77	0.80	23.62	8.23-23.62**	23-Feb-90	1.70	0.90	335.07	N/A	
ARC SHELL PW-2 [2]	321.11	321.11	0.00	31.40	16-22	10-Aug-72	3.00	3.00	318.11	N/A	
WELL #1 [1]	329.79 [5]	329.99 [5]	0.20	45.23	31.51-45.23	28-Feb-85	9.31	9.11	320.68 [5]	N/A	

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
WELL #2 [1]	330.64 [5]	330.95 [5]	0.31	10.97	9.45-10.97	26-Feb-85	2.84	2.53	328.11 [5]	1.7E-05	
WELL #3 [1]	331.23 [5]	331.58 [5]	0.35	16.46	14.94-16.46	26-Feb-85	3.98	3.63	327.60 [5]	2.3E-04	
WELL #4 [1]	330.77 [5]	331.58 [5]	0.81	43.28	38.71-43.28	28-Feb-85	15.49	14.68	316.09 [5]	9.1E-06	
WELL #6 [1]	331.14 [5]	331.75 [5]	0.61	42.89	29.17-42.89	26-Feb-85	19.30	18.69	312.45 [5]	2.2E-05	
SH06-4001	323.69	324.55	0.86	34	30.9-34	19-Mar-06	7.33	6.47	317.22	N/A	
SH06-4002	328.08	328.93	0.85	45.5	42.4-45.5	19-Mar-06	11.62	10.77	317.31	N/A	
SH06-4003A	325.87	326.83	0.96	40.7	37.7-40.7	3-Mar-06	9.35	8.39	317.48	N/A	
SH06-4003B	325.87	326.76	0.89	25.4	22.4-25.4	3-Mar-06	9.27	8.38	317.49	N/A	
SH06-4004A	325.01	325.89	0.88	31.7	28.7-31.7	19-Mar-06	8.47	7.59	317.42	N/A	
SH06-4005	322.3	323.13	0.83	28.4	25.3-28.4	19-Mar-06	5.71	4.88	317.42	N/A	
SH06-4006	321.71	322.54	0.83	28	25-28	19-Mar-06	5.05	4.22	317.49	N/A	
SH06-4009A	319.14	319.96	0.82	19.5	16.5-19.5	19-Mar-06	2.44	1.62	317.52	N/A	
SH06-4011	317.06	318.1	1.04	16.6	15.7-16.6	19-Mar-06	N/A	frozen	N/M	N/A	
SH06-4013	316.28	317.25	0.97	6.4	4.8-6.4	10-Mar-06	1.22	0.25	316.03	N/A	
SH06-4015	314.67	315.58	0.91	30.2	28.7-30.2	19-Mar-06	5.88	4.97	309.70	N/A	
SH06-4016	313.49	314.35	0.86	8.1	5-8.1	19-Mar-06	4.43	3.57	309.92	N/A	
SH06-4018	315.09	316.11	1.02	10.7	9.1-10.7	19-Mar-06	7.85	6.83	308.26	N/A	
SH06-4019	313.75	314.61	0.86	9.4	6.3-9.4	19-Mar-06	5.64	4.78	308.97	N/A	
SH06-4023	313.74	314.52	0.78	7.4	5.9-7.4	19-Mar-06	N/A	frozen	N/M	N/A	
SH06-4025A	315.25	316.13	0.88	30.5	27.4-30.5	19-Mar-06	1.46	0.58	314.67	N/A	
SH06-4025B	315.24	316	0.76	21.9	18.9-21.9	19-Mar-06	7.25	6.49	308.75	N/A	
SH06-4026A	316.44	317.21	0.77	27.1	25.6-27.1	19-Mar-06	N/M	flowing	N/M	N/A	
SH06-4026B	316.55	317.04	0.49	23.8	20.5-23.8	19-Mar-06	N/M	flowing	N/M	N/A	
SH06-4027	316.55	317.3	0.75	27.9	24.9-27.9	19-Mar-06	N/M	flowing	N/M	N/A	
SH06-4029A	316.48	317.24	0.76	31.3	28.2-31.3	19-Mar-06	N/M	flowing	N/M	N/A	
SH063-4030A	318.65	319.71	1.06	19.8	16.8-19.8	19-Mar-06	2.03	0.97	317.68	N/A	
SH06-4031A	319.13	319.97	0.84	27.7	24.7-27.7	19-Mar-06	2.83	1.99	317.14	N/A	
SH06-4031B	318.09	319.84	1.75	11.6	8.5-11.6	19-Mar-06	1.60	-0.15	318.24	N/A	
SH06-4031PW	319.25	320.33	1.08	28	16.0-28.0	24-Mar-06	2.29	1.21	318.04	N/A	

Table 2

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
SH06-4043	325.54	326.32	0.78	8.2	6.7-8.2	19-Mar-06	7.86	7.08	318.46	N/A	
SH06-4051	322.14	322.92	0.78	29.9	26.8-29.9	19-Mar-06	5.41	4.63	317.51	N/A	
SH06-4053A	321.57	322.57	1.00	28.3	25.3-28.3	19-Mar-06	4.87	3.87	317.70	N/A	
SH06-4062	322.23	323.02	0.79	28	25.0-28.0	17-Mar-06	4.90	4.11	318.12	N/A	
SH06-4063	321.18	322.02	0.84	29	25.9-29.0	21-Mar-06	4.10	3.26	317.92	N/A	
SH06-4064	321.2	322.16	0.96	21	18.0-21.0	16-Mar-06	4.26	3.30	317.90	N/A	
SH06-4067	318.43	319.2	0.77	22.4	19.3-22.4	21-Mar-06	1.33	0.56	317.87	N/A	
SH06-4068	314.48	315.29	0.81	5.9	5.0-5.9	21-Mar-06	1.12	0.31	314.17	N/A	
SH06-4069	317.05	317.88	0.83	11.9	8.8-11.9	19-Mar-06	7.74	6.91	310.14	N/A	
SH06-4070	312.61	313.47	0.86	6.4	4.9-6.4	19-Mar-06	2.21	1.35	311.26	N/A	
SH06-4071	315.41	316.2	0.79	14	11.0-14.0	20-Mar-06	4.22	3.43	311.98	N/A	
SH06-4072	316.99	317.77	0.78	6.5	4.9-6.5	20-Mar-06	2.15	1.37	315.62	N/A	
SH06-4074A	315.66	316.88	1.22	24.2	21.2-24.2	19-Mar-06	N/M	flowing	N/M	N/A	
SH06-4074B	316.22	316.97	0.75	16.2	13.2-16.2	19-Mar-06	8.33	7.58	308.64	N/A	
SH06-4074PW	316.05	317.12	1.07	34.1	25.0-34.0	19-Mar-06	N/M	flowing	N/M	N/A	
SH07-4057	316.04	317.06	1.02	6.4	3.4-6.4	30-Mar-07	1.78	0.76	315.28	N/A	
SH07-4085	315.67	316.57	0.90	5.2	4.3-5.2	27-Mar-07	1.51	0.61	315.06	N/A	
SH07-4086	315.26	316.07	0.81	5.9	2.9-5.9	27-Mar-07	2.34	1.53	313.73	N/A	
SH07-4087A	314.81	315.86	1.05	18.6	17.1-18.6	27-Mar-07	2.61	1.56	313.25	N/A	
SH07-4087B	314.83	315.87	1.04	12.7	11.4-12.7	27-Mar-07	2.67	1.63	313.20	N/A	
SH07-4088	316.08	316.95	0.87	12.7	11.4-12.7	4-Mar-07	0.86	-0.01	316.09	N/A	
SH07-4091	317.86	318.86	1.00	22.1	19.1-22.1	1-Apr-07	4.10	3.10	314.76	N/A	
SH07-4092	315.77	318.87	3.10	27	26.1-27.0	31-Mar-07	N/M	flowing	N/M	N/A	
SH07-4093	318.4	319.37	0.97	32.2	29.1-32.2	31-Mar-07	1.63	0.66	317.74	N/A	
McMURRAY FORMATION											
Oil Sands/Intra-Orebody											
P01-904C	317.88	318.88	1.00	25.9	22.3-25.9**	16-Sep-01	10.85	9.85	308.03	N/A	
						11-Feb-02	10.69	9.69	308.19		
P01-906C	289.66	290.56	0.90	7.65	5.79-8.38**	14-Sep-01	0.98	0.08	289.58	1.3E-07	
P01-910C	280.43	281.08	0.65	8.48	6.55-8.48**	13-Sep-01	0.98	0.33	280.11	1.8E-08	

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
16-20-95-08 P-2 [1]	329.26 [5]	330.06 [5]	0.8	71.8	65.5-71.8**	26-Feb-85	12.47	11.67	317.59 [5]	1.2E-05	
ARC7-135 [2]	326.14	327.31	1.17	41.2	35.4-41.2**	7-Aug-01	4.59	3.42	322.72	N/A	
Basal Aquifer											
P00-3D	319.25	320.16	0.91	119.62	93.5-119.62**	28-Sep-01	8.43	7.52	311.73	N/A	
P01-902D	315.42	316.37	0.95	117.5	103.5-117.5**	27-Sep-01 9-Feb-02 25-Jun-07	14.00 10.37 23.88	13.05 9.42 22.93	302.37 306.00 292.50	2.8E-04	
P01-905D	305.56	306.56	1.00	120	109.2-122.4**	27-Sep-01 9-Feb-02	10.64 11.20	9.64 10.20	295.92 295.36	N/A	
P01-909D	307.30	308.25	0.95	146.3	134.3-146.3**	26-Sep-01 9-Feb-02	12.26 12.71	11.31 11.76	296.00 295.54	N/A	
12-04-95-08 [1]	343.79 [5]	344.20 [5]	0.41	95.1	87.7-95.1	24-Feb-85	23.17	22.76	321.03 [5]	2.1E-04	
07-07-95-08 [1]	327.80 [5]	328.45 [5]	0.65	N/A	N/A	8-Aug-01	9.10	8.45	319.35 [5]	N/A	
05-20-95-08 [1]	328.94 [5]	329.36 [5]	0.42	105.8	88.5-91.0 100.9-105.8	25-Feb-85	8.58	8.16	320.78 [5]	N/A	
07-20-95-08 [1]	327.12 [5]	327.36 [5]	0.24	118.5	69.4-73.8 86.8-92.3 101.4-118.5	26-Feb-85	10.59	10.35	316.77 [5]	N/A	
08-20-95-08 [1]	329.42 [5]	330.18 [5]	0.76	112.7	100.5-112.7	26-Feb-85	4.32	3.56	325.86 [5]	1.3E-05	
ARC6-220 [2]	299.93	300.37	0.44 1.35	66.45	58.83-64.92	9-Feb-75 17-Aug-01 25-Jun-07	10.42 9.54 26.67	9.98 8.19 25.32	289.95 290.83 273.70	N/A	
ARC7-337 [2]	326.14 [9]	326.65	0.51 0.98	102.11	97.54-100.59	1-Feb-75 8-Aug-01	7.16 6.96	6.65 5.98	319.49 319.69	N/A	
12-20-95-08 [1]	331.72 [5]	332.06 [5]	0.34	118.5	107.2-108.4 112.4-118.5	25-Feb-85	9.00	8.66	323.06 [5]	2.4E-05	
13-20-95-08 [1]	331.63 [5]	332.09 [5]	0.46	96.8	91.8-96.8	28-Feb-85	9.49	9.03	322.60 [5]	1.8E-07	
SH06-4113B	316.39	317.20	0.81	165.5	159.5-165.5	26-Mar-06	28.81	28.00	288.39	N/A	
SH06-4130B	318.74	319.51	0.77	86.1	80.1-86.1	25-Mar-06	15.24	14.47	304.27	N/A	
DEVONIAN											
Waterways Formation											
P01-904E	317.94	318.94	1.00	121.26	116.3-121.26**	28-Sep-01 11-Feb-02	111.74 9.96	110.74 8.96	207.21 308.98	1E-11 to 2E-10	

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
P01-909E	307.18	308.12	0.94	162.4	158.5-162.4**	26-Sep-01 9-Feb-02	145.30 >50	144.36	162.82 < 258.12	<3.0E-11	
16-20-95-08 P-1 [1]	329.26 [5]	329.66 [5]	0.40	N/A	86.5-98.6	26-Feb-85	5.45	5.05	324.21	1.8E-14	
SH06-4015	322.3	323.11	0.81	122.5	116.4-122.5	19-Mar-06	10.42	9.61	312.69	N/A	
SH06-4113A	316.42	317.19	0.77	187.7	181.7-187.7	26-Mar-06	25.71	24.94	291.48	N/A	
SH06-4130A	318.7	319.48	0.78	108.3	102.3-108.3	26-Mar-06	64.35	63.57	255.13	N/A	
Watt Mountain Formation											
ARC6-310 [2]	299.93 [5]	301.43 [5]	1.5	94	69-94 [5]	17-Aug-01 26-Jun-07	10.27 23.87	8.77 22.37	291.16 [5] 277.53 [5]	N/A	
ARC7-594 [2]	326.14 [5]	327.29 [5]	1.15	181	156-181 [5]	7-Aug-01	36.96	35.81	290.33 [5]	N/A	
La Loche Formation											
01-911 (formerly 13-07-95-08) [4]	331.64 [5]	333.09 [5]	1.45	N/A	N/A	8-Aug-01	62.00	60.55	271.09 [5]	N/A	
ARC7-933 [2]	326.14 [5]	326.61	0.47	284	257-284 [5]	7-Aug-01	41.12	40.65	285.49 [5]	N/A	
Kearl Oil Sands Project											
QUATERNARY											
P04169707Q	339.18	339.77	0.59	4.30	0.41-4.5**	12-Mar-04	0.76	0.17	339.01	1.1E-07	Peat/Sand/Silty clay
P04169707Q1	339.10	340.01	0.91	8.70	5.00-9.00**	12-Mar-04	0.82	-0.09	339.19	1.4E-07	Clay
P06159607Q	372.03	372.88	0.85	5.25	1.84-5.25**	16-Mar-04	5.20	4.35	367.68	3.4E-06	Sandy clay/Silty sand
P06159607Q1	372.77	373.55	0.78	10.38	7.82-10.50**	16-Mar-04	6.20	5.42	367.35	8.8E-08	Sand
P06179607Q	335.48	336.55	1.07	2.53	0.74-3.00**	29-Mar-04	2.62	1.55	333.94	1.9E-06	Sandy clay
P06229707Q	357.28	358.21	0.93	6.66	3.25-6.71**	26-Mar-04	7.62	6.68	350.60	N/A	Clay
P06229707Q1	357.61	358.45	0.84	11.75	10.11-12.00**	26-Mar-04	9.37	8.53	349.08	2.6E-06	Clay/Sandy clay
P06319607Q	327.87	328.96	1.09	3.75	0.50-3.75**	17-Mar-04	2.01	0.92	326.96	2.7E-06	Clay till/Sand
P06319607Q1	327.79	328.66	0.87	8.83	6.70-9.05**	17-Mar-04	1.33	0.45	327.34	1.2E-06	Clay/Sand
P08079707Q	330.06	330.91	0.85	4.22	0.73-4.22**	12-Mar-04	3.66	2.80	327.26	8.2E-06	Sand
P08079707Q1	330.01	330.93	0.92	10.17	8.65-10.19**	12-Mar-04	3.78	2.86	327.15	1.0E-06	Sand
P08289607Q	356.73	357.69	0.96	5.33	1.75-5.33**	17-Mar-04	Dry	>5.33	<351.40	N/A	Sand/Sandy clay
P08289607Q1	356.53	357.29	0.76	8.96	6.95-9.00**	17-Mar-04	8.65	7.89	348.64	3.4E-05	Sand
P11229607Q	342.30	342.85	0.55	4.00	0.76-4.57**	15-Mar-04	0.66	0.11	342.19	5.8E-07	Peat/Sand/Clay
P11229607Q1	342.41	343.17	0.76	10.50	8.56-10.67**	16-Mar-04	1.26	0.50	341.91	4.8E-09	Clay

Table 2

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
P12359607Q	365.94	366.65	0.71	7.36	4.16-12.0**	13-Mar-04	7.96	7.25	358.69	N/A	Clayey sand/Sand
P12359607Q1	365.86	366.64	0.78	11.43	9.14-12.00**	13-Mar-04	7.97	7.19	358.67	1.5E-05	Sand
P14049607Q	397.15	397.93	0.78	4.56	1.18-4.88**	16-Mar-04	2.54	1.76	395.39	3.1E-06	Clayey sand/Clay till
P14049607Q1	397.19	398.05	0.86	10.50	8.68-10.50**	16-Mar-04	3.41	2.55	394.64	4.7E-07	Clayey sand/Silty sand
P14199607Q	329.70	330.56	0.86	4.06	0.75-4.06**	13-Mar-04	3.28	2.42	327.28	1.5E-05	Clay till/Sand
P14199607Q2	329.78	330.63	0.85	13.06	10.66-13.72**	13-Mar-04	4.73	3.88	325.90	5.4E-09	Clay till
P14209607Q	341.68	342.31	0.63	5.05	1.42-5.05**	12-Mar-04	4.40	3.77	337.91	3.3E-06	Sand
P14209607Q1	341.72	342.68	0.96	12.09	8.90-12.09**	12-Mar-04	5.24	4.28	337.45	5.4E-08	Silty sand/Clay till
P14259607Q	358.76	359.59	0.83	2.87	0.91-4.50**	13-Mar-04	1.30	0.47	358.29	2.1E-06	Sand
P16039707Q	388.95	389.92	0.97	4.52	0.97-4.52**	10-Mar-04	Dry	>4.52	<384.43	N/A	Sand/Clay till
P16039707Q1	389.13	390.00	0.87	12.60	10.39-13.50**	10-Mar-04	Dry	>12.60	<376.53	N/A	Sand
P16149707Q	352.66	353.69	1.03	2.55	0.86-3.00**	11-Mar-04	1.35	0.32	352.34	>1.0E-05	Muskeg/Sand
P16149707Q1	352.71	353.56	0.85	10.36	8.54-12.00**	11-Mar-04	1.25	0.40	352.31	>1.0E-05	Sand
P16229607Q	345.56	346.39	0.83	4.30	0.89-5.15**	13-Mar-04	1.81	0.98	344.58	1.4E-06	Clay/Clay sand
P16229607Q1	345.59	346.31	0.72	10.14	8.45-10.50**	13-Mar-04	1.68	0.95	344.64	5.8E-07	Silty sand
1-9-96-8 (Q)	336.09	337.20	1.11	15.00	10.90-15.00**	23-Jan-98	15.03	15.03	322.17	>1.0 E-05	Sand
						1-Mar-98	15.43	15.43	321.77		
						6-Sep-98	15.00	15.00	322.20		
						4-Nov-98	15.01	15.01	322.19		
						29-Mar-04	15.13	15.13	322.07		
3-5-96-8 (Q)	344.06	344.91	0.85	32.00	29.00-32.00**	6-Sep-98	30.75	29.90	314.16	>1.0 E-05	Sand
						9-Feb-98	30.80	30.80	314.11		
						8-Aug-98	30.72	30.72	314.19		
						29-Mar-04	Frozen	N/A	N/A		
3-14-96-8 (Q)	329.20	330.33	1.13	9.00	5-95-9.00**	23-Jan-98	1.70	1.70	328.63	N/A	Sand
						8-Aug-98	1.56	1.56	328.77		
						4-Nov-98	1.87	1.87	328.46		
						29-Mar-04	Frozen	N/A	N/A		
3-22-96-8 (Q1)	320.31	321.47	1.16	4.14	0.70-4.14**	23-Jan-98	2.54	1.44	318.93	N/A	Sand
						2-Nov-98	3.88	2.78	317.60		
						29-Mar-04	Frozen	N/A	N/A		
3-22-96-8 (Q2)	320.31	321.44	1.13	8.40	4.00-8.40**	23-Jan-98	3.60	2.47	317.84	2.2 E-07	Clay Till

Table 2

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
						28-Feb-98	3.52	2.39	317.92		
						2-Nov-98	>9.53	N/A	<311.91		
						29-Mar-04	3.90	2.77	317.54		
5-7-96-8 (Q)	298.10	298.89	0.79	3.73	0.68-3.73**	23-Jan-98	Frozen	N/A	N/A	N/A	Muskeg
						29-Mar-04	Frozen	N/A	N/A		
7-1-96-9 (Q)	300.92	301.81	0.89	5.30	3.40-5.30**	23-Jan-98	Frozen	N/A	N/A	N/A	Sand
						29-Mar-04	Frozen	N/A	N/A		
7-10-96-8 (Q)	333.90	334.88	0.98	47.00	40.00-47.00**	5-Sep-98	17.26	16.28	317.62	>1.0E-5	Sand
						4-Nov-98	17.45	17.45	317.43		
						29-Mar-04	17.51	17.51	317.38		
9-6-96-8 (Q)	320.79	321.34	0.55	9.10	5.50-9.10**	23-Jan-98	7.83	7.83	313.51	N/A	Sand
						26-Feb-98	7.85	7.85	313.49		
						8-Aug-98	7.78	7.78	313.56		
						2-Nov-98	7.95	7.95	313.39		
						29-Mar-04	7.70	7.70	313.65		
11-24-96-8 (Q)	322.07	322.77	0.70	5.60	3.40-5.60**	23-Jan-98	2.24	1.54	320.53	4.1 E-07	Sand
						3-Mar-98	2.41	2.41	320.37		
						3-Nov-98	2.26	2.26	320.51		
						29-Mar-04	2.73	2.73	320.05		
13-4-96-8 (Q)	338.14	339.14	1.00	24.00	21.00-24.00**	27-Feb-98	22.34	21.56	316.80	>1.0 E-05	Sand
						8-Aug-98	22.28	21.50	316.86		
						6-Sep-98	22.26	21.48	316.88		
						3-Nov-98	22.28	21.50	316.86		
						29-Mar-04	22.39	21.61	316.75		
13-9-96-8 (Q)	316.88	317.46	0.58	5.28	1.83-5.26**	23-Jan-98	1.97	1.13	315.50	5.3 E-07	Silt Till
						28-Feb-98	2.06	1.22	315.40		
						11-Sep-98	2.53	1.69	314.94		
						4-Nov-98	2.39	1.55	315.07		
13-10-96-8 (Q)	333.62	334.97	1.35	19.00	15.25-19.00**	23-Jan-98	17.41	17.41	317.56	>1.0 E-05	Sand
						27-Feb-98	17.47	17.47	317.50		
						8-Aug-98	17.37	17.37	317.61		
						6-Sep-98	17.39	17.39	317.59		
						4-Nov-98	17.48	17.48	317.49		
						29-Mar-04	17.68	17.68	317.29		
14-3-96-8 (QOW)	333.83	334.53	0.70	50.50	43.50-50.50**	4-Sep-98	16.74	16.04	317.79	N/A	N/A
						29-Mar-04	17.03	17.03	317.51		

Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation (m asl)	Datum Elevation (Top of PVC) (m asl)	Stickup (PVC) (m)	Total Depth of Piezometer (m bgs)	Depth Interval of Screen (m bgs)	Date Measured (d-m-y)	Depth To Groundwater (m btoc)	Depth To Groundwater (m bgs)	Groundwater Surface Elevation (m asl)	Hydraulic Conductivity (m/s)	Lithology
15-1-96-8 (Q)	335.43	336.26	0.83	7.15	2.10-7.15**	23-Jan-98	Frozen	N/A	N/A	N/A	Till
						6-Sep-98	1.31	0.48	334.95		
						4-Nov-98	1.32	0.49	334.94		
McMURRAY FORMATION											
Oil Sands/Intra-Orebody											
97-4 Oil Sands	337.22	338.03	0.81	96.00	90.00-96.00**	10-Mar-97	20.49	19.63	317.54	4.0E-08	Middle McMurray Oil Sands
Basal Aquifer											
P04179707B	330.57	331.60	1.03	127.10	93.3-117.0**	14-Mar-04	0.07	0.07	331.53	4.8E-05	Sand
						27-May-04	0.20	0.20	331.40		
P14339607B	353.87	354.88	1.01	121.60	100.1-109.6**	27-Mar-04	21.65	21.02	333.23	4.2E-05	Sand
P16069707B	329.90	331.13	1.23	126.60	102.5-116.0**	N/A	N/A	N/A	N/A	2.2E-05	Sand
		*333.25	*3.35			14-Mar-04	0.61	-2.74	332.64		
						27-May-04	Flowing	<-3.35	>333.25		
P10169707B	344.05	344.65	0.60	117.40	89.0-102.0**	26-Mar-04	2.05	1.45	342.60	N/A	Sand
W08059707B	339.14	340.04	0.90	100.340	84.0-100.34**	14-Mar-04	7.00	6.10	333.04	8.2E-05	Sand
97-2 (B)	332.45	333.06	0.61	103.00	97.00-103.00**	10-Mar-97	5.46	4.61	327.60	8.00E-05	Sandstone
1-9-96-8 (B)	336.09	337.02	0.93	100.10	96.00-97.10**	1-Mar-98	19.15	18.32	317.87	6.40E-09	Mudstone/Sandstone
						9-May-98	18.13	17.30	318.89		
						6-Aug-98	18.99	18.16	318.03		
						4-Nov-98	19.37	18.54	317.65		
						29-Mar-04	19.29	18.46	317.74		
3-5-96-8 (B)	343.97	344.92	0.95	130.00	125.60-130.60**	6-Feb-98	4.51	3.56	340.41	3.1 E-07	Sandstone
						25-Feb-98	27.27	26.32	317.65		
						8-Aug-98	27.04	26.09	317.88		
						3-Nov-98	27.45	26.50	317.47		
						29-Mar-04	27.37	27.37	317.55		
3-22-96-8 (B)	320.31	321.30	0.99	67.00	61.00-68.00**	9-Feb-98	3.55	2.44	317.75	8.9 E-10	Mudstone/Sandstone
						1-Mar-98	3.54	2.43	317.76		
						2-Nov-98	9.87	8.76	311.43		
						29-Mar-04	9.80	8.69	311.50		
5-7-96-8 (B)	298.14	298.78	0.64	90.60	86.10-93.00**	7-Feb-98	1.38	0.74	297.40	N/A	Mudstone/Sandstone
						29-Mar-04	0.62	0.62	298.16		
10-14-96-8 (B)	328.83	329.78	0.95	112.00	108.00-113.00**	5-Sep-98	0.65	-0.30	329.14	5.9 E-07	Sandstone/Mudstone
						3-Nov-98	0.57	-0.38	329.21		
						29-Mar-04	Frozen	N/A	N/A		

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PROJECT NO.: F35772801

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12-1-96-9 (B)	298.50	298.95	0.45	86.30	80.30-87.60**	7-Feb-98	7.35	6.90	291.60	4.3 E-08	Sandstone
						26-Feb-98	7.32	6.87	291.63		
						29-Mar-04	16.78	16.78	282.17		
13-4-96-8 (B)	338.14	338.68	0.54	124.00	118.90-126.00**	9-Feb-98	25.82	25.82	312.86	5.1 E-06	Sandstone/Mudstone
						27-Feb-98	20.72	20.72	317.96		
						8-Aug-98	21.29	21.29	317.40		
						3-Nov-98	21.58	21.58	317.10		
						29-Mar-04	22.58	22.04	316.10		
13-9-96-8 (B)	316.88	317.46	0.58	69.90	64.90-70.30**	28-Feb-98	10.90	10.90	306.56	N/A	Mudstone/Sandstone
						11-Sep-98	10.32	10.32	307.15		
						4-Nov-98	10.40	10.40	307.07		
14-14-96-8 (B)	327.82	328.69	0.87	118.00	110.50-119.00**	3-Nov-98	0.20	-0.67	328.49	N/A	Mudstone/Sandstone
						29-Mar-04	Frozen	N/A	N/A		
15-1-96-8 (B)	335.43	335.78	0.35	110.00	106.00-111.70**	9-Feb-98	4.60	4.25	331.18	N/A	Sandstone
						4-Nov-98	1.27	0.92	334.51		
						29-Mar-04	Frozen	N/A	N/A		
15-8-96-8 (B)	310.74	311.18	0.44	76.00	70.20-76.50**	9-Feb-98	4.42	3.98	306.76	5.0 E-07	Sandstone/Mudstone
						1-Mar-98	4.40	3.96	306.78		
						2-Nov-98	4.93	4.49	306.25		
						29-Mar-04	4.84	4.40	306.35		
Tenneco 1	N/A	341.40	N/A	79.30	71.63-79.25**	14-Jan-81	N/A	N/A	333.35	N/A	N/A
DEVONIAN											
Waterways Formation											
P08079707D	329.32	330.16	0.84	117.40	89.0-102.0**	26-Mar-04	>100	N/A	not stabilised	N/A	Limestone
						27-May-04	83.71	82.87	not stabilised		
5-24-96-8 (D)	328.92	329.80	0.88	133.10	129.10-135.10**	9-Feb-98	7.46	6.58	322.34	9.8 E-10	Mudstone
						2-Mar-98	7.76	6.88	322.50		
						4-Nov-98	7.88	7.00	321.92		
						29-Mar-98	12.16	11.28	317.65		
11-12-96-8 (D)	333.01	333.21	0.20	141.00	135.70-143.10**	9-Feb-98	3.67	3.67	329.54	1.5 E-08	Mudstone
						2-Mar-98	5.56	5.56	327.65		
						6-Sep-98	2.99	2.99	330.22		
						4-Nov-98	3.31	3.31	329.90		
						29-Mar-04	2.57	2.37	330.64		

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PROJECT NO.: F35772801

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3-14-96-8 (D)	329.20	329.78	0.58	105.60	99.80-106.10**	9-Feb-98	4.65	4.65	325.13	2.0 E-09	Limestone
						3-Mar-98	5.01	5.01	324.77		
						8-Aug-98	3.45	3.45	326.33		
						4-Nov-98	3.86	3.86	325.92		
						29-Mar-04	5.66	5.08	324.12		

NOTES:

1. *Data may be entered to the nearest mm, but are reported above to the nearest cm. Apparent rounding errors may occasionally occur in calculated fields (e.g., Groundwater Surface Elevation).*
2. *N/M - Denotes not measured.*
3. *N/A - Denotes not available.*
4. *m asl - Denotes metres above sea level.*
5. *m bgs - Denotes metres below ground surface.*
6. *m btoc - Denotes metres below top of PVC casing.*
7. ** denotes extention added to piezometer due to flowing conditions.*
8. *** denotes depth interval of sand pack, not screen.*
9. *† denotes pneumatic piezometer reading.*
10. *Superscript [1] denotes piezometer/data from Terracon Geotechnique Ltd., 1985. Data Report for 1985 Geotechnical and Hydrological Program, OSLO Project - Lease 31.*
11. *Submitted to Esso Resources Canada Ltd., July 22, 1985.*
12. *Superscript [2] denotes piezometer/data from Alberta Research Council. 1976-1982. Groundwater Observation Well Network, Athabasca Oil Sands Area, Information Series 69, Eight Volumes. Edmonton.*
13. *Superscript [3] denotes piezometer/data from Terracon Geotechnique Ltd., 1991. Hydrogeology of the Pleistocene Meltwater Channel System. Submitted to OSLO Alberta Limited,*
14. *Superscript [4] denotes piezometer/data from Terracon Geotechnique Ltd., 1990a. 1990 Geotechnical Program Data Report. Volume 6, Piezometer and Hydrogeologic Data. Submitted to OSLO Alberta Limited, January 4, 1990.*
15. *Superscript [5] denote elevations and depths are approximate.*

Table 3
Water Quality: Field Measured Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	Temperature (°C)	Electrical Conductivity (at 25°C) (µS/cm)	pH (units)	Comments
Jackpine Expansion Mining Area					
QUATERNARY					
Shallow					
P06-1620-SQ	22-Feb-06	4.1	874	6.44	
P06-1623-SQ	24-Feb-06	2.0	436	7.92	
P06-1629-SQ	22-Feb-06	7.3	521	6.54	
P06-1639-SQ	22-Feb-06	5.3	748	6.60	
P06-1641-SQ	01-Mar-06	4.3	570	7.85	
P06-1650-SQ	24-Feb-06	3.1	432	7.73	
P06-1655-SQ	22-Feb-06	2.5	565	8.46	
P06-1664-SQ	24-Feb-06	3.1	561	7.40	
P06-1672-SQ	13-Mar-06	10.9	680	8.42	
P06-1699-SQ	24-Feb-06	4.0	460	7.93	
SH07-1721-SQ	20-Mar-07	3.7	616	7.15	
Deep					
P06-1629-DQ	22-Feb-06	5.0	1,510	7.10	
SH06-1641-DQ	20-Mar-06	4.7	478	8.12	
P06-1650-DQ	24-Feb-06	1.0	557	7.85	
SH06-1672-DQ	21-Mar-06	4.8	611	7.61	
P06-1699-DQ	24-Feb-06	5.0	602	7.79	
SH07-1712-DQ	19-Mar-07	4.0	5,060	11.58 [1]	Suspected drilling contamination
PLEISTOCENE CHANNEL					
SH06-1638-PC	07-Mar-06	3.1	729	7.45	
SH06-1663-PC	07-Mar-06	3.1	590	7.68	
SH06-1698-PC	07-Mar-06	3.9	1,318	8.12	
SH06-1720-PC	07-Mar-06	4.7	716	7.31	
McMURRAY FORMATION					
Basal Aquifer					
SH06-1620-BS	22-Feb-06	4.6	5,400	7.61	
SH06-1636-BS	22-Feb-06	5.4	1,161	7.40	
SH06-1641-BS	20-Mar-06	5.7	1,935	8.44	
SH06-1655-BS	22-Feb-06	3.7	853	7.75	
SH06-1672-BS	21-Mar-06	5.9	920	8.09	
SH06-1699-BS	21-Mar-06	5.0	1,074	7.13	
SH07-1712-BS	20-Mar-07	4.2	695	8.00	
DEVONIAN					
Waterways Formation					
SH06-1641-D	20-Mar-06	10.8	783	8.84	
SH06-1655-D	23-Feb-06	0.3	22,900	13.44 [1]	Suspected drilling contamination
SH06-1699-D	21-Mar-06	8.4	968	8.18	
Jackpine Mine - Phase 1					
QUATERNARY					
P01-903A	16-Sep-01	5.7	672	6.89	
P01-903B	16-Sep-01	5.0	637	6.98	
P01-904A	14-Sep-01	6.3	444	7.38	Sandy
P01-905A	16-Sep-01	6.9	400	7.16	
P01-905B	14-Sep-01	7.0	395	7.17	
P01-906A	13-Sep-01	11.3	758	6.61	Bitumen present
P01-909A	12-Sep-01	11.3	636	6.44	Bitumen present

Table 3

Water Quality: Field Measured Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	Temperature (°C)	Electrical Conductivity (at 25°C) (µS/cm)	pH (units)	Comments
P01-909B	12-Sep-01	10.6	483	6.56	DUP-909G
P01-910A	13-Sep-01	10.8	638	6.83	
	26-Sep-01	10.3	483	6.52	
1390006 (PG1)	2-Aug-01	11.5	843	6.85	
1390006 (PG2)	2-Aug-01	15.4	821	7.24	
1390202 (PG1)	3-Aug-01	13.8	480	6.89	
1390202 (PG1)	3-Aug-01	13.0	664	6.80	
1390211	8-Aug-01	10.7	706	7.15	
1390214	3-Aug-01	9.3	654	6.55	Odour, sheen, bitumen
ARC7-32	8-Aug-01	9.3	621	7.71	Oily sheen
PLEISTOCENE CHANNEL					
1390202-#3	3-Aug-01	8.0	795	7.19	
1390701-#2	3-Aug-01	23.9	448	7.68	temperature suspect
1390701-#3	3-Aug-01	10.8	1,005	6.98	
1390701 (PSF)	3-Aug-01	7.3	1,022	6.92	
McMURRAY FORMATION					
Oil Sands/Intra-Orebody					
P01-904C	16-Sep-01	8.1	2,090	7.17	Bitumen present
P01-906C	13-Sep-01	8.9	4,200	6.94	
P01-910C	13-Sep-01	8.1	4,670	6.87	
ARC7-135	7-Aug-01	7.7	1,448	9.70 [1]	Oily sheen
Basal Aquifer					
P00-3D	28-Sep-01	6.6	5,400	6.79	
P01-902D	27-Sep-01	6.5	3,770	7.20	
P01-905D	27-Sep-01	6.8	1,648	7.38	
P01-909D	26-Sep-01	8.5	3,820	7.30	H_2S odour, DUP-909F [2]
07-07-95-08	8-Aug-01	4.7	2,680	7.46	H2S odour
ARC6-220	17-Aug-01	9.2	5,970	8.82 [1]	ODOUR
ARC7-337	8-Aug-01	6.7	7,330	8.51	
DEVONIAN					
Waterways Formation					
P01-904E	28-Sep-01	7.4	6,640	7.31	
P01-909E	26-Sep-01	8.9	4,940	7.09	
Watt Mountain Formation					
ARC6-310	17-Aug-01	8.9	6,000	8.78 [1]	Odour
ARC7-594	7-Aug-01	9.1	7,060	11.93 [1]	
La Loche Formation					
01-911 (formerly 12-07-95-08)	16-Aug-01	8.8	1,224	10.71 [1]	Bitumen present
ARC7-933	7-Aug-01	7.5	2,740	12.11 [1]	
Kearl Oil Sands Project					
QUATERNARY					
P04169707Q	12-Mar-04	3.5	588	7.42	
P04169707Q1	12-Mar-04	5.3	507	7.54	
P06159607Q	16-Mar-04	3.9	814	7.11	
P06159607Q1	16-Mar-04	3.8	993	7.34	
P06179607Q	29-Mar-04	5.1	521	7.45	
P06229707Q	26-Mar-04	N/M	N/M	N/M	Dry
P06229707Q1	26-Mar-04	3.0	685	7.50	
P06319607Q	17-Mar-04	2.1	563	7.21	

Table 3

Water Quality: Field Measured Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	Temperature (°C)	Electrical Conductivity (at 25°C) (µS/cm)	pH (units)	Comments
P06319607Q1	17-Mar-04	3.6	652	7.18	
P08079707Q	12-Mar-04	3.0	548	7.39	
P08079707Q1	12-Mar-04	3.5	578	7.62	
P08289607Q1	17-Mar-04	N/M	N/M	N/M	Dry
P11229607Q	15-Mar-04	3.0	542	6.88	
P11229607Q1	16-Mar-04	3.6	964	8.38	
P12359607Q	13-Mar-04	N/M	N/M	N/M	Insufficient Water
P12359607Q1	13-Mar-04	4.0	465	7.47	
P14049607Q	16-Mar-04	2.4	502	7.31	
P14049607Q1	16-Mar-04	2.8	1,693	7.54	
P14199607Q	13-Mar-04	3.0	566	7.20	
P14199607Q2	13-Mar-04	3.9	163	8.02	
P14209607Q	12-Mar-04	4.1	523	7.44	
P14209607Q1	12-Mar-04	3.9	604	7.65	
P14259607Q	13-Mar-04	2.3	240	7.37	
P16039707Q		N/M	N/M	N/M	Dry
P16039707Q1		N/M	N/M	N/M	Dry
P16149707Q	11-Mar-04	2.8	123	7.51	
P16149707Q1	11-Mar-04	2.9	502	7.40	
P16229607Q	13-Mar-04	3.1	357	7.99	
P16229607Q1	13-Mar-04	2.3	391	7.67	
1-9-96-8 (Q)	1-Mar-98	N/M	N/M	N/M	Insufficient to sample. T.D. 15.78 m
	4-Nov-98	4.5	664	7.04	
3-5-96-8 (Q)	25-Feb-98	N/M	N/M	N/M	Frozen
	3-Nov-98	N/M	N/M	N/M	Insufficient Sample
3-14-96-8 (Q)	3-Mar-98	N/M	N/M	N/M	Frozen
	4-Nov-98	2.0	748	6.98	
3-22-96-8 (Q1)	28-Feb-98	3.0	417	7.52	Producing Sand
	2-Nov-98	4.0	1,122	7.62	
	2-Nov-98	4.2	553	7.60	
	2-Nov-98	4.0	1,124	7.62	
3-22-96-8 (Q2)	2-Nov-98	N/M	N/M	N/M	Dry
5-7-96-8 (Q)	28-Feb-98	N/M	N/M	N/M	Frozen
7-1-96-9 (Q)	28-Feb-98	N/M	N/M	N/M	Frozen
7-10-96-8 (Q)	4-Nov-98	3.7	1,122	7.82	
9-6-96-8 (Q)	28-Feb-98	4.1	724	6.36	
	2-Nov-98	5.8	130	8.01	
	2-Nov-98	5.8	83	7.09	
	2-Nov-98	5.7	79	6.02	
	2-Nov-98	5.7	78	6.49	
11-24-96-8 (Q)	3-Mar-98	2.7	623	7.40	Slow recovery, producing sand, pH questionable
	4-Nov-98	5.7	753	7.23	
	4-Nov-98	5.8	739	7.16	
	4-Nov-98	5.7	757	7.27	
	4-Nov-98	6.0	764	7.34	
	4-Nov-98	5.7	741	7.20	
	4-Nov-98	5.8	736	7.17	
	4-Nov-98	5.8	746	7.21	

Table 3

Water Quality: Field Measured Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	Temperature (°C)	Electrical Conductivity (at 25°C) (µS/cm)	pH (units)	Comments
13-4-96-8 (Q)	28-Feb-98	N/M	N/M	N/M	Unable to sample, obstruction in pipe @ 17.5 m
	3-Nov-98	4.7	739	7.05	
	3-Nov-98	4.7	776	7.11	
	3-Nov-98	4.6	794	7.15	
	3-Nov-98	4.7	760	7.06	
	3-Nov-98	4.7	741	7.06	
13-9-96-8 (Q)	28-Feb-98	0.9	483	7.82	Very slow recovery, producing sand
	4-Nov-98	3.9	586	7.51	
13-10-96-8 (Q)	4-Nov-98	3.6	283	7.76	
14-3-96-8 (QOW)	7-Sep-98	5.2	1,020	6.90	
15-1-96-8 (Q)	2-Mar-98	N/M	N/M	N/M	Frozen
	4-Nov-98	2.1	689	7.28	
McMURRAY FORMATION					
Oil Sands/Intra-Orebody					
97-4 Oil Sands	10-Mar-97	6.1	1,255	7.70	
Basal Aquifer					
P04179707B	27-May-04	5.4	992	7.34	Flowing
P14339607B	27-Mar-04	4.8	714	7.34	
P16069707B	27-May-04	5.0	772	7.36	Flowing
P10169707B	26-Mar-04	3.7	886	12.17 [1]	
W08059707B	15-Mar-04	5.7	660	7.30	Sample at 24hrs pumping
97-2 (B)	11-Mar-97	3.1	7,730	12.90 [1]	
Post Purge	11-Mar-97	2.8	1,053	7.50	
1-9-96-8 (B)	1-Mar-98	4.3	2,290	7.92	Strong H_2S odour
	4-Nov-98	5.4	2,740	7.48	
3-5-96-8 (B)	25-Feb-98	5.1	2,310	8.18	Very strong H_2S odour
	3-Nov-98	5.6	2,770	7.56	
	3-Nov-98	5.8	2,870	7.32	
	3-Nov-98	5.7	2,860	7.31	
	3-Nov-98	6.0	2,870	7.33	
	3-Nov-98	5.8	2,830	7.43	
3-22-96-8 (B)	1-Mar-98	3.2	1,003	8.80	Trace of tar. Blown out for 5.5 hrs.
	2-Nov-98	4.2	1,072	7.39	
5-7-96-8 (B)	26-Feb-98	N/M	N/M	N/M	Frozen
10-14-96-8 (B)	12-Sep-98	8.0	1,175	7.65	
	3-Nov-98	4.9	1,095	7.34	
	3-Nov-98	5.2	1,123	7.44	
	3-Nov-98	5.1	2,111	7.45	
	3-Nov-98	5.0	2,111	7.44	
12-1-96-9 (B)	26-Feb-98	3.6	3,310	7.79	
13-4-96-8 (B)	27-Feb-98	4.8	1,812	8.18	Tar. Strong H_2S odour.
	3-Nov-98	5.5	2,040	7.37	
	3-Nov-98	6.2	2,080	7.35	
	3-Nov-98	6.2	2,070	7.36	
	3-Nov-98	5.2	2,110	7.45	
13-9-96-8 (B)	28-Feb-98	1.9	765	7.73	
	4-Nov-98	3.7	851	7.65	
14-14-96-8 (B)	3-Nov-98	4.8	1,140	7.54	
	3-Nov-98	5.3	1,160	7.50	
	3-Nov-98	5.3	1,156	7.44	
	3-Nov-98	5.6	1,167	7.39	
	3-Nov-98	5.6	1,195	7.46	
	3-Nov-98	5.6	1,193	7.44	
15-1-96-8 (B)	2-Mar-98	N/M	N/M	N/M	Not sampled. Damaged @ surface. Dirt/ice in well @ 0.37 m
	4-Nov-98	3.4	768	7.24	

Table 3

Water Quality: Field Measured Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	Temperature (°C)	Electrical Conductivity (at 25°C) (µS/cm)	pH (units)	Comments
15-8-96-8 (B)	1-Mar-98	2.4	1,159	7.97	Weak H_2S odour
	2-Nov-98	2.8	578	7.75	
	2-Nov-98	2.8	580	7.80	
	2-Nov-98	2.7	584	7.84	
	2-Nov-98	2.0	530	7.02	
	2-Nov-98	2.4	570	7.65	
DEVONIAN					
Waterways Formation					
P08079707D	26-Mar-03	4.1	11,260	13.12 [1]	
5-24-96-8 (D)	2-Mar-98	4.5	1,593	8.27	Tar
	3-Nov-98	4.6	1,827	7.51	
11-12-96-8 (D)	2-Mar-98	4.0	937	8.37	Strong H_2S odour
	4-Nov-98	4.1	865	7.22	
3-14-96-8 (D)	3-Mar-98	3.2	617	N/M	pH meter not operational
	4-Nov-98	3.0	729	7.14	

NOTES:

1. Electrical conductivity values standardized to 25°C.
2. N/M denoted not measured.
3. Superscript [1] denotes suspect cement contamination.
4. Superscript [2] denotes duplicate sample.

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Table 4

Selected Indicator Parameters

PROJECT NO.: F35772801

		PHYSICAL				INDICATORS													NITROGEN			PHENOLS
Monitoring Station	Date (d-m-y)	Electrical Conductivity (µS/cm)	pH (units)	Total Hard as $CaCO_3$ (mg/L)	Total Alk as $CaCO_3$ (mg/L)	Chloride:D (mg/L)	Sulphate:D (mg/L)	Iron:D (mg/L)	Manganese:D (mg/L)	TDS-calculated (mg/L)	Calcium:D (mg/L)	Magnesium:D (mg/L)	Potassium:D (mg/L)	Sodium:D (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Fluoride:D (mg/L)	Ion Balance (%)	NO_2 as N (mg/L)	NO_3 as N (mg/L)	NO_2+NO_3 as N (mg/L)	Phenols (mg/L)
Aesthetic Objective (AO)		---	6.5 - 8.5	---	---	250	500	0.3	0.05	500	---	---	---	200	---	---	---	---	---	---	---	---	---
Maximum Acceptable Concentration (MAC)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	10	10	---
Jackpine Expansion Mining Area																							
QUATERNARY																							
Shallow																							
P06-1620-SQ	22-Feb-06	931	6.7	509	525	5	11.0	2.74 [1]	0.435 [1]	526 [1]	154	30.3	2.0	9	640	<5	---	0.17	97.8	<0.05	<0.1	---	0.017
P06-1623-SQ	24-Feb-06	418	7.4	213	212	7	6.2	2.00 [1]	0.24 [1]	237	71.3	8.5	1.3	15	258	<5	---	0.13	108	<0.05	0.1	---	0.037
P06-1629-SQ	22-Feb-06	524	6.8	290	284	3	6.8	3.36 [1]	0.249 [1]	292	78.8	22.7	1.1	9	347	<5	---	0.26	105	<0.05	<0.1	---	0.006
P06-1639-SQ	22-Feb-06	765	6.8	333	415	8	8.8	2.72 [1]	0.351 [1]	428	92.3	24.9	4.0	41	506	<5	---	0.25	98.2	<0.05	<0.1	---	0.015
P06-1641-SQ	01-Mar-06	407	7.1	258	230	1.9	33.2	0.035	0.022	269	65.7	22.7	1.1	3	281	<5	---	0.1	98.1	0.07	0.75	---	0.003
P06-1650-SQ	24-Feb-06	434	7.4	248	232	2	5.6	2.19 [1]	0.22 [1]	240	74.8	14.8	1.1	2	283	<5	---	0.17	105	<0.05	0.1	---	0.009
P06-1655-SQ	22-Feb-06	498	7.0	278	282	2	11.1	18.1 [1]	0.326 [1]	293	87.5	14.5	1.6	7	344	<5	---	0.07	99.7	<0.05	<0.1	---	0.017
P06-1664-SQ	24-Feb-06	510	7.1	266	263	2	13.6	8.75 [1]	0.52 [1]	284	86.9	12.0	1.4	10	321	<5	---	0.11	103	<0.05	<0.1	---	0.011
P06-1672-SQ	13-Mar-06	636	8.4	366	307	2	48.4	0.006	0.695 [1]	364	89.0	34.8	1.6	4	365	<5	---	0.42	107	<0.05	0.1	---	0.005
P06-1699-SQ	24-Feb-06	412	7.7	213	192	2	29.3	0.09	0.53 [1]	234	63.0	13.6	1.0	9	234	<5	---	0.13	104	<0.05	0.1	---	0.003
SH07-1721-SQ	19-Mar-07	652	7.7	372	367	6	5.2	7.42 [1]	0.204 [1]	378	102	28.4	4.5	12	448	<5	<5	0.18	106	<0.05	<0.1	<0.1	<0.001
Deep																							
P06-1629-DQ	22-Feb-06	1,720	7.5	128	1,010	5	7.5	0.017	0.165 [1]	1,100 [1]	25.5	15.6	12.9	425 [1]	1,240	<5	---	1.12	104	<0.05	<0.1	---	<0.001
SH06-1641-DQ	20-Mar-06	423	8.1	233	239	2	5.3	0.051	0.182 [1]	239	64.2	17.6	2.2	4	291	<5	---	0.19	98.8	<0.05	0.1	---	0.027
P06-1650-DQ	24-Feb-06	505	7.8	282	283	1	6.5	0.68 [1]	0.20 [1]	284	79.0	20.5	3.4	4	346	<5	---	0.32	101	<0.05	<0.1	---	0.003
SH06-1672-DQ	21-Mar-06	562	8.0	302	313	5	8.6	0.016	0.310 [1]	318	78.2	26.0	6.0	6	382	<5	---	0.43	98.0	<0.05	0.1	---	0.097
P06-1699-DQ	24-Feb-06	546	7.6	304	299	2	7.2	0.32 [1]	0.25 [1]	300	81.6	24.4	1.8	4	364	<5	---	0.32	102	<0.05	<0.1	---	0.002
(Duplicate)	24-Feb-06	543	7.6	302	293	2	7.6	0.30	0.25 [1]	297	81.0	24.3	1.9	4	358	<5	---	0.2	103	<0.05	0.1	---	0.002
SH07-1712-DQ	19-Mar-07	4,900	12.1 [1 7]	949	1,010	29	313	<0.005	<0.001	1,610 [1]	380	<0.1	97	188	<5	71	303	0.26	108	<0.05	0.1	0.1	0.012
(Duplicate)	19-Mar-07	4,790	12.1 [1 7]	933	947	29	320	0.008	<0.001	1,570 [1]	372	1	96	186	<5	70	282	0.27	111	<0.05	0.1	0.1	0.01
PLEISTOCENE CHANNEL																							
SH06-1638-PC	07-Mar-06	677	7.4	325	364	5	7.5	6.93 [1]	0.322 [1]	381	91.7	23.4	2.9	32	444	<5	---	0.38	105	<0.05	<0.1	---	0.007
SH06-1663-PC	07-Mar-06	558	7.8	317	306	1	5.9	2.01 [1]	0.215 [1]	306	83.7	26.2	1.1	4	373	<5	---	0.28	104	<0.05	<0.1	---	0.002
SH06-1698-PC	07-Mar-06	1,230	8.2	506	501	75	127	0.125	0.049	777 [1]	132	42.9	6.5	93	609	<5	---	0.71	97.2	<0.05	<0.1	---	0.014
SH06-1720-PC	07-Mar-06	663	7.4	382	364	2	7.6	6.64 [1]	0.181 [1]	369	104	29.6	1.6	6	444	<5	---	0.18	106	<0.05	<0.1	---	0.009
MCMURRAY FORMATION																							
Basal Aquifer																							
SH06-1620-BS	22-Feb-06	2,480	7.9	250	838	367 [1]	5.8	0.057	0.049	1,470 [1]	52.8	28.8	17.8	499 [1]	1,020	<5	---	1.98 [2]	99.9	<0.05	<0.1	---	0.013
SH06-1636-BS	22-Feb-06	1,200	7.7	224	526	89	25.6	0.073	0.033	729 [1]	55.6	20.8	10.6	212 [1]	641	<5	---	1.93 [2]	103	<0.05	<0.1	---	0.046
(Duplicate)	22-Feb-06	1,210	7.7	218	531	90	25.1	0.056	0.033	723 [1]	54.3	20.0	10.1	205 [1]	647	<5	---	1.93 [2]	99.0	<0.05	<0.1	---	0.051
SH06-1641-BS	20-Mar-06	1,680	8.3	260	626	201	24.7	0.019	0.109 [1]	990 [1]	66.7	22.7	12.9	286 [1]	749	7	---	2.21 [2]	96.1	<0.05	<0.1	---	0.043
(Duplicate)	20-Mar-06	1,680	8.3	261	624	206	24.7	0.020	0.108 [1]	992 [1]	66.6	22.9	13.0	284 [1]	744	9	---	2.20 [2]	95.1	<0.05	<0.1	---	0.044
SH06-1655-BS	22-Feb-06	889	7.9	208	451	29	13.0	0.034	0.055 [1]	534 [1]	56.2	16.4	7.1	142	551	<5	---	1.55 [2]	104	<0.05	<0.1	---	0.016
SH06-1672-BS	21-Mar-06	827	8.3	225	348	69	20.1	0.031	0.080 [1]	485	58.0	19.5	20.8	88	418	<5	---	1.52 [2]	96.1	<0.05	0.1	---	0.240
SH06-1699-BS	21-Mar-06	983	7.7	512	581	6	9.1	0.444 [1]	0.093 [1]	573 [1]	121	50.9	9.1	28	709	<5	---	0.81	97.5	<0.05	<0.1	---	0.016
SH07-1712-BS	19-Mar-07	728	8.4	248	393	4	31.6	0.014	0.065 [1]	454	65.1	20.7	5.3	90	470	<5	<5	0.82	106	<0.05	0.1	0.1	<0.001
DEVONIAN																							
Waterways Formation																							
SH06-1641-D	20-Mar-06	681	8.5	313	337	24	30.8	0.180	0.631 [1]	412	89.3	21.9	2.9	40	375	17	---	0.28	100	0.06	0.1	---	0.042
SH06-1655-D	23-Feb-06	20,400	12.9 [1 7]	867	4,070	543 [1]	65.2	0.013	0.001	5,570 [1]	346	0.7	274	1,900 [1]	1,350	3,620	---	0.39	54.4	0.06	0.1	---	0.036
SH06-1699-D	21-Mar-06	899	8.6 [1]	338	368	64	56.5	0.050	0.400 [1]	549 [1]	94.7	24.6	20.0	68	401	23	---	0.35	98.9	<0.05	0.2	---	0.077
QA/QC																							
Trip Blank	21-Mar-07	1	5.6 [1]	<1	<5	<1	0.6	<0.005	<0.001	<1	<0.5	<0.1	<0.5	<1	<5	<5	<5	<0.05	Low TDS	<0.05	<0.1	<0.1	<0.001
Field Blank	24-Feb-06	<2	6.0 [1]	<1	<5	<1	<0.5	<0.06	<0.01	<1	<0.5	<0.1	<0.5	<1	<5	<5	---	<0.05	Low TDS	<0.05	<0.1	---	<0.001
	21-Mar-06	2.7	5.7 [1]	<1	<5	<1	<0.5	<0.005	<0.001	<1	<0.5	<0.1	<0.5	<1	<5	<5	---	<0.05	Low TDS	<0.05	<0.1	---	<0.001

WorleyParsons Komex

resources & energy

Table 4

Selected Indicator Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	PHYSICAL: Electrical Conductivity (µS/cm)	PHYSICAL: pH (units)	PHYSICAL: Total Hard as $CaCO_3$ (mg/L)	PHYSICAL: Total Alk as $CaCO_3$ (mg/L)	INDICATORS: Chloride:D (mg/L)	Sulphate:D (mg/L)	Iron:D (mg/L)	Manganese:D (mg/L)	TDS-calculated (mg/L)	Calcium:D (mg/L)	Magnesium:D (mg/L)	Potassium:D (mg/L)	Sodium:D (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Fluoride:D (mg/L)	Ion Balance (%)	NITROGEN: NO_2 as N (mg/L)	NO_3 as N (mg/L)	NO_2+NO_3 as N (mg/L)	PHENOLS: Phenols (mg/L)
Aesthetic Objective (AO)		---	6.5 - 8.5	---	---	250	500	0.3	0.05	500	---	---	---	200	---	---	---	---	---	---	---	---	---
Maximum Acceptable Concentration (MAC)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	10	10	---
Jackpine Mine - Phase 1																							
QUATERNARY																							
Outwash Sand & Sandy Clay Till																							
P01-903A	16-Sep-01	718	7.1	394	403	<1	22.3	<0.005	0.023	410	110	29.0	1.6	4	492	<5	<5	0.29	94.6	---	---	0.3	<0.001
P01-903B	16-Sep-01	669	7.3	348	384	2	14.9	0.480 [1]	0.126 [1]	386	94.3	27.3	3.0	14	469	<5	<5	0.20	94.9	---	---	<0.1	<0.001
P01-904A	16-Sep-01	452	7.5	245	234	<1	23.0	0.108	0.041	251	63.5	21.1	1.0	1	286	<5	<5	0.13	96.0	---	---	0.2	<0.001
P01-905A	16-Sep-01	405	7.4	216	224	2	5.0	1.84 **	0.793 **	229	66.6	12.0	1.2	8	274	<5	<5	0.19	101	---	---	<0.1	0.005
P01-905B	16-Sep-01	409	7.5	206	230	2	5.1	1.02 [1]	0.283 [1]	229	62.7	11.9	1.4	8	280	<5	<5	0.16	94.5	---	---	<0.1	<0.001
P01-906A	13-Sep-01	812	7.0	423	437	7	15.6	1.27 [1]	0.203 [1]	470	148	12.9	1.4	23	533	<5	<5	0.27	102	---	---	<0.1	0.002
P01-909A	12-Sep-01	640	6.8	327	331	4	39.9	19.2 [1]	2.35 [1]	381	91.1	24.1	7.8	15	404	<5	<5	0.12	97.6	---	---	<0.1	0.006
P01-909B	12-Sep-01	558	6.9	306	270	4	54.5	21.4 [1]	0.272 [1]	342	82.6	24.3	1.5	13	329	<5	<5	0.09	101	---	---	<0.1	0.003
	26-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(duplicate, "909G")	26-Sep-01	547	7.0	300	262	3	49.7	19.4 [1]	0.231 [1]	325	82.7	22.6	1.9	8	319	<5	<5	0.05	101	---	---	<0.1	<0.001
P01-910A	13-Sep-01	619	7.2	291	314	19	11.2	2.51 [1]	0.312 [1]	352	92.1	14.9	1.2	25	383	<5	<5	0.20	98.5	---	---	<0.1	0.005
1390006 (PG1)	2-Aug-01	839	7.2	466	467	2	14.7	19.7 **	1.79 **	477	152	21.1	1.2	6	570	<5	<5	0.24	99.1	---	---	<0.1	0.001
1390006 (PG2)	2-Aug-01	845	7.6	368	431	3	49.0	---	---	505 [1]	92.4	33.3	8.8	59	526	<5	<5	0.71	104	---	---	0.1	0.002
1390202 (PG1)	3-Aug-01	466	6.8	240	241	1	6.5	0.643 [1]	0.790 [1]	256	79.9	9.9	0.6	13	295	<5	<5	0.09	108	---	---	<0.1	0.005
1390202 (PG2)	3-Aug-01	685	7.0	344	367	2	10.2	0.290	1.41 [1]	378	110	16.9	2.6	16	448	<5	<5	0.17	100	---	---	<0.1	0.008
1390211	8-Aug-01	846	7.4	266	468	1	9.3	39.0 **	3.06 **	477	81.5	15.2	4.3	85	571	<5	<5	0.45	95.3	---	---	<0.1	0.003
1390214	3-Aug-01	555	6.7	185	286	4	4.7	43.8 [1]	0.806 [1]	312	62.4	7.0	1.1	61	349	<5	<5	0.19	107	---	---	<0.1	<0.001
1390502 (PG2) [4]	Feb-90	461	7.90	175	---	<1	11	5.12 **	1.16 **	344	45.3	15.0	5.4	47.8	320	<1	---	0.2	---	---	---	0.02	0.049
1390504 (PG1) [4]	15-Mar-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.043
1390504 (PG2) [4]	15-Mar-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.005
1390508 (PG1) [4]	15-Mar-90	---	7.6	---	302	<1	27	0.20	0.82 **	339	93	15.5	1.2	20.8	369	<1	<1	0.17	---	---	---	0.79	0.006
3090500 (PG1) [4]	15-Mar-90	---	7.5	---	---	2	20	0.2	---	394	123	16.2	1.9	15.4	438	<1	<1	---	---	---	---	---	0.043
3090500 (PG2) [4]	15-Mar-90	---	7.6	---	---	4	16	0.2	---	415	123	20.2	3.1	15.4	474	<1	<1	---	---	---	---	---	0.066
ARC7-32	8-Aug-01	650	7.5	345	347	4	23.4	---	19.3 **	371	93.5	27.1	3.0	12	423	<5	<5	0.51	99.5	---	---	<0.1	<0.001
PLEISTOCENE CHANNEL																							
1389013 [3] [4]	28-Feb-90	---	7.57	336	1033	7	6	---	0.777 **	1,101 [1]	90	27	4.0	120	847	---	---	---	---	---	---	---	<0.002
	---	---	---	492.5	410	2.7	72.5	27.2 **	---	---	142	33.5	1.88	9.7	500	<0.5	---	0.4	---	---	---	0.014	---
1389020 [3] [4]	---	---	7.95	374.1	577	11.5	5.5	13.1 **	0.241 **	---	101	29.6	5	100	704	<0.5	---	0.5	---	---	---	0.025	---
	---	---	---	374.0	577	12	6	---	---	971 [1]	101	30	5	100	704	<0.5	---	---	---	---	---	---	---
1389204 [3] [4]	---	---	7.65	365	768	3.0	21	7.03 **	0.42 **	---	95	31.0	5	54	630	---	---	---	---	---	---	0.13	---
1389504 [3] [4]	---	---	---	---	---	---	---	3.01 **	0.19 **	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390008 (PFS) [3] [4]	15-Mar-90	---	7.8	356	396	52	<1	0.30 **	1.23 **	463	102	24.9	5.20	15.6	535	<1	<1	0.38	---	---	---	0.016	0.054
1390202-#3	3-Aug-01	782	7.3	236	441	11	8.1	1.17 [1]	0.148 [1]	477	64.4	18.2	6.9	103	538	<5	<5	0.69	101	---	---	0.1	0.019
1390502 (PFS) [3] [4]	13-Mar-90	---	7.76	278	439	2	<1	1.3 **	0.333 **	441	76	21.1	4.7	73.0	535	<1	<1	0.69	---	---	---	0.008	0.007
1390700 [3] [4]	25-Feb-90	---	7.98	415	536	1.6	2.4	0.03	0.086 **	---	110	34	4.78	52	643	<1	---	0.51	---	---	---	0.010	<1
	28-Feb-90	---	7.92	387	540	2.6	4.8	0.04	0.083 **	---	103	31.4	---	53	659	<1	---	0.51	---	---	---	0.008	<0.002
	5-Mar-90	---	7.6	402	531	2.7	7.6	0.02	0.078 **	---	102	35.8	---	55.6	647	<1	---	0.50	---	---	---	0.020	<1
	15-Mar-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.004
1390701-#2	3-Aug-01	462	7.9	245	222	<1	23.1	8.32 **	0.35 **	251	73.0	15.2	1.2	4	271	<5	<5	0.42	103	---	---	0.2	---
1390701-#3	3-Aug-01	1,050	7.2	569	414	<1	202	0.013	0.172 [1]	675 [1]	154	44.9	2.2	22	506	<5	<5	0.60	99.0	---	---	0.3	<0.001
1390701-#4	3-Aug-01	1,090	7.3	581	498	<1	139	0.374 [1]	0.152 [1]	673 [1]	158	45.4	3.1	28	607	<5	<5	0.35	101	---	---	0.1	0.004
3189211 [3] [4]	---	---	7.77	323.9	332	0.7	3	25 **	0.54 **	---	89	24.7	2.95	9.4	404	<0.5	---	0.5	---	---	---	0.007	---
	---	---	7.36	297.0	595	1	---	---	---	633 [1]	81	23	4	29	488	---	---	---	---	---	---	0.007	---
3189214 [3] [4]	---	---	8.03	495.3	503	1	24.8	64 **	0.283 **	903 [1]	139	36	3.75	18.9	614	<0.5	---	0.44	---	---	---	0.028	---
	---	---	8.00	309.0	890	1	10	7.3 **	0.210 **	932 [1]	122	38	5	27	730	---	---	---	---	---	---	---	---
3189221 [3] [4]	15-Mar-90	---	8.05	321	801	9	16	---	---	872 [1]	84	27	4	76	657	---	---	---	---	---	---	---	0.014
3189230 [3] [4]	---	---	8.1	105	1248	61	8	---	---	1,476 [1]	24	11	4	346 [1]	1023	---	---	---	---	---	---	---	---

WorleyParsons Komex
resources & energy

Table 4

Selected Indicator Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	PHYSICAL: Electrical Conductivity (µS/cm)	PHYSICAL: pH (units)	PHYSICAL: Total Hard as $CaCO_3$ (mg/L)	PHYSICAL: Total Alk as $CaCO_3$ (mg/L)	INDICATORS: Chloride:D (mg/L)	Sulphate:D (mg/L)	Iron:D (mg/L)	Manganese:D (mg/L)	TDS-calculated (mg/L)	Calcium:D (mg/L)	Magnesium:D (mg/L)	Potassium:D (mg/L)	Sodium:D (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Fluoride:D (mg/L)	Ion Balance (%)	NITROGEN: NO_2 as N (mg/L)	NO_3 as N (mg/L)	NO_2+NO_3 as N (mg/L)	PHENOLS: Phenols (mg/L)
Aesthetic Objective (AO)		---	6.5 - 8.5	---	---	250	500	0.3	0.05	500	---	---	---	200	---	---	---	---	---	---	---	---	---
Maximum Acceptable Concentration (MAC)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	10	10	---
ARC SHELL PW-2 [6]	10-Aug-72	---	7.4	---	---	22	2	---	---	613 [1]	106	17	---	---	439	0	---	---	---	---	---	---	---
	16-Aug-72	---	7.3	---	---	22	1	---	---	625 [1]	105	20	---	---	451	0	---	---	---	---	---	---	---
	17-Jul-76	600	7.6	---	---	6	4.3	---	---	384	102	16.4	2.5	15	388	0	---	0.2	---	---	---	---	---
Well #1 [5]	28-Feb-85	---	8.04	---	---	38	5	1.7 **	0.1 **	---	54	28	15	240 [1]	815	---	---	1.1	---	---	---	<0.003	---
Well #2 [5]	20-Feb-85	---	8.09	---	---	<1	12	1.9 **	0.12 **	---	86	46	10	141	664	---	---	0.67	---	---	---	0.007	---
Well #3 [5]	20-Feb-85	---	7.98	---	---	1	3	3.5 **	0.10 **	---	42	32	10	183	537	---	---	0.92	---	---	---	0.030	---
Well #4 [5]	27-Feb-85	---	8.1	---	---	<1	<1	8.8 **	0.08 **	---	93	46	7	108	586	---	---	0.85	---	---	---	0.046	---
	15-Mar-90	---	8.5	139	228	9	47	0.10	---	269	50.4	13.5	2	20.3	216	20	<1	0.64	---	---	---	0.011	0.022
Well #6 [5]	22-Feb-85	---	8.1	---	---	<1	7	2.8 **	0.12 **	---	87	19	8	15	391	---	---	0.27	---	---	---	0.004	---
MCMURRAY FORMATION																							
Oilsand/Intra-Orebody																							
P01-904C	26-Sep-01	2,140	7.5	254	819	50	323	<0.06	0.41 [1]	1,370 [1]	62.9	23.5	21.4	400 [1]	999	<5	<5	0.98	93.9	---	---	<0.1	0.003
P01-906C	13-Sep-01	4,350	7.5	407	1,650	594 [1]	131	19.6 **	1.17 **	2,930 [1]	86.7	46.2	18.0	1,060 [1]	1,880	68	<5	0.60	104	---	---	<0.1	0.005
P01-910C	13-Sep-01	4,880	7.8	366	1,080	843 [1]	129	0.162	0.539 [1]	2,660 [1]	74.4	43.8	16.1	902 [1]	1,320	<5	<5	0.45	97.5	---	---	1.3	0.002
16-20-95-08 P-2 [5]	26-Feb-85	---	7.85	---	---	28	3	25.4 **	0.32 **	---	51	20	17	315 [1]	976	---	---	1.68 [2]	---	---	---	<0.003	0.2
ARC7-135	7-Aug-01	1,570	9.7 [1]	16	654	69	29.7	<0.005	<0.001	907 [1]	1.2	3.2	76.8	335 [1]	422	188	<5	0.72	107	---	---	<0.1	<0.001
Basal Aquifer																							
P00-3D	28-Sep-01	5,650	7.3	602	892	1,540 [1]	5	<0.06	0.07 [1]	3,280 [1]	109	80.2	39.0	973 [1]	1,090	<5	<5	0.65	90.2	---	---	<0.1	<0.001
P01-902D	27-Sep-01	3,990	7.7	276	1,080	755 [1]	33.1	0.152	0.087 [1]	2,330 [1]	55.7	33.2	17.3	789 [1]	1,320	<5	<5	1.42	92.3	---	---	<0.1	0.003
P01-905D	27-Sep-01	1,750	7.9	83	718	153	23.7	0.070	0.071 [1]	982 [1]	18.8	8.7	13.0	358 [1]	875	<5	<5	1.61 [2]	94.1	---	---	<0.1	<0.001
P01-909D	26-Sep-01	3,810	7.6	256	1,030	773 [1]	23.8	<0.06	0.09 [1]	2,290 [1]	54.3	29.3	17.7	777 [1]	1,260	<5	<5	1.40	91.7	---	---	<0.1	0.001
(duplicate, "909F")	26-Sep-01	3,840	7.6	255	1,040	769 [1]	25.8	0.072	0.084 [1]	2,290 [1]	53.8	29.2	17.6	775 [1]	1,260	<5	<5	1.41	91.5	---	---	<0.1	0.008
12-04-95-08 [5]	24-Feb-85	---	7.97	---	---	511 [1]	5	9.2 **	0.44 **	---	90	44	21	735 [1]	1386	---	---	1.80 [2]	---	---	---	<0.003	---
07-07-95-08	8-Aug-01	2,830	7.9	75	1,600	57	7.4	0.60 **	0.02 **	1,800 [1]	12.7	10.4	8.0	746 [1]	1,950	<5	<5	0.68	101	---	---	<0.1	<0.001
05-20-95-08 [5]	25-Feb-85	---	7.78	---	---	40	8	34.2 **	0.24 **	---	50	18	17	265 [1]	854	---	---	2.10 [2]	---	---	---	0.007	0.27
07-20-95-08 [5]	26-Feb-85	---	7.9	---	---	45	15	10.0 **	0.22 **	---	47	18	15	305 [1]	952	---	---	2.20 [2]	---	---	---	0.008	---
08-20-95-08 [5]	26-Feb-85	---	7.15	---	---	15	2	82.4 **	0.49 **	---	70	21	17	190	537	---	---	1.40	---	---	---	0.007	---
ARC6-220 [6]	18-Feb-75	6,500	9.0 [1]	---	---	1,320 [1]	73.5	---	---	3,910 [1]	6.8	22.8	18.8	1,431 [1]	1,715	146	---	0.7	---	---	---	---	---
	11-Sep-75	---	8.7 [1]	---	---	658 [1]	2.5	---	---	3,988 [1]	6.9	21.1	125	1,400 [1]	2,079	86	---	1.2	---	---	---	---	---
	17-Aug-01	6,350	8.8 [1]	84	1,680	1,150 [1]	12.1	0.037 [1]	0.016	3,830 [1]	2.7	18.8	27.9	1,610 [1]	1,740	152	<5	0.94	109	---	---	<0.1	0.076
ARC7-337 [6]	6-Feb-75	2,780	8.5	---	---	321 [1]	12.7	---	---	1,572 [1]	9.2	28.7	22.1	583 [1]	1,235	31	---	1.4	---	---	---	---	---
	7-Feb-75	2,900	8.2	---	---	315 [1]	10.5	---	---	1648 [1]	42.5	29	22.1	586 [1]	1,369	0	---	1.4	---	---	---	---	---
	8-Feb-75	2,780	8.9 [1]	---	---	323 [1]	12.2	---	---	1,556 [1]	7	28	22.1	585 [1]	1,171	79	---	1.4	---	---	---	---	---
	9-Sep-75	3,200	8.2	---	---	218	2.7	---	---	1,584 [1]	14.7	28	22.1	575 [1]	1,239	0	---	1.2	---	---	---	---	---
	10-Sep-75	3,200	8.2	---	---	218	2.7	---	---	1,581 [1]	14.7	28	22.1	575 [1]	1,239	0	---	1.2	---	---	---	---	---
	8-Aug-01	2,910	8.4	155	1,160	288 [1]	13.9	1.92 **	0.03 **	1,700 [1]	9.8	31.7	25.3	638 [1]	1,350	31	<5	1.08	99.8	---	---	<0.1	<0.001
12-20-95-08 [5]	25-Feb-85	---	7.65	---	---	48	8	11.6 **	0.30 **	---	54	19	18	283 [1]	854	---	---	1.90 [2]	---	---	---	0.004	---
13-20-95-08 [5]	28-Feb-85	---	8.02	---	---	248	<2	7.4 **	0.24 **	---	66	31	25	618 [1]	1,308	---	---	1.75 [2]	---	---	---	0.005	---
DEVONIAN																							
Waterways Formation																							
P01-904E	30-Sep-01	6,210	7.7	340	524	265 [1]	2,800 [1]	10.7 **	1.35 **	4,940 [1]	105	18.9	23.3	1,410 [1]	640	<5	<5	1.03	90.1	---	---	<0.1	0.026
P01-909E	28-Sep-01	5,100	7.5	900	385	806 [1]	1,470 [1]	<0.06	0.11 [1]	3,700 [1]	223	83.3	44.4	838 [1]	470	<5	<5	0.54	91.0	---	---	<0.1	0.022
16-20-95-08 P-1 [5]	26-Feb-85	---	8.01	---	---	1	6	9.4 **	0.34 **	---	66	14	3	87	249	---	---	0.19	---	---	---	0.012	---
Watt Mountain Formation																							
ARC6-310	17-Aug-01	6,310	8.9 [1]	99	1,590	1,190 [1]	11.6	0.051	0.023	3,690 [1]	5.3	20.8	45.8	1,460 [1]	1,600	166	<5	0.65	102	---	---	<0.1	0.026
ARC7-594	7-Aug-01	7,070	12.3 [1 7]	1,160	1,310	442 [1]	424	<0.06 **	<0.02 **	2,660 [1]	466	<0.1	109	429 [1]	<5	91	394	0.09	94.1	---	---	<0.1	0.012
LaLoche Formation																							
01-911 (formerly 12-07-95-08) [4]	7-Mar-90	---	6.9	---	---	99,719 [1]	2314 [1]	1.7 **	---	164117 [1]	4290	980	395	56,400 [1]	36	<1	<1	---	---	---	---	---	---
	16-Aug-01	1,190	10.2 [1 7]	22	175	282 [1]	50.9	9.78 **	0.34 **	710 [1]	7.6	0.7	116	148	38	88	<5	0.36	78.3	---	---	<0.1	0.073
ARC7-933	7-Aug-01	2,580	11.7 [1 7]	257	356	144	441	<0.06 **	<0.02 **	1,270 [1]	103	<0.1	97.8	271 [1]	<5	73	79	0.23	95.6	---	---	<0.1	0.061

WorleyParsons Komex
resources & energy

Table 4

Selected Indicator Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	PHYSICAL: Electrical Conductivity (µS/cm)	PHYSICAL: pH (units)	PHYSICAL: Total Hard as $CaCO_3$ (mg/L)	PHYSICAL: Total Alk as $CaCO_3$ (mg/L)	INDICATORS: Chloride:D (mg/L)	Sulphate:D (mg/L)	Iron:D (mg/L)	Manganese:D (mg/L)	TDS-calculated (mg/L)	Calcium:D (mg/L)	Magnesium:D (mg/L)	Potassium:D (mg/L)	Sodium:D (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Fluoride:D (mg/L)	Ion Balance (%)	NITROGEN: NO_2 as N (mg/L)	NO_3 as N (mg/L)	NO_2+NO_3 as N (mg/L)	PHENOLS: Phenols (mg/L)
Aesthetic Objective (AO)		---	6.5 - 8.5	---	---	250	500	0.3	0.05	500	---	---	---	200	---	---	---	---	---	---	---	---	---
Maximum Acceptable Concentration (MAC)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	10	10	---
Kearl Oil Sands Project																							
QUATERNARY																							
P04169707Q	13-Mar-04	656	7.9	285	335	<1	26	0.4 [1]	0.133 [1]	380	69.8	27.0	3.30	53.8	408	<0.5	---	0.2	105.2	---	---	0.9	0.005
P04169707Q1	13-Mar-04	557	8.0	295	314	<1	<1	0.4 [1]	0.061 [1]	278	70.3	29.1	1.43	3.03	383	<0.5	---	0.1	98.2	---	---	<0.2	0.004
P06159607Q	17-Mar-04	925	7.9	507	439	2	93	0.028	0.305 [1]	592 [1]	121	49.8	6.15	14.6	535	<0.5	---	0.4	100.3	---	---	<0.2	0.004
P06159607Q1	17-Mar-04	1,120	7.9	537	517	2	133	4.439 [1]	0.317 [1]	674 [1]	136	47.9	8.25	58.2	630	<0.5	---	0.2	101.7	---	---	<0.2	0.003
P06179607Q	29-Mar-04	565	7.9	341	297	<1	12	0.259	0.081 [1]	330	92.4	26.7	1.21	3.86	362	<0.5	---	0.1	105.9	---	---	0.2	0.008
P06229707Q1	26-Mar-04	755	8.0	448	424	<1	14	2.637 [1]	0.170 [1]	434	106	44.5	2.62	13.1	517	<0.5	---	0.3	104.8	---	---	<0.2	0.001
P06319607Q	17-Mar-04	620	7.7	364	355	<1	2	4.287 [1]	0.195 [1]	378	102	26.5	0.65	4.77	433	<0.5	---	0.3	103.2	---	---	<0.2	<0.001
P06319607Q1	17-Mar-04	753	8.1	433	382	<1	<1	8.324 [1]	0.196 [1]	450	125	29.4	0.70	2.87	466	<0.5	---	0.3	108.5	---	---	<0.2	<0.001
P08079707Q	13-Mar-04	627	7.9	303	319	<1	25	0.3	0.135 [1]	336	72.4	29.6	0.86	20.5	389	<0.5	---	0.1	100	---	---	0.6	0.015
P08079707Q1	13-Mar-04	626	8.0	307	331	3	6	0.8 [1]	0.257 [1]	338	72.7	30.4	3.02	10.3	403	<0.5	---	0.3	98.7	---	---	<0.2	0.018
P08289607Q1	17-Mar-04	352	8.0	185	161	<1	11	0.177	0.021	210	45.6	17.3	0.55	1.43	196	<0.5	---	0.1	103.8	---	---	0.5	<0.001
P11229607Q	15-Mar-04	613	7.5	345	344	2	2	8.527 [1]	0.734 [1]	388	94.0	26.7	0.85	16.6	419	<0.5	---	0.1	106.3	---	---	<0.2	0.008
P11229607Q1	17-Mar-04	1,100	8.2	160	450	2	92	0.294	0.117 [1]	722 [1]	40.8	14	5.16	193	549	<0.5	---	0.7	102.4	---	---	2.5	0.001
P12359607Q1	13-Mar-04	517	8.0	341	278	<1	8	0.3	0.041	258	76.4	36.5	1.01	3.25	339	<0.5	---	0.1	109.7	---	---	<0.2	0.004
P14049607Q	17-Mar-04	586	7.9	304	304	<1	23	0.024	0.033	330	72.9	29.5	0.75	15.1	371	<0.5	---	1.1	80	---	---	<0.2	<0.001
P14049607Q1	17-Mar-04	1,950	8.0	771	529	<1	522 [1]	0.036	0.463 [1]	1,360 [1]	198	67.1	9.61	195	645	<0.5	---	0.2	105.8	---	---	<0.2	<0.001
P14199607Q	13-Mar-04	664	7.9	333	343	<1	23	0.9 [1]	0.043	356	83.4	30.4	0.64	3.80	418	<0.5	---	0.2	96.5	---	---	<0.2	0.005
P14199607Q2	13-Mar-04	1,940	8.1	320	357	12	709 [1]	0.3	0.132 [1]	1,330 [1]	70.9	34.7	10.9	310 [1]	435	<0.5	---	0.7	95	---	---	<0.2	0.006
P14209607Q	13-Mar-04	583	7.9	338	303	<1	17	0.5 [1]	0.020	290	84.5	30.9	0.89	1.66	369	<0.5	---	0.1	103.2	---	---	<0.2	0.009
P14209607Q1	13-Mar-04	713	8.0	375	373	4	13	0.4 [1]	0.453 [1]	372	91.9	35.4	2.42	4.67	455	<0.5	---	0.2	99.5	---	---	<0.2	0.010
P14259607Q	13-Mar-04	285	7.8	145	142	<1	8	0.2	0.011	166	33.4	14.9	0.56	1.27	173	<0.5	---	<0.1	99.1	---	---	<0.2	0.004
P16149707Q	13-Mar-04	136*	7.7	66.9	58	<1	12	<0.1	0.013	540 [1]	15.1	7.10	0.57	6.50	70.7	<0.5	---	<0.1	106.1	---	---	0.2	0.005
P16149707Q1	13-Mar-04	476	8.0	307	256	<1	5	<0.1	<0.001	242	72.0	30.8	1.91	5.01	312	<0.5	---	0.1	110	---	---	<0.2	0.004
P16229607Q	13-Mar-04	451	7.8	258	226	<1	19	0.3	0.048	240	59.5	26.5	0.74	9.41	275	<0.5	---	<0.1	106.1	---	---	<0.2	0.004
P16229607Q1	13-Mar-04	434	8.0	221	235	<1	<1	0.2	0.086 [1]	222	50.9	22.8	3.36	28.1	286	<0.5	---	0.2	109.5	---	---	<0.2	0.005
1-9-96-8 (Q)	4-Nov-98	670	6.93	380	339	0.5	17.7	0.12	0.045	364	108	26.4	1.6	3.4	414	<0.5	---	---	108	---	---	0.590	<0.002
3-14-96-8 (Q)	4-Nov-98	737	6.96	410	412	0.6	0.5	18.1 [1]	0.453 [1]	409	130	21.1	2.0	7.9	503	<0.5	---	---	104	---	---	<0.003	<0.002
3-22-96-8 (Q1)	28-Feb-98	501	7.42	258	281	1.5	4.0	0.15	0.102 [1]	272	67.6	21.7	1.47	4.57	343	<0.5	---	0.23	94	---	---	0.078	<0.001
	2-Nov-98	568	7.02	310	344	1.4	1.8	0.60 [1]	0.123 [1]	327	82.6	25.5	1.7	7.5	420	<0.5	---	---	95	---	---	0.082	0.012
7-10-96-8 (Q)	27-Aug-98	1,070	7.88	---	---	10.8	2.8	---	---	760 [1]	---	---	---	---	---	---	---	---	---	---	---	---	---
	4-Nov-98	1,130	7.83	330	607	13.7	21.7	3.47 [1]	0.162 [1]	656 [1]	80.7	32.3	9.3	134	741	<0.5	---	---	98	---	---	0.043	<0.002
9-6-96-8 (Q)	26-Feb-98	76.1	6.12 [1]	24.8	28.3	0.9	9.8	0.11	0.011	46	5.0	3.0	1.45	4.97	34.5	<0.5	---	0.36	---	---	---	0.773	<0.001
	2-Nov-98	79.6	5.81 [1]	34	20.3	0.5	8.6	0.08	0.003	35.8	8.5	3.4	1.0	3.4	24.8	<0.5	---	---	115	---	---	0.347	0.007
11-24-96-8 (Q)	4-Mar-98	768	6.97	386	441	1.4	0.5	2.11 [1]	0.181 [1]	426	104	30.6	2.47	16.9	538	<0.5	---	0.40	96	---	---	0.210	<0.001
	3-Nov-98	767	6.82	440	454	0.5	<0.1	3.47 [1]	0.181 [1]	445	108	30.7	1.8	16.2	554	<0.5	---	---	105	---	---	0.043	<0.002
13-4-96-8 (Q)	3-Nov-98	754	6.87	390	392	0.7	0.9	3.25 [1]	0.216 [1]	400	114	21.7	4.6	18.2	478	<0.5	---	---	110	---	---	0.006	0.011
13-9-96-8 (Q)	28-Feb-98	599	7.54	329	324	1.4	15.2	0.03	0.114 [1]	333	83.7	29.2	2.21	3.78	395	<0.5	---	0.30	100	---	---	0.027	<0.001
	4-Nov-98	610	7.45	360	334	<0.5	10.8	0.15	0.175 [1]	343	91.2	31.8	1.5	7.5	408	<0.5	---	---	109	---	---	0.047	<0.002
13-10-96-8 (Q)	27-Feb-98	314	7.60	155	159	0.7	9.9	0.15	0.031	165	40.6	12.9	1.24	0.55	194	<0.5	---	0.14	92	---	---	0.391	<0.001
	4-Nov-98	294	7.39	160	147	<0.5	8.2	0.11	0.085 [1]	159	13.2	13.7	0.5	2.7	179	<0.5	---	---	109	---	---	0.433	<0.002
14-3-96-8 (QOW)	28-Aug-98	965	7.39	290	488	27.3	2.7	0.02	0.061 [1]	523 [1]	78.8	22.3	15.6	83.4	595	<0.5	---	---	92	---	---	0.044	---
	7-Sep-98	965	7.54	290	503	27.3	2.7	0.02	0.061 [1]	529 [1]	80.0	22.3	15.6	83.4	595	<0.5	---	---	92	---	---	<0.003	<0.001
15-1-96-8 (Q)	4-Nov-98	717	7.38	350	384	9.6	3.7	4.02 [1]	0.243 [1]	392	98.6	25.4	5.2	19.3	469	<0.5	---	---	99	---	---	0.014	<0.002

WorleyParsons Komex

resources & energy

Table 4

Selected Indicator Parameters

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	PHYSICAL: Electrical Conductivity (µS/cm)	PHYSICAL: pH (units)	PHYSICAL: Total Hard as $CaCO_3$ (mg/L)	PHYSICAL: Total Alk as $CaCO_3$ (mg/L)	INDICATORS: Chloride:D (mg/L)	Sulphate:D (mg/L)	Iron:D (mg/L)	Manganese:D (mg/L)	TDS-calculated (mg/L)	Calcium:D (mg/L)	Magnesium:D (mg/L)	Potassium:D (mg/L)	Sodium:D (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Fluoride:D (mg/L)	Ion Balance (%)	NITROGEN: NO_2 as N (mg/L)	NO_3 as N (mg/L)	NO_2+NO_3 as N (mg/L)	PHENOLS: Phenols (mg/L)
Aesthetic Objective (AO)		---	6.5 - 8.5	---	---	250	500	0.3	0.05	500	---	---	---	200	---	---	---	---	---	---	---	---	---
Maximum Acceptable Concentration (MAC)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	10	10	---
MCMURRAY FORMATION																							
Oilsand/Intra-Orebody																							
97-4 Oil Sands	10-Mar-97	1,400	8.4	86	621	72.8	11.8	5.65 [1]	0.296 [1]	816 [1]	15.4	11.6	15.5	316 [1]	720	18	---	1.8 [2]	108	---	---	<0.05	0.008
Basal Aquifer																							
P04179707B	27-May-04	1,010	8.0	277	440	43	22	0.081	0.091 [1]	548 [1]	65.1	27.7	13.1	112	536	<0.5	---	1.6 [2]	101	---	---	<0.2	0.007
P14339607B	27-Mar-04	794	7.9	309	427	9	<1	0.101	0.061 [1]	440	71.0	32.0	11.4	48.5	521	<0.5	---	1.3	98.4	---	---	<0.2	0.035
(duplicate)	27-Mar-04	788	7.8	346	429	9	1	0.117	0.07 [1]	440	79.7	35.8	13.2	54.4	523	<0.5	---	1.4	103.7	---	---	<0.2	0.039
P16069707B	27-May-04	819	7.9	257	380	11	7	0.246	0.091 [1]	422	60.0	26.1	10.9	71.4	463	<0.5	---	1.7 [2]	102.3	---	---	<0.2	0.004
P10169707B	26-Mar-04	1,020	11.4 [1 7]	11.2	196	8	57	0.009	<0.001	342	4.35	0.08	31.1	119	<0.5	50.4	---	1.2	89.4	---	---	0.5	0.008
W08059707B	15-Mar-04	752	7.8	328	404	8	<1	0.042	0.056 [1]	404	76.3	33.3	10.1	47.5	492	<0.5	---	1.5	102.8	---	---	<0.2	0.004
	17-Mar-04	787	8.1	315	414	8	3	0.033	0.055 [1]	420	73.0	32.2	10.2	48.5	505	<0.5	---	1.5	100.1	---	---	<0.2	<0.001
	19-Mar-04	754	7.7	314	405	7	4	0.022	0.054 [1]	356	72.7	32.2	10.2	48.8	494	<0.5	---	1.4	101.2	---	---	<0.2	0.002
97-2 (B)	11-Mar-97	5,920	12.4 [1 7]	629	1,410	88.5	114	0.137	0.015	1,930 [1]	252	<0.1	360	271 [1]	<5	204	---	1.0	102	---	---	<0.05	---
(Post Purge)	11-Mar-97	1,170	7.7	117	533	53.1	4.4	0.078	0.043	640 [1]	16.3	18.5	27.2	201 [1]	650	<5	---	2.1 [2]	96	---	---	<0.05	0.017
(Post Purge - duplicate)	11-Mar-97	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.025
1-9-96-8 (B)	1-Mar-98	2,972	7.91	247	830	410 [1]	9.7	<0.01	0.086 [1]	1,948 [1]	47.1	31.3	17.9	455 [1]	1,012	<0.5	---	2.00 [2]	---	---	---	106 [2]	<0.001
	8-Nov-98	2,720	7.42	280	803	445 [1]	29.3	0.05	0.117 [1]	1,540 [1]	49.7	38.1	19.5	474 [1]	979	<0.5	---	---	91	---	---	<0.003	0.019
3-5-96-8 (B)	26-Feb-98	2,820	7.31	269	1,114	292 [1]	20.4	0.05	0.076	1,602 [1]	55.6	31.7	20.2	503 [1]	1,358	<0.5	---	1.79	90	---	---	0.008	<0.001
(duplicate)	26-Feb-98	---	---	---	---	---	---	0.05	0.072	---	52.1	32.0	20.3	401 [1]	---	---	---	---	---	---	---	---	<0.001
	4-Mar-98	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	3-Nov-98	2,980	7.23	260	1,060	341 [1]	13.9	0.16	0.285	1,600 [1]	50.2	31.0	19.3	524 [1]	1,300	<0.5	---	---	88	---	---	<0.003	0.061
(duplicate)	3-Nov-98	---	---	---	---	---	---	0.13	0.277	---	52.0	32.2	20.0	539 [1]	---	---	---	---	---	---	---	---	0.024
3-22-96-8 (B)	1-Mar-98	8,452	12.53 [1 7]	345	1,892	13.3	12.6	<0.01	<0.001	1,461 [1]	138	<0.1	40.4	588 [1]	<0.5	56.6	---	0.41	---	---	---	0.223	<0.001
	4-Mar-98	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	2-Nov-98	1,190	7.33	200	556	40.6	8.4	0.02	0.040	645 [1]	47.9	19.3	9.1	186	678	<0.5	---	---	99	---	---	<0.003	<0.002
10-14-96-8 (B)	12-Sep-98	1,140	7.52	210	586	45.4	1.4	<0.01	0.039	660 [1]	50.8	20.3	9.7	201 [1]	715	<0.5	---	2.48 [2]	93	---	---	0.055	0.014
	3-Nov-98	1,150	7.12	220	529	40.7	24.5	<0.01	0.030	659 [1]	42.7	17.1	7.7	166	646	<0.5	---	---	106	---	---	0.025	<0.002
(duplicate)	3-Nov-98	---	---	---	---	---	---	<0.01	0.033	---	45.0	17.9	8.2	173	---	---	---	---	---	---	---	---	<0.002
12-1-96-9 (B)	26-Feb-98	3,990	7.23	335	1,065	605 [1]	3.8	0.10	0.111 [1]	2,074 [1]	69.2	39.4	23.3	684 [1]	1,298	<0.5	---	1.67 [2]	96	---	---	0.011	<0.001
(duplicate)	26-Feb-98	---	---	---	---	---	---	<0.01	0.066 [1]	---	42.6	22.8	13.0	540 [1]	---	---	---	---	---	---	---	---	<0.001
13-4-96-8 (B)	27-Feb-98	2,070	7.56	249	818	212	39.2	0.32 [1]	0.220 [1]	1,209 [1]	53.2	28.3	22.6	355 [1]	997	<0.5	---	1.53 [2]	91	---	---	0.010	<0.001
	3-Nov-98	2,180	7.47	270	714	235	31.7	0.03	0.105 [1]	1,130 [1]	55.9	30.5	16.2	356 [1]	871	<0.5	---	---	94	---	---	<0.003	0.017
13-9-96-8 (B)	28-Feb-98	942	7.88	287	430	57.5	3.9	<0.01	0.198 [1]	529 [1]	72.1	26.0	12.2	94.8	524	<0.5	---	0.97	99	---	---	0.080	<0.001
	4-Nov-98	857	7.56	250	380	53.3	1.8	0.12	0.200 [1]	469 [1]	59.0	26.1	8.5	91.8	464	<0.5	---	---	102	---	---	0.019	<0.002
(duplicate)	4-Nov-98	---	---	---	---	---	---	0.10	0.179 [1]	---	58.0	25.8	8.4	92.0	---	---	---	---	---	---	---	---	<0.002
	9-Nov-98	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(duplicate)	9-Nov-98	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14-14-96-8 (B)	3-Nov-98	1,230	7.26	200	533	47.7	28.9	0.02	0.073 [1]	692 [1]	44.8	17.8	8.4	209 [1]	651	<0.5	---	---	109	---	---	0.020	0.023
15-1-96-8 (B)	4-Nov-98	786	7.35	260	407	14.3	13.4	2.58 [1]	0.219 [1]	446	72.4	20.0	7.7	74.4	497	<0.5	---	---	98	---	---	0.008	0.003
15-8-96-8 (B)	1-Mar-98	1,483	7.46	201	685	87.0	0.4	<0.01	0.067 [1]	806 [1]	44.7	21.7	11.5	223 [1]	835	<0.5	---	1.79 [2]	---	---	---	0.012	<0.001
	2-Nov-98	616	7.31	280	333	2.6	<0.1	1.49 [1]	0.371 [1]	332	70.7	25.2	6.2	27.8	406	<0.5	---	---	104	---	---	0.015	0.018
Tenneco 1																							
start of pumptest	6-Mar-74	---	8.10	---	---	2	9.0	---	---	446	41	15	9	114	453	31	---	---	---	---	---	---	---
end of pump test	6-Mar-74	---	8.20	---	---	1	7.0	---	---	462	43	15	9	114	462	37	---	---	---	---	---	---	---
	11-Sep-75	760	7.10	---	---	6	4.3	---	---	412	31	17.1	8.8	111	461	0	---	1.4	---	---	---	---	---
	17-Jul-98	690	7.90	---	---	14	3.8	---	---	384	24	16.5	9.6	116	444	0	---	1.2	---	---	---	---	---

WorleyParsons Komex

resources & energy

Table 4

Selected Indicator Parameters

PROJECT NO.: F35772801		PHYSICAL				INDICATORS														NITROGEN			PHENOLS
Monitoring Station	Date (d-m-y)	Electrical Conductivity (µS/cm)	pH (units)	Total Hard as $CaCO_3$ (mg/L)	Total Alk as $CaCO_3$ (mg/L)	Chloride:D (mg/L)	Sulphate:D (mg/L)	Iron:D (mg/L)	Manganese:D (mg/L)	TDS-calculated (mg/L)	Calcium:D (mg/L)	Magnesium:D (mg/L)	Potassium:D (mg/L)	Sodium:D (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Fluoride:D (mg/L)	Ion Balance (%)	NO_2 as N (mg/L)	NO_3 as N (mg/L)	NO_2+NO_3 as N (mg/L)	Phenols (mg/L)
Aesthetic Objective (AO)		---	6.5 - 8.5	---	---	250	500	0.3	0.05	500	---	---	---	200	---	---	---	---	---	---	---	---	---
Maximum Acceptable Concentration (MAC)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	10	10	---
DEVONIAN																							
Waterways Formation																							
P08079707D	26-Mar-04	11,400	12.7 [1,7]	629	2,460	16	202	0.022	<0.001	3,210 [1]	252	<0.05	830	502 [1]	<0.5	132	---	0.3	72.2	---	---	0.4	<0.001
5-24-96-8 (D)	4-Mar-98	1,977	7.58	211	487	148	159	6.35 [1]	0.220 [1]	1,058 [1]	51.9	19.7	75.0	307 [1]	594	<0.5	---	1.14	---	---	---	0.170	0.024
	21-Mar-98	2,160	7.35	350	595	336 [1]	37.4	<0.01	0.337 [1]	---	77.9	40.1	23.3	316 [1]	726	<0.5	---	1.73 [2]	99	---	---	0.004	<0.001
	3-Nov-98	1,970	7.22	270	692	197	19.4	0.09	0.336 [1]	1,020 [1]	57.4	29.8	17.5	323 [1]	845	<0.5	---	---	92	---	---	<0.003	0.022
11-12-96-8 (D)	4-Mar-98	733	7.12	372	406	4.1	6.5	<0.01	0.107 [1]	398	95.4	32.5	4.53	5.97	495	<0.5	---	0.51	93	---	---	0.390	<0.001
	4-Nov-98	898	7.38	330	416	29.8	44.7	0.08	0.108 [1]	527 [1]	83.7	29.2	7.9	82.1	508	<0.5	---	---	103	---	---	0.011	0.006
3-14-96-8 (D)	4-Mar-98	782	7.00	382	431	2.1	7.7	18.2 [1]	0.342 [1]	436	98.0	33.4	6.54	24.6	525	<0.5	---	0.56	100	---	---	0.170	<0.001
	4-Nov-98	728	7.54	380	407	<0.5	0.1	3.40 [1]	0.221 [1]	394	99.1	31.2	4.9	14.7	497	<0.5	---	---	102	---	---	0.012	<0.002

NOTES:

1. *--- in guideline(s) row denotes no criteria, and in data row(s) indicates parameter not analysed.*
2. *Highlighting indicates parameters above applied guideline/criteria.*
3. *Superscript [1] denotes values exceeding Aesthetic Objective (AO) (Health Canada (2007) AO Guideline).*
4. *Superscript [2] denotes values exceeding Maximum Acceptable Concentration (MAC) (Health Canada (2007) MAC Guideline).*
5. *Superscript [3] denotes data taken from Terracon Geotechnique Ltd., 1991.*
6. *Superscript [4] denotes data taken from Terracon Geotechnique Ltd., 1990a.*
7. *Superscript [5] denotes data taken from Terracon Geotechnique Ltd., 1985.*
8. *Superscript [6] denotes data taken from Alberta Research Council. 1976-1982.*
9. *Superscript [7] denotes potential cement contamination*
10. ** EC lower then TDS due to organic interference.*
11. *** denotes values are extractable and not dissolved.n*
12. *Single bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence.*
13. *Superscript [g] denotes MDL raised due to dilution.*
14. *Superscript [m] indicates MDL raised due to matrix interference.*
15. *Superscript [i] indicates MDL raised due colour interference.*

PROJECT NO.: F35772801		BTEX				SELECT HYDROCARBONS						
Monitoring Station	Date (d-m-y)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes-total (mg/L)	F1 (C_6-C_{10})-BTEX (mg/L)	F2 ($C_{>10}$-C_{16}) (mg/L)	TVH (C_5-C_{10}) *(mg/L)*	TEH (C_{11}-C_{30}) *(mg/L)*	TEH (C_{11}-C_{60}) *(mg/L)*	TPH (C_{11}-C_{60}) *(mg/L)*	Oil & Grease *(mg/L)*
AENV (2001) Guideline		**0.005**	**0.024**	**0.0024**	**0.3**	**4.6**	**2.1**	**---**	**---**	**---**	**---**	**---**
Jackpine Expansion Mining Area												
QUATERNARY												
Shallow												
P06-1620-SQ	22-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.16	N/M	N/M	N/M	N/M	N/M
P06-1623-SQ	24-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1629-SQ	22-Feb-06	<0.0005	0.0013	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1639-SQ	22-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1641-SQ	01-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1650-SQ	24-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1655-SQ	22-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1664-SQ	24-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1672-SQ	13-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1699-SQ	24-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
SH07-1712-SQ	19-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
Deep												
P06-1629-DQ	22-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.14	N/M	N/M	N/M	N/M	N/M
SH06-1641-DQ	20-Mar-06	0.0008	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
P06-1650-DQ	24-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
SH06-1672-DQ	21-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.06	N/M	N/M	N/M	N/M	N/M
P06-1699-DQ	24-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.88	N/M	N/M	N/M	N/M	N/M
(Duplicate)	24-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.83	N/M	N/M	N/M	N/M	N/M
SH07-1712-DQ	19-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.1	N/M	N/M	N/M	N/M	N/M
(Duplicate)	19-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.19	N/M	N/M	N/M	N/M	N/M
PLEISTOCENE CHANNEL												
SH06-1638-PC	07-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
SH06-1663-PC	07-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
SH06-1698-PC	07-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
SH06-1720-PC	07-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
MCMURRAY FORMATION												
Basal Aquifer												
SH06-1620-BS	22-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.08	N/M	N/M	N/M	N/M	N/M
SH06-1636-BS	22-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.12	N/M	N/M	N/M	N/M	N/M
(Duplicate)	22-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.12	N/M	N/M	N/M	N/M	N/M
SH06-1641-BS	20-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.37	N/M	N/M	N/M	N/M	N/M
(Duplicate)	20-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.33	N/M	N/M	N/M	N/M	N/M
SH06-1655-BS	22-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.13	N/M	N/M	N/M	N/M	N/M

Table 5

Petroleum Hydrocarbon Data

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	BTEX				SELECT HYDROCARBONS						
		Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes-total (mg/L)	F1 (C_6-C_{10})-BTEX (mg/L)	F2 ($C_{>10}$-C_{16}) (mg/L)	TVH (C_5-C_{10}) *(mg/L)*	TEH (C_{11}-C_{30}) *(mg/L)*	TEH (C_{11}-C_{60}) *(mg/L)*	TPH (C_{11}-C_{60}) *(mg/L)*	Oil & Grease *(mg/L)*
AENV (2001) Guideline		**0.005**	**0.024**	**0.0024**	**0.3**	**4.6**	**2.1**	---	---	---	---	---
SH06-1672-BS	21-Mar-06	<0.0005	0.0006	<0.0005	<0.0005	<0.1	0.09	N/M	N/M	N/M	N/M	N/M
SH06-1699-BS	21-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.19	N/M	N/M	N/M	N/M	N/M
SH07-1712-BS	19-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.27	N/M	N/M	N/M	N/M	N/M
DEVONIAN												
SH06-1641-D	20-Mar-06	0.0007	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
SH06-1655-D	23-Feb-06	<0.0005	0.0074	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
SH06-1699-D	21-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.12	N/M	N/M	N/M	N/M	N/M
QA/QC												
Field Blank	24-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
	21-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
Trip Blank	21-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	N/M	N/M	N/M	N/M	N/M
Jackpine Mine - Phase 1												
QUATERNARY												
P01-903A	16-Sep-01	0.0035	0.0022	<0.0005	0.0031	N/M	N/M	<0.1	3.6	N/M	N/M	N/M
P01-903B	16-Sep-01	0.0035	0.0063	<0.0005	0.0071	N/M	N/M	<0.1	12	N/M	N/M	N/M
P01-904A	16-Sep-01	0.0012	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	4.7	N/M	N/M	N/M
P01-905A	16-Sep-01	0.0017	0.0006	<0.0005	<0.0005	N/M	N/M	<0.1	0.42	N/M	N/M	N/M
P01-905B	16-Sep-01	0.0010	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	1.8	N/M	N/M	N/M
P01-906A	13-Sep-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	5.2	N/M	N/M	N/M
P01-909A	12-Sep-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	1.2	N/M	N/M	N/M
P01-909B	12-Sep-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	2.0	N/M	N/M	N/M
(duplicate, "909G")	26-Sep-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	2.8	N/M	N/M	N/M
P01-910A	13-Sep-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	3.2	N/M	N/M	N/M
1390006 (PG1)	2-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	0.11	N/M	N/M	N/M
1390006 (PG2)	2-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	0.60	N/M	N/M	N/M
1390202 (PG1)	3-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	0.05	N/M	N/M	N/M
1390202 (PG2)	3-Aug-01	<0.0005	<0.0005	0.0007	0.027	N/M	N/M	<0.1	0.21	N/M	N/M	N/M
1390211	8-Aug-01	<0.0005	0.0006	0.0014	0.015	N/M	N/M	<0.1	7.6	N/M	N/M	N/M
1390214	3-Aug-01	0.0028	0.0009	0.034 [1]	0.21	N/M	N/M	0.3	2.1	N/M	N/M	N/M
1390504 (PG1) [3]	15-Mar-90	<0.005	0.046 [1]	0.020 [1]	0.011	N/M	N/M	2.2	0.42	N/M	N/M	3.0
1390504 (PG2) [3]	15-Mar-90	<0.005	<0.005	<0.005	<0.005	N/M	N/M	ND [7]	ND [7]	N/M	N/M	0.70
1390508 (PG1) [3]	15-Mar-90	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	4.0
3090500 (PG1) [3]	15-Mar-90	0.235 [1]	0.154 [1]	0.309 [1]	0.195	N/M	N/M	19.2	19.3	N/M	N/M	1.0
3090500 (PG2) [3]	15-Mar-90	0.021 [1]	0.057 [1]	0.016 [1]	0.086	N/M	N/M	7.5	132	N/M	N/M	2.5
ARC7-32	8-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	0.48	N/M	N/M	N/M

Table 5

Petroleum Hydrocarbon Data

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	BTEX: Benzene (mg/L)	BTEX: Toluene (mg/L)	BTEX: Ethylbenzene (mg/L)	BTEX: Xylenes-total (mg/L)	SELECT HYDROCARBONS: F1 (C_6-C_{10})-BTEX (mg/L)	F2 ($C_{>10}$-C_{16}) (mg/L)	TVH (C_5-C_{10}) (mg/L)	TEH (C_{11}-C_{30}) (mg/L)	TEH (C_{11}-C_{60}) (mg/L)	TPH (C_{11}-C_{60}) (mg/L)	Oil & Grease (mg/L)
AENV (2001) Guideline		**0.005**	**0.024**	**0.0024**	**0.3**	**4.6**	**2.1**	**---**	**---**	**---**	**---**	**---**
PLEISTOCENE CHANNEL												
1389013 [2 3]	28-Feb-90	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	2.8
1390008 (PFS) [2 3]	---	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	0.4
1390202-#3	3-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	0.14	N/M	N/M	N/M
1390502 (PFS) [2 3]	13-Mar-90	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	0.1
1390700 [2 3]	25-Feb-90	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	0.40
	28-Feb-90	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	0.10
	5-Mar-90	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	0.10
	15-Mar-90	<0.005	<0.005	<0.005	<0.005	N/M	N/M	ND [7]	ND [7]	N/M	N/M	0.20
1390701-#3	3-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	0.43	N/M	N/M	N/M
1390701-#4	3-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	23	N/M	N/M	N/M
3189221 [2 3]	15-Mar-90	<0.005	<0.005	<0.005	<0.005	N/M	N/M	ND [7]	ND [7]	N/M	N/M	0.30
Well #4 [4]	15-Mar-90	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	0.20
McMURRAY FORMATION												
Oil Sands/Intra-Orebody												
P01-904C	26-Sep-01	<0.0005	0.0019	<0.0005	<0.0005	N/M	N/M	<0.1	15	N/M	N/M	N/M
P01-906C	13-Sep-01	<0.0005	<0.0005	<0.0005	0.0022	N/M	N/M	<0.1	31	N/M	N/M	N/M
P01-910C	13-Sep-01	<0.0005	<0.0005	<0.0005	0.0024	N/M	N/M	<0.1	48	N/M	N/M	N/M
Basal Aquifer												
P00-3D	28-Sep-01	<0.0005	<0.0005	<0.0005	0.0011	N/M	N/M	<0.1	0.45	N/M	N/M	N/M
P01-902D	27-Sep-01	<0.0005	0.0012	<0.0005	<0.0005	N/M	N/M	<0.1	2.3	N/M	N/M	N/M
P01-905D	27-Sep-01	0.0011	0.0006	<0.0005	<0.0005	N/M	N/M	<0.1	1.6	N/M	N/M	N/M
P01-909D	26-Sep-01	<0.0005	0.044 [1]	<0.0005	<0.0005	N/M	N/M	<0.1	2.3	N/M	N/M	N/M
(duplicate, "909F")	26-Sep-01	<0.0005	0.0020	<0.0005	<0.0005	N/M	N/M	<0.1	2.3	N/M	N/M	N/M
07-07-95-8	8-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	0.22	N/M	N/M	N/M
DEVONIAN												
Waterways Formation												
P01-904E	30-Sep-01	<0.0005	0.094 [1]	<0.0005	<0.0005	N/M	N/M	0.1	0.48	N/M	N/M	N/M
P01-909E	28-Sep-01	<0.0005	0.092 [1]	<0.0005	0.0005	N/M	N/M	0.1	0.15	N/M	N/M	N/M
Watt Mountain Formation												
ARC6-310	17-Aug-01	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	<0.1	0.76	N/M	N/M	N/M
Kearl Oil Sands Project												
QUATERNARY												
P04169707Q	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	0.2	N/M	0.45	N/M
P04169707Q1	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P06159607Q	17-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M

PROJECT NO.: F35772801		BTEX				SELECT HYDROCARBONS						
Monitoring Station	Date (d-m-y)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes-total (mg/L)	F1 (C_6-C_{10})-BTEX (mg/L)	F2 ($C_{>10}$-C_{16}) (mg/L)	TVH (C_5-C_{10}) *(mg/L)*	TEH (C_{11}-C_{30}) *(mg/L)*	TEH (C_{11}-C_{60}) *(mg/L)*	TPH (C_{11}-C_{60}) *(mg/L)*	Oil & Grease *(mg/L)*
AENV (2001) Guideline		**0.005**	**0.024**	**0.0024**	**0.3**	**4.6**	**2.1**	**---**	**---**	**---**	**---**	**---**
P06159607Q1	17-Mar-04	<0.0005	0.001	0.0018	0.0205	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P06179607Q	29-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	0.14	N/M
P06229707Q1	26-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P06319607Q	17-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P06319607Q1	17-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P08079707Q	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	0.4	N/M	0.51	N/M
P08079707Q1	13-Mar-04	<0.0005	0.0006	0.0019	0.0242	0.2	0.3	N/M	0.2	N/M	0.14	N/M
P08289607Q1	17-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P11229607Q	15-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P11229607Q1	17-Mar-04	<0.0005	<0.0005	<0.0005	0.0007	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P12359607Q1	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	0.2	N/M	<0.1	N/M
P14049607Q	17-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P14049607Q1	17-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P14199607Q	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.1	N/M	0.7	N/M	1.23	N/M
P14199607Q2	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.1	N/M	0.3	N/M	0.38	N/M
P14209607Q	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P14209607Q1	13-Mar-04	<0.0005	<0.0005	<0.0005	0.0031	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P14259607Q	13-Mar-04	<0.0005	<0.0005	<0.0005	0.0007	<0.1	<0.1	N/M	<0.1	N/M	0.11	N/M
P16149707Q	13-Mar-04	<0.0005	<0.0005	0.0012	0.0091	<0.1	0.3	N/M	0.5	N/M	0.56	N/M
P16149707Q1	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	0.12	N/M
P16229607Q	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P16229607Q1	13-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.1	N/M	0.5	N/M	0.70	N/M
McMURRAY FORMATION												
Oil Sands/Intra-Orebody												
97-4 Oil Sands	10-Mar-97	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	N/M	N/M	N/M	N/M	N/M
Basal Aquifer												
P04179707B	27-May-04	<0.0005	<0.0005	<0.0005	0.0015	<0.1	<0.1	N/M	0.2	N/M	0.31	N/M
P10169707B	26-Mar-04	<0.0005	<0.0005	<0.0005	0.0017	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P14339607B	27-Mar-04	<0.0005	0.0012	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	0.15	N/M
(duplicate)	27-Mar-04	<0.0005	0.0012	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
P16069707B	27-May-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	0.2	N/M	0.35	N/M
W08059707B	15-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	1.2	N/M	<0.1	N/M
	17-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
	19-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	0.1	N/M	<0.1	N/M

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Table 5

Petroleum Hydrocarbon Data

PROJECT NO.: F35772801		BTEX				SELECT HYDROCARBONS						
Monitoring Station	Date (d-m-y)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes-total (mg/L)	F1 (C_6-C_{10})-BTEX (mg/L)	F2 ($C_{>10}$-C_{16}) (mg/L)	TVH (C_5-C_{10}) *(mg/L)*	TEH (C_{11}-C_{30}) *(mg/L)*	TEH (C_{11}-C_{60}) *(mg/L)*	TPH (C_{11}-C_{60}) *(mg/L)*	Oil & Grease *(mg/L)*
AENV (2001) Guideline		**0.005**	**0.024**	**0.0024**	**0.3**	**4.6**	**2.1**	**---**	**---**	**---**	**---**	**---**
97-2 (B) Post Purge	11-Mar-97	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	N/M	N/M	N/M	N/M	N/M
(duplicate)	11-Mar-97	<0.0005	<0.0005	<0.0005	<0.0005	N/M	N/M	N/M	N/M	N/M	N/M	N/M
1-9-96-8 (B)	1-Mar-98	<0.0004	<0.0004	<0.0004	<0.0008	N/M	N/M	N/M	N/M	N/M	0.31	N/M
3-5-96-8 (B)	26-Feb-98	<0.0004	<0.0004	<0.0004	<0.0008	N/M	N/M	N/M	N/M	N/M	0.57	N/M
(duplicate)	26-Feb-98	<0.0004	<0.0004	<0.0004	<0.0008	N/M	N/M	N/M	N/M	N/M	1.5	N/M
3-22-96-8 (B)	1-Mar-98	<0.0004	(0.0007)*	(0.0005)*	0.0041	N/M	N/M	N/M	N/M	N/M	<0.050	N/M
10-14-96-8 (B)	12-Sep-98	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	0.61	N/M
12-1-96-9 (B)	26-Feb-98	<0.0004	<0.0004	<0.0004	<0.0008	N/M	N/M	N/M	N/M	N/M	0.23	N/M
(duplicate)	26-Feb-98	<0.0004	<0.0004	<0.0004	<0.0008	N/M	N/M	N/M	N/M	N/M	0.27	N/M
13-4-96-8 (B)	27-Feb-98	<0.0004	<0.0004	<0.0004	<0.0008	N/M	N/M	N/M	N/M	N/M	<0.050	N/M
13-9-96-8 (B)	28-Feb-98	<0.0018	<0.0018	<0.0018	<0.0036	N/M	N/M	N/M	N/M	N/M	<0.050	N/M
15-8-96-8 (B)	1-Mar-98	<0.0004	<0.0004	<0.0004	<0.0008	N/M	N/M	N/M	N/M	N/M	0.57	N/M
DEVONIAN												
Waterways Formation												
P08079707D	26-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	0.13	N/M
QA/QC												
FIELD BLANK	27-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M
TRIP BLANK	27-Mar-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.1	N/M	<0.1	N/M	<0.1	N/M

NOTES:

1. *--- in guideline row(s) denotes no criteria for that parameter.*
2. *Highlighting indicates parameters above applied guideline/criteria.*
3. *Superscript [1] denotes values exceeding AENV (2001) Guideline (AENV (2001) Guideline, applicable pathways as described in report).*
4. *N/M denotes parameter not measured.*
5. *Superscript [2] denotes values from Terracon Geotechnique Ltd., 1991.*
6. *Superscript [3] denotes values from Terracon Geotechnique Ltd., 1990a.*
7. *Superscript [4] denotes values from Terracon Geotechnique Ltd., 1985.*

** Single bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence.*

*** MDL raised due to matrix interference.*

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Table 6

Polycyclic Aromatic Hydrocarbon Data for Groundwater Samples

PROJECT NO.: E35772801

Monitoring Station	Date (d-m-y)	PANH: C2-Sub'd B(A)a/Chrysene (mg/L)	C2-Sub'd B(B&K)F/B(A)P (mg/L)	C2-Sub'd Biphenyl (mg/L)	C2-Sub'd Dibenzothiophene (mg/L)	C2-Sub'd Fluorene (mg/L)	C2-Sub'd Naphthalene (mg/L)	C2-Sub'd Phenanthrene/Anthracene (mg/L)	C3-Sub'd Dibenzothiophene (mg/L)	C3-Sub'd Naphthalene (mg/L)	C3-Sub'd Phenanthrene/Anthracene (mg/L)	C4-Sub'd Dibenzothiophene (mg/L)	C4-Sub'd Naphthalene (mg/L)	C4-Sub'd Phenthrene/Anth. (mg/L)	Acridine (mg/L)	Methyl Dibenzothiophene (mg/L)	ALBERTA TIER 1 PAH'S: 3-Methylcholanthrene (mg/L)	7, 12-Dimethylbenz(a)anthracene (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Anthracene (mg/L)	Benzo(a)-anthracene (mg/L)	Benzo(a)-pyrene (mg/L)	Benzo(b)fluoranthene (mg/L)	^Benzo(c)phenanthrene (mg/L)
AENV (2001b) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			---	---	---	---	---	---	0.00001	---	
Jackpine Expansion Mining Area																										
QUATERNARY																										
Shallow																										
P06-1620-SQ*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
P06-1623-SQ	24-Feb-06	0.00035	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00008	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	0.00002 [1]	0.00002	---
P06-1629-SQ*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
P06-1639-SQ*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
P06-1641-SQ*	01-Mar-06	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		---	---	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	---
P06-1650-SQ	24-Feb-06	0.00037	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	0.00001	0.00002 [1]	0.00002	---
P06-1655-SQ*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
P06-1664-SQ	24-Feb-06	0.00008	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P06-1672-SQ	13-Mar-06	<0.00004	<0.00004	<0.00004	0.00024	<0.00004	0.00050	<0.00004	0.00012	0.00058	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	0.00009		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P06-1699-SQ	24-Feb-06	0.00007	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
SH07-1712-SQ	19-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
Deep																										
P06-1629-DQ*	22-Feb-06	0.0058	<0.0001	<0.0001	0.012	0.0045	<0.0001	0.020	0.026	0.0025	0.021	0.025	0.0010	0.0069	0.0008	0.0023		---	---	0.0003	<0.0001	0.0001	0.0003	<0.0001	<0.0001	---
SH06-1641-DQ	20-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P06-1650-DQ	24-Feb-06	0.00014	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	---
SH06-1672-DQ	21-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P06-1699-DQ	24-Feb-06	0.0014	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	0.00004	0.00006 [1]	0.00005	---
(Duplicate)	24-Feb-06	0.00096	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	0.00003	0.00004 [1]	0.00004	---
SH07-1712-DQ	19-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00005	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
(Duplicate)	19-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00005	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
PLEISTOCENE CHANNEL																										
SH06-1638-PC	07-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00009	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
SH06-1663-PC	07-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00011	0.00011	<0.00004	<0.00004	0.00010	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
SH06-1698-PC	07-Mar-06	0.00006	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
SH06-1720-PC	07-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
McMURRAY FORMATION																										
Basal Aquifer																										
SH06-1620-BS*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
SH06-1636-BS*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
(Duplicate)*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
SH06-1641-BS	20-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00016	<0.00004	<0.00004	0.00025	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
(Duplicate)	20-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00012	<0.00004	<0.00004	0.00017	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
SH06-1655-BS*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
SH06-1672-BS	21-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00009	<0.00004	<0.00004	0.00008	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
SH06-1699-BS	21-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
SH07-1712-BS	19-Mar-07	0.0002	0.00006	<0.00004	0.00024	<0.00004	0.00005	0.00044	0.00066	0.00005	0.00041	0.00049	<0.00004	0.00031	<0.00001	0.00009		---	---	<0.00001	<0.00001	0.00002	<0.00001	0.00002 [1]	0.00003	---
DEVONIAN																										
SH06-1641-D	20-Mar-06	<0.00004	<0.00004	0.00020	<0.00004	<0.00004	0.00013	0.00014	<0.00004	0.00007	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
SH06-1655-D*	23-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
SH06-1699-D	21-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00012	0.00007	<0.00004	<0.00004	0.00006	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
QA/QC																										
Field Blank	24-Feb-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
	21-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
Trip Blank	21-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004		---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
Jackpine Mine - Phase I																										
QUATERNARY																										
P01-903A	16-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	16-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-903B	16-Sep-01	0.00018	<0.00004	<0.00004	0.00005	<0.00004	<0.00004	<0.00004	0.00028	<0.00004	0.00011	0.00017	<0.00004	0.00021	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	16-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-904A	16-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	16-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---

Table 6

Polycyclic Aromatic Hydrocarbon Data for Groundwater Samples

PROJECT NO.: E35772801

Monitoring Station	Date (d-m-y)	PANH														ALBERTA TIER 1 PAH'S								
		C2-Sub'd B(A)a/Chrysene (mg/L)	C2-Sub'd B(B&K)F/B(A)P (mg/L)	C2-Sub'd Biphenyl (mg/L)	C2-Sub'd Dibenzothiophene (mg/L)	C2-Sub'd Fluorene (mg/L)	C2-Sub'd Naphthalene (mg/L)	C2-Sub'd Phenanthrene/Anthracene (mg/L)	C3-Sub'd Dibenzothiophene (mg/L)	C3-Sub'd Naphthalene (mg/L)	C3-Sub'd Phenanthrene/Anthracene (mg/L)	C4-Sub'd Dibenzothiophene (mg/L)	C4-Sub'd Naphtahalene (mg/L)	C4-Sub'd Phenthrene/Anth. (mg/L)	Acridine (mg/L)	Methyl Dibenzothiophene (mg/L)	3-Methylcholanthrene (mg/L)	7, 12-Dimethylbenz(a)anthracene (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Anthracene (mg/L)	Benzo(a)-anthracene (mg/L)	Benzo(a)-pyrene (mg/L)	Benzo(b)fluoranthene (mg/L)	^Benzo(c)phenanthrene (mg/L)
AENV (2001b) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			---	---	---	---	**0.00001**	---	
P01-905A	16-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	16-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-905B	16-Sep-01	0.00007	<0.00004	<0.00004	<0.00004	0.00005	<0.00004	<0.00004	0.00006	<0.00004	0.00011	<0.00004	<0.00004	0.00005	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	16-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-906A	13-Sep-01	<0.00004	<0.00004	0.00017	0.00034	0.00032	<0.00004	0.00025	0.00031	0.00039	0.00017	0.00005	0.00030	0.00005	---	0.00009	<0.00001	<0.00001	0.00019	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	13-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00019	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-909A	12-Sep-01	<0.00004	<0.00004	0.00021	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00006	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	12-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-909B	26-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	26-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
(duplicate, "909G")	26-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00005	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate, "909G")	26-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-910A	13-Sep-01	<0.00004	<0.00004	0.00009	0.00020	0.00019	<0.00004	0.00024	0.00013	0.00006	0.00012	<0.00004	0.00029	<0.00004	---	0.00004	<0.00001	<0.00001	0.00006	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	13-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00006	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
1390006 (PG1)	2-Aug-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	2-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
1390006 (PG2)	2-Aug-01	<0.00004	<0.00004	0.00006	0.00013	0.00021	0.0010	0.00035	0.00017	0.00066	0.00023	<0.00004	0.00035	0.00004	---	0.00010	<0.00001	<0.00001	0.00012	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	2-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00012	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
1390202 (PG1)	3-Aug-01	<0.00004	<0.00004	<0.00004	0.00007	<0.00004	0.00008	0.00012	0.00013	0.00010	0.00011	<0.00004	<0.00004	0.00005	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	3-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
1390202 (PG2)	3-Aug-01	0.00015	<0.00004	0.00014	0.00009	<0.00004	0.0062	0.00013	0.00040	0.0017	0.00027	0.00032	0.00021	0.00017	---	0.00005	<0.00001	0.00001	0.00010	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	3-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	---
1390211	8-Aug-01	0.00019	<0.00004	0.00015	0.00030	0.00019	0.0043	0.00025	0.0012	0.0018	0.00082	0.00076	0.00034	0.00074	---	0.00009	<0.00001	<0.00001	0.00006	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	8-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00006	<0.00001	<0.00001	0.00001	<0.00001	0.00001	---
1390214	3-Aug-01	0.00009	<0.00004	0.0012	0.00016	0.00036	0.039	0.00033	0.00010	0.016	0.00026	<0.00004	0.0029	0.00012	---	0.00018	<0.00001	<0.00001	0.00029	0.00003	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	3-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00031	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	---
1390504 (PG2) [2]	15-Mar-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	---
ARC7-32	8-Aug-01	0.00004	<0.00004	0.00004	0.00010	0.00010	0.00007	0.00014	0.00016	0.00012	0.00029	0.00006	0.00011	0.00006	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	8-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
PLEISTOCENE CHANNEL																									
1390202-#3	3-Aug-01	0.00037	<0.00004	<0.00004	0.00014	0.00014	0.00034	0.00058	0.00096	0.00021	0.0012	0.00057	<0.00004	0.00024	---	<0.00004	<0.00001	0.00003	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00003	<0.00001
(duplicate)	3-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00001	<0.00001	<0.00001	0.00002	<0.00001	0.00003	---
1390700 [2 3]	15-Mar-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---
1390701-#2	3-Aug-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	3-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
1390701-#3	3-Aug-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00007	<0.00004	<0.00004	0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	3-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
1390701-#4	3-Aug-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	3-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
3189221 (PFS) [2 3]	15-Mar-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---
McMURRAY FORMATION																									
Oil Sands/Intra-Orebody																									
P01-904C	26-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00007	0.00031	0.00006	0.00007	0.00007	<0.00004	0.00008	<0.00004	---	0.00005	<0.00001	<0.00001	0.00020	<0.00002	<0.00002	0.00003	<0.00002	<0.00002	<0.00001
(duplicate)	26-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00017	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-906C	13-Sep-01	<0.00004	<0.00004	0.00032	0.00095	0.00044	0.00009	0.00080	0.0010	0.0019	0.00030	0.00009	0.00076	0.00006	---	0.00057	<0.00001	<0.00001	0.00029	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	13-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00032	<0.00001	<0.00001	0.00002	<0.00001	<0.00001	---
P01-910C	13-Sep-01	<0.00004	<0.00004	0.00031	0.0011	0.00060	0.00022	0.0011	0.0013	0.0022	0.00055	0.00023	0.00098	0.00010	---	0.00085	<0.00001	<0.00001	0.00030	<0.00002	0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	13-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
Basal Aquifer																									
P00-3D	28-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	28-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-902D	27-Sep-01	<0.00004	<0.00004	<0.00004	0.00009	0.00021	0.00011	0.0013	<0.00004	0.00030	0.00007	<0.00004	0.00012	<0.00004	---	0.00011	<0.00001	<0.00001	0.00005	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	27-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-905D	27-Sep-01	<0.00004	<0.00004	0.00006	0.00004	0.00026	0.00006	0.00012	<0.00004	0.00029	0.00005	<0.00004	0.00015	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	27-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---

WorleyParsons Komex
resources & energy

Table 6

Polycyclic Aromatic Hydrocarbon Data for Groundwater Samples

PROJECT NO.: E35772801

Monitoring Station	Date (d-m-y)	PANH														ALBERTA TIER 1 PAH'S								
		C2-Sub'd B(A)a/Chrysene (mg/L)	C2-Sub'd B(B&K)F/B(A)P (mg/L)	C2-Sub'd Biphenyl (mg/L)	C2-Sub'd Dibenzothiophene (mg/L)	C2-Sub'd Fluorene (mg/L)	C2-Sub'd Naphthalene (mg/L)	C2-Sub'd Phenanthrene/Anthracene (mg/L)	C3-Sub'd Dibenzothiophene (mg/L)	C3-Sub'd Naphthalene (mg/L)	C3-Sub'd Phenanthrene/Anthracene (mg/L)	C4-Sub'd Dibenzothiophene (mg/L)	C4-Sub'd Naphtahalene (mg/L)	C4-Sub'd Phenthrene/Anth. (mg/L)	Acridine (mg/L)	Methyl Dibenzothiophene (mg/L)	3-Methylcholanthrene (mg/L)	7, 12-Dimethylbenz(a)anthracene (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Anthracene (mg/L)	Benzo(a)-anthracene (mg/L)	Benzo(a)-pyrene (mg/L)	Benzo(b)fluoranthene (mg/L)	^Benzo(c)phenanthrene (mg/L)
AENV (2001b) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	**0.00001**	---	
P01-909D	26-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00008	0.00008	<0.00004	0.00031	0.00004	<0.00004	0.00015	<0.00004	---	0.00007	<0.00001	<0.00001	0.00003	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	26-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
(duplicate, "909F")	26-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00008	0.00009	<0.00004	0.00024	0.00005	<0.00004	0.00017	<0.00004	---	0.00009	<0.00001	<0.00001	0.00003	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate, "909F")	26-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00003	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
07-07-95-08	8-Aug-01	<0.00004	<0.00004	0.00006	0.00006	0.00012	0.00008	0.00008	<0.00004	0.00017	<0.00004	<0.00004	0.00020	<0.00004	---	0.00007	<0.00001	<0.00001	0.00006	<0.00002	0.00004	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	8-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00007	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
DEVONIAN																									
Waterways Formation																									
P01-904E	30-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00010	<0.00004	<0.00004	0.00006	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	30-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
P01-909E	28-Sep-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00013	<0.00004	<0.00004	0.00024	<0.00004	<0.00004	0.00016	<0.00004	---	0.00008	<0.00001	<0.00001	0.00004	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	28-Sep-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00003	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	---
Watt Mountain Formation																									
ARC6-310	17-Aug-01	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00035	0.00008	<0.00004	0.00045	<0.00004	<0.00004	0.00008	<0.00004	---	0.00007	<0.00001	<0.00001	0.00004	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001
(duplicate)	17-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---
Kearl Oil Sands Project																									
QUATERNARY																									
P04169707Q	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000022	<0.000018	<0.000010	---	---
P04169707Q1	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000025	<0.000018	<0.000010	---	---
P06159607Q	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000038	<0.000018	<0.000010	---	---
P06159607Q1	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000027	<0.000018	<0.000010	---	---
P06179607Q	29-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000025	<0.000018	<0.000010	---	---
P06229707Q1	26-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000025	<0.000018	<0.000010	---	---
P06319607Q	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000034	<0.000018	<0.000010	---	---
P06319607Q1	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---		<0.00010	<0.00010	0.000054	<0.000018	<0.000010	---	---
P08079707Q	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---		<0.00010	<0.00010	0.000013	<0.000018	<0.000010	---	---
P08079707Q1	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000025	0.000026	<0.000010	---	---
P08289607Q1	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000070	<0.000018	<0.000010	---	---
P11229607Q	15-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000028	<0.000018	<0.000010	---	---
P11229607Q1	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	0.00010	<0.00010	0.000045	<0.000018	<0.000010	---	---
P12359607Q1	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000051	0.000018	<0.000010	---	---
P14049607Q	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000037	<0.000018	<0.000010	---	---
P14049607Q1	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000030	<0.000018	<0.000010	---	---
P14199607Q	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000025	<0.000018	<0.000010	---	---
P14199607Q2	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000036	0.000019	<0.000010	---	---
P14209607Q	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000020	<0.000018	<0.000010	---	---
P14209607Q1	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000030	0.00002	<0.000010	---	---
P14259607Q	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000025	<0.000018	<0.000010	---	---
P16149707Q	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000039	0.000019	<0.000010	---	---
P16149707Q1	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000017	<0.000018	<0.000010	---	---
P16229607Q	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000024	<0.000018	<0.000010	---	---
P16229607Q1	13-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000029	0.000019	<0.000010	---	---
13-9-96-8 (Q)	4-Mar-98	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.0002	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---
McMURRAY FORMATION																									
Oil Sands/Intra-Orebody																									
97-4 Oil Sands	10-Mar-97	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	---
Basal Aquifer																									
P04179707B	27-May-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000012	0.000029	<0.000010	---	---
P14339607B	27-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000043	<0.000018	<0.000010	---	---
(duplicate)	27-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000043	<0.000018	<0.000010	---	---
P16069707B	27-May-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	<0.000012	0.000024	<0.000010	---	---
P10169707B	26-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000020	<0.000018	<0.000010	---	---

WorleyParsons Komex
resources & energy

Table 6

Polycyclic Aromatic Hydrocarbon Data for Groundwater Samples

PROJECT NO.: E35772801		PANH															ALBERTA TIER 1 PAH'S								
Monitoring Station	Date (d-m-y)	C2-Sub'd B(A)a/Chrysene (mg/L)	C2-Sub'd B(B&K)F/B(A)P (mg/L)	C2-Sub'd Biphenyl (mg/L)	C2-Sub'd Dibenzothiophene (mg/L)	C2-Sub'd Fluorene (mg/L)	C2-Sub'd Naphthalene (mg/L)	C2-Sub'd Phenanthrene/Anthracene (mg/L)	C3-Sub'd Dibenzothiophene (mg/L)	C3-Sub'd Naphthalene (mg/L)	C3-Sub'd Phenanthrene/Anthracene (mg/L)	C4-Sub'd Dibenzothiophene (mg/L)	C4-Sub'd Naphtahalene (mg/L)	C4-Sub'd Phenthrene/Anth. (mg/L)	Acridine (mg/L)	Methyl Dibenzothiophene (mg/L)	3-Methylcholanthrene (mg/L)	7, 12-Dimethylbenz(a)anthracene (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Anthracene (mg/L)	Benzo(a)-anthracene (mg/L)	Benzo(a)-pyrene (mg/L)	Benzo(b)fluoranthene (mg/L)	^Benzo(c)phenanthrene (mg/L)
AENV (2001b) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
W08059707B	15-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.00003	<0.000018	<0.000010	---	---
	17-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	<0.000012	0.000158	<0.000010	---	---
	19-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000023	<0.000018	<0.000010	---	---
97-2 (B) Post Purge	11-Mar-97	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00005	<0.00005	<0.0001	<0.00005	<0.00005	<0.00005	---
3-5-96-8 (B)	4-Mar-98	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.0002	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---
3-22-96-8 (B)	4-Mar-98	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.0002	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---
10-14-96-8 (B)	12-Sep-98	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	---	---
DEVONIAN																									
Waterways Formation																									
P08079707D	26-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000025	<0.000018	<0.000010	---	---
QA/QC																									
FIELD BLANK	27-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000033	<0.000018	<0.000010	---	---
TRIP BLANK	27-Mar-04	---	---	---	---	---	---	---	---	---	---	---	---	---	<0.00010	---	---	---	<0.00010	<0.00010	0.000024	<0.000018	<0.000010	---	---

NOTES:

1. *--- in detail data row(s) denotes parameter not analysed.*
2. ** Denotes MDL raised due to sample dilution.*
3. *Highlighting indicates parameters above applied guideline/criteria.*
4. *Superscript [1] denotes values exceeding AENV (2001) Guideline, applicable pathways as described in report.*
5. *Superscript [2] denotes piezometer/data from Terracon Geotechnique Ltd., 1990a. 1990 Geotechnical Program Data Report. Volume 6, Piezometer and Hydrogeologic Data. Submitted to OSLO Alberta Limited, January 4, 1990.*
6. *Superscript [3] denotes piezometer/data from Terracon Geotechnique Ltd., 1991. Hydrogeology of the Pleistocene Meltwater Channel System. Submitted to OSLO Alberta Limited, February 28, 1991.*
7. *[h] Single bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence.*
8. ** MDL raised due to dilution.*
9. *** PAH parameters were not analysed or reported for Kearl Oil Sands Project using low level PAH method detection limits in 2005.*

Polycyclic Aromatic Hydrocarbon Data for Groundwater Samples

PROJECT NO.: E35772803

Monitoring Station	Date (d-m-y)	ALBERTA TIER 1 PAH'S								PAH																			VOCS		
		Benzo(g,h,i)-perylene (mg/L)	Benzo(k)fluoranthene (mg/L)	Chrysene (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	Indeno(1,2,3-cd)pyrene (mg/L)	Naphthalene (mg/L)	Perylene	Phenanthrene (mg/L)	Pyrene (mg/L)	Quinoline (mg/L)	Biphenyl (mg/L)	Benzo(j)fluoranthene (mg/L)	Benzo(b&j)fluoranthene (mg/L)	Benzo(e)pyrene (mg/L)	Dibenzo(a,e)-pyrene (mg/L)	Dibenzo(a,h)-anthracene (mg/L)	Dibenzo(a,h)-pyrene (mg/L)	Dibenzo(a,i)-pyrene (mg/L)	Dibenzo(ah,ai,aj)-pyrene (mg/L)	Dibenzo(a,l)-pyrene (mg/L)	Dibenzothiophene (mg/L)	Methyl Acenaphthene (mg/L)	Methyl B(A)A/Chrysene (mg/L)	Methyl B(B&K)F/B(A)P (mg/L)	Methyl Biphenyl (mg/L)	Methyl Napthelene (mg/L)	Methylanthracenes (mg/L)	Methylnapthelenes (mg/L)	Naphthenic Acids (FTIR) (mg/L)	Methyl Phenanthrene/Anthracene (mg/L)	Methyl Fluoranthene/Pyrene (mg/L)	Methyl Fluorene (mg/L)
AENV (2001b) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
QUATERNARY																															
Shallow Quaternary																															
P06-1620-SQ*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---	<1	<0.0001	<0.0001	<0.0001
P06-1623-SQ	24-Feb-06	0.00002	0.00001	0.00009	<0.00001	<0.00001	<0.00001	0.00003	---	<0.00001	0.00006	<0.00001	<0.00001	---	---	---	---	0.00001	---	---	---	---	<0.00001	<0.00004	0.00020	<0.00004	<0.00004	0.00004	---	---	<1	<0.00004	0.00012	<0.00004
P06-1629-SQ*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---	<1	0.0001	<0.0001	<0.0001
P06-1639-SQ*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---	<1	<0.0001	<0.0001	<0.0001
P06-1641-SQ*	01-Mar-06	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	---	<0.002	<0.002	<0.002	<0.002	---	---	---	---	<0.002	---	---	---	---	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	---	---	2	<0.002	<0.002	<0.002
P06-1650-SQ	24-Feb-06	0.00001	0.00001	0.00007	<0.00001	<0.00001	<0.00001	0.00002	---	0.00002	0.00003	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	0.00021	0.00013	<0.00004	0.00004	---	---	<1	<0.00004	0.00009	<0.00004
P06-1655-SQ*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---	<1	<0.0001	<0.0001	<0.0001
P06-1664-SQ	24-Feb-06	<0.00001	<0.00001	0.00004	<0.00001	<0.00001	<0.00001	0.00002	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	0.00006	0.00006	<0.00004	0.00003	---	---	<1	<0.00004	0.00005	<0.00004
P06-1672-SQ	13-Mar-06	<0.00001	<0.00001	<0.00001	0.00007	0.00002	<0.00001	0.00072	---	0.00004	0.00031	<0.00001	0.00002	---	---	---	---	<0.00001	---	---	---	---	0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00030	---	---	1	<0.00004	0.00009	<0.00004
P06-1699-SQ	24-Feb-06	<0.00001	<0.00001	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	0.00005	0.00005	<0.00004	<0.00001	---	---	<1	<0.00004	<0.00004	<0.00004
SH07-1712-SQ	19-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<1	---	<0.00004	<0.00004
Deep Quaternary																															
P06-1629-DQ*	22-Feb-06	<0.0001	<0.0001	0.0013	0.0005	<0.0001	<0.0001	0.0001	---	0.0018	0.0008	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	0.0008	<0.0001	0.0030	<0.0001	<0.0001	<0.0001	---	---	11	0.011	0.0027	0.0005
SH06-1641-DQ	20-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	---	---	<1	<0.00004	<0.00004	<0.00004
P06-1650-DQ	24-Feb-06	<0.00001	<0.00001	0.00003	<0.00001	<0.00001	<0.00001	0.00002	---	0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	0.00007	0.00007	<0.00004	0.00003	---	---	<1	<0.00004	<0.00004	<0.00004
SH06-1672-DQ	21-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	---	---	1	<0.00004	<0.00004	<0.00004
P06-1699-DQ	24-Feb-06	0.00004	0.00003	0.00021	<0.00001	<0.00001	<0.00001	0.00002	---	<0.00001	0.00008	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	0.00070	0.00033	0.00005	<0.00001	---	---	<1	<0.00004	0.00027	<0.00004
(Duplicate)	24-Feb-06	0.00002	0.00002	0.00013	<0.00001	<0.00001	<0.00001	0.00002	---	<0.00001	0.00007	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	0.00048	0.00034	<0.00004	<0.00001	---	---	1	<0.00004	0.00019	<0.00004
SH07-1712-DQ	19-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00008	---	0.00002	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	4	---	<0.00004	<0.00004
(Duplicate)	19-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00006	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	3	---	<0.00004	<0.00004
PLEISTOCENE CHANNEL																															
SH06-1638-PC	07-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	---	---	1	<0.00004	<0.00004	<0.00004
SH06-1663-PC	07-Mar-06	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00002	---	0.00002	0.00002	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00002	---	---	<1	0.00009	<0.00004	<0.00004
SH06-1698-PC	07-Mar-06	<0.00001	<0.00001	0.00002	<0.00001	<0.00001	<0.00001	0.00002	---	<0.00001	0.00002	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	0.00004	0.00002	---	---	4	<0.00004	<0.00004	<0.00004
SH06-1720-PC	07-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	---	---	<1	<0.00004	<0.00004	<0.00004
McMURRAY FORMATION																															
Basal Aquifer																															
SH06-1620-BS*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---	8	<0.0001	<0.0001	<0.0001
SH06-1636-BS*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---	8	<0.0001	<0.0001	<0.0001
(Duplicate)*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---	6	<0.0001	<0.0001	<0.0001
SH06-1641-BS	20-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00006	---	0.00001	0.00004	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00010	---	---	7	<0.00004	<0.00004	<0.00004
(Duplicate)	20-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00008	---	0.00002	0.00005	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00012	---	---	7	<0.00004	<0.00004	<0.00004
SH06-1655-BS*	22-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---	7	<0.0001	<0.0001	<0.0001
SH06-1672-BS	21-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00004	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00006	---	---	2	<0.00004	<0.00004	<0.00004
SH06-1699-BS	21-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	---	---	6	<0.00004	<0.00004	<0.00004
SH07-1712-BS	19-Mar-07	0.00001	<0.00001	0.00008	<0.00001	<0.00001	0.00001	0.00006	---	0.00008	0.00007	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	0.00013	0.00009	<0.00004	---	0.00043	0.00004	3	---	0.00014	<0.00004
DEVONIAN																															
SH06-1641-D	20-Mar-06	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00005	---	<0.00001	0.00018	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00011	---	---	<1	<0.00004	<0.00004	<0.00004
SH06-1655-D*	23-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	---	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	<0.0001	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	---	---	<1	<0.0001	<0.0001	<0.0001
SH06-1699-D	21-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00010	---	<0.00001	0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00022	---	---	<1	<0.00004	<0.00004	<0.00004
QA/QC																															
Field Blank	24-Feb-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	---	<1	<0.00004	<0.00004	<0.00004
	21-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	---	<1	<0.00004	<0.00004	<0.00004
Trip Blank	21-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	<0.00001	<0.00001	---	---	---	---	<0.00001	---	---	---	---	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00001	<1	---	<0.00004	<0.00004
Jackpine Mine - Phase I																															
QUATERNARY																															
P01-903A	16-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	16-Sep-01	---	<0.00001	<0.00001	<0.00001	<0.00001	---	0.00003	---	<0.00001	0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-903B	16-Sep-01	<0.00002	<0.00002	0.00006	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	0.00004	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	0.00016	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	0.00009	<0.00004
(duplicate)	16-Sep-01	---	<0.00001	0.00006	<0.00001	<0.00001	---	<0.00001	---	<0.00001	0.00004	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-904A	16-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	16-Sep-01	---	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	---	<0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

WorleyParsons Komex
resources & energy

Table 6

Polycyclic Aromatic Hydrocarbon Data for Groundwater Samples

PROJECT NO.: E35772803		ALBERTA TIER 1 PAH'S											PAH																		VOCS		
Monitoring Station	Date (d-m-y)	Benzo(g,h,i)-perylene (mg/L)	Benzo(k)fluoranthene (mg/L)	Chrysene (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	Indeno(1,2,3-cd)pyrene (mg/L)	Naphthalene (mg/L)	Perylene	Phenanthrene (mg/L)	Pyrene (mg/L)	Quinoline (mg/L)	Biphenyl (mg/L)	Benzo(j)fluoranthene (mg/L)	Benzo(b&j)fluoranthene (mg/L)	Benzo(e)pyrene (mg/L)	Dibenzo(a,e)-pyrene (mg/L)	Dibenzo(a,h)-anthracene (mg/L)	Dibenzo(a,h)-pyrene (mg/L)	Dibenzo(a,i)-pyrene (mg/L)	Dibenzo(ah,ai,aj)-pyrene (mg/L)	Dibenzo(a,l)-pyrene (mg/L)	Dibenzothiophene (mg/L)	Methyl Acenaphthene (mg/L)	Methyl B(A)A/Chrysene (mg/L)	Methyl B(B&K)F/B(A)P (mg/L)	Methyl Biphenyl (mg/L)	Methyl Napthelene (mg/L)	Methylanthracenes (mg/L)	Methylnapthelenes (mg/L)	Naphthenic Acids (FTIR) (mg/L)	Methyl Phenanthrene/Anthracene (mg/L)	Methyl Fluoranthene/Pyrene (mg/L)	Methyl Fluorene (mg/L)
AENV (2001b) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-905A	16-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	16-Sep-01	---	<0.00001	0.00003	<0.00001	<0.00001	---	<0.00001	---	<0.00001	0.00002	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-905B	16-Sep-01	<0.00002	<0.00002	0.00004	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	0.00006	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	0.00004	<0.00004
(duplicate)	16-Sep-01	---	<0.00001	0.00003	<0.00001	<0.00001	---	<0.00001	---	<0.00001	0.00002	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-906A	13-Sep-01	<0.00002	<0.00002	0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	0.00007	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	0.00007	<0.00004	<0.00004	<0.00004	---	0.00020	<0.00002	---	---	<0.00004	0.00021
(duplicate)	13-Sep-01	---	<0.00001	<0.00001	0.00001	<0.00001	---	0.00002	---	0.00007	0.00003	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-909A	12-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	0.000026	---	---	<0.00004	<0.00004
(duplicate)	12-Sep-01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-909B	26-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	0.00017	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	26-Sep-01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	---	0.00001	0.00002	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(duplicate, "909G")	26-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate, "909G")	26-Sep-01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-910A	13-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	0.00009	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00026	<0.00002	---	---	<0.00004	0.00006
(duplicate)	13-Sep-01	---	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	---	0.00007	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390006A (PG1)	2-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	2-Aug-01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	---	0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390006B (PG2)	2-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	0.00004	<0.00002	0.00018	---	0.00021	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	0.00012	<0.00004	<0.00004	<0.00004	---	0.00037	0.00073	---	---	<0.00004	0.00009
(duplicate)	2-Aug-01	<0.00001	<0.00001	<0.00001	<0.00001	0.00004	<0.00001	0.00018	---	0.00017	0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390202-#1	3-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	0.00003	0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00009	0.00008	---	---	<0.00004	<0.00004
(duplicate)	3-Aug-01	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	---	0.00003	0.00002	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390202-#2	3-Aug-01	<0.00002	<0.00002	0.00004	<0.00002	0.00021	<0.00002	0.0015	---	0.00008	0.00004	---	0.00024	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	0.00005	0.00019	0.00014	0.00006	0.00015	---	0.00012	0.0077	---	---	0.00008	0.00012
(duplicate)	3-Aug-01	<0.00001	<0.00001	0.00004	<0.00001	0.00019	<0.00001	0.0015	---	0.00009	0.00004	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390211	8-Aug-01	<0.00002	<0.00002	0.00006	<0.00002	0.00011	<0.00002	0.0011	---	0.00007	0.00006	---	0.00014	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00004	0.00014	0.00015	<0.00004	0.00016	---	0.00016	0.0031	---	---	0.00019	0.00013
(duplicate)	8-Aug-01	<0.00001	<0.00001	0.00005	0.00001	0.00010	<0.00001	0.0011	---	0.00007	0.00006	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390214	3-Aug-01	<0.00002	<0.00002	0.00004	<0.00002	0.0010	<0.00002	0.016	---	0.00035	0.00004	---	0.0011	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	0.00032	0.00092	<0.00004	<0.00004	0.00085	---	0.00046	0.038	---	---	0.00014	0.00091
(duplicate)	3-Aug-01	<0.00001	<0.00001	0.00003	<0.00001	0.00095	<0.00001	0.016	---	0.00034	0.00004	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390504 (PG2) [2]	15-Mar-90	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	---	<0.10	<0.10	---	---	---	---	---	---	<0.10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ARC7-32	8-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00003	---	0.00003	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00013	0.00005	---	---	<0.00004	<0.00004
(duplicate)	8-Aug-01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	---	0.00004	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
PLEISTOCENE CHANNEL																																			
1390202-#3	3-Aug-01	<0.00002	<0.00002	0.00011	<0.00002	0.00002	<0.00002	0.00007	---	<0.00002	0.00007	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	0.00005	0.00021	<0.00004	<0.00004	---	0.00011	0.00030	---	---	0.00016	<0.00004
(duplicate)	3-Aug-01	<0.00001	<0.00001	0.00008	<0.00001	0.00003	<0.00001	0.00009	---	0.00002	0.00006	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390700 [2 3]	15-Mar-90	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---	<0.01	<0.01	---	---	---	---	---	---	<0.01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390701-#2	3-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	3-Aug-01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390701-#3	3-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	3-Aug-01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	---	0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390701-#4	3-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	3-Aug-01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	---	<0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3189221 (PFS) [2 3]	15-Mar-90	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---	<0.01	<0.01	---	---	---	---	---	---	<0.01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
McMURRAY FORMATION																																			
Oil Sands/Intra-Orebody																																			
P01-904C	26-Sep-01	<0.00002	<0.00002	0.00003	<0.00002	<0.00002	<0.00002	0.00004	---	0.00039	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.0011	0.00004	---	---	<0.00004	<0.00004
(duplicate)	26-Sep-01	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	0.00004	---	0.00039	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-906C	13-Sep-01	<0.00002	<0.00002	0.00003	0.00003	0.00011	<0.00002	0.00006	---	0.00043	0.00003	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	0.00020	<0.00004	<0.00004	0.00005	---	0.0011	0.00003	---	---	0.00004	0.00049
(duplicate)	13-Sep-01	---	<0.00001	0.00002	0.00004	0.00010	---	0.00006	---	0.00051	0.00004	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-910C	13-Sep-01	<0.00002	<0.00002	0.00002	<0.00002	0.00020	<0.00002	0.00006	---	0.00048	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	0.00024	<0.00004	<0.00004	<0.00004	---	0.0014	0.00003	---	---	<0.00004	0.00048
(duplicate)	13-Sep-01	---	<0.00001	<0.00001	<0.00001	0.00017	---	0.00003	---	0.00052	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Basal Aquifer																																			
P00-3D	28-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	<0.00002	---	---	<0.00004	<0.00004
(duplicate)	28-Sep-01	---	<0.00001	<0.00001	<0.00001	<0.00001	---	0.00001	---	<0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-902D	27-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	0.00006	<0.00002	<0.00002	---	0.00007	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00021	0.00003	---	---	<0.00004	0.00012
(duplicate)	27-Sep-01	---	<0.00001	<0.00001	<0.00001	0.00006	---	0.00001	---	0.00007	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-905D	27-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00013	<0.00002	---	---	<0.00004	0.00008
(duplicate)	27-Sep-01	---	<0.00001	<0.00001	<0.00001	<0.00001	---	0.00001	---	0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

WorleyParsons Komex
resources & energy

Table 6

Polycyclic Aromatic Hydrocarbon Data for Groundwater Samples

PROJECT NO.: E35772803		ALBERTA TIER 1 PAH'S											PAH																		VOCS		
Monitoring Station	Date (d-m-y)	Benzo(g,h,i)-perylene (mg/L)	Benzo(k)fluoranthene (mg/L)	Chrysene (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	Indeno(1,2,3-cd)pyrene (mg/L)	Naphthalene (mg/L)	Perylene	Phenanthrene (mg/L)	Pyrene (mg/L)	Quinoline (mg/L)	Biphenyl (mg/L)	Benzo(j)fluoranthene (mg/L)	Benzo(b&j)fluoranthene (mg/L)	Benzo(e)pyrene (mg/L)	Dibenzo(a,e)-pyrene (mg/L)	Dibenzo(a,h)-anthracene (mg/L)	Dibenzo(a,h)-pyrene (mg/L)	Dibenzo(a,i)-pyrene (mg/L)	Dibenzo(ah,ai,aj)-pyrene (mg/L)	Dibenzo(a,l)-pyrene (mg/L)	Dibenzothiophene (mg/L)	Methyl Acenaphthene (mg/L)	Methyl B(A)A/Chrysene (mg/L)	Methyl B(B&K)F/B(A)P (mg/L)	Methyl Biphenyl (mg/L)	Methyl Napthelene (mg/L)	Methylanthracenes (mg/L)	Methylnapthelenes (mg/L)	Naphthenic Acids (FTIR) (mg/L)	Methyl Phenanthrene/Anthracene (mg/L)	Methyl Fluoranthene/Pyrene (mg/L)	Methyl Fluorene (mg/L)
AENV (2001b) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-909D	26-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	0.00006	<0.00002	<0.00002	---	0.00007	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00012	0.00002	---	---	<0.00004	<0.00004
(duplicate)	26-Sep-01	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	0.00002	---	0.00009	0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(duplicate, "909F")	26-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	---	0.00008	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00018	<0.00002	---	---	<0.00004	<0.00004
(duplicate, "909F")	26-Sep-01	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	0.00002	---	0.00008	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
07-07-95-08 W4M	8-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00007	---	0.00003	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	0.00002	0.00009	<0.00004	<0.00004	<0.00004	---	0.00026	0.00007	---	---	<0.00004	0.00011
(duplicate)	8-Aug-01	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00006	---	0.00005	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEVONIAN																																			
Waterways Formation																																			
P01-904E	30-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00004	---	<0.00002	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	<0.00004	0.00005	---	---	<0.00004	<0.00004
(duplicate)	30-Sep-01	---	<0.00001	<0.00001	<0.00001	<0.00001	---	0.00005	---	0.00001	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P01-909E	28-Sep-01	<0.00002	<0.00002	<0.00002	<0.00002	0.00003	<0.00002	0.00003	---	0.00008	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00014	0.00005	---	---	<0.00004	<0.00004
(duplicate)	28-Sep-01	---	<0.00001	<0.00001	<0.00001	0.00003	---	0.00003	---	0.00007	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Watt Mountain Formation																																			
ARC6-310	17-Aug-01	<0.00002	<0.00002	<0.00002	<0.00002	0.00013	<0.00002	0.00037	---	0.00005	<0.00002	---	<0.00004	<0.00001	---	---	---	<0.00002	---	---	<0.00001	---	<0.00002	<0.00004	<0.00004	<0.00004	<0.00004	---	0.00025	0.00018	---	---	<0.00004	<0.00004
(duplicate)	17-Aug-01	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	<0.00001	0.00033	---	0.00006	<0.00001	---	---	---	---	---	---	<0.00001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Kearl Oil Sands Project																																			
QUATERNARY																																			
P04169707Q	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	0.000041	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P04169707Q1	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00036	0.000047	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P06159607Q	17-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00035	0.000046	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P06159607Q1	17-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00031	0.00004	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P06179607Q	29-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00036	0.000055	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P06229707Q1	26-Mar-04	<0.00010	<0.00010	<0.00010	0.000045	<0.00010	<0.00010	<0.0010	---	0.00037	0.000051	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P06319607Q	17-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00033	0.000045	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P06319607Q1	17-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00035	0.000048	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P08079707Q	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	0.000030	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P08079707Q1	13-Mar-04	<0.00010	<0.00010	<0.00010	0.000045	<0.00010	<0.00010	0.0027	---	0.00036	0.000054	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P08289607Q1	17-Mar-04	<0.00010	<0.00010	<0.00010	0.000061	0.00013	<0.00010	<0.0010	---	0.00057	0.000072	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P11229607Q	15-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	0.000043	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P11229607Q1	17-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00045	0.000043	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P12359607Q1	13-Mar-04	<0.00010	<0.00010	<0.00010	0.000054	0.00012	<0.00010	<0.0010	---	0.00047	0.000061	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P14049607Q	17-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00034	0.000042	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P14049607Q1	17-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	0.000035	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P14199607Q	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00032	0.000042	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P14199607Q1	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00039	0.000048	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P14209607Q	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00035	0.000043	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P14209607Q1	13-Mar-04	<0.00010	<0.00010	<0.00010	0.000064	0.00014	<0.00010	<0.0010	---	0.00056	0.000073	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P14259607Q	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00032	0.000040	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P16149707Q	13-Mar-04	<0.00010	<0.00010	<0.00010	0.000046	0.00010	<0.00010	<0.0010	---	0.00041	0.000055	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P16149707Q1	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	0.000037	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P16229607Q	13-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	0.000029	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P16229607Q1	13-Mar-04	<0.00010	<0.00010	<0.00010	0.000052	0.00011	<0.00010	<0.0010	---	0.00046	0.000076	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
13-9-96-8 (Q)	4-Mar-98	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	---	<0.0001	<0.0001	<0.0002	---	---	---	---	---	<0.0001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
McMURRAY FORMATION																																			
Oil Sands/Intra-Orebody																																			
97-4 Oil Sands	10-Mar-97	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	---	<0.00005	<0.00005	---	---	---	---	---	---	<0.00005	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Basal Aquifer																																			
P04179707B	27-May-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	0.000035	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P14339607B	27-Mar-04	<0.00010	<0.00010	<0.00010	0.000069	0.00016	<0.00010	<0.0010	---	0.00071	0.000084	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(duplicate)	27-Mar-04	<0.00010	<0.00010	<0.00010	0.000062	0.00017	<0.00010	<0.0010	---	0.00069	0.000079	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P16069707B	27-May-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	<0.000025	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
P10169707B	26-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	<0.00030	0.000031	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

WorleyParsons Komex

resources & energy

Table 6

Polycyclic Aromatic Hydrocarbon Data for Groundwater Samples

PROJECT NO.: E35772803		ALBERTA TIER 1 PAH'S											PAH																				VOCS		
Monitoring Station	Date (d-m-y)	Benzo(g,h,i)-perylene (mg/L)	Benzo(k)fluoranthene (mg/L)	Chrysene (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	Indeno(1,2,3-cd)pyrene (mg/L)	Naphthalene (mg/L)	Perylene	Phenanthrene (mg/L)	Pyrene (mg/L)	Quinoline (mg/L)	Biphenyl (mg/L)	Benzo(j)fluoranthene (mg/L)	Benzo(b&j)fluoranthene (mg/L)	Benzo(e)pyrene (mg/L)	Dibenzo(a,e)-pyrene (mg/L)	Dibenzo(a,h)-anthracene (mg/L)	Dibenzo(a,h)-pyrene (mg/L)	Dibenzo(a,i)-pyrene (mg/L)	Dibenzo(ah,ai,aj)-pyrene (mg/L)	Dibenzo(a,l)-pyrene (mg/L)	Dibenzothiophene (mg/L)	Methyl Acenaphthene (mg/L)	Methyl B(A)A/Chrysene (mg/L)	Methyl B(B&K)F/B(A)P (mg/L)	Methyl Biphenyl (mg/L)	Methyl Napthelene (mg/L)	Methylanthracenes (mg/L)	Methylnapthelenes (mg/L)	Naphthenic Acids (FTIR) (mg/L)	Methyl Phenanthrene/Anthracene (mg/L)	Methyl Fluoranthene/Pyrene (mg/L)	Methyl Fluorene (mg/L)
AENV (2001b) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
W08059707B	15-Mar-04	<0.00010	<0.00010	<0.00010	0.000045	0.00010	<0.00010	<0.0010	---	0.00044	0.000054	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	17-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	0.00051	0.00038	<0.0010	---	<0.00030	<0.000025	0.0174	---	---	<0.00010	---	---	0.00036	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	19-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00031	0.000038	<0.00010	---	---	---	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
97-2 (B) Post Purge	11-Mar-97	<0.00005	<0.00005	<0.00005	<0.00005	<0.0001	<0.00005	0.00019	---	<0.0001	<0.00005	---	---	---	---	---	---	<0.00005	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3-5-96-8 (B)	4-Mar-98	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	---	<0.0001	<0.0001	<0.0002	---	---	---	---	---	<0.0001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3-22-96-8 (B)	4-Mar-98	<0.0001	---	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	---	<0.0001	<0.0001	<0.0002	---	---	---	---	---	<0.0001	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10-14-96-8 (B)	12-Sep-98	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	---	<0.00005	<0.00005	---	---	---	<0.00005	---	---	<0.00005	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEVONIAN Waterways Formation																																			
P08079707D	26-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00039	0.000049	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
QA/QC																																			
FIELD BLANK	27-Mar-04	<0.00010	<0.00010	<0.00010	0.000059	0.00012	<0.00010	<0.0010	---	0.00051	0.000063	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TRIP BLANK	27-Mar-04	<0.00010	<0.00010	<0.00010	<0.000040	<0.00010	<0.00010	<0.0010	---	0.00036	0.000039	<0.00010	---	---	<0.00010	---	---	<0.00010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

NOTES:

1. *--- in detail data row(s) denotes parameter not analysed.*
2. ** Denotes MDL raised due to sample dilution.*
3. *Highlighting indicates parameters above applied guideline/criteria.*
4. *Superscript [1] denotes values exceeding AENV (2001b) Guideline, applicable pathways as described in report.*
5. *Superscript [2] denotes piezometer/data from Terracon Geotechnique Ltd., 1990a. 1990 Geotechnical Program Data Report. Volume 6, Piezometer and Hydrogeologic Data. Submitted to OSLO Alberta Limited, January 4, 1990.*
6. *Superscript [3] denotes piezometer/data from Terracon Geotechnique Ltd., 1991. Hydrogeology of the Pleistocene Meltwater Channel System. Submitted to OSLO Alberta Limited, February 28, 1991.*
7. *[h] Single bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence.*
8. ** MDL raised due to dilution.*
9. *** PAH parameters were not analysed or reported for Kearl Oil Sands Project using low level PAH method detection limits in 2005.*

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Table 7

Dissolved Metal Data for Groundwater Samples

PROJECT NO.: E35772801

Monitoring Station	Date (d-m-y)	DISSOLVED METALS AND TRACE ELEMENTS																													SULPHUR	
		Aluminum:D (mg/L)	Antimony:D (mg/L)	Arsenic:D (mg/L)	Barium:D (mg/L)	Beryllium:D (mg/L)	Bismuth:D (mg/L)	Boron:D (mg/L)	Cadmium:D (mg/L)	Chromium:D (mg/L)	Cobalt:D (mg/L)	Copper:D (mg/L)	Lead:D (mg/L)	Lithium:D (mg/L)	Mercury:D (mg/L)	Molybdenum:D (mg/L)	Nickel:D (mg/L)	Phosphorus:D (mg/L)	Selenium:D (mg/L)	Silicon:D (mg/L)	Silver:D (mg/L)	Strontium:D (mg/L)	Tellurium:D (mg/L)	Thallium:D (mg/L)	Tin:D (mg/L)	Titanium:D (mg/L)	Total Diss. P (mg/L)	Uranium:D (mg/L)	Vanadium:D (mg/L)	Zinc:D (mg/L)	Zirconium:D (mg/L)	Sulphur:D (mg/L)	Sulphide (mg/L)
Aesthetic Objective (AO)		---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	---	---	0.05
Maximum Acceptable Concentration (MAC)		---	0.006	0.01	1	---	---	5	0.005	0.05	---	---	0.01	---	0.001	---	---	---	0.01	---	---	---	---	---	---	---	---	0.02	---	---	---	---	---
Jackpine Expansion Mining Area																																
QUATERNARY																																
Shallow																																
P06-1620-SQ	22-Feb-06	0.03	---	---	0.174	<0.001	---	0.26	<0.001	<0.005	<0.002	0.001	<0.005	---	---	<0.005	<0.002	---	---	8.4	<0.005	0.680	---	<0.05	<0.05	0.003	---	---	<0.001	0.018	---	---	0.021
P06-1623-SQ	24-Feb-06	0.01	---	---	0.040	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.032	<0.005	---	---	<0.005	<0.002	---	---	3.3	<0.005	0.113	---	<0.05	<0.05	<0.001	---	---	<0.001	0.018	---	---	0.135 [1]
P06-1629-SQ	22-Feb-06	0.02	---	---	0.129	<0.001	---	0.16	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	9.6	<0.005	0.289	---	<0.05	<0.05	0.002	---	---	<0.001	0.007	---	---	0.040
P06-1639-SQ	22-Feb-06	0.02	---	---	0.164	<0.001	---	0.11	<0.001	<0.005	<0.002	0.001	<0.005	---	---	<0.005	<0.002	---	---	7.2	<0.005	0.631	---	<0.05	<0.05	0.002	---	---	<0.001	0.013	---	---	0.229 [1]
P06-1641-SQ	01-Mar-06	<0.01	---	---	0.100	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.002	<0.005	---	---	<0.005	0.002	---	---	6.0	<0.005	0.085	---	<0.05	<0.05	0.002	---	---	<0.001	0.003	---	---	0.062 [1]
P06-1650-SQ	24-Feb-06	0.02	---	---	0.095	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.003	<0.005	---	---	<0.005	<0.002	---	---	5.5	<0.005	0.084	---	<0.05	<0.05	0.004	---	---	0.006	0.012	---	---	0.015
P06-1655-SQ	22-Feb-06	0.03	---	---	0.096	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.002	<0.005	---	---	<0.005	<0.002	---	---	4.6	<0.005	0.141	---	<0.05	<0.05	0.003	---	---	0.002	0.013	---	---	9.23 [1]
P06-1664-SQ	24-Feb-06	0.02	---	---	0.167	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.032	<0.005	---	---	<0.005	<0.002	---	---	5.3	<0.005	0.142	---	<0.05	<0.05	0.003	---	---	0.002	0.017	---	---	0.050
P06-1672-SQ	13-Mar-06	0.01	---	---	0.095	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.002	<0.005	---	---	<0.005	<0.002	---	---	6.4	<0.005	0.141	---	<0.05	<0.05	0.001	---	---	<0.001	0.022	---	---	<0.003
P06-1699-SQ	24-Feb-06	<0.01	---	---	0.088	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.012	<0.005	---	---	<0.005	<0.002	---	---	5.9	<0.005	0.078	---	<0.05	<0.05	<0.001	---	---	<0.001	0.009	---	---	0.015
SH07-1712-SQ	19-Mar-07	0.07	0.0005	<0.0004	0.109	<0.0005	<0.00005	0.04	<0.0001	<0.005	0.0009	0.0016	<0.0001		<0.0001	0.0002	0.0024		<0.0004	6.5	<0.0002	0.221		<0.00005	0.0003	0.0045	---	<0.0001	0.003	0.002	---	---	0.01
Deep																																
P06-1629-DQ	22-Feb-06	0.01	---	---	0.296	<0.001	---	2.72	<0.001	<0.005	<0.002	0.002	<0.005	---	---	<0.005	<0.002	---	---	3.0	<0.005	0.913	---	<0.05	<0.05	<0.001	---	---	<0.001	0.019	---	---	0.011
SH06-1641-DQ	20-Mar-06	0.01	---	---	0.088	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.005	<0.005	---	---	<0.005	<0.002	---	---	7.5	<0.005	0.075	---	<0.05	<0.05	<0.001	---	---	<0.001	0.013	---	---	<0.003
P06-1650-DQ	24-Feb-06	<0.01	---	---	0.241	<0.001	---	0.06	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	17.5	<0.005	0.227	---	<0.05	<0.05	0.002	---	---	<0.001	0.005	---	---	0.024
SH06-1672-DQ	21-Mar-06	0.05	---	---	0.219	<0.001	---	0.06	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	9.2	<0.005	0.133	---	<0.05	<0.05	<0.001	---	---	<0.001	0.009	---	---	0.190 [1]
P06-1699-DQ	24-Feb-06	<0.01	---	---	0.084	<0.001	---	<0.05	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	8.6	<0.005	0.127	---	<0.05	<0.05	0.001	---	---	<0.001	0.002	---	---	0.563 [1]
(Duplicate)	24-Feb-06	<0.01	---	---	0.084	<0.001	---	<0.05	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	8.6	<0.005	0.128	---	<0.05	<0.05	0.001	---	---	<0.001	0.002	---	---	0.632 [1]
SH07-1712-DQ	19-Mar-07	0.05	<0.0004	0.0005	0.813	<0.0005	<0.00005	0.007	0.0002	0.0121	0.0004	0.003	0.0003	---	<0.0001	0.101	0.0092	---	0.0024	2.5	<0.0002	2.56	---	<0.00005	0.0003	0.001	---	<0.0001	0.0157	0.003	---	---	0.059 [1]
(Duplicate)	19-Mar-07	0.05	0.0004	0.0004	0.817	<0.0005	<0.00005	0.007	0.0002	0.0126	0.0004	0.0024	0.0003	---	<0.0001	0.0981	0.0085	---	0.0026	2.5	<0.0002	2.56	---	<0.00005	0.0003	0.0015	---	<0.0001	0.0161	0.003	---	---	0.075 [1]
PLEISTOCENE CHANNEL																																
SH06-1638-PC	07-Mar-06	0.02	---	---	0.304	<0.001	---	0.19	<0.001	0.008	<0.002	0.003	<0.005	---	---	<0.005	<0.002	---	---	5.9	<0.005	0.378	---	<0.05	<0.05	0.002	---	---	0.002	0.004	---	---	<0.003
SH06-1663-PC	07-Mar-06	<0.01	---	---	0.111	<0.001	---	<0.05	<0.001	0.007	<0.002	0.002	<0.005	---	---	<0.005	<0.002	---	---	8.2	<0.005	0.150	---	<0.05	<0.05	0.002	---	---	<0.001	0.011	---	---	<0.003
SH06-1698-PC	07-Mar-06	0.03	---	---	0.166	<0.001	---	0.46	<0.001	0.008	<0.002	0.001	<0.005	---	---	<0.005	<0.002	---	---	7.4	<0.005	1.66	---	<0.05	<0.05	0.002	---	---	<0.001	0.005	---	---	12.9 [1]
SH06-1720-PC	07-Mar-06	<0.01	---	---	0.138	<0.001	---	<0.05	<0.001	0.008	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	7.4	<0.005	0.180	---	<0.05	<0.05	0.003	---	---	0.003	0.002	---	---	0.004
McMURRAY FORMATION																																
Basal Aquifer																																
SH06-1620-BS[†]	22-Feb-06	0.02	---	---	0.061	<0.001	---	1.02	<0.001	<0.005	<0.002	0.001	<0.005	---	---	<0.005	<0.002	---	---	2.3	<0.005	1.40	---	<0.05	<0.05	0.001	---	---	0.001	0.014	---	---	---
SH06-1636-BS	22-Feb-06	0.01	---	---	0.068	<0.001	---	0.69	<0.001	<0.005	<0.002	0.002	<0.005	---	---	<0.005	<0.002	---	---	2.6	<0.005	0.955	---	<0.05	<0.05	<0.001	---	---	<0.001	0.006	---	---	9.29 [1]
(Duplicate)	22-Feb-06	<0.01	---	---	0.071	<0.001	---	0.67	<0.001	<0.005	<0.002	0.001	<0.005	---	---	<0.005	<0.002	---	---	2.6	<0.005	1.01	---	<0.05	<0.05	<0.001	---	---	<0.001	0.002	---	---	8.70 [1]
SH06-1641-BS	20-Mar-06	0.03	---	---	0.118	<0.001	---	1.08	<0.001	<0.005	<0.002	0.004	<0.005	---	---	<0.005	<0.002	---	---	2.9	<0.005	1.38	---	<0.05	<0.05	<0.001	---	---	<0.001	0.008	---	---	6.93 [1]
(Duplicate)	20-Mar-06	0.02	---	---	0.115	<0.001	---	1.02	<0.001	<0.005	<0.002	0.003	<0.005	---	---	<0.005	<0.002	---	---	2.9	<0.005	1.33	---	<0.05	<0.05	<0.001	---	---	<0.001	0.008	---	---	6.26 [1]
SH06-1655-BS	22-Feb-06	<0.01	---	---	0.197	<0.001	---	0.60	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	3.2	<0.005	0.851	---	<0.05	<0.05	<0.001	---	---	<0.001	0.003	---	---	1.92 [1]
SH06-1672-BS	21-Mar-06	0.01	---	---	0.080	<0.001	---	0.44	<0.001	<0.005	<0.002	0.001	<0.005	---	---	<0.005	<0.002	---	---	3.9	<0.005	0.818	---	<0.05	<0.05	<0.001	---	---	<0.001	0.005	---	---	4.52 [1]
SH06-1699-BS	21-Mar-06	0.01	---	---	0.202	<0.001	---	0.49	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	7.3	<0.005	1.58	---	<0.05	<0.05	0.001	---	---	<0.001	0.009	---	---	<0.003
SH07-1712-BS	19-Mar-07	0.02	0.0012	0.0026	0.0927	<0.0005	<0.00005	0.229	<0.0001	<0.0004	0.0004	0.0009	<0.0001	---	<0.0001	0.0046	0.0017	---	0.0009	9.9	<0.0002	0.522	---	<0.00005	0.0004	0.0023	---	0.0033	0.0021	<0.002	---	---	0.063 [1]
DEVONIAN																																
SH06-1641-D	20-Mar-06	0.03	---	---	0.097	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.003	<0.005	---	---	0.007	<0.002	---	---	10.2	<0.005	0.129	---	<0.05	<0.05	0.001	---	---	<0.001	0.027	---	---	0.009
SH06-1655-D	23-Feb-06	0.26	---	---	1.80 [2]	<0.001	---	0.06	<0.001	0.100 [2]	<0.002	0.012	0.007	---	---	0.141	<0.002	---	---	1.7	<0.005	8.84	---	<0.05	<0.05	0.004	---	---	0.001	0.019	---	---	0.029
SH06-1699-D	21-Mar-06	0.03	---	---	0.105	<0.001	---	0.17	<0.001	<0.005	0.004	0.005	<0.005	---	---	<0.005	0.030	---	---	7.0	<0.005	0.329	---	<0.05	<0.05	<0.001	---	---	<0.001	0.014	---	---	0.029
QA/QC																																
Field Blank	24-Feb-06	<0.01	---	---	<0.003	<0.001	---	0.06	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	0.1	<0.005	<0.005	---	<0.05	<0.05	<0.001	---	---	<0.001	0.001	---	---	<0.003
	21-Mar-06	0.01	---	---	<0.003	<0.001	---	<0.05	<0.001	<0.005	<0.002	<0.001	<0.005	---	---	<0.005	<0.002	---	---	<0.1	<0.005	<0.005	---	<0.05	<0.05	<0.001	---	---	<0.001	0.007	---	---	<0.003
Trip Blank	21-Mar-07	<0.01	0.0005	<0.0004	0.0002	<0.0005	<0.00005	0.027	<0.0001	<0.0004	<0.0001	<0.0006	<0.0001	---	<0.0001	0.0001	<0.0001	---	<0.0004	<0.1	<0.0002	0.0004	---	<0.00005	<0.0002	<0.0003	---	<0.0001	0.0001	0.003	---	---	<0.003

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Table 7

Dissolved Metal Data for Groundwater Samples

PROJECT NO.: E35772801

Monitoring Station	Date (d-m-y)	DISSOLVED METALS AND TRACE ELEMENTS																													SULPHUR	
		Aluminum:D (mg/L)	Antimony:D (mg/L)	Arsenic:D (mg/L)	Barium:D (mg/L)	Beryllium:D (mg/L)	Bismuth:D (mg/L)	Boron:D (mg/L)	Cadmium:D (mg/L)	Chromium:D (mg/L)	Cobalt:D (mg/L)	Copper:D (mg/L)	Lead:D (mg/L)	Lithium:D (mg/L)	Mercury:D (mg/L)	Molybdenum:D (mg/L)	Nickel:D (mg/L)	Phosphorus:D (mg/L)	Selenium:D (mg/L)	Silicon:D (mg/L)	Silver:D (mg/L)	Strontium:D (mg/L)	Tellurium:D (mg/L)	Thallium:D (mg/L)	Tin:D (mg/L)	Titanium:D (mg/L)	Total Diss. P (mg/L)	Uranium:D (mg/L)	Vanadium:D (mg/L)	Zinc:D (mg/L)	Zirconium:D (mg/L)	Sulphur:D (mg/L)	Sulphide (mg/L)
Aesthetic Objective (AO)		---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	---	---	0.05
Maximum Acceptable Concentration (MAC)		---	0.006	0.01	1	---	---	5	0.005	0.05	---	---	0.01	---	0.001	---	---	---	0.01	---	---	---	---	---	---	---	---	---	0.02	---	---	---	---
Jackpine Mine - Phase 1																																
QUATERNARY																																
P01-903A	16-Sep-01	0.02	---	0.0006	0.072	<0.001	---	<0.05	<0.001	<0.005	0.003	0.003	<0.005	---	<0.0002	<0.005	0.014	<0.1	0.0009	---	<0.005	0.140	---	<0.05	<0.05	0.002	---	---	<0.001	0.040	---	---	---
P01-903B	16-Sep-01	<0.01	---	0.0006	0.147	<0.001	---	0.07	<0.001	<0.005	<0.002	<0.001	<0.005	---	<0.0002	<0.005	<0.002	<0.1	<0.0004	---	<0.005	0.153	---	<0.05	<0.05	0.002	---	---	<0.001	0.007	---	---	---
P01-904A	16-Sep-01	0.10	---	0.0005	0.045	<0.001	---	<0.05	<0.001	<0.005	<0.002	0.001	<0.005	---	<0.0002	<0.005	0.005	<0.1	<0.0004	---	<0.005	0.086	---	<0.05	<0.05	0.004	---	---	<0.001	0.012	---	---	---
P01-905A	16-Sep-01	**0.46**	---	**<0.0004**	**0.118**	**<0.001**	---	**0.05**	**<0.001**	**<0.005**	**<0.002**	**0.001**	**<0.005**	---	**<0.0002**	**<0.005**	**<0.002**	**0.1**	**<0.0004**	---	**<0.005**	**0.117**	---	**<0.05**	**<0.05**	**0.017**	---	---	**0.003**	**0.040**	---	---	---
P01-905B	16-Sep-01	0.02	---	<0.0004	0.079	<0.001	---	0.06	<0.001	<0.005	<0.002	<0.001	<0.005	---	<0.0002	<0.005	<0.002	<0.1	<0.0004	---	<0.005	0.136	---	<0.05	<0.05	0.003	---	---	0.001	0.013	---	---	---
P01-906A	13-Sep-01	0.19	---	0.0004	3.74 [2]	<0.001	---	0.97	<0.001	<0.005	<0.002	0.002	<0.005	---	<0.0002	<0.005	<0.002	<0.1	0.0007	---	<0.005	0.494	---	<0.05	<0.05	0.007	---	---	0.006	1.71	---	---	---
P01-909A	12-Sep-01	0.07	---	0.0021	0.160	<0.001	---	<0.05	<0.001	<0.005	0.007	<0.001	<0.005	---	<0.0002	<0.005	0.007	<0.1	<0.0004	---	<0.005	0.152	---	<0.05	<0.05	0.003	---	---	0.001	0.021	---	---	---
P01-909B	12-Sep-01	0.01	---	0.0013	0.095	<0.001	---	<0.05	<0.001	<0.005	<0.002	<0.001	<0.005	---	<0.0002	<0.005	<0.002	<0.1	<0.0004	---	<0.005	0.101	---	<0.05	<0.05	0.002	---	---	<0.001	0.016	---	---	---
(duplicate, "909G")	26-Sep-01	<0.01	---	0.0016	0.103	<0.001	---	<0.05	<0.001	<0.005	<0.002	<0.001	<0.005	---	<0.0002	<0.005	<0.002	0.1	<0.0004	---	<0.005	0.104	---	<0.05	<0.05	0.001	---	---	0.001	0.008	---	---	---
P01-910A	13-Sep-01	0.20	---	<0.0004	3.45 [2]	<0.001	---	0.81	<0.001	<0.005	<0.002	0.002	<0.005	---	<0.0002	<0.005	<0.002	<0.1	0.0004	---	<0.005	0.313	---	<0.05	<0.05	0.004	---	---	0.003	1.71	---	---	---
1390006 (PG1)	2-Aug-01	0.02	---	<0.0004	0.133	<0.001	---	<0.05	<0.001	<0.005	0.005	0.003	<0.005	---	<0.0002	<0.005	0.004	<0.1	<0.0004	---	<0.005	0.191	---	<0.05	<0.05	0.003	---	---	<0.001	0.006	---	---	---
1390006 (PG2)	2-Aug-01	**0.38**	---	**0.0017**	**0.465**	**<0.001**	---	**0.48**	**<0.001**	**<0.005**	**<0.002**	**0.004**	**<0.005**	---	**<0.0002**	**0.008**	**0.005**	**<0.1**	**<0.0004**	---	**<0.005**	**1.15**	---	**<0.05**	**<0.05**	**0.010**	---	---	**<0.001**	**0.007**	---	---	---
1390202 (PG1)	3-Aug-01	0.05	---	0.0037	0.157	<0.001	---	<0.05	<0.001	<0.005	0.011	0.002	<0.005	---	<0.0002	<0.005	0.006	<0.1	<0.0004	---	<0.005	0.097	---	<0.05	<0.05	0.004	---	---	0.001	0.005	---	---	---
1390202 (PG2)	3-Aug-01	0.02	---	0.0007	0.232	<0.001	---	0.06	<0.001	<0.005	0.002	<0.001	<0.005	---	<0.0002	<0.005	0.002	<0.1	<0.0004	---	<0.005	0.337	---	<0.05	<0.05	0.004	---	---	<0.001	0.021	---	---	---
1390211	8-Aug-01	**0.82**	---	**0.0024**	**0.356**	**<0.001**	---	**0.20**	**<0.001**	**<0.005**	**<0.002**	**0.004**	**<0.005**	---	<0.0002	0.014	0.004	<0.1	**0.0005**	---	**<0.005**	**0.371**	---	**<0.05**	**<0.05**	**0.019**	---	---	**0.005**	**0.011**	---	---	---
1390214	3-Aug-01	<0.01	---	0.0109 [2]	0.075	<0.001	---	<0.05	<0.001	<0.005	0.009	<0.001	<0.005	---	<0.0002	<0.005	0.011	<0.1	<0.0004	---	<0.005	0.095	---	<0.05	<0.05	0.005	---	---	0.005	0.012	---	---	---
1390502 (PG2) [4]	Feb-90	**0.82**	---	**0.0032**	---	---	---	**0.13**	**0.010** [2]	**0.004**	---	**0.016**	**0.12** [2]	---	**<0.10**	---	**0.032**	---	**<0.002**	---	---	---	---	---	---	---	---	---	**0.007**	**0.41**	---	---	---
1390508 (PG1) [4]	15-Mar-90	**4.03**	---	**0.0020**	---	---	---	**0.05**	**<0.001**	**0.009**	---	**0.041**	**0.02** [2]	---	**0.12** [2]	---	**0.052**	**3**	**<0.0002**	---	---	---	---	---	---	---	---	---	**0.018**	**0.30**	---	---	---
3090500 (PG1) [4]	15-Mar-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3090500 (PG2) [4]	15-Mar-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ARC7-32	8-Aug-01	**0.21**	---	**0.0019**	**0.266**	**<0.001**	---	**0.08**	**<0.001**	**<0.005**	**<0.002**	**<0.001**	**<0.005**	---	**<0.0002**	**0.007**	**0.013**	**<0.1**	**0.0011**	---	**<0.005**	**0.343**	---	**<0.05**	**<0.05**	**0.008**	---	---	**0.003**	**0.027**	---	---	---
PLEISTOCENE CHANNEL																																
1389013 [3] [4]	28-Feb-90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1389020 [3] [4]	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1389204 [3] [4]	---	**0.32**	---	**0.0030**	---		---	**0.24**	**<0.001**	**<0.001**	---	---	**<0.002**	---	**<0.05**	---	**<0.001**	---	**0.0003**	---	---	---	---	---	---	---	---	---	---	**<0.001**	**0.028**	---	---	---
1389504 [3] [4]	---	**0.10**	---	**0.0005**	---		---	**0.19**	**<0.001**	**<0.001**	---	---	**<0.002**	---	**<0.05**	---	**<0.001**	---	**0.0002**	---	---	---	---	---	---	---	---	---	---	**0.002**	**0.32**	---	---	---
1390008 (PFS) [3] [4]	15-Mar-90	---	---	**0.0050**	---	---	---	---	---	---	---	**0.005**	**0.007**	---	**<0.00010**	---	---	**0.18**	---	---	---	---	---	---	---	---	---	---	---	---	**0.04**	---	---	---
1390202-#3	3-Aug-01	0.02	---	0.0031	0.279	<0.001	---	0.76	<0.001	<0.005	0.006	<0.001	<0.005	---	<0.0002	<0.005	<0.002	<0.1	<0.0004	---	<0.005	0.580	---	<0.05	<0.05	0.009	---	---	0.002	0.004	---	---	---
1390502 (PFS) [3] [4]	13-Mar-90	---	---	**0.0002**	---	---	---	---	---	---	---	**0.011**	**0.003**	---	**<0.10**	---	---	**1.3**	---	---	---	---	---	---	---	---	---	---	---	---	**0.016**	---	---	---
1390700 [3] [4]	25-Feb-90	**<0.01**	---	**0.0004**			---	**0.29**	**<0.001**	**0.002**	---	**<0.001**	**0.002**	---	**<0.10**	---	**0.002**	**1**	**<0.0002**	---	---	---	---	---	---	---	---	---	---	**0.007**	**<0.001**	---	---	---
	28-Feb-90	---	---	**0.0004**	---	---	---	---	---	---	---	**<0.001**	**<0.002**	---	**<0.10**	---	---	**0.99**	---	---	---	---	---	---	---	---	---	---	---	---	**<0.001**	---	---	---
	5-Mar-90	---	---	**0.0006**	---	---	---	---	---	---	---	**<0.001**	**<0.002**	---	**<0.10**	---	---	**0.96**	---	---	---	---	---	---	---	---	---	---	---	---	**<0.001**	---	---	---
1390701-#2	3-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1390701-#3	3-Aug-01	<0.01	---	0.0024	0.080	<0.001	---	0.10	<0.001	<0.005	<0.002	<0.001	<0.005	---	<0.0002	<0.005	<0.002	<0.1	<0.0004	---	<0.005	0.457	---	<0.05	<0.05	0.002	---	---	<0.001	0.004	---	---	---
1390701-#4	3-Aug-01	<0.01	---	0.0037	0.073	<0.001	---	0.23	<0.001	<0.005	0.005	<0.001	<0.005	---	<0.0002	<0.005	<0.002	<0.1	<0.0004	---	<0.005	0.700	---	<0.05	<0.05	0.002	---	---	<0.001	0.015	---	---	---
3189211 [3] [4]	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3189214 [3] [4]	---	**0.34**	---	**0.0075**	---		---	**0.24**	**<0.001**	**0.001**	---	---	**<0.002**	---	**<0.05**	---	**<0.001**	**<0.1**	**0.0004**	---	---	---	---	---	---	---	---	---	---	**<0.001**	**0.048**	---	---	---
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	**0.87**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Well #1 [5]	28-Feb-85	**1.1**	---	**0.0015**	---	---	---	---	---	---	---	**0.010**	---	---	---	---	---	**0.06**	**<0.0002**	---	---	---	---	---	---	---	---	---	---	---	**0.012**	---	---	---
Well #2 [5]	20-Feb-85	**0.6**	---	**0.0132** [2]	---	---	---	---	---	---	---	**<0.001**	---	---	---	---	---	---	**<0.0002**	---	---	---	---	---	---	---	---	---	---	---	**0.039**	---	---	---
Well #3 [5]	20-Feb-85	**1.3**	---	**0.0021**	---	---	---	---	---	---	---	**0.004**	---	---	---	---	---	---	**<0.0002**	---	---	---	---	---	---	---	---	---	---	---	**0.023**	---	---	---
Well #4 [5]	27-Feb-85	**0.6**	---	**0.0117** [2]	---	---	---	---	---	---	---	**<0.001**	---	---	---	---	---	**0.42**	**<0.0002**	---	---	---	---	---	---	---	---	---	---	---	**0.022**	---	---	---
	15-Mar-90	---	---	**0.0002**	---	---	---	---	---	---	---	**0.037**	**0.005**	---	**<0.10**	---	---	**0.068**	---	---	---	---	---	---	---	---	---	---	---	---	**0.043**	---	---	---
Well #6 [5]	22-Feb-85	**0.6**	---	**0.0020**	---	---	---	---	---	---	---	**<0.001**	---	---	---	---	---	**0.05**	**<0.0002**	---	---	---	---	---	---	---	---	---	---	---	**0.009**	---	---	---
	13-Mar-90	---	---	**0.0002**	---	---	---	---	---	---	---	**0.011**	**0.003**	---	**<0.10**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	**0.016**	---	---	---

WorleyParsons Komex
resources & energy

Table 7

Dissolved Metal Data for Groundwater Samples

PROJECT NO.: E35772801

Monitoring Station	Date (d-m-y)	DISSOLVED METALS AND TRACE ELEMENTS																														SULPHUR	
		Aluminum:D (mg/L)	Antimony:D (mg/L)	Arsenic:D (mg/L)	Barium:D (mg/L)	Beryllium:D (mg/L)	Bismuth:D (mg/L)	Boron:D (mg/L)	Cadmium:D (mg/L)	Chromium:D (mg/L)	Cobalt:D (mg/L)	Copper:D (mg/L)	Lead:D (mg/L)	Lithium:D (mg/L)	Mercury:D (mg/L)	Molybdenum:D (mg/L)	Nickel:D (mg/L)	Phosphorus:D (mg/L)	Selenium:D (mg/L)	Silicon:D (mg/L)	Silver:D (mg/L)	Strontium:D (mg/L)	Tellurium:D (mg/L)	Thallium:D (mg/L)	Tin:D (mg/L)	Titanium:D (mg/L)	Total Diss. P (mg/L)	Uranium:D (mg/L)	Vanadium:D (mg/L)	Zinc:D (mg/L)	Zirconium:D (mg/L)	Sulphur:D (mg/L)	Sulphide (mg/L)
Aesthetic Objective (AO)		---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	---	---	0.05
Maximum Acceptable Concentration (MAC)		---	0.006	0.01	1	---	---	5	0.005	0.05	---	---	0.01	---	0.001	---	---	---	0.01	---	---	---	---	---	---	---	---	---	0.02	---	---	---	---	---
McMURRAY FORMATION																																	
Oil Sands/Intra-Orebody																																	
P01-904C	26-Sep-01	**0.27**	---	**0.0012**	**0.117**	**<0.001**	---	**1.64**	**<0.001**	**<0.005**	**0.005**	**0.002**	**<0.005**	---	**<0.0002**	**<0.005**	**0.006**	**<0.1**	**0.0007**	---	**<0.005**	**1.17**	---	**<0.05**	**<0.05**	**0.006**	---	---	**0.004**	**0.025**	---	---	---
P01-906C	13-Sep-01	**0.74**	---	**0.0024**	**4.27** [2]	**<0.001**	---	**3.20**	**<0.001**	**<0.005**	**<0.002**	**0.003**	**0.008**	---	**<0.0002**	**<0.005**	**0.002**	**0.2**	**0.0057**	---	**<0.005**	**1.42**	---	**<0.05**	**<0.05**	**0.013**	---	---	**0.014**	**1.68**	---	---	---
P01-910C	13-Sep-01	0.01	---	0.0020	0.638	<0.001	---	2.52	<0.001	<0.005	0.005	0.002	<0.005	---	<0.0002	0.006	0.011	<0.1	0.0089	---	<0.005	1.77	---	<0.05	<0.05	0.003	---	---	0.005	0.015	---	---	---
16-20-95-08 P-2 [5]	26-Feb-85	**20.0**	---	**0.0041**	---	---	---	---	---	---	---	**0.010**	---	---	---	---	---	---	**0.0002**	---	---	---	---	---	---	---	---	---	---	**0.055**	---	---	---
Basal Aquifer																																	
P00-3D	28-Sep-01	0.13	---	0.0017	0.176	<0.001	---	1.44	<0.001	<0.005	<0.002	<0.001	<0.005	---	0.0004	<0.005	<0.002	<0.1	0.0075	---	<0.005	3.61	---	<0.05	<0.05	0.007	---	---	0.003	0.009	---	---	---
P01-902D	27-Sep-01	0.33	---	0.0014	0.192	<0.001	---	1.52	<0.001	<0.005	<0.002	0.002	<0.005	---	<0.0002	<0.005	<0.002	0.2	0.0067	---	<0.005	1.60	---	<0.05	<0.05	0.007	---	---	0.006	0.011	---	---	---
P01-905D	27-Sep-01	0.03	---	0.0007	0.036	<0.001	---	1.11	<0.001	<0.005	<0.002	0.001	<0.005	---	<0.0002	<0.005	<0.002	0.1	0.0009	---	<0.005	0.415	---	<0.05	<0.05	0.002	---	---	0.002	0.012	---	---	---
P01-909D	26-Sep-01	**0.24**	---	**0.0012**	**0.169**	**<0.001**	---	**1.55**	**<0.001**	**<0.005**	**<0.002**	**0.001**	**<0.005**	---	**0.0002**	**<0.005**	**<0.002**	**0.2**	**0.0065**	---	**<0.005**	**1.36**	---	**<0.05**	**<0.05**	**0.006**	---	---	**<0.001**	**0.010**	---	---	---
(duplicate, "909F")	26-Sep-01	<0.01	---	0.0012	0.175	<0.001	---	1.37	<0.001	<0.005	<0.002	<0.001	<0.005	---	0.0003	<0.005	<0.002	0.2	0.0045	---	<0.005	1.32	---	<0.05	<0.05	0.001	---	---	0.001	0.004	---	---	---
12-04-95-08 [5]	24-Feb-85	**0.4**	---	**0.0003**	---	---	---	---	---	---	---	**<0.001**	---	---	---	---	---	---	**0.0002**	---	---	---	---	---	---	---	---	---	---	**0.009**	---	---	---
07-07-95-08	8-Aug-01	**0.01**	---	**<0.0004**	**0.122**	**<0.001**	---	**2.52**	**<0.001**	**<0.005**	**<0.002**	**0.001**	**<0.005**	---	**<0.0002**	**<0.005**	**<0.002**	**0.1**	**0.0014**	---	**<0.005**	**0.672**	---	**<0.05**	**<0.05**	**0.003**	---	---	**0.004**	**0.006**	---	---	---
05-20-95-08 [5]	25-Feb-85	**48.0**	---	**0.0055**	---	---	---	---	---	---	---	**0.013**	---	---	---	---	---	---	**0.0003**	---	---	---	---	---	---	---	---	---	---	**0.066**	---	---	---
07-20-95-08 [5]	26-Feb-85	**6.2**	---	**0.0028**	---	---	---	---	---	---	---	**0.001**	---	---	---	---	---	---	**0.0002**	---	---	---	---	---	---	---	---	---	---	**0.026**	---	---	---
08-20-95-08 [5]	26-Feb-85	**62.4**	---	**0.0047**	---	---	---	---	---	---	---	**0.021**	---	---	---	---	---	---	**0.0012**	---	---	---	---	---	---	---	---	---	---	**0.11**	---	---	---
12-20-95-08 [5]	25-Feb-85	**7.0**	---	**0.0049**	---	---	---	---	---	---	---	**0.005**	---	---	---	---	---	---	**<0.0002**	---	---	---	---	---	---	---	---	---	---	**0.037**	---	---	---
13-20-95-08 [5]	28-Feb-85	**0.8**	---	**0.0026**	---	---	---	---	---	---	---	**0.006**	---	---	---	---	---	---	**<0.0002**	---	---	---	---	---	---	---	---	---	---	**0.62**	---	---	---
DEVONIAN																																	
Waterways Formation																																	
P01-904E	30-Sep-01	**<0.01**	---	**0.0087**	**0.033**	**<0.001**	---	**0.66**	**<0.001**	**0.021**	**<0.002**	**0.013**	**<0.005**	---	**<0.0002**	**0.026**	**0.009**	**0.2**	**0.0064**	---	**<0.005**	**2.00**	---	**<0.05**	**<0.05**	**0.004**	---	---	**0.007**	**0.020**	---	---	---
P01-909E	28-Sep-01	**<0.01**	---	**0.0030**	**0.042**	**<0.001**	---	**1.20**	**<0.001**	**<0.005**	**<0.002**	**0.003**	**<0.005**	---	**0.0003**	**0.008**	**<0.002**	**0.2**	**0.0094**	---	**<0.005**	**3.27**	---	**<0.05**	**<0.05**	**0.004**	---	---	**0.002**	**0.030**	---	---	---
16-20-95-08 P-1 [5]	26-Feb-85	**0.4**	---	**0.0006**	---	---	---	---	---	---	---	**0.011**	---	---	---	---	---	---	**<0.0002**	---	---	---	---	---	---	---	---	---	---	**0.032**	---	---	---
Watt Mountain Formation																																	
ARC6-310	17-Aug-01	<0.01	---	0.0018	0.014	<0.001	---	1.85	<0.001	<0.005	0.007	0.002	<0.005	---	<0.0002	0.123	0.028	<0.1	0.0040	---	<0.005	0.319	---	<0.05	<0.05	0.001	---	---	0.002	0.005	---	---	---
Kearl Oil Sands Project																																	
QUATERNARY																																	
P04169707Q	13-Mar-04	0.066	<0.02	<0.005	0.099	<0.0100	<0.20	<0.050	0.000055	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	0.002	---	<0.0001	0.122	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	9.3	---
P04169707Q1	13-Mar-04	0.031	<0.02	<0.005	0.107	<0.0100	0.25	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.068	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	<0.2	---
P06159607Q	17-Mar-04	<0.005	<0.02	<0.005	0.145	<0.0100	<0.20	0.094	0.000105	<0.007	<0.005	<0.002	<0.001	0.07	<0.00005	<0.006	<0.008	---	0.009	---	<0.0001	0.546	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	32	---
P06159607Q1	17-Mar-04	<0.005	<0.02	<0.005	0.049	<0.0100	<0.20	0.361	0.000017	<0.007	<0.005	<0.002	<0.001	0.13	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	1.289	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	44	---
P06179607Q	29-Mar-04	0.130	<0.02	<0.005	0.032	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	0.007	<0.008	---	<0.001	---	<0.0001	0.095	<0.05	<0.0008	<0.04	0.007	<0.1	<1.0	<0.050	<0.005	<0.005	4.5	---
P06229707Q1	26-Mar-04	0.006	<0.02	<0.005	0.158	<0.0100	<0.20	0.093	0.000027	<0.007	<0.005	<0.002	<0.001	0.04	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.234	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	4.2	---
P06319607Q	17-Mar-04	0.009	<0.02	<0.005	0.052	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.077	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	0.6	---
P06319607Q1	17-Mar-04	0.013	<0.02	<0.005	0.059	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.090	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	0.005	<0.005	<0.2	---
P08079707Q	13-Mar-04	0.052	<0.02	<0.005	0.040	<0.0100	0.25	<0.050	0.000030	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	0.001	---	<0.0001	0.068	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	9.3	---
P08079707Q1	13-Mar-04	<0.005	<0.02	<0.005	0.076	<0.0100	<0.20	<0.050	0.000044	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.133	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	0.021	<0.005	1.7	---
P08289607Q1	17-Mar-04	0.059	<0.02	<0.005	0.016	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.025	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	3.9	---
P11229607Q	15-Mar-04	0.045	<0.02	<0.005	0.075	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0010*	0.119	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	0.8	---
P11229607Q1	17-Mar-04	0.024	<0.02	<0.005	0.076	<0.0100	<0.20	0.799	0.000144	<0.007	<0.005	0.003	<0.001	0.07	<0.00005	0.030	<0.008	---	0.007	---	<0.0001	0.371	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	0.012	<0.005	23	---
P12359607Q1	13-Mar-04	<0.005	<0.02	<0.005	0.027	<0.0100	<0.20	<0.050	0.000037	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.041	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	0.006	<0.005	2.6	---
P14049607Q	17-Mar-04	0.010	<0.02	<0.005	0.096	<0.0100	<0.20	0.100	<0.000017	<0.007	<0.005	<0.002	<0.001	0.06	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.382	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	7.7	---
P14049607Q1	17-Mar-04	<0.005	<0.02	<0.005	0.052	<0.0100	<0.20	0.666	0.000029	<0.007	<0.005	<0.002	<0.001	0.18	<0.00005	0.007	<0.008	---	<0.001	---	<0.0001	1.953	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	210	---
P14199607Q	13-Mar-04	0.006	<0.02	<0.005	0.033	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.052	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	7.4	---
P14199607Q1	13-Mar-04	<0.005	<0.02	<0.005	0.079	<0.0100	<0.20	0.314	0.000063	<0.007	<0.005	0.003	<0.001	0.10	<0.00005	0.017	<0.008	---	<0.001	---	<0.0001	0.733	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	230	---
P14209607Q	13-Mar-04	0.075	<0.02	<0.005	0.027	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.041	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	5.6	---
P14209607Q1	13-Mar-04	<0.005	<0.02	<0.005	0.033	<0.0100	<0.20	<0.050	0.000035	<0.007	0.006	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.066	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	0.008	<0.005	4.2	---
P14259607Q	13-Mar-04	0.157	<0.02	<0.005	0.012	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	0.002	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.022	<0.05	<0.0008	<0.04	0.006	<0.1	<1.0	<0.050	<0.005	<0.005	2.6	---
P16149707Q	13-Mar-04	0.132	<0.02	<0.005	0.008	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.013	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	4.0	---
P16149707Q1	13-Mar-04	0.020	<0.02	<0.005	0.070	<0.0100	<0.20	<0.050	0.000029	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.064	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	1.4	---
P16229607Q	13-Mar-04	0.057	<0.02	<0.005	0.016	<0.0100	0.24	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.027	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	6.1	---
P16229607Q1	13-Mar-04	0.023	<0.02	<0.005	0.096	<0.0100	0.23	0.232	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	0.235	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	<0.2	---

WorleyParsons Komex

resources & energy

Table 7

Dissolved Metal Data for Groundwater Samples

PROJECT NO.: E35772801

Monitoring Station	Date (d-m-y)	DISSOLVED METALS AND TRACE ELEMENTS																													SULPHUR	
		Aluminum:D (mg/L)	Antimony:D (mg/L)	Arsenic:D (mg/L)	Barium:D (mg/L)	Beryllium:D (mg/L)	Bismuth:D (mg/L)	Boron:D (mg/L)	Cadmium:D (mg/L)	Chromium:D (mg/L)	Cobalt:D (mg/L)	Copper:D (mg/L)	Lead:D (mg/L)	Lithium:D (mg/L)	Mercury:D (mg/L)	Molybdenum:D (mg/L)	Nickel:D (mg/L)	Phosphorus:D (mg/L)	Selenium:D (mg/L)	Silicon:D (mg/L)	Silver:D (mg/L)	Strontium:D (mg/L)	Tellurium:D (mg/L)	Thallium:D (mg/L)	Tin:D (mg/L)	Titanium:D (mg/L)	Total Diss. P (mg/L)	Uranium:D (mg/L)	Vanadium:D (mg/L)	Zinc:D (mg/L)	Zirconium:D (mg/L)	Sulphur:D (mg/L)	Sulphide (mg/L)
Aesthetic Objective (AO)		---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	---	---	0.05
Maximum Acceptable Concentration (MAC)		---	0.006	0.01	1	---	---	5	0.005	0.05	---	---	0.01	---	0.001	---	---	---	0.01	---	---	---	---	---	---	---	---	0.02	---	---	---	---	---
1-9-96-8 (Q)	4-Nov-98	0.05	0.0003	<0.0002	0.10	0.004	---	0.02	<0.0002	0.012	0.0059	0.01	<0.0003	0.006	<0.00005	<0.003	0.0037	---	<0.0002	---	<0.0001	0.130	---	---	---	<0.003	---	0.0005	0.004	0.011	---	---	---
3-14-96-8 (Q)	4-Nov-98	0.04	0.0004	0.0002	0.16	0.004	---	0.04	0.0015	0.012	0.0076	0.004	<0.0003	0.013	<0.00005	<0.003	0.004	---	<0.0002	---	<0.0001	0.195	---	---	---	<0.003	---	<0.0004	0.003	0.022	---	---	---
3-22-96-8 (Q1)	28-Feb-98	0.13	<0.0002	0.0011	0.06	<0.001	---	0.01	<0.0002	0.005	0.0006	<0.001	<0.0003	0.004	<0.00005	<0.003	0.0035	---	<0.0002	---	<0.0001	0.80	---	<0.001	---	0.020	---	<0.0004	<0.002	0.008	<0.0002	---	---
	2-Nov-98	0.03	0.0003	<0.0002	0.05	0.0053	---	0.04	<0.0002	<0.002	0.0054	0.004	<0.0003	0.008	<0.00005	<0.003	0.0019	---	<0.0002	---	<0.0001	0.101	---	---	---	<0.003	---	<0.0004	0.004	0.003	---	---	---
7-10-96-8 (Q)	4-Nov-98	0.04	0.0005	0.0031	0.52	0.004	---	0.63	<0.0002	0.009	0.0063	<0.001	<0.0003	0.085	<0.00005	<0.003	0.0071	---	<0.0002	---	<0.0001	1.35	---	---	---	<0.003	---	<0.0004	<0.002	<0.001	---	---	---
9-6-96-8 (Q)	26-Feb-98	0.08	<0.0002	<0.0002	<0.01	0.005	---	0.01	<0.0002	<0.002	<0.0003	0.018	0.0008	0.002	<0.00005	<0.003	0.0023	---	<0.0002	---	<0.0001	0.011	---	<0.001	---	<0.003	---	<0.0004	0.024	0.221	0.0007	---	---
	2-Nov-98	0.08	<0.0002	<0.0002	0.01	0.004	---	<0.01	<0.0002	<0.002	0.0055	0.002	<0.0003	0.002	<0.00005	<0.003	0.0018	---	<0.0002	---	<0.0001	0.022	---	---	---	<0.003	---	<0.0004	0.004	0.005	---	---	---
11-24-96-8 (Q)	4-Mar-98	<0.01	<0.0002	0.0003	0.14	<0.001	---	0.25	<0.0002	<0.002	0.0007	0.013	0.0009	0.028	<0.00005	<0.003	0.005	---	<0.0002	---	<0.0001	0.335	---	<0.001	---	<0.003	---	<0.0004	0.004	0.039	0.0034	---	---
	3-Nov-98	0.05	0.0004	<0.0002	0.12	0.006	---	0.24	0.0002	<0.002	0.0059	0.001	<0.0003	0.032	<0.00005	<0.003	0.0032	---	<0.0002	---	<0.0001	0.264	---	---	---	<0.003	---	<0.0004	<0.002	0.006	---	---	---
13-4-96-8 (Q)	3-Nov-98	0.04	0.0013	0.0003	0.24	0.007	---	0.1	<0.0002	<0.002	0.0056	0.004	<0.0003	0.018	<0.00005	<0.003	0.0026	---	<0.0002	---	<0.0001	0.275	---	---	---	<0.003	---	<0.0004	0.001	0.002	---	---	---
13-9-96-8 (Q)	28-Feb-98	0.03	<0.0002	0.0006	0.08	<0.001	---	0.02	<0.0002	0.011	0.0006	0.006	<0.0003	0.008	<0.00005	0.004	0.0033	---	<0.0002	---	<0.0001	0.085	---	<0.001	---	<0.003	---	0.0010	0.006	0.012	0.134	---	---
	4-Nov-98	0.02	0.0006	0.0006	0.09	0.007	---	0.02	0.0004	0.01	0.0065	0.005	<0.0003	0.007	<0.00005	0.009	0.003	---	<0.0002	---	<0.0001	0.092	---	---	---	<0.003	---	0.0005	0.002	<0.001	---	---	---
13-10-96-8 (Q)	27-Feb-98	<0.01	<0.0002	<0.0002	0.02	<0.001	---	0.01	<0.0002	<0.002	0.0011	0.003	<0.0003	0.002	<0.00005	<0.003	0.0025	---	<0.0002	---	<0.0001	0.044	---	<0.001	---	<0.003	---	<0.0004	<0.002	0.018	<0.0002	---	---
	4-Nov-98	0.19	0.0003	0.0002	0.02	0.005	---	<0.01	<0.0002	0.026	0.0064	<0.001	<0.0003	<0.001	<0.00005	<0.003	0.0051	---	<0.0002	---	<0.0001	0.037	---	---	---	0.012	---	<0.0004	<0.002	0.008	---	---	---
14-3-96-8 (QOW)	7-Sep-98	<0.01	---	0.0016	---	---	---	---	<0.0002	<0.002	---	0.016	<0.0003	---	<0.00005	---	0.003	---	<0.0002	---	<0.0001	---	---	---	---	---	---	---	---	0.030	---	---	---
(duplicate)	7-Sep-98	<0.01	---	0.0015	---	---	---	---	0.0002	<0.002	---	<0.001	<0.0003	---	<0.00005	---	0.003	---	<0.0002	---	<0.0001	---	---	---	---	---	---	---	---	0.027	---	---	---
15-1-96-8 (Q)	4-Nov-98	<0.01	0.0004	0.0007	0.14	0.004	---	0.09	<0.0002	0.009	0.0059	0.004	<0.0003	0.033	<0.00005	<0.003	0.0035	---	<0.0002	---	<0.0001	0.259	---	---	---	<0.003	---	<0.0004	0.005	<0.001	---	---	---
McMURRAY FORMATION																																
Oil Sands/Intra-Orebody																																
97-4 Oil Sands**	10-Mar-97	1,040	---	0.131 [2]	5.20 [2]	0.078	---	6.15 [2]	0.007 [2]	2.04 [2]	0.809	0.955	0.695 [2]	---	0.007 [2]	0.014	1.25	---	0.019 [2]	---	<0.005	6.11	---	<0.05	<0.05	4.91	22.4	---	2.29	1.99	---	---	---
Basal Aquifer																																
P04179707B	27-May-04	<0.050*	<0.010*	0.071 [2]	1.141 [2]	<0.0002	<0.05	0.829	<0.00017*	<0.005	<0.005	<0.02*	<0.01*	0.11	<0.00005	<0.005	<0.008	---	0.128 [2]	---	<0.001*	1.714	<0.05	<0.008*	<0.02	0.003	<0.05	<0.01*	0.011	<0.005	<0.005	100	---
P14339607B	27-Mar-04	<0.500*	<0.02	<0.500*	0.217	<0.0100	<0.20	0.848	0.00184	<0.007	<0.005	<0.200*	<0.100*	0.10	<0.00005	<0.006	<0.008	---	<0.100*	---	<0.010*	1.726	<0.05	<0.080*	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	77	---
(duplicate)	27-Mar-04	<0.500*	<0.02	<0.500*	0.231	<0.0100	<0.20	0.920	0.00275	0.007	<0.005	<0.200*	<0.100*	0.11	<0.00005	<0.006	<0.008	---	<0.100*	---	<0.010*	1.884	<0.05	<0.080*	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	84	---
P16069707B	27-May-04	<0.050*	<0.010*	0.068 [2]	0.412	0.0002	<0.05	0.960	<0.00017*	0.005	<0.005	<0.02*	<0.01*	0.10	<0.00005	<0.005	<0.008	---	0.039 [2]	---	<0.001*	1.587	<0.05	<0.008*	<0.02	<0.003	<0.05	<0.01*	0.015	<0.005	<0.005	18	---
P10169707B	26-Mar-04	0.033	<0.02	<0.005	0.014	<0.0100	<0.20	0.308	0.000085	<0.007	<0.005	0.004	<0.001	0.06	<0.00005	0.029	<0.008	---	0.002	---	<0.0001	0.312	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	24	---
W08059707B	15-Mar-04	<0.005	<0.02	<0.005	0.199	<0.0100	<0.20	0.891	<0.000017	<0.007	<0.005	<0.002	<0.001	0.11	<0.00005	<0.006	<0.008	---	0.018 [2]	---	<0.0010*	1.881	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	80	---
	17-Mar-04	<5.00*	<0.02	<5.00*	0.200	<0.0100	<0.20	0.905	<0.0170*	<0.007	<0.005	<2.00*	<1.00	0.12	<0.00005	<0.006	<0.008	---	<1.00*	---	<0.100*	1.889	<0.05	<0.800*	<0.04	<0.006	<0.1	<1.0*	<0.050	<0.005	<0.005	8.9	---
	19-Mar-04	<5.00*	<0.02	<5.00*	0.201	<0.0100	<0.20	0.909	<0.0170*	<0.007	<0.005	<2.00*	<1.00	0.12	<0.00005	<0.006	<0.008	---	<1.00*	---	<0.100*	1.896	<0.05	<0.800*	<0.04	<0.006	<0.1	<1.0*	<0.050	<0.005	<0.005	5.5	---
97-2 (B) Post Purge**	11-Mar-97	0.60	---	<0.004	0.120	<0.002	---	0.77	<0.0002	0.003	<0.002	0.002	0.002	---	<0.002	<0.005	<0.002	---	<0.004	---	<0.0002	0.994	---	<0.05	<0.05	0.007	0.10	---	0.002	0.016	---	---	---
1-9-96-8 (B)	1-Mar-98	<0.01	0.0003	<0.0002	0.70	<0.001	---	1.02	<0.0002	<0.002	<0.0003	<0.001	<0.0003	0.171	<0.00005	<0.003	0.0023	---	<0.0002	---	<0.0001	1.62	---	<0.001	---	<0.003	---	<0.0004	<0.002	<0.001	0.0083	---	---
	8-Nov-98	<0.01	0.0005	0.0007	0.62	<0.001	---	1.10	<0.0002	<0.002	<0.0003	0.002	<0.0003	0.213	0.00008	<0.003	0.0023	---	0.0004	---	<0.0001	1.65	---	---	---	0.007	---	<0.0004	<0.002	0.02	---	---	---
3-5-96-8 (B)	26-Feb-98	0.06	<0.0002	<0.0002	0.19	<0.001	---	0.85	<0.0002	<0.002	<0.0003	0.018	<0.0003	0.141	<0.00005	<0.003	0.002	---	<0.0002	---	<0.0001	0.822	---	<0.001	---	<0.003	---	<0.0004	0.013	0.002	<0.0002	---	---
(duplicate)	26-Feb-98	<0.01	<0.0002	<0.0002	0.18	<0.001	---	0.88	0.0008	<0.002	0.0003	0.018	<0.0003	0.143	<0.00005	<0.003	<0.0005	---	<0.0002	---	<0.0001	0.918	---	<0.001	---	<0.003	---	<0.0004	<0.002	0.002	<0.0002	---	---
	3-Nov-98	0.22	0.0005	0.0010	0.19	0.009	---	1.36	0.0003	<0.002	0.0014	0.003	<0.0003	0.197	<0.00005	<0.003	0.0015	---	<0.0002	---	<0.0001	1.49	---	---	---	<0.003	---	<0.0004	<0.002	0.001	---	---	---
(duplicate)	3-Nov-98	0.08	<0.0002	0.0009	0.20	0.010	---	1.41	<0.0002	<0.002	0.0004	0.006	<0.0003	0.200	<0.00005	<0.003	0.0012	---	<0.0002	---	<0.0001	1.54	---	---	---	<0.003	---	0.0004	0.009	<0.001	---	---	---
3-22-96-8 (B)	1-Mar-98	0.03	<0.0002	<0.0002	0.63	<0.001	---	0.08	<0.0002	0.044	<0.0003	<0.001	<0.0003	0.043	<0.00005	0.062	0.0038	---	<0.0002	---	<0.0001	1.75	---	<0.001	---	<0.003	---	<0.0004	<0.002	0.008	<0.0002	---	---
	2-Nov-98	0.02	0.0004	0.0010	0.10	0.004	---	0.98	<0.0002	<0.002	0.0052	<0.001	<0.0003	0.083	<0.00005	<0.003	0.0015	---	0.0007	---	<0.0001	1.14	---	---	---	<0.003	---	<0.0004	<0.002	0.002	---	---	---
10-14-96-8 (B)	12-Sep-98	0.14	<0.0002	<0.0002	0.15	0.004	---	0.95	<0.0002	<0.002	0.0004	<0.001	<0.0003	0.090	---	<0.003	0.0021	---	<0.0002	---	<0.0001	1.12	---	<0.0002	---	<0.003	---	<0.0004	<0.002	0.008	0.0044	---	---
	3-Nov-98	0.03	0.0002	0.0003	0.10	0.006	---	0.99	<0.0002	<0.002	<0.0003	0.002	<0.0003	0.081	<0.00005	<0.003	<0.0005	---	0.0008	---	<0.0001	1.06	---	---	---	<0.003	---	<0.0004	<0.002	<0.001	---	---	---
(duplicate)	3-Nov-98	<0.01	<0.0002	<0.0002	0.11	0.005	---	1.01	<0.0002	<0.002	0.0004	0.004	<0.0003	0.082	<0.00005	<0.003	<0.0005	---	<0.0002	---	<0.0001	1.11	---	---	---	<0.003	---	<0.0004	<0.002	0.001	---	---	---
12-1-96-9 (B)	26-Feb-98	0.19	<0.0002	<0.0002	0.06	0.005	---	0.69	<0.0002	<0.002	<0.0003	0.003	<0.0003	0.165	<0.00005	<0.003	0.0030	---	<0.0002	---	<0.0001	0.983	---	<0.001	---	0.004	---	<0.0004	0.006	0.004	<0.0002	---	---
(duplicate)	26-Feb-98	<0.01	<0.0002	<0.0002	0.07	0.003	---	0.79	<0.0002	<0.002	<0.0003	0.004	<0.0003	0.161	<0.00005	<0.003	0.0033	---	<0.0002	---	<0.0001	0.990	---	<0.001	---	<0.003	---	<0.0004	0.005	<0.001	<0.0002	---	---
13-4-96-8 (B)	27-Feb-98	0.33	<0.0002	0.0022	0.13	<0.001	---	1.18	<0.0002	<0.002	0.0013	0.004	<0.0003	0.156	<0.00005	<0.003	0.0046	---	0.0038	---	<0.0001	1.42	---	<0.001	---	0.004	---	<0.0004	0.007	0.008	0.0027	---	---
	3-Nov-98	0.11	0.0005	0.0010	0.18	0.007	---	1.35	<0.0002	<0.002	0.0017	0.002	<0.0003	0.147	<0.00005	<0.003	0.0015	---	0.0012	---	<0.0001	1.63	---	---	---	<0.003	---	<0.0004	<0.002	<0.001	---	---	---
13-9-96-8 (B)	28-Feb-98	0.02	<0.0002	0.0002	0.22	<0.001	---	0.35	<0.0002	0.007	<0.0003	<0.001	<0.0003	0.074	<0.00005	<0.003	0.0013	---	<0.0002	---	<0.0001	1.15	---	<0.001	---	0.011	---	<0.0004	<0.002	<0.001	<0.0002	---	---
	4-Nov-98	0.2	0.0003	0.0002	0.20	0.005	---	0.55	<0.0002	0.006	0.0059	0.010	<0.0003	0.086	<0.00005	<0.003	0.0018	---	<0.0002	---	0.0002	1.02	---	---	---	<0.003	---	0.0005	0.011	<0.001	---	---	---
	4-Nov-98	0.10	<0.0002	0.0002	0.20	0.003	---	0.54	0.0004	0.005	0.0006	0.005	<0.0003	0.085	<0.00005	<0.003	<0.0005	---	<0.0002	---	<0.0001	1.02	---	---	---	<0.003	---	<0.0004	<0.002	<0.001	---	---	---
14-14-96-8 (B)	3-Nov-98	0.08	<0.0002	<0.0002	0.22	0.005	---	0.97	0.0002	<0.002	0.0077	0.003	<0.0003	0.082	<0.00005	<0.003	0.0027	---	<0.0002	---	<0.0001	1.09	---	---	---	0.005	---	<0.0004	<0.002	<0.001	---	---	---
15-1-96-8 (B)	4-Nov-98	0.01	<0.0002	0.0002	0.17	0.005	---	0.51	0.0007	<0.002	0.0017	0.009	<0.0003	0.066	<0.00005	<0.003	0.0018	---	<0.0002	---	<0.0001	0.793	---	---	---	<0.003	---	<0.0004	0.009	0.003	---	---	---
15-8-96-8 (B)	1-Mar-98	0.07	<0.0002	<0.0002	0.08	<0.001	---	1.08	<0.0002	0.008	<0.0003	<0.001	<0.0003	0.112	<0.00005	<0.003	0.0045	---	<0.0002	---	<0.0001	0.899	---	<0.001	---	0.017	---	<0.0004	<0.002	<0.001	0.0036	---	---
	2-Nov-98	0.03	0.0004	<0.0002	0.24	0.005	---	0.42	0.0003	<0.002	0.0081	0.001	<0.0003	0.071	<0.00005	<0.003	0.0022	---	<0.0002	---	<0.0001	0.896	---	---	---	<0.003	---	<0.0004	<0.002	0.002	---	---	---

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Table 7

Dissolved Metal Data for Groundwater Samples

PROJECT NO.: E35772801

Monitoring Station	Date (d-m-y)	DISSOLVED METALS AND TRACE ELEMENTS																													SULPHUR	
		Aluminum:D (mg/L)	Antimony:D (mg/L)	Arsenic:D (mg/L)	Barium:D (mg/L)	Beryllium:D (mg/L)	Bismuth:D (mg/L)	Boron:D (mg/L)	Cadmium:D (mg/L)	Chromium:D (mg/L)	Cobalt:D (mg/L)	Copper:D (mg/L)	Lead:D (mg/L)	Lithium:D (mg/L)	Mercury:D (mg/L)	Molybdenum:D (mg/L)	Nickel:D (mg/L)	Phosphorus:D (mg/L)	Selenium:D (mg/L)	Silicon:D (mg/L)	Silver:D (mg/L)	Strontium:D (mg/L)	Tellurium:D (mg/L)	Thallium:D (mg/L)	Tin:D (mg/L)	Titanium:D (mg/L)	Total Diss. P (mg/L)	Uranium:D (mg/L)	Vanadium:D (mg/L)	Zinc:D (mg/L)	Zirconium:D (mg/L)	Sulphur:D (mg/L)	Sulphide (mg/L)
Aesthetic Objective (AO)		---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	---	---	0.05
Maximum Acceptable Concentration (MAC)		---	0.006	0.01	1	---	---	5	0.005	0.05	---	---	0.01	---	0.001	---	---	---	0.01	---	---	---	---	---	---	---	---	0.02	---	---	---	---	---
DEVONIAN																																
Waterways Formation																																
P08079707D	26-Mar-04	0.029	<0.02	<0.025*	0.358	<0.0100	<0.20	0.089	<0.000085*	0.007	<0.005	<0.010*	<0.005*	0.56	<0.00005	0.038	<0.008	---	<0.005*	---	<0.0005*	12.00	<0.05	<0.004*	<0.04	0.008	<0.1	1.5 [2]	<0.050	0.007	0.023	83	---
5-24-96-8 (D)	4-Mar-98	<0.01	0.0006	0.0005	0.23	<0.001	---	0.88	<0.0002	<0.002	<0.0003	<0.001	<0.0003	0.097	<0.00005	0.026	0.0056	---	<0.0002	---	0.0003	1.11	---	<0.001	---	<0.003	---	0.0006	<0.002	0.009	0.0021	---	---
	21-Mar-98	0.08	0.0005	0.0006	0.60	<0.001	---	1.06	<0.0002	<0.002	0.0003	<0.001	<0.0003	0.142	<0.00005	<0.003	0.0018	---	<0.0002	---	<0.0001	1.73	---	<0.0002	---	<0.003	---	<0.0004	<0.002	0.009	0.0051	---	---
	3-Nov-98	0.38	0.0002	<0.0002	1.56 [2]	0.008	---	1.24	<0.0002	0.016	0.0021	0.001	<0.0003	0.131	<0.00005	0.016	0.0022	---	<0.0002	---	<0.0001	1.43	---	---	---	0.021	---	<0.0004	0.004	0.003	---	---	---
11-12-96-8 (D)	4-Mar-98	<0.01	<0.0002	<0.0002	0.23	<0.001	---	0.19	<0.0002	<0.002	<0.0003	0.028	<0.0003	0.031	<0.00005	<0.003	0.0026	---	<0.0002	---	<0.0001	0.588	---	<0.001	---	<0.003	---	<0.0004	0.026	0.026	<0.0002	---	---
	4-Nov-98	0.08	0.0002	0.0006	0.14	0.007	---	0.46	0.0014	0.003	0.0048	0.010	<0.0003	0.051	<0.00005	<0.003	0.0023	---	0.0006	---	<0.0001	0.819	---	---	---	<0.003	---	<0.0004	0.007	<0.001	---	---	---
3-14-96-8 (D)	4-Mar-98	<0.01	<0.0002	0.0002	0.37	0.002	---	0.87	<0.0002	<0.002	<0.0003	0.004	<0.0003	0.091	<0.00005	<0.003	0.0035	---	<0.0002	---	<0.0001	1.51	---	<0.001	---	<0.003	---	<0.0004	<0.002	0.050	<0.0002	---	---
	4-Nov-98	0.02	0.0003	0.0002	0.32	0.004	---	0.56	0.0006	0.006	0.0064	0.006	<0.0003	0.070	<0.00005	<0.003	0.004	---	<0.0002	---	<0.0001	1.27	---	---	---	<0.003	---	<0.0004	0.006	<0.001	---	---	---
QA/QC																																
FIELD BLANK	27-Mar-04	0.005	<0.02	<0.005	<0.003	<0.0100	<0.20	<0.050	0.000066	<0.007	<0.005	<0.002	0.003	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	<0.010	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	1.2	---
TRIP BLANK	27-Mar-04	<0.005	<0.02	<0.005	<0.003	<0.0100	<0.20	<0.050	<0.000017	<0.007	<0.005	<0.002	<0.001	<0.02	<0.00005	<0.006	<0.008	---	<0.001	---	<0.0001	<0.010	<0.05	<0.0008	<0.04	<0.006	<0.1	<1.0	<0.050	<0.005	<0.005	<0.2	---

NOTES:

1. *--- in guideline(s) row denotes no criteria, and in data row(s) indicates parameter not analysed.*
2. *Highlighting indicates parameters above applied guideline/criteria.*
3. *Superscript [1] denotes values exceeding Aesthetic Objective (AO) (Health Canada (2007) AO Guideline).*
4. *Superscript [2] denotes values exceeding Maximum Acceptable Concentration (MAC) (Health Canada (2007) MAC Guideline).*
5. *Superscript [3] denotes piezometer/data from Terracon Geotechnique Ltd., 1991.*
6. *Superscript [4] denotes piezometer/data from Terracon Geotechnique Ltd., 1990a.*
7. *Superscript [5] denotes piezometer/data from Terracon Geotechnique Ltd., 1985.*
8. *** denotes MDL raised due to sample dilution.**
9. **** denotes values are for extractable and not dissolved.**
10. **† denotes sample mislabelled in the field.**

Bold values indicate extractable, not dissolved, parameter.

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Table 8

Pierre River Mining Area - Monitoring Well Names

PROJECT NO.: F35772801

Installation Name	Revised Name	Northing	Easting
Shallow Quaternary			
P06-1801-16	P06-1801-SQ	6368299.25	459200.46
P06-1804-4	P06-1804-SQ	6368283.84	462177.44
P06-1821-6	P06-1821-SQ	6371478.85	461211.76
P06-1830-8	P06-1830-SQ	6373286.01	464182.25
P06-1836-9	P06-1836-SQ	6374319.06	462418.22
P06-1840-2	P06-1840-SQ	6374286.99	466581.1685
P06-1853-4	P06-1853-SQ	6376062.7	459344.35
P06-1861-4	P06-1861-SQ	6376687.11	466558.85
P06-1862-5	P06-1862-SQ	6377287.11	463634.98
P06-2895-5	P06-2895-SQ	6370470.61	464496.33
Deep Quaternary			
SH06-1801-DQ	SH06-1801-DQ	6368299.25	459200.46
P06-1830-13	P06-1830-DQ	6373286.26	464183.66
P06-1853-16	P06-1853-DQ	6376061.63	459345.18
P06-1861-14	P06-1861-DQ	6376687.27	466561.27
Basal Aquifer			
SH06-1824	SH06-1824-BS	6372296.63	460204.81
SH06-1845	SH06-1845-BS	6374907.08	466000.61
SH06-1848-BS	SH06-1848-BS	6375502.96	462398.03
SH06-1862	SH06-1862-BS	6377303.081	463651.0362
SH07-1805-BS	SH07-1805-BS	6380385.107	465573.6263
SH07-1814-BS	SH07-1814-BS	6381990.855	467195.9316
SH07-1826-BS	SH07-1826-BS	6385228.197	465608.1411
SH07-1830-BS	SH07-1830-BS	6386876.263	460736.7391
SH07-1901	SH07-1901-BS	6374297.007	466599.5187
Devonian			
SH06-1848-D	SH06-1848-D	6375493.9	462404.08
SH07-1826-D	SH07-1826-D	6372296.63	460204.81

NOTES:

"SQ" series wells denote shallow quaternary completion.
"DQ" series wells denote deep quaternary completion.
"BS" series wells denote Basal Aquifer completion.
"D" series wells denote Devonian completion.

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Table 9

Pierre River Mining Area - Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation	Datum Elevation (Top of PVC)	Stickup (PVC)	Total Depth of Piezometer	Depth Interval of Screen	Date Measured	Depth To Groundwater	Depth To Groundwater	Groundwater Surface Elevation	Hydraulic Conductivity	Lithology
	(m asl)	*(m asl)*	*(m)*	*(m bgs)*	*(m bgs)*	*(d-m-y)*	*(m btoc)*	*(m bgs)*	*(m asl)*	*(m/s)*	
Shallow Quaternary											
P06-1801-SQ	**302.91**	303.87	0.96	16.10	14.31-16.10	23-Feb-06	dry	N/A	N/M	N/A	Sand
						25-May-07	17.04	16.08	286.83		
P06-1804-SQ	**262.22**	263.25	1.03	3.40	1.10-3.40	25-Feb-06	2.62	1.59	260.63	2.1E-06	Siltstone
						25-May-07	1.36	0.33	261.89		
P06-1821-SQ	**281.47**	282.58	1.11	6.10	2.80-6.10	25-Feb-06	6.51	5.40	276.07	3.8E-05	Sand
						25-May-07	6.61	5.50	275.97		
P06-1830-SQ	**266.78**	267.90	1.12	8.00	4.60-8.00	25-Feb-06	7.13	6.01	260.77	N/M	Sand
						25-May-07	6.95	5.83	260.95		
P06-1836-SQ	**278.51**	279.49	0.98	9.20	5.65-9.20	25-Feb-06	4.69	3.71	274.80	1.6E-07	Clay Till/Silt
						25-May-07	4.65	3.67	274.84		
P06-1840-SQ	**255.36**	256.29	0.93	2.00	0.70-2.00	25-Feb-06	1.79	0.86	254.50	N/M	Sand
						17-Mar-07	Frozen	N/A	N/M		
						25-May-07	1.09	0.16	255.20		
P06-1853-SQ	**297.23**	298.16	0.93	4.15	0.85-4.15	06-Mar-06	3.43	2.50	294.73	N/A	Clay Till
						25-May-07	2.40	1.47	295.76		
P06-1861-SQ	**257.20**	257.86	0.66	4.30	1.00-4.30	25-Feb-06	1.47	0.81	256.39	N/M	Sand/Silt
						25-May-07	1.14	0.48	256.72		
P06-1862-SQ	**278.88**	279.40	0.52	5.50	1.70-4.50	25-Feb-06	1.21	0.69	278.19	2.3E-05	Sand
						25-May-07	1.04	0.52	278.36		
P06-2895-SQ	**252.78**	253.84	1.06	5.25	2.00-5.25	03-Mar-06	2.10	1.04	251.74	N/M	Clay Till/Sand
						25-May-07	1.30	0.24	252.54		
Deep Quaternary											
SH06-1801-DQ	**302.67**	303.53	0.86	26.00	22.90-26.00	23-Feb-06	16.45	15.59	287.09	2.2E-05	Oilsand
						25-May-07	17.04	16.18	286.49		
P06-1830-DQ	**266.79**	267.52	0.73	13.15	5.49-13.15	25-Feb-06	6.75	6.02	260.77	N/M	Sand
						25-May-07	6.58	5.85	260.94		
P06-1853-DQ	**297.23**	298.08	0.85	15.62	12.90-15.62	05-Mar-06	4.29	3.44	293.79	1.0E-07	Clay Till/Silt
						25-May-07	3.25	2.40	294.83		
P06-1861-DQ	**257.17**	258.17	1.00	14.50	12.30-14.50	06-Mar-06	4.27	3.27	253.90	N/M	Silt
						25-May-07	0.82	-0.18	257.35		
Basal Aquifer											
SH06-1824-BS	**284.76**	285.78	1.02	71.50	59.50-61.00	23-Feb-06	7.64	6.62	278.14	1.5E-05	Sand
						25-May-07	7.54	6.52	278.24		
SH06-1845-BS	**256.63**	257.40	0.77	72.50	50.44-53.50	06-Mar-06	29.29	28.52	228.11	N/M	Sand
						25-May-07	28.54	27.77	228.86		
SH06-1848-BS	**283.81**	284.58	0.77	86.50	62.00-65.00	06-Mar-06	7.84	7.07	276.74	N/A	Sand
						09-Mar-07	7.78	7.01	276.80		
						25-May-07	7.80	7.03	276.78		
SH06-1862-BS	**278.77**	279.73 *	0.96	68.50	57.50-60.60	12-Mar-06	4.38	3.41	275.35	N/M	Sand
						25-May-07	4.44	3.48	275.29		
SH07-1805-BS	**283.04**	283.81	0.77	108.00	92.85-108	12-Mar-07	48.79	48.02	235.02	3.2E-05	Sand
						25-May-07	51.75	50.98	232.06		

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Table 9

Pierre River Mining Area - Piezometer Installation Details, Datum/Groundwater Surface Elevations, and Hydraulic Conductivities

PROJECT NO.: F35772801

Monitoring Station	Ground Elevation	Datum Elevation (Top of PVC)	Stickup (PVC)	Total Depth of Piezometer	Depth Interval of Screen	Date Measured	Depth To Groundwater	Depth To Groundwater	Groundwater Surface Elevation	Hydraulic Conductivity	Lithology
	(m asl)	*(m asl)*	*(m)*	*(m bgs)*	*(m bgs)*	*(d-m-y)*	*(m btoc)*	*(m bgs)*	*(m asl)*	*(m/s)*	
SH07-1814-BS	**283.16**	284.04	0.89	110.50	96.0-110.5	09-Mar-07	29.20	28.31	254.84	N/M	Sand
						25-May-07	54.14	53.25	229.90		
SH07-1826-BS	**281.56**	282.20	0.64	94.00	86.0-94.0	11-Mar-07	49.45	48.81	232.75	N/M	Sand
						25-May-07	49.82	49.18	232.38		
SH07-1830-BS	**301.20**	302.07	0.87	70.10	66.5-70.10	09-Mar-07	24.01	23.14	278.06	N/M	Sand
						25-May-07	24.76	23.89	277.31		
SH07-1901-BS	**255.61**	256.38	0.77	N/M	N/M	17-Mar-07	21.93	21.16	well damaged	N/M	Sand
						25-May-07	28.31	27.54	well damaged		
Devonian											
SH06-1848-D	**284.05**	284.81	0.76	86.00	82.73-85.75	12-Mar-06	71.12	70.36	213.69	N/M	Limestone
						10-Mar-07	50.06	49.30	234.75		
						25-May-07	62.29	61.53	222.52		
SH07-1826-D	**281.54**	282.28	0.74	106.00	103.1-106.0	04-May-06	5.49	4.75	276.79	N/M	Limestone
						25-May-07	49.17	48.43	233.11		

NOTES:

1. *Data may be entered to the nearest mm, but are reported above to the nearest cm. Apparent rounding errors may occasionally occur in calculated fields (e.g., Groundwater Surface Elevation).*
2. ** Denotes approximate value.*
3. *N/M - Denotes not measured.*
4. *N/A - Denotes not available.*
5. *m asl - Denotes metres above sea level.*
6. *m bgs - Denotes metres below ground surface.*
7. *m btoc - Denotes metres below top of PVC casing.*

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Table 10

Pierre River Mining Area - Field-Measured Parameters

PROJECT NO.: F35772801

Monitoring Station	Date	Temperature	Electrical Conductivity (at 25°C)	pH	Comments
	(d-m-y)	*(°C)*	*(µS/cm)*	*(units)*	
Shallow Quaternary					
P06-1801-SQ	23-Feb-06	---	---	---	Insufficient water
P06-1804-SQ	25-Feb-06	1.7	620	6.61	
P06-1821-SQ	25-Feb-06	2.5	780	6.83	
P06-1830-SQ	25-Feb-06	1.6	728	6.66	
P06-1836-SQ	25-Feb-06	4	777	7.10	
P06-1840-SQ	25-Feb-06	3.4	744	6.82	
P06-1853-SQ	05-Mar-06	2.1	3,920	7.29	
P06-1861-SQ	25-Feb-06	2.2	888	6.45	
P06-1862-SQ	25-Feb-06	1.1	584	7.27	
P06-2895-SQ	03-Mar-06	2.2	1,060	7.37	
Deep Quaternary					
SH06-1801-DQ	23-Feb-06	3.6	521	8.79	
P06-1830-DQ	25-Feb-06	2.4	835	6.40	
P06-1853-DQ	05-Mar-06	2.6	2,210	7.43	
P06-1861-DQ	05-Mar-06	3.1	1,051	7.17	
Basal Aquifer					
SH06-1824-BS	23-Feb-06	4	3,830	8.10	
SH06-1845-BS	06-Apr-06	3	3,590	8.07	
SH06-1848-BS	06-Mar-06	5.1	9,390	8.11	
SH06-1862-BS	12-Mar-06	3.9	3,470	7.86	
SH07-1805-BS	12-Mar-07	4.4	94,300	---	pH meter malfunction
SH07-1814-BS	09-Mar-07	4.1	94,900	7.93	
SH07-1826-BS	11-Mar-07	2.5	23,700	---	pH meter malfunction
SH07-1830-BS	04-Mar-07	3.5	10,800	---	pH meter malfunction
SH07-1901-BS	21-Mar-07	2.3	5,260	11.30	Damaged
Devonian					
SH06-1848-D	12-Mar-06	2.3	1,736	8.96	
SH07-1826-D	17-Mar-07	2.1	44,100	7.10	

NOTES:

1. ***Electrical conductivity values standardized to 25°C.***
2. ***--- Denotes parameter not measured.***

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Table 11

Pierre River Mining Area - Selected Indicator Parameters

PROJECT NO.: F35772801		PHYSICAL				INDICATORS					CATIONS, ANIONS & ION BALANCE									NITROGEN			PHENOLS
Monitoring Station	Date (d-m-y)	Electrical Conductivity (µS/cm)	pH (units)	Total Hard as $CaCO_3$ (mg/L)	Total Alk as $CaCO_3$ (mg/L)	Chloride:D (mg/L)	Sulphate:D (mg/L)	Iron:D (mg/L)	Manganese:D (mg/L)	TDS-calculated (mg/L)	Calcium:D (mg/L)	Magnesium:D (mg/L)	Potassium:D (mg/L)	Sodium:D (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Fluoride:D (mg/L)	Ion Balance (%)	NO_2 as N (mg/L)	NO_3 as N (mg/L)	NO_2+NO_3 as N (mg/L)	Phenols (mg/L)
Aesthetic Objective (AO)		---	6.5 - 8.5	---	---	250	500	0.3	0.05	500	---	---	---	200	---	---	---	---	---	---	---	---	---
Maximum Acceptable Concentration (MAC)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	10	10	---
Shallow Quaternary																							
P06-1804-SQ	25-Feb-06	579	7.4	309	304	2	17.3	0.044	0.051 [1]	329	93.8	18.2	1.9	13	370	<5	<5	0.40	105	<0.05	0.2	0.2	<0.001
P06-1821-SQ	25-Feb-06	782	7.9	175	344	7	73.5	0.018	0.880 [1]	482	48.7	12.9	7.7	123	419	<5	<5	0.52	105	0.21	0.4	0.7	0.005
P06-1830-SQ	25-Feb-06	759	7.6	390	305	3	123	0.212	0.178 [1]	456	91.3	39.4	2.7	13	372	<5	<5	0.84	96.4	<0.05	0.1	0.1	<0.001
P06-1836-SQ	25-Feb-06	753	7.8	361	313	3	106	0.100	0.100 [1]	463	95.4	29.9	8.0	32	382	<5	<5	0.42	103	<0.05	0.2	0.2	0.002
P06-1840-SQ	25-Feb-06	694	7.0	402	330	2	57.3	0.756 [1]	2.16 [1]	409	128	20.0	1.7	2	403	<5	<5	0.12	104	<0.05	0.1	0.1	0.006
	21-Mar-07	667	7.5	400	338	2	48.4	1.01 [1]	1.57 [1]	404	128	19.6	1.2	2	412	<5	<5	0.21	104	<0.05	<0.1	<0.1	<0.001
P06-1853-SQ	05-Mar-06	3,580	7.2	2,050	481	7	2,040 [1]	<0.005	0.489 [1]	3,290 [1]	476	208	13.6	259 [1]	587	<5	<5	0.94	100	<0.05	0.2	0.2	0.010
P06-1861-SQ	25-Feb-06	777	6.7	431	425	2	9.0	31.3 [1]	0.174 [1]	432	122	30.6	6.1	7	519	<5	<5	0.36	104	<0.05	0.1	0.1	0.013
(Duplicate)	25-Feb-06	760	6.7	435	424	2	9.1	30.5 [1]	0.170 [1]	433	122	31.6	6.4	7	517	<5	<5	0.38	105	<0.05	<0.1	<0.1	0.013
P06-1862-SQ	25-Feb-06	590	7.7	313	282	2	48.1	0.181	0.131 [1]	352	92.9	19.6	3.9	16	343	<5	<5	0.28	105	<0.05	0.1	0.1	0.003
P06-2895-SQ	01-Mar-06	782	7.1	452	545	2.2	6.9	0.139	0.305 [1]	525 [1]	111	32.7	3.6	24.4	665	<5	<5	0.30	93.3	<0.05	<0.05	<0.05	0.005
Deep Quaternary																							
SH06-1801-DQ	23-Feb-06	545	8.4	216	303	3	9.5	0.045	0.062 [1]	325	56.1	18.4	3.0	53	348	11	<5	0.27	105	<0.05	<0.1	<0.1	0.004
P06-1830-DQ	25-Feb-06	809	7.6	422	322	5	131	1.21 [1]	0.072 [1]	497	104	39.3	4.7	19	393	<5	<5	0.71	101	<0.05	0.1	0.1	<0.001
P06-1853-DQ	05-Mar-06	1,950	7.5	132	1,030	65	7.4	0.496 [1]	0.104 [1]	1,180 [1]	23.0	18.2	9.0	437 [1]	1,250	<5	<5	0.46	97.4	<0.05	<0.1	<0.1	0.005
P06-1861-DQ	05-Mar-06	929	7.1	495	516	3	19.9	4.87 [1]	0.734 [1]	537 [1]	129	42.1	7.0	25	630	<5	<5	0.14	103	<0.05	0.3	0.3	0.020
Basal Aquifer																							
SH06-1824-BS	23-Feb-06	3,940	8.0	46	1,300	562 [1]	5.9	0.265	0.038	2,320 [1]	8.70	5.80	13.0	941 [1]	1,580	<5	<5	1.22	101	<0.05	<0.1	<0.1	0.058
SH06-1845-BS	05-Mar-06	3,060	8.1	370	757	576 [1]	37.0	0.121	0.106 [1]	1,780 [1]	84.3	38.7	22.2	567 [1]	923	<5	<5	0.86	101	<0.05	<0.1	<0.1	0.196
SH06-1848-BS	06-Mar-06	7,780	8.1	191	2,100	1,600 [1]	4.7	0.012	0.089 [1]	4,900 [1]	25.7	30.9	21.6	1,960 [1]	2,500	27	---	0.84	103	<0.05	<0.1	<0.1	---
SH06-1862-BS	12-Mar-06	3,250	8.3	67	1,110	379 [1]	7.0	<0.005	0.019	1,880 [1]	13.0	8.50	10.8	798 [1]	1,360	<5	---	1.18	110	<0.05	<0.1	<0.1	---
(Duplicate)	12-Mar-06	3,220	8.0	63	1,110	381 [1]	5.5	<0.005	0.020	1,870 [1]	12.5	7.70	10.8	785 [1]	1,360	<5	<5	1.17	108	<0.05	<0.1	<0.1	0.010
SH07-1805-BS	14-Mar-07	98,000	7.7	5,190	482	45,200 [1]	4,860 [1]	0.022	0.2 [1]	81,900 [1]	1,710	223	27.2	29,600 [1]	588	<5	<5	1.05	100	<0.05	0.1	0.1	0.037
SH07-1814-BS	10-Mar-07	103,000	7.5	4,990	461	47,400 [1]	4,770 [1]	0.005	0.656 [1]	85,800 [1]	1,550	271	38.6	31,500 [1]	562	<5	<5	0.84	102	<0.05	0.1	0.1	<0.001
SH07-1826-BS	11-Mar-07	28,300	7.9	688	1,470	9,500 [1]	568 [1]	0.016	0.194 [1]	18,000 [1]	109	101	49.6	6,830 [1]	1,800	<5	<5	1.10	101	<0.05	<0.1	<0.1	0.019
SH07-1830-BS	11-Mar-07	13,500	8.2	295	2,650	3,240 [1]	<0.5	0.504 [1]	0.167 [1]	7,930 [1]	26.7	55.4	54.2	2,960 [1]	3,160	30	<10	0.79	94.3	<0.05	<0.1	<0.1	0.004
Devonian																							
SH06-1848-D	12-Mar-06	1,560	8.6 [1]	336	481	129	147	0.107	0.734 [1]	940 [1]	75.6	35.7	10.6	253 [1]	513	36	---	0.49	110	<0.05	0.1	0.1	---
SH07-1826-D	18-Mar-07	43,500	7.4	2,530	921	16,500 [1]	1,400 [1]	0.447 [1]	1.7 [1]	29,900 [1]	566	270	77.1	10,500 [1]	1,120	<5	<5	0.36	99.3	<0.05	0.2	0.2	0.008
Trip Blank	21-Mar-07	1	5.6 [1]	<1	<5	<1	0.6	<0.005	<0.001	<1	<0.5	<0.1	<0.5	<1	<5	<5	<5	<0.05	---	<0.05	<0.1	<0.1	<0.001
Field Blank	12-Mar-06	72	6.1 [1]	21	5	4	15.0	<0.005	0.001	33	2.00	3.90	3.1	2	6	<5	<5	<0.05	---	<0.05	<0.1	<0.1	0.003
	21-Mar-06	2.7	5.7 [1]	<1	<5	<1	<0.5	<0.005	<0.001	<1	<0.50	<0.1	<0.5	<1	<5	<5	<5	<0.05	---	<0.05	<0.1	<0.1	<0.001
	11-Mar-07	1.8	5.7 [1]	<1	<5	<1	<0.5	<0.005	<0.001	<1	<0.5	<0.1	<0.5	<1	<5	<5	<5	<0.05	---	<0.05	<0.1	<0.1	<0.001

NOTES:

1. *--- in guideline(s) row denotes no criteria, and in data row(s) indicates parameter not analysed.*
2. *Highlighting indicates parameters above applied guideline/criteria.*
3. *Superscript [1] denotes values exceeding Aesthetic Objective (AO) (Health Canada (2006) AO Guideline).*
4. *Superscript [2] denotes values exceeding Maximum Acceptable Concentration (MAC) (Health Canada (2006) MAC Guideline).*

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Table 12

Pierre River Mining Area - Petroleum Hydrocarbons

PROJECT NO.: F35772801		BTEX				SELECT HYDROCARBONS	
Monitoring Station	Date (d-m-y)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes-total (mg/L)	F1 (C_6-C_{10})-BTEX (mg/L)	F2 ($C_{>10}$-C_{16}) (mg/L)
AENV (2001) Guideline		**0.005**	**0.024**	**0.0024**	**0.3**	**4.6**	**2.1**
Shallow Quaternary							
P06-1804-SQ	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1821-SQ	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1830-SQ	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1836-SQ	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1840-SQ	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
	21-Mar-07	<0.0005	0.0006	<0.0005	<0.0005	<0.1	0.77
P06-1853-SQ	05-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1861-SQ	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
(Duplicate)	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1862-SQ	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-2895-SQ	01-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
Deep Quaternary							
SH06-1801-DQ	23-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1830-DQ	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1853-DQ	05-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
P06-1861-DQ	05-Mar-06	<0.0005	0.0015	<0.0005	<0.0005	<0.1	<0.05
Basal Aquifer							
SH06-1824-BS	23-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
SH06-1845-BS	05-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.33
SH06-1848-BS	06-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
SH06-1862 BS	12-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
(duplicate)	12-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
SH07-1805-BS	14-Mar-07	<0.0005	0.0006	<0.0005	<0.0005	<0.1	0.23
SH07-1814-BS	10-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.27
SH07-1826-BS	11-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.39
SH07-1830-BS	11-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	0.09
Devonian							
SH06-1848-D	12-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
SH07-1826-D	18-Mar-07	<0.0005	0.0012	<0.0005	<0.0005	<0.1	0.35
Trip Blank	21-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
Field Blank	25-Feb-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
	12-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05
	11-Mar-07	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05

NOTES:

1. *--- in guideline row(s) denotes no criteria for that parameter.*
2. *Highlighting indicates parameters above applied guideline/criteria.*
3. *Superscript [1] denotes values exceeding AENV (2001) Guideline (AENV (2001) Guideline, applicable pathways as described in report).*

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Table 13

Pierre River Mining Area - Polycyclic Aromatic Hydrocarbons

PROJECT NO.: F35772801

Monitoring Station	Date (d-m-y)	PANH: C2-Sub'd B(A)a/Chrysene (mg/L)	C2-Sub'd B(B&K)F/B(A)P (mg/L)	C2-Sub'd Biphenyl (mg/L)	C2-Sub'd Dibenzothiophene (mg/L)	C2-Sub'd Fluorene (mg/L)	C2-Sub'd Naphthalene (mg/L)	C2-Sub'd Phenanthrene/Anthracene (mg/L)	C3-Sub'd Dibenzothiophene (mg/L)	C3-Sub'd Naphthalene (mg/L)	C3-Sub'd Phenanthrene/Anthracene (mg/L)	C4-Sub'd Dibenzothiophene (mg/L)	C4-Sub'd Naphthalene (mg/L)	C4-Sub'd Phenthrene/Anth. (mg/L)	Acridine (mg/L)	Methyl Dibenzothiophene (mg/L)	ALBERTA TIER 1 PAH'S: Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Anthracene (mg/L)	Benzo(a)-anthracene (mg/L)	Benzo(a)-pyrene (mg/L)	Benzo(b)fluoranthene (mg/L)
AENV (2001) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	**0.00001**	---
Shallow Quaternary																						
P06-1804-SQ	25-Feb-06	0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00005	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
P06-1821-SQ*	25-Feb-06	0.052	<0.002	<0.002	0.2	0.057	0.051	0.22	0.23	0.17	0.13	0.15	0.19	<0.002	<0.002	0.1	0.005	<0.002	<0.002	<0.002	0.002 [1]	<0.002
P06-1830-SQ	25-Feb-06	0.00014	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
P06-1836-SQ	25-Feb-06	0.00024	<0.00004	<0.00004	0.00024	<0.00004	<0.00004	<0.00004	0.00054	<0.00004	0.00025	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	0.00001
P06-1840-SQ	25-Feb-06	0.00005	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
	21-Mar-07	0.00009	0.00006	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
P06-1853-SQ	05-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00011	<0.00004	<0.00004	0.00008	<0.00004	<0.00004	0.00006	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
P06-1861-SQ	25-Feb-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
(duplicate)	25-Feb-06	0.00033	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	0.00002	0.00004 [1]	0.00004
P06-1862-SQ*	25-Feb-06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
P06-2895-SQ*	01-Mar-06	0.004	<0.002	<0.002	0.018	<0.002	<0.002	<0.002	0.022	0.007	0.014	0.023	0.016	<0.002	<0.002	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Deep Quaternary																						
SH06-1801-DQ*	23-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
P06-1830-DQ*	25-Feb-06	0.0055	<0.0003	<0.0003	0.0041	<0.0003	<0.0003	0.0017	0.011	<0.0003	0.0053	0.012	<0.0003	<0.0003	<0.0003	0.0005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
P06-1853-DQ*	05-Mar-06	0.0014	<0.0003	<0.0003	<0.0003	0.0011	<0.0003	0.0044	0.0059	<0.0003	0.0056	0.0043	0.0015	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
P06-1861-DQ*	05-Mar-06	0.0044	<0.0005	<0.0005	<0.0005	0.0048	<0.0005	0.013	0.021	<0.0005	0.017	0.024	0.0020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Basal Aquifer																						
SH06-1824-BS*	23-Feb-06	<0.0001	<0.0001	0.0003	<0.0001	<0.0001	0.0001	0.00001	<0.0001	0.0002	0.00001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
SH06-1845-BS	05-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
SH06-1848-BS	06-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
SH06-1862 BS	12-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00019	<0.00004	<0.00004	0.00010	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
(duplicate)	12-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
SH07-1805-BS	14-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
SH07-1814-BS	10-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
SH07-1826-BS	11-Mar-07	0.00006	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00006	<0.00004	<0.00004	0.00008	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
SH07-1830-BS	11-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	0.00006	<0.00004	0.0001	<0.00004	0.00006	0.00008	<0.00004	0.00008	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Devonian																						
SH06-1848-D	12-Mar-06	0.00007	<0.00004	<0.00004	0.00060	<0.00004	0.00046	0.00043	0.00097	0.00025	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	0.00014	0.00006	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
SH07-1826-D	18-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00025	0.00019	<0.00004	<0.00004	0.00011	<0.00004	<0.00004	0.00008	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001
Trip Blank	21-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Field Blank	25-Feb-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
	12-Mar-06	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00046	<0.00004	<0.00004	0.00022	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
	11-Mar-07	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

NOTES:

1. *--- in guideline or detail data row(s) denotes parameter not analyzed.*
2. ** Denotes MDL raised due to dilution.*
3. *Highlighting indicates parameters above applied guideline/criteria.*
4. *Superscript [1] denotes values exceeding AENV (2001) Guideline (AENV (2001) Guideline, applicable pathways as described in report).*

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Table 13

Pierre River Mining Area - Polycyclic Aromatic Hydrocarbons

PROJECT NO.: F35772801

		ALBERTA TIER 1 PAH'S										PAH										VOCS	
Monitoring Station	Date (d-m-y)	Benzo(g,h,i)-perylene (mg/L)	Benzo(k)fluoranthene (mg/L)	Chrysene (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	Indeno(1,2,3-cd)pyrene (mg/L)	Naphthalene (mg/L)	Phenanthrene (mg/L)	Pyrene (mg/L)	Quinoline (mg/L)	Biphenyl (mg/L)	Dibenzo(a,h)-anthracene (mg/L)	Dibenzothiophene (mg/L)	Methyl Acenaphthene (mg/L)	Methyl B(A)A/Chrysene (mg/L)	Methyl B(B&K)F/B(A)P (mg/L)	Methyl Biphenyl (mg/L)	Methylanthracenes (mg/L)	Methylnapthelenes (mg/L)	Naphthenic Acids (FTIR) (mg/L)	Methyl Fluoranthene/Pyrene (mg/L)	Methyl Fluorene (mg/L)
AENV (2001) Guideline		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Shallow Quaternary																							
P06-1804-SQ	25-Feb-06	<0.00001	<0.00001	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<1	<0.00004	<0.00004
P06-1821-SQ*	25-Feb-06	<0.002	<0.002	0.012	<0.002	0.003	<0.002	<0.002	0.04	0.006	<0.002	<0.002	<0.002	0.003	0.009	0.029	0.014	<0.002	0.15	0.003	2	0.021	0.023
P06-1830-SQ	25-Feb-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	0.00005	0.00007	<0.00004	<0.00004	<0.00001	<1	<0.00004	<0.00004
P06-1836-SQ	25-Feb-06	<0.00001	<0.00001	0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	0.00014	0.00009	<0.00004	<0.00004	<0.00001	<1	0.00007	<0.00004
P06-1840-SQ	25-Feb-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<1	<0.00004	<0.00004
	21-Mar-07	0.00002	<0.00001	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	0.00006	<0.00004	<0.00004	<0.00004	<0.00001	<1	0.00005	<0.00004
P06-1853-SQ	05-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00004	0.00004	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00008	0.00003	2	<0.00004	<0.00004
P06-1861-SQ	25-Feb-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<1	<0.00004	<0.00004
(duplicate)	25-Feb-06	0.00002	0.00001	0.00005	<0.00001	<0.00001	0.00002	<0.00001	<0.00001	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	0.00016	0.00013	<0.00004	<0.00004	<0.00001	<1	0.00006	<0.00004
P06-1862-SQ*	25-Feb-06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<1	<0.001	<0.001
P06-2895-SQ*	01-Mar-06	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	0.008	<0.002	1	<0.002	<0.002
Deep Quaternary																							
SH06-1801-DQ*	23-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	6	<0.0001	<0.0001
P06-1830-DQ*	25-Feb-06	<0.0003	<0.0003	0.0008	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0030	0.0016	<0.0003	0.0005	<0.0003	<1	0.0019	<0.0003
P06-1853-DQ*	05-Mar-06	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0009	0.0006	<0.0003	0.0017	<0.0003	8	0.0007	<0.0003
P06-1861-DQ*	05-Mar-06	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0010	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0030	0.0017	<0.0005	0.0056	<0.0005	<1	0.0020	<0.0005
Basal Aquifer																							
SH06-1824-BS*	23-Feb-06	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<1	<0.0001	<0.0001
SH06-1845-BS	05-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	<0.00001	0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00005	2	<0.00004	<0.00004
SH06-1848-BS	06-Mar-06	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00002	0.00003	0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	15	<0.00004	<0.00004
SH06-1862 BS	12-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00002	21	<0.00004	<0.00004
(duplicate)	12-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00002	15	<0.00004	<0.00004
SH07-1805-BS	14-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	4	<0.00004	<0.00004
SH07-1814-BS	10-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00002	4	<0.00004	<0.00004
SH07-1826-BS	11-Mar-07	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	0.00004	0.00002	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	16	<0.00004	<0.00004
SH07-1830-BS	11-Mar-07	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	0.00005	0.00003	0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00007	0.00003	19	<0.00004	<0.00004
Devonian																							
SH06-1848-D	12-Mar-06	<0.00001	<0.00001	<0.00001	0.00008	0.00003	<0.00001	0.0019	0.00013	0.00018	<0.00001	0.00004	<0.00001	<0.00001	<0.00004	0.00007	<0.00004	<0.00004	0.00038	0.0011	3	0.00011	<0.00004
SH07-1826-D	18-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	0.00021	0.00004	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	0.00017	0.00018	4	<0.00004	<0.00004
Trip Blank	21-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<1	<0.00004	<0.00004
Field Blank	25-Feb-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00001	<1	<0.00004	<0.00004
	12-Mar-06	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00003	<1	<0.00004	<0.00004
	11-Mar-07	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00002	<1	<0.00004	<0.00004

NOTES:

1. ***--- in guideline or detail data row(s) denotes parameter not analyzed.***
2. *** Denotes MDL raised due to dilution.**
3. **Highlighting indicates parameters above applied guideline/criteria.**
4. ***Superscript [1] denotes values exceeding AENV (2001) Guideline (AENV (2001) Guideline, applicable pathways as described in report).***

WorleyParsons Komex
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Table 14

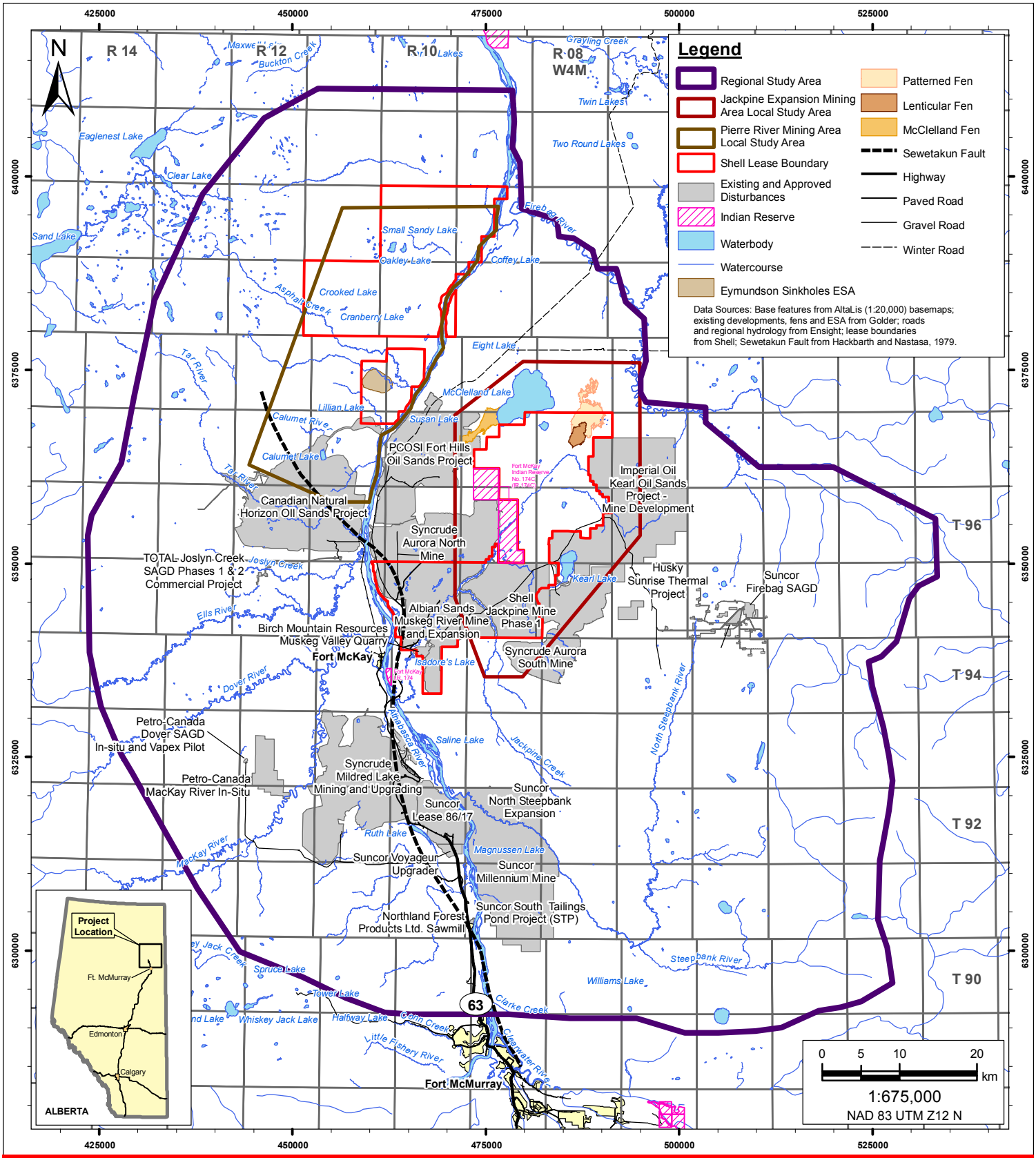
Pierre River Mine Area - Dissolved Trace Elements

PROJECT NO.: F35772801		DISSOLVED METALS AND TRACE ELEMENTS																			SULPHUR
Monitoring Station	Date (d-m-y)	Aluminum:D (mg/L)	Barium:D (mg/L)	Beryllium:D (mg/L)	Boron:D (mg/L)	Cadmium:D (mg/L)	Chromium:D (mg/L)	Cobalt:D (mg/L)	Copper:D (mg/L)	Lead:D (mg/L)	Molybdenum:D (mg/L)	Nickel:D (mg/L)	Silicon:D (mg/L)	Silver:D (mg/L)	Strontium:D (mg/L)	Thallium:D (mg/L)	Tin:D (mg/L)	Titanium:D (mg/L)	Vanadium:D (mg/L)	Zinc:D (mg/L)	Sulphide (mg/L)
Aesthetic Objective (AO)		---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	5	0.05
Maximum Acceptable Concentration (MAC)		---	1	---	5	0.005	0.05	---	---	0.01	---	---	---	---	---	---	---	---	---	---	---
Shallow Quaternary																					
P06-1804-SQ	25-Feb-06	0.01	0.101	<0.001	0.06	<0.001	<0.005	<0.002	0.081	<0.005	<0.005	0.002	6.1	<0.005	0.180	<0.05	<0.05	0.001	<0.001	0.023	0.007
P06-1821-SQ	25-Feb-06	0.01	0.277	<0.001	0.49	<0.001	<0.005	<0.002	0.064	<0.005	0.010	0.002	4.7	<0.005	0.394	<0.05	<0.05	<0.001	<0.001	0.026	0.056 [1]
P06-1830-SQ	25-Feb-06	<0.01	0.042	<0.001	0.05	<0.001	<0.005	<0.002	0.041	<0.005	<0.005	<0.002	4.1	<0.005	0.374	<0.05	<0.05	<0.001	<0.001	0.017	0.026
P06-1836-SQ	25-Feb-06	0.05	0.275	<0.001	0.31	<0.001	<0.005	<0.002	0.007	<0.005	<0.005	<0.002	10.1	<0.005	1.33	<0.05	<0.05	0.002	<0.001	0.004	0.017
P06-1840-SQ	25-Feb-06	0.03	0.092	<0.001	<0.05	<0.001	<0.005	<0.002	0.010	<0.005	<0.005	<0.002	3.9	<0.005	0.215	<0.05	<0.05	<0.001	<0.001	0.008	0.046
	21-Mar-07	0.02	0.102	<0.0005	0.028	<0.0001	0.001	0.001	0.002	0.0001	0.0004	0.0051	3.3	<0.0002	0.197	<0.00005	<0.0002	0.0023	0.0004	0.007	0.052 [1]
P06-1853-SQ	05-Mar-06	0.01	0.070	<0.001	0.71	<0.001	0.007	0.002	0.005	<0.005	<0.005	<0.002	9.1	<0.005	2.91	<0.05	<0.05	0.002	<0.001	0.011	<0.003
P06-1861-SQ	25-Feb-06	0.01	0.335	<0.001	0.13	<0.001	<0.005	<0.002	0.010	<0.005	<0.005	<0.002	11.6	<0.005	0.653	<0.05	<0.05	0.002	0.002	0.007	0.092 [1]
(Duplicate)	25-Feb-06	0.01	0.349	<0.001	0.15	<0.001	<0.005	<0.002	<0.001	<0.005	<0.005	<0.002	11.3	<0.005	0.647	<0.05	<0.05	0.002	0.002	0.003	0.043
P06-1862-SQ	25-Feb-06	<0.01	0.123	<0.001	0.11	<0.001	<0.005	<0.002	0.002	<0.005	<0.005	<0.002	6.5	<0.005	0.190	<0.05	<0.05	<0.001	<0.001	0.014	0.075 [1]
P06-2895-SQ	01-Mar-06	<0.01	0.500	<0.001	0.18	<0.001	<0.005	<0.002	0.001	<0.005	<0.005	<0.002	10.2	<0.005	0.579	<0.05	<0.05	0.002	<0.001	0.002	0.021
Deep Quaternary																					
SH06-1801-DQ	23-Feb-06	0.02	0.151	<0.001	0.13	<0.001	<0.005	<0.002	0.033	<0.005	<0.005	<0.002	6.7	<0.005	0.168	<0.05	<0.05	0.002	0.003	0.018	0.030
SH06-1830-DQ	25-Feb-06	0.01	0.041	<0.001	0.14	<0.001	<0.005	<0.002	0.017	<0.005	<0.005	<0.002	6.3	<0.005	0.583	<0.05	<0.05	<0.001	<0.001	0.011	0.003
P06-1853-DQ	05-Mar-06	<0.01	0.579	<0.001	1.49	<0.001	0.018	<0.002	0.006	<0.005	<0.005	<0.002	15.4	<0.005	0.901	<0.05	<0.05	0.003	<0.001	0.005	0.012
P06-1861-DQ	05-Mar-06	0.02	0.435	<0.001	0.35	<0.001	0.011	0.006	0.002	<0.005	<0.005	<0.002	9.5	<0.005	1.28	<0.05	<0.05	0.002	<0.001	0.034	<0.003
Basal Aquifer																					
SH06-1824-BS	23-Feb-06	<0.01	0.121	<0.001	5.15 [2]	<0.001	0.005	<0.002	0.002	<0.005	<0.005	<0.002	2.3	<0.005	0.370	<0.05	<0.05	0.001	0.001	0.009	0.030
SH06-1845-BS	05-Mar-06	<0.01	0.606	<0.001	1.39	<0.001	0.011	<0.002	0.022	<0.005	<0.005	<0.002	5.5	<0.005	1.61	<0.05	<0.05	0.002	0.004	0.006	2.77 [1]
SH06-1848 BS	6-Mar-06	<0.01	0.143	<0.001	6.76 [2]	<0.001	0.031	<0.002	0.071	<0.005	<0.005	<0.002	2.6	<0.005	1.40	<0.05	<0.05	0.003	<0.001	0.005	---
SH06-1862 BS	12-Mar-06	<0.01	0.018	<0.001	4.24	<0.001	0.012	<0.002	0.011	<0.005	<0.005	<0.002	2.4	<0.005	0.385	<0.05	<0.05	<0.001	0.004	0.005	---
(Duplicate)	12-Mar-06	<0.01	0.019	<0.001	4.12	<0.001	0.013	<0.002	0.010	<0.005	<0.005	<0.002	2.4	<0.005	0.388	<0.05	<0.05	<0.001	0.005	0.003	0.420 [1]
SH07-1805-BS	14-Mar-07	0.06	0.09	0.001	2.32	<0.001	<0.005	<0.002	0.314	<0.005	<0.005	0.035	5.0	<0.005	19.9	<0.05	<0.05	<0.001	<0.001	0.073	48.4 [1]
SH07-1814-BS	10-Mar-07	1.00	0.3	<0.100	<5.00	<0.10*	<0.005	<0.2	<0.100	<0.5*	<0.5	<0.2	3.2	<0.5	24	<5	<5	<0.100	<0.001	<0.1	12.6 [1]
SH07-1826-BS	11-Mar-07	<1.00	0.2	<0.100	2.00	<0.100*	<0.005	<0.200	<0.100	<0.500*	<0.500	0.005	2.7	<0.500	7	<5	<5	<0.100	<0.001	<0.100	38.8 [1]
SH07-1830-BS	11-Mar-07	0.20	0.27	<0.010	5.00	<0.010*	<0.005	<0.02	<0.010	<0.05*	<0.050	<0.020	2.6	<0.050	2.9	<0.05	<0.50	0.01	<0.001	0.21	0.015
Devonian																					
SH06-1848-D	12-Mar-06	0.02	0.069	<0.001	0.88	<0.001	<0.005	<0.002	0.009	<0.005	0.049	0.003	6.3	<0.005	0.464	<0.05	<0.05	0.002	0.004	0.026	---
SH07-1826-D	18-Mar-07	0.02	0.686	<0.001	1.74	<0.001	<0.005	<0.002	0.128	<0.005	0.006	0.013	7.4	<0.005	14.4	<0.05	<0.05	<0.001	0.006	0.113	0.009
Trip Blank	21-Mar-07	<0.01	0.0002	<0.0005	0.027	<0.0001	<0.0004	<0.0001	<0.0006	<0.0001	0.0001	<0.0001	<0.1	<0.0002	0.0004	<0.00005	<0.0002	<0.0003	0.0001	0.003	<0.003
Field Blank	12-Mar-06	0.01	<0.003	<0.001	<0.05	<0.001	<0.005	<0.002	<0.001	<0.005	<0.005	<0.002	<0.1	<0.005	0.007	<0.05	<0.05	<0.001	<0.001	0.003	0.004
	21-Mar-06	0.01	<0.003	<0.001	<0.05	<0.001	<0.005	<0.002	<0.001	<0.005	<0.005	<0.002	<0.1	<0.005	<0.005	<0.05	<0.05	<0.001	<0.001	0.007	<0.003
	11-Mar-07	<0.01	<0.003	<0.001	<0.05	<0.001	<0.005	<0.002	<0.001	<0.005	<0.005	<0.002	<0.1	<0.005	<0.005	<0.05	<0.05	<0.001	<0.001	0.002	0.006

NOTES:

1. *--- in guideline(s) row denotes no criteria, and in data row(s) indicates parameter not analysed.*
2. *Highlighting indicates parameters above applied guideline/criteria.*
3. ** MDL raised due to dilution.*
4. *Superscript [1] denotes values exceeding Aesthetic Objective (AO) (Health Canada (2006) AO Guideline).*
5. *Superscript [2] denotes values exceeding Maximum Acceptable Concentration (MAC) (Health Canada (2006) MAC Guideline).*

Figures



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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

REGIONAL AND LOCAL STUDY AREAS AND SURROUNDING DEVELOPMENTS

WorleyParsons Komex
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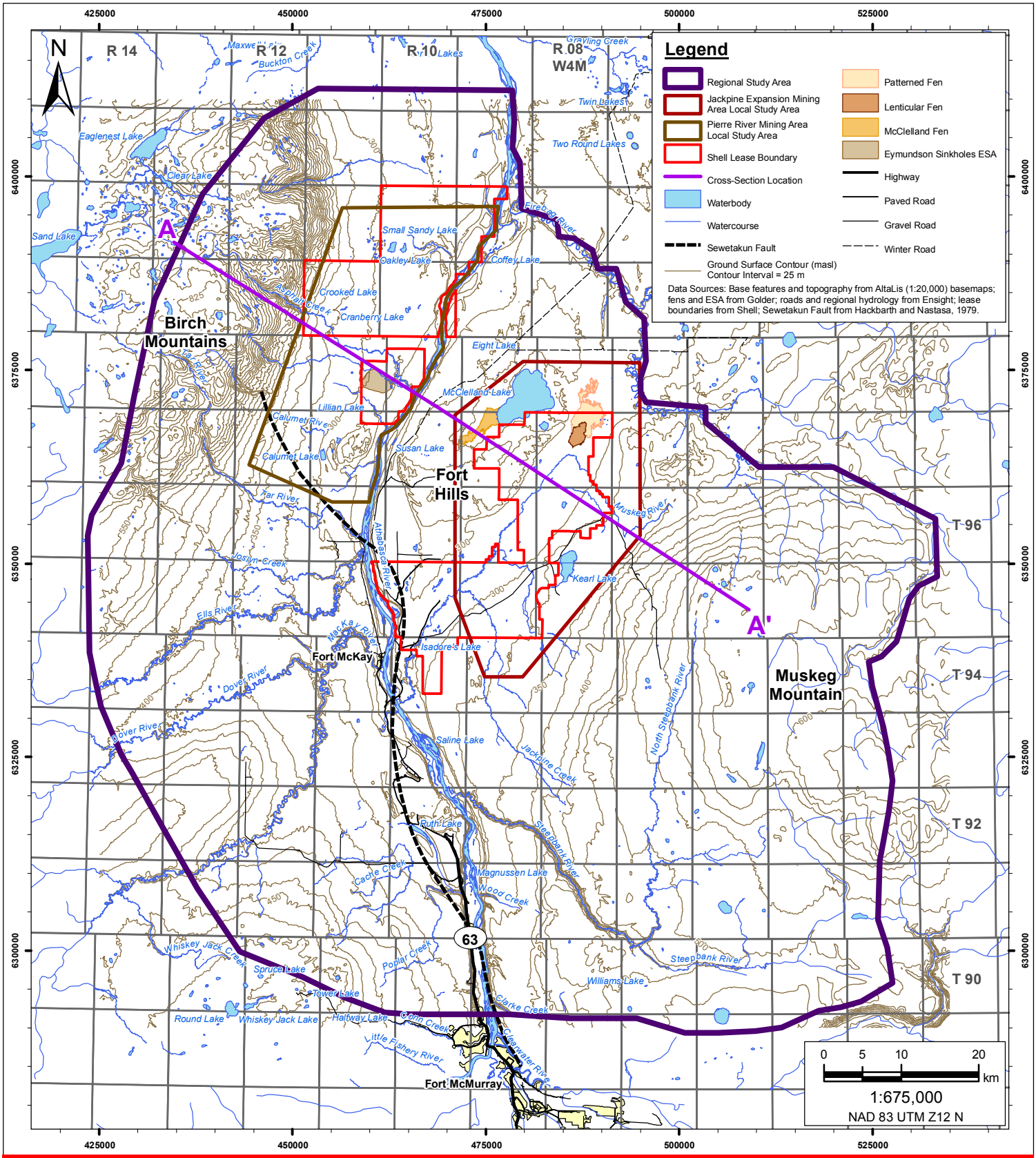
28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: 1

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\ArcGIS\Baseline\RSA_location.mxd Issued By: Edmonton GIS



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TOPOGRAPHY, DRAINAGE AND REGIONAL GEOLOGICAL CROSS-SECTION LOCATION

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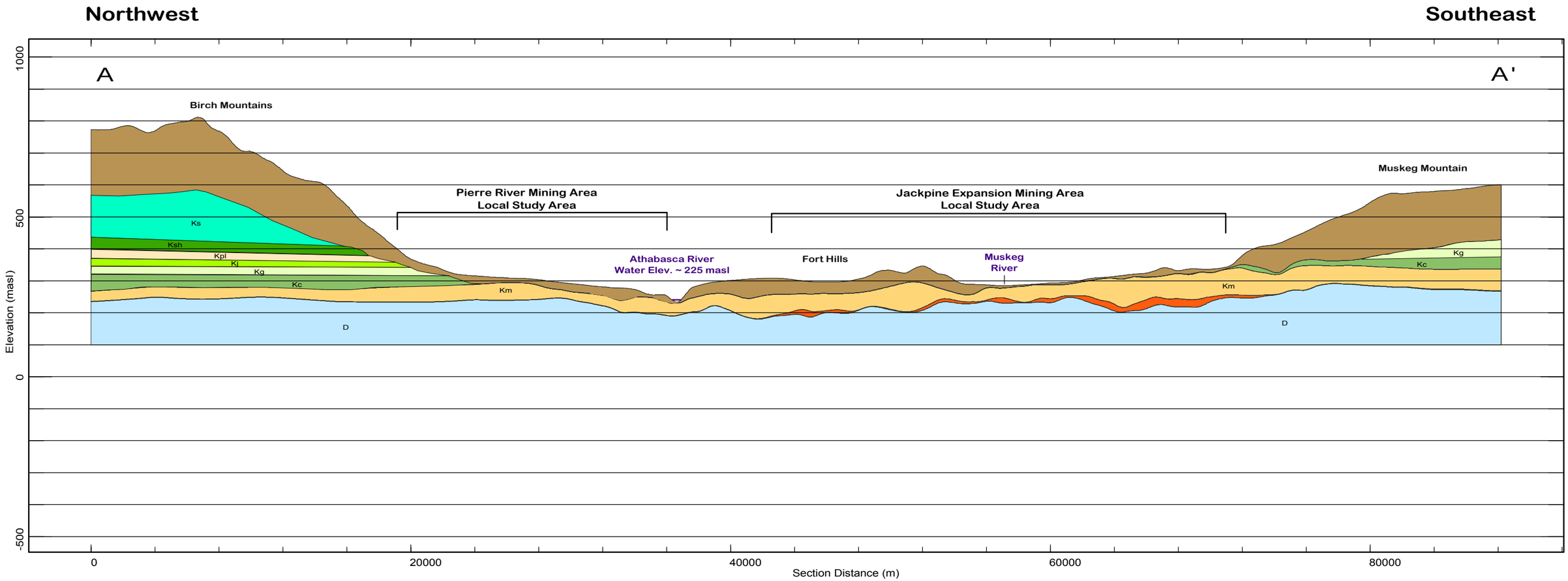
28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

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FIGURE: 2

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LEGEND

- Quaternary Deposits
- Smoky Group (Ks)
- Shaftsbury Formation (Ksh)
- Pelican Formation (Kpl)
- Joli Fou Formation (Kj)
- Grand Rapids Formation (Kg)
- Clearwater Formation (Kc)
- McMurray Formation (Km)
- McMurray Formation Basal Aquifer
- Devonian Formations (D)

Scale: 1:250000
Vertical Exaggeration: 20X
Map Units: metres

Notes:
1. Data coverage is sparse in Birch Mountains area; surfaces are based on Hamilton, 1999 and Andriashek, 2007.
2. Location of cross-section shown in Figure 2.

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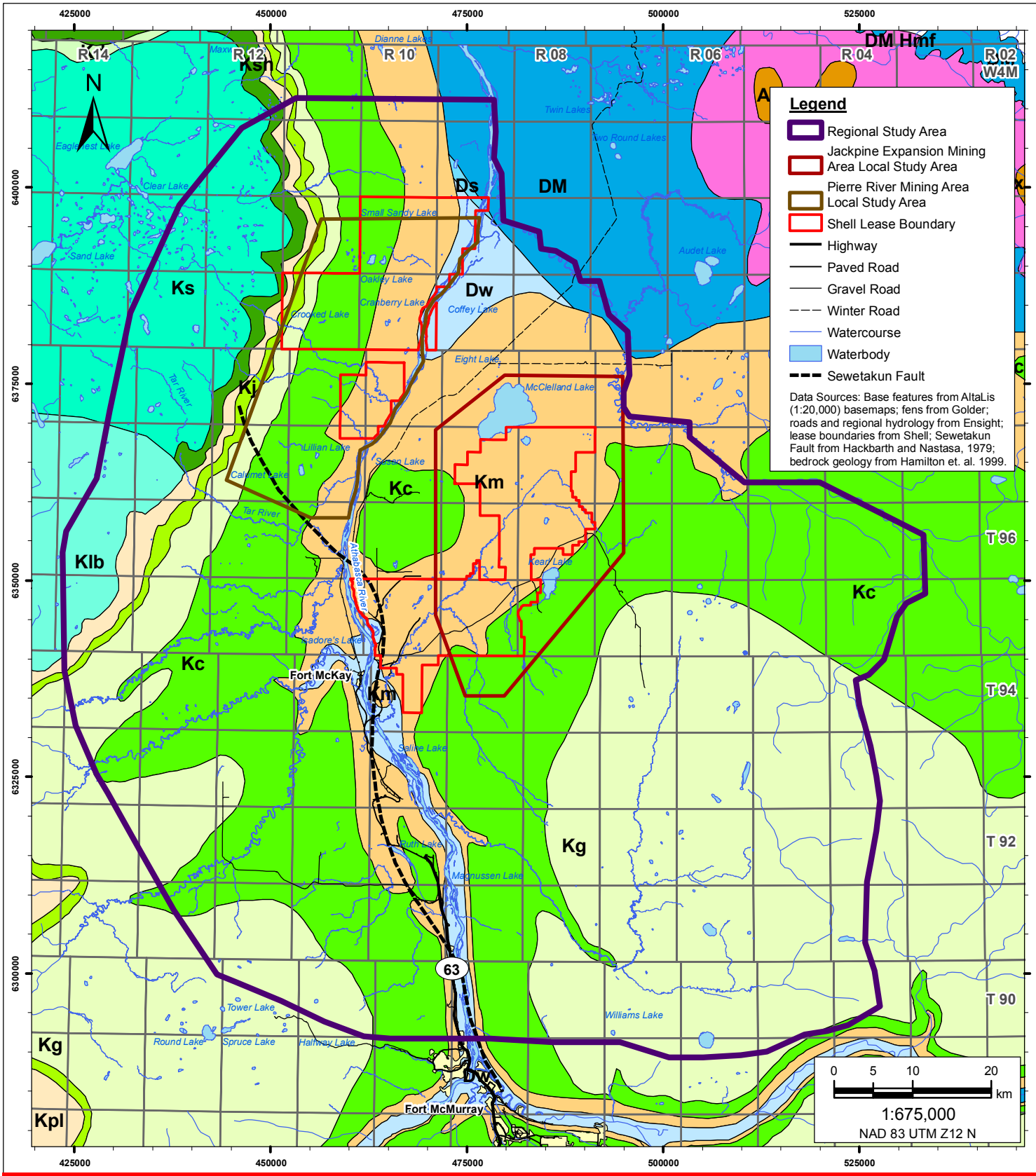
REGIONAL SCHEMATIC GEOLOGICAL CROSS-SECTION A-A'

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28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 3

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C\My Documents\Omnibus\Cross-sections\Baseline_Figures\Regional_Section.map Issued By: Edmonton GIS



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BEDROCK GEOLOGY

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FIGURE: 4A

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\ArcGIS\Baseline\Bedrock_geology.mxd Issued By: Edmonton GIS

Cretaceous

Ks - Smoky Group
dark grey shale and silty shale, nodules and thin beds of concretionary ironstone; includes unnamed dark grey shale unit on Caribou Mountains and Buffalo Head Hills; marine

Klb - LaBiche Formation
dark grey shale and silty shale; ironstone partings and concretions; silty fish-scale bearing beds in lower part; marine

Kd - Dunvegan Formation
grey, fine-grained, feldspathic sandstone with hard calcareous beds; laminated siltstone and grey silty shale; deltaic to marine

Ksh - Shaftesbury Formation
dark grey fish-scale bearing shale, silty in upper part; numerous nodules and thin beds of concretionary ironstone; bentonite partings; lower part with thin silty and sandy intervals; marine

Kpl - Pelican Formation
fine-grained quartzose sandstone, silty and glauconitic in lower part; marine

Kj - Joli Fou Formation
dark grey fossiliferous shale, silty interbeds in upper part; marine

Kg - Grand Rapids Formation
fine-grained quartzose and feldspathic sandstone, laminated siltstone and silty shale; thin coal beds; shoreline complex

Kc - Clearwater Formation
dark grey, fossiliferous, silty shale; laminated siltstone and fine-grained cherty sandstone; glauconitic sandstone (Wabiskaw Member) near base; marine

Km - McMurray Formation
thick-bedded quartzose sandstone and siltstone; oil-impregnated; grey silty shale interbeds in upper part; nonmarine to deltaic

Devonian

Dw - Waterways Formation
grey and greenish grey shale and argillaceous limestone interbedded with grey and greyish brown, fine-grained to coarse clastic limestone; marine

Ds - Slave Point Formation
grey and brown fine- to medium-grained limestone and dolomitic limestone; minor shale, gypsum; marine

DM - Middle Devonian
arkosic sandstone (La Loche Formation); grey-green silty and sandy shale, reddish shale; dolomite; minor anhydrite (McLean River Formation); brown and buff, massive, porous dolomite; brown to grey thin-bedded dolomite; dolomitic limestone (Methy Formation); gypsum; anhydrite; grey-green silty and dolomitic shale; minor dolomite (leached Prairie Evaporite Formation); marine and evaporitic. Note: McLean River, Methy and Prairie Evaporite Formations are equivalents of Chinchaga, Keg River and Muskeg Formations respectively, the Prairie Evaporite including a thick succession of salt beds in subsurface

Aphebian

Ag - Granitoids
granite, various

Ax - Mylonitic Rocks
dark grey to green, fine-grained, massive rock; light grey felsic varieties present locally; commonly chlorite epidote-rich; well-foliated with streaky patches of quartz and feldspar; includes protomylonites

Data Source: Hamilton et. al. 1999. Geological Map of Alberta. Scale 1:1,000,000.

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LEGEND FOR BEDROCK GEOLOGY

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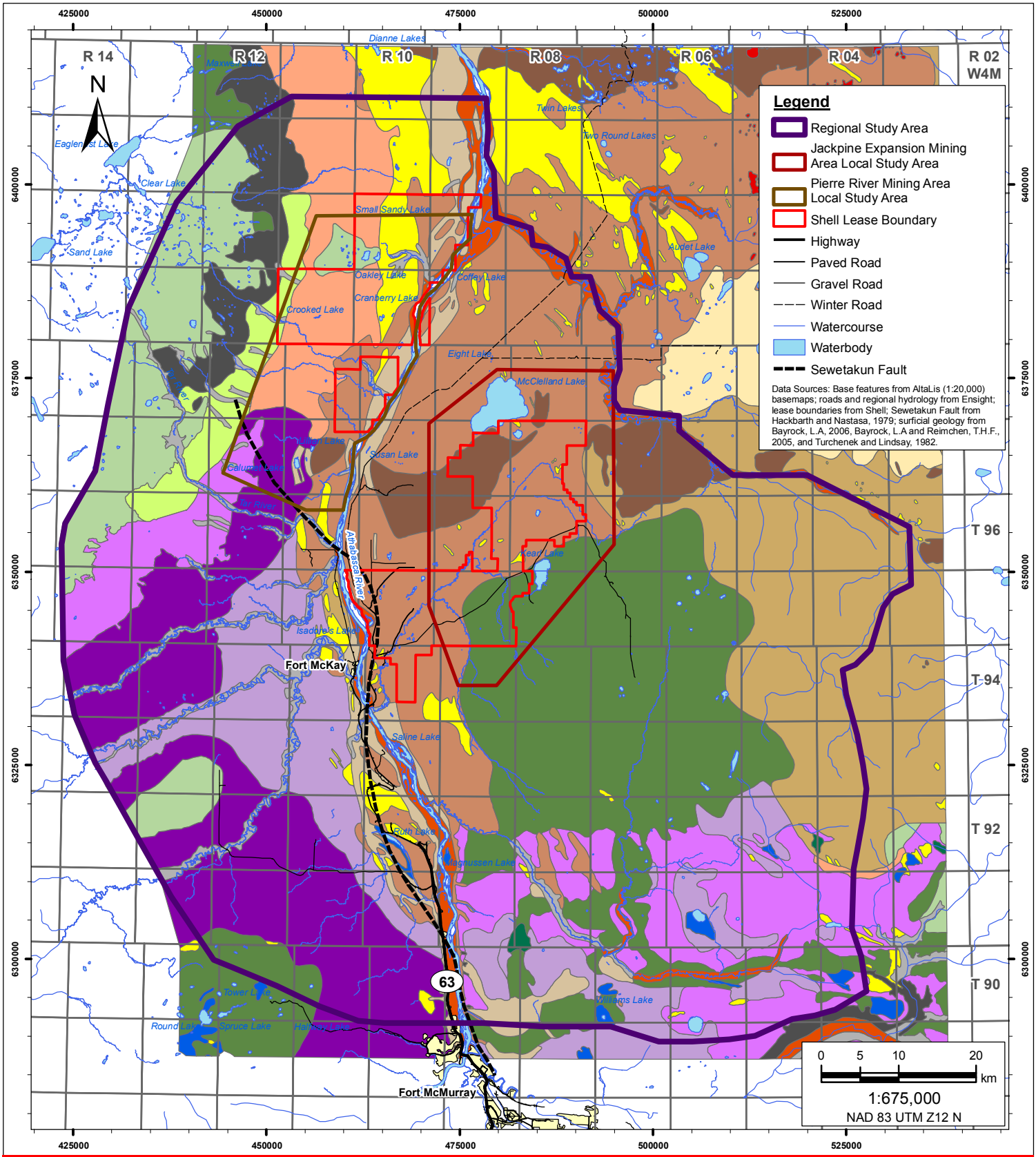
26-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by

PROJECT NUMBER: F35772801

FIGURE: 4B

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_OmnibusArcGIS\Baseline\Bedrock_legend.mxd Issued By: Edmonton GIS



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SURFICIAL GEOLOGY

WorleyParsons Komex
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PROJECT NUMBER: F35772801

FIGURE: 5A

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FILE: Q:\F3577_Shell\F35772801_Omnibus\ArcGIS\Baseline\Surficial_geology.mxd Issued By: Edmonton GIS

Surficial Geology Units

Aeolian Deposits

- Sands, dunes

Alluvial Deposits

- Alluvial fan
- Stream alluvium

Glacial Deposits

- Colluviated ground moraines
- Ground moraines
- Kame moraines
- Hummocky moraines

Glaciofluvial Deposits

- Meltwater channel sediment
- Outwash sand
- Outwash sand and gravel
- Outwash sand and gravel overridden by glacier
- Ice-contact deposits

Glaciolacustrine Deposits

- Sand and silt
- Silt and clay
- Mixed

Lacustrine Deposits

- Organic

Erosional Features

- Gully, creek valley
- Slump

Bedrock

- Granite, gneiss and metasedimentary Precambrian rocks

Data Source: Bayrock, L.A. 2006. Surficial geology of the Bitumont area, Alberta, NTS 74E.
Bayrock, L.A. and Reimchen, T.H.F. 2005. Surficial geology of the Waterways area, Alberta, NTS 74D.
Turchenek, L.W. and J.D. Lindsay. 1982. Soils Inventory of the Alberta Oil Sands Environmental Research Program Study Area. AOSERP Report 122 and Appendix 9.4.

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LEGEND FOR SURFICIAL GEOLOGY

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PROJECT NUMBER: F35772801

FIGURE: 5B

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FILE: Q:\F3577_Shell\F35772801_Omnibus\ArcGIS\Baseline\Surficial_legend.mxd Issued By: Edmonton GIS

Period		Stratigraphy		
		Group	Formation	Member
Pleistocene and Recent Deposits				
Erosional Unconformity				
Cretaceous	Upper	Smoky		
		Colorado	LaBiche (Klb)	
			Dunvegan (Kd)	
			Shaftesbury (Ksh)	
	Lower		Pelican (Kpl)	
			Joli Fou (Kj)	
		Mannville	Grand Rapids (Kg)	
			Clearwater	Wabiskaw
			McMurray	Upper
				Middle
				Lower
Erosional Unconformity				
Devonian	Upper	Beaverhill Lake	Waterways	Mildred
				Moberly
				Christina
				Calumet
				Firebag
			Paraconformity	
			Slave Point	
	Paraconformity			
	Middle	Elk Point	Watt Mountain	
			Muskeg	
			Prairie Evaporite	
			Methy	
			McLean River	
	Lower		La Loche	
Erosional Unconformity				
Precambrian				

NOTES: Modified from Carrigy (1973b), Gorrell (1976), Hackbarth and Natasa (1979) and Bachu and Underschultz (1993), Hamilton (1999).

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STRATIGRAPHIC COLUMN FOR THE REGIONAL STUDY AREA

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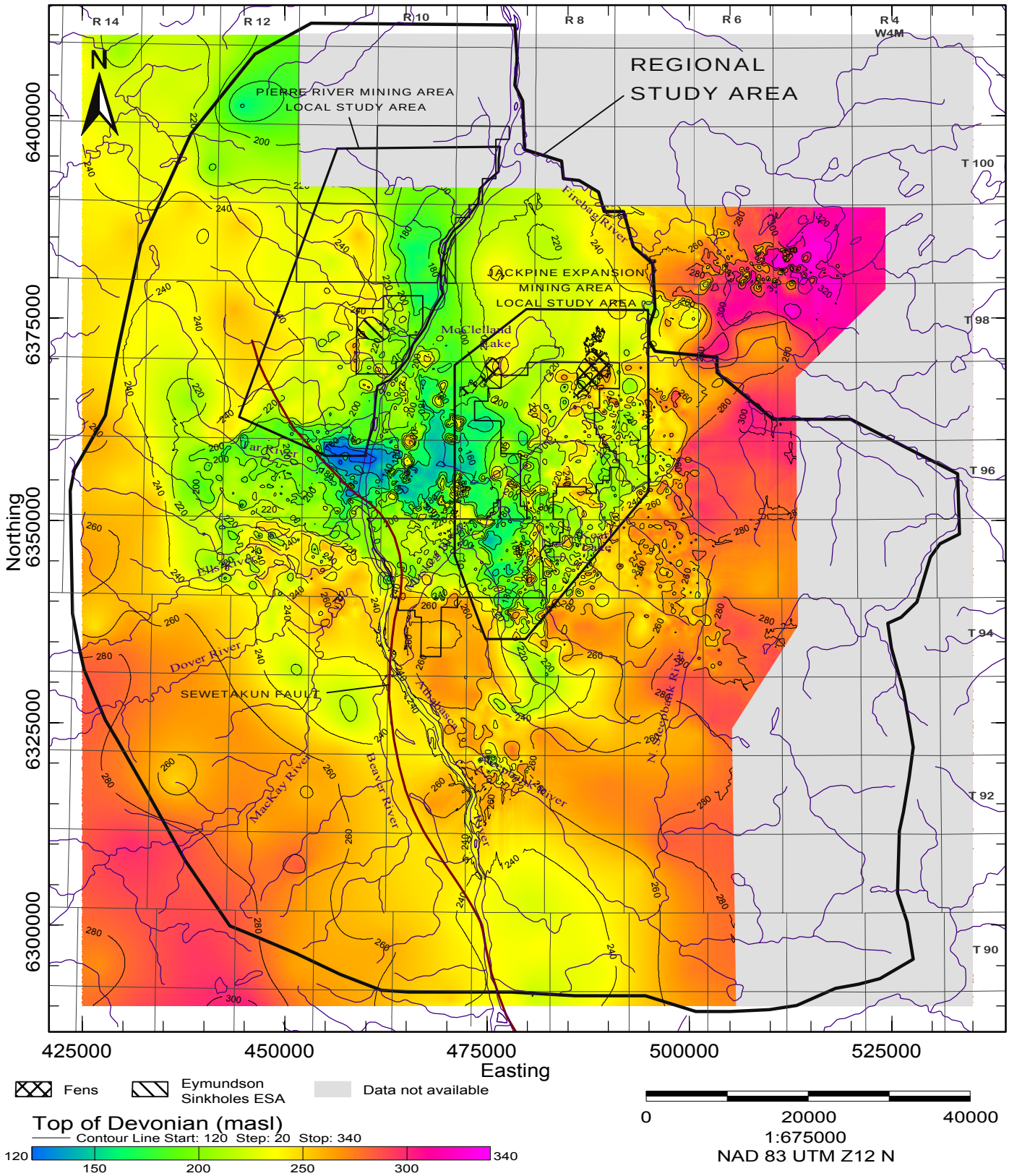
26-NOV-07	date	J.G.	edited by	J.Q.	drawn by		app by

PROJECT NUMBER: F35772801

FIGURE: 6

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FILE: S:\F35772801\WORD-TABLE.DWG Issued By: Edmonton CAD



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SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

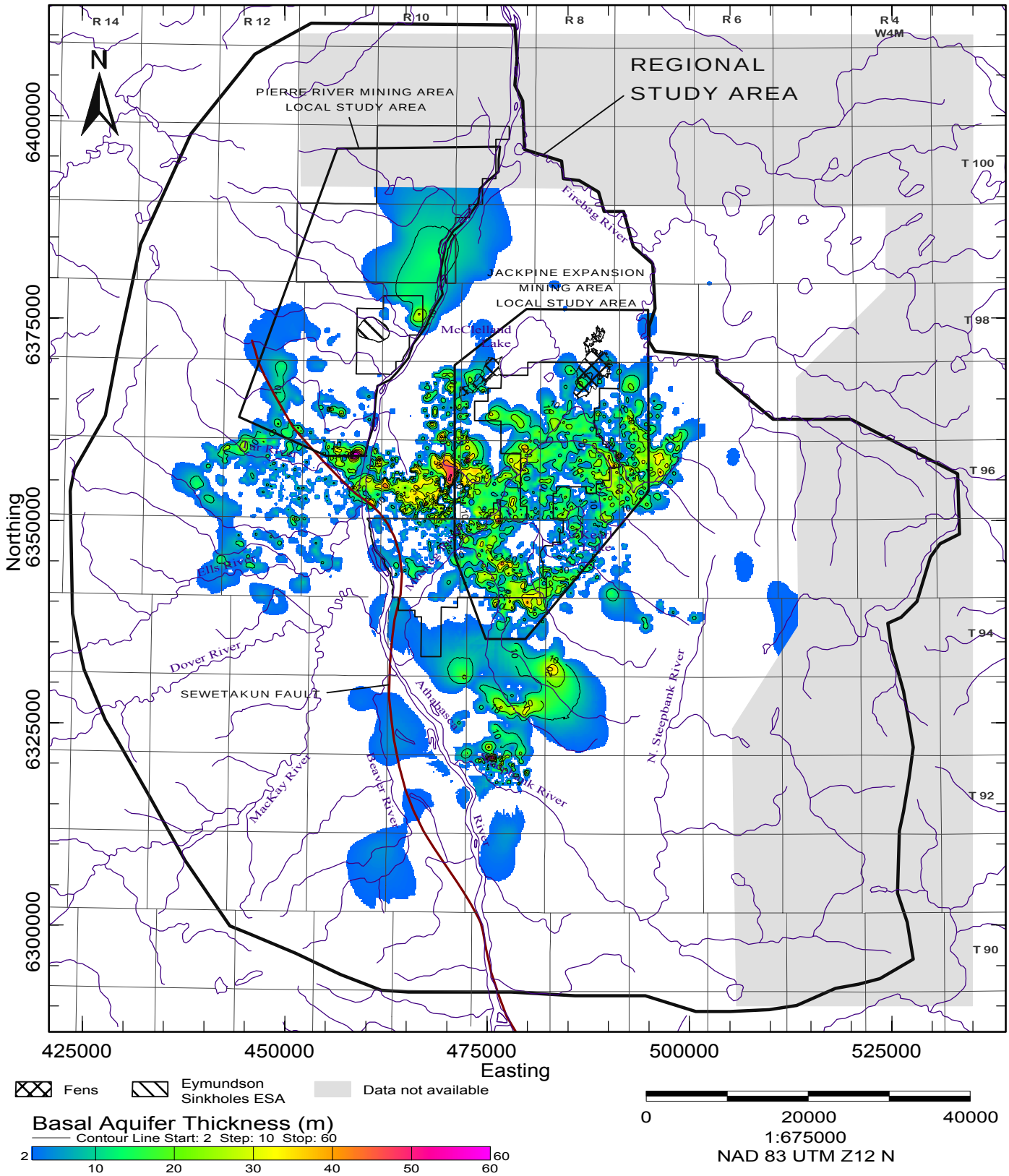
REGIONAL STRUCTURE MAP – TOP OF DEVONIAN

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 7

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\Omnibus\Figures\Regional\Regional.map Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

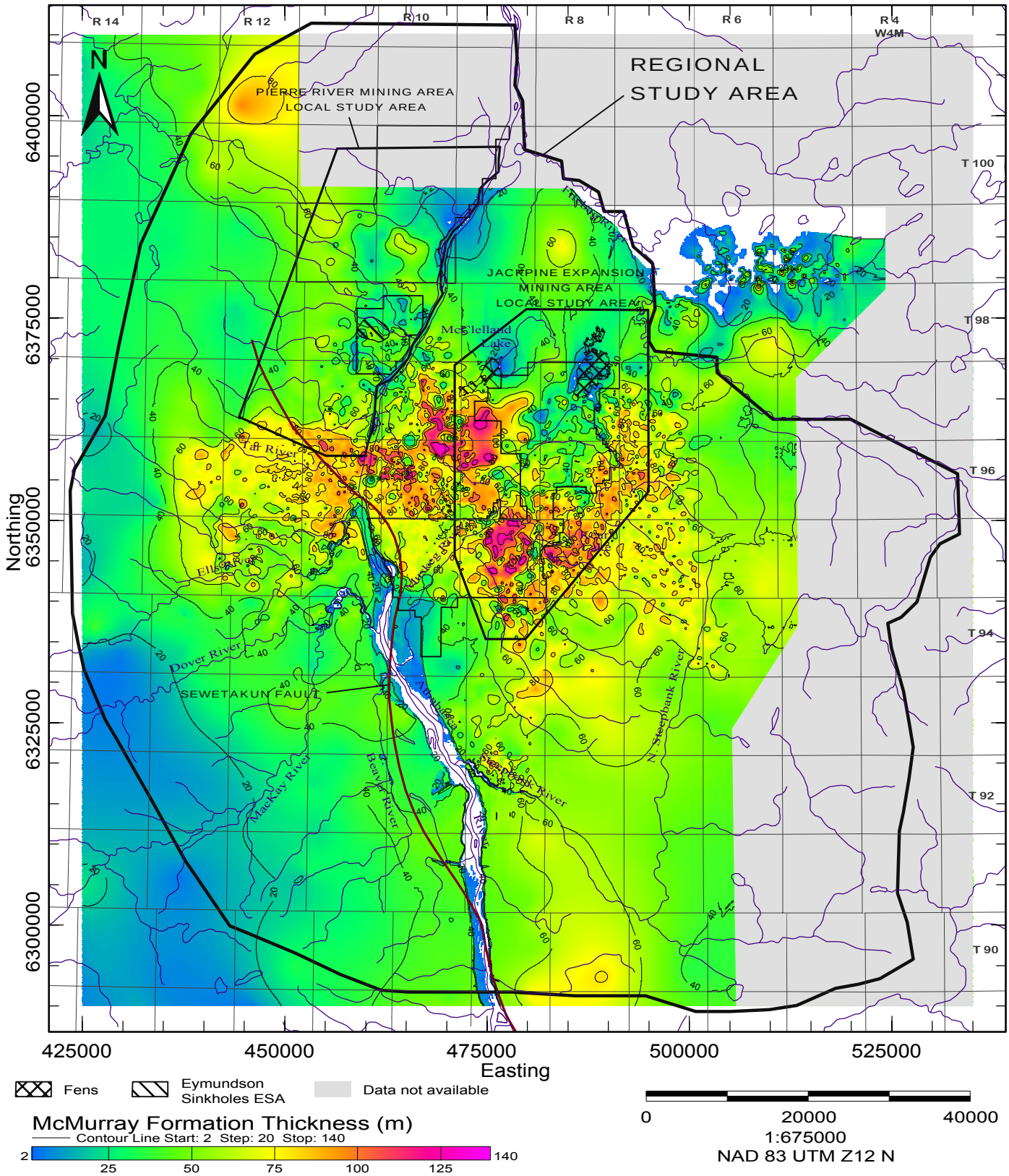
REGIONAL ISOPACH MAP – McMURRAY FORMATION BASAL AQUIFER

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 8

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\OmnibusFigures\Regional\Regional.map Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

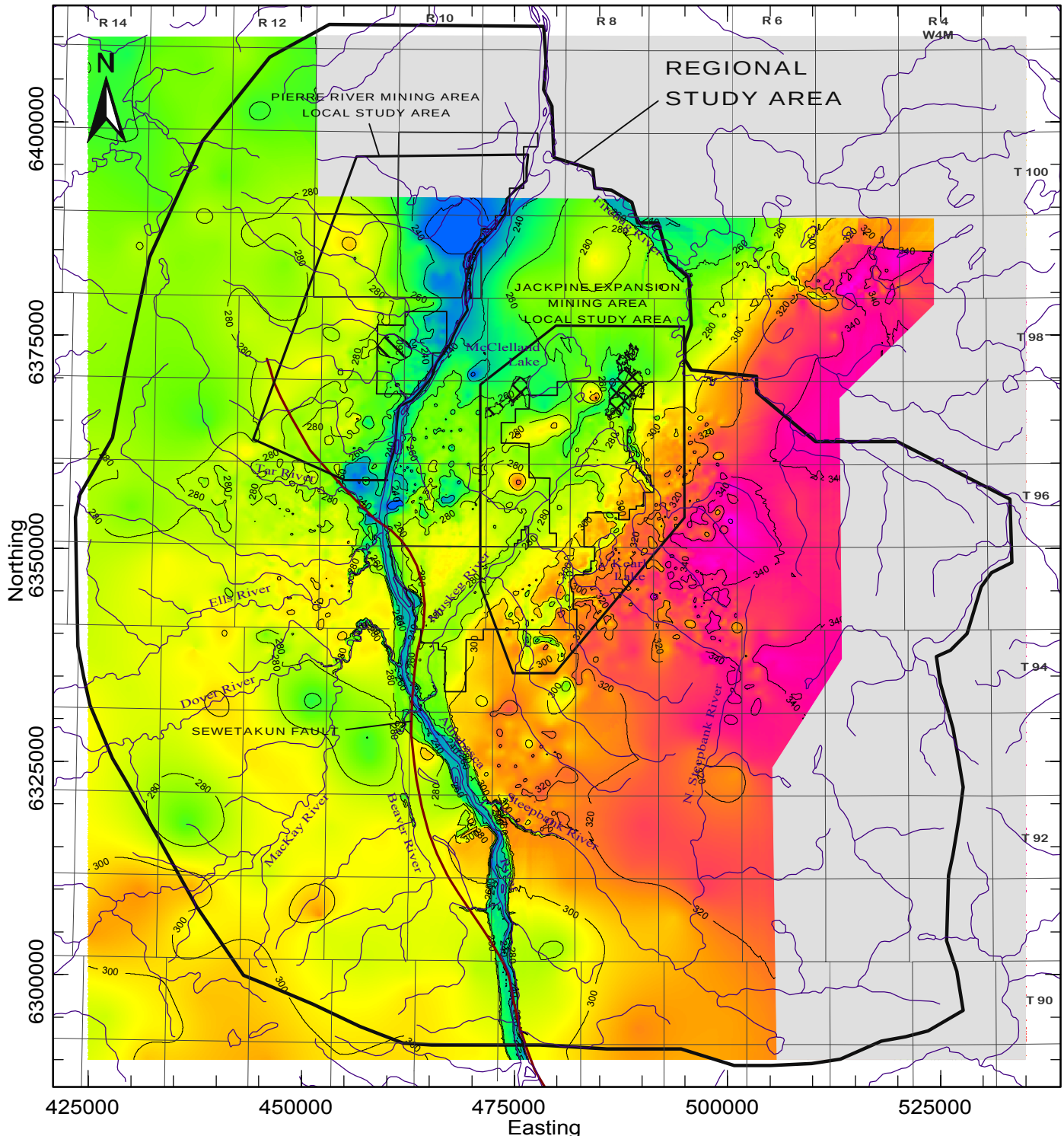
REGIONAL ISOPACH MAP –
McMURRAY FORMATION ABOVE THE BASAL AQUIFER

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 9

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

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Fens

Eymundson Sinkholes ESA

Data not available

Top of McMurray (masl)

Contour Line Start: 220 Step: 20 Stop: 360

220 225 250 275 300 325 350 360

0 20000 40000

1:675000

NAD 83 UTM Z12 N

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

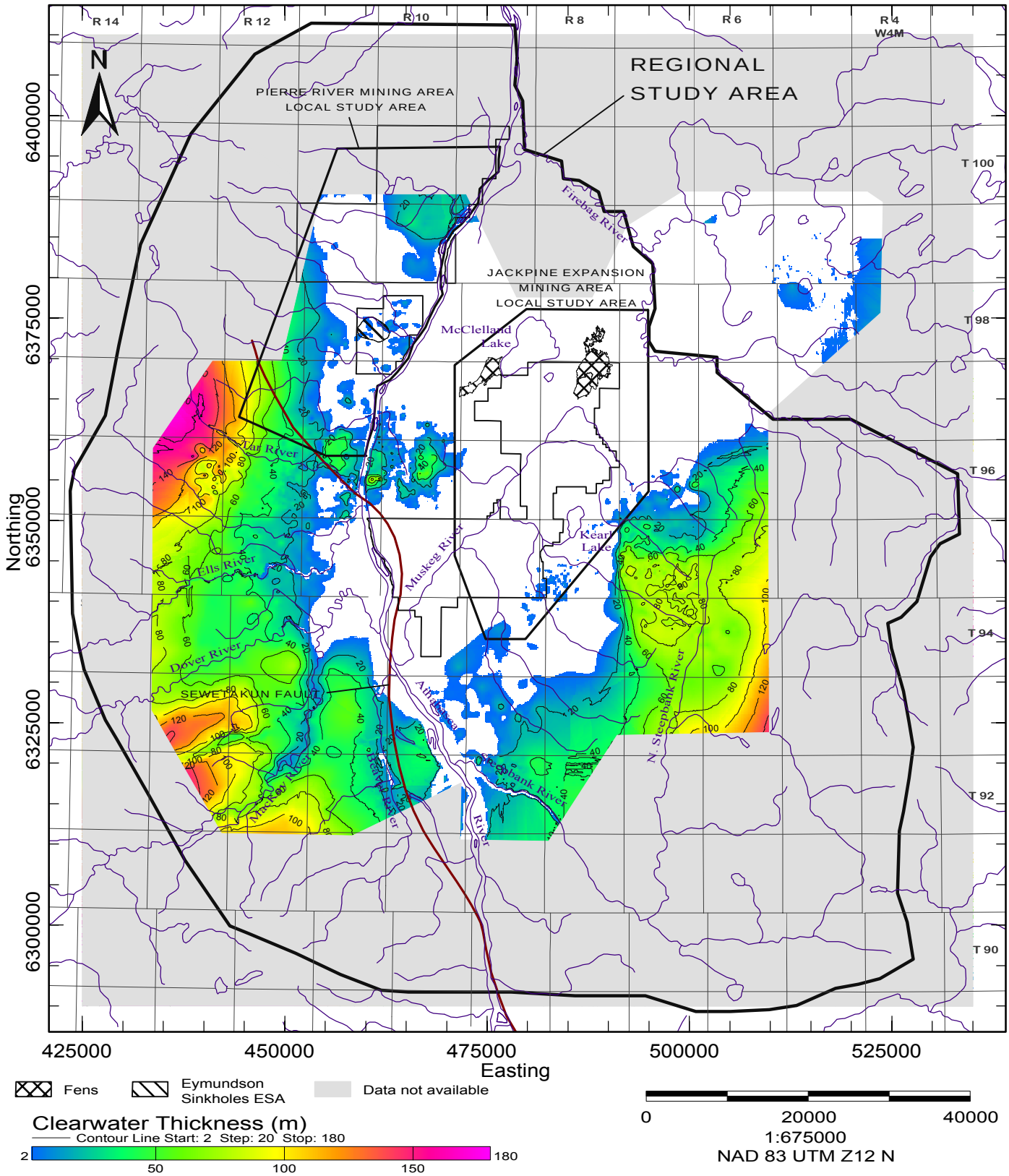
REGIONAL STRUCTURE MAP – TOP OF McMURRAY FORMATION

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 10

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\Omnibus\Figures\Regional\Regional.map Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

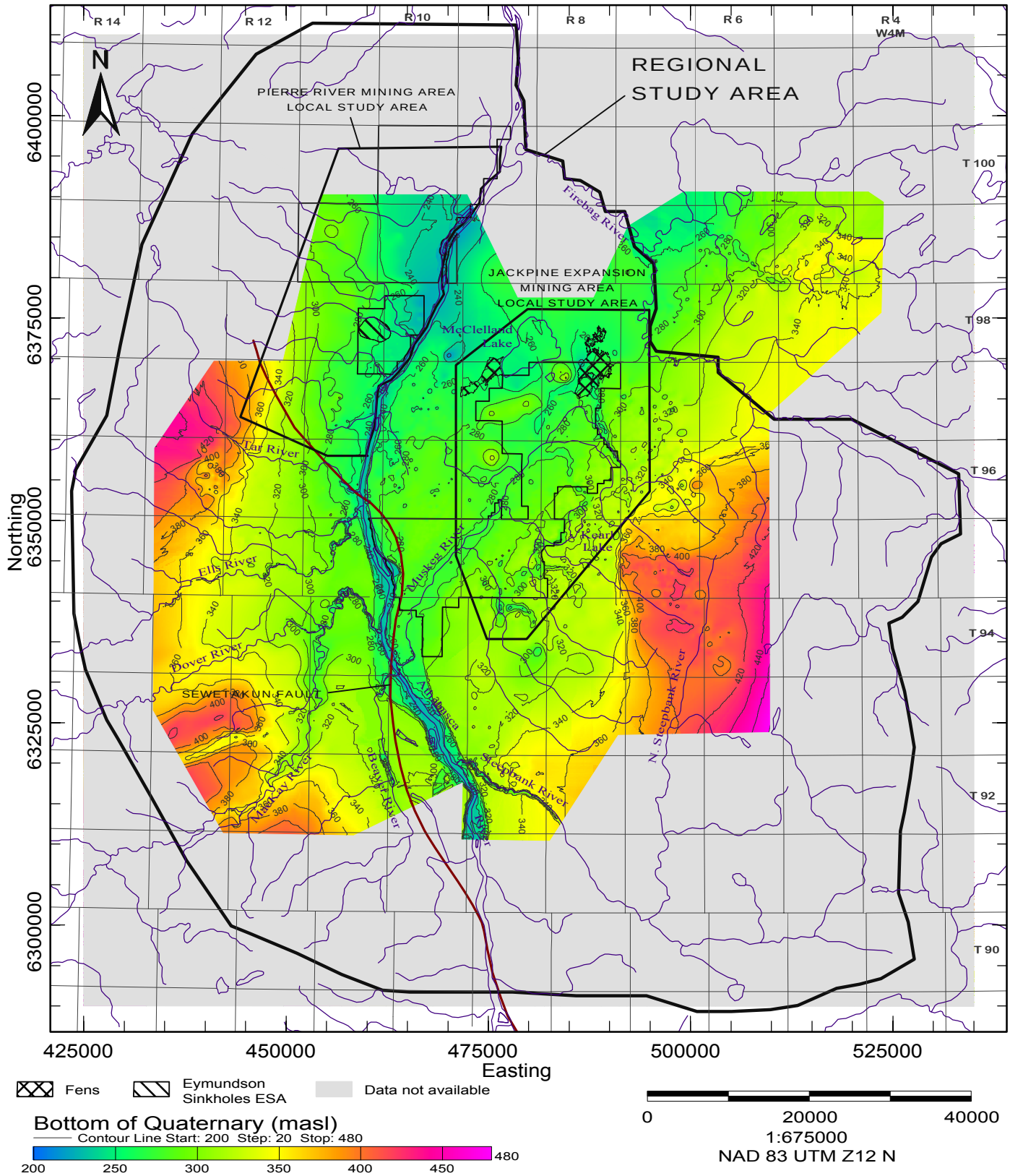
REGIONAL ISOPACH MAP – CLEARWATER FORMATION

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 11

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\OmnibusFigures\Regional\Regional.map Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

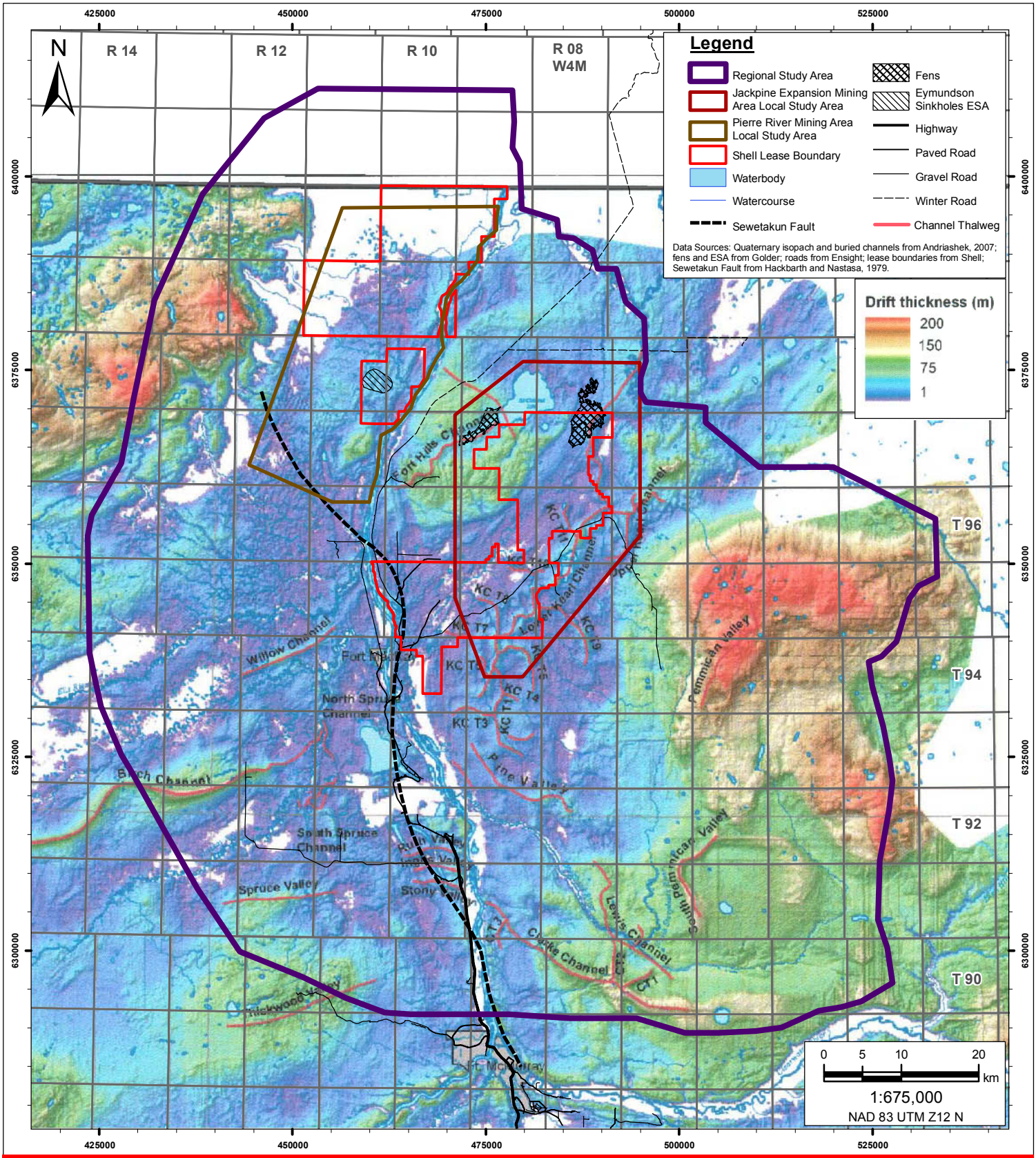
REGIONAL STRUCTURE MAP – BOTTOM OF QUATERNARY DEPOSITS

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 12

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

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Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

REGIONAL ISOPACH MAP – QUATERNARY DEPOSITS AND BURIED CHANNEL LOCATIONS

WorleyParsons Komex
resources & energy

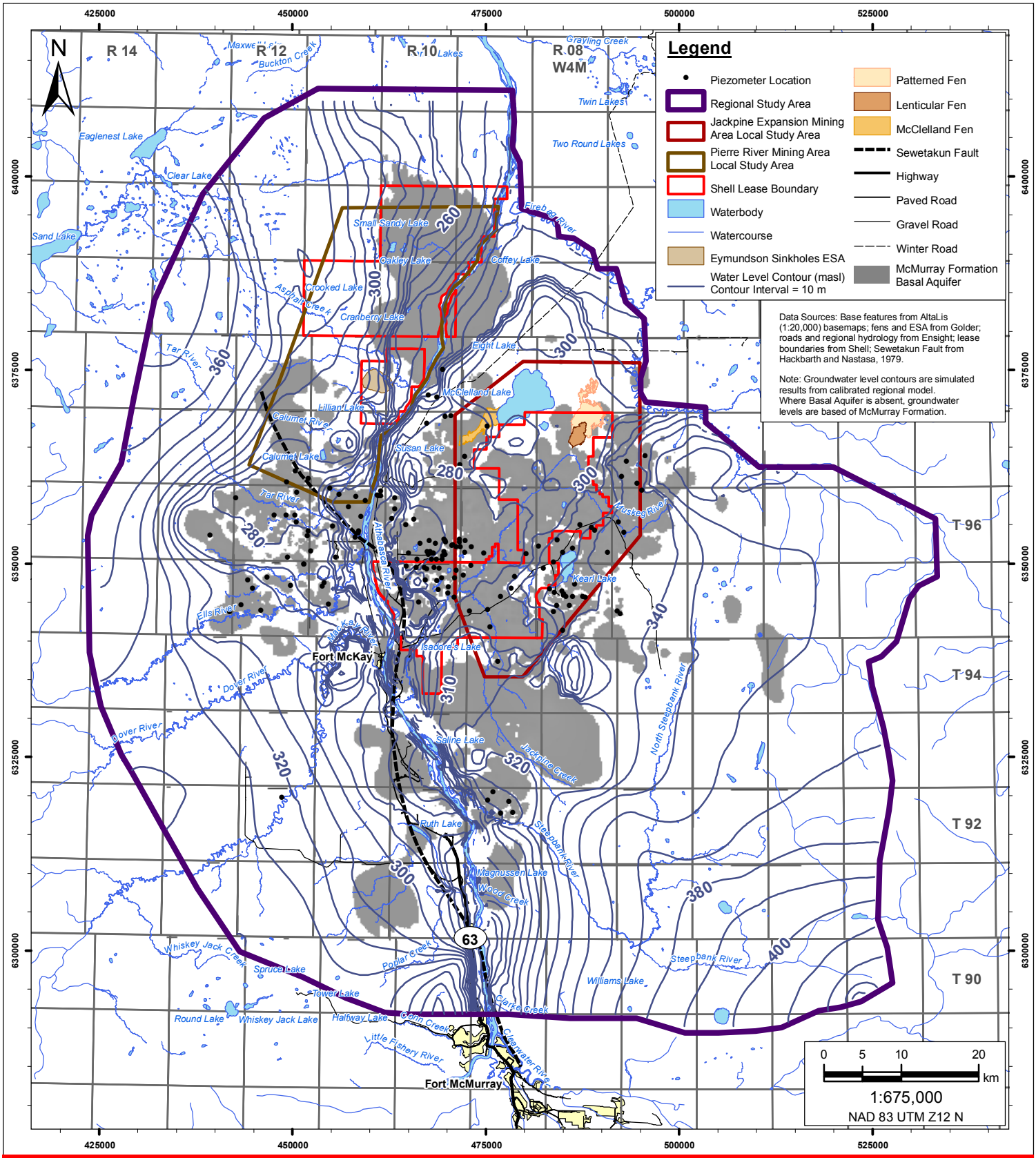
28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: 13

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\ArcGIS\Baseline\RSA_Quaternary_isopach.mxd Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

SIMULATED REGIONAL GROUNDWATER SURFACE ELEVATIONS – McMURRAY FORMATION BASAL AQUIFER

WorleyParsons Komex
resources & energy

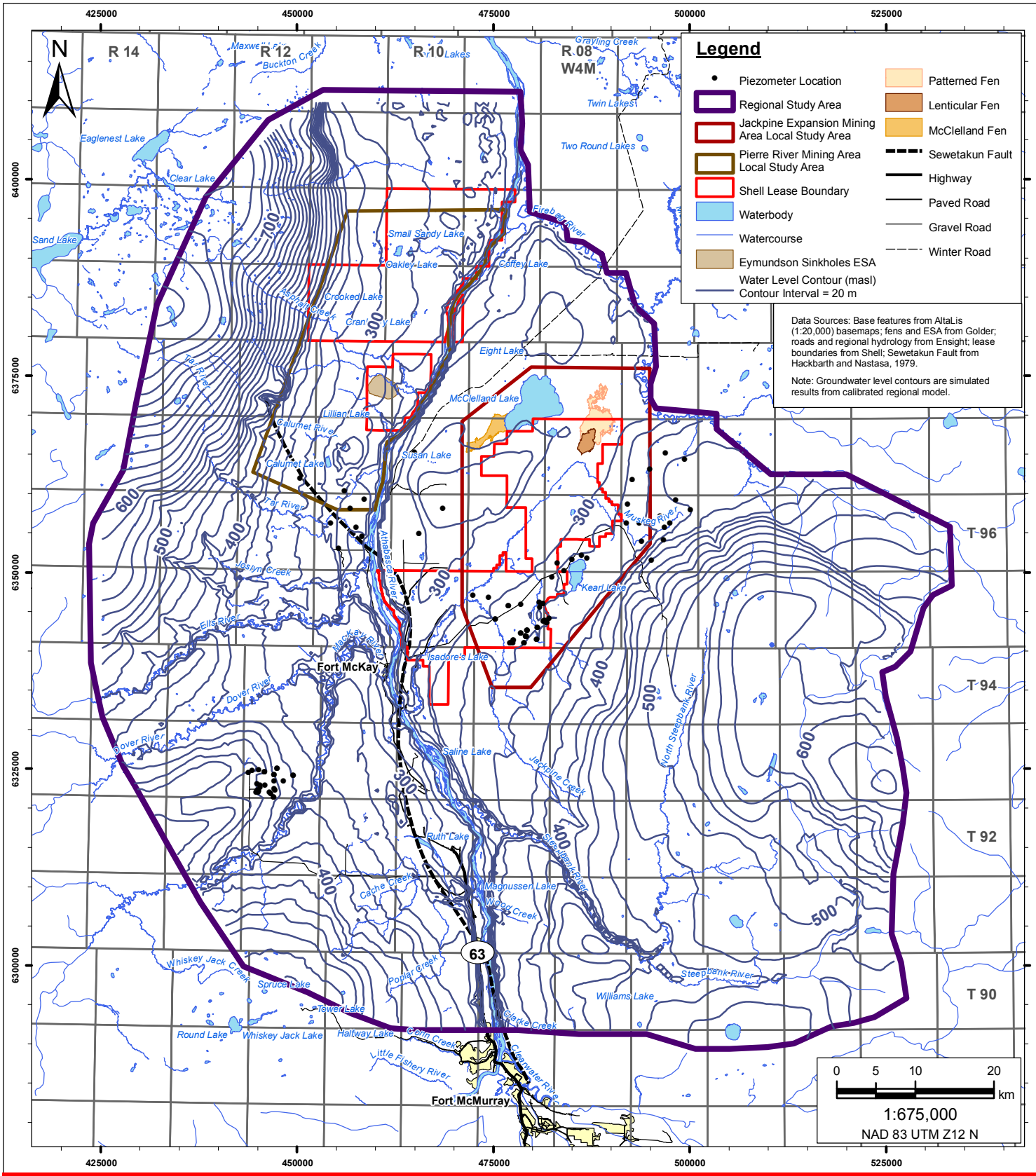
28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: 14

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\ArcGIS\Baseline\RSA_Basal_heads.mxd Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

SIMULATED REGIONAL GROUNDWATER SURFACE ELEVATIONS – QUATERNARY DEPOSITS

WorleyParsons Komex
resources & energy

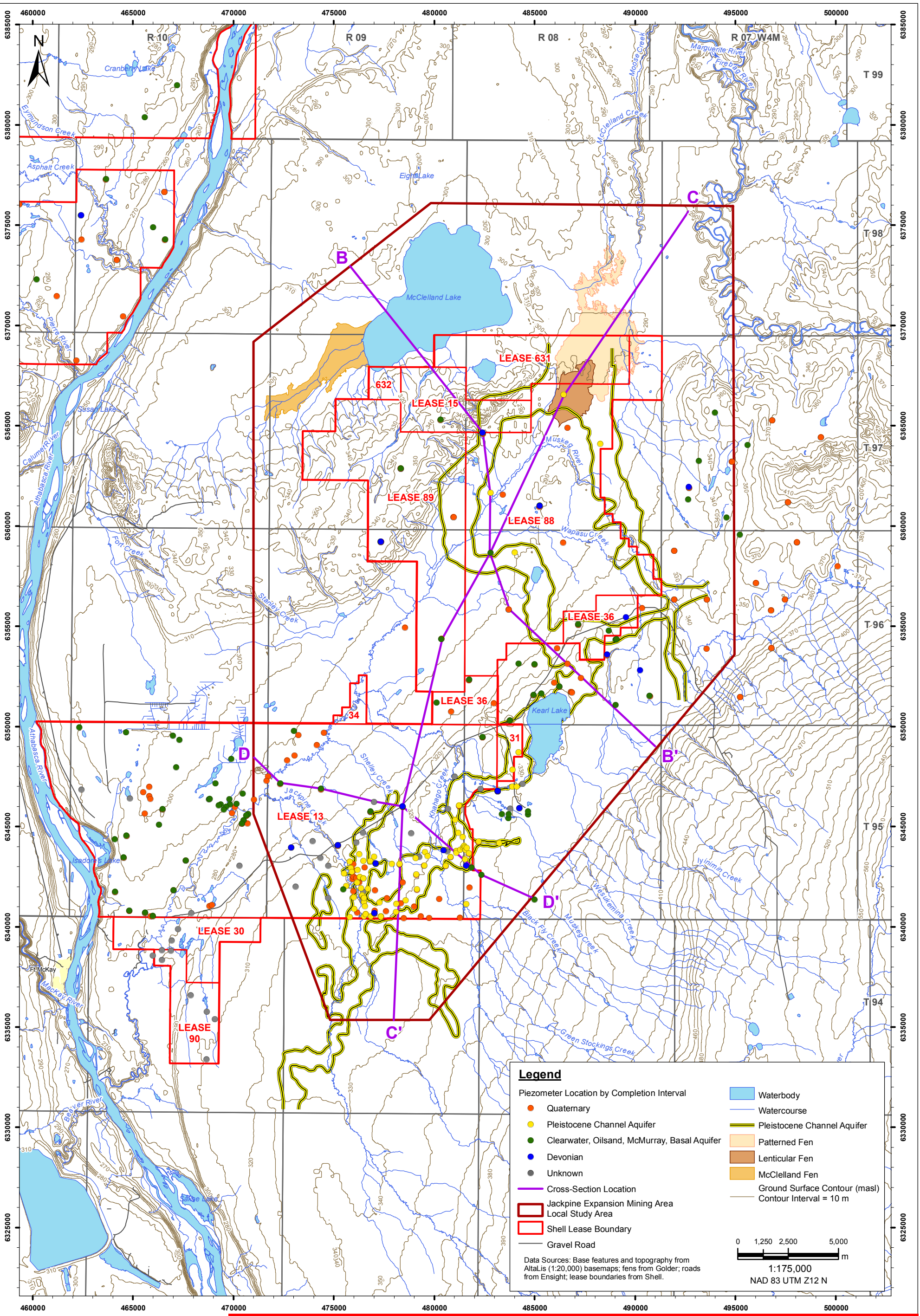
28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: 15

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\ArcGIS\Baseline\RSA_Quat_heads.mxd Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

JACKPINE EXPANSION MINING AREA – HYDROGEOLOGIC CROSS-SECTION LOCATIONS AND MONITORING WELLS IN THE LOCAL STUDY AREA

WorleyParsons Komex
resources & energy

28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

PROJECT NUMBER: F35772801

FIGURE: 16

FILE: Q:\F3577_Shell\F35772801_Omnibus\Baseline_Figures\JEMA_LSA_11x17.mxd Issued By: Edmonton GIS

North

South

B

B'

Cross-Section C-C'

LEASE AREA

Cross-Section D-D'

Fort Hills

McClelland Lake

Kearl Lake

Muskeg River

Wapasu Creek

AUG06-2699-D (45.0)
SH06-1699-SQ (44.6)
SH06-1699-SQ (54.6)
P06-1699-SQ (54.6)
P06-1699-DQ (52.4)
SH06-1699-BS (43.9)
SH06-1699-D (61.9)

L88-042-74 (52.0)

AUG06-2663 (39.6)
SH06-1663 (39.7)
SH05-1663-PC (39.7)

AUG06-2651 (26.0)
SH05-1651 (26.0)

L88-071-74 (24-2)

L88-045-81 (11.9)

AUG06-2636 (-2.3)
SH06-1636 (-2.3)
SH05-1636-BS (-2.2)

L88-097-81 (-5.0)

AUG06-2629 (19.6)
SH06-1629 (19.6)
P06-1629-SQ (-8.0)
P06-1629-DQ (-7.3)

MOB99-5R (24.1)
AAGI81TP9688W400 (36.9)

MOB98-41 (44.7)
1AA136960691400 (11.6)
13-9-96-8 (QI) (8.8)
13-9-96-8 (BI) (8.6)

Elevation (masl)

600
400
200
0

0
5000
10000
15000
20000

Section Distance (m)

LEGEND

- Corehole Location
- Piezometer Location
- Piezometer Completion Intervals:
  - SQ - Shallow Quaternary
  - PC - Pleistocene Channel
  - BS - Basal Sand
  - D - Devonian
- Screened Interval
- Water Level

- Undifferentiated Quaternary Deposits (Fort Hills)
- Undifferentiated Muskeg & Upper Fine-Grained Deposits
- Upper Quaternary Sand Deposits
- Lower Quaternary Fine-Grained Deposits
- Pleistocene Channel Aquifer & Lower Quaternary Sand Deposits
- Clearwater Formation (Kc)
- McMurray Formation (Km)
- McMurray Formation Basal Aquifer
- Devonian Formations (D)

Note: Value in parentheses following locator name indicates distance (m) from cross-section line.

Scale: 55000
Vertical Exaggeration: 10
Map Units: metres
Offset Distance: 55

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

JACKPINE EXPANSION MINING AREA – HYDROGEOLOGICAL CROSS-SECTION B-B'

WorleyParsons Komex
resources & energy

26-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 17

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C\My Documents\Omnibus\Cross-sections\Baseline_Figures\Section_B.map Issued By: Edmonton GIS

Southwest

Northeast

C

C'

LEASE AREA

Cross-Section B-B'

Fort Hills

Lenticular and Patterned Fens

AUG06-2641 (3.2)
SH06-1641 (3.3)
P06-1641-SQ (3.2)
SH06-1641-DQ (6.1)
SH06-1641-BS (12.8)
SH06-1641-D (-3.0)

AUG06-2699 (15.8)
SH06-1699 (15.8)
P06-1699-SQ (-42.9)
P06-1699-DQ (-43.8)
SH06-1699-BS (-18.4)
SH06-1699-D (-19.5)

SH06-1720 (-21.1)
SH06-1720-PC (7.9)

Elevation (masl)

600
400
200
0

0
5000
10000
15000

Section Distance (m)

LEGEND

- Corehole Location
- Piezometer Location
- Piezometer Completion Intervals:
  - SQ - Shallow Quaternary
  - PC - Pleistocene Channel
  - BS - Basal Sand
  - D - Devonian
- Screened Interval
- Water Level

- Undifferentiated Quaternary Deposits (Fort Hills)
- Undifferentiated Muskeg & Upper Fine-Grained Deposits
- Upper Quaternary Sand Deposits
- Lower Quaternary Fine-Grained Deposits
- Pleistocene Channel Aquifer & Lower Quaternary Sand Deposits
- Clearwater Formation (Kc)
- McMurray Formation (Km)
- McMurray Formation Basal Aquifer
- Devonian Formations (D)

Note: Value in parentheses following locator name indicates distance (m) from cross-section line.

Scale: 50000
Vertical Exaggeration: 10
Map Units: metres
Offset Distance: 50

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

JACKPINE EXPANSION MINING AREA – HYDROGEOLOGICAL CROSS-SECTION C-C'

WorleyParsons Komex
resources & energy

26-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 18

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\Omnibus\Cross-sections\Baseline_Figures\Section_C.map Issued By: Edmonton GIS

Southwest

Northeast

D

D'

Cross-Section B-B'

LEASE AREA

AUG06-2612 (-40.2)
SH06-1612 (-40.2)

AUG06-2620 (-24.0)
SH06-1620 (-24.0)
L89-137-81 (-14.9)
P06-1620-SQ (8.5)
SH06-1620-BS (-24.0)
(-SQ) 288.04
(-BS) 285.07

Muskeg Creek

L88-077-81 (9.2)

AUG06-2638 (-23.8)
SH06-1638 (-23.8)
SH06-1638-PC (-15.5)
(-PC) 291.49

AUG06-2639 (-6.2)
SH06-1639 (-4.2)
L88-061-81 (-4.5)
P06-1639-SQ (-3.4)
(-SQ) 291.92

Wapasu Creek

L88-076-74 (11.9)

L88-031-81 (49.0)

Muskeg River

Elevation (masl)

400
300
200
100
0

0
5000
10000
15000

Section Distance (m)

LEGEND

- Corehole Location
- Piezometer Location
- Piezometer Completion Intervals:
  - SQ - Shallow Quaternary
  - PC - Pleistocene Channel
  - BS - Basal Sand
  - D - Devonian
- Screened Interval
- Water Level

- Undifferentiated Muskeg & Upper Fine-Grained Deposits
- Upper Quaternary Sand Deposits
- Lower Quaternary Fine-Grained Deposits
- Pleistocene Channel Aquifer & Lower Quaternary Sand Deposits
- Clearwater Formation (Kc)
- McMurray Formation (Km)
- McMurray Formation Basal Aquifer
- Devonian Formations (D)

Note: Value in parentheses following locator name indicates distance (m) from cross-section line.

Scale: 40000
Vertical Exaggeration: 10
Map Units: metres
Offset Distance: 50

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

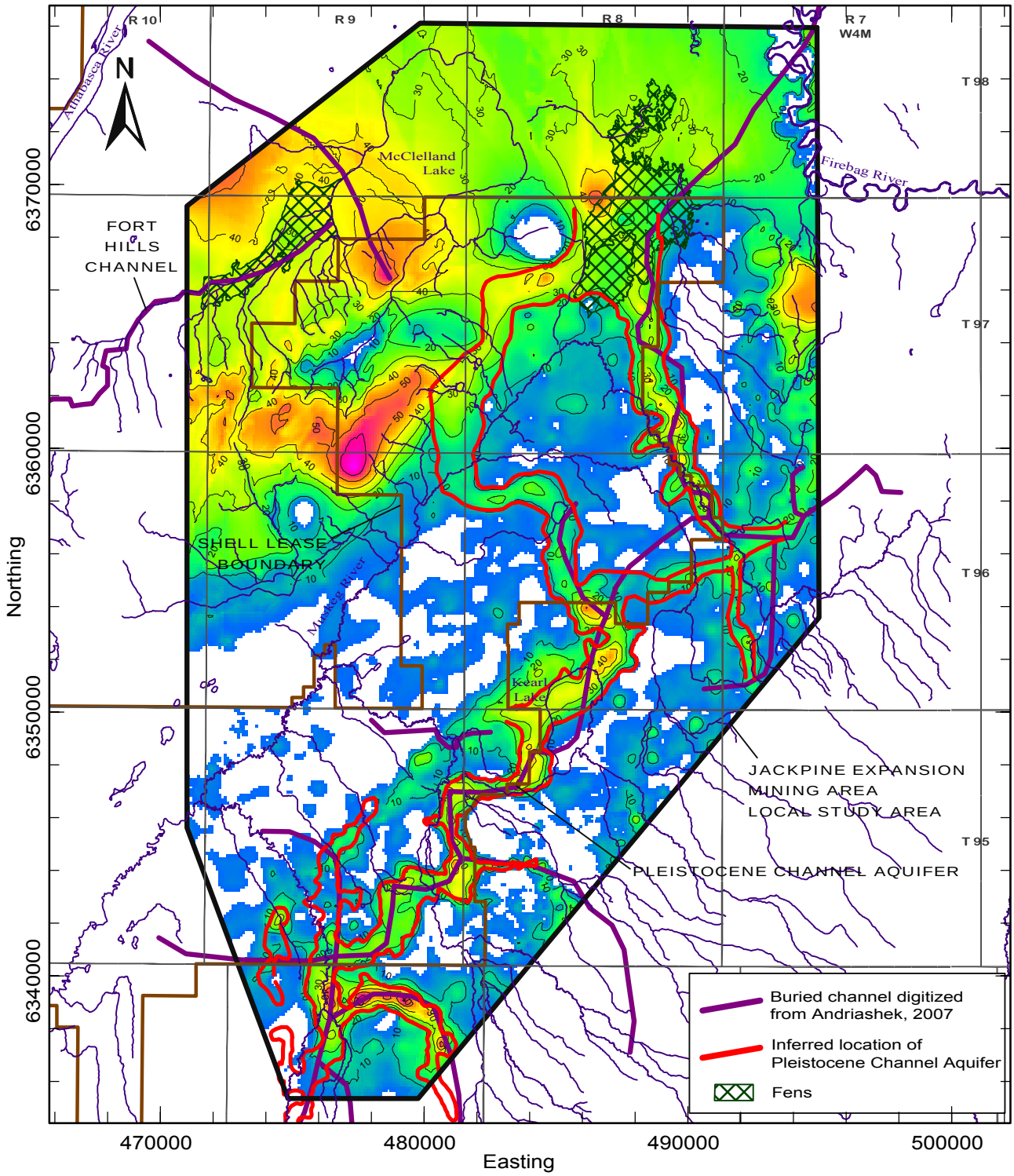
JACKPINE EXPANSION MINING AREA – HYDROGEOLOGICAL CROSS-SECTION D-D'

WorleyParsons Komex
resources & energy

26-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 19

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C\My Documents\Omnibus\Cross-sections\Baseline_Figures\Section_D.map Issued By: Edmonton GIS



Cumulative Sand and Gravel Thickness (m)

Contour Line Start: 2 Step: 10 Stop: 70

2 20 40 60 70

0 5000 10000

1:225000

NAD 83 UTM Z12 N

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

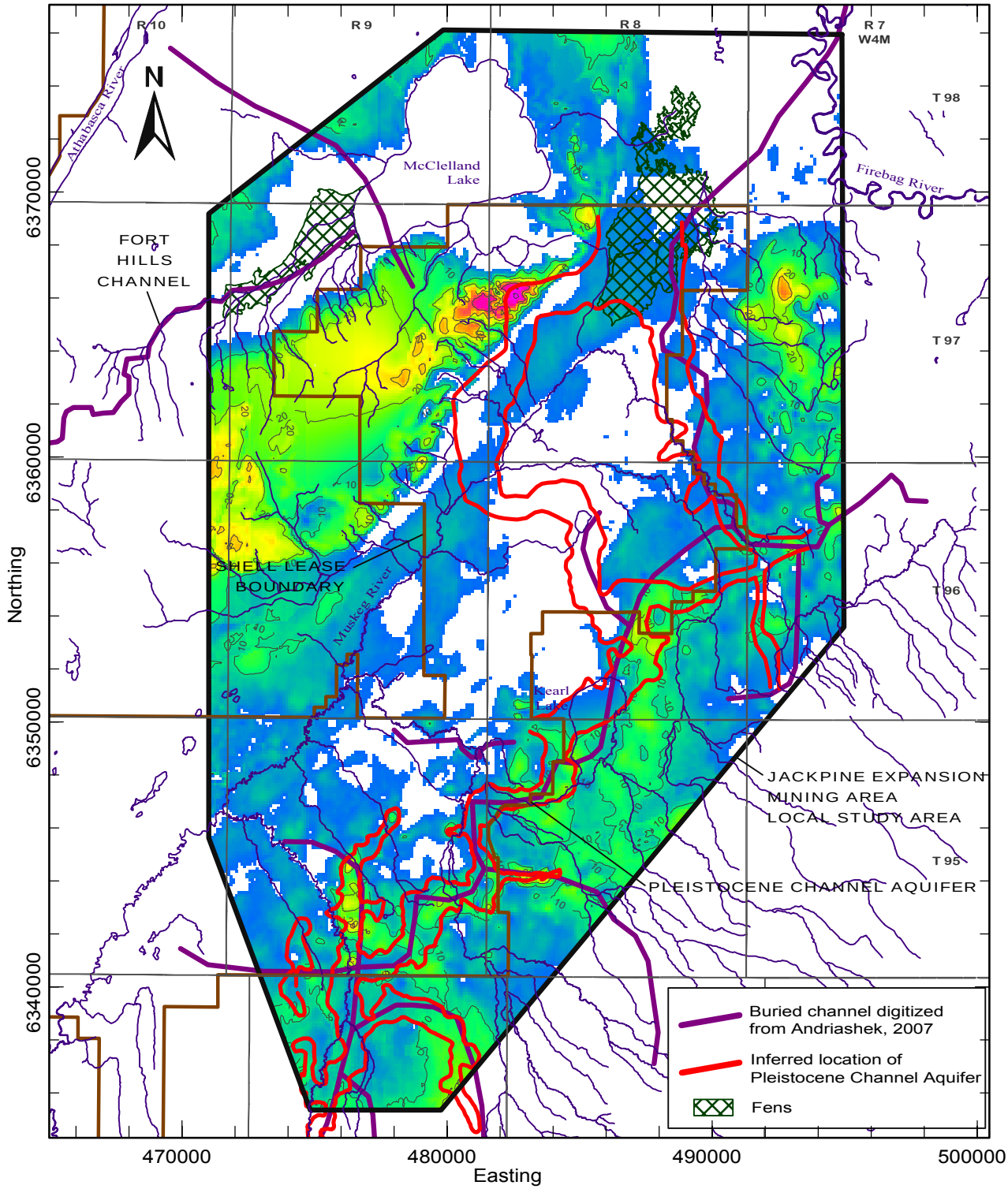
JACKPINE EXPANSION MINING AREA LOCAL ISOPACH MAP – BURIED CHANNELS AND SUFICIAL SAND DEPOSITS

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 20

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\OmnibusFigures\Baseline\Cumulative_sand.map Issued By: Edmonton GIS



Environment & Water Resources

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

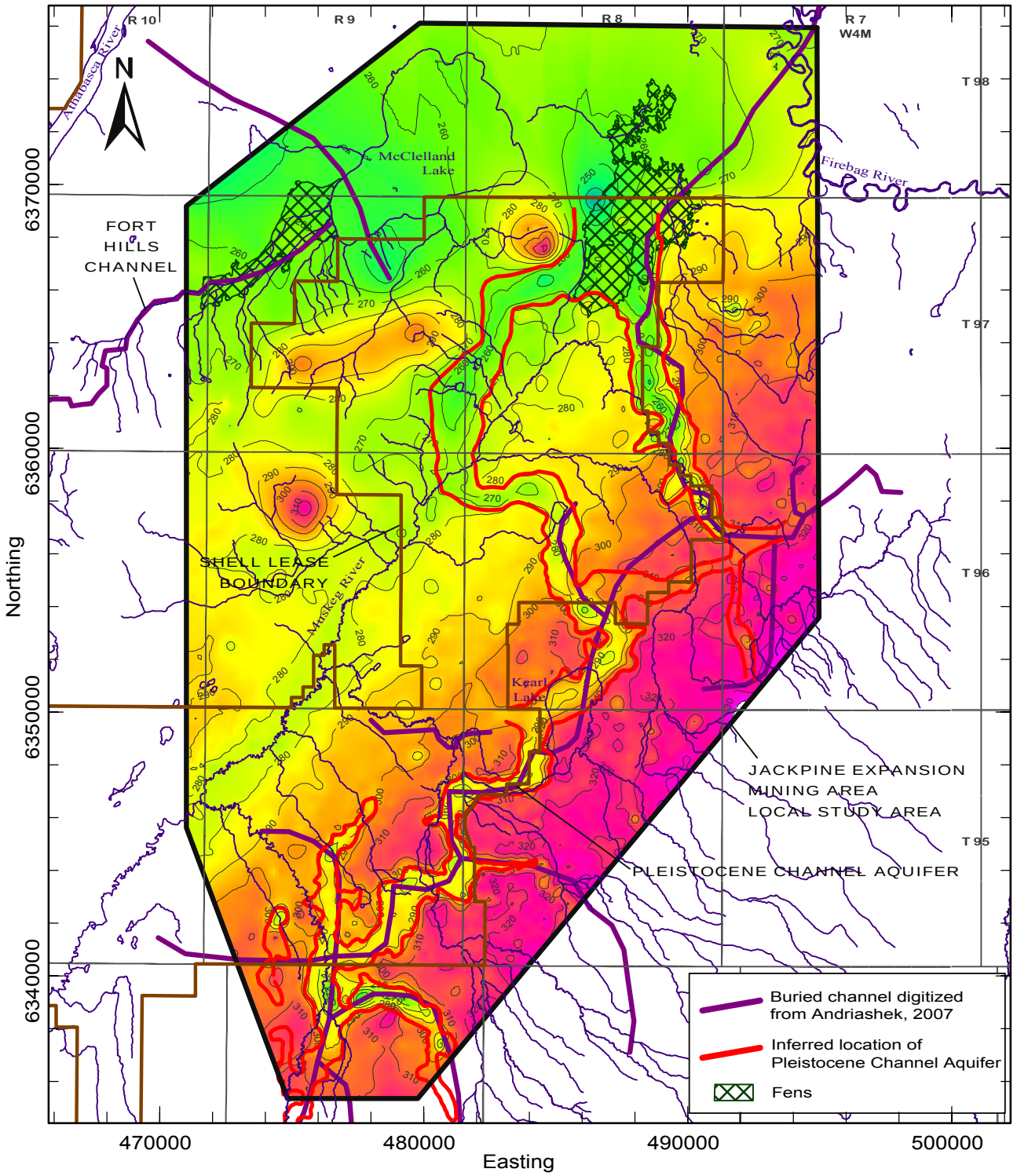
JACKPINE EXPANSION MINING AREA LOCAL ISOPACH MAP – FINE-GRAINED (CLAY AND SILT) QUATERNARY DEPOSITS

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 21

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\OmnibusFigures\Baseline\Cumulative_fines.map Issued By: Edmonton GIS



Bottom of Quaternary (masl)

Contour Line Start: 220 Step: 10 Stop: 340

220 225 250 275 300 325 340

0 5000 10000

1:225000

NAD 83 UTM Z12 N

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

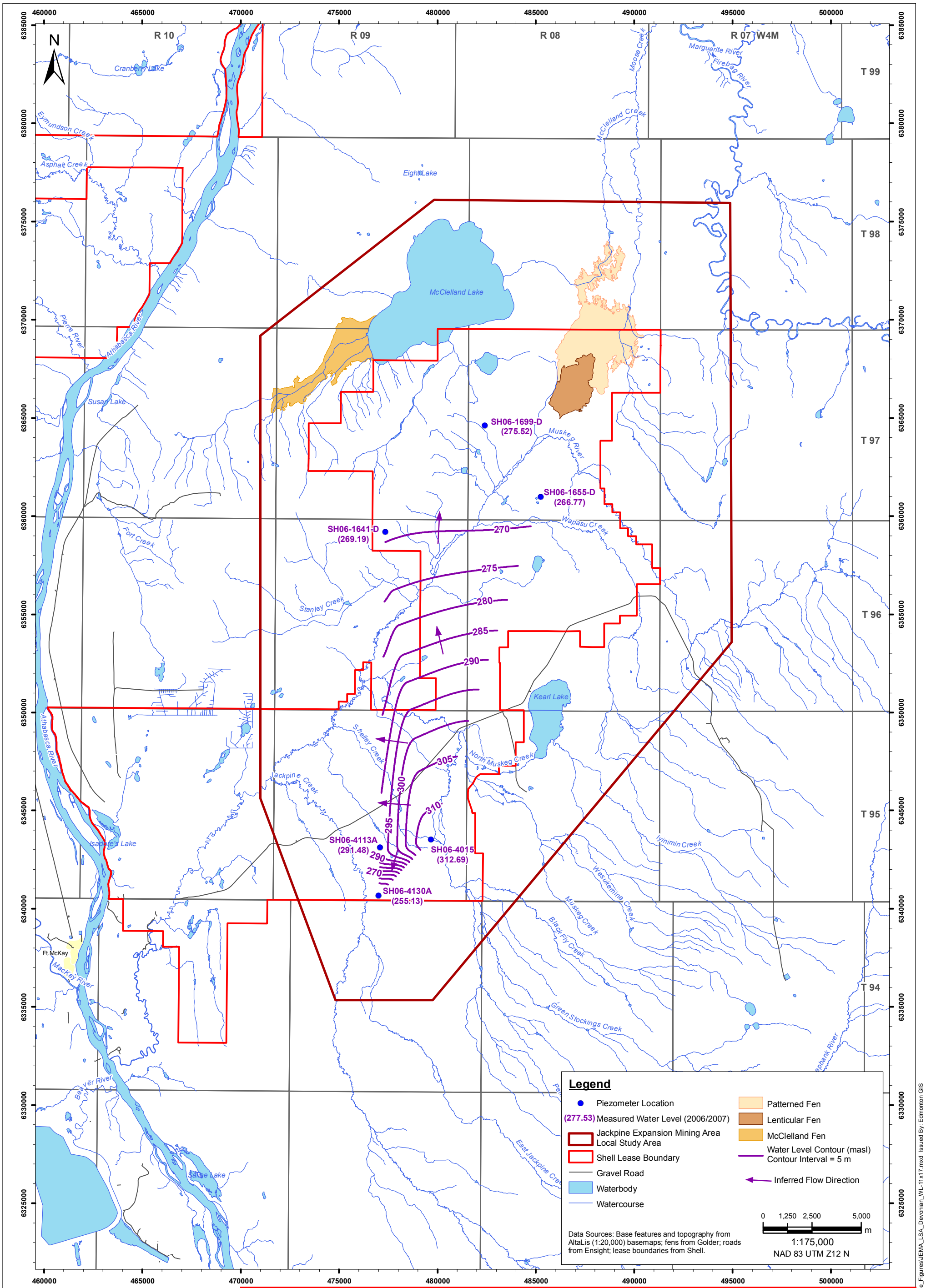
JACKPINE EXPANSION MINING AREA LOCAL STRUCTURE MAP – BOTTOM OF QUATERNARY DEPOSITS

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 22

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\Omnibus\Figures\Baseline\Bottom_Quaternary_JPME.map Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

JACKPINE EXPANSION MINING AREA – GROUNDWATER SURFACE ELEVATIONS – DEVONIAN WATERWAYS FORMATION, 2006 AND 2007

WorleyParsons Komex
resources & energy

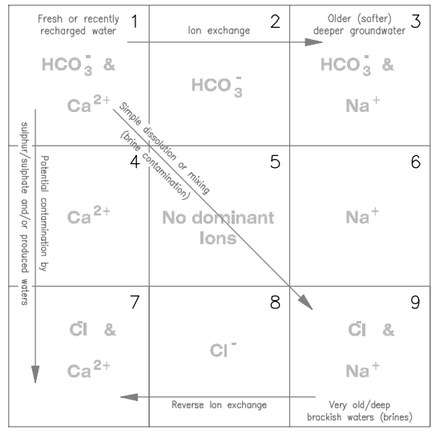
28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 23

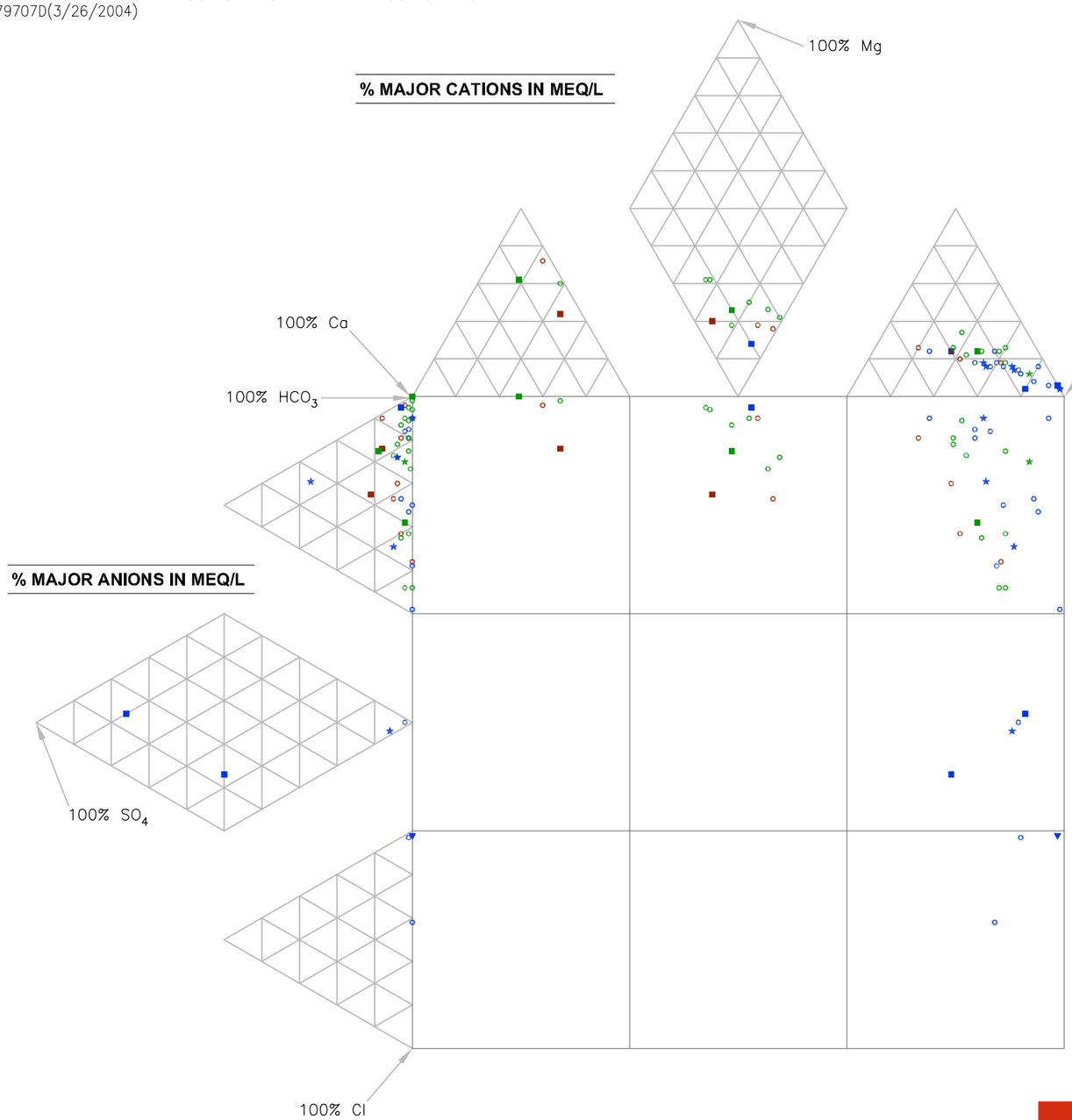
PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

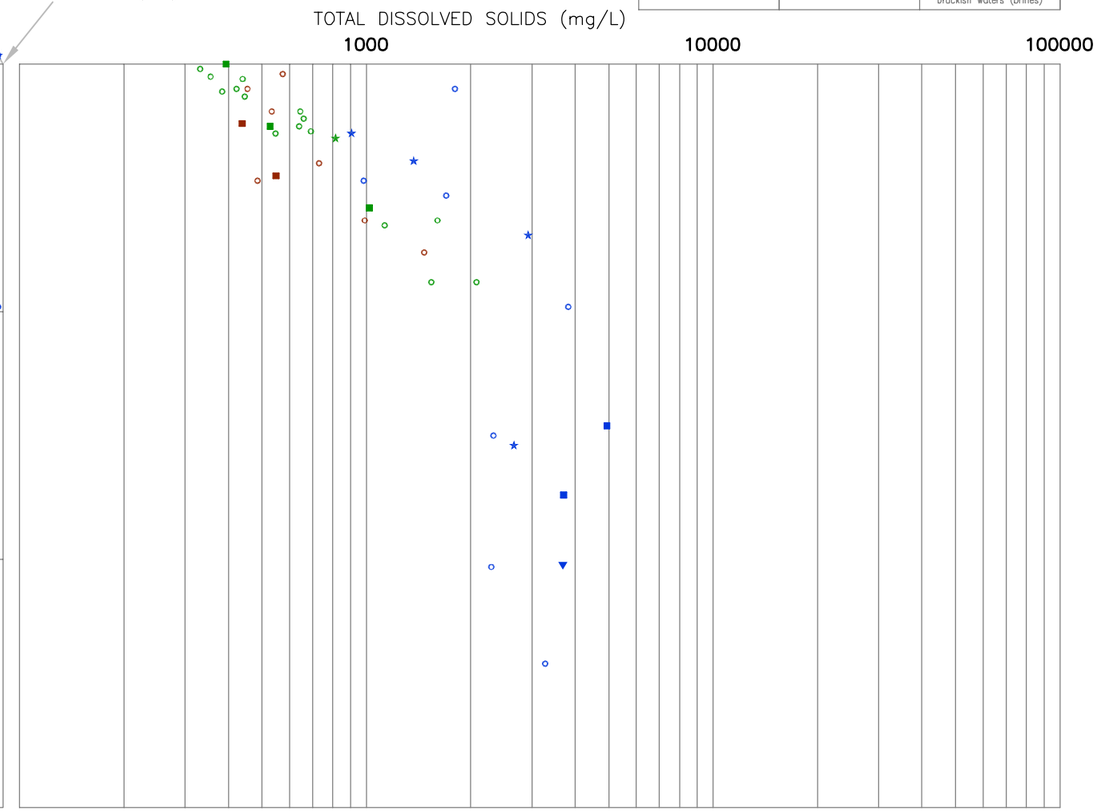
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* No TDS values for: 11-24-96-8 Q(3/4/1998), 13-10-96-8 Q(2/27/1998), 13-9-96-8 Q(2/28/1998), 14-3-96-8 QOW(8/28/1998), 3-22-96-8 Q1(2/28/1998), 7-10-96-8 Q(8/27/1998), 9-6-96-8 Q(2/26/1998), P08079707D(3/26/2004)

(Lloyd, J.W. and J.A. Heathcote, 1985. Natural Inorganic Hydrochemistry in Relation to Groundwater. Clarendon Press, Oxford. pp 127-139)







NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

LEGEND

JACKPINE EXPANSION MINING AREA
- DEVONIAN – WATERWAYS FORMATION
- McMURRAY – OILSANDS/INTRA-OREBODY
- McMURRAY – BASAL AQUIFER

JACKPINE MINE – PHASE 1
- DEVONIAN – WATERWAYS FORMATION
- DEVONIAN – WATT MOUNTAIN FORMATION
- McMURRAY – OILSANDS/INTRA-OREBODY
- McMURRAY – BASAL AQUIFER

KEARL OIL SANDS PROJECT
- DEVONIAN – WATERWAYS FORMATION
- McMURRAY – OILSANDS/INTRA-OREBODY
- McMURRAY – BASAL AQUIFER

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT
JACKPINE EXPANSION MINING AREA - GROUNDWATER CHEMISTRY: MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM) DEVONIAN AND CRETACEOUS DEPOSITS

WorleyParsons Komex
resources & energy

30-NOV-07 date	J.G. edited by	J.G. drawn by	app by

PROJECT NUMBER: F35772801

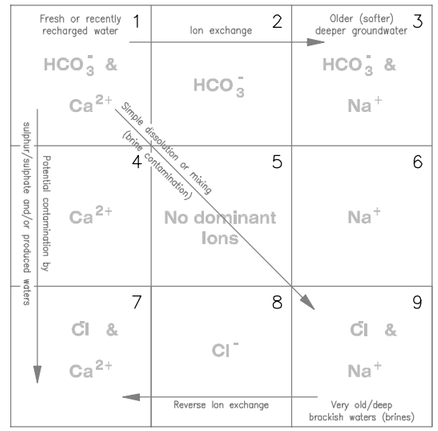
FIGURE: 24A

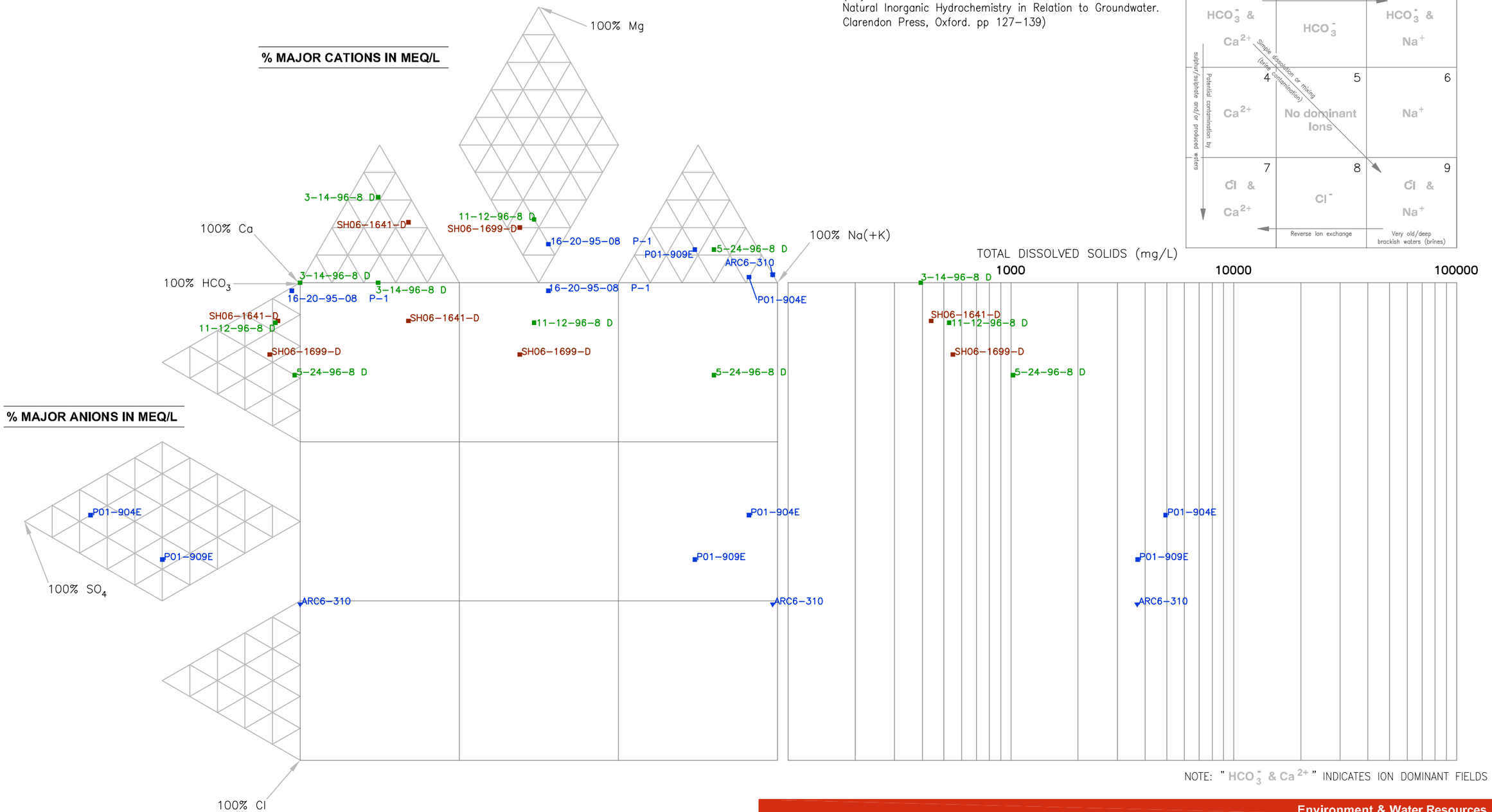
PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: S:\F35772801\DUROV-DEVONIAN-CRETACEOUS.DWG Issued By: Edmonton CAD

* No TDS values for: 11-12-96-8 D(3/4/1998), 16-20-95-08 P-1(2/26/1985), 3-14-96-8 D(3/4/1998), 5-24-96-8 D(3/4/1998), 5-24-96-8 D(3/21/1998)

(Lloyd, J.W. and J.A. Heathcote, 1985.
Natural Inorganic Hydrochemistry in Relation to Groundwater.
Clarendon Press, Oxford. pp 127-139)





NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

LEGEND

JACKPINE EXPANSION MINING AREA
- DEVONIAN – WATERWAYS FORMATION

JACKPINE MINE – PHASE 1
- DEVONIAN – WATERWAYS FORMATION
- DEVONIAN – WATT MOUNTAIN FORMATION

KEARL OIL SANDS PROJECT
- DEVONIAN – WATERWAYS FORMATION

* No TDS values for: 16-20-95-08 P-2

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JACKPINE EXPANSION MINING AREA - GROUNDWATER CHEMISTRY: MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM) DEVONIAN FORMATIONS

WorleyParsons Komex
resources & energy

23-NOV-07	date	J.G.	edited by	J.G.	drawn by		app by

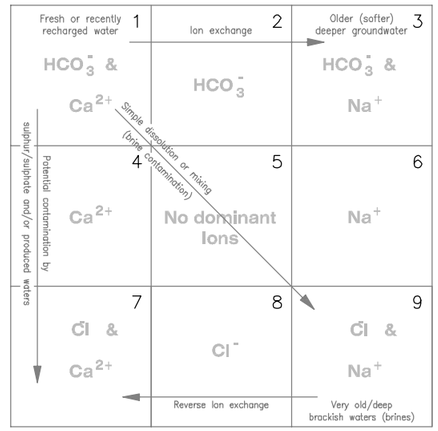
PROJECT NUMBER: F35772801

FIGURE: 24B

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: F35772801\DUROV-DEVONIAN.DWG Issued By: Edmonton CAD

(Lloyd, J.W. and J.A. Heathcote, 1985.
Natural Inorganic Hydrochemistry in Relation to Groundwater.
Clarendon Press, Oxford. pp 127–139)



% MAJOR CATIONS IN MEQ/L

100% Mg

100% Ca

100% HCO_3

100% Na(+K)

% MAJOR ANIONS IN MEQ/L

100% SO_4

100% Cl

TOTAL DISSOLVED SOLIDS (mg/L)

1000 10000 100000

NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

LEGEND

JACKPINE EXPANSION MINING AREA

- ★ McMURRAY – OILSANDS/INTRA–OREBODY
- ○ McMURRAY – BASAL AQUIFER

JACKPINE MINE – PHASE 1

- ★ McMURRAY – OILSANDS/INTRA–OREBODY
- ○ McMURRAY – BASAL AQUIFER

KEARL OIL SANDS PROJECT

- ★ McMURRAY – OILSANDS/INTRA–OREBODY
- ○ McMURRAY – BASAL AQUIFER

* No TDS values for: 05–20–95–08(2/25/1985), 07–20–95–08(2/26/1985), 08–20–95–08(2/26/1985), 12–04–95–08(2/24/1985), 12–20–95–08(2/25/1985), 13–20–95–08(2/28/1985), 13–9–96–8 B(11/4/1998).

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

JACKPINE EXPANSION MINING AREA - GROUNDWATER CHEMISTRY: MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM) CRETACEOUS McMURRAY FORMATION

WorleyParsons Komex
resources & energy

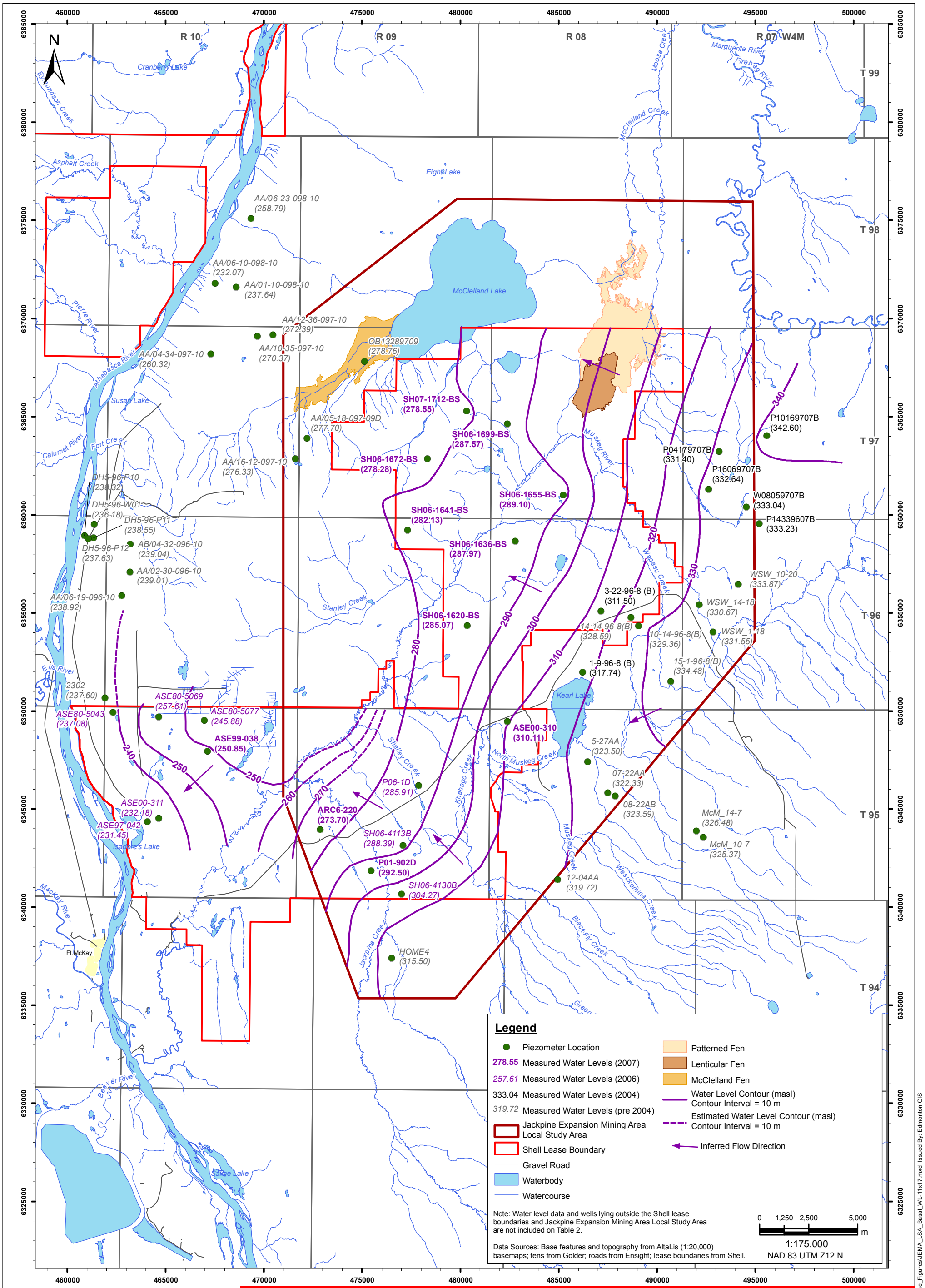
23-NOV-07	date	J.G.	edited by	J.G.	drawn by		app by

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PROJECT NUMBER: F35772801

FIGURE: 24C

FILE: S:\F35772801\DUROV–MCMURRAY2.DWG Issued By: Edmonton CAD



Legend

- Piezometer Location
- 278.55 Measured Water Levels (2007)
- 257.61 Measured Water Levels (2006)
- 333.04 Measured Water Levels (2004)
- 319.72 Measured Water Levels (pre 2004)
- Jackpine Expansion Mining Area Local Study Area
- Shell Lease Boundary
- Gravel Road
- Waterbody
- Watercourse
- Patterned Fen
- Lenticular Fen
- McClelland Fen
- Water Level Contour (masl) Contour Interval = 10 m
- Estimated Water Level Contour (masl) Contour Interval = 10 m
- Inferred Flow Direction

Note: Water level data and wells lying outside the Shell lease boundaries and Jackpine Expansion Mining Area Local Study Area are not included on Table 2.

Data Sources: Base features and topography from AltaLis (1:20,000) basemaps; fens from Golder; roads from Ensight; lease boundaries from Shell.

0 1,250 2,500 5,000 m

1:175,000

NAD 83 UTM Z12 N

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

JACKPINE EXPANSION MINING AREA – GROUNDWATER SURFACE ELEVATIONS – MCMURRAY FORMATION BASAL AQUIFER

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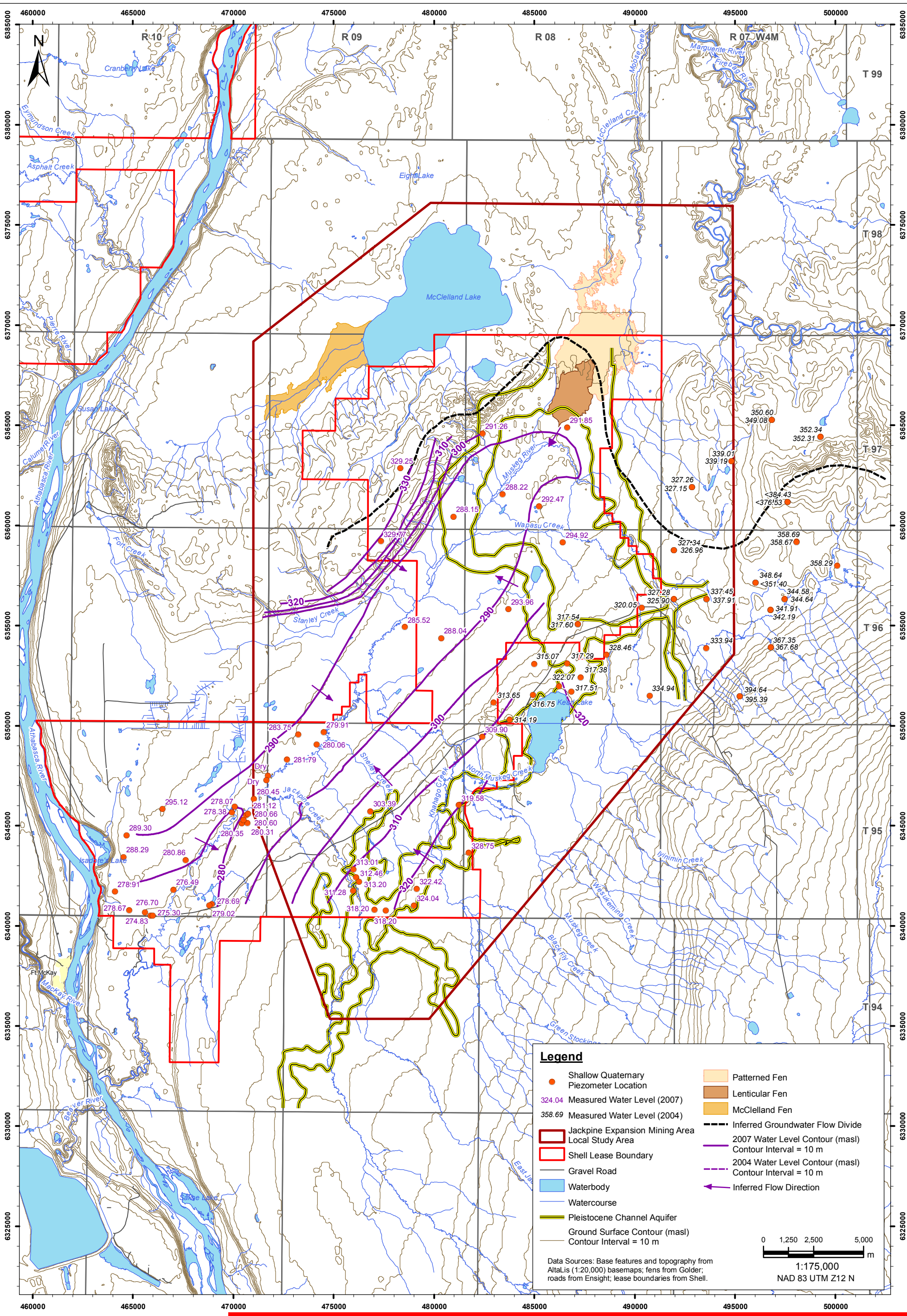
28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: 25

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\Baseline_Figures\JEMA_LSA_Basal_WL-11x17.mxd Issued By: Edmonton GIS



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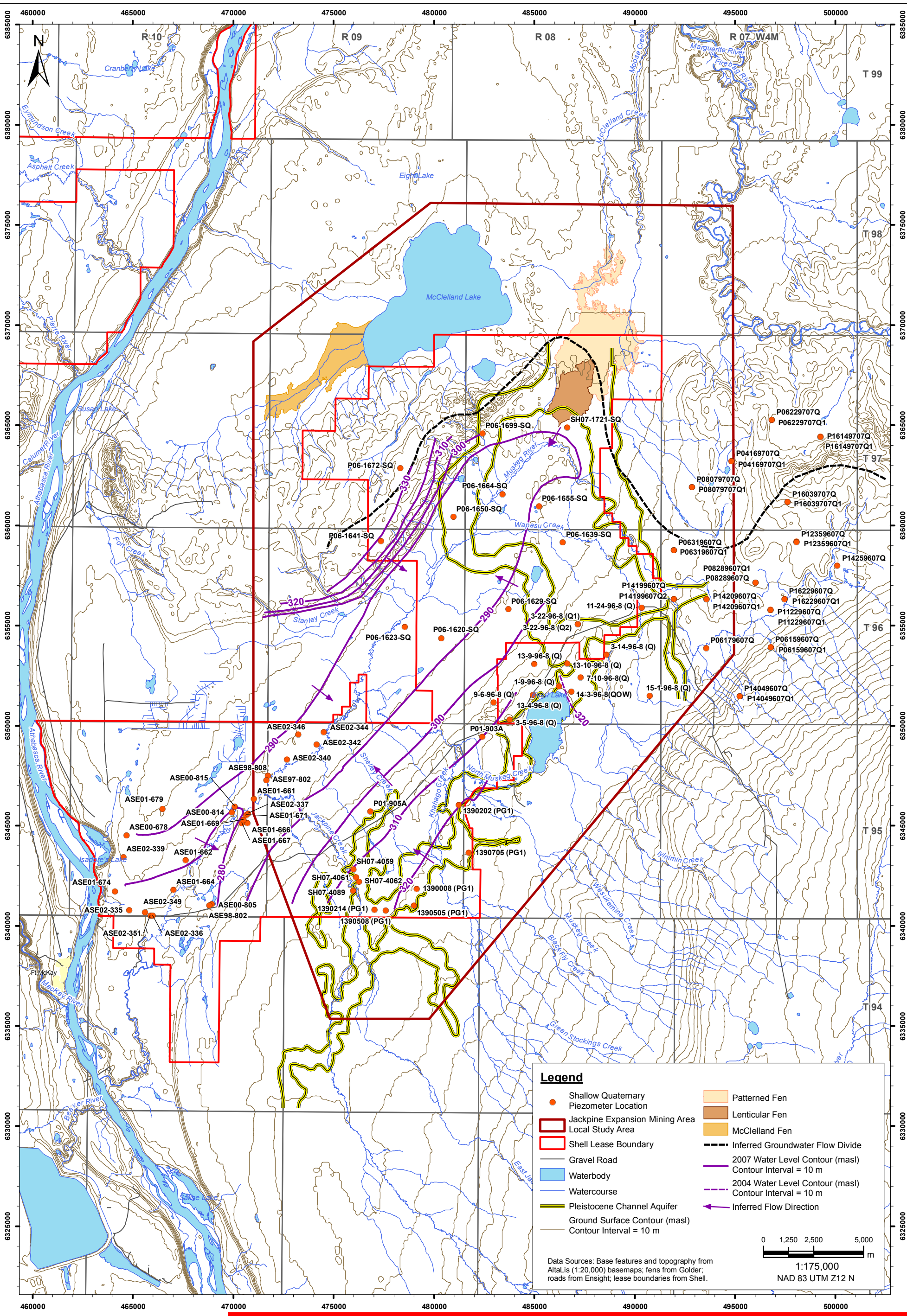
JACKPINE EXPANSION MINING AREA – GROUNDWATER SURFACE ELEVATIONS – SHALLOW QUATERNARY DEPOSITS, 2004 AND 2007

WorleyParsons Komex
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28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 26A

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\Baseline_Figures\JEMA_LSA_Shallow_WL.mxd Issued By: Edmonton GIS



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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

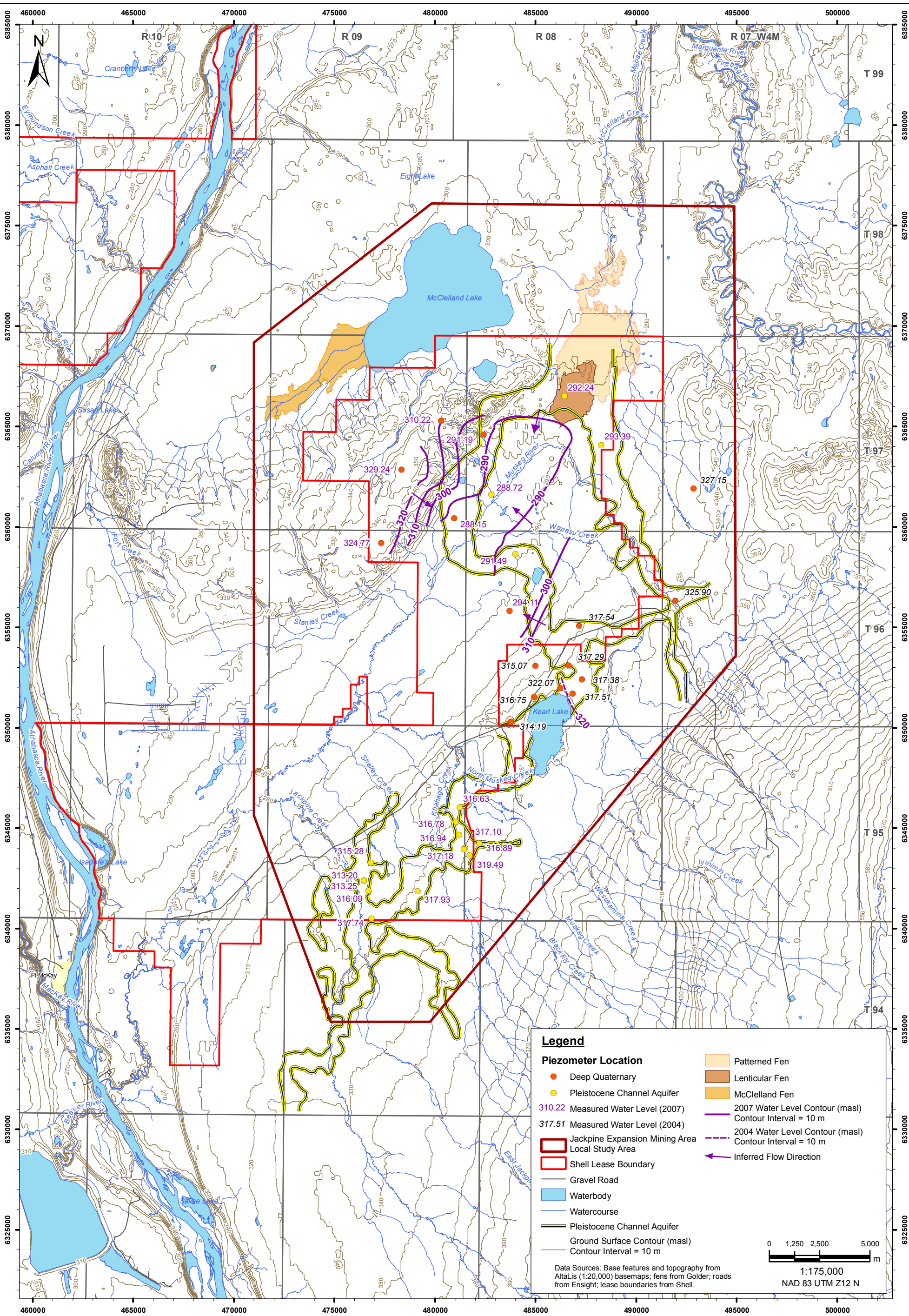
JACKPINE EXPANSION MINING AREA – GROUNDWATER SURFACE ELEVATIONS – SHALLOW QUATERNARY DEPOSITS (WELL NAMES)

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 26B

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

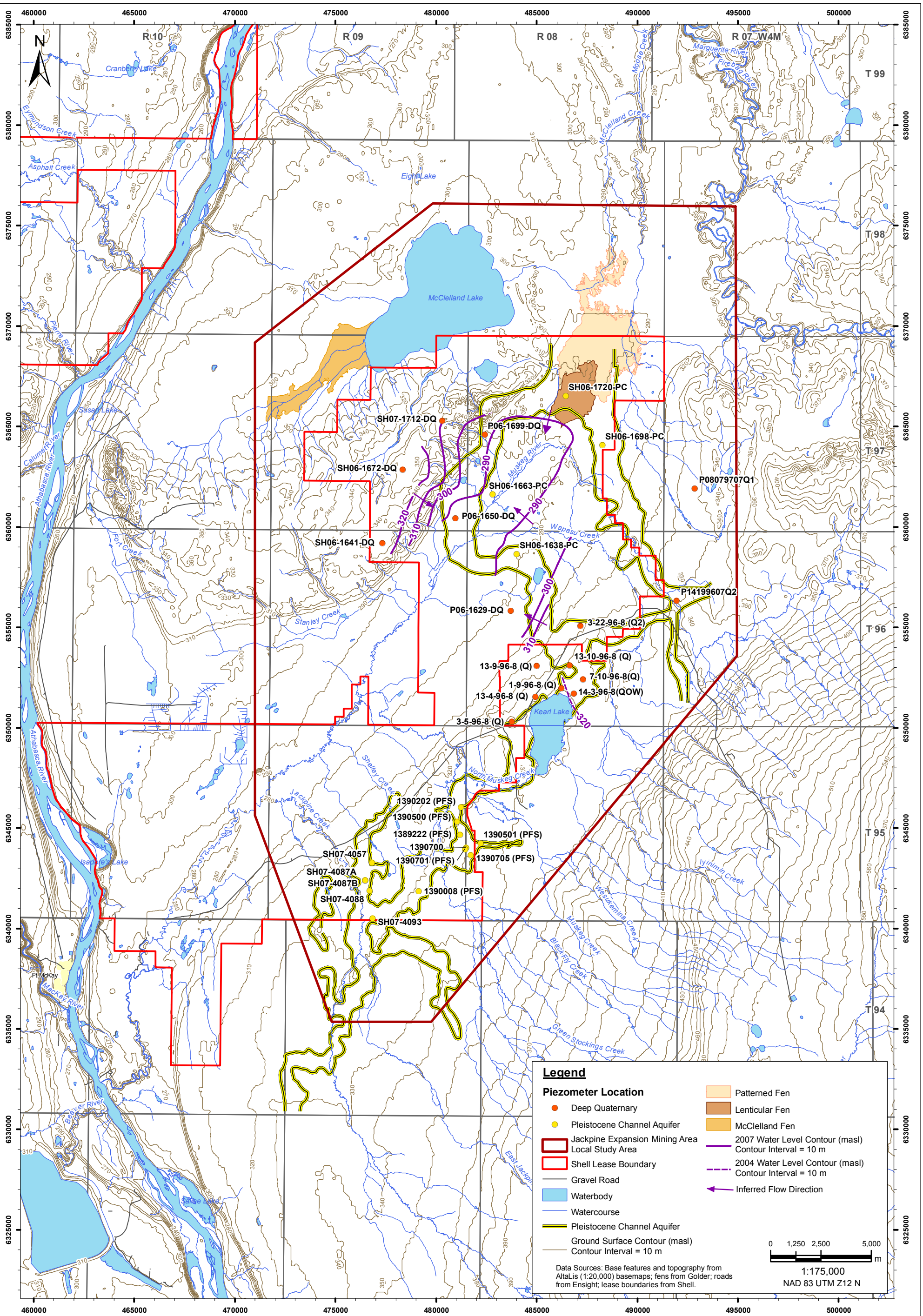
JACKPINE EXPANSION MINING AREA – GROUNDWATER SURFACE ELEVATIONS – DEEP QUATERNARY AND PLEISTOCENE CHANNEL, 2004 AND 2007

WorleyParsons Komex
resources & energy

28-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 27A

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\Baseline_Figures\JEMA_LSA_Deep_WL.mxd Issued By: Edmonton GIS



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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

JACKPINE EXPANSION MINING AREA – GROUNDWATER SURFACE ELEVATIONS – DEEP QUATERNARY AND PLEISTOCENE CHANNEL (WELL NAMES)

WorleyParsons Komex
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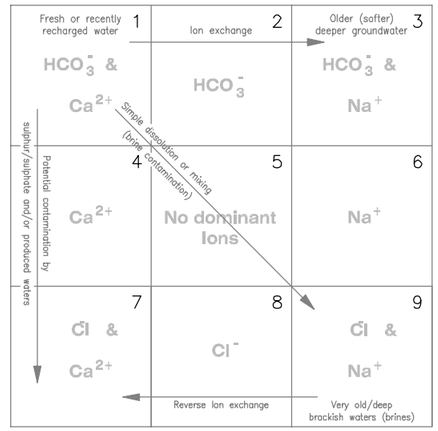
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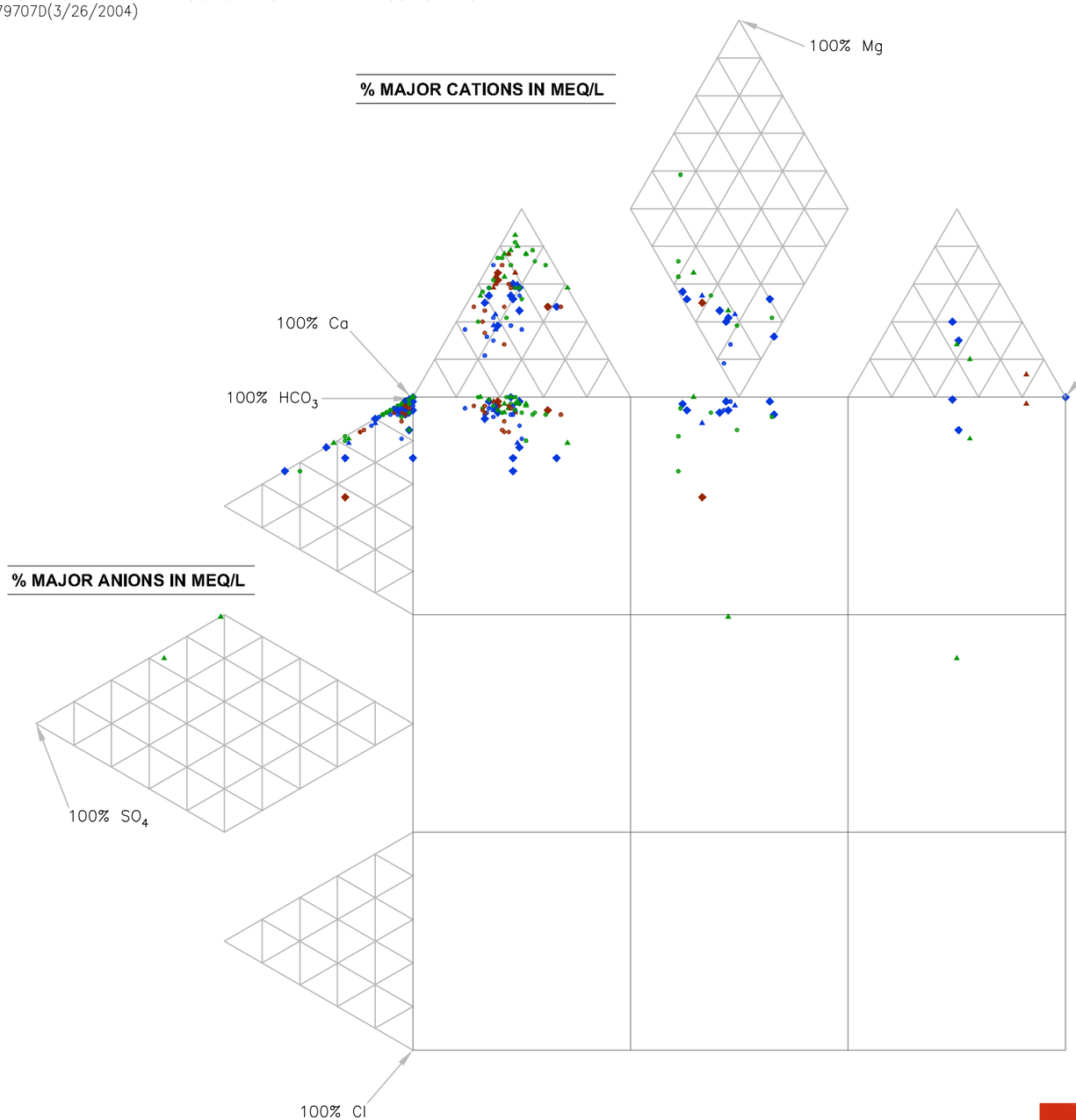
FIGURE: 27B

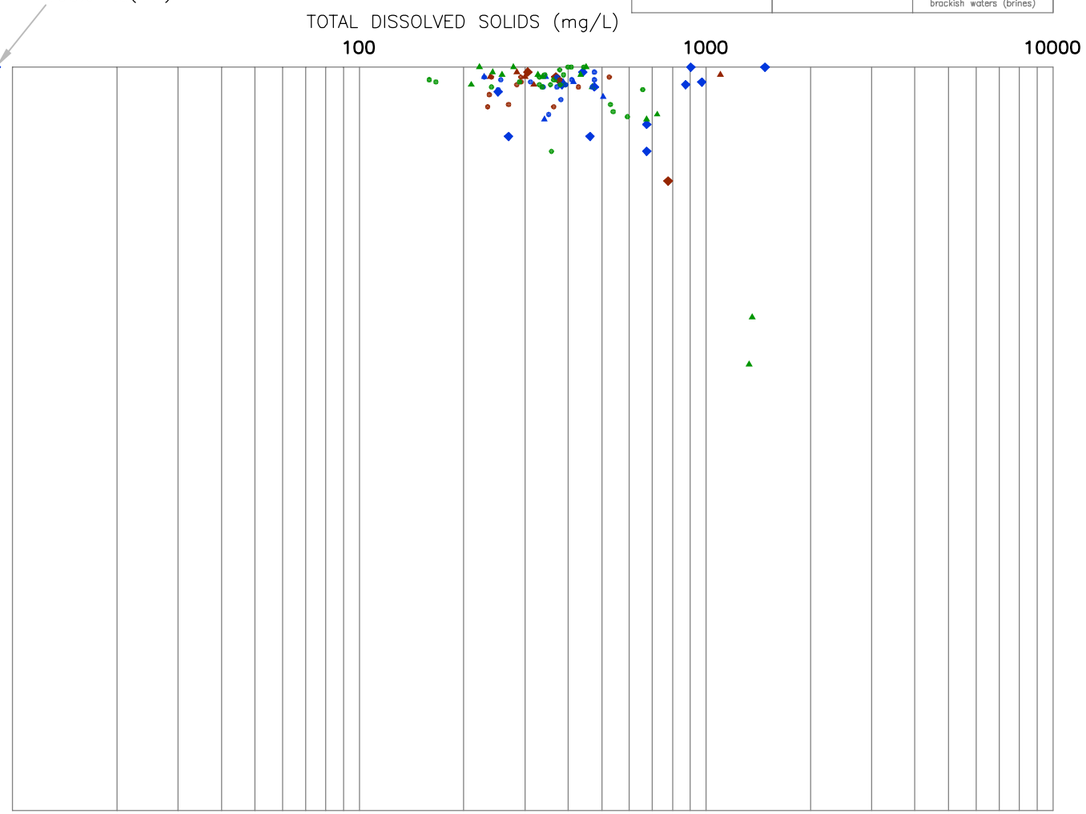
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* No TDS values for: 11-24-96-8 Q(3/4/1998), 13-10-96-8 Q(2/27/1998), 13-9-96-8 Q(2/28/1998), 14-3-96-8 QOW(8/28/1998), 3-22-96-8 Q1(2/28/1998), 7-10-96-8 Q(8/27/1998), 9-6-96-8 Q(2/26/1998), P08079707D(3/26/2004)

(Lloyd, J.W. and J.A. Heathcote, 1985. Natural Inorganic Hydrochemistry in Relation to Groundwater. Clarendon Press, Oxford. pp 127-139)







NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

LEGEND

JACKPINE EXPANSION MINING AREA
- QUATERNARY – SHALLOW
- QUATERNARY – DEEP
- QUATERNARY – PLEISTOCENE

JACKPINE MINE – PHASE 1
- QUATERNARY – SHALLOW
- QUATERNARY – DEEP
- QUATERNARY – PLEISTOCENE

KEARL OIL SANDS PROJECT
- QUATERNARY – SHALLOW
- QUATERNARY – DEEP
- QUATERNARY – PLEISTOCENE

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SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT
JACKPINE EXPANSION MINING AREA - GROUNDWATER CHEMISTRY: MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM) QUATERNARY DEPOSITS

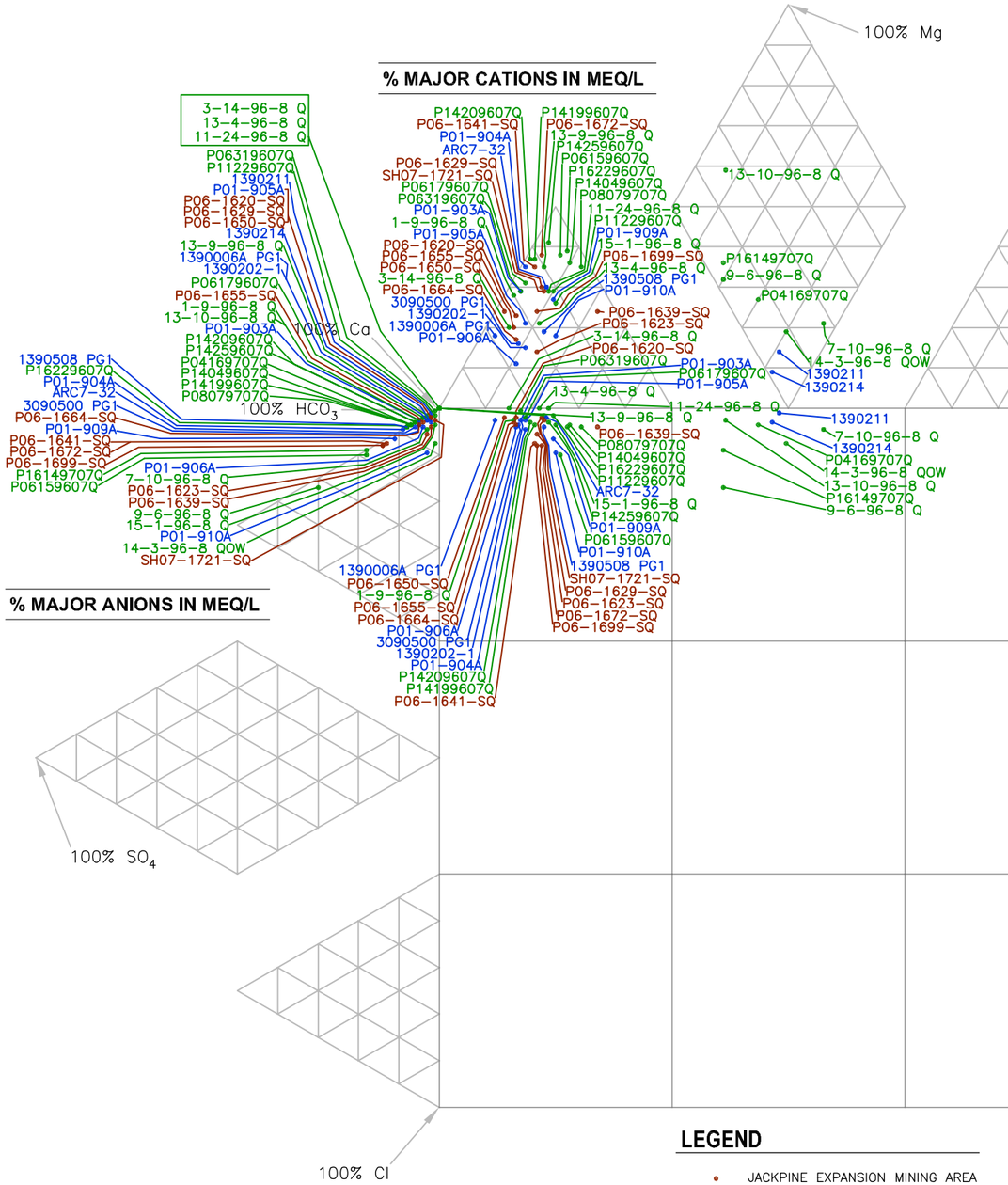
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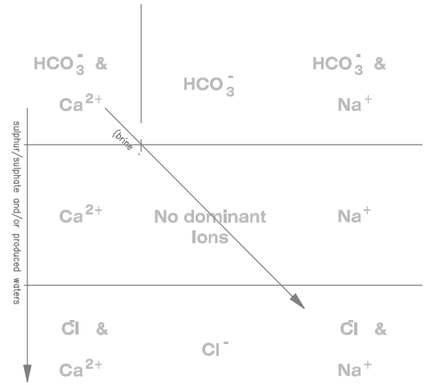
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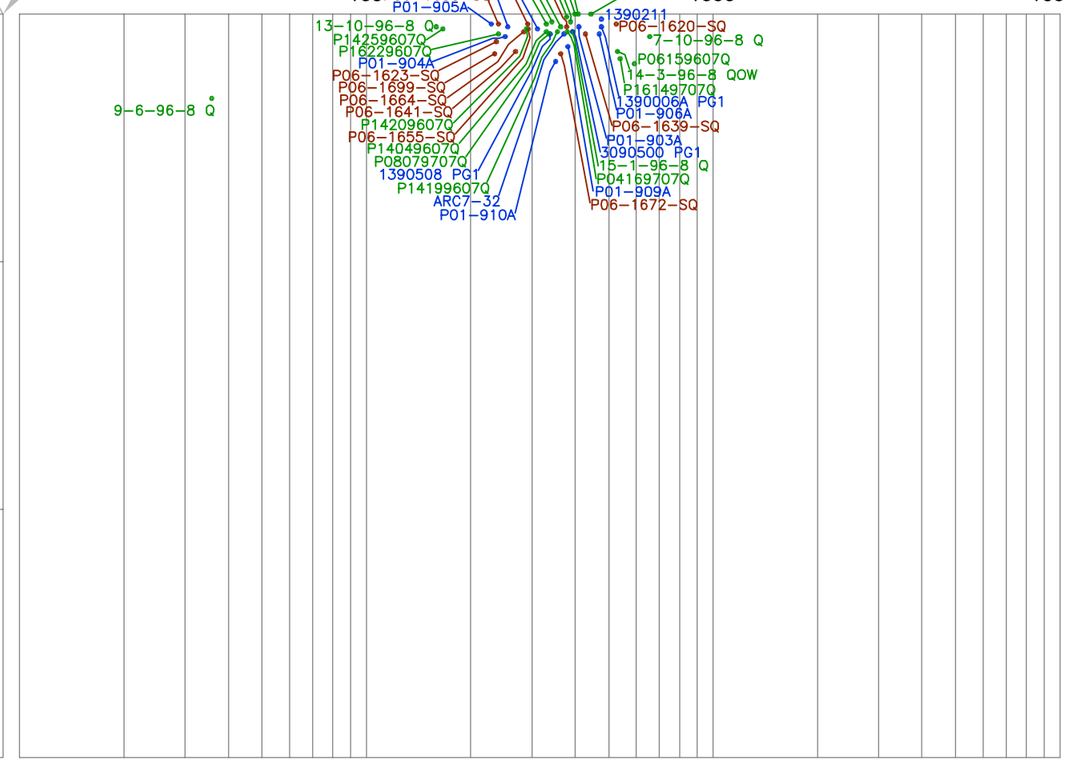
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FILE: S:\F35772801\DUROV-QUAT.DWG Issued By: Edmonton CAD

(Lloyd, J.W. and J.A. Heathcote, 1985.
Natural Inorganic Hydrochemistry in Relation to Groundwater.
Clarendon Press, Oxford. pp 127–139)







LEGEND

- JACKPINE EXPANSION MINING AREA
- JACKPINE MINE – PHASE 1
- KEARL OIL SANDS PROJECT

* No TDS values for: 11–24–96–8 Q(3/4/1998), 13–10–96–8 Q(2/27/1998), 13–9–96–8 Q(2/28/1998), 14–3–96–8 QOW(8/28/1998), 3–22–96–8 Q1(2/28/1998), 7–10–96–8 Q(8/27/1998), 9–6–96–8 Q(2/26/1998), P08079707D(3/26/2004)

NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

Environment & Water Resources

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT
JACKPINE EXPANSION MINING AREA - GROUNDWATER CHEMISTRY: MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM) SHALLOW QUATERNARY DEPOSITS

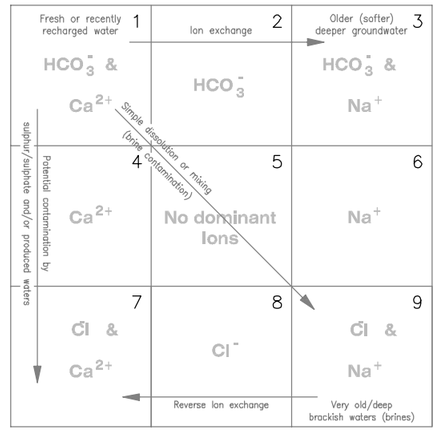
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26-NOV-07 date	J.G. edited by	J.G. drawn by	app by	PROJECT NUMBER: F35772801	FIGURE: 28B

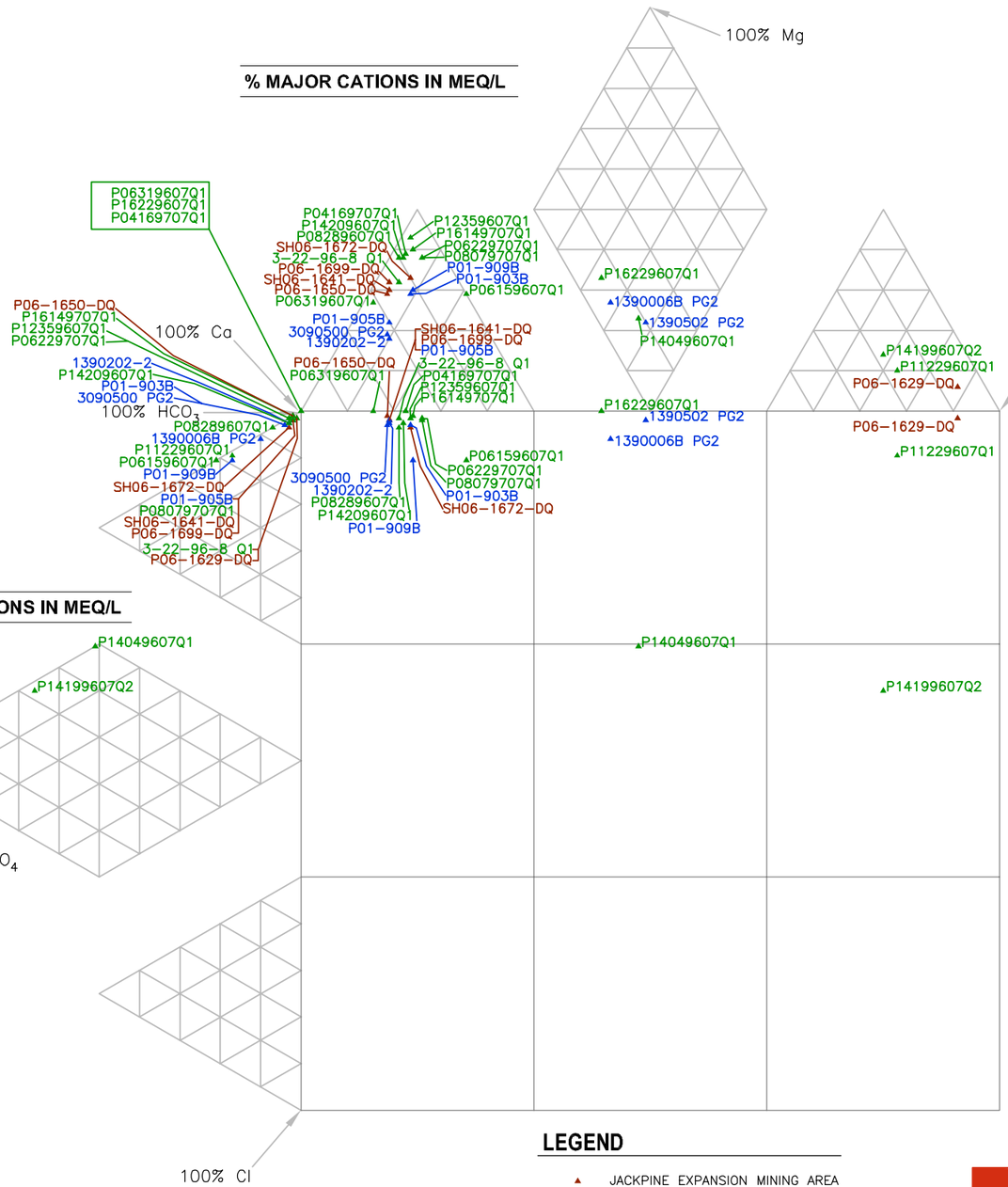
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FILE: S:\F35772801\DUROV-QUAT-SHALLOW.DWG Issued By: Edmonton CAD

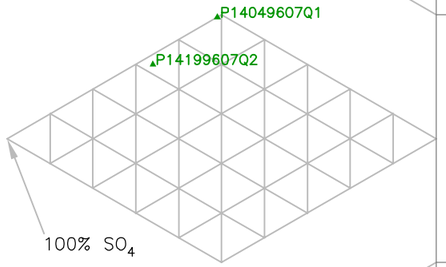
(Lloyd, J.W. and J.A. Heathcote, 1985.
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Clarendon Press, Oxford. pp 127–139)

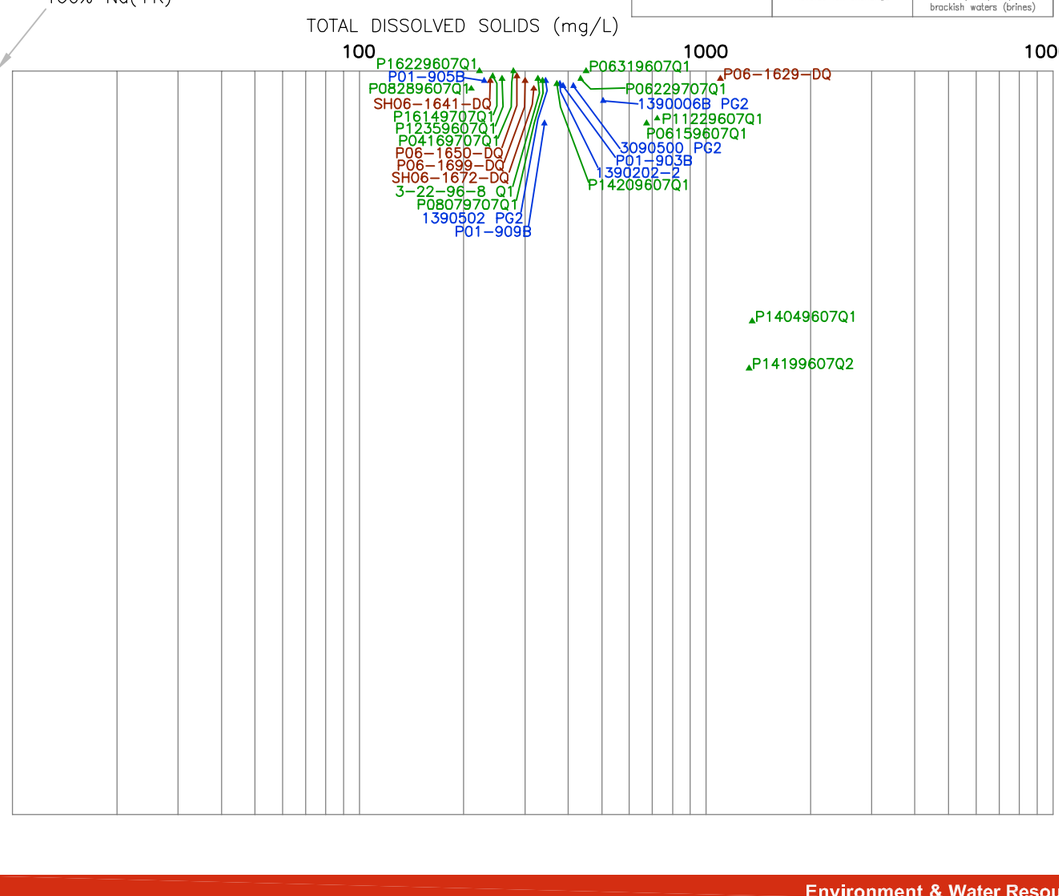


% MAJOR CATIONS IN MEQ/L



% MAJOR ANIONS IN MEQ/L





LEGEND

- ▲ JACKPINE EXPANSION MINING AREA
- ▲ JACKPING MINE – PHASE 1
- ▲ KEARL OIL SANDS PROJECT

* No TDS values for: 11–24–96–8 Q(3/4/1998), 13–10–96–8 Q(2/27/1998), 13–9–96–8 Q(2/28/1998), 14–3–96–8 QOW(8/28/1998), 3–22–96–8 Q1(2/28/1998), 7–10–96–8 Q(8/27/1998), 9–6–96–8 Q(2/26/1998), P08079707D(3/26/2004)

NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT
JACKPINE EXPANSION MINING AREA - GROUNDWATER CHEMISTRY
MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM)
DEEP QUATERNARY DEPOSITS

WorleyParsons Komex
resources & energy

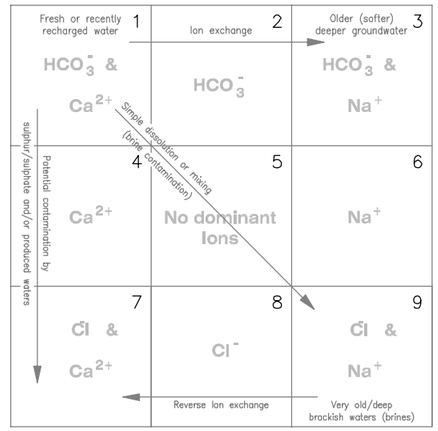
23-NOV-07	date	J.G.	edited by	J.G.	drawn by		app by

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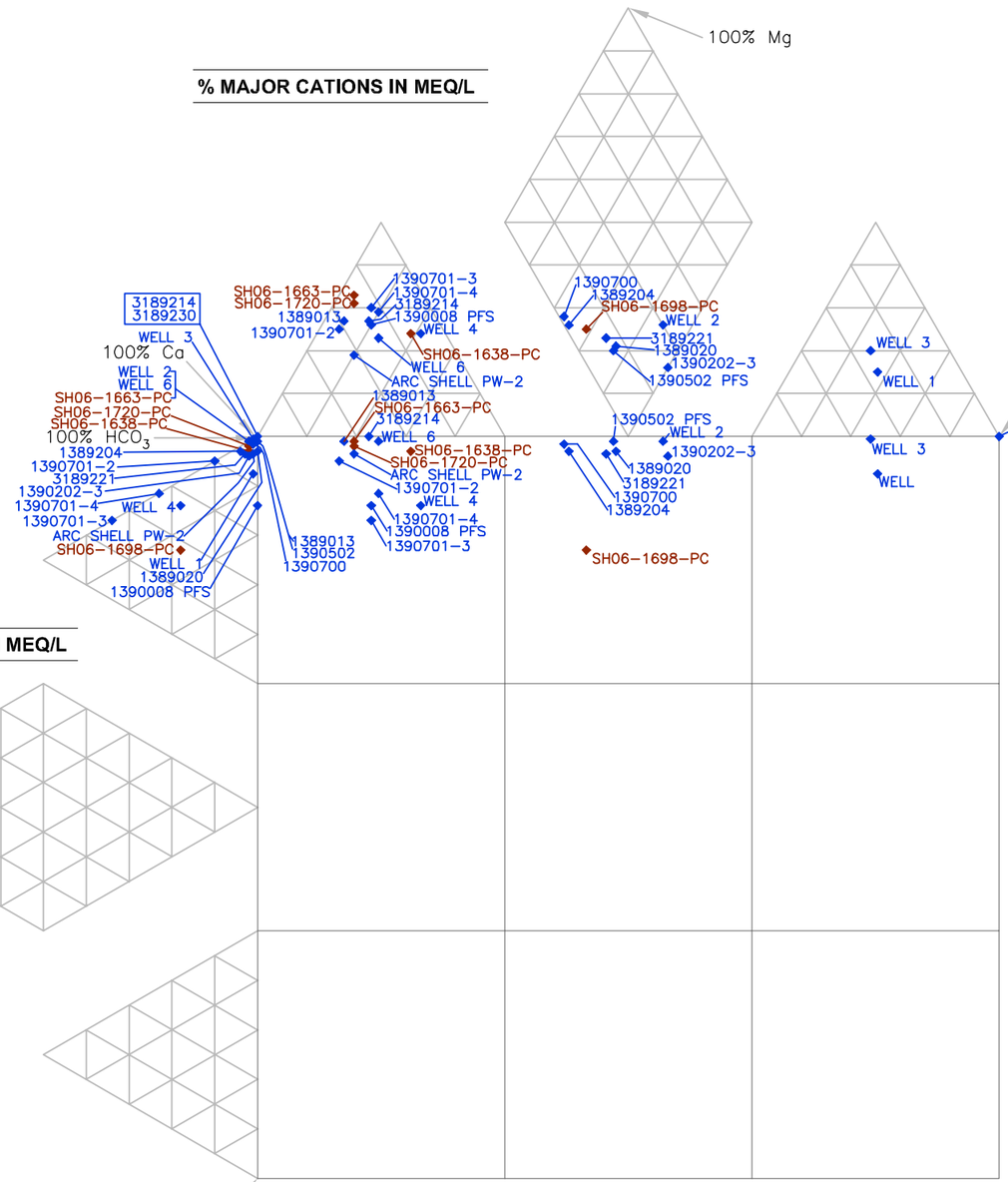
PROJECT NUMBER:	FIGURE:
F35772801	28C

FILE: S:\F35772801\DUROV-QUAT-DEEP.DWG Issued By: Edmonton CAD

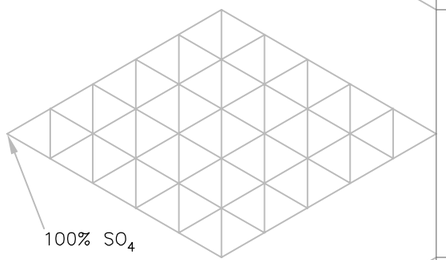
(Lloyd, J.W. and J.A. Heathcote, 1985.
Natural Inorganic Hydrochemistry in Relation to Groundwater.
Clarendon Press, Oxford. pp 127–139)



% MAJOR CATIONS IN MEQ/L



% MAJOR ANIONS IN MEQ/L



100% Cl

TOTAL DISSOLVED SOLIDS (mg/L)

100 | 1000 | 10000

SH06–1720–PC
SH06–1663–PC
SH06–1638–PC
1390701–2
ARC SHELL PW–2
WELL 4
1390008 PFS
1390502 PFS
1390202–3
3189214
3189230
1389020
3189221
1390701–4
1390701–3
SH06–1698–PC

LEGEND

- JACKPINE EXPANSION MINING AREA
- JACKPINE MINE PHASE 1

NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT
JACKPINE EXPANSION MINING AREA - GROUNDWATER CHEMISTRY: MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM) PLEISTOCENE CHANNEL

WorleyParsons Komex
resources & energy

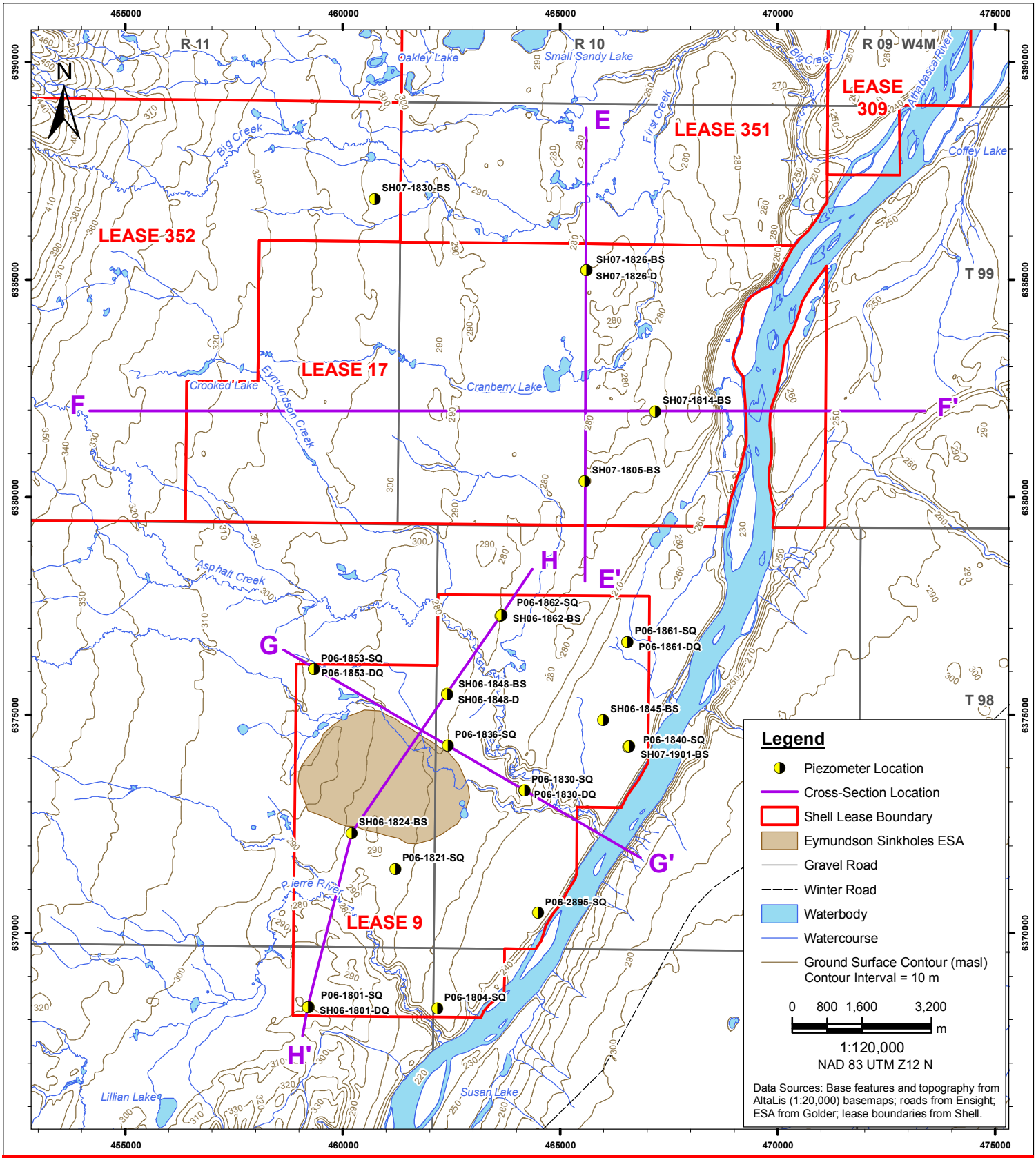
23-NOV-07	date	J.G.	edited by	J.G./MJC	drawn by	app by

PROJECT NUMBER: F35772801

FIGURE: 28D

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FILE: S:\F35772801\DUROV-QUAT-PLEIST.DWG Issued By: Edmonton CAD



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SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

PIERRE RIVER MINING AREA – HYDROGEOLOGIC CROSS-SECTION LOCATIONS AND MONITORING WELLS IN THE LOCAL STUDY AREA

WorleyParsons Komex
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26-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: 29

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North

South

E

E'

LEASE AREA

Cross-Section F-F'

SH07-1838 (-31.3)

SH07-1832 (27.7)

SH07-1826 (18.6)
SH07-1826-BS (11.0)
SH07-1826-D (16.3)

SH07-1819 (9.7)

SH07-1813 (-0.4)

SH07-1805 (-10.9)
SH07-1805-BS(-9.0)

(-D) 233.1073
(-BS) 232.3805

(-BS) 232.057

Kc

Km

D

Elevation (masl)

400

300

200

100

0

2500

5000

7500

10000

Section Distance (m)

LEGEND

- Corehole Location
- Piezometer Location
- Piezometer Completion Intervals:
  - SQ - Shallow Quaternary
  - DQ - Deep Quaternary
  - PC - Pleistocene Channel
  - BS - Basal Sand
  - D - Devonian
- Screened Interval
- Water Level

- Sand and Gravel
- Clay
- Quaternary Deposits
- Clearwater Formation (Kc)
- McMurray Formation (Km)
- McMurray Formation Basal Aquifer
- Devonian Formations (D)

Note: Value in parentheses following locator name indicates distance (m) from cross-section line.

Scale: 1:30000
Vertical Exaggeration: 10X
Map Units: metres
Offset Distance: 35

Environment & Water Resources

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

PIERRE RIVER MINING AREA – HYDROGEOLOGICAL CROSS-SECTION E-E'

WorleyParsons Komex
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26-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 30

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: C:\My Documents\Omnibus\Cross-sections\Baseline_Figures\Section_E.map Issued By: Edmonton GIS

West

East

F

F'

LEASE AREA

Cross-Section E-E'

SH07-1809 (-2.8)

SH07-1810 (45.0)

SH07-1811 (6.0)

SH07-1812 (6.0)

SH07-1813 (6.0)

SH07-1814 (6.0)

SH07-1814-BS (-0.1)

Athabasca River

Water Elev. ~ 225 masl

[BS] 229.946

Kc

Km

D

Km

D

Elevation (masl)

400

200

0

0

5000

10000

15000

Section Distance (m)

LEGEND

- Corehole Location
- Piezometer Location
- Piezometer Completion Intervals:
  - SQ - Shallow Quaternary
  - DQ - Deep Quaternary
  - PC - Pleistocene Channel
  - BS - Basal Sand
  - D - Devonian
- Screened Interval
- Water Level

- Sand and Gravel
- Clay
- Quaternary Deposits
- Clearwater Formation (Kc)
- McMurray Formation (Km)
- McMurray Formation Basal Aquifer
- Devonian Formations (D)

Note: Value in parentheses following locator name indicates distance (m) from cross-section line.

Scale: 1:50000
Vertical Exaggeration: 10X
Map Units: metres
Offset Distance: 45

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

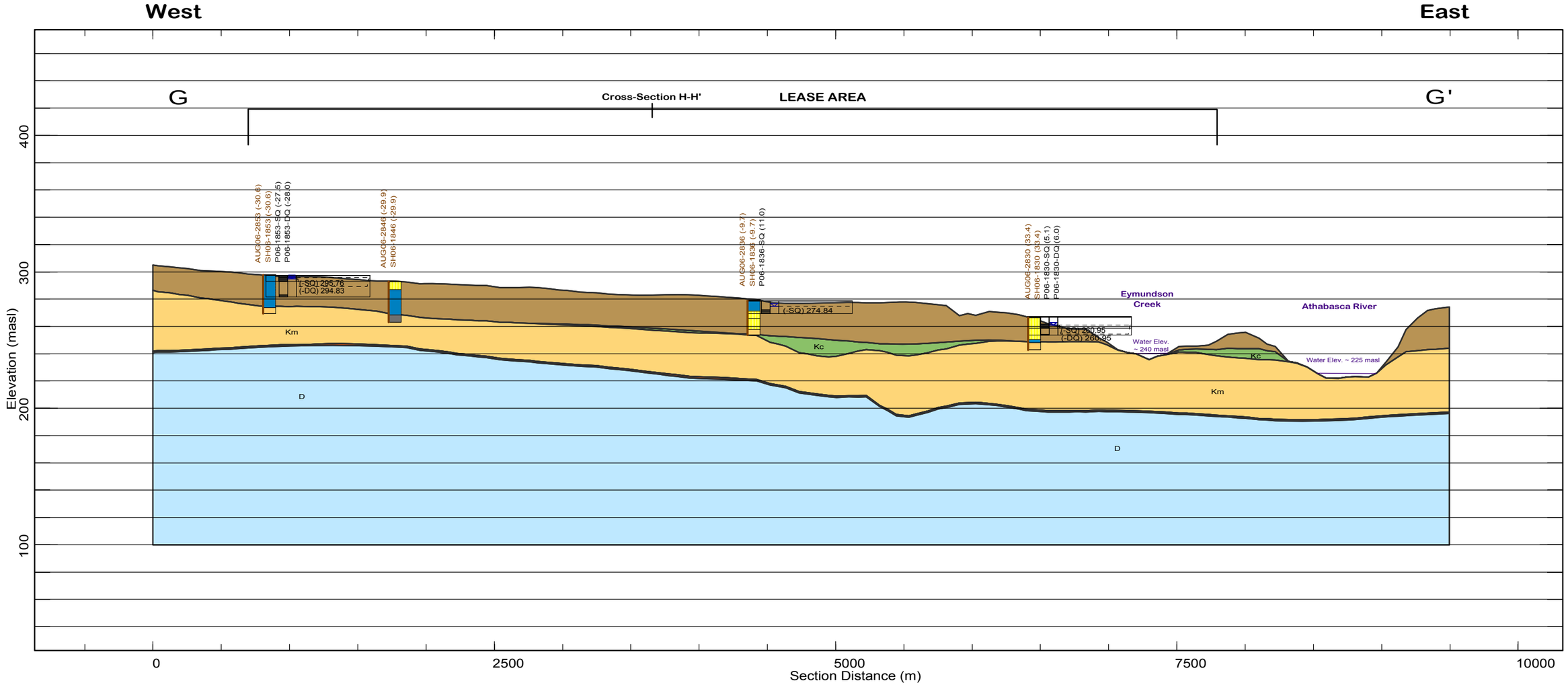
PIERRE RIVER MINING AREA – HYDROGEOLOGICAL CROSS-SECTION F-F'

WorleyParsons Komex
resources & energy

26-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 31

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LEGEND

- Corehole Location
- Piezometer Location
- Piezometer Completion Intervals:
  - SQ - Shallow Quaternary
  - DQ - Deep Quaternary
  - PC - Pleistocene Channel
  - BS - Basal Sand
  - D - Devonian
- Screened Interval
- Water Level

- Sand and Gravel
- Clay
- Quaternary Deposits
- Clearwater Formation (Kc)
- McMurray Formation (Km)
- McMurray Formation Basal Aquifer
- Devonian Formations (D)

Note: Value in parentheses following locator name indicates distance (m) from cross-section line.

Scale: 1:30000
Vertical Exaggeration: 10X
Map Units: metres
Offset Distance: 35

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

PIERRE RIVER MINING AREA – HYDROGEOLOGICAL CROSS-SECTION G-G'

WorleyParsons Komex
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PROJECT NUMBER: F35772801

FIGURE: 32

FILE: C:\My Documents\Omnibus\Cross-sections\Baseline_Figures\Section_G.map Issued By: Edmonton GIS

North

South

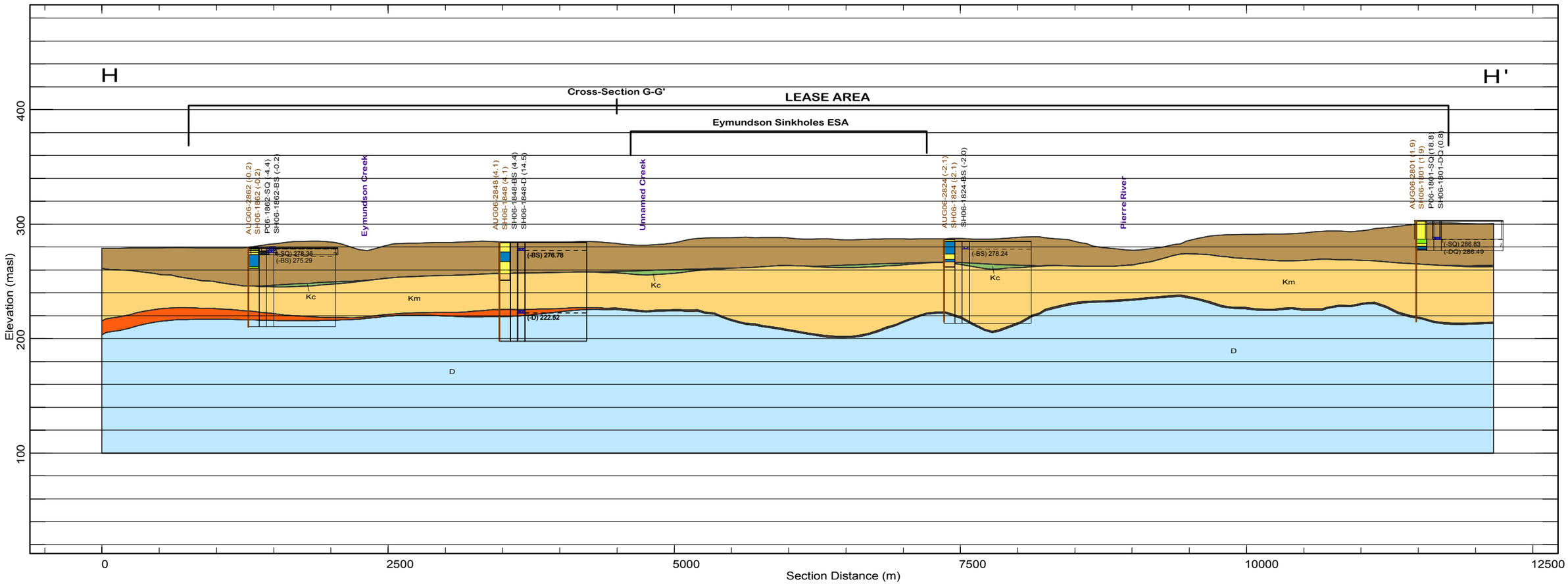
H

H'

Cross-Section G-G'

LEASE AREA

Eymundson Sinkholes ESA



LEGEND

- Corehole Location
- Piezometer Location
- Piezometer Completion Intervals:
  - SQ - Shallow Quaternary
  - DQ - Deep Quaternary
  - PC - Pleistocene Channel
  - BS - Basal Sand
  - D - Devonian
- Screened Interval
- Water Level

- Sand and Gravel
- Silt
- Clay
- Quaternary Deposits
- Clearwater Formation (Kc)
- McMurray Formation (Km)
- McMurray Formation Basal Aquifer
- Devonian Formations (D)

Note: Value in parentheses following locator name indicates distance (m) from cross-section line.

Scale: 1:35000
Vertical Exaggeration: 10X
Map Units: metres
Offset Distance: 30

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

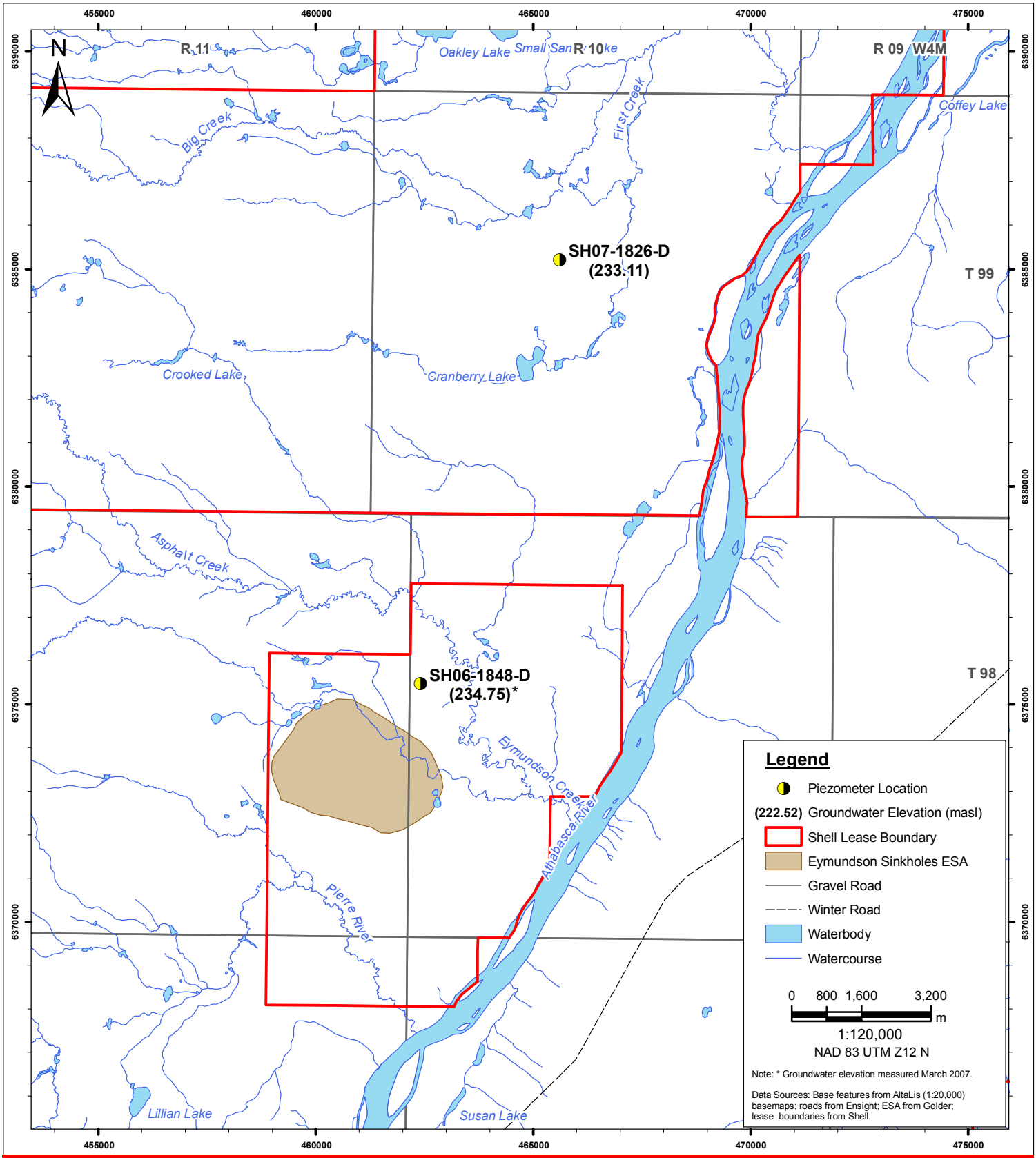
PIERRE RIVER MINING AREA – HYDROGEOLOGICAL CROSS-SECTION H-H'

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26-NOV-07 date	S.L. edited by	S.L. drawn by	J.K. app by	PROJECT NUMBER: F35772801	FIGURE: 33

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

PIERRE RIVER MINING AREA – GROUNDWATER SURFACE ELEVATIONS – DEVONIAN WATERWAYS FORMATION, MAY 2007

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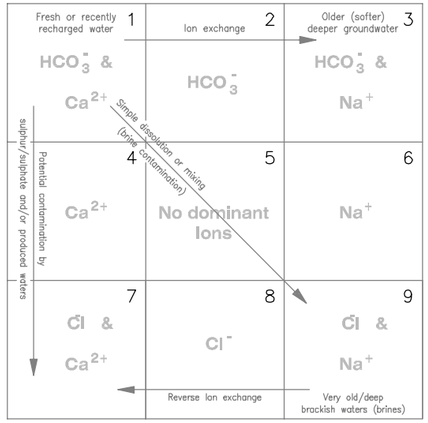
PROJECT NUMBER: F35772801

FIGURE: 34

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(Lloyd, J.W. and J.A. Heathcote, 1985.
Natural Inorganic Hydrochemistry in Relation to Groundwater.
Clarendon Press, Oxford. pp 127–139)



% MAJOR CATIONS IN MEQ/L

100% Mg

100% Ca

100% HCO_3

100% Na(+K)

SH06–1848–D
SH06–1845–BS
SH07–1826–D
SH07–1805–BS
SH07–1814–BS
SH06–1862–BS
SH06–1824–BS
SH07–1826–BS
SH06–1848–BS
SH07–1830–BS

% MAJOR ANIONS IN MEQ/L

100% SO_4

100% Cl

SH06–1848–D
SH06–1862–BS
SH06–1824–BS
SH06–1845–BS
SH06–1848–BS
SH07–1830–BS
SH07–1826–BS
SH07–1826–D
SH07–1805–BS
SH07–1814–BS

TOTAL DISSOLVED SOLIDS (mg/L)

1000 10000 100000

SH06–1848–D
SH06–1862–BS
SH06–1824–BS
SH06–1845–BS
SH06–1848–BS
SH07–1830–BS
SH07–1826–BS
SH07–1826–D
SH07–1805–BS
SH07–1814–BS

LEGEND

- BEDROCK – BASAL AQUIFER
- BEDROCK – DEVONIAN

NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

Environment & Water Resources

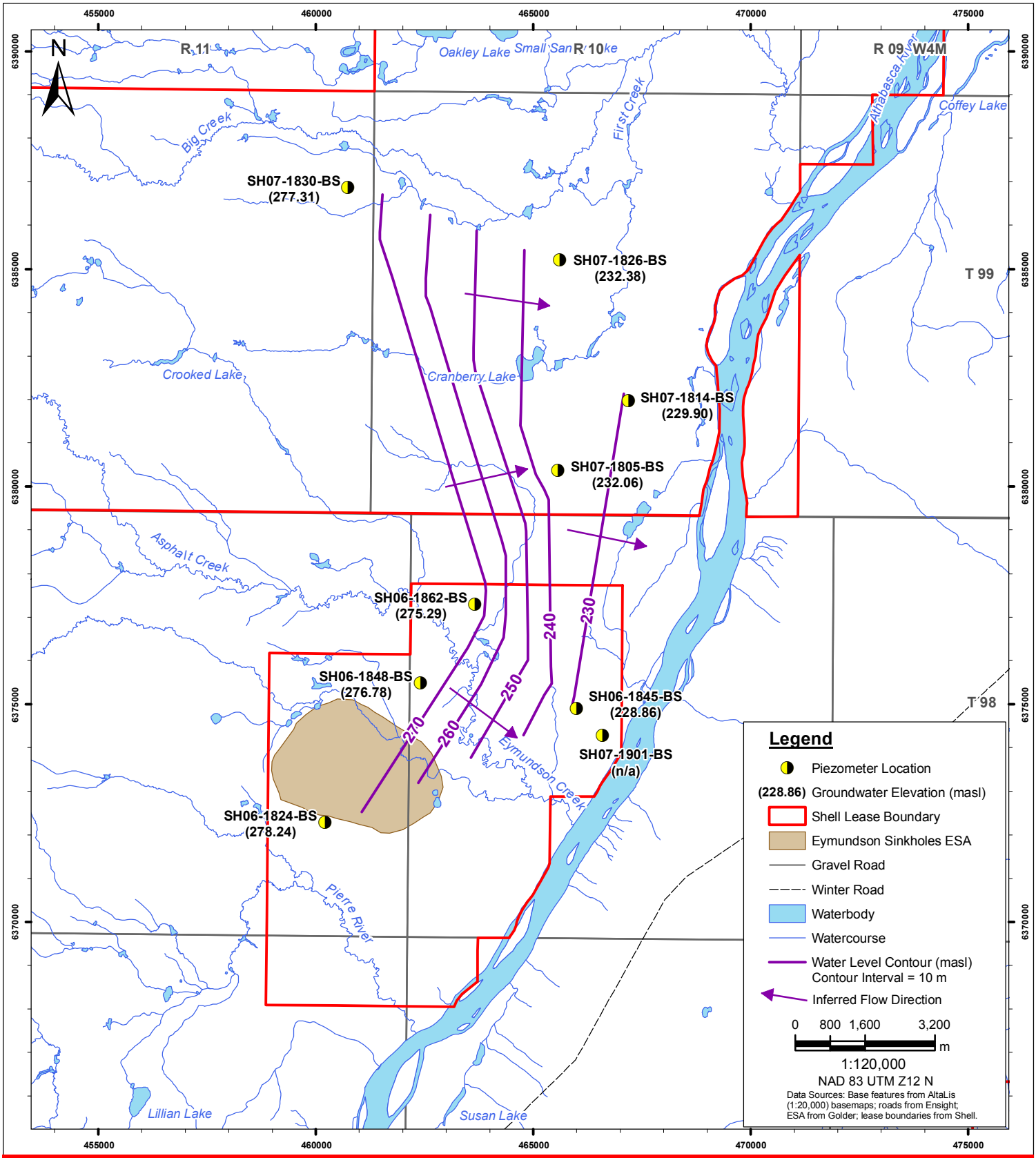
SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT
PIERRE RIVER MINING AREA - GROUNDWATER CHEMISTRY: MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM) DEVONIAN AND CRETACEOUS FORMATIONS

WorleyParsons Komex
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26-NOV-07 date	J.G. edited by	J.G./J.Q. drawn by	app by	PROJECT NUMBER: F35772801	FIGURE: 35

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

PIERRE RIVER MINING AREA – GROUNDWATER SUFACE ELEVATIONS – McMURRAY FORMATION BASAL AQUIFER, MAY 2007

WorleyParsons Komex
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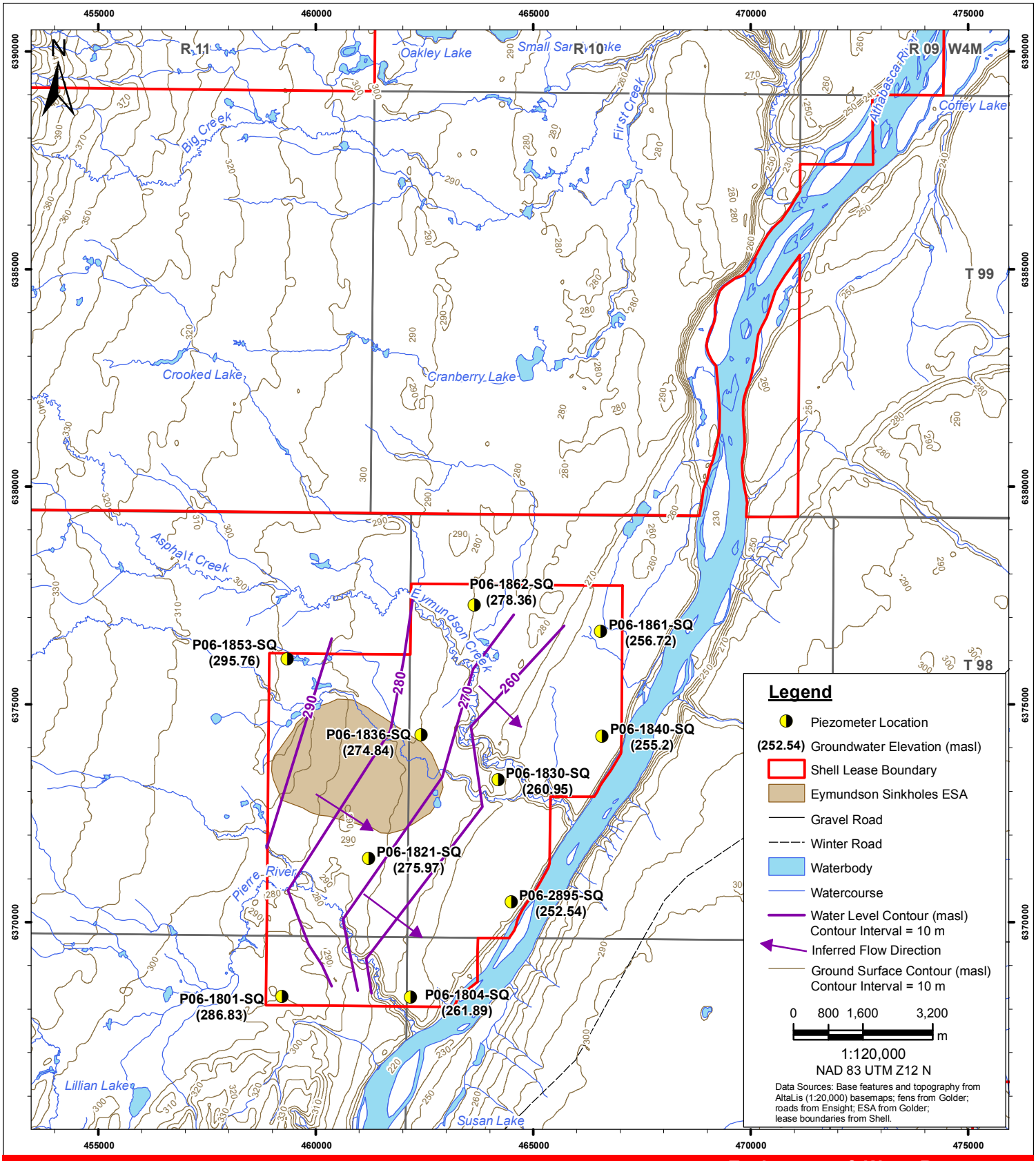
26-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: 36

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JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

PIERRE RIVER MINING AREA – GROUNDWATER SURFACE ELEVATIONS – SHALLOW QUATERNARY DEPOSITS, MAY 2007

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resources & energy

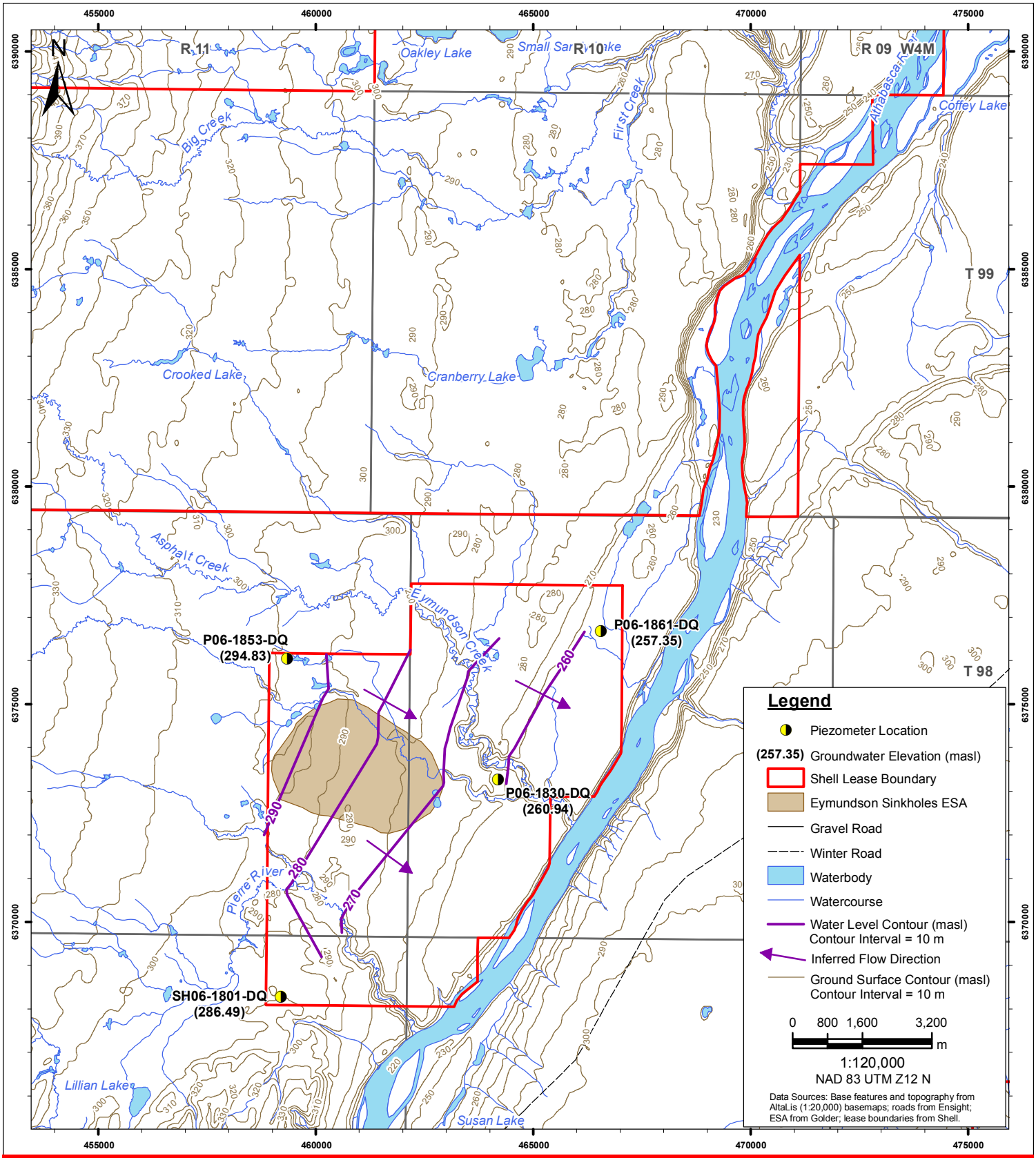
26-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: 37

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Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

PIERRE RIVER MINING AREA – GROUNDWATER SURFACE ELEVATIONS – DEEP QUATERNARY DEPOSITS, MAY 2007

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resources & energy

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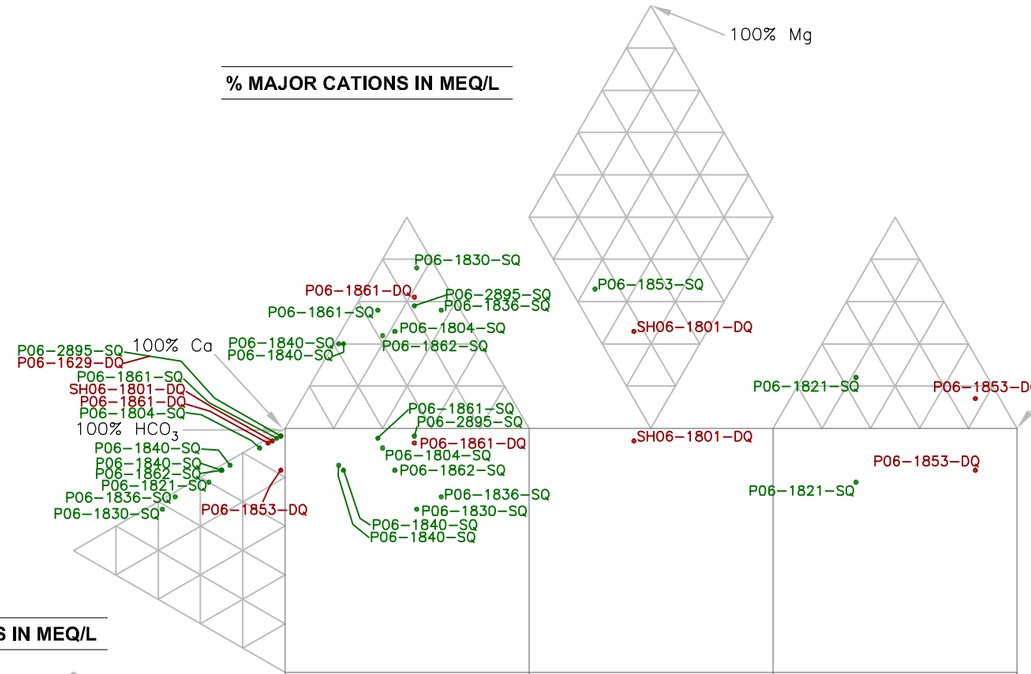
PROJECT NUMBER: F35772801

FIGURE: 38

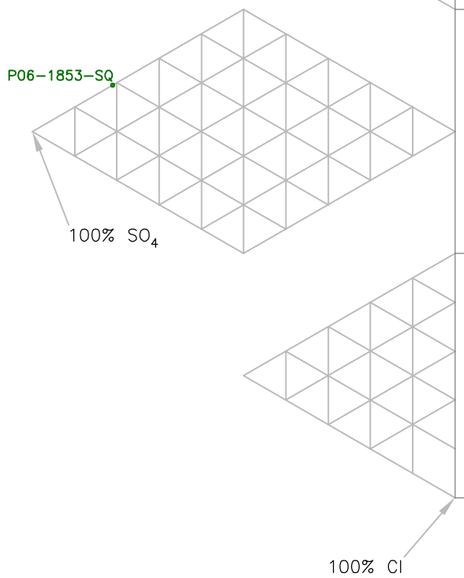
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FILE: Q:\F3577_Shell\F35772801_Omnibus\Baseline_Figures\PRM_DQ_WL.mxd Issued By: Edmonton GIS

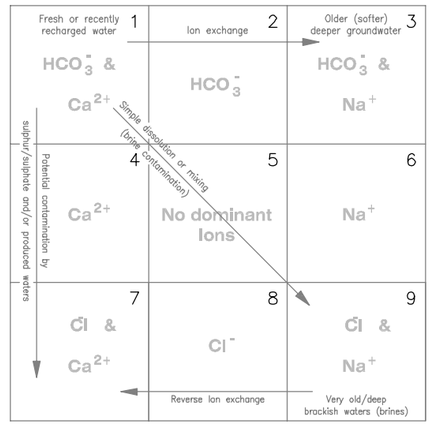
% MAJOR CATIONS IN MEQ/L



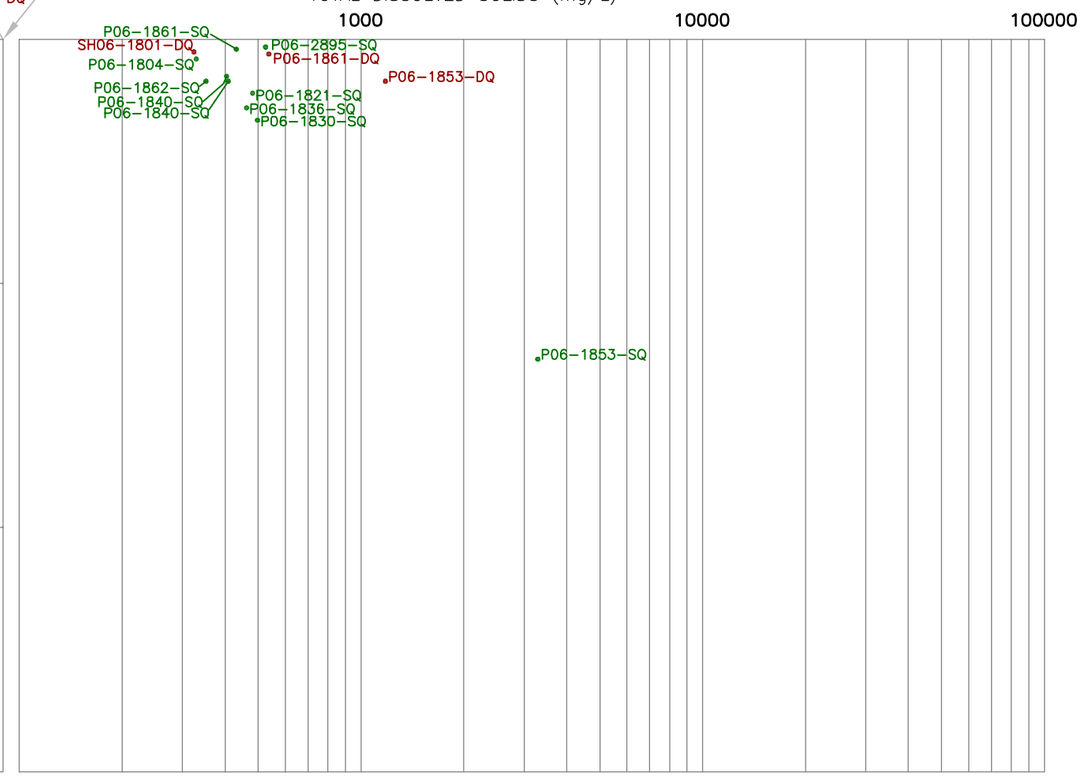
% MAJOR ANIONS IN MEQ/L



(Lloyd, J.W. and J.A. Heathcote, 1985.
Natural Inorganic Hydrochemistry in Relation to Groundwater.
Clarendon Press, Oxford. pp 127–139)



TOTAL DISSOLVED SOLIDS (mg/L)



NOTE: " HCO_3^- & Ca^{2+} " INDICATES ION DOMINANT FIELDS

LEGEND

- OVERBURDEN – SHALLOW QUATERNARY
- OVERBURDEN – DEEP QUATERNARY

Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT
PIERRE RIVER MINE AREA - GROUNDWATER CHEMISTRY:
MAIN ION CHARACTERIZATION (EXPANDED DUROV DIAGRAM)
QUATERNARY DEPOSITS

WorleyParsons Komex
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26-NOV-07 date	J.Q. edited by	J.G./J.G. drawn by	app by	PROJECT NUMBER: F35772801	FIGURE: 39

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Appendices

Appendix 1A Monitoring Well Installation and Construction Procedures, Geological Logs and Geophysical Logs

APPENDIX 1A
MONITORING WELL INSTALLATION AND CONSTRUCTION PROCEDURES, GEOLOGICAL LOGS AND GEOPHYSICAL LOGS

Piezometer Installation and Construction Procedures

Auger Drilling Procedures – Monitoring Well

A B61 Truck Mounted auger rig operated by Mobile Augers Ltd., Edmonton was used for monitoring well installations in the Quaternary deposits in 2006. This type of rig is well-suited to drilling in unconsolidated materials. Both solid-stemmed and hollow-stemmed augering was used for the Quaternary well installations. Boreholes were advanced to depths between 2 and 25 metres below ground surface (mbgs).

Solid-stem augers of 152 mm (nominal) diameter were used where the Quaternary deposits were cohesive enough to prevent slumping of the borehole. Hollow-stem augers of 201 mm (nominal) diameter were used where necessary to provide a temporary casing to support the borehole walls as drilling advanced, minimizing the potential for extraneous materials to enter the borehole during installation. Soil descriptions were made directly from the solid-stemmed auger flights. Borehole logs and well completion details are attached.

A 51-mm (nominal) inside diameter ID schedule 40 or 49.3 mm (nominal) ID schedule-80, environmental-quality polyvinyl chloride (PVC) pipe, with a machined-slotted 0.5. mm width (No. 20-slot) screen was placed in each drillhole. The screen lengths were generally 3 or 6 m long, but varied occasionally according to the stratigraphy. 10/20 silica sand was used as a filter pack around the well screen. The silica sand was placed from 0.1 to 0.3 m above the top of the well screen to accommodate any settling, and to prevent contact between the bentonite seal (described below) and the well screen.

To avoid the use of PVC glue and primer, which can potentially introduce trace concentrations of organic substances, the 51-mm PVC screens and all plain pipe section were machined with threaded flush joints. Screen bottoms were closed with a heat-welded seal or threaded-end cap. Additionally, after machining, all PVC goods were cleaned by the supplier. Cleaning is necessary to remove machine oil and other extraneous substances. According to practice accepted by the United States Environmental Protection Agency (U.S. EPA), cleaning is performed with a non-phosphate detergent and potable water. Individual pieces were then sealed in plastic bags.

A primary water-tight seal was placed above the sand pack using bentonite tablets. Typically, this seal is adequate to prevent direct leakage between the sand pack and backfill material. However, to further ensure hydraulic isolation between the ground surface and other potential water-bearing horizons, the remaining annulus was backfilled to between 0.1 and 0.3 mbgs with hydrated bentonite chips and surface cuttings were placed to surface.

A 1.5 m length of 141-mm (nominal) diameter protective steel surface casing was installed around the PVC pipe to approximately 0.75 m depth into the drillhole. This helped protect the piezometer from physical damage. The casing had a lockable cap. A soil mound at surface was placed around the casing to deflect surface runoff. The casing was locked to prevent tampering.

Rotary Drilling Procedures – Monitoring Well

Mud rotary rigs operated by SDS Drilling Div. of Boart Longyear, and Lang Exploratory Drilling were used for the Basal Aquifer and Devonian Waterways Formation monitoring well installations in 2006. Rotary rigs operated by SDS Drilling Div. of Boart Longyear were used for installations in 2007. This type of rig is used for coring, and in most cases the monitoring well was installed in the core hole. Core samples were sealed on site and transported to Calgary for description by Shell geologists. After drilling, and before well installation, the corehole was logged by Precision Drilling of Calgary, Alberta, using a suite of geophysical tools.

For the groundwater monitoring wells, a 49.3-mm (nominal) ID, schedule 80, environmental-quality PVC pipe, with a machine-slotted, 0.020-slot screen was placed in each drillhole. Screen length varied with formation thickness, although most wells had screen length between 3 and 6 m long. 10/20 silica sand was used as a filter pack around each well screen. The silica sand was placed from 0.3 to 12 m above the top of the well screen to prevent contact between the bentonite seal (described below) and the well screen.

To avoid the use of PVC glue and primer, which can potentially introduce trace concentrations of organic substances, the PVC screens and all plain pipe section were machined with threaded flush joints. Screen bottoms were closed with a heat-welded seal or threaded-end cap.

Additionally, after machining, all PVC goods were cleaned by the supplier. Cleaning is necessary to remove machine oil and other extraneous substances. According to practice accepted by the U.S. EPA, cleaning was performed with a non-phosphate detergent and clean/potable water. Individual pieces were then sealed in plastic bags.

A primary water-tight seal was placed above the sand pack using coated bentonite tablets. Typically, this seal is adequate to prevent direct leakage between the sand pack and backfill material. However, to further ensure hydraulic isolation between the ground surface and other potential water-bearing horizons, the remaining annulus was grouted to surface with bentonite grout.

A 1.5 m length of 141-mm (nominal) diameter protective steel surface casing was installed around the PVC pipe to approximately 0.75 m depth into the drillhole. This helped protect the monitoring well from physical damage. The casing had a lockable cap. A soil mound at surface was placed around the casing to deflect surface runoff. The casing was locked to prevent tampering.

Sonic Drilling Procedures – Monitoring Well

A sonic rig operated by SDS Drilling Div. of Boart Longyear was used for installation of monitoring wells within the Pleistocene Channel in 2006. This type of drilling rig is well suited for drilling in unconsolidated, saturated, coarse-grained deposits. Follow drilling, and prior to well installation, the borehole was logged by Precision Drilling of Calgary, Alberta, using a suite of geophysical tools.

For the groundwater monitoring wells, a 49.3-mm (nominal) ID, schedule 80, environmental-quality PVC pipe, with a machine-slotted, 0.5 mm width (No. 20-slot) screen was placed in each drillhole. Screen lengths varied from about 2.5 to 4.3 m in length. 10/20 silica sand was used as a filter pack around the well screen. The silica sand was placed from 0.3 to 12 m above the top of the well screen to prevent contact between the bentonite seal (described below) and the well screen.

To avoid the use of PVC glue and primer, which can potentially introduce trace concentrations of organic substances, the PVC screens and all plain pipe section were machined with threaded flush joints. Screen bottoms were closed with a heat-welded seal or threaded-end cap.

Additionally, after machining, all PVC goods were cleaned by the supplier. Cleaning is necessary to remove machine oil and other extraneous substances. According to practice accepted by the U.S. EPA, cleaning was performed with a non-phosphate detergent and clean/potable water. Individual pieces were then sealed in plastic bags.

A primary water-tight seal was placed above the sand pack using coated bentonite tablets. Typically, this seal is adequate to prevent direct leakage between the sand pack and backfill material. However, to further ensure hydraulic isolation between the ground surface and other potential water-bearing horizons, the remaining annulus was grouted to surface with bentonite grout.

A 1.5 m length of 141-mm (nominal) diameter protective steel surface casing was installed around the PVC pipe to approximately 0.75 m depth into the drillhole. This helped protect the monitoring well from physical damage. The casing had a lockable cap. A soil mound at surface was placed around the casing to deflect surface runoff. The casing was locked to prevent tampering.

Jackpine Expansion Mining Area Logs

WorleyParsons Komex
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Borehole # P06-1620-SQ/

PROJECT # F35772801 *P06-1620-4*

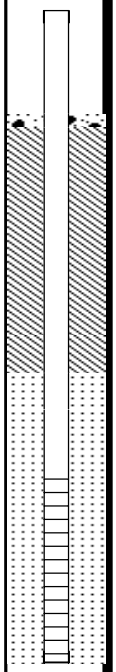
Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 01-Feb-06
Compiled by: FR

Northing: 6354386.05
Easting: 480363.79
Elevation: 288.03 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
0		Ground Surface
		MUSKEG (0.00-4.50 m) Reddish brown; frozen to 0.60 m; wet at 0.60 m; rootlets.
		At 0.75-4.50 m: As above; saturated.
4.50		***SANDY CLAY (4.50-4.70 m)*** Brown; moist; with gastropods.
4.70		***SAND (4.70-5.25 m)*** Grey; fine-grained sand; light grey stringer at 5.00-5.10 m; clean.
5.25		End of Borehole

Gamma (cps): 0 2.5 5 7.5 10
Conductivity (mS/m): 0 2.5 5 7.5 10



Well Details

Stick-Up 0.89 m

Surface Cuttings (0-0.10 m)

49.3 mm ID Sch 80 PVC pipe

Hydrated Bentonite Chips (0.10-0.21 m)

Top of Sand at 2.10 m
10/20 Frac Sand (2.10-2.40 m)
Muskeg Natural Pack (2.40-4.45 m)
Top of Screen at 2.95 m

1.52 m x 49.3 mm ID Sch 80 PVC Solid Stem Borehole (254 mm diameter)

Bottom of Screen at 4.45 m
T.D. of Borehole at 5.25 m

WorleyParsons Komex
resources & energy

Borehole # P06-1623-SQ/

PROJECT # F35772801 *P06-1623-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 06-Feb-06
Compiled by: FR

Northing: 6354943.14
Easting: 478551.20
Elevation: 285.66 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 1.10 m
0		Ground Surface					
		SAND AND GRAVEL (0.00-4.50 m) Dark brown; damp; coarse-grained sand; some gravel; some clay.					Surface Cuttings (0-0.30 m) 49.3 mm ID Sch 80 PVC pipe
1		At 0.50-0.75 m: Reddish brown; fine-grained sand; clayey; iron staining.					Hydrated Bentonite Chips (0.30-1.00 m)
		At 0.75-2.25 m: Reddish brown; wet at 1.60 m; coarse-grained sand; subrounded; some clay; gravel > 1 cm; iron; possibly minor bitumen. 40 %					Hydrated Bentonite Pellets (1.00-1.35 m)
2							Top of Sand at 1.35m Top of Screen at 1.50 m 10/20 Frac Sand (13.5-4.50 m)
		At 2.25-4.50 m: As above; poor recovery; bitumen evident.					
3							3.05 m x 49.3 mm ID Sch 80 PVC
4							Hollow Stem Borehole (254 mm diameter)
		SAND (4.50-7.80 m) Light grey; very coarse-grained sand; some clay or siltstone matrix; very hard drilling;					Bottom of Screen at 4.50 m T.D. of Borehole at 4.50 m
5		At 4.80-5.25 m: Light grey; very coarse-grained sand; some silt.					
		At 5.25-5.85 m: As above; grey.					
6		At 5.85-6.75 m: Grey; wet; very fine-grained sand.					
		At 6.75-7.80 m: As above; obvious bitumen at bottom.					
7							
8		***CLAY (7.80-9.25 m)*** Brown; damp; firm; low plasticity; some grey mottling; strong bitumen odour.					

WorleyParsons Komex
resources & energy

Borehole # P06-1623-SQ/

PROJECT # F35772801 *P06-1623-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 06-Feb-06
Compiled by: FR

Northing: 6354943.14
Easting: 478551.20
Elevation: 285.66 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
		SAND (9.25-9.75 m) Dark brown to black; fine-grained sand; bitumen.					
10		***CLAYEY SAND (9.75-14.25 m)*** Dark brown; fine-grained sand; bitumen odour.					
11		At 11.25-12.75 m: As above; some pebbles.					
12							
13		At 12.75-14.25 m: As above; soft; medium plasticity.					
14							
		End of Borehole					
15							
16							
17							
18							

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resources & energy

Borehole # P06-1629-SQ/

PROJECT # F35772801 *P06-1629-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 01-Feb-06
Compiled by: FR

Northing: 6355831.65
Easting: 483697.68
Elevation: 294.00 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.93 m
0		Ground Surface					Surface Cuttings (0-0.10 m) 49.3 mm ID Sch 80 PVC pipe
		MUSKEG (0.00-2.95 m) Reddish brown; damp; some woody material.					Hydrated Bentonite Chips (0.10-1.00 m)
1							Top of Sand at 1.00 m 10/20 Frac Sand (1.00-3.75 m)
2							Top of Screen at 2.25 m
3		***SAND (2.95-3.75 m)*** Dark grey; coarse-grained; poorly sorted; medium-grained gravels; subrounded to subangular; 15 cm sand muskeg mix at 3.20-3.35 m.					1.52 m x 49.3 mm ID Sch 80 PVC Solid Stem Borehole (152 mm diameter)
4							Bottom of Screen at 3.75 m T.D. of Borehole at 3.75 m
5							
6							
7							
8		At 8.25-12.75 m: Damp to moist; firmer.					

WorleyParsons Komex
resources & energy

Borehole # P06-1629-SQ/

PROJECT # F35772801 *P06-1629-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 01-Feb-06
Compiled by: FR

Northing: 6355831.65
Easting: 483697.68
Elevation: 294.00 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		At 9.75-11.25 m: Less bitumen; coal clast at 10.50 m.					
11		At 11.25-12.75 m: More bitumen.					
12							
13		End of Borehole					
14							
15							
16							
17							
18							

WorleyParsons Komex
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Borehole # P06-1639-SQ/

PROJECT # F35772801 *P06-1639-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 02-Feb-06
Compiled by: FR

Northing: 6359166.82
Easting: 486419.46
Elevation: 294.90 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 1.04 m
0		Ground Surface					Surface Cuttings (0-0.10 m) 49.3 mm ID Sch 80 PVC pipe
		MUSKEG (0.00-4.15 m) Reddish brown; damp; some woody material; some rootlets. At 0.75-2.25 m: Wet.					Hydrated Bentonite Chips (0.10-1.90 m)
1							
2							Top of Sand at 1.90 m 10/20 Frac Sand mixed with Muskeg (1.90-3.95 m) Top of Screen at 2.45 m
3							1.52 m x 49.3 mm ID Sch 80 PVC Solid Stem Borehole (152 mm diameter)
4		***SAND (4.15-5.25 m)*** Dark grey; wet; fine-grained sand; gravels; rafted oil sand.					Bottom of Screen at 3.75 m T.D. of Borehole at 3.75 m
5		End of Borehole					
6							
7							
8							

WorleyParsons Komex
resources & energy

Borehole # P06-1641-SQ/

PROJECT # F35772801 *P06-1641-21*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 28-Feb-06
Compiled by: J. Eastman

Northing: 6359224.89
Easting: 477356.00
Elevation: 347.71 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.72 m
0		Ground Surface					Surface Cuttings (0-0.30 m)
		FLUVIAL SAND (0.00-0.76 m) Medium brown; frozen to 0.30 m; dry; loose; trace silt; fine- to medium-grained; well graded; poorly sorted; trace gravels maxiumum size 20 mm; angular; trace fresh vegetation near surface.					49.3 mm ID Sch 80 PVC pipe
1		***COLLUVIUM SAND (0.76-1.82 m)*** Orangish brown; dry; loose; trace dark brown sand; trace pink clay; fine- to medium-grained sand; poorly graded; well sorted; laminated; carbonates present; trace rootlets.					Hydrated Bentonite Chips (0.30-1.00 m)
2		***FLUVIAL SAND (1.82-2.90 m)*** Light brown to dark brown; dry; loose; fine-grained sand; trace silt; poorly graded; well sorted; stratified; carbonates present.					
3		***SAND (2.90-3.96 m)*** McMurray like formation; black; moist; very dense; fine- to medium-grained; trace silt; rare gravel; subrounded; maximum size 30 mm; trace coal fragments.					Cuttings (1.00-7.75 m)
4		***FLUVIAL SAND (3.96-20.88 m)*** Light brown; dry; loose; fine-grained sand; trace silt; trace medium brown and dark brown lamination; swirling sand; poorly graded; very well sorted; uniform.					
5							
6							
7							
8							

WorleyParsons Komex
resources & energy

Borehole # P06-1641-SQ/

PROJECT # F35772801 *P06-1641-21*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 28-Feb-06
Compiled by: J. Eastman
Northing: 6359224.89
Easting: 477356.00
Elevation: 347.71 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / ppm 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10							
11							
12							Hydrated Bentonite Chips (7.75-16.10 m)
13							
14							
15		At 14.48-17.22 m: Light brown to dark brown; damp; compact; fine- to very fine-grained sand; silty; swirling sand; poorly graded; well sorted; uniform.					
16							Hydrated Bentonite Pellets (16.10-16.65 m)
17		At 17.22-20.88 m: Wet; compact; rapid dilatancy; well sorted; trace coal fragments.					Top of Sand at 16.65 m Natural Pack Sand (16.65-20.70 m)
18							Top of Screen at 17.70 m S.W.L. on Mar. 1/06 17.68 m bgs 3.05 m x 49.3 mm ID Sch 80 PVC Solid Stem Borehole (254 mm diameter)

WorleyParsons Komex
resources & energy

Borehole # P06-1641-SQ/

PROJECT # F35772801 *P06-1641-21*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 28-Feb-06
Compiled by: J. Eastman

Northing: 6359224.89
Easting: 477356.00
Elevation: 347.71 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
19							
20							Bottom of Screen at 20.70 m T.D. of Borehole at 20.70 m
21		***OUTWASH SAND (20.88-25.15 m)*** Light brownish grey; wet; compact; fine-grained sand; trace silt; trace reworked McMurray sand; rare fine gravel (maximum size 15 mm); poorly graded; well sorted; uniform; rapid dilatancy; laminated; subrounded.					
22							
23		At 23.62-25.15 m: Light grey; trace clay lenses.					
24							
25							
26		***CLAY TILL (25.15-30.48 m)*** Dark brown; moist; stiff to very stiff; medium to high plasticity; trace pink sand lenses; trace medium grey silt lenses; trace light brown silt lenses; laminated; gritty; trace gravels (maximum size 55 mm); angular; trace coal fragments; carbonates present.					
27		At 26.67-29.72 m: Very stiff consistency.					
28							

WorleyParsons Komex
resources & energy

Borehole # P06-1641-SQ/

PROJECT # F35772801 *P06-1641-21*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 28-Feb-06
Compiled by: J. Eastman
Northing: 6359224.89
Easting: 477356.00
Elevation: 347.71 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
29		At 29.72-30.48 m: Hard consistency.					
30		***OUTWASH SAND (30.48-40.39 m)*** Light brownish grey; wet; compact; fine-grained sand; trace silt; trace reworked McMurray sand; trace clay lenses; poorly graded; well sorted; unifrom; rapid dilantancy; laminated.					
31							
32		At 31.24-34.29 m: Medium brownish grey; trace clay; trace coal fragments; rare coarse-grained sand grain (maximum size 3 mm); subrounded; trace coal fragments; slight bituminous odour.					
33							
34		At 34.29-37.95 m: Medium brown; loose to compact; fine- to coarse-grained sand.					
35							
36							
37							
38		At 37.95-40.39 m: Loose to compact; fine- to medium-grained sand; rare coarse-grained sand grain; rare fine gravel; trace coal fragments.					

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Borehole # P06-1641-SQ/

PROJECT # F35772801 *P06-1641-21*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 28-Feb-06
Compiled by: J. Eastman

Northing: 6359224.89
Easting: 477356.00
Elevation: 347.71 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
39							
40							
		End of Borehole					
41							
42							
43							
44							
45							
46							
47							
48							

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Borehole # P06-1650-SQ/

PROJECT # F35772801 *P06-1650-11*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 02-Feb-06
Compiled by: FR

Northing: 6360444.48
Easting: 480954.78
Elevation: 288.78 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.64 m
0		Ground Surface					
		MUSKEG (0.00-3.60 m) Light brown; frozen; some woody debris.					Surface Cuttings (0-0.10 m)
1		At 0.75-2.25 m: Reddish brown; becoming darker with depth; wet; woody material at depth; some mosses near top.					
2							49.3 mm ID Sch 80 PVC pipe
3							Hydrated Bentonite Chips (0.10-5.90 m)
4		***SANDY CLAY (3.60-4.00 m)*** Yellowish brown; moist; soft; gastropods. At 3.75-4.00 m: As above; some mollusks.					
		SILTY CLAY (4.00-4.20 m) Grey; moist; soft; medium to high plasticity.					
5		***SILTY SAND (4.20-5.25 m)*** Grey; wet; fine-grained sand; poorly sorted.					
		SAND (5.25-9.75 m) Grey; wet; fine- to coarse-grained sand; poorly sorted.					
6							
7							Hydrated Bentonite Pellets (5.90-7.70 m)
8							Top of Sand at 7.70 m Natural Pack Sand (7.70-11.60 m)
							Top of Screen at 8.60 m

WorleyParsons Komex
resources & energy

Borehole # P06-1650-SQ/

PROJECT # F35772801 *P06-1650-11*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 02-Feb-06
Compiled by: FR

Northing: 6360444.48
Easting: 480954.78
Elevation: 288.78 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		***SAND AND GRAVEL (9.75-11.75 m)*** Wet; clean; coarse-grained sand with cobbles > 3 cm; granitic; occasional blebs.					3.05 m x 49.3 mm ID Sch 80 PVC Hollow Stem Borehole (254 mm diameter)
11							
12		***CLAY TILL (11.75-15.75 m)*** Pinkish grey; moist; firm; medium plasticity; occasional coarse fragment. At 12.75-14.25 m: As above; pink.					Bottom of Screen at 11.60 m T.D. of Borehole at 11.60 m
13							
14							
15							
16		***CLAYEY SAND (15.75-17.25 m)*** Grey; fine-grained sand; coarse-grained sand at 16.85-17.25 m; abundant gravels; well rounded gravel and cobbles; bitumen odour.					
17							
18		***SAND AND GRAVEL (17.25-24.00 m)*** Grey; wet; coarse-grained sand to gravel; some clays; poorly sorted; angular to subangular; well rounded gravels. At 18.75-23.25 m: As above; bitumen blebs.					

WorleyParsons Komex
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Borehole # P06-1650-SQ/

PROJECT # F35772801 *P06-1650-11*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 02-Feb-06
Compiled by: FR

Northing: 6360444.48
Easting: 480954.78
Elevation: 288.78 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
19							
20							
21							
22							
23		At 23.25-24.00 m: As above; auger refusal at 24.0 m (change to rock bit).					
24		***SHALE (24.00-24.15 m)*** Possible shale; hand augering.					
		OIL SAND (24.15-27.75 m) Dark brown to black; fine-grained sand; broken gravels; rafted. At 24.45-27.75 m: Black; approximately 9-10 % bitumen.					
25							
26							
27							
28		End of Borehole					

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Borehole # P06-1655-SQ/

PROJECT # F35772801 *P06-1655-5*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 05-Feb-06
Compiled by: FR

Northing: 3630967.62
Easting: 485222.90
Elevation: 292.92 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / ppm 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.65 m
0		Ground Surface					Surface Cuttings (0-0.20 m)
		SAND (0.00-4.50 m) Reddish brown; damp; fine- to coarse-grained; some silt; poorly sorted.					49.3 mm ID Sch 80 PVC pipe Hydrated Bentonite Chips (0.20-0.95 m) Hydrated Bentonite Pellets (0.95-1.12 m) Top of Sand at 1.12 m Natural Pack Sand (1.12-5.13 m)
1		At 1.00-1.95 m: Grey; wet; coarse-grained; poorly sorted; fewer fine-grains than above.					Top of Screen at 2.13 m
2		At 1.95-4.50 m: Grey; wet; fine-grained sand; well sorted.					
3							
4							3.05 m x 49.3 mm ID Sch 80 PVC Hollow Stem Borehole (254 mm diameter)
5		End of Borehole					Bottom of Screen at 5.13 m T.D. of Borehole at 5.13 m
6							
7							
8							

WorleyParsons Komex
resources & energy

Borehole # P06-1664-SQ/

PROJECT # F35772801 *P06-1664-5*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 04-Feb-06
Compiled by: FR

Northing: 6361568.50
Easting: 483411.46
Elevation: 288.36 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ (0 25 50 75 100) • ppm • (0 100 300 500)	Well Data	Lab Analysis or Well Details
-1						Stick-Up 1.40 m
0	Ground Surface					
	MUSKEG (0.00-3.00 m) Reddish brown; frozen; some woody fragments.					Surface Cuttings (0-0.10 m)
	At 0.75-3.00 m: As above; wet; more compact at depth.					49.3 mm ID Sch 80 PVC pipe
1						
2						Hydrated Bentonite Chips (0.10-3.25 m)
3	***SILTY CLAY TO SANDY CLAY (3.00-3.75 m)*** Grey; wet; soft; minor sand lenses varying from fine- to coarse-grained sand; silty in lenses; some gastropods.					Hydrated Bentonite Pellets (3.25-3.50 m)
	SILTY SAND (3.75-5.00 m) Grey; wet; fine-grained at top; becoming coarse-grained at 4.20 m.					Top of Sand at 3.50 m 10/20 Frac Sand (3.50-5.25 m) Top of Screen at 3.75 m 3.05 m x 49.3 mm ID Sch 80 PVC Hollow Stem Borehole (254 mm diameter)
4						
5	***CLAY (5.00-5.25 m)*** Grey; wet; soft; high plasticity; some minor sands.					Bottom of Screen at 5.25 m T.D. of Borehole at 5.25 m
	End of Borehole					
6						
7						
8						

WorleyParsons Komex
resources & energy

Borehole # P06-1672-SQ/

PROJECT # F35772801 *P06-1672-25*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 01-Mar-06
Compiled by: FR

Northing: 6362877.87
Easting: 478325.55
Elevation: 350.02 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.73 m
0		Ground Surface					
		CLAYEY SAND (0.0-0.75 m) Light brown; dry; friable; some gravel.					
1		***SANDY CLAY TILL (0.75-1.50 m)*** Light reddish brown; dry; firm; friable.					49.3 mm ID Sch 80 PVC pipe
2		***SILT (1.50-6.75 m)*** Yellowish brown; dry. At 2.25-3.75 m: As above; some dark brown mottles.					
3							Surface Cuttings (0-7.00 m)
4		At 3.75-5.25 m: As above; some clay inclusions.					
5		At 5.25-6.75 m: As above; becoming damp; iron staining.					
6							
7		***CLAY TILL (6.75-7.50 m)*** Pink; moist; firm; medium plasticity; coarse fragments; coal; iron.					
8		***SAND (7.50-12.00 m)*** Yellowish brown; damp; fine-grained sand.					
9							Hydrated Bentonite Chips (7.00-11.25 m)

WorleyParsons Komex
resources & energy

Borehole # P06-1672-SQ/

PROJECT # F35772801 *P06-1672-25*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 01-Mar-06
Compiled by: FR

Northing: 6362877.87
Easting: 478325.55
Elevation: 350.02 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
10							
11		At 11.50-12.00 m: Black; damp; fine-grained sand; some clay clasts; organic.					Hydrated Bentonite Pellets (11.25-11.75 m)
12		***SILT (12.00-17.25 m)*** Brown; damp.					Top of Sand at 11.75 m
13		At 12.75-17.25 m: As above; some slight colour changes.					Natural Pack Sand (11.75-24.75 m)
14							
15							
16							
17		***SAND (17.25-29.25 m)*** Light brown; damp; fine-grained; well sorted.					
18							
19		At 18.75-20.25 m: As above; moist at 20.00 m					

WorleyParsons Komex
resources & energy

Borehole # P06-1672-SQ/

PROJECT # F35772801 *P06-1672-25*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 01-Mar-06
Compiled by: FR

Northing: 6362877.87
Easting: 478325.55
Elevation: 350.02 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
20							
21		At 21.00-21.75 m: Brown; wet; very fine-grained sand.					
22		At 21.75-24.75 m: As above; slightly coarser than above.					Top of Screen at 21.75 m 3.05 m x 49.3 mm ID Sch 80 PVC Hollow Stem Borehole (254 mm diameter)
23							
24							
25		At 24.75-26.25 m: As above; occasional light brown clay till clasts > 2 cm.					Bottom of Screen at 24.75 m T.D. of Borehole at 24.95 m
26		At 26.25-29.25 m: As above; no clasts.					
27							
28							
29		End of Borehole					
30							

WorleyParsons Komex
resources & energy

Borehole # P06-1699-SQ/

PROJECT # F35772801 *P06-1699-5*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 05-Feb-06
Compiled by: FR

Northing: 6364613.76
Easting: 482408.45
Elevation: 291.50 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ (0 25 50 75 100) • ppm • (0 100 300 500)	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.67 m
0		Ground Surface					
		MUSKEG (0.00-0.45 m) Dark brown; wet; some woody debris.					Surface Cuttings (0-0.10 m)
							49.3 mm ID Sch 80 PVC pipe
1		***SAND (0.45-4.50 m)*** Yellowish brown; wet; very fine-grained sand; well sorted.					Hydrated Bentonite Chips (0.10-1.50 m)
		At 0.75-2.25 m: Brown; fine- to coarse-grained sand; little silt; becoming siltier at bottom.					
2							Hydrated Bentonite Pellets (1.50-2.25 m)
		At 2.25-3.75 m: Light brown; fine-grained sand; silty at top ending at 2.50 m; below 2.50 m: well sorted; clean.					Top of Sand at 2.25 m 10/20 Frac Sand (2.25-5.64 m) Top of Screen at 2.64 m
3							
		At 3.75-4.50 m: As above; coarsening downwards; subrounded.					
4							3.05 m x 49.3 mm ID Sch 80 PVC Hollow Stem Borehole (254 mm diameter)
		SILTY CLAY (4.50-4.60 m) Grey; wet; soft.					
5		***SAND (4.60-5.64 m)*** Grey; wet; very fine-grained sand.					
		End of Borehole					Bottom of Screen at 5.64 m T.D. of Borehole at 5.64 m
6							
7							
8							

WorleyParsons Komex
resources & energy

Borehole # P06-1629-DQ/

PROJECT # F35772801 *P06-1629-13*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 01-Feb-06
Compiled by: FR

Northing: 6355830.44
Easting: 483698.81
Elevation: 294.04 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.70 m
0		Ground Surface					Surface Cuttings (0-0.10 m)
		MUSKEG (0.00-2.95 m) Reddish brown; damp; some woody material.					49.3 mm ID Sch 80 PVC pipe
1							
2							
3		***SAND (2.95-3.75 m)*** Dark grey; coarse-grained; poorly sorted; medium-grained gravels; subrounded to subangular; 15 cm sand muskeg mix at 3.20-3.35 m.					
4		***CLAYEY SAND (3.75-5.25 m)*** Dark brown; damp; firm; lean oil sand; very-fine grained sand.					
5							
		CLAY (5.25-6.75 m) Dark brown; damp; firm; fractured; lean oil sand in fractures; some minor grey silts.					
6							Hydrated Bentonite Chips (0.10-11.10 m)
		CLAYEY SAND (6.75-12.75 m) Dark brown; damp; firm; less clay than above; higher percent bitumen.					
7							
8		At 8.25-12.75 m: Damp to moist; firmer.					

WorleyParsons Komex
resources & energy

Borehole # P06-1629-DQ/

PROJECT # F35772801 *P06-1629-13*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 01-Feb-06
Compiled by: FR

Northing: 6355830.44
Easting: 483698.81
Elevation: 294.04 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		At 9.75-11.25 m: Less bitumen; coal clast at 10.50 m.					
11		At 11.25-12.75 m: More bitumen.					Hydrated Bentonite Pellets (11.10-11.40 m) Top of Sand at 11.40 m 10/20 Frac Sand (11.40-13.25 m) Top of Screen at 11.75 m
12							1.52 m x 49.3 mm ID Sch 80 PVC
13		End of Borehole					Hollow Stem Borehole (254 mm diameter) Bottom of Screen at 13.25 m T.D. of Borehole at 13.25 m
14							
15							
16							
17							
18							

WorleyParsons Komex
resources & energy

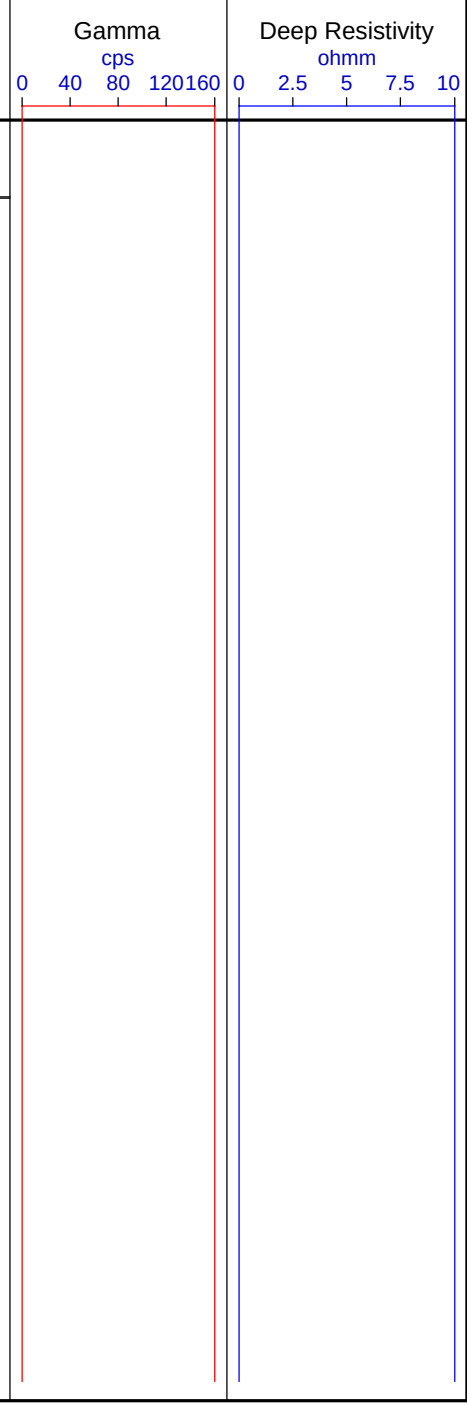
Borehole # SH06-1641-DQ

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Mar-06
Compiled by: P. Turnbull/D. Dillon
Northing: 6359204.12
Easting: 477332.88
Elevation: 347.35 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-2		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
8		
18		
28		
38		
48		





Well Details

Stick-Up 0.82 m
Sand (0-0.50m)

Hydrated Bentonite Chips
(0.50-10.00m)

Grout (10.00-44.00m)

Hydrated Bentonite Pellets
(44.00-46.30m)

Top of Sand at 46.3 m
10/20 Frac Sand

WorleyParsons Komex
resources & energy

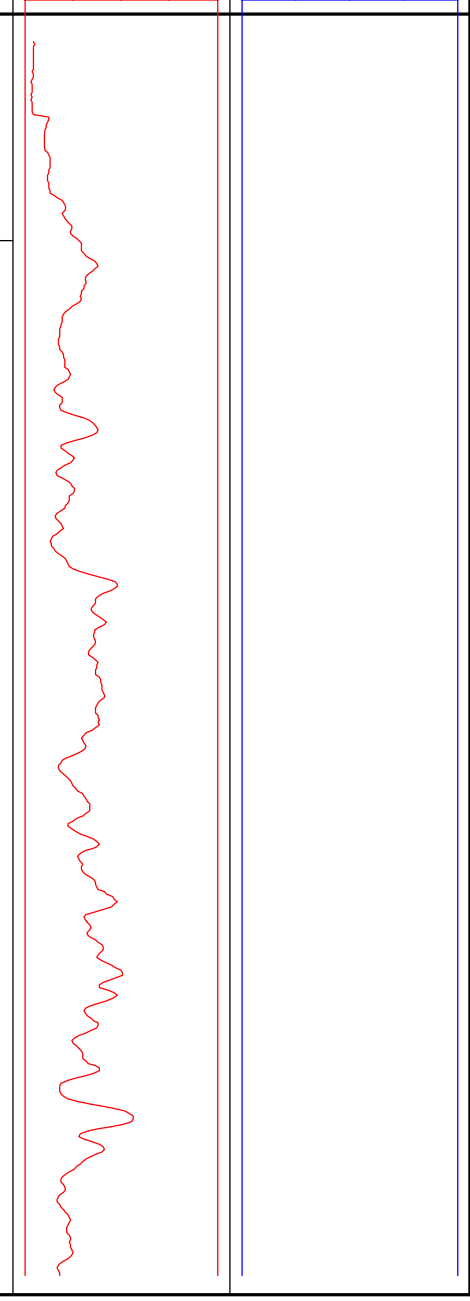
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PROJECT # F35772801

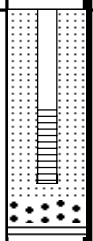
Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Mar-06
Compiled by: P. Turnbull/D. Dillon
Northing: 6359204.12
Easting: 477332.88
Elevation: 347.35 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
58		End of Borehole
68		
78		
88		
98		



Well Data



Well Details

Top of Screen at 52.0 m

3.05 m x 49.3 mm ID Sch 80 PVC
020 Slot Screen

Bottom of Screen at 55.0 m
Slough (56.5-57.0m)
TD of Borehole at 57.0 m

Sonic Drill Borehole
(127.0 mm diameter)

WorleyParsons Komex
resources & energy

Borehole # P06-1650-DQ/

PROJECT # F35772801 *P06-1650-19*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 02-Feb-06
Compiled by: FR

Northing: 6360443.69
Easting: 480952.07
Elevation: 288.71 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.43 m
0		Ground Surface					
		MUSKEG (0.00-3.60 m) Light brown; frozen; some woody debris.					Surface Cuttings (0-0.10 m)
1		At 0.75-2.25 m: Reddish brown; becoming darker with depth; wet; woody material at depth; some mosses near top.					
2							49.3 mm ID Sch 80 PVC pipe
3							
4		***SANDY CLAY (3.60-4.00 m)*** Yellowish brown; moist; soft; gastropods. At 3.75-4.00 m: As above; some mollusks.					
		SILTY CLAY (4.00-4.20 m) Grey; moist; soft; medium to high plasticity.					Hydrated Bentonite Chips (0.10-7.00 m)
5		***SILTY SAND (4.20-5.25 m)*** Grey; wet; fine-grained sand; poorly sorted.					
		SAND (5.25-9.75 m) Grey; wet; fine- to coarse-grained sand; poorly sorted.					
6							
7							
8							

WorleyParsons Komex
resources & energy

Borehole # P06-1650-DQ/

PROJECT # F35772801 *P06-1650-19*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 02-Feb-06
Compiled by: FR

Northing: 6360443.69
Easting: 480952.07
Elevation: 288.71 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		***SAND AND GRAVEL (9.75-11.75 m)*** Wet; clean; coarse-grained sand with cobbles > 3 cm; granitic; occasional blebs.					Slough (7.00-12.00 m)
11							
12		***CLAY TILL (11.75-15.75 m)*** Pinkish grey; moist; firm; medium plasticity; occasional coarse fragment. At 12.75-14.25 m: As above; pink.					Hydrated Bentonite Chips (12.00-13.10 m)
13							
14							
15							Hydrated Bentonite Pellets (13.10-16.85 m)
16		***CLAYEY SAND (15.75-17.25 m)*** Grey; fine-grained sand; coarse-grained sand at 16.85-17.25 m; abundant gravels; well rounded gravel and cobbles; bitumen odour.					Top of Sand at 16.85 m Natural Pack Sand (16.85-19.32 m)
17							Top of Screen at 17.60 m
18		***SAND AND GRAVEL (17.25-24.00 m)*** Grey; wet; coarse-grained sand to gravel; some clays; poorly sorted; angular to subangular; well rounded gravels. At 18.75-23.25 m: As above; bitumen blebs.					1.52 m x 49.3 mm ID Sch 80 PVC Hollow Stem Borehole (254 mm diameter)

WorleyParsons Komex
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Borehole # P06-1650-DQ/

PROJECT # F35772801 *P06-1650-19*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 02-Feb-06
Compiled by: FR

Northing: 6360443.69
Easting: 480952.07
Elevation: 288.71 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
19							Bottom of Screen at 19.30 m T.D. of Borehole at 19.32 m
20							
21							
22							
23		At 23.25-24.00 m: As above; auger refusal at 24.0 m (change to rock bit).					
24		***SHALE (24.00-24.15 m)*** Possible shale; hand augering.					
25		***OIL SAND (24.15-27.75 m)*** Dark brown to black; fine-grained sand; broken gravels; rafted. At 24.45-27.75 m: Black; approximately 9-10 % bitumen.					
26							
27							
28		End of Borehole					

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Borehole # SH06-1672-DQ

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 19-Mar-06
Compiled by: P. Turnbull
Northing: 6362857.60
Easting: 478339.66
Elevation: 350.04 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-2		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
8		
18		
28		
38		
48		

Gamma (cps): 0 40 80 120 160
Deep Resistivity (ohmm): 0 2.5 5 7.5 10



Well Data

Well Details

Stick-Up 0.76 m
Hydrated Bentonite Chips
(0-1.5m)

Grout (1.5-50.1m)

51 mm ID Sch 80 PVC pipe

Mud Rotary Borehole
(146mm diameter)

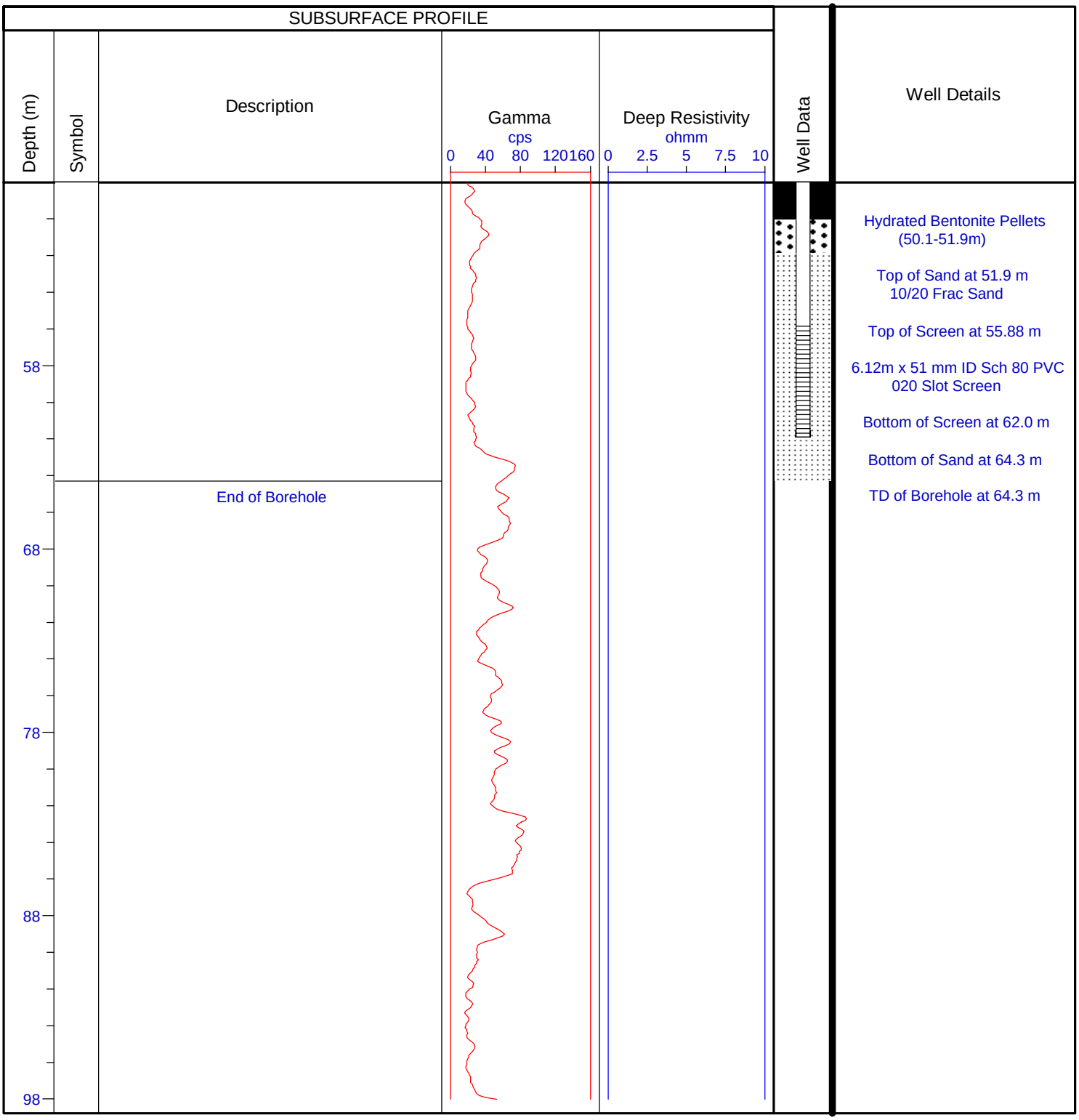
WorleyParsons Komex
resources & energy

Borehole # SH06-1672-DQ

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 19-Mar-06
Compiled by: P. Turnbull
Northing: 6362857.60
Easting: 478339.66
Elevation: 350.04 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

Borehole # P06-1699-DQ/

PROJECT # F35772801 *P06-1699-14*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 06-Feb-06
Compiled by: FR

Northing: 6364611.96
Easting: 482406.83
Elevation: 291.53 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.83 m
0		Ground Surface					Surface Cuttings (0-0.10 m)
		MUSKEG (0.00-0.45 m) Dark brown; wet; some woody debris.					49.3 mm ID Sch 80 PVC pipe
1		***SAND (0.45-4.50 m)*** Yellowish brown; wet; very fine-grained sand; well sorted. At 0.75-2.25 m: Brown; fine- to coarse-grained sand; little silt; becoming siltier at bottom.					Hydrated Bentonite Chips (0.10-2.50 m)
2		At 2.25-3.75 m: Light brown; fine-grained sand; silty at top ending at 2.50 m; below 2.50 m: well sorted; clean.					Top of Sand at 2.5 m
3							
4		At 3.75-4.50 m: As above; coarsening downwards; subrounded.					
		SILTY CLAY (4.50-4.60 m) Grey; wet; soft.					
5		***SAND (4.60-7.90 m)*** Grey; wet; very fine-grained sand.					
6							Natural Sand Pack (2.50-14.40 m)
7		At 6.75-7.90 m: As above; minor silt lenses.					
8		***SILTY CLAY (7.90-8.25 m)*** Grey; wet; soft.					
		SAND (8.25-14.25 m) Grey; wet; very fine-grained sand; some silt.					

WorleyParsons Komex
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Borehole # P06-1699-DQ/

PROJECT # F35772801 *P06-1650-14*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 06-Feb-06
Compiled by: FR

Northing: 6364611.96
Easting: 482406.83
Elevation: 291.53 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		At 9.75-12.45 m: As above; some minor bitumen deposits.					
11							
12		At 12.45-12.75 m: Light brown; coarse- to medium-grained sand; poorly sorted.					Top of Screen at 12.90 m
13							3.05 m x 49.3 mm ID Sch 80 PVC Hollow Stem Borehole (254 mm diameter)
14		At 12.75-14.25 m: As above; with bitumen nodules at 14.00-14.25 m.					Bottom of Screen at 14.4 m T.D. of Borehole at 14.4 m
		End of Borehole					
15							
16							
17							
18							

WorleyParsons Komex
resources & energy

Borehole # SH07-1712-DQ

PROJECT # F35772803 *1712-QUAT*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 12-Mar-07
Compiled by: D. Dillon
Northing: 6365284.55
Easting: 480308.85
Elevation: 339.35 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-1		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
9		
19		
29		
39		
49		

Gamma (cps): 0 50 100 150
Conductivity (mS/m): 0 100 200

Well Data

Well Details

Stick-Up 0.87 m

49.3 mm ID Sch 80 PVC pipe

Grout (0.00-46.50 m)

Hydrated Bentonite Pellets (46.50-50.00 m)

Top of Sand at 50.00 m

WorleyParsons Komex
resources & energy

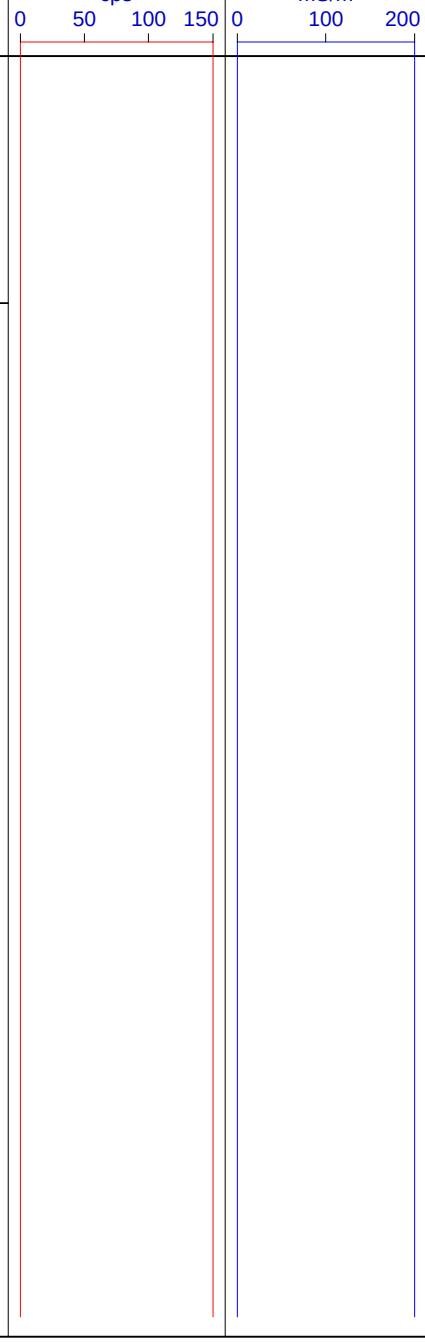
Borehole # SH07-1712-DQ

PROJECT # F35772803 *1712-QUAT*

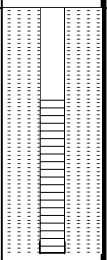
Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 12-Mar-07
Compiled by: D. Dillon
Northing: 6365284.55
Easting: 480308.85
Elevation: 339.35 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
60		End of Borehole
70		
80		
90		
100		



Well Data



Well Details

10/20 Frac Sand

Top of Screen at 53.80 m
6.20 m x 49.3 mm ID Sch 80 PVC
020 Slot Screen
Core Rig Borehole
(152 mm diameter)
Bottom of Screen at 60.00 m
Bottom of Sand at 60.00 m
T.D. of Borehole at 60.00 m

WorleyParsons Komex
resources & energy

Borehole # SH06-1638-PC/

PROJECT # F35772801 *SH06-1638*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 01-Mar-06
Compiled by: P. Turnbull/D. Dillon
Northing: 6358657.85
Easting: 483998.19
Elevation: 291.50 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 40 80 120 160	Deep Resistivity (ohmm) 0 2.5 5 7.5 10	Well Data	Well Details
-1		Ground Surface ***NO LITHOLOGY DATA AVAILABLE***				Stick-Up 1.0 m Hydrated Bentonite Chips (0-15.61m) 49.3 mm ID Sch 80 PVC pipe Sonic Drill Borehole (127mm diameter)
9						

WorleyParsons Komex
resources & energy

Borehole # SH06-1638-PC/

PROJECT # F35772801 *SH06-1638*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 01-Mar-06
Compiled by: P. Turnbull/D. Dillon
Northing: 6358657.85
Easting: 483998.19
Elevation: 291.50 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 40 80 120 160	Deep Resistivity (ohmm) 0 2.5 5 7.5 10	Well Data	Well Details
20						Hydrated Bentonite Pellets (15.61-16.46m) Sand - Natural Pack (16.46-17.37m) Top of Sand at 17.37 m 10/20 Frac Sand Top of Screen at 18.59 m 1.53 m x 49.3 mm ID Sch 80 PVC 020 Slot Screen Bottom of Screen at 20.12 m

WorleyParsons Komex
resources & energy

Borehole # SH06-1638-PC/

PROJECT # F35772801 *SH06-1638*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 01-Mar-06
Compiled by: P. Turnbull/D. Dillon
Northing: 6358657.85
Easting: 483998.19
Elevation: 291.50 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 40 80 120 160	Deep Resistivity (ohmm) 0 2.5 5 7.5 10	Well Data	Well Details
						Hydrated Bentonite Chips (20.73-25.91m)
		End of Borehole				TD of Borehole at 25.91 m
31						

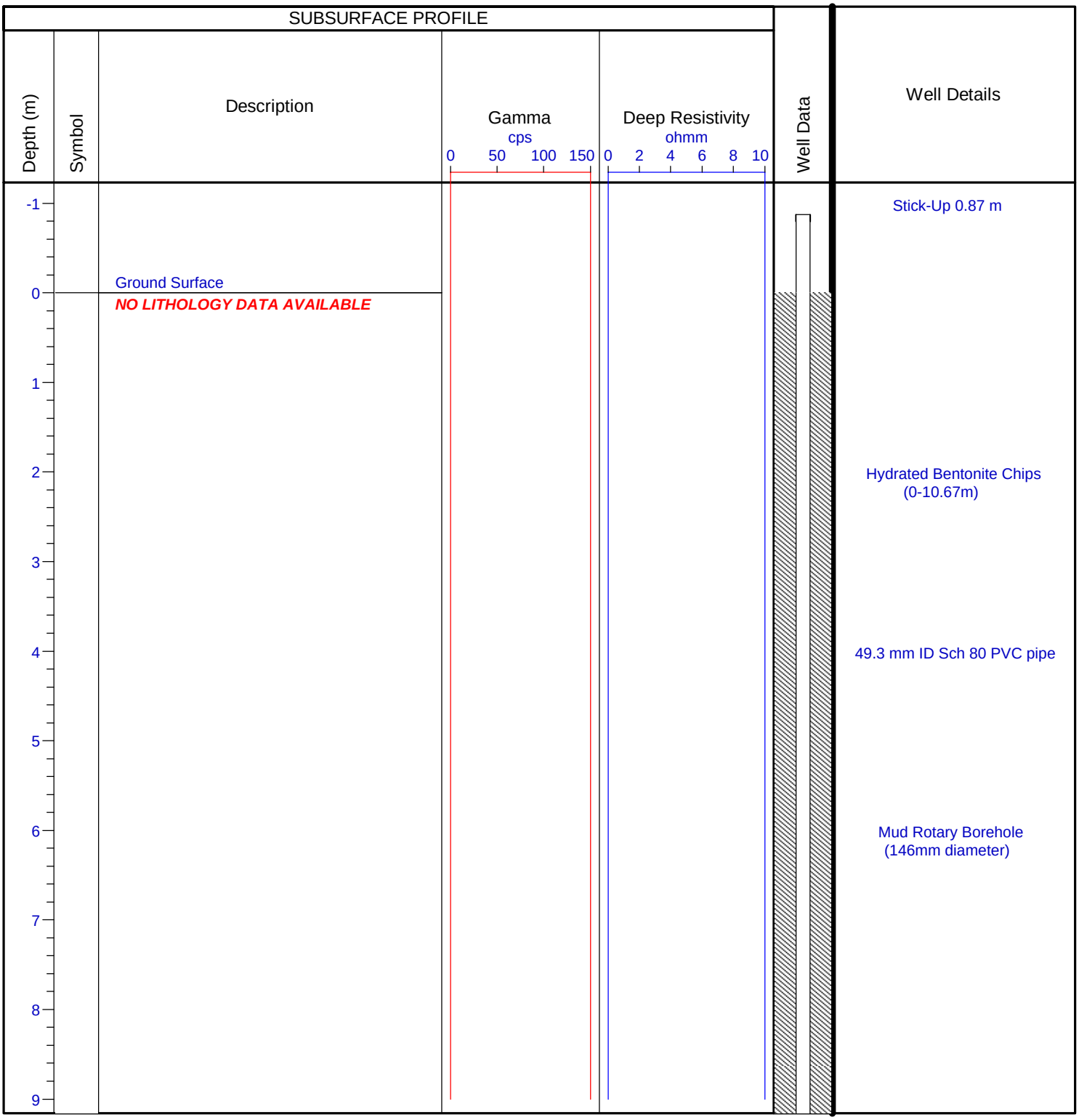
WorleyParsons Komex
resources & energy

Borehole # SH06-1663-PC/

PROJECT # F35772801 *SH06-1663*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull
Northing: 6361636.08
Easting: 482801.93
Elevation: 288.89 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

Borehole # SH06-1663-PC/

PROJECT # F35772801 *SH06-1663*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull

Northing: 6361636.08
Easting: 482801.93
Elevation: 288.89 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 2 4 6 8 10	Well Data	Well Details
10						
11						
12						Hydrated Bentonite Pellets (10.67-13.77m)
13						
14						Top of Sand at 13.77 m 10/20 Frac Sand
15						Top of Screen at 15.09 m 1.52 m x 49.3 mm ID Sch 80 PVC 020 Slot Screen
16						Bottom of Screen at 16.61 m
17						
18						
19						Hydrated Bentonite Chips

WorleyParsons Komex
resources & energy

Borehole # SH06-1698-PC

PROJECT # F35772801 *SH06-1698*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull
Northing: 6364086.72
Easting: 488266.09
Elevation: 293.39 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 2.5 5 7.5 10	Deep Resistivity (ohmm) 0 2.5 5 7.5 10	Well Data	Well Details
-1						Stick-Up 0.89 m
		Ground Surface				
		NO LITHOLOGY DATA AVAILABLE				
						Hydrated Bentonite Chips
						(0-28.04m)
9						

WorleyParsons Komex
resources & energy

Borehole # SH06-1698-PC

PROJECT # F35772801 *SH06-1698*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull
Northing: 6364086.72
Easting: 488266.09
Elevation: 293.39 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma cps 0 2.5 5 7.5 10	Deep Resistivity ohmm 0 2.5 5 7.5 10	Well Data	Well Details
						49.3 mm ID Sch 80 PVC pipe
						Sonic Drill Borehole
						(127mm diameter)
19						

WorleyParsons Komex
resources & energy

Borehole # SH06-1698-PC

PROJECT # F35772801 *SH06-1698*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull
Northing: 6364086.72
Easting: 488266.09
Elevation: 293.39 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 2.5 5 7.5 10	Deep Resistivity (ohmm) 0 2.5 5 7.5 10	Well Data	Well Details
29						Hydrated Bentonite Pellets (30.02-30.48m)

WorleyParsons Komex
resources & energy

Borehole # SH06-1698-PC

PROJECT # F35772801 *SH06-1698*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull
Northing: 6364086.72
Easting: 488266.09
Elevation: 293.39 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma cps 0 2.5 5 7.5 10	Deep Resistivity ohmm 0 2.5 5 7.5 10	Well Data	Well Details
						Top of Sand at 30.02 m
						Top of Screen at 30.48 m
						1.52 m x 49.3 mm ID Sch 80 PVC
						020 Slot Screen
						Hydrated Bentonite Chips
						(32.51-38.10m)
		End of Borehole				
39						TD of Borehole at 38.10 m

WorleyParsons Komex
resources & energy

Borehole # SH06-1720-PC

PROJECT # F35772801 *SH06-1720*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull

Northing: 6366535.75
Easting: 486441.49
Elevation: 292.49 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 25 50	Well Data	Well Details
-1						Stick-Up 0.90 m
0		Ground Surface ***NO LITHOLOGY DATA AVAILABLE***				
1						
2						
3						
4						
5						
6						Hydrated Bentonite Pellets (0-21.34m)
7						
8						
9						

WorleyParsons Komex
resources & energy

Borehole # SH06-1720-PC

PROJECT # F35772801 *SH06-1720*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull
Northing: 6366535.75
Easting: 486441.49
Elevation: 292.49 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 25 50	Well Data	Well Details
10						
11						
12						49.3 mm ID Sch 80 PVC pipe
13						
14						Sonic Drill Borehole (127mm diameter)
15						
16						
17						
18						
19						

WorleyParsons Komex
resources & energy

Borehole # SH06-1720-PC

PROJECT # F35772801 *SH06-1720*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull

Northing: 6366535.75
Easting: 486441.49
Elevation: 292.49 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 25 50	Well Data	Well Details
20						
21						Hydrated Bentonite Pellets (21.34-22.56m)
22						Top of Sand at 22.56 m 10/20 Frac Sand
23						
24						Top of Screen at 24.08 m
25						1.52m x 49.3 mm ID Sch 80 PVC 020 Slot Screen Bottom of Screen at 25.60 m
26						
27						
28						Hydrated Bentonite Chips (25.91-35.05m)
29						

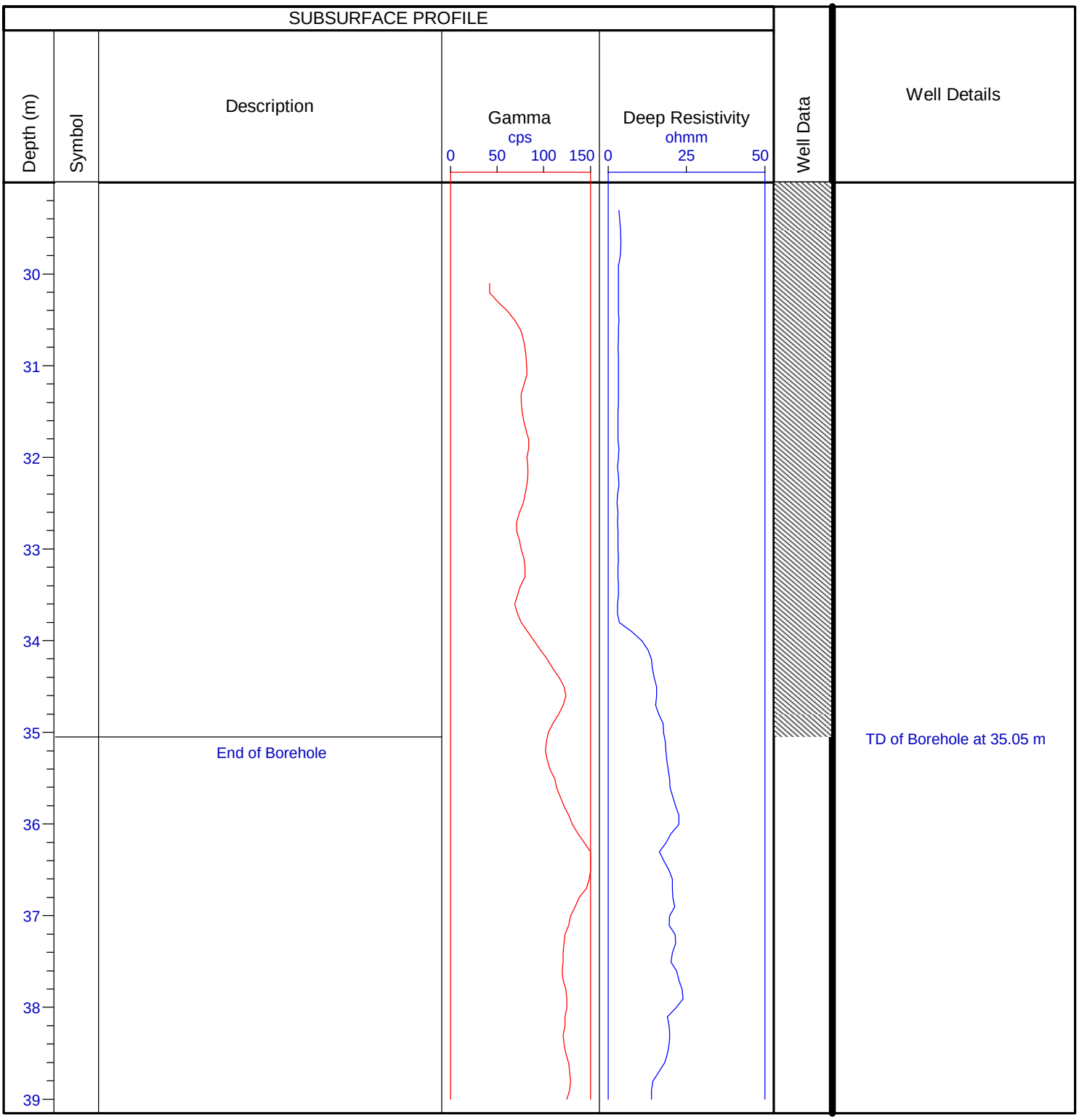
WorleyParsons Komex
resources & energy

Borehole # SH06-1720-PC

PROJECT # F35772801 *SH06-1720*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: T. Sharp/P. Turnbull
Northing: 6366535.75
Easting: 486441.49
Elevation: 292.49 m asl (Ground)

SUBSURFACE PROFILE



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resources & energy

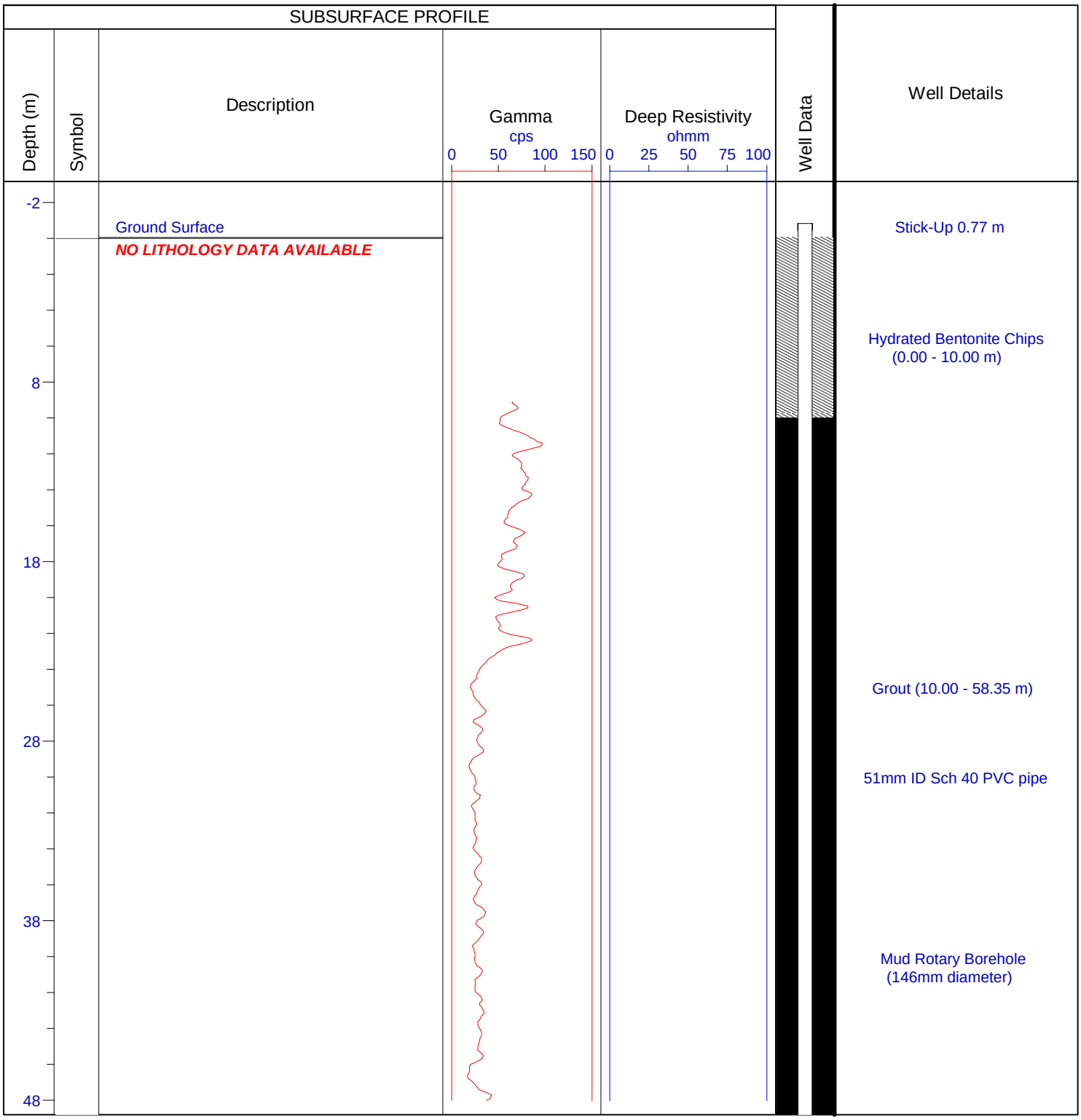
Borehole # SH06-1620-BS/

PROJECT # F3577801 *SH06-1620*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 05-Feb-06
Compiled by: P. Turnbull/D. Dillon

Northing: 6354355.22
Easting: 480346.07
Elevation: 288.01 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

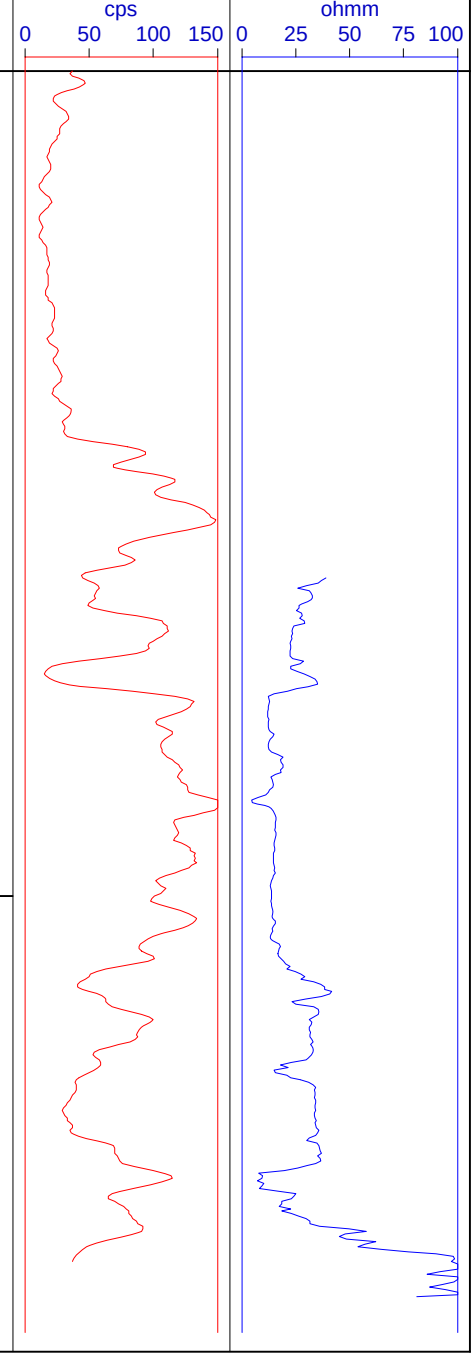
Borehole # SH06-1620-BS/

PROJECT # F3577801 *SH06-1620*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 05-Feb-06
Compiled by: P. Turnbull/D. Dillon
Northing: 6354355.22
Easting: 480346.07
Elevation: 288.01 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
58		
68		
78		End of Borehole
88		
98		



Well Data

Well Details

Hydrated Bentonite Pellets

Top of Sand at 61.10 m.
10/20 Frac Sand

Top of Screen at 68.25 m.

6.09 m x 49.3 mm ID Sch 80 PVC
020 Slot Screen

Bottom of Screen at 74.34 m

Hydrated Bentonite Pellets
(74.8-76.0m)

Sand (76.0-80.3m)
10/20 Frac Sand

Slough (80.3-80.7m)

TD of Borehole at 80.7 m.

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Borehole # SH06-1636-BS/

PROJECT # F35772801 *SH06-1636*

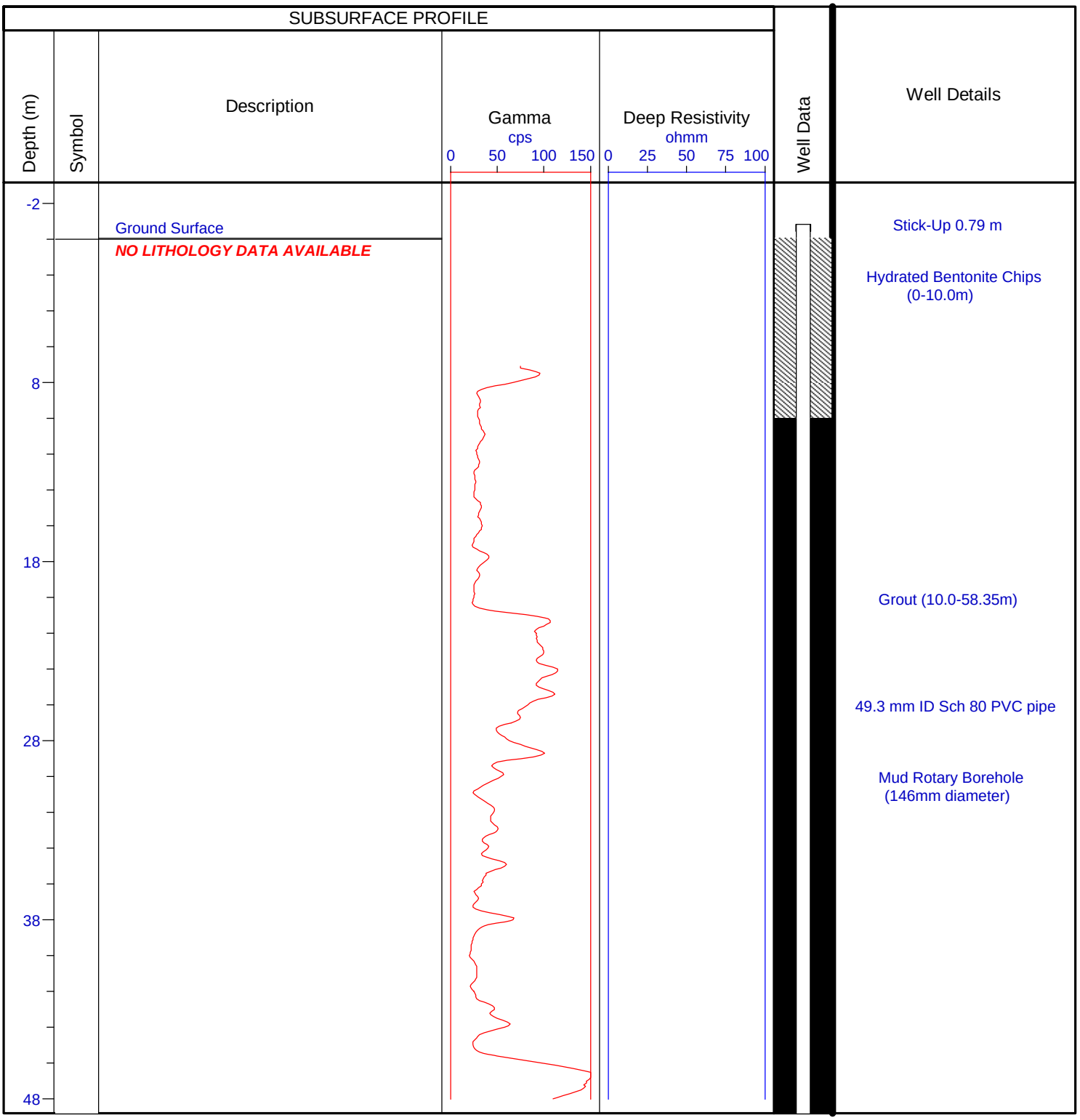
Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 04-Feb-06
Compiled by: P. Turnbull/D. Dillon

Northing: 6358647.43
Easting: 482797.76
Elevation: 289.20 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-2		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
8		
18		
28		
38		
48		

Gamma (cps): 0 50 100 150
Deep Resistivity (ohmm): 0 25 50 75 100



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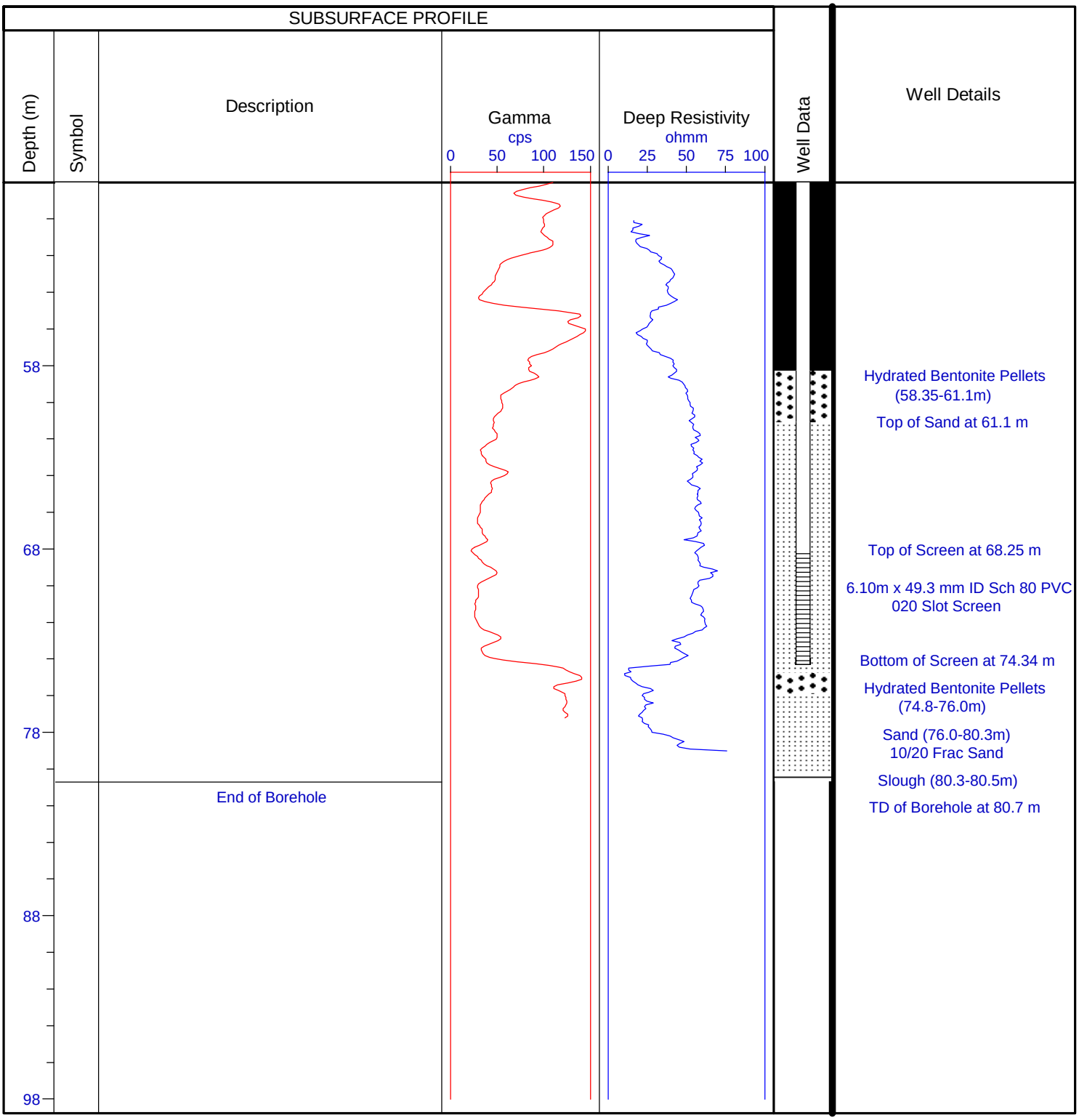
Borehole # SH06-1636-BS/

PROJECT # F35772801 *SH06-1636*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 04-Feb-06
Compiled by: P. Turnbull/D. Dillon

Northing: 6358647.43
Easting: 482797.76
Elevation: 289.20 m asl (Ground)

SUBSURFACE PROFILE



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resources & energy

Borehole # SH06-1641-BS

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 05-Feb-06
Compiled by: P. Turnbull
Northing: 6359206.13
Easting: 477325.59
Elevation: 347.49 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 250 500 700	Well Data	Well Details
-2		Ground Surface				Stick-Up 0.74 m
		NO LITHOLOGY DATA AVAILABLE				Grout (0-103.90m)
8						49.3 mm ID Sch 80 PVC pipe
						Mud Rotary Borehole (146mm diameter)
18						
28						
38						
48						

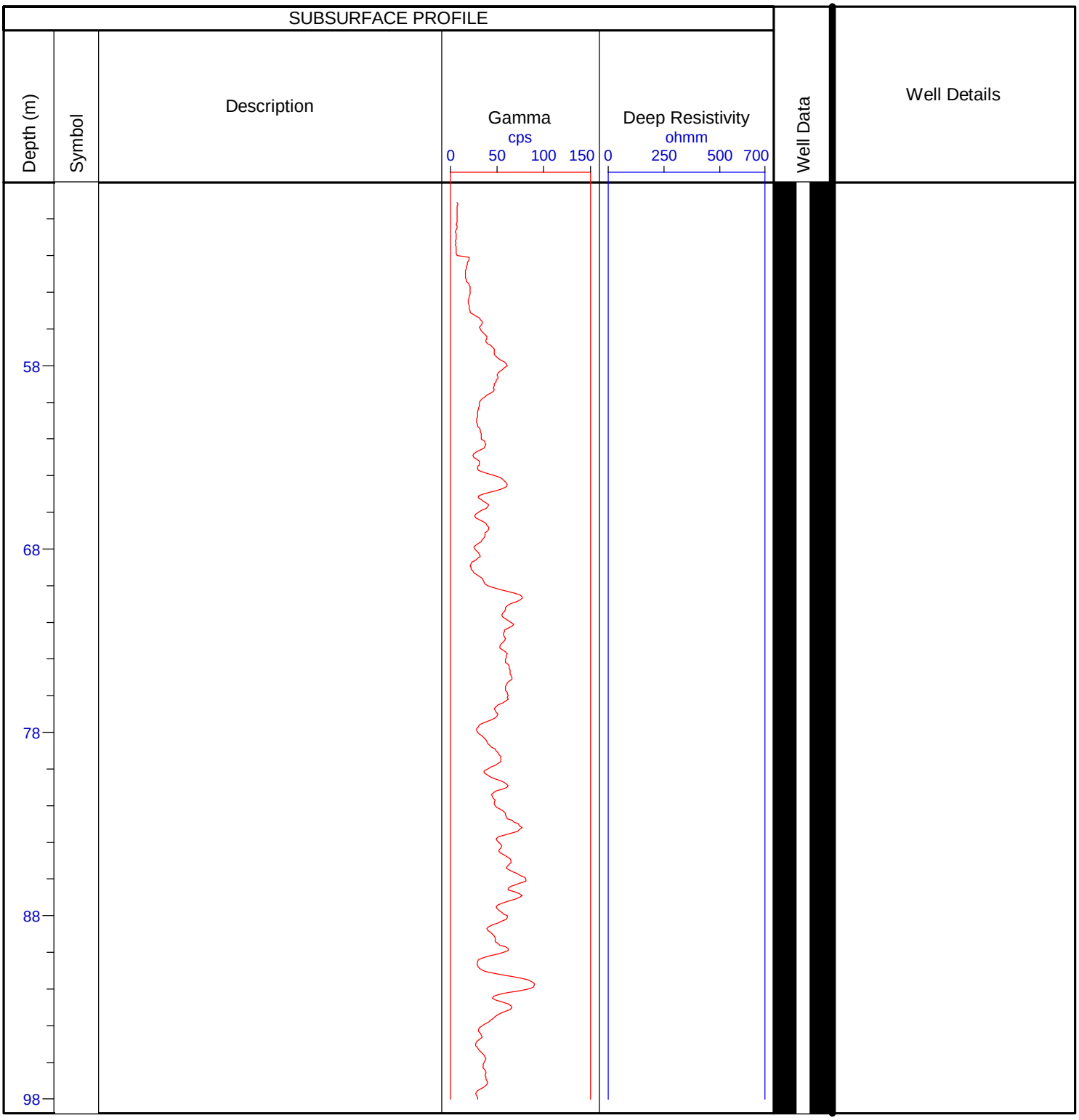
WorleyParsons Komex
resources & energy

Borehole # SH06-1641-BS

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 05-Feb-06
Compiled by: P. Turnbull
Northing: 6359206.13
Easting: 477325.59
Elevation: 347.49 m asl (Ground)

SUBSURFACE PROFILE



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resources & energy

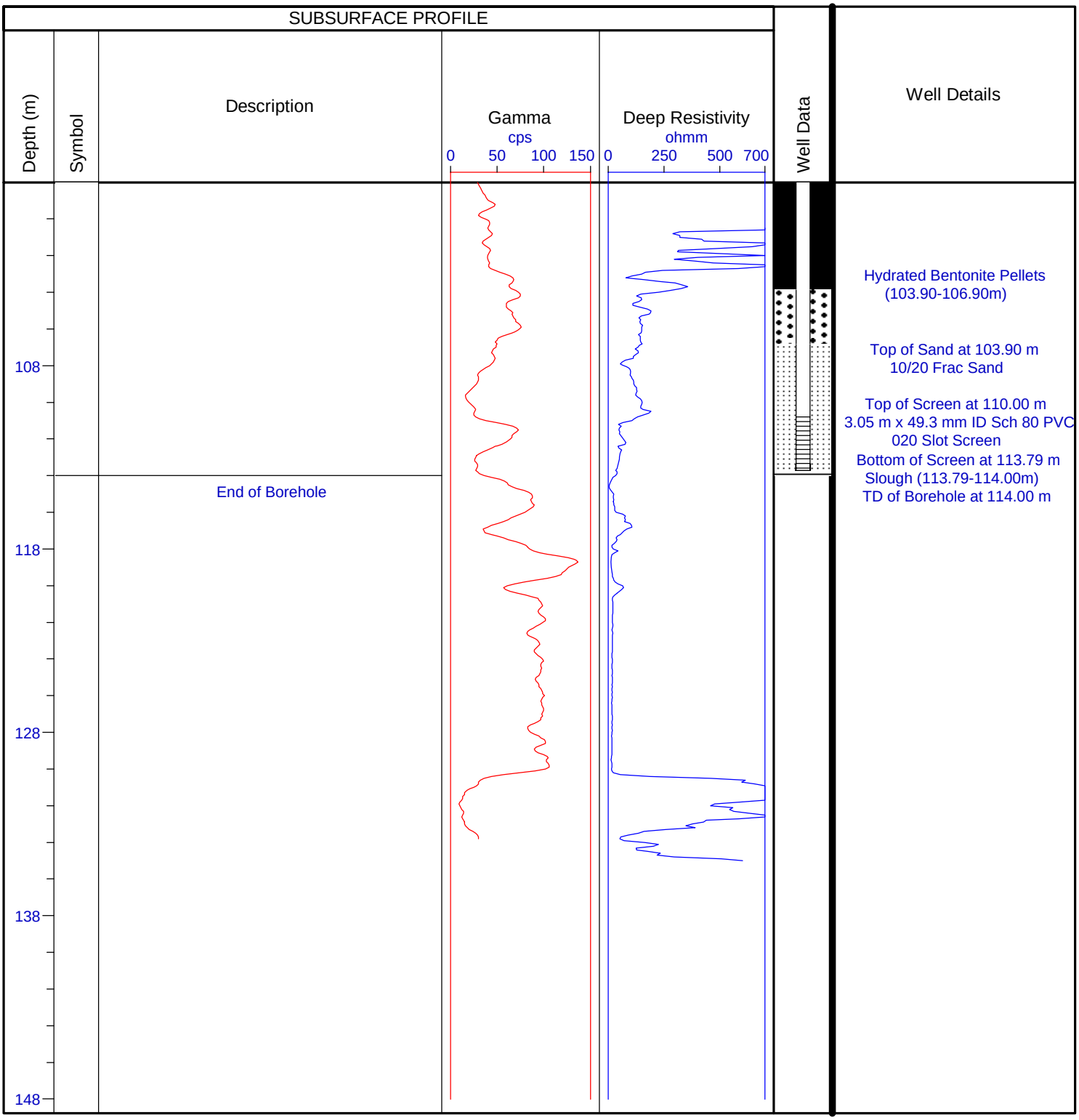
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PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 05-Feb-06
Compiled by: P. Turnbull

Northing: 6359206.13
Easting: 477325.59
Elevation: 347.49 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

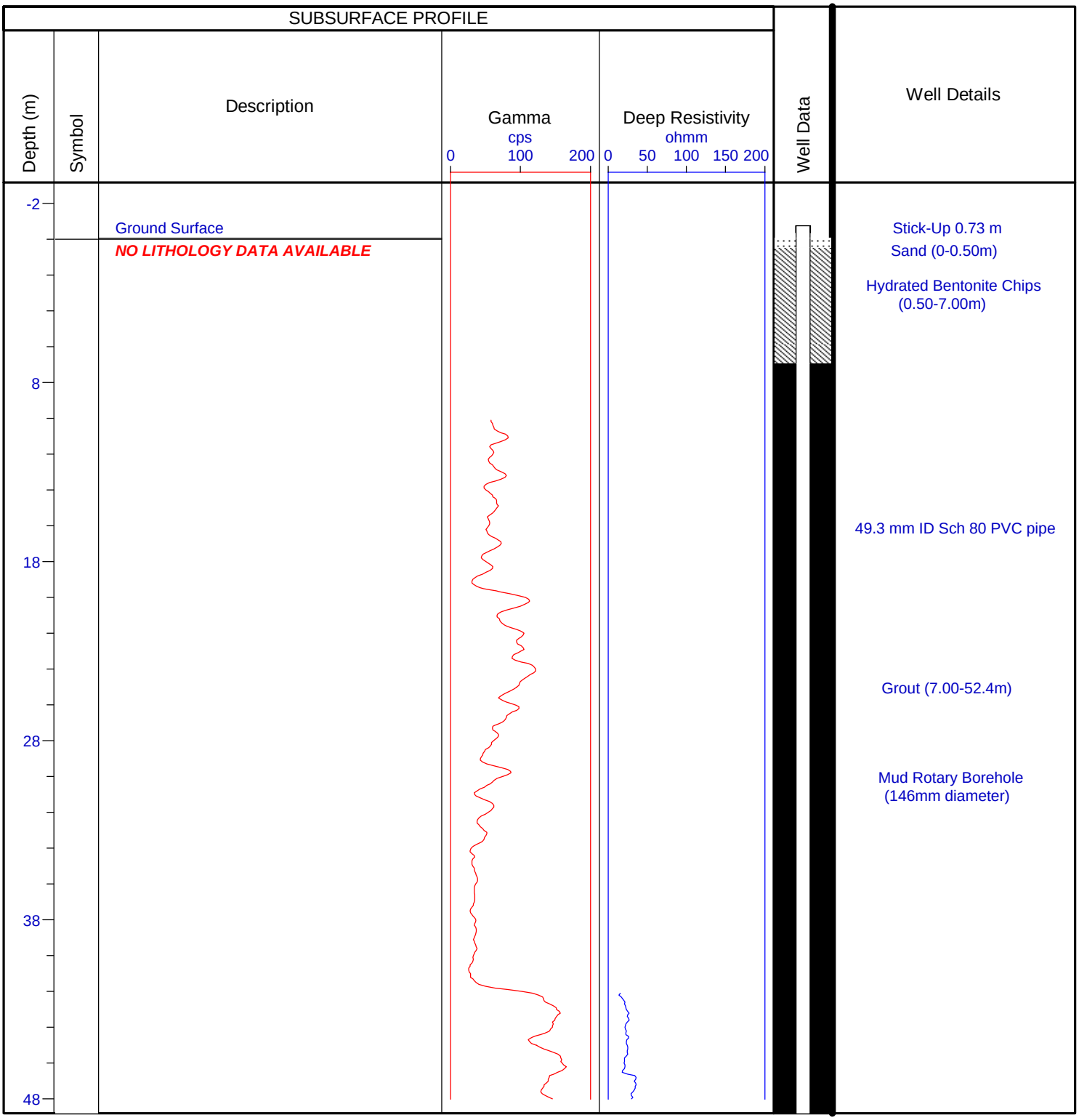
Borehole # SH06-1655-BS

PROJECT # F35772801 *SH06-1655-D*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: ???
Compiled by: P. Turnbull/D. Dillon

Northing: 6361003.79
Easting: 485235.62
Elevation: 293.08 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

Borehole # SH06-1655-BS

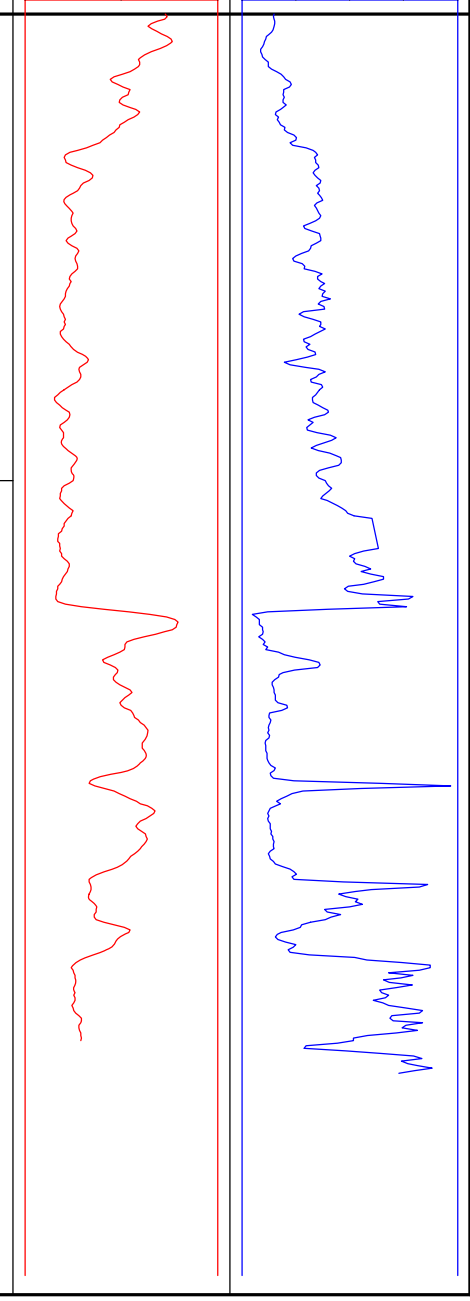
PROJECT # F35772801 *SH06-1655-D*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: ???
Compiled by: P. Turnbull/D. Dillon

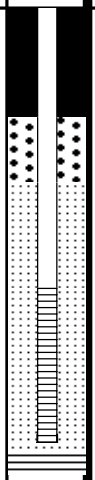
Northing: 6361003.79
Easting: 485235.62
Elevation: 293.08 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
58		
68		End of Borehole
78		
88		
98		



Well Data



Well Details

Hydrated Bentonite Pellets (52.40-55.00m)

Top of Sand at 55.0 m
10/20 Frac Sand

Top of Screen at 59.16 m

6.13 m x 49.3 mm ID Sch 80 PVC 020 Slot Screen

End of Screen at 65.29 m
Slough (65.60-66.50m)

TD of Borehole at 66.50 m

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Borehole # SH06-1672-BS

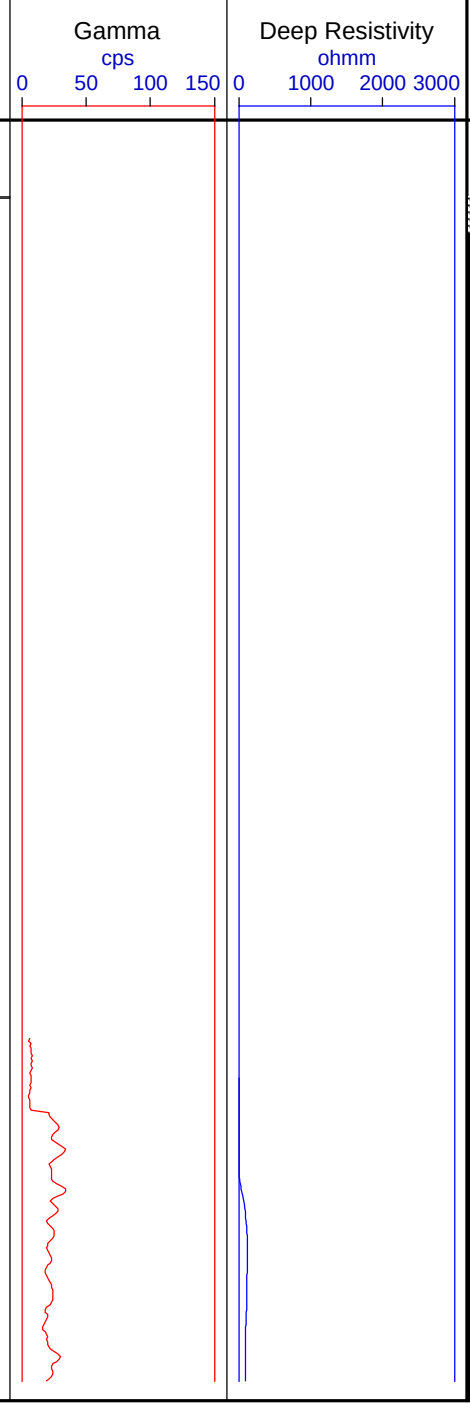
PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 19-Mar-06
Compiled by: P. Turnbull

Northing: 6362859.18
Easting: 478332.73
Elevation: 349.90 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-2		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
8		
18		
28		
38		
48		



Well Data

Well Details

Stick-Up 0.62 m

Hydrated Bentonite Chips (0-1.5m)

Grout (1.5-97.0m)

49.3 mm ID Sch 80 PVC pipe

Mud Rotary Borehole (146mm diameter)

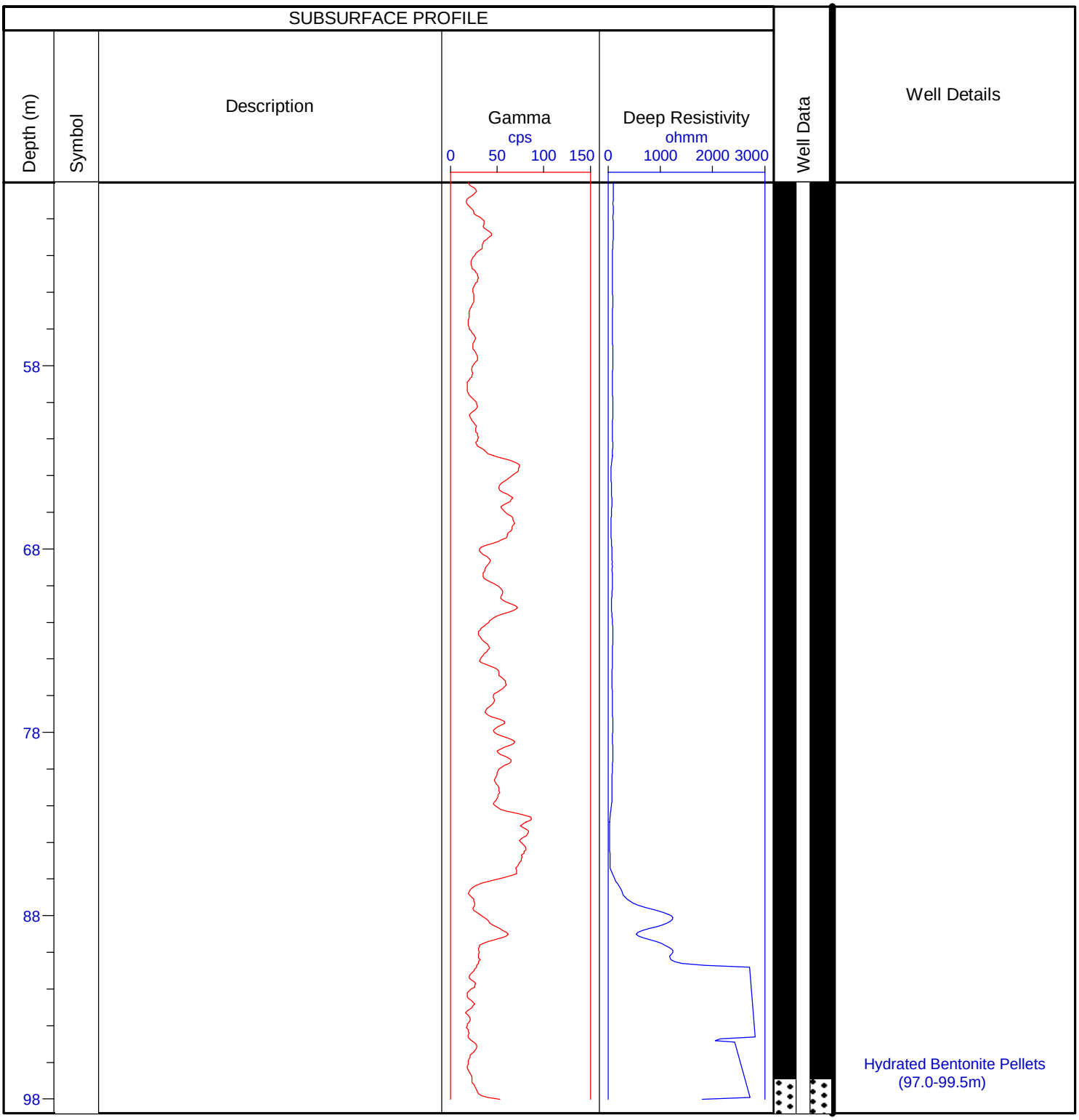
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resources & energy

Borehole # SH06-1672-BS

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 19-Mar-06
Compiled by: P. Turnbull
Northing: 6362859.18
Easting: 478332.73
Elevation: 349.90 m asl (Ground)

SUBSURFACE PROFILE



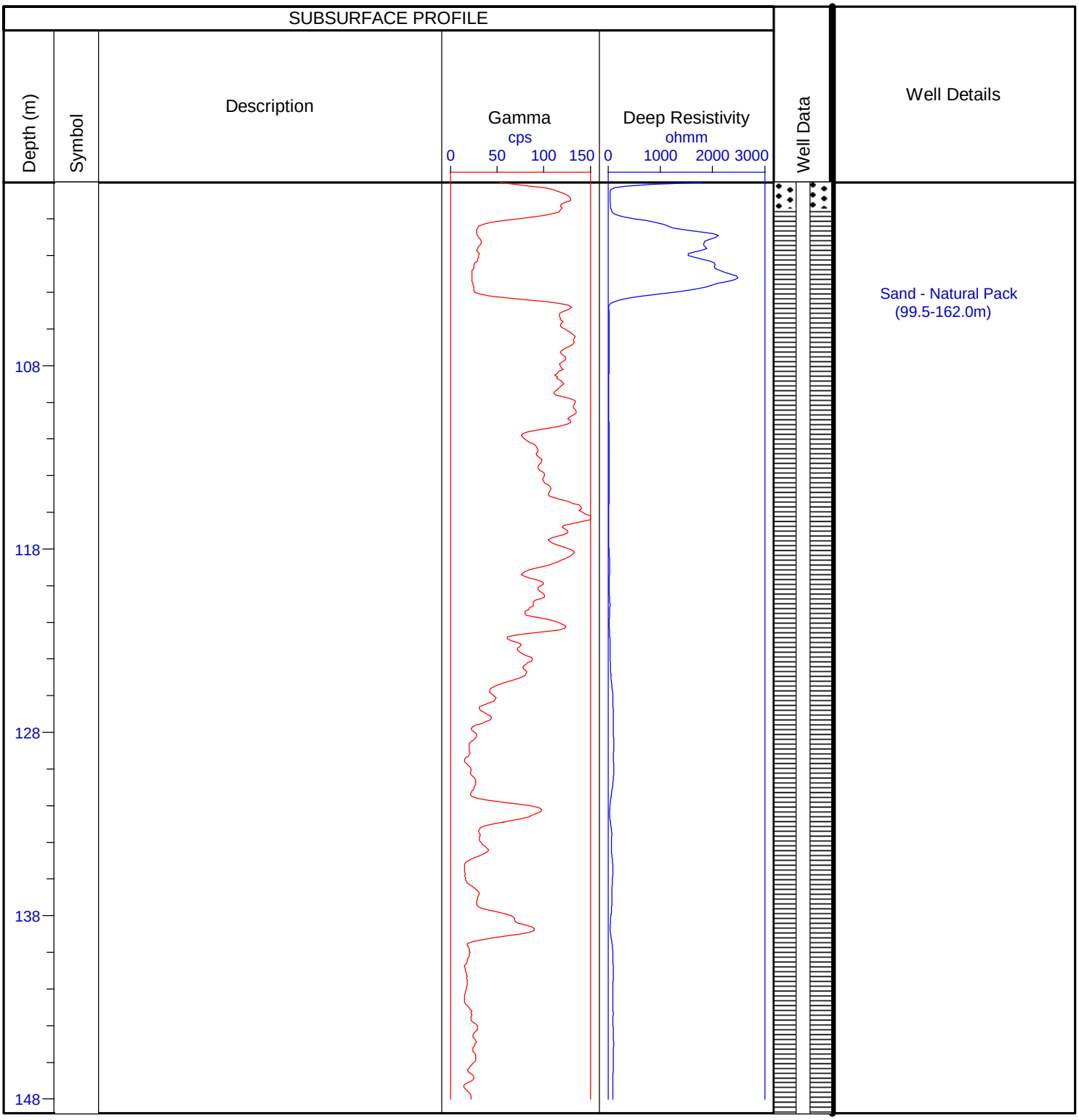
WorleyParsons Komex
resources & energy

Borehole # SH06-1672-BS

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 19-Mar-06
Compiled by: P. Turnbull
Northing: 6362859.18
Easting: 478332.73
Elevation: 349.90 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

Borehole # SH06-1672-BS

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 19-Mar-06
Compiled by: P. Turnbull

Northing: 6362859.18
Easting: 478332.73
Elevation: 349.90 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 1000 2000 3000	Well Data	Well Details
158						Top of Sand at unknown depth tape broke 10/20 Frac Sand Top of Screen at 155.0 m 6.0 m x 49.3 mm ID Sch 80 PVC 020 Slot Screen Bottom of Screen at 161.0 m Hydrated Bentonite Pellets (164.0-170.13 m) Slough (170.13-170.5m) TD of Borehole at 170.5 m
168		End of Borehole				
178						
188						
198						

WorleyParsons Komex
resources & energy

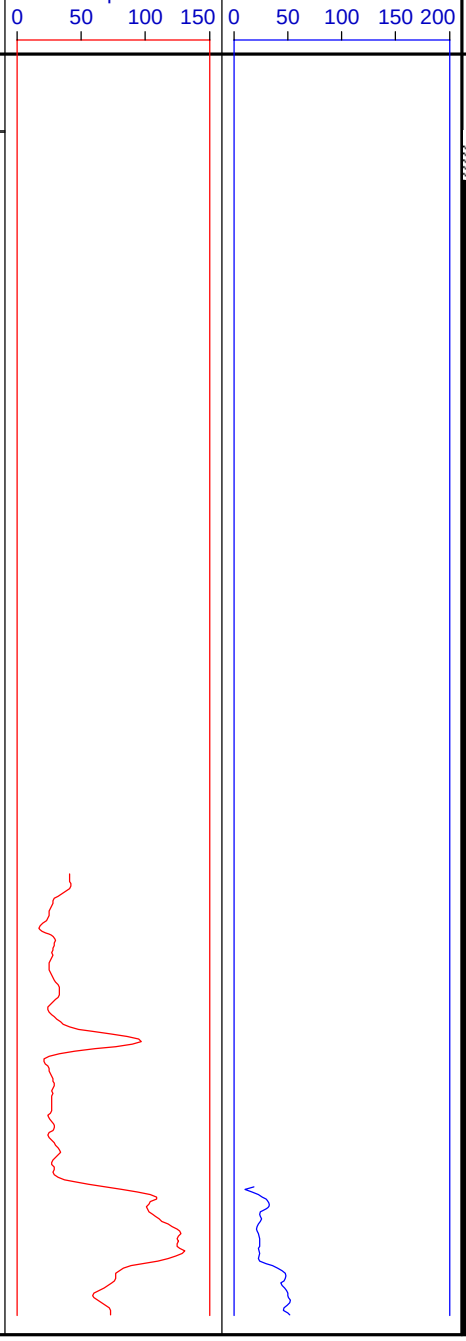
Borehole # SH06-1699-BS

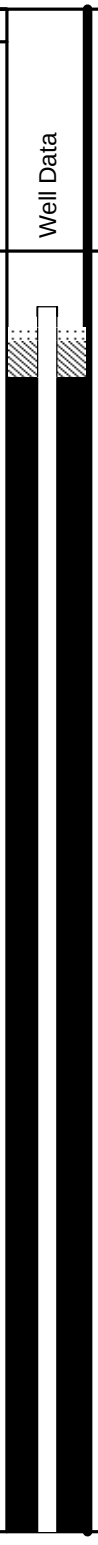
PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 17-Mar-06
Compiled by: P. Turnbull
Northing: 6364629.11
Easting: 482386.63
Elevation: 291.69 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-2		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
8		
18		
28		
38		
48		





Well Details

Stick-Up 0.85 m
Sand (0-0.5m)
Hydrated Bentonite Chips
(0.5-2.0m)

Grout (2.0-52.0m)

49.3 mm ID Sch 80 PVC pipe

Mud Rotary Borehole
(146mm diameter)

WorleyParsons Komex
resources & energy

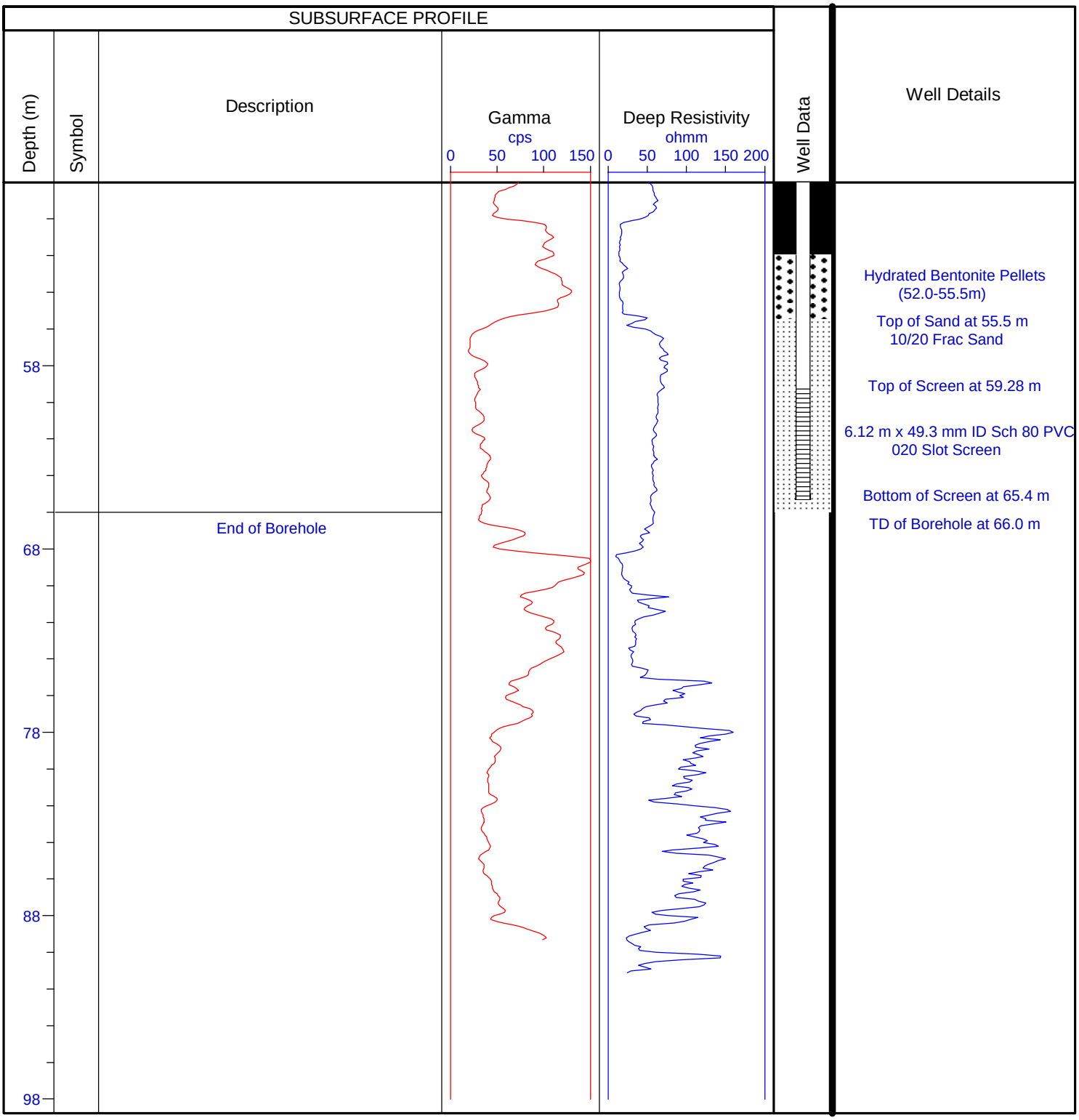
Borehole # SH06-1699-BS

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 17-Mar-06
Compiled by: P. Turnbull

Northing: 6364629.11
Easting: 482386.63
Elevation: 291.69 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

Borehole # SH06-1641-D

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Mar-06
Compiled by: P. Turnbull

Northing: 6359203.89
Easting: 477345.11
Elevation: 347.30 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 250 500 700	Well Data	Well Details
-2		Ground Surface				Stick-Up 0.83 m
		NO LITHOLOGY DATA AVAILABLE				
8						Grout (12.00-113.68m)
18						49.3 mm ID Sch 80 PVC pipe
28						
38						
48						

WorleyParsons Komex
resources & energy

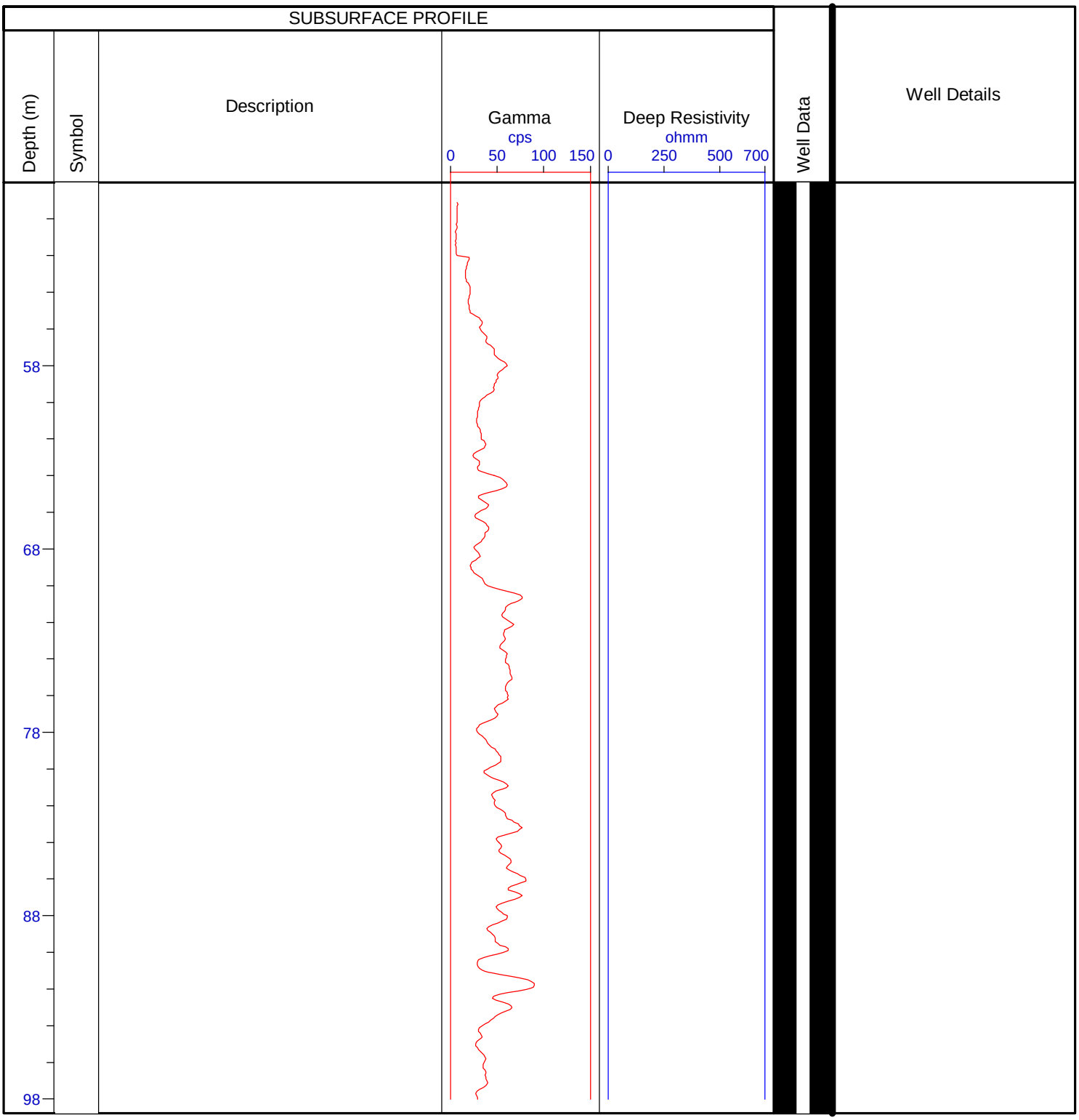
Borehole # SH06-1641-D

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Mar-06
Compiled by: P. Turnbull

Northing: 6359203.89
Easting: 477345.11
Elevation: 347.30 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

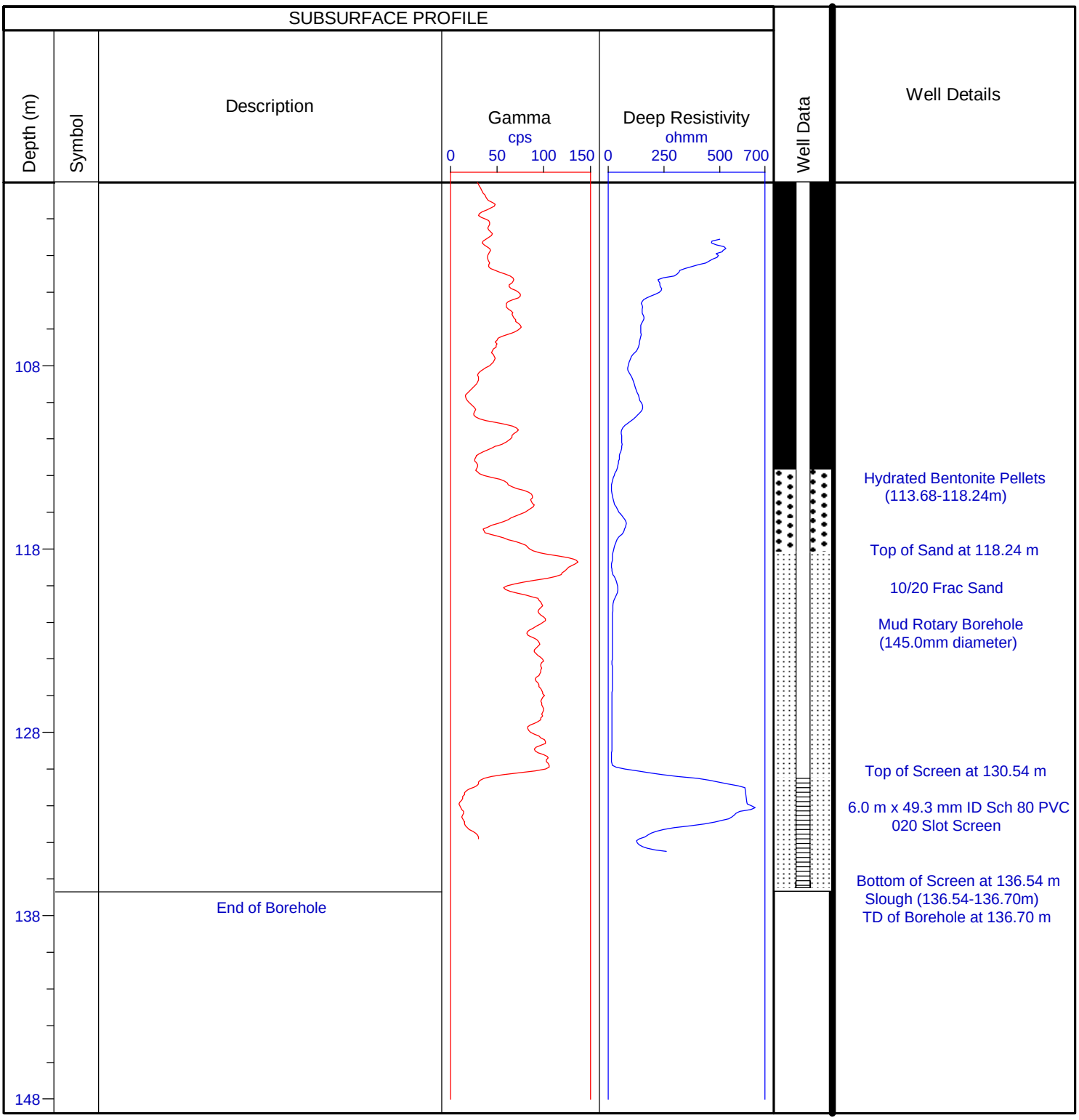
Borehole # SH06-1641-D

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Mar-06
Compiled by: P. Turnbull

Northing: 6359203.89
Easting: 477345.11
Elevation: 347.30 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

Borehole # SH06-1655-D/

PROJECT # F35772801 *SH06-1655-E*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Feb-06
Compiled by: P. Turnbull/D. Dillon
Northing: 6360987.94
Easting: 485239.18
Elevation: 292.81 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 100 200	Deep Resistivity (ohmm) 0 50 100 150 200	Well Data	Well Details
-2		Ground Surface				Stick-Up 0.85 m
		NO LITHOLOGY DATA AVAILABLE				Hydrated Bentonite Chips (0-1.5m)
8						Grout & Portland Cement (1:2 ratio) (1.5-78.0m)
18						
28						49.3 mm ID Sch 80 PVC pipe
						Mud Rotary Borehole (146 mm diameter)
38						
48						

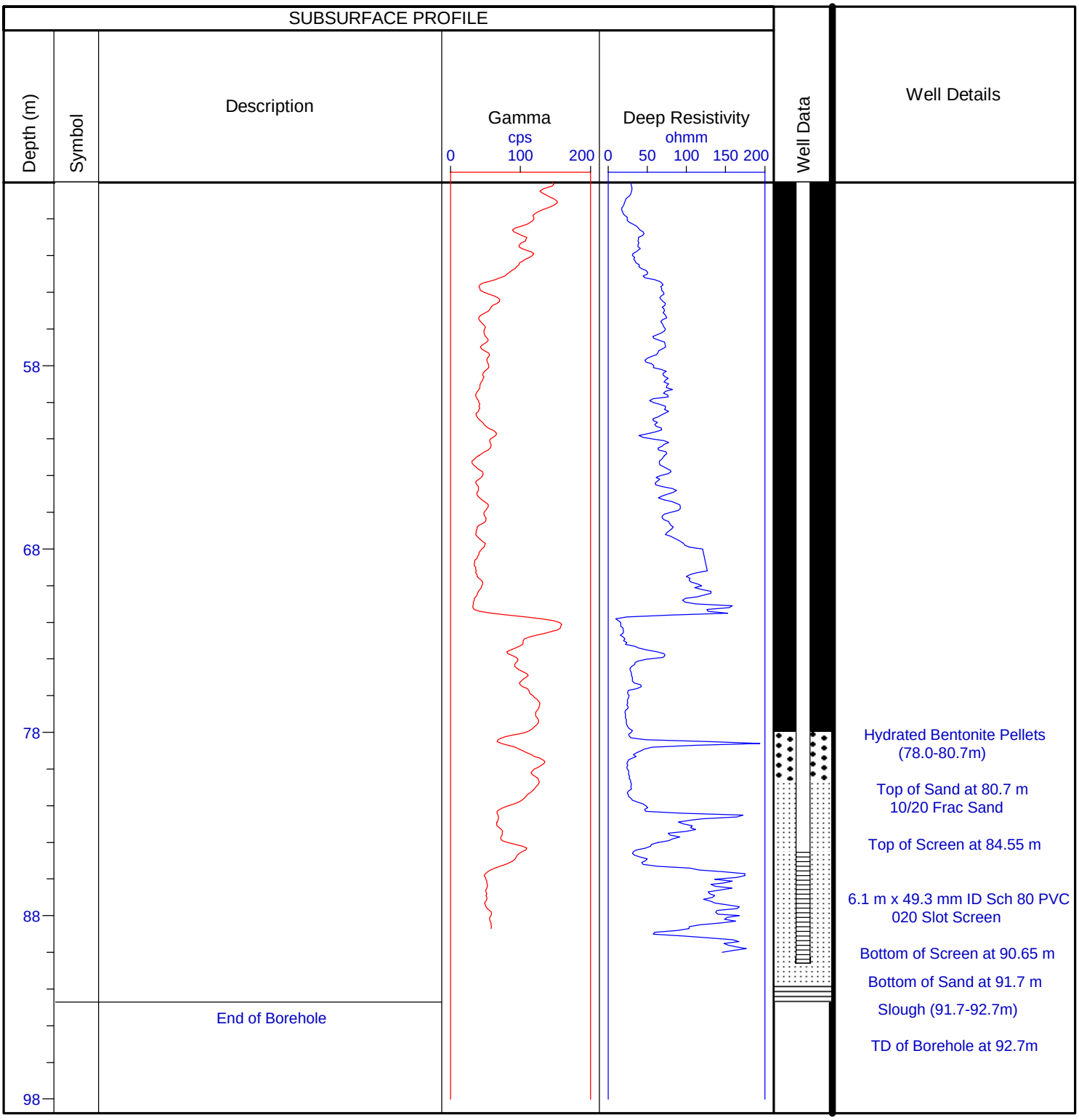
WorleyParsons Komex
resources & energy

Borehole # SH06-1655-D/

PROJECT # F35772801 *SH06-1655-E*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Feb-06
Compiled by: P. Turnbull/D. Dillon
Northing: 6360987.94
Easting: 485239.18
Elevation: 292.81 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

Borehole # SH06-1699-D

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Mar-06 - 17Mar-06
Compiled by: P. Turnbull

Northing: 6364632.84
Easting: 482393.92
Elevation: 291.35 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 50 100 150 200	Well Data	Well Details
-2		Ground Surface				Stick-Up 1.07 m
		NO LITHOLOGY DATA AVAILABLE				Sand (0-0.50m)
						Hydrated Bentonite Chips (0.5-7.0m)
8						
						Grout (7.0-79,50m)
18						
						49.3 mm ID Sch 80 PVC pipe
28						
						Mud Rotary Borehole (146mm diameter)
38						
48						

WorleyParsons Komex
resources & energy

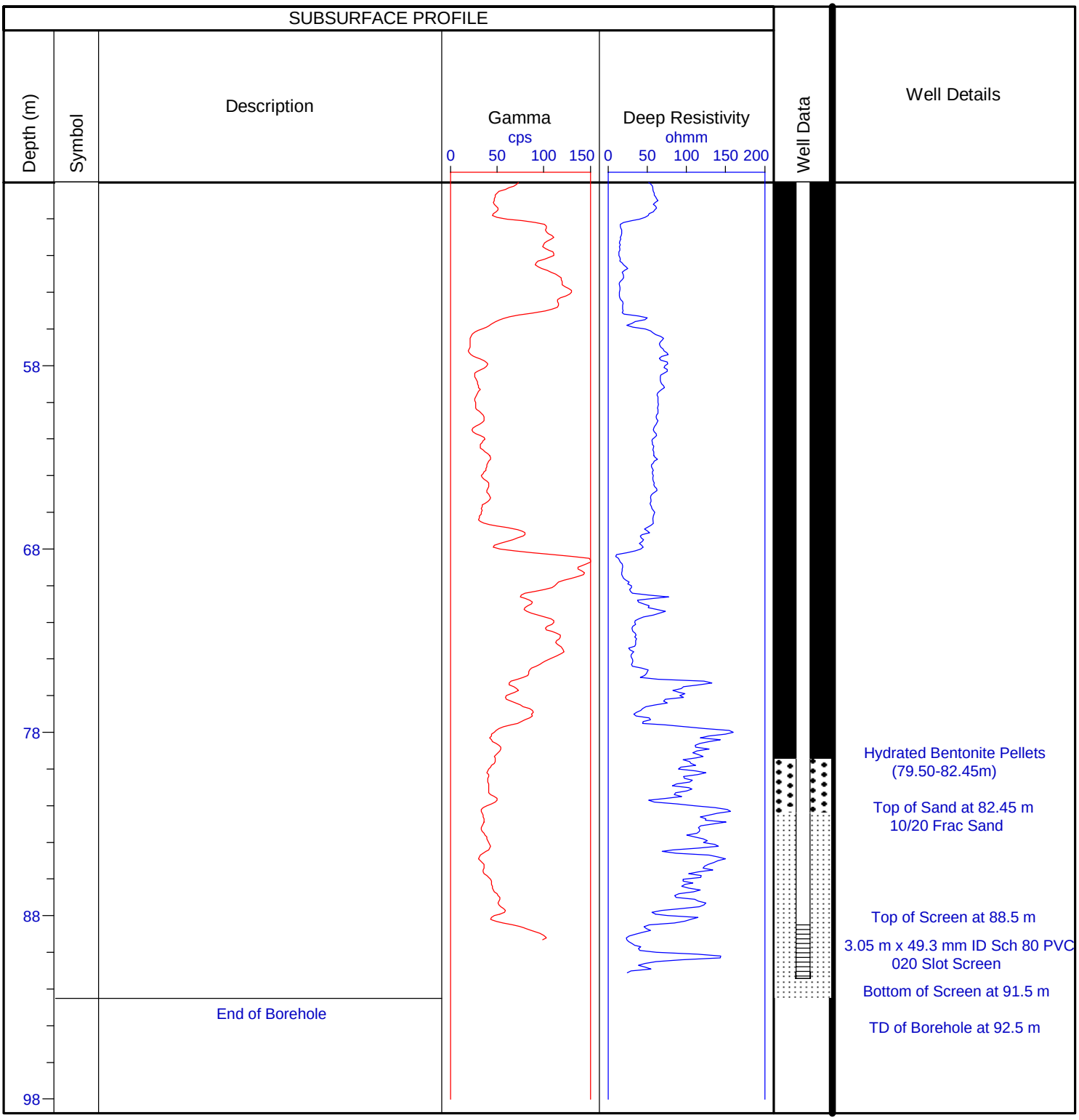
Borehole # SH06-1699-D

PROJECT # F35772801

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Mar-06 - 17Mar-06
Compiled by: P. Turnbull

Northing: 6364632.84
Easting: 482393.92
Elevation: 291.35 m asl (Ground)

SUBSURFACE PROFILE



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resources & energy

Borehole # SH07-1721-SQ

PROJECT # F35772803 *1721*

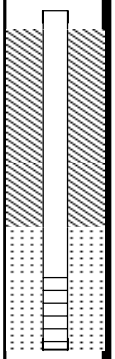
Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 09-Mar-07
Compiled by: D. Dillon
Northing: 6364907.44
Easting: 486635.09
Elevation: 292.19 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-1		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
9		
		End of Borehole
19		
29		
39		
49		

Gamma (cps): 0 50 100 150
Conductivity (mS/m): 0 100 200

Well Data



Well Details

Stick-Up 0.82 m
49.3 mm ID Sch 80 PVC pipe

Hydrated Bentonite Chips
(0.00-8.00 m)

Top of Sand at 8.00 m
10/20 Frac Sand
Top of Screen at 10.00 m
3.00 m x 49.3 mm ID Sch 80 PVC
Core Rig Borehole
(152 mm diameter)
Bottom of Screen at 13.00 m
Bottom of Sand at 13.00 m
T.D. of Borehole at 13.00 m

WorleyParsons Komex
resources & energy

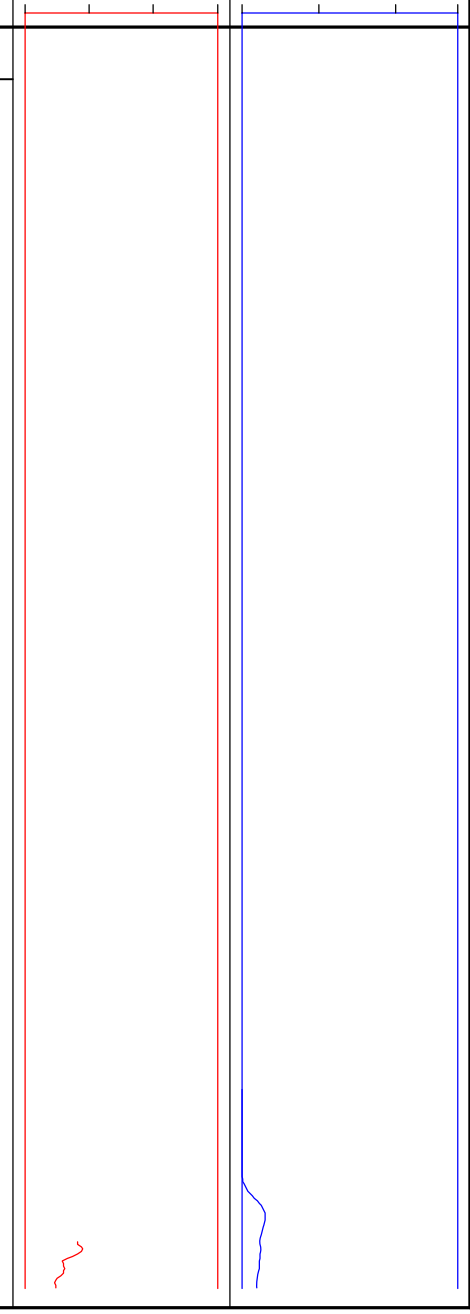
Borehole # SH07-1712-BS

PROJECT # F35772803 *SH07-1712-BASAL*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 12-Mar-07
Compiled by: D. Dillon
Northing: 6365281.39
Easting: 480318.43
Elevation: 339.39 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-1		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
9		
19		
29		
39		
49		



Well Data

Well Details

Stick-Up 1.10 m

49.3 mm ID Sch 80 PVC pipe

Grout (0.00-114.00 m)

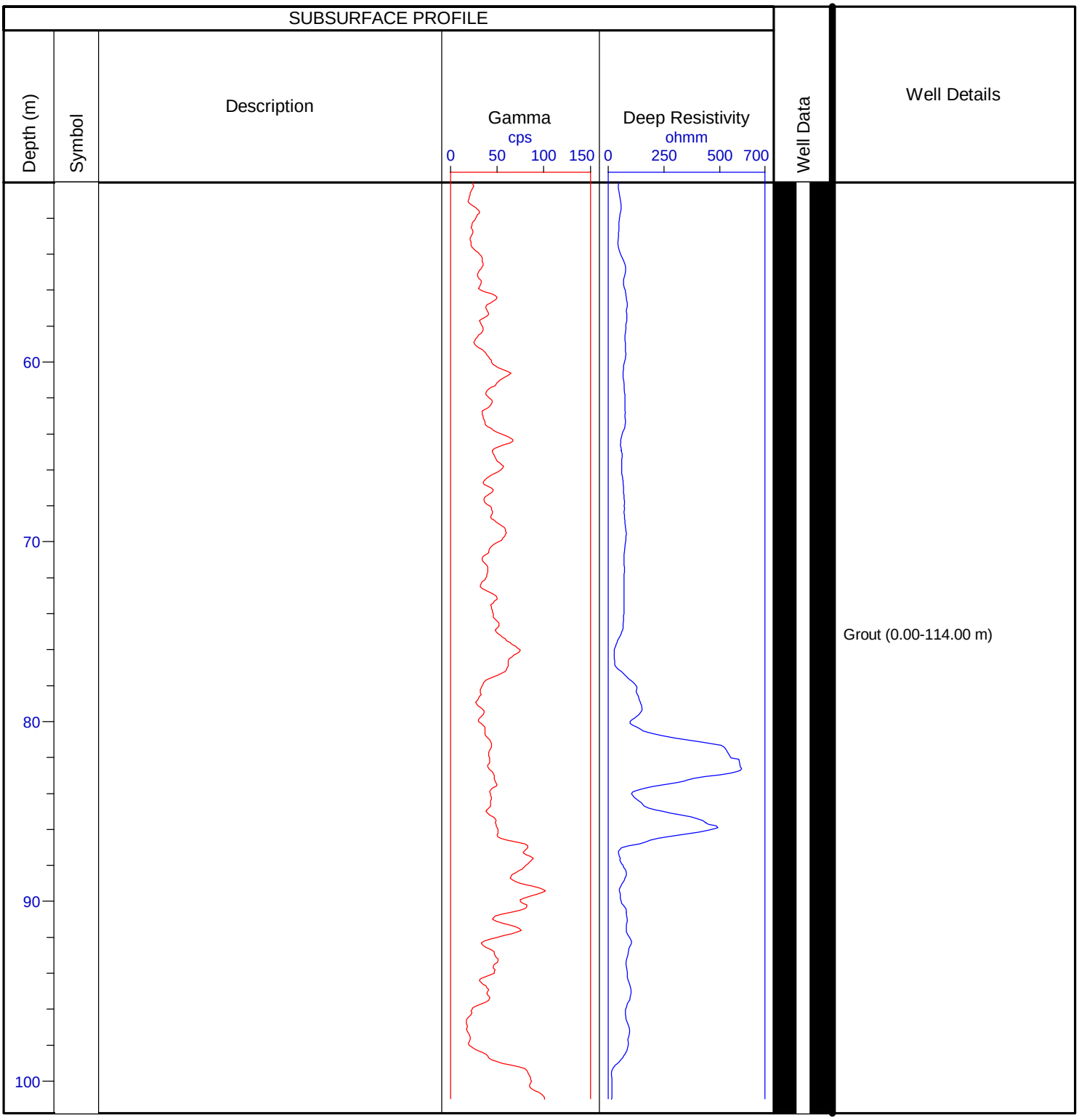
WorleyParsons Komex
resources & energy

Borehole # SH07-1712-BS

PROJECT # F35772803 *SH07-1712-BASAL*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 12-Mar-07
Compiled by: D. Dillon
Northing: 6365281.39
Easting: 480318.43
Elevation: 339.39 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

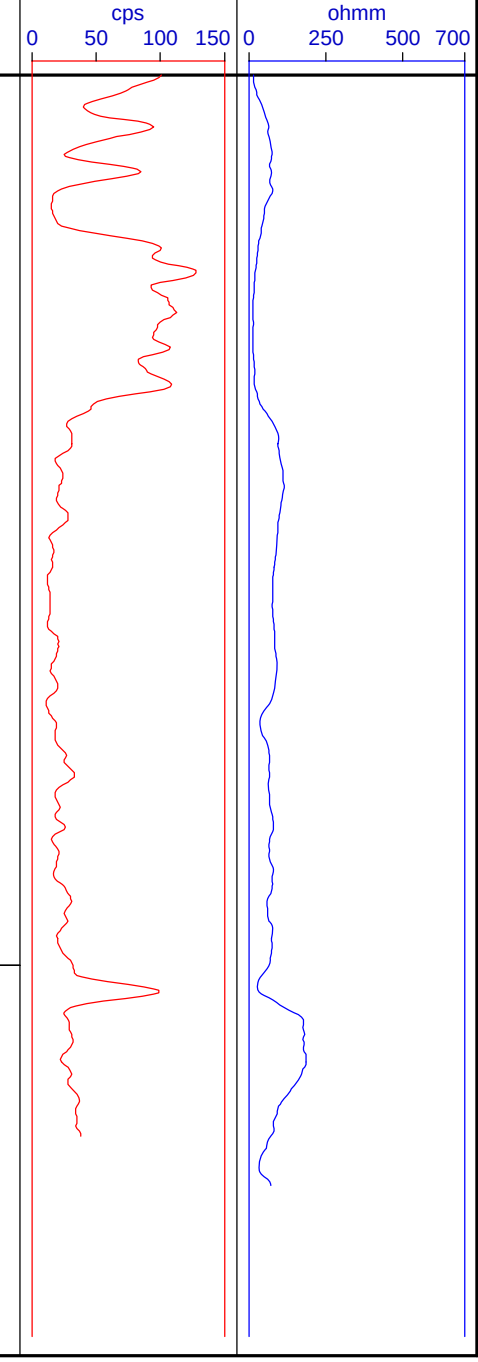
Borehole # SH07-1712-BS

PROJECT # F35772803 *SH07-1712-*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Jackpine Expansion Mining Area
Drilled by: SDS Drilling
Drill Date: 12-Mar-07
Compiled by: D. Dillon
Northing: 6365281.39
Easting: 480318.43
Elevation: 339.39 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
111		
121		
131		
		End of Borehole
141		
151		



Well Data

Well Details

Hydrated Bentonite Pellets
(114.00-118.00 m)

Top of Sand at 118.00 m

10/20 Frac Sand

Top of Screen at 127.00 m

10.00 m x 49.3 mm ID Sch 80
PVC
020 Slot Screen
Core Rig Borehole
(152 mm diameter)

Bottom of Screen at 137.00 m
Bottom of Sand at 137.00 m
T.D. of Borehole at 137.00 m

Pierre River Mining Area Logs

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Borehole # P06-1801-SQ/

PROJECT # F35772801 *P06-1801-16*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mine
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 07-Feb-06
Compiled by: FR

Northing: 6368307.03
Easting: 459220.15
Elevation: 302.91 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.96 m
0		Ground Surface ***SAND (0.00-15.75 m)*** Brown; dry; very fine-grained; some organics.					Surface Cuttings (0-0.40 m)
1		At 0.75-2.25 m: As above; damp; minor clay clasts; some decayed organic matter.					51 mm ID Sch 40 PVC pipe
2		At 2.25-5.25 m: As above; damp to moist.					
3							
4							
5		At 5.25-6.75 m: As above; with some iron.					
6							Hydrated Bentonite Chips (0.40-12.00 m)
7		At 6.75-11.25 m: As above; with occasional pebbles and gravel; some reworked McMurray.					
8							

WorleyParsons Komex
resources & energy

Borehole # P06-1801-SQ/

PROJECT # F35772801 *P06-1801-16*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mine
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 07-Feb-06
Compiled by: FR

Northing: 6368307.03
Easting: 459220.15
Elevation: 302.91 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10							
11		At 11.25-14.25 m: As above; more iron staining.					
12							Hydrated Bentonite Pellets (12.00-12.65 m) Top of Sand at 12.65 m
13							10/20 Frac Sand (12.65-14.32 m)
14		At 14.25-15.75 m: As above; wet to moist at 15.20 m.					6.00 m x 51 mm ID Sch 40 PVC
15							Natural Sand Pack (14.32-16.10 m)
16		***SILT (15.75-19.60 m)*** Olive brown to black; moist; firm.					Solid Stem Borehole (203 mm diameter) T.D. of Borehole at 16.10 m
17		At 17.25-18.75 m: As above; moderate bitumen odour.					
18		At 18.75-19.6 m: Dark grey; wet.					

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resources & energy

Borehole # P06-1801-SQ/

PROJECT # F35772801 *P06-1801-16*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mine
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 07-Feb-06
Compiled by: FR

Northing: 6368307.03
Easting: 459220.15
Elevation: 302.91 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
19							
20		***SAND (19.60-22.00 m)*** Grey; wet; fine-grained sand. At 20.25-22.00 m: As above; with some reworked McMurray.					
21							
22		***OIL SAND (22.00-24.55 m)*** Black; >10% fine-grained sand;					
23		At 23.25-24.55 m: Rafted.					
24							
25		***CLAY (24.55-24.75 m)*** Olive brown; moist; firm; high plasticity; some pink inclusions. End of Borehole					
26							
27							
28							

WorleyParsons Komex
resources & energy

Borehole # P06-1804-SQ/

PROJECT # F35772801 *P06-1804-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 08-Feb-06
Compiled by: FR

Northing: 6368283.84
Easting: 462177.44
Elevation: 262.22 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 1.03 m
0		Ground Surface					
		CLAY (0.00-1.70 m) Brown; frozen to 0.40 m; moist; some grey mottling; abundant iron at 0.50-0.75 m.					Hydrated Bentonite Chips (0-0.60 m) Hydrated Bentonite Pellets (0.60-1.10 m)
1							Top of Sand at 1.10 m
		GRAVEL (1.70-2.00 m) Brown; wet; abundant clays; > 2cm.					Top of Screen at 1.90 m
2		***CLAY (2.00-2.25 m)*** Yellowish brown; dry; firm; friable.					3.05 m x 51 mm ID Sch 40 PVC
		SILTSTONE (2.25-3.75 m) Blackish grey; dry; very hard drilling.					10/20 Frac Sand (1.10-3.40 m)
3							Bottom of Screen at 3.40 m Natural Sand Pack (3.40-3.50 m) T.D. of Borehole at 3.75 m
4		End of Borehole					
5							
6							
7							
8							
9							

WorleyParsons Komex
resources & energy

Borehole # P06-1821-SQ/

PROJECT # F35772801 *P06-1821-6*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 09-Feb-06
Compiled by: FR

Northing: 6371478.85
Easting: 461211.76
Elevation: 281.47 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 1.11 m
0		Ground Surface					
		SILTY SAND (0.00-0.30 m) Light brown; dry; very fine-grained sand.					Surface Cuttings (0-0.10 m)
		SAND (0.30-5.85 m) Light brown; dry to damp; very fine-grained.					51 mm ID Sch 40 PVC pipe
1		At 0.75-2.25 m: Turning brown at 1.1 m; moist; brown clay stringer at 1.25-1.35 m; sand coarsening downwards (becoming fine-grained).					Hydrated Bentonite Chips (0.10-2.20 m)
2		At 2.25-3.75 m: As above; still coarsening (becoming medium-grained).					Hydrated Bentonite Pellets (2.20-2.80 m)
3							Top of Sand at 2.80 m
							Top of Screen at 3.10 m
							10/20 Frac Sand (2.80-6.10 m)
4		At 3.75-5.25 m: As above; rare gravels; some decaying organics.					Solid Stem Borehole (152 mm diameter)
5		At 5.25-5.85 m: As above; wet; coarser.					3.05 m x 51 mm ID Sch 40 PVC
6		***CLAY TILL (5.85-11.25 m)*** Greenish grey; moist; firm; medium to high plasticity; some gravels; occasional siltstone inclusion.					Bottom of Screen at 6.10 m
7		At 6.75-11.25 m: As above; occasional cobbles; moderate bitumen odour.					T.D. of Borehole at 7.00 m
8							
9							
10							
11		End of Borehole					

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Borehole # P06-1830-SQ/

PROJECT # F35772801 *P06-1830-8*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 10-Feb-06
Compiled by: FR

Northing: 6373286.01
Easting: 464182.25
Elevation: 266.78 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ (0 25 50 75 100) • ppm • (0 100 300 500)	Well Data	Lab Analysis or Well Details
-1							Stick-Up 1.12 m
0		Ground Surface					
		CLAYEY SAND (0.00-0.50 m) Reddish brown; dry; medium-grained; poorly sorted; rootlets.					Surface Cuttings (0-0.30 m)
1		***SILTY CLAY (0.50-0.75 m)*** Brown; damp; firm; friable; low plasticity.					51 mm ID Sch 40 PVC pipe
		SANDY GRAVEL (0.75-3.75 m) Brown; damp; with medium-grained sand; some cobbles > 10 cm.					
2							Hydrated Bentonite Chips (0.30-3.65 m)
3							
4		***SAND (3.75-15.75 m)*** Light brown; damp; fine- to medium-grained sand; iron oxidation at bottom.					Hydrated Bentonite Pellets (3.65-4.60 m)
5		At 5.25-6.40 m: As above; reddish brown; damp; iron oxidation.					Top of Sand at 4.60 m 10/20 Frac Sand (5.00-6.00 m) Top of Screen at 5.00 m
6		At 6.40-8.25 m: Grey; wet; fine- to medium-grained sand; salt and pepper.					3.05 m x 51 mm ID Sch 40 PVC Natural Sand Pack (6.00-8.25 m)
7							Solid Stem Borehole (152 mm diameter)
8		At 8.25-9.75 m: As above; some reworked McMurray.					Bottom of Screen at 8.00 m T.D. of Borehole at 8.25 m

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Borehole # P06-1830-SQ/

PROJECT # F35772801 *P06-1830-8*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 10-Feb-06
Compiled by: FR
Northing: 6373286.01
Easting: 464182.25
Elevation: 266.78 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		At 9.75-12.75 m: As above; occasional coarser granitic grains; subrounded to subangular.					
11							
12							
13		At 12.75-15.75 m: As above; becoming fine-grained sand.					
14							
15							
16		***CLAY TILL (15.75-18.00 m)*** Olive brown; moist; firm; medium plasticity; coarse fragments; bitumen odour.					
17							
18		***OIL SAND (18.00-23.25 m)*** Black; fine-grained sand; bitumen rich.					

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resources & energy

Borehole # P06-1830-SQ/

PROJECT # F35772801 *P06-1830-8*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 10-Feb-06
Compiled by: FR

Northing: 6373286.01
Easting: 464182.25
Elevation: 266.78 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
19							
20							
21		At 18.75-23.25 m: As above; some silt and clay within matrix.					
22							
23		End of Borehole					
24							
25							
26							
27							
28							

WorleyParsons Komex
resources & energy

Borehole # P06-1836-SQ/

PROJECT # F35772801 *P06-1836-9*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 12-Feb-06
Compiled by: FR

Northing: 6374319.06
Easting: 462418.22
Elevation: 278.51 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.98 m
0		Ground Surface					
		SANDY CLAY (0.00-0.75 m) Reddish brown; damp; firm; friable; low plasticity; fine-grained sand.					Surface Cuttings (0-0.10 m)
1		***CLAYEY SAND (0.75-1.50 m)*** Brown; moist to damp; fine- to medium-grained sand; subrounded to subangular.					51 mm ID Sch 40 PVC pipe Hydrated Bentonite Chips (0.10-4.85 m)
2		***CLAY TILL (1.50-7.90 m)*** Olive brown; becoming darker with depth; moist; firm; low to medium plasticity; some gravels; angular; some carbonates; iron. At 2.25-3.75 m: Grey; medium plasticity; coarse fragments; angular gravels; carbonates in fractures.					
3							
4		At 3.75-5.25 m: As above; fractures; fine-grained sand in fractures; some pink clasts.					
5		At 5.25-6.75 m: Greenish grey; damp; low plasticity; coarse fragments; gravels; coal; carbonates; some pink sandstone inclusions; some reworked McMurray in fractures.					Hydrated Bentonite Pellets (4.85-5.65 m) Top of Sand at 5.65 m 10/20 Frac Sand (5.65-9.20 m) Top of Screen at 6.2 m 3.05 m x 51 mm ID Sch 40 PVC
6							
7							Solid Stem Borehole
8		***SILT (7.90-8.75 m)*** Greenish grey; wet.					

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Borehole # P06-1836-SQ/

PROJECT # F35772801 *P06-1836-9*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 12-Feb-06
Compiled by: FR

Northing: 6374319.06
Easting: 462418.22
Elevation: 278.51 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9		***CLAY (8.75-9.25 m)*** Greenish grey; moist; firm; medium to high plasticity.					Bottom of Screen at 9.20 m T.D. of Borehole at 9.20 m
		SAND (9.25-9.75 m) Greenish grey; wet; fine-grained sand.					
10		***CLAY TILL (9.75-10.20 m)*** Greenish grey; damp; firm; medium plasticity; coarse fragments.					
		SILTY CLAY TILL (10.20-11.25 m) Greenish grey; damp; friable; some pebbles..					
11							
		SAND AND CLAY INTERBEDS (11.25-12.75 m) Greenish grey; medium plasticity; firm clays; fine sands; hard drilling.					
12							
		SILTY CLAY (12.75-13.50 m) Greenish grey; damp; friable; some bitumen odour.					
13							
		SANDY SILT (13.50-13.75 m) Greenish grey; damp; friable; some bitumen odour.					
14		***SAND (13.75-17.25 m)*** Greenish grey; wet; fine-grained sand. At 14.25-15.75 m: As above; slight bitumen odour.					
15							
16							
17							
		SILT (17.25-18.25 m) Greenish grey; wet; slight bitumen odour.					
18							
		SAND (18.25-18.75 m) Greenish grey; wet; fine-grained sand.					
		End of Borehole					

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Borehole # P06-1840-SQ/

PROJECT # F35772801 *P06-1840-2*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 10-Feb-06
Compiled by: FR

Northing: 6374286.99
Easting: 466581.17
Elevation: 255.36 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.93 m 51 mm ID Sch 40 PVC pipe Hydrated Bentonite Chips (0-0.70 m)
0		Ground Surface ***MUSKEG (0.00-0.65 m)*** Reddish brown; wet; some rootlets.					Top of Sand at 0.70 m 10/20 Frac Sand Top of Screen at 1.00 m (0.70-1.30 m) Natural Sand Pack (1.30-2.00 m) 1.52 m x 51 mm ID Sch 40 PVC Solid Stem Borehole (203 mm diameter) Slough (2.0-2.25 m) Bottom of Screen at 2.0 m T.D. of Borehole at 2.25 m
1		***SAND (0.65-2.30 m)*** Brown; wet; coarse-grained sand; angular to subangular; some clay. At 0.75-2.25 m: Subangular to subrounded cobbles > 20 cm; some clay; poorly sorted.					
2							
3		***CLAY TILL (2.30-3.75 m)*** Grey; moist; firm; medium plasticity; coarse fragments (siltstone clasts); some gravels; fractured at top with coarse sand in the fractures.					
4		***SILTY CLAY TILL (3.75-7.50 m)*** Grey; moist; firm; high plasticity; coarse fragments (siltstone); less gravel; slight bitumen odour.					
5							
6							
7		At 6.75-7.50 m: As above; pink silty clasts.					
8		***CLAY TILL (7.50-8.25 m)*** Grey; dry; firm; high plasticity; coarse fragments; less gravel; very fine sand inclusions; slight bitumen odour.					

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resources & energy

Borehole # P06-1840-SQ/

PROJECT # F35772801 *P06-1840-2*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 10-Feb-06
Compiled by: FR

Northing: 6374286.99
Easting: 466581.17
Elevation: 255.36 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9		***SAND (8.25-12.75 m)*** Pink to light brown; dry; very fine-grained sand; very hard drilling (possibly cemented); some clay inclusions.					
10							
11							
12							
13		***CLAYEY SILT TO SILTY CLAY (12.75-14.25 m)*** Light brown; damp; firm; some very fine-grained sand interbeds; clays are pink.					
14							
15		***SAND (14.25-15.75 m)*** Light brown; damp; very fine-grained sand; clean.					
16		End of Borehole					
17							
18							

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Borehole # P06-1853-SQ/

PROJECT # F35772801 *P06-1853-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 04-Mar-06
Compiled by: FR

Northing: 6376062.70
Easting: 459344.35
Elevation: 297.23 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.93 m
0		Ground Surface					
		CLAY TILL (0.00-10.85 m) Pink; firm; friable; some siltstone fragments.					Surface Cuttings (0-0.10 m) 51 mm ID Sch 40 PVC pipe
1		At 0.75-2.25 m: Pink/brown; damp to 1.25 m (moist below); medium to high plasticity; mottled; silty at 1.50-2.25 m; some gravel; iron oxidation; possibly fractured; carbonates.					Hydrated Bentonite Pellets (0.10-0.85 m) Top of Sand at 0.85 m 10/20 Frac Sand Top of Screen at 1.15 m
2		At 2.25-3.75 m: Brown; moist to wet; soft; high plasticity; some pink inclusions; some rock flour seams (wet; grey); iron.					1.52 m x 51 mm ID Sch 40 PVC Solid Stem Borehole (152 mm)
3							
4		At 4.00-5.25 m: Olive brown; damp to moist; firm; medium plasticity; coarse fragments; carbonate clasts.					Bottom of Screen at 4.15 m T.D. of Borehole at 4.15 m
5		At 5.25-6.75 m: As above; Grey.					
6							
7							
8		At 8.25-10.85 m: As above; damp; cobbles > 4cm; slight sheen; slight bitumen odour.					

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Borehole # P06-1853-SQ/

PROJECT # F35772801 *P06-1853-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 04-Mar-06
Compiled by: FR

Northing: 6376062.70
Easting: 459344.35
Elevation: 297.23 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10							
11		***SILT (10.85-11.25 m)*** Grey; damp; slight bitumen odour.					
12		***CLAY TILL (11.25-15.10 m)*** Grey; moist; firm; medium to high plasticity; coarse fragments; some reworked McMurray stringers (fine-grained sand in bitumen).					
13							
14		At 14.25-15.10 m: As above; wet at 14.90 m.					
15		***SILT (15.10-15.75 m)*** Grey; wet.					
16		End of Borehole					
17							
18							

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Borehole # P06-1861-SQ/

PROJECT # F35772801 *P06-1861-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 14-Feb-06
Compiled by: FR

Northing: 6376687.11
Easting: 466558.85
Elevation: 257.20 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.66 m
0		Ground Surface					Surface Cuttings (0-0.10 m) 51 mm ID Sch 40 PVC pipe
		MUSKEG (0.00-0.85 m) Reddish brown; frozen; some rootlets.					Hydrated Bentonite Pellets (0-1.00 m)
		At 0.75-0.85 m: As above; wet.					
1		***SANDY CLAY (0.85-1.00 m)*** Dark grey; wet; soft; high plasticity; abundant organics.					Top of Sand at 1.00 m 10/20 Frac Sand (1.00-2.80 m) Top of Screen at 1.30 m
2		***SAND (1.00-2.25 m)*** Olive brown; wet; fine-grained sand; some gravel; some clay; poorly sorted.					
		SILT (2.25-3.75 m) Olive brown; moist; possibly some reworked McMurray.					Natural Pack Sand (2.80-4.30 m)
3							3.05 m x 51 mm ID Sch 40 PVC Solid Stem Borehole
4		***SILTY SAND (3.75-6.75 m)*** Olive brown; wet; very fine-grained.					Bottom of Screen at 4.30 m Slough (4.30-5.25 m)
5		At 5.25-6.75 m: As above; less moisture; some reworked McMurray.					T.D. of Borehole at 5.25 m
6							
7		***SILT (6.75-13.80 m)*** Grey; moist; firm; reworked McMurray.					
8							

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resources & energy

Borehole # P06-1861-SQ/

PROJECT # F35772801 *P06-1861-4*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 14-Feb-06
Compiled by: FR

Northing: 6376687.11
Easting: 466558.85
Elevation: 257.20 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		At 9.75-11.25 m: As above; some very fine-grained sand.					
11		At 11.25-12.75 m: As above; more sand.					
12							
13							
14		***CLAY TILL (13.80-18.75 m)*** Dark grey; damp; firm; medium plasticity; coarse fragments; some pink inclusions; bitumen odour.					
15							
16							
17		At 17.25-18.75 m: As above; more pink inclusions.					
18							
		End of Borehole					

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Borehole # P06-1862-SQ/

PROJECT # F35772801 *P06-1862-5*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 11-Feb-06
Compiled by: FR
Northing: 6377287.11
Easting: 463634.98
Elevation: 278.88 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.52 m
0		Ground Surface					
		MUSKEG (0.00-0.40 m) Brown; moist; rootlets.					Surface Cuttings (0-0.10 m)
		SANDY CLAY (0.40-0.75 m) Light brown; moist; soft; fine- to medium-grained sand; iron oxidation.					51 mm ID Sch 40 PVC pipe
1		***SAND (0.75-1.75 m)*** Brown; wet; fine- to coarse-grained sand; gravels; some clay; subangular to angular.					Hydrated Bentonite Chips (0.10-1.40 m)
							Hydrated Bentonite Pellets (1.40-1.70 m)
2		***SANDY CLAY (1.75-2.25 m)*** Brown; wet; soft; with gravels and some sand.					Top of Sand at 1.70 m
		SAND (2.25-3.60 m) Grey; wet; fine-grained sand.					Natural Sand Pack (1.70-5.50 m)
3							Top of Screen at 2.50 m
							3.05 m x 51 mm ID Sch 40 PVC
		CLAY (3.60-3.75 m) Grey; moist; firm; medium to high plasticity.					
4		***SAND (3.75-5.45 m)*** Grey; wet; very fine-grained.					Solid Stem Borehole (203 mm diameter)
5							
		CLAY TILL (5.45-16.00 m) Grey; moist; firm; high plasticity; abundant pink sandstone clasts.					Bottom of Screen at 5.50 m
6							T.D. of Borehole at 5.50 m
		At 6.75-9.75 m: As above; siltstone clast ending at 7.00 m; gravels; subangular to subrounded.					
7							
8							

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Borehole # P06-1862-SQ/

PROJECT # F35772801 *P06-1862-5*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 11-Feb-06
Compiled by: FR

Northing: 6377287.11
Easting: 463634.98
Elevation: 278.88 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		At 9.75-14.25 m: As above; some coal fragments; occasional silt clast; slight bitumen odour.					
11							
12							
13							
14		At 14.25-16.00 m: As above; some gravel starting at 14.50 m; >2 cm; angular.					
15							
16		***SANDY SILT (16.00-17.25 m)*** Greyish brown; damp; very fine-grained sand; some bitumen; very little water.					
17		End of Borehole					
18							

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Borehole # P06-2895-SQ/

PROJECT # F35772801 *P06-2895-5*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 09-Feb-06
Compiled by: FR

Northing: 6370470.61
Easting: 464496.33
Elevation: 252.78 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ (0 25 50 75 100) • ppm • (0 100 300 500)	Well Data	Lab Analysis or Well Details
-1						Stick-Up 1.06 m
0	Ground Surface					
	SANDY CLAY (0.00-0.75 m) Reddish brown; moist; crumbles; fine-grained sand; some gravel; occasional cobble; some iron staining.					Surface Cuttings (0-0.10 m) 51 mm ID Sch 40 PVC pipe Hydrated Bentonite Chips (0.10-1.00 m)
1	***SILTY CLAY TILL (0.75-2.70 m)*** Brown; moist; firm; medium plasticity; some gravels.					
2						Hydrated Bentonite Pellets (1.00-2.00 m) Top of Sand at 2.00 m Top of Screen at 2.25 m
3	***SAND (2.70-3.25 m)*** Light brown; moist; very fine-grained sand; some silt; occasional gravel.					10/20 Frac Sand
	CLAY TILL (3.25-3.75 m) Brown; damp to moist; firm; medium plasticity; coarse fragments.					3.05 m x 51 mm ID Sch 40 PVC
4	***SILTY CLAY TILL (3.75-5.00 m)*** Dark grey; damp; firm; low to medium plasticity; some gravels; some siltstone clasts; some coarse fragments.					Solid Stem Borehole (152 mm diameter)
5	***SAND (5.00-5.45 m)*** Light grey; wet; very fine-grained sand.					Bottom of Screen at 5.25 m T.D. of Borehole at 5.25 m
	CLAY TILL (5.45-6.50 m) Brown to black; fine-grained sand; bitumen odour.					
6	***OIL SAND (6.50-6.75 m)*** Black; fine-grained sand; approximately equal to 8-10 %.					
7	***SILTY CLAY TILL (6.75-7.50 m)*** Brown; dry; firm; with bitumen.					
	OIL SAND (7.50-9.75 m) Black; fine-grained sand; bitumen rich.					
8						
9						
	End of Borehole					

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Borehole # SH06-1801-DQ

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Feb-06
Compiled by: D. Dillon
Northing: 6368299.25
Easting: 459200.46
Elevation: 302.67 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.87 m
		Ground Surface					
		SAND (0.00-15.75 m) Brown; dry; very fine-grained; some organics.					
		At 0.75-2.25 m: As above; damp; minor clay clasts; some decayed organic matter.					
		At 2.25-5.25 m: As above; damp to moist.					49.3 mm ID Sch 80 PVC pipe
							Hydrated Bentonite Chips (0.0-7.0 m)
		At 5.25-6.75 m: As above; with some iron.					
		At 6.75-11.25 m: As above; occasional pebbles and gravel; some reworked McMurray.					
9							Volclay Granular Grout (7.0-20.0 m)
		At 11.25-14.25 m: As above; more iron staining.					

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Borehole # SH06-1801-DQ

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 16-Feb-06
Compiled by: D. Dillon
Northing: 6368299.25
Easting: 459200.46
Elevation: 302.67 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
		At 14.25-15.75 m: As above; wet to moist at 15.20 m.					
		SILT (15.75-19.60 m) Olive brown to black; moist; firm. At 17.25-18.75 m: As above; moderate bitumen odour. At 18.75-19.60 m: Dark grey; wet.					
		SAND (19.60-22.0 m) Grey; wet; fine-grained sand. At 20.25-22.00 m: As above; with some reworked McMurray.					Hydrated Bentonite Pellets (20.0-21.0 m) Top of Sand at 21.0 m 10/20 Frac Sand
		OIL SAND (22.00-24.55 m) Black; >10% fine-grained sand. At 23.25: Rafted.					Top of Screen at 22.9 m 3.1 m x 49.3 mm ID Sch 80 PVC 020 Slot Screen
24		***CLAY (24.55-24.75 m)*** Olive brown; moist; firm; high plasticity; some pink inclusions.					Bottom of Screen at 26.0 m T.D. of Borehole at 26.0 m
		End of Borehole					

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Borehole # P06-1830-DQ/

PROJECT # F35772801 *P06-1830-13*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 10-Feb-06
Compiled by: FR

Northing: 6373286.26
Easting: 464183.66
Elevation: 266.79 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.73 m
0		Ground Surface					
		CLAYEY SAND (0.00-0.50 m) Reddish brown; dry; medium-grained; poorly sorted; rootlets.					Surface Cuttings (0-0.30 m)
1		***SILTY CLAY (0.50-0.75 m)*** Brown; damp; firm; friable; low plasticity.					51 mm ID Sch 40 PVC pipe
		SANDY GRAVEL (0.75-3.75 m) Brown; damp; with medium-grained sand; some cobbles > 10 cm.					
2							Hydrated Bentonite Chips (0.30-4.85 m)
3							
4		***SAND (3.75-15.75 m)*** Light brown; damp; fine- to medium-grained sand; iron oxidation at bottom.					
5		At 5.25-6.40 m: As above; reddish brown; damp; iron oxidation.					Hydrated Bentonite Pellets (4.85-5.48 m) Top of Sand at 5.48 m Natural Pack Sand (5.48-14.2 m)
6		At 6.40-8.25 m: Grey; wet; fine- to medium-grained; salt and pepper.					
7							Solid Stem Borehole (203 mm diameter)
8		At 8.25-9.75 m: As above; some reworked McMurray.					

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Borehole # P06-1830-DQ/

PROJECT # F35772801 *P06-1830-13*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 10-Feb-06
Compiled by: FR
Northing: 6373286.26
Easting: 464183.66
Elevation: 266.79 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		At 9.75-12.75 m: As above; occasional coarser granitic grains; subrounded to subangular.					
11							
12							
13		At 12.75-15.75 m: As above; becoming fine-grained.					Top of Screen at 12.65 m 1.52 m x 51 mm ID Sch 40 PVC Bottom of Screen at 13.15 m
14							T.D. of Borehole at 14.20 m
15							
16		***CLAY TILL (15.75-18.00 m)*** Olive brown; moist; firm; medium plasticity; coarse fragments; bitumen odour.					
17							
18		***OIL SAND (18.00-23.25 m)*** Black; fine-grained sand; bitumen rich.					

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Borehole # P06-1830-DQ/

PROJECT # F35772801 *P06-1830-13*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 10-Feb-06
Compiled by: FR

Northing: 6373286.26
Easting: 464183.66
Elevation: 266.79 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
19							
20							
21		At 18.75-23.25 m: As above; some silt and clay within matrix.					
22							
23							
		End of Borehole					
24							
25							
26							
27							
28							

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Borehole # P06-1853-DQ/

PROJECT # F35772801 *P06-1853-16*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 04-Mar-06
Compiled by: FR

Northing: 6376061.63
Easting: 459345.18
Elevation: 297.23 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 0.85 m
0		Ground Surface					
		CLAY TILL (0.00-10.85 m) Pink; firm; friable; some siltstone fragments.					Surface Cuttings (0-0.30 m)
1		At 0.75-2.25 m: Pink/brown; damp to 1.25 m (moist below); medium to high plasticity; mottled; silty at 1.50-2.25 m; some gravel; iron oxidation; possibly fractured; carbonates.					51 mm ID Sch 40 PVC pipe
2		At 2.25-3.75 m: Brown; moist to wet; soft; high plasticity; some pink inclusions; some rock flour seams (wet; grey); iron.					
3							
4		At 4.00-5.25 m: Olive brown; damp to moist; firm; medium plasticity; coarse fragments; carbonate clasts.					
5		At 5.25-6.75 m: As above; Grey.					
6							Hydrated Bentonite Chips (0.30-11.85 m)
7							
8		At 8.25-10.85 m: As above; damp; cobbles > 4cm; slight sheen; slight bitumen odour.					

WorleyParsons Komex
resources & energy

Borehole # P06-1853-DQ/

PROJECT # F35772801 *P06-1853-16*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 04-Mar-06
Compiled by: FR

Northing: 6376061.63
Easting: 459345.18
Elevation: 297.23 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10							
11		***SILT (10.85-11.25 m)*** Grey; damp; slight bitumen odour.					
		CLAY TILL (11.25-15.10 m) Grey; moist; firm; medium to high plasticity; coarse fragments; some reworked McMurray stringers (fine-grained sand in bitumen).					Hydrated Bentonite Pellets (11.85-12.90 m)
12							
13							Top of Sand at 12.90 m 10/20 Frac Sand
14		At 14.25-15.10 m: As above; wet at 14.90 m.					Top of Screen at 14.12 m 1.52 m x 51 mm ID Sch 40 PVC
15		***SILT (15.10-15.75 m)*** Grey; wet.					Solid Stem Borehole (152 mm) Bottom of Screen at 15.62 m Slough (15.62-15.75 m) T.D. of Borehole at 15.75 m
		End of Borehole					
16							
17							
18							

WorleyParsons Komex
resources & energy

Borehole # P06-1861-DQ/

PROJECT # F35772801 *P06-1861-14*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 03-Mar-06
Compiled by: FR
Northing: 6376687.27
Easting: 466561.27
Elevation: 257.17 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▽ % LEL ▽ 0 25 50 75 100 • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
-1							Stick-Up 1.0 m
0		Ground Surface					Surface Cuttings (0-0.10 m)
		MUSKEG (0.00-0.85 m) Reddish brown; frozen; some rootlets.					51 mm ID Sch 40 PVC pipe
1		At 0.75-0.85 m: As above; wet.					Hydrated Bentonite Chips (0.10-2.75 m)
		SANDY CLAY (0.85-1.00 m) Dark grey; wet; soft; high plasticity; abundant organics.					
2		***SAND (1.00-2.25 m)*** Olive brown; wet; fine-grained sand; some gravel; some clay; poorly sorted.					
		SILT (2.25-3.75 m) Olive brown; moist; possibly some reworked McMurray.					
3							
4		***SILTY SAND (3.75-6.75 m)*** Olive brown; wet; very fine-grained.					
5		At 5.25-6.75 m: As above; less moisture; some reworked McMurray.					
6							
7		***SILT (6.75-13.80 m)*** Grey; moist; firm; reworked McMurray.					
8							

WorleyParsons Komex
resources & energy

Borehole # P06-1861-DQ/

PROJECT # F35772801 *P06-1861-14*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: Mobile Augers and Research Ltd.
Drill Date: 03-Mar-06
Compiled by: FR
Northing: 6376687.27
Easting: 466561.27
Elevation: 257.17 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Sample Depth (m)	Sample Type	VOC ▿ % LEL ▿ 0 25 50 75 100 / • ppm • 0 100 300 500	Well Data	Lab Analysis or Well Details
9							
10		At 9.75-11.25 m: As above; some very fine-grained sand.					Hydrated Bentonite Chips (8.60-11.90 m)
11		At 11.25-12.75 m: As above; more sand.					Hydrated Bentonite Pellets (11.90-12.30 m)
12							Top of Sand at 12.30 m 10/20 Frac Sand
13							Top of Screen at 13.00 m 1.52 m x 51 mm ID Sch 40 PVC
14		***CLAY TILL (13.80-18.75 m)*** Dark grey; damp; firm; medium plasticity; coarse fragments; some pink inclusions; bitumen odour.					Solid Stem Borehole (254 mm) Bottom of Screen at 14.50 m T.D. of Borehole at 14.50 m
15							
16							
17		At 17.25-18.75 m: As above; more pink inclusions.					
18							
		End of Borehole					

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resources & energy

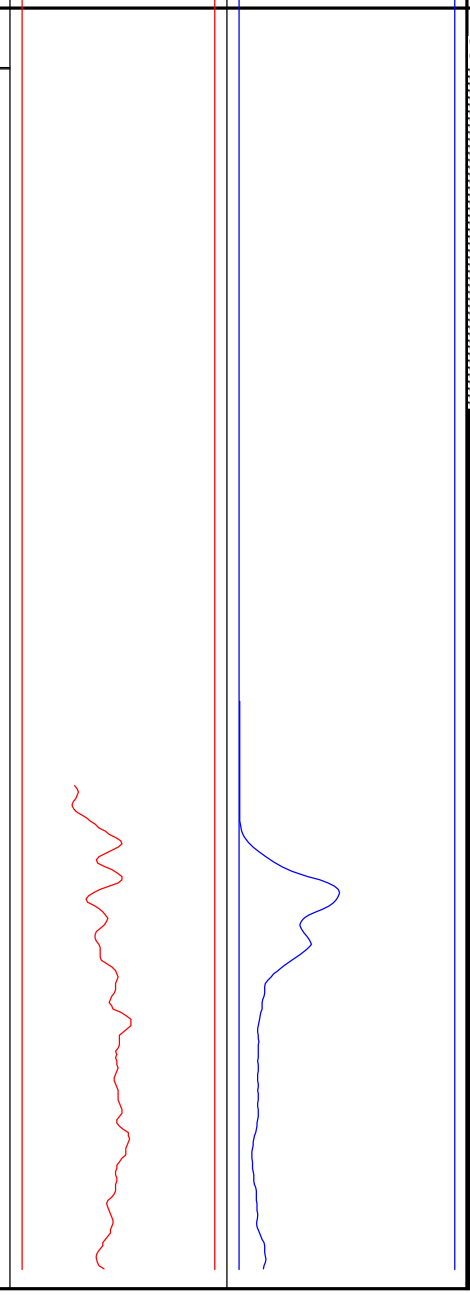
Borehole # SH06-1824-BS

PROJECT # F35772803 *SH06-1824*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 19-Feb-06
Compiled by: D. Dillon
Northing: 6372296.63
Easting: 460204.81
Elevation: 284.76 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-1		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
9		
19		
29		





Well Data

Well Details

Stick-Up 1.02 m

49.3 mm ID Sch 80 PVC pipe

Hydrated Bentonite Chips
(0.00-10.50 m)

Volclay Granular Grout
(10.50-56.50 m)

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Borehole # SH06-1824-BS

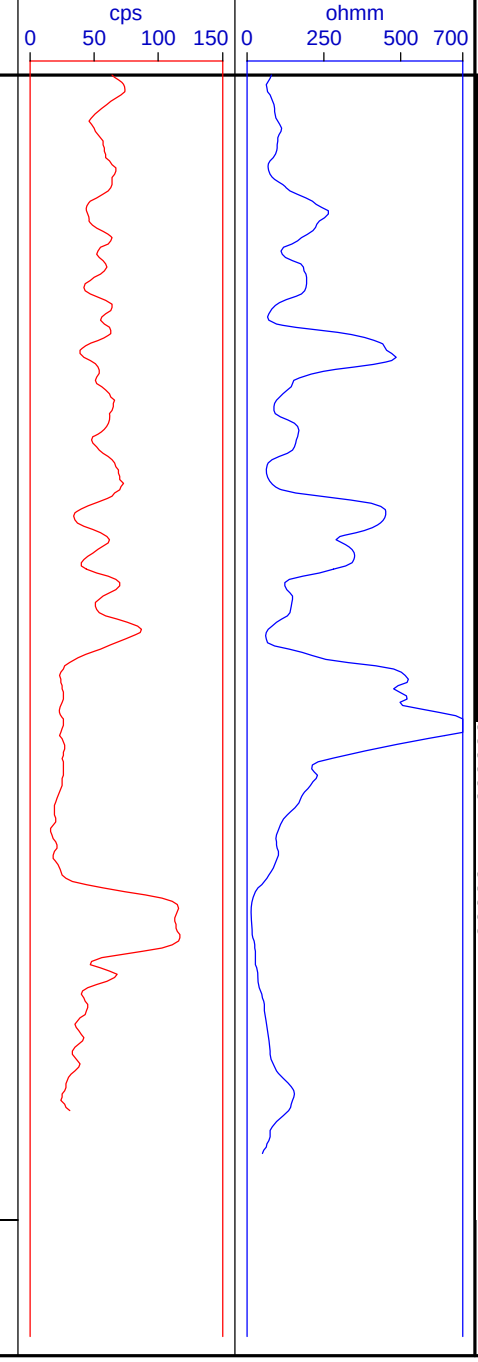
PROJECT # F35772803 *SH06-1824*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 19-Feb-06
Compiled by: D. Dillon

Northing: 6372296.63
Easting: 460204.81
Elevation: 284.76 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
47		
57		
67		
		End of Borehole



Well Data

Well Details

Hydrated Bentonite Pellets
(56.50-59.15 m)

10/20 Frac Sand
Top of Sand at 59.15 m
Top of Screen at 59.50 m
1.5 m x 49.3 mm ID Sch 80
PVC 020 Slot Screen
Bottom of Screen at 61.00 m
Hydrated Bentonite Pellets
(61.00-63.00 m)
Top of Sand at 63.00 m
10/20 Frac Sand

T.D. of Borehole at 71.50 m

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resources & energy

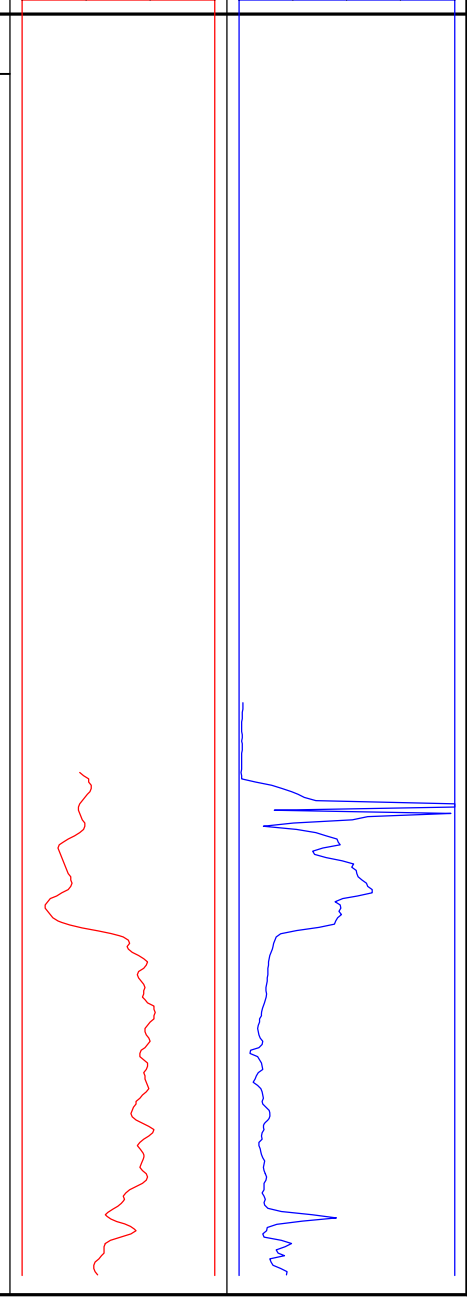
Borehole # SH06-1845-BS

PROJECT # F35772803 *SH06-1845*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 04-Mar-06
Compiled by: D. Dillon
Northing: 6374907.08
Easting: 466000.61
Elevation: 256.63 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-1		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
9		
19		
29		



Well Data



Well Details

Stick-Up 0.77 m

49.3 mm ID Sch 80 PVC pipe

Hydrated Bentonite Chips (0.0-?? m)

Volclay Granular Grout

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Borehole # SH06-1845-BS

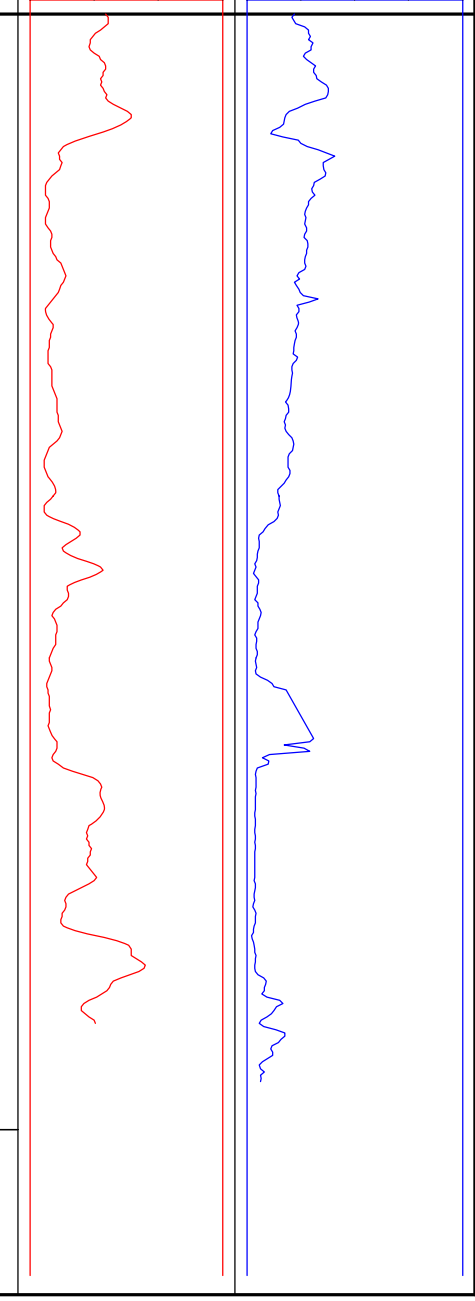
PROJECT # F35772803 *SH06-1845*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 04-Mar-06
Compiled by: D. Dillon

Northing: 6374907.08
Easting: 466000.61
Elevation: 256.63 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
48		
58		
68		
		End of Borehole



Well Data

Well Details

Hydrated Bentonite Pellets

Top of Sand at 41.85 m

10/20 Frac Sand

Top of Screen at 50.44 m

3.06 m x 49.3 mm ID Sch 80 PVC 020 Slot Screen
Bottom of Screen at 53.50 m

Bottom of Sand at 53.55 m

Hydrated Bentonite Pellets (53.55-55.85 m)

10/20 Frac Sand (55.85-71.98 m)

Natural Fill (71.98-72.50 m)
T.D. of Borehole at 72.50 m

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resources & energy

Borehole # SH06-1848-BS

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: D. Dillon
Northing: 6375502.96
Easting: 462398.03
Elevation: 283.81 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 1000 2000	Well Data	Well Details
-1		Ground Surface				Stick-Up 0.77 m
		NO LITHOLOGY DATA AVAILABLE				49.3 mm ID Sch 80 PVC pipe
						Hydrated Bentonite Chips (0.0-8.0 m)
9						
19						
29						Volclay Granular Grout (8.0-57.0 m)
39						

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resources & energy

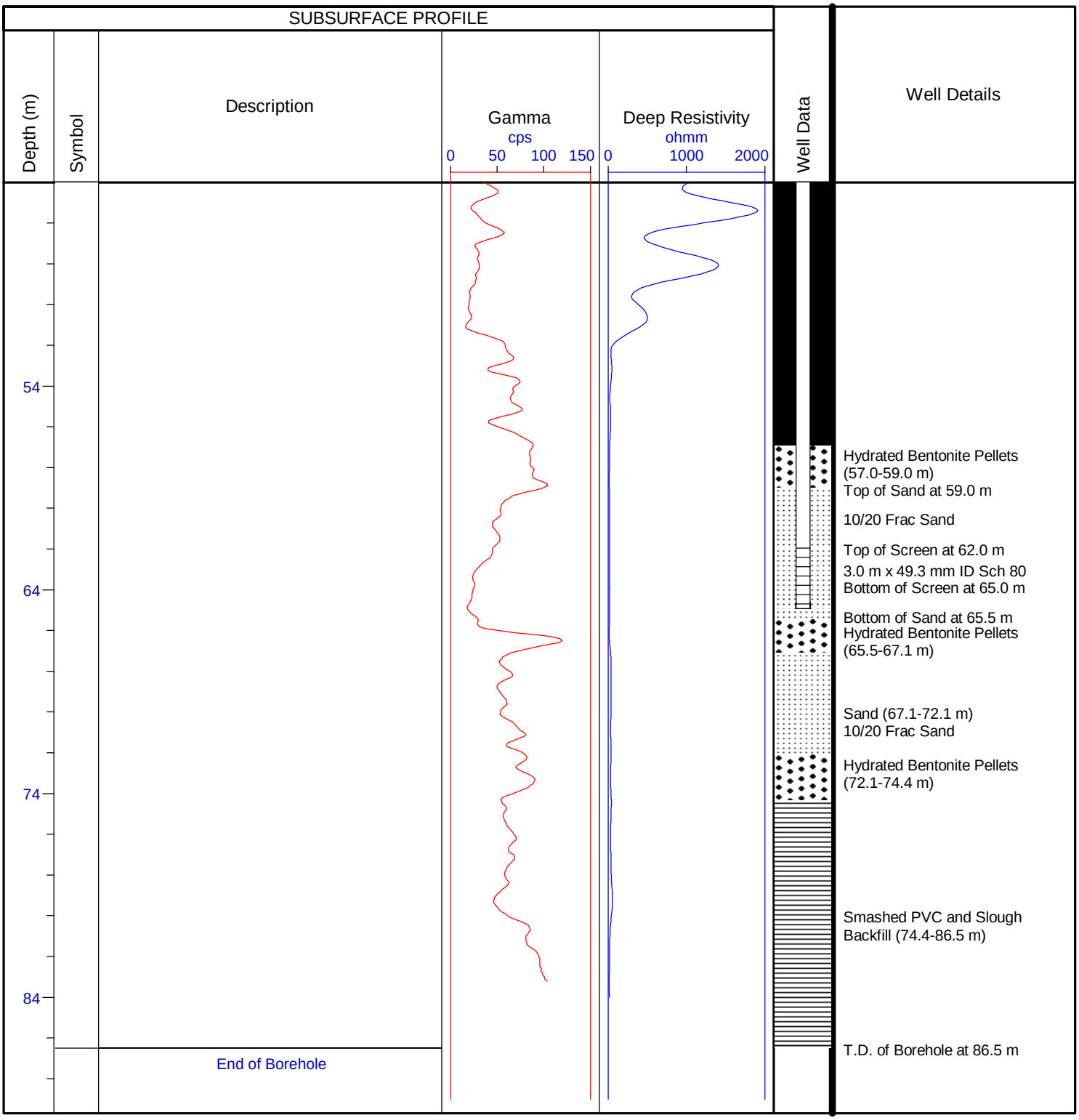
Borehole # SH06-1848-BS

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-06
Compiled by: D. Dillon

Northing: 6375502.96
Easting: 462398.03
Elevation: 283.81 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

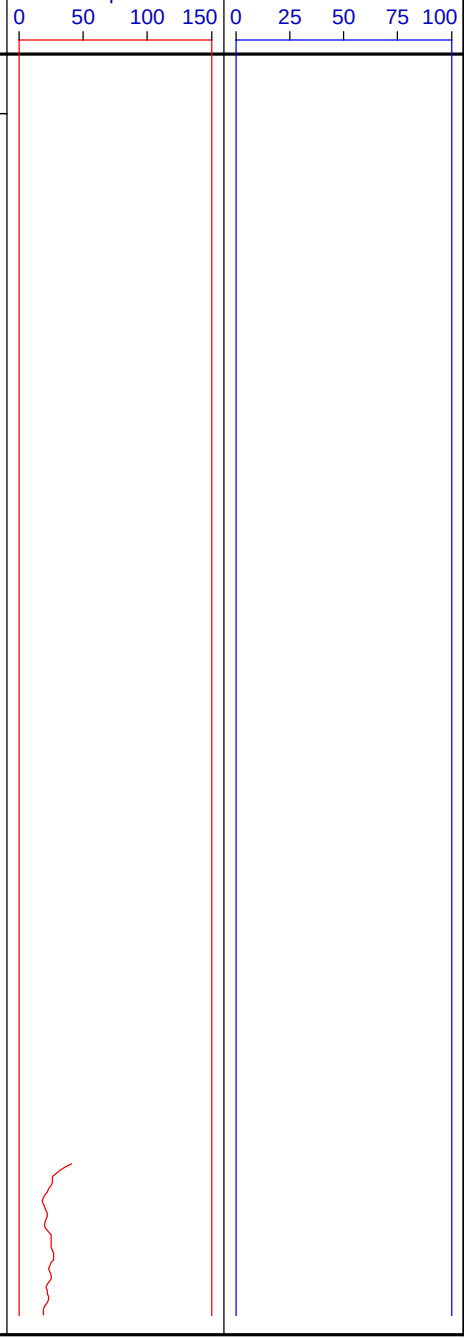
Borehole # SH06-1862-BS

PROJECT # F35772803 *SH06-1862*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 08-Mar-06
Compiled by: D. Dillon
Northing: 6377303.08
Easting: 463651.04
Elevation: 278.77 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-1		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
9		
19		
29		
39		



Well Data

Well Details

Stick-Up 0.96 m

49.3 mm ID Sch 80 PVC pipe

Hydrated Bentonite Chips

Volclay Granular Grout
(??-50.8 m)

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Borehole # SH06-1862-BS

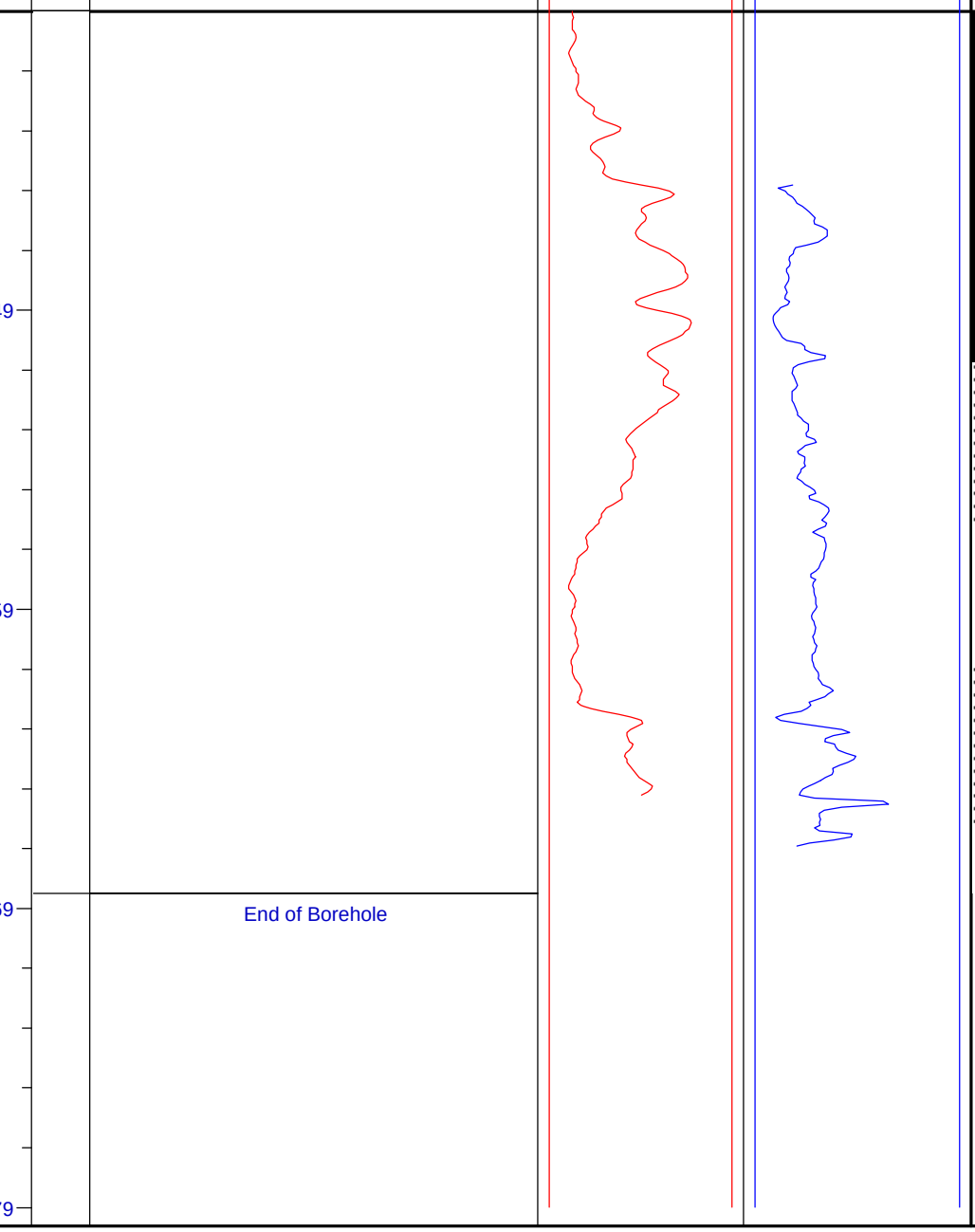
PROJECT # F35772803 *SH06-1862*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 08-Mar-06
Compiled by: D. Dillon

Northing: 6377303.08
Easting: 463651.04
Elevation: 278.77 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
69		End of Borehole



Well Data

Well Details

Hydrated Bentonite Pellets (50.80-56.40 m)

Top of Sand at 56.45 m
10/20 Frac Sand
Top of Screen at 57.50 m

3.1 m x 49.3 mm ID Sch 80 PVC 020 Slot Screen

Bottom of Screen at 60.60 m
Bottom of Sand at 60.90 m

Hydrated Bentonite Pellets (60.90-66.20 m)

Sand (66.20-68.50 m)

T.D. of Borehole at 68.50 m

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Borehole # SH07-1805-BS

PROJECT # F35772803 *SH07-1805*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-07
Compiled by: D. Dillon
Northing: 6380385.11
Easting: 465573.63
Elevation: 283.04 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 25 50	Well Data	Well Details
-1		Ground Surface				Stick-Up 0.77 m
		NO LITHOLOGY DATA AVAILABLE				Hydrated Bentonite Chips (0.00-10.00 m)
9						49.3 mm ID Sch 80 PVC pipe
19						Grout (10.00-92.85 m)
29						
39						
49						

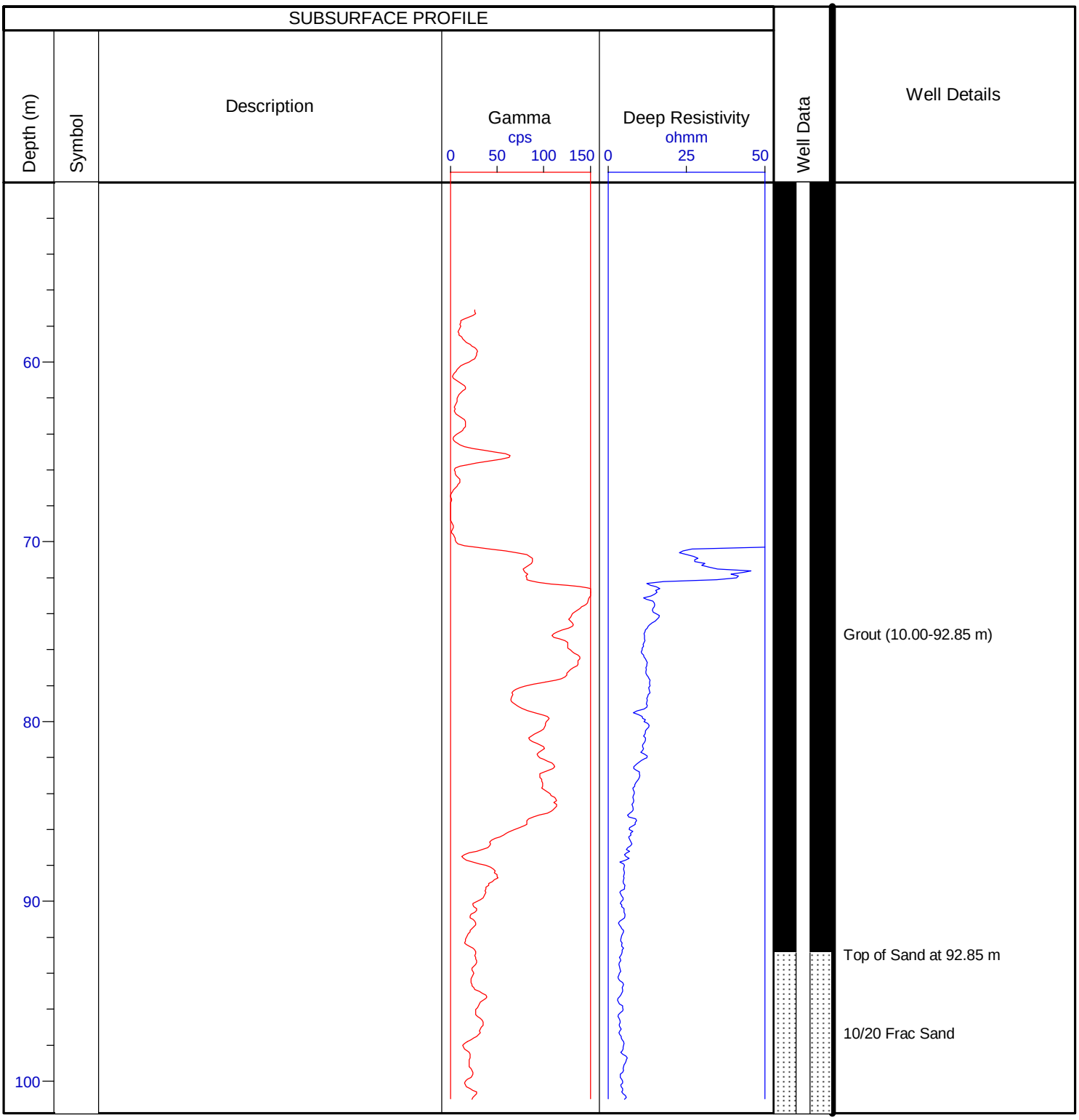
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Borehole # SH07-1805-BS

PROJECT # F35772803 *SH07-1805*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-07
Compiled by: D. Dillon
Northing: 6380385.11
Easting: 465573.63
Elevation: 283.04 m asl (Ground)

SUBSURFACE PROFILE



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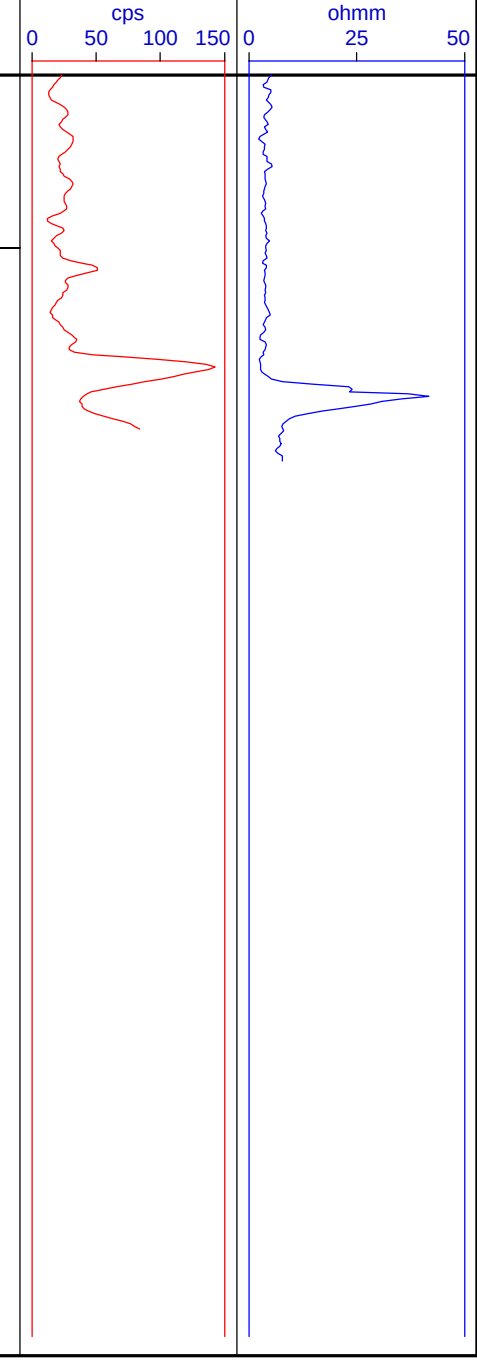
Borehole # SH07-1805-BS

PROJECT # F35772803 *SH07-1805*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 02-Mar-07
Compiled by: D. Dillon
Northing: 6380385.11
Easting: 465573.63
Elevation: 283.04 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
		End of Borehole



Well Data

Well Details

Top of Screen at 102.00 m
6.00 m x 49.3 mm ID Sch 80 PVC
020 Slot Screen
Core Rig Borehole
(152 mm diameter)
Bottom of Screen at 108.00 m
Bottom of Sand at 108.00 m
T.D. of Borehole at 108.00 m

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Borehole # SH07-1814-BS

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 09-Mar-07
Compiled by: D. Dillon
Northing: 6381990.86
Easting: 467195.93
Elevation: 283.16 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 25 50 75 100	Well Data	Well Details
-1		Ground Surface				Stick-Up 0.89 m
		NO LITHOLOGY DATA AVAILABLE				
9						49.3 mm ID Sch 80 PVC pipe
19						Grout (0.00-92.00 m)
29						
39						
49						

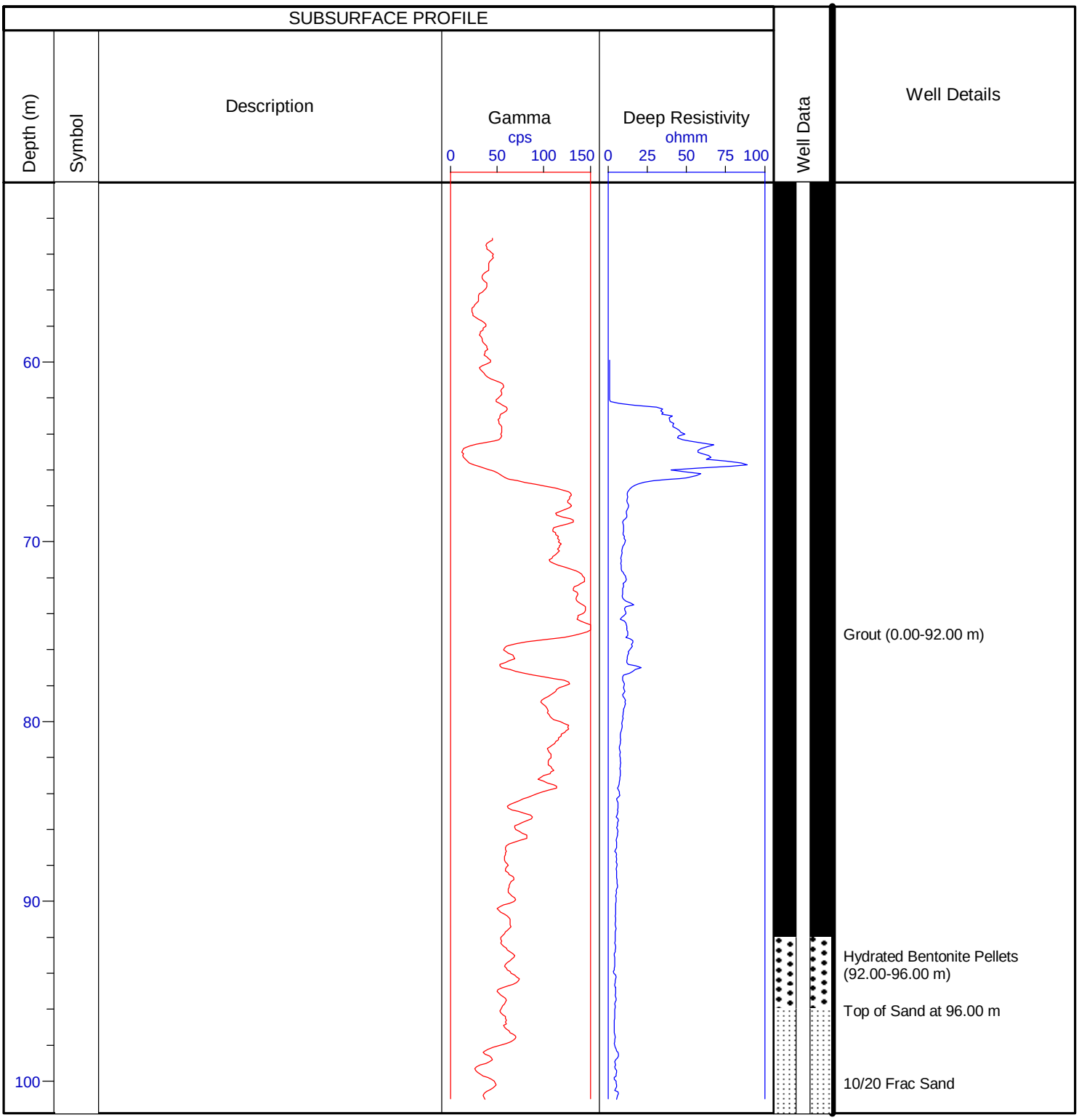
WorleyParsons Komex
resources & energy

Borehole # SH07-1814-BS

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 09-Mar-07
Compiled by: D. Dillon
Northing: 6381990.86
Easting: 467195.93
Elevation: 283.16 m asl (Ground)

SUBSURFACE PROFILE



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resources & energy

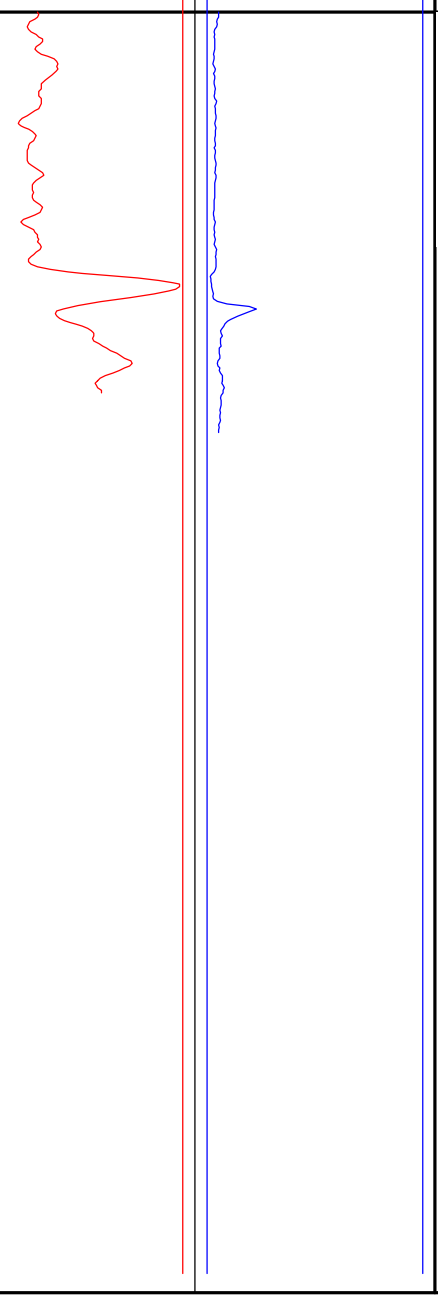
Borehole # SH07-1814-BS

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 09-Mar-07
Compiled by: D. Dillon
Northing: 6381990.86
Easting: 467195.93
Elevation: 283.16 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
111		End of Borehole



Well Details

Top of Screen at 104.00 m

6.50 m x 49.3 mm ID Sch 80 PVC
Core Rig Borehole
(152 mm diameter)

Bottom of Screen at 110.50 m
Bottom of Sand at 110.50 m
T.D. of Borehole at 110.50 m

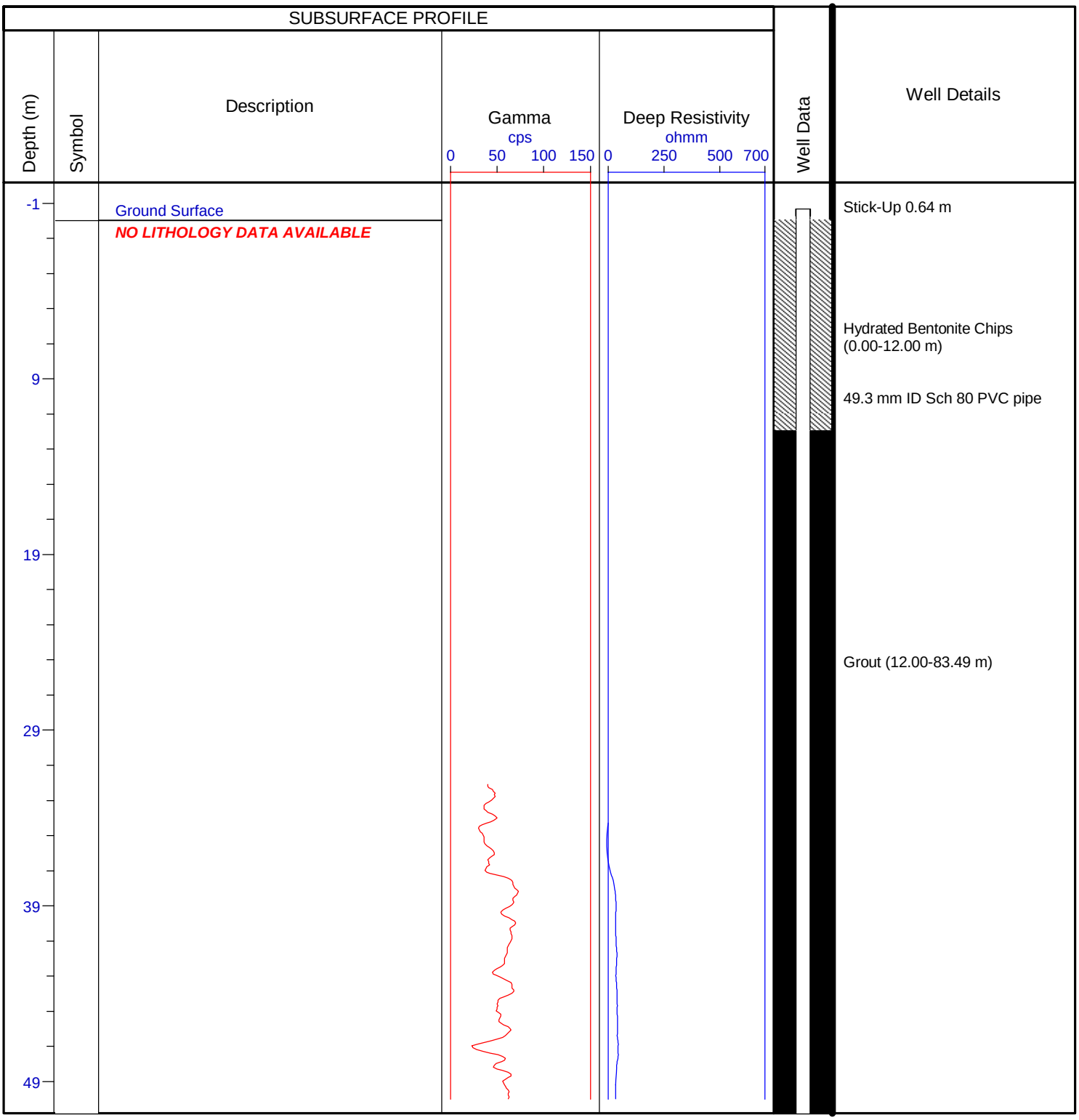
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resources & energy

Borehole # SH07-1826-BS

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 06-Mar-07
Compiled by: D. Dillon
Northing: 6385228.20
Easting: 465608.14
Elevation: 281.56 m asl (Ground)

SUBSURFACE PROFILE



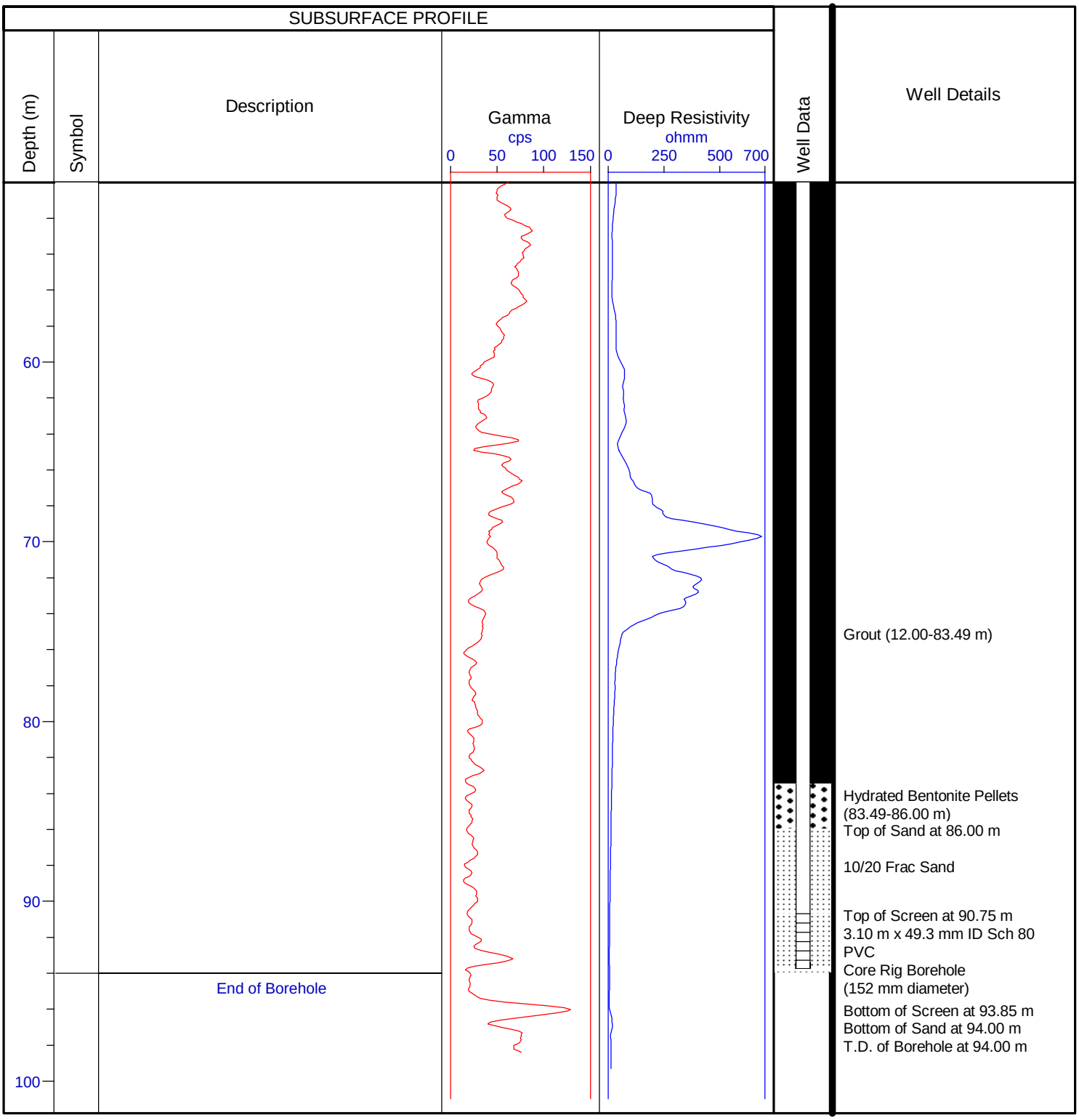
WorleyParsons Komex
resources & energy

Borehole # SH07-1826-BS

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 06-Mar-07
Compiled by: D. Dillon
Northing: 6385228.20
Easting: 465608.14
Elevation: 281.56 m asl (Ground)

SUBSURFACE PROFILE



WorleyParsons Komex
resources & energy

Borehole # SH07-1830-BS

PROJECT # F35772803 *SH07-1830*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 08-Mar-07
Compiled by: D. Dillon
Northing: 6386876.26
Easting: 460736.74
Elevation: 301.20 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 50 100 150 200	Well Data	Well Details
-1		Ground Surface ***NO LITHOLOGY DATA AVAILABLE***				Stick-Up 0.87 m
9						49.3 mm ID Sch 80 PVC pipe
19						Grout (0.00-64.00 m)
29						
39						
49						

WorleyParsons Komex
resources & energy

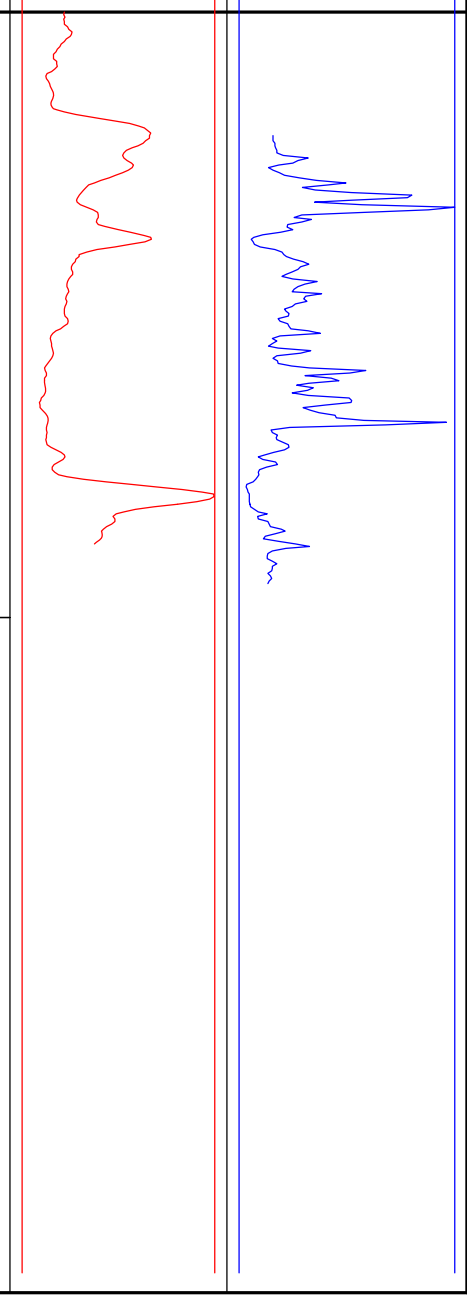
Borehole # SH07-1830-BS

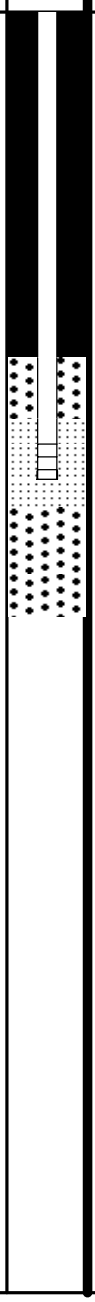
PROJECT # F35772803 *SH07-1830*

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 08-Mar-07
Compiled by: D. Dillon
Northing: 6386876.26
Easting: 460736.74
Elevation: 301.20 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
60		
70		
		End of Borehole
80		
90		
100		





Well Details

Grout (0.00-64.00 m)

Hydrated Bentonite Pellets
(64.00-66.50 m)
Top of Sand at 66.50 m
10/20 Frac Sand
Top of Screen at 67.50 m

1.50 m x 49.3 mm ID Sch 80
PVC
020 Slot Screen

Core Rig Borehole
(152 mm diameter)

Bottom of Screen at 69.00 m
Bottom of Sand at 70.10 m
Hydrated Bentonite Pellets
(70.10-74.50 m)
T.D. of Borehole at 74.50 m

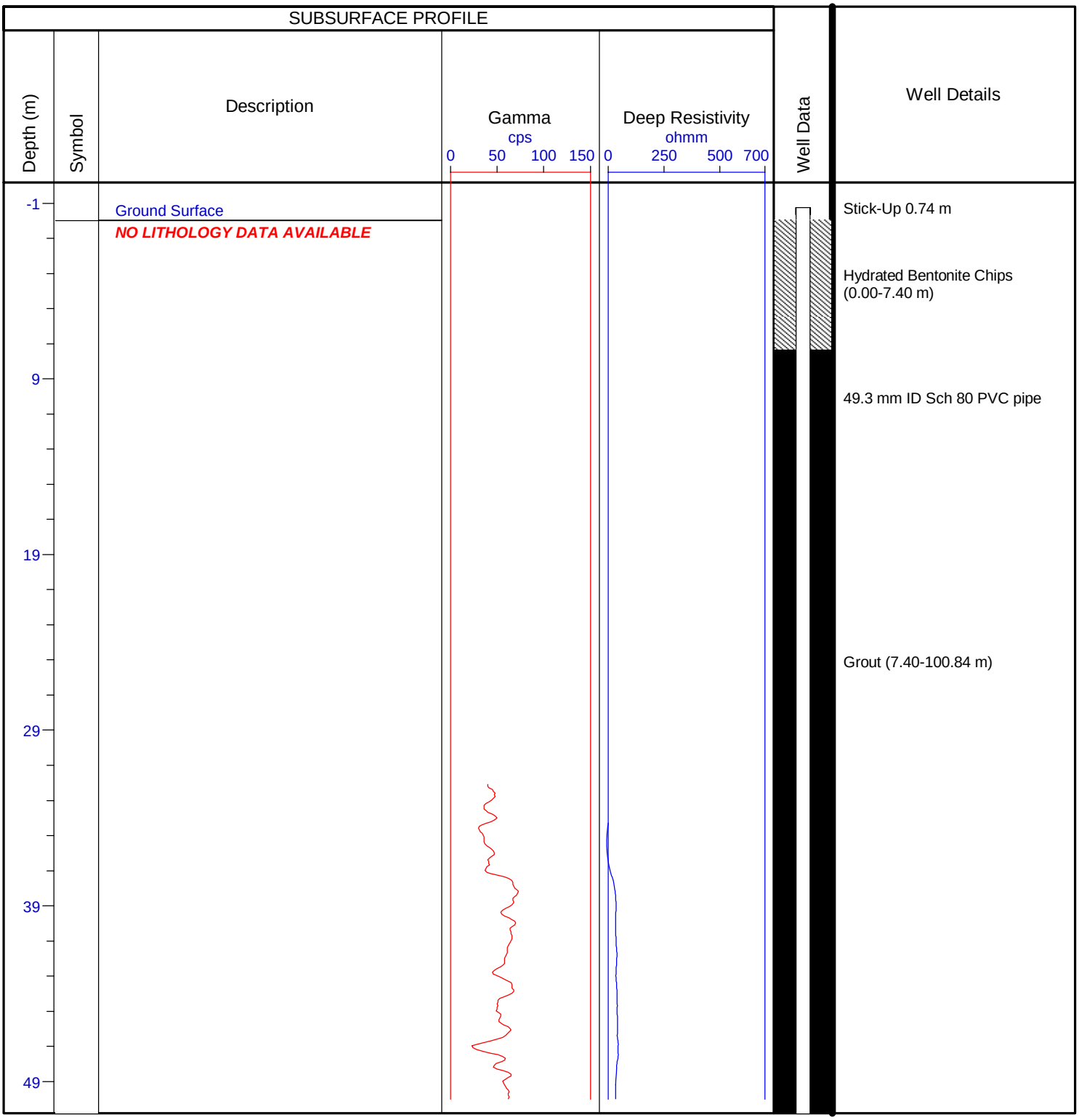
WorleyParsons Komex
resources & energy

Borehole # SH07-1826-D

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 05-Mar-07
Compiled by: D. Dillon
Northing: 6385227.40
Easting: 465613.37
Elevation: 281.54 m asl (Ground)

SUBSURFACE PROFILE



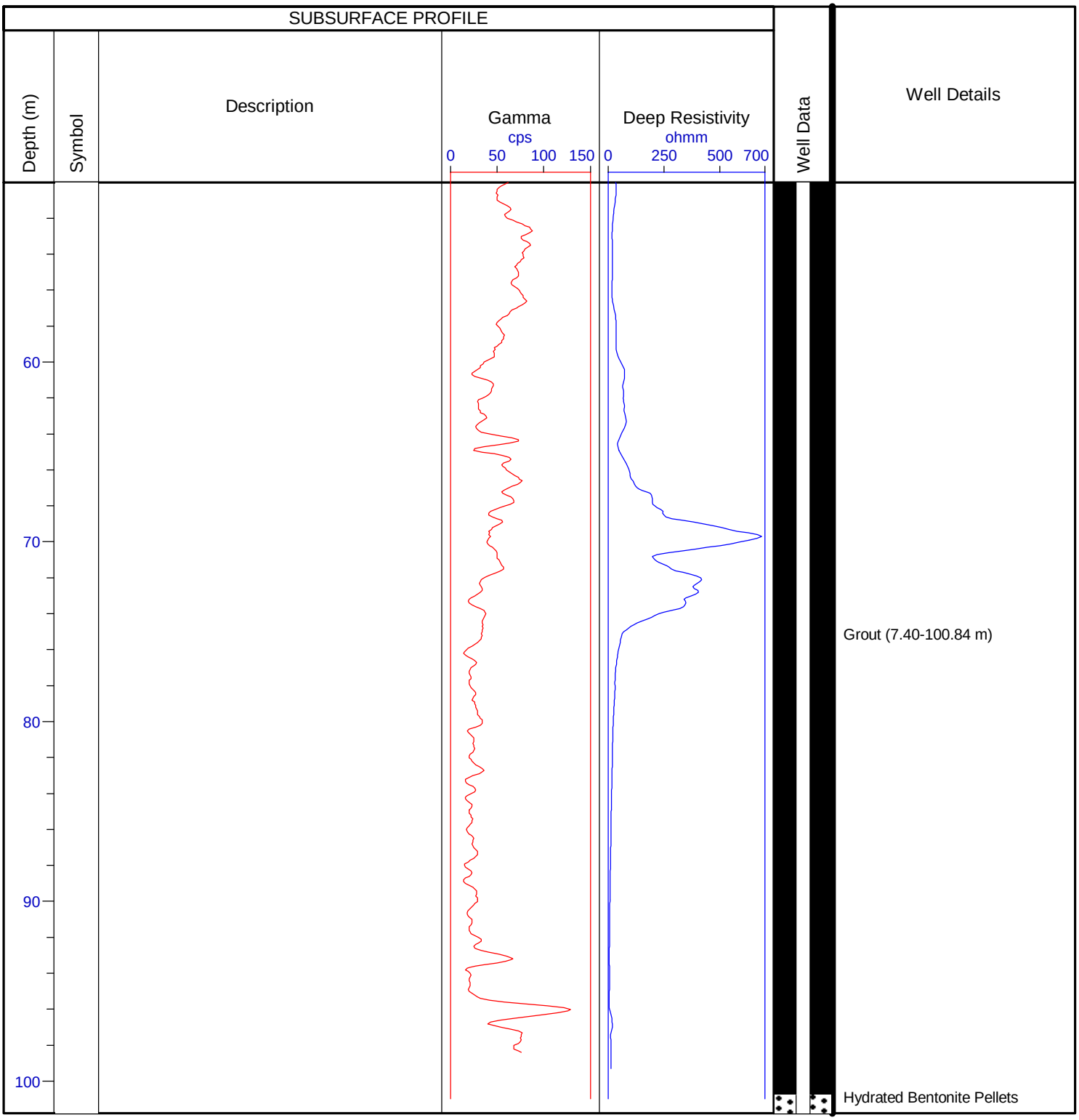
WorleyParsons Komex
resources & energy

Borehole # SH07-1826-D

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 05-Mar-07
Compiled by: D. Dillon
Northing: 6385227.40
Easting: 465613.37
Elevation: 281.54 m asl (Ground)

SUBSURFACE PROFILE



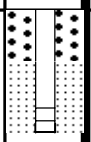
WorleyParsons Komex
resources & energy

Borehole # SH07-1826-D

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 05-Mar-07
Compiled by: D. Dillon
Northing: 6385227.40
Easting: 465613.37
Elevation: 281.54 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Gamma (cps) 0 50 100 150	Deep Resistivity (ohmm) 0 250 500 700	Well Data	Well Details
						Top of Sand at 103.10 m 10/20 Frac Sand Top of Screen at 105.00 m 1.00 m x 49.3 mm ID Sch 80 PVC Core Rig Borehole (152 mm diameter) Bottom of Screen at 106.00 m Bottom of Sand at 106.00 m T.D. of Borehole at 106.00 m
		End of Borehole				
111						
121						
131						
141						
151						

WorleyParsons Komex
resources & energy

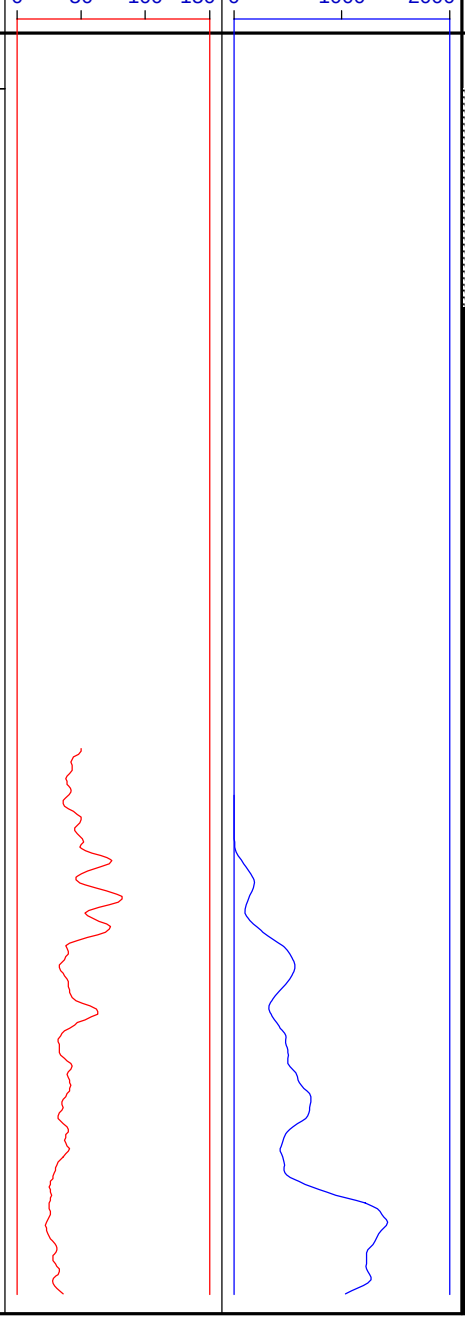
Borehole # SH06-1848-D

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 04-Mar-06
Compiled by: D. Dillon
Northing: 6375493.90
Easting: 462404.08
Elevation: 284.05 m asl (Ground)

SUBSURFACE PROFILE

Depth (m)	Symbol	Description
-1		Ground Surface
		NO LITHOLOGY DATA AVAILABLE
9		
19		
29		
39		



Well Data

Well Details

Stick-Up 0.76 m

49.3 mm ID Sch 80 PVC pipe

Hydrated Bentonite Chips

Volclay Granular Grout
(??-65.75 m)

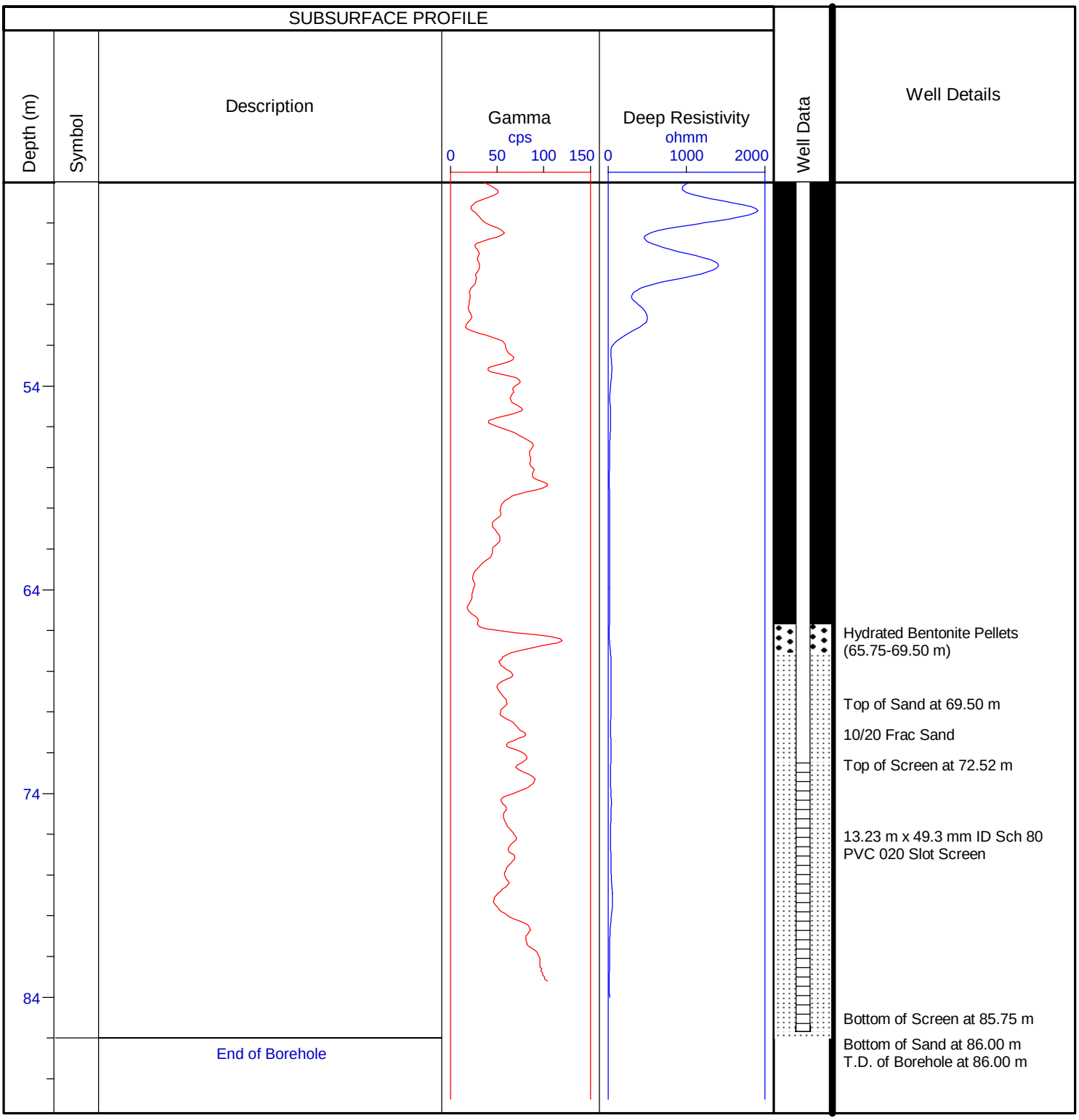
WorleyParsons Komex
resources & energy

Borehole # SH06-1848-D

PROJECT # F35772803

Project Name: Jackpine Mine Expansion and Pierre River Mine Project
Client: Shell Canada Limited
Location: Pierre River Mining Area
Drilled by: SDS Drilling
Drill Date: 04-Mar-06
Compiled by: D. Dillon
Northing: 6375493.90
Easting: 462404.08
Elevation: 284.05 m asl (Ground)

SUBSURFACE PROFILE



Kearl Logs

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.:	4512AD	COMPILED BY:		BORING DATE:	22 Jan 1998
BORING NO.:	AA5-07-96-8 W4M	LOCATION:	Lease 36	CONTRACTOR:	Basal
NORTHING:	6352318.4	EASTING:	481736.7	ELEVATION:	298.1

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2 (1 2 3 4)
SPT BLOWS/0.3m (10 20 30 40 50)
O.V.A. READING (100 300 500 700 900)

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0		MUSKEG: black, soft, wet, fibrous.					0.45 PVC STICK-UP = 0.80 m 0.71 BENTONITE CHIPS
1.0							SCH 80 PVC PIPE
2.0		2.29 Trace medium to coarse sand.					10/20 FRAC SAND
3.0		3.05 Wood chips, roots, saturated.					203 mm DIA. HOLE.
4.0							.020 SLOT SCREEN 3.74 BENTONITE CHIPS
		TOTAL DEPTH = 4.01 m					4.01
5.0							
6.0							
7.0							
8.0		NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					
9.0							
10.0							

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.: 4512AD
BORING NO.: AA7-01-96-8 W4M
NORTHING: 6350744.1
COMPILED BY:
LOCATION: Lease 36
EASTING: 480850.4
BORING DATE: 22 Jan 1998
CONTRACTOR: Basal
ELEVATION: 300.92

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2 (1 2 3 4)
SPT BLOWS/0.3m (10 20 30 40 50)
O.V.A. READING (100 300 500 700 900)

DEPTH m	SYMBOL	SOIL/ROCK	DESCRIPTION	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0			MUSKEG: soft, fibrous, wood chips, roots, wet, dark brown.					PVC STICK-UP = 0.70 m
1.0								BENTONITE CHIPS
2.0								SCH 80 PVC PIPE
		2.74						2.2 PELTONITE
3.0			CLAYEY SILT: soft, wet, shell fragments, organics.					
		3.66						3.4 10/20 FRAC SAND
4.0			SAND: some silt, trace gravel, well graded, grey, dense, wet.					3.8 .020 SLOT SCREEN
		4.57	Trace gravel.					203 mm DIA. HOLE.
5.0								5.3
			TOTAL DEPTH = 5.3 m					
6.0								
7.0								
8.0								
9.0								
10.0								

NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.: 4512AD
BORING NO.: AA9-6-96-8 W4M
NORTHING: 6351175.2
COMPILED BY:
LOCATION: Lease 36
EASTING: 482964.3
BORING DATE: 20 Jan 1998
CONTRACTOR: Basal
ELEVATION: 320.79

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
SPT BLOWS/0.3m
O.V.A. READING

DEPTH m	SYMBOL	DESCRIPTION	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0		SOIL/ROCK SAND: mostly fine grained, some medium grained, trace silt stringers, compact/dense, light brown, moist.					PVC STICK-UP = 0.60 m
1.0							BENTONITE CHIPS
2.0		2.29 Trace gravel to 3.0 m.					SCH 80 PVC PIPE
3.0		3.05 Fine to medium grained.					
4.0		4.57 Dark brown silt stringer.					4.2 10/20 FRAC SAND
5.0		NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					5.5 6.06 .020 SLOT SCREEN
6.0							
7.0		7.17 Wet.					203 mm DIA. HOLE
8.0		8.38 Trace silt (3 mm thick stringers), wet.					
9.0							9.1
10.0		TOTAL DEPTH = 9.1 m					

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.: 4512AD
BORING NO.: AA11-24-96-8 W4M
NORTHING: 6355912.6
COMPILED BY:
LOCATION: Lease 36
EASTING: 490360.1
BORING DATE: 23 Jan 1998
CONTRACTOR: Basal
ELEVATION: 322.07

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
SPT BLOWS/0.3m
O.V.A. READING

DEPTH m	SYMBOL	SOIL/ROCK	DESCRIPTION	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0			SAND: trace to some silt, brown to grey, compact, wet, organic.					PVC STICK-UP = 0.90 m
1.0								BENTONITE CHIPS
		1.4						
			SILT TILL: sandy, trace coarse gravel, silty sand stringers, pebbles.					SCH 80 PVC PIPE
2.0		2.29	Grey, soft to firm, wet, cohesive.					2.3 PELTONITE
3.0		3.51						3.4 10/20 FRAC SAND
			GRAVEL / COBBLE LAYER:					
4.0		4.25						.020 SLOT SCREEN
			SAND: trace silt, light grey brown, moist to wet.					203 mm DIA. HOLE.
5.0								5.6
6.0			TOTAL DEPTH = 5.6 m					
7.0			NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					
8.0								
9.0								
10.0								

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.: 4512AD
BORING NO.: AA03-22-96-8 W4M
NORTHING:

COMPILED BY:
LOCATION: Lease 36
EASTING:

BORING DATE: 23 Jan 1998
CONTRACTOR: Basal
ELEVATION: 320.31

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
SPT BLOWS/0.3m
O.V.A. READING

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0		CLAY TILL: silty, trace to some sand, trace fine gravel, cobbles and boulders.					PVC STICK-UP = 0.80 m BENTONITE CHIPS SCH 80 PVC PIPE
0.7							
1.09							10/20 FRAC SAND
2.0		SANDY SILTY CLAY TILL: trace gravel, cobble, moist, soft.					
2.74		Less sand, brown.					.020 SLOT SCREEN
3.0							203 mm DIA. HOLE.
4.0							
4.14							BENTONITE CHIPS
4.3		TOTAL DEPTH = 4.3 m					
5.0							
6.0							
7.0		NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					
8.0							
9.0							
10.0							

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.: 4512AD
BORING NO.: AA13-09-96-8 W4M
NORTHING: 6353087.7
COMPILED BY:
LOCATION: Lease 36
EASTING: 484988.9
BORING DATE: 22 Jan 1998
CONTRACTOR: Basal
ELEVATION: 316.88

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2 (1 2 3 4)
SPT BLOWS/0.3m (10 20 30 40 50)
O.V.A. READING (100 300 500 700 900)

DEPTH m	SYMBOL	SOIL/ROCK	DESCRIPTION	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0			SAND AND SILT: trace cobbles, moist, organics, disturbed.					PVC STICK-UP = 0.91 m
			0.76					BENTONITE CHIPS
1.0			CLAY: trace to some silt, trace sand, trace gravel, light brown, firm to stiff, calcareous, medium plastic.					SCH 80 PVC PIPE
								1.37
								10/20 FRAC SAND
2.0								1.84
								2.15
			2.74					
3.0			SILT TILL: some sand, trace clay, trace gravel, grey, very stiff, moist to wet.					.020 SLOT SCREEN
			3.81 Cobbles					
4.0			4.27 Cobbles					203 mm DIA. HOLE.
5.0								5.2
			TOTAL DEPTH = 5.28 m					5.28
6.0								
7.0			NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					
8.0								
9.0								
10.0								

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 2

CONTRACT NO.:	4512AD	COMPILED BY:		BORING DATE:	23 Jan 1998
BORING NO.:	AA013-10-96-8 W4M	LOCATION:	Lease 36	CONTRACTOR:	Basal
NORTHING:	6353126.7	EASTING:	486623.7	ELEVATION:	333.62

SAMPLE TYPES
- A AUGER SAMPLE
- W WASH SAMPLE
- R ROCK CORE
- C CRREL BARREL
- S SPLIT SPOON
- T SHELBY TUBE
- O THIN WALL OPEN
- P THIN WALL PISTON
- ▽ STATIC WATER LEVEL
- ▼ DYNAMIC WATER LEVEL

SAMPLE CONDITION
- DISTURBED
- FAIR
- GOOD
- LOST

TEST INFORMATION
- PENETROMETER kg/cm2 (1, 2, 3, 4)
- △ SPT BLOWS/0.3m (10, 20, 30, 40, 50)
- X O.V.A. READING X (100, 300, 500, 700, 900)

DEPTH m	SYMBOL	SOIL/ROCK	DESCRIPTION	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0		0.35	ORGANIC SOIL: with wood chips, rootlets, disturbed native fill.					PVC STICK-UP = 0.90 m
		0.91	SAND: poorly graded, red/brown, compact, moist. At 0.91 m, trace to some silt, well graded, dark brown.					
1.0		1.52	Fine to medium grained, poorly graded, light brown.					
2.0								
3.0								BENTONITE CHIPS
4.0								
5.0		5.49	Fine grained.					SCH 80 PVC PIPE
6.0								
7.0		7.32	Fine to medium grained.					203 mm DIA. HOLE
8.0								
9.0								
		9.75	Trace gravel, well graded.					
10.0								

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 2 OF 2

CONTRACT NO.: 4512AD
BORING NO.: AA013-10-96-8 W4M
NORTHING: 6353126.7
COMPILED BY:
LOCATION: Lease 36
EASTING: 486623.7
BORING DATE: 23 Jan 1998
CONTRACTOR: Basal
ELEVATION: 333.62

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
SPT BLOWS/0.3m
O.V.A. READING

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
10.0		SAND: as above.					
		10.97 Fine to medium grained, dense, no gravel.					
11.0							BENTONITE CHIPS
12.0							SCH 80 PVC PIPE
13.0							203 mm DIA. HOLE.
14.0							
15.0							15.25 10/20 FRAC SAND 15.95
16.0		NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					.020 SLOT SCREEN
17.0							17.85
18.0		18.29 Wet, dark brown.					NATURAL SLOUGH
19.0							19.0
		TOTAL DEPTH = 19.0 m					
20.0							

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 3

CONTRACT NO.: 4512AD
BORING NO.: AA13-4-96-8 W4M
NORTHING: 6351557.8
COMPILED BY:
LOCATION: Lease 36
EASTING: 484943.2
BORING DATE: 12 Aug 1997
CONTRACTOR: Basal
ELEVATION: 338.14

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
▽ STATIC WATER LEVEL
▼ DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
1 2 3 4
△ SPT BLOWS/0.3m
10 20 30 40 50
X O.V.A. READING X
100 300 500 700 900

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0		SAND: Fine to medium grained, well graded, trace gravel, light red/brown, compact, moist.					PVC STICK-UP = 0.88 m
1.0							
		1.52 Gravelly silt layers, dark brown.					
2.0							
		2.44 Fine grained, trace clay, moist to wet.					
		2.74 Occasional hard grey silt layers, fine grained sand, cobbles.					
3.0							
4.0							BENTONITE CHIPS
		4.88 No gravel, light brown, occasional brown seams.					
5.0							
6.0							SCH 80 PVC PIPE
7.0							
8.0							159 mm DIA. HOLE
9.0							
10.0							

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 2 OF 3

CONTRACT NO.: 4512AD
BORING NO.: AA13-4-96-8 W4M
NORTHING: 6351557.8
COMPILED BY:
LOCATION: Lease 36
EASTING: 484943.2
BORING DATE: 12 Aug 1997
CONTRACTOR: Basal
ELEVATION: 338.14

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
1 2 3 4
SPT BLOWS/0.3m
10 20 30 40 50
O.V.A. READING
100 300 500 700 900

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
10.0		SAND: as above.					
		10.36 Very fine grained, trace silt.					
11.0							
12.0							BENTONITE CHIPS
13.0							
14.0							SCH 80 PVC PIPE
15.0		15.39 Silt seam, trace clay, brown, moist.					
		15.54 Very fine grained, poorly graded, light brown.					
16.0							159 mm DIA. HOLE
17.0							
		17.83 Silt seam, trace clay, moist.					
18.0							
19.0							10/20 FRAC SAND .020 SLOT SCREEN
20.0							

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 3 OF 3

CONTRACT NO.: 4512AD
BORING NO.: AA13-4-96-8 W4M
NORTHING: 6351557.8
COMPILED BY:
LOCATION: Lease 36
EASTING: 484943.2
BORING DATE: 12 Aug 1997
CONTRACTOR: Basal
ELEVATION: 338.14

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
SPT BLOWS/0.3m
O.V.A. READING

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS	TEST INFORMATION
20.0		SAND: as above.						159 mm DIA. HOLE
21.0								10/20 FRAC SAND
								.020 SLOT SCREEN
22.0		TOTAL DEPTH = 22.0 m						22.0
23.0								
24.0								
25.0								
26.0		NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.						
27.0								
28.0								
29.0								
30.0								

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.: 4512AD
BORING NO.: AA15-1-96-8 W4M
NORTHING: 6351504.9
COMPILED BY:
LOCATION: Lease 36
EASTING: 490710.1
BORING DATE: 24 Jan 1998
CONTRACTOR: Basal
ELEVATION: 335.43

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
SPT BLOWS/0.3m
O.V.A. READING

DEPTH m	SYMBOL	SOIL/ROCK	DESCRIPTION	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0			MUSKEG: wood chips, dark brown, wet, fibrous.					PVC STICK-UP = 0.97 m
1.0								BENTONITE CHIPS
		1.83						SCH 80 PVC PIPE
2.0			SILT TILL: clayey, trace to some sand, trace organics and pebbles, dark brown, soft, moist to wet, massive, calcareous.					2.1
3.0		3.05	Coal specks.					3.3
		3.66						
4.0			SAND TILL: silty, trace clay and pebbles, dark grey/brown, moist, cohesive.					4.1
5.0		5.33	Sand layer, wet.					10/20 FRAC SAND
								.020 SLOT SCREEN
6.0		6.1	Less silt.					203 mm DIA. HOLE.
7.0								7.15
			TOTAL DEPTH = 7.2 m					7.2
8.0			NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					
9.0								
10.0								

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.:	4512AD	COMPILED BY:		BORING DATE:	24 Jan 1998
BORING NO.:	AA3-14-96-8 W4M	LOCATION:	Lease 36	CONTRACTOR:	Basal
NORTHING:	6353574.0	EASTING:	488602.7	ELEVATION:	329.20

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON

T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2 (1 2 3 4)
SPT BLOWS/0.3m (10 20 30 40 50)
O.V.A. READING (100 300 500 700 900)

DEPTH m	SYMBOL	SOIL/ROCK	DESCRIPTION	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0			MUSKEG: dark brown, soft, wet, fibrous, roots.					PVC STICK-UP = 0.90 m
1.0								
		1.52						
		1.68	CLAY: silty, sandy, trace gravel and organics, soft, wet. At 1.68 m, sand interbeds, trace gravel.					
2.0								BENTONITE CHIPS
3.0		3.2	SAND TILL: fine to medium grained, trace clay and gravel, calcareous.					SCH 80 PVC PIPE
		3.66	Dense, moist, bitumen odour.					
4.0		4.11	Sand stringers, fine grained.					
5.0		5.49	Trace cobbles, wet.					5.3 PELTONITE 5.85
6.0			SAND: fine grained, light grey/brown, loose to compact, wet, bitumen blebs, occasional clasts of dark brown silt.					10/20 FRAC SAND
7.0			NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					.020 SLOT SCREEN
8.0								203 mm DIA. HOLE
		8.53	Trace gravel/cobbles.					9.0
9.0								
			TOTAL DEPTH = 9.1 m					9.1
10.0								

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.: 4512AD
BORING NO.: AA3-22-96-B W4M
NORTHING: 6355088.7
COMPILED BY:
LOCATION: Lease 36
EASTING: 487165.5
BORING DATE: 23 Jan 1998
CONTRACTOR: Basal
ELEVATION: 320.31

SAMPLE TYPES
B BULK SAMPLE
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
SPT BLOWS/0.3m
WATER CONTENT %
plastic limit
liquid limit

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	USCS	BLOW COUNTS	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER INSTALLATION
0.0		CLAY TILL: silty, trace to some sand, trace fine gravel, cobbles and boulders, firm, moist, coal specks, white calcium carbonate streaks.							PVC STICK-UP = 0.80 m BENTONITE CHIPS SCH 80 PVC PIPE
0.7									
1.09									10/20 FRAC SAND BENTONITE CHIPS
1.0									
1.83		Sandy, gravelly, wet.							
2.0									.020 SLOT SCREEN SCH 80 PVC PIPE
2.74		Less sand, brown.							
3.0									203 mm DIA. HOLE
4.0									
4.14									BENTONITE CHIPS
4.3									
4.5		SAND: Fine grained, trace silt, light grey, loose to compact, moist.							
5.03		Fine to medium grained.							
5.0									10/20 FRAC SAND
6.0									
6.9									
7.0		NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.							.020 SLOT SCREEN 203 mm DIA. HOLE
8.0									
8.4									
9.0		TOTAL DEPTH = 9.0 m							
9.0									
10.0									

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 4

CONTRACT NO.: 4512AD
BORING NO.: AA3-5-96-8 W4M
NORTHING: 6350291.0
COMPILED BY:
LOCATION: Lease 36
EASTING: 483760.8
BORING DATE: 12 Oct. 1997
CONTRACTOR: Basal
ELEVATION: 344.06

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
▽ STATIC WATER LEVEL
▼ DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
1 2 3 4
△ SPT BLOWS/0.3m
10 20 30 40 50
X O.V.A. READING X
100 300 500 700 900

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0		SAND: Fine grained, silty, light red/brown, loose to compact, moist, dark grey silt layers (20-30 mm thick).					PVC STICK-UP = 0.85 m
1.0		SAND: Fine to medium grained, trace silt, poorly graded, light brown, compact, moist.					
4.27		Light brown in colour.					BENTONITE CHIPS
8.84		Less moist to dry.					SCH 80 PVC PIPE; 159 mm DIA. HOLE
10.0							

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 2 OF 4

CONTRACT NO.: 4512AD
BORING NO.: AA3-5-96-8 W4M
NORTHING: 6350291.0
COMPILED BY:
LOCATION: Lease 36
EASTING: 483760.8
BORING DATE: 12 Oct. 1997
CONTRACTOR: Basal
ELEVATION: 344.0

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
▽ STATIC WATER LEVEL
▼ DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
1 2 3 4
△ SPT BLOWS/0.3m
10 20 30 40 50
X O.V.A. READING X
100 300 500 700 900

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
10.0		SAND: as above.					
11.0		11.28 Medium to dark red/brown, oxidized.					
12.0							
13.0							
14.0							BENTONITE CHIPS
		14.63 Medium/dark brown medium grained sand layers 20 to 30 mm thick.					
15.0							
16.0							SCH 80 PVC PIPE
		16.46 Fine to medium grained, poorly graded.					
17.0							
18.0							159 mm DIA. HOLE
		18.59 Dark brown layers 10 mm thick.					
19.0							
20.0							

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 3 OF 4

CONTRACT NO.: 4512AD
BORING NO.: AA3-5-96-8 W4M
NORTHING: 6350291.0
COMPILED BY:
LOCATION: Lease 36
EASTING: 483760.8
BORING DATE: 12 Oct. 1997
CONTRACTOR: Basal
ELEVATION: 344.0

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
▽ STATIC WATER LEVEL
▼ DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
1 2 3 4
△ SPT BLOWS/0.3m
10 20 30 40 50
X O.V.A. READING X
100 300 500 700 900

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
20.0		SAND: as above.					
21.0		21.64 Medium to coarse grained, moderately graded, compact to dense, dry to moist.					
22.0							
23.0		23.77 Fine to medium grained, light brown.					
24.0							BENTONITE CHIPS
25.0		25.6 Dark brown layers 5-10 mm thick.					
26.0							SCH 80 PVC PIPE
27.0							
28.0							153 mm DIA. HOLE
29.0							10/20 FRAC SAND
30.0							.020 SLOT SCREEN

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 1

CONTRACT NO.: 4512AD
BORING NO.: AA3-5-96-8 W4M
NORTHING: 6350291.0
COMPILED BY:
LOCATION: Lease 36
EASTING: 483760.8
BORING DATE: 12 Oct. 1997
CONTRACTOR: Basal
ELEVATION: 344.0

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON

T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
1 2 3 4
SPT BLOWS/0.3m
10 20 30 40 50
O.V.A. READING
100 300 500 700 900

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS	TEST INFORMATION
30.0		SAND: as above.						159 mm DIA. HOLE
31.0		31.7 Wet.						10/20 FRAC SAND .020 SLOT SCREEN
32.0		TOTAL DEPTH = 32.0 m					32.0	
33.0								
34.0								
35.0								
36.0								
37.0								
38.0								
39.0								
40.0								

NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET 1 OF 2

CONTRACT NO.: 4512AD
BORING NO.: AA01-9-96-B W4M
NORTHING: 6351982.1
COMPILED BY:
LOCATION: Lease 36
EASTING: 486235.8
BORING DATE: 23 Jan 1998
CONTRACTOR: Basal
ELEVATION: 336.09

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
1 2 3 4
SPT BLOWS/0.3m
10 20 30 40 50
O.V.A. READING
100 300 500 700 900

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
0.0		SAND: Fine to medium, some gravel and cobbles, trace silt, light brown. At 0.61 m, trace silt clasts, compact, moist.					PVC STICK-UP = 0.90 m
0.61							
2.74		Gravelly, trace cobble to boulder size material, well graded, dark brown, dense.					BENTONITE CHIPS
6.1		Silty sand lenses, gravelly.					SCH 80 PVC PIPE
7.92		Fine grained gravel, light brown, dense, moist.					203 mm DIA. HOLE
9.14		Very fine grained, dry					
9.8							PELLETONITE
10.0							

KOMEX INTERNATIONAL LTD. OFFICE REPORT ON SITE INVESTIGATION SHEET .2. OF 2.

CONTRACT NO.: 4512AD
BORING NO.: AA1-9-96-8 W4M
NORTHING: 6351982.1
COMPILED BY:
LOCATION: Lease 36
EASTING: 486235.8
BORING DATE: 22 Jan 1998
CONTRACTOR: Basal
ELEVATION: 336.09

SAMPLE TYPES
A AUGER SAMPLE
W WASH SAMPLE
R ROCK CORE
C CRREL BARREL
S SPLIT SPOON
T SHELBY TUBE
O THIN WALL OPEN
P THIN WALL PISTON
STATIC WATER LEVEL
DYNAMIC WATER LEVEL

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

TEST INFORMATION
PENETROMETER kg/cm2
SPT BLOWS/0.3m
O.V.A. READING

DEPTH m	SYMBOL	DESCRIPTION SOIL/ROCK	SAMPLES TYPE	SAMPLES CONDITION	SAMPLES NUMBER	WATER LEVEL	PIEZOMETER CONSTRUCTION DETAILS
10.0		SAND: as above.					BENTONITE CHIPS SCH 80 PVC PIPE
10.9							
11.0							10/20 FRAC SAND
11.8							
12.0							.020 SLOT SCREEN
13.0							203 mm DIA. HOLE.
14.0							
14.85							
		14.94 Some gravel and cobbles.					
15.0							
15.0		TOTAL DEPTH = 15.0 m					
16.0		NOTE: Lithologic descriptions are provided by Clifton and Associate field personnel. Komex makes no guarantees or warrantees with respect to the accuracy of the information and it is used here for reasons of consistency and information.					
17.0							
18.0							
19.0							
20.0							

Appendix 1B Groundwater Sampling Procedures and Laboratory Analytical Data

APPENDIX 1B
GROUNDWATER SAMPLING PROCEDURES AND LABORATORY ANALTYICAL DATA

Groundwater Sampling Procedures

For monitoring wells completed within coreholes, airlifting was used to conduct well sampling and development. This technique used compressed air to displace standing water at each well by injecting air near the base of the well, but above the screened interval, thereby lifting the standing water column out the top of the well. Groundwater parameters (pH, electrical conductivity and temperature) were measured during development. When the parameters had stabilized, the same airlifting technique was used to sample the well.

Before collecting the groundwater samples, an attempt was made to withdraw the equivalent of three to five volumes of standing water from each piezometer. Groundwater samples were collected using disposable PVC bailers. Where samples were collected for Volatile Organic Compound (VOC) analysis, VOC sampling attachments were used with each bailer. For VOC analysis, vials were filled until the meniscus was convex at the lip of the vial. After the vial was tightly capped, it was inverted and gently tapped. If a bubble was visible in the vial, the sample was discarded and re-collected.

Sample bottles were rinsed with formation water at each location before sample collection. Groundwater samples were placed in new high-density polyethylene (HDPE) plastic or amber glass bottles and stored in a cool, dark environment. Upon completion of sampling at each location, all equipment was thoroughly rinsed with distilled water.

New rope and gloves were used at each monitoring station to reduce the potential for cross-contamination. Samples were promptly delivered to the laboratory after completion of the field program. Measurements of sensitive water-quality parameters (pH, temperature and electrical conductivity) were conducted during the field sampling program. Parameters measured and instruments used were as follows:

- temperature and pH were measured with a thermometer and pH meter, calibrated using buffer solutions of pH 4 and pH 7; and
- electrical conductivity was measured with a conductivity meter, calibrated with standard potassium chloride (KCl) solution (1,420 µS/m at 25°C).

ANALYTICAL REPORT

WORLEYPARSONS CANADA LTD

ATTN: DAVID DILLON

705, 10240 124 ST

EDMONTON AB T5N 3W6

Reported On: 30-APR-07 09:04 AM
Revision: 3

Lab Work Order #: **L485366** **Date Received:** **12-MAR-07**

Project P.O. #: F35772803
Job Reference:
Legal Site Desc:
CofC Numbers: 01288

Other Information:

Comments:

17-Apr-07 Revised Report:
As per client's request, removed PAHs that are in alkylated and CCME packages from alkylated package.

27-Apr-07 Revised Report:
L485366-2 and -3 Dissolved Cr and V double-reporting removed. ICPMS run had interferences for these metals, so they were run by ICPOES.

ROY JONES
General Manager, Edmonton

For any questions about this report please contact your Account Manager:

ERIN ANDERSON

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-1 SH07 1814								
Sampled By: CZ,CO,AE on 10-MAR-07 @ 17:00								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	15-MAR-07	15-MAR-07	NRG	R502606
Toluene	<0.0005		0.0005	mg/L	15-MAR-07	15-MAR-07	NRG	R502606
EthylBenzene	<0.0005		0.0005	mg/L	15-MAR-07	15-MAR-07	NRG	R502606
Xylenes	<0.0005		0.0005	mg/L	15-MAR-07	15-MAR-07	NRG	R502606
F1(C6-C10)	<0.1		0.1	mg/L	15-MAR-07	15-MAR-07	NRG	R502606
F1-BTEX	<0.1		0.1	mg/L	15-MAR-07	15-MAR-07	NRG	R502606
F2 (>C10-C16)								
F2 (>C10-C16)	0.27		0.05	mg/L	13-MAR-07	16-MAR-07	AAT	R504111
Surr: 2-Bromobenzotrifluoride	98		65-146	%	13-MAR-07	16-MAR-07	AAT	R504111
Dissolved Metals								
Dissolved Trace Metals								
Silver (Ag)	<0.5	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Aluminum (Al)	1	DLM	1	mg/L		16-MAR-07	MX	R503071
Boron (B)	<5	DLM	5	mg/L		16-MAR-07	MX	R503071
Barium (Ba)	0.3	DLM	0.3	mg/L		16-MAR-07	MX	R503071
Beryllium (Be)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Cadmium (Cd)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Cobalt (Co)	<0.2	DLM	0.2	mg/L		16-MAR-07	MX	R503071
Chromium (Cr)	<0.005		0.005	mg/L		14-MAR-07	SYF	R502595
Copper (Cu)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Molybdenum (Mo)	<0.5	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Nickel (Ni)	<0.2	DLM	0.2	mg/L		16-MAR-07	MX	R503071
Lead (Pb)	<0.5	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Tin (Sn)	<5	DLM	5	mg/L		16-MAR-07	MX	R503071
Strontium (Sr)	24	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Titanium (Ti)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Thallium (Tl)	<5	DLM	5	mg/L		16-MAR-07	MX	R503071
Vanadium (V)	<0.001		0.001	mg/L		14-MAR-07	SYF	R502595
Zinc (Zn)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Iron (Fe)-Dissolved	0.005		0.005	mg/L		14-MAR-07	SYF	R502595
Manganese (Mn)-Dissolved	0.656		0.001	mg/L		14-MAR-07	SYF	R502595
CCME PAHs								
Naphthalene	0.03		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Quinoline	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Acenaphthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Fluorene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Phenanthrene	0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Acridine	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(a)anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Chrysene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(b)fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(k)fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(a)pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Surr: Nitrobenzene d5	8	SOL:MI	24-132	%	16-MAR-07	16-MAR-07	SRL	R503838
Surr: 2-Fluorobiphenyl	52		37-123	%	16-MAR-07	16-MAR-07	SRL	R503838

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-1 SH07 1814								
Sampled By: CZ,CO,AE on 10-MAR-07 @ 17:00								
Matrix: WATER								
CCME PAHs								
Surr: p-Terphenyl d14	102		50-142	%	16-MAR-07	16-MAR-07	SRL	R503838
Mercury (Hg)-Dissolved	0.144		0.0002	mg/L		16-MAR-07	MX	R503071
Naphthenic Acids	4		1	mg/L		14-MAR-07	RP	R502630
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Benzo(ghi)perylene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Biphenyl	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd biphenyl	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd fluorene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd naphthalene	<0.04	RAMB	0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd naphthalene	0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd naphthalene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Dibenzothiophene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl acenaphthene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl biphenyl	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl fluorene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl naphthalene	0.02		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl phenanthrene/anthracene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Surr: Nitrobenzene d5	8	SOL:MI	24-132	%	16-MAR-07	16-MAR-07	SRL	R503833
Surr: 2-Fluorobiphenyl	52		37-123	%	16-MAR-07	16-MAR-07	SRL	R503833
Surr: p-Terphenyl d14	102		50-142	%	16-MAR-07	16-MAR-07	SRL	R503833
Phenols (4AAP)	<0.001		0.001	mg/L	19-MAR-07	19-MAR-07	SF	R504019
Silicon (Si)-Dissolved	3.2		0.1	mg/L		14-MAR-07	SYF	R502595
Sulphide	12.6		0.003	mg/L		14-MAR-07	KMY	R502625
Routine Water: Major Ions, Fluoride								
Chloride (Cl)	47400		1	mg/L		14-MAR-07	CLT	R502351
Fluoride (F)	0.84		0.05	mg/L		13-MAR-07	UM	R502360
ICP metals and SO4 for routine water								
Calcium (Ca)	1550		0.5	mg/L		14-MAR-07	JWU	R502497
Potassium (K)	38.6		0.5	mg/L		14-MAR-07	JWU	R502497
Magnesium (Mg)	271		0.1	mg/L		14-MAR-07	JWU	R502497
Sodium (Na)	31500		1	mg/L		14-MAR-07	JWU	R502497
Sulfate (SO4)	4770		0.5	mg/L		14-MAR-07	JWU	R502497
Ion Balance Calculation								
Ion Balance	102			%		15-MAR-07		
TDS (Calculated)	85800			mg/L		15-MAR-07		
Hardness (as CaCO3)	4990			mg/L		15-MAR-07		
Nitrate+Nitrite-N	0.1		0.1	mg/L		13-MAR-07	KMY	R502167
Nitrate-N	0.1		0.1	mg/L		13-MAR-07	KMY	R502167

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-1 SH07 1814								
Sampled By: CZ,CO,AE on 10-MAR-07 @ 17:00								
Matrix: WATER								
Routine Water: Major Ions, Fluoride								
Nitrite-N	<0.05		0.05	mg/L		13-MAR-07	KMY	R502167
pH, Conductivity and Total Alkalinity								
pH	7.5		0.1	pH		13-MAR-07	UM	R502360
Conductivity (EC)	103000		0.2	uS/cm		13-MAR-07	UM	R502360
Bicarbonate (HCO3)	562		5	mg/L		13-MAR-07	UM	R502360
Carbonate (CO3)	<5		5	mg/L		13-MAR-07	UM	R502360
Hydroxide (OH)	<5		5	mg/L		13-MAR-07	UM	R502360
Alkalinity, Total (as CaCO3)	461		5	mg/L		13-MAR-07	UM	R502360
L485366-2 SH07 1830								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 13:00								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
Toluene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
EthylBenzene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
Xylenes	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F1(C6-C10)	<0.1		0.1	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F1-BTEX	<0.1		0.1	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F2 (>C10-C16)								
F2 (>C10-C16)	0.09		0.05	mg/L	13-MAR-07	16-MAR-07	AAT	R504111
Surr: 2-Bromobenzotrifluoride	92		65-146	%	13-MAR-07	16-MAR-07	AAT	R504111
Dissolved Metals								
Dissolved Trace Metals								
Silver (Ag)	<0.05	DLM	0.05	mg/L		16-MAR-07	MX	R503071
Aluminum (Al)	0.2	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Boron (B)	5	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Barium (Ba)	0.27	DLM	0.03	mg/L		16-MAR-07	MX	R503071
Beryllium (Be)	<0.01	DLM	0.01	mg/L		16-MAR-07	MX	R503071
Cadmium (Cd)	<0.01	DLM	0.01	mg/L		16-MAR-07	MX	R503071
Cobalt (Co)	<0.02	DLM	0.02	mg/L		16-MAR-07	MX	R503071
Chromium (Cr)	<0.005		0.005	mg/L		14-MAR-07	SYF	R502595
Copper (Cu)	<0.01	DLM	0.01	mg/L		16-MAR-07	MX	R503071
Molybdenum (Mo)	<0.05	DLM	0.05	mg/L		16-MAR-07	MX	R503071
Nickel (Ni)	<0.02	DLM	0.02	mg/L		16-MAR-07	MX	R503071
Lead (Pb)	<0.05	DLM	0.05	mg/L		16-MAR-07	MX	R503071
Tin (Sn)	<0.5	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Strontium (Sr)	2.9	DLM	0.05	mg/L		16-MAR-07	MX	R503071
Titanium (Ti)	0.01	DLM	0.01	mg/L		16-MAR-07	MX	R503071
Thallium (Tl)	<0.05	DLM	0.05	mg/L		16-MAR-07	MX	R503071
Vanadium (V)	<0.001		0.001	mg/L		14-MAR-07	SYF	R502595
Zinc (Zn)	0.21	DLM	0.01	mg/L		16-MAR-07	MX	R503071
Iron (Fe)-Dissolved	0.504		0.005	mg/L		14-MAR-07	SYF	R502595
Manganese (Mn)-Dissolved	0.167		0.001	mg/L		14-MAR-07	SYF	R502595
CCME PAHs								
Naphthalene	0.05		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Quinoline	0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Acenaphthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Fluorene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Phenanthrene	0.03		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-2 SH07 1830								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 13:00								
Matrix: WATER								
CCME PAHs								
Acridine	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Pyrene	0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(a)anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Chrysene	0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(b)fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(k)fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(a)pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Surr: Nitrobenzene d5	68		24-132	%	16-MAR-07	16-MAR-07	SRL	R503838
Surr: 2-Fluorobiphenyl	62		37-123	%	16-MAR-07	16-MAR-07	SRL	R503838
Surr: p-Terphenyl d14	88		50-142	%	16-MAR-07	16-MAR-07	SRL	R503838
Mercury (Hg)-Dissolved	0.0021		0.0002	mg/L		16-MAR-07	MX	R503071
Naphthenic Acids	19		1	mg/L		14-MAR-07	RP	R502630
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Benzo(ghi)perylene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Biphenyl	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd biphenyl	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd fluorene	0.06		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd naphthalene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd phenanthrene/anth.	0.10		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd naphthalene	0.06		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd phenanthrene/anth.	0.08		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd naphthalene	0.08		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Dibenzothiophene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl acenaphthene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl biphenyl	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl fluorene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl naphthalene	0.03		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl phenanthrene/anthracene	0.07		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Surr: Nitrobenzene d5	68		24-132	%	16-MAR-07	16-MAR-07	SRL	R503833
Surr: 2-Fluorobiphenyl	62		37-123	%	16-MAR-07	16-MAR-07	SRL	R503833
Surr: p-Terphenyl d14	88		50-142	%	16-MAR-07	16-MAR-07	SRL	R503833
Phenols (4AAP)	0.004		0.001	mg/L	19-MAR-07	19-MAR-07	SF	R504019
Silicon (Si)-Dissolved	2.6		0.1	mg/L		14-MAR-07	SYF	R502595
Sulphide	0.015		0.003	mg/L		14-MAR-07	KMY	R502625
Routine Water: Major Ions, Fluoride								
Chloride (Cl)	3240		1	mg/L		14-MAR-07	CLT	R502351

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-2 SH07 1830								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 13:00								
Matrix: WATER								
Routine Water: Major Ions, Fluoride								
Fluoride (F)	0.79		0.05	mg/L		13-MAR-07	UM	R502360
ICP metals and SO4 for routine water								
Calcium (Ca)	26.7		0.5	mg/L		14-MAR-07	JWU	R502497
Potassium (K)	54.2		0.5	mg/L		14-MAR-07	JWU	R502497
Magnesium (Mg)	55.4		0.1	mg/L		14-MAR-07	JWU	R502497
Sodium (Na)	2960		1	mg/L		14-MAR-07	JWU	R502497
Sulfate (SO4)	<0.5		0.5	mg/L		14-MAR-07	JWU	R502497
Ion Balance Calculation								
Ion Balance	94.3			%		15-MAR-07		
TDS (Calculated)	7930			mg/L		15-MAR-07		
Hardness (as CaCO3)	295			mg/L		15-MAR-07		
Nitrate+Nitrite-N	<0.1		0.1	mg/L		13-MAR-07	KMY	R502167
Nitrate-N	<0.1		0.1	mg/L		13-MAR-07	KMY	R502167
Nitrite-N	<0.05		0.05	mg/L		13-MAR-07	KMY	R502167
pH, Conductivity and Total Alkalinity								
pH	8.2		0.1	pH		13-MAR-07	UM	R502360
Conductivity (EC)	13500		0.2	uS/cm		13-MAR-07	UM	R502360
Bicarbonate (HCO3)	3160	DLA	10	mg/L		14-MAR-07	UM	R502408
Carbonate (CO3)	30	DLA	10	mg/L		14-MAR-07	UM	R502408
Hydroxide (OH)	<10	DLA	10	mg/L		14-MAR-07	UM	R502408
Alkalinity, Total (as CaCO3)	2650	DLA	10	mg/L		14-MAR-07	UM	R502408
L485366-3 SH07 1826 BS								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 17:00								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
Toluene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
EthylBenzene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
Xylenes	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F1(C6-C10)	<0.1		0.1	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F1-BTEX	<0.1		0.1	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F2 (>C10-C16)								
F2 (>C10-C16)	0.39		0.05	mg/L	13-MAR-07	16-MAR-07	AAT	R504111
Surr: 2-Bromobenzotrifluoride	112		65-146	%	13-MAR-07	16-MAR-07	AAT	R504111
Dissolved Metals								
Dissolved Trace Metals								
Silver (Ag)	<0.5	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Aluminum (Al)	<1.0	DLM	1	mg/L		16-MAR-07	MX	R503071
Boron (B)	2	DLM	5	mg/L		16-MAR-07	MX	R503071
Barium (Ba)	0.2	DLM	0.3	mg/L		16-MAR-07	MX	R503071
Beryllium (Be)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Cadmium (Cd)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Cobalt (Co)	<0.2	DLM	0.2	mg/L		16-MAR-07	MX	R503071
Chromium (Cr)	<0.005		0.005	mg/L		14-MAR-07	SYF	R502595
Copper (Cu)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Molybdenum (Mo)	<0.5	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Nickel (Ni)	0.005	DLM	0.2	mg/L		16-MAR-07	MX	R503071
Lead (Pb)	<0.5	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Tin (Sn)	<5	DLM	5	mg/L		16-MAR-07	MX	R503071
Strontium (Sr)	7	DLM	0.5	mg/L		16-MAR-07	MX	R503071
Titanium (Ti)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-3 SH07 1826 BS								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 17:00								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals								
Thallium (Tl)	<5	DLM	5	mg/L		16-MAR-07	MX	R503071
Vanadium (V)	<0.001		0.001	mg/L		14-MAR-07	SYF	R502595
Zinc (Zn)	<0.1	DLM	0.1	mg/L		16-MAR-07	MX	R503071
Iron (Fe)-Dissolved	0.016		0.005	mg/L		14-MAR-07	SYF	R502595
Manganese (Mn)-Dissolved	0.194		0.001	mg/L		14-MAR-07	SYF	R502595
CCME PAHs								
Naphthalene	0.04		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Quinoline	0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Acenaphthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Fluorene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Phenanthrene	0.02		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Acridine	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(a)anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Chrysene	0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(b)fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(k)fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(a)pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Surr: Nitrobenzene d5	74		24-132	%	16-MAR-07	16-MAR-07	SRL	R503838
Surr: 2-Fluorobiphenyl	72		37-123	%	16-MAR-07	16-MAR-07	SRL	R503838
Surr: p-Terphenyl d14	110		50-142	%	16-MAR-07	16-MAR-07	SRL	R503838
Mercury (Hg)-Dissolved	0.0012		0.0002	mg/L		16-MAR-07	MX	R503071
Naphthenic Acids	16		1	mg/L		14-MAR-07	RP	R502630
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Benzo(ghi)perylene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Biphenyl	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd B(a)A/chrysene	0.06		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd biphenyl	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd fluorene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd naphthalene	<0.04	RAMB	0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd naphthalene	0.06		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd naphthalene	0.08		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Dibenzothiophene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl acenaphthene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl biphenyl	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-3 SH07 1826 BS								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 17:00								
Matrix: WATER								
PAHs & Alkylated PAHs								
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl fluorene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl naphthalene	0.04		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl phenanthrene/anthracene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Surr: Nitrobenzene d5	74		24-132	%	16-MAR-07	16-MAR-07	SRL	R503833
Surr: 2-Fluorobiphenyl	72		37-123	%	16-MAR-07	16-MAR-07	SRL	R503833
Surr: p-Terphenyl d14	110		50-142	%	16-MAR-07	16-MAR-07	SRL	R503833
Phenols (4AAP)	0.019		0.001	mg/L	19-MAR-07	19-MAR-07	SF	R504019
Silicon (Si)-Dissolved	2.7		0.1	mg/L		14-MAR-07	SYF	R502595
Sulphide	38.8		0.003	mg/L		14-MAR-07	KMY	R502625
Routine Water: Major Ions, Fluoride								
Chloride (Cl)	9500		1	mg/L		14-MAR-07	CLT	R502351
Fluoride (F)	1.10		0.05	mg/L		13-MAR-07	UM	R502360
ICP metals and SO4 for routine water								
Calcium (Ca)	109		0.5	mg/L		14-MAR-07	JWU	R502497
Potassium (K)	49.6		0.5	mg/L		14-MAR-07	JWU	R502497
Magnesium (Mg)	101		0.1	mg/L		14-MAR-07	JWU	R502497
Sodium (Na)	6830		1	mg/L		14-MAR-07	JWU	R502497
Sulfate (SO4)	568		0.5	mg/L		14-MAR-07	JWU	R502497
Ion Balance Calculation								
Ion Balance	101			%		15-MAR-07		
TDS (Calculated)	18000			mg/L		15-MAR-07		
Hardness (as CaCO3)	688			mg/L		15-MAR-07		
Nitrate+Nitrite-N	<0.1		0.1	mg/L		13-MAR-07	KMY	R502167
Nitrate-N	<0.1		0.1	mg/L		13-MAR-07	KMY	R502167
Nitrite-N	<0.05		0.05	mg/L		13-MAR-07	KMY	R502167
pH, Conductivity and Total Alkalinity								
pH	7.9		0.1	pH		13-MAR-07	UM	R502360
Conductivity (EC)	28300		0.2	uS/cm		13-MAR-07	UM	R502360
Bicarbonate (HCO3)	1800		5	mg/L		13-MAR-07	UM	R502360
Carbonate (CO3)	<5		5	mg/L		13-MAR-07	UM	R502360
Hydroxide (OH)	<5		5	mg/L		13-MAR-07	UM	R502360
Alkalinity, Total (as CaCO3)	1470		5	mg/L		13-MAR-07	UM	R502360
L485366-4 SH07 1826 FB								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 17:30								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
Toluene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
EthylBenzene	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
Xylenes	<0.0005		0.0005	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F1(C6-C10)	<0.1		0.1	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F1-BTEX	<0.1		0.1	mg/L	13-MAR-07	13-MAR-07	NRG	R502606
F2 (>C10-C16)								
F2 (>C10-C16)	<0.05		0.05	mg/L	13-MAR-07	16-MAR-07	AAT	R504111
Surr: 2-Bromobenzotrifluoride	96		65-146	%	13-MAR-07	16-MAR-07	AAT	R504111
Dissolved Metals								
Dissolved Trace Metals								
Silver (Ag)	<0.005		0.005	mg/L		16-MAR-07	MX	R503071
Aluminum (Al)	<0.01		0.01	mg/L		16-MAR-07	MX	R503071

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-4 SH07 1826 FB								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 17:30								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals								
Boron (B)	<0.05		0.05	mg/L		16-MAR-07	MX	R503071
Barium (Ba)	<0.003		0.003	mg/L		16-MAR-07	MX	R503071
Beryllium (Be)	<0.001		0.001	mg/L		16-MAR-07	MX	R503071
Cadmium (Cd)	<0.001		0.001	mg/L		16-MAR-07	MX	R503071
Cobalt (Co)	<0.002		0.002	mg/L		16-MAR-07	MX	R503071
Chromium (Cr)	<0.005		0.005	mg/L		16-MAR-07	MX	R503071
Copper (Cu)	<0.001		0.001	mg/L		16-MAR-07	MX	R503071
Molybdenum (Mo)	<0.005		0.005	mg/L		16-MAR-07	MX	R503071
Nickel (Ni)	<0.002		0.002	mg/L		16-MAR-07	MX	R503071
Lead (Pb)	<0.005		0.005	mg/L		16-MAR-07	MX	R503071
Tin (Sn)	<0.05		0.05	mg/L		16-MAR-07	MX	R503071
Strontium (Sr)	<0.005		0.005	mg/L		16-MAR-07	MX	R503071
Titanium (Ti)	<0.001		0.001	mg/L		16-MAR-07	MX	R503071
Thallium (Tl)	<0.05		0.05	mg/L		16-MAR-07	MX	R503071
Vanadium (V)	<0.001		0.001	mg/L		16-MAR-07	MX	R503071
Zinc (Zn)	0.002		0.001	mg/L		16-MAR-07	MX	R503071
Iron (Fe)-Dissolved	<0.005		0.005	mg/L		14-MAR-07	SYF	R502595
Manganese (Mn)-Dissolved	<0.001		0.001	mg/L		14-MAR-07	SYF	R502595
CCME PAHs								
Naphthalene	0.03		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Quinoline	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Acenaphthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Fluorene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Phenanthrene	0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Acridine	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(a)anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Chrysene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(b)fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(k)fluoranthene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Benzo(a)pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503838
Surr: Nitrobenzene d5	64		24-132	%	16-MAR-07	16-MAR-07	SRL	R503838
Surr: 2-Fluorobiphenyl	63		37-123	%	16-MAR-07	16-MAR-07	SRL	R503838
Surr: p-Terphenyl d14	98		50-142	%	16-MAR-07	16-MAR-07	SRL	R503838
Mercury (Hg)-Dissolved	<0.0002		0.0002	mg/L		16-MAR-07	MX	R503071
Naphthenic Acids	<1		1	mg/L		14-MAR-07	RP	R502630
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Benzo(ghi)perylene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Biphenyl	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd biphenyl	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd fluorene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C2 sub'd naphthalene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L485366-4 SH07 1826 FB								
Sampled By: CZ,CO,AE on 11-MAR-07 @ 17:30								
Matrix: WATER								
PAHs & Alkylated PAHs								
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd naphthalene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd naphthalene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Dibenzothiophene	<0.01		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl acenaphthene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl biphenyl	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl dibenzothiophene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl fluorene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl naphthalene	0.02		0.01	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Methyl phenanthrene/anthracene	<0.04		0.04	ug/L	16-MAR-07	16-MAR-07	SRL	R503833
Surr: Nitrobenzene d5	64		24-132	%	16-MAR-07	16-MAR-07	SRL	R503833
Surr: 2-Fluorobiphenyl	63		37-123	%	16-MAR-07	16-MAR-07	SRL	R503833
Surr: p-Terphenyl d14	98		50-142	%	16-MAR-07	16-MAR-07	SRL	R503833
Phenols (4AAP)	<0.001		0.001	mg/L	19-MAR-07	19-MAR-07	SF	R504019
Silicon (Si)-Dissolved	<0.1		0.1	mg/L		14-MAR-07	SYF	R502595
Sulphide	0.006		0.003	mg/L		14-MAR-07	KMY	R502625
Routine Water: Major Ions, Fluoride								
Chloride (Cl)	<1		1	mg/L		14-MAR-07	CLT	R502351
Fluoride (F)	<0.05		0.05	mg/L		13-MAR-07	UM	R502360
ICP metals and SO4 for routine water								
Calcium (Ca)	<0.5		0.5	mg/L		14-MAR-07	JWU	R502497
Potassium (K)	<0.5		0.5	mg/L		14-MAR-07	JWU	R502497
Magnesium (Mg)	<0.1		0.1	mg/L		14-MAR-07	JWU	R502497
Sodium (Na)	<1		1	mg/L		14-MAR-07	JWU	R502497
Sulfate (SO4)	<0.5		0.5	mg/L		14-MAR-07	JWU	R502497
Ion Balance Calculation								
Ion Balance	Low TDS			%		15-MAR-07		
TDS (Calculated)	<1			mg/L		15-MAR-07		
Hardness (as CaCO3)	<1			mg/L		15-MAR-07		
Nitrate+Nitrite-N	<0.1		0.1	mg/L		13-MAR-07	KMY	R502167
Nitrate-N	<0.1		0.1	mg/L		13-MAR-07	KMY	R502167
Nitrite-N	<0.05		0.05	mg/L		13-MAR-07	KMY	R502167
pH, Conductivity and Total Alkalinity								
pH	5.7		0.1	pH		13-MAR-07	UM	R502360
Conductivity (EC)	1.8		0.2	uS/cm		13-MAR-07	UM	R502360
Bicarbonate (HCO3)	<5		5	mg/L		13-MAR-07	UM	R502360
Carbonate (CO3)	<5		5	mg/L		13-MAR-07	UM	R502360
Hydroxide (OH)	<5		5	mg/L		13-MAR-07	UM	R502360
Alkalinity, Total (as CaCO3)	<5		5	mg/L		13-MAR-07	UM	R502360

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

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
DLA	Detection Limit Adjusted For Dilution
DLM	Detection Limit Adjustment For Sample Matrix Effects
RAMB	Result Adjusted For Method Blank
SOL:MI	Surrogate recovery outside acceptable limits due to matrix interference

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
BTX,F1-ED	Water	BTEX and F1 (C6-C10)	EPA 5030	EPA 5030/8015&8260-P&T GC-MS & FID
CL-ED	Water	Chloride (Cl)		APHA 4500 Cl E-Colorimetry
ETL-ROUTINE-ICP-ED	Water	ICP metals and SO4 for routine water		APHA 3120 B-ICP-OES
F-ED	Water	Fluoride (F)		APHA 4500 F-C-Electrode
F2-ED	Water	F2 (>C10-C16)		EPA 3510/8000-GC-FID
FE-DIS-ED	Water	Iron (Fe)-Dissolved		EPA 200.7
HG-DIS-HYD-ED	Water	Mercury (Hg)-Dissolved (CVAA)		EPA 6020
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET1-DIS-ED	Water	Dissolved Trace Metals		EPA 6020
MN-DIS-ED	Water	Manganese (Mn)-Dissolved		EPA 200.7
N2N3-ED	Water	Nitrate+Nitrite-N		APHA 4500 NO3H-Colorimetry
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR,Syncrude,1994
NO2-ED	Water	Nitrite-N		APHA 4500 NO2B-Colorimetry
NO3-ED	Water	Nitrate-N		APHA 4500 NO3H-Colorimetry
PAH-ALK-ED	Water	PAHs & Alkylated PAHs		EPA 3510/8270-GC/MS
		NOTE: The Alkylated PAH results are determined via a semi-quantitative method to be used for research purposes only. This method is not necessarily intended to address regulatory requirements.		
PAH-CCME-ED	Water	CCME PAHs		EPA 3510/8270-GC/MS
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity		APHA 4500-H, 2510, 2320
PHENOLS-4AAP-WT	Water	Phenols (4AAP)		APHA 5530
SI-DIS-ED	Water	Silicon (Si)-Dissolved		EPA 200.7
SULPHIDE-ED	Water	Sulphide		APHA 4500 -S E-Auto-Colorimetry

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

Chain of Custody numbers:

01288

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

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP -		

Reference Information

	EDMONTON, ALBERTA, CANADA	FM	ALS LABORATORY GROUP - FORT MCMURRAY, ALBERTA, CANADA
WT	ALS LABORATORY GROUP - WATERLOO (SENTINEL), ONTARIO, CAN		

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

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

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

ALS Laboratory Group Quality Control Report

Workorder: L485366 Report Date: 30-APR-07

Client: WORLEYPARSONS CANADA LTD
705, 10240 124 ST
EDMONTON AB T5N 3W6

Contact: DAVID DILLON

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Water**							
Batch R502606								
WG571036-2 LCS								
Benzene			76		%		45-106	13-MAR-07
EthylBenzene			76		%		47-108	13-MAR-07
Toluene			78		%		46-111	13-MAR-07
F1(C6-C10)			62		%		35-154	13-MAR-07
Xylenes			75		%		45-109	13-MAR-07
WG571036-1 MB								
Benzene			<0.0005		mg/L		0.0005	13-MAR-07
EthylBenzene			<0.0005		mg/L		0.0005	13-MAR-07
Toluene			<0.0005		mg/L		0.0005	13-MAR-07
F1(C6-C10)			<0.1		mg/L		0.1	13-MAR-07
Xylenes			<0.0005		mg/L		0.0005	13-MAR-07
WG570328-1 MS		**L485366-4**						
Benzene			62		%		35-109	15-MAR-07
EthylBenzene			59		%		45-103	15-MAR-07
Toluene			62		%		44-107	15-MAR-07
Xylenes			58		%		45-104	15-MAR-07
WG570328-2 MS		**L485366-4**						
F1(C6-C10)			68		%		33-158	13-MAR-07
CL-ED	**Water**							
Batch R502351								
WG570610-10 DUP		**L483751-1**						
Chloride (Cl)		43	43		mg/L	0.12	6.5	14-MAR-07
WG570610-11 DUP		**L485819-1**						
Chloride (Cl)		83	84		mg/L	0.77	6.5	14-MAR-07
WG570610-2 LCS								
Chloride (Cl)			96		%		94-109	14-MAR-07
WG570610-3 LCS								
Chloride (Cl)			98		%		93-113	14-MAR-07
WG570610-1 MB								
Chloride (Cl)			<1		mg/L		1	14-MAR-07
WG570610-12 MS		**L485819-1**						
Chloride (Cl)			114		%		87-117	14-MAR-07
WG570610-9 MS		**L469444-4**						
Chloride (Cl)			95		%		87-117	14-MAR-07
ETL-ROUTINE-ICP-ED	**Water**							

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ETL-ROUTINE-ICP-ED	**Water**							
Batch R502497								
WG570953-2 CRM		**ION-915_WATER**						
Calcium (Ca)			105		%		96-116	14-MAR-07
Magnesium (Mg)			100		%		96-115	14-MAR-07
Potassium (K)			118		%		88-126	14-MAR-07
Sodium (Na)			113		%		95-118	14-MAR-07
Sulfate (SO4)			97		%		87-118	14-MAR-07
WG570953-5 DUP		**L486193-1**						
Calcium (Ca)		40.6	41.5		mg/L	2.3	14	14-MAR-07
Magnesium (Mg)		13.3	13.6		mg/L	2.2	10	14-MAR-07
Potassium (K)		3.0	3.0	J	mg/L	0.1	2	14-MAR-07
Sodium (Na)		106	108		mg/L	2.2	10	14-MAR-07
Sulfate (SO4)		18.6	18.2		mg/L	2.2	10	14-MAR-07
WG570953-1 MB								
Calcium (Ca)			<0.5		mg/L		2.5	14-MAR-07
Magnesium (Mg)			<0.1		mg/L		0.5	14-MAR-07
Potassium (K)			<0.5		mg/L		2.5	14-MAR-07
Sodium (Na)			<1		mg/L		5	14-MAR-07
Sulfate (SO4)			<0.5		mg/L		2.5	14-MAR-07
WG570953-6 MS		**L486193-1**						
Calcium (Ca)			91		%		81-119	14-MAR-07
Magnesium (Mg)			88		%		86-111	14-MAR-07
Potassium (K)			85		%		83-115	14-MAR-07
Sodium (Na)			84		%		81-116	14-MAR-07
Sulfate (SO4)			100		%		72-129	14-MAR-07
WG570953-8 MS		**L486230-2**						
Calcium (Ca)			102		%		81-119	14-MAR-07
Magnesium (Mg)			95		%		86-111	14-MAR-07
Potassium (K)			95		%		83-115	14-MAR-07
Sodium (Na)			96		%		81-116	14-MAR-07
Sulfate (SO4)			95		%		72-129	14-MAR-07
F-ED	**Water**							
Batch R502360								
WG570487-5 DUP		**L485373-2**						
Fluoride (F)		0.44	0.44	J	mg/L	0.00	0.2	13-MAR-07
WG570487-6 DUP		**L485827-3**						

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-ED	**Water**							
Batch R502360								
WG570487-6 DUP		**L485827-3**						
Fluoride (F)		0.13	0.13	J	mg/L	0.00	0.2	13-MAR-07
WG570487-4 LCS								
Fluoride (F)			100		%		89-114	13-MAR-07
WG570487-1 MB								
Fluoride (F)			<0.05		mg/L		0.05	13-MAR-07
F2-ED	**Water**							
Batch R504111								
WG572852-2 LCS								
F2 (>C10-C16)			73		%		38-152	16-MAR-07
WG572852-1 MB								
F2 (>C10-C16)			<0.05		mg/L		0.05	16-MAR-07
FE-DIS-ED	**Water**							
Batch R502595								
WG570744-3 DUP		**L485366-4**						
Iron (Fe)-Dissolved		<0.005	<0.005	RPD-NA	mg/L	N/A	26	14-MAR-07
WG570744-7 DUP		**L485080-8**						
Iron (Fe)-Dissolved		23.2	23.8		mg/L	2.5	26	14-MAR-07
WG570744-9 DUP		**L485080-18**						
Iron (Fe)-Dissolved		1.93	1.93		mg/L	0.13	26	14-MAR-07
WG570744-1 MB								
Iron (Fe)-Dissolved			<0.005		mg/L		0.005	14-MAR-07
WG570744-10 MS		**L485080-18**						
Iron (Fe)-Dissolved			96		%		63-138	14-MAR-07
WG570744-4 MS		**L485366-4**						
Iron (Fe)-Dissolved			99		%		63-138	14-MAR-07
WG570744-8 MS		**L485080-8**						
Iron (Fe)-Dissolved			94		%		63-138	14-MAR-07
HG-DIS-HYD-ED	**Water**							
Batch R503071								
WG571444-1 MB								
Mercury (Hg)-Dissolved			<0.0002		mg/L		0.001	15-MAR-07
MET1-DIS-ED	**Water**							

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-ED	**Water**							
Batch R503071								
WG571444-2 CRM		**1643E_WATER**						
Aluminum (Al)			97		%		90-122	15-MAR-07
Barium (Ba)			104		%		88-109	15-MAR-07
Beryllium (Be)			94		%		77-110	15-MAR-07
Boron (B)			101		%		80-116	15-MAR-07
Cadmium (Cd)			94		%		87-109	15-MAR-07
Chromium (Cr)			117		%		83-118	15-MAR-07
Cobalt (Co)			101		%		90-110	15-MAR-07
Copper (Cu)			103		%		89-112	15-MAR-07
Lead (Pb)			103		%		89-110	15-MAR-07
Molybdenum (Mo)			101		%		88-111	15-MAR-07
Nickel (Ni)			103		%		88-110	15-MAR-07
Strontium (Sr)			98		%		87-109	15-MAR-07
Vanadium (V)			105		%		87-109	15-MAR-07
Zinc (Zn)			99		%		65-133	15-MAR-07
WG571444-1 MB								
Aluminum (Al)			<0.01		mg/L		0.05	15-MAR-07
Barium (Ba)			<0.003		mg/L		0.015	15-MAR-07
Beryllium (Be)			<0.001		mg/L		0.005	15-MAR-07
Boron (B)			<0.05		mg/L		0.25	15-MAR-07
Cadmium (Cd)			<0.001		mg/L		0.005	15-MAR-07
Chromium (Cr)			<0.005		mg/L		0.025	15-MAR-07
Cobalt (Co)			<0.002		mg/L		0.01	15-MAR-07
Copper (Cu)			<0.001		mg/L		0.005	15-MAR-07
Lead (Pb)			<0.005		mg/L		0.025	15-MAR-07
Molybdenum (Mo)			<0.005		mg/L		0.025	15-MAR-07
Nickel (Ni)			<0.002		mg/L		0.01	15-MAR-07
Phosphorus (P)			<0.1		mg/L		0.5	15-MAR-07
Silver (Ag)			<0.005		mg/L		0.025	15-MAR-07
Strontium (Sr)			<0.005		mg/L		0.025	15-MAR-07
Thallium (Tl)			<0.05		mg/L		0.25	15-MAR-07
Tin (Sn)			<0.05		mg/L		0.25	15-MAR-07
Titanium (Ti)			<0.001		mg/L		0.005	15-MAR-07
Vanadium (V)			<0.001		mg/L		0.005	15-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-ED	**Water**							
Batch R503071								
WG571444-1 MB								
Zinc (Zn)			<0.001		mg/L		0.005	15-MAR-07
MN-DIS-ED	**Water**							
Batch R502595								
WG570744-3 DUP		**L485366-4**						
Manganese (Mn)-Dissolved		<0.001	0.001	RPD-NA	mg/L	N/A	26	14-MAR-07
WG570744-7 DUP		**L485080-8**						
Manganese (Mn)-Dissolved		0.396	0.395		mg/L	0.38	26	14-MAR-07
WG570744-9 DUP		**L485080-18**						
Manganese (Mn)-Dissolved		0.771	0.790		mg/L	2.3	26	14-MAR-07
WG570744-1 MB								
Manganese (Mn)-Dissolved			<0.001		mg/L		0.001	14-MAR-07
WG570744-10 MS		**L485080-18**						
Manganese (Mn)-Dissolved			98		%		63-138	14-MAR-07
WG570744-4 MS		**L485366-4**						
Manganese (Mn)-Dissolved			99		%		63-138	14-MAR-07
WG570744-8 MS		**L485080-8**						
Manganese (Mn)-Dissolved			97		%		63-138	14-MAR-07
N2N3-ED	**Water**							
Batch R502167								
WG570432-5 DUP		**L485373-2**						
Nitrate+Nitrite-N		<0.1	<0.1	RPD-NA	mg/L	N/A	6.9	13-MAR-07
WG570432-7 DUP		**L485612-3**						
Nitrate+Nitrite-N		<1	0.3	J	mg/L	0.0	0.4	13-MAR-07
WG570432-3 LCS								
Nitrate+Nitrite-N			101		%		87-113	13-MAR-07
WG570432-2 MB								
Nitrate+Nitrite-N			<0.1		mg/L		0.1	13-MAR-07
WG570432-6 MS		**L485550-1**						
Nitrate+Nitrite-N			103		%		84-118	13-MAR-07
NAPHTHENIC-ACID-FM	**Water**							
Batch R502630								
WG571078-3 DUP		**L485366-1**						
Naphthenic Acids		4	3	J	mg/L	0	4	14-MAR-07
WG571078-4 LCS								
Naphthenic Acids			94		%		55-145	14-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NAPHTHENIC-ACID-FM	**Water**							
Batch R502630								
WG571078-1 MB								
Naphthenic Acids			<1		mg/L		1	14-MAR-07
WG571078-2 MS		**L485366-1**						
Naphthenic Acids			105		%		55-145	14-MAR-07
NO2-ED	**Water**							
Batch R502167								
WG570432-4 DUP		**L485354-4**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	13-MAR-07
WG570432-5 DUP		**L485373-2**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	13-MAR-07
WG570432-7 DUP		**L485612-3**						
Nitrite-N		<0.5	0.11	J	mg/L	0.03	0.2	13-MAR-07
WG570432-3 LCS								
Nitrite-N			101		%		90-110	13-MAR-07
WG570432-2 MB								
Nitrite-N			<0.05		mg/L		0.05	13-MAR-07
WG570432-6 MS		**L485550-1**						
Nitrite-N			103		%		88-113	13-MAR-07
NO3-ED	**Water**							
Batch R502167								
WG570432-2 MB								
Nitrate-N			<0.1		mg/L		0.1	13-MAR-07
PAH-ALK-ED	**Water**							
Batch R503833								
WG570297-2 LCS								
Acenaphthene			88		%		49-124	16-MAR-07
Acenaphthylene			85		%		48-126	16-MAR-07
Anthracene			90		%		55-125	16-MAR-07
Benzo(a)anthracene			85		%		58-129	16-MAR-07
Benzo(a)pyrene			97		%		53-131	16-MAR-07
Benzo(b)fluoranthene			109		%		49-131	16-MAR-07
Benzo(ghi)perylene			100		%		47-137	16-MAR-07
Benzo(k)fluoranthene			96		%		56-129	16-MAR-07
Biphenyl			80		%		54-120	16-MAR-07
C2 sub'd naphthalene			85		%		51-125	16-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ALK-ED	**Water**							
Batch R503833								
WG570297-2 LCS								
C3 sub'd naphthalene			94		%		55-129	16-MAR-07
Chrysene			104		%		62-128	16-MAR-07
Dibenzo(a,h)anthracene			100		%		48-134	16-MAR-07
Dibenzothiophene			93		%		58-131	16-MAR-07
Fluoranthene			94		%		55-129	16-MAR-07
Fluorene			92		%		53-126	16-MAR-07
Indeno(c,d-123)pyrene			99		%		49-135	16-MAR-07
Methyl naphthalene			77		%		47-121	16-MAR-07
Methyl phenanthrene/anthracene			89		%		56-127	16-MAR-07
Naphthalene			76		%		42-119	16-MAR-07
Phenanthrene			92		%		57-128	16-MAR-07
Pyrene			94		%		54-131	16-MAR-07
WG570297-1 MB								
Acenaphthylene			<0.01		ug/L		0.01	16-MAR-07
Benzo(ghi)perylene			<0.01		ug/L		0.01	16-MAR-07
Biphenyl			<0.01		ug/L		0.01	16-MAR-07
C2 sub'd B(a)A/chrysene			<0.04		ug/L		0.04	16-MAR-07
C2 sub'd B(b&k)F/B(a)P			<0.04		ug/L		0.04	16-MAR-07
C2 sub'd biphenyl			<0.04		ug/L		0.04	16-MAR-07
C2 sub'd dibenzothiophene			<0.04		ug/L		0.04	16-MAR-07
C2 sub'd fluorene			<0.04		ug/L		0.04	16-MAR-07
C2 sub'd naphthalene			<0.04		ug/L		0.04	16-MAR-07
C2 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	16-MAR-07
C3 sub'd dibenzothiophene			<0.04		ug/L		0.04	16-MAR-07
C3 sub'd naphthalene			<0.04		ug/L		0.04	16-MAR-07
C3 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	16-MAR-07
C4 sub'd dibenzothiophene			<0.04		ug/L		0.04	16-MAR-07
C4 sub'd naphthalene			<0.04		ug/L		0.04	16-MAR-07
C4 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	16-MAR-07
Dibenzothiophene			<0.01		ug/L		0.01	16-MAR-07
Methyl acenaphthene			<0.04		ug/L		0.04	16-MAR-07
Methyl B(a)A/chrysene			<0.04		ug/L		0.04	16-MAR-07
Methyl B(b&k)F/B(a)P			<0.04		ug/L		0.04	16-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ALK-ED	**Water**							
Batch **R503833**								
WG570297-1 **MB**								
Methyl biphenyl			<0.04		ug/L		0.04	16-MAR-07
Methyl dibenzothiophene			<0.04		ug/L		0.04	16-MAR-07
Methyl fluoranthene/pyrene			<0.04		ug/L		0.04	16-MAR-07
Methyl fluorene			<0.04		ug/L		0.04	16-MAR-07
Methyl naphthalene			<0.01		ug/L		0.01	16-MAR-07
Methyl phenanthrene/anthracene			<0.04		ug/L		0.04	16-MAR-07
PH/EC/ALK-ED	**Water**							
Batch **R502360**								
WG570487-5 **DUP**		**L485373-2**						
Alkalinity, Total (as CaCO3)		377	377		mg/L	0.093	6.5	13-MAR-07
Bicarbonate (HCO3)		460	460		mg/L	0.096	26	13-MAR-07
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	26	13-MAR-07
Conductivity (EC)		751	752		uS/cm	0.13	7.1	13-MAR-07
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	26	13-MAR-07
pH		7.9	7.9	J	pH	0.0	0.2	13-MAR-07
WG570487-6 **DUP**		**L485827-3**						
Alkalinity, Total (as CaCO3)		110	109		mg/L	0.62	6.5	13-MAR-07
Bicarbonate (HCO3)		66	66		mg/L	0.85	26	13-MAR-07
Carbonate (CO3)		33	33	J	mg/L	0	20	13-MAR-07
Conductivity (EC)		463	463		uS/cm	0.0	7.1	13-MAR-07
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	26	13-MAR-07
pH		9.5	9.5	J	pH	0.0	0.2	13-MAR-07
WG570487-2 **LCS**								
Conductivity (EC)			99		%		94-106	13-MAR-07
WG570487-3 **LCS**								
pH			7.0		pH		6.9-7.1	13-MAR-07
WG570487-4 **LCS**								
Alkalinity, Total (as CaCO3)			97		%		90-110	13-MAR-07
WG570487-1 **MB**								
Alkalinity, Total (as CaCO3)			<5		mg/L		5	13-MAR-07
Bicarbonate (HCO3)			<5		mg/L		5	13-MAR-07
Carbonate (CO3)			<5		mg/L		5	13-MAR-07
Hydroxide (OH)			<5		mg/L		5	13-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R502408								
WG570849-2 LCS								
Conductivity (EC)			100		%		94-106	14-MAR-07
WG570849-3 LCS								
pH			7.0		pH		6.9-7.1	14-MAR-07
WG570849-4 LCS								
Alkalinity, Total (as CaCO3)			97		%		90-110	14-MAR-07
WG570849-1 MB								
Alkalinity, Total (as CaCO3)			<5		mg/L		5	14-MAR-07
Bicarbonate (HCO3)			<5		mg/L		5	14-MAR-07
Carbonate (CO3)			<5		mg/L		5	14-MAR-07
Hydroxide (OH)			<5		mg/L		5	14-MAR-07
PHENOLS-4AAP-WT	**Water**							
Batch R504019								
WG572746-2 CVS								
Phenols (4AAP)			100		%		85-115	19-MAR-07
WG572746-3 DUP		**L486634-1**						
Phenols (4AAP)		<0.001	<0.001	RPD-NA	mg/L	N/A	20	19-MAR-07
WG572746-5 DUP		**L485916-1**						
Phenols (4AAP)		<0.001	<0.001	RPD-NA	mg/L	N/A	20	19-MAR-07
WG572746-1 MB								
Phenols (4AAP)			<0.001		mg/L		0.001	19-MAR-07
SI-DIS-ED	**Water**							
Batch R502595								
WG570744-3 DUP		**L485366-4**						
Silicon (Si)-Dissolved		<0.1	<0.1	RPD-NA	mg/L	N/A	26	14-MAR-07
WG570744-1 MB								
Silicon (Si)-Dissolved			<0.1		mg/L		0.1	14-MAR-07
WG570744-4 MS		**L485366-4**						
Silicon (Si)-Dissolved			102		%		63-138	14-MAR-07
SULPHIDE-ED	**Water**							
Batch R502625								
WG570768-10 DUP		**L485542-1**						
Sulphide		0.005	0.005	J	mg/L	0.000	0.012	14-MAR-07
WG570768-4 DUP		**L484525-1**						
Sulphide		0.009	0.010	J	mg/L	0.001	0.012	14-MAR-07
WG570768-6 DUP		**L484164-15**						
Sulphide		0.058	0.062		mg/L	5.5	15	14-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SULPHIDE-ED	**Water**							
Batch R502625								
WG570768-8 DUP		**L485075-2**						
Sulphide		<0.003	<0.003	RPD-NA	mg/L	N/A	15	14-MAR-07
WG570768-2 LCS								
Sulphide			79		%		63-116	14-MAR-07
WG570768-3 LCS								
Sulphide			90		%		70-119	14-MAR-07
WG570768-1 MB								
Sulphide			<0.003		mg/L		0.003	14-MAR-07
WG570768-5 MS		**L484164-7**						
Sulphide			92		%		42-140	14-MAR-07
WG570768-7 MS		**L484426-8**						
Sulphide			105		%		42-140	14-MAR-07
WG570768-9 MS		**L485354-3**						
Sulphide			82		%		42-140	14-MAR-07

ALS Laboratory Group Quality Control Report

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

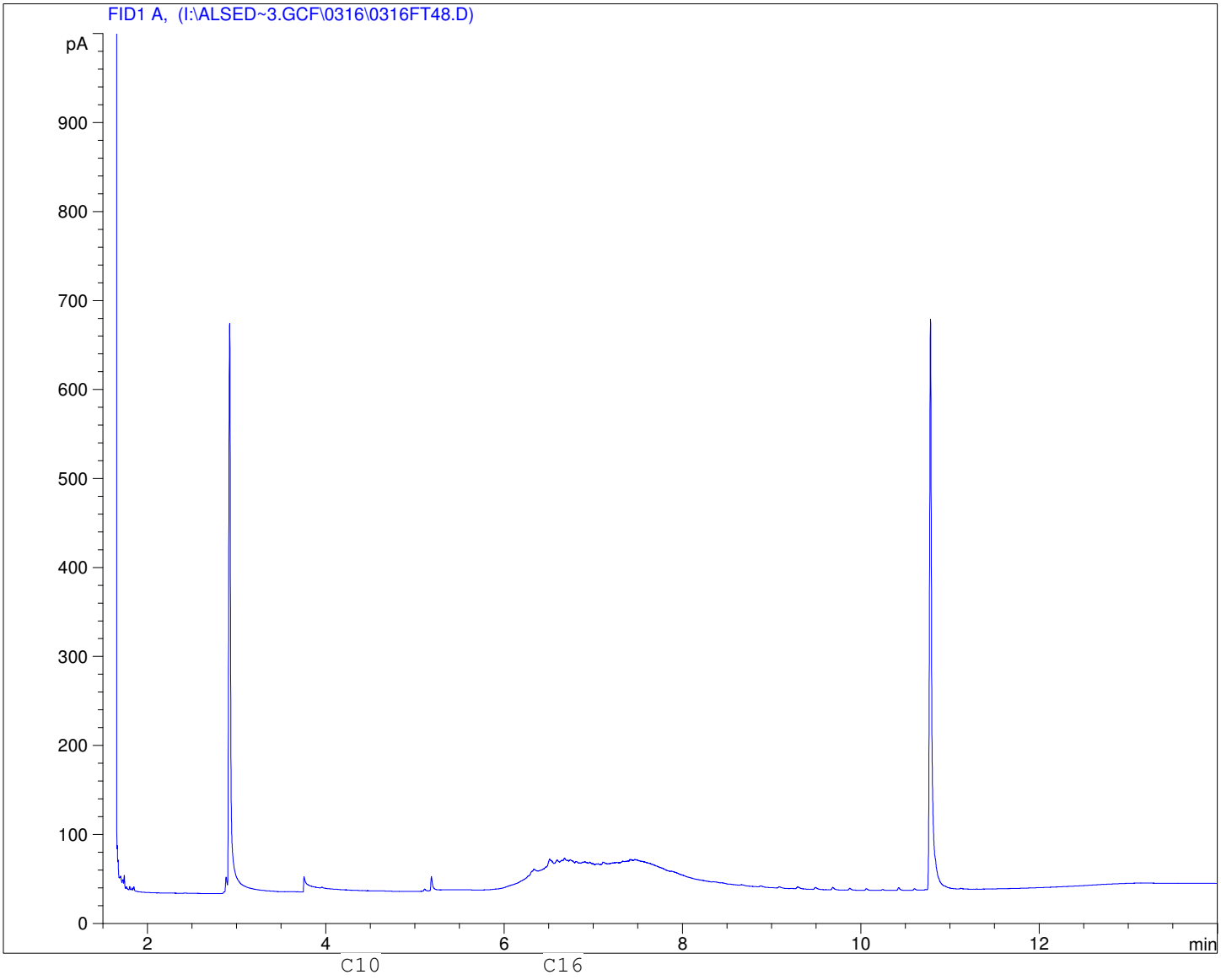
Qualifier:

RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
A	Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB" (result adjusted for method blank) appears in the Analytical Report.
B	Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.
E	Matrix spike recovery may fall outside the acceptance limits due to high sample background.
F	Silver recovery low, likely due to elevated chloride levels in sample.
G	Outlier - No assignable cause for nonconformity has been determined.
J	Duplicate results and limit(s) are expressed in terms of absolute difference.
K	The sample referenced above is of a non-standard matrix type; standard QC acceptance criteria may not be achievable.
L	Low matrix spike recovery due to instability of spiked analyte in the sample matrix.

Client ID: SH07 1814

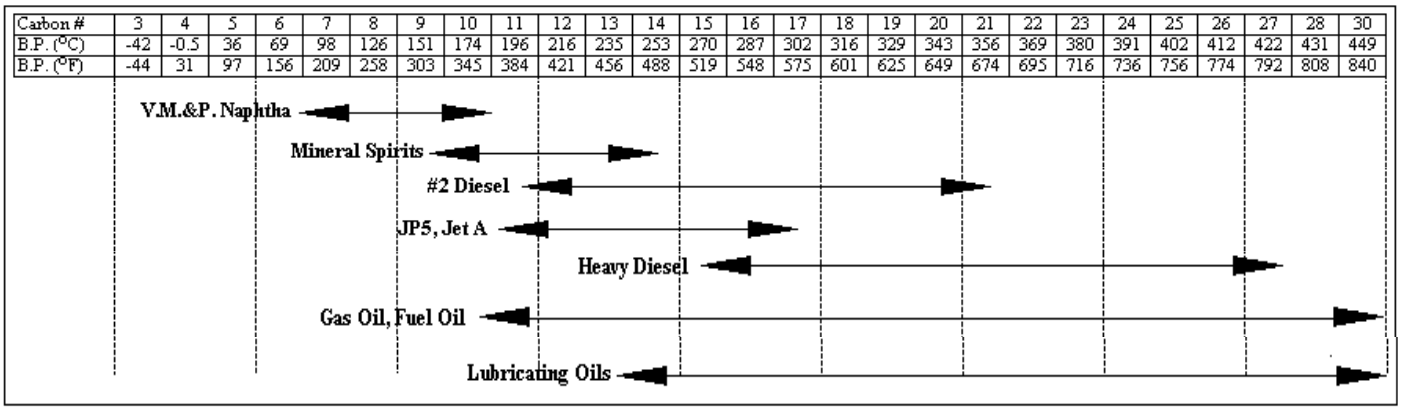
Sample ID: L485366-1 4
Injection Date: 3/17/07 1:45:55 PM
Instrument: 6890

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

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

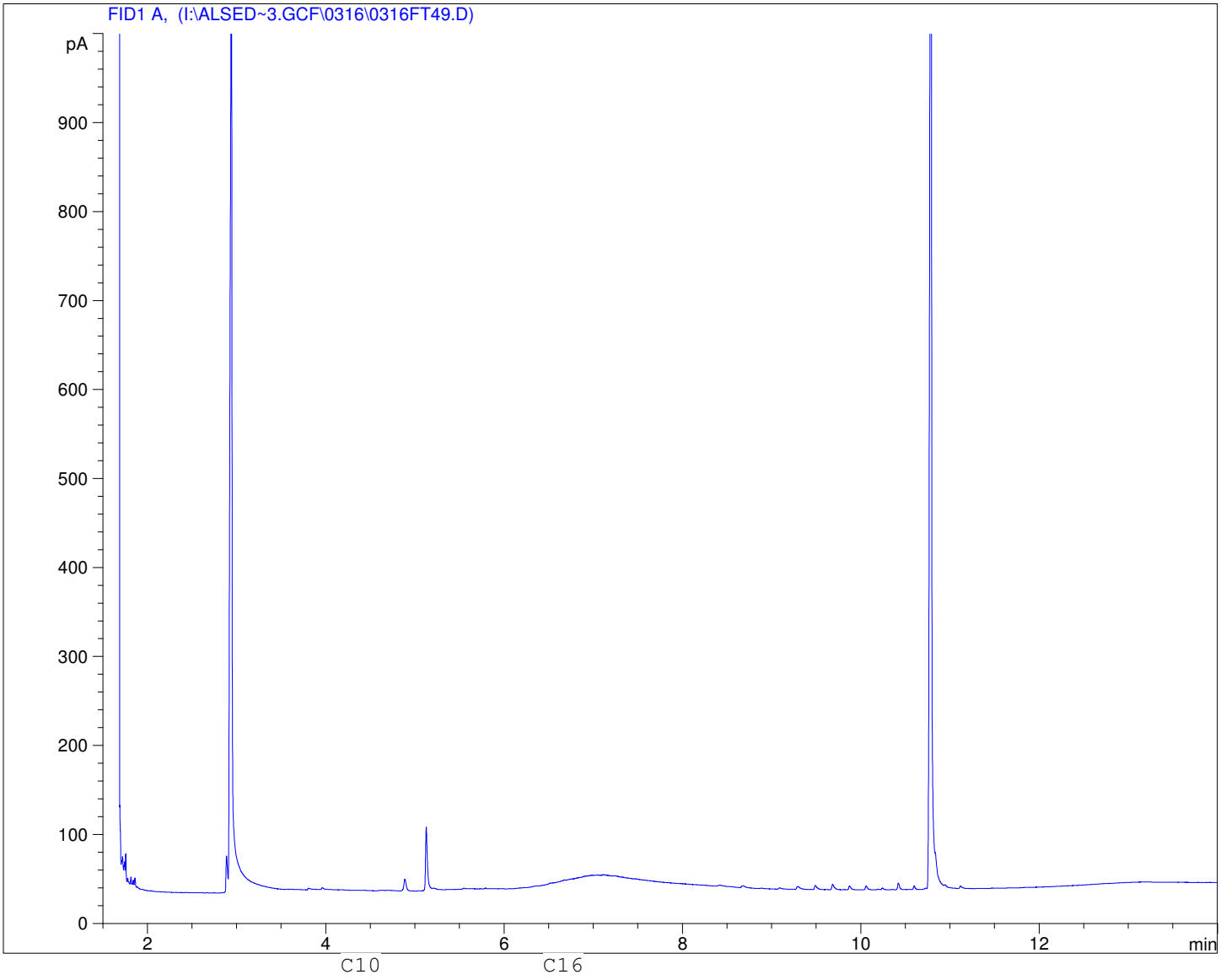


Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

Client ID: SH07 1830

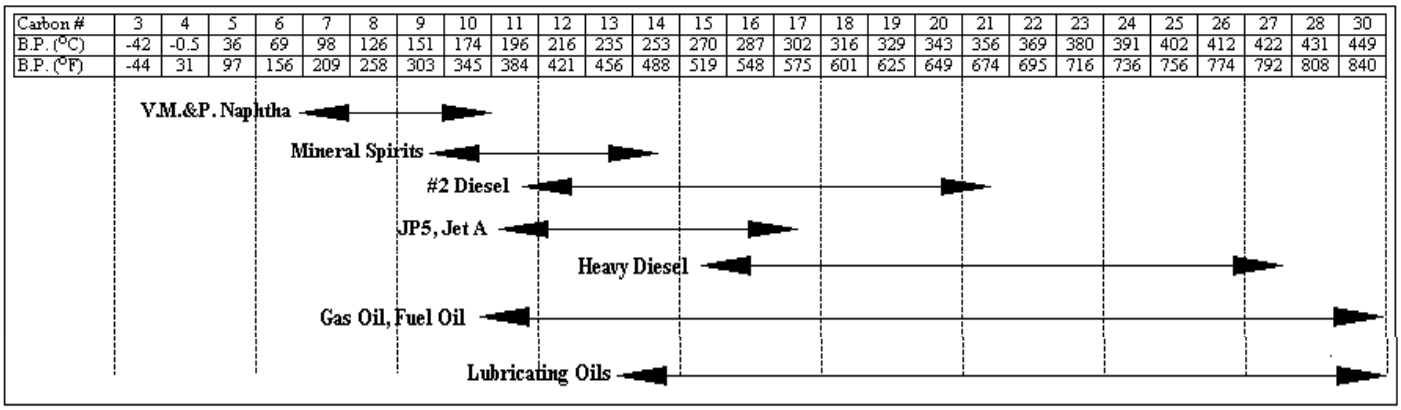
Sample ID: L485366-2 2
Injection Date: 3/17/07 2:16:06 PM
Instrument: 6890

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

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

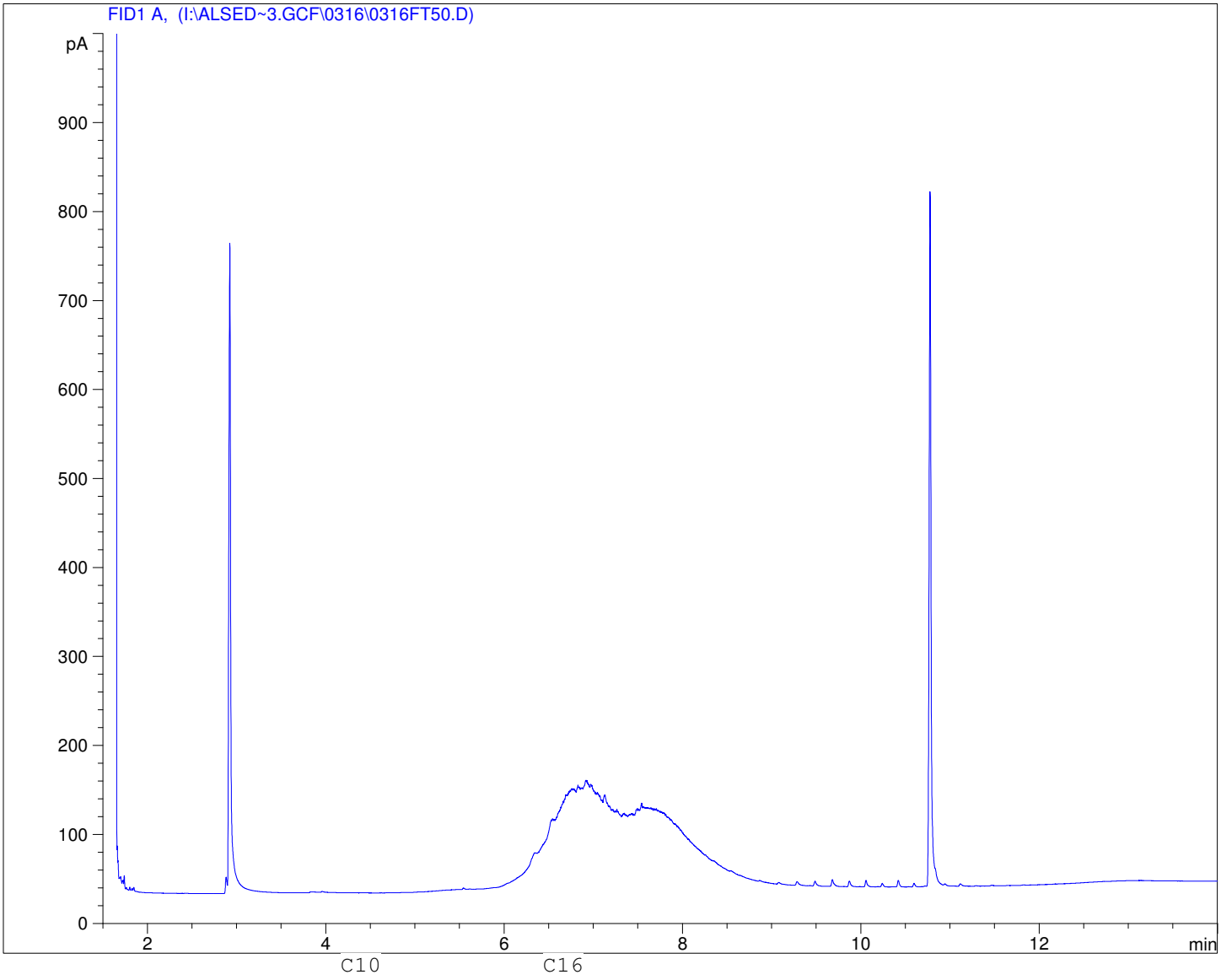


Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

Client ID: SH07 1826 BS

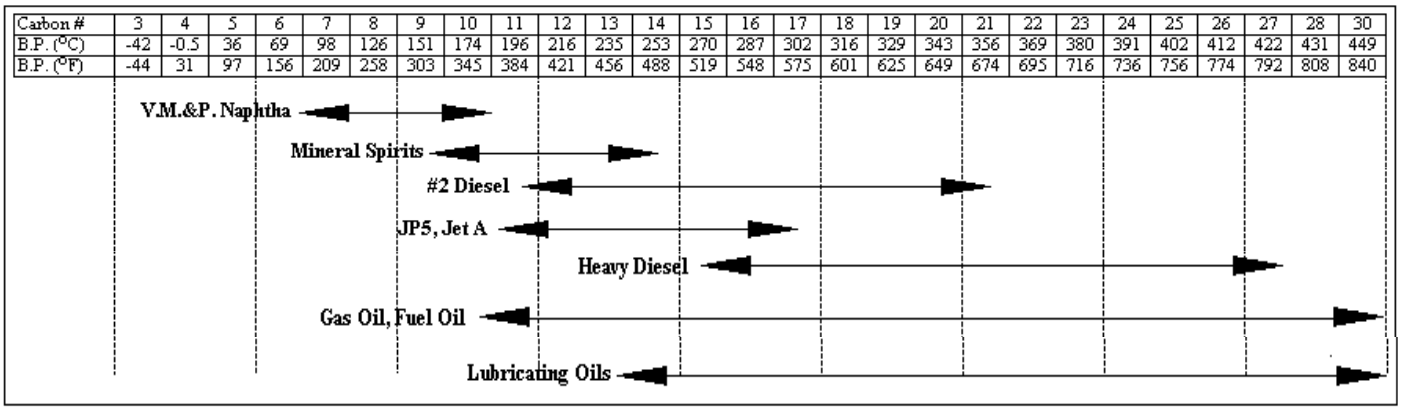
Sample ID: L485366-3 4
Injection Date: 3/17/07 2:46:06 PM
Instrument: 6890

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

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



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

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

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Page 1 of ___

REPORT TO: Worley Parsons Komex	REPORT FORMAT / DISTRIBUTION
COMPANY: Edmonton Office	STANDARD (OTHER) DBF
CONTACT:	(PDF) EXCEL CUSTOM FAX
ADDRESS: Edmonton	EMAIL 1: david.dillon@worleyparsons.com
	EMAIL 2: Joao.Kupper@worleyparsons.com
PHONE: 1-877-566-3933 FAX (780) 496-9575	
INVOICE TO: SAME AS REPORT ? (YES) / NO	INDICATE BOTTLES: FILTERED / PRESERVED (F/P)
COMPANY:	**CLIENT / PROJECT INFORMATION:**
CONTACT:	JOB #:
ADDRESS:	PO/AFE: F35772803
	Legal Site Description:
PHONE: FAX:	QUOTE #:
Lab Work Order # (lab use only): L485366	SAMPLER (Initials): CJCO, AE

SERVICE REQUESTED

- X REGULAR SERVICE (DEFAULT)
- RUSH SERVICE (2-3 DAYS)
- PRIORITY SERVICE (1 DAY or ASAP)
- EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Routine; majors, F, Fe, Mn	Silicon (Si) Dissolved	Mercury (Hg) - Dissolved	Sulphide (P)	Phenols (4AAP) (P)	CCME PAHs	Dissolved Metals (P)	Naph by FTIR	BTEX, F1, F2	PAHs & Alkylated PAHs	HAZARDOUS?	HIGHLY CONTAMINATED?	NUMBER OF CONTAINERS
	SH07 1814	MAR. 10, 2007	17:00	H_2O	X	X	X	X	X	X	X	X	X	X			
	SH07 1830	MAR. 11, 2007	13:00	H_2O	X	X	X	X	X	X	X	X	X	X			
	SH07 1826 BS	Mar 11, 2007	17:00	H_2O	X	X	X	X	X	X	X	X	X	X			
	SH07-1826-FB	Mar. 11, 2007	17:30	H_2O	X	X	X	X	X	X	X	X	X	X			

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this from *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
Cathleen O'Brien	Mar 12 8:40	D. Anthony	12-MAR-07
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME: 08:40

SAMPLE CONDITION (lab use only)
TEMPERATURE — SAMPLES RECEIVED IN GOOD CONDITION? YES / NO
(If no provide details) NOT CHECKED

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

ANALYTICAL REPORT

WORLEYPARSONS CANADA LTD

ATTN: DAVID DILLON

705, 10240 124 ST

EDMONTON AB T5N 3W6

Reported On: 17-APR-07 05:30 PM
Revision: 4

Lab Work Order #: **L487653** **Date Received:** **19-MAR-07**

Project P.O. #: F35772803
Job Reference:
Legal Site Desc:
CofC Numbers: 01292

Other Information:

Comments: ADDITIONAL 03-APR-07 17:47

05-Apr-07 Revised Report:
L487653-1 and -2 Surrogate for F2 was revised due to calculation error.

17-Apr-07 Revised Report:
As per client's request, removed PAHs that are in alkylated and CCME packages from alkylated package and removed extractable Fe and Mn.

CHERYLE KEARLEY
General Manager, Fort McMurray

For any questions about this report please contact your Account Manager:

CHERYLE KEARLEY

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L487653-1 SH07-1826-D								
Sampled By: CLIENT on 18-MAR-07 @ 11:00								
Matrix: Water								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)								
F2 (>C10-C16)	0.35	RAMB	0.05	mg/L	20-MAR-07	21-MAR-07	GRB	R505352
Surr: 2-Bromobenzotrifluoride	92		65-146	%	20-MAR-07	21-MAR-07	GRB	R505352
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
Toluene	0.0012		0.0005	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
EthylBenzene	<0.0005		0.0005	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
Xylenes	<0.0005		0.0005	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
F1(C6-C10)	<0.1		0.1	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
F1-BTEX	<0.1		0.1	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
Dissolved Metals								
Iron (Fe)-Dissolved	0.447		0.005	mg/L		20-MAR-07	SYF	R504635
Manganese (Mn)-Dissolved	1.70		0.001	mg/L		20-MAR-07	SYF	R504635
Dissolved Trace Metals								
Silver (Ag)	<0.005	RAMB	0.005	mg/L		23-MAR-07	CVM	R505402
Aluminum (Al)	0.02		0.01	mg/L		23-MAR-07	CVM	R505402
Boron (B)	1.74		0.05	mg/L		23-MAR-07	CVM	R505402
Barium (Ba)	0.686		0.003	mg/L		23-MAR-07	CVM	R505402
Beryllium (Be)	<0.001		0.001	mg/L		23-MAR-07	CVM	R505402
Cadmium (Cd)	<0.001		0.001	mg/L		23-MAR-07	CVM	R505402
Cobalt (Co)	<0.002		0.002	mg/L		23-MAR-07	CVM	R505402
Chromium (Cr)	<0.005		0.005	mg/L		21-MAR-07	SYF	R504635
Copper (Cu)	0.128		0.001	mg/L		23-MAR-07	CVM	R505402
Molybdenum (Mo)	0.006		0.005	mg/L		23-MAR-07	CVM	R505402
Nickel (Ni)	0.013		0.002	mg/L		23-MAR-07	CVM	R505402
Lead (Pb)	<0.005		0.005	mg/L		23-MAR-07	CVM	R505402
Tin (Sn)	<0.05		0.05	mg/L		23-MAR-07	CVM	R505402
Strontium (Sr)	14.4		0.005	mg/L		23-MAR-07	CVM	R505402
Titanium (Ti)	<0.001		0.001	mg/L		23-MAR-07	CVM	R505402
Thallium (Tl)	<0.05		0.05	mg/L		23-MAR-07	CVM	R505402
Vanadium (V)	0.006		0.001	mg/L		23-MAR-07	CVM	R505402
Zinc (Zn)	0.113		0.001	mg/L		23-MAR-07	CVM	R505402
Mercury (Hg)-Dissolved	0.0005		0.0001	mg/L		23-MAR-07	CVM	R505402
Silicon (Si)-Dissolved	7.4		0.1	mg/L		20-MAR-07	SYF	R504635
Naphthenic Acids	4		1	mg/L		23-MAR-07	RP	R505937
Phenols (4AAP)	0.008		0.001	mg/L	26-MAR-07	26-MAR-07	SF	R506461
Sulphide	0.009		0.003	mg/L		21-MAR-07	KMY	R505055
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Benzo(ghi)perylene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Biphenyl	<0.01	RAMB	0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C2 sub'd biphenyl	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C2 sub'd fluorene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C2 sub'd naphthalene	0.25		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C2 sub'd phenanthrene/anth.	0.19		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C3 sub'd naphthalene	<0.04	RAMB	0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L487653-1 SH07-1826-D								
Sampled By: CLIENT on 18-MAR-07 @ 11:00								
Matrix: Water								
PAHs & Alkylated PAHs								
C3 sub'd phenanthrene/anth.	0.11		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C4 sub'd naphthalene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
C4 sub'd phenanthrene/anth.	0.08		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Dibenzothiophene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl acenaphthene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl biphenyl	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl dibenzothiophene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl fluorene	<0.04		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl naphthalene	0.18	RAMB	0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Methyl phenanthrene/anthracene	0.17		0.04	ug/L	20-MAR-07	24-MAR-07	JR	R506290
Surr: Nitrobenzene d5	89		24-132	%	20-MAR-07	24-MAR-07	JR	R506290
Surr: 2-Fluorobiphenyl	85		37-123	%	20-MAR-07	24-MAR-07	JR	R506290
Surr: p-Terphenyl d14	99		50-142	%	20-MAR-07	24-MAR-07	JR	R506290
CCME PAHs								
Naphthalene	0.21	RAMB	0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Quinoline	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Acenaphthene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Fluorene	0.02		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Phenanthrene	0.04	RAMB	0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Anthracene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Acridine	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Fluoranthene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Pyrene	0.02		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Benzo(a)anthracene	0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Chrysene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Benzo(b)fluoranthene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Benzo(k)fluoranthene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Benzo(a)pyrene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	20-MAR-07	24-MAR-07	JR	R506289
Surr: Nitrobenzene d5	89		24-132	%	20-MAR-07	24-MAR-07	JR	R506289
Surr: 2-Fluorobiphenyl	85		37-123	%	20-MAR-07	24-MAR-07	JR	R506289
Surr: p-Terphenyl d14	99		50-142	%	20-MAR-07	24-MAR-07	JR	R506289
Routine Water: Major Ions, Fluoride								
Chloride (Cl)	16500		1	mg/L		20-MAR-07	CLT	R504255
Fluoride (F)	0.36		0.05	mg/L		20-MAR-07	UM	R504905
Nitrate+Nitrite-N	0.2		0.1	mg/L		20-MAR-07	KMY	R504655
Nitrate-N	0.2		0.1	mg/L		20-MAR-07	KMY	R504655
Nitrite-N	<0.05		0.05	mg/L		20-MAR-07	KMY	R504655
pH, Conductivity and Total Alkalinity								
pH	7.4		0.1	pH		20-MAR-07	UM	R504905
Conductivity (EC)	43500		0.2	uS/cm		20-MAR-07	UM	R504905
Bicarbonate (HCO3)	1120		5	mg/L		20-MAR-07	UM	R504905
Carbonate (CO3)	<5		5	mg/L		20-MAR-07	UM	R504905
Hydroxide (OH)	<5		5	mg/L		20-MAR-07	UM	R504905
Alkalinity, Total (as CaCO3)	921		5	mg/L		20-MAR-07	UM	R504905

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L487653-1 SH07-1826-D								
Sampled By: CLIENT on 18-MAR-07 @ 11:00								
Matrix: Water								
Routine Water: Major Ions, Fluoride								
Ion Balance Calculation								
Ion Balance	99.3			%		22-MAR-07		
TDS (Calculated)	29900			mg/L		22-MAR-07		
Hardness (as CaCO3)	2530			mg/L		22-MAR-07		
ICP metals and SO4 for routine water								
Calcium (Ca)	566		0.5	mg/L		21-MAR-07	JWU	R504904
Potassium (K)	77.1		0.5	mg/L		21-MAR-07	JWU	R504904
Magnesium (Mg)	270		0.1	mg/L		21-MAR-07	JWU	R504904
Sodium (Na)	10500		1	mg/L		21-MAR-07	JWU	R504904
Sulfate (SO4)	1400		0.5	mg/L		21-MAR-07	JWU	R504904

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L487653-2 SH07-1805								
Sampled By: CLIENT on 14-MAR-07 @ 16:30								
Matrix: Water								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)								
F2 (>C10-C16)	0.23	RAMB	0.05	mg/L	20-MAR-07	21-MAR-07	GRB	R505352
Surr: 2-Bromobenzotrifluoride	90		65-146	%	20-MAR-07	21-MAR-07	GRB	R505352
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
Toluene	0.0006		0.0005	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
EthylBenzene	<0.0005		0.0005	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
Xylenes	<0.0005		0.0005	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
F1(C6-C10)	<0.1		0.1	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
F1-BTEX	<0.1		0.1	mg/L	19-MAR-07	20-MAR-07	NRG	R505032
Dissolved Metals								
Iron (Fe)-Dissolved	0.022		0.005	mg/L		20-MAR-07	SYF	R504635
Manganese (Mn)-Dissolved	0.200		0.001	mg/L		20-MAR-07	SYF	R504635
Dissolved Trace Metals								
Silver (Ag)	<0.005		0.005	mg/L		23-MAR-07	CVM	R505402
Aluminum (Al)	0.06		0.01	mg/L		23-MAR-07	CVM	R505402
Boron (B)	2.32		0.05	mg/L		23-MAR-07	CVM	R505402
Barium (Ba)	0.090		0.003	mg/L		23-MAR-07	CVM	R505402
Beryllium (Be)	0.001		0.001	mg/L		23-MAR-07	CVM	R505402
Cadmium (Cd)	<0.001		0.001	mg/L		23-MAR-07	CVM	R505402
Cobalt (Co)	<0.002		0.002	mg/L		23-MAR-07	CVM	R505402
Chromium (Cr)	<0.005		0.005	mg/L		23-MAR-07	CVM	R505402
Copper (Cu)	0.314		0.001	mg/L		23-MAR-07	CVM	R505402
Molybdenum (Mo)	<0.005		0.005	mg/L		23-MAR-07	CVM	R505402
Nickel (Ni)	0.035		0.002	mg/L		23-MAR-07	CVM	R505402
Lead (Pb)	<0.005		0.005	mg/L		23-MAR-07	CVM	R505402
Tin (Sn)	<0.05		0.05	mg/L		23-MAR-07	CVM	R505402
Strontium (Sr)	19.9		0.005	mg/L		23-MAR-07	CVM	R505402
Titanium (Ti)	<0.001		0.001	mg/L		23-MAR-07	CVM	R505402
Thallium (Tl)	<0.05		0.05	mg/L		23-MAR-07	CVM	R505402
Vanadium (V)	<0.001		0.001	mg/L		23-MAR-07	CVM	R505402
Zinc (Zn)	0.073		0.001	mg/L		23-MAR-07	CVM	R505402
Mercury (Hg)-Dissolved	0.0005		0.0001	mg/L		23-MAR-07	CVM	R505402
Silicon (Si)-Dissolved	5.0		0.1	mg/L		20-MAR-07	SYF	R504635
Naphthenic Acids	4		1	mg/L		23-MAR-07	RP	R505937
Phenols (4AAP)	0.037		0.001	mg/L	27-MAR-07	27-MAR-07	SF	R506461
Sulphide	48.4		0.003	mg/L		23-MAR-07	KMY	R505989
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Benzo(ghi)perylene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Biphenyl	<0.01	RAMB	0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C2 sub'd biphenyl	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C2 sub'd fluorene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C2 sub'd naphthalene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C3 sub'd naphthalene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L487653-2 SH07-1805								
Sampled By: CLIENT on 14-MAR-07 @ 16:30								
Matrix: Water								
PAHs & Alkylated PAHs								
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C4 sub'd naphthalene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Dibenzothiophene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl acenaphthene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl biphenyl	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl dibenzothiophene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl fluorene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl naphthalene	<0.01	RAMB	0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Methyl phenanthrene/anthracene	<0.04		0.04	ug/L	20-MAR-07	25-MAR-07	JR	R506290
Surr: Nitrobenzene d5	76		24-132	%	20-MAR-07	25-MAR-07	JR	R506290
Surr: 2-Fluorobiphenyl	74		37-123	%	20-MAR-07	25-MAR-07	JR	R506290
Surr: p-Terphenyl d14	103		50-142	%	20-MAR-07	25-MAR-07	JR	R506290
CCME PAHs								
Naphthalene	0.01	RAMB	0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Quinoline	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Acenaphthene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Fluorene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Phenanthrene	<0.01	RAMB	0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Anthracene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Acridine	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Fluoranthene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Pyrene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Benzo(a)anthracene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Chrysene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Benzo(b)fluoranthene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Benzo(k)fluoranthene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Benzo(a)pyrene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	20-MAR-07	25-MAR-07	JR	R506289
Surr: Nitrobenzene d5	76		24-132	%	20-MAR-07	25-MAR-07	JR	R506289
Surr: 2-Fluorobiphenyl	74		37-123	%	20-MAR-07	25-MAR-07	JR	R506289
Surr: p-Terphenyl d14	103		50-142	%	20-MAR-07	25-MAR-07	JR	R506289
Routine Water: Major Ions, Fluoride								
Chloride (Cl)	45200		1	mg/L		20-MAR-07	CLT	R504255
Fluoride (F)	1.05		0.05	mg/L		20-MAR-07	UM	R504905
Nitrate+Nitrite-N	0.1		0.1	mg/L		20-MAR-07	KMY	R504655
Nitrate-N	0.1		0.1	mg/L		20-MAR-07	KMY	R504655
Nitrite-N	<0.05		0.05	mg/L		20-MAR-07	KMY	R504655
pH, Conductivity and Total Alkalinity								
pH	7.7		0.1	pH		20-MAR-07	UM	R504905
Conductivity (EC)	98000		0.2	uS/cm		20-MAR-07	UM	R504905
Bicarbonate (HCO3)	588		5	mg/L		20-MAR-07	UM	R504905
Carbonate (CO3)	<5		5	mg/L		20-MAR-07	UM	R504905
Hydroxide (OH)	<5		5	mg/L		20-MAR-07	UM	R504905
Alkalinity, Total (as CaCO3)	482		5	mg/L		20-MAR-07	UM	R504905

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L487653-2 SH07-1805								
Sampled By: CLIENT on 14-MAR-07 @ 16:30								
Matrix: Water								
Routine Water: Major Ions, Fluoride								
Ion Balance Calculation								
Ion Balance	100			%		22-MAR-07		
TDS (Calculated)	81900			mg/L		22-MAR-07		
Hardness (as CaCO3)	5190			mg/L		22-MAR-07		
ICP metals and SO4 for routine water								
Calcium (Ca)	1710		0.5	mg/L		21-MAR-07	JWU	R504904
Potassium (K)	27.2		0.5	mg/L		21-MAR-07	JWU	R504904
Magnesium (Mg)	223		0.1	mg/L		21-MAR-07	JWU	R504904
Sodium (Na)	29600		1	mg/L		21-MAR-07	JWU	R504904
Sulfate (SO4)	4860		0.5	mg/L		21-MAR-07	JWU	R504904

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

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
RAMB	Result Adjusted For Method Blank

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
BTX,F1-ED	Water	BTEX and F1 (C6-C10)	EPA 5030	EPA 5030/8015&8260-P&T GC-MS & FID
CL-ED	Water	Chloride (Cl)		APHA 4500 Cl E-Colorimetry
ETL-ROUTINE-ICP-ED	Water	ICP metals and SO4 for routine water		APHA 3120 B-ICP-OES
F-ED	Water	Fluoride (F)		APHA 4500 F-C-Electrode
F2-ED	Water	F2 (>C10-C16)		EPA 3510/8000-GC-FID
FE-DIS-ED	Water	Iron (Fe)-Dissolved		EPA 200.7
FE-EXT-ROU-ED	Water	Iron (Fe)-Extractable		APHA 3120 B-ICP-OES
HG-DIS-LOW-ED	Water	Mercury (Hg)-Dissolved		EPA 6020
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET1-DIS-ED	Water	Dissolved Trace Metals		EPA 6020
MN-DIS-ED	Water	Manganese (Mn)-Dissolved		EPA 200.7
MN-EXT-ROU-ED	Water	Manganese (Mn)-Extractable		APHA 3120 B-ICP-OES
N2N3-ED	Water	Nitrate+Nitrite-N		APHA 4500 NO3H-Colorimetry
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR,Syncrude,1994
NO2-ED	Water	Nitrite-N		APHA 4500 NO2B-Colorimetry
NO3-ED	Water	Nitrate-N		APHA 4500 NO3H-Colorimetry
PAH-ALK-ED	Water	PAHs & Alkylated PAHs		EPA 3510/8270-GC/MS
NOTE: The Alkylated PAH results are determined via a semi-quantitative method to be used for research purposes only. This method is not necessarily intended to address regulatory requirements.				
PAH-CCME-ED	Water	CCME PAHs		EPA 3510/8270-GC/MS
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity		APHA 4500-H, 2510, 2320
PHENOLS-4AAP-WT	Water	Phenols (4AAP)		APHA 5530
SI-DIS-ED	Water	Silicon (Si)-Dissolved		EPA 200.7
SULPHIDE-ED	Water	Sulphide		APHA 4500 -S E-Auto-Colorimetry

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

Chain of Custody numbers:

01292

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

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA	FM	ALS LABORATORY GROUP - FORT MCMURRAY, ALBERTA, CANADA

Reference Information

WT	ALS LABORATORY GROUP - WATERLOO (SENTINEL), ONTARIO, CAN

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

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

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

ALS Routine Water Chemistry Report

L487653

Lab ID	Sample ID	Result	UNITS	MEQ/L	MEQ %
L487653-1	SH07-1826-D				
Sample Date:	18-MAR-07				
Matrix:	Water				
Ion Balance		99.3	%		
Routine Anions					
Bicarbonate		1120	mg/L	18.35	2
Carbonate		<5	mg/L	0	0
Hydroxide		<5	mg/L	0	0
Chloride		16500	mg/L	465.44	46
Sulfate		1400	mg/L	29.15	3
Nitrate+Nitrite-N		0.2	mg/L	0.01	0
Anion Sum				512.98	50
Routine Cations					
Calcium		566	mg/L	28.24	3
Magnesium		270	mg/L	22.22	2
Sodium		10500	mg/L	456.72	45
Potassium		77.1	mg/L	1.97	0
Ammonium		0	mg/L	0	0
Cation Sum				509.16	50

Lab ID	Sample ID	Result	UNITS	MEQ/L	MEQ %
L487653-2	SH07-1805				
Sample Date:	14-MAR-07				
Matrix:	Water				
Ion Balance		100	%		
Routine Anions					
Bicarbonate		588	mg/L	9.64	0
Carbonate		<5	mg/L	0	0
Hydroxide		<5	mg/L	0	0
Chloride		45200	mg/L	1,275.04	46
Sulfate		4860	mg/L	101.19	4
Nitrate+Nitrite-N		0.1	mg/L	0.01	0
Anion Sum				1,385.92	50
Routine Cations					
Calcium		1710	mg/L	85.33	3
Magnesium		223	mg/L	18.35	1
Sodium		29600	mg/L	1,287.52	46
Potassium		27.2	mg/L	0.70	0
Ammonium		0	mg/L	0	0
Cation Sum				1,391.90	50

ALS LABORATORY GROUP SOIL SALINITY CONVERSION

L487653

Lab ID	Sample ID					Lab ID	Sample ID				

"Calculations are as per:
Methods of Analysis for Soils, Plants and Waters
Homer D. Chapman and Parker F. Pratt
University of California, Riverside, Cl.
August, 1961."

ALS Laboratory Group Quality Control Report

Workorder: L487653 Report Date: 17-APR-07

Client: WORLEYPARSONS CANADA LTD
705, 10240 124 ST
EDMONTON AB T5N 3W6

Contact: DAVID DILLON

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Water**							
Batch R505032								
WG573182-1 DUP		**L487675-1**						
Benzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	20-MAR-07
EthylBenzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	24	20-MAR-07
Toluene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	32	20-MAR-07
F1(C6-C10)		<0.1	<0.1	RPD-NA	mg/L	N/A	17	20-MAR-07
Xylenes		<0.0005	<0.0005	RPD-NA	mg/L	N/A	26	20-MAR-07
WG573972-4 LCS								
Benzene			94		%		45-106	20-MAR-07
EthylBenzene			88		%		47-108	20-MAR-07
Toluene			96		%		46-111	20-MAR-07
F1(C6-C10)			76		%		35-154	20-MAR-07
Xylenes			87		%		45-109	20-MAR-07
WG573972-3 MB								
Benzene			<0.0005		mg/L		0.0005	20-MAR-07
EthylBenzene			<0.0005		mg/L		0.0005	20-MAR-07
Toluene			<0.0005		mg/L		0.0005	20-MAR-07
F1(C6-C10)			<0.1		mg/L		0.1	20-MAR-07
Xylenes			<0.0005		mg/L		0.0005	20-MAR-07
CL-ED	**Water**							
Batch R504255								
WG573025-14 DUP		**L487617-1**						
Chloride (Cl)		<1	<1	RPD-NA	mg/L	N/A	6.5	20-MAR-07
WG573025-7 DUP		**L487445-1**						
Chloride (Cl)		<1	<1	RPD-NA	mg/L	N/A	6.5	20-MAR-07
WG573025-9 DUP		**L486967-8**						
Chloride (Cl)		3	3	J	mg/L	0	4	20-MAR-07
WG573025-2 LCS								
Chloride (Cl)			100		%		94-109	20-MAR-07
WG573025-3 LCS								
Chloride (Cl)			97		%		93-113	20-MAR-07
WG573025-1 MB								
Chloride (Cl)			<1		mg/L		1	20-MAR-07
WG573025-13 MS		**L487617-2**						
Chloride (Cl)			98		%		87-117	20-MAR-07
WG573025-8 MS		**L487445-1**						
Chloride (Cl)			99		%		87-117	20-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ETL-ROUTINE-ICP-ED	**Water**							
Batch R504904								
WG573867-2 CRM		**ION-915_WATER**						
Calcium (Ca)			106		%		96-116	21-MAR-07
Magnesium (Mg)			105		%		96-115	21-MAR-07
Sodium (Na)			110		%		95-118	21-MAR-07
Sulfate (SO4)			107		%		87-118	21-MAR-07
Potassium (K)			133	G	%		88-126	21-MAR-07
WG573867-3 DUP		**L488105-12**						
Calcium (Ca)		33.0	30.8		mg/L	7.1	14	21-MAR-07
Magnesium (Mg)		12.9	12.2		mg/L	5.3	10	21-MAR-07
Potassium (K)		5.0	4.6	J	mg/L	0.4	2	21-MAR-07
Sodium (Na)		174	164		mg/L	6.1	10	21-MAR-07
Sulfate (SO4)		2.3	2.1	J	mg/L	0.1	2	21-MAR-07
WG573867-5 DUP		**L487740-2**						
Calcium (Ca)		29.6	31.4		mg/L	5.9	14	21-MAR-07
Magnesium (Mg)		22.4	24.2		mg/L	7.9	10	21-MAR-07
Potassium (K)		1.8	1.7	J	mg/L	0.1	2	21-MAR-07
Sodium (Na)		16	17		mg/L	6.4	10	21-MAR-07
Sulfate (SO4)		5.0	5.1	J	mg/L	0.2	2	21-MAR-07
WG573867-7 DUP		**L488133-2**						
Calcium (Ca)		48.1	48.1		mg/L	0.067	14	21-MAR-07
Magnesium (Mg)		14.0	14.0		mg/L	0.056	10	21-MAR-07
Potassium (K)		1.1	1.2	J	mg/L	0.1	2	21-MAR-07
Sodium (Na)		10	10		mg/L	3.3	10	21-MAR-07
Sulfate (SO4)		59.5	59.7		mg/L	0.25	10	21-MAR-07
WG573867-1 MB								
Calcium (Ca)			<0.5		mg/L		2.5	21-MAR-07
Magnesium (Mg)			<0.1		mg/L		0.5	21-MAR-07
Potassium (K)			<0.5		mg/L		2.5	21-MAR-07
Sodium (Na)			<1		mg/L		5	21-MAR-07
Sulfate (SO4)			<0.5		mg/L		2.5	21-MAR-07
WG573867-4 MS		**L488105-12**						
Calcium (Ca)			107		%		81-119	21-MAR-07
Magnesium (Mg)			106		%		86-111	21-MAR-07
Potassium (K)			101		%		83-115	21-MAR-07
Sodium (Na)			110		%		81-116	21-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ETL-ROUTINE-ICP-ED	**Water**							
Batch R504904								
WG573867-4 MS		**L488105-12**						
Sulfate (SO4)			101		%		72-129	21-MAR-07
WG573867-6 MS		**L487740-2**						
Calcium (Ca)			108		%		81-119	21-MAR-07
Magnesium (Mg)			108		%		86-111	21-MAR-07
Potassium (K)			102		%		83-115	21-MAR-07
Sodium (Na)			104		%		81-116	21-MAR-07
Sulfate (SO4)			113		%		72-129	21-MAR-07
WG573867-8 MS		**L488133-2**						
Calcium (Ca)			105		%		81-119	21-MAR-07
Magnesium (Mg)			105		%		86-111	21-MAR-07
Potassium (K)			101		%		83-115	21-MAR-07
Sodium (Na)			102		%		81-116	21-MAR-07
Sulfate (SO4)			95		%		72-129	21-MAR-07
F-ED	**Water**							
Batch R504905								
WG573616-5 DUP		**L487865-3**						
Fluoride (F)		0.60	0.60		mg/L	0.0	8	20-MAR-07
WG573616-6 DUP		**L487472-14**						
Fluoride (F)		2.79	2.78		mg/L	0.36	8	21-MAR-07
WG573616-7 DUP		**L488113-4**						
Fluoride (F)		1.46	1.47		mg/L	0.68	8	21-MAR-07
WG573616-4 LCS								
Fluoride (F)			99		%		89-114	20-MAR-07
WG573616-1 MB								
Fluoride (F)			<0.05		mg/L		0.05	20-MAR-07
F2-ED	**Water**							
Batch R505352								
WG574276-2 LCS								
F2 (>C10-C16)			127		%		38-152	21-MAR-07
WG574276-1 MB								
F2 (>C10-C16)			0.07	A	mg/L		0.05	21-MAR-07
FE-DIS-ED	**Water**							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FE-DIS-ED	**Water**							
Batch R504635								
WG573405-3 DUP		**L487684-1**						
Iron (Fe)-Dissolved		0.014	0.013	J	mg/L	0.001	0.02	20-MAR-07
WG573405-1 MB								
Iron (Fe)-Dissolved			<0.005		mg/L		0.005	20-MAR-07
WG573405-4 MS		**L487684-1**						
Iron (Fe)-Dissolved			90		%		63-138	20-MAR-07
HG-DIS-LOW-ED	**Water**							
Batch R505402								
WG574227-1 MB								
Mercury (Hg)-Dissolved			<0.0001		mg/L		0.0005	22-MAR-07
MET1-DIS-ED	**Water**							
Batch R505402								
WG574227-2 CRM		**1643E_WATER**						
Aluminum (Al)			109		%		90-122	22-MAR-07
Barium (Ba)			99		%		88-109	22-MAR-07
Beryllium (Be)			95		%		77-110	22-MAR-07
Boron (B)			97		%		80-116	22-MAR-07
Cadmium (Cd)			100		%		87-109	22-MAR-07
Chromium (Cr)			100		%		83-118	22-MAR-07
Cobalt (Co)			106		%		90-110	22-MAR-07
Copper (Cu)			103		%		89-112	22-MAR-07
Lead (Pb)			100		%		89-110	22-MAR-07
Molybdenum (Mo)			105		%		88-111	22-MAR-07
Nickel (Ni)			104		%		88-110	22-MAR-07
Strontium (Sr)			99		%		87-109	22-MAR-07
Vanadium (V)			101		%		87-109	22-MAR-07
Zinc (Zn)			99		%		65-133	22-MAR-07
WG574227-1 MB								
Aluminum (Al)			<0.01		mg/L		0.05	22-MAR-07
Barium (Ba)			<0.003		mg/L		0.015	22-MAR-07
Beryllium (Be)			<0.001		mg/L		0.005	22-MAR-07
Boron (B)			<0.05		mg/L		0.25	22-MAR-07
Cadmium (Cd)			<0.001		mg/L		0.005	22-MAR-07
Chromium (Cr)			<0.005		mg/L		0.025	22-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-ED	**Water**							
Batch R505402								
WG574227-1 MB								
Cobalt (Co)			<0.002		mg/L		0.01	22-MAR-07
Copper (Cu)			<0.001		mg/L		0.005	22-MAR-07
Lead (Pb)			<0.005		mg/L		0.025	22-MAR-07
Molybdenum (Mo)			<0.005		mg/L		0.025	22-MAR-07
Nickel (Ni)			<0.002		mg/L		0.01	22-MAR-07
Phosphorus (P)			<0.1		mg/L		0.5	22-MAR-07
Silver (Ag)			<0.005		mg/L		0.025	22-MAR-07
Strontium (Sr)			<0.005		mg/L		0.025	22-MAR-07
Thallium (Tl)			<0.05		mg/L		0.25	22-MAR-07
Tin (Sn)			<0.05		mg/L		0.25	22-MAR-07
Titanium (Ti)			<0.001		mg/L		0.005	22-MAR-07
Vanadium (V)			<0.001		mg/L		0.005	22-MAR-07
Zinc (Zn)			<0.001		mg/L		0.005	22-MAR-07
MN-DIS-ED	**Water**							
Batch R504635								
WG573405-3 DUP		**L487684-1**						
Manganese (Mn)-Dissolved		0.030	0.030		mg/L	2.0	26	20-MAR-07
WG573405-1 MB								
Manganese (Mn)-Dissolved			<0.001		mg/L		0.001	20-MAR-07
WG573405-4 MS		**L487684-1**						
Manganese (Mn)-Dissolved			97		%		63-138	20-MAR-07
N2N3-ED	**Water**							
Batch R504655								
WG573223-5 DUP		**L487617-17**						
Nitrate+Nitrite-N		0.8	0.8	J	mg/L	0.0	0.4	20-MAR-07
WG573223-9 DUP		**L487914-1**						
Nitrate+Nitrite-N		<0.1	<0.1	RPD-NA	mg/L	N/A	6.9	20-MAR-07
WG573223-3 LCS								
Nitrate+Nitrite-N			100		%		87-113	20-MAR-07
WG573223-2 MB								
Nitrate+Nitrite-N			<0.1		mg/L		0.1	20-MAR-07
WG573223-4 MS		**L487617-9**						
Nitrate+Nitrite-N			100		%		84-118	20-MAR-07
WG573223-6 MS		**L487358-6**						
Nitrate+Nitrite-N			100		%		84-118	20-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N2N3-ED	**Water**							
Batch R504655								
WG573223-7 MS		**L487684-1**						
Nitrate+Nitrite-N			99		%		84-118	20-MAR-07
NAPHTHENIC-ACID-FM	**Water**							
Batch R505937								
WG575071-3 DUP		**L488105-8**						
Naphthenic Acids		<1	<1	RPD-NA	mg/L	N/A	33	23-MAR-07
WG575071-4 LCS								
Naphthenic Acids			104		%		55-145	23-MAR-07
WG575071-1 MB								
Naphthenic Acids			<1		mg/L		1	23-MAR-07
WG575071-2 MS		**L488105-8**						
Naphthenic Acids			87		%		55-145	23-MAR-07
NO2-ED	**Water**							
Batch R504655								
WG573223-5 DUP		**L487617-17**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	20-MAR-07
WG573223-8 DUP		**L487472-14**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	20-MAR-07
WG573223-9 DUP		**L487914-1**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	20-MAR-07
WG573223-3 LCS								
Nitrite-N			103		%		90-110	20-MAR-07
WG573223-2 MB								
Nitrite-N			<0.05		mg/L		0.05	20-MAR-07
WG573223-4 MS		**L487617-9**						
Nitrite-N			102		%		88-113	20-MAR-07
WG573223-6 MS		**L487358-6**						
Nitrite-N			103		%		88-113	20-MAR-07
WG573223-7 MS		**L487684-1**						
Nitrite-N			101		%		88-113	20-MAR-07
PAH-ALK-ED	**Water**							
Batch R506290								
WG573207-2 LCS								
Acenaphthene			74		%		49-124	24-MAR-07
Acenaphthylene			75		%		54-105	24-MAR-07
Anthracene			98		%		55-125	24-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ALK-ED	**Water**							
Batch R506290								
WG573207-2 LCS								
Benzo(a)anthracene			108		%		58-129	24-MAR-07
Benzo(a)pyrene			101		%		53-131	24-MAR-07
Benzo(b)fluoranthene			102		%		49-131	24-MAR-07
Benzo(ghi)perylene			98		%		47-137	24-MAR-07
Benzo(k)fluoranthene			100		%		56-129	24-MAR-07
Biphenyl			69		%		54-120	24-MAR-07
C2 sub'd naphthalene			71		%		51-125	24-MAR-07
C3 sub'd naphthalene			82		%		55-129	24-MAR-07
Chrysene			107		%		62-128	24-MAR-07
Dibenzothiophene			95		%		54-121	24-MAR-07
Fluoranthene			111		%		55-129	24-MAR-07
Fluorene			74		%		53-126	24-MAR-07
Indeno(c,d-123)pyrene			102		%		49-135	24-MAR-07
Methyl naphthalene			64		%		47-121	24-MAR-07
Methyl phenanthrene/anthracene			106		%		56-127	24-MAR-07
Naphthalene			61		%		42-119	24-MAR-07
Phenanthrene			99		%		57-128	24-MAR-07
Pyrene			112		%		54-131	24-MAR-07
Dibenzo(a,h)anthracene			97		%		48-134	24-MAR-07
WG573207-1 MB								
Acenaphthylene			<0.01		ug/L		0.01	24-MAR-07
Benzo(ghi)perylene			<0.01		ug/L		0.01	24-MAR-07
Biphenyl			0.01		ug/L		0.01	24-MAR-07
C2 sub'd B(a)A/chrysene			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd B(b&k)F/B(a)P			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd biphenyl			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd dibenzothiophene			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd fluorene			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd naphthalene			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	24-MAR-07
C3 sub'd dibenzothiophene			<0.04		ug/L		0.04	24-MAR-07
C3 sub'd naphthalene			<0.04		ug/L		0.04	24-MAR-07
C3 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	24-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ALK-ED	**Water**							
Batch	**R506290**							
WG573207-1	**MB**							
C4 sub'd dibenzothiophene			<0.04		ug/L		0.04	24-MAR-07
C4 sub'd naphthalene			<0.04		ug/L		0.04	24-MAR-07
C4 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	24-MAR-07
Dibenzothiophene			<0.01		ug/L		0.01	24-MAR-07
Methyl acenaphthene			<0.04		ug/L		0.04	24-MAR-07
Methyl B(a)A/chrysene			<0.04		ug/L		0.04	24-MAR-07
Methyl B(b&k)F/B(a)P			<0.04		ug/L		0.04	24-MAR-07
Methyl biphenyl			<0.04		ug/L		0.04	24-MAR-07
Methyl dibenzothiophene			<0.04		ug/L		0.04	24-MAR-07
Methyl fluoranthene/pyrene			<0.04		ug/L		0.04	24-MAR-07
Methyl fluorene			<0.04		ug/L		0.04	24-MAR-07
Methyl naphthalene			0.01		ug/L		0.01	24-MAR-07
Methyl phenanthrene/anthracene			<0.04		ug/L		0.04	24-MAR-07
PAH-CCME-ED	**Water**							
Batch	**R506289**							
WG573207-2	**LCS**							
Acenaphthene			74		%		49-124	24-MAR-07
Acridine			103		%		56-127	24-MAR-07
Anthracene			98		%		55-125	24-MAR-07
Benzo(a)anthracene			108		%		58-129	24-MAR-07
Benzo(a)pyrene			101		%		53-131	24-MAR-07
Benzo(b)fluoranthene			102		%		49-131	24-MAR-07
Benzo(k)fluoranthene			100		%		56-129	24-MAR-07
Chrysene			107		%		62-128	24-MAR-07
Fluoranthene			111		%		55-129	24-MAR-07
Fluorene			74		%		53-126	24-MAR-07
Indeno(1,2,3-cd)pyrene			102		%		49-135	24-MAR-07
Naphthalene			61		%		42-119	24-MAR-07
Phenanthrene			99		%		57-128	24-MAR-07
Pyrene			112		%		54-131	24-MAR-07
Quinoline			84		%		53-121	24-MAR-07
Dibenzo(a,h)anthracene			97		%		48-134	24-MAR-07
WG573207-1	**MB**							

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-ED	**Water**							
Batch R506289								
WG573207-1 MB								
Acenaphthene			<0.01		ug/L		0.01	24-MAR-07
Acridine			<0.01		ug/L		0.01	24-MAR-07
Anthracene			<0.01		ug/L		0.01	24-MAR-07
Benzo(a)anthracene			<0.01		ug/L		0.01	24-MAR-07
Benzo(a)pyrene			<0.01		ug/L		0.01	24-MAR-07
Benzo(b)fluoranthene			<0.01		ug/L		0.01	24-MAR-07
Benzo(k)fluoranthene			<0.01		ug/L		0.01	24-MAR-07
Chrysene			<0.01		ug/L		0.01	24-MAR-07
Dibenzo(a,h)anthracene			<0.01		ug/L		0.01	24-MAR-07
Fluoranthene			<0.01		ug/L		0.01	24-MAR-07
Fluorene			<0.01		ug/L		0.01	24-MAR-07
Indeno(1,2,3-cd)pyrene			<0.01		ug/L		0.01	24-MAR-07
Naphthalene			0.01		ug/L		0.01	24-MAR-07
Pyrene			<0.01		ug/L		0.01	24-MAR-07
Quinoline			<0.01		ug/L		0.01	24-MAR-07
Phenanthrene			0.02	A	ug/L		0.01	24-MAR-07
PH/EC/ALK-ED	**Water**							
Batch R504905								
WG573616-5 DUP		**L487865-3**						
Alkalinity, Total (as CaCO3)		38	38	J	mg/L	0	20	20-MAR-07
Bicarbonate (HCO3)		47	47	J	mg/L	0	20	20-MAR-07
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	26	20-MAR-07
Conductivity (EC)		1630	1640		uS/cm	0.31	7.1	20-MAR-07
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	26	20-MAR-07
pH		7.8	7.8	J	pH	0.0	0.2	20-MAR-07
WG573616-7 DUP		**L488113-4**						
Alkalinity, Total (as CaCO3)		111	113		mg/L	2.0	6.5	21-MAR-07
Bicarbonate (HCO3)		135	138		mg/L	2.0	26	21-MAR-07
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	26	21-MAR-07
Conductivity (EC)		294	294		uS/cm	0.0	7.1	21-MAR-07
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	26	21-MAR-07
pH		N/A	8.1	J	pH	0.0	0.2	21-MAR-07
WG573616-2 LCS								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R504905								
WG573616-2 LCS								
Conductivity (EC)			98		%		94-106	20-MAR-07
WG573616-3 LCS								
pH			7.0		pH		6.9-7.1	20-MAR-07
WG573616-4 LCS								
Alkalinity, Total (as CaCO3)			98		%		90-110	20-MAR-07
WG573616-1 MB								
Alkalinity, Total (as CaCO3)			<5		mg/L		5	20-MAR-07
Bicarbonate (HCO3)			<5		mg/L		5	20-MAR-07
Carbonate (CO3)			<5		mg/L		5	20-MAR-07
Hydroxide (OH)			<5		mg/L		5	20-MAR-07
PHENOLS-4AAP-WT	**Water**							
Batch R506461								
WG575658-2 CVS								
Phenols (4AAP)			100		%		85-115	26-MAR-07
WG575658-3 DUP		**L487662-1**						
Phenols (4AAP)		<0.001	<0.001	RPD-NA	mg/L	N/A	20	26-MAR-07
WG575658-1 MB								
Phenols (4AAP)			<0.001		mg/L		0.001	26-MAR-07
SI-DIS-ED	**Water**							
Batch R504635								
WG573405-1 MB								
Silicon (Si)-Dissolved			<0.1		mg/L		0.1	20-MAR-07
SULPHIDE-ED	**Water**							
Batch R505055								
WG573697-4 DUP		**L485560-9**						
Sulphide		<0.02	<0.003	RPD-NA	mg/L	N/A	15	21-MAR-07
WG573697-5 DUP		**L486951-1**						
Sulphide		0.045	0.047		mg/L	4.8	15	21-MAR-07
WG573697-7 DUP		**L487352-1**						
Sulphide		<0.003	<0.003	RPD-NA	mg/L	N/A	15	21-MAR-07
WG573697-2 LCS								
Sulphide			87		%		63-116	21-MAR-07
WG573697-3 LCS								
Sulphide			89		%		70-119	21-MAR-07
WG573697-1 MB								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SULPHIDE-ED	**Water**							
Batch R505055								
WG573697-1 MB								
Sulphide			<0.003		mg/L		0.003	21-MAR-07
WG573697-6 MS		**L487107-1**						
Sulphide			55		%		42-140	21-MAR-07
WG573697-8 MS		**L487472-7**						
Sulphide			92		%		42-140	21-MAR-07
WG573697-9 MS		**L486204-1**						
Sulphide			115		%		42-140	21-MAR-07
Batch R505989								
WG575047-5 DUP		**L488105-3**						
Sulphide		<0.003	<0.003	RPD-NA	mg/L	N/A	15	23-MAR-07
WG575047-7 DUP		**L488325-2**						
Sulphide		<0.003	<0.003	RPD-NA	mg/L	N/A	15	23-MAR-07
WG575047-9 DUP		**L487986-10**						
Sulphide		5.49	5.14		mg/L	6.6	15	23-MAR-07
WG575047-2 LCS								
Sulphide			98		%		63-116	23-MAR-07
WG575047-3 LCS								
Sulphide			93		%		70-119	23-MAR-07
WG575047-1 MB								
Sulphide			<0.003		mg/L		0.003	23-MAR-07
WG575047-4 MS		**L487662-2**						
Sulphide			95		%		42-140	23-MAR-07
WG575047-6 MS		**L488105-12**						
Sulphide			45		%		42-140	23-MAR-07
WG575047-8 MS		**L488795-1**						
Sulphide			88		%		42-140	23-MAR-07

ALS Laboratory Group Quality Control Report

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Qualifier:

RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
A	Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB" (result adjusted for method blank) appears in the Analytical Report.
B	Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.
E	Matrix spike recovery may fall outside the acceptance limits due to high sample background.
F	Silver recovery low, likely due to elevated chloride levels in sample.
G	Outlier - No assignable cause for nonconformity has been determined.
J	Duplicate results and limit(s) are expressed in terms of absolute difference.
K	The sample referenced above is of a non-standard matrix type; standard QC acceptance criteria may not be achievable.
L	Low matrix spike recovery due to instability of spiked analyte in the sample matrix.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # 01292

Page 1 of 1

REPORT TO:	Worley Parsons Komex
COMPANY:	Edmonton Office
CONTACT:	
ADDRESS:	Edmonton
PHONE:	1-877-566-4933 FAX: 780-496-1575

REPORT FORMAT / DISTRIBUTION

STANDARD (OTHER) DBF

(PDF) EXCEL CUSTOM FAX

EMAIL 1: david.dillon@worleyparsons.com

EMAIL 2: joao.kupper@worleyparsons.com

SERVICE REQUESTED

- ✓ REGULAR SERVICE (DEFAULT)
- RUSH SERVICE (2-3 DAYS)
- PRIORITY SERVICE (1 DAY or ASAP)
- EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

INVOICE TO:	SAME AS REPORT ? (YES) / NO
COMPANY:	
CONTACT:	
ADDRESS:	
PHONE:	FAX:
Lab Work Order # (lab use only)	L487653

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) →

CLIENT / PROJECT INFORMATION:

JOB #:

PO/AFE: F35772303

Legal Site Description:

QUOTE #:

SAMPLER (Initials):

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Routine Major Ions, Fe, Mn	Silicon (Si) Dissolved	Mercury (Hg) Dissolved	Sulphide	Phenols (4AAP)	Cl in E PAH's	Dissolved Metals	Meth by FTIR	BTEX F1, F2	PAH's & Alkylated PAHs	HAZARDOUS?	HIGHLY CONTAMINATED	NUMBER OF CONTAINERS
	SH07-1805	Mar. 14 07	16:30	H_2O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	SH07-1826-D	Mar 18 07	11 am	H_2O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this from *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
Connie O'Brien	Mar 18, 20:00		
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)

TEMPERATURE SAMPLES RECEIVED IN GOOD CONDITION? YES / NO

(If no provide details)

ANALYTICAL REPORT

WORLEYPARSONS CANADA LTD
ATTN: DAVID DILLON
705, 10240 124 ST
EDMONTON AB T5N 3W6

Reported On: 02-MAY-07 03:12 PM
Revision: 3

Lab Work Order #: **L488563** **Date Received:** **21-MAR-07**

Project P.O. #: F35772803
Job Reference:
Legal Site Desc:
CofC Numbers: 01293

Other Information:

Comments: ADDITIONAL 03-APR-07 08:50

12-Apr-07 Revised Report:
L488563-4 sample ID corrected.

17-Apr-07 Revised Report:
As per client's request, removed PAHs that are in alkylated and CCME packages from alkylated package and removed extractable Fe and Mn.

02-May-07 Additional Report:
L488563-1 and -2 HCO3 and CO3 rechecks confirmed original analytical results. If a sample's pH is greater than 10 (which both of these are), then there will be no HCO3 (only OH, CO3, and total alkalinity.

CHERYLE KEARLEY
General Manager, Fort McMurray

For any questions about this report please contact your Account Manager:

CHERYLE KEARLEY

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-1 1712-Q								
Sampled By: CLIENT on 19-MAR-07 @ 16:00								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
Toluene	<0.0005	RAMB	0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
EthylBenzene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
Xylenes	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F1(C6-C10)	<0.1		0.1	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F1-BTEX	<0.1		0.1	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F2 (>C10-C16)								
F2 (>C10-C16)	0.10		0.05	mg/L	22-MAR-07	22-MAR-07	MKE	R505682
Surr: 2-Bromobenzotrifluoride	98		65-146	%	22-MAR-07	22-MAR-07	MKE	R505682
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Silver (Ag)	<0.0002		0.0002	mg/L		23-MAR-07	CVM	R505935
Aluminum (Al)	0.05		0.01	mg/L		23-MAR-07	CVM	R505935
Arsenic (As)	0.0005		0.0004	mg/L		23-MAR-07	CVM	R505935
Boron (B)	0.007		0.002	mg/L		23-MAR-07	CVM	R505935
Barium (Ba)	0.813		0.0001	mg/L		23-MAR-07	CVM	R505935
Beryllium (Be)	<0.0005		0.0005	mg/L		23-MAR-07	CVM	R505935
Bismuth (Bi)	<0.00005		0.00005	mg/L		23-MAR-07	CVM	R505935
Cadmium (Cd)	0.0002		0.0001	mg/L		23-MAR-07	CVM	R505935
Cobalt (Co)	0.0004		0.0001	mg/L		23-MAR-07	CVM	R505935
Chromium (Cr)	0.0121	RRVAP	0.0004	mg/L		23-MAR-07	CVM	R505935
Copper (Cu)	0.0030		0.0006	mg/L		23-MAR-07	CVM	R505935
Molybdenum (Mo)	0.101		0.0001	mg/L		23-MAR-07	CVM	R505935
Nickel (Ni)	0.0092		0.0001	mg/L		23-MAR-07	CVM	R505935
Lead (Pb)	0.0003		0.0001	mg/L		23-MAR-07	CVM	R505935
Antimony (Sb)	<0.0004		0.0004	mg/L		23-MAR-07	CVM	R505935
Selenium (Se)	0.0024		0.0004	mg/L		23-MAR-07	CVM	R505935
Tin (Sn)	0.0003		0.0002	mg/L		23-MAR-07	CVM	R505935
Strontium (Sr)	2.56		0.0001	mg/L		23-MAR-07	CVM	R505935
Titanium (Ti)	0.0010		0.0003	mg/L		23-MAR-07	CVM	R505935
Thallium (Tl)	<0.00005		0.00005	mg/L		23-MAR-07	CVM	R505935
Uranium (U)	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Vanadium (V)	0.0157	RRVAP	0.0001	mg/L		23-MAR-07	CVM	R505935
Zinc (Zn)	0.003		0.002	mg/L		23-MAR-07	CVM	R505935
Iron (Fe)-Dissolved	<0.005		0.005	mg/L		23-MAR-07	SYF	R506068
Manganese (Mn)-Dissolved	<0.001		0.001	mg/L		23-MAR-07	SYF	R506068
CCME PAHs								
Naphthalene	0.08		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Quinoline	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Acenaphthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Fluorene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Phenanthrene	0.02		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Acridine	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Pyrene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(a)anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Chrysene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(b)fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(k)fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-1 1712-Q								
Sampled By: CLIENT on 19-MAR-07 @ 16:00								
Matrix: WATER								
CCME PAHs								
Benzo(a)pyrene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Surr: Nitrobenzene d5	87		24-132	%	22-MAR-07	25-MAR-07	JR	R506458
Surr: 2-Fluorobiphenyl	99		37-123	%	22-MAR-07	25-MAR-07	JR	R506458
Surr: p-Terphenyl d14	102		50-142	%	22-MAR-07	25-MAR-07	JR	R506458
Mercury (Hg)-Dissolved	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Naphthenic Acids	4		1	mg/L		23-MAR-07	RP	R505937
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Benzo(ghi)perylene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Biphenyl	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd biphenyl	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd fluorene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd naphthalene	0.05	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd naphthalene	<0.04	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd naphthalene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Dibenzothiophene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl acenaphthene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl biphenyl	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl fluorene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl naphthalene	0.09		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl phenanthrene/anthracene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Surr: Nitrobenzene d5	87		24-132	%	22-MAR-07	25-MAR-07	JR	R506459
Surr: 2-Fluorobiphenyl	99		37-123	%	22-MAR-07	25-MAR-07	JR	R506459
Surr: p-Terphenyl d14	102		50-142	%	22-MAR-07	25-MAR-07	JR	R506459
Phenols (4AAP)	0.012		0.001	mg/L	28-MAR-07	28-MAR-07	SF	R507416
Silicon (Si)-Dissolved	2.5		0.1	mg/L		23-MAR-07	SYF	R506068
Sulphide	0.059		0.003	mg/L		23-MAR-07	KMY	R505989
Routine Water: Major Ions, F, Fe & Mn								
Chloride (Cl)	29		1	mg/L		22-MAR-07	CLT	R505302
Fluoride (F)	0.26		0.05	mg/L		22-MAR-07	UM/J	R505599
ICP metals and SO4 for routine water								
Calcium (Ca)	380		0.5	mg/L		24-MAR-07	EOC	R506395
Potassium (K)	97.0		0.5	mg/L		24-MAR-07	EOC	R506395
Magnesium (Mg)	<0.1		0.1	mg/L		24-MAR-07	EOC	R506395
Sodium (Na)	188		1	mg/L		24-MAR-07	EOC	R506395
Sulfate (SO4)	313		0.5	mg/L		24-MAR-07	EOC	R506395
Ion Balance Calculation								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-1 1712-Q								
Sampled By: CLIENT on 19-MAR-07 @ 16:00								
Matrix: WATER								
Routine Water: Major Ions, F, Fe & Mn								
Ion Balance Calculation								
Ion Balance	108			%		26-MAR-07		
TDS (Calculated)	1610			mg/L		26-MAR-07		
Hardness (as CaCO3)	949			mg/L		26-MAR-07		
Nitrate+Nitrite-N	0.1		0.1	mg/L		22-MAR-07	KMY	R506003
Nitrate-N	0.1		0.1	mg/L		22-MAR-07	KMY	R506003
Nitrite-N	<0.05		0.05	mg/L		22-MAR-07	KMY	R506003
pH, Conductivity and Total Alkalinity								
pH	12.1		0.1	pH		22-MAR-07	UM/J	R505599
Conductivity (EC)	4900	RRV	0.2	uS/cm		26-MAR-07	EOC	R506456
Bicarbonate (HCO3)	<5		5	mg/L		22-MAR-07	UM/J	R505599
Carbonate (CO3)	71		5	mg/L		22-MAR-07	UM/J	R505599
Hydroxide (OH)	303		5	mg/L		22-MAR-07	UM/J	R505599
Alkalinity, Total (as CaCO3)	1010		5	mg/L		22-MAR-07	UM/J	R505599
L488563-2 1712-QD								
Sampled By: CLIENT on 19-MAR-07 @ 16:30								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
Toluene	<0.0005	RAMB	0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
EthylBenzene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
Xylenes	<0.0005	RAMB	0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F1(C6-C10)	<0.1		0.1	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F1-BTEX	<0.1		0.1	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F2 (>C10-C16)								
F2 (>C10-C16)	0.19		0.05	mg/L	22-MAR-07	22-MAR-07	MKE	R505682
Surr: 2-Bromobenzotrifluoride	103		65-146	%	22-MAR-07	22-MAR-07	MKE	R505682
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Silver (Ag)	<0.0002		0.0002	mg/L		23-MAR-07	CVM	R505935
Aluminum (Al)	0.05		0.01	mg/L		23-MAR-07	CVM	R505935
Arsenic (As)	0.0004		0.0004	mg/L		23-MAR-07	CVM	R505935
Boron (B)	0.007		0.002	mg/L		23-MAR-07	CVM	R505935
Barium (Ba)	0.817		0.0001	mg/L		23-MAR-07	CVM	R505935
Beryllium (Be)	<0.0005		0.0005	mg/L		23-MAR-07	CVM	R505935
Bismuth (Bi)	<0.00005		0.00005	mg/L		23-MAR-07	CVM	R505935
Cadmium (Cd)	0.0002		0.0001	mg/L		23-MAR-07	CVM	R505935
Cobalt (Co)	0.0004		0.0001	mg/L		23-MAR-07	CVM	R505935
Chromium (Cr)	0.0126	RRVAP	0.0004	mg/L		23-MAR-07	CVM	R505935
Copper (Cu)	0.0024		0.0006	mg/L		23-MAR-07	CVM	R505935
Molybdenum (Mo)	0.0981		0.0001	mg/L		23-MAR-07	CVM	R505935
Nickel (Ni)	0.0085		0.0001	mg/L		23-MAR-07	CVM	R505935
Lead (Pb)	0.0003		0.0001	mg/L		23-MAR-07	CVM	R505935
Antimony (Sb)	0.0004		0.0004	mg/L		23-MAR-07	CVM	R505935
Selenium (Se)	0.0026		0.0004	mg/L		23-MAR-07	CVM	R505935
Tin (Sn)	0.0003		0.0002	mg/L		23-MAR-07	CVM	R505935
Strontium (Sr)	2.56		0.0001	mg/L		23-MAR-07	CVM	R505935
Titanium (Ti)	0.0015		0.0003	mg/L		23-MAR-07	CVM	R505935
Thallium (Tl)	<0.00005		0.00005	mg/L		23-MAR-07	CVM	R505935
Uranium (U)	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Vanadium (V)	0.0161	RRVAP	0.0001	mg/L		23-MAR-07	CVM	R505935

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-2 1712-QD								
Sampled By: CLIENT on 19-MAR-07 @ 16:30								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Zinc (Zn)	0.003		0.002	mg/L		23-MAR-07	CVM	R505935
Iron (Fe)-Dissolved	0.008		0.005	mg/L		23-MAR-07	SYF	R506068
Manganese (Mn)-Dissolved	<0.001		0.001	mg/L		23-MAR-07	SYF	R506068
CCME PAHs								
Naphthalene	0.06		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Quinoline	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Acenaphthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Fluorene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Phenanthrene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Acridine	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Pyrene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(a)anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Chrysene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(b)fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(k)fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(a)pyrene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Surr: Nitrobenzene d5	62		24-132	%	22-MAR-07	25-MAR-07	JR	R506458
Surr: 2-Fluorobiphenyl	74		37-123	%	22-MAR-07	25-MAR-07	JR	R506458
Surr: p-Terphenyl d14	101		50-142	%	22-MAR-07	25-MAR-07	JR	R506458
Mercury (Hg)-Dissolved	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Naphthenic Acids	3		1	mg/L		23-MAR-07	RP	R505937
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Benzo(ghi)perylene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Biphenyl	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd biphenyl	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd fluorene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd naphthalene	0.05	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd naphthalene	<0.04	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd naphthalene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Dibenzothiophene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl acenaphthene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl biphenyl	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl fluorene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-2 1712-QD								
Sampled By: CLIENT on 19-MAR-07 @ 16:30								
Matrix: WATER								
PAHs & Alkylated PAHs								
Methyl naphthalene	0.05		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl phenanthrene/anthracene	<0.04	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Surr: Nitrobenzene d5	62		24-132	%	22-MAR-07	25-MAR-07	JR	R506459
Surr: 2-Fluorobiphenyl	74		37-123	%	22-MAR-07	25-MAR-07	JR	R506459
Surr: p-Terphenyl d14	101		50-142	%	22-MAR-07	25-MAR-07	JR	R506459
Phenols (4AAP)	0.010		0.001	mg/L	28-MAR-07	28-MAR-07	SF	R507416
Silicon (Si)-Dissolved	2.5		0.1	mg/L		23-MAR-07	SYF	R506068
Sulphide	0.075		0.003	mg/L		23-MAR-07	KMY	R505989
Routine Water: Major Ions, F, Fe & Mn								
Chloride (Cl)	29		1	mg/L		22-MAR-07	CLT	R505302
Fluoride (F)	0.27		0.05	mg/L		22-MAR-07	UM/J	R505599
ICP metals and SO4 for routine water								
Calcium (Ca)	372		0.5	mg/L		26-MAR-07	EOC	R506395
Potassium (K)	96.0		0.5	mg/L		26-MAR-07	EOC	R506395
Magnesium (Mg)	1.0		0.1	mg/L		26-MAR-07	EOC	R506395
Sodium (Na)	186		1	mg/L		26-MAR-07	EOC	R506395
Sulfate (SO4)	320		0.5	mg/L		22-MAR-07	EOC	R505665
Ion Balance Calculation								
Ion Balance	111	BL:INT		%		26-MAR-07		
TDS (Calculated)	1570			mg/L		26-MAR-07		
Hardness (as CaCO3)	933			mg/L		26-MAR-07		
Nitrate+Nitrite-N	0.1		0.1	mg/L		22-MAR-07	KMY	R506003
Nitrate-N	0.1		0.1	mg/L		22-MAR-07	KMY	R506003
Nitrite-N	<0.05		0.05	mg/L		22-MAR-07	KMY	R506003
pH, Conductivity and Total Alkalinity								
pH	12.1		0.1	pH		22-MAR-07	UM/J	R505599
Conductivity (EC)	4790	RRV	0.2	uS/cm		26-MAR-07	EOC	R506456
Bicarbonate (HCO3)	<5		5	mg/L		22-MAR-07	UM/J	R505599
Carbonate (CO3)	70		5	mg/L		22-MAR-07	UM/J	R505599
Hydroxide (OH)	282		5	mg/L		22-MAR-07	UM/J	R505599
Alkalinity, Total (as CaCO3)	947		5	mg/L		22-MAR-07	UM/J	R505599
L488563-3 1712-B								
Sampled By: CLIENT on 19-MAR-07 @ 11:45								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
Toluene	<0.0005	RAMB	0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
EthylBenzene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
Xylenes	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F1(C6-C10)	<0.1		0.1	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F1-BTEX	<0.1		0.1	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F2 (>C10-C16)								
F2 (>C10-C16)	0.27		0.05	mg/L	22-MAR-07	22-MAR-07	MKE	R505682
Surr: 2-Bromobenzotrifluoride	104		65-146	%	22-MAR-07	22-MAR-07	MKE	R505682
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Silver (Ag)	<0.0002		0.0002	mg/L		23-MAR-07	CVM	R505935
Aluminum (Al)	0.02		0.01	mg/L		23-MAR-07	CVM	R505935
Arsenic (As)	0.0026		0.0004	mg/L		23-MAR-07	CVM	R505935
Boron (B)	0.229		0.002	mg/L		23-MAR-07	CVM	R505935

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-3 1712-B								
Sampled By: CLIENT on 19-MAR-07 @ 11:45								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Barium (Ba)	0.0927		0.0001	mg/L		23-MAR-07	CVM	R505935
Beryllium (Be)	<0.0005		0.0005	mg/L		23-MAR-07	CVM	R505935
Bismuth (Bi)	<0.00005		0.00005	mg/L		23-MAR-07	CVM	R505935
Cadmium (Cd)	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Cobalt (Co)	0.0004		0.0001	mg/L		23-MAR-07	CVM	R505935
Chromium (Cr)	<0.0004		0.0004	mg/L		23-MAR-07	CVM	R505935
Copper (Cu)	0.0009		0.0006	mg/L		23-MAR-07	CVM	R505935
Molybdenum (Mo)	0.0046		0.0001	mg/L		23-MAR-07	CVM	R505935
Nickel (Ni)	0.0017		0.0001	mg/L		23-MAR-07	CVM	R505935
Lead (Pb)	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Antimony (Sb)	0.0012		0.0004	mg/L		23-MAR-07	CVM	R505935
Selenium (Se)	0.0009		0.0004	mg/L		23-MAR-07	CVM	R505935
Tin (Sn)	0.0004		0.0002	mg/L		23-MAR-07	CVM	R505935
Strontium (Sr)	0.522		0.0001	mg/L		23-MAR-07	CVM	R505935
Titanium (Ti)	0.0023		0.0003	mg/L		23-MAR-07	CVM	R505935
Thallium (Tl)	<0.00005		0.00005	mg/L		23-MAR-07	CVM	R505935
Uranium (U)	0.0033		0.0001	mg/L		23-MAR-07	CVM	R505935
Vanadium (V)	0.0021		0.0001	mg/L		23-MAR-07	CVM	R505935
Zinc (Zn)	<0.002		0.002	mg/L		23-MAR-07	CVM	R505935
Iron (Fe)-Dissolved	0.014		0.005	mg/L		23-MAR-07	SYF	R506068
Manganese (Mn)-Dissolved	0.065		0.001	mg/L		23-MAR-07	SYF	R506068
CCME PAHs								
Naphthalene	0.06		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Quinoline	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Acenaphthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Fluorene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Phenanthrene	0.08	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Anthracene	0.02		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Acridine	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Pyrene	0.07		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(a)anthracene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Chrysene	0.08		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(b)fluoranthene	0.03		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(k)fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(a)pyrene	0.02		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Indeno(1,2,3-cd)pyrene	0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Surr: Nitrobenzene d5	86		24-132	%	22-MAR-07	25-MAR-07	JR	R506458
Surr: 2-Fluorobiphenyl	84		37-123	%	22-MAR-07	25-MAR-07	JR	R506458
Surr: p-Terphenyl d14	99		50-142	%	22-MAR-07	25-MAR-07	JR	R506458
Mercury (Hg)-Dissolved	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Naphthenic Acids	3		1	mg/L		23-MAR-07	RP	R505937
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Benzo(ghi)perylene	0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Biphenyl	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd B(a)A/chrysene	0.20		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd B(b&k)F/B(a)P	0.06		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd biphenyl	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-3 1712-B								
Sampled By: CLIENT on 19-MAR-07 @ 11:45								
Matrix: WATER								
PAHs & Alkylated PAHs								
C2 sub'd dibenzothiophene	0.24		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd fluorene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd naphthalene	0.05	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd phenanthrene/anth.	0.44	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd dibenzothiophene	0.66		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd naphthalene	0.05	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd phenanthrene/anth.	0.41		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd dibenzothiophene	0.49		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd naphthalene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd phenanthrene/anth.	0.31		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Dibenzothiophene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl B(a)A/chrysene	0.13		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl B(b&k)F/B(a)P	0.09		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl acenaphthene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl biphenyl	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl dibenzothiophene	0.09		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl fluoranthene/pyrene	0.14		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl fluorene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl naphthalene	0.04		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl phenanthrene/anthracene	0.43	RAMB	0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Surr: Nitrobenzene d5	86		24-132	%	22-MAR-07	25-MAR-07	JR	R506459
Surr: 2-Fluorobiphenyl	84		37-123	%	22-MAR-07	25-MAR-07	JR	R506459
Surr: p-Terphenyl d14	99		50-142	%	22-MAR-07	25-MAR-07	JR	R506459
Phenols (4AAP)	<0.001		0.001	mg/L	28-MAR-07	28-MAR-07	SF	R507416
Silicon (Si)-Dissolved	9.9		0.1	mg/L		23-MAR-07	SYF	R506068
Sulphide	0.063		0.003	mg/L		23-MAR-07	KMY	R505989
Routine Water: Major Ions, F, Fe & Mn								
Chloride (Cl)	4		1	mg/L		22-MAR-07	CLT	R505302
Fluoride (F)	0.82		0.05	mg/L		22-MAR-07	UM/J	R505599
ICP metals and SO4 for routine water								
Calcium (Ca)	65.1		0.5	mg/L		22-MAR-07	EOC	R505665
Potassium (K)	5.3		0.5	mg/L		22-MAR-07	EOC	R505665
Magnesium (Mg)	20.7		0.1	mg/L		22-MAR-07	EOC	R505665
Sodium (Na)	90		1	mg/L		22-MAR-07	EOC	R505665
Sulfate (SO4)	31.6		0.5	mg/L		22-MAR-07	EOC	R505665
Ion Balance Calculation								
Ion Balance	106			%		23-MAR-07		
TDS (Calculated)	454			mg/L		23-MAR-07		
Hardness (as CaCO3)	248			mg/L		23-MAR-07		
Nitrate+Nitrite-N	0.1		0.1	mg/L		22-MAR-07	KMY	R506003
Nitrate-N	0.1		0.1	mg/L		22-MAR-07	KMY	R506003
Nitrite-N	<0.05		0.05	mg/L		22-MAR-07	KMY	R506003
pH, Conductivity and Total Alkalinity								
pH	8.4		0.1	pH		22-MAR-07	UM/J	R505599
Conductivity (EC)	728		0.2	uS/cm		22-MAR-07	UM/J	R505599
Bicarbonate (HCO3)	470		5	mg/L		22-MAR-07	UM/J	R505599
Carbonate (CO3)	<5		5	mg/L		22-MAR-07	UM/J	R505599
Hydroxide (OH)	<5		5	mg/L		22-MAR-07	UM/J	R505599
Alkalinity, Total (as CaCO3)	393		5	mg/L		22-MAR-07	UM/J	R505599

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-4 1721								
Sampled By: CLIENT on 19-MAR-07 @ 16:00								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
Toluene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
EthylBenzene	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
Xylenes	<0.0005		0.0005	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F1(C6-C10)	<0.1		0.1	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F1-BTEX	<0.1		0.1	mg/L	22-MAR-07	22-MAR-07	DCD	R505925
F2 (>C10-C16)								
F2 (>C10-C16)	<0.05		0.05	mg/L	22-MAR-07	22-MAR-07	MKE	R505682
Surr: 2-Bromobenzotrifluoride	111		65-146	%	22-MAR-07	22-MAR-07	MKE	R505682
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Silver (Ag)	<0.0002		0.0002	mg/L		23-MAR-07	CVM	R505935
Aluminum (Al)	0.07		0.01	mg/L		23-MAR-07	CVM	R505935
Arsenic (As)	<0.0004		0.0004	mg/L		23-MAR-07	CVM	R505935
Boron (B)	0.040		0.002	mg/L		23-MAR-07	CVM	R505935
Barium (Ba)	0.109		0.0001	mg/L		23-MAR-07	CVM	R505935
Beryllium (Be)	<0.0005		0.0005	mg/L		23-MAR-07	CVM	R505935
Bismuth (Bi)	<0.00005		0.00005	mg/L		23-MAR-07	CVM	R505935
Cadmium (Cd)	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Cobalt (Co)	0.0009		0.0001	mg/L		23-MAR-07	CVM	R505935
Chromium (Cr)	<0.005		0.005	mg/L		23-MAR-07	SYF	R506068
Copper (Cu)	0.0016		0.0006	mg/L		23-MAR-07	CVM	R505935
Molybdenum (Mo)	0.0002		0.0001	mg/L		23-MAR-07	CVM	R505935
Nickel (Ni)	0.0024		0.0001	mg/L		23-MAR-07	CVM	R505935
Lead (Pb)	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Antimony (Sb)	0.0005		0.0004	mg/L		23-MAR-07	CVM	R505935
Selenium (Se)	<0.0004		0.0004	mg/L		23-MAR-07	CVM	R505935
Tin (Sn)	0.0003		0.0002	mg/L		23-MAR-07	CVM	R505935
Strontium (Sr)	0.221		0.0001	mg/L		23-MAR-07	CVM	R505935
Titanium (Ti)	0.0045		0.0003	mg/L		23-MAR-07	CVM	R505935
Thallium (Tl)	<0.00005		0.00005	mg/L		23-MAR-07	CVM	R505935
Uranium (U)	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Vanadium (V)	0.003		0.001	mg/L		23-MAR-07	SYF	R506068
Zinc (Zn)	0.002		0.002	mg/L		23-MAR-07	CVM	R505935
Iron (Fe)-Dissolved	7.42		0.005	mg/L		23-MAR-07	SYF	R506068
Manganese (Mn)-Dissolved	0.204		0.001	mg/L		23-MAR-07	SYF	R506068
CCME PAHs								
Naphthalene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Quinoline	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Acenaphthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Fluorene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Phenanthrene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Acridine	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Pyrene	<0.01	RAMB	0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(a)anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Chrysene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(b)fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Benzo(k)fluoranthene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-4 1721								
Sampled By: CLIENT on 19-MAR-07 @ 16:00								
Matrix: WATER								
CCME PAHs								
Benzo(a)pyrene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506458
Surr: Nitrobenzene d5	82		24-132	%	22-MAR-07	25-MAR-07	JR	R506458
Surr: 2-Fluorobiphenyl	83		37-123	%	22-MAR-07	25-MAR-07	JR	R506458
Surr: p-Terphenyl d14	91		50-142	%	22-MAR-07	25-MAR-07	JR	R506458
Mercury (Hg)-Dissolved	<0.0001		0.0001	mg/L		23-MAR-07	CVM	R505935
Naphthenic Acids	<1		1	mg/L		23-MAR-07	RP	R505937
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Benzo(ghi)perylene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Biphenyl	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd biphenyl	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd fluorene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd naphthalene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd naphthalene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd naphthalene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Dibenzothiophene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl acenaphthene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl biphenyl	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl dibenzothiophene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl fluorene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl naphthalene	<0.01		0.01	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Methyl phenanthrene/anthracene	<0.04		0.04	ug/L	22-MAR-07	25-MAR-07	JR	R506459
Surr: Nitrobenzene d5	82		24-132	%	22-MAR-07	25-MAR-07	JR	R506459
Surr: 2-Fluorobiphenyl	83		37-123	%	22-MAR-07	25-MAR-07	JR	R506459
Surr: p-Terphenyl d14	91		50-142	%	22-MAR-07	25-MAR-07	JR	R506459
Phenols (4AAP)	<0.001		0.001	mg/L	28-MAR-07	28-MAR-07	SF	R507416
Silicon (Si)-Dissolved	6.5		0.1	mg/L		23-MAR-07	SYF	R506068
Sulphide	0.010		0.003	mg/L		23-MAR-07	KMY	R505989
Routine Water: Major Ions, F, Fe & Mn								
Chloride (Cl)	6		1	mg/L		22-MAR-07	CLT	R505302
Fluoride (F)	0.18		0.05	mg/L		22-MAR-07	UM/J	R505599
ICP metals and SO4 for routine water								
Calcium (Ca)	102		0.5	mg/L		22-MAR-07	EOC	R505665
Potassium (K)	4.5		0.5	mg/L		22-MAR-07	EOC	R505665
Magnesium (Mg)	28.4		0.1	mg/L		22-MAR-07	EOC	R505665
Sodium (Na)	12		1	mg/L		22-MAR-07	EOC	R505665
Sulfate (SO4)	5.2		0.5	mg/L		22-MAR-07	EOC	R505665
Ion Balance Calculation								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L488563-4 1721								
Sampled By: CLIENT on 19-MAR-07 @ 16:00								
Matrix: WATER								
Routine Water: Major Ions, F, Fe & Mn								
Ion Balance Calculation								
Ion Balance	106			%		23-MAR-07		
TDS (Calculated)	378			mg/L		23-MAR-07		
Hardness (as CaCO3)	372			mg/L		23-MAR-07		
Nitrate+Nitrite-N	<0.1		0.1	mg/L		22-MAR-07	KMY	R506003
Nitrate-N	<0.1		0.1	mg/L		22-MAR-07	KMY	R506003
Nitrite-N	<0.05		0.05	mg/L		22-MAR-07	KMY	R506003
pH, Conductivity and Total Alkalinity								
pH	7.7		0.1	pH		22-MAR-07	UM/J	R505599
Conductivity (EC)	652		0.2	uS/cm		22-MAR-07	UM/J	R505599
Bicarbonate (HCO3)	448		5	mg/L		22-MAR-07	UM/J	R505599
Carbonate (CO3)	<5		5	mg/L		22-MAR-07	UM/J	R505599
Hydroxide (OH)	<5		5	mg/L		22-MAR-07	UM/J	R505599
Alkalinity, Total (as CaCO3)	367		5	mg/L		22-MAR-07	UM/J	R505599

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

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
RAMB	Result Adjusted For Method Blank
RRV	Reported Result Verified By Repeat Analysis
RRVAP	Reported Result Verified by Alternate Process

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
BTX,F1-ED	Water	BTEX and F1 (C6-C10)	EPA 5030	EPA 5030/8015&8260-P&T GC-MS & FID
CL-ED	Water	Chloride (Cl)		APHA 4500 Cl E-Colorimetry
ETL-ROUTINE-ICP-ED	Water	ICP metals and SO4 for routine water		APHA 3120 B-ICP-OES
F-ED	Water	Fluoride (F)		APHA 4500 F-C-Electrode
F2-ED	Water	F2 (>C10-C16)		EPA 3510/8000-GC-FID
FE-DIS-ED	Water	Iron (Fe)-Dissolved		EPA 200.7
FE-EXT-ROU-ED	Water	Iron (Fe)-Extractable		APHA 3120 B-ICP-OES
HG-DIS-LOW-ED	Water	Mercury (Hg)-Dissolved		EPA 6020
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET1-DIS-LOW-ED	Water	Dissolved Trace Metals (Low Level)		EPA 6020
MN-DIS-ED	Water	Manganese (Mn)-Dissolved		EPA 200.7
MN-EXT-ROU-ED	Water	Manganese (Mn)-Extractable		APHA 3120 B-ICP-OES
N2N3-ED	Water	Nitrate+Nitrite-N		APHA 4500 NO3H-Colorimetry
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR,Syncrude,1994
NO2-ED	Water	Nitrite-N		APHA 4500 NO2B-Colorimetry
NO3-ED	Water	Nitrate-N		APHA 4500 NO3H-Colorimetry
PAH-ALK-ED	Water	PAHs & Alkylated PAHs		EPA 3510/8270-GC/MS

NOTE: The Alkylated PAH results are determined via a semi-quantitative method to be used for research purposes only. This method is not necessarily intended to address regulatory requirements.

PAH-CCME-ED	Water	CCME PAHs		EPA 3510/8270-GC/MS
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity		APHA 4500-H, 2510, 2320
PHENOLS-4AAP-WT	Water	Phenols (4AAP)		APHA 5530
SI-DIS-ED	Water	Silicon (Si)-Dissolved		EPA 200.7
SULPHIDE-ED	Water	Sulphide		APHA 4500 -S E-Auto-Colorimetry

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

Chain of Custody numbers:

01293

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

Reference Information

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA	FM	ALS LABORATORY GROUP - FORT MCMURRAY, ALBERTA, CANADA
WT	ALS LABORATORY GROUP - WATERLOO (SENTINEL), ONTARIO, CAN		

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

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

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

ALS Laboratory Group Quality Control Report

Workorder: L488563 Report Date: 02-MAY-07

Client: WORLEYPARSONS CANADA LTD
705, 10240 124 ST
EDMONTON AB T5N 3W6

Contact: DAVID DILLON

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Water**							
Batch R505925								
WG574187-1 DUP		**L488798-1**						
Benzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	22-MAR-07
EthylBenzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	24	22-MAR-07
Toluene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	32	22-MAR-07
F1(C6-C10)		<0.1	<0.1	RPD-NA	mg/L	N/A	17	22-MAR-07
Xylenes		<0.0005	<0.0005	RPD-NA	mg/L	N/A	26	22-MAR-07
WG575073-2 LCS								
Benzene			101		%		45-106	22-MAR-07
EthylBenzene			88		%		47-108	22-MAR-07
Toluene			95		%		46-111	22-MAR-07
F1(C6-C10)			98		%		35-154	22-MAR-07
Xylenes			87		%		45-109	22-MAR-07
WG575073-1 MB								
Benzene			<0.0005		mg/L		0.0005	22-MAR-07
EthylBenzene			<0.0005		mg/L		0.0005	22-MAR-07
Toluene			<0.0005		mg/L		0.0005	22-MAR-07
F1(C6-C10)			<0.1		mg/L		0.1	22-MAR-07
Xylenes			<0.0005		mg/L		0.0005	22-MAR-07
WG574187-2 MS		**L488563-1**						
Benzene			84		%		35-109	22-MAR-07
EthylBenzene			75		%		45-103	22-MAR-07
Toluene			76		%		44-107	22-MAR-07
Xylenes			75		%		45-104	22-MAR-07
WG574187-3 MS		**L488563-1**						
F1(C6-C10)			103		%		33-158	22-MAR-07
CL-ED	**Water**							
Batch R505302								
WG574271-10 DUP		**L488798-7**						
Chloride (Cl)		6	6	J	mg/L	0	4	22-MAR-07
WG574271-7 DUP		**L488328-1**						
Chloride (Cl)		5	5	J	mg/L	0	4	22-MAR-07
WG574271-8 DUP		**L488726-2**						
Chloride (Cl)		10	10	J	mg/L	0	4	22-MAR-07
WG574271-2 LCS								
Chloride (Cl)			97		%		94-109	22-MAR-07
WG574271-3 LCS								

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-ED	**Water**							
Batch R505302								
WG574271-3 LCS								
Chloride (Cl)			98		%		93-113	22-MAR-07
WG574271-1 MB								
Chloride (Cl)			<1		mg/L		1	22-MAR-07
WG574271-11 MS		**L488798-7**						
Chloride (Cl)			100		%		87-117	22-MAR-07
WG574271-9 MS		**L488795-1**						
Chloride (Cl)			97		%		87-117	22-MAR-07
ETL-ROUTINE-ICP-ED	**Water**							
Batch R505665								
WG574473-2 CRM		**ION-915_WATER**						
Calcium (Ca)			104		%		96-116	22-MAR-07
Magnesium (Mg)			101		%		96-115	22-MAR-07
Sodium (Na)			117		%		95-118	22-MAR-07
Sulfate (SO4)			113		%		87-118	22-MAR-07
Potassium (K)			142	G	%		88-126	22-MAR-07
WG574473-3 DUP		**L488563-4**						
Calcium (Ca)		102	102		mg/L	0.47	14	22-MAR-07
Magnesium (Mg)		28.4	28.4		mg/L	0.20	10	22-MAR-07
Potassium (K)		4.5	4.2	J	mg/L	0.3	2	22-MAR-07
Sodium (Na)		12	11		mg/L	4.0	10	22-MAR-07
Sulfate (SO4)		5.2	5.9	G	mg/L	11	10	22-MAR-07
WG574473-5 DUP		**L488619-9**						
Calcium (Ca)		65.5	65.7		mg/L	0.29	14	22-MAR-07
Magnesium (Mg)		19.5	19.6		mg/L	0.51	10	22-MAR-07
Potassium (K)		8.5	8.3		mg/L	2.2	10	22-MAR-07
Sodium (Na)		140	139		mg/L	0.92	10	22-MAR-07
Sulfate (SO4)		62.7	62.8		mg/L	0.12	10	22-MAR-07
WG574473-7 DUP		**L488798-7**						
Calcium (Ca)		391	396		mg/L	1.5	14	22-MAR-07
Magnesium (Mg)		102	102		mg/L	0.26	10	22-MAR-07
Potassium (K)		8.9	8.9		mg/L	0.84	10	22-MAR-07
Sodium (Na)		273	275		mg/L	0.56	10	22-MAR-07
Sulfate (SO4)		1440	1480		mg/L	2.9	10	22-MAR-07
WG574473-9 LCS								

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ETL-ROUTINE-ICP-ED	**Water**							
Batch R505665								
WG574473-9 LCS								
Calcium (Ca)			98		%		63-138	22-MAR-07
Magnesium (Mg)			102		%		63-138	22-MAR-07
Potassium (K)			95		%		63-138	22-MAR-07
Sodium (Na)			99		%		63-138	22-MAR-07
WG574473-1 MB								
Calcium (Ca)			<0.5		mg/L		2.5	22-MAR-07
Magnesium (Mg)			<0.1		mg/L		0.5	22-MAR-07
Potassium (K)			<0.5		mg/L		2.5	22-MAR-07
Sodium (Na)			<1		mg/L		5	22-MAR-07
Sulfate (SO4)			0.7		mg/L		2.5	22-MAR-07
WG574473-4 MS		**L488563-4**						
Calcium (Ca)			107		%		81-119	22-MAR-07
Magnesium (Mg)			107		%		86-111	22-MAR-07
Potassium (K)			99		%		83-115	22-MAR-07
Sodium (Na)			99		%		81-116	22-MAR-07
Sulfate (SO4)			102		%		72-129	22-MAR-07
WG574473-6 MS		**L488619-9**						
Calcium (Ca)			108		%		81-119	22-MAR-07
Magnesium (Mg)			108		%		86-111	22-MAR-07
Potassium (K)			100		%		83-115	22-MAR-07
Sodium (Na)			101		%		81-116	22-MAR-07
Sulfate (SO4)			103		%		72-129	22-MAR-07
WG574473-8 MS		**L488798-7**						
Calcium (Ca)			89		%		81-119	22-MAR-07
Magnesium (Mg)			100		%		86-111	22-MAR-07
Potassium (K)			98		%		83-115	22-MAR-07
Sodium (Na)			94		%		81-116	22-MAR-07
Sulfate (SO4)			84		%		72-129	22-MAR-07
Batch R506395								
WG575647-2 CRM		**ION-915_WATER**						
Calcium (Ca)			107		%		96-116	24-MAR-07
Magnesium (Mg)			103		%		96-115	24-MAR-07
Potassium (K)			123		%		88-126	24-MAR-07
Sodium (Na)			104		%		95-118	24-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ETL-ROUTINE-ICP-ED	**Water**							
Batch R506395								
WG575647-2 CRM		**ION-915_WATER**						
Sulfate (SO4)			104		%		87-118	24-MAR-07
WG575647-1 MB								
Calcium (Ca)			<0.5		mg/L		2.5	24-MAR-07
Magnesium (Mg)			<0.1		mg/L		0.5	24-MAR-07
Potassium (K)			<0.5		mg/L		2.5	24-MAR-07
Sodium (Na)			<1		mg/L		5	24-MAR-07
Sulfate (SO4)			<0.5		mg/L		2.5	24-MAR-07
F-ED	**Water**							
Batch R505599								
WG574660-5 DUP		**L488563-4**						
Fluoride (F)		0.18	0.18	J	mg/L	0.00	0.2	22-MAR-07
WG574660-6 DUP		**L488982-2**						
Fluoride (F)		0.09	0.09	J	mg/L	0.00	0.2	22-MAR-07
WG574660-4 LCS								
Fluoride (F)			97		%		89-114	22-MAR-07
WG574660-1 MB								
Fluoride (F)			<0.05		mg/L		0.05	22-MAR-07
F2-ED	**Water**							
Batch R505682								
WG574822-3 DUP		**L488798-3**						
F2 (>C10-C16)		<0.05	<0.05	RPD-NA	mg/L	N/A	46	22-MAR-07
WG574822-2 LCS								
F2 (>C10-C16)			107		%		38-152	22-MAR-07
WG574822-1 MB								
F2 (>C10-C16)			<0.05		mg/L		0.05	22-MAR-07
FE-DIS-ED	**Water**							
Batch R506068								
WG574831-3 DUP		**L488620-1**						
Iron (Fe)-Dissolved		0.938	0.921		mg/L	1.9	26	23-MAR-07
WG574831-5 DUP		**L489016-3**						
Iron (Fe)-Dissolved		0.257	0.264		mg/L	2.3	26	23-MAR-07
WG574831-7 DUP		**L489247-6**						
Iron (Fe)-Dissolved		0.007	0.007	J	mg/L	0.000	0.02	23-MAR-07
WG574831-1 MB								
Iron (Fe)-Dissolved			<0.005		mg/L		0.005	23-MAR-07
WG574831-4 MS		**L488620-1**						

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FE-DIS-ED	**Water**							
Batch R506068								
WG574831-4 MS		**L488620-1**						
Iron (Fe)-Dissolved			95		%		63-138	23-MAR-07
WG574831-6 MS		**L489016-3**						
Iron (Fe)-Dissolved			94		%		63-138	23-MAR-07
WG574831-8 MS		**L489247-6**						
Iron (Fe)-Dissolved			97		%		63-138	23-MAR-07
HG-DIS-LOW-ED	**Water**							
Batch R505935								
WG574873-5 DUP		**L488105-12**						
Mercury (Hg)-Dissolved		<0.0001	<0.0001	RPD-NA	mg/L	N/A	26	23-MAR-07
WG574873-1 MB								
Mercury (Hg)-Dissolved			<0.0001		mg/L		0.0005	23-MAR-07
WG574873-6 MS		**L488105-12**						
Mercury (Hg)-Dissolved			100		%		68-118	23-MAR-07
WG574873-8 MS		**L488798-6**						
Mercury (Hg)-Dissolved			105		%		68-118	29-MAR-07
MET1-DIS-LOW-ED	**Water**							
Batch R505935								
WG574873-2 CRM		**1643E_WATER**						
Aluminum (Al)			113		%		90-122	23-MAR-07
Antimony (Sb)			99		%		86-108	23-MAR-07
Arsenic (As)			98		%		84-105	23-MAR-07
Barium (Ba)			99		%		88-109	23-MAR-07
Beryllium (Be)			103		%		77-110	23-MAR-07
Bismuth (Bi)			108		%		84-115	23-MAR-07
Boron (B)			104		%		80-116	23-MAR-07
Cadmium (Cd)			103		%		87-109	23-MAR-07
Chromium (Cr)			100		%		83-118	23-MAR-07
Cobalt (Co)			103		%		90-110	23-MAR-07
Copper (Cu)			101		%		89-112	23-MAR-07
Lead (Pb)			103		%		89-110	23-MAR-07
Molybdenum (Mo)			101		%		88-111	23-MAR-07
Nickel (Ni)			101		%		88-110	23-MAR-07
Selenium (Se)			97		%		76-112	23-MAR-07
Strontium (Sr)			103		%		87-109	23-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R505935								
WG574873-2 CRM		**1643E_WATER**						
Vanadium (V)			98		%		87-109	23-MAR-07
Zinc (Zn)			105		%		65-133	23-MAR-07
WG574873-3 DUP		**L487848-1**						
Aluminum (Al)		0.03	0.05	J	mg/L	0.02	0.04	23-MAR-07
Antimony (Sb)		0.0006	0.0006	J	mg/L	0.0000	0.0016	23-MAR-07
Arsenic (As)		0.0005	0.0006	J	mg/L	0.0001	0.0016	23-MAR-07
Barium (Ba)		0.481	0.479		mg/L	0.47	9.8	23-MAR-07
Beryllium (Be)		<0.0005	<0.0005	RPD-NA	mg/L	N/A	10	23-MAR-07
Bismuth (Bi)		<0.00005	<0.00005	RPD-NA	mg/L	N/A	26	23-MAR-07
Boron (B)		0.047	0.047		mg/L	1.3	10	23-MAR-07
Cadmium (Cd)		<0.0001	<0.0001	RPD-NA	mg/L	N/A	12	23-MAR-07
Chromium (Cr)		<0.0004	0.0008	G	mg/L	N/A	16	23-MAR-07
Cobalt (Co)		0.0006	0.0006	J	mg/L	0.0000	0.0004	23-MAR-07
Copper (Cu)		0.0014	0.0010	J	mg/L	0.0004	0.0024	23-MAR-07
Lead (Pb)		<0.0001	<0.0001	RPD-NA	mg/L	N/A	10	23-MAR-07
Molybdenum (Mo)		0.0255	0.0254		mg/L	0.64	9.7	23-MAR-07
Nickel (Ni)		0.0178	0.0175		mg/L	2.0	12	23-MAR-07
Phosphorus (P)		0.01	<0.01	RPD-NA	mg/L	N/A	10	23-MAR-07
Selenium (Se)		0.0005	0.0054		mg/L	2.3	15	23-MAR-07
Silver (Ag)		<0.0002	<0.0002	RPD-NA	mg/L	N/A	26	23-MAR-07
Strontium (Sr)		0.577	0.568		mg/L	1.6	6.5	23-MAR-07
Thallium (Tl)		<0.00005	<0.00005	RPD-NA	mg/L	N/A	26	23-MAR-07
Tin (Sn)		<0.0002	<0.0002	RPD-NA	mg/L	N/A	10	23-MAR-07
Titanium (Ti)		0.0010	0.0009	J	mg/L	0.0002	0.0012	23-MAR-07
Uranium (U)		0.0035	0.0035		mg/L	0.86	10	23-MAR-07
Vanadium (V)		0.0005	0.0007	J	mg/L	0.0002	0.0004	23-MAR-07
Zinc (Zn)		0.075	0.074		mg/L	1.7	14	23-MAR-07
WG574873-5 DUP		**L488105-12**						
Aluminum (Al)		<0.01	<0.01	RPD-NA	mg/L	N/A	14	23-MAR-07
Antimony (Sb)		0.0005	0.0005	J	mg/L	0.0000	0.0016	23-MAR-07
Arsenic (As)		<0.0004	<0.0004	RPD-NA	mg/L	N/A	10	23-MAR-07
Barium (Ba)		0.171	0.169		mg/L	1.1	9.8	23-MAR-07
Beryllium (Be)		<0.0005	<0.0005	RPD-NA	mg/L	N/A	10	23-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R505935								
WG574873-5 DUP		**L488105-12**						
Bismuth (Bi)		<0.00005	<0.00005	RPD-NA	mg/L	N/A	26	23-MAR-07
Boron (B)		0.478	0.479		mg/L	0.26	10	23-MAR-07
Cadmium (Cd)		<0.0001	<0.0001	RPD-NA	mg/L	N/A	12	23-MAR-07
Chromium (Cr)		<0.0004	<0.0004	RPD-NA	mg/L	N/A	16	23-MAR-07
Cobalt (Co)		0.0002	0.0002	J	mg/L	0.0000	0.0004	23-MAR-07
Copper (Cu)		0.0230	0.0228		mg/L	0.76	10	23-MAR-07
Lead (Pb)		0.0209	0.0209		mg/L	0.19	10	23-MAR-07
Molybdenum (Mo)		0.0031	0.0031		mg/L	0.65	9.7	23-MAR-07
Nickel (Ni)		0.0008	0.0007	J	mg/L	0.0000	0.0004	23-MAR-07
Phosphorus (P)		0.48	0.47		mg/L	1.1	10	23-MAR-07
Selenium (Se)		<0.0004	<0.0004	RPD-NA	mg/L	N/A	15	23-MAR-07
Silver (Ag)		<0.0002	<0.0002	RPD-NA	mg/L	N/A	26	23-MAR-07
Strontium (Sr)		0.422	0.430		mg/L	1.8	6.5	23-MAR-07
Thallium (Tl)		<0.00005	<0.00005	RPD-NA	mg/L	N/A	26	23-MAR-07
Tin (Sn)		0.0004	0.0004	J	mg/L	0.0000	0.0008	23-MAR-07
Titanium (Ti)		0.0029	0.0027	J	mg/L	0.0002	0.0012	23-MAR-07
Uranium (U)		<0.0001	<0.0001	RPD-NA	mg/L	N/A	10	23-MAR-07
Vanadium (V)		<0.0001	<0.0001	RPD-NA	mg/L	N/A	23	23-MAR-07
Zinc (Zn)		0.017	0.017	J	mg/L	0.000	0.008	23-MAR-07
WG574873-1 MB								
Aluminum (Al)			<0.01		mg/L		0.05	23-MAR-07
Antimony (Sb)			<0.0004		mg/L		0.002	23-MAR-07
Arsenic (As)			<0.0004		mg/L		0.002	23-MAR-07
Barium (Ba)			<0.0001		mg/L		0.0005	23-MAR-07
Beryllium (Be)			<0.0005		mg/L		0.0025	23-MAR-07
Bismuth (Bi)			<0.00005		mg/L		0.00025	23-MAR-07
Boron (B)			<0.002		mg/L		0.01	23-MAR-07
Cadmium (Cd)			<0.0001		mg/L		0.0005	23-MAR-07
Chromium (Cr)			<0.0004		mg/L		0.002	23-MAR-07
Cobalt (Co)			<0.0001		mg/L		0.0005	23-MAR-07
Copper (Cu)			<0.0006		mg/L		0.003	23-MAR-07
Lead (Pb)			<0.0001		mg/L		0.0005	23-MAR-07
Molybdenum (Mo)			<0.0001		mg/L		0.0005	23-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R505935								
WG574873-1 MB								
Nickel (Ni)			0.0001		mg/L		0.0005	23-MAR-07
Phosphorus (P)			0.01		mg/L		0.05	23-MAR-07
Selenium (Se)			<0.0004		mg/L		0.002	23-MAR-07
Silver (Ag)			<0.0002		mg/L		0.001	23-MAR-07
Strontium (Sr)			0.0003		mg/L		0.0005	23-MAR-07
Thallium (Tl)			<0.00005		mg/L		0.00025	23-MAR-07
Tin (Sn)			<0.0002		mg/L		0.001	23-MAR-07
Titanium (Ti)			<0.0003		mg/L		0.0015	23-MAR-07
Uranium (U)			<0.0001		mg/L		0.0005	23-MAR-07
Vanadium (V)			<0.0001		mg/L		0.0005	23-MAR-07
Zinc (Zn)			0.002		mg/L		0.01	23-MAR-07
WG574873-4 MS		**L487848-1**						
Aluminum (Al)			101		%		79-120	23-MAR-07
Antimony (Sb)			102		%		85-116	23-MAR-07
Arsenic (As)			103		%		89-109	23-MAR-07
Barium (Ba)			107		%		78-116	23-MAR-07
Beryllium (Be)			99		%		76-125	23-MAR-07
Bismuth (Bi)			97		%		69-125	23-MAR-07
Boron (B)			99		%		75-121	23-MAR-07
Cadmium (Cd)			103		%		86-112	23-MAR-07
Chromium (Cr)			98		%		80-113	23-MAR-07
Cobalt (Co)			106		%		82-109	23-MAR-07
Copper (Cu)			103		%		80-108	23-MAR-07
Lead (Pb)			103		%		83-116	23-MAR-07
Molybdenum (Mo)			105		%		81-116	23-MAR-07
Nickel (Ni)			105		%		80-108	23-MAR-07
Phosphorus (P)			103		%		81-119	23-MAR-07
Selenium (Se)			106		%		82-127	23-MAR-07
Silver (Ag)			68		%		22-143	23-MAR-07
Strontium (Sr)			112	E	%		73-121	23-MAR-07
Thallium (Tl)			106		%		84-118	23-MAR-07
Tin (Sn)			105		%		85-117	23-MAR-07
Titanium (Ti)			101		%		88-110	23-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R505935								
WG574873-4 MS		**L487848-1**						
Uranium (U)			107		%		81-120	23-MAR-07
Vanadium (V)			100		%		84-111	23-MAR-07
Zinc (Zn)			109		%		74-121	23-MAR-07
WG574873-6 MS		**L488105-12**						
Aluminum (Al)			104		%		79-120	23-MAR-07
Antimony (Sb)			99		%		85-116	23-MAR-07
Arsenic (As)			104		%		89-109	23-MAR-07
Barium (Ba)			99		%		78-116	23-MAR-07
Beryllium (Be)			98		%		76-125	23-MAR-07
Bismuth (Bi)			104		%		69-125	23-MAR-07
Boron (B)			102		%		75-121	23-MAR-07
Cadmium (Cd)			104		%		86-112	23-MAR-07
Chromium (Cr)			100		%		80-113	23-MAR-07
Cobalt (Co)			104		%		82-109	23-MAR-07
Copper (Cu)			103		%		80-108	23-MAR-07
Lead (Pb)			102		%		83-116	23-MAR-07
Molybdenum (Mo)			106		%		81-116	23-MAR-07
Nickel (Ni)			101		%		80-108	23-MAR-07
Phosphorus (P)			103		%		81-119	23-MAR-07
Selenium (Se)			105		%		82-127	23-MAR-07
Silver (Ag)			82		%		22-143	23-MAR-07
Strontium (Sr)			94		%		73-121	23-MAR-07
Thallium (Tl)			104		%		84-118	23-MAR-07
Tin (Sn)			105		%		85-117	23-MAR-07
Titanium (Ti)			100		%		88-110	23-MAR-07
Uranium (U)			108		%		81-120	23-MAR-07
Vanadium (V)			101		%		84-111	23-MAR-07
Zinc (Zn)			102		%		74-121	23-MAR-07
WG574873-8 MS		**L488798-6**						
Aluminum (Al)			103		%		79-120	29-MAR-07
Antimony (Sb)			102		%		85-116	29-MAR-07
Arsenic (As)			103		%		89-109	29-MAR-07
Barium (Ba)			104		%		78-116	29-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R505935								
WG574873-8 MS		**L488798-6**						
Beryllium (Be)			104		%		76-125	29-MAR-07
Bismuth (Bi)			109		%		69-125	29-MAR-07
Boron (B)			105		%		75-121	29-MAR-07
Cadmium (Cd)			101		%		86-112	29-MAR-07
Chromium (Cr)			99		%		80-113	29-MAR-07
Cobalt (Co)			97		%		82-109	29-MAR-07
Copper (Cu)			101		%		80-108	29-MAR-07
Lead (Pb)			109		%		83-116	29-MAR-07
Molybdenum (Mo)			96		%		81-116	29-MAR-07
Nickel (Ni)			96		%		80-108	29-MAR-07
Phosphorus (P)			104		%		81-119	29-MAR-07
Selenium (Se)			104		%		82-127	29-MAR-07
Silver (Ag)			48		%		22-143	29-MAR-07
Thallium (Tl)			118		%		84-118	29-MAR-07
Tin (Sn)			106		%		85-117	29-MAR-07
Titanium (Ti)			103		%		88-110	29-MAR-07
Uranium (U)			102		%		81-120	29-MAR-07
Vanadium (V)			99		%		84-111	29-MAR-07
Zinc (Zn)			98		%		74-121	29-MAR-07
Strontium (Sr)			139	E	%		73-121	29-MAR-07
MN-DIS-ED	**Water**							
Batch R506068								
WG574831-3 DUP		**L488620-1**						
Manganese (Mn)-Dissolved		0.022	0.021		mg/L	1.5	26	23-MAR-07
WG574831-5 DUP		**L489016-3**						
Manganese (Mn)-Dissolved		0.010	0.010		mg/L	2.7	26	23-MAR-07
WG574831-7 DUP		**L489247-6**						
Manganese (Mn)-Dissolved		0.051	0.052		mg/L	1.0	26	23-MAR-07
WG574831-1 MB								
Manganese (Mn)-Dissolved			<0.001		mg/L		0.001	23-MAR-07
WG574831-4 MS		**L488620-1**						
Manganese (Mn)-Dissolved			92		%		63-138	23-MAR-07
WG574831-6 MS		**L489016-3**						
Manganese (Mn)-Dissolved			95		%		63-138	23-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MN-DIS-ED	**Water**							
Batch R506068								
WG574831-8 MS		**L489247-6**						
Manganese (Mn)-Dissolved			96		%		63-138	23-MAR-07
N2N3-ED	**Water**							
Batch R506003								
WG574305-7 DUP		**L488778-3**						
Nitrate+Nitrite-N		<0.1	<0.1	RPD-NA	mg/L	N/A	6.9	22-MAR-07
WG574305-9 DUP		**L488726-1**						
Nitrate+Nitrite-N		<0.1	<0.1	RPD-NA	mg/L	N/A	6.9	22-MAR-07
WG574305-3 LCS								
Nitrate+Nitrite-N			103		%		87-113	22-MAR-07
WG574305-2 MB								
Nitrate+Nitrite-N			<0.1		mg/L		0.1	22-MAR-07
WG574305-10 MS		**L488573-3**						
Nitrate+Nitrite-N			101		%		84-118	22-MAR-07
WG574305-4 MS		**L487428-15**						
Nitrate+Nitrite-N			100		%		84-118	22-MAR-07
WG574305-6 MS		**L488619-2**						
Nitrate+Nitrite-N			101		%		84-118	22-MAR-07
NAPHTHENIC-ACID-FM	**Water**							
Batch R505937								
WG575071-3 DUP		**L488105-8**						
Naphthenic Acids		<1	<1	RPD-NA	mg/L	N/A	33	23-MAR-07
WG575071-4 LCS								
Naphthenic Acids			104		%		55-145	23-MAR-07
WG575071-1 MB								
Naphthenic Acids			<1		mg/L		1	23-MAR-07
WG575071-2 MS		**L488105-8**						
Naphthenic Acids			87		%		55-145	23-MAR-07
NO2-ED	**Water**							
Batch R506003								
WG574305-5 DUP		**L488113-8**						
Nitrite-N		0.83	0.83		mg/L	0.12	6.5	22-MAR-07
WG574305-7 DUP		**L488778-3**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	22-MAR-07
WG574305-9 DUP		**L488726-1**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	22-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-ED	**Water**							
Batch R506003								
WG574305-3 LCS								
Nitrite-N			103		%		90-110	22-MAR-07
WG574305-2 MB								
Nitrite-N			<0.05		mg/L		0.05	22-MAR-07
WG574305-10 MS		**L488573-3**						
Nitrite-N			105		%		88-113	22-MAR-07
WG574305-4 MS		**L487428-15**						
Nitrite-N			103		%		88-113	22-MAR-07
WG574305-6 MS		**L488619-2**						
Nitrite-N			104		%		88-113	22-MAR-07
PAH-ALK-ED	**Water**							
Batch R506459								
WG574186-2 LCS								
Acenaphthene			95		%		49-124	24-MAR-07
Acenaphthylene			95		%		54-105	24-MAR-07
Anthracene			90		%		55-125	24-MAR-07
Benzo(a)anthracene			95		%		58-129	24-MAR-07
Benzo(a)pyrene			87		%		53-131	24-MAR-07
Benzo(b)fluoranthene			92		%		49-131	24-MAR-07
Benzo(ghi)perylene			91		%		47-137	24-MAR-07
Benzo(k)fluoranthene			90		%		56-129	24-MAR-07
Biphenyl			92		%		54-120	24-MAR-07
C2 sub'd naphthalene			94		%		51-125	24-MAR-07
C3 sub'd naphthalene			95		%		55-129	24-MAR-07
Chrysene			95		%		62-128	24-MAR-07
Dibenzo(a,h)anthracene			90		%		48-134	24-MAR-07
Dibenzothiophene			94		%		54-121	24-MAR-07
Fluoranthene			99		%		55-129	24-MAR-07
Fluorene			95		%		53-126	24-MAR-07
Indeno(c,d-123)pyrene			92		%		49-135	24-MAR-07
Methyl naphthalene			89		%		47-121	24-MAR-07
Methyl phenanthrene/anthracene			90		%		56-127	24-MAR-07
Naphthalene			92		%		42-119	24-MAR-07
Phenanthrene			95		%		57-128	24-MAR-07
Pyrene			99		%		54-131	24-MAR-07

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ALK-ED	**Water**							
Batch R506459								
WG574186-1 MB								
Acenaphthylene			<0.01		ug/L		0.01	24-MAR-07
Benzo(ghi)perylene			<0.01		ug/L		0.01	24-MAR-07
Biphenyl			<0.01		ug/L		0.01	24-MAR-07
C2 sub'd B(a)A/chrysene			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd B(b&k)F/B(a)P			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd biphenyl			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd dibenzothiophene			<0.04		ug/L		0.04	24-MAR-07
C2 sub'd naphthalene			<0.04		ug/L		0.04	24-MAR-07
C3 sub'd dibenzothiophene			<0.04		ug/L		0.04	24-MAR-07
C3 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	24-MAR-07
C4 sub'd dibenzothiophene			<0.04		ug/L		0.04	24-MAR-07
C4 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	24-MAR-07
Dibenzothiophene			<0.01		ug/L		0.01	24-MAR-07
Methyl acenaphthene			<0.04		ug/L		0.04	24-MAR-07
Methyl B(a)A/chrysene			<0.04		ug/L		0.04	24-MAR-07
Methyl B(b&k)F/B(a)P			<0.04		ug/L		0.04	24-MAR-07
Methyl biphenyl			<0.04		ug/L		0.04	24-MAR-07
Methyl dibenzothiophene			<0.04		ug/L		0.04	24-MAR-07
Methyl fluoranthene/pyrene			<0.04		ug/L		0.04	24-MAR-07
Methyl fluorene			<0.04		ug/L		0.04	24-MAR-07
Methyl naphthalene			<0.01		ug/L		0.01	24-MAR-07
C2 sub'd fluorene			0.05	A	ug/L		0.04	24-MAR-07
C2 sub'd phenanthrene/anth.			0.10	A	ug/L		0.04	24-MAR-07
C3 sub'd naphthalene			0.07	A	ug/L		0.04	24-MAR-07
C4 sub'd naphthalene			0.06	A	ug/L		0.04	24-MAR-07
Methyl phenanthrene/anthracene			0.10	A	ug/L		0.04	24-MAR-07
PAH-CCME-ED	**Water**							
Batch R506458								
WG574186-2 LCS								
Acenaphthene			95		%		49-124	24-MAR-07
Acridine			94		%		56-127	24-MAR-07
Anthracene			90		%		55-125	24-MAR-07
Benzo(a)anthracene			95		%		58-129	24-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-ED	**Water**							
Batch R506458								
WG574186-2 LCS								
Benzo(a)pyrene			87		%		53-131	24-MAR-07
Benzo(b)fluoranthene			92		%		49-131	24-MAR-07
Benzo(k)fluoranthene			90		%		56-129	24-MAR-07
Chrysene			95		%		62-128	24-MAR-07
Dibenzo(a,h)anthracene			90		%		48-134	24-MAR-07
Fluoranthene			99		%		55-129	24-MAR-07
Fluorene			95		%		53-126	24-MAR-07
Indeno(1,2,3-cd)pyrene			92		%		49-135	24-MAR-07
Naphthalene			92		%		42-119	24-MAR-07
Phenanthrene			95		%		57-128	24-MAR-07
Pyrene			99		%		54-131	24-MAR-07
Quinoline			92		%		53-121	24-MAR-07
WG574186-1 MB								
Acenaphthene			<0.01		ug/L		0.01	24-MAR-07
Acridine			<0.01		ug/L		0.01	24-MAR-07
Anthracene			<0.01		ug/L		0.01	24-MAR-07
Benzo(a)anthracene			<0.01		ug/L		0.01	24-MAR-07
Benzo(a)pyrene			<0.01		ug/L		0.01	24-MAR-07
Benzo(b)fluoranthene			<0.01		ug/L		0.01	24-MAR-07
Benzo(k)fluoranthene			<0.01		ug/L		0.01	24-MAR-07
Chrysene			<0.01		ug/L		0.01	24-MAR-07
Dibenzo(a,h)anthracene			<0.01		ug/L		0.01	24-MAR-07
Fluoranthene			<0.01		ug/L		0.01	24-MAR-07
Fluorene			<0.01		ug/L		0.01	24-MAR-07
Indeno(1,2,3-cd)pyrene			<0.01		ug/L		0.01	24-MAR-07
Naphthalene			<0.01		ug/L		0.01	24-MAR-07
Pyrene			<0.01		ug/L		0.01	24-MAR-07
Quinoline			<0.01		ug/L		0.01	24-MAR-07
Phenanthrene			0.02	A	ug/L		0.01	24-MAR-07
PH/EC/ALK-ED	**Water**							

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R505599								
WG574660-5 DUP		**L488563-4**						
Alkalinity, Total (as CaCO3)		367	366		mg/L	0.30	6.5	22-MAR-07
Bicarbonate (HCO3)		448	447		mg/L	0.30	26	22-MAR-07
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	26	22-MAR-07
Conductivity (EC)		652	651		uS/cm	0.15	7.1	22-MAR-07
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	26	22-MAR-07
pH		7.7	7.7	J	pH	0.0	0.2	22-MAR-07
WG574660-6 DUP		**L488982-2**						
Alkalinity, Total (as CaCO3)		57	58		mg/L	2.3	6.5	22-MAR-07
Bicarbonate (HCO3)		69	71		mg/L	2.3	26	22-MAR-07
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	26	22-MAR-07
Conductivity (EC)		543	543		uS/cm	0.0	7.1	22-MAR-07
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	26	22-MAR-07
pH		7.4	7.4	J	pH	0.0	0.2	22-MAR-07
WG574660-2 LCS								
Conductivity (EC)			99		%		94-106	22-MAR-07
WG574660-3 LCS								
pH			7.0		pH		6.9-7.1	22-MAR-07
WG574660-4 LCS								
Alkalinity, Total (as CaCO3)			98		%		90-110	22-MAR-07
WG574660-1 MB								
Alkalinity, Total (as CaCO3)			<5		mg/L		5	22-MAR-07
Bicarbonate (HCO3)			<5		mg/L		5	22-MAR-07
Carbonate (CO3)			<5		mg/L		5	22-MAR-07
Hydroxide (OH)			<5		mg/L		5	22-MAR-07
Batch R506456								
WG575719-2 LCS								
Conductivity (EC)			100		%		94-106	26-MAR-07
PHENOLS-4AAP-WT	**Water**							
Batch R507416								
WG576889-2 CVS								
Phenols (4AAP)			100		%		85-115	28-MAR-07
WG576889-3 DUP		**L489953-1**						
Phenols (4AAP)		<0.001	<0.001	RPD-NA	mg/L	N/A	20	28-MAR-07
WG576889-1 MB								

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	**Water**							
Batch R507416								
WG576889-1 MB								
Phenols (4AAP)			<0.001		mg/L		0.001	28-MAR-07
SI-DIS-ED	**Water**							
Batch R506068								
WG574831-1 MB								
Silicon (Si)-Dissolved			<0.1		mg/L		0.1	23-MAR-07
SULPHIDE-ED	**Water**							
Batch R505989								
WG575047-5 DUP		**L488105-3**						
Sulphide		<0.003	<0.003	RPD-NA	mg/L	N/A	15	23-MAR-07
WG575047-7 DUP		**L488325-2**						
Sulphide		<0.003	<0.003	RPD-NA	mg/L	N/A	15	23-MAR-07
WG575047-9 DUP		**L487986-10**						
Sulphide		5.49	5.14		mg/L	6.6	15	23-MAR-07
WG575047-2 LCS								
Sulphide			98		%		63-116	23-MAR-07
WG575047-3 LCS								
Sulphide			93		%		70-119	23-MAR-07
WG575047-1 MB								
Sulphide			<0.003		mg/L		0.003	23-MAR-07
WG575047-4 MS		**L487662-2**						
Sulphide			95		%		42-140	23-MAR-07
WG575047-6 MS		**L488105-12**						
Sulphide			45		%		42-140	23-MAR-07
WG575047-8 MS		**L488795-1**						
Sulphide			88		%		42-140	23-MAR-07

ALS Laboratory Group Quality Control Report

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

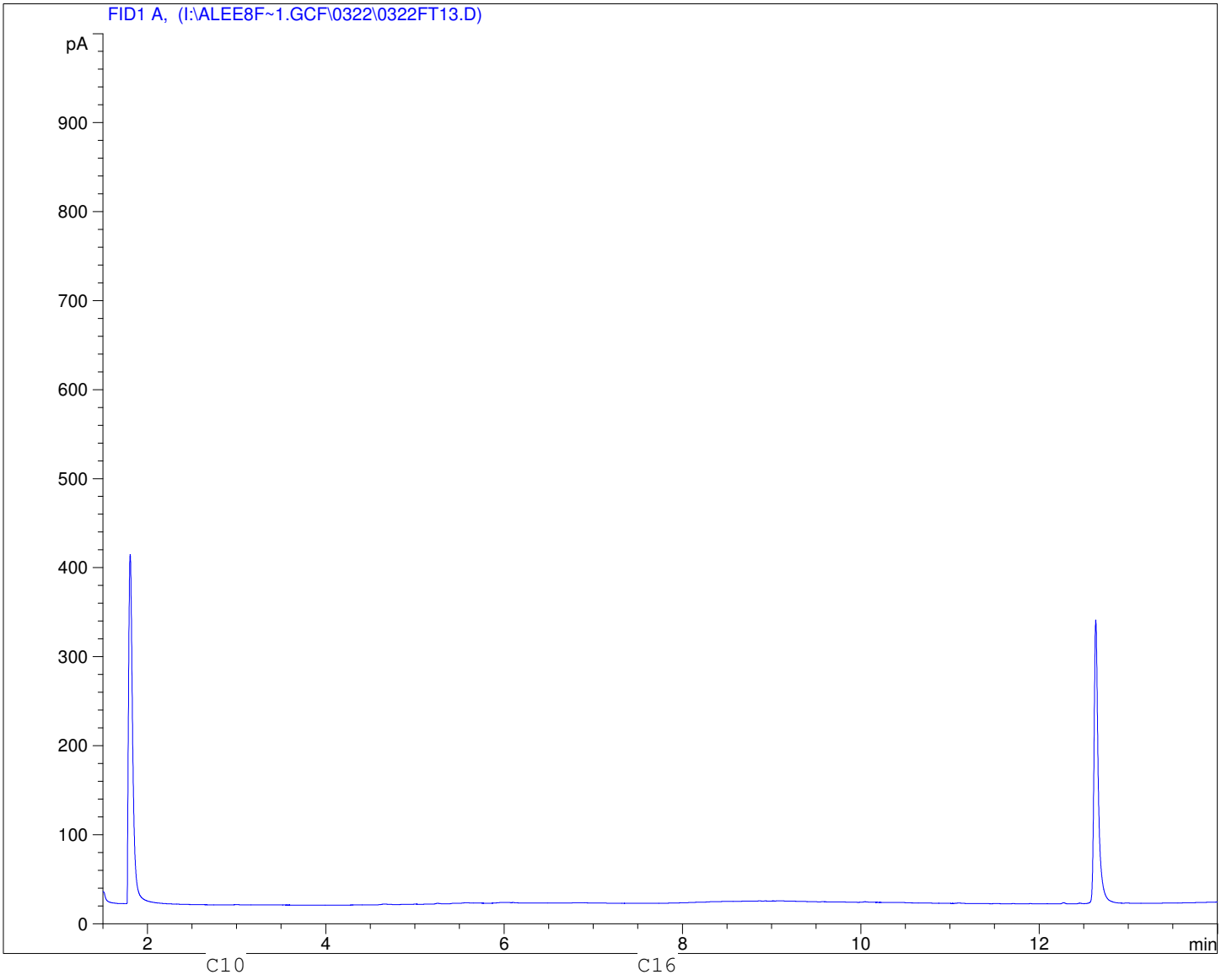
Qualifier:

RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
A	Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB" (result adjusted for method blank) appears in the Analytical Report.
B	Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.
E	Matrix spike recovery may fall outside the acceptance limits due to high sample background.
F	Silver recovery low, likely due to elevated chloride levels in sample.
G	Outlier - No assignable cause for nonconformity has been determined.
J	Duplicate results and limit(s) are expressed in terms of absolute difference.
K	The sample referenced above is of a non-standard matrix type; standard QC acceptance criteria may not be achievable.
L	Low matrix spike recovery due to instability of spiked analyte in the sample matrix.

Client ID: 1712-Q

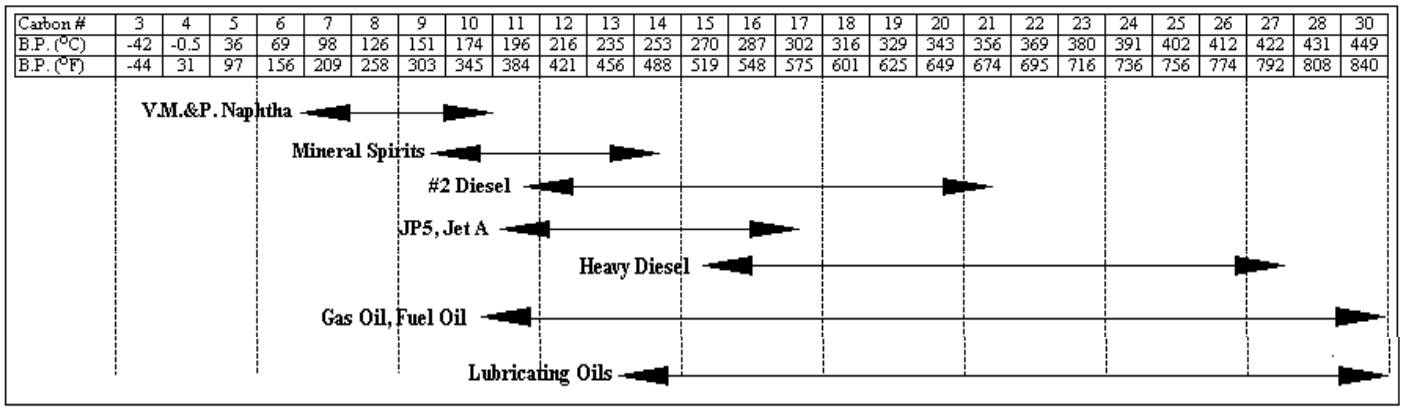
Sample ID: L488563-1 2
Injection Date: 3/22/2007 10:06:15 PM
Instrument: 6890

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

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

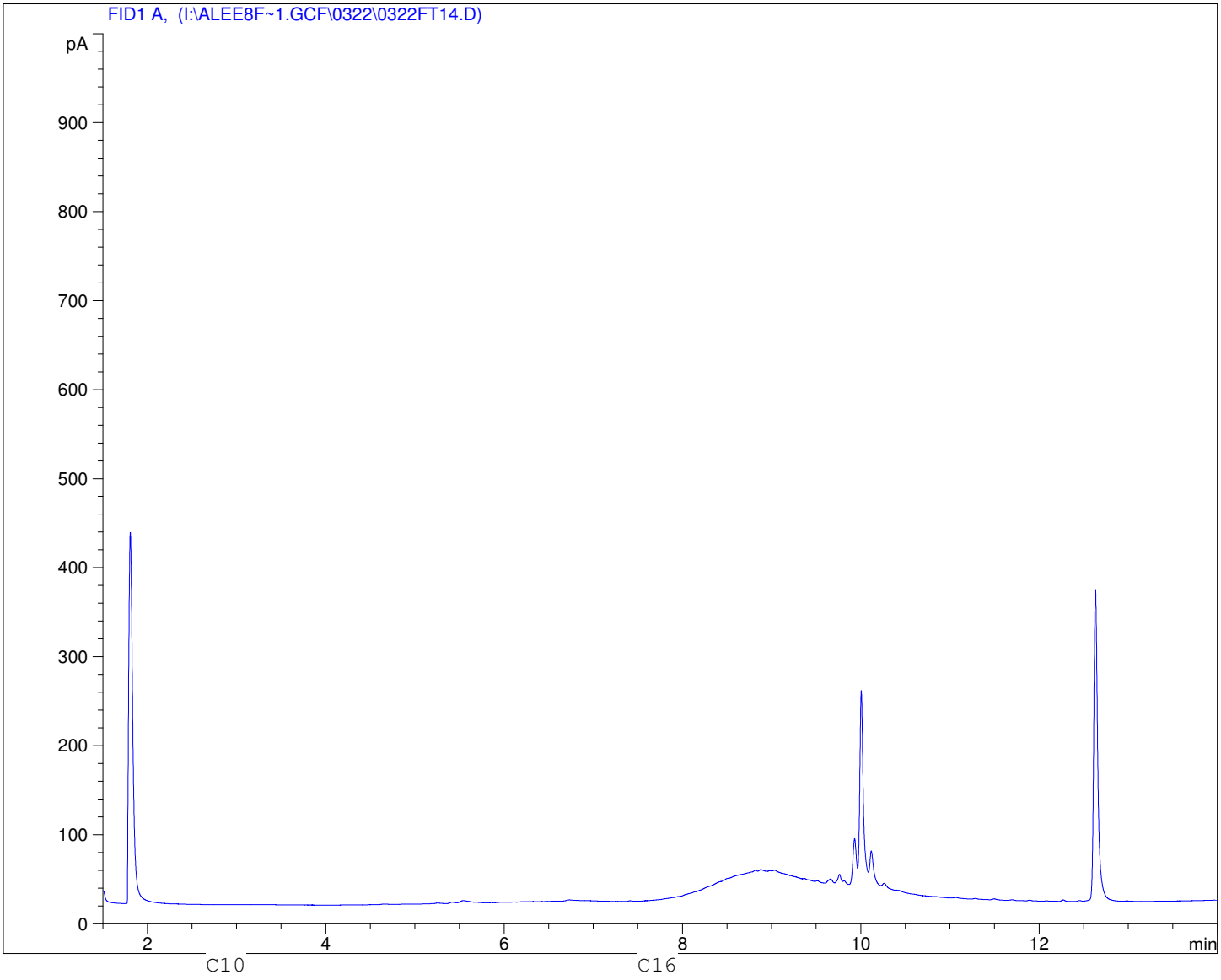


Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

Client ID: 1712-QD

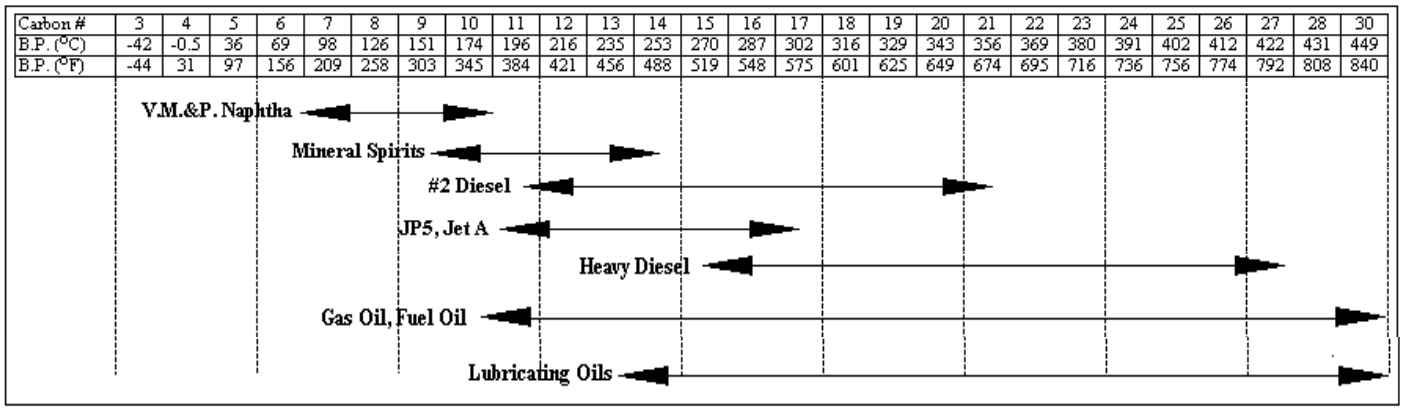
Sample ID: L488563-2 2
Injection Date: 3/22/2007 10:31:14 PM
Instrument: 6890

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

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

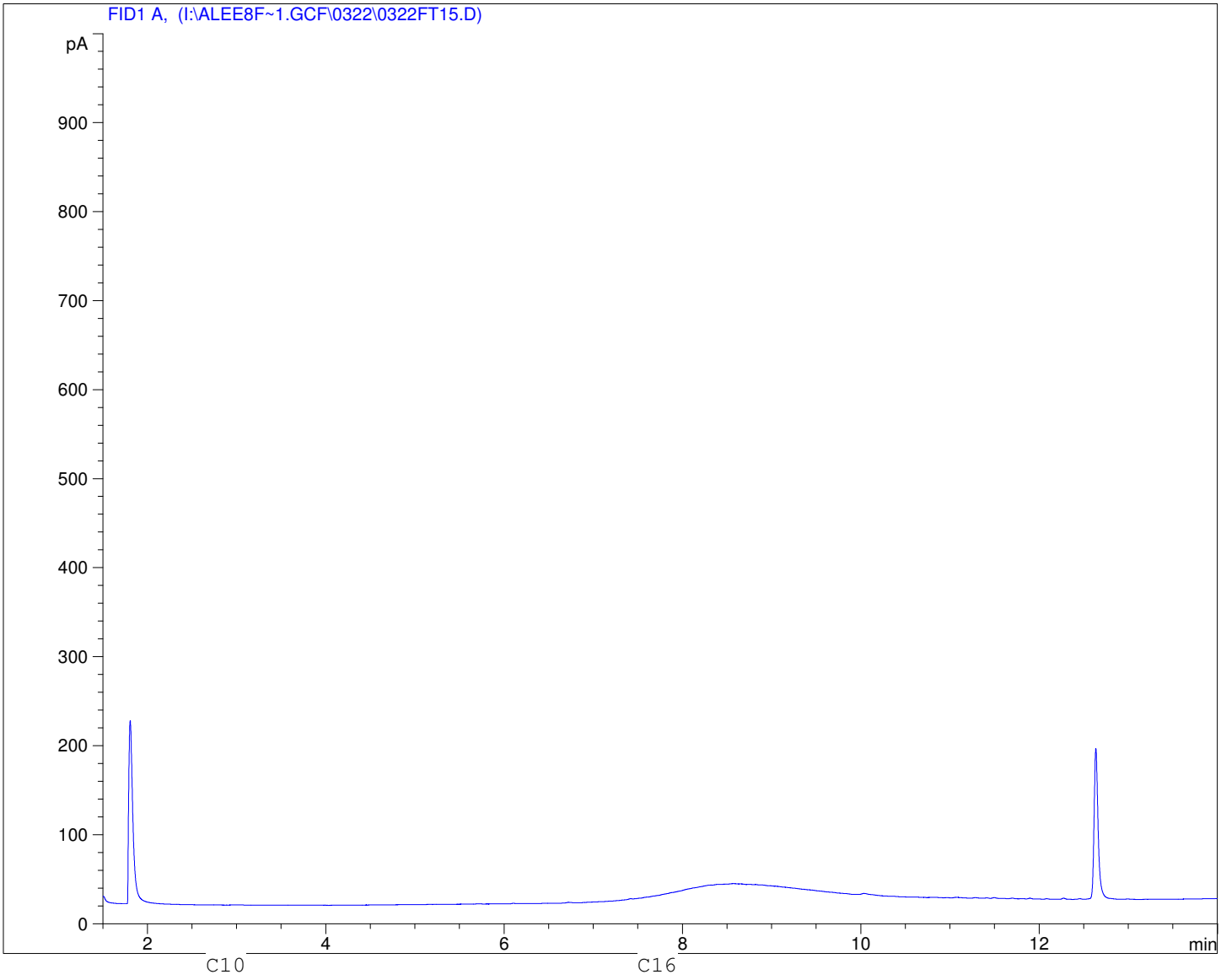


Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

Client ID: 1712-B

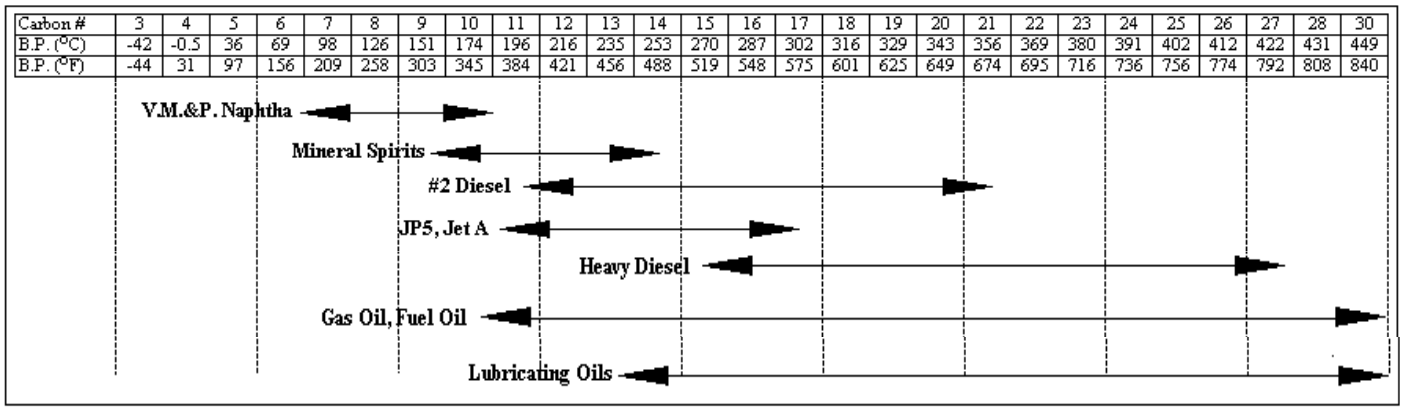
Sample ID: L488563-3 4
Injection Date: 3/22/2007 10:56:14 PM
Instrument: 6890

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

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



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

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # 01293

Page 1 of 1

REPORT TO: WorleyParsonsKomex	REPORT FORMAT / DISTRIBUTION: STANDARD, OTHER DBF, PDF, EXCEL, CUSTOM, FAX
COMPANY:	EMAIL 1: david.dillon@worleyparsons.com
CONTACT:	EMAIL 2: Joao.Kupper@worleyparsons.com
ADDRESS: Edmonton	
PHONE: 1877-566-3975 FAX: 780-496-9575	
INVOICE TO: SAME AS REPORT ? YES / NO	INDICATE BOTTLES: FILTERED / PRESERVED (F/P)
COMPANY:	CLIENT / PROJECT INFORMATION:
CONTACT:	JOB #:
ADDRESS:	PO/AFE: F35772803
	Legal Site Description:
PHONE: FAX:	QUOTE #:
Lab Work Order # (lab use only): L488563	SAMPLER (Initials):

SERVICE REQUESTED

- [X] REGULAR SERVICE (DEFAULT)
- [ ] RUSH SERVICE (2-3 DAYS)
- [ ] PRIORITY SERVICE (1 DAY or ASAP)
- [ ] EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Routine Fe, Mn, major ions (F)	Silicon(s) dissolved (F)	Mercury(Hg) dissolved (F)	Sulphide (P)	Phenols (4AAP) (P)	CCME PAHs	Dissolved Metals (F)	Naph by FTIR *	BTEX, F1, F2 - PAHs & Alkylated PAH	HAZARDOUS?	NUMBER OF CONTAINERS
-1	1712-Q	Mar. 19107	16:00	H_2O	✓	✓	✓	✓	✓	✓	✓	✓	✓		
-2	1712-QD	Mar 19107	16:30	H_2O	✓	✓	✓	✓	✓	✓	✓	✓	✓		
-3	172-B	Mar 20107	11:45	H_2O	✓	✓	✓	✓	✓	✓	✓	✓	✓		
-4	1721-	Mar20107	16:00	H_2O	✓	✓	✓	✓	✓	✓	✓	✓	✓		
							1						1		
						15-415	Hg-015								

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this from *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
[signature]	21/MAR/07 0900	CRYSTAL COLEMAN	21/MAR/07
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)

TEMPERATURE | SAMPLES RECEIVED IN GOOD CONDITION? YES / NO (If no provide details)

ANALYTICAL REPORT

WORLEYPARSONS CANADA LTD

ATTN: JOAO KUPPER

705, 10240 124 ST

EDMONTON AB T5N 3W6

Reported On: 17-APR-07 05:34 PM
Revision: 2

Lab Work Order #: **L489212** **Date Received:** **22-MAR-07**

Project P.O. #: F35772803
Job Reference:
Legal Site Desc:
CofC Numbers: 01199

Other Information:

Comments: ADDITIONAL 03-APR-07 13:08

17-Apr-07 Revised Report:
As per client's request, removed PAHs that are in alkylated and CCME packages from alkylated package and removed extractable Fe and Mn.

CHERYLE KEARLEY
General Manager, Fort McMurray

For any questions about this report please contact your Account Manager:

CHERYLE KEARLEY

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L489212-1 P06-1840-2								
Sampled By: CLIENT on 21-MAR-07 @ 15:00								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
Toluene	0.0006		0.0005	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
EthylBenzene	<0.0005		0.0005	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
Xylenes	<0.0005	RAMB	0.0005	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
F1(C6-C10)	<0.1		0.1	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
F1-BTEX	<0.1		0.1	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
F2 (>C10-C16)								
F2 (>C10-C16)	0.77		0.05	mg/L	26-MAR-07	26-MAR-07	MKE	R506710
Surr: 2-Bromobenzotrifluoride	73		65-146	%	26-MAR-07	26-MAR-07	MKE	R506710
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Silver (Ag)	<0.0002		0.0002	mg/L		29-MAR-07	JGP	R507874
Aluminum (Al)	0.02		0.01	mg/L		29-MAR-07	JGP	R507874
Arsenic (As)	<0.0004		0.0004	mg/L		29-MAR-07	JGP	R507874
Boron (B)	0.028		0.002	mg/L		29-MAR-07	JGP	R507874
Barium (Ba)	0.102		0.0001	mg/L		29-MAR-07	JGP	R507874
Beryllium (Be)	<0.0005		0.0005	mg/L		29-MAR-07	JGP	R507874
Bismuth (Bi)	<0.00005		0.00005	mg/L		29-MAR-07	JGP	R507874
Cadmium (Cd)	<0.0001		0.0001	mg/L		29-MAR-07	JGP	R507874
Cobalt (Co)	0.0010		0.0001	mg/L		29-MAR-07	JGP	R507874
Chromium (Cr)	0.0010		0.0004	mg/L		29-MAR-07	JGP	R507874
Copper (Cu)	0.0020		0.0006	mg/L		29-MAR-07	JGP	R507874
Molybdenum (Mo)	0.0004		0.0001	mg/L		29-MAR-07	JGP	R507874
Nickel (Ni)	0.0051		0.0001	mg/L		29-MAR-07	JGP	R507874
Lead (Pb)	0.0001		0.0001	mg/L		29-MAR-07	JGP	R507874
Antimony (Sb)	0.0004		0.0004	mg/L		29-MAR-07	JGP	R507874
Selenium (Se)	0.0005		0.0004	mg/L		29-MAR-07	JGP	R507874
Tin (Sn)	<0.0002		0.0002	mg/L		29-MAR-07	JGP	R507874
Strontium (Sr)	0.197		0.0001	mg/L		29-MAR-07	JGP	R507874
Titanium (Ti)	0.0023		0.0003	mg/L		29-MAR-07	JGP	R507874
Thallium (Tl)	<0.00005		0.00005	mg/L		29-MAR-07	JGP	R507874
Uranium (U)	0.0026		0.0001	mg/L		29-MAR-07	JGP	R507874
Vanadium (V)	0.0004		0.0001	mg/L		29-MAR-07	JGP	R507874
Zinc (Zn)	0.007		0.002	mg/L		29-MAR-07	JGP	R507874
Iron (Fe)-Dissolved	1.01		0.005	mg/L		29-MAR-07	HAS	R507795
Manganese (Mn)-Dissolved	1.57		0.001	mg/L		29-MAR-07	HAS	R507795
CCME PAHs								
Naphthalene	<0.01	RAMB	0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Quinoline	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Acenaphthene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Fluorene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Phenanthrene	<0.01	RAMB	0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Anthracene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Acridine	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Fluoranthene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Pyrene	0.03		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Benzo(a)anthracene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Chrysene	0.02		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Benzo(b)fluoranthene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Benzo(k)fluoranthene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L489212-1 P06-1840-2								
Sampled By: CLIENT on 21-MAR-07 @ 15:00								
Matrix: WATER								
CCME PAHs								
Benzo(a)pyrene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Surr: Nitrobenzene d5	64		24-132	%	27-MAR-07	29-MAR-07	JR	R507617
Surr: 2-Fluorobiphenyl	73		37-123	%	27-MAR-07	29-MAR-07	JR	R507617
Surr: p-Terphenyl d14	82		50-142	%	27-MAR-07	29-MAR-07	JR	R507617
Fluoride (F)	0.21		0.05	mg/L		04-APR-07	UM	R509458
Mercury (Hg)-Dissolved	<0.0001		0.0001	mg/L		29-MAR-07	JGP	R507874
Naphthenic Acids	<1		1	mg/L		29-MAR-07	JOB	R507877
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Benzo(ghi)perylene	0.02		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Biphenyl	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd B(a)A/chrysene	0.09		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd B(b&k)F/B(a)P	0.06		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd biphenyl	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd fluorene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd naphthalene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C3 sub'd naphthalene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C4 sub'd naphthalene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Dibenzothiophene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl B(a)A/chrysene	0.06		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl acenaphthene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl biphenyl	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl dibenzothiophene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl fluoranthene/pyrene	0.05		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl fluorene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl naphthalene	<0.01	RAMB	0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl phenanthrene/anthracene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Surr: Nitrobenzene d5	64		24-132	%	27-MAR-07	29-MAR-07	JR	R507618
Surr: 2-Fluorobiphenyl	73		37-123	%	27-MAR-07	29-MAR-07	JR	R507618
Surr: p-Terphenyl d14	82		50-142	%	27-MAR-07	29-MAR-07	JR	R507618
Phenols (4AAP)	<0.001		0.001	mg/L	30-MAR-07	30-MAR-07	SF	R508163
Silicon (Si)-Dissolved	3.3		0.1	mg/L		29-MAR-07	HAS	R507795
Sulphide	0.052		0.003	mg/L		28-MAR-07	KMY	R507355
Routine Water: Major Ions, Fe & Mn								
Chloride (Cl)	2		1	mg/L		26-MAR-07	CLT	R506263
ICP metals and SO4 for routine water								
Calcium (Ca)	128		0.5	mg/L		26-MAR-07	EOC	R506556
Potassium (K)	1.2		0.5	mg/L		26-MAR-07	EOC	R506556
Magnesium (Mg)	19.6		0.1	mg/L		26-MAR-07	EOC	R506556
Sodium (Na)	2		1	mg/L		26-MAR-07	EOC	R506556
Sulfate (SO4)	48.4		0.5	mg/L		26-MAR-07	EOC	R506556
Ion Balance Calculation								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L489212-1 P06-1840-2								
Sampled By: CLIENT on 21-MAR-07 @ 15:00								
Matrix: WATER								
Routine Water: Major Ions, Fe & Mn								
Ion Balance Calculation								
Ion Balance	104			%		28-MAR-07		
TDS (Calculated)	404			mg/L		28-MAR-07		
Hardness (as CaCO3)	400			mg/L		28-MAR-07		
Nitrate+Nitrite-N	<0.1		0.1	mg/L		26-MAR-07	KMY	R506581
Nitrate-N	<0.1		0.1	mg/L		26-MAR-07	KMY	R506581
Nitrite-N	<0.05		0.05	mg/L		26-MAR-07	KMY	R506581
pH, Conductivity and Total Alkalinity								
pH	7.5		0.1	pH		25-MAR-07	WMA	R507079
Conductivity (EC)	667		0.2	uS/cm		25-MAR-07	WMA	R507079
Bicarbonate (HCO3)	412		5	mg/L		25-MAR-07	WMA	R507079
Carbonate (CO3)	<5		5	mg/L		25-MAR-07	WMA	R507079
Hydroxide (OH)	<5		5	mg/L		25-MAR-07	WMA	R507079
Alkalinity, Total (as CaCO3)	338		5	mg/L		25-MAR-07	WMA	R507079
L489212-2 TRIP BLANK								
Sampled By: CLIENT on 21-MAR-07								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
Toluene	<0.0005	RAMB	0.0005	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
EthylBenzene	<0.0005		0.0005	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
Xylenes	<0.0005		0.0005	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
F1(C6-C10)	<0.1		0.1	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
F1-BTEX	<0.1		0.1	mg/L	23-MAR-07	23-MAR-07	NRG	R506363
F2 (>C10-C16)								
F2 (>C10-C16)	<0.05		0.05	mg/L	26-MAR-07	26-MAR-07	MKE	R506710
Surr: 2-Bromobenzotrifluoride	99		65-146	%	26-MAR-07	26-MAR-07	MKE	R506710
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Silver (Ag)	<0.0002		0.0002	mg/L		27-MAR-07	CVM	R507158
Aluminum (Al)	<0.01		0.01	mg/L		27-MAR-07	CVM	R507158
Arsenic (As)	<0.0004		0.0004	mg/L		27-MAR-07	CVM	R507158
Boron (B)	0.027	RRVAP	0.002	mg/L		27-MAR-07	CVM	R507158
Barium (Ba)	0.0002		0.0001	mg/L		27-MAR-07	CVM	R507158
Beryllium (Be)	<0.0005		0.0005	mg/L		27-MAR-07	CVM	R507158
Bismuth (Bi)	<0.00005		0.00005	mg/L		27-MAR-07	CVM	R507158
Cadmium (Cd)	<0.0001		0.0001	mg/L		27-MAR-07	CVM	R507158
Cobalt (Co)	<0.0001		0.0001	mg/L		27-MAR-07	CVM	R507158
Chromium (Cr)	<0.0004		0.0004	mg/L		27-MAR-07	CVM	R507158
Copper (Cu)	<0.0006		0.0006	mg/L		27-MAR-07	CVM	R507158
Molybdenum (Mo)	0.0001		0.0001	mg/L		27-MAR-07	CVM	R507158
Nickel (Ni)	<0.0001		0.0001	mg/L		27-MAR-07	CVM	R507158
Lead (Pb)	<0.0001		0.0001	mg/L		27-MAR-07	CVM	R507158
Antimony (Sb)	0.0005		0.0004	mg/L		27-MAR-07	CVM	R507158
Selenium (Se)	<0.0004		0.0004	mg/L		27-MAR-07	CVM	R507158
Tin (Sn)	<0.0002		0.0002	mg/L		27-MAR-07	CVM	R507158
Strontium (Sr)	0.0004		0.0001	mg/L		27-MAR-07	CVM	R507158
Titanium (Ti)	<0.0003		0.0003	mg/L		27-MAR-07	CVM	R507158
Thallium (Tl)	<0.00005		0.00005	mg/L		27-MAR-07	CVM	R507158
Uranium (U)	<0.0001		0.0001	mg/L		27-MAR-07	CVM	R507158
Vanadium (V)	0.0001		0.0001	mg/L		27-MAR-07	CVM	R507158

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L489212-2 TRIP BLANK								
Sampled By: CLIENT on 21-MAR-07								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals (Low Level)								
Zinc (Zn)	0.003		0.002	mg/L		27-MAR-07	CVM	R507158
Iron (Fe)-Dissolved	<0.005		0.005	mg/L		25-MAR-07	SYF	R506206
Manganese (Mn)-Dissolved	<0.001		0.001	mg/L		25-MAR-07	SYF	R506206
CCME PAHs								
Naphthalene	<0.01	RAMB	0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Quinoline	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Acenaphthene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Fluorene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Phenanthrene	<0.01	RAMB	0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Anthracene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Acridine	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Fluoranthene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Pyrene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Benzo(a)anthracene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Chrysene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Benzo(b)fluoranthene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Benzo(k)fluoranthene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Benzo(a)pyrene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Indeno(1,2,3-cd)pyrene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Dibenzo(a,h)anthracene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507617
Surr: Nitrobenzene d5	58		24-132	%	27-MAR-07	29-MAR-07	JR	R507617
Surr: 2-Fluorobiphenyl	59		37-123	%	27-MAR-07	29-MAR-07	JR	R507617
Surr: p-Terphenyl d14	79		50-142	%	27-MAR-07	29-MAR-07	JR	R507617
Fluoride (F)	<0.05		0.05	mg/L		04-APR-07	UM	R509458
Mercury (Hg)-Dissolved	<0.0001		0.0001	mg/L		27-MAR-07	CVM	R507158
Naphthenic Acids	<1		1	mg/L		29-MAR-07	JOB	R507877
PAHs & Alkylated PAHs								
Acenaphthylene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Benzo(ghi)perylene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Biphenyl	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd B(a)A/chrysene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd B(b&k)F/B(a)P	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd biphenyl	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd dibenzothiophene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd fluorene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd naphthalene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C2 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C3 sub'd dibenzothiophene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C3 sub'd naphthalene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C3 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C4 sub'd dibenzothiophene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C4 sub'd naphthalene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
C4 sub'd phenanthrene/anth.	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Dibenzothiophene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl B(a)A/chrysene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl B(b&k)F/B(a)P	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl acenaphthene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl biphenyl	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl dibenzothiophene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl fluoranthene/pyrene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L489212-2 TRIP BLANK								
Sampled By: CLIENT on 21-MAR-07								
Matrix: WATER								
PAHs & Alkylated PAHs								
Methyl fluorene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl naphthalene	<0.01		0.01	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Methyl phenanthrene/anthracene	<0.04		0.04	ug/L	27-MAR-07	29-MAR-07	JR	R507618
Surr: Nitrobenzene d5	58		24-132	%	27-MAR-07	29-MAR-07	JR	R507618
Surr: 2-Fluorobiphenyl	59		37-123	%	27-MAR-07	29-MAR-07	JR	R507618
Surr: p-Terphenyl d14	79		50-142	%	27-MAR-07	29-MAR-07	JR	R507618
Phenols (4AAP)	<0.001		0.001	mg/L	30-MAR-07	30-MAR-07	SF	R508163
Silicon (Si)-Dissolved	<0.1		0.1	mg/L		25-MAR-07	SYF	R506206
Sulphide	<0.003		0.003	mg/L		28-MAR-07	KMY	R507355
Routine Water: Major Ions, Fe & Mn								
Chloride (Cl)	<1		1	mg/L		26-MAR-07	CLT	R506263
ICP metals and SO4 for routine water								
Calcium (Ca)	<0.5		0.5	mg/L		26-MAR-07	EOC	R506556
Potassium (K)	<0.5		0.5	mg/L		26-MAR-07	EOC	R506556
Magnesium (Mg)	<0.1		0.1	mg/L		26-MAR-07	EOC	R506556
Sodium (Na)	<1		1	mg/L		26-MAR-07	EOC	R506556
Sulfate (SO4)	0.6		0.5	mg/L		26-MAR-07	EOC	R506556
Ion Balance Calculation								
Ion Balance	Low TDS			%		28-MAR-07		
TDS (Calculated)	<1			mg/L		28-MAR-07		
Hardness (as CaCO3)	<1			mg/L		28-MAR-07		
Nitrate+Nitrite-N	<0.1		0.1	mg/L		26-MAR-07	KMY	R506581
Nitrate-N	<0.1		0.1	mg/L		26-MAR-07	KMY	R506581
Nitrite-N	<0.05		0.05	mg/L		26-MAR-07	KMY	R506581
pH, Conductivity and Total Alkalinity								
pH	5.6		0.1	pH		25-MAR-07	WMA	R507079
Conductivity (EC)	1.0		0.2	uS/cm		25-MAR-07	WMA	R507079
Bicarbonate (HCO3)	<5		5	mg/L		25-MAR-07	WMA	R507079
Carbonate (CO3)	<5		5	mg/L		25-MAR-07	WMA	R507079
Hydroxide (OH)	<5		5	mg/L		25-MAR-07	WMA	R507079
Alkalinity, Total (as CaCO3)	<5		5	mg/L		25-MAR-07	WMA	R507079

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

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
RAMB	Result Adjusted For Method Blank
RRVAP	Reported Result Verified by Alternate Process

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
BTX,F1-ED	Water	BTEX and F1 (C6-C10)		EPA 5030/8015&8260-P&T GC-MS & FID
CL-ED	Water	Chloride (Cl)		APHA 4500 Cl E-Colorimetry
ETL-ROUTINE-ICP-ED	Water	ICP metals and SO4 for routine water		APHA 3120 B-ICP-OES
F-ED	Water	Fluoride (F)		APHA 4500 F-C-Electrode
F2-ED	Water	F2 (>C10-C16)		EPA 3510/8000-GC-FID
FE-DIS-ED	Water	Iron (Fe)-Dissolved		EPA 200.7
FE-EXT-ROU-ED	Water	Iron (Fe)-Extractable		APHA 3120 B-ICP-OES
HG-DIS-LOW-ED	Water	Mercury (Hg)-Dissolved		EPA 6020
IONBALANCE-ED	Water	Ion Balance Calculation		APHA 1030E
MET1-DIS-LOW-ED	Water	Dissolved Trace Metals (Low Level)		EPA 6020
MN-DIS-ED	Water	Manganese (Mn)-Dissolved		EPA 200.7
MN-EXT-ROU-ED	Water	Manganese (Mn)-Extractable		APHA 3120 B-ICP-OES
N2N3-ED	Water	Nitrate+Nitrite-N		APHA 4500 NO3H-Colorimetry
NAPHTHENIC-ACID-FM	Water	Naphthenic Acids by FTIR		Naphthenic Acids by FTIR,Syncrude,1994
NO2-ED	Water	Nitrite-N		APHA 4500 NO2B-Colorimetry
NO3-ED	Water	Nitrate-N		APHA 4500 NO3H-Colorimetry
PAH-ALK-ED	Water	PAHs & Alkylated PAHs		EPA 3510/8270-GC/MS
NOTE: The Alkylated PAH results are determined via a semi-quantitative method to be used for research purposes only. This method is not necessarily intended to address regulatory requirements.				
PAH-CCME-ED	Water	CCME PAHs		EPA 3510/8270-GC/MS
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity		APHA 4500-H, 2510, 2320
PHENOLS-4AAP-WT	Water	Phenols (4AAP)		APHA 5530
SI-DIS-ED	Water	Silicon (Si)-Dissolved		EPA 200.7
SULPHIDE-ED	Water	Sulphide		APHA 4500 -S E-Auto-Colorimetry

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

Chain of Custody numbers:

01199

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

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP -		

Reference Information

	EDMONTON, ALBERTA, CANADA	FM	ALS LABORATORY GROUP - FORT MCMURRAY, ALBERTA, CANADA
WT	ALS LABORATORY GROUP - WATERLOO (SENTINEL), ONTARIO, CAN		

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

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

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

ALS Laboratory Group Quality Control Report

Workorder: L489212 Report Date: 17-APR-07

Client: WORLEYPARSONS CANADA LTD
705, 10240 124 ST
EDMONTON AB T5N 3W6

Contact: JOAO KUPPER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Water**							
Batch R506363								
WG575322-1 DUP		**L489212-2**						
Benzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	23-MAR-07
EthylBenzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	24	23-MAR-07
Toluene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	32	23-MAR-07
F1(C6-C10)		<0.1	<0.1	RPD-NA	mg/L	N/A	17	23-MAR-07
Xylenes		<0.0005	<0.0005	RPD-NA	mg/L	N/A	26	23-MAR-07
WG575598-2 LCS								
Benzene			79		%		45-106	23-MAR-07
EthylBenzene			71		%		47-108	23-MAR-07
Toluene			75		%		46-111	23-MAR-07
F1(C6-C10)			110		%		35-154	23-MAR-07
Xylenes			71		%		45-109	23-MAR-07
WG575598-1 MB								
Benzene			<0.0005		mg/L		0.0005	23-MAR-07
EthylBenzene			<0.0005		mg/L		0.0005	23-MAR-07
Toluene			<0.0005		mg/L		0.0005	23-MAR-07
F1(C6-C10)			<0.1		mg/L		0.1	23-MAR-07
Xylenes			0.0006	A	mg/L		0.0005	23-MAR-07
CL-ED	**Water**							
Batch R506263								
WG575405-14 DUP		**L489535-1**						
Chloride (Cl)		111	114		mg/L	2.0	6.5	26-MAR-07
WG575405-9 DUP		**L489522-1**						
Chloride (Cl)		3	3	J	mg/L	0	4	26-MAR-07
WG575405-2 LCS								
Chloride (Cl)			97		%		94-109	26-MAR-07
WG575405-3 LCS								
Chloride (Cl)			100		%		93-113	26-MAR-07
WG575405-1 MB								
Chloride (Cl)			<1		mg/L		1	26-MAR-07
WG575405-10 MS		**L489522-5**						
Chloride (Cl)			99		%		87-117	26-MAR-07
WG575405-15 MS		**L489535-1**						
Chloride (Cl)			107		%		87-117	26-MAR-07
WG575405-17 MS		**L489593-1**						
Chloride (Cl)			99		%		87-117	26-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ETL-ROUTINE-ICP-ED	**Water**							
Batch R506556								
WG575823-2 CRM		**ION-915_WATER**						
Calcium (Ca)			105		%		96-116	26-MAR-07
Magnesium (Mg)			103		%		96-115	26-MAR-07
Potassium (K)			120		%		88-126	26-MAR-07
Sodium (Na)			97		%		95-118	26-MAR-07
Sulfate (SO4)			116		%		87-118	26-MAR-07
WG575823-3 DUP		**L489166-2**						
Calcium (Ca)		13.5	14.5		mg/L	6.7	14	26-MAR-07
Magnesium (Mg)		10.7	11.6		mg/L	8.6	10	26-MAR-07
Potassium (K)		15.9	17.2		mg/L	7.5	10	26-MAR-07
Sodium (Na)		290	317		mg/L	8.9	10	26-MAR-07
Sulfate (SO4)		101	111		mg/L	8.7	10	26-MAR-07
WG575823-5 DUP		**L489560-3**						
Calcium (Ca)		<0.5	<0.5	RPD-NA	mg/L	N/A	14	26-MAR-07
Magnesium (Mg)		<0.1	<0.1	RPD-NA	mg/L	N/A	10	26-MAR-07
Potassium (K)		2.5	2.7	J	mg/L	0.2	2	26-MAR-07
Sodium (Na)		555	554		mg/L	0.10	10	26-MAR-07
Sulfate (SO4)		6.1	5.9		mg/L	3.9	10	26-MAR-07
WG575823-1 MB								
Calcium (Ca)			<0.5		mg/L		2.5	26-MAR-07
Magnesium (Mg)			<0.1		mg/L		0.5	26-MAR-07
Potassium (K)			<0.5		mg/L		2.5	26-MAR-07
Sodium (Na)			<1		mg/L		5	26-MAR-07
Sulfate (SO4)			0.5		mg/L		2.5	26-MAR-07
WG575823-4 MS		**L489166-2**						
Calcium (Ca)			104		%		81-119	26-MAR-07
Magnesium (Mg)			104		%		86-111	26-MAR-07
Potassium (K)			99		%		83-115	26-MAR-07
Sodium (Na)			95		%		81-116	26-MAR-07
Sulfate (SO4)			105		%		72-129	26-MAR-07
WG575823-6 MS		**L489560-3**						
Calcium (Ca)			105		%		81-119	26-MAR-07
Magnesium (Mg)			105		%		86-111	26-MAR-07
Potassium (K)			101		%		83-115	26-MAR-07
Sodium (Na)			107		%		81-116	26-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ETL-ROUTINE-ICP-ED	**Water**							
Batch R506556								
WG575823-6 MS		**L489560-3**						
Sulfate (SO4)			102		%		72-129	26-MAR-07
F-ED	**Water**							
Batch R509458								
WG579234-5 DUP		**L492429-4**						
Fluoride (F)		<0.05	<0.05	RPD-NA	mg/L	N/A	8	04-APR-07
WG579234-6 DUP		**L492932-2**						
Fluoride (F)		0.28	0.28	J	mg/L	0.00	0.2	04-APR-07
WG579234-4 LCS								
Fluoride (F)			103		%		89-114	04-APR-07
WG579234-1 MB								
Fluoride (F)			<0.05		mg/L		0.05	04-APR-07
F2-ED	**Water**							
Batch R506710								
WG576029-2 LCS								
F2 (>C10-C16)			101		%		38-152	26-MAR-07
WG576029-1 MB								
F2 (>C10-C16)			<0.05		mg/L		0.05	26-MAR-07
FE-DIS-ED	**Water**							
Batch R506206								
WG575348-3 DUP		**L489416-6**						
Iron (Fe)-Dissolved		<0.005	<0.005	RPD-NA	mg/L	N/A	26	25-MAR-07
WG575348-1 MB								
Iron (Fe)-Dissolved			<0.005		mg/L		0.005	25-MAR-07
WG575348-4 MS		**L489416-6**						
Iron (Fe)-Dissolved			94		%		63-138	25-MAR-07
Batch R507795								
WG576954-1 MB								
Iron (Fe)-Dissolved			<0.005		mg/L		0.005	29-MAR-07
HG-DIS-LOW-ED	**Water**							
Batch R507158								
WG575969-3 DUP								
Mercury (Hg)-Dissolved		N/A	<0.0001	RPD-NA	mg/L	N/A	26	27-MAR-07
WG575969-5 DUP		**L489560-3**						
Mercury (Hg)-Dissolved		<0.0001	<0.0001	RPD-NA	mg/L	N/A	26	27-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-LOW-ED	**Water**							
Batch R507158								
WG575969-1 MB								
Mercury (Hg)-Dissolved			<0.0001		mg/L		0.0005	27-MAR-07
WG575969-4 MS								
Mercury (Hg)-Dissolved			100		%		68-118	27-MAR-07
WG575969-6 MS		**L489560-3**						
Mercury (Hg)-Dissolved			95		%		68-118	27-MAR-07
Batch R507874								
WG577151-1 MB								
Mercury (Hg)-Dissolved			<0.0001		mg/L		0.0005	29-MAR-07
MET1-DIS-LOW-ED	**Water**							
Batch R507158								
WG575969-2 CRM		**1643E_WATER**						
Aluminum (Al)			110		%		90-122	27-MAR-07
Antimony (Sb)			102		%		86-108	27-MAR-07
Arsenic (As)			100		%		84-105	27-MAR-07
Barium (Ba)			97		%		88-109	27-MAR-07
Beryllium (Be)			95		%		77-110	27-MAR-07
Bismuth (Bi)			107		%		84-115	27-MAR-07
Boron (B)			100		%		80-116	27-MAR-07
Cadmium (Cd)			105		%		87-109	27-MAR-07
Chromium (Cr)			102		%		83-118	27-MAR-07
Cobalt (Co)			105		%		90-110	27-MAR-07
Copper (Cu)			103		%		89-112	27-MAR-07
Lead (Pb)			101		%		89-110	27-MAR-07
Molybdenum (Mo)			101		%		88-111	27-MAR-07
Nickel (Ni)			103		%		88-110	27-MAR-07
Selenium (Se)			99		%		76-112	27-MAR-07
Strontium (Sr)			100		%		87-109	27-MAR-07
Vanadium (V)			98		%		87-109	27-MAR-07
Zinc (Zn)			103		%		65-133	27-MAR-07
WG575969-3 DUP								
Aluminum (Al)		N/A	<0.01	RPD-NA	mg/L	N/A	14	27-MAR-07
Antimony (Sb)		N/A	0.0007	J	mg/L	0.0001	0.0016	27-MAR-07
Arsenic (As)		N/A	0.0011	J	mg/L	0.0001	0.0016	27-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R507158								
WG575969-3 DUP								
Barium (Ba)		N/A	0.109		mg/L	0.018	9.8	27-MAR-07
Beryllium (Be)		N/A	<0.0005	RPD-NA	mg/L	N/A	10	27-MAR-07
Bismuth (Bi)		N/A	<0.00005	RPD-NA	mg/L	N/A	26	27-MAR-07
Boron (B)		N/A	0.181		mg/L	0.19	10	27-MAR-07
Cadmium (Cd)		N/A	<0.0001	RPD-NA	mg/L	N/A	12	27-MAR-07
Chromium (Cr)		N/A	0.0034	J	mg/L	0.0012	0.0016	27-MAR-07
Cobalt (Co)		N/A	0.0011		mg/L	5.1	6.7	27-MAR-07
Copper (Cu)		N/A	0.0010	J	mg/L	0.0001	0.0024	27-MAR-07
Lead (Pb)		N/A	<0.0001	RPD-NA	mg/L	N/A	10	27-MAR-07
Molybdenum (Mo)		N/A	0.0003	J	mg/L	0.0000	0.0004	27-MAR-07
Nickel (Ni)		N/A	0.0032		mg/L	4.3	12	27-MAR-07
Phosphorus (P)		N/A	<0.01	RPD-NA	mg/L	N/A	10	27-MAR-07
Selenium (Se)		N/A	<0.0004	RPD-NA	mg/L	N/A	15	27-MAR-07
Silver (Ag)		N/A	<0.0002	RPD-NA	mg/L	N/A	26	27-MAR-07
Strontium (Sr)		N/A	0.275		mg/L	0.32	6.5	27-MAR-07
Thallium (Tl)		N/A	0.00007	J	mg/L	0.00004	0.0002	27-MAR-07
Tin (Sn)		N/A	<0.0002	RPD-NA	mg/L	N/A	10	27-MAR-07
Titanium (Ti)		N/A	0.0008	J	mg/L	0.0002	0.0012	27-MAR-07
Uranium (U)		N/A	0.0017		mg/L	0.23	10	27-MAR-07
Vanadium (V)		N/A	0.0008	J	mg/L	0.0004	0.0004	27-MAR-07
WG575969-5 DUP		**L489560-3**						
Aluminum (Al)		<0.01	<0.01	RPD-NA	mg/L	N/A	14	27-MAR-07
Antimony (Sb)		0.0007	0.0007	J	mg/L	0.0000	0.0016	27-MAR-07
Arsenic (As)		0.0018	0.0018	J	mg/L	0.0000	0.0016	27-MAR-07
Barium (Ba)		0.0380	0.0381		mg/L	0.13	9.8	27-MAR-07
Beryllium (Be)		<0.0005	<0.0005	RPD-NA	mg/L	N/A	10	27-MAR-07
Bismuth (Bi)		<0.00005	<0.00005	RPD-NA	mg/L	N/A	26	27-MAR-07
Boron (B)		5.09	5.19		mg/L	2.0	10	27-MAR-07
Cadmium (Cd)		<0.0001	<0.0001	RPD-NA	mg/L	N/A	12	27-MAR-07
Chromium (Cr)		<0.005	0.0062		mg/L	3.5	16	27-MAR-07
Cobalt (Co)		0.0002	0.0002	J	mg/L	0.0000	0.0004	27-MAR-07
Copper (Cu)		<0.0006	<0.0006	RPD-NA	mg/L	N/A	10	27-MAR-07
Lead (Pb)		<0.0001	<0.0001	RPD-NA	mg/L	N/A	10	27-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R507158								
WG575969-5 DUP		**L489560-3**						
Molybdenum (Mo)		0.0012	0.0013		mg/L	3.2	9.7	27-MAR-07
Nickel (Ni)		0.0003	0.0002	J	mg/L	0.0000	0.0004	27-MAR-07
Phosphorus (P)		1.26	1.28		mg/L	1.7	10	27-MAR-07
Selenium (Se)		<0.0004	<0.0004	RPD-NA	mg/L	N/A	15	27-MAR-07
Silver (Ag)		<0.0002	<0.0002	RPD-NA	mg/L	N/A	26	27-MAR-07
Strontium (Sr)		0.113	0.112		mg/L	0.56	6.5	27-MAR-07
Thallium (Tl)		0.00009	0.00007	J	mg/L	0.00002	0.0002	27-MAR-07
Tin (Sn)		<0.0002	<0.0002	RPD-NA	mg/L	N/A	10	27-MAR-07
Titanium (Ti)		0.0022	0.0018	J	mg/L	0.0005	0.0012	27-MAR-07
Uranium (U)		0.0001	<0.0001	RPD-NA	mg/L	N/A	10	27-MAR-07
Vanadium (V)		<0.001	0.0026		mg/L	4.1	23	27-MAR-07
Zinc (Zn)		0.014	0.013	J	mg/L	0.001	0.008	27-MAR-07
WG575969-1 MB								
Aluminum (Al)			0.01		mg/L		0.05	27-MAR-07
Antimony (Sb)			<0.0004		mg/L		0.002	27-MAR-07
Arsenic (As)			<0.0004		mg/L		0.002	27-MAR-07
Barium (Ba)			<0.0001		mg/L		0.0005	27-MAR-07
Beryllium (Be)			<0.0005		mg/L		0.0025	27-MAR-07
Bismuth (Bi)			0.00006		mg/L		0.00025	27-MAR-07
Boron (B)			0.007		mg/L		0.01	27-MAR-07
Cadmium (Cd)			<0.0001		mg/L		0.0005	27-MAR-07
Chromium (Cr)			<0.0004		mg/L		0.002	27-MAR-07
Cobalt (Co)			<0.0001		mg/L		0.0005	27-MAR-07
Copper (Cu)			<0.0006		mg/L		0.003	27-MAR-07
Lead (Pb)			<0.0001		mg/L		0.0005	27-MAR-07
Molybdenum (Mo)			<0.0001		mg/L		0.0005	27-MAR-07
Nickel (Ni)			<0.0001		mg/L		0.0005	27-MAR-07
Phosphorus (P)			<0.01		mg/L		0.05	27-MAR-07
Selenium (Se)			<0.0004		mg/L		0.002	27-MAR-07
Silver (Ag)			<0.0002		mg/L		0.001	27-MAR-07
Strontium (Sr)			<0.0001		mg/L		0.0005	27-MAR-07
Thallium (Tl)			<0.00005		mg/L		0.00025	27-MAR-07
Tin (Sn)			<0.0002		mg/L		0.001	27-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R507158								
WG575969-1 MB								
Titanium (Ti)			<0.0003		mg/L		0.0015	27-MAR-07
Uranium (U)			<0.0001		mg/L		0.0005	27-MAR-07
Vanadium (V)			<0.0001		mg/L		0.0005	27-MAR-07
Zinc (Zn)			<0.002		mg/L		0.01	27-MAR-07
WG575969-4 MS								
Aluminum (Al)			102		%		79-120	27-MAR-07
Antimony (Sb)			104		%		85-116	27-MAR-07
Arsenic (As)			103		%		89-109	27-MAR-07
Barium (Ba)			99		%		78-116	27-MAR-07
Beryllium (Be)			103		%		76-125	27-MAR-07
Bismuth (Bi)			106		%		69-125	27-MAR-07
Boron (B)			101		%		75-121	27-MAR-07
Cadmium (Cd)			102		%		86-112	27-MAR-07
Chromium (Cr)			100		%		80-113	27-MAR-07
Cobalt (Co)			105		%		82-109	27-MAR-07
Copper (Cu)			103		%		80-108	27-MAR-07
Lead (Pb)			106		%		83-116	27-MAR-07
Molybdenum (Mo)			104		%		81-116	27-MAR-07
Nickel (Ni)			102		%		80-108	27-MAR-07
Phosphorus (P)			103		%		81-119	27-MAR-07
Selenium (Se)			106		%		82-127	27-MAR-07
Silver (Ag)			64		%		22-143	27-MAR-07
Strontium (Sr)			88		%		73-121	27-MAR-07
Thallium (Tl)			115		%		84-118	27-MAR-07
Tin (Sn)			105		%		85-117	27-MAR-07
Titanium (Ti)			101		%		88-110	27-MAR-07
Uranium (U)			107		%		81-120	27-MAR-07
Vanadium (V)			101		%		84-111	27-MAR-07
WG575969-6 MS		**L489560-3**						
Aluminum (Al)			103		%		79-120	27-MAR-07
Antimony (Sb)			107		%		85-116	27-MAR-07
Arsenic (As)			105		%		89-109	27-MAR-07
Barium (Ba)			98		%		78-116	27-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R507158								
WG575969-6 MS		**L489560-3**						
Beryllium (Be)			98		%		76-125	27-MAR-07
Bismuth (Bi)			102		%		69-125	27-MAR-07
Boron (B)			88	E	%		75-121	27-MAR-07
Cadmium (Cd)			104		%		86-112	27-MAR-07
Chromium (Cr)			100		%		80-113	27-MAR-07
Cobalt (Co)			104		%		82-109	27-MAR-07
Copper (Cu)			104		%		80-108	27-MAR-07
Lead (Pb)			103		%		83-116	27-MAR-07
Molybdenum (Mo)			109		%		81-116	27-MAR-07
Nickel (Ni)			102		%		80-108	27-MAR-07
Phosphorus (P)			105		%		81-119	27-MAR-07
Selenium (Se)			110		%		82-127	27-MAR-07
Silver (Ag)			51		%		22-143	27-MAR-07
Strontium (Sr)			107		%		73-121	27-MAR-07
Thallium (Tl)			109		%		84-118	27-MAR-07
Tin (Sn)			106		%		85-117	27-MAR-07
Titanium (Ti)			103		%		88-110	27-MAR-07
Uranium (U)			101		%		81-120	27-MAR-07
Vanadium (V)			102		%		84-111	27-MAR-07
Zinc (Zn)			102		%		74-121	27-MAR-07
Batch R507874								
WG577151-2 CRM		**1643E_WATER**						
Aluminum (Al)			111		%		90-122	29-MAR-07
Antimony (Sb)			102		%		86-108	29-MAR-07
Arsenic (As)			99		%		84-105	29-MAR-07
Barium (Ba)			100		%		88-109	29-MAR-07
Beryllium (Be)			96		%		77-110	29-MAR-07
Bismuth (Bi)			103		%		84-115	29-MAR-07
Boron (B)			97		%		80-116	29-MAR-07
Cadmium (Cd)			103		%		87-109	29-MAR-07
Chromium (Cr)			103		%		83-118	29-MAR-07
Cobalt (Co)			103		%		90-110	29-MAR-07
Copper (Cu)			102		%		89-112	29-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET1-DIS-LOW-ED	**Water**							
Batch R507874								
WG577151-2 CRM		**1643E_WATER**						
Lead (Pb)			97		%		89-110	29-MAR-07
Molybdenum (Mo)			102		%		88-111	29-MAR-07
Nickel (Ni)			100		%		88-110	29-MAR-07
Selenium (Se)			97		%		76-112	29-MAR-07
Strontium (Sr)			91		%		87-109	29-MAR-07
Vanadium (V)			102		%		87-109	29-MAR-07
Zinc (Zn)			103		%		65-133	29-MAR-07
WG577151-1 MB								
Aluminum (Al)			<0.01		mg/L		0.05	29-MAR-07
Antimony (Sb)			<0.0004		mg/L		0.002	29-MAR-07
Arsenic (As)			<0.0004		mg/L		0.002	29-MAR-07
Barium (Ba)			<0.0001		mg/L		0.0005	29-MAR-07
Beryllium (Be)			<0.0005		mg/L		0.0025	29-MAR-07
Bismuth (Bi)			<0.00005		mg/L		0.00025	29-MAR-07
Boron (B)			<0.002		mg/L		0.01	29-MAR-07
Cadmium (Cd)			<0.0001		mg/L		0.0005	29-MAR-07
Chromium (Cr)			<0.0004		mg/L		0.002	29-MAR-07
Cobalt (Co)			<0.0001		mg/L		0.0005	29-MAR-07
Copper (Cu)			<0.0006		mg/L		0.003	29-MAR-07
Lead (Pb)			<0.0001		mg/L		0.0005	29-MAR-07
Molybdenum (Mo)			<0.0001		mg/L		0.0005	29-MAR-07
Nickel (Ni)			<0.0001		mg/L		0.0005	29-MAR-07
Phosphorus (P)			<0.01		mg/L		0.05	29-MAR-07
Selenium (Se)			<0.0004		mg/L		0.002	29-MAR-07
Silver (Ag)			<0.0002		mg/L		0.001	29-MAR-07
Strontium (Sr)			<0.0001		mg/L		0.0005	29-MAR-07
Tin (Sn)			<0.0002		mg/L		0.001	29-MAR-07
Titanium (Ti)			<0.0003		mg/L		0.0015	29-MAR-07
Uranium (U)			<0.0001		mg/L		0.0005	29-MAR-07
Vanadium (V)			<0.0001		mg/L		0.0005	29-MAR-07
Zinc (Zn)			<0.002		mg/L		0.01	29-MAR-07
Thallium (Tl)			0.00072	A	mg/L		0.00025	29-MAR-07
MN-DIS-ED	**Water**							

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MN-DIS-ED	**Water**							
Batch R506206								
WG575348-3 DUP		**L489416-6**						
Manganese (Mn)-Dissolved		<0.001	<0.001	RPD-NA	mg/L	N/A	26	25-MAR-07
WG575348-1 MB								
Manganese (Mn)-Dissolved			<0.001		mg/L		0.001	25-MAR-07
WG575348-4 MS		**L489416-6**						
Manganese (Mn)-Dissolved			96		%		63-138	25-MAR-07
Batch R507795								
WG576954-1 MB								
Manganese (Mn)-Dissolved			<0.001		mg/L		0.001	29-MAR-07
N2N3-ED	**Water**							
Batch R506581								
WG575636-4 DUP		**L489416-5**						
Nitrate+Nitrite-N		<0.1	<0.1	RPD-NA	mg/L	N/A	6.9	26-MAR-07
WG575636-6 DUP		**L489644-7**						
Nitrate+Nitrite-N		0.1	0.1	J	mg/L	0.0	0.4	26-MAR-07
WG575636-3 LCS								
Nitrate+Nitrite-N			105		%		87-113	26-MAR-07
WG575636-2 MB								
Nitrate+Nitrite-N			<0.1		mg/L		0.1	26-MAR-07
WG575636-5 MS		**L489593-1**						
Nitrate+Nitrite-N			106		%		84-118	26-MAR-07
WG575636-7 MS		**L489504-4**						
Nitrate+Nitrite-N			103		%		84-118	26-MAR-07
NAPHTHENIC-ACID-FM	**Water**							
Batch R507877								
WG577386-3 DUP		**L489416-1**						
Naphthenic Acids		13	12		mg/L	13	33	29-MAR-07
WG577386-4 LCS								
Naphthenic Acids			89		%		55-145	29-MAR-07
WG577386-1 MB								
Naphthenic Acids			<1		mg/L		1	29-MAR-07
WG577386-2 MS		**L489416-6**						
Naphthenic Acids			94		%		55-145	29-MAR-07
NO2-ED	**Water**							

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-ED	**Water**							
Batch R506581								
WG575636-4 DUP		**L489416-5**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	26-MAR-07
WG575636-6 DUP		**L489644-7**						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	6.5	26-MAR-07
WG575636-3 LCS								
Nitrite-N			103		%		90-110	26-MAR-07
WG575636-2 MB								
Nitrite-N			<0.05		mg/L		0.05	26-MAR-07
WG575636-5 MS		**L489593-1**						
Nitrite-N			105		%		88-113	26-MAR-07
WG575636-7 MS		**L489504-4**						
Nitrite-N			104		%		88-113	26-MAR-07
PAH-ALK-ED	**Water**							
Batch R507618								
WG574671-2 LCS								
Acenaphthene			71		%		49-124	29-MAR-07
Acenaphthylene			71		%		54-105	29-MAR-07
Anthracene			75		%		55-125	29-MAR-07
Benzo(a)anthracene			79		%		58-129	29-MAR-07
Benzo(a)pyrene			74		%		53-131	29-MAR-07
Benzo(b)fluoranthene			77		%		49-131	29-MAR-07
Benzo(ghi)perylene			74		%		47-137	29-MAR-07
Benzo(k)fluoranthene			75		%		56-129	29-MAR-07
Biphenyl			69		%		54-120	29-MAR-07
C2 sub'd naphthalene			69		%		51-125	29-MAR-07
C3 sub'd naphthalene			74		%		55-129	29-MAR-07
Chrysene			79		%		62-128	29-MAR-07
Dibenzo(a,h)anthracene			72		%		48-134	29-MAR-07
Dibenzothiophene			77		%		54-121	29-MAR-07
Fluoranthene			80		%		55-129	29-MAR-07
Fluorene			71		%		53-126	29-MAR-07
Indeno(c,d-123)pyrene			75		%		49-135	29-MAR-07
Methyl naphthalene			67		%		47-121	29-MAR-07
Methyl phenanthrene/anthracene			76		%		56-127	29-MAR-07
Naphthalene			64		%		42-119	29-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ALK-ED	**Water**							
Batch R507618								
WG574671-2 LCS								
Phenanthrene			78		%		57-128	29-MAR-07
Pyrene			80		%		54-131	29-MAR-07
WG574671-1 MB								
Acenaphthylene			<0.01		ug/L		0.01	29-MAR-07
Benzo(ghi)perylene			<0.01		ug/L		0.01	29-MAR-07
Biphenyl			<0.01		ug/L		0.01	29-MAR-07
C2 sub'd B(a)A/chrysene			<0.04		ug/L		0.04	29-MAR-07
C2 sub'd B(b&k)F/B(a)P			<0.04		ug/L		0.04	29-MAR-07
C2 sub'd biphenyl			<0.04		ug/L		0.04	29-MAR-07
C2 sub'd dibenzothiophene			<0.04		ug/L		0.04	29-MAR-07
C2 sub'd fluorene			<0.04		ug/L		0.04	29-MAR-07
C2 sub'd naphthalene			<0.04		ug/L		0.04	29-MAR-07
C3 sub'd dibenzothiophene			<0.04		ug/L		0.04	29-MAR-07
C3 sub'd naphthalene			<0.04		ug/L		0.04	29-MAR-07
C3 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	29-MAR-07
C4 sub'd dibenzothiophene			<0.04		ug/L		0.04	29-MAR-07
C4 sub'd naphthalene			<0.04		ug/L		0.04	29-MAR-07
C4 sub'd phenanthrene/anth.			<0.04		ug/L		0.04	29-MAR-07
Dibenzothiophene			<0.01		ug/L		0.01	29-MAR-07
Methyl acenaphthene			<0.04		ug/L		0.04	29-MAR-07
Methyl B(a)A/chrysene			<0.04		ug/L		0.04	29-MAR-07
Methyl B(b&k)F/B(a)P			<0.04		ug/L		0.04	29-MAR-07
Methyl biphenyl			<0.04		ug/L		0.04	29-MAR-07
Methyl dibenzothiophene			<0.04		ug/L		0.04	29-MAR-07
Methyl fluoranthene/pyrene			<0.04		ug/L		0.04	29-MAR-07
Methyl fluorene			<0.04		ug/L		0.04	29-MAR-07
Methyl naphthalene			<0.01		ug/L		0.01	29-MAR-07
C2 sub'd phenanthrene/anth.			0.06	A	ug/L		0.04	29-MAR-07
Methyl phenanthrene/anthracene			0.05	A	ug/L		0.04	29-MAR-07
PAH-CCME-ED	**Water**							

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-ED	**Water**							
Batch R507617								
WG574671-2 LCS								
Acenaphthene			71		%		49-124	29-MAR-07
Acridine			77		%		56-127	29-MAR-07
Anthracene			75		%		55-125	29-MAR-07
Benzo(a)anthracene			79		%		58-129	29-MAR-07
Benzo(a)pyrene			74		%		53-131	29-MAR-07
Benzo(b)fluoranthene			77		%		49-131	29-MAR-07
Benzo(k)fluoranthene			75		%		56-129	29-MAR-07
Chrysene			79		%		62-128	29-MAR-07
Dibenzo(a,h)anthracene			72		%		48-134	29-MAR-07
Fluoranthene			80		%		55-129	29-MAR-07
Fluorene			71		%		53-126	29-MAR-07
Indeno(1,2,3-cd)pyrene			75		%		49-135	29-MAR-07
Naphthalene			64		%		42-119	29-MAR-07
Phenanthrene			78		%		57-128	29-MAR-07
Pyrene			80		%		54-131	29-MAR-07
Quinoline			73		%		53-121	29-MAR-07
WG574671-1 MB								
Acenaphthene			<0.01		ug/L		0.01	29-MAR-07
Acridine			<0.01		ug/L		0.01	29-MAR-07
Anthracene			<0.01		ug/L		0.01	29-MAR-07
Benzo(a)anthracene			<0.01		ug/L		0.01	29-MAR-07
Benzo(a)pyrene			<0.01		ug/L		0.01	29-MAR-07
Benzo(b)fluoranthene			<0.01		ug/L		0.01	29-MAR-07
Benzo(k)fluoranthene			<0.01		ug/L		0.01	29-MAR-07
Chrysene			<0.01		ug/L		0.01	29-MAR-07
Dibenzo(a,h)anthracene			<0.01		ug/L		0.01	29-MAR-07
Fluoranthene			<0.01		ug/L		0.01	29-MAR-07
Fluorene			<0.01		ug/L		0.01	29-MAR-07
Indeno(1,2,3-cd)pyrene			<0.01		ug/L		0.01	29-MAR-07
Naphthalene			<0.01		ug/L		0.01	29-MAR-07
Phenanthrene			0.01		ug/L		0.01	29-MAR-07
Pyrene			<0.01		ug/L		0.01	29-MAR-07
Quinoline			<0.01		ug/L		0.01	29-MAR-07

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch **R507079**								
WG575340-5 **DUP**		**L489560-2**						
Alkalinity, Total (as CaCO3)		880	866		mg/L	1.6	6.5	25-MAR-07
Bicarbonate (HCO3)		962	945		mg/L	1.8	26	25-MAR-07
Carbonate (CO3)		55	55		mg/L	0.25	26	25-MAR-07
Conductivity (EC)		2260	2240		uS/cm	0.89	7.1	25-MAR-07
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	26	25-MAR-07
pH		8.8	8.8	J	pH	0.0	0.2	25-MAR-07
WG575340-6 **DUP**		**L489522-5**						
Alkalinity, Total (as CaCO3)		91	91		mg/L	0.39	6.5	25-MAR-07
Bicarbonate (HCO3)		112	111		mg/L	0.40	26	25-MAR-07
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	26	25-MAR-07
Conductivity (EC)		211	210		uS/cm	0.48	7.1	25-MAR-07
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	26	25-MAR-07
pH		7.8	7.8	J	pH	0.0	0.2	25-MAR-07
WG575340-2 **LCS**								
Conductivity (EC)			99		%		94-106	25-MAR-07
WG575340-3 **LCS**								
pH			7.0		pH		6.9-7.1	25-MAR-07
WG575340-4 **LCS**								
Alkalinity, Total (as CaCO3)			98		%		90-110	25-MAR-07
WG575340-1 **MB**								
Alkalinity, Total (as CaCO3)			<5		mg/L		5	25-MAR-07
Bicarbonate (HCO3)			<5		mg/L		5	25-MAR-07
Carbonate (CO3)			<5		mg/L		5	25-MAR-07
Hydroxide (OH)			<5		mg/L		5	25-MAR-07
PHENOLS-4AAP-WT	**Water**							
Batch **R508163**								
WG577682-2 **CVS**								
Phenols (4AAP)			100		%		85-115	30-MAR-07
WG577682-3 **DUP**		**L490792-1**						
Phenols (4AAP)		0.001	0.001	J	mg/L	0.000	0.004	30-MAR-07
WG577682-5 **DUP**		**L489601-1**						
Phenols (4AAP)		<0.001	<0.001	RPD-NA	mg/L	N/A	20	30-MAR-07
WG577682-1 **MB**								
Phenols (4AAP)			<0.001		mg/L		0.001	30-MAR-07
SI-DIS-ED	**Water**							

ALS Laboratory Group Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SI-DIS-ED	**Water**							
Batch R506206								
WG575348-1 MB								
Silicon (Si)-Dissolved			<0.1		mg/L		0.1	25-MAR-07
Batch R507795								
WG576954-1 MB								
Silicon (Si)-Dissolved			<0.1		mg/L		0.1	29-MAR-07
SULPHIDE-ED	**Water**							
Batch R507355								
WG576801-4 DUP		**L489101-1**						
Sulphide		<0.003	<0.003	RPD-NA	mg/L	N/A	15	28-MAR-07
WG576801-6 DUP		**L489551-1**						
Sulphide		0.019	0.020	J	mg/L	0.001	0.012	28-MAR-07
WG576801-7 DUP		**L489753-11**						
Sulphide		<0.003	<0.003	RPD-NA	mg/L	N/A	15	28-MAR-07
WG576801-9 DUP		**L490446-8**						
Sulphide		0.005	0.005	J	mg/L	0.000	0.012	28-MAR-07
WG576801-2 LCS								
Sulphide			84		%		63-116	28-MAR-07
WG576801-3 LCS								
Sulphide			80		%		70-119	28-MAR-07
WG576801-1 MB								
Sulphide			<0.003		mg/L		0.003	28-MAR-07
WG576801-10 MS		**L490249-2**						
Sulphide			89		%		42-140	28-MAR-07
WG576801-5 MS		**L489166-1**						
Sulphide			97		%		42-140	28-MAR-07
WG576801-8 MS		**L489819-2**						
Sulphide			92		%		42-140	28-MAR-07

ALS Laboratory Group Quality Control Report

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

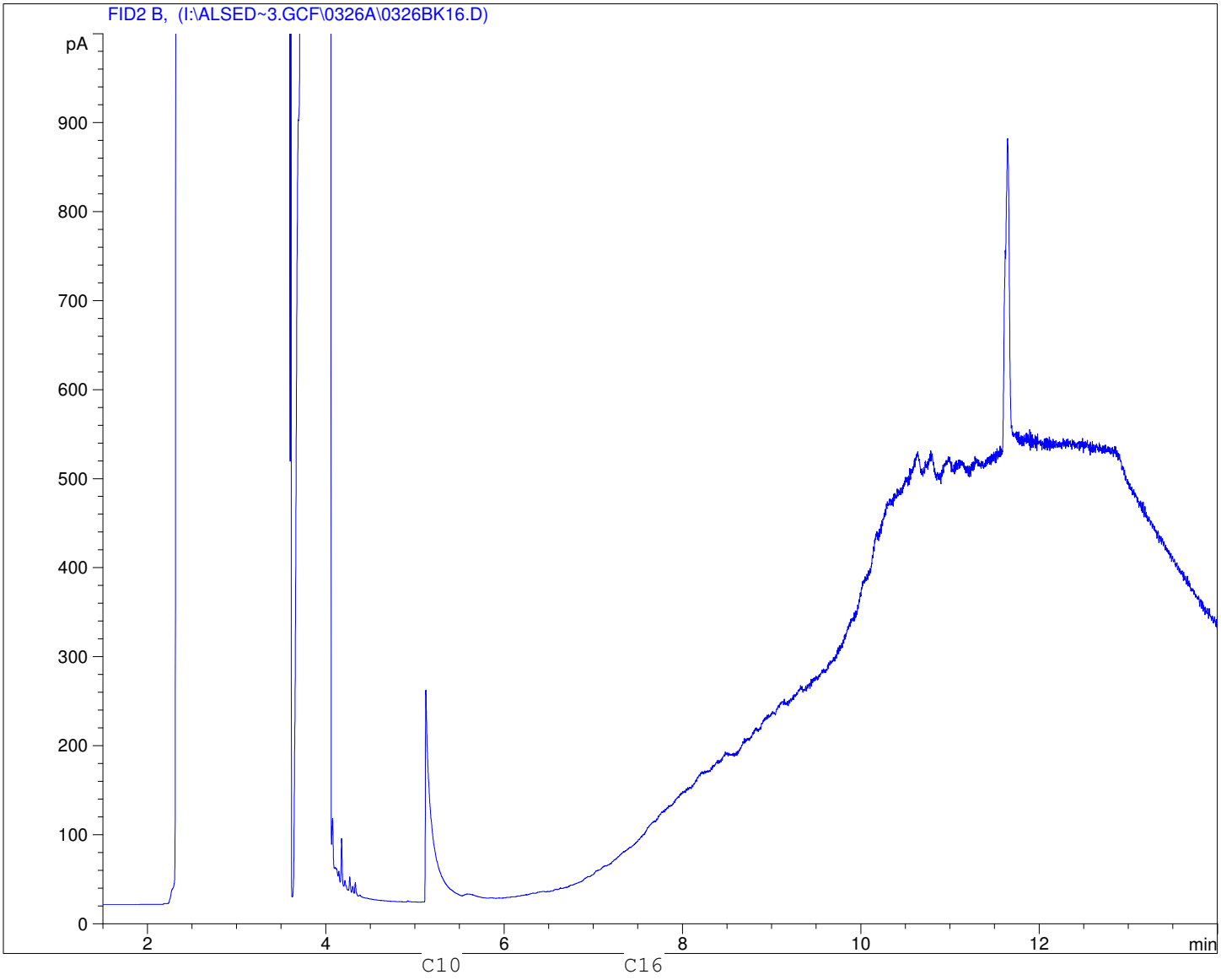
Qualifier:

RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
A	Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB" (result adjusted for method blank) appears in the Analytical Report.
B	Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.
E	Matrix spike recovery may fall outside the acceptance limits due to high sample background.
F	Silver recovery low, likely due to elevated chloride levels in sample.
G	Outlier - No assignable cause for nonconformity has been determined.
J	Duplicate results and limit(s) are expressed in terms of absolute difference.
K	The sample referenced above is of a non-standard matrix type; standard QC acceptance criteria may not be achievable.
L	Low matrix spike recovery due to instability of spiked analyte in the sample matrix.

Client ID: P06-1840-2

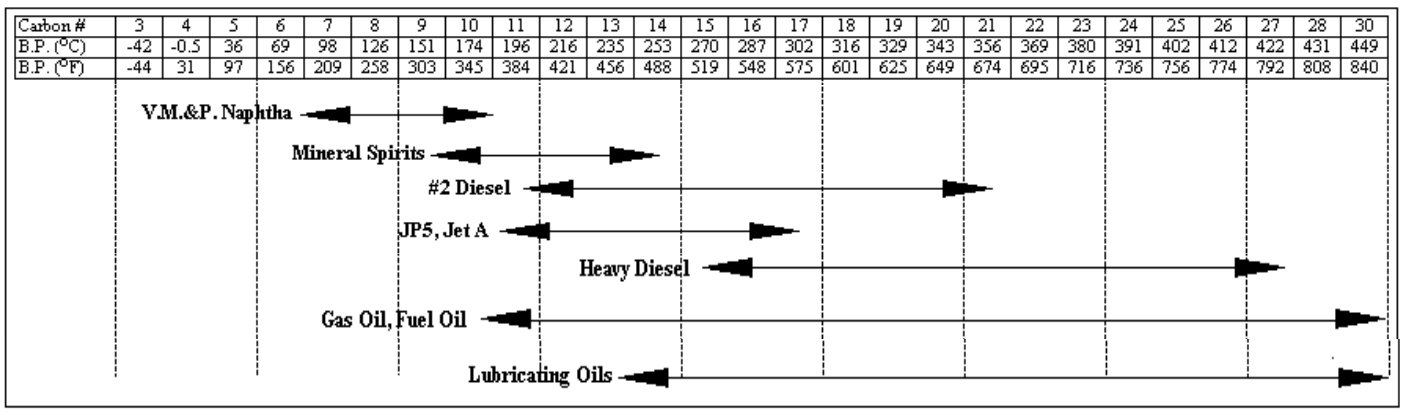
Sample ID: L489212-1 4
Injection Date: 3/26/07 11:06:08 PM
Instrument: 6890

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

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



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

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # 01199

REPORT TO: Worley Parsons Komex	REPORT FORMAT / DISTRIBUTION
COMPANY:	STANDARD OTHER
CONTACT: Joao Kupper	PDF EXCEL CUSTOM FAX
ADDRESS: Edmonton.	EMAIL 1: Joao.kupper@worleyparsons.com
	EMAIL 2: david.dillon@ " "
PHONE: 1-877-566-3933 FAX:	
INVOICE TO: SAME AS REPORT ? (YES) / NO	INDICATE BOTTLES: FILTERED / PRESERVED (F/P)
COMPANY:	CLIENT / PROJECT INFORMATION:
CONTACT:	JOB #:
ADDRESS:	PO/AFE: F35772803
	Legal Site Description:
PHONE: FAX:	QUOTE #:
Lab Work Order # (lab use only): L489212-	SAMPLER (Initials):

SERVICE REQUESTED

- X REGULAR SERVICE (DEFAULT)
- RUSH SERVICE (2-3 DAYS)
- PRIORITY SERVICE (1 DAY or ASAP)
- EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Routine Major ions, Fe, Mn	Silicon (Si) Dissolved	Mercury (Hg) Dissolved	Sulphide	Phenols (4AAP)	CCME PAHs	Dissolved Metals	Napth by FTIR	BTEX, F1, F2	PAHs & Alkylated PAHs	HAZARDOUS?	FIELD CONTAMINATED?	NUMBER OF CONTAINERS
	P06-1840-2	Mar. 21/07	15:00	H_2O	X	X	X	X	X	X	X	X	X	X			
	TRIP BLANK	Mar. 21/07	—	H_2O	X	X	X	X	X	X	X	X	X	X			

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARD DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this from *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
Cathleen O'Brien	Mar. 22/07 13:22	CHRISTA COLEMAN	23/MAR/13:22
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)

TEMPERATURE — SAMPLES RECEIVED IN GOOD CONDITION? YES / NO (If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

Appendix 1C Hydraulic Conductivity Testing Method and Groundwater Surface Water Interaction Calculations

APPENDIX 1C
HYDRAULIC CONDUCTIVITY TESTING METHOD AND GROUNDWATER SURFACE WATER INTERACTION CALCULATIONS

Hydraulic Conductivity Testing Method

Development of monitoring wells was accomplished either by bailing or by airlifting. Bailing was generally used for shallow monitoring wells. This technique imposes a surging action that results in the production and removal of fine-grained materials from the formation immediately surrounding the screened interval. Where possible, development was continued until the water clarified, or until a sufficient volume (one to three well bores) had been withdrawn to ensure removal of all water affected by drilling and installation activities.

Deeper wells were generally developed using airlifting. This technique used compressed air to rapidly displace the water in the well, thereby imposing a surging action that results in the production and removal of fine-grained materials from the formation immediately surrounding the screened interval. During development, groundwater chemistry (pH, electrical conductivity and temperature) was monitored until the parameters stabilized.

Hydraulic conductivity (K) tests were conducted using a solid PVC slug to displace a fixed volume of water in the well. A pressure transducer was placed in the well prior to immersing the slug. The transducer was used to collect water level measurements as the water level recovered following removal of the slug. Hydraulic conductivity values obtained from slug tests can only be considered as approximate given the relatively small volume of water removed from the formation. Therefore, such hydraulic conductivity estimates only represent the zone in the immediate vicinity of the monitoring well.

Although small variations in clay content can greatly change the hydraulic conductivity of otherwise similar geologic deposits, this type of test provides a useful indication as to the order of magnitude of the local hydraulic conductivity. The Bouwer and Rice (1976) method (for unconfined conditions) or the Springer-Gelhar (1991) (for high hydraulic conductivity, unconfined aquifers) and Butler (1998) (for high hydraulic conductivity, confined aquifers) methods was used to calculate K values.

Groundwater Surface Water Interaction Calculations

Jackpine Expansion Mining Area

Shallow groundwater flow at the Jackpine Expansion Mining Area (JEMA) was expected to discharge primarily to the Muskeg River. An exception to this was the northwest portion of the JEMA lease area located on the Fort Hills. Based on the hydrologic and topographic data in this area, there is a high probability that groundwater flow divide exists along the ridge of the Fort Hills. The area northwest of the ridge was expected to ultimately drain to McClelland Lake, while southeast of the divide drainage was

expected to be to Muskeg River. Using the groundwater flow pattern in the Quaternary deposits, it was possible to estimate the amount of groundwater discharge to the Muskeg River from the Quaternary deposits.

Based on the available data, and with the Muskeg River acting as a local groundwater flow divide across the JEMA leases, two separate shallow groundwater flow areas in the Quaternary deposits were defined:

- flow from the slopes of Muskeg Mountain to Muskeg River (southeast corner of the JEMA leases); and
- flow from the slopes of the Fort Hills to Muskeg River.

Although shallow groundwater was expected to discharge as seeps and springs from steep slopes (i.e., Fort Hills), each of these flow systems will ultimately discharge to the Muskeg River. The groundwater flux to the river from each area was calculated based on the measured hydraulic gradient, hydraulic conductivity and estimated discharge area.

Although hydraulic data was not available to the edge of all the leases, for the purposes of estimating discharge, the topographic slope was taken to represent the maximum hydraulic gradient in the Quaternary deposits. Using the topographic slope to define the hydraulic gradient provided a conservative estimate of flux through the Quaternary deposits.

For the southeast side of the JEMA leases the lateral hydraulic gradient is about 0.0035 m/m. The geometric mean of the hydraulic conductivity measurements of the Quaternary deposits (shallow, deep and Pleistocene Channel) in the Muskeg River valley was 2.0×10^{-4} m/s. The groundwater level at the monitoring wells nearest the Muskeg River (P06-1623-SQ and P06-1664-SQ) was 0.14 mbgs, indicating the Quaternary deposits were basically saturated over their entire thickness. The discharge rate to the river was calculated as:

$$Q = A \times K \times \frac{\Delta h}{\Delta l}$$

Where Q was the total discharge (flux), A was the cross-sectional area of discharge in the relevant geologic formation along a certain length of river, K was the hydraulic conductivity, and $\Delta h/\Delta l$ was the hydraulic gradient. The area of the Quaternary deposits along which discharge occurs from the southeast was about 149,040 m^2. The calculated discharge to the Muskeg River was about 0.104 m^3/s (corresponding to 9,014 m^3/d).

Using the same method, flux to Muskeg River was calculated from the northeast (Fort Hills). The inferred hydraulic gradient from the foot of the Fort Hills to the Muskeg River ranged from approximately 0.001 to 0.003 m/m. The geometric mean of the hydraulic conductivity measurements of the Quaternary deposits

(shallow and deep) in the Muskeg River valley was 2.0 x 10^{-4} m/s. The cross-sectional area of Quaternary groundwater discharge from the northwest was approximately 132,332 m^2. The calculated discharge to the Muskeg River from the Fort Hills area ranged from about 0.026 to 0.08 m^3/s (which corresponds to 2,286 and 6,860 m^3/d).

The total contribution to baseflow in the Muskeg River from the Quaternary deposits across the remainder of the JEMA lease area was estimated to range from 0.126 to 0.18 m^3/s (or about 11,300 to 15,874 m^3/d). For comparison, mean annual discharge of the Muskeg River from the JEMA lease area was estimated to be 1.45 m^3/s (or 125,280 m^3/d) (Golder 2007). The estimated baseflow from the JEMA was therefore about 12.6% of the mean annual discharge.

Pierre River Mining Area

At the Pierre River Mining Area (PRMA), the Quaternary deposits outcrop in the Athabasca River valley, with groundwater discharge expected to occur as seeps and spring along the valley wall. Discharge from the valley wall will eventually reach the Athabasca River, either as shallow groundwater discharge or surface water flow, although some of the seepage water will be lost to evapotranspiration.

As with JEMA, the depth to groundwater within the Quaternary deposits adjacent to the Athabasca River valley was less than 0.5 m, indicating that the Quaternary deposits were essentially fully saturated near the river. The hydraulic gradient in the Quaternary deposits across Lease 9 was about 0.006 m/m. The geometric mean hydraulic conductivity at the Quaternary monitoring wells in Lease 9 was 3 x 10^{-6} m/s. The cross-sectional area of the Quaternary deposits outcropping in the Athabasaca River valley along the east edge of Lease 9 was about 165,456 m^2. Therefore, the estimated discharge from the Quaternary deposits in Lease 9 was deduced to be about 0.003 m^3/s (or 257 m^3/d).

No Quaternary groundwater monitoring wells were available in Lease 17, so groundwater flow patterns in the Quaternary deposits were not available. Using the conservative assumption that groundwater flow in the Quaternary deposits mimics the topographic slope, the hydraulic gradient was estimated to be 0.005 m/m. The cross-sectional area of the Quaternary deposits in the Lease 17 along the Athabasca River valley was approximately 293,988 m^2. Assuming that hydraulic conductivity values in Lease 17 Quaternary deposits were similar to those in Lease 9 (3 x 10^{-6} m/s), groundwater discharge to the Athabasca River valley from the Lease 17 Quaternary deposits was 0.0044 m^3/s (or 381 m^3/d).

Based on the regional hydrogeological data, the Basal Aquifer discharges to the Athabasca River along the length of the PRMA lease area. The hydraulic gradient within the Basal Aquifer across Lease 9 and 17 ranged from approximately 0.006 to 0.01. The one hydraulic conductivity measurement available for the Basal Aquifer in the PRMA area (1.5 x 10^{-5} m/s) was consistent with the hydraulic conductivity measurements from the Canadian Natural Horizon Project (1 x 10^{-6} to 5 x 10^{-5}; Clifton, 2001). The cross-sectional area of the Basal Aquifer beneath the Athabasca River was approximately 182,230 m^2. Therefore, the discharge to the Athabasca River from the Basal Aquifer was calculated to range from 0.016 to 0.09 m^3/s (corresponding to 1,417 and 7,872 m^3/d).

Although there will be groundwater discharge to the Athabasca River or river valley from the Clearwater Formation and Middle and Upper Members of the McMurray Formation, due to the relatively low permeability of these units, the groundwater discharge volume was expected to be relatively low compared to discharge from the Quaternary deposits and Basal Aquifer.

The total contribution to baseflow in the Athabasca River from the Quaternary deposits and Basal Aquifer across the PRMA lease area was estimated to range from 0.023 to 0.097 m^3/s (or 1,987 to 8,381 m^3/d). For comparison, mean annual discharge of the Athabasca River below Eymundson Creek was 656 m^3/s (or 5.67 x 10^7 m^3/d) (Golder 2007). The maximum estimated baseflow from the PRMA was about 0.015% of the mean annual discharge.

REFERENCES

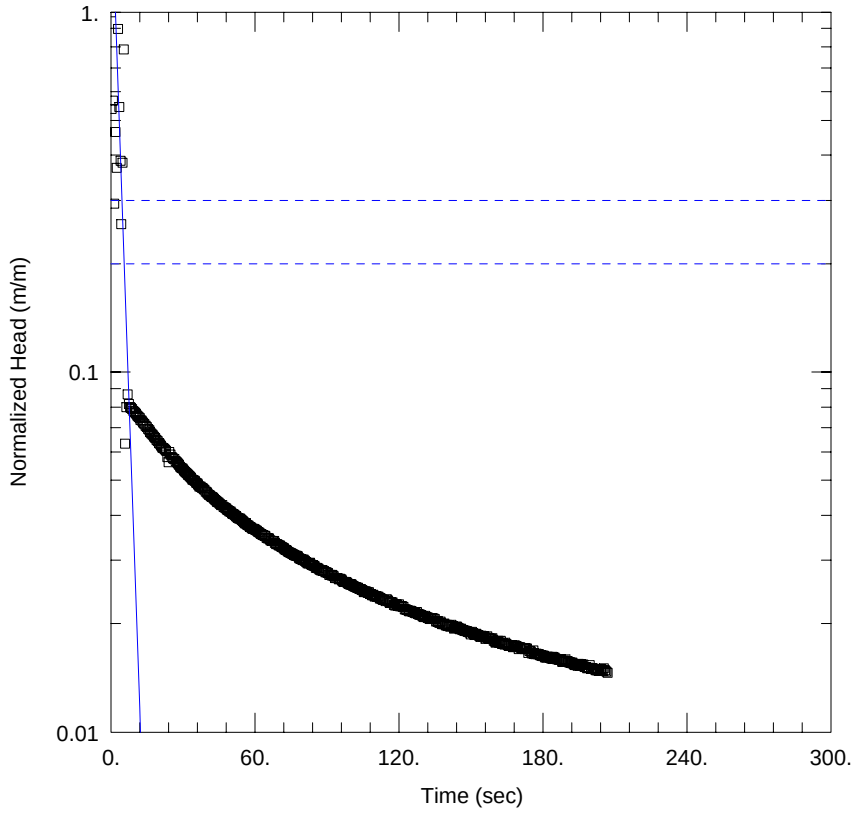
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WELL TEST ANALYSIS

Data Set: J:\...\P06-1620-SQ.aqt
Date: 10/17/07 Time: 18:38:16

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001 m/sec
y0 = 8.632 m

AQUIFER DATA

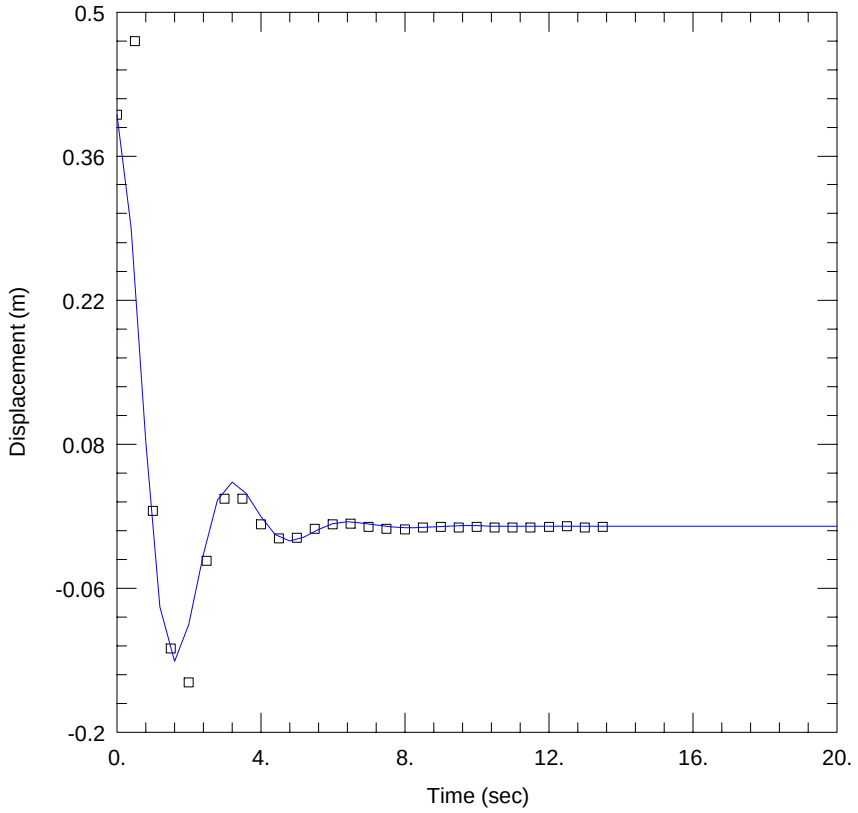
Saturated Thickness: 10. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1620-SQ)

Initial Displacement: 3.5 m
Total Well Penetration Depth: 5.19 m
Casing Radius: 0.025 m

Static Water Column Height: 5.19 m
Screen Length: 3.15 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1623-SQ.aqt
Date: 10/17/07 Time: 18:38:07

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.00065 m/sec
Le = 2.267 m

AQUIFER DATA

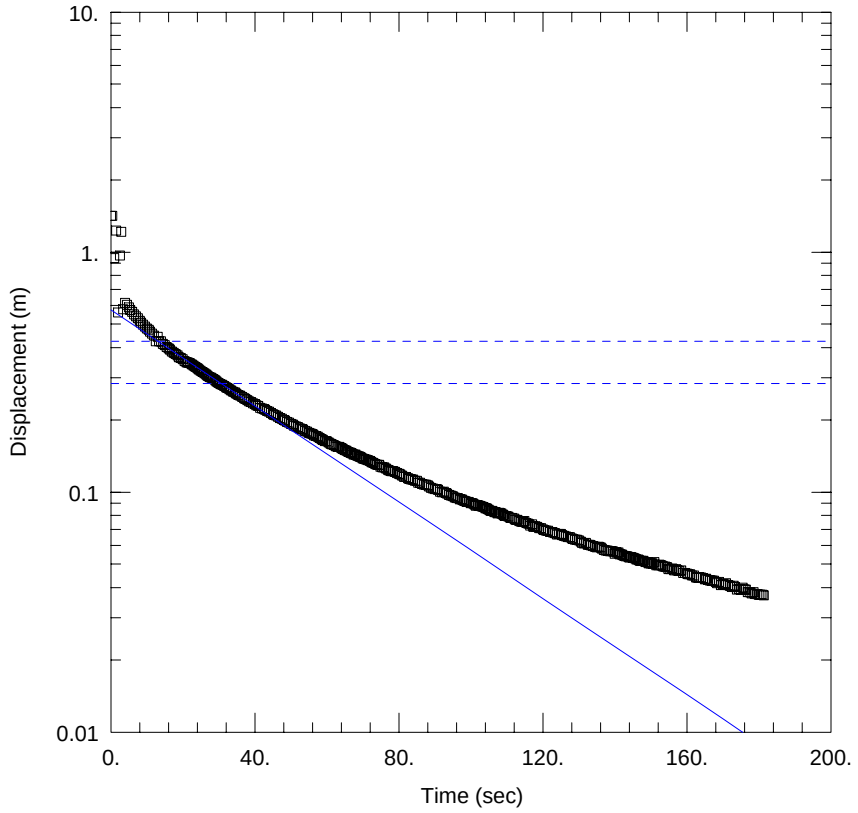
Saturated Thickness: 6.33 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1623-SQ)

Initial Displacement: 0.4 m
Total Well Penetration Depth: 3.05 m
Casing Radius: 0.025 m

Static Water Column Height: 3.03 m
Screen Length: 3.05 m
Well Radius: 0.127 m
Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS

Data Set: J:\...\P06-1629-SQ.aqt
Date: 10/17/07 Time: 18:37:57

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.3E-5 m/sec
y0 = 0.5741 m

AQUIFER DATA

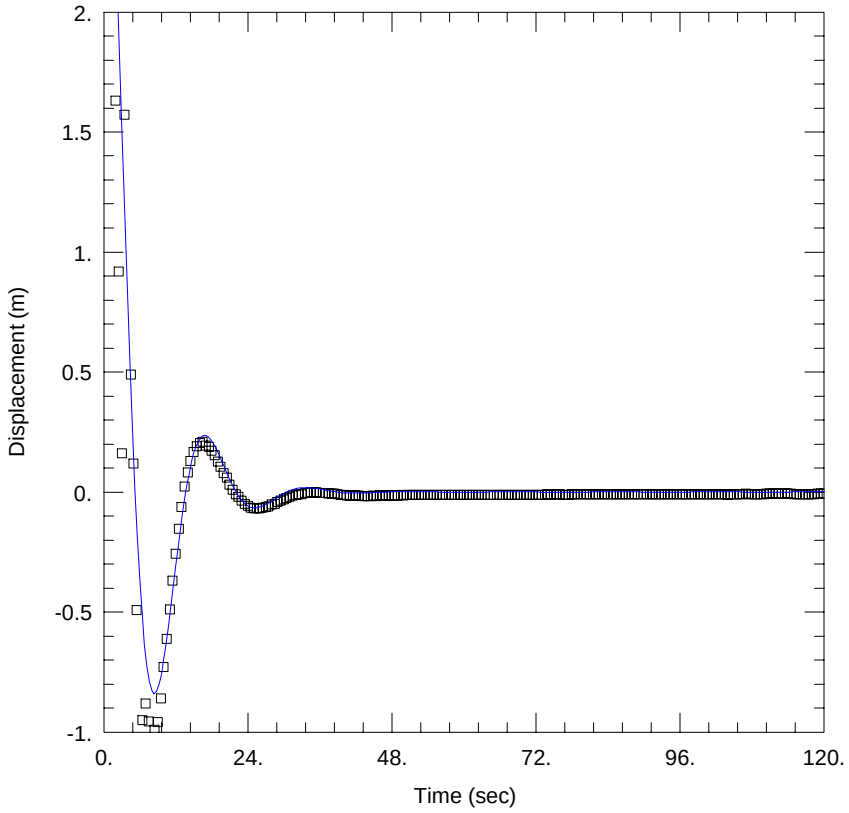
Saturated Thickness: 6.23 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1629-SQ)

Initial Displacement: 1.418 m
Total Well Penetration Depth: 4.15 m
Casing Radius: 0.025 m

Static Water Column Height: 2.93 m
Screen Length: 3.15 m
Well Radius: 0.127 m
Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS

Data Set: J:\...\P06-1636-D.aqt
Date: 10/17/07 Time: 18:37:47

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 0.00014 m/sec
Le = 60.49 m

AQUIFER DATA

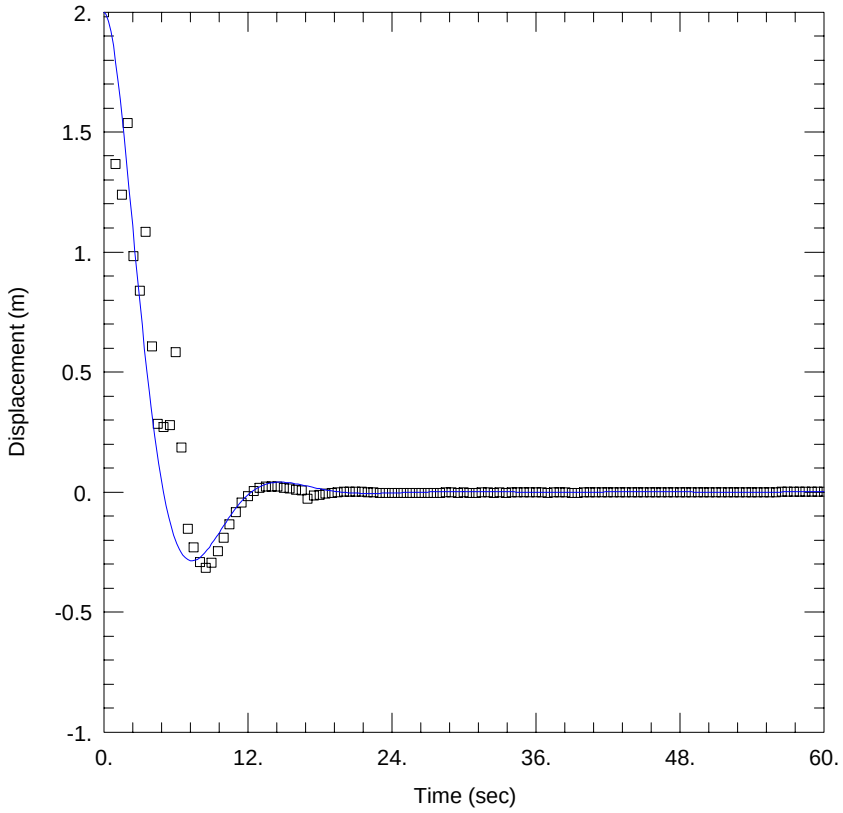
Saturated Thickness: 19.6 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1636-D)

Initial Displacement: 3. m
Total Well Penetration Depth: 72.84 m
Casing Radius: 0.025 m

Static Water Column Height: 73.3 m
Screen Length: 6.09 m
Well Radius: 0.075 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1638-PC.aqt
Date: 10/17/07 Time: 18:37:38

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.00028 m/sec
Le = 38.86 m

AQUIFER DATA

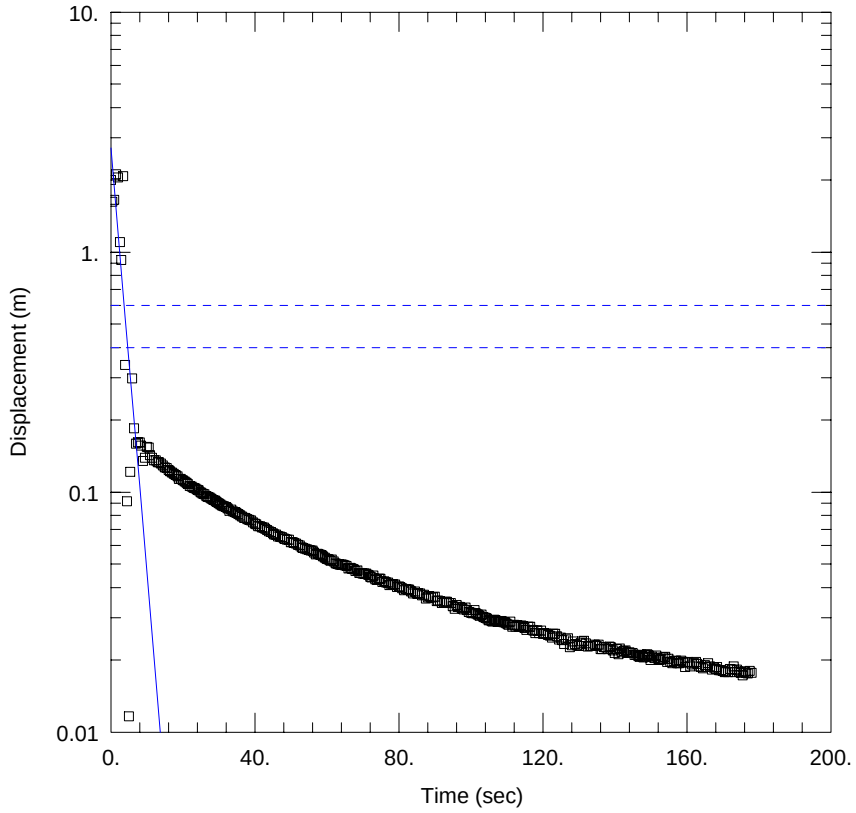
Saturated Thickness: 25.9 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1638-PC)

Initial Displacement: 2. m
Total Well Penetration Depth: 20.11 m
Casing Radius: 0.025 m

Static Water Column Height: 20.5 m
Screen Length: 1.5 m
Well Radius: 0.0635 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1639-SQ.aqt
Date: 10/17/07 Time: 18:37:27

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 17, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.00017 m/sec
y0 = 2.715 m

AQUIFER DATA

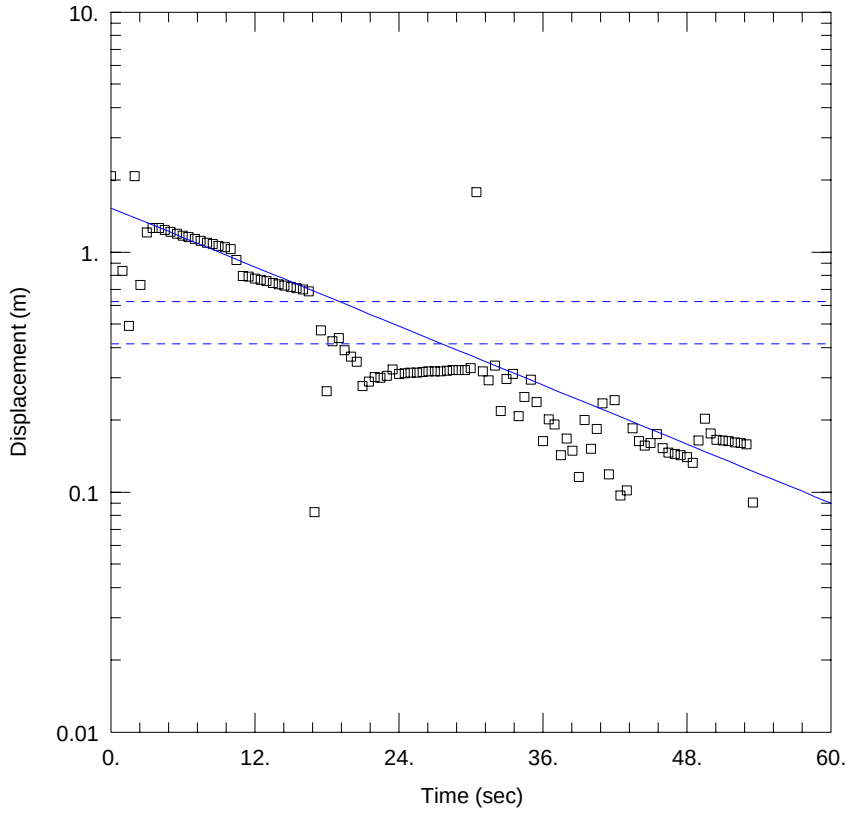
Saturated Thickness: 3.93 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1639-SQ)

Initial Displacement: 2. m
Total Well Penetration Depth: 3.53 m
Casing Radius: 0.025 m

Static Water Column Height: 3.53 m
Screen Length: 1.85 m
Well Radius: 0.075 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1641-SQ.aqt
Date: 10/17/07 Time: 18:37:16

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 17, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.00011 m/sec
y0 = 1.527 m

AQUIFER DATA

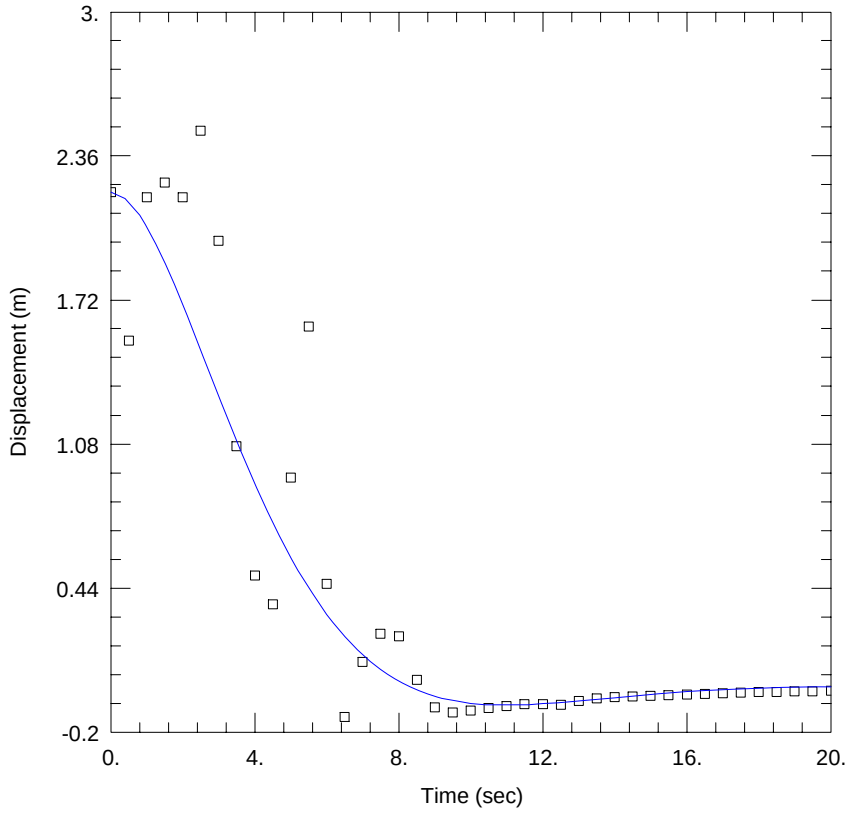
Saturated Thickness: 7.55 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1641-SQ)

Initial Displacement: 2.07 m
Total Well Penetration Depth: 20.7 m
Casing Radius: 0.025 m

Static Water Column Height: 2.92 m
Screen Length: 4.05 m
Well Radius: 0.127 m
Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS

Data Set: J:\...\P06-1650-DQ.aqt
Date: 10/17/07 Time: 18:37:07

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 0.00011 m/sec
Le = 56.69 m

AQUIFER DATA

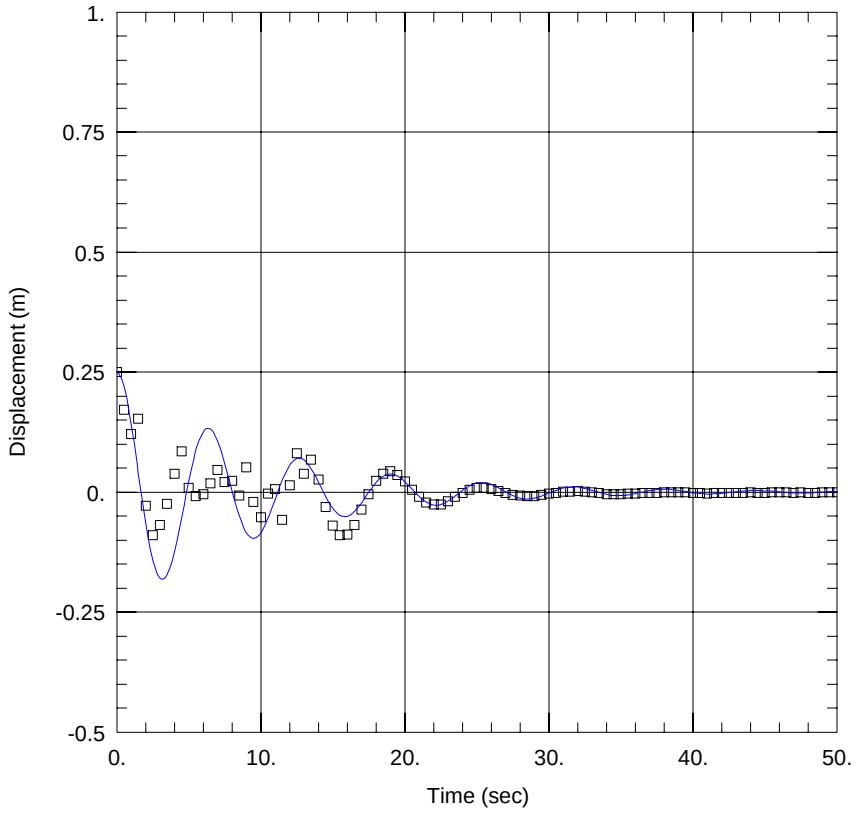
Saturated Thickness: 6.75 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1650-DQ)

Initial Displacement: 2.2 m
Total Well Penetration Depth: 19.29 m
Casing Radius: 0.025 m

Static Water Column Height: 18.57 m
Screen Length: 3.19 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1650-SQ.aqt
Date: 10/17/07 Time: 18:36:58

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.0012 m/sec
Le = 9.866 m

AQUIFER DATA

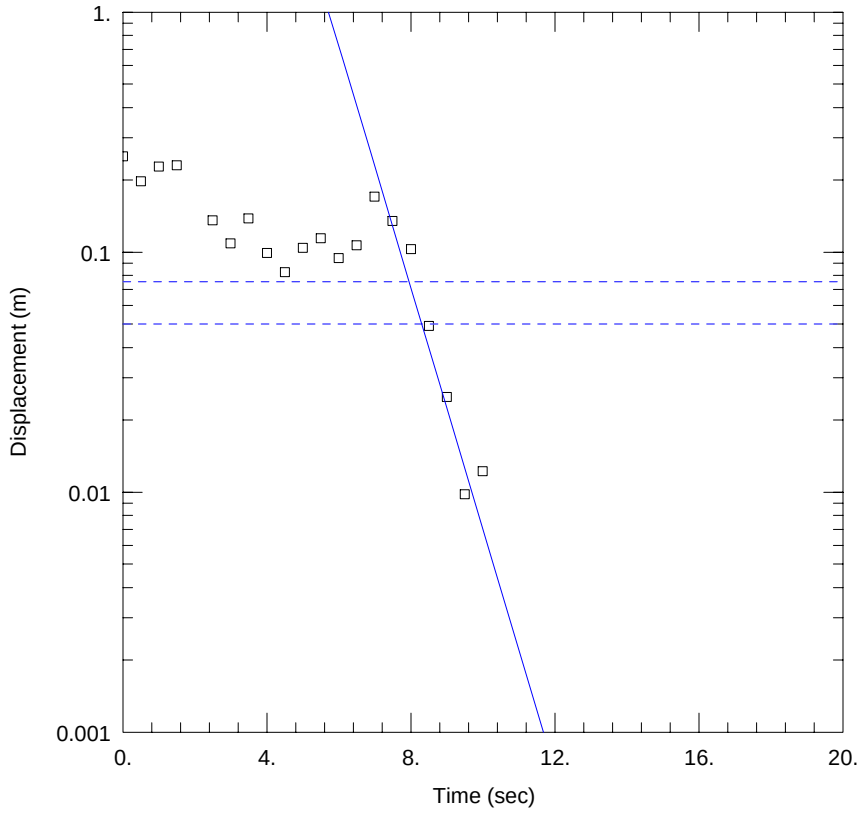
Saturated Thickness: 11.05 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1650-SQ)

Initial Displacement: 0.25 m
Total Well Penetration Depth: 10.87 m
Casing Radius: 0.025 m

Static Water Column Height: 10.87 m
Screen Length: 3.9 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1655-SQ.aqt
Date: 10/17/07 Time: 18:36:48

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

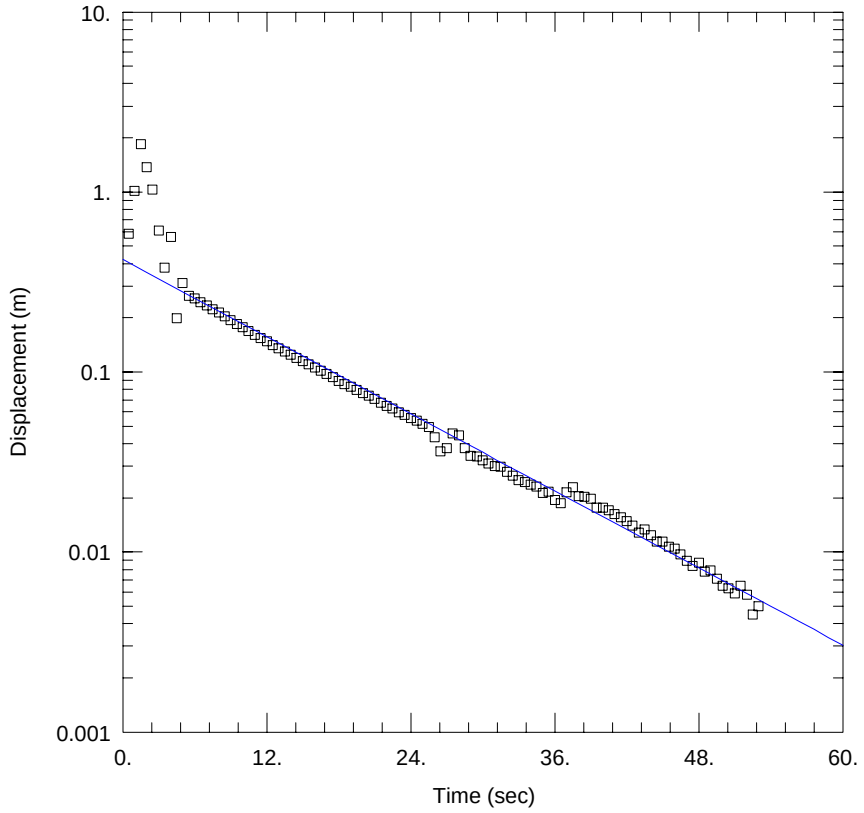
K = 0.00025 m/sec
y0 = 759.8 m

AQUIFER DATA

Saturated Thickness: 3.93 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1655-SQ)

Initial Displacement: 0.25 m
Total Well Penetration Depth: 5.13 m
Casing Radius: 0.025 m
Static Water Column Height: 3.93 m
Screen Length: 4.01 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1664-SQ.aqt
Date: 10/17/07 Time: 18:36:39

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.0E-5 m/sec
y0 = 0.4209 m

AQUIFER DATA

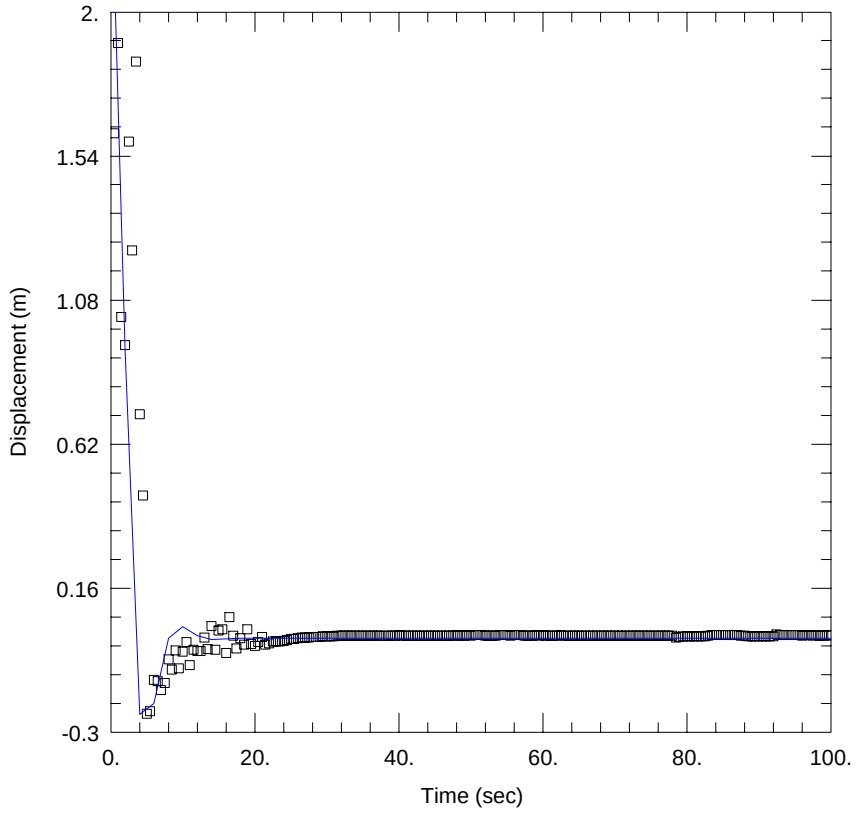
Saturated Thickness: 4.33 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1664-SQ)

Initial Displacement: 0. m
Total Well Penetration Depth: 4.33 m
Casing Radius: 0.025 m

Static Water Column Height: 4.33 m
Screen Length: 1.5 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1672-SQ.aqt
Date: 10/17/07 Time: 18:36:30

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.00035 m/sec
Le = 15.51 m

AQUIFER DATA

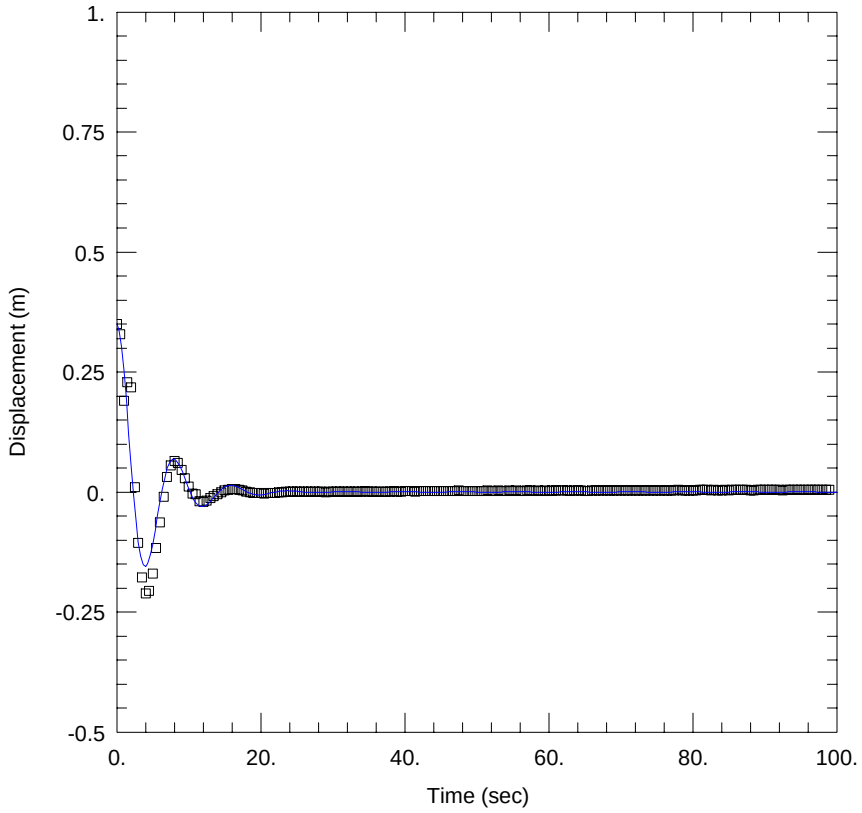
Saturated Thickness: 4.33 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1672-SQ)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 4.33 m
Casing Radius: 0.025 m

Static Water Column Height: 4.12 m
Screen Length: 1.5 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1699-DQ.aqt
Date: 10/17/07 Time: 18:36:17

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

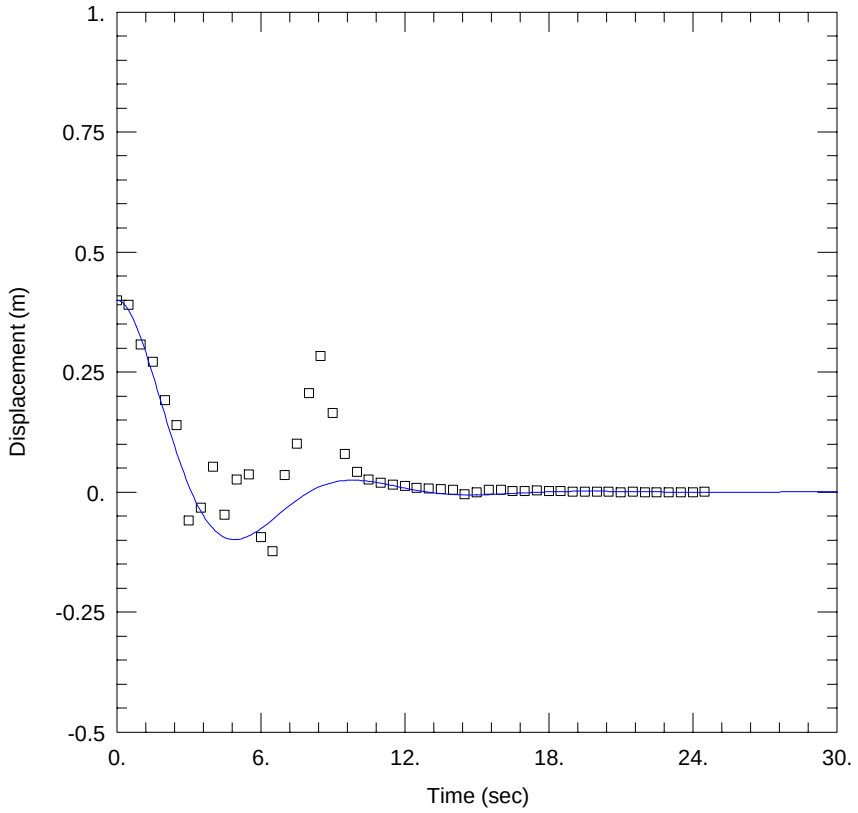
K = 0.00054 m/sec
Le = 14.52 m

AQUIFER DATA

Saturated Thickness: 14. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1699-DQ)

Initial Displacement: 0.35 m
Total Well Penetration Depth: 5.37 m
Casing Radius: 0.025 m
Static Water Column Height: 5.37 m
Screen Length: 3.39 m
Well Radius: 0.025 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1699-SQ.aqt
Date: 10/17/07 Time: 18:36:04

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.00036 m/sec
Le = 20.04 m

AQUIFER DATA

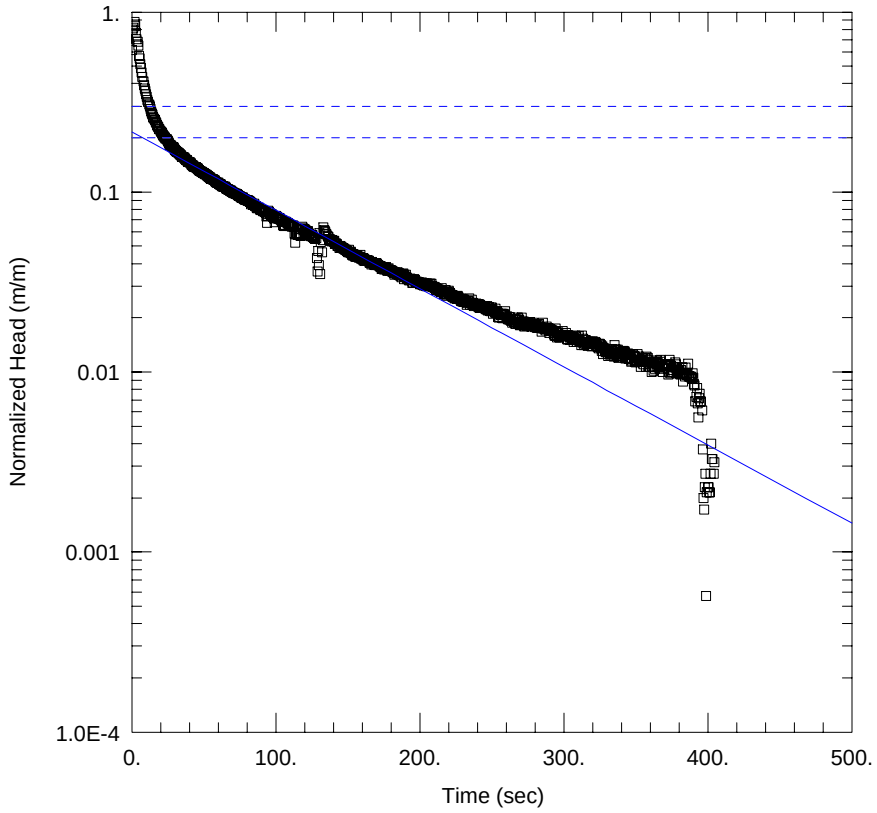
Saturated Thickness: 5.25 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1699-SQ)

Initial Displacement: 0.4 m
Total Well Penetration Depth: 5.42 m
Casing Radius: 0.025 m

Static Water Column Height: 5.25 m
Screen Length: 3.05 m
Well Radius: 0.025 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1804-SQ.aqt
Date: 10/17/07 Time: 18:39:23

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Pierre River Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.1E-6 m/sec
y0 = -0.1509 m

AQUIFER DATA

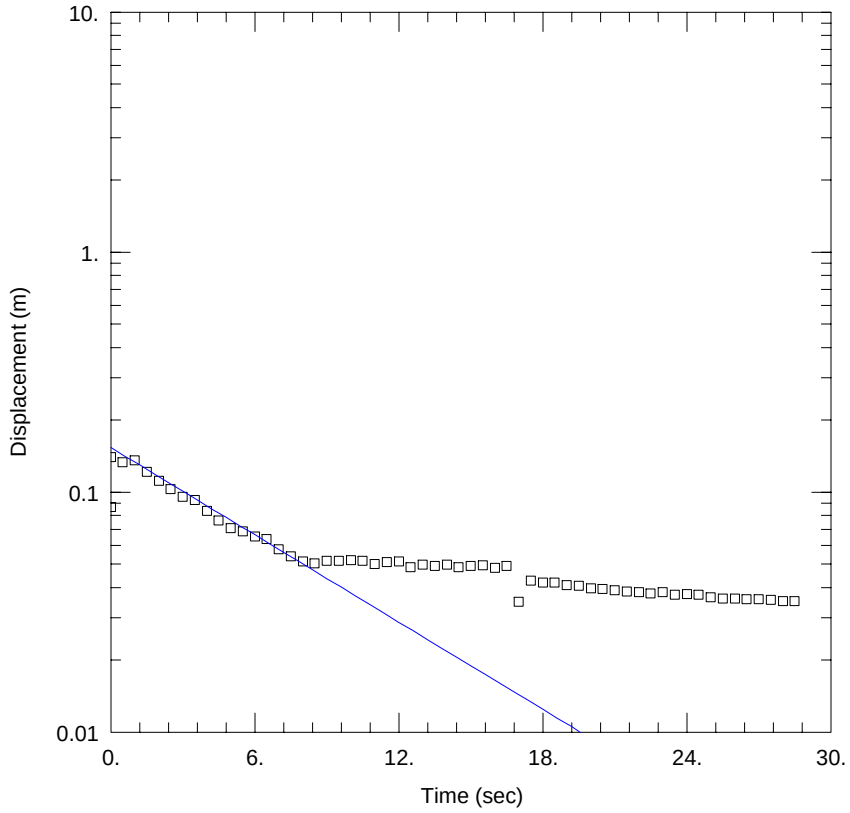
Saturated Thickness: 10. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1804-SQ)

Initial Displacement: -0.7 m
Total Well Penetration Depth: 3.4 m
Casing Radius: 0.025 m

Static Water Column Height: 1.81 m
Screen Length: 3.05 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1821-SQ.aqt
Date: 10/17/07 Time: 18:40:57

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Pierre River Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.8E-5 m/sec
y0 = 0.1531 m

AQUIFER DATA

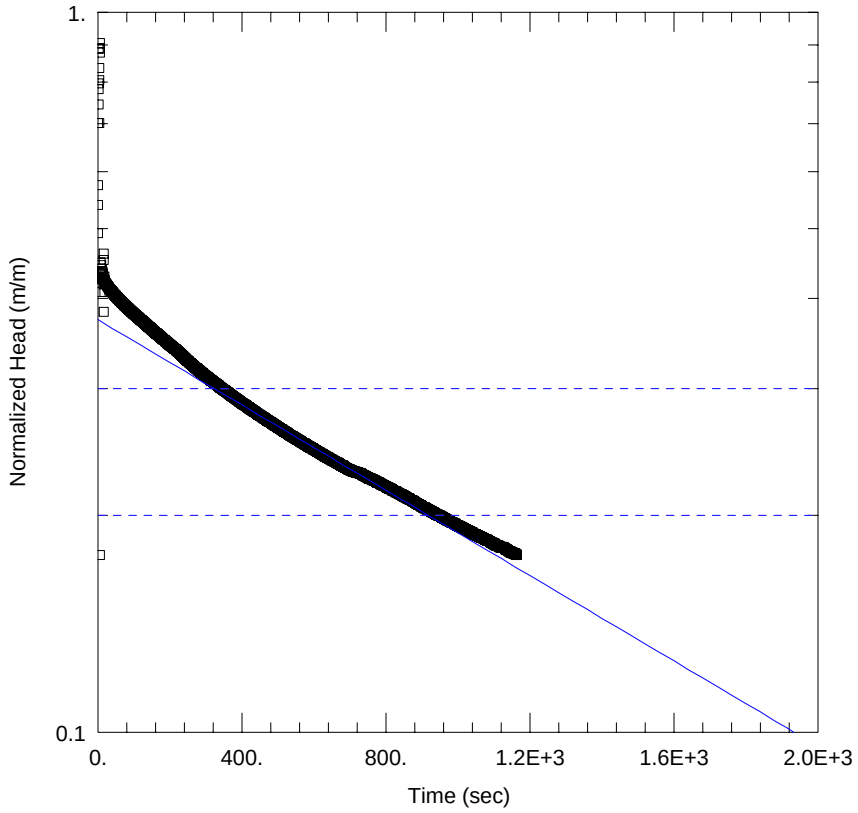
Saturated Thickness: 0.45 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1821-SQ)

Initial Displacement: 0.14 m
Total Well Penetration Depth: 5.55 m
Casing Radius: 0.025 m

Static Water Column Height: 0.7 m
Screen Length: 3.15 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1836-SQ.aqt
Date: 10/17/07 Time: 18:40:48

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Pierre River Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

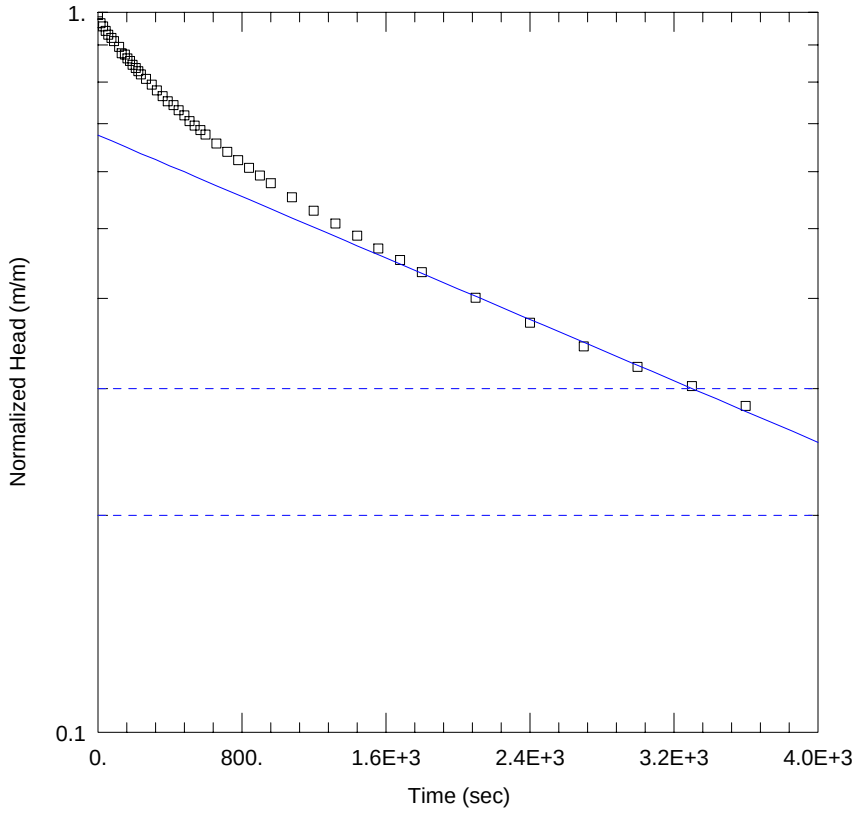
K = 1.6E-7 m/sec
y0 = -0.7476 m

AQUIFER DATA

Saturated Thickness: 9.25 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1836-SQ)

Initial Displacement: -2. m
Total Well Penetration Depth: 5.54 m
Casing Radius: 0.025 m
Static Water Column Height: 5.49 m
Screen Length: 3.05 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1853-DQ_manual.aqt
Date: 10/17/07 Time: 18:40:15

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Pierre River Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.0E-7 m/sec
y0 = 7.217 m

AQUIFER DATA

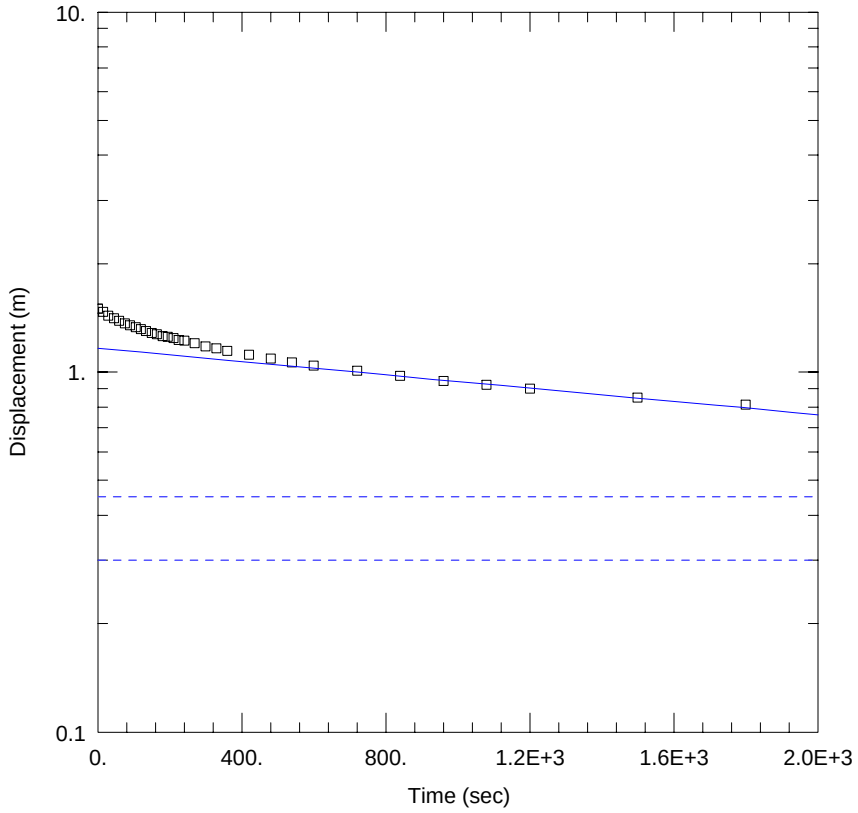
Saturated Thickness: 20. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1853-DQ)

Initial Displacement: 10.7 m
Total Well Penetration Depth: 10.96 m
Casing Radius: 0.025 m

Static Water Column Height: 14.77 m
Screen Length: 1.5 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1853-SQ_manual.aqt
Date: 10/17/07 Time: 18:40:07

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Pierre River Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.6E-8 m/sec
y0 = 1.164 m

AQUIFER DATA

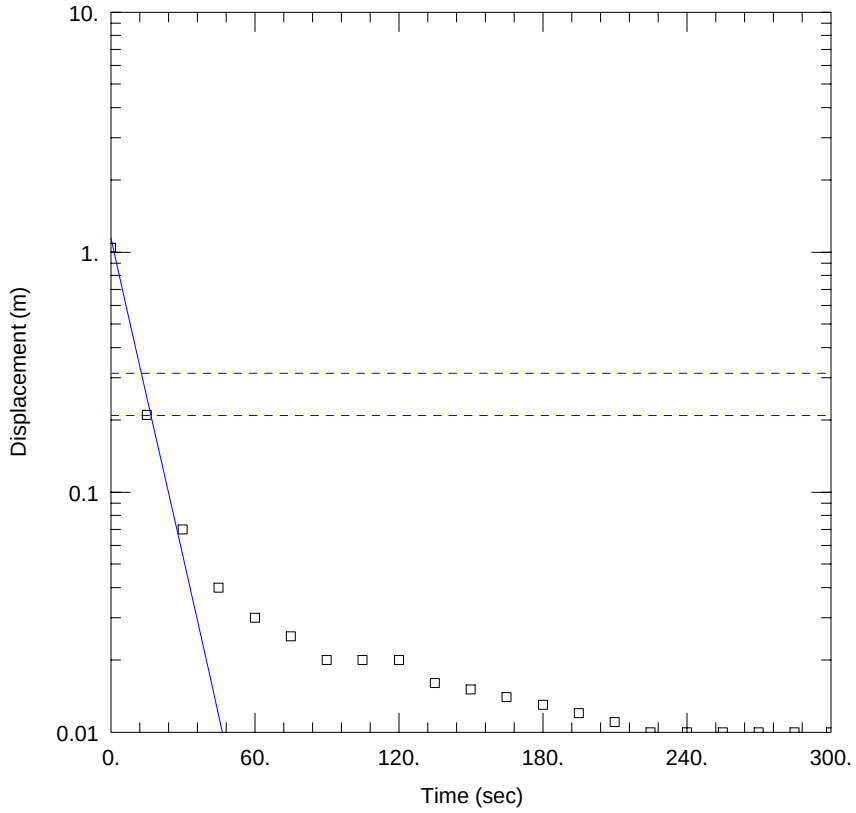
Saturated Thickness: 4.15 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1853-SQ)

Initial Displacement: 1.5 m
Total Well Penetration Depth: 4.2 m
Casing Radius: 0.025 m

Static Water Column Height: 1.65 m
Screen Length: 3.05 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\P06-1862-SQ_manual.aqt
Date: 10/17/07 Time: 18:39:58

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Pierre River Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.4E-5 m/sec
y0 = 1.139 m

AQUIFER DATA

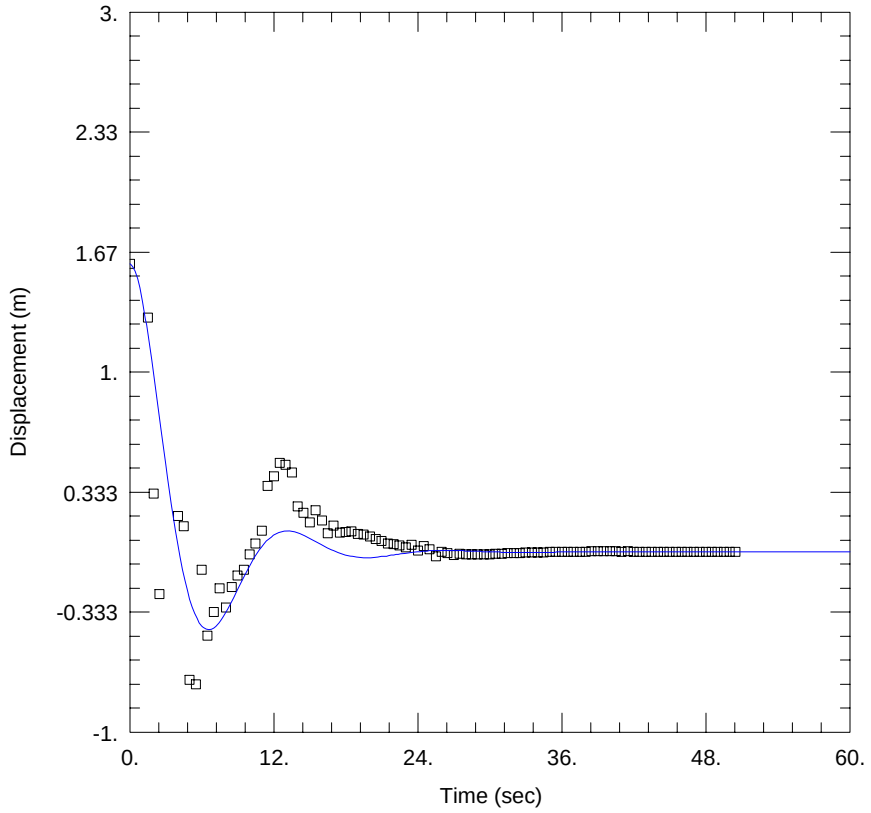
Saturated Thickness: 3.75 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P06-1862-SQ)

Initial Displacement: 1.04 m
Total Well Penetration Depth: 3.46 m
Casing Radius: 0.025 m

Static Water Column Height: 3.75 m
Screen Length: 3. m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1620-BS.aqt
Date: 10/17/07 Time: 18:35:50

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 0.00021 m/sec
Le = 36.52 m

AQUIFER DATA

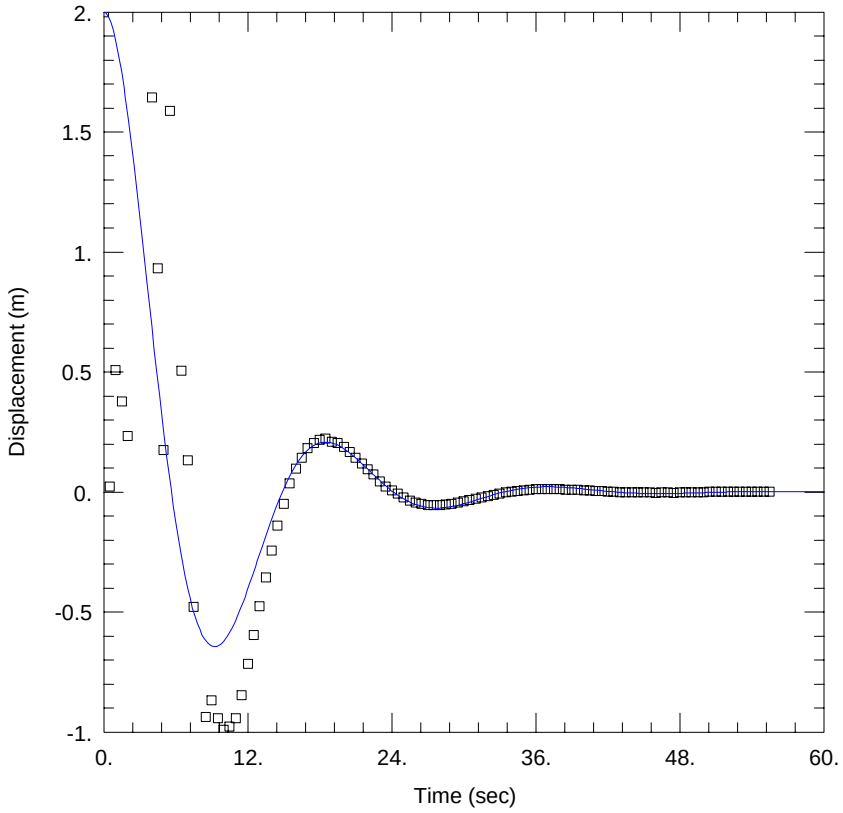
Saturated Thickness: 5. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1620-BS)

Initial Displacement: 1.6 m
Total Well Penetration Depth: 4.7 m
Casing Radius: 0.025 m

Static Water Column Height: 88.59 m
Screen Length: 3. m
Well Radius: 0.15 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1636-D.aqt
Date: 10/17/07 Time: 18:35:37

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 0.00014 m/sec
Le = 75.16 m

AQUIFER DATA

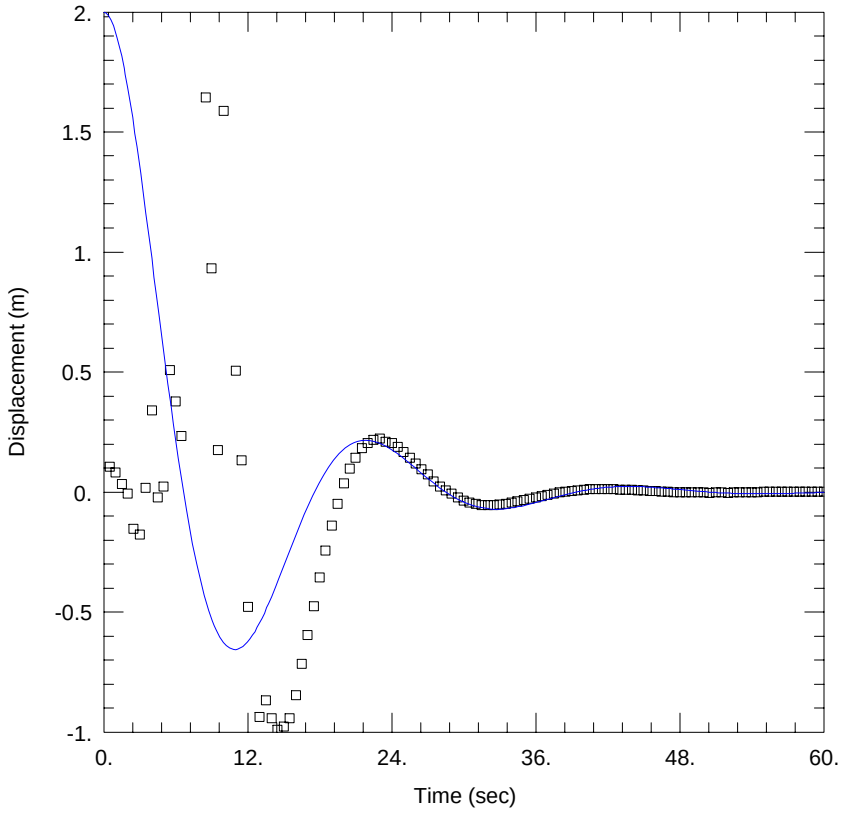
Saturated Thickness: 20. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1636-D)

Initial Displacement: 2. m
Total Well Penetration Depth: 72.14 m
Casing Radius: 0.025 m

Static Water Column Height: 78.5 m
Screen Length: 6.09 m
Well Radius: 0.0725 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1641-D.aqt
Date: 10/17/07 Time: 18:35:27

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 22, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 0.00012 m/sec
Le = 105.3 m

AQUIFER DATA

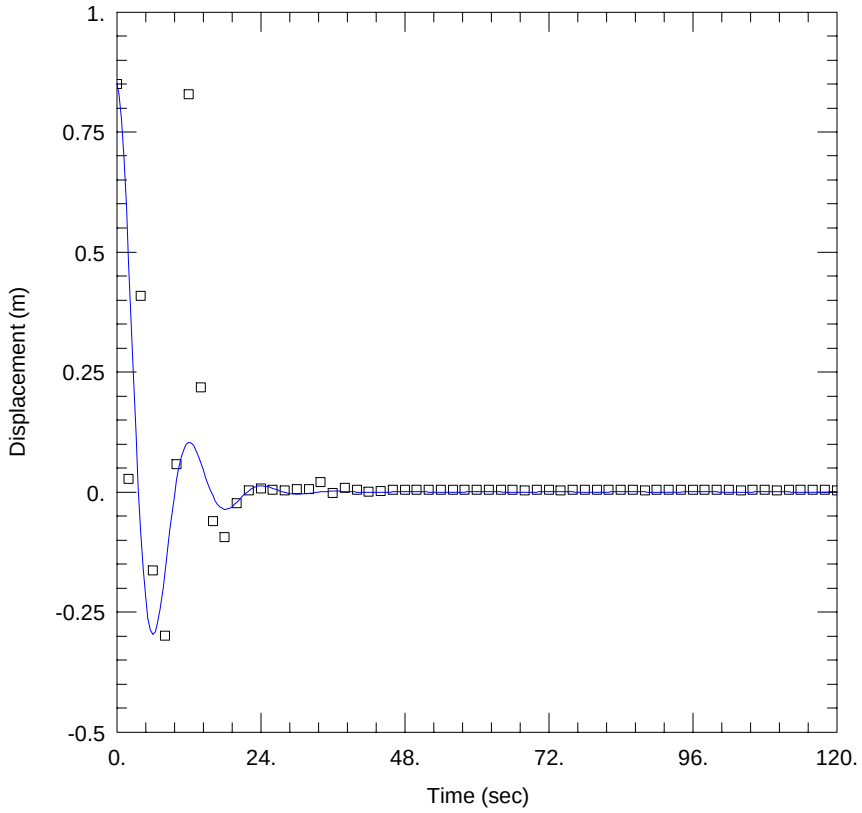
Saturated Thickness: 20. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1641-D)

Initial Displacement: 2. m
Total Well Penetration Depth: 72.14 m
Casing Radius: 0.025 m

Static Water Column Height: 78.5 m
Screen Length: 6.09 m
Well Radius: 0.0725 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1641-DQ.aqt
Date: 10/17/07 Time: 18:35:08

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 22, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 0.00067 m/sec
Le = 32.58 m

AQUIFER DATA

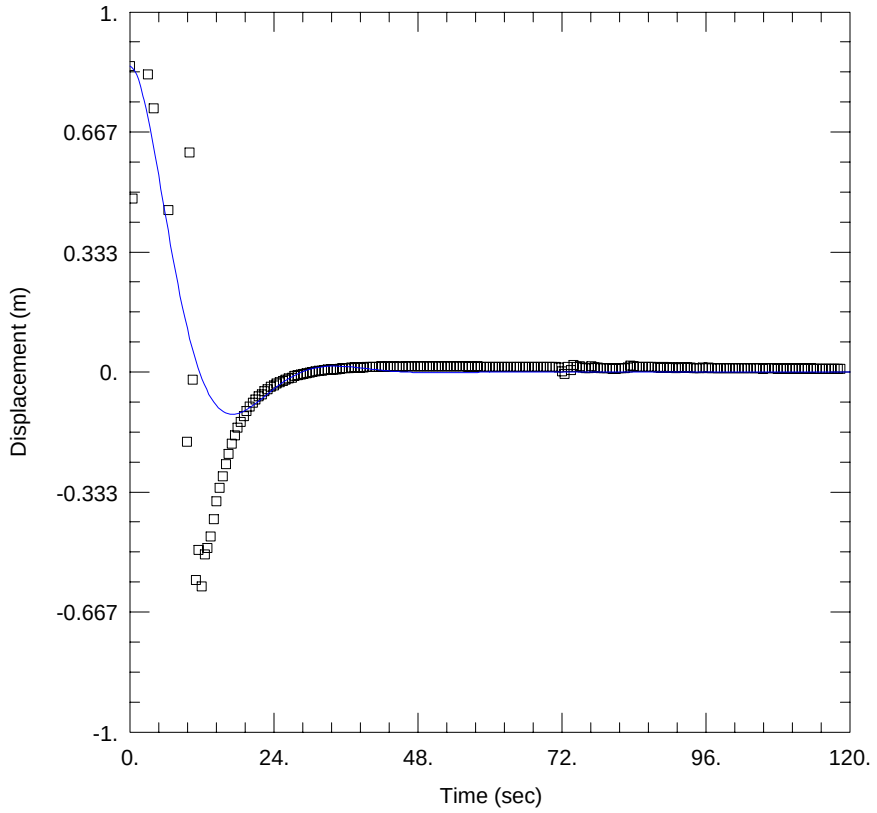
Saturated Thickness: 22. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1641-DQ)

Initial Displacement: 0.85 m
Total Well Penetration Depth: 22. m
Casing Radius: 0.025 m

Static Water Column Height: 22. m
Screen Length: 1.5 m
Well Radius: 0.0725 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1655-BS.aqt
Date: 10/17/07 Time: 18:34:58

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 4.6E-5 m/sec
Le = 208.1 m

AQUIFER DATA

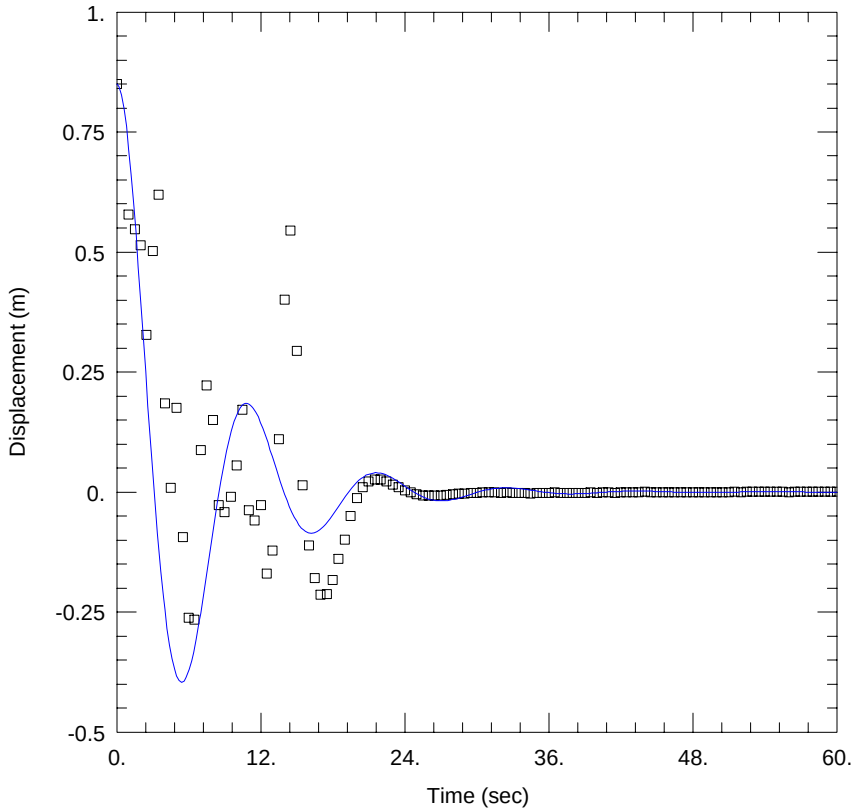
Saturated Thickness: 10.6 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1655-BS)

Initial Displacement: 0.85 m
Total Well Penetration Depth: 10.29 m
Casing Radius: 0.025 m

Static Water Column Height: 62. m
Screen Length: 6.13 m
Well Radius: 0.0725 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1663-PC.aqt
Date: 10/17/07 Time: 18:34:47

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.00045 m/sec
Le = 27.44 m

AQUIFER DATA

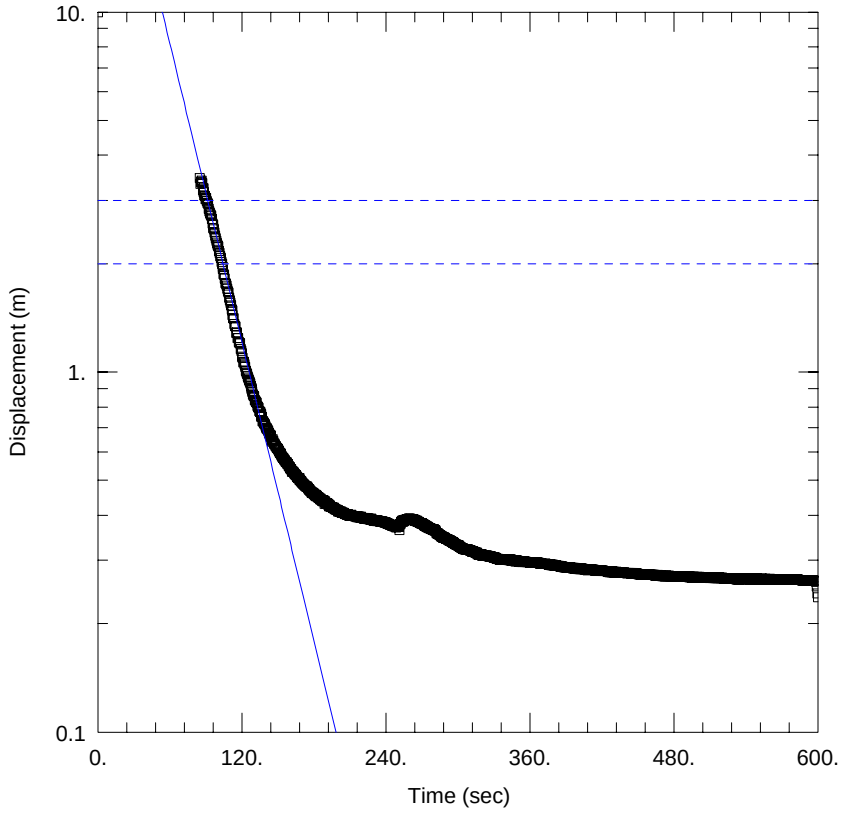
Saturated Thickness: 17.66 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1663-PC)

Initial Displacement: 0.85 m
Total Well Penetration Depth: 16.29 m
Casing Radius: 0.025 m

Static Water Column Height: 16.29 m
Screen Length: 3. m
Well Radius: 0.0635 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1672-BS.aqt
Date: 10/17/07 Time: 18:34:36

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 23, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 7.2E-6 m/sec
y0 = 55.39 m

AQUIFER DATA

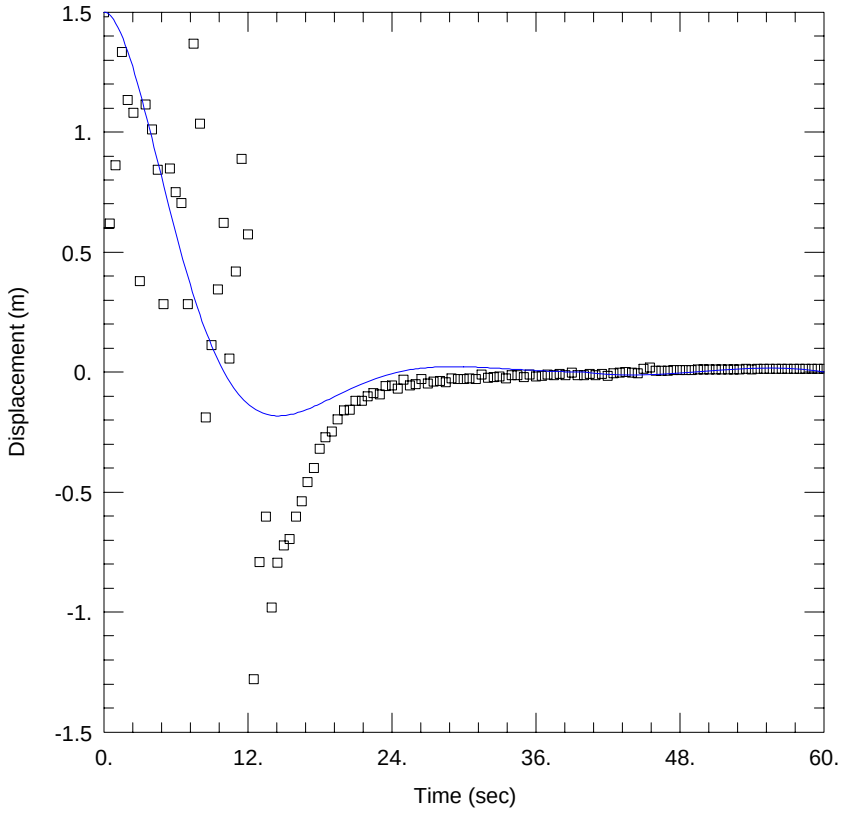
Saturated Thickness: 35. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1672-BS)

Initial Displacement: 10. m
Total Well Penetration Depth: 93.28 m
Casing Radius: 0.025 m

Static Water Column Height: 93.28 m
Screen Length: 7. m
Well Radius: 0.0725 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1672-DQ.aqt
Date: 10/17/07 Time: 18:34:24

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 23, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 4.8E-5 m/sec
Le = 145.6 m

AQUIFER DATA

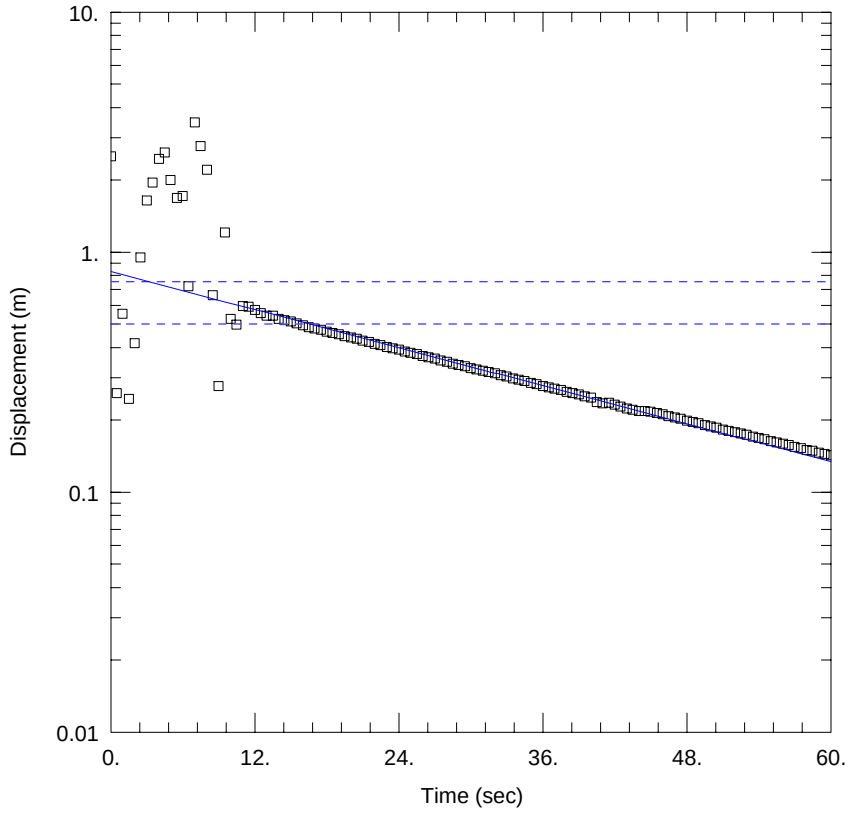
Saturated Thickness: 43.47 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1672-DQ)

Initial Displacement: 1.5 m
Total Well Penetration Depth: 41.17 m
Casing Radius: 0.025 m

Static Water Column Height: 41.17 m
Screen Length: 6.12 m
Well Radius: 0.0725 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1698-PC.aqt
Date: 10/17/07 Time: 18:34:10

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 15, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.0E-5 m/sec
y0 = 0.8291 m

AQUIFER DATA

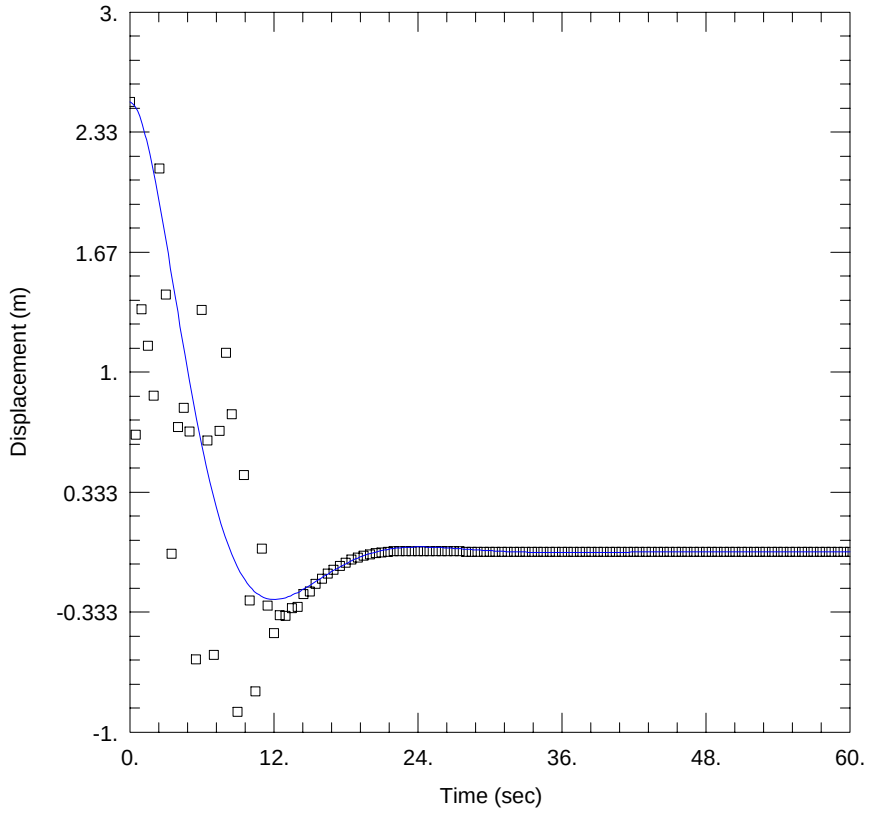
Saturated Thickness: 31.97 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1698-PC)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 30.86 m
Casing Radius: 0.025 m

Static Water Column Height: 30.86 m
Screen Length: 1.5 m
Well Radius: 0.0635 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1699-BS.aqt
Date: 10/17/07 Time: 18:33:26

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 23, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 7.2E-5 m/sec
Le = 95.69 m

AQUIFER DATA

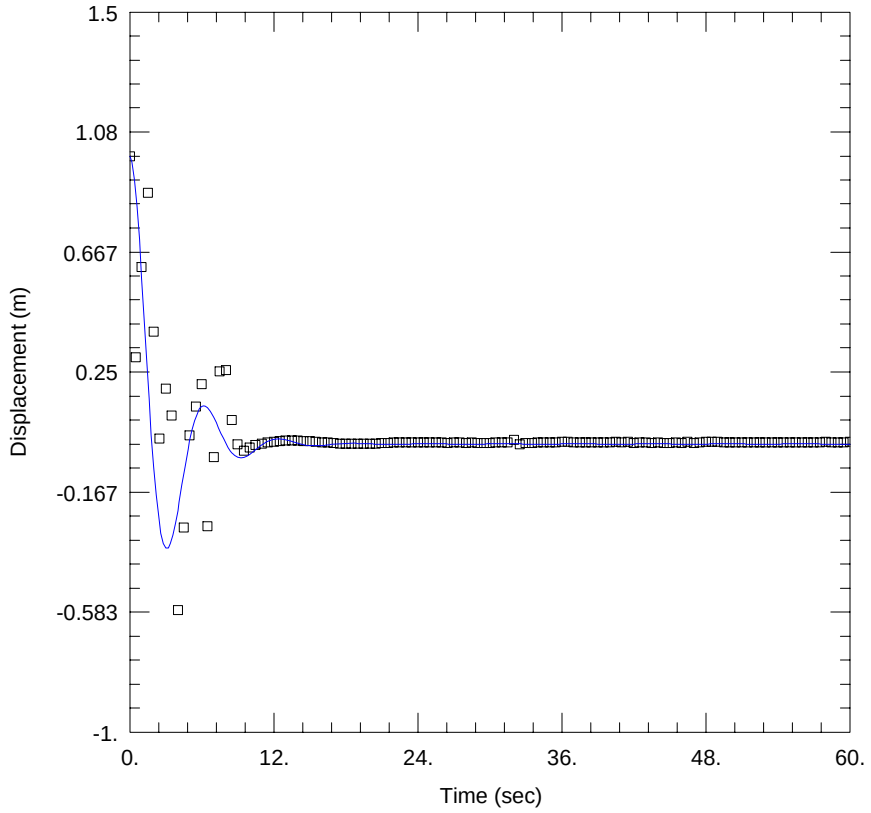
Saturated Thickness: 61.39 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1699-BS)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 61.39 m
Casing Radius: 0.025 m

Static Water Column Height: 61.39 m
Screen Length: 6.12 m
Well Radius: 0.0725 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1720-PC.aqt
Date: 10/17/07 Time: 18:38:26

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Jackpine Expansion Mining Area
Test Date: Mar 17, 2006

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 0.0011 m/sec
Le = 8.592 m

AQUIFER DATA

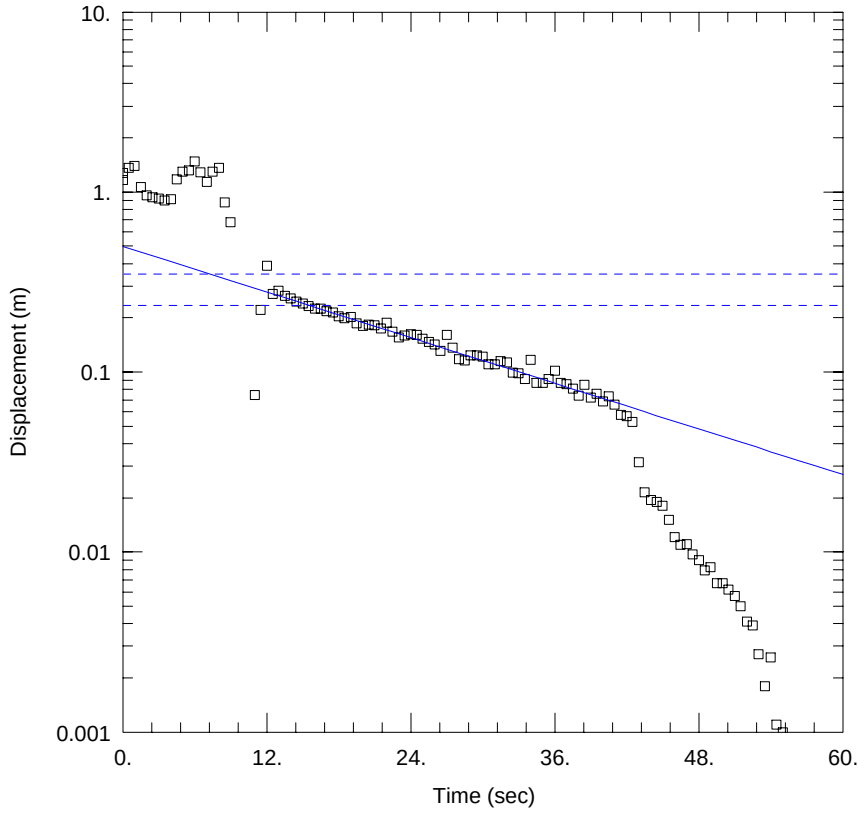
Saturated Thickness: 25.36 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1720-PC)

Initial Displacement: 1. m
Total Well Penetration Depth: 25.05 m
Casing Radius: 0.025 m

Static Water Column Height: 25.05 m
Screen Length: 1.5 m
Well Radius: 0.0725 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1801-DQ.aqt
Date: 10/17/07 Time: 18:39:49

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Pierre River Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.2E-5 m/sec
y0 = 0.4985 m

AQUIFER DATA

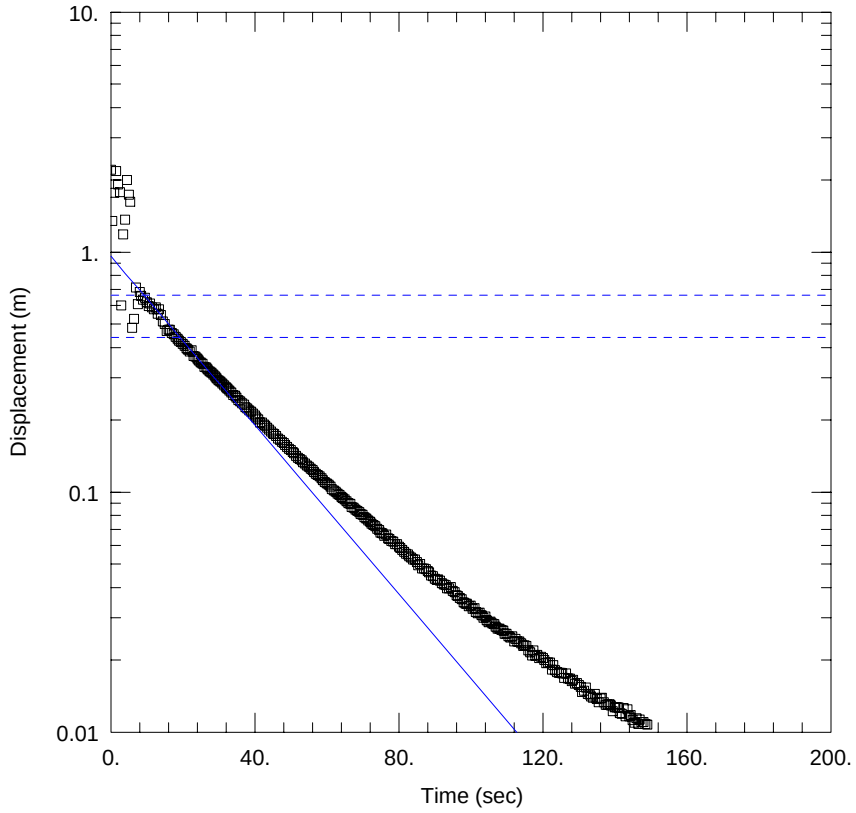
Saturated Thickness: 3.1 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1801-DQ)

Initial Displacement: 1.17 m
Total Well Penetration Depth: 3.1 m
Casing Radius: 0.025 m

Static Water Column Height: 10.81 m
Screen Length: 1.5 m
Well Radius: 0.127 m



WELL TEST ANALYSIS

Data Set: J:\...\SH06-1824-BS.aqt
Date: 10/17/07 Time: 18:39:40

PROJECT INFORMATION

Company: WorleyParsons Komex
Client: Shell Canada
Project: F35772801
Location: Pierre River Mining Area
Test Date: Mar 14, 2006

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.5E-5 m/sec
y0 = 0.9589 m

AQUIFER DATA

Saturated Thickness: 1.85 m

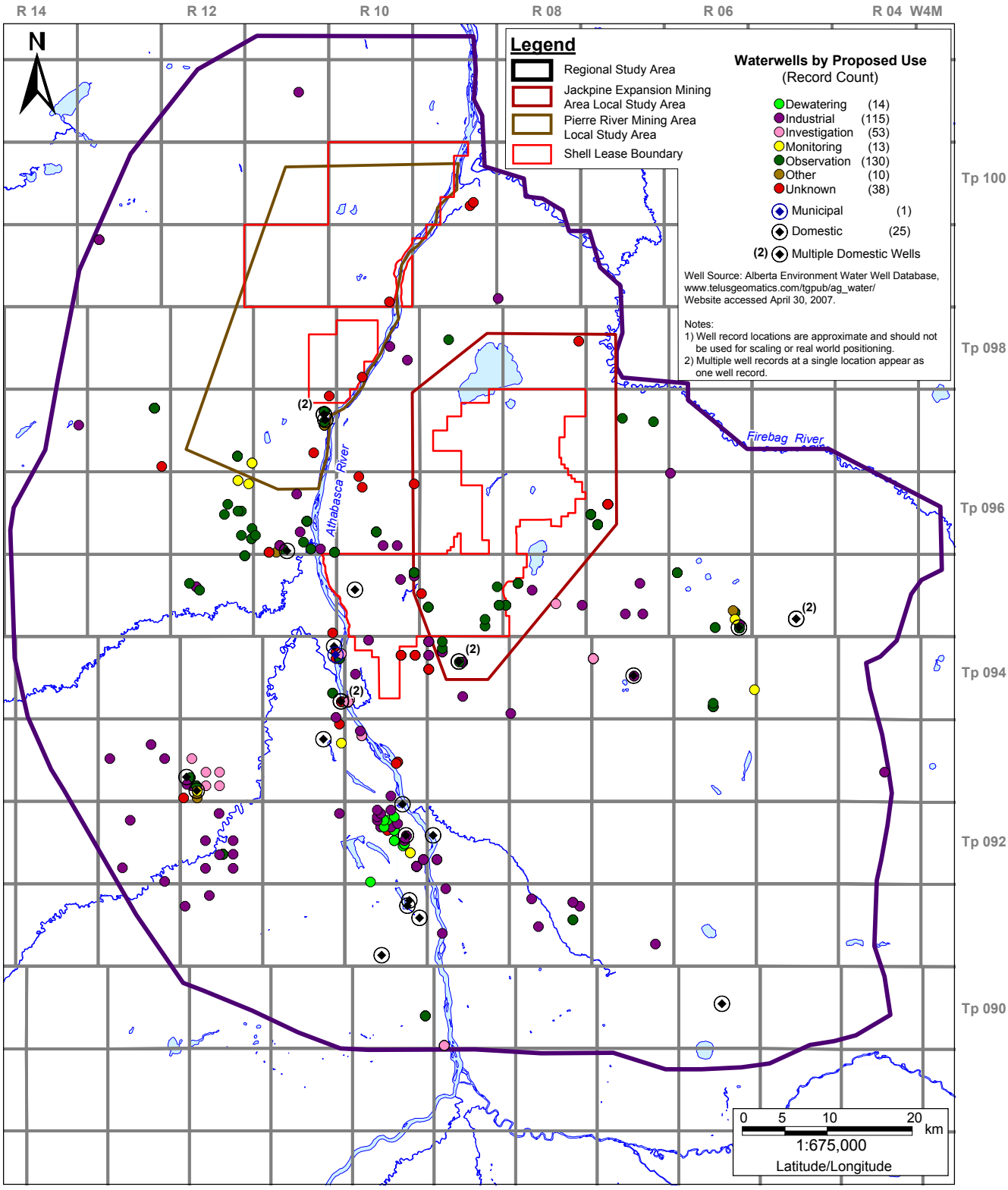
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SH06-1824-BS)

Initial Displacement: 2.2 m
Total Well Penetration Depth: 1.85 m
Casing Radius: 0.0242 m

Static Water Column Height: 54.38 m
Screen Length: 1.5 m
Well Radius: 0.127 m

Appendix 2 Groundwater Records



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

ALL WATER WELL RECORDS WITHIN THE REGIONAL STUDY AREA

WorleyParsons Komex
resources & energy

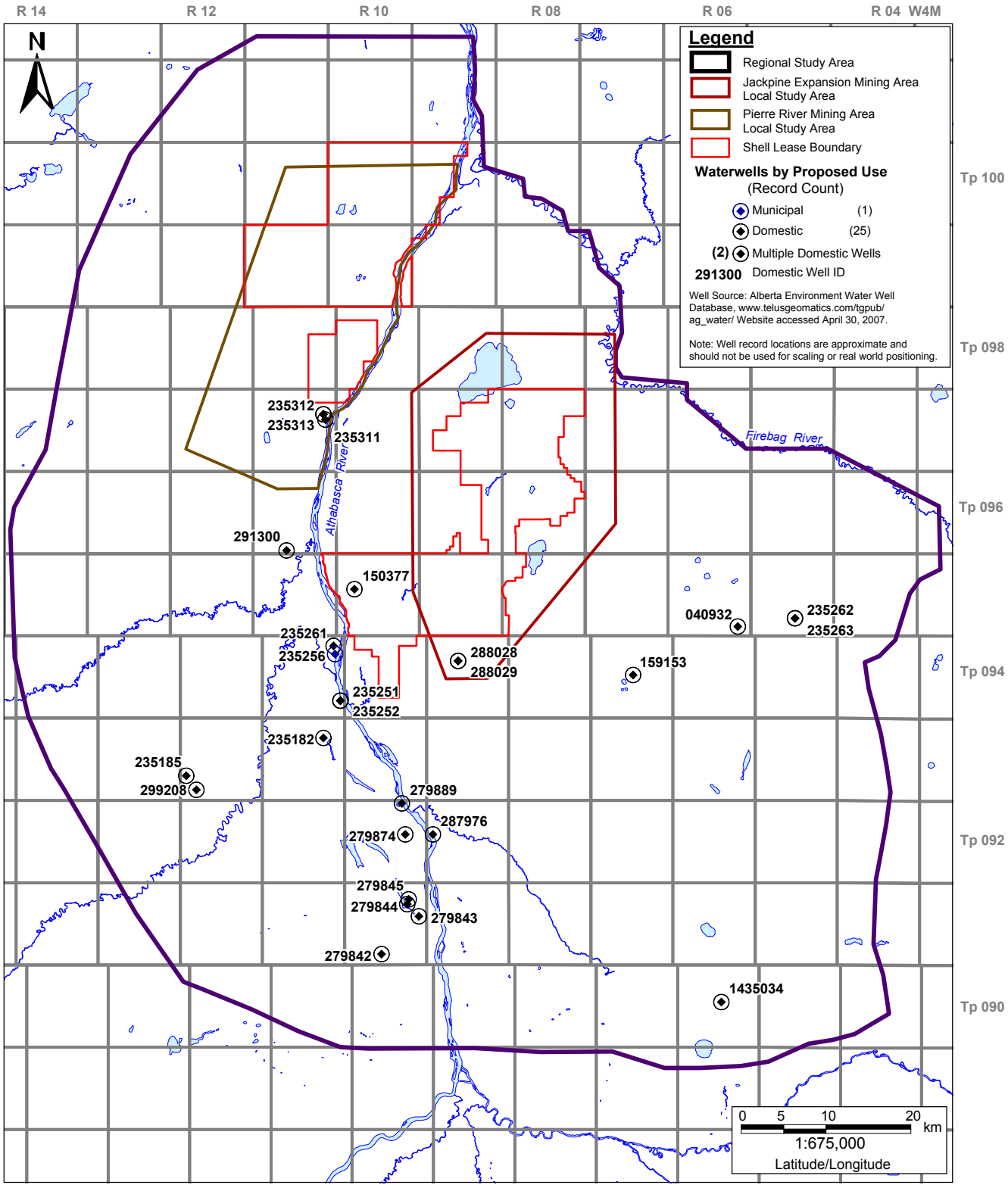
28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: A2-1

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_OmnibusBaseline_Figures\RSA_Waterwells.wor Issued By: Edmonton GIS



Environment & Water Resources

SHELL CANADA LIMITED
JACKPINE MINE EXPANSION & PIERRE RIVER MINE PROJECT

DOMESTIC WATER WELL RECORDS WITHIN THE REGIONAL STUDY AREA

WorleyParsons Komex
resources & energy

28-NOV-07	date	S.L.	edited by	S.L.	drawn by	J.K.	app by

PROJECT NUMBER: F35772801

FIGURE: A2-2

PREPARED SOLELY FOR THE USE OF OUR CLIENT AS SPECIFIED IN THE ACCOMPANYING REPORT. NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH WORLEYPARSONS KOMEX HAS NOT ENTERED INTO A CONTRACT.

FILE: Q:\F3577_Shell\F35772801_Omnibus\Baseline_Figures\RSA_Waterwells.wor Issued By: Edmonton GIS

WATER WELLS WITHIN THE REGIONAL STUDY AREA

WELLID	WELLOWNER	LSD	SEC	TWP	RGE	MER	DRILL_METHOD	TYPE_WORK	PROPOSED USE	WELL_FINISH	WELLDEPTH (m)	PERFFROM1 (m)	PERFTO1 (m)	PERFFROM2 (m)	PERFTO2 (m)	PERFFROM3 (m)	PERFTO3 (m)	SCRNFROM1 (m)	SCRNTO1 (m)	SCRNFROM2 (m)	SCRNTO2 (m)	DATE COMPLETED	DATE ABANDONED	LATITUDE	LONGITUDE
1435034	GROCOCK, BOB	SW	22	090	06	4	Rotary	New Well	Domestic	Plastic/Stainless Steel	30.48	--	--	--	--	--	--	21.34	27.43	--	--	7/14/2003	--	56.81709	-110.87571
1270000	DIVERSIFIED TRANSPORTATION LTD WSW 2001-03	SE	06	090	09	4	Rotary	New Well	Industrial	Plastic/Stainless Steel	9.60	--	--	--	--	--	--	7.68	9.30	--	--	7/6/2001	--	56.77341	-111.42012
1270147	DIVERSIFIED TRANSPORTATION LTD	SE	06	090	09	4	Rotary	Piezometer	Monitoring	Plastic	10.06	3.35	6.40	--	--	--	--	--	--	--	--	7/3/2001	--	56.77341	-111.42012
1270148	DIVERSIFIED TRANSPORTATION LTD	SE	06	090	09	4	Rotary	New Well	Industrial	Plastic/Stainless Steel	10.67	--	--	--	--	--	--	6.40	7.92	--	--	7/4/2001	--	56.77341	-111.42012
1270150	DIVERSIFIED TRANSPORTATION LTD	SE	06	090	09	4	Rotary	New Well	Industrial	Steel	9.45	6.40	9.45	--	--	--	--	--	--	--	--	7/5/2001	--	56.77341	-111.42012
1270157	DIVERSIFIED TRANSPORTATION LTD	SE	06	090	09	4	Rotary	Test Hole-Abandoned	Investigation	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	7/3/2001	56.77341	-111.42012
233689	ALTA RESEARCH COUNCIL#16-55	06	13	090	10	4	Unknown	New Well	Observation	Screen & Open Hole	16.76	--	--	--	--	--	--	10.67	15.24	--	--	--	--	56.80433	-111.45721
233690	ALTA RESEARCH COUNCIL#16-165	06	13	090	10	4	Unknown	New Well	Observation	Screen & Open Hole	50.29	--	--	--	--	--	--	45.72	48.77	--	--	--	--	56.80433	-111.45721
233692	ALTA RESEARCH COUNCIL#16-325	06	13	090	10	4	Unknown	New Well	Observation	Screen & Open Hole	99.06	--	--	--	--	--	--	94.49	97.54	--	--	--	--	56.80433	-111.45721
233696	ALTA RESEARCH COUNCIL#16-550	06	13	090	10	4	Unknown	New Well	Observation	Open Hole	167.64	--	--	--	--	--	--	--	--	--	--	--	--	56.80433	-111.45721
1500276	PETRO CANADA	10	11	091	07	4	Rotary	New Well	Industrial	Stainless Steel	244.45	--	--	--	--	--	--	22.56	244.45	--	--	2/2/2005	--	56.88081	-111.00768
279840	BAILEY SEABURN OIL	13	16	091	08	4	Unknown	Structure Test Hole	Industrial	Not Applicable	477.93	--	--	--	--	--	--	--	--	--	--	9/13/1957	9/13/1957	56.89907	-111.23628
042465	PETRO CAN#LEWIS CAMP	07	23	091	08	4	Rotary	New Well	Observation	Plastic	74.68	--	--	--	--	--	--	50.29	68.58	--	--	1/12/2001	--	56.90618	-111.16859
042466	PETRO CAN#LEWIS CAMP	07	23	091	08	4	Rotary	New Well	Observation	Stainless Steel	76.20	--	--	--	--	--	--	48.77	67.97	--	--	1/9/2001	--	56.90618	-111.16859
042467	PETRO CAN#LEWIS CAMP	05	25	091	08	4	Rotary	Test Hole-Abandoned	Industrial	Unknown	72.54	--	--	--	--	--	--	--	--	--	--	1/11/2001	1/11/2001	56.92064	-111.15555
042468	PETRO CAN#LEWIS CAMP	10	26	091	08	4	Rotary	New Well	Observation	Plastic	73.15	--	--	--	--	--	--	54.86	67.06	--	--	1/10/2001	--	56.92457	-111.16848
1500282	PETRO CANADA	10	26	091	08	4	Rotary	New Well	Industrial	Stainless Steel	71.93	--	--	--	--	--	--	49.38	65.53	--	--	2/2/2005	--	56.92457	-111.16848
092608	BAILEY SELBURN	15	29	091	08	4	Rotary	Drill Stem Test Hole	Industrial	Not Applicable	438.30	--	--	--	--	--	--	--	--	--	--	10/1/1957	10/1/1957	56.92815	-111.24986
279841	BEAR OIL CO #RODEO 2	05	17	091	09	4	Unknown	Structure Test Hole	Industrial	Open Hole	324.31	--	--	--	--	--	--	--	--	--	--	4/27/1949	--	56.89184	-111.42395
1270006	SUNCOR ENERGY INC.	11	32	091	09	4	Rotary	New Well	Industrial	Unknown	61.57	24.38	30.48	36.58	60.96	--	--	--	--	--	--	4/23/2004	--	56.93909	-111.41715
279842	LAMONTAGNE, KIM	NE	04	091	10	4	Unknown	Chemistry	Domestic	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	56.86817	-111.54162
279843	ALTA FOREST SVC	00	24	091	10	4	Unknown	Chemistry	Domestic	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	56.90808	-111.46779
279844	POPLAR CREEK SCALES	07	26	091	10	4	Unknown	Chemistry	Domestic	Unknown	4.27	--	--	--	--	--	--	--	--	--	--	--	--	56.92090	-111.49130
279845	POPLAR CREEK GRAVEL PIT	NE	26	091	10	4	Unknown	Chemistry	Domestic	Unknown	2.44	--	--	--	--	--	--	--	--	--	--	--	--	56.92633	-111.48800
279846	CAN ROXY	06	30	091	12	4	Rotary	Test Hole	Industrial	Open Hole	33.53	--	--	--	--	--	--	--	--	--	--	2/5/1987	--	56.92089	-111.92713
279847	CAN ROXY	04	33	091	12	4	Rotary	New Well-Abandoned	Industrial	Not Applicable	21.34	--	--	--	--	--	--	--	--	--	--	2/11/1987	2/11/1987	56.93174	-111.88007
040931	SUNCOR	NE	07	092	09	4	Other	Test Hole-Abandoned	Industrial	Not Applicable	17.98	--	--	--	--	--	--	--	--	--	--	3/23/2001	3/23/2001	56.96986	-111.43435
1500034	SUNCOR	NE	07	092	09	4	Downhole Hammer	New Well	Observation	Plastic	16.46	--	--	--	--	--	--	13.41	16.46	--	--	3/22/2001	--	56.96986	-111.43435
1500049	SUNCOR	NE	07	092	09	4	Downhole Hammer	New Well	Industrial	Stainless Steel	34.44	--	--	--	--	--	--	28.08	32.92	--	--	1/3/2025	--	56.96986	-111.43435
287976	BURNCO ROCK PRODUCTS	00	19	092	09	4	Rotary	New Well	Domestic	Screen	23.16	--	--	--	--	--	--	9.75	11.28	--	--	8/12/1997	--	56.99533	-111.44098
279860	GCOS #P19	01	05	092	10	4	Unknown	Piezometer	Dewatering	Unknown	19.20	--	--	--	--	--	--	--	--	--	--	--	--	56.94635	-111.56510
150376	CARBOVAN	SW	12	092	10	4	Rotary	New Well	Industrial	Screen	20.12	--	--	--	--	--	--	10.67	15.24	--	--	3/6/1990	--	56.96262	-111.47441
151049	CARBOVAN	SW	12	092	10	4	Rotary	New Well	Industrial	Screen	109.73	--	--	--	--	--	--	14.94	19.51	--	--	3/31/1990	--	56.96262	-111.47441
151050	CARBOVAN	SW	12	092	10	4	Rotary	Test Hole-Abandoned	Industrial	Not Applicable	103.02	--	--	--	--	--	--	--	--	--	--	4/5/1990	--	56.96262	-111.47441
151051	CARBOVAN	SW	12	092	10	4	Rotary	New Well	Industrial	Screen	31.09	--	--	--	--	--	--	9.45	14.02	--	--	4/30/1990	--	56.96262	-111.47441
152512	CARBOVAN#TEST HOLE 5	SW	12	092	10	4	Rotary	Test Hole-Abandoned	Industrial	Not Applicable	104.24	--	--	--	--	--	--	--	--	--	--	7/24/1990	--	56.96262	-111.47441
152513	CARBOVAN#TEST HOLE 3	SW	12	092	10	4	Rotary	Test Hole-Abandoned	Industrial	Not Applicable	30.48	--	--	--	--	--	--	--	--	--	--	7/9/1990	--	56.96262	-111.47441
152514	CARBOVAN#WELL 4	SW	12	092	10	4	Rotary	New Well	Industrial	Screen	30.48	--	--	--	--	--	--	13.11	17.68	--	--	7/10/1990	--	56.96262	-111.47441
152515	CARBOVAN#WELL 3	SW	12	092	10	4	Rotary	New Well	Industrial	Screen	105.16	--	--	--	--	--	--	12.50	17.07	--	--	7/8/1990	--	56.96262	-111.47441
152516	CARBOVAN#WELL 4	SW	12	092	10	4	Rotary	Test Hole-Abandoned	Industrial	Not Applicable	121.92	--	--	--	--	--	--	--	--	--	--	7/23/1990	--	56.96262	-111.47441
296250	GRAHAM CONSTR & ENG	SW	12	092	10	4	Rotary	New Well	Industrial	Screen	17.07	--	--	--	--	--	--	12.19	15.24	--	--	12/7/2000	--	56.96262	-111.47441
296251	MIDSTREAM JOINT VENTURE #3	NE	12	092	10	4	Rotary	New Well	Industrial	Screen	12.19	--	--	--	--	--	--	7.32	10.36	--	--	5/8/2001	--	56.96985	-111.46118
296252	MIDSTREAM JOINT VENTURE #1	NE	12	092	10	4	Rotary	Test Hole-Abandoned	Industrial	Not Applicable	15.24	--	--	--	--	--	--	--	--	--	--	3/27/2001	3/27/2001	56.96985	-111.46118
296253	MIDSTREAM JOINT VENTURE #3	NE	12	092	10	4	Rotary	Test Hole-Abandoned	Industrial	Not Applicable	42.67	--	--	--	--	--	--	--	--	--	--	3/27/2001	3/26/2001	56.96985	-111.46118
279862	GCOS #OBS 1	14	14	092	10	4	Unknown	Piezometer	Dewatering	Unknown	13.72	--	--	--	--	--	--	--	--	--	--	--	--	56.98629	-111.49792
279863	GCOS #OBS 2	14	14	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	13.72	--	--	--	--	--	--	--	--	--	--	--	--	56.98629	-111.49792
279861	GCOS #CH 117	NW	14	092	10	4	Unknown	Piezometer	Dewatering	Unknown	13.72	--	--	--	--	--	--	--	--	--	--	--	--	56.98448	-111.50122
1827822	ALTA ENV	SE	14	092	10	4	Rotary	New Well	Monitoring	Unknown	8.53	--	--	--	--	--	--	--	--	--	--	9/30/1994	--	56.97708	-111.48722
1827856	ALTA ENV	SE	14	092	10	4	Rotary	New Well	Monitoring	Unknown	--	--	--	--	--	--	--	--	--	--	--	7/20/1994	--	56.97708	-111.48722
279864	GCOS #P49	02	22	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	13.41	--	--	--	--	--	--	--	--	--	--	--	--	56.98990	-111.51812
279865	GCOS #P48	02	22	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	15.24	--	--	--	--	--	--	--	--	--	--	--	--	56.98990	-111.51812
279866	ARC #K17	13	22	092	10	4	Unknown	Chemistry	Unknown	Unknown	19.51	--	--	--	--	--	--	--	--	--	--	--	--	57.00075	-111.53137
279867	GCOS #P51	15	22	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	3.05	--	--	--	--	--	--	--	--	--	--	--	--	57.00075	-111.51812
279868	GCOS #P29	15	22	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	3.05	--	--	--	--	--	--	--	--	--	--	--	--	57.00075	-111.51812
279869	GCOS #P55	15	22	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	12.19	--	--	--	--	--	--	--	--	--	--	--	--	57.00075	-111.51812
279870	GCOS	00	23	092	10	4	Unknown	Chemistry	Industrial	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	56.99532	-111.49461
279871	GCOS #TS6	00	23	092	10	4	Unknown	Chemistry	Industrial	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	56.99532	-111.49461
279872	GCOS #TS7	00	23	092	10	4	Unknown	Chemistry	Industrial	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	56.99532	-111.49461
279874	EMPIRE DEV	00	23	092	10	4	Rotary	New Well-Abandoned	Domestic	Not Applicable	36.58	--	--	--	--	--	--	--	--	--	--	7/24/1969	7/24/1969	56.99532	-111.49461
279873	GCOS	03	23	092	10	4	Unknown	Chemistry	Industrial	Unknown	12.19	--	--	--	--	--	--	--	--	--	--	--	--	56.98989	-111.49792
279876	GCOS #K4	03	27	092	10	4	Unknown	Chemistry	Industrial	Unknown	11.58	--	--	--	--	--	--	--	--	--	--	--	--	57.00454	-111.52475
279875	GCOS #K3	08	27	092	10	4	Unknown	Chemistry	Industrial	Unknown	12.19	--	--	--	--	--	--	--	--	--	--	--	--	57.00815	-111.51150
279877	GCOS #P57	12	27	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	17.37	--	--	--	--	--	--	--	--	--	--	--	--	57.01177	-111.53138
279878	GCOS #P39	15	27	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	5.79	--	--	--	--	--	--	--	--	--	--	--	--	57.01539	-111.51813
279879	GCOS #P58	01	28	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	17.68	--	--	--	--	--	--	--	--	--	--	--	--	57.00454	-111.53832
279880	GCOS #K18	02	28	092	10	4	Unknown	Chemistry	Industrial	Unknown	10.67	--	--	--	--	--	--	--	--	--	--	--	--	57.00454	-111.54494
279883	GCOS #P56	09	28	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	8.23	--	--	--	--	--	--	--	--	--	--	--	--	57.01177	-111.53832
279884	GCOS #P54	09	28	092	10	4	Unknown	Piezometer	Dewatering	Open Hole	14.33	--	--	--	--	--	--	--	--	--	--	--	--	57.01177	-111.53832
279881	GCOS #K15	11	28	092	10	4	Unknown	Chemistry	Industrial	Unknown	16.46	--	--	--	--	--	--	--	--	--	--	--	--	57.01177	-111.55157
279882	GCOS #K16	14	28	092	10	4	Unknown	Chemistry	Industrial	Unknown	17.68	--	--	--	--	--	--	--	--	--	--	--	--	57.01538	-111.55157
279885	GCOS #K14	02	33	092	10	4	Unknown	Chemistry	Industrial	Unknown	12.19	--	--	--	--	--	--	--	--	--	--	--	--	57.01899	-111.54495
279886	GCOS #K9	06	33	092	10	4	Unknown	Chemistry	Industrial	Unknown	11.58	--	--	--	--	--	--	--	--	--	--	--	--	57.02261	-111.55158
279888	GCOS #K6	06	34	092	10	4	Unknown	Chemistry	Industrial	Unknown	8.53	--	--	--	--	--	--	--	--	--	--	--	--	57.02261	-111.52476
279889	SYNCRUDE CAN LTD	NW	35	092	10	4	Unknown	Chemistry	Domestic	Unknown	12.19	--	--	--	--	--	--	--	--	--	--	--	--	57.02803	-111.50126
092620	SYNCRUDE	02	36	092	11	4	Rotary	Drill Stem Test Hole	Industrial	Unknown	256.95	--	--	--	--	--	--	--	--	--	--	--	--	57.01897	-111.62543
279890	SINCLAIR CAN#16	01	08	092	12	4	Unknown	Structure Test Hole	Industrial	Open Hole	114.60	--	--	--	--	--	--	--	--	--	--	2/15/1959	--	56.96068	-111.88728
279893	SINCLAIR CAN#31	01	10	092	12	4	Unknown	Structure Test Hole	Industrial	Open Hole	138.07	--	--	--	--	--	--	--	--	--	--	1/24/1960	--	56.96098	-111.83313
279894	SINCLAIR CAN#17	01	15	092	12	4	Unknown	Structure Test Hole	Industrial	Open Hole	110.03	--	--	--	--	--	--	--	--	--	--	2/18/1959	--	56.97556	-111.83360
233709	ALTA RESEARCH COUNCIL#14-247	04	15	092	12	4	Unknown	New Well	Observation	Screen & Open Hole	75.29	--	--	--	--	--	--	69.19	73.76	--	--	--	--	56.97545	-111.85326
233710	ALTA RESEARCH COUNCIL#14-1590	04	15	092	12	4	Unknown	New Well	Observation	Open Hole	484.63	--	--	--	--	--	--	--	--	--	--	--	--	56.97545	-111.85326
233711	ALTA RESEARCH COUNCIL#14-31	04	15	092	12	4	Unknown	New Well	Observation	Screen & Open Hole	11.89	--	--	--	--	--	--	8.84	10.36	--	--	--	--	56.97545	-111.85326
233713	ALTA RESEARCH COUNCIL#14-119	04	15	092	12	4	Unknown	New Well	Observation	Screen & Open Hole	36.27	--	--	--	--	--	--	30.18	34.75	--	--	--	--	56.97545	-111.85326
233714	ALTA RESEARCH COUNCIL#14-699	04	15	092	12	4	Unknown	New Well	Observation	Open Hole	213.06	--	--	--	--	--	--	--	--	--	--	--	--	56.97545	-111.85326

WATER WELLS WITHIN THE REGIONAL STUDY AREA

WELLID	WELLOWNER	LSD	SEC	TWP	RGE	MER	DRILL_METHOD	TYPE_WORK	PROPOSED USE	WELL_FINISH	WELLDEPTH (m)	PERFFROM1 (m)	PERFTO1 (m)	PERFFROM2 (m)	PERFTO2 (m)	PERFFROM3 (m)	PERFTO3 (m)	SCRNFROM1 (m)	SCRNTO1 (m)	SCRNFROM2 (m)	SCRNTO2 (m)	DATE COMPLETED	DATE ABANDONED	LATITUDE	LONGITUDE
279896	SINCLAIR OIL #33	01	16	092	12	4	Unknown	Structure Test Hole	Industrial	Open Hole	108.51	--	--	--	--	--	--	--	--	--	--	1/29/1960	--	56.97530	-111.86049
279899	SINCLAIR CAN#18	01	20	092	12	4	Unknown	Structure Test Hole	Industrial	Open Hole	110.64	--	--	--	--	--	--	--	--	--	--	2/20/1959	--	56.99018	-111.88778
279898	SINCLAIR CAN#32	01	22	092	12	4	Unknown	Structure Test Hole	Industrial	Open Hole	101.19	--	--	--	--	--	--	--	--	--	--	1/27/1960	--	56.98993	-111.83342
279900	SINCLAIR CAN#19	01	33	092	12	4	Unknown	Structure Test Hole	Industrial	Open Hole	132.59	--	--	--	--	--	--	--	--	--	--	2/22/1959	--	57.01904	-111.86095
279901	SINCLAIR CAN#15	01	02	092	13	4	Unknown	Structure Test Hole	Industrial	Open Hole	129.24	--	--	--	--	--	--	--	--	--	--	2/14/1959	--	56.94668	-111.96754
279903	SINCLAIR CAN#1	01	08	092	13	4	Unknown	Structure Test Hole	Industrial	Open Hole	171.91	--	--	--	--	--	--	--	--	--	--	1/12/1959	--	56.96114	-112.04982
279902	AMERADA #MINK LAKE 6	11	28	092	13	4	Unknown	Structure Test Hole	Industrial	Open Hole	102.41	--	--	--	--	--	--	--	--	--	--	3/18/1957	--	57.01176	-112.03453
235165	#SP236	03	15	093	04	4	Unknown	Flowing Shot Hole	Industrial	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	6/14/1982	6/14/1982	57.06271	-110.55907
235166	SUN OIL	06	03	093	10	4	Rotary	Dry Hole-Abandoned	Industrial	Not Applicable	316.38	--	--	--	--	--	--	--	--	--	--	11/30/1965	--	57.03725	-111.52478
235172		16	15	093	10	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.07358	-111.51154
235173		16	15	093	10	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	12/7/1978	--	57.07358	-111.51154
235167		NE	15	093	10	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.07177	-111.51486
235174	#74-8 ATHABASCA BRIDGE STUDY	NW	29	093	10	4	Unknown	Test Hole	Investigation	Open Hole	29.87	--	--	--	--	--	--	--	--	--	--	3/2/1974	--	57.10086	-111.58178
235176	#74-9 ATHABASCA BRIDGE STUDY	NW	29	093	10	4	Unknown	Test Hole	Investigation	Open Hole	31.70	--	--	--	--	--	--	--	--	--	--	3/3/1974	--	57.10086	-111.58178
235177	#74-10 ATHABASCA BRIDGE STUDY	NW	29	093	10	4	Unknown	Test Hole	Investigation	Open Hole	18.90	--	--	--	--	--	--	--	--	--	--	3/20/1974	--	57.10086	-111.58178
235179	BEAR OIL CO LTD#BEAR VAMPIRE 2	04	32	093	10	4	Rotary	Oil Exploratory	Industrial	Unknown	269.14	--	--	--	--	--	--	--	--	--	--	4/1/1949	--	57.10627	-111.58510
1827859	ALTA ENV	SE	25	093	11	4	Rotary	New Well	Monitoring	Unknown	7.01	--	--	--	--	--	--	--	--	--	--	7/20/1994	--	57.09336	-111.62150
235182	ALTA FOREST SVC	00	26	093	11	4	Unknown	Test Hole	Domestic	Unknown	26.52	--	--	--	--	--	--	--	--	--	--	--	--	57.09722	-111.65561
235184		10	36	093	11	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.11347	-111.62548
258338		NW	05	093	12	4	Unknown	Test Hole	Observation	Screen	91.44	--	--	--	--	--	--	66.75	68.28	--	--	2/2/1984	--	57.04266	-111.90366
258339		NW	05	093	12	4	Unknown	New Well	Unknown	Screen	68.28	--	--	--	--	--	--	64.01	65.53	--	--	1/31/1984	--	57.04266	-111.90366
299208	PETROCAN	NW	05	093	12	4	Rotary	New Well	Domestic	Screen	57.91	--	--	--	--	--	--	52.43	49.38	36.88	52.43	5/24/2001	--	57.04266	-111.90366
042469	P.T.I. CAMP SVC	SW	05	093	12	4	Rotary	New Well	Other	Screen	56.69	--	--	--	--	--	--	46.33	49.38	49.38	50.90	11/23/2000	--	57.03538	-111.90354
1501015	PETRO CANADA	NW	05	093	12	4	Rotary	New Well	Monitoring	Plastic	39.62	--	--	--	--	--	--	36.58	39.62	--	--	4/30/2004	--	57.04266	-111.90366
1501039	PETRO CANADA	NW	05	093	12	4	Rotary	New Well	Other	Stainless Steel	56.39	--	--	--	--	--	--	41.15	53.34	--	--	12/13/2003	--	57.04266	-111.90366
1501016	PETRO CANADA	NW	05	093	12	4	Rotary	New Well	Monitoring	Plastic	35.05	--	--	--	--	--	--	32.00	35.05	--	--	5/1/2004	--	57.04266	-111.90366
1501017	PETRO CANADA	NW	05	093	12	4	Rotary	New Well	Monitoring	Plastic	39.62	--	--	--	--	--	--	36.58	39.62	--	--	5/1/2004	--	57.04266	-111.90366
1501018	PETRO CANADA	NW	05	093	12	4	Rotary	New Well	Monitoring	Plastic	36.58	--	--	--	--	--	--	33.53	36.58	--	--	4/30/2004	--	57.04266	-111.90366
258340		SW	06	093	12	4	Unknown	New Well	Unknown	Screen	67.67	--	--	--	--	--	--	61.87	63.70	--	--	1/31/1984	--	57.03541	-111.93050
286009	GIBSON PETRO CO LTD	01	07	093	12	4	Rotary	New Well	Industrial	Screen	92.96	--	--	--	--	--	--	66.75	76.81	--	--	2/9/1996	--	57.04806	-111.91392
258336	AOSTRA UTF 74E/4 #1	NE	07	093	12	4	Unknown	Test Hole	Observation	Unknown	91.44	--	--	--	--	--	--	--	--	--	--	1/31/1984	--	57.05710	-111.91724
235185	AOSTRA	NH	07	093	12	4	Unknown	Chemistry	Domestic	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	57.05710	-111.92387
168219	A.O.S.T.R.A. UTF SITE	SH	07	093	12	4	Rotary	New Well	Industrial	Screen	94.79	--	--	--	--	--	--	60.66	69.80	--	--	7/29/1992	--	57.04986	-111.92387
235187	SINCLAIR CAN OIL CO#TH20	01	08	093	12	4	Rotary	Test Hole	Investigation	Open Hole	138.68	--	--	--	--	--	--	--	--	--	--	2/24/1989	--	57.04807	-111.88708
042470	PETRO CAN#WSW 3	04	08	093	12	4	Rotary	New Well	Industrial	Screen	91.44	--	--	--	--	--	--	57.91	73.15	73.15	76.20	2/18/2002	--	57.04814	-111.90594
042471	PETRO CAN#WSW 2	04	08	093	12	4	Rotary	New Well	Industrial	Screen	85.95	--	--	--	--	--	--	60.96	70.10	76.20	82.30	2/15/2002	--	57.04814	-111.90594
042472	PETRO CAN	04	08	093	12	4	Rotary	New Well	Observation	Screen	85.34	--	--	--	--	--	--	66.45	78.64	--	--	2/15/2002	--	57.04814	-111.90594
235188	SINCLAIR CAN OIL CO#TH34	01	09	093	12	4	Rotary	Test Hole	Investigation	Open Hole	117.35	--	--	--	--	--	--	--	--	--	--	1/31/1960	--	57.04807	-111.86025
235189	SINCLAIR CAN OIL CO#TH21	01	16	093	12	4	Rotary	Test Hole	Investigation	Open Hole	120.70	--	--	--	--	--	--	--	--	--	--	2/26/1989	--	57.06270	-111.86025
235190	SINCLAIR CAN OIL CO#TH35	01	17	093	12	4	Rotary	Test Hole	Investigation	Open Hole	131.37	--	--	--	--	--	--	--	--	--	--	2/2/1960	--	57.06270	-111.88708
235191	SINCLAIR CAN OIL CO#TH25	01	19	093	12	4	Rotary	Test Hole	Investigation	Open Hole	137.46	--	--	--	--	--	--	--	--	--	--	3/5/1959	--	57.07714	-111.91392
235331	SINCLAIR CAN OIL CO#TH23	01	19	093	13	4	Rotary	Core Hole	Industrial	Unknown	113.39	--	--	--	--	--	--	--	--	--	--	1/3/1959	--	57.07713	-112.07496
235333	SINCLAIR CAN OIL CO#TH22	01	23	093	13	4	Rotary	Core Hole	Industrial	Unknown	156.97	--	--	--	--	--	--	--	--	--	--	2/28/1959	--	57.07714	-111.96760
235335	SINCLAIR CAN OIL CO#TH24	01	27	093	13	4	Rotary	Core Hole	Industrial	Unknown	128.02	--	--	--	--	--	--	--	--	--	--	3/4/1959	--	57.09178	-111.99444
233718	ALTA RESEARCH COUNCIL#9-43	16	04	094	06	4	Unknown	New Well	Observation	Screen & Open Hole	13.11	--	--	--	--	--	--	9.45	10.97	--	--	--	--	57.13170	-110.89454
233728	ALTA RESEARCH COUNCIL#9-449	16	04	094	06	4	Unknown	New Well	Observation	Screen & Open Hole	136.86	--	--	--	--	--	--	123.44	128.02	--	--	--	--	57.13170	-110.89454
233730	ALTA RESEARCH COUNCIL#9-951	16	04	094	06	4	Unknown	New Well	Observation	Screen & Open Hole	289.86	--	--	--	--	--	--	283.77	288.34	--	--	--	--	57.13170	-110.89454
233731	ALTA RESEARCH COUNCIL#9-1056	16	04	094	06	4	Unknown	New Well	Observation	Screen	321.87	--	--	--	--	--	--	318.82	321.87	--	--	--	--	57.13170	-110.89454
233736	ALTA RESEARCH COUNCIL#9-1150	16	04	094	06	4	Unknown	New Well	Observation	Open Hole	350.52	--	--	--	--	--	--	--	--	--	--	--	--	57.13170	-110.89454
233723	ALTA RESEARCH COUNCIL#9-161	01	09	094	06	4	Unknown	New Well	Observation	Screen & Open Hole	49.07	--	--	--	--	--	--	44.50	47.55	--	--	--	--	57.13531	-110.89454
1545515	HUSKY ENERGY	01	13	094	06	4	Rotary	Test Hole	Monitoring	Plastic	105.00	--	--	--	--	--	--	54.95	58.00	--	--	2/11/2004	--	57.14968	-110.81314
156286	CHEVRON CAN LTD	04	22	094	07	4	Rotary	New Well-Abandoned	Industrial	Not Applicable	39.62	--	--	--	--	--	--	--	--	--	--	6/1/1991	--	57.16440	-111.04865
157415	CHEVRON CAN LTD	04	22	094	07	4	Rotary	New Well	Industrial	Casing/Perforated Liner	54.86	30.48	54.86	--	--	--	--	--	--	--	--	6/3/1991	9/7/1998	57.16440	-111.04865
159153	CHEVRON	04	22	094	07	4	Rotary	New Well	Domestic	Screen	67.06	--	--	--	--	--	--	51.82	56.69	--	--	9/20/1991	9/5/1998	57.16440	-111.04865
233738	ARC#8-34	05	30	094	07	4	Unknown	New Well	Observation	Screen & Open Hole	10.36	--	--	--	--	--	--	7.32	8.84	--	--	--	--	57.18264	-111.12914
233741	ALTA RESEARCH COUNCIL#8-114	05	30	094	07	4	Unknown	New Well	Observation	Screen & Open Hole	34.75	--	--	--	--	--	--	30.18	33.22	--	--	1/1/1975	--	57.18264	-111.12914
233762	ALTA RESEARCH COUNCIL#8-220	05	30	094	07	4	Unknown	New Well-Abandoned	Observation	Screen & Open Hole	67.06	--	--	--	--	--	--	56.39	62.48	--	--	1/1/1975	--	57.18264	-111.12914
233772	ALTA RESEARCH COUNCIL#8-370	05	30	094	07	4	Unknown	New Well	Observation	Screen & Open Hole	112.78	--	--	--	--	--	--	103.63	108.20	--	--	--	--	57.18264	-111.12914
233778	ALTA RESEARCH COUNCIL#8-532	05	30	094	07	4	Unknown	New Well	Observation	Screen & Open Hole	162.15	--	--	--	--	--	--	157.58	160.63	--	--	1/1/1975	--	57.18264	-111.12914
233783	ARC #8-716	05	30	094	07	4	Unknown	Core Hole	Investigation	Open Hole	218.24	--	--	--	--	--	--	--	--	--	--	--	--	57.18264	-111.12914
235192	#SP172	05	06	094	08	4	Unknown	Flowing Shot Hole	Industrial	Not Applicable	17.98	--	--	--	--	--	--	--	--	--	--	3/10/1988	3/10/1988	57.12448	-111.29004
235193	HOME OIL	10	09	094	09	4	Rotary	Oil Exploratory	Industrial	Open Hole	147.83	--	--	--	--	--	--	--	--	--	--	3/1/1972	--	57.14256	-111.38404
235194	HOME OIL	12	19	094	09	4	Unknown	Chemistry	Unknown	Unknown	45.11	--	--	--	--	--	--	--	--	--	--	--	--	57.17163	-111.45094
235195	HOME OIL	12	19	094	09	4	Unknown	Chemistry	Unknown	Unknown	54.25	--	--	--	--	--	--	--	--	--	--	--	--	57.17163	-111.45094
235196	HOME OIL	12	19	094	09	4	Unknown	Chemistry	Unknown	Unknown	26.82	--	--	--	--	--	--	--	--	--	--	--	--	57.17163	-111.45094
233796	HOME OIL#BH-7	02	28	094	09	4	Drilled	New Well	Industrial	Open Hole	107.29	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.17904	-111.38405
233808	HOME OIL CO#7	02	28	094	09	4	Unknown	Chemistry	Industrial	Unknown	107.29	--	--	--	--	--	--	--	--	--	--	--	--	57.17904	-111.38405
162173	HOME OIL#OBS.WELL HOME-4	03	28	094	09	4	Rotary	Test Hole	Observation	Screen	96.32	--	--	--	--	--	--	86.87	94.49	--	--	3/4/1975	--	57.17904	-111.39070
288028	#OIL SANDS OBS WELL (OSOWN)	03	28	094	09	4	Unknown	Chemistry	Domestic	Unknown	--	--	--	--	--	--	--	--	--	--	--	9/15/1984	--	57.17904	-111.39070
288029	OSOWN	03	28	094	09	4	Unknown	Chemistry	Domestic	Unknown	--	--	--	--	--	--	--	--	--	--	--	9/15/1984	--	57.17904	-111.39070
235197	HOME OIL	13	29	094	09	4	Unknown	Chemistry	Unknown	Unknown	50.29	--	--	--	--	--	--	--	--	--	--	--	--	57.18988	-111.42415
235198	HOME OIL	13	29	094	09	4	Unknown	Chemistry	Industrial	Unknown	45.72	--	--	--	--	--	--	--	--	--	--	--	--	57.18988	-111.42415
235199	HOME OIL	13	29	094	09	4	Unknown	Chemistry	Industrial	Unknown	22.86	--	--	--	--	--	--	--	--	--	--	--	--	57.18988	-111.42415
235200	HOME OIL	12	30	094	09	4	Unknown	Chemistry	Industrial	Unknown	41.15	--	--	--	--	--	--	--	--	--	--	--	--	57.18626	-111.45093
235201	HOME OIL	12	30	094	09	4	Unknown	Chemistry	Industrial	Unknown	13.72	--	--	--	--	--	--	--	--	--	--	--	--	57.18626	-111.45093
235202	HOME OIL	12	31	094	09	4	Unknown	Chemistry	Industrial	Unknown	9.14	--	--	--	--	--	--	--	--	--	--	--	--	57.20072	-111.45094
235203	HOME OIL	12	31	094	09	4	Unknown	Chemistry	Industrial	Unknown	13.72	--	--	--	--	--	--	--	--	--	--	--	--	57.20072	-111.45094
235204	HOME OIL	12	31	094	09	4	Unknown	Chemistry	Industrial	Unknown	41.15	--	--	--	--	--	--	--	--	--	--	--	--	57.20072	-111.45094
235205	HOME OIL	12	31	094	09	4	Unknown	Chemistry	Industrial	Unknown	32.00	--	--	--	--	--	--	--	--	--	--	--	--	57.20072	-111.45094
235206	HOME OIL	12	31	094	09	4	Unknown	Chemistry	Industrial	Unknown	22.86	--	--	--	--	--	--	--	--	--	--	--	--	57.20072	-111.45094
235207	HOME OIL#4-32 TW1	04	32	094	09	4	Unknown	Test Hole	Observation	Slotted & Open Hole	85.04	51.82	53.34	63.70	65.23	81.99	85.04	--	--	--	--	1/1/1974	--	57.19350	-111.42415
235208	HOME OIL#TW2	12	32	094	09	4	Unknown	Test Hole	Observation	Slotted & Open Hole	13.72	10.67	13.72	--	--	--	--	--	--	--	--	1/1/1974	--	57.20073	-111.42416
235211	#TH78-3	06	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	36.58	--	--	--	--	--	--	--	--	--	--	3/1/1978	--	57.13893	-111.60522

WATER WELLS WITHIN THE REGIONAL STUDY AREA

WELLID	WELLOWNER	LSD	SEC	TWP	RGE	MER	DRILL_METHOD	TYPE_WORK	PROPOSED USE	WELL_FINISH	WELLDEPTH (m)	PERFFROM1 (m)	PERFTO1 (m)	PERFFROM2 (m)	PERFTO2 (m)	PERFFROM3 (m)	PERFTO3 (m)	SCRNFROM1 (m)	SCRNTO1 (m)	SCRNFROM2 (m)	SCRNTO2 (m)	DATE COMPLETED	DATE ABANDONED	LATITUDE	LONGITUDE
235212	#TH78-4	06	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	36.27	--	--	--	--	--	--	--	--	--	--	3/1/1978	--	57.13893	-111.60522
235213	#TH78-5	06	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	36.58	--	--	--	--	--	--	--	--	--	--	3/1/1978	--	57.13893	-111.60522
235209	#TH75-9 STN 861+58.5	SW	07	094	10	4	Rotary	Test Hole	Investigation	Unknown	27.43	--	--	--	--	--	--	--	--	--	--	3/13/1975	--	57.13713	-111.60854
235210	#TH75-19 STN 865+32	SW	07	094	10	4	Rotary	Test Hole	Investigation	Unknown	54.86	--	--	--	--	--	--	--	--	--	--	3/17/1975	--	57.13713	-111.60854
235214	#PH26	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	11.28	--	--	--	--	--	--	--	--	--	--	1/1/1978	--	57.13713	-111.60854
235215	#PH27	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	11.28	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235216	#PH28	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	14.02	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235217	#PH29	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	11.89	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235218	#PH30	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	9.75	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235219	#PH31	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	9.75	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235220	#PH32	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	39.93	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235221	#PH33	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	15.24	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235222	#PH34	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	11.58	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235223	#PH35	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	41.45	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235224	#PH36	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	10.67	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235225	#PH42	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	12.50	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235226	#PH43	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	9.45	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235227	#PH44	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	10.97	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235228	#PH45	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	12.19	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235229	#PH46	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	9.45	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235230	#PH47	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	11.89	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235231	#PH48	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	13.41	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235232	#PH49	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	12.19	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235233	#PH50	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	12.80	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235234	#PH51	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	11.28	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235235	#PH52	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	11.89	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235236	#PH53	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	12.50	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235237	#PH54	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	11.89	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235238	#PH55	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	17.98	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235239	#PH56	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	16.15	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235240	#PH57	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	13.72	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235241	#PH58	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	15.85	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235242	#PH47	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	14.33	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
235243	#PH60	SW	07	094	10	4	Unknown	Test Hole	Investigation	Unknown	10.67	--	--	--	--	--	--	--	--	--	--	1/1/1975	--	57.13713	-111.60854
1911642	INLAND CONCRET	SE	19	094	10	4	Rotary	Dry Hole-Abandoned	Industrial	Unknown	21.34	--	--	--	--	--	--	--	--	--	--	6/9/2005	6/9/2005	57.16621	-111.59466
235244	HOME OIL	12	25	094	10	4	Unknown	Chemistry	Unknown	Unknown	27.43	--	--	--	--	--	--	--	--	--	--	--	--	57.18629	-111.47771
235245	HOME OIL	12	25	094	10	4	Unknown	Chemistry	Unknown	Unknown	36.58	--	--	--	--	--	--	--	--	--	--	--	--	57.18629	-111.47771
235246	HOME OIL	12	25	094	10	4	Unknown	Chemistry	Unknown	Unknown	50.29	--	--	--	--	--	--	--	--	--	--	--	--	57.18629	-111.47771
235247	HOME OIL	12	26	094	10	4	Unknown	Chemistry	Unknown	Unknown	36.58	--	--	--	--	--	--	--	--	--	--	--	--	57.18631	-111.50463
235248	HOME OIL	12	26	094	10	4	Unknown	Chemistry	Unknown	Unknown	18.29	--	--	--	--	--	--	--	--	--	--	--	--	57.18631	-111.50463
235249	HOME OIL	12	26	094	10	4	Unknown	Chemistry	Unknown	Unknown	27.43	--	--	--	--	--	--	--	--	--	--	--	--	57.18631	-111.50463
299207	PTI GROUP INC	NE	32	094	10	4	Other	Test Hole-Abandoned	Industrial	Not Applicable	30.48	--	--	--	--	--	--	--	--	--	--	5/15/2001	5/15/2001	57.20257	-111.56849
235250	SYNCRUDE CAN LTD	03	01	094	11	4	Rotary	Drill Stem Test Hole	Industrial	Unknown	335.28	--	--	--	--	--	--	--	--	--	--	6/15/1974	--	57.12085	-111.63214
233809	ALTA RESEARCH COUNCIL#17-200	13	12	094	11	4	Unknown	New Well	Observation	Open Hole	60.96	--	--	--	--	--	--	--	--	--	--	--	--	57.14614	-111.63880
233810	ALTA RESEARCH COUNCIL#17-45	13	12	094	11	4	Unknown	New Well	Observation	Screen & Open Hole	13.72	--	--	--	--	--	--	7.62	12.19	--	--	--	--	57.14614	-111.63880
235251	ALTA FOREST SVC	SE	12	094	11	4	Rotary	Test Hole	Domestic	Unknown	100.58	--	--	--	--	--	--	--	--	--	--	1/31/1986	--	57.13710	-111.62217
235252	ALTA FOREST SVC#TH1	SE	12	094	11	4	Rotary	Test Hole-Abandoned	Domestic	Unknown	91.44	--	--	--	--	--	--	--	--	--	--	8/6/1986	8/6/1986	57.13710	-111.62217
235253	ALTA FOREST SVC#TH2	SE	12	094	11	4	Rotary	Test Hole-Abandoned	Investigation	Not Applicable	76.20	--	--	--	--	--	--	--	--	--	--	8/7/1986	8/7/1986	57.13710	-111.62217
235254	ALTA FOREST SVC#TH3	SE	12	094	11	4	Rotary	Test Hole-Abandoned	Unknown	Not Applicable	42.67	--	--	--	--	--	--	--	--	--	--	8/7/1986	8/7/1986	57.13710	-111.62217
235255		06	25	094	11	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.18262	-111.63218
233811	ALTA RESEARCH COUNCIL#18-44	07	25	094	11	4	Unknown	New Well	Observation	Screen & Open Hole	13.41	--	--	--	--	--	--	8.53	10.06	--	--	--	--	57.18262	-111.62552
233813	ALTA RESEARCH COUNCIL#18-108	07	25	094	11	4	Unknown	New Well	Observation	Screen & Open Hole	32.92	--	--	--	--	--	--	26.82	29.87	--	--	--	--	57.18262	-111.62552
233815	ALTA RESEARCH COUNCIL#18-180	07	25	094	11	4	Unknown	New Well	Observation	Open Hole	54.86	--	--	--	--	--	--	--	--	--	--	3/1/1978	--	57.18262	-111.62552
235256	FT MACKAY COMMUNITY	11	25	094	11	4	Unknown	New Well-Abandoned	Municipal	Not Applicable	156.36	--	--	--	--	--	--	--	--	--	--	9/16/1969	9/16/1969	57.18623	-111.63218
235257		14	25	094	11	4	Unknown	Well Inventory	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	57.18985	-111.63218
235258	#75-38	NE	25	094	11	4	Rotary	Test Hole	Investigation	Unknown	37.19	--	--	--	--	--	--	--	--	--	--	3/21/1975	--	57.18804	-111.62220
235259	#75-40	NE	25	094	11	4	Rotary	Test Hole	Investigation	Unknown	36.58	--	--	--	--	--	--	--	--	--	--	3/22/1975	--	57.18804	-111.62220
235260	#75-201	NE	25	094	11	4	Auger	Test Hole	Investigation	Unknown	27.74	--	--	--	--	--	--	--	--	--	--	3/12/1975	--	57.18804	-111.62220
235261	ALTA FORESTRY#RANGER STATION	SW	36	094	11	4	Unknown	Chemistry	Domestic	Unknown	4.27	--	--	--	--	--	--	--	--	--	--	--	--	57.19530	-111.63551
235262	WESTCAMP CATERING	SW	10	095	05	4	Rotary	New Well	Domestic	Screen	91.44	--	--	--	--	--	--	81.99	86.56	--	--	11/1/1985	--	57.22448	-110.73104
235263	WESTCAMP CATERING	SW	10	095	05	4	Rotary	New Well	Domestic	Screen	85.34	--	--	--	--	--	--	22.86	27.43	--	--	11/1/1985	--	57.22448	-110.73104
298239	SUNCOR	13	01	095	06	4	Rotary	New Well	Industrial	Screen	115.52	--	--	--	--	--	--	92.96	108.20	--	--	1/25/1999	--	57.21905	-110.84269
040932	SUNCOR #CAMP	12	01	095	06	4	Rotary	New Well	Domestic	Screen	42.06	--	--	--	--	--	--	33.53	36.58	--	--	10/15/2001	--	57.21543	-110.84269
040933	SUNCOR	12	01	095	06	4	Other	New Well	Observation	Screen	3.96	--	--	--	--	--	--	0.91	3.96	--	--	10/16/2001	--	57.21543	-110.84269
040934	SUNCOR	12	01	095	06	4	Other	New Well	Observation	Screen	3.96	--	--	--	--	--	--	0.91	3.96	--	--	10/16/2001	--	57.21543	-110.84269
040935	SUNCOR	12	01	095	06	4	Other	New Well	Observation	Screen	3.96	--	--	--	--	--	--	0.91	3.96	--	--	10/15/2001	--	57.21543	-110.84269
040936	SUNCOR	12	01	095	06	4	Other	New Well	Observation	Screen	9.75	--	--	--	--	--	--	7.01	8.53	--	--	10/15/2001	--	57.21543	-110.84269
040937	SUNCOR	12	01	095	06	4	Other	New Well	Observation	Screen	4.27	--	--	--	--	--	--	1.22	4.27	--	--	10/16/2001	--	57.21543	-110.84269
040938	SUNCOR	12	01	095	06	4	Other	New Well	Observation	Screen	3.96	--	--	--	--	--	--	0.91	3.96	--	--	10/16/2001	--	57.21543	-110.84269
298240	SUNCOR #PTI CAMP WELL	11	03	095	06	4	Rotary	New Well	Industrial	Screen	46.63	--	--	--	--	--	--	36.88	39.93	--	--	1/21/1999	--	57.21547	-110.89019
298241	SUNCOR #PTI CAMP	11	03	095	06	4	Rotary	New Well	Observation	Screen	9.45	--	--	--	--	--	--	5.49	8.53	--	--	1/21/1999	--	57.21547	-110.89019
042473	SUNCOR	NE	11	095	06	4	Rotary	New Well	Industrial	Screen	73.15	--	--	--	--	--	--	46.33	49.38	--	--	1/6/2001	--	57.23170	-110.85200
042474	SUNCOR #2	NE	11	095	06	4	Rotary	New Well	Industrial	Screen	60.35	--	--	--	--	--	--	46.94	49.99	--	--	1/7/2001	--	57.23170	-110.85200
042475	SUNCOR #3	NE	11	095	06	4	Rotary	New Well	Observation	Screen	54.25	--	--	--	--	--	--	44.50	50.60	--	--	1/7/2001	--	57.23170	-110.85200
042476	SUNCOR #4	NE	11	095	06	4	Rotary	New Well	Observation	Screen	7.32	--	--	--	--	--	--	3.05	7.32	--	--	1/8/2001	--	57.23170	-110.85200
1500968	SUNCOR	15	11	095	06	4	Rotary	New Well	Other	Stainless Steel	67.06	--	--	--	--	--	--	38.71	44.81	--	--	7/7/2005	--	57.23351	-110.85502
1501014	SUNCOR	SE	11	095	06	4	Rotary	New Well	Monitoring	Plastic	48.77	--	--	--	--	--	--	38.74	44.81	--	--	7/8/2005	--	57.22443	-110.85165
289515	SUNCOR "FIRE BAG" OBS	10	30	095	06	4	Rotary	Test Hole	Observation	Screen	91.44	--	--	--	--	--	--	74.07	80.16	--	--	2/25/1998	--	57.27362	-110.96476
298242	SUNCOR	10	30	095	06	4	Rotary	New Well	Industrial	Screen	95.40	--	--	--	--	--	--	68.88	81.08	--	--	1/29/1999	--	57.27362	-110.96476
298243	SUNCOR	10	30	095	06	4	Rotary	New Well	Observation	Screen	111.86	--	--	--	--	--	--	91.44	94.49	--	--	1/28/1999	--	57.27362	-110.96476
200155	HUSKY OIL OPERATIONS	09	09	095	07	4	Unknown	Old Well-Abandoned	Industrial	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	8/28/1995	57.22992	-111.06640
1545514	HUSKY OIL	12	11	095	07	4	Rotary	Test Hole	Industrial	Stainless Steel	96.00	--	--	--	--	--	--	71.90	76.70	--	--	2/10/2004	--	57.22993	-111.03146
1545340	HUSKY OIL	16	22	095	07	4	Rotary	New Well	Industrial	Stainless Steel	75.60	--	--	--	--	--	--	63.47	72.00	--	--	2/27/2004	--	57.26262	-111.03807

WATER WELLS WITHIN THE REGIONAL STUDY AREA

WELLID	WELLOWNER	LSD	SEC	TWP	RGE	MER	DRILL_METHOD	TYPE_WORK	PROPOSED USE	WELL_FINISH	WELLDEPTH (m)	PERFFROM1 (m)	PERFTO1 (m)	PERFFROM2 (m)	PERFTO2 (m)	PERFFROM3 (m)	PERFTO3 (m)	SCRNFROM1 (m)	SCRNTO1 (m)	SCRNFROM2 (m)	SCRNTO2 (m)	DATE COMPLETED	DATE ABANDONED	LATITUDE	LONGITUDE
151136	ESSO#OSLO	SE	13	095	08	4	Rotary	New Well	Industrial	Screen	41.15	--	--	--	--	--	--	22.25	34.44	--	--	2/23/1990	--	57.23910	-111.15097
235264	ESSO#OSLO	08	15	095	08	4	Rotary	Test Hole-Abandoned	Investigation	Screen & Open Hole	128.93	--	--	--	--	--	--	116.43	128.93	--	--	2/17/1988	--	57.24093	-111.20180
150682	ESSO#OLSO	SW	18	095	08	4	Rotary	Reconditioned	Observation	Screen	47.24	--	--	--	--	--	--	22.86	44.20	--	--	2/19/1990	--	57.23911	-111.29970
150683	ESSO#OSLO PIEZOMETER 5	SW	18	095	08	4	Rotary	Reconditioned	Observation	Screen	39.62	--	--	--	--	--	--	18.29	36.58	--	--	2/20/1990	--	57.23911	-111.29970
150684	ESSO#OSLO PIEZOMETER 8	SW	18	095	08	4	Rotary	Reconditioned	Observation	Screen	33.53	--	--	--	--	--	--	14.33	23.47	--	--	2/21/1990	--	57.23911	-111.29970
233766	ARC#7-32	13	20	095	08	4	Unknown	New Well	Observation	Screen & Open Hole	13.41	--	--	--	--	--	--	6.71	8.23	--	--	--	--	57.26261	-111.27597
233775	ALTA RESEARCH COUNCIL#7-337	13	20	095	08	4	Unknown	New Well	Observation	Screen & Open Hole	102.72	--	--	--	--	--	--	98.15	101.19	--	--	--	--	57.26261	-111.27597
233777	ALTA RESEARCH COUNCIL#7-594	13	20	095	08	4	Unknown	New Well	Observation	Open Hole	181.05	--	--	--	--	--	--	--	--	--	--	--	--	57.26261	-111.27597
233793	ALTA RESEARCH COUNCIL#7-933	13	20	095	08	4	Unknown	New Well	Observation	Open Hole	284.38	--	--	--	--	--	--	--	--	--	--	--	--	57.26261	-111.27597
233806	ALTA RESEARCH COUNCIL#7-135	13	20	095	08	4	Unknown	New Well	Observation	Screen & Open Hole	41.15	--	--	--	--	--	--	36.58	39.62	--	--	2/1/1975	--	57.26261	-111.27597
235267	ESSO	05	21	095	08	4	Rotary	New Well	Industrial	Screen	130.15	--	--	--	--	--	--	96.32	112.17	115.21	123.14	2/22/1986	--	57.25538	-111.24888
150685	ESSO#OSLO PIEZOMETER 6	NE	02	095	09	4	Rotary	Reconditioned	Observation	Screen	42.67	--	--	--	--	--	--	11.89	30.18	--	--	2/21/1990	--	57.21726	-111.34051
150686	ESSO#OSLO PIEZOMETER 7	SE	11	095	09	4	Rotary	Reconditioned	Observation	Screen	31.70	--	--	--	--	--	--	16.76	28.96	--	--	2/21/1990	--	57.22448	-111.34051
150687	ESSO#OSLO PIEZOMETER 1	SE	13	095	09	4	Rotary	Reconditioned	Observation	Screen	50.29	--	--	--	--	--	--	12.50	46.02	--	--	2/18/1990	--	57.23910	-111.31345
150688	ESSO#OSLO PIEZOMETER 3	SE	13	095	09	4	Rotary	Reconditioned	Observation	Screen	44.20	--	--	--	--	--	--	16.15	40.54	--	--	2/19/1990	--	57.23910	-111.31345
150689	ESSO#OSLO PIEZOMETER 4	SE	13	095	09	4	Rotary	Reconditioned	Observation	Screen	42.67	--	--	--	--	--	--	17.68	35.97	--	--	2/20/1990	--	57.23910	-111.31345
233818	ALTA RESEARCH COUNCIL#6-21	02	18	095	09	4	Unknown	New Well	Observation	Screen & Open Hole	6.40	--	--	--	--	--	--	4.27	5.79	--	--	--	--	57.23730	-111.45210
233822	ALTA RESEARCH COUNCIL#6-310	02	18	095	09	4	Unknown	New Well	Observation	Open Hole	94.49	--	--	--	--	--	--	--	--	--	--	2/8/1975	--	57.23730	-111.45210
233835	ALTA RESEARCH COUNCIL#6-220	02	18	095	09	4	Unknown	New Well	Observation	Screen & Open Hole	67.06	--	--	--	--	--	--	59.44	65.53	--	--	2/1/1975	--	57.23730	-111.45210
235269	SHELL CAN	04	19	095	09	4	Unknown	Chemistry	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	57.25175	-111.46544
233856	SHELL#PW-2	10	24	095	09	4	Unknown	New Well	Observation	Screen & Open Hole	31.39	--	--	--	--	--	--	15.85	22.25	--	--	--	--	57.25897	-111.31678
150377	ALTA FORESTRY	06	20	095	10	4	Rotary	New Well	Domestic	Perforated Casing/Liner	115.82	54.86	93.27	--	--	--	--	--	--	--	--	3/5/1990	--	57.25537	-111.59424
235270	SHELL CAN	07	25	095	10	4	Rotary	Dry Hole-Abandoned	Industrial	Not Applicable	304.19	--	--	--	--	--	--	--	--	--	--	8/22/1975	--	57.26998	-111.47917
233859	SHELL#PW-4	10	25	095	10	4	Unknown	New Well	Observation	Screen & Open Hole	91.74	--	--	--	--	--	--	75.90	82.30	85.34	88.39	--	--	57.27359	-111.47917
233860	SHELL#OBS7	10	25	095	10	4	Unknown	New Well	Observation	Open Hole	299.62	--	--	--	--	--	--	--	--	--	--	--	--	57.27359	-111.47917
235271	SHELL CAN	10	25	095	10	4	Unknown	Chemistry	Industrial	Unknown	196.90	--	--	--	--	--	--	--	--	--	--	--	--	57.27359	-111.47917
235272	SHELL#PW	10	25	095	10	4	Rotary	New Well	Observation	Screen & Open Hole	94.49	--	--	--	--	--	--	77.72	90.22	--	--	1/1/1972	--	57.27359	-111.47917
235274	SHELL#OBS1	10	25	095	10	4	Unknown	Test Hole-Abandoned	Observation	Not Applicable	88.39	--	--	--	--	--	--	--	--	--	--	10/1/1973	10/1/1973	57.27359	-111.47917
235276	SHELL#OBS2	10	25	095	10	4	Unknown	Test Hole	Observation	Screen & Open Hole	94.49	--	--	--	--	--	--	73.15	82.30	--	--	1/1/1972	--	57.27359	-111.47917
235277	SHELL#OBS3	10	25	095	10	4	Unknown	Test Hole	Observation	Unknown	94.49	--	--	--	--	--	--	76.20	85.34	--	--	1/1/1972	--	57.27359	-111.47917
235279	SHELL#OBS4	10	25	095	10	4	Unknown	Test Hole	Observation	Unknown	96.62	--	--	--	--	--	--	78.03	87.17	--	--	1/1/1972	--	57.27359	-111.47917
235280	SHELL#OBS5	10	25	095	10	4	Unknown	Test Hole	Observation	Unknown	87.48	--	--	--	--	--	--	76.20	82.30	--	--	1/1/1972	--	57.27359	-111.47917
235281	SHELL#OBS7	10	25	095	10	4	Unknown	Test Hole	Observation	Unknown	299.62	--	--	--	--	--	--	--	--	--	--	1/1/1972	--	57.27359	-111.47917
235282	#OBS 434	10	25	095	10	4	Unknown	Test Hole	Observation	Unknown	3.96	--	--	--	--	--	--	--	--	--	--	1/1/1973	--	57.27359	-111.47917
235283	#OBS 439	10	25	095	10	4	Unknown	Test Hole	Observation	Unknown	3.35	--	--	--	--	--	--	--	--	--	--	1/1/1973	--	57.27359	-111.47917
235285	SHELL CAN	02	26	095	10	4	Unknown	Test Hole	Industrial	Unknown	39.93	--	--	--	--	--	--	--	--	--	--	--	--	57.26637	-111.50625
235286	NIELSON, GRANT#SALT OF THE EAR	SE	01	095	11	4	Unknown	Chemistry	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	57.21003	-111.63848
233864	B.P.#4WA	09	20	095	12	4	Unknown	New Well	Observation	Open Hole	54.86	--	--	--	--	--	--	--	--	--	--	--	--	57.25897	-111.90582
233912	B.P.#OV 2-75-4W	09	20	095	12	4	Unknown	Structure Test Hole	Industrial	Open Hole	103.63	--	--	--	--	--	--	--	--	--	--	3/17/1975	--	57.25897	-111.90582
1501021	DEER CREEK ENERGY	14	20	095	12	4	Rotary	New Well	Observation	Plastic	24.08	--	--	--	--	--	--	20.73	23.77	--	--	2/4/2003	--	57.26260	-111.91894
233866	B.P.#3W	05	21	095	12	4	Unknown	New Well	Observation	Open Hole	110.03	--	--	--	--	--	--	--	--	--	--	--	--	57.25536	-111.89875
233883	B.P.#2W	14	36	095	12	4	Unknown	New Well	Observation	Open Hole	153.62	--	--	--	--	--	--	--	--	--	--	--	--	57.29162	-111.81089
233900	B.P.#2WA	14	36	095	12	4	Unknown	New Well	Observation	Screen & Open Hole	126.49	--	--	--	--	--	--	112.78	126.49	--	--	--	--	57.29162	-111.81089
1501022	DEER CREEK ENERGY	14	36	095	12	4	Rotary	New Well	Observation	Plastic	17.68	--	--	--	--	--	--	14.63	17.68	--	--	2/4/2003	--	57.29162	-111.81089
235288	SHELL CAN	13	31	096	06	4	Rotary	Dry Hole-Abandoned	Industrial	Not Applicable	266.40	--	--	--	--	--	--	--	--	--	--	2/25/1974	2/25/1974	57.37892	-110.97816
213128	HUSKY OIL OPERATIONS	01	18	096	07	4	Unknown	Old Well-Abandoned	Industrial	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	8/29/1995	57.32455	-111.12056
214093	HUSKY OIL OPERATIONS	01	18	096	07	4	Unknown	Old Well-Abandoned	Industrial	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	8/29/1995	57.32455	-111.12056
216325	HUSKY OIL OPERATIONS	01	18	096	07	4	Unknown	Old Well-Abandoned	Industrial	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	8/29/1995	57.32455	-111.12056
235289	CDC OIL & GAS#OBS2-81	01	18	096	07	4	Rotary	New Well	Industrial	Open Hole	109.73	--	--	--	--	--	--	--	--	--	--	1/25/1981	--	57.32455	-111.12056
235290	CDC OIL & GAS#TH1-81	01	18	096	07	4	Rotary	Test Hole-Abandoned	Investigation	Not Applicable	116.43	--	--	--	--	--	--	--	--	--	--	1/22/1981	1/22/1981	57.32455	-111.12056
235291	CDC OIL & GAS#SITE 1 PW	01	18	096	07	4	Rotary	New Well	Industrial	Screen	85.34	--	--	--	--	--	--	64.92	78.94	--	--	2/12/1981	--	57.32455	-111.12056
235292	CDC OIL & GAS#OBS3-81	01	18	096	07	4	Rotary	New Well	Observation	Screen	78.33	--	--	--	--	--	--	74.68	78.03	--	--	1/28/1981	--	57.32455	-111.12056
219180	HUSKY OIL OPERATIONS	14	18	096	07	4	Unknown	Old Well-Abandoned	Industrial	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	8/30/1995	57.33539	-111.13393
219669	HUSKY OIL OPERATIONS	14	18	096	07	4	Unknown	Old Well-Abandoned	Industrial	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	8/30/1995	57.33539	-111.13393
219891	HUSKY OIL OPERATIONS	14	18	096	07	4	Unknown	Old Well-Abandoned	Industrial	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	8/30/1995	57.33539	-111.13393
235293	CDC OIL & GAS#TH4-81 SITE 2	14	18	096	07	4	Rotary	Test Hole	Investigation	Not Applicable	109.12	--	--	--	--	--	--	--	--	--	--	1/30/1981	1/30/1981	57.33539	-111.13393
235294	CDC OIL & GAS#TH5-81 SITE 2	14	18	096	07	4	Rotary	Test Hole	Observation	Screen	100.89	--	--	--	--	--	--	97.54	100.89	--	--	2/2/1981	--	57.33539	-111.13393
235295	CDC OIL & GAS#SITE 2 PW	14	18	096	07	4	Rotary	New Well	Industrial	Screen	97.54	--	--	--	--	--	--	74.37	90.83	--	--	3/1/1981	--	57.33539	-111.13393
235296	CDC OIL & GAS#6-81 SITE 2	14	18	096	07	4	Rotary	New Well	Observation	Screen	88.39	--	--	--	--	--	--	84.43	87.78	--	--	2/4/1981	--	57.33539	-111.13393
166629	HUSKY OIL OPERATIONS#WELL 2	10	20	096	07	4	Unknown	Old Well-Abandoned	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	2/12/1992	2/12/1992	57.34624	-111.10016
166630	HUSKY OIL OPERATIONS#WELL 3	10	20	096	07	4	Unknown	Old Well-Abandoned	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	2/12/1992	2/12/1992	57.34624	-111.10016
166631	HUSKY OIL OPERATIONS#WELL 4	10	20	096	07	4	Unknown	Old Well-Abandoned	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	2/12/1992	2/12/1992	57.34624	-111.10016
166632	HUSKY OIL OPERATIONS#WELL 5	10	20	096	07	4	Unknown	Old Well-Abandoned	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	2/12/1992	2/12/1992	57.34624	-111.10016
166801	TENNECO 1/HUSKY OIL OPER. #1	10	20	096	07	4	Unknown	Old Well-Abandoned	Industrial	Screen	79.25	--	--	--	--	--	--	74.68	79.25	--	--	--	2/12/1992	57.34624	-111.10016
289516	SYNCRUDE #CWS-1/PRBM RPT.	11	02	096	10	4	Rotary	New Well	Industrial	Screen	5.79	--	--	--	--	--	--	2.13	3.66	3.66	5.18	4/11/1996	--	57.30268	-111.51294
289517	SYNCRUDE #DWW1/PRBM RPT	11	03	096	10	4	Rotary	New Well	Industrial	Screen	10.67	--	--	--	--	--	--	5.49	8.84	--	--	4/12/1996	--	57.30269	-111.54001
233916	PETROFINA#73-6	09	09	096	10	4	Drilled	New Well	Industrial	Unknown	147.22	--	--	--	--	--	--	--	--	--	--	2/26/1974	--	57.31714	-111.55373
233920	PETROFINA#73-6	09	09	096	10	4	Unknown	New Well	Observation	Screen	119.48	--	--	--	--	--	--	--	--	--	--	3/24/1974	--	57.31714	-111.55373
233923	PETROFINA#73-6	09	09	096	10	4	Unknown	New Well	Observation	Unknown	119.48	--	--	--	--	--	--	--	--	--	--	--	--	57.31714	-111.55373
233930	PETROFINA#73-6	09	09	096	10	4	Unknown	New Well	Observation	Screen & Open Hole	109.73	--	--	--	--	--	--	--	--	--	--	--	--	57.31714	-111.55373
235297	INTL BITUMEN CO LTD#WELL4	16	29	096	10	4	Unknown	Unknown	Unknown	Unknown	70.10	--	--	--	--	--	--	--	--	--	--	1/29/1901	--	57.36447	-111.58082
235298	INTL BITUMEN CO LTD#1A	10	32	096	10	4	Unknown	Unknown	Unknown	Unknown	29.87	--	--	--	--	--	--	--	--	--	--	1/1/1927	--	57.37530	-111.58749
235299	INTL BITUMEN CO LTD# WELL 3	02	36	096	10	4	Unknown	Unknown	Unknown	Unknown	106.38	--	--	--	--	--	--	--	--	--	--	1/1/1928	--	57.36806	-111.47921
233932	PETROFINA #73-2	01	01	096	11	4	Unknown	New Well	Observation	Screen & Open Hole	100.58	--	--	--	--	--	--	96.93	100.58	--	--	3/30/1974	--	57.29540	-111.63522
233939	PETROFINA #73-2	01	01	096	11	4	Unknown	New Well	Observation	Screen & Open Hole	100.58	--	--	--	--	--	--	96.93	100.58	--	--	--	--	57.29540	-111.63522
233959	PETROFINA#73-2	01	01	096	11	4	Unknown	New Well	Observation	Screen & Open Hole	109.42	--	--	--	--	--	--	--	--	--	--	2/1/1974	--	57.29540	-111.63522
235300	ATHABASCA OILS LTD#WELL1	08	02	096	11	4	Unknown	Dry Hole-Abandoned	Industrial	Not Applicable	344.42	--	--	--	--	--	--	--	--	--	--	1/1/1914	1/1/1914	57.29904	-111.66220
042477	CNRL	05	02	096	11	4	Rotary	Test Hole	Industrial	Stainless Steel	140.82	--	--	--	--	--	--	128.02	134.72	134.72	140.82	3/4/2002	--	57.29876	-111.68185
042478	CNRL	05	02	096	11	4	Rotary	New Well	Observation	Plastic	142.04	--	--	--	--	--	--	137.16	140.21	--	--	3/5/2002	--	57.29876	-111.68185
233976	B.P.#1W	15	03	096	11	4	Unknown	New Well	Observation	Open Hole	129.24	--	--	--	--	--	--	--	--	--	--	--	--	57.30628	-111.69587
291300	DEER CREEK ENERGY	03	04	096	11	4	Rotary	New Well	Domestic	Screen	9.14	--	--	--	--	--	--	4.88	9.14	--	--	1/15/1999	--	57.29642	-111.72727
1501023	DEER CREEK ENERGY	05	04	096	11	4	Rotary	New Well	Observation	Plastic	13.72	--	--	--	--	--	--	10.67	12.80	--	--	2/4/2003	--	57.29880	-111.73586
1500289	DEER CREEK ENERGY	09	05	096	11	4	Rotary	New Well	Other	Stainless Steel	10.06	--	--	--	--	--	--	5.49	8.53	--	--	2/6/2006	--	57.30266	-111.74258

WATER WELLS WITHIN THE REGIONAL STUDY AREA

WELLID	WELLOWNER	LSD	SEC	TWP	RGE	MER	DRILL_METHOD	TYPE_WORK	PROPOSED USE	WELL_FINISH	WELLDEPTH (m)	PERFFROM1 (m)	PERFTO1 (m)	PERFFROM2 (m)	PERFTO2 (m)	PERFFROM3 (m)	PERFTO3 (m)	SCRNFROM1 (m)	SCRNTO1 (m)	SCRNFROM2 (m)	SCRNTO2 (m)	DATE COMPLETED	DATE ABANDONED	LATITUDE	LONGITUDE
1500216	DEER CREEK ENERGY	02	05	096	11	4	Rotary	New Well	Other	Stainless Steel	10.67	--	--	--	--	--	--	5.79	8.84	--	--	2/5/2003	--	57.29526	-111.74919
1500220	DEER CREEK ENERGY	04	05	096	11	4	Rotary	New Well	Other	Stainless Steel	16.76	--	--	--	--	--	--	6.10	9.14	--	--	2/5/2003	--	57.29526	-111.76312
1500225	DEER CREEK ENERGY	04	05	096	11	4	Rotary	Test Hole	Unknown	Stainless Steel	10.06	--	--	--	--	--	--	5.49	8.53	--	--	2/5/2003	--	57.29526	-111.76312
1501041	DEER CREEK ENERGY	09	05	096	11	4	Rotary	New Well	Industrial	Stainless Steel	9.75	--	--	--	--	--	--	5.79	7.62	7.62	9.45	12/14/2003	--	57.30266	-111.74258
1500035	CNRL	05	07	096	11	4	Rotary	New Well	Observation	Plastic	126.80	--	--	--	--	--	--	118.87	127.97	--	--	1/17/2004	--	57.31338	-111.79006
235301	HUDSON'S BAY OIL & GAS CO LTD	11	10	096	11	4	Unknown	Chemistry	Industrial	Unknown	134.11	--	--	--	--	--	--	--	--	--	--	1/1/1973	--	57.31712	-111.70259
233982	ALTA RESEARCH COUNCIL#1-32	08	15	096	11	4	Unknown	New Well	Observation	Screen & Open Hole	9.75	--	--	--	--	--	--	6.71	8.23	--	--	1/1/1975	--	57.32814	-111.68923
233986	ALTA RESEARCH COUNCIL#1-507	08	15	096	11	4	Unknown	New Well	Observation	Open Hole	154.53	--	--	--	--	--	--	--	--	--	--	3/1/1975	--	57.32814	-111.68923
233990	ALTA RESEARCH COUNCIL#1-432	08	15	096	11	4	Unknown	New Well	Observation	Screen & Open Hole	131.67	--	--	--	--	--	--	127.10	130.15	--	--	1/1/1975	--	57.32814	-111.68923
233995	ALTA RESEARCH COUNCIL#1-123	08	15	096	11	4	Unknown	New Well	Observation	Perforated Casing/Liner	37.49	22.25	25.30	--	--	--	--	--	--	--	--	3/1/1975	--	57.32814	-111.68923
233999	ALTA RESEARCH COUNCIL#1-726	08	15	096	11	4	Unknown	New Well	Observation	Perforated Casing/Liner	221.28	--	--	--	--	--	--	--	--	--	--	3/1/1975	--	57.32814	-111.68923
234006	ALTA RESEARCH COUNCIL#1-1040	08	15	096	11	4	Unknown	New Well	Observation	Open Hole	316.99	--	--	--	--	--	--	--	--	--	--	2/1/1976	--	57.32814	-111.68923
042479	CNRL #TEST WELL 1	05	27	096	11	4	Rotary	Test Hole	Industrial	Stainless Steel	151.79	--	--	--	--	--	--	131.37	145.39	145.39	151.49	3/2/2002	--	57.35701	-111.70899
1500007	CNRL	16	12	096	12	4	Rotary	New Well	Observation	Plastic	115.21	--	--	--	--	--	--	109.73	111.56	--	--	1/16/2004	--	57.32072	-111.79691
1500059	CNRL	05	12	096	12	4	Rotary	New Well	Observation	Plastic	124.05	--	--	--	--	--	--	118.57	121.62	--	--	1/18/2004	--	57.31338	-111.81740
1500045	CNRL	01	12	096	12	4	Rotary	New Well	Other	Stainless Steel	124.97	--	--	--	--	--	--	112.47	124.97	--	--	1/12/2004	--	57.30978	-111.79713
1500053	CNRL	01	12	096	12	4	Rotary	New Well	Observation	Plastic	125.27	--	--	--	--	--	--	112.78	121.92	--	--	1/10/2004	--	57.30978	-111.79713
1500013	CNRL	16	15	096	12	4	Rotary	New Well	Observation	Plastic	138.99	--	--	--	--	--	--	131.67	137.77	--	--	1/15/2004	--	57.33534	-111.85094
1500018	CNRL	01	23	096	12	4	Rotary	New Well	Observation	Plastic	136.86	--	--	--	--	--	--	128.63	134.72	--	--	1/14/2004	--	57.33889	-111.82379
1500021	CNRL	12	23	096	12	4	Rotary	New Well	Observation	Plastic	139.60	--	--	--	--	--	--	131.67	135.33	--	--	1/15/2004	--	57.34626	-111.84434
1500027	CNRL	04	24	096	12	4	Rotary	New Well	Observation	Plastic	127.71	--	--	--	--	--	--	112.78	124.97	--	--	1/6/2004	--	57.33888	-111.81726
1500275	CNRL	08	35	096	12	4	Rotary	New Well	Other	Stainless Steel	43.28	--	--	--	--	--	--	37.53	39.41	--	--	2/22/2005	--	57.37156	-111.82382
1500292	CNRL	08	35	096	12	4	Rotary	New Well	Monitoring	Plastic	41.15	--	--	--	--	--	--	41.42	42.36	37.72	39.58	2/17/2005	--	57.37156	-111.82382
1500267	HOUZON, CNRL	02	36	096	12	4	Rotary	New Well	Monitoring	Plastic	138.94	--	--	--	--	--	--	39.03	41.17	--	--	2/17/2005	--	57.36803	-111.80354
1420443	IMPERIAL OIL RESOURCES	15	21	097	07	4	Rotary	New Well	Observation	Stainless Steel	44.20	--	--	--	--	--	--	28.96	41.15	--	--	2/12/2006	--	57.43711	-111.07179
1420444	IMPERIAL OIL RESOURCES	09	23	097	07	4	Rotary	New Well	Observation	Stainless Steel	30.48	--	--	--	--	--	--	11.58	20.73	--	--	2/20/2006	--	57.43347	-111.01096
235302		06	11	097	11	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.40077	-111.67555
235306	CANSTAR OILSAND#6B	05	24	097	11	4	Rotary	New Well	Observation	Screen	79.25	--	--	--	--	--	--	69.49	71.02	--	--	9/26/1981	--	57.42984	-111.65525
235303	CANSTAR OILSAND#SITE2 B5	05	24	097	11	4	Rotary	New Well	Observation	Open Hole	60.96	--	--	--	--	--	--	--	--	--	--	9/22/1981	--	57.42984	-111.65525
235304	CANSTAR OILSANDS LTD#SITE2 B4	05	24	097	11	4	Rotary	New Well	Observation	Slotted & Open Hole	18.29	3.05	3.96	--	--	--	--	--	--	--	--	9/20/1981	--	57.42984	-111.65525
235307	CANSTAR OILSANDS#SITE2 B1	05	24	097	11	4	Rotary	New Well	Observation	Screen	85.34	--	--	--	--	--	--	68.28	73.15	--	--	9/5/1981	--	57.42984	-111.65525
235308	CANSTAR OILSANDS#SITE2 B3	05	24	097	11	4	Rotary	New Well	Observation	Open Hole	103.63	--	--	--	--	--	--	--	--	--	--	9/20/1981	--	57.42984	-111.65525
235309	CANSTAR OILSANDS#SITE2 B2	05	24	097	11	4	Rotary	New Well	Other	Screen	78.03	--	--	--	--	--	--	73.15	78.03	--	--	9/18/1981	--	57.42984	-111.65525
235310	CANSTAR OILSANDS#B1	12	24	097	11	4	Rotary	New Well	Observation	Open Hole	152.40	--	--	--	--	--	--	--	--	--	--	9/3/1981	--	57.43346	-111.65525
235311	CANSTAR OILSANDS#OFFICE	NW	24	097	11	4	Rotary	New Well	Domestic	Open Hole	12.19	--	--	--	--	--	--	--	--	--	--	9/23/1981	--	57.43526	-111.65190
235312	CANSTAR OILSANDS LTD#CAMP	04	25	097	11	4	Rotary	New Well	Domestic	Screen	10.06	--	--	--	--	--	--	6.10	9.14	--	--	9/1/1981	--	57.44086	-111.65527
235313	CANSTAR OILSANDS#CAMP	04	25	097	11	4	Rotary	New Well	Domestic	Screen	9.75	--	--	--	--	--	--	6.10	9.14	--	--	8/31/1981	--	57.44086	-111.65527
235314	CANSTAR OILSANDS#A2	05	25	097	11	4	Rotary	New Well	Observation	Screen	56.39	--	--	--	--	--	--	54.56	56.39	--	--	9/8/1981	--	57.44447	-111.65527
235315	CANSTAR OILSANDS#A3	05	25	097	11	4	Rotary	New Well	Observation	Screen	40.54	--	--	--	--	--	--	38.71	40.54	--	--	9/12/1981	--	57.44447	-111.65527
235316	CANSTAR OILSANDS#A4	05	25	097	11	4	Rotary	New Well	Investigation	Open Hole	60.96	--	--	--	--	--	--	--	--	--	--	9/14/1981	--	57.44447	-111.65527
235317	CANSTAR OILSANDS#A1	05	25	097	11	4	Rotary	New Well	Observation	Open Hole	71.02	--	--	--	--	--	--	--	--	--	--	9/8/1981	--	57.44447	-111.65527
235318	CANSTAR OILSANDS#A5	05	25	097	11	4	Rotary	New Well	Observation	Screen	6.71	--	--	--	--	--	--	4.88	6.71	--	--	9/15/1981	--	57.44447	-111.65527
235319	CANSTAR OILSANDS	00	36	097	11	4	Unknown	Chemistry	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	57.46073	-111.64523
1500281	CNRL	09	01	097	12	4	Rotary	New Well	Other	Stainless Steel	44.20	--	--	--	--	--	--	40.28	45.00	--	--	2/20/2005	--	57.39000	-111.79696
1500287	CNRL	09	01	097	12	4	Rotary	New Well	Monitoring	Plastic	44.20	--	--	--	--	--	--	40.51	44.20	--	--	2/18/2005	--	57.39000	-111.79696
234007	ALTA RESEARCH COUNCIL#2-402	01	11	097	12	4	Unknown	New Well	Observation	Screen & Open Hole	122.53	--	--	--	--	--	--	117.96	121.01	--	--	--	--	57.39714	-111.82458
234010	ALTA RESEARCH COUNCIL#2-222	01	11	097	12	4	Unknown	New Well	Observation	Screen & Open Hole	67.67	--	--	--	--	--	--	63.09	66.14	--	--	3/1/1975	--	57.39714	-111.82458
234013	ALTA RESEARCH COUNCIL#2-46	01	11	097	12	4	Unknown	New Well	Observation	Screen & Open Hole	14.02	--	--	--	--	--	--	10.97	12.50	--	--	1/1/1975	--	57.39714	-111.82458
234015	ALTA RESEARCH COUNCIL#2-525	01	11	097	12	4	Unknown	New Well	Observation	Open Hole	160.02	--	--	--	--	--	--	--	--	--	--	1/12/1975	--	57.39714	-111.82458
279621	RCA#SPRING	06	01	097	13	4	Not Applicable	Chemistry	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	3/1/1975	--	57.38629	-111.97337
234018	ALTA RESEARCH COUNCIL#3-44	09	26	097	13	4	Unknown	New Well	Observation	Screen & Open Hole	13.41	--	--	--	--	--	--	10.36	11.89	--	--	--	--	57.44807	-111.98707
234019	ALTA RESEARCH COUNCIL#3-57	09	26	097	13	4	Unknown	New Well	Observation	Screen & Open Hole	17.37	--	--	--	--	--	--	14.33	15.85	--	--	--	--	57.44807	-111.98707
234020	ALTA RESEARCH COUNCIL#3-209	09	26	097	13	4	Unknown	New Well	Observation	Screen & Open Hole	63.70	--	--	--	--	--	--	59.13	62.18	--	--	--	--	57.44807	-111.98707
234021	ALTA RESEARCH COUNCIL#3-425	09	26	097	13	4	Unknown	New Well	Observation	Screen & Open Hole	129.54	--	--	--	--	--	--	124.97	128.02	--	--	--	--	57.44807	-111.98707
234022	ALTA RESEARCH COUNCIL#3-731	09	26	097	13	4	Unknown	New Well	Observation	Screen & Open Hole	222.81	--	--	--	--	--	--	212.14	215.19	--	--	--	--	57.44807	-111.98707
234023	ALTA RESEARCH COUNCIL#3-1144	09	26	097	13	4	Unknown	New Well	Observation	Screen & Open Hole	348.69	--	--	--	--	--	--	344.12	347.17	--	--	--	--	57.44807	-111.98707
234024	ALTA RESEARCH COUNCIL#3-1310	09	26	097	13	4	Unknown	New Well	Observation	Open Hole	399.29	--	--	--	--	--	--	--	--	--	--	--	--	57.44807	-111.98707
092668	PAN AMERICAN PETRO	06	24	097	14	4	Rotary	Drill Stem Test Hole	Industrial	Not Applicable	1344.17	--	--	--	--	--	--	--	--	--	--	3/27/1966	3/27/1966	57.42981	-112.13588
235320		00	24	098	08	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.51889	-111.15774
234016	ALTA RESEARCH COUNCIL#19-103	12	21	098	09	4	Unknown	New Well	Observation	Screen & Open Hole	31.39	--	--	--	--	--	--	25.30	31.39	--	--	3/1/1978	--	57.52072	-111.41149
235321		16	05	098	10	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.48080	-111.58101
235322	SHELL CAN	04	13	098	10	4	Unknown	New Well	Industrial	Unknown	103.63	--	--	--	--	--	--	--	--	--	--	--	--	57.49902	-111.49288
235323	SHELL CAN	01	22	098	10	4	Unknown	New Well	Industrial	Unknown	94.49	--	--	--	--	--	--	--	--	--	--	--	--	57.51350	-111.52688
235324	SHELL CAN	12	06	099	08	4	Rotary	Dry Hole-Abandoned	Industrial	Not Applicable	166.12	--	--	--	--	--	--	--	--	--	--	2/8/1974	2/8/1974	57.56440	-111.31522
235325	#SPRING 617	06	02	099	10	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.56078	-111.52738
235326		05	11	100	09	4	Not Applicable	Spring	Unknown	Not Applicable	--	--	--	--	--	--	--	--	--	--	--	--	--	57.66245	-111.37010
235327		11	11	100	09	4	Not Applicable	Spring	Unknown	Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	57.66607	-111.36335

Source: Alberta Environment Water Well Database; www.telusgeomatics.com/tgpub/ag_water/ - Website accessed April 30, 2007.