

R. Don Peel, P.Geol.
February 15, 2012

Kearl Property

Fort McMurray Region
Northeast Alberta
Canada



National Instrument 43-101 Technical Report for the Estimation of the Aggregate Resources within Section 35 Township 96 Range 08 West of the 4th Meridian

National Instrument 43-101 Technical Report for the Estimation of the Aggregate Resources within Section 35 Township 96 Range 08 West of the 4th Meridian: Kearl Property

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Certificate of Author

I, R. Don Peel, P.Geol., do hereby certify that:

a. The above address is my current mailing address and I am a consultant specializing in sustainable resource development projects.
b. I am responsible for the preparation of the entire report entitled "*National Instrument 43-101 Technical Report for the Estimation of the Aggregate Resources within Section 35 Township 96 Range 08 West of the 4th Meridian: Kearl Property*." The report is effective February 15, 2012.
c. I graduated with a Bachelor of Science degree in geology (1974) and a Masters of Science degree in earth sciences from the University of Alberta (2004). In addition, I have obtained a technical diploma in Exploration from the Northern Alberta Institute of Technology (1969). I served over 26 years of working in the role as a geologist; 23 years specifically focused on the mineral aggregate resources. I have completed a Masters degree dedicated to researching the concept of sustainable development (Earth Sciences – University of Alberta) and it's applicability to the aggregate resource sector. I have completed 3 years (2006-2008) of sustainable development research related to planning theory as a graduate student in the Faculty of Urban and Regional Planning at the University of Hawai'i. I am continuing (2009-present) my research of sustainable development through the College of Education at the University of Hawai'i, in pursuit of a Master degree in Educational Foundations. I am a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA). I have read the definition of "qualified person" set out in the National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
d. I have visited Athabasca Minerals Inc.'s Surface Material Lease (#SML 090051) site for 3 days from April 5 to April 7, 2011.
e. During my site visit I have conducted a follow up testing program to verify and estimate the extent and quality of the industrial mineral resources within the lease 4:08:096:35 NE.
f. I am independent of the issuer applying all the tests in section 1.5 of NI 43-101.
g. I have not had any prior involvement with this property.
h. I have read NI 43-101 and Form 43-101F1 dated June 24, 2011, and the Technical Report has been prepared in compliance with that instrument and form.
i. As of the effective date of this Technical Report, that to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 15th Day of February, 2012

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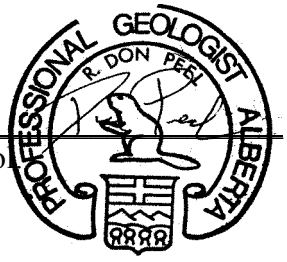
Consent of Author

I, R. Don Peel, do hereby consent to the filing of the written disclosure of a technical report entitled "*National Instrument 43-101 Technical Report for the Estimation of the Aggregate Resources within Section 35, Township 96 Range 08 West of the 4th Meridian: Kearl Property*", and dated February 15th, 2012 (the Technical Report) and any extracts from or a summary of the Technical Report in the preliminary geological investigation of Athabasca Minerals Inc., and the filing of the Technical Report with the appropriate security regulatory authorities.

I also certify that I had read the written disclosure being filed and do not have any reason to believe that there is any misrepresentations in the information derived from the Technical Report or that the written disclosure in the preliminary geological investigation contains any misrepresentation of the information contained in the Technical Report.

Dated the 15th Day of February, 2012.



R, Don Peel, P.Geol.

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1.0 Summary

Athabasca Minerals Incorporated (ABM) is a Canadian company that has assembled an expert management team with combined knowledge and experience of over 170 years in mineral and aggregate exploration, developing, marketing, and managing those minerals. The team is focusing on exploring and developing industrial minerals in the Regional Municipality of Wood Buffalo, Alberta. This Municipality continues to experience high economic growth as the oil, extracted from the oil sands, feeds the growing global energy demand in the face of diminishing conventional oil supplies. Due to the international controversy triggered by the oil sands development, the ABM team can counter the negative image by integrating sustainable development practices and corporate social responsibility (CSR) as the Company's modus operandi for all their projects.

Oil sands development has placed a high demand for mineral aggregate resources in a region of limited supply. Due to the bulky nature of the aggregate resources, the most sustainable sources are those closest to the market, therefore any aggregate deposits located within the region will have a ready market. ABM is actively exploring the region for new aggregate sources and the "Kearl" aggregate deposit was discovered through interpretative geology and field reconnaissance. The aggregate resource deposition relates to a "buried bedrock channel" as described in EUB/AGS Earth Sciences Report 2007-01(Andriashek and Atkinson 2007). This deposit is 70 km north of Ft. McMurray in the heart of oil sand operations, bordered by the Imperial Oil Kearl and Shell Jackpine oil sand properties.

ABM has obtained a 10-year (renewable) "Surface Material Lease" from the Alberta government which gives the company exclusive rights to develop and extract surface materials (sand and gravel) within the lease area. The 32.37 ha (80 acre) parcel is the maximum allotted area for a Surface Material Lease without triggering a bid process for the land (includes the "surface materials). A "Conservation and Reclamation Business Plan", which describes the operational aspects of the lease from development to reclamation, has been approved by the Government. To access the site and transport the resource to the market, a 3.7 km road has been also approved (Licence of Occupation LOC 091139) and constructed from "pit run" material extracted from the lease, proving the sand material has sufficient rock content for road building purposes. All other regulatory requirements to extract the sand and gravel to supply market demands have been met.

R. Don Peel, P.Geol. was contracted to prepare an independent Qualified Person's Review and Technical Report for the Kearl sand and gravel property, northeast Alberta, Canada as defined in Canadian Securities Administrators, National Instrument 43-101, *Standards of Disclosure for Mineral Projects* to estimate the mineral resources within the lease. This report's format and content are guided by Form 43—101F1, *Technical Report* and *Rules and Policies. NI 43-101 Standards of Disclosures for Mineral Projects, Form 43-101Technical Report and Related Consequential Amendments* (OSC 2011).

From April 5-7, 2011, R. Don Peel, P.Geol. co-supervised (with ABM staff) a track hoe and auger drill program while visiting the property to evaluate the site. Samples were taken from the track hoe material piles to determine the variation in grain sizes. A sieve test was conducted by

Mr. David Bagdan, P.Eng of DK Engineering on samples taken in the 2009 and 2010 exploration programs to evaluate the composition of the material (Appendix 4).

The planned 100 meter spacing grid pattern track hoe and auger drill program to estimate the "Mineral Resource" volumes within the lease area was not fully carried out due to wet ground conditions, however the overall testing programs accomplished does merit the deposit to be classified under the "indicated" and "inferred resource" categories. As seven of the holes did not reach the full depth of the deposit, a conservative depth projection (0.3 to 1.5m based on the completive drill data), has been added to the depth to arrive at the "Inferred Mineral Resource" value (Table 2). In addition, by not completely qualifying the market parameters, this report is an estimate of the "resource" volumes. The data used to determine this estimate of the resource will be expanded upon in Section 10, Resource Testing Programs.

The testing program gave the author sufficient confidence to establish the following estimates for the mineral resource volume of the sand and gravel resources within the property, West 4 Meridian., Range 8, Township 96, Northeast of Section 35 (4:8:96:35:NE). Ms. Dian Mitrayani, Masters in Urban and Regional Planning, provided assistance with the following volume estimations, and compilation of the report.

"Indicated Mineral Resources" Estimates			
	Banked volume	**Loose volume**	**Weight**
Gravel	**1,885,165 cu m**	**2,356,465 cu m**	**3,770,330 tonnes**
Sand	**3,818,195 cu m**	**4,772,743 cu m**	**7,636,390 tonnes**
Total Resources	**5,703,360 cu m**	**7,129,200 cu m**	**11,406,720 tonnes**

Table 1 Averaged "Mineral Resource" Estimations (Appendix 2)

"Inferred Mineral Resource" Estimates			
	Banked volume	**Loose volume**	**Weight**
Gravel	**217,000 cu m**	**271,750 cu m**	**434,000 tonnes**

Table 2 "B" Method " Inferred Mineral Resource" Quantity Estimations (Appendix 3)

Conclusions and Recommendations

- Due to expanding resource development in the Regional Municipality of Wood Buffalo, there is a growing demand for aggregate resources in a region where the known aggregate sources are in short supply.
- The subject property has high potential for aggregate resource development.
- The total resource quantity (indicated + inferred) is approximately 12 million tonnes.
- A sieve analysis has been conducted on samples taken from the previous exploration programs and evaluated by David Bagdan, P.Eng. (Appendix 4).

- The location of this source has a ready market with two adjacent oil sand projects under development, which will allow a more sustainable approach when considering energy expenditures and greenhouse gas emissions, through shorter haul distances for the resource.
- A sustainable development approach is crucial for this operation considering the growing international criticism of the oil sands development.
- A sustainable development approach calls for an all inclusive assessment of the regional resources to design an integrated and balanced management strategy.
- Take every opportunity to build community relations through intensive public and aboriginal consultation to encourage a collaborative determination of operational best practices and reclamation objectives ("Corporate Social Responsibility - CSR").
- Explore the development potential of the adjoining lands.
- Check for other mineral values within the sand and gravel deposit (e.g. titanium, zircon).
- If the resource reserves exceed the demand of the adjacent oil sand development, ensure all the developers and their suppliers in the region are informed of this source for mineral aggregate.

2.0 Introduction

2.1 Issuer

Since the Company's inception, February 14, 2006, one of thee focus areas of Athabasca Minerals Inc. is exploring and developing granular resources in northeast Alberta to serve the oil sands development implementing **sustainable**[1] practices. The Company trades on the Toronto stock exchange (TSX Venture Exchange) as ABM.

2.2 Terms of Reference and Purpose of Report

Worldwide, mineral aggregate resources (sand and gravel) have traditionally been the highest consumed minerals with the rate of consumption driven by development trends, increasing as expanding infrastructure (resource development, rural and urban settlement) is constructed and maintained. Aggregate resources are heavy, bulky materials which have to be processed to meet various specifications for different purposes from fill to concrete manufacturing. Aggregate resources are used in large quantities in oil sands development and operations towards infrastructure development and maintenance (fill, concrete, asphalt, for roads, buildings, etc.). Transportation and environmental costs are tied to the distance the resources and products are hauled.

The Regional Municipality of Wood Buffalo's aggregate resource consumption is likely the highest of any municipality in Alberta due to the burgeoning oil sands development; however, new sources are not being discovered at the rate of demand as the area near development seems to be devoid of good quality aggregate resources. The Kearl deposit represents a significant source due to its location and size in relationship to new oil sand developments.

[1] Development and operational decisions based on a balanced approach or "triple bottom line" (balancing the environment, economic, and social values in an equable manner).

This report is to qualify the aggregate resource estimate for shareholders and potential investors. The aggregate resources are a commodity that do not attract the same investment interest as other minerals; however, when scrutinized under *Statistics Canada* aggregate resource production data show an 90% increase in tonnage production between 1995 and 2008 (31 million tonnes, 59 million tonnes respectively). When viewed in the context of profitability, the production value of the resource jumped 425% in this time period ($113 million, $593 million respectively). As a trading commodity the aggregate resources have eluded the awareness of the majority of stock market investors.

The other important aspect that this report highlights is the value of the sustainable approach that ABM operates within an environment of international criticism. This international controversy associated with the oil sands development, creates a significant opportunity to lead the aggregate resource sector in adopting sustainable practices. Similar to oil sands development, the global aggregate resource sector also has a high ecological footprint in both resource extraction (removal of large volumes of porous subsurface material impacting water resources-aquifers) and transportation (greenhouse gas emissions). ABM's role of supplying aggregate resources in a sustainable manner to the oil sands developments, can serve as a catalyst to improve the public perspective surrounding resource development activity.

2.3 Sources of Information

Resource information has been generated under an auger drill and track hoe testing program in April 2011. Relevant data from an earlier exploration program is also used for calculating the resources within the lease. Site information has been taken from the Conservation and Reclamation Business Plan for the lease. Regional geological information has been obtained from a number of Alberta Geological Survey publications (see References).

2.4 Qualified Person Involvement

The test program, to estimate the lease resources, was co-supervised by the Qualified Person (R. Don Peel, P.Geol.) and the exploration programs were conducted under the guidance of the Company's professional engineers. The testing program could not be conducted in the planned grid design (100 meter spacing) due to wet spring thaw conditions. In addition, the auger drill had difficulties in penetrating the deposit or was deeper than the drilling limit; therefore the full depth of the gravel resource was not determined in 7 holes.

3.0 Reliance on Other Experts

This report combines the exploration data of a previous exploration program (2009) and the laboratory testing under the guidance of DK Engineering's David Bagdan, P.Eng. The experienced driller from Canadian Geological Drilling Ltd. was also a factor in determining material types and obtaining accurate logging depths for the 2011 auger drill program.

4.0 Property Description and Location



Figure 1 **Site Location** (Google Earth 2011)

4.1 Site Area and Location

The 32.37 hectare (80 acre) property, legally described as West of the 4th Meridian, Range 8, Township 96, Northeast of Section 35 (4:8:96:35:NE), is located in the northeast of Alberta (Figure 1). The proposed pit is located approximately 35 km north of Fort MacKay via Hwy. 63. To access the property from Highway 63, LOC 790743 or Canterra Road (32 km east), maintained by Shell Oil Company and used by many local interest-holders and public, is used. LOC 091139 (3.7 km) connects the Kearl lease to the Canterra road. This road was in the final stages of construction at the time of the testing program, using the aggregate resources from the Kearl property. The pit run (unprocessed) sand and gravel provided a good indicator that the deposit contains a good quality of sand and gravel for road construction.

4.2 Resource Tenure and Obligations

Through the application process for the lease of public land, ABM was obligated to determine the interest holders within the lands of the lease area and is responsible to

mitigate any conflicts that may arise by this development. ABM, guided by the Alberta Government's consultative process, also notified all aboriginal bands who may have an interest in the lands. ABM also notified Marvin B. L'Hommecourt, who has trapping rights under Trappers Area #TPA 1714, of the proposed development. Compensation would be determined by the trapper's harvesting history and the development's impact relative to the overall size/productivity of the TPA.

Once the lease application was approved, ABM obtained a standard renewable 10 year lease from the Alberta Government under Surface Material Lease #SML 090051, which is renewable as long as the lease is required and held in good standing by the lease-holder. The lease, which gives the company exclusive rights to access, develop, and extract surface materials (sand and gravel) within the lease area, is subject to conditions which include obtaining agreements or advising interest holders within the same land description of the proposed lease development. A "Conservation and Reclamation Business Plan", a Provincial regulatory requirement on surface material leases, which describes the operational aspects of the lease from development to reclamation, has also been compiled and approved by the Government.

4.3 Royalties and Agreements

ABM has obtained a standard renewable 10 year lease agreement from the Alberta Government under Surface Material Lease #SML 090051, which is renewable as long as the lease is required by the lease-holder. The lease agreement is subject to a number of conditions which include obtaining agreements or advising interest holders within the same land description of the proposed lease development.

In the lease application stage, ABM has followed the Government procedures to carry out Aboriginal "consultations" with four bands listed for the area (provided by the Government), and to notify Marvin B. L'Hommecourt, who has trapping rights under Trappers Area #TPA 1714, of the proposed development. Areas of traditional use are to be conveyed by any of the indigenous people and compensation would be determined by the trapper's harvesting history and the development's impact relative to the overall size/productivity of the TPA. No concerns for the development were received in the consultation process.

Royalties to the Alberta Government equate to $0.48/tonne for gravel and $0.28/tonne for sand. Rental rates on the land also apply.

ABM entered into an agreement with Alberta Pacific Forest Industries, who hold rights to the timber on the land, to gain access into the area for the exploration and development stages. Usually the agreement defines the compensation amount as an estimate of the value of the timber in the lease area. The value is based on a formula, not necessarily equating to the actual value of timber within the lease area. For the Kearl lease the timber of the area was logged by Northland Forest Products Ltd. through a timber license issued in 2004 and no compensation was required.

The lease area is primarily used for logging by the Alberta Pacific Forest Industries under FMA 9100029 and lies between two oil sand leases (Shell and Esso).

4.4 Existing Environmental Liabilities

The property is located in a remote area where the only visible surface disturbance is an abandoned trail which runs north from the Canterra road to cut across the lease and is now being used as the alignment of the new access road. All disturbances related to the access road and pit development will be subject to the Provincial reclamation regulations. A "security deposit" of $1000/acre, based on the initial area of surface disturbance, has been paid to the Government. The security deposit is refundable on verification of reclamation, which in this case will be merely leaving a graded landscape as oil sands mining is to follow.

4.5 Permits

One of the Surface Material Lease conditions stipulates the "holder is responsible for obtaining any necessary federal, municipal and other permits and approvals with respect to this activity." According to company staff, this has been accomplished.

4.6 Significant Factors and Risks Affecting Access, Title, or Operations – none detected.

5.0 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Physiography

The lease is relatively level varying between 302 m and 308 m above sea level (Google Earth). The area is comprised of a very gentle slope from the southeast to the northwest (Canadian Land Classification - gentle slopes 6 - 9% (10:1)). The area has some lower wet spots (northeast side), and lies west of a north-south trending creek. The lease is covered with a mixture of young trehrin aspen, balsam, poplar and white birch, and a mixture of various grasses. The area was logged by Northland Forest Products Ltd. under a Commercial Timber License (CTL150001). The lease lies within the physiographic region classified as "Interior Plains" (Natural Resources Canada 2011).

5.2 Accessibility

Access to the lease from Highway 63, is the Canterra Road held under LOC 790743 (maintained by the Shell Oil Company), to which the property's 3.7 km access road, held under LOC 091139 (ABM), is tied into. Road use agreements have been obtained from all parties.

5.3 Infrastructure

The nearest settlement is Fort McKay (First Nation population of approx. 800) approximately 35 km south west, with Ft. McMurray being the closest city approximately 90 km south. The resource will be hauled to the surrounding oil sands sites by truck.

5.4 Climate

The climate at the site would be categorized as "humid continental" (Koppen climate classification Dfb). Fort McMurray is the nearest city (90 km south) with historical climate data. The city's weather station is recording the data from 369m above sea level (World Climate 2011), which is similar to the site elevation at 308 m, therefore this data should apply.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mm	20.4	16.0	19.2	20.5	36.6	61.5	76.9	65.5	50.1	28.5	24.1	22.5	443.1

Table 3 Average Precipitation (Fort McMurray-70 km south) (World Climate 2011)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	-20.5	-16.0	-8.6	2.1	9.7	13.9	16.5	14.8	9.0	3.0	-8.7	-17.3	-0.2

Table 4 Average Temperature (Fort McMurray-70 km south) (WorldClimate 2011)

These conditions allow year round operations and the access road has been constructed to all season specifications to accommodate year round operations.



Figure 2 Location and access of SML 090051 (Google Earth 2011)

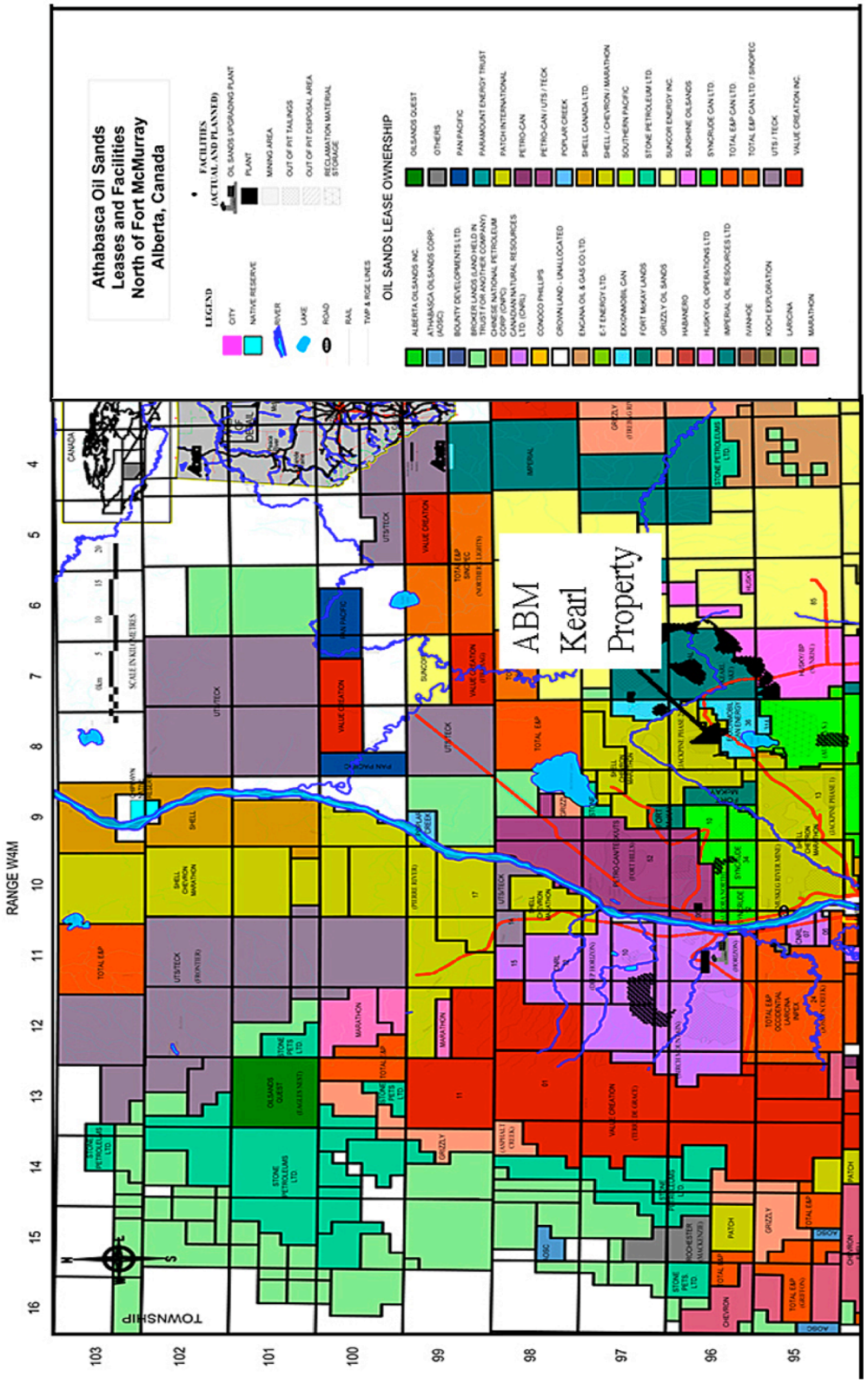


Figure 3 **Area development projects for potential mineral aggregate resource demand** (Terracon Group 2009)

5.5 Local Resources

The site will accommodate resource extraction as described by the Conservation and Reclamation Business Plan with equipment and workforce likely being supplied by the clients. The sand and gravel from SML 090051 (Kearl Prospect) in 4-08-096-35NE will supply sand and granular material required by the oil sands industry (Figure 3) for the

road infrastructure and construction of their development expansions in the surrounding area. Some screening and custom crushing may occur occasionally on site, with the bulk of the resources leaving the site as "pit run". Water, power, personnel will not be factors towards the pit development of this operation.



Figure 4 Lease (outlined red) and surrounding area (Google Earth 2011)

6.0 History

6.1 Prior Ownership

Treaty 8 (1899), is the original agreement which established the ownership parameters and is the basis for aboriginal consultation. The Natural Resources Transfer Act (1930) shifted the resource allocation authority from the Federal Government to the Provincial Government. The lease is on public land where the only prior rights allocated by the Provincial Government are for timber, trapping, and minerals (oil sands). In Alberta "surface materials" (topsoil, clay, silt, sand, and gravel) are allocated with surface rights.

6.2 Previous Exploration or Development

It appears no previous aggregate resource exploration has occurred in this remote area.

6.3 Previous significant historical mineral resource and mineral reserve estimates

There is no previous site volume estimates. The Alberta Geological Survey has identified the deposit as a buried bedrock channel. The AGS 2007 report has estimated depths and widths of the channel, based on oil sands drilling data, which includes the lease area.

6.4 Previous Production from Property

As this is a newly discovered deposit the only resource extraction to date is the pit run that has been extracted to build the 3.7 km access road from the Canterra road to the middle of the lease.

7.0 Geological Setting and Mineralization

7.1 Regional Geology

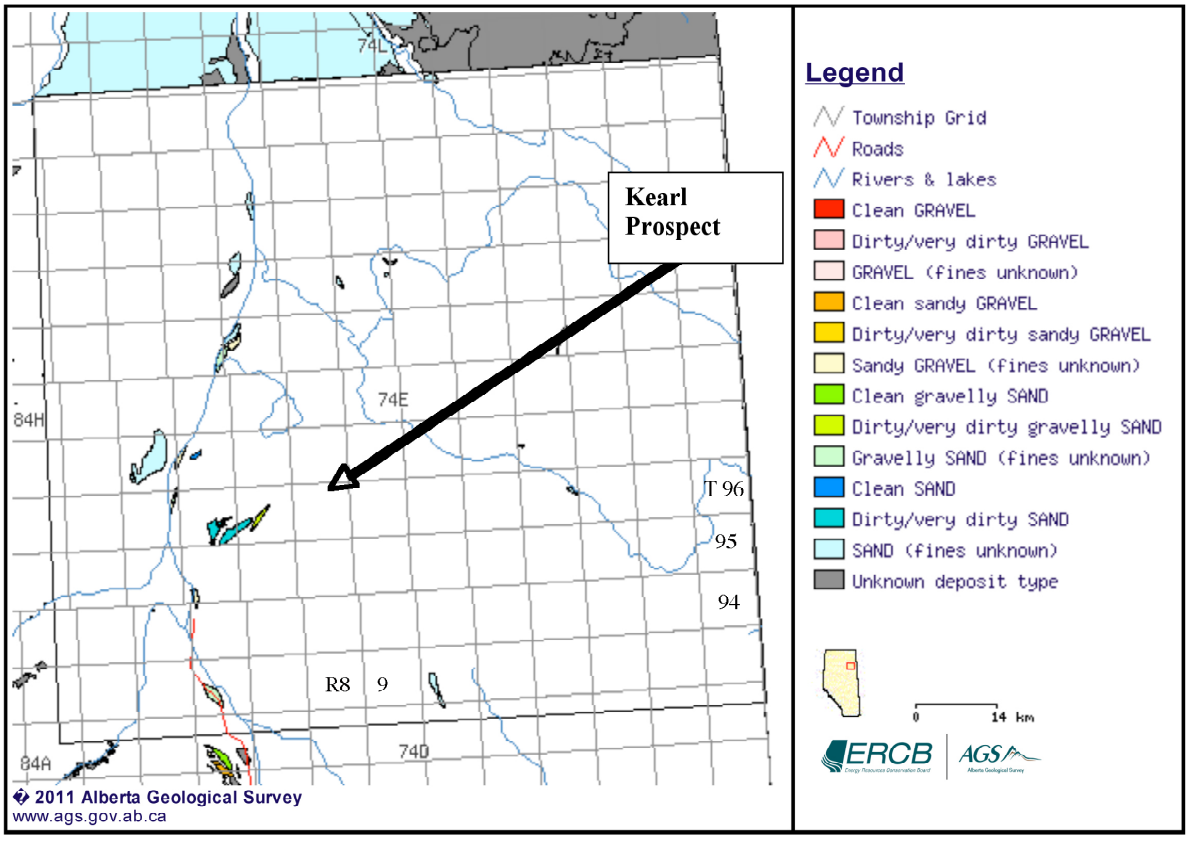


Figure 5 Alberta Geological Survey Sand and Gravel Map (AGS 2010)

According to the Alberta Geological Survey's aggregate potential data, there is a scarcity of known gravel deposits in a regional context within a radius of over 80 km

(Figures 5 and 6). The Susan Lake Public Pit is the closest major supply option (approx. 40 km south west of lease area).

7.2 Local Geology

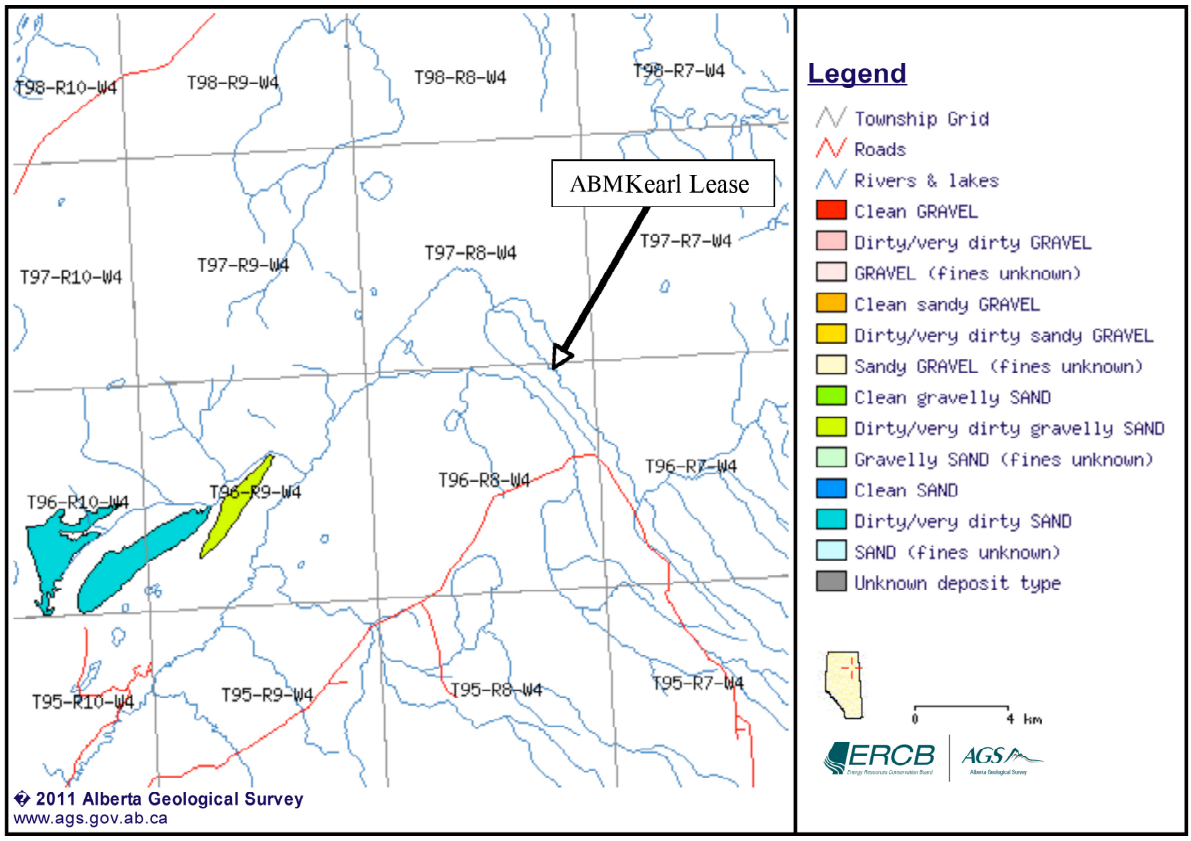
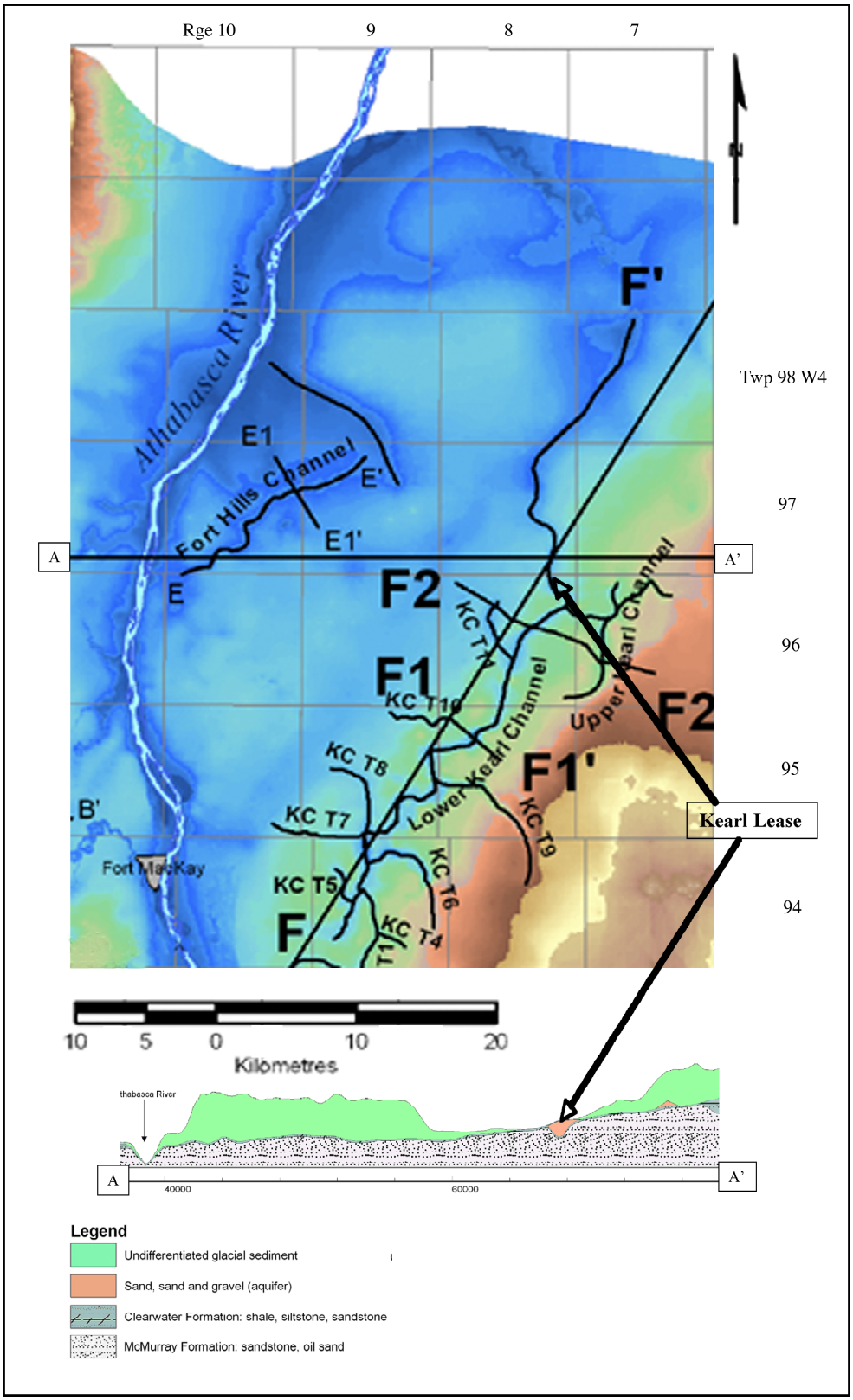


Figure 6 Alberta Geological Survey Aggregate Resource Map (AGS 2011)

The AGS publication "*Buried Channels and Glacial-Drift Aquifers in the Fort McMurray Region, Northeast Alberta*" conveys pertinent local geological information specific to the genesis of the Kearl channel complex (Figur 7), a channel incised into the bedrock, from meltwater stemming from the receding Continental glacier. According to Horne and Seve's (1991) interpretation, the Kearl channel's formation was from the catastrophic release of meltwater that flowed south under the ice, against the topographical gradient, creating up-slope erosion and an undulating to overdeepening channel profile. This interpretation supports the unevenness of the channel depths detected by the drill results.

Horne and Seve also report the sand and gravel deposits contain fragments of the Clearwater Formation, which either slumped from the surrounding bedrock or were plucked up by ice thrusting.



Figures 7 Kearl Buried Channels with Cross Section (AGS 2009)

7.3 Property Geology

The test results indicate there are glaciofluvial sands and gravels underling a thin clay layer, underlying the thin surface duff horizon. The sand and gravel equate a portion of the Kearl channel complex as described in the AGS publication previously mentioned. The channel trends from southeast to northwest through the lease. A near surface tributary trends to the west from the middle of the lease (trackhoe test pit #340). Near surface gravel occurs mainly in the north half of the lease; however, the sand layers contain gravel (approx. 20-30%) which was used for the construction of the access road. The full depth of the deposit was reached between approximately 7-32 m, which overlay oil sands; however, the drill was unable to penetrate the full depth in some locations. The oil sands appear to pinch out the deposit to the west. The underlying oil sands have been allocated for future extraction, therefore the removal of the aggregate resources facilitates reduced costs (no overburden) for oil and development and alleviates much of the reclamation cost for ABM. Figures 8, 9, 10, 11, 13, and 14 are interpretations from all the drill and track hoe data.

There was no indication of any Clearwater Formation fragments within this stretch of the deposit, however, since the local bedrock is oil sands, the evidence of bands of oil sands detected in many test pits suggest this bedrock material was intermixed during deposition.

The following cross sections represent the deposit characteristics based on the exploration results.

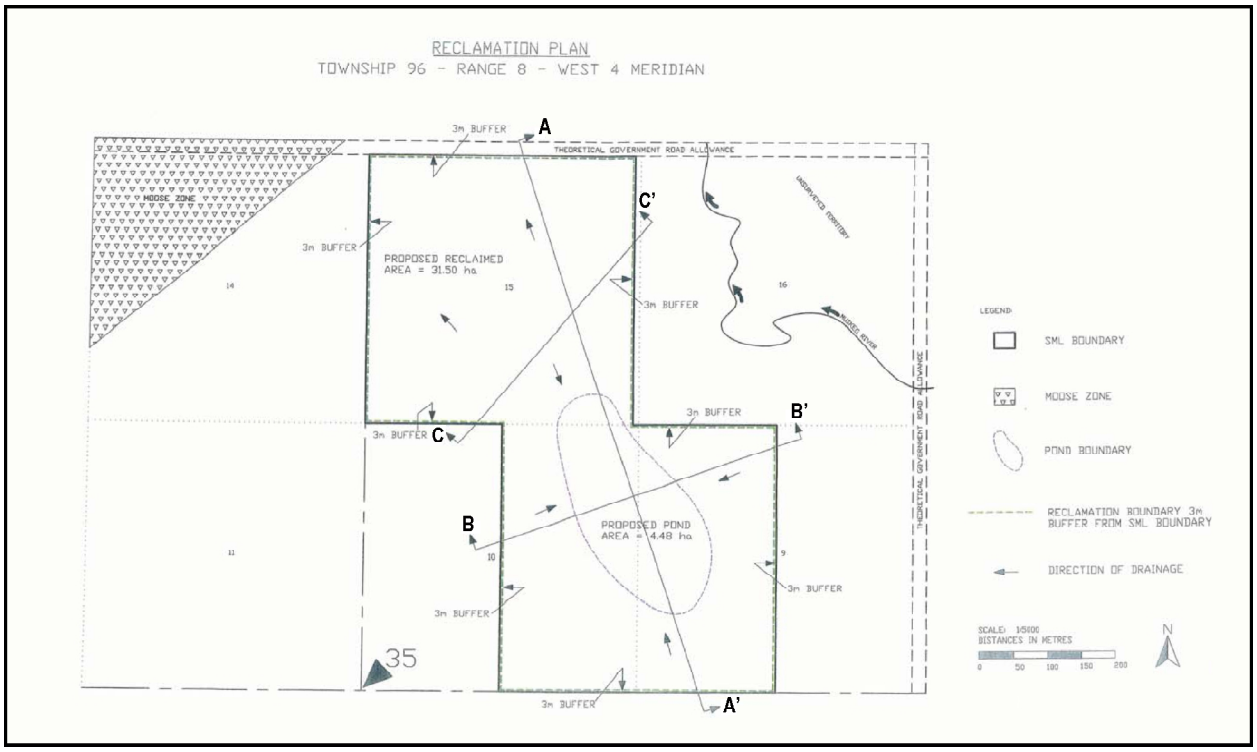


Figure 8 Cross Sections Locations (ABM 2010)

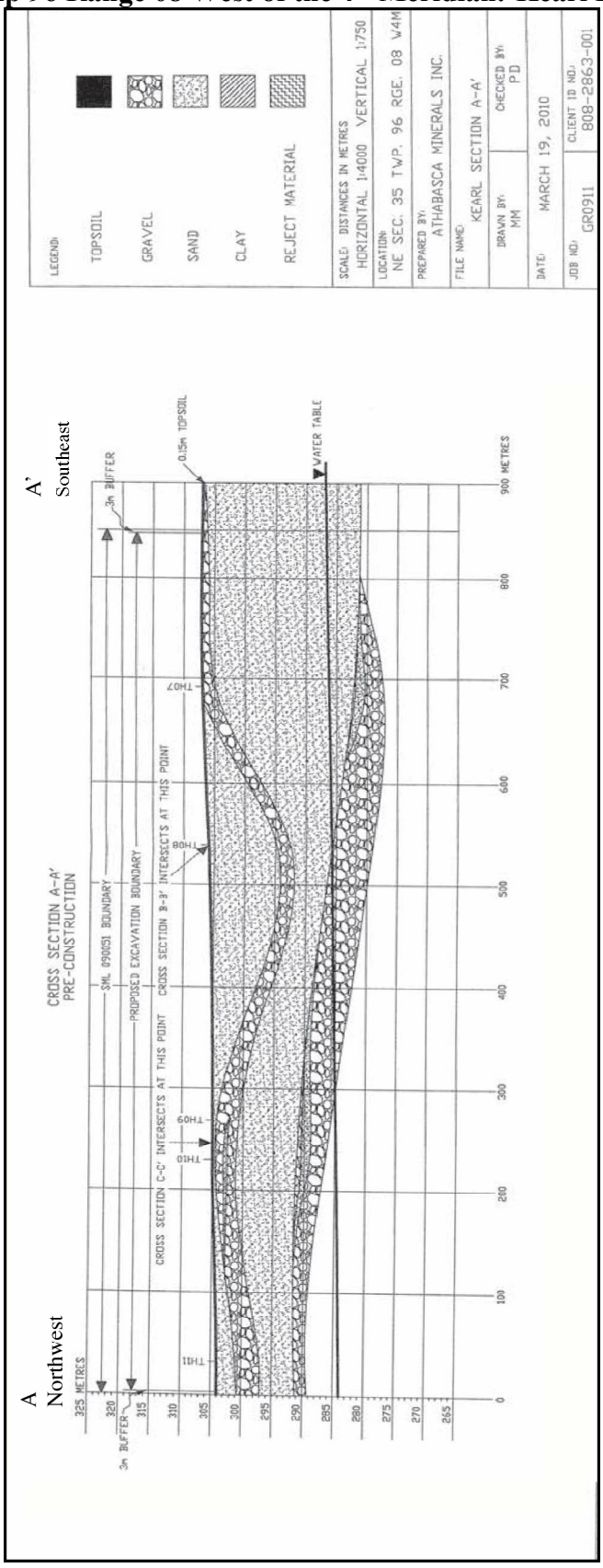


Figure 9 Cross Section A-A

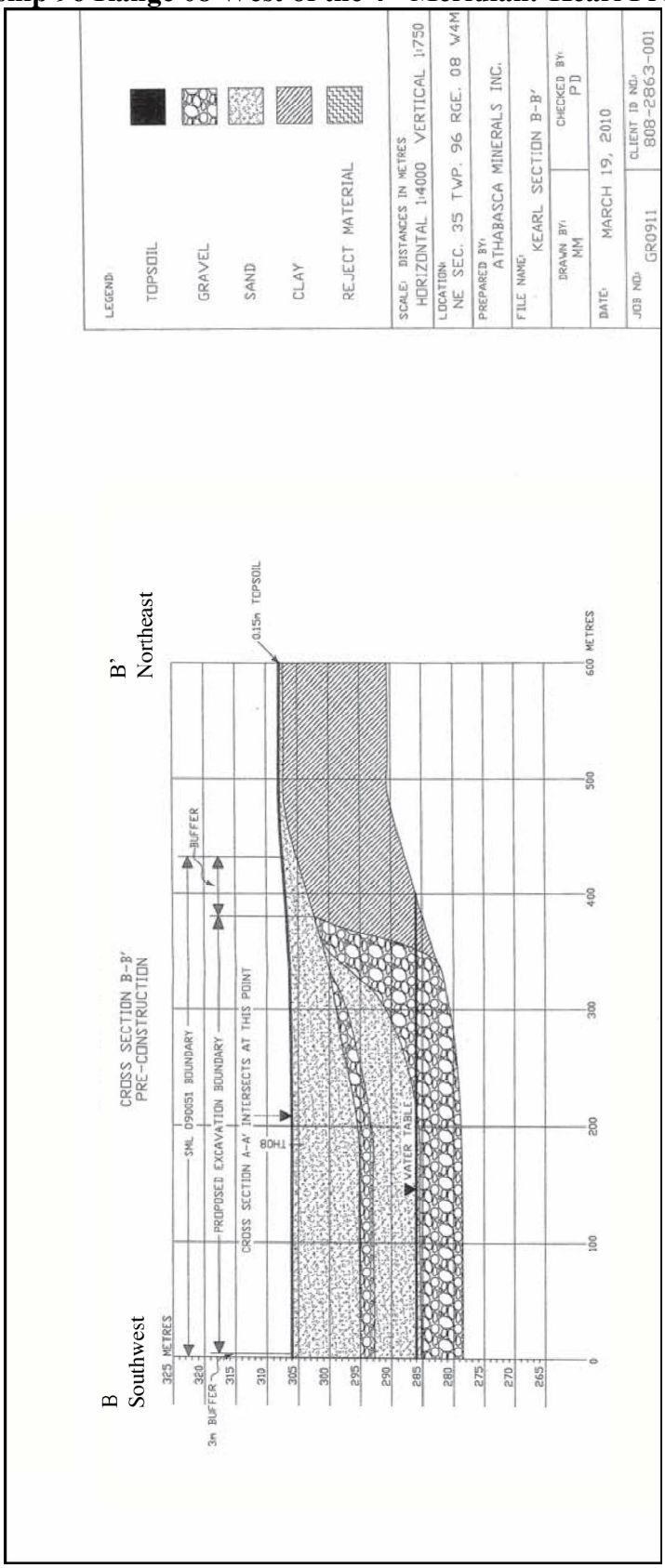


Figure 10 Cross Section B-B

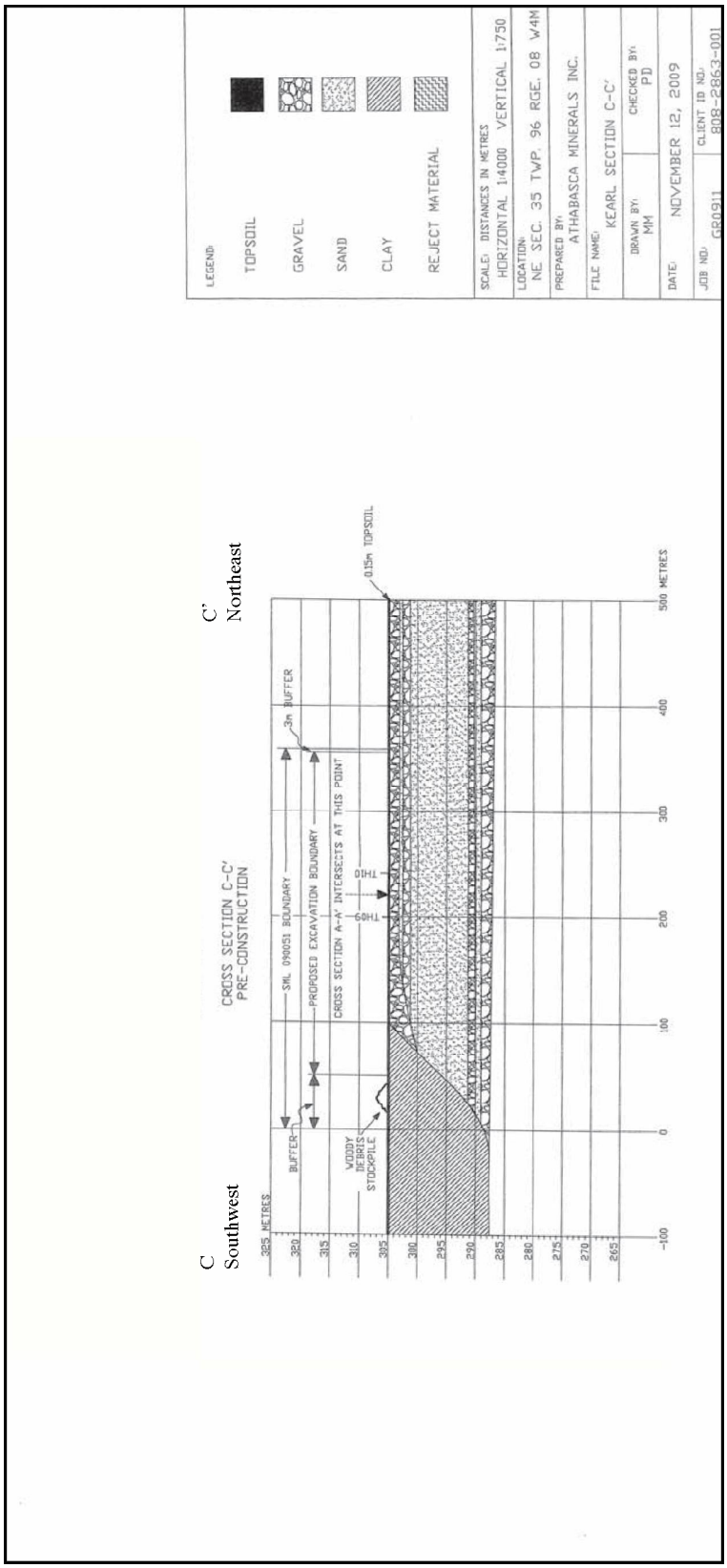


Figure 11 Cross Section C-C'

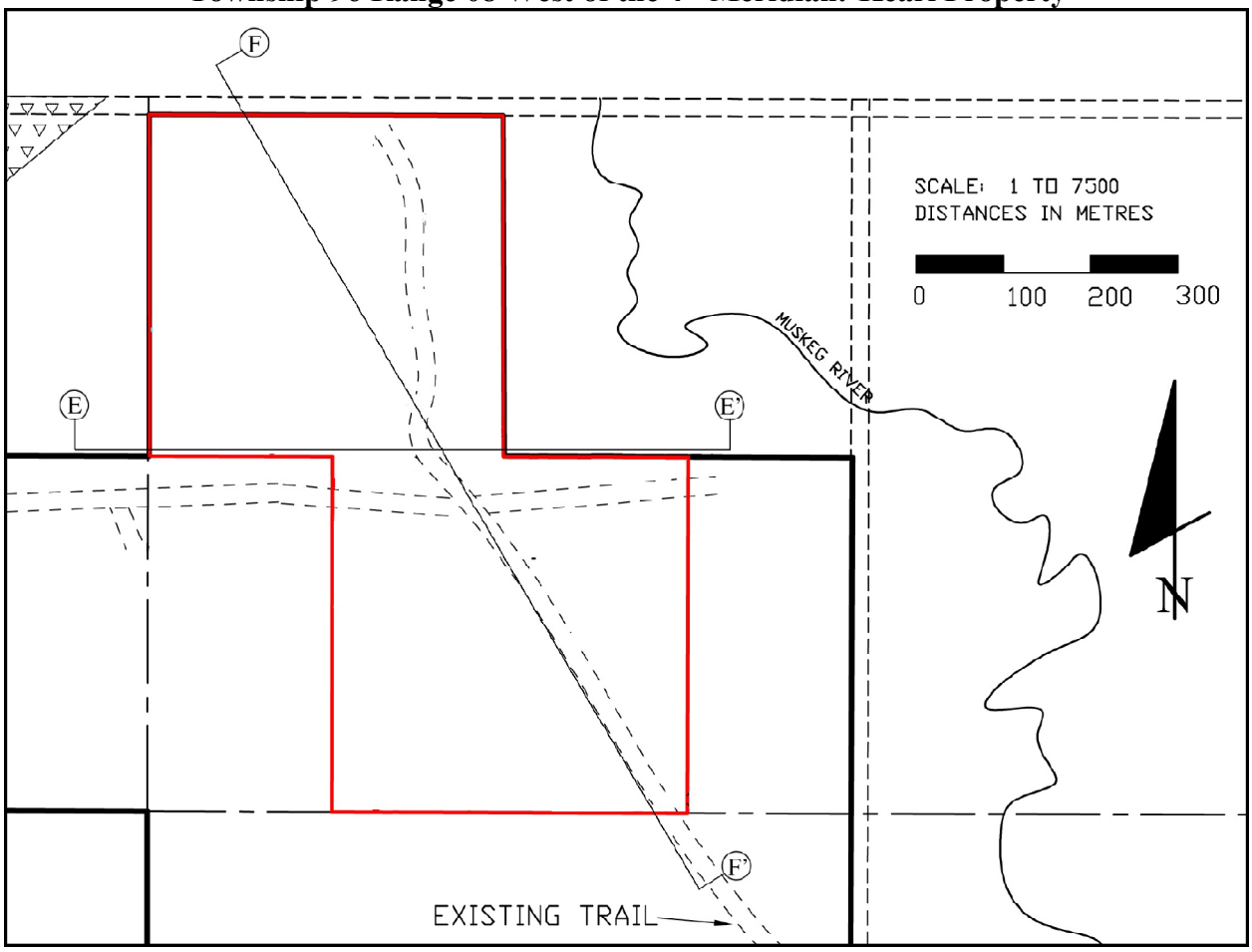


Figure 12 Cross Section Locations of Additional Testing

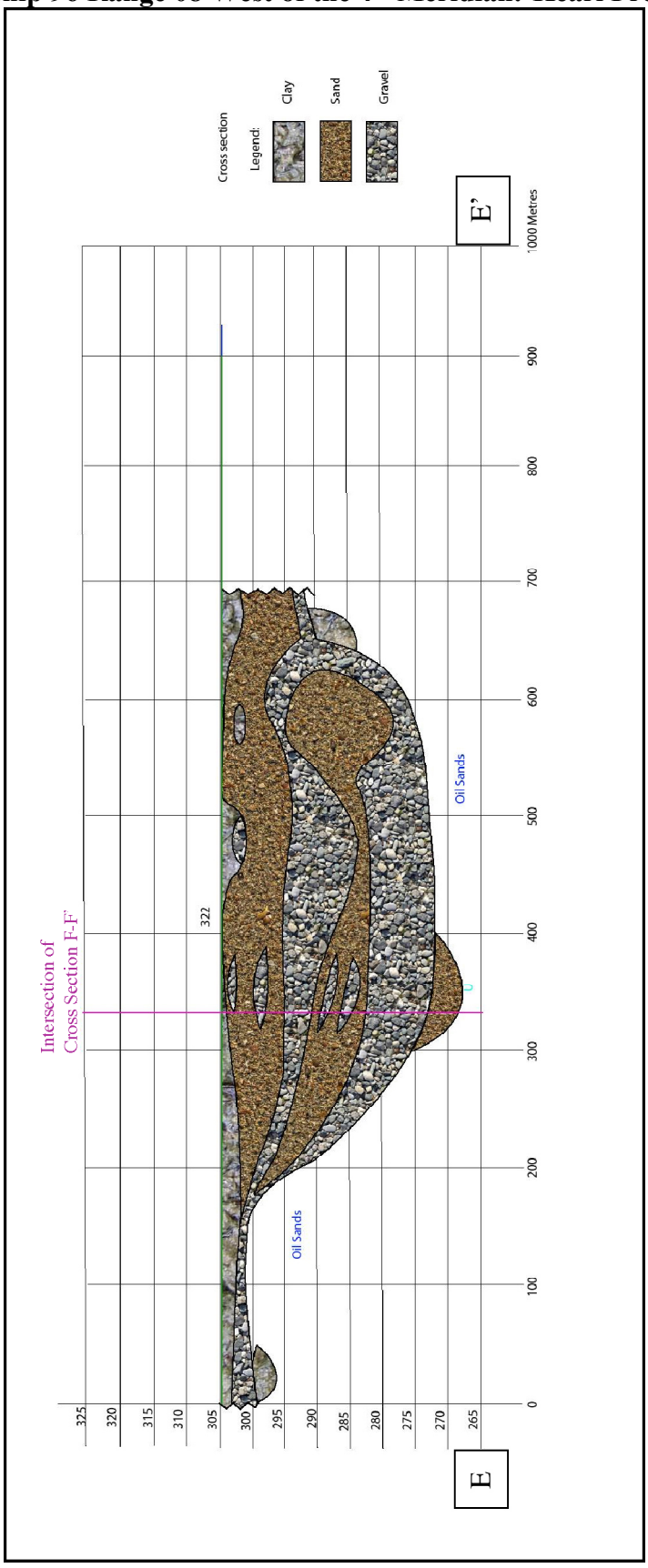


Figure 13 Cross Section E-E'

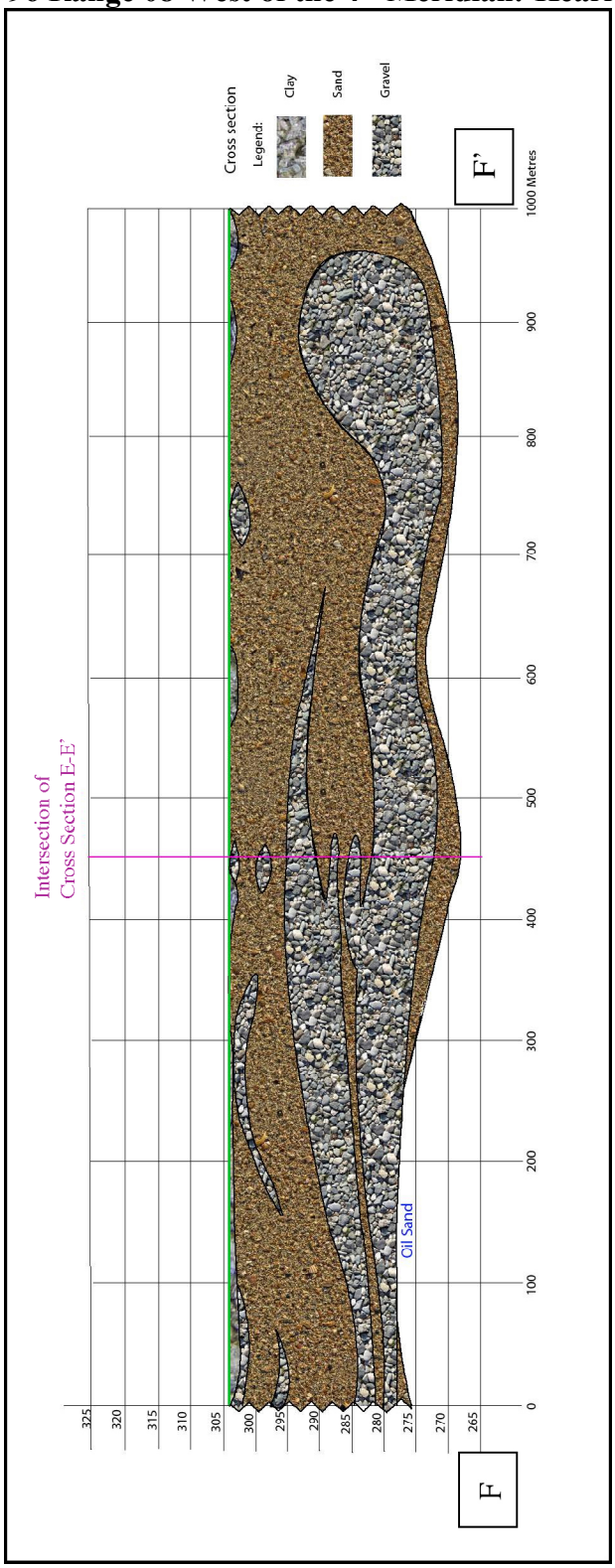


Figure 14 Cross Section F-F'

8.0 Deposit type

Sand and gravel deposits are associated with surficial or sub-ice fluvial deposition and usually have narrow meandering linear trends. The Alberta Geological Survey categorizes the Kearl channel as a glaciofluvial gravel deposit based on the deposition of sand and gravel from meltwater flow as "buried" channel deposits. Meltwater deposits were formed by meltwater flowing away or under the melting Continental glacier. The identifying factor is the inclusion of granitic rocks which are carried by the advancing ice from the Canadian Shield. The deposits now appear as undulating sand and gravel layers incised into the bedrock, which locally is oil sand. According to the AGS, meltwater channel deposits represent small but highly useful, sources of sand and gravel. From the rock content and depositional characteristics, this deposit was formed in a meltwater environment and has good suitability for resource development.

The deposit does vary in grain size composition and the auger drill was unable to fully penetrate the deposit at some locations. This complicates the resource estimate, so the estimates are conservative volumes. The extent of the deposit will be better determined as the site is mined. The variation in grain size is a favorable factor to meet variable specifications in products. The majority of the deposit appears to be "clean" which concur with the sieve analysis tests, making the deposit a high quality resource.

9.0 Exploration

The property and surrounding area was explored under an exploration permit in July, 2009 with an auger drill rig and a track hoe. The exploration area was determined from the mentioned AGS report. Athabasca Minerals Inc. conducted an auger drill program under SME 090020 covering 320 acres, consisting of the original 15 holes completed in July 2009 to determine the resource potential of the area and locate an 80 acre (maximum size) parcel to claim and develop the best portion of resource found. To minimize surface disturbance, test locations were limited to the clearings and trail access. Care was taken to avoid damaging any of the timber resources on the site. The auger drill was capable of penetrating beyond the depth of 50 meters. Some of the holes drilled on the lease reached the water table at 6 meters, while some were unsuccessful on penetrating the dense gravels of the deposit. Sand and gravel was encountered in 15 of the 15 test holes. Samples were taken and a sieve analysis was done on three samples (#09-258 to 09-260; see Appendix 4), which are representative of the overall deposit.

10.0 Resource Testing Programs (Drilling and Test Pits)

The exploration permit (SME 090020) of 320 acres was initially tested in July, 2009 by an auger drill, however the coverage was limited following an existing trail. An additional track hoe program was conducted on December 2010 (8 holes #292-299) to obtain more representative samples and further delineate the deposit. Finally, to estimate the aggregate resource volumes, a detailed program consisting of a hole spacing of 100m was proposed using both a track hoe and auger drill. The track hoe testing was to determine the variation in quality of the aggregate resources near surface and the auger was to determine the depth of the deposit.

Between April 5-7, 2011(#142-158) the program was conducted; however, due to wet ground conditions the hole spacing was reduced as shown in Figure 15. A total of 17 auger drill holes (Mobile Foremost MS-61 truck-mounted drill, using a 6" auger) and 33 track hoe pits (Hitachi 270LC) were completed (Appendices 1 and 6).

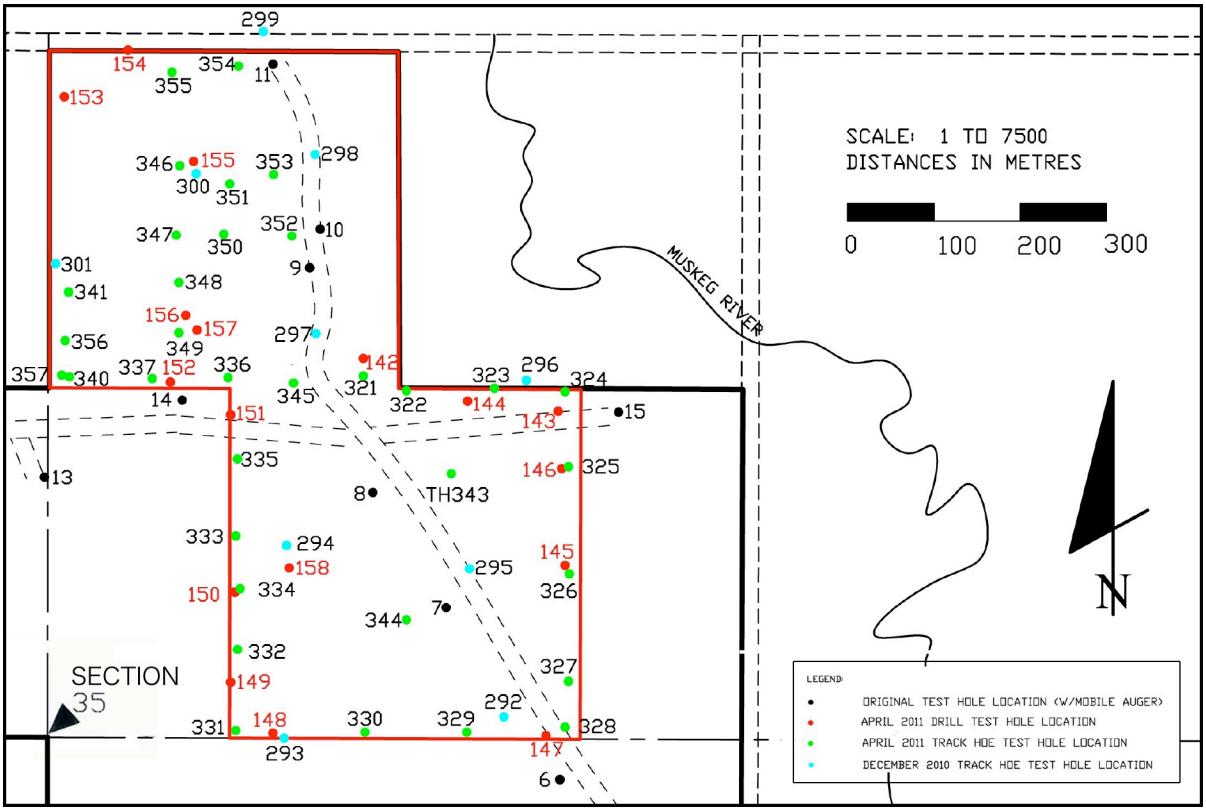


Figure 15 Test Hole Locations

11.0 Sample Preparation, Analyses, and Security

The drill encountered impenetrable gravels in 5 holes (DH 142, DH 148, DH 153, DH 156 and an un-numbered hole 3 m south of DH 156). The full depth of the deposit also was not determined in 3 other holes (DH 145, DH 146, and DH 147) where the gravel was deeper than the limit of the drill. Samples were bagged and labeled from the auger drill and track hoe extraction piles. Most samples were "grab" samples representative of the material within the total amount brought to surface by the auger drill, as well as the track hoe. The sampling program (DH 1 – DH 15, DH142-158, TH 292-301, TH 321-357) was supervised and analyzed by DK Engineering's Dave Bagdan, P.Eng. Security is not a factor for aggregate samples and the fact the samples accompany the engineer from field to laboratory ensures the samples are intact and have not been tampered with. As the samples do not have direct correlation to the resource estimates stated in this report, the sample data is included to illustrate the composition of the resource.

The aggregate resource samples were run through standard sieve analyses procedures conducted by the DK Engineering laboratory, Edmonton, Alberta under the supervision of Dave Bagdan, P.Eng. This test is best suited for a preliminary assessment of the quality of the deposit. See Appendix 4, the data of the sieve analyses results (exploration program).

The drill data is the most relevant determinant for computing the resource estimates. The auger drill is fairly accurate determining the amount of rock content (sand, 20-35% gravel, 35-50% gravel, over 50% gravel) it encounters along with the depth recorded for each variation in the subsurface. The material it is penetrating is also verified by the cuttings which surface on the flight of the drill stem; however large cobbles are rarely brought to the surface making the samples unrepresentative of the material being encountered. Operator experience is also a factor in accurately determining the gravel content the drill is encountering.

As the drill logs become the key factor in determining the resource volumes, the use of Canadian Geological Drilling Ltd's experienced drillers boosts the confidence factor of the data collection, in addition to the author supervising the drilling and logging processes. Samples taken from the drill only represent material that can be surfaced by the drill stem flight, as the larger rocks of the deposit do not come to the surface. Samples taken from the track hoe material piles are more representative; however, the depth limit of the equipment used (Hitachi 270LC) is 6 m. A representative sample of the material below 6 m (auger samples) due to the large cobble factor explained above; however, the auger drill did encounter horizons it could not penetrate, indicating large stones or boulders.

Since the oil sand industry requires large volumes of aggregate resources in an area devoid of aggregate resources and there are two adjacent oil sand developments, all the resources of this lease will likely be of use in some capacity despite the grain size. I have all the confidence that the sampling done is sufficient for the quality verification.

12.0 Data Verification

The data collected from the 2011 auger drill and track hoe program was conducted under the supervision of the author. Most of the track hoe pits were logged by the author and the drill logging was overseen by the author. The drill data concurs with the data logged in the initial drilling program. The drilling technique is relatively simple and accurate as increased rock content offers greater resistance to the auger penetration speed. The accuracy of the auger data was verified by correlating depths of the exposed gravel horizons in track hoe test pits with adjacent drill holes.

Data have been calculated in various ways to verify resource estimations. This report is focused on quantifying the resource volume and weight that can be potentially mined. It is the author's opinion that the resource estimates are on the conservative side as some of the holes had to be stopped while still in the gravel horizon. To compensate for this factor, projected depths, varying from 0.3 to 1.5 meters based on the surrounding drill data, were added to calculate the "Inferred Resource" estimate.

13.0 Mineral Processing and Metallurgical Testing

The only mineral processing was conducting sieve analysis on some of the samples taken from the exploration and the 2010 track hoe program. The deposit tests "clean" and will meet most specifications required by the oil sand industry.

14.0 Mineral Resource Estimates

14.1 Quantity Parameters

The main objective of this report is to establish a preliminary estimation of the amount of sand and gravel within the property under assessment. The geological confidence in the resource/reserve estimations of the test program is dependent on the number of test holes, the spacing of the hole locations, and the interpretation of the material being encountered by the track hoe and drill along with the accuracy of the corresponding depth measurements. The designed drill program of a 100 m grid, which would verify the consistency of the deposit, could not be performed due to the wet ground conditions and the loss of drill stems. However, the combination of the two drill programs provides enough data to confidently provide the reported estimates.

Although access resulted in an irregular testing pattern, there is sufficient testing to convey "indicated" and "inferred resource" (NI 43101/CIM definition) values for the sand and gravel deposit. The following tables quantify the resources. The banked volume is calculated from the recorded drill depth measurements. Due to the volume expanding upon extraction a 25% fluff factor is added (The Engineering ToolBox 2010). To convert the volume to a weight, Alberta Transportation and Alberta Sustainable Resource Development standard conversion factor of 1.6 tonnes/cu m is multiplied to the loose volume.

"Indicated Mineral Resource" Estimates	
Perimeter method	**Banked volume**
Gravel	1,770,030 cu m
Sand	3,581,190 cu m

Table 5 "Perimeter" Method "Mineral Resource" Estimations (Appendix 2)

"B" Method	**Banked volume**
Gravel	2,000,300 cu m
Sand	4,055,200 cu m

Table 6 "B" (Heron) Method "Mineral Resource" Quantity Estimations (Appendix 3)

"Indicated Mineral Resources" Estimates			
	Banked volume	**Loose volume**	**Weight**
Gravel	**1,885,165 cu m**	**2,356,465 cu m**	**3,770,330 tonnes**
Sand	**3,818,195 cu m**	**4,772,740 cu m**	**7,636,390 tonnes**
Total Resources	**5,703,360 cu m**	**7,129,200 cu m**	**11,406,720 tonnes**

Table 7 Averaged "Mineral Resource" Estimations

"Inferred Mineral Resource" Estimates			
	Banked volume	**Loose volume**	**Weight**
Gravel	**217,000 cu m**	**271,750 cu m**	**434,000 tonnes**

Table 8 "B" Method " Inferred Mineral Resource" Quantity Estimations (Appendix 3)

Total Resources ("Indicated" + "Inferred")			
	Banked volume	**Loose volume**	**Weight**
Total Gravel	**2,102,165 cu m**	**2,627,700 cu m**	**4,204,330 tonnes**
Total Sand	**3,818,195 cu m**	**4,772,740 cu m**	**7,636,390 tonnes**
Total Resources	**5,920,360 cu m**	**7,400,440 cu m**	**11,840,720 tonnes**

Table 9 Indicated + Inferred Mineral Resource Estimate

The Perimeter method uses the dimensions of areas correlating to the deposit's trend multiplied by the average thickness (Appendix 2). The resource estimate assumes the deposit is relatively consistent between the drill holes, as there was no indication of ice thrusting (ice thrusting can disrupt deposit continuity). B method employs the Heron's Formula for the volume calculation and provides a variation of area configurations (Appendix 3).

The "Inferred Mineral Resource" estimation has been included since the track hoe pits did not reach the full depth of the deposit (maximum reach of the bucket is 6 m depth) and the drill encountered impenetrable gravels in 5 holes (DH 142, DH 148, DH 153, DH 156 and an un-numbered hole 3 m south of DH 156). The full depth of the deposit also was not determined in 3 other holes (DH 145, DH 146, and DH 147) where the gravel was deeper than the limit of the drill. To compensate for this factor, projected depths, varying from 0.3 to 1.5 meters based on the surrounding drill data, were added to calculate the "Inferred Resource" estimate. These estimations are believed to be conservative figures.

15.0 – 22.0 Advanced Property Requirements (not required for this report)

23.0 Adjacent Properties

The exploration data which includes the adjoining lands indicate this site (lease area) has the best potential for development. No other operators have applied to explore the surrounding lands and the adjoining oil sand leases, which may include rights to surface materials, also deter any further aggregate resource developments.

24.0 Other Relevant Data and Information

As the oil sand industry has triggered international controversy, ABM is aiming to counter the criticism by becoming a leader for the aggregate resource sector in "best practices" towards sustainable development. One of the best practices involves using corporate social responsibility (CSR) strategies to supply aggregate resources to the growing oil sand development market of the Regional Municipality of Wood Buffalo. Due to this modus operandi, ABM has received a number of awards for the Susan Lake Public Pit operation near Ft. McMurray, Alberta. There is a growing trend for the corporate world to adopt this approach to respond to public scrutiny in development.

To accommodate a holistic view and an integrated resource management strategy of the area and its resources, ABM will continually assess each resource from the economic, environmental, and social perspectives.

24.1 ECONOMIC Considerations

24.1.1 Mineral Resources

Aggregate resources are essential to and are continually being consumed by rural and urban development and maintenance. In the Regional Municipality of Wood Buffalo there has been an ongoing concern for being able to continue to satisfy the aggregate resource demands of the region due to the heavy consumption created by oil sand projects. By supplying the oil sand projects' demand, the Susan Lake Public Pit, managed by ABM, grew to be Canada's largest producing aggregate source in 2008 by supplying 11.8 million tonnes (A&R 2009) and 2009 with 6.59 million tonnes (A&R 2010). The Hammerstone limestone quarry, located near the Susan Lake pit, came into production in 2006 claiming "limestone aggregate show superior performance over alluvial gravels" (Hammerstone 2011); however, where the limestone aggregate has been used in road building, excessive airborne particulate created from daily traffic, has settled on the adjacent vegetation along the roadway as a white coating. This will impact the health of the roadside forest cover, contradicting Hammerstone's claim of superior performance of limestone aggregate.

Due to the bulkiness of aggregate resources and the volumes required, haul distance between the source and the market plays one of the most significant roles in determining the profitability of each mining operation, and becomes increasingly critical as energy costs rise. Therefore, the location has been assessed for its proximity to existing and potential future market demands. With few aggregate deposits known in this area, this will be a source for the oil sands development in the Ft. McKay region. The two adjoining oil sand operations may require the total of the reserves.

Figures 5-7 inclusive, indicate the extent of known aggregate resource (sand and gravel) deposits in the region through Alberta Geological Survey data. Most resource development requires infrastructure, thus any mineral development is a market generator

for the aggregate resources. Mineral potential that could impact the area has not fully been inventoried.

Oil sands development of the area (Figure 3) is underway and is expanding. Removing the surface materials is a cost benefit to the oil sand developer who has less or no overburden to relocate.

The location also provides a source for the Canterra Road and beyond, which minimizes the construction costs for the industries operating in the area and reduces the tax burden passed on to ratepayers of the region for municipal road maintenance.

The deposit should be tested for other valuable minerals to ensure the resource opportunities are maximized.

24.1.1.1 Other Mineral Values

Many companies have been primarily focused on supplying the aggregate resource market without fully assessing other profitable options. Other valuable minerals (e.g. gold) have been profitably extracted from sand and gravel deposits in Alberta.

ABM can conduct other mineral value tests on the Kearl gravels. The oil sands tailings are known to contain titanium (rutile, anatase, leucoxene, and ilmenite) and zircon, (Titanium Corp 2011, Chachula and Erasmus 2008). These tests could benefit ABM from exploring options of recovering heavy metals and perhaps even diamond values.

Further testing to determine if there is a sedimentation correlation with valuable minerals can be carried out from samples taken from the property. Maximizing resource development is a sustainable development approach that increases the feasibility factor of mineral development for all concerned, including Alberta taxpayers and the Crown.

24.1.2 Timber Resources

ABM will be salvaging all timber with value. The area was logged off under a timber license issued in 2004 to Northland Forest Products Ltd. Northland Forest Products Ltd. and ALPAC will serve as salvage purchasers to any remaining timber values. The last forest assessment is shown by the Phase 3 Forest Inventory mapping (Figure 16).

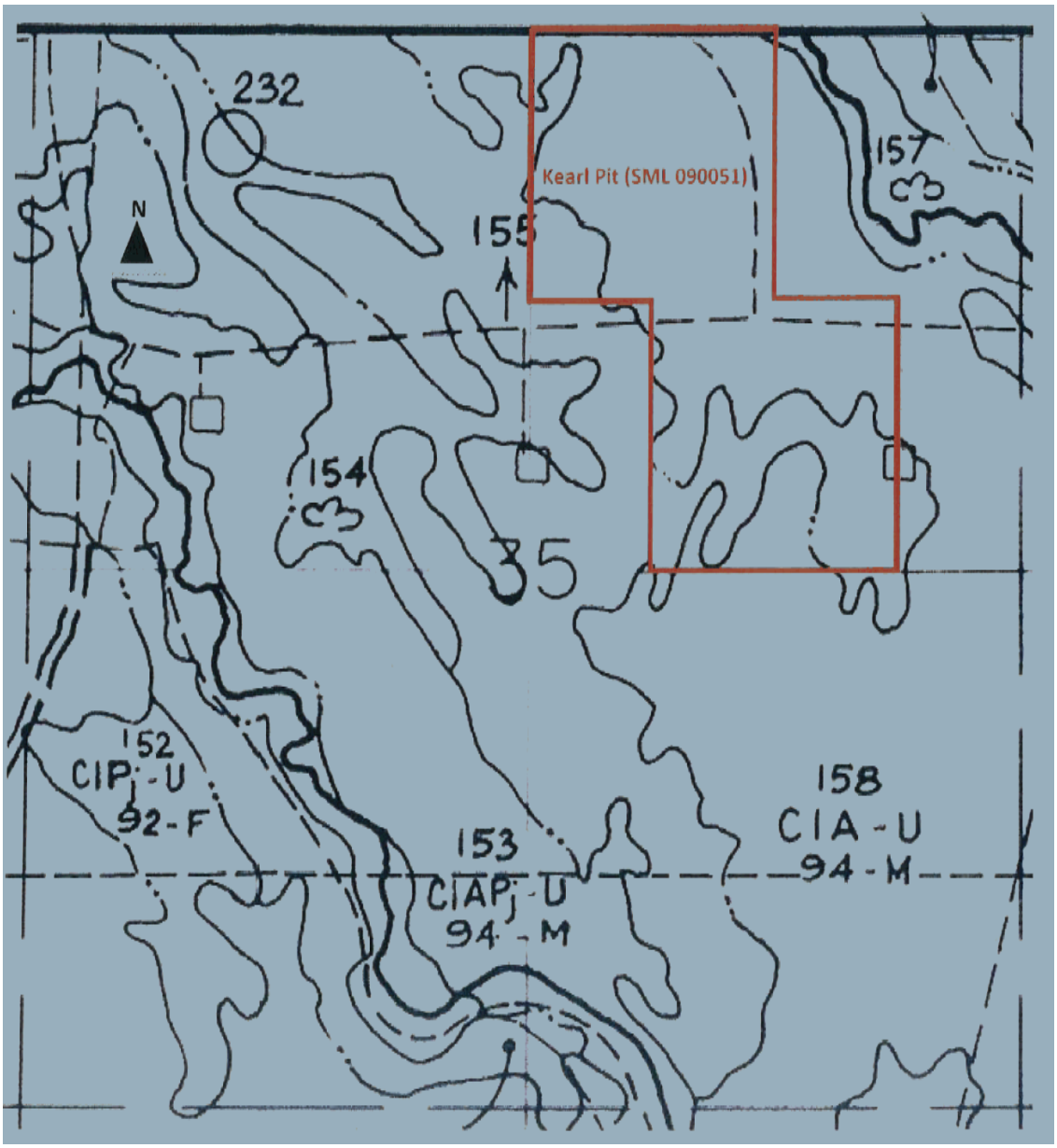


Figure 16 Phase 3 Forest Inventory (Alberta Government 1984)

24.2 ENVIRONMENTAL Considerations

In Alberta, the aggregate resource sector has not been subjected to important environmental regulatory components required by other mining developments. Therefore the implementation of sustainable development practices by the aggregate resource sector that impose higher short-term development cost, are usually discounted in the planning and development stages. This aspect has and continues to alienate the aggregate resource development projects from public acceptance, further impeding the implementation of sustainable resource practices.

Efficient energy consumption equates to reduced greenhouse gas emissions, therefore this location can be assessed similar to the economic consideration. The location of this lease

appears to be central to potential development of the region, thus minimizing haulage distances, compared to alternate sources, in supplying the market demand. This complies with Alberta's "Climate Change" initiative through efficient energy consumption creating less greenhouse gas emissions. In addition, best practice pit development can reduce potential environmental risks. As oil sand extraction will follow the aggregate resource removal, the aggregate resource extraction operation's environmental impact will be minimal in comparison.

24.2.1 Water Resources

A 100 m buffer will be maintained between the operation and the Muskeg River. LOC 091139 will be upgraded to an all-weather road, and a 100 m buffer from the Muskeg River to LOC 091139 shall also be maintained.

Groundwater was encountered in a number of test holes dug within the SML 090051 area. The average depth of water table is estimated between 5-6 m. Surface water was present on the site during the testing of the test holes, due to snow melt. A dewatering program shall be implemented in order to extract the gravel below the watertable. The area to be mined is to be bermed. The water will be pumped from one excavation to another until depletion. The material shall be bailed out, crushed, stockpiled, and hauled to the various projects. The methodology does not require a water permit. Best practices will be employed to ensure no contamination occurs.

24.2.2 Soil Resources

The deposit is within Alberta Environment's soil correlation area 20 (Figure 17). The soil is classified as a gray terricmesisoil, parent material is an organic fen with a glaciolacustrine material. The topsoil texture is a clay loam to a silty clay loam. All topsoil will be salvaged to be used in any reclamation requirements.

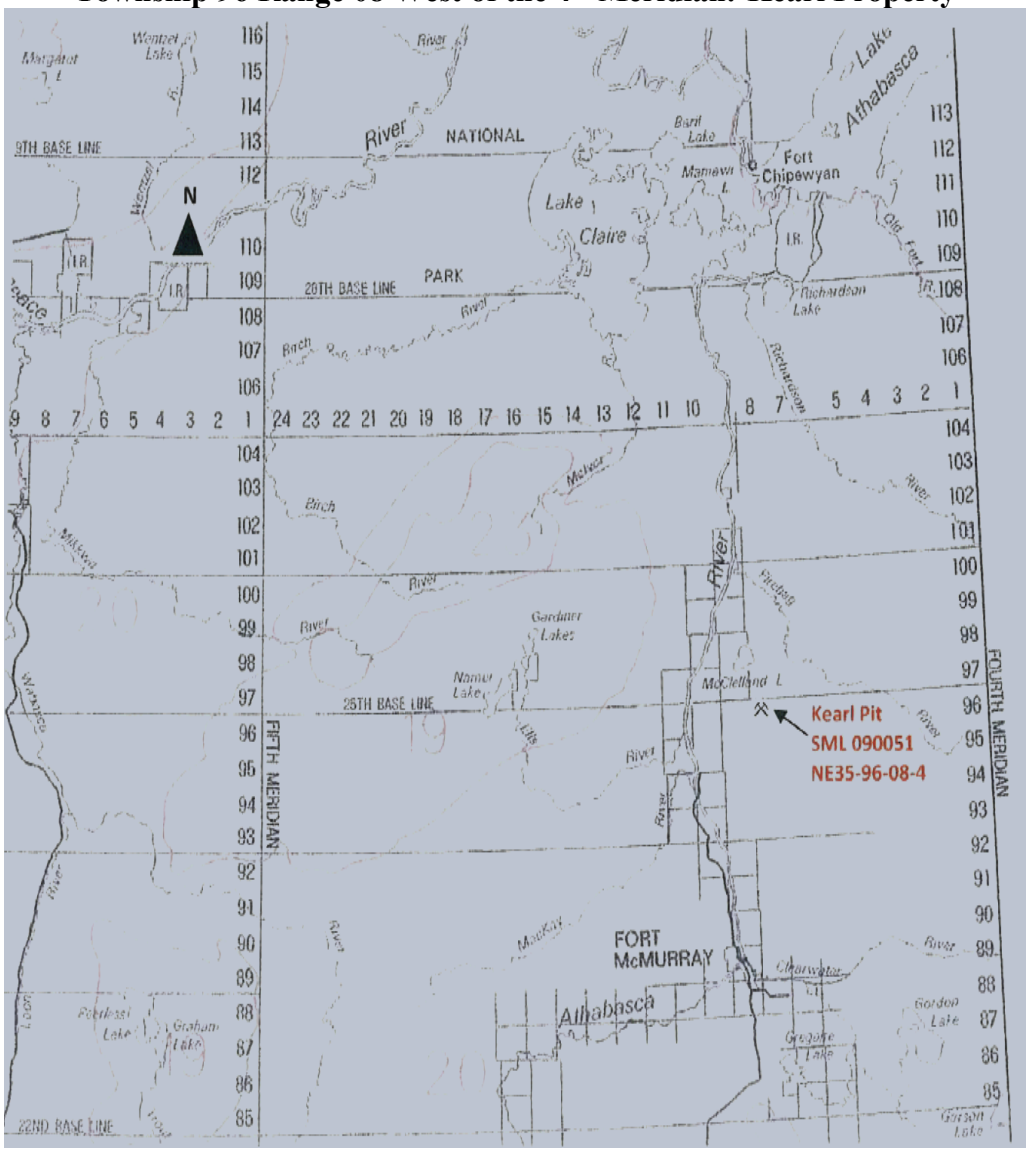


Figure 17 Alberta Soil Correlation Map (Alberta Government 2006)

24.2.3 Wildlife Resources

There are no special conditions concerning wildlife that were noted in the lease conditions. A number of mammals, birds, amphibian/ reptiles, fish, invertebrates, bird, and plant species are classified provincially and nationally.

In Alberta, rare plant species are tracked, ranked, and mapped by the Alberta Natural Heritage Information Centre (ANHIC). ANHIC database provided a list of rare plant occurrences in township 95 to 97 and ranges 7 to 9 West of the 4th Meridian, which is attached as Appendix 5. This data forms part of an inventory from the Kearl Oil Sand project – Mine Development July 2005 EIA, Volume 3. The inventory of rare bryophyte and vascular plant species was compiled from the ANHIC database as well as a number of studies conducted in the vicinity by Imperial Oil Mobil Lease 36 (2005), Syncrude (2003), Husky (2003), and the Regional Aquatic Monitoring Program. Refer to Appendix 5 for data on wildlife species (an inventory from the

Kearl Oil Sands Project - Mine Development July 2005 EIA, Volume 3 as well as an inventory provided by Todd Powell, Waterways Area Biologist, ASRD, Ft. McMurray).

24.3 SOCIAL Considerations

Athabasca Minerals Inc. (ABM) has taken a leadership position to address the negative public perception of the aggregate resource sector by using sustainable development and corporate social responsibility (CSR) strategies to supply aggregate resources to the growing oil sand development market of the Regional Municipality of Wood Buffalo. Due to this modus operandi, ABM has received a number of awards for the Susan Lake Public Pit operation near Ft. McMurray, Alberta. There is a growing trend for the corporate world to adopt this approach to respond to public scrutiny in development.

In addition, the Federal Government (Industry Canada) is promoting the concept of "Corporate Social Responsibility" to Canadian businesses to make them:

"more competitive by supporting operational efficiency gains; improved risk management; favourable relations with the investment community and improved access to capital; enhanced employee relations; stronger relationships with communities and an enhanced licence to operate; and improved reputation and branding.

Corporate social responsibility is a concept with a growing currency within Canada and around the globe. CSR is a concept that frequently overlaps with similar approaches such as corporate sustainability, corporate sustainable development, corporate responsibility, and corporate citizenship. While CSR does not have a universal definition, many see it as the private sector's way of integrating the economic, social, and environmental imperatives of their activities. As such, CSR closely resembles the business pursuit of sustainable development and the triple bottom line. In addition to integration into corporate structures and processes, CSR also frequently involves creating innovative and proactive solutions to societal and environmental challenges, as well as collaborating with both internal and external stakeholders to improve CSR performance" (Industry Canada 2011).

The trend is also occurring at the international level as the International Organization for Standardization (ISO) recently launched the ISO 26000 standard on social responsibility (ISO 2010). The United Nations have also launched the *Global Compact Differentiation Programme* (UN 2011). The Royal Bank of Canada (RBC), who has been recognized as "one of the most sustainable large corporations in the world" (Christian 2010), achieved this position through providing loans to companies with sustainable business proposals. RBC has rated a number of "emerging" oil sand developers as "attractive" short to long term investments (Friesen 2010). According to RBC analysts, the oil sand developers have "shifted from a resource capture mentality to a project execution mentality" and are positioning themselves for a boom from 2012 to 2015 (Friesen 2010). The RBC along with Suncor, one of the largest oil sand developers, have been demonstrating corporate responsibility through implementing sustainable development

practices that earned them the reputation to be included as ethical companies[2] listed in the Janzti Social Index Fund.

"*Suncor was recognized for its 2010 Report on Sustainability, capturing the Sustainable Development Reporting Award of Excellence in this year's Corporate Reporting Awards competition. The awards are presented annually by the Canadian Institute of Chartered Accountants and reflect the CA profession's commitment to enhancing the quality of reporting*" (Suncor 2011).

According to an article in the Canadian Mining Journal, Barrick Gold Corporation has benefited from "making corporate social responsibility a competitive advantage" (Canadian Mining Journal 2010).

Noise, dust, truck traffic are commonly associated with surface pit mining, therefore operating in locations away from settlements or residential sites is a prime consideration. This location possesses little social impact due to the area being a forested area being accessed for logging and trapping activity. The location also provides a source for local highway and township road maintenance (provincial and municipality), which minimizes the tax burden passed on to ratepayers of the region.

ABM will be using this as an opportunity to establish a close working relationship with the aboriginal communities who may have traditional ties to the area. Consideration can be given to reclaim the site for enhanced camping, reforestation, or wildlife options by dialogue with the appropriate stakeholders.

24.3.1 Historical Resources

ABM emphasizes social responsibility in all development projects and have not heard back from the Athabasca Chipewyan, Chipewyan Prairie Dene, Ft. McKay, Ft. McMurray, and Mikisew Cree who may have traditional resources within the area. Public and aboriginal consultation is a normal practice to establish the cultural and historical attributes of the area and allow for community participation to provide input for designing a neighborhood friendly operation. This process is an opportunity to fulfill the corporate social responsibility (CSR) aspect. The extraction activity also provides an opportunity to assess paleontological attributes of the pre-glacial gravels as they are mined and processed.

25.0 Interpretations and Conclusions

This property possesses a significant aggregate resource value for the local oil sand development projects. The exploration programs delineated a sand and gravel deposit exceeding 11 million tonnes within the property with a potential of approximately 12 million tonnes. The programs and laboratory analyses enable a geological confidence level that classifies the quality and quantity of the property resources as an "Indicated Mineral Resource". As the thickness of the

[2] "selected by Jantzi based on criteria for identifying companies that reflect a higher standard of environmental and social performance" (iShares 2007).

deposit was not fully determined there is supporting evidence (two drill holes) the quantity could be over 12 million tonnes ("Inferred Mineral Resource").

One of the adjacent oil sand developers has already expressed an interest to obtain gravel from the site.

26.0 Recommendations

- Seek and communicate with key personnel for the oil sand resource development companies to create an awareness of the Kearl aggregate source and ABM's sustainable operating philosophy.
- A sustainable development approach gives ABM a strategic advantage considering the growing international criticism of the oil sands development.
- A sustainable development approach calls for an all inclusive assessment of the regional resources to design an integrated and balanced management strategy.
- When considering energy expenditures and greenhouse gas emissions, development of aggregate resources becomes location dependent and should become a priority resource in a regional context.
- Take every opportunity to build community relations through intensive public and aboriginal consultation to encourage a collaborative determination of operational best practices and reclamation objectives ("Corporate Social Responsibility - CSR").
- Check for other mineral values within the sand and gravel deposit (e.g. titanium, zircon).
- Consider the development potential of the adjoining sections.
- If the resources contained within this property exceed the demand of the adjacent oil sand development, ensure all the developers and their suppliers in the region are informed of this source for mineral aggregate.

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Appendix 1

Appendix 1: Complete Test Hole Results

TH# (trackhoe) /DH# (drill)	OB meters	W meters (approx.)	G meters	S meters
DH 6	0-0.15			0.15-27.6
DH 7	0-0.15		0.15-2.3 24.7-25.1 26.7-29.7 (u)	2.3-24.7 25.1-26.7
DH 8	0-0.15		10.8-13 15.8-16 20.6-27.4 (u)	0.15-10.8 13-15.8 16-20.6
DH 9	0.15		0.75-3.05 (u)	0.15-0.75
DH 10	0.15		0.46-1.8 2.4-3.8 13.7-14.5 16-18.3 (u)	0.15-0.46 1.8-2.4 3.8-13.7 14.5-16
DH 11	0-0.76		3.0-6.9 12.6-14.5 (u)	0.76-3.0 6.9-12.6
DH 14	0-1.8		1.8-3.0	
DH 15	0-0.15		11.86-12.2	0.15-0.76
DH 142		4.57	0.61-0.91 5.49-6.71 8.84-13.72 15.54-17.07 17.98-19.20 20.73-30.78 34.44 (U)	0-0.61 0.91-5.49 6.71-8.84 13.72-15.54 17.07-17.98 19.20-20.73 30.78-34.44

TH# (trackhoe) /DH# (drill)	OB meters	W meters (approx.)	G meters	S meters
DH 143	0-0.09		7.62-8.53 25.60-28.96	0.09-0.61 2.13-7.62 8.53-25.60
DH 145	0-0.91		11.89-20.42 23.77-26.52 29.26- +33.53	0.91-11.89 20.42-23.77 26.52-29.26
DH 146	0-1.22		9.45-12.19 16.15-16.76 23.16-23.47 25.60- +33.53	1.22-9.45 12.19-16.15 16.76-23.16 23.47-25.60
DH 147	0-0.09		13.72-23.47 25-+27.43	0.09-13.72 23.47-25
DH 148	0-0.09		0.09-0.61 13.72-15.24 18.59-19.51 (U)	0.61-13.72 15.24-18.59
DH 149	0-0.09			0.09-0.61
DH 150	0-0.61		1.52-3.35	0.61-1.52 3.35 – 14.02
DH 151	0-0.91		5.49 – 7.01 11.28–12.19	0.91 – 5.49 7.01 – 11.28
DH 152	-		-	-
DH 153	0-2.13		3.66 – 7.62 (U)	2.13-3.66
DH 154	0-0.09		0.09-1.52 7.32-8.53 19.20-22.25 24.08-25.91	1.52-7.32 8.53-19.20 22.25-24.08 25.91-28.65
DH 155	0-0.09		16.46-19.81 21.34-25.3	0.09-16.46 19.81-21.34

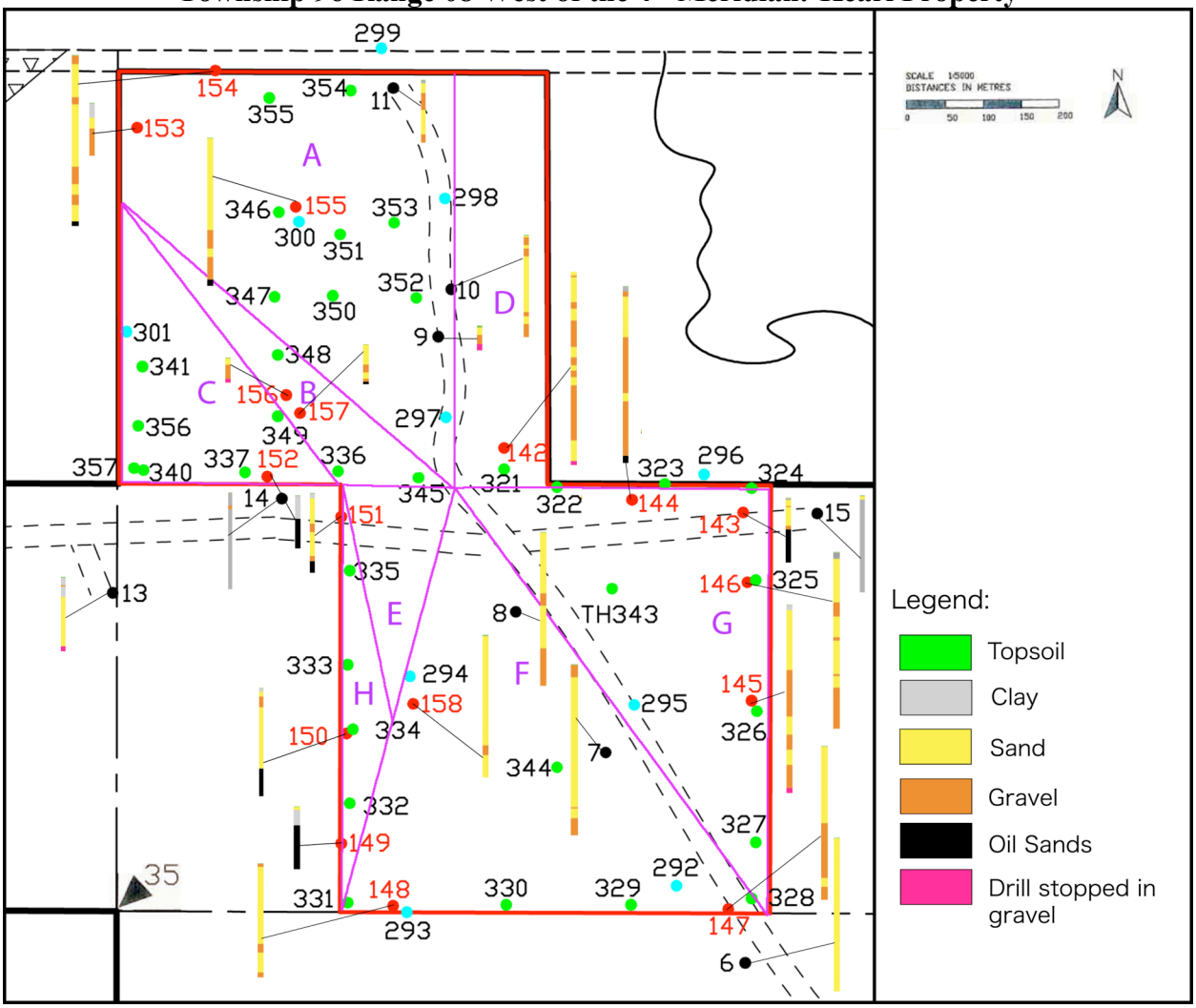
TH# (trackhoe) /DH# (drill)	OB meters	W meters (approx.)	G meters	S meters
DH 157	0-0.09		3.96-5.49 6.71-7.32	0.09-3.96 5.49-6.71
DH 158	0-0.09		17.68-19.20	0.09-17.68 19.20-22.86
TH 292	0-0.2			0.2-3.2
TH 293	0-0.2		1.1-2.0	0.2-1.1 2.0-4
TH 294	0-0.1			0.1-3.1
TH 295	0-0.1			0.1-3.8
TH 296	0-0.1			0.1-4.0
TH 297	0-0.1			0.1-3.1
TH 298	0-0.1			0.1-4.9
TH 299	0-0.1			0.1-3.9
TH 300	0-0.1			0.1-4.1
TH 301	0-0.1			0.1-2.5
TH 321	0-0.03	4.51	4.51-6.00	0.03-4.51
TH 322	0-0.03			0.03-6.10
TH 323	0-0.03			0.03-6.10
TH 324	0-3.66			3.66-6.10
TH 325	0-0.76			0.76-6.10
TH 326	0-0.76			0.76-6.10
TH 327	0-0.76			0.76-6.10

National Instrument 43-101 Technical Report for the Estimation of the Aggregate Resources within Section 35 Township 96 Range 08 West of the 4th Meridian: Kearl Property

TH# (trackhoe) /DH# (drill)	OB meters	W meters (approx.)	G meters	S meters
TH 329	0-0.46			0.46-6.10
TH 330	0-0.46	6.10	1.83-2.74	0.46-1.83
TH 331	-	-	-	-
TH 333	0-3.66	4.72	3.66-5.49	
TH 334	0-0.76		0.76-0.82	0.82-6.10
TH 335	0-0.76		0.76-0.91	0.91-6.10
TH 336	-	-	-	-
TH 337	0-1.07		1.07-1.10	
TH 340	0-0.91	0.98	0.91-4.57	
TH 341	No resources			
TH 343	0-0.76			0.76-6.10
TH 344	0-0.61			0.61-6.10
TH 345	0-0.61	6.10		0.61-6.10
TH 346	0-2.74			2.74-6.10
TH 347	0-2.13		2.13-4.58	
TH 348	0-0.76		0.76-4.88	
TH 349	0-0.76		2.13-4.57	0.76-2.13
TH 350	0-0.61		1.52-2.29	0.61-1.52 2.29-5.49
TH 351	0-0.76		5.79-6.10	0.76-5.79
TH 352	0-0.91		0.91-1.68	1.68-6.10

TH# (trackhoe) /DH# (drill)	OB meters	W meters (approx.)	G meters	S meters
TH 354	0-1.22	6.10	1.22-1.83	1.83-6.10
TH 355	0-1.37	6.10	1.37-1.74	1.74-6.10
TH 356	-	-		

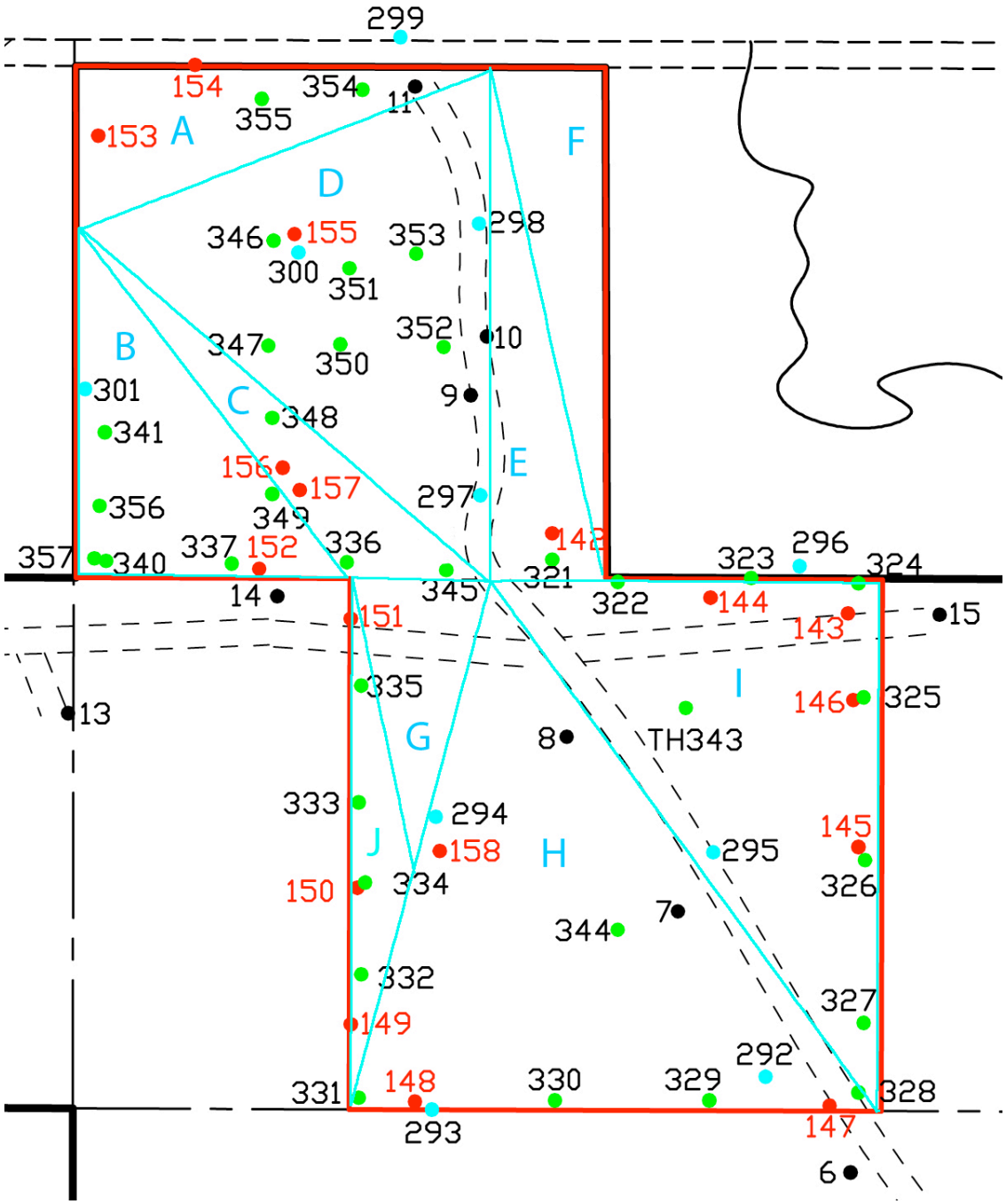
Appendix 2



"Perimeter" Method "Mineral Resource" Quantity Estimation

Area	Average Gravel Depth (m)	Average Sand Depth (m)	Area (ha)	*Gravel Quantity (m3)*	*Sand Quantity (m3)*
A	5.4	10.2	8.2	442,800	836,400
B	2	3	1.5	30,000	45,000
C	0.9	0.5	3	27,000	15,000
D	12.6	13.7	3.4	428,400	465,800
E	2	15.1	1.2	24,000	181,200
F	5.2	20.4	8.0	416,000	1,632,000
G	10.5	14.1	5.7	598,500	803,700
Total				1,966,700	3,979,100
			Less 10%	196,670	397,910
			Total	**1,770,030**	**3,581,190**

Appendix 3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154
354
11
355
153
A
F
D
346
155
353
298
300
351
B
347
352
10
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301
C
9
348
341
E
156
157
297
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142
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144
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I
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325
13
G
8
TH343
333
294
145
J
158
H
295
150
334
326
7
344
332
327
149
292
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330
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293
147
6

"B" Method "Mineral Resource" Quantity Estimation

GRAVEL AND SAND TESTING

B Method Quantity Estimation

AREA CALCULATIONS BY HERON'S FORMULA

PROJECT INFORMATION

Project	Kearl Site - Gravel M ource	Tested By	
Pit Name	Kearl Site	Date	
Pit Location	NE 35-93-8-W4M	Calculated By	RDP
Job No.		Date	12-Aug-11

Average Overburden _____ m Average Aggregate _____ m

SECTION	SIDE (m) a	b	c	S (m)	AREA (m_)		DEPTH (m)		VOLUME (m_)
A	315	125	338.9	389	19,700	X	5.8	=	114,300
B	215	275	349.1	420	29,600	X	0.9	=	26,600
C	110	349.1	410	435	17,200	X	2.0	=	34,400
D	410	338.9	400	574	62,300	X	5.4	=	336,400
E	400	85	408.9	447	17,000	X	12.6	=	214,200
F	400	85	408.9	447	17,000	X	12.6	=	214,200
G	110	230	235	288	12,400	X	2.0	=	24,800
H	400	491.1	420	656	80,600	X	5.2	=	419,100
I	400	285	491.1	588	57,000	X	10.5	=	598,500
J	400	230	190	410	12,700	X	1.4	=	17,800
K						X		=	
L						X		=	
M						X		=	
N						X		=	
O						X		=	
P						X		=	
Q						X		=	
R						X		=	
S						X		=	
T						X		=	
U						X		=	
V						X		=	
W						X		=	
X						X		=	
Y						X		=	
Z						X		=	

CALCULATE DEPTHS TO 0.1m **TOTAL** 2,000,300

S=(side a + side b + side c)/2

Area = square root of s(s-a)(s-b)(s-c)

ESTIMATED QUANTITY AVAILABLE (in situ) 2,000,300

ESTIMATED QUANTITY AVAILABLE (extracted) **2,500,375 cu m**

Fluff +25%

ESTIMATED QUANTITY AVAILABLE (volume) **4,000,600 tonnes**

1.6 tonnes/cu m

GRAVEL AND SAND TESTING

B Method Quantity Estimation

AREA CALCULATIONS BY HERON'S FORMULA

PROJECT INFORMATION

Project	Kearl Site - Sand M source	Tested By	
Pit Name	Kearl Site	Date	
Pit Location	NE 35-93-8-W4M	Calculated By	RDP
Job No.		Date	12-Aug-11

Average Overburden _____ m Average Aggregate _____ m

SECTION	SIDE (m) a	b	c	S (m)	AREA (m²)		DEPTH (m)		VOLUME (m³)
A	315	125	338.9	389	19,700	X	10.2	=	200,900
B	215	275	349.1	420	29,600	X	0.5	=	14,800
C	110	349.1	410	435	17,200	X	3.0	=	51,600
D	410	338.9	400	574	62,300	X	9.6	=	598,100
E	400	85	408.9	447	17,000	X	13.7	=	232,900
F	400	85	408.9	447	17,000	X	13.7	=	232,900
G	110	230	235	288	12,400	X	15.1	=	187,200
H	400	491.1	420	656	80,600	X	20.4	=	1,644,200
I	400	285	491.1	588	57,000	X	14.1	=	803,700
J	400	230	190	410	12,700	X	7.0	=	88,900
K						X		=	
L						X		=	
M						X		=	
N						X		=	
O						X		=	
P						X		=	
Q						X		=	
R						X		=	
S						X		=	
T						X		=	
U						X		=	
V						X		=	
W						X		=	
X						X		=	
Y						X		=	
Z						X		=	

CALCULATE DEPTHS TO 0.1m

TOTAL 4,055,200

S=(side a + side b + side c)/2

Area = square root of s(s-a)(s-b)(s-c)

ESTIMATED QUANTITY AVAILABLE (in situ) 4,055,200

ESTIMATED QUANTITY AVAILABLE (extracted) **5,069,000 cu m**

Fluff +25%

ESTIMATED QUANTITY AVAILABLE (volume) **8,110,400 tonnes**

1.6 tonnes/cu m

"B" Method " Inferred Mineral Resource" Quantity Estimation

GRAVEL AND SAND TESTING

B Method Quantity Estimation

INFERRED AREA CALCULATIONS BY HERON'S FORMULA

PROJECT INFORMATION

Project	Kearl Site - Gravel M	ource	Tested By	
Pit Name	Kearl Site		Date	
Pit Location	NE 35-93-8-W4M		Calculated By	RDP
Job No.			Date	12-Aug-11

Average Overburden _____ m Average Aggregate _____ m

SECTION	SIDE (m) a	b	c	S (m)	AREA (m_)		DEPTH (m)		VOLUME (m_)
A	315	125	338.9	389	19,700	X	0.3	=	5,900
B	215	275	349.1	420	29,600	X	0.0	=	0
C	110	349.1	410	435	17,200	X	0.0	=	0
D	410	338.9	400	574	62,300	X	1.5	=	93,500
E	400	85	408.9	447	17,000	X	0.5	=	8,500
F	400	85	408.9	447	17,000	X	0.5	=	8,500
G	110	230	235	288	12,400	X	0.0	=	0
H	400	491.1	420	656	80,600	X	0.4	=	32,200
I	400	285	491.1	588	57,000	X	1.2	=	68,400
J	400	230	190	410	12,700	X	0.0	=	0
K						X		=	
L						X		=	
M						X		=	
N						X		=	
O						X		=	
P						X		=	
Q						X		=	
R						X		=	
S						X		=	
T						X		=	
U						X		=	
V						X		=	
W						X		=	
X						X		=	
Y						X		=	
Z						X		=	

CALCULATE DEPTHS TO 0.1m

TOTAL 217,000

S=(side a + side b + side c)/2

Area = square root of s(s-a)(s-b)(s-c)

ESTIMATED QUANTITY AVAILABLE (in situ) 217,000

ESTIMATED QUANTITY AVAILABLE (extracted) **271,250 cu m**

Fluff +25%

ESTIMATED QUANTITY AVAILABLE (volume) **434,000 tonnes**

1.632 tonnes/cu m

Appendix 4

DK ENGINEERING SERVICES LTD.

GRAIN SIZE ANALYSIS

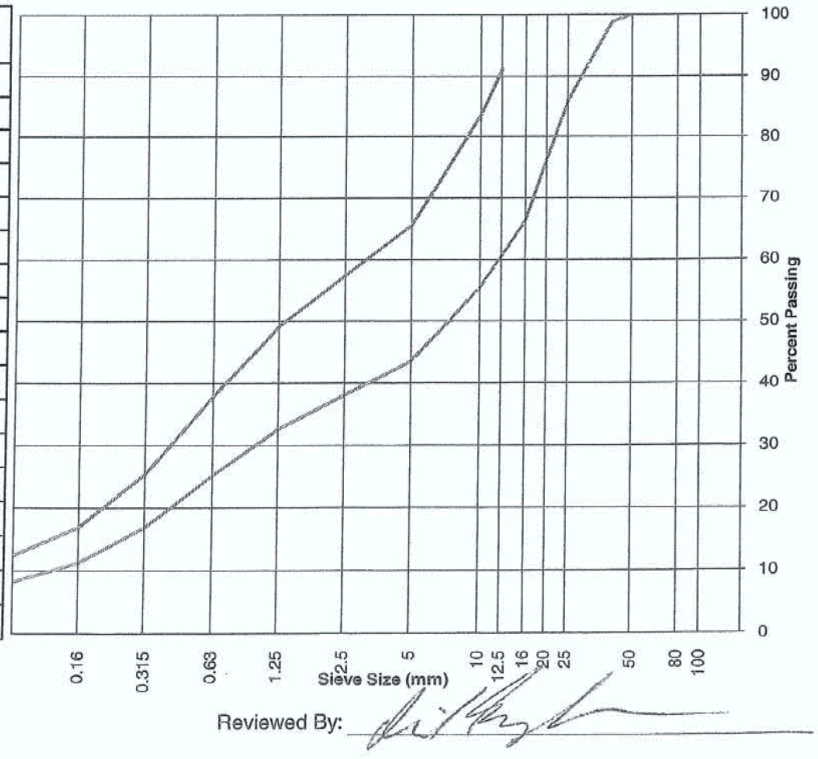
Project:	Kearl Gravel Exploration	Project No:	AP-0902
		Pit Name:	Kearl Pit
Client:	Athabasca Minerals Inc.	Pit Location:	NE 35-Twp 96-Rge 8-W4M
	9524 - 27 Avenue	Sample Source:	Test Hole
	Edmonton, Alberta	Sample No:	09-258 Bag No: K7-5ft
	T6N 1B2	Date Tested:	August 13, 2009
Attention:	Mr. Dom Kriangkum	Tested By:	D.E.B.

Sample Description: Pit Run
Smooth, Round, Trace Soft Shale

Remarks: Moisture Content = 1.6%
Aggregate Classification: GP

Gradation Analysis

Sieve Size (mm)	Percent Passing	% Passing on Fraction
150		
100		
80		
50	100	
40	99	
25	86	
20	76	
16	66	
12.5	60	91
10	55	84
5	44	66
2.50		
1.250	33	49
0.63	25	38
0.315	16.8	25
0.16	11.2	17
0.08	8.2	12



Reviewed By:

DK ENGINEERING SERVICES LTD.

GRAIN SIZE ANALYSIS

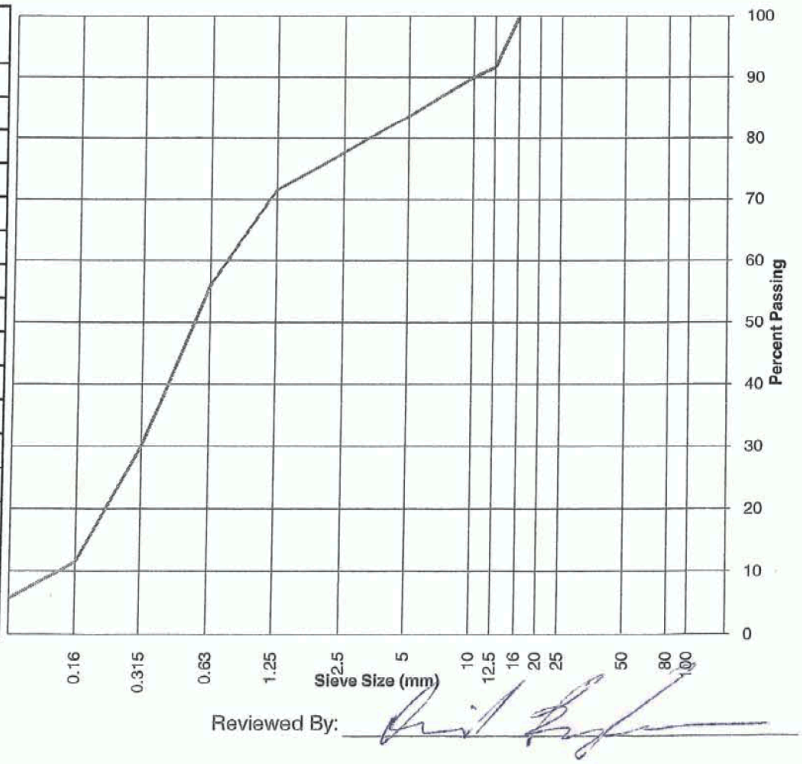
Project:	Kearl Gravel Exploration	Project No:	AP-0902
		Pit Name:	Kearl Pit
Client:	Athabasca Minerals Inc.	Pit Location:	NE 35-Twp 96-Rge 8-W4M
	9524 - 27 Avenue	Sample Source:	Test Hole
	Edmonton, Alberta	Sample No:	09-259 Bag No: K8
	T6N 1B2	Date Tested:	August 13, 2009
Attention:	Mr. Dom Kriangkum	Tested By:	D.E.B.

Sample Description: Pit Run (Sand)

Remarks: Moisture Content = 5.8%

Gradation Analysis

Sieve Size (mm)	Percent Passing	% Passing on Fraction
150		
100		
80		
50		
40		
25		
20		
16	100	
12.5	92	92
10	90	90
5	84	84
2.50		
1.250	72	72
0.63	56	56
0.315	30.1	30
0.16	11.5	12
0.08	5.7	6



Reviewed By:

DK ENGINEERING SERVICES LTD.

GRAIN SIZE ANALYSIS

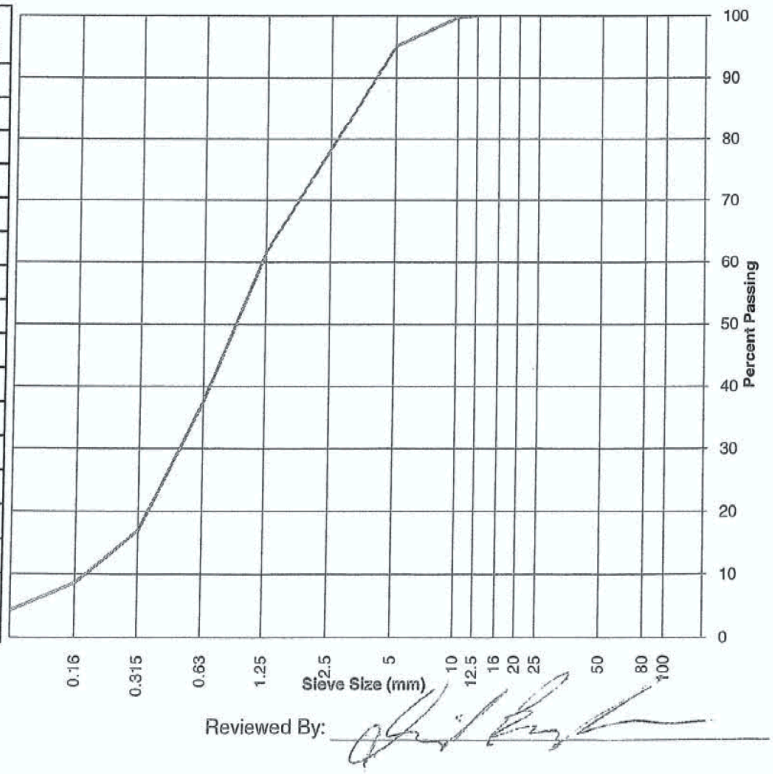
Project:	Kearl Gravel Exploration	Project No:	AP-0902
		Pit Name:	Kearl Pit
Client:	Athabasca Minerals Inc.	Pit Location:	NE 35-Twp 96-Rge 8-W4M
	9524 - 27 Avenue	Sample Source:	Test Hole
	Edmonton, Alberta	Sample No:	09-260 Bag No: K10-30ft
	T6N 1B2	Date Tested:	August 13, 2009
Attention:	Mr. Dom Kriangkum	Tested By:	D.E.B.

Sample Description: Pit Run (Sand)

Remarks: Moisture Content = 8.3%

Gradation Analysis

Sieve Size (mm)	Percent Passing	% Passing on Fraction
150		
100		
80		
50		
40		
25		
20		
16		
12.5	100	100
10	100	100
5	95	95
2.50		
1.250	62	62
0.63	38	38
0.315	17.0	17
0.16	8.6	9
0.08	4.2	4



Reviewed By:

DK ENGINEERING SERVICES LTD.

GRAIN SIZE ANALYSIS

Project:	Future Prospect	Project No:	AP-1004 (GR-0911)
		Pit Name:	Kearl Pit
Client:	Athabasca Minerals Inc.	Pit Location:	NE¼ 35-96-8-W4M
	9524 - 27 Avenue NW	Sample Source:	Test Hole
	Edmonton, Alberta	Sample No:	Average of 4 Sieves
	T6N 1B2	Date Tested:	December 14, 2010
Attention:	Mr. Peter DeLuca or Mr. Mark McCallum	Tested By:	D.E.B.

Sample Description: Pit Run (Sand)

Shell Pf Sand specifications shown (Sieve Specifications marked with * are nearest sieve sizes)

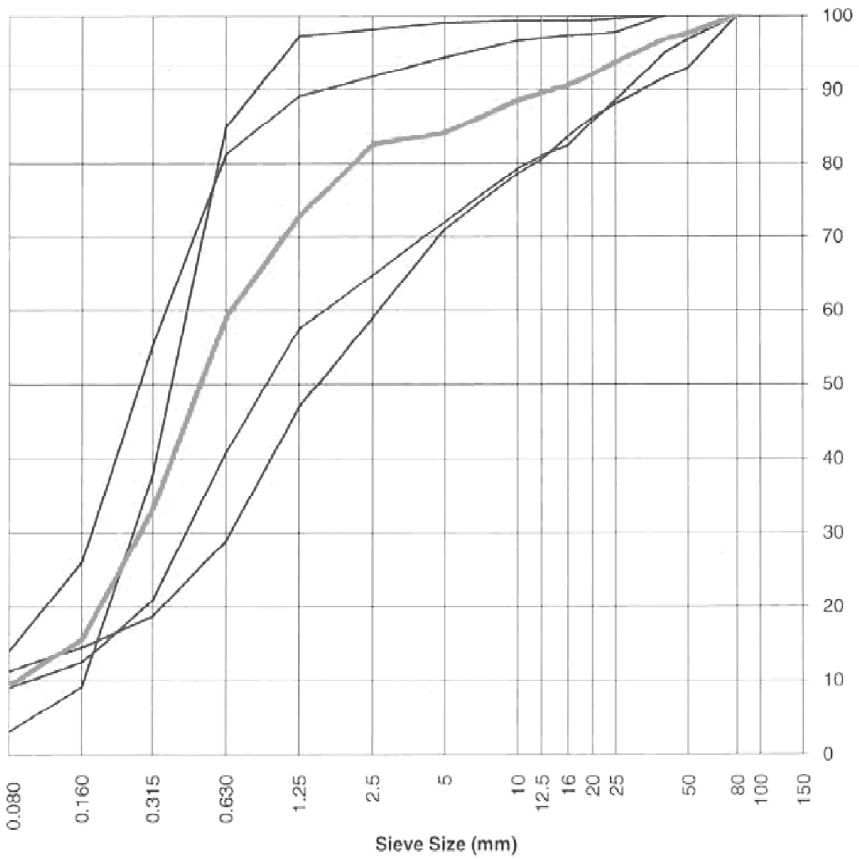
Remarks: Average Moisture Content = 4.9%

Yellow line is the average of 4 sieves.

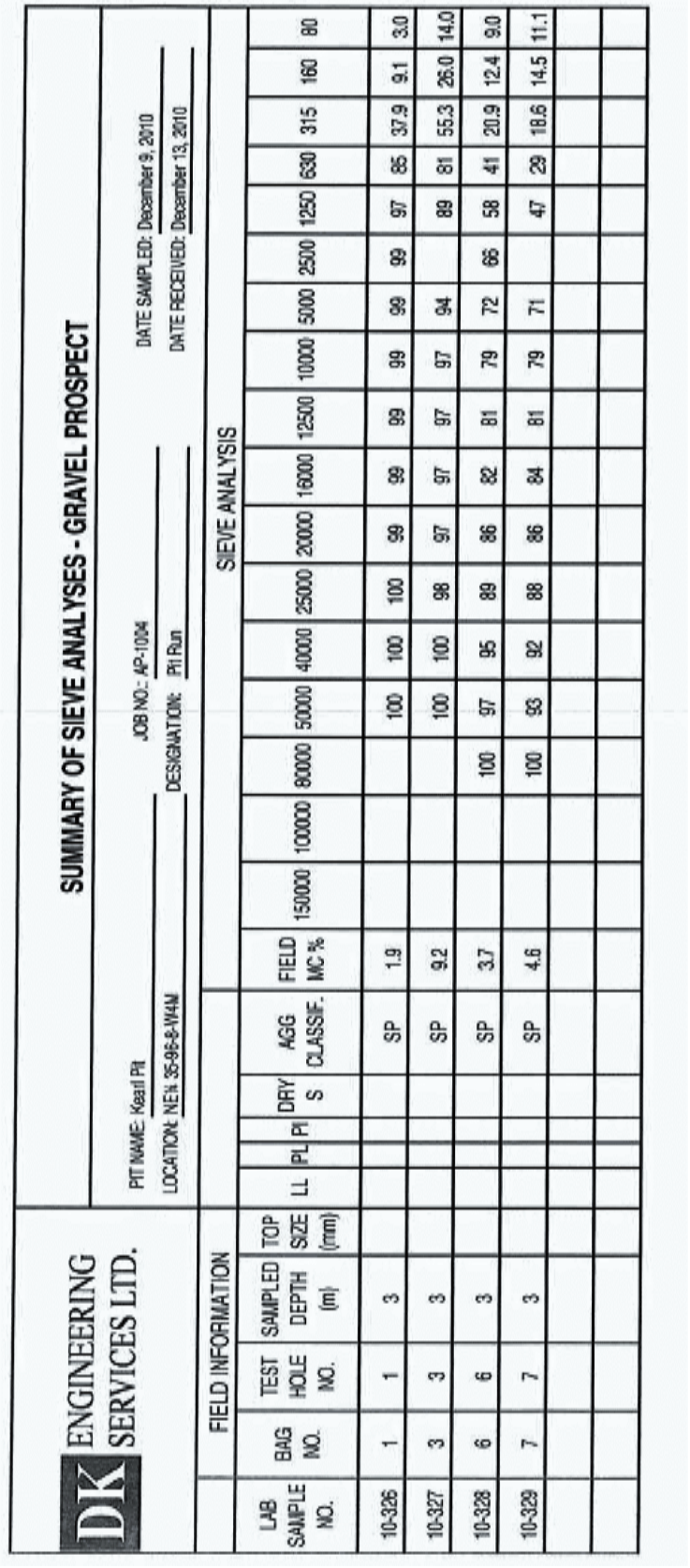
Blue lines are each individual sieve.

Sieve Size (mm)	Percent Passing	Shell Pf Sand Specification
150	0	
100	0	
80	100	
50	98	
40	97	100
25	94	
20	92	90-100*
16	91	
12.5	90	
10	89	80-100*
5	84	68-96
2.50	83	54-87
1.250	73	36-73
0.63	59	20-57
0.315	33.2	0-39
0.16	15.5	0-20
0.08	9.3	0-8

Gradation Analysis



Reviewed By:



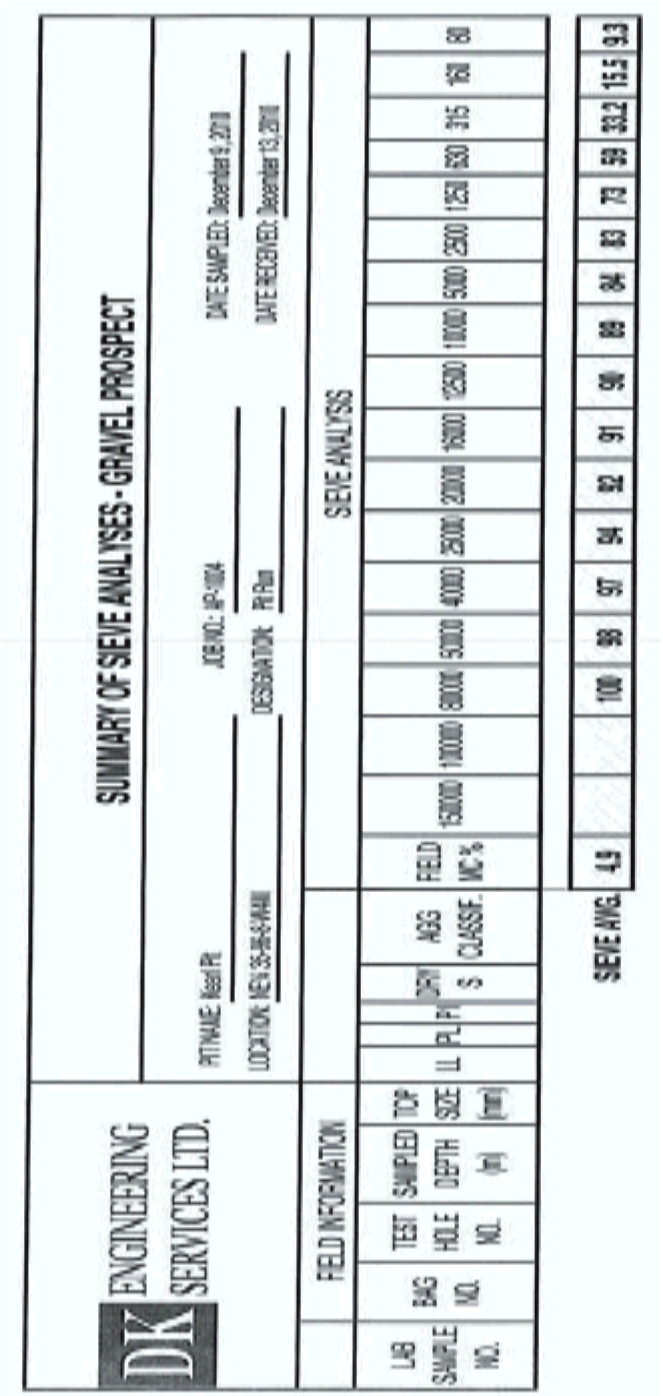
DK ENGINEERING SERVICES LTD.

SUMMARY OF SIEVE ANALYSES - GRAVEL PROSPECT

PIT NAME: Kearl Pit — JOB NO.: AP-1004 — DATE SAMPLED: December 9, 2010

LOCATION: NE¼ 35-96-8-W4M — DESIGNATION: Pit Run — DATE RECEIVED: December 13, 2010

LAB SAMPLE NO.	FIELD INFORMATION								SIEVE ANALYSIS																	
	BAG NO.	TEST HOLE NO.	SAMPLED DEPTH (m)	TOP SIZE (mm)	LL	PL	PI	DRY S	AGG CLASSIF.	FIELD MC %	150000	100000	80000	50000	40000	25000	20000	16000	12500	10000	5000	2500	1250	630	315	160	80
10-326	1	1	3						SP	1.9				100	100	100	99	99	99	99	99	99	97	85	37.9	9.1	3.0
10-327	3	3	3						SP	9.2				100	100	98	97	97	97	97	94		89	81	55.3	26.0	14.0
10-328	6	6	3						SP	3.7			100	97	95	89	86	82	81	79	72	66	58	41	20.9	12.4	9.0
10-329	7	7	3						SP	4.6			100	93	92	88	86	84	81	79	71		47	29	18.6	14.5	11.1



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SIEVE AVG.										4.9			100	98	97	94	92	91	90	89	84	83	73	59	33.2	15.5	9.3

Appendix 5

June 2007

SPECIES AT RISK IN THE BOREAL REGION

At Risk

Mammals	Birds	Amphibians/ reptiles	Fish	Invertebrates	Plants
Wood bison (E)	Peregrine falcon (TH)	Northern leopard frog* (TH)	Lake sturgeon *(p)* (TH)		
Woodland caribou (TH)	Trumpeter swan (TH)		Shortjaw cisco (TH)		
	Whooping crane (E)				

E = endangered, TH = threatened, *p* = peripheral to boreal
* Possibly isolated populations in northeast

May be at Risk

Mammals	Birds	Amphibians/ reptiles	Fish	Invertebrates	Plants
Grizzly bear		Canadian toad (DD)	Cutthroat trout *(p)*		American Lyme Grass*
Long-tailed weasel			Pygmy whitefish (DD)		
Northern-long-eared bat			Rainbow trout		
Wolverine (DD)					

DD = data deficient, *p* = peripheral to boreal
* Found in Canadian Shield in sand dunes

Sensitive

Mammals	Birds	Amphibians/ reptiles	Fish	Invertebrates	Plants –*not available**
Canadian lynx	American bittern	Long-toed salamander** (SC)	Bull trout (SC)	Alberta arctic***	
Fisher	American green-winged teal	Western (boreal) toad	Lake trout		
Red bat	American white pelican	Red-sided garter snake	Largescale sucker		
Silver-haired bat	Bald eagle	Wandering garter snake	Northern pikeminnow *(formerly northern squawfish)*		
Hoary bat	Barn swallow		Northern redbelly dace		
	Barred owl (SC)		Arctic grayling (SC)		
	Short-eared owl				
	Bay-breasted warbler (SC)				

1

June 2007

	Black tern				
	Black-backed woodpecker				
	Blackburnian warbler *(p)*				
	Black-throated green warbler (SC)				
	Broad-winged hawk *(p)*				
	Brown creeper *(p)*				
	Canada warbler				
	Cape May warbler (SC)				
	Caspian tern				
	Common nighthawk				
	Common yellowthroat				
	Eastern Phoebe				
	Forster's tern				
	Golden eagle				
	Great blue heron				
	Great gray owl				
	Horned grebe				
	Least flycatcher				
	Lesser scaup				
	Northern goshawk				
	Northern harrier				
	Northern hawk owl				
	Northern pintail				
	Northern pygmy owl *(p)*				
	Osprey				
	Pied-billed grebe				
	Pileated woodpecker				
	Purple martin				
	Rusty blackbird				
	Sandhill crane				
	Sedge wren *(p)*				
	Sharp-tailed grouse				
	Sora				
	Upland sandpiper				
	Western grebe (SC)				
	Western tanager				
	White-winged scoter (SC)				

SC = species of special concern, *p* = peripheral to boreal
***Provincial list of 'sensitive' plants is extensive and not identified by region; a boreal list is currently not available, * Found in Peace Region, **Butterfly found in grasslands of Peace River

2

June 2007

Status of Alberta Recovery and Management Plans (Boreal Species)

Species	Provincial Status	Type of Plan	Status of Plan	Contact
Bison	Endangered	National Recovery (provincial plan to follow)	National plan due June 2007	Matt Besko
Whooping crane	Endangered	National Recovery (no provincial plan required)	National Strategic Plan complete, Action Plan in progress	Lisa Wilkinson
Woodland caribou	Threatened	Recovery	Approved in part	Dave Hervieux
Trumpeter Swan	Threatened	Recovery	Approved	Mark Heckbert
Peregrine Falcon	Threatened	Recovery	Approved	Gord Court
Lake sturgeon	Threatened	Recovery	In progress Due: July 2005	Terry Clayton Co-lead needed
Shortjaw cisco	Threatened	Recovery	Submitted	Larry Rhude
Grizzly bear	May be at Risk	Recovery	Submitted	Gord Stenhouse
Long-toed salamander	Special Concern	Management	Submitted	Lisa Wilkinson
Western grebe	Special Concern	Management	In progress Due: Sept 2011	Hugh Wollis/ Lisa Wilkinson
Black-throated green warbler	Special Concern	Management	In progress Due: June 2006	Lisa Wilkinson
Cape May warbler	Special Concern	Management	Not started Due: Feb 2008	Lisa Wilkinson
Bay breasted warbler	Special Concern	Management	Not started Due: Feb 2008	Lisa Wilkinson
Barred owl	Special Concern	Management	Not started Due: Dec 2010	Gord Court
White-winged scoter	Special Concern	Management	In progress Due: Feb 2008	Lisa Wilkinson
Arctic grayling	Special Concern	Management	Not started Due: May 2011	Not assigned
Bull trout	Special Concern	Management	In progress Due: Apr 2007	Dave Walty/ Dave Christiansen

3

Rare Plant Species	Source	Provincial or Global Rank
Vascular Species		
Barbarea orthoceras (Ledeb.) – American winter cress	Kearl project baseline	S2; G5
Botrychium dusenii (Christ) Alston – Grape fern	Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data)	No longer considered rare
Cardamine pratensis (L.) – Meadow bitter cress	Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Kearl project baseline	S1 S2; G5
Carex capitata (L.) – Capitate sedge	Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data)	S2; G5
Carex houghtoniana Torr. *ex* Dewey – Sand sedge	Kearl project baseline	S2; G5
Carex lacustris (Willd.) – Lakeshore sedge	ANHIC 2004 database;Mobil Lease 36 1996 surveys(Imperial Oil, unpublished data); Kearl project baseline	S2; G5
Carex oligosperma (Michx.) – Few-fruited sedge	Kearl project baseline	S1S2; G4
Carex pseudocyperus (L.) – Cyperus-like sedge	ANHIC 2004 database; Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Syncrude 2003	S2; G5
Carex retrorsa (Schwein.) – Turned sedge	Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Kearl project baseline	S2S3; G5
Carex rostrata (Stokes) – Beaked sedge	(Imperial Oil, unpublished data); Syncrude 2003; Kearl project baseline Mobil Lease 36 1996 surveys	S2; G5
Chrysosplenium iowense (Rydb.) – Golden saxifrage	Kearl project baseline	S3; G3 G4
Chrysosplenium tetrandrum ((Lund) T. Fries) –Green saxifrage	Syncrude 2003; Kearl project baseline	S3; G5
Coptis trifolia ((L.) Salisb.) –Goldthread	Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Kearl project baseline	S3; G5
Cypripedium acaule (Ait.) – Stemless lady's slipper	Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Kearl project baseline	S3; G5
Juncus filiformis (L.) – Thread rush	Kearl project baseline	S2S3; G5
Juncus stygius ssp. *americanus* ((Buch.) Hultén) – Moor rush	Kearl project baseline	S2; G5
Nymphaea tetragona (Georgi) – White water-lily	ANHIC 2004 database; Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Syncrude 2003; RAMP; Kearl project baseline	S1: G5
Potamogeton natans (L.) – Floating-leaf pondweed	ANHIC 2004 database; Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Husky 2003; Syncrude 2003; RAMP	S2; G5
Potamogeton praelongus (Wulf.) – White-stem pondweed	ANHIC 2004 database; Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Syncrude 2003	S2; G5
Sagittaria latifolia (Willd.) – Broad-leaved arrowhead	ANHIC 2004 database; Syncrude 2003	S1; G5
Sarracenia purpurea (L.) – Pitcher-plant	ANHIC 2004 database; Kearl project baseline	S2; G5
Spiranthes lacera (Raf.) Raf. –Northern slender-ladies' tresses	Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data)	S1; G5
Bryophyte Species		
Anastrophyllum helleranum (Nees) Schust	Kearl project baseline	S2; G5
Blasia pusilla L.	Kearl project baseline	S2; G5
Brachythecium nelsonii Grout	Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data)	S2; G3G5
Brachythecium campestre (C. Mull.) Schimp. In BSG	Kearl project baseline	S3; G4G

Source: Kearl Oil Sands Project – Mine Development July 2005 EIA, Volume 3

Rare Plant Species	Source	Provincial or Global Rank
Brachythecium reflexum (Starke) Schimp.	Kearl project baseline	S1; G4G5
Bryum algovicum Sendtn. ex Müll. Hal.	Kearl project baseline	S2; G4G5
Bryum pallens (Brid.) Sw. *in* Rohl.	Kearl project baseline	S2; G4G5
Calypogeia sphagnicola (Arnell and J.Perss.) Warnst. and Loeske	Kearl project baseline	S?(a); G5
Cephalozia loitlesbergeri Schiffner	Kearl project baseline	Not ranked provincially; G5
Cephalozia pleniceps (Austin) Lindb.	Kearl project baseline	S2S3; G5
Cephaloziella elachista (Jack) Schiffn.	Kearl project baseline	S2S3; G4
Chiloscyphus pallescnes Corda	Kearl project baseline	S1; G5
Conocephalum conicum (L.) Dumort.	Kearl project baseline	S2; G5
Cynodontium strumiferum (Hedw.) Lindb.	Kearl project baseline	S2S3; G3G5
Drepanocladus sendtneri(Schimp.) Warnst.	Syncrude 2003	S2G5? (a)
Herzogiella turfacea (Lindb.) Z. Iwats	Kearl project baseline	S2; G4G5
Hygroamblystegium noterophilum (Sull. and Lesq. ex Sull.) Warnst.	ANHIC 2004 database;	SU; G4
Hygroamblystegium tenax (Hedw.) Jenn.	Kearl project baseline	S2; G5
Hypnum pallescens (Hedw.) P. Beauv	Kearl project baseline	S2; G5
Leptodictyum humile P. Beauv Syncrude 2003;	Kearl project baseline	S2; G5
Lophocolea bidentata (Linnaeus) Dum.	Kearl project baseline	S?(a); G5
Lophozia heterocolpos (Thed.) M.A. Howe	Kearl project baseline	S2; G5
Lophozia rutheana (Limpr.) M. Howe.	Kearl project baseline	S2; G4?(a)
Meesia longiseta Hedw.	Kearl project baseline	S1; G4?(a)
Mnium ambiguum H. Müll.	Kearl project baseline	S1S2; G5
Odontoschisma denudatum (Nees *ex* Mart.) Dunn.	Kearl project baseline	S1; G5
Neckera pennata Hedw.	Kearl project baseline	S2; G5
Odontoschisma sphagni (Dicks.) Dumort.	Kearl project baseline	Not ranked provincially; G5
Paludella squarrosa (Hedw.) Brid.	Kearl project baseline	S3; G3G5
Pellia endiviifolia ((Dicks.) Dumort.)	Kearl project baseline	S1; G5
Pohlia sphagnicola (Bruch and Schimp.) Lindb and Arnell	Syncrude 2003; Kearl project baseline	S2; G2G3
Polytrichum longisetum (Sw. *ex* Brid.)	Kearl project baseline	S1; G5
Rhizomnium magnifolium (Horik.) T.Kop	Syncrude 2003	S2; G4G5
Riccardia latifrons (Lindb.) Lindb.	Kearl project baseline	S?(a); G4G5
Riccardia palmate (Hedw.) Carruth.	Kearl project baseline	S?(a); G5
Scapania glaucocephala (Tayl.) Aust.	Kearl project baseline	S1; G4G5
Scapania paludicola Loeske and Müll.Frib.	Kearl project baseline	S2; G5
Sphagnum fallax (Klinggr.) Klinggr.	Syncrude 2003; Kearl project baseline	S2; G5
Sphagnum fimbriatum Wilson.	ANHIC 2003 database; Mobil Lease 36 1996 surveys (Imperial Oil, unpublished data); Kearl project baseline	S2S3; G5
Splachnum spp. Hedw.	Kearl project baseline	S2; G3
Tritomaria scitula ((Tayl.) Joerg.)	Kearl project baseline	S2S3; G5

Source: Kearl Oil Sands Project – Mine Development July 2005 EIA, Volume 3

Appendix 6

National Instrument 43-101 Technical Report for the Estimation of the Aggregate Resources within Section 35 Township 96 Range 08 West of the 4th Meridian: Kearl Property

TEST HOLE RESULTS SHOWN IN FEET

LEGEND:

C-CLAY
FG-FAIR GRAVEL (30-60%)
GG-GOOD GRAVEL (+60%)
OG-ORIGINAL GROUND
OS-OILSANDS
PG-POOR GRAVEL (20-30%)
S-SAND
SC-SANDY CLAY
TS-TOPSOIL
U-UNABLE TO PENETRABLE
W-WATER TABLE
(0.1) Thickness in meters

DH142 (-10 from OG) 0-2 S 2-3 GG 3-18 S 18-22 PG 22-29 S 29-45 GG 45-51 S 51-56 GG 56-59 S 59-63 GG 63-68 S 68-101 GG 101-113 S 113 U W @ 15 (25 FROM OG) TH IN EXCAVATED AREA	**DH143** 0-0.3 TS (0.1) 0.3-2 S (0.52) 2-7 C (1.52) 7-25 S (5.49) 25-28 FG (0.91) 28-84 S (17.07) 84-95 GG (3.35) 95-105 OS	**DH144** 0-0.3 TS (0.1) 0.3-3 SC (0.82) 3-6 PG (0.91) 6-30 S (7.32) 30-47 GG 47-55 PG 55-63 GG (10.06) 63-68 S (1.52) 68-100 GG (9.75) 100-105 OS (1.52)	**DH145** 0-0.3 TS (0.1) 0.3-3 SC (0.82) 3-39 S (10.97) 39-60 GG (6.40) 60-67 PG (2.13) 67-78 S (3.35) 78-87 GG (2.74) 87-96 S (2.74) 96-110 GG (4.27) +110 GG TH EXCEEDS DRILL LENGTH
DH146 0-0.3 TS (0.1) 0.3-4 SC (1.13) 4-31 S (8.23) 31-40 GG (2.74) 40-53 S (3.96) 53-55 GG (0.61) 55-76 S (6.40) 76-77 GG (0.30) 77-84 S (2.13) 84-110 GG (7.92) +110 GG TH EXCEEDS DRILL LENGTH	**DH147** 0-0.3 TS (0.1) 0.3-45 S (13.62) 45-77 GG (9.75) 77-82 S (1.52) 82-90 GG (2.44) +90 GG TH EXCEEDS DRILL LENGTH	**DH148** 0-0.3 TS (0.1) 0.3-2 GG (0.52) 2-45 S (13.11) 45-50 FG (1.52) 50-61 S (3.35) 61-64 GG (0.91) 64 U	**DH149** 0-0.3 TS (0.1) 0.3-2 S (0.52) 2-11 C (2.74) 11-37 OS (7.92)
DH150 0-0.3 TS (0.1) 0.3-2 C (0.52) 2-5 S (0.91) 5-11 PG (1.83) 11-46 S (10.67) 46-62 OS (4.88)	**DH151** 0-0.3 TS (0.1) 0.3-3 C (0.82) 3-18 S (4.57) 18-23 GG (1.52) 23-37 S (4.27) 37-40 FG (0.91) 40-47 OS (2.13)	**DH152** 0-0.3 TS (0.1) 0.3-14 C (4.18) 14-32 OS (5.49)	**DH153** 0-0.3 TS (0.1) 0.3-7 C (2.04) 7-12 S (1.52) 12-25 GG (3.96) 25 U
DH154 0-0.3' Topsoil (0.1) 0.3-5' Poor Gravel (1.43) 5-24' Sand (5.79) 24-28' Fair Gravel (1.22) 28-63' Sand (10.67) 63-73' Fair Gravel (3.05) 73-79' Sand (1.83) 79-85' Good Gravel with sand (1.83) 85-94' Sand (2.74) 94-97' Oil sand (0.91)	**DH155** 0-0.3' Topsoil (0.1) 0.3-54' Sand (16.37) 54-65' Good Gravel (3.35) 65-70' Sand (1.52) 70-83' Good Gravel (3.96) 83-87' Oil sands (1.22)	**DH156** 0-0.3' Topsoil (0.1) 0.3-3' Sand (0.83) 3-7' Poor Gravel 7-9' Good Gravel (1.83) Hole ended due to no further penetration possible (to bony or large rock) Note: Drill moved 10' south with same results as DH 156	**DH157** 0-0.3' Topsoil (0.1) 0.3-13' Dirty Sand (3.87) 13-18' Good Gravel (1.52) 18-22' Sand (1.22) 22-24' Good Gravel (0.61) 24' Oil sands

TH158 0-0.3' Topsoil 0.3-58' Sand 58-63' Fair Gravel 63-75' Sand 75-82 Oil sands			

NOTE: RECORDED TOPSOIL DEPTH SKEWED DUE TO PREVIOUS STRIPPING OF DRILL TEST AREAS

National Instrument 43-101 Technical Report for the Estimation of the Aggregate Resources within Section 35 Township 96 Range 08 West of the 4th Meridian: Kearl Property

Kearl Testing Program: April 5-7, 2011

Project Personnel: Rolley, Mark M., R. Don Peel
Equipment: Hitachi 270LC Backhoe

April 5 (Sunny, +5C)



Location of K321 within access road material excavation pit[3] (middle of pit along south end)

[3] Material being excavated at a depth of 2-3 from this pit is the source for construction of the access road (2 km)



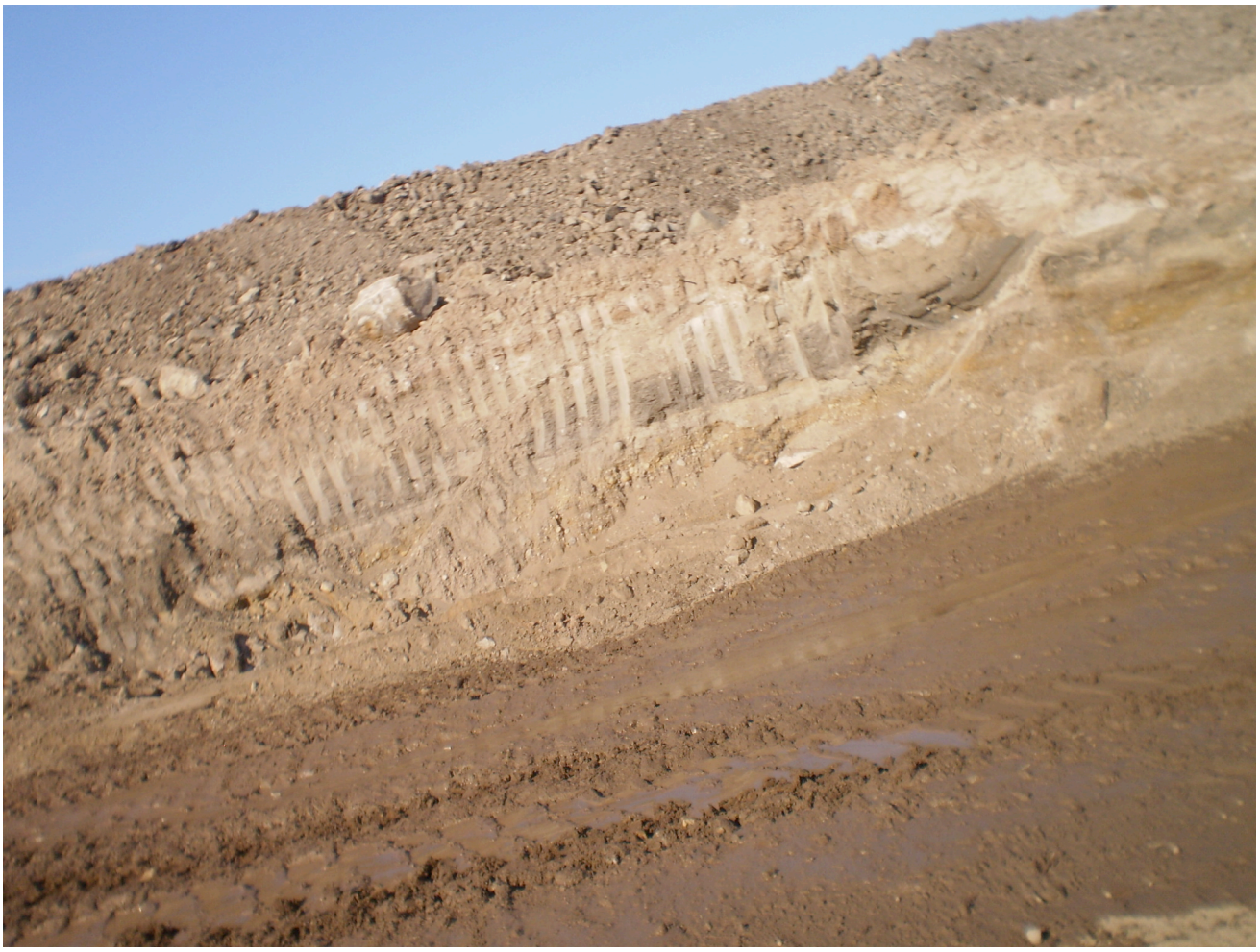
South wall of road material excavation pit



South wall of road material excavation pit



West wall of road excavation pit



North wall of raod excavation pit



Road material excavation looking northwest from southeast pit edge



Road material excavation looking west southwest



K321 North test-pit wall (dug on road excavation pit bottom – 3 m below original surface elevation)

0-0.1	Organic layer (consistent in all test pits)	
0.1-14.’	Sand (20-30% gravel)	- water @ 14.8’
14.8-19.7’	Course dirty gravel	



K322

0.1-8.2’	Coarse dark sand
8.2-20’	Light coloured sand

K323

0.1-20’	Sand with thin layers and lumps of oil sand



K324

0.1-12’	Gravelly clay
12-19’	Sand
19-20’	Gravelly coarse sand

K325

0.1-2.5’	Clay
2.5-20’	Sand



K326

0.1-2.5’	Gravelly clay
2.5-7’	Light-coloured sand
7-20’	Gravelly sand banded (oilsand layers)

K327

0.1-2.5’	Gravelly clay
2.5-15’	Gravelly sand (grain size up to 3″) banded (oilsand layers)
15-20’	Sand

K328

0.1-3’	Gravelly clay
3-14’	Gravelly sand (grain size up to 6″)
14-20’	Sand (cross-bedding)



K329



K329 Material Pile

0.1-1.5’	Gravelly clay with boulders
1.5-4’	Light-coloured sand
4-15’	Gravelly banded sand (grain size up to 4″- dark thin layers of oilsand)
15-20’	Sand



K330

0.1-1.5’	Gravelly clay	
1.5-6’	Light coloured sand	
6-9’	Gravel	
9-20’	Clay	- water @ 20’

K331

0.1-2.5’	Gravelly clay	
2.5- 6’	Oilsands	

K332

0.1-2’	Gravelly clay	
2-5’	Oilsands	

K333

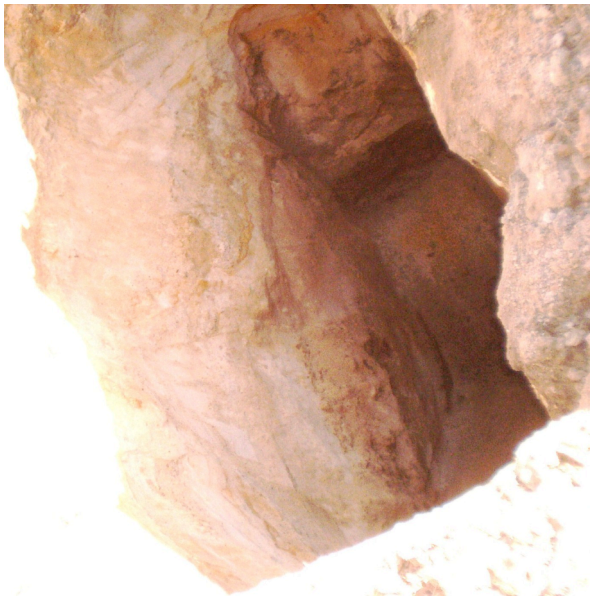
0.1-12’	Clay	
12-18’	Gravel	- water @ 15.5’

April 6 (0C Sunny with cloudy periods - shower)



K334

0.1-2.5’	Gravelly clay
2.5-2.7‘	Gravel
2.7-20’	Sand



K335

0.1-2.5’	Gravelly clay
2.5-3.0‘	Gravel
3.0-20’	Sand



K336



K336 Material pile

0.1-20’ Sandy gravelly clay (15-20% gravel)



K337



K337 Material pile

0.1-3.5’ Gravelly clay
3.5-3.6’ Dark layer of gravel
3.6-12’ Oilsands



K340

0.1-3’	Gravelly clay	
3-15’	Dirty gravel	- water @ 3.2’
15-17’	Clay (caving walls prevents deeper penetration)	



K340 Material pile



K343

0.1-2.5’	Gravelly clay
2.5-12’	Sand with thin dark bands of oilsand
12-20’	Gravelly sand



K343 Material pile



K344

0.1-2’	Gravelly clay
2-20’	Gravelly sand



K344 Material pile





K345

0.1-2’	Gravelly clay	
2-20’	Gravelly sand	- water @ 20’

<u>April 7</u> Cloudy 0C

K346

0.1-9’	Clay
9-20’	Fine sand

K347

0.1-7’	Clay
7-15’	Dirty gravel with boulder (3□)
15-16’	Clay and oilsand





K348

0.1-2.5’	Gravelly clay
2.5-16’	Gravel (large boulder prevents further penetration) - water @ 16



K348 Material pile

K349

0.1-2.5’	Gravelly clay	
2.5-?’	Gravelly sand and clay	
?-15’	Clay	

K350

0.1-2’	Gravelly clay	
2-5’	Sand	
5-7.5’	Gravel	
7.5-18’	Sand	

K351

0.1-2.5’	Gravelly clay	
2.5-19’	Fine sand	
19-20’	Gravel	

K352

0.1-3’	Gravelly clay	
3-5.5’	Gravel	
5.5-20’	Sand with thin black layers	

K353

0.1-4’	Gravelly clay	
4-12’	Gravel	
12-20’	Sand	

K354

0.1-4’	Gravelly clay	
4-6’	Gravel	
6-20’	Gravelly sand	- water @ 20’

K355

0.1-4.5’	Gravelly clay	
4.5-5.7’	Gravel	
5.7-20’	Gravelly sand	- water @ 20’

K356 (dug April 6 but renumbered due to GPS functionality)

0.1-18’	Gravelly clay	- water @ 18’
18-20’	Oilsand	

Note: original plan was to conduct a 100 m X 100 m test grid; however the material type at the penetration depth of the backhoe was consistent in the lease area with the main gravel layers below the backhoe depth limit (20□). To determine the aggregate resources at depth, the testing program was supplemented by an auger drill; however, ground conditions were too wet for the truck-mounted auger, limiting the number of holes that could be drilled.



Extracted Resource pile near DH 142



Area where the material for constructing the access road was extracted (mid-lease)



Cross-bedding in a gravel layer (mid-lease area)



Gravel seam (mid-lease area)



Lease Access Road construction material (mid-lease area)



Screening gravel from sand horizon



Coarse gravel screened from sand horizon



Coarse gravel screened from the sand horizon