MAR 20130012: CHINCHAGA A

Chinchaga A- A report on Sand exploration near Rainbow Lake, North West Alberta.

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Metallic and Industrial Mineral Permit Number 9311010579

Chinchaga Project

Part B
Administrative Documents

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Preferred Sands of Canada, ULC

March 10, 2013

preferred sands

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Expenditure Statement by Activity

Required Expenditure	**Hectares**	**Rate**	**Cost**
Permit No. 9311010579	2,048	$5	$10,240
Total			**$10,240**
Actual Expenditure			
Prospecting	**Units**	**Rate**	**Cost**
Air	1	$772.20	$772.20
Rental Car			$380.52
Fuel			$45.06
Hotel			$120.23
Food			$75.32
Intern Hours (2)	25	$32.00	$800.00
Geologist Hours	24	$150.00	$3,600.00
Misc. Supplies			$366.94
Assaying & Whole Rock Analysis			
Gradation Testing	12	$75.00	$900.00
Crush testing	5	$550.00	$2,750.00
simulated attrition wash	6	$50.00	$300.00
Microscopic pictures/visual analysis	54	$100.00	$5,400.00
Administration (up to 10%)			$1,551.03
Total			**$17,061.29**

1.0 Introduction

In 2012, a visit was conducted by Preferred Sands of Canada, ULC (Preferred) to the property subject to the terms and conditions of the Metallic and Industrial Mineral Permit, No. 9311010579 (Permit) which was issued on January 10th, 2011. The mineral reserves of this parcel were explored by finding exposed mineral sample points and obtaining representative samples. Observations pertaining to sampling and sample sites were recorded. All samples and notes were forwarded to the corporate office where samples were assessed and select samples were chosen for evaluation.

The Preferred Geology Department conducted American Petroleum Institute (API) material assessments to determine the properties of the sand as they relate to a proppant. These observations will be used to evaluate reserve quality and assess product potential.

2.0 Summary

In late August 2012 representatives of Preferred commenced a five day investigation of the Permit property. The purposes of the investigation were to determine the following: 1) review literature on the Chinchaga deposit, 2) compile a brief assessment of the potential proppant reserve quality based on surface sampling and observations.

A total of 16 samples were collected from 10 locations. GPS locations and pictures were taken to properly record sample locations and conditions. Approximately 2 – 4 lbs. of sand were collected for each sample. Upon completion of sample gathering, each sample was shipped to the Preferred Corporate office for analysis.

Representative samples were selected on the basis of accessibility, existing outcrops, and safety. All samples were washed, half were attrition scrubbed. The clean samples were then evaluated for crush strength and sieve size distribution. Potential product samples were separated out and examined under a microscope to observe roundness, and sphericity. Further evaluation and study will be required to determine exact product chemistry and overall deposit quality.

Over the course of this investigation expenditures totaling $17,061.29 were incurred ($15,510.26 on exploration, $1551.03 on administration). The current assessment period (Period 1) requires expenses totaling $5 per hectare for 2,048 hectares; a total cost of $10,240 on exploration will keep the Permit in good standing. For this assessment period a balance of $6,821.29 will be carried forward into Assessment Period 2 and be credited towards the $20,480 in expenses required for that assessment period.

3.0 Geology

3.1Regional Geographic Setting

The region can be described as within the Mackenzie River drainage basin, which empties into the Beaufort Sea (Plouffe, Paulen, and Smith, 2006, p.7). The Permit is located in northwest Alberta, adjacent to the Northwest Territories and British Columbia. The Permit is situated in the Rainbow Lake Plain within the Clear Hills Uplands and just south of the Fort Nelson Lowlands (Pawlowicz et al., 2005a).

The elevation typically ranges between 335 meters to 450 meters above sea level (ASL) but can reach elevations greater than 700 meters ASL in the highest areas of the Clear Hills Uplands (Pawlowicz et al., 2005b). The Permit region is found to be poorly drained due to deep incision of secondary streams which is a main contributing factor to the formation of organic deposits in the forms of fens and bogs (Plouffe, Paulen, and Smith, 2006, p.7).

3.2 Regional Tectonic Setting and Bedrock Geology

The Chinchaga region has a complex tectonic setting. The area covering the Permit lies directly south and east of the Great Slave Lake Shear Zone and directly west of the Allan Shear Zone (Pană, 2003, p.2-3). Pană has shown that Precambrian basement rocks include both plutonic and metamorphic domains as well as granitic belts (2003, p.3).

The bedrock geology consists of the Cretaceous Shaftesbury shale formation overlain by the Cretaceous Dunvegan formation which is a sandstone (Plouffe, Paulen, and Smith, 2006, p.8-9). The Shaftesbury is defined as a dark gray, marine shale which is interbedded with silty and sandy intervals 250 to 450 meters thick; and the Dunvegan formation is noted to be a deltaic to marine, gray, fine-grained feldspathic sandstone with laminated siltstone and gray, silty shale 140 to 180 meters thick (Ozoray, 1982, p.4). It is noted by Plouffe, Paulen, and Smith (2006) that bedrock is exposed in meltwater channels, along stream valleys, and hilltops (p.8).

3.3 Regional Surficial Geology and Associated Glacial Deposits

The region is covered by an extensive till blanket comprised of glacial sand and gravel. The depositional material originated within the Laurentide Ice Sheet which flowed west and southwest across the area during the Late Wisconsonian glaciation (Plouffe, Paulen, and Smith, 2006, p.8). Glaciofluvial sand and gravel was deposited along the outlets of proglacial lakes and meltwater channels in the area.

The surficial geology of the region is mostly material deposited during the Late Wisconsonian Glaciation. The ice sheet dictated the deposition of current features and surficial materials and molded the topography of the region. The region is covered by diamicton till, glaciolacustrine layers, outwash deposits, organic soils, and bog peats (Ozoray, 1982, p.5). In general, glaciolacustrine materials are found in undulating, lower-lying land; and tills are found in areas of relatively higher elevations.

The till in this region is nearly continuous consisting of diamicton with a fine grained matrix and low clast content (< 5%). On average the matrix is about 60% silt, 27% sand, and 12% clay (Plouffe, Paulen, and Smith, 2006, p.8). Tills are exposed at some surfaces in raised areas but generally underlie organic materials. Outwash deposits are defined as well sorted sands with pebble lenses (Ozoray, 1982, p.5)

4.0 Hydrogeology

Data provided by Borneuf and Pretula in the publication "Hydrogeology of the Zama - Bistcho Lakes Area, Alberta" (1980) provides an assessment of the hydrogeology of the Hay River-Chinchaga River Drainage Basin. In this region, the water table is close to, or at, the surface due to thin surficial sediments which contributes to the low permeability of the area and subsequently lower groundwater recharge (p.3-4).

Surficial sediments are the main aquifer; they range between 15 m and 100 m in thickness. Their yield range is between 0.1 and 2 L/s (Borneuf and Pretula, 1980, p.4). The Dunvegan Sandstone comparatively has a yield range between 0.2 and 0.4 L/s (Borneuf and Pretula, 1980, p.4). The Dunvegan Sandstone is not very thick and is located at higher elevations. Commonly, they are completely unsaturated.

The Hay River-Chinchaga River drainage system flows north through British Columbia, Alberta, and Northwest Territories. It ultimately drains into Great Slave Lake and from there will discharge into the Arctic Ocean. The basin is characterized with poor drainage which explains the tendency of the lowlands to flood. Basin tributary rivers and streams meander sluggishly (Borneuf and Pretula, 1980, p.2).

5.0 Climate

The climate in the region is characterized as microthermal (Borneuf and Pretula, 1980, p.2). Records show that the four warmest months (May, June, July, and August) of the year have average temperatures of 8 degrees Celsius or higher and the average annual temperature is 3 degrees Celsius (O'Leary, Saxena, and Decoursey, 2002, p.6). The mean annual snowfall for the region is 1.5 m (Borneuf and Pretula, 1980, p.2) while, the snowpack on average lasts from October to May (Ozoray, 1982, p.2). Mean annual precipitation varies from 394 mm to 457 mm, depending on the elevation (Borneuf and Pretula, 1980, p.2).

6.0 Quality and Evaluation of Testing Results

Prior to visiting the Permit site (Figure 6.1, Appendix D), strategic areas were targeted and identified as areas of focus for this initial investigation. Representative samples were collected over a five day period from August 19th to August 23rd, 2012 by Lauren Punt and Jordan Booth, Preferred Geology Department interns. To see a map of sample locations please reference Figure 6.2 in Appendix D.

Sixteen representative samples were collected for evaluation and study. Sample elevations ranged from 434 meters to 485 meters with the average sample elevation being464 meters (see sample notes, Table 6.4). To thoroughly document the Permit, pictures were taken at each individual sample location (Appendix A).

The samples were split, washed and sorted through a stack of US Standard sieves that were shaken in a Ro-Tap™ for 10 minutes. The sieves used were the #12, #16, #20, #25, #30, #35, #40, #45, #50, #60, #70, #100, and #140 mesh sizes. Any material that passed the #140 mesh size sieve was collected in the pan. Each sieve and the pan's contents were weighed in grams and documented (Table 6.3). Using that information, the individual percent retained on each sieve was calculated. The accumulation of a certain set of sieves can give one an idea of the expected yield of a certain product. For example, by adding together the individual percent retained of the #25, #30, #35, and the #40 sieve, the potential yield of a 20/40 proppant is determined. The Permit sands show, on average, a 20/40 content of 31.8%, 40/70 content of 42.7%, and 70/140 content of 8.1%.

Crush strength was evaluated for 5 samples of 40/70 at 5000 PSI following the equipment and testing guidelines set forth in "Measurement of Properties of Proppants" (2008, p. 23-28). The recommended suggested fines percentage for 40/70 is 8% ("Recommended Practices for Testing Sand", 1995, p. 11). The evaluation of the samples conducted by Preferred show values ranging between 9.7 and 16.8%, the average crush value for these samples is 11.9% (Table 6.1). This value is almost 50% higher than the recommended value. A larger data set is required for further evaluation so that a better understanding of product potential can be established, as this study only evaluated 5 samples from 2 sample locations. These tests were conducted to get an initial crush evaluation and determine if the samples show potential.

Microscope pictures (Appendix B) were used to do a cursory evaluation of grain roundness and sphericity. A visual observation of the grains was completed and approximate values were assigned to individual grains by using Figure 5 "Chart for Visual Estimation of Sphericity and Roundness," cited on page 7 of "Recommended Practices for Testing Sand" (1995). According to "Recommended Practices for Testing Sand" proppant sand should have a sphericity of 0.6 or greater, and a roundness of 0.6 or greater (1995, p.5). More specifically, McLaws asserts that proppant sand should have a roundness factor of 0.6 or more to be useable, be a roundness factor of 0.7 is preferable (1971, p. 17-18).

After evaluating the three sample sets (20/40, 40/70, and 70/140) for roundness and sphericity at each sample location (waypoints 7, 8, and 11), the samples are found to be within the acceptable range necessary for use as a proppant sand (Table 6.2). The average roundness and sphericity values are as follows for products 20/40, 4070, 70/140 respectively: 0.68 and 0.71, 6.2 and 6.8, and 5.8 and 6.3. More in depth evaluation will be necessary prior to marketing this sand for use as a proppant.

7.0 Conclusions

Overall site investigation and evaluation has presented positive findings and a need for more in-depth study of reserve potential. Sieve analyses prove to be within an acceptable range and illustrate a high product yield potential for the Permit. Initial roundness and sphericity values are found to be within an acceptable range for proppant sand use. Crush resistance testing has not shown values within the acceptable range, although more tests are needed before reserve quality can be properly assessed.

8.0 Future Work

More in depth research will be scheduled for the next work period as we continue to understand the potential product yields. Preferred will need to conduct a drilling program to determine the exact quality and quantity of proppant materials available at the Permit site. Samples will need to be evaluated for chemistry, gradation, sphericity, roundness, and crush strength to understand its use as a proppant as well as other potential market applications.

Authors Qualifications

March 10, 2013

I, Matthew Bendernagel, reside in Paoli, Pennsylvania, United States of America and hereby certify that:

1. I am the Manager of Geology for Preferred Sands of Canada, ULC (Preferred), One Radnor Corporate Center, 100 Matsonford Road, Suite 101, Radnor, PA 19087. Preferred has been supplying sand proppant to the oil and gas industry since 2008.
2. I am a graduate of Purdue University, West Lafayette, IN with a B.S. in Earth Science.
3. I have been a geologist in the mining industry since 1999.
4. I have my Masters in Business Administration for the University of Detroit Mercy.
5. I am responsible for the exploration of minerals due diligence for all prospective sites that Preferred explores.
6. I am responsible for all mining planning activities for existing Preferred operations.
7. I have been studying and investigating sandstones suitable for hydraulic fracturing of oil and gas wells since 2010.
8. I co-authored this report with Amanda Lierman, Geologist, Preferred.
9. I am not aware of any material fact or material change with respect to the subject matter of this report that is not reflected in this report, or the omission to disclose which makes this report misleading.

[redacted]

MATTHEW B. BENDERNAGEL
Manager of Geology
Preferred Sands of Canada, ULC

March 10, 2013

I, Amanda Lierman, reside in Bloomer, Wisconsin, United States of America and hereby certify that:

1. I am a Geologist for Preferred Sands of Canada, ULC (Preferred), One Radnor Corporate Center, 100 Matsonford Road, Suite 101, Radnor, PA 19087. Preferred has been supplying sand proppant to the oil and gas industry since 2008.
2. I am a graduate of University Wisconsin Eau Claire, Eau Claire, Wi with a B.S. in Geology.
3. I have been working in the mining industry since 2009.
4. I am responsible for field work in association with the exploration of minerals and due diligence necessary for all prospective sites that Preferred explores.
5. I have been studying and investigating sandstones suitable for hydraulic fracturing of oil and gas wells since 2007.
6. I co-authored this report with Matthew Bendernagel, Manager of Geology, Preferred.
7. I am not aware of any material fact or material change with respect to the subject matter of this report that is not reflected in this report, or the omission to disclose which makes this report misleading.

[redacted]

AMANDA LIERMAN
Geologist
Preferred Sands of Canada, ULC

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Pawlowicz, J.G., Hickin, A. S., Nicoll, T.J., Fenton, M. M., Paulen, R.C., Plouffe, A., & Smith, I. R. (2005). *Drift Thickness of Zama Lake Area, Alberta (NTS 84L)*. Alberta Energy and Utilities Board, EUB/AGS Map 329, Scale 1:250 000.

Plouffe, A., Paulen, R.C., & Smith, I.R. (2006) *Indicator Mineral Content and Geochemistry of Glacial Sediments from Northwest Alberta (NTS 84L, M): New Opportunities for Mineral Exploration.* (EUB/AGS Special Report 77). Calgary, AB: Geological Survey of Canada Open File 5121.

Recommended Practices for Testing Sand Used in Hydraulic Fracturing Operations. (1995). Washington DC: American Petroleum Institute.

Appendix A – Site Pictures

(Picture 431)
Chinchaga A, Site 1, Waypoint 3, Approximately 5 meters of sand, Husky mine site

(Picture 429)
Chinchaga A, Site 1, Waypoint 3, Approximately 5 meters of sand, Husky mine site

(Picture 436)
Chinchaga A, Site 8, Waypoint 4, Sample ~7 inches below surface, next to Husky drill rig

(Picture 442)
Chinchaga A, Site 10, Waypoint 5, Sample ~8 inches below surface

(Picture 445)
Chinchaga A, Site 12, Waypoint 7, Husky mine site

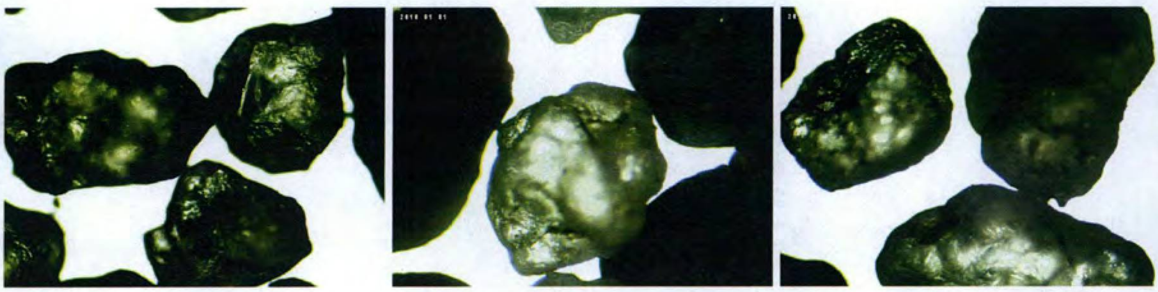
(Picture 507)
Chinchaga A, Site 12.2, Waypoint 30, Husky mine site, 7 samples taken spaced ~ 3 feet apart on 20 foot face, labeled 30-1, 30-2, etc.

(Picture 448)
Chinchaga A, Site 13, Waypoint 8, Husky mine site number 2

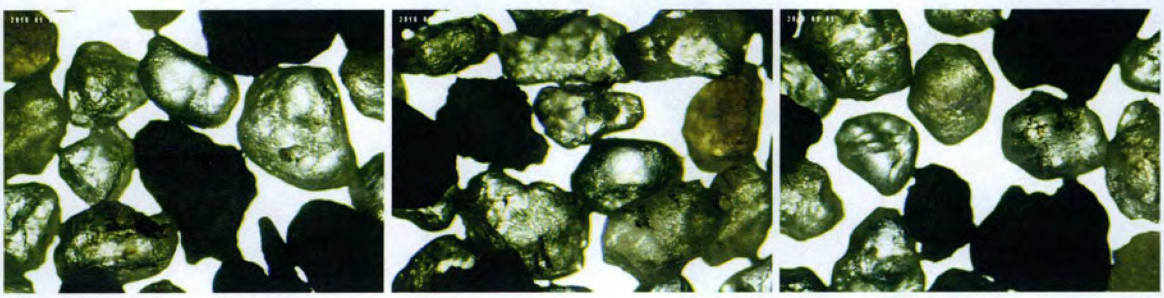
(Picture 450)
Chinchaga A, Site 14, Waypoint 9, Campground at river ban

Appendix B – Microscope Pictures

20/40



40/70



70/140

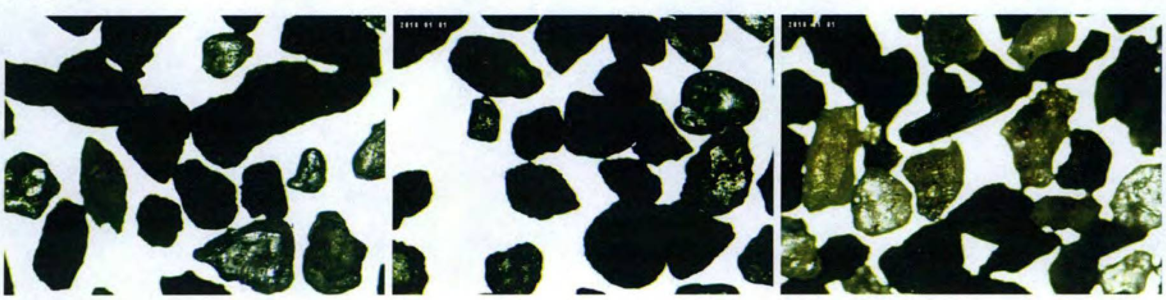


Figure 1: Waypoint 7, Potential Product Pictures – manually washed samples

Figure 2: Waypoint 7, Potential Product Pictures – Samples washed using simulated attrition method (70% solids by weight, 2 minutes, x4 magnification)

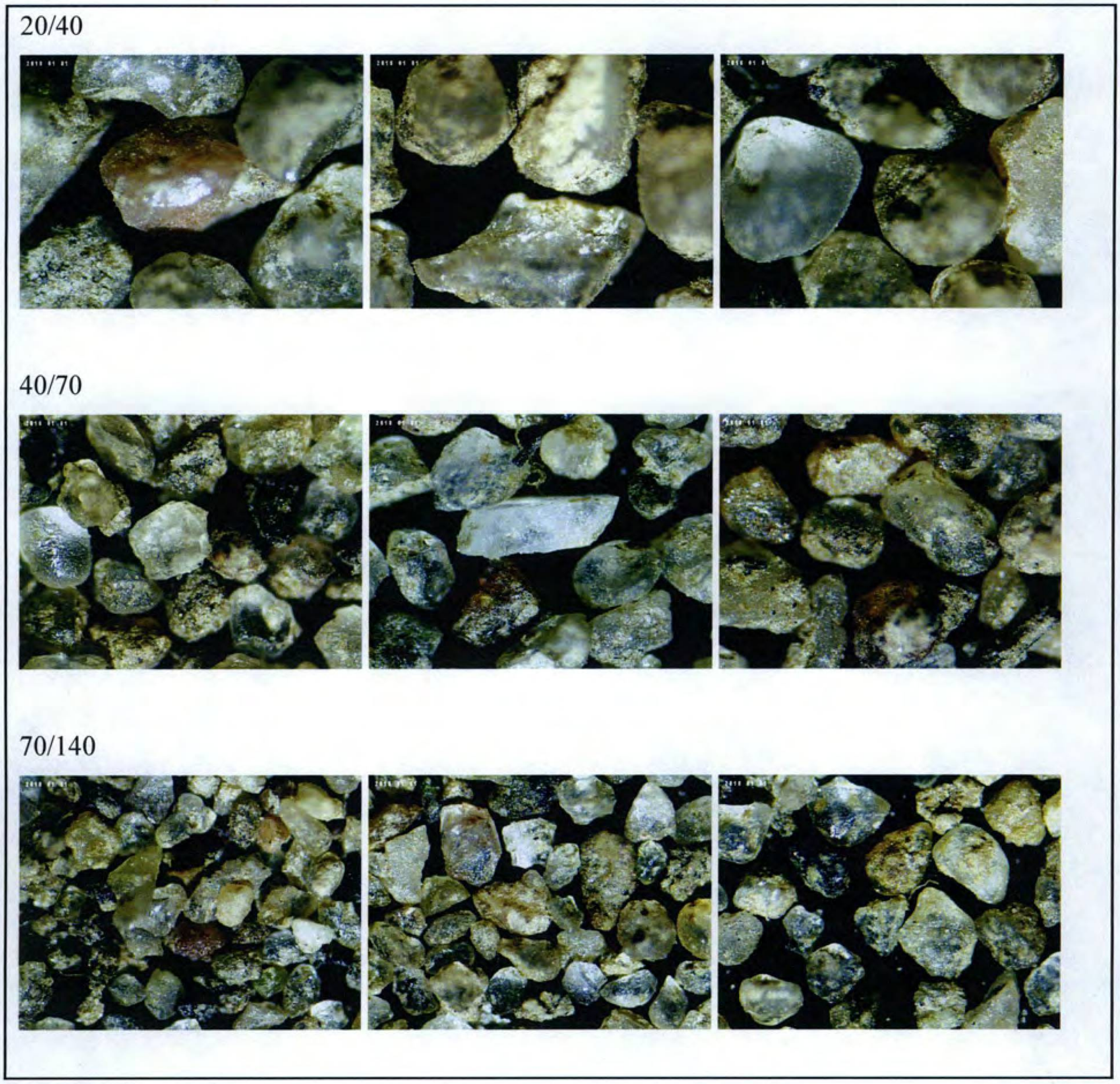
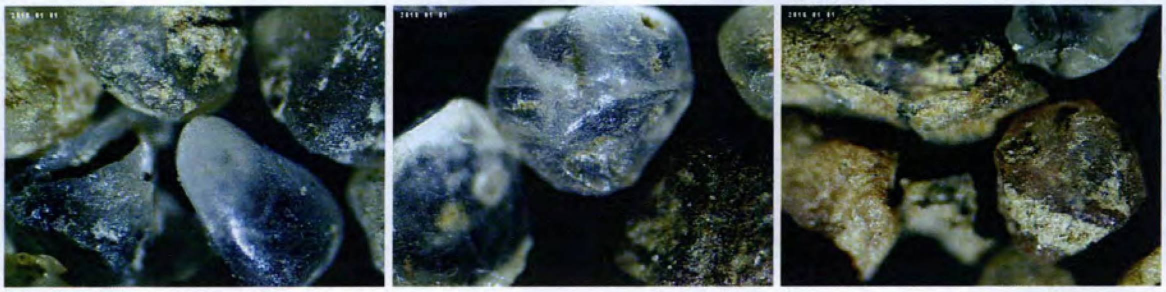
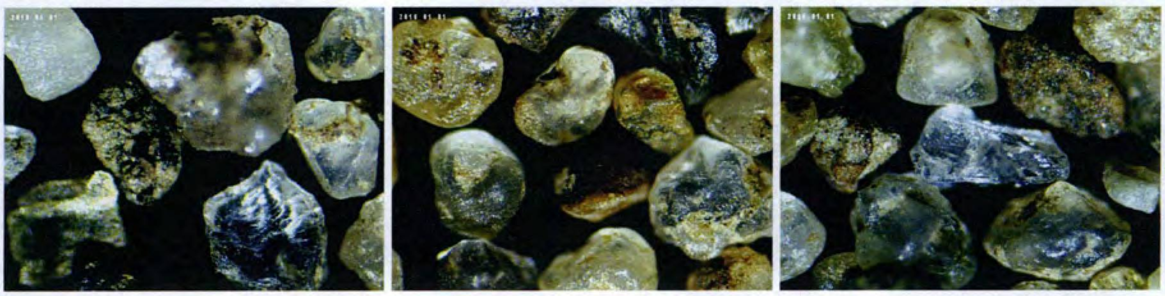


Figure 3: Waypoint 11, Potential Product Pictures – manually washed samples

20/40



40/70



70/140

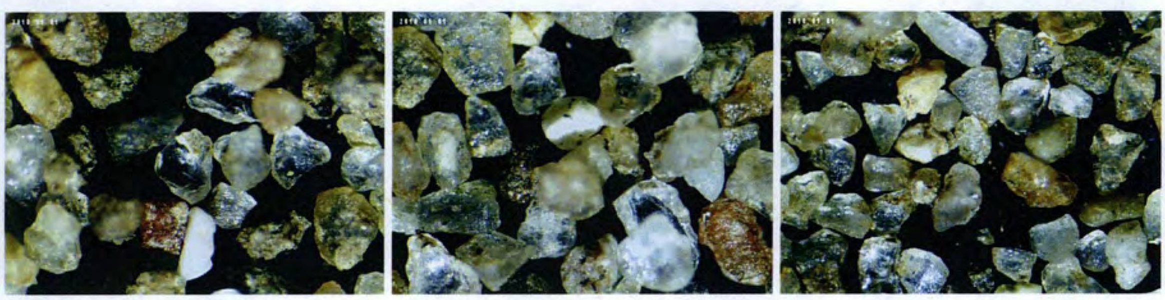


Figure 4: Waypoint 11, Potential Product Pictures – Samples washed using simulated attrition method (70% solids by weight, 2 minutes, x4 magnification)

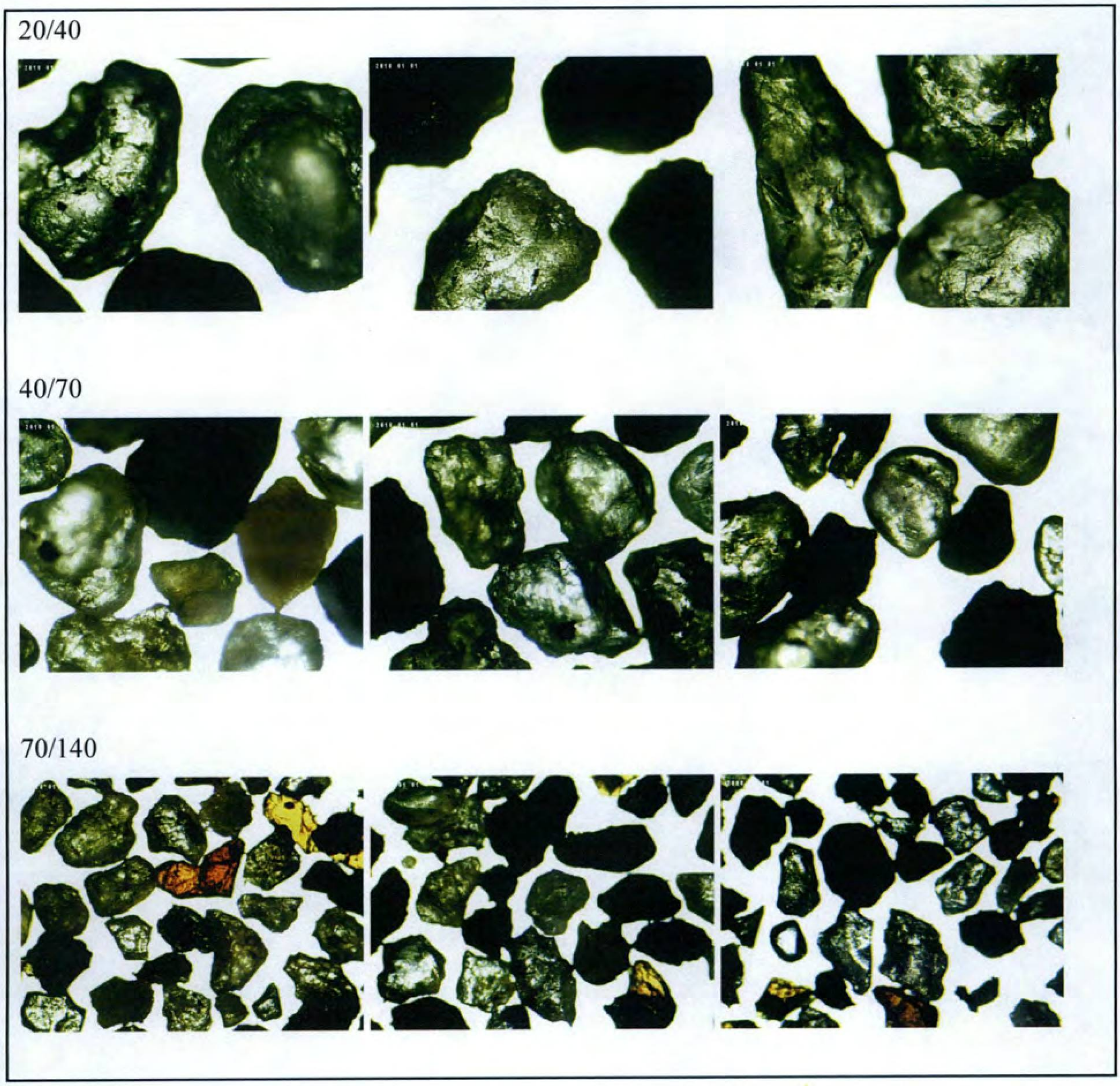


Figure 5: Waypoint 8, Potential Product Pictures – manually washed samples

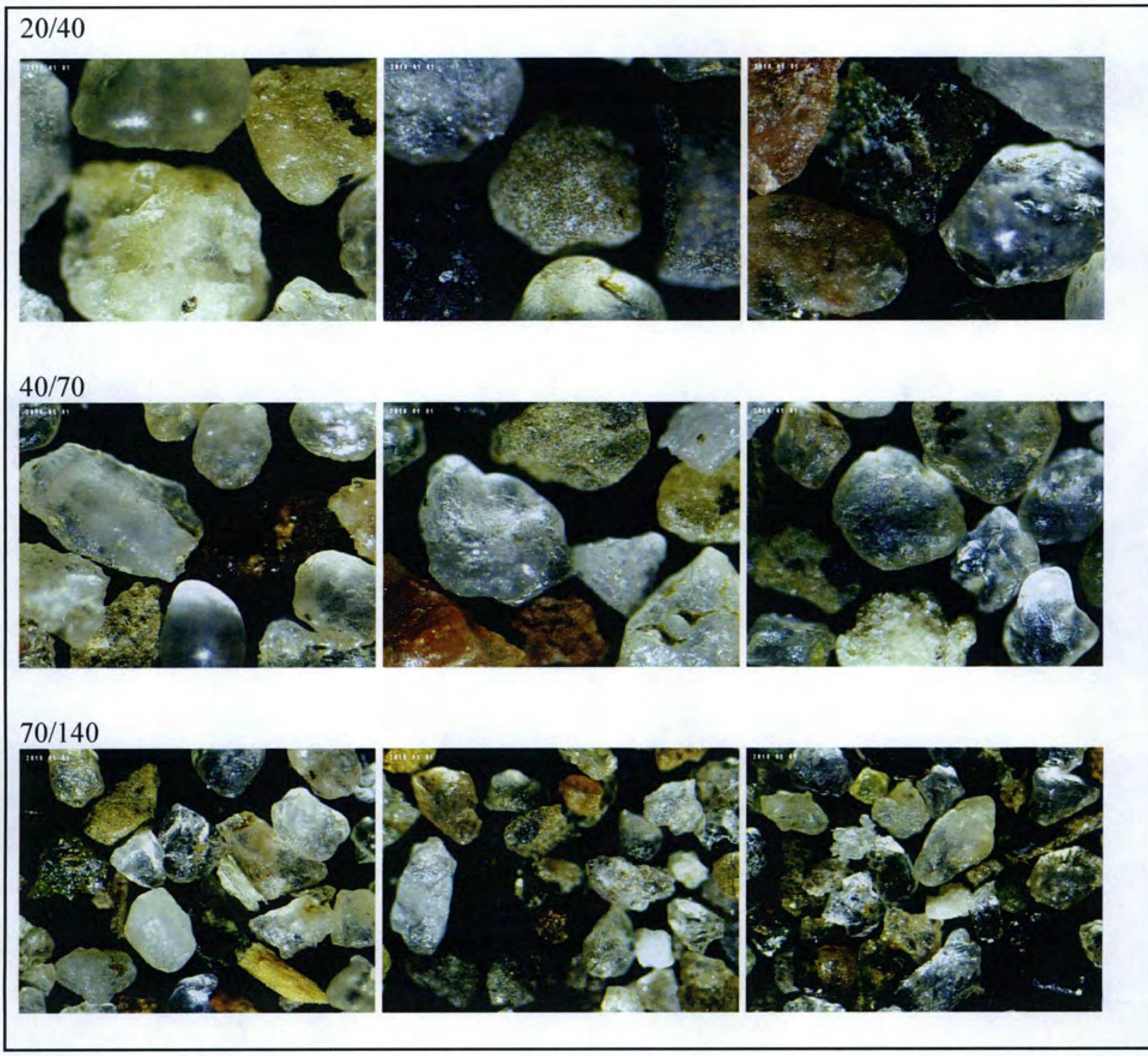


Figure 6: Waypoint 8, Potential Product Pictures – Samples washed using simulated attrition method (70% solids by weight, 2 minutes, x4 magnification)

Appendix C - Tables

Sample Site	Chinchaga A	Chinchaga A	Chinchaga A
Sample Name	WP #8	WP #30 - #7	WP #30 - 5
Date Tested	12/3/2012	12/10/2012	12/10/2012
Latitiude	58.35105	58.37373	58.37373
Longitude	-119.55060	-119.56920	-119.56920
Surface Ele	1532	1552	1558
Crush 40/70	Washes Combined		
Trial 1 Weight	42.2	43.3	38.7
#70	35.1	39.1	34.1
pan	7.1	4.2	4.7
% loss	**16.82%**	**9.70%**	**12.14%**
Trial 2 Weight		46.9	45.0
#70		42.2	40.2
pan		4.7	4.8
% loss		**10.02%**	**10.67%**

Table 6.1 - Crush Strength Test Analyses (Samples Evaluated at 5000 PSI)

Waypoint	Sample Gradation	Roundness (0.1)	Sphericity(0.1)
8	20/40	7.0	7.7
	40/70	6.2	6.7
	70/140	6.8	5.6
7	20/40	5.9	6.8
	40/70	6.0	7.0
	70/140	5.2	6.3
11	20/40	7.4	6.8
	40/70	6.5	6.8
	70/140	6.6	5.8

Table 6.2 - Roundness and Sphericity Values for Microscope Pictures

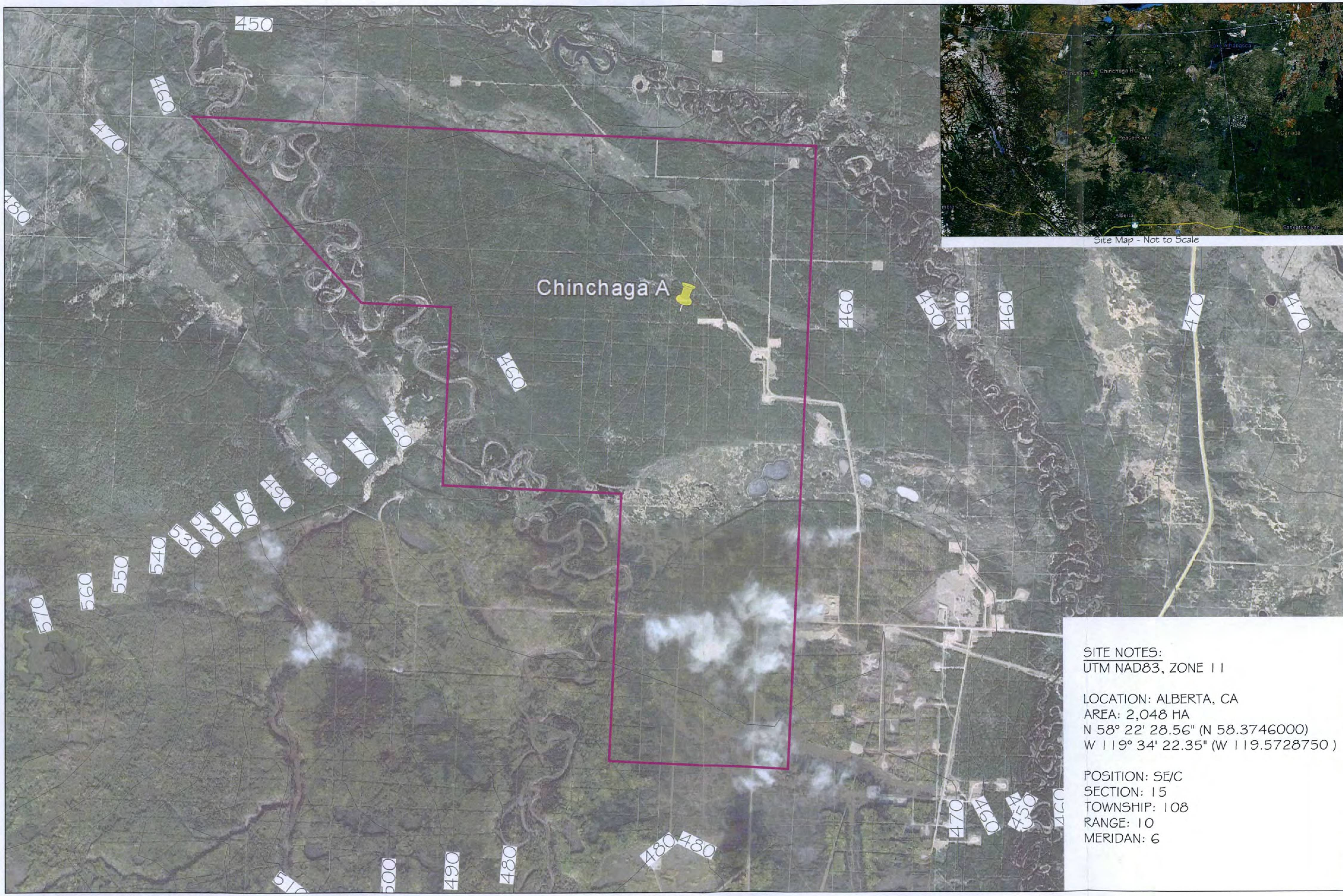
Sample Site	Chinchaga A		Chinchaga A		Chinchaga A		Chinchaga A		Chinchaga A		Chinchaga A	
Sample Name	WP #7		WP #11		WP #8		WP #30 - #7		WP #30 - #6		WP #30 - 5	
Date Tested	12/3/2012		12/3/2012		12/3/2012		12/10/2012		12/11/2012		12/10/2012	
Latitiude	58.37401		58.34790		58.35105		58.37373		58.37373		58.37373	
Longitude	-119.56890		-119.57140		-119.55060		-119.56920		-119.56920		-119.56920	
Surface Ele	1530		1466		1532		1552		1555		1558	
Wet Weight Total	876.4		416.9		425.7		699.1		845.2		869.1	
Dry Weight Total	828.0		407.9		423.6		669.0		834.7		862.9	
% moisture	5.52%		2.16%		0.49%		4.31%		1.24%		0.71%	
Dry Weight (g)	192.4	153.6	202.2	205.7	203.6	220.0	119.7	185.3	175.5	210.5	153.4	215.0
Wash Weight (g)	180.2	136.9	175.4	168.9	182.4	194.4	111.8	167.8	163.4	189.9	146.5	199.1
LBW %	6.34%	10.87%	13.25%	17.89%	10.41%	11.64%	6.60%	9.44%	6.89%	9.79%	4.50%	7.40%
% Water by Wight	n/a	30%	n/a	30%	n/a	30%	n/a	30%	n/a	30%	n/a	30%
Water Added (ml)	n/a	65.8	n/a	88.2	n/a	94.3	n/a	79.4	n/a	90.2	n/a	92.1
Attrition Time (min)	0	2	0	2	0	2	0	2	0	2	0	2
Sieve	Grams Retained											
#12	0.7	0.2	6.6	3.9	91.0	91.4	0.4	0.5	0.2	0.3	0.4	0.6
#16	3.1	1.7	2.5	2.0	13.9	14.9	0.7	1.1	0.9	0.8	1.1	1.3
#20	14.2	8.1	4.8	4.3	13.5	14.8	3.0	4.8	4.1	3.6	4.7	5.2
#25	17.9	9.8	5.6	5.0	8.6	9.7	4.3	6.7	5.8	5.2	6.2	7.1
#30	19.9	12.6	8.7	7.5	8.1	9.0	6.6	9.5	9.1	8.6	8.7	9.7
#35	35.5	22.3	18.2	17.7	10.5	12.6	12.5	18.7	17.6	17.9	16.0	20.5
#40	24.7	20.6	17.8	15.4	7.3	7.6	12.9	18.0	19.2	21.6	16.9	20.5
#45	28.4	24.0	24.3	22.2	7.5	8.2	19.0	27.6	25.8	34.1	24.4	31.7
#50	18.7	16.7	25.4	25.5	5.9	6.8	19.9	30.7	29.0	36.8	24.7	36.9
#60	8.6	8.0	18.5	19.5	3.8	4.5	12.8	20.5	18.8	24.2	17.0	25.8
#70	4.1	4.4	12.6	12.7	2.7	3.0	7.5	11.7	11.2	14.7	10.6	15.7
#100	4.0	4.0	15.7	17.0	3.6	4.2	6.9	11.7	10.4	13.4	9.5	15.1
#140	1.9	1.9	7.1	7.5	2.5	3.0	2.7	3.8	4.0	4.4	3.0	4.7
pan	2.5	2.6	6.7	7.9	3.9	4.7	2.8	3.2	4.5	3.2	2.8	4.2
total	184.2	136.9	174.5	168.1	182.8	194.4	112.0	168.5	160.6	188.8	146.0	199.0
Sieve	Individual Percent Retained											
#12	0.4%	0.1%	3.8%	2.3%	49.8%	47.0%	0.4%	0.3%	0.1%	0.2%	0.3%	0.3%
#16	1.7%	1.2%	1.4%	1.2%	7.6%	7.7%	0.6%	0.7%	0.6%	0.4%	0.8%	0.7%
#20	7.7%	5.9%	2.8%	2.6%	7.4%	7.6%	2.7%	2.8%	2.6%	1.9%	3.2%	2.6%
#25	9.7%	7.2%	3.2%	3.0%	4.7%	5.0%	3.8%	4.0%	3.6%	2.8%	4.2%	3.6%
#30	10.8%	9.2%	5.0%	4.5%	4.4%	4.6%	5.9%	5.6%	5.7%	4.6%	6.0%	4.9%
#35	19.3%	16.3%	10.4%	10.5%	5.7%	6.5%	11.2%	11.1%	11.0%	9.5%	11.0%	10.3%
#40	13.4%	15.0%	10.2%	9.2%	4.0%	3.9%	11.5%	10.7%	12.0%	11.4%	11.6%	10.3%
#45	15.4%	17.5%	13.9%	13.2%	4.1%	4.2%	17.0%	16.4%	16.1%	18.1%	16.7%	15.9%
#50	10.2%	12.2%	14.6%	15.2%	3.2%	3.5%	17.8%	18.2%	18.1%	19.5%	16.9%	18.5%
#60	4.7%	5.8%	10.6%	11.6%	2.1%	2.3%	11.4%	12.2%	11.7%	12.8%	11.6%	13.0%
#70	2.2%	3.2%	7.2%	7.6%	1.5%	1.5%	6.7%	6.9%	7.0%	7.8%	7.3%	7.9%
#100	2.2%	2.9%	9.0%	10.1%	2.0%	2.2%	6.2%	6.9%	6.5%	7.1%	6.5%	7.6%
#140	1.0%	1.4%	4.1%	4.5%	1.4%	1.5%	2.4%	2.3%	2.5%	2.3%	2.1%	2.4%
Pan	1.4%	1.9%	3.8%	4.7%	2.1%	2.4%	2.5%	1.9%	2.8%	1.7%	1.9%	2.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sieve	In-Size											
12/20	9.4%	7.2%	4.2%	3.7%	15.0%	15.3%	3.3%	3.5%	3.1%	2.3%	4.0%	3.3%
20/70	85.7%	86.5%	75.1%	74.7%	29.8%	31.6%	85.3%	85.1%	85.0%	86.4%	85.3%	84.4%
20/40	53.2%	47.7%	28.8%	27.1%	18.9%	20.0%	32.4%	31.4%	32.2%	28.2%	32.7%	29.0%
40/70	32.5%	38.8%	46.3%	47.5%	10.9%	11.6%	52.9%	53.7%	52.8%	58.2%	52.5%	55.3%
70/140	3.2%	4.3%	13.1%	14.6%	3.3%	3.7%	8.6%	9.2%	9.0%	9.4%	8.6%	9.9%

Table 6.3 - Sample Gradation Distribution and Product Content

Lease	Site#	Waypoint	Elevation(ft)	Y	X	Notes	Notes	Pictures
Chinchaga A	1	3	1513	58.36553	-119.5513	~5 m of sand	husky mine site (#2)	425,426,429,430-33
Chinchaga A	6	10	1539	58.35949	-119.6141	old rig site	1.5 inches of silt on top of clay	no open faces
Chinchaga A	8	4	1547	58.37228	-119.5616	sample from 7 inches below surface	next to husky drill rig	434-7, 441
Chinchaga A	9	11	1466	58.3497	-119.5714	road cut	sample 8 inches down	
Chinchaga A	10	5	1592	58.3853	-119.5599	road grown over by small trees/shurbs	sample from 8 inches below surface	443 (facing w road), 444 (facing e road), 442
Chinchaga A	11	6	1425	58.38913	-119.5591	river bank		iphone
Chinchaga A	12	7	1530	58.37401	-119.5689	husky mine site		445-6
Chinchaga A	12.2	30	1552	58.37373	-119.5692	7 samples on ~20 ft face ~ every 3 ft	samples labeled 30-1, 30-2 etc.	507-513
Chinchaga A	13	8	1532	58.35105	-119.5506	husky mine site #2		448
Chinchaga A	14	9	1523	58.35073	-119.5803	campground @ river bank		449-50

Table 6.4 - Major Field Notes and Sample Notations from August Trip

Appendix D - Figures



Site Map - Not to Scale

SITE NOTES:
UTM NAD83, ZONE 11

LOCATION: ALBERTA, CA
AREA: 2,048 HA
N 58° 22' 28.56" (N 58.3746000)
W 119° 34' 22.35" (W 119.5728750)

POSITION: SE/C
SECTION: 15
TOWNSHIP: 108
RANGE: 10
MERIDAN: 6

preferred sands

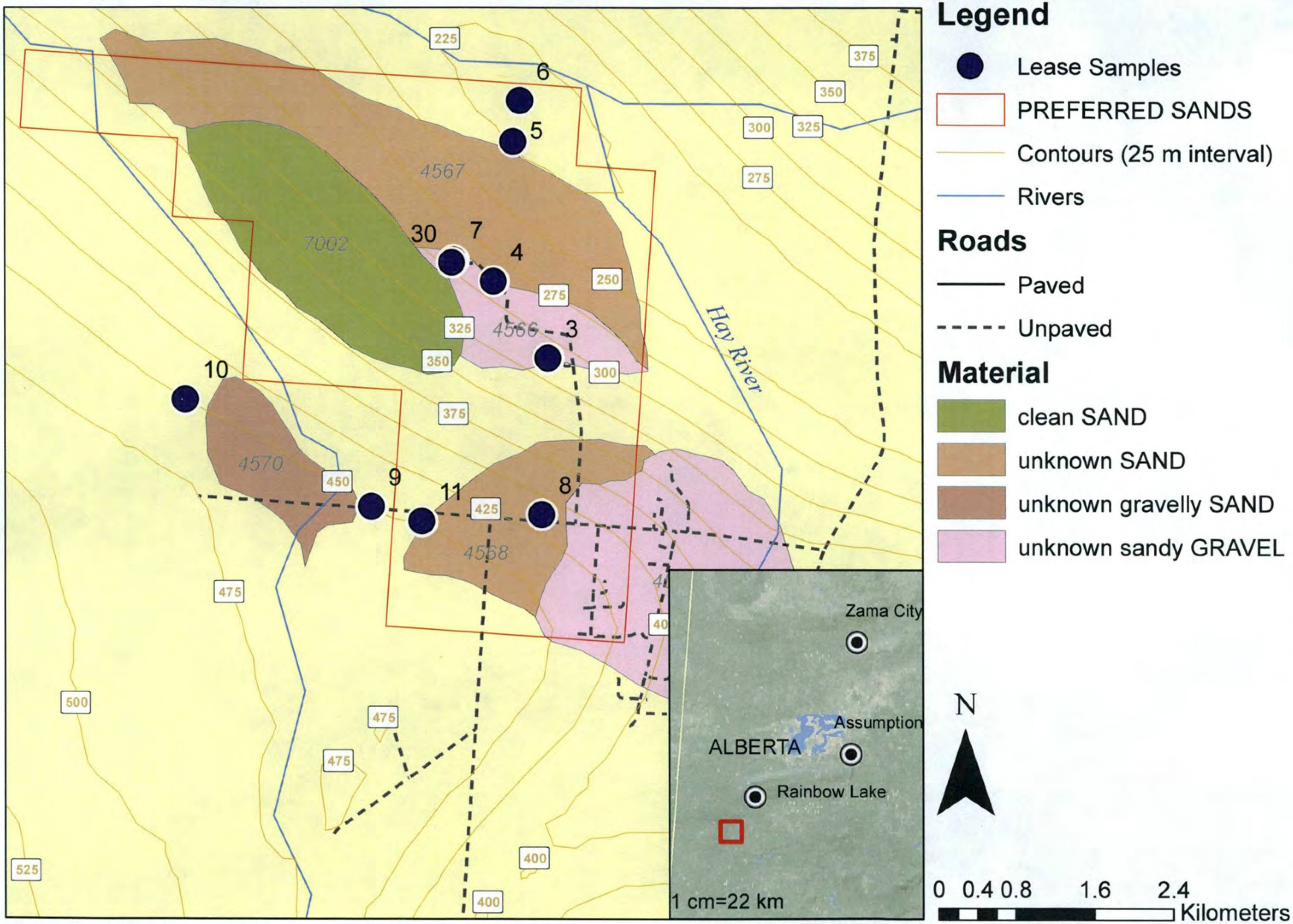
Preferred Proppants, LLC
Corporate Headquarters
One Radnor Corp. Center
100 Matsonford Road
Radnor, PA 19087
610.834.1969
610.834.7593 fax
preferredsands.com

SITE MAP
(2m. & 10m. Contours)

PREFERRED SANDS OF CANADA, ULC
CHINCHAGA "A"
Permit No. 9311010579

LAYOUT	11"x17"
SCALE	1mm:30m
COORDINATE SYSTEM	UTM with NAD83 datum, Zone 11, Meter; Central Meridian 117d W
GEOLOGIST	M. BENDERNAGEL
CAD	M. BENDERNAGEL
SHEET	Page 8
DATE	3/10/2013

Preferred Sands Chinchaga Metallic Agreements (Lease A)



Aug 2012; Source: Gov of AB, Geogratis, Geobase