



Ministry of Energy and Mines  
BC Geological Survey

ASSESSMENT REPORT  
TITLE PAGE AND SUMMARY

TITLE OF REPORT [type of survey(s)]		TOTAL COST	
2010 GEOLOGICAL REPORT ON THE PET PROPERTY		11,347.46	
AUTHOR(S)	B. LANE	SIGNATURE(S)	
NOTICE OF WORK PERMIT NUMBER(S)/DATE(S)		YEAR OF WORK	
N/A		2010	
STATEMENT OF WORK - CASH PAYMENT EVENT NUMBER(S)/DATE(S)		4849800 ; APRIL 1/2011	
PROPERTY NAME			
PET			
CLAIM NAME(S) (on which work was done)			
604084, 604088 - 604090			
COMMODITIES SOUGHT			
SANDSTONE, QTZ PURE			
MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN			
MINING DIVISION			
LIA RD NTS			
LATITUDE	59° 56' 30"	LONGITUDE	122° 56' 17" (at centre of work)
OWNER(S)			
1)	STIKINE ENERGY CORP.	2)	
MAILING ADDRESS			
490-1122 MAINLAND ST VANCOUVER, BC V6B 5L1			
OPERATOR(S) [who paid for the work]			
1)	SAME	2)	
MAILING ADDRESS			
SAME			
PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):			
QUARTZ SANDSTONE; QUARTZITE; MISSISSIPPIAN; MATTSON FM; ANTILLINE; UPRIGHT.			
REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS			
31620			

(OVER)

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping	1:10,000	604084; 604088-090	6,500
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for ...)			
Soil			
Silt			
Rock	3	604084; 604088-090	2,000
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying	3 }	604084; 604088-090	2,000
Petrographic	3 }		
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY/PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other	FIELD Prep., maps, running	604084-086; 604088-091	847.46
		TOTAL COST	11,347.46

**BC Geological Survey  
Assessment Report  
32308**

**2010  
Geological Report  
on the  
Pet Property**

**Liard Mining Division  
British Columbia**

**BCGS Maps 094O.096 and 094O.086  
Latitude 59.941700°N and Longitude 122.938150°W  
Statement of Work Event #: 4849800**

PREPARED FOR: STIKINE ENERGY CORP.  
490 – 1122 MAINLAND STREET  
VANCOUVER, BC CANADA V6B 5L1

PREPARED BY: BOB LANE, PGEO  
PLATEAU MINERALS CORP

DATE: JUNE 22, 2011

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## **1. Executive Summary**

On August 14, 2010 Stikine Energy Corp. (Stikine) conducted a one-day mapping and sampling program on its Pet property. The Pet property is in part underlain by fine-grained sandstones of the Mississippian Mattson Formation. These rocks may be suitable for processing into frac sand, a commodity that is in high demand in northeast BC where it is used to enhance the recovery of natural gas from unconventional (shale) deposits.

The Pet property straddles a segment of Highway 77 in an otherwise remote area of northeast British Columbia in the Liard Mining Division, approximately one-half hour by air northwest of Fort Nelson. The property is comprised of 9 mineral claims that cover 3601.45 ha. The claims extend south from the BC-NWT border for approximately 14 km.

The work in 2010 confirmed the presence of a north-trending belt of quartz sandstone. Initial observations and positive results from preliminary testing of samples indicate that additional follow-up exploration is warranted. Future work should include additional bedrock mapping, diamond drilling, and extraction of large samples for test processing. The estimated cost of the recommended Phase 1 work program is \$ 565,000.

## 2. INTRODUCTION

Stikine recognized the need for a northeast BC source of frac sand for the region's developing unconventional gas exploration and production sector. In 2009 an assessment of central and northern British Columbia's potential sources of suitable quartz arenite and quartzite was conducted. The research identified a number of prospective targets northwest of Fort Nelson and staking of many of these areas, including the Pet property, was conducted. The 2010 program followed up on the brief work completed in 2009.

This report was prepared at the request of Stikine Energy Corp (Stikine) to summarize results from one-day of helicopter-supported mapping and sampling conducted on its Pet property in 2010.

The current report was prepared by independent Qualified Person Bob Lane, PGeo, who conducted the initial reconnaissance in 2009. Observations and positive results from the 2010 follow-up work on the Pet property are encouraging and are described below.

### 2.1. LOCATION AND ACCESS

The Pet property is located in northeast British Columbia in the Liard Mining Division, approximately one-half hour by air northwest of Fort Nelson (Figure 1). It is centered at Latitude 59.941700° N and Longitude 122.938150° W. The nearest populated centers are Fort Nelson, 125 km to the south and Fort Liard, NWT, 30 km to the north.

The property is accessible by the Liard Highway (Highway 77), which bisects the property, and several seasonal 4X4 oil and gas access roads.

### 2.2. PHYSIOGRAPHY AND CLIMATE

The Pet property lies in the Alberta Plateau physiographic region and occurs within the Northern Boreal Mountains Ecoprovince. The area of interest covers a narrow, subdued elongate ridge that is cut by the Petitot River just south of the BC-NWT border. Local relief within the claim group ranges from about 300 m in the Petitot River valley to just over 600 m on the crest of the elongate ridge. The Pet property is vegetated principally by spruce, willow and birch.

The area has a cold, sub-Arctic climate. Seasonal temperatures for the property are not available, but those for Fort Nelson average daily highs of 21°C in July and average daily lows of -29°C in January. A record high temperature of 34°C was set in May 1983 and a record low temperature of -59°C was set in January 1947.

### 2.3. PROPERTY STATUS AND OWNERSHIP

The Pet property is comprised of 9 mineral claims that cover 3601.45 ha (Table 1 and Figure 2). The property extends southward from the BC-NWT border for approximately 14 kilometres. The claims were acquired by staking and are 100%-owned by Stikine. The claims are not subject to any underlying interests. The Pet property is not encumbered by any provincial or national parks, or other protected areas.

**Table 1: Pet Property - Mineral Claims**

Tenure Number	Claim Name	Owner	Tenure Type	Map Number	Issue Date	Good To Date	Area (ha)
604083	PET	145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	404.80
604084		145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	405.00
604085		145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	405.17
604086		145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	405.41
604087		145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	390.14
604088		145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	389.96
604089		145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	389.79
604090		145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	405.71
604091		145114 (100%)	Mineral	094N	2009/may/07	2012/may/31	405.47
TOTAL				9			3601.45

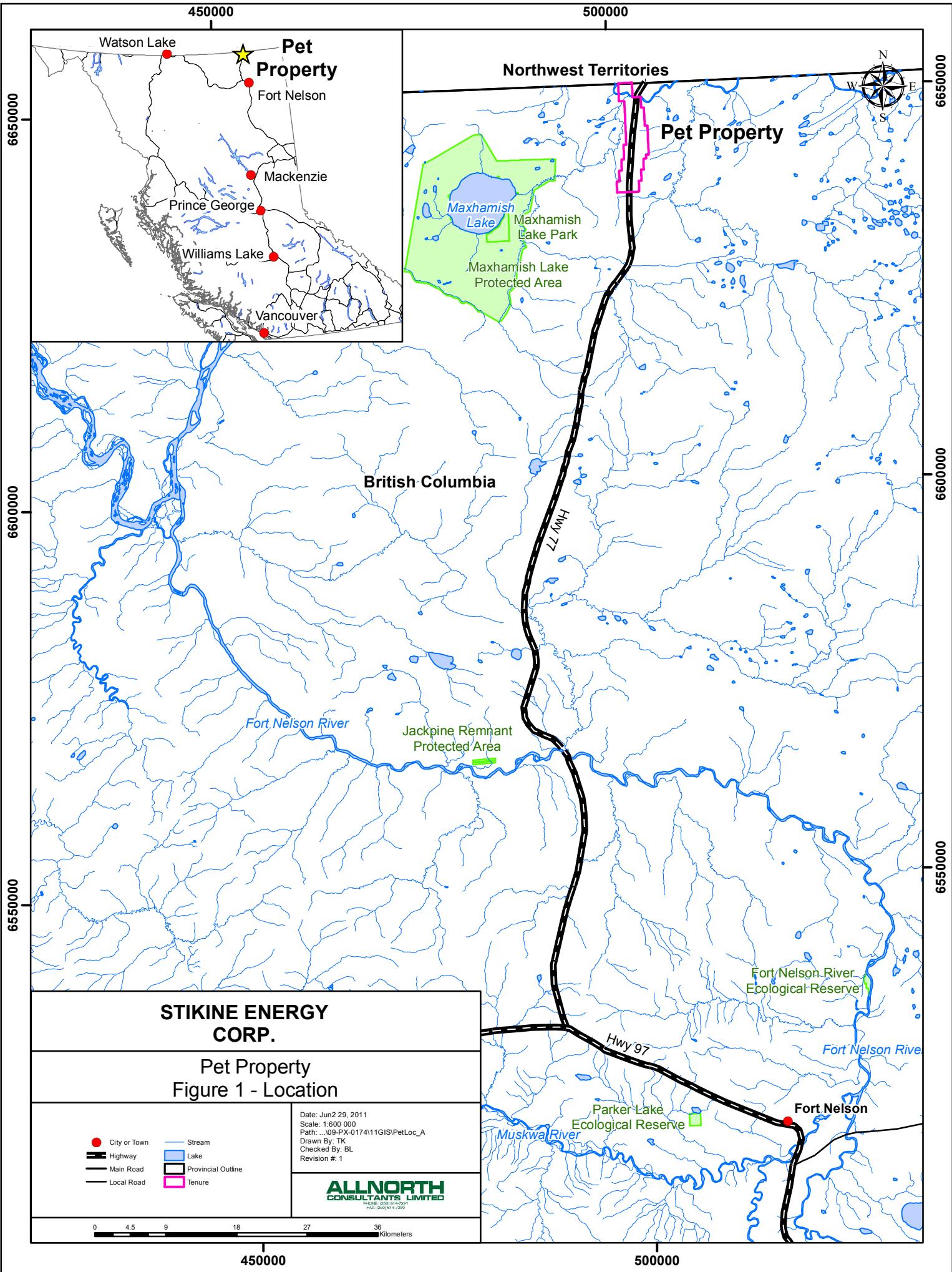
## 2.4. EXPLORATION HISTORY

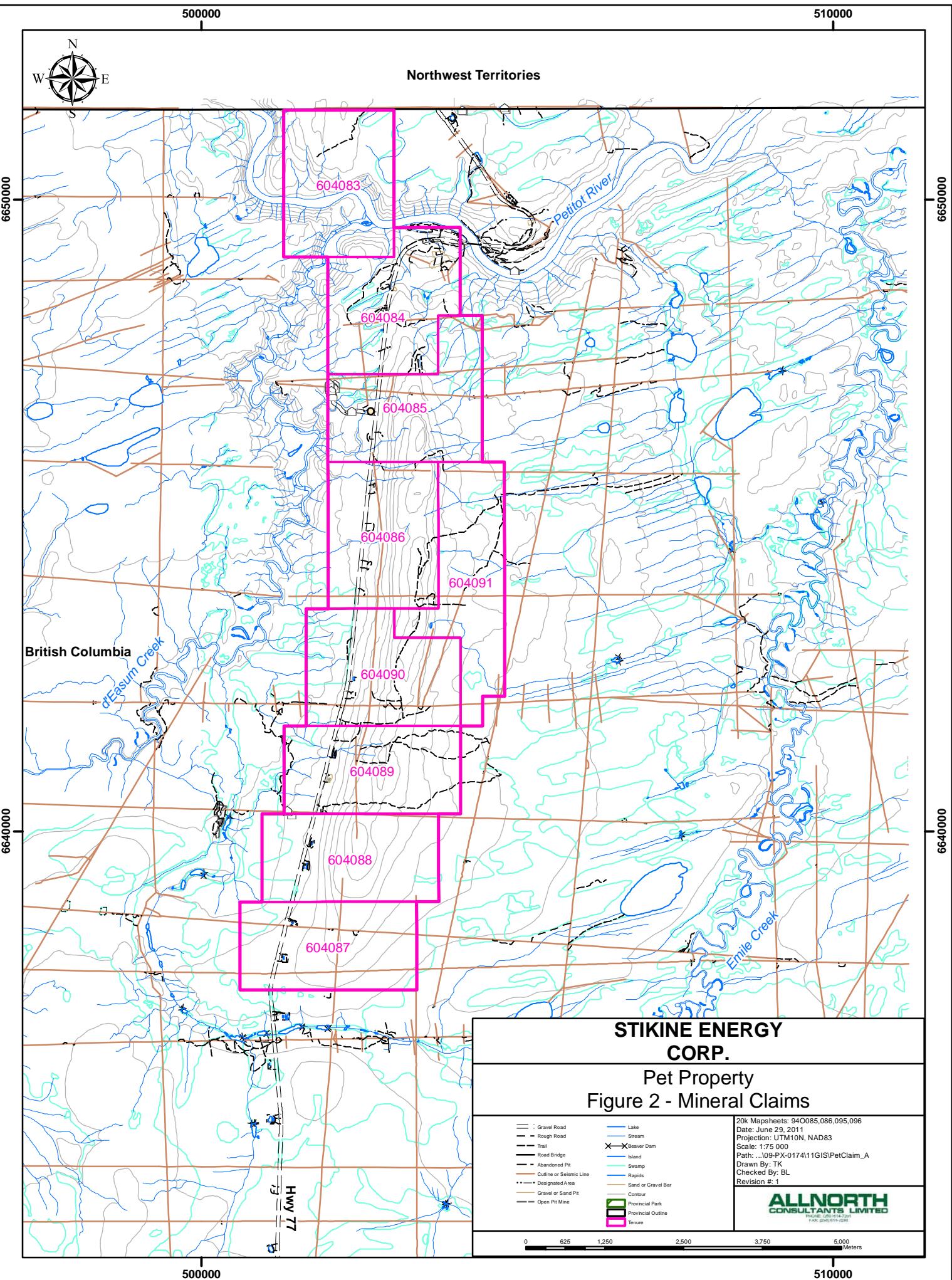
The Pet property covers an area that includes two active and adjoining limestone quarries. Other than this current activity, the claims have not been the subject of any recorded mineral exploration and no historical mineral exploration exists for the area of interest.

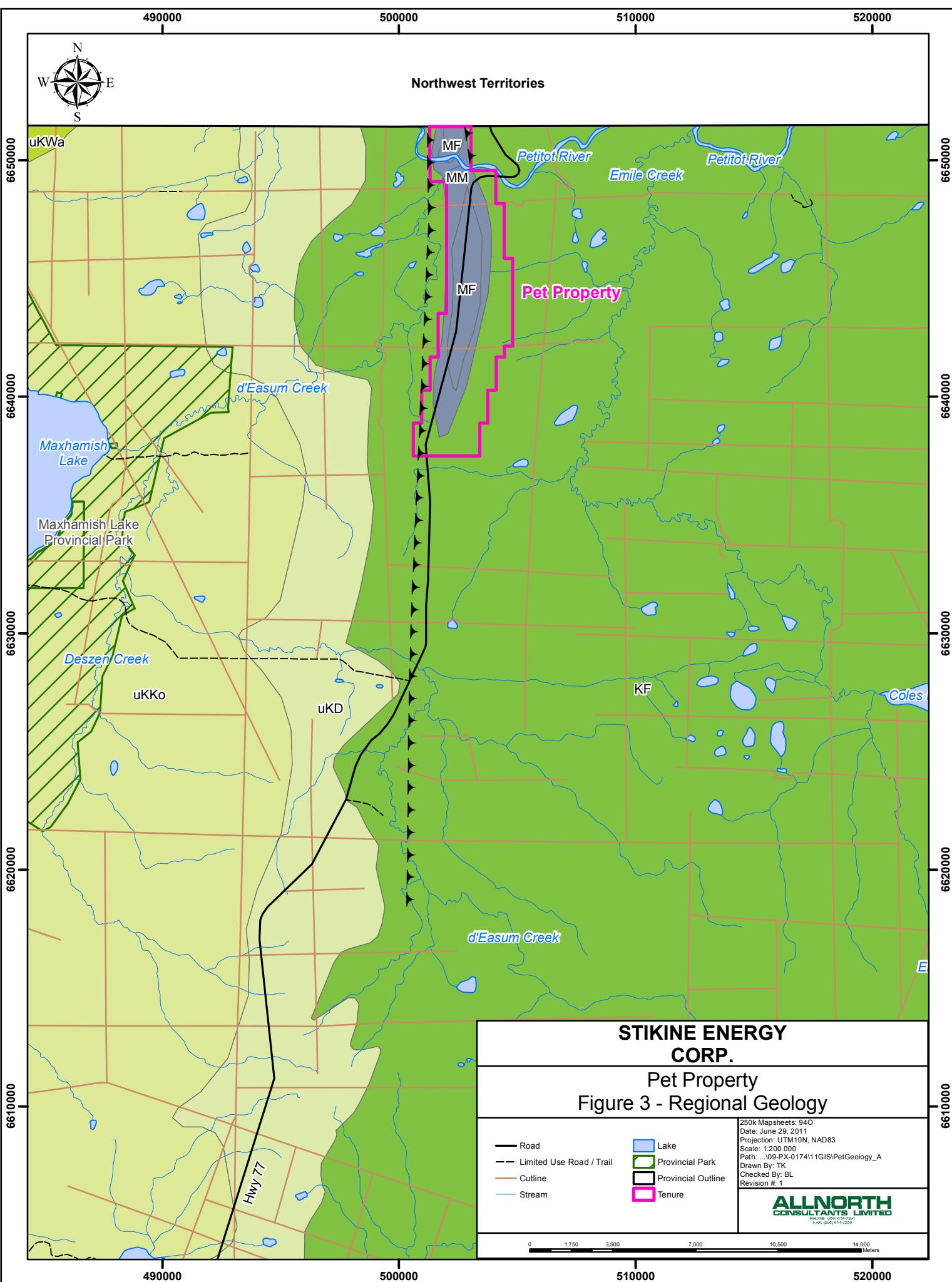
## 3. REGIONAL GEOLOGY

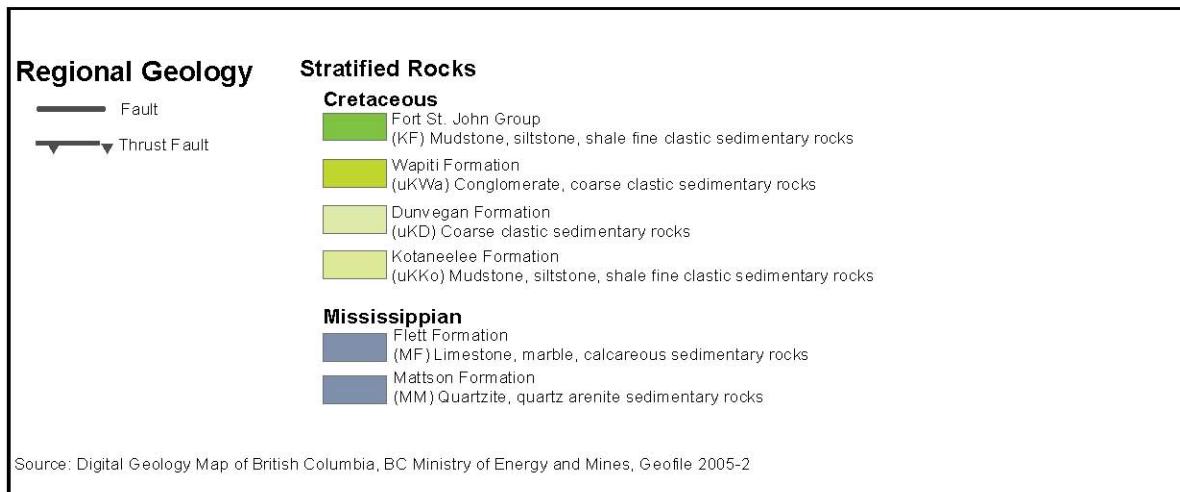
The regional geology of the area is presented in Figure 3. In general, the area is underlain by north-northeast trending clastic and carbonate sedimentary rocks of Mississippian to Cretaceous age. The oldest rocks exposed in the central part of the map area are limestones and quartz-rich sandstones of the Mississippian Flett and Mattson formations. These rocks are exposed in the core of several northeast-oriented upright anticlines, and are flanked by chert, siliceous argillite and siliciclastic rocks of the Permian Fantasque Formation and coarse clastic sedimentary rocks of the Mississippian/Pennsylvanian and Permian Kindle Formation.

The area immediately east of the Pet property is dominated by generally weakly lithified clastic sediments of the Lower Cretaceous Scatter, Lepine and Garbutt formations (Fort St. John Group). Well west of the Pet property, the geology is dominated by a succession of Paleozoic sedimentary rocks. The succession is interrupted by a number of unconformities, and deformed by folding and thrust faulting.









## 4. PROPERTY GEOLOGY

The majority of the Pet property is underlain by quartz sandstone or quartzite that is assigned to the Mississippian Mattson Formation and limestone of the Mississippian Flett Formation. The Flett Formation forms the core of a north-trending upright anticline and is flanked by Mattson Formation which is in turn overlain by mudstone and fine-grained clastic sedimentary rocks of the Cretaceous Fort St John Group.

The property encompasses two adjoining active quarries (operating under Licenses of Occupation) from which a pale brown, crystalline limestone (of the Flett Formation) is being mined, crushed and screened for use on nearby road surfacing applications.

### 4.1. STRUCTURE

A series of north-northeast trending anticline-syncline fold axes and thrust faults characterize the structure of the region. The Pet property covers one such anticline, and the rocks of interest occupy the core of the fold.

## 5. MINERALIZATION AND GEOLOGICAL MODEL

The Pet property was staked to cover a sedimentary unit of quartz-rich sandstone (Mississippian Mattson Formation). This quartz-rich sandstone is regarded to be a potential bedrock source of high-value frac sand, a commodity that is used in the extraction of hydrocarbons, and in particular shale-hosted natural gas.

## 6. 2010 EXPLORATION PROGRAM

The 2010 exploration program at the Pet property was comprised of reconnaissance geological assessment, prospecting and sampling (Table 2 and Figure 4).

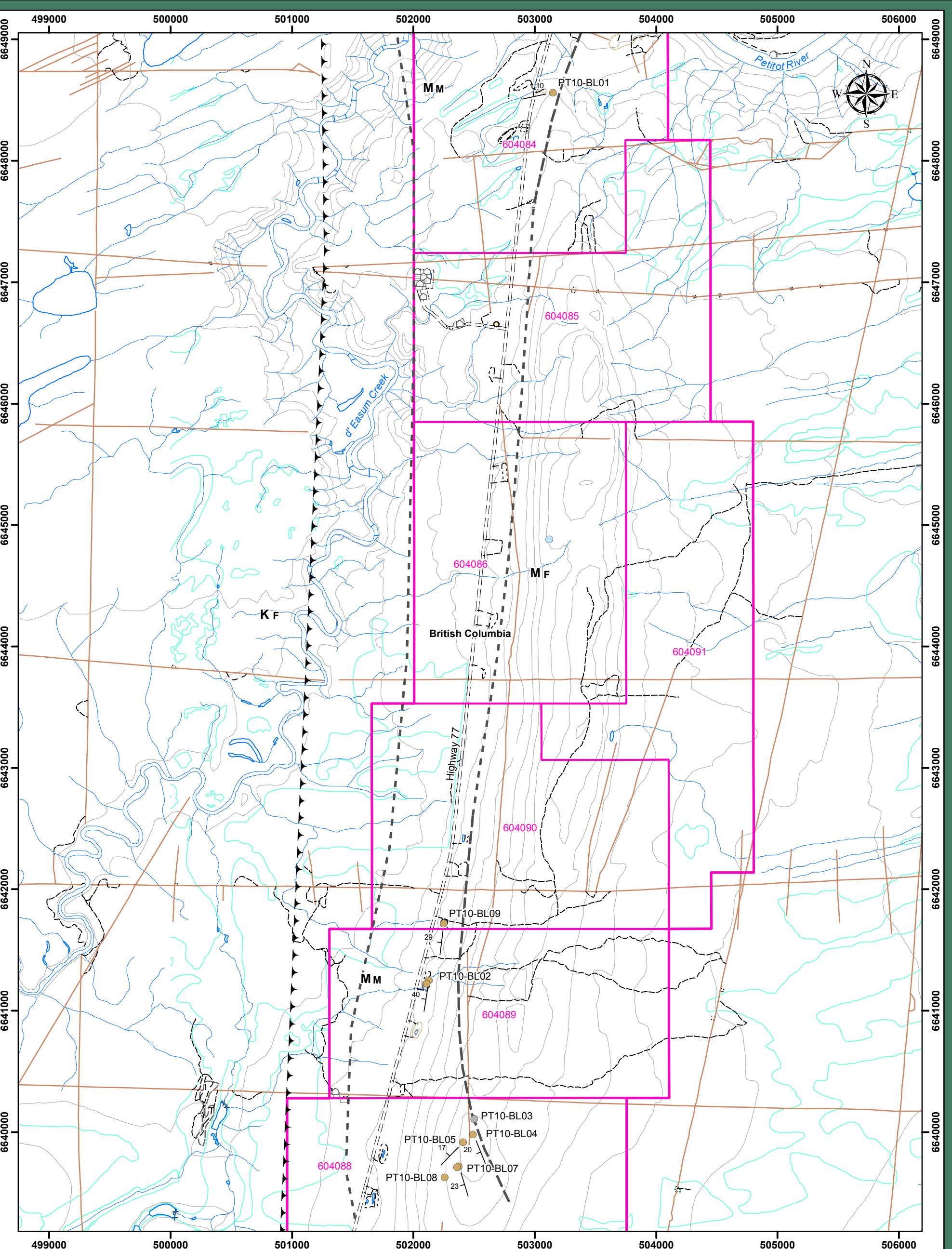
The helicopter-supported work was conducted on August 14, 2010, and consisted of a traverse along the main ridge crest on the property and investigations of several overgrown borrow pits (that were

developed to source road construction material) near Highway 77. The work identified locally abundant bedrock comprised primarily of iron oxide-stained, pale beige fossiliferous fine-grained quartz sandstone of the Mississippian Mattson Formation. Limited sampling, geochemical analysis and petrographic examination rounded out the program. The results are presented below.

**Table 2: Pet Property - List of Samples Collected**

Sample ID	Location (UTM Zone 10)	Elevation (m)	Description
PT10-BL02	502128; 6641250	461	Pale orange-brown weathering, pale grey-brown fine-grained sandstone; bivalve and plant fossils; sample from edge of borrow pit
PT10-BL06	502414; 6639798	581	Orange-brown weathering, pale grey-brown fine-grained sandstone; bivalve and plant fossils; sample from edge of borrow pit
PT10-BL09	502250; 6641718	470	Pale orange-brown weathering, iron stained, fine-grained calcareous sandstone, weak reaction to dilute HCl; bivalve and plant fossils

Whole rock analysis (by XRF) and trace element analysis was conducted on three rock samples collected from the Pet property believed to be representative of the bedrock examined. Two of the samples yielded high silica contents (of 94.4% and 95.3% SiO<sub>2</sub>) while the third sample contained only 36.01% SiO<sub>2</sub>, but a combined CaO and MgO content of 29.57%, indicating that the sample is a dolomitic sandstone (Table 3 and Appendix A).



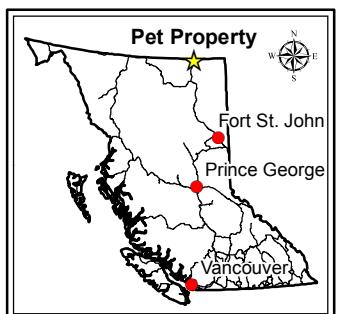
**Stikine Energy Corp.**  
Pet Property  
Figure 4  
2010 Sample Locations

20k Mapsheets: 940085,086,095,096  
Date: 6/2/2011  
Projection: UTM10N, NAD83  
Scale: 1:30,000  
Path: C:\09-PX-0174\11GIS\Pet2010Sample\_B.mxd  
Drawn By: TK  
Checked By: BL  
Revision #: 1  
0 120 240 480 720 960 1,200 Meters

#### Legend

- Bedding
- Limestone
- Shale
- Sandstone
- Geological Contact
- Approximate
- Inferred
- ▲ Thrust Fault
- Gravel Road
- Rough Road
- Trail
- Road Bridge
- Abandoned Pit
- Designated Area
- Open Pit Mine
- Lake
- Stream
- Beaver Dam
- Island
- Swamp
- Rapids
- Sand or Gravel Bar
- Contour
- Tenure

- Geology**
- Cretaceous**  
Fort St. John Group  
(KF) Mudstone, siltstone, shale fine clastic sedimentary rocks
- Mississippian**  
Flett Formation  
(MF) Limestone, marble, calcareous sedimentary rocks
- Mattson Formation  
(MM) Quartzite, quartz arenite sedimentary rocks





**Figure 5: Photograph of one of several overgrown borrow pits that expose Mississippian Mattson Formation quartz sandstone.**

**Table 3: 2010 Rock Geochemical Sample Results**

Sample ID	Location (Easting)	Location (Northing)	SiO <sub>2</sub> %	TiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	Fe <sub>2</sub> O <sub>3</sub> %	MnO %	MgO %	CaO %	Na <sub>2</sub> O %	K <sub>2</sub> O %	P <sub>2</sub> O <sub>5</sub> %	Ba %	LOI %	Total %
PT10-BL02	502128	6641250	94.4	0.15	1.89	0.99	0.01	0.17	0.12	<0.01	0.45	0.02	0.02	1.47	99.71
PT10-BL06	502414	6639798	95.3	0.4	2.01	0.49	0.01	0.07	0.04	<0.01	0.61	0.03	0.01	0.84	99.84
PT10-BL09	502250	6614718	36.01	0.1	1.45	3.53	0.06	11.29	18.28	0.05	0.24	0.08	0.01	28.68	99.88
Minimum detection			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Maximum detection			100	100	100	100	100	100	100	100	100	100	100	100	105
Method			XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	1000C	XRF

Initial petrographic analysis revealed that the quartz sandstone rock is comprised principally of tightly packed quartz grains (Ross, 2009). Bedding is typically defined by variation in grain size. Contacts between individual grains are generally straight, not sutured, with local, weakly developed polygonal texture. Most grains are approximately equant, although in certain layers there is a weak elongation of the

grains. A few plagioclase grains are recognizable and muscovite flakes occur locally as discrete, crenulated layers. Scaly chlorite and/or clays are also present. Iron oxides are ubiquitous, occurring as a stain and as more solid, opaque masses between quartz grains. It is these oxides which give the rock its colour.

Thirty measurements per thin section of apparent grain diameters were made by Le Couteur (2011). The average apparent grain size in sample PT10-BL02 was 180 microns, while the average apparent grain size in sample PT10-BL06 was 44 microns.

## **7. SAMPLING METHOD AND APPROACH**

Samples collected in the field were described by Bob Lane, PGeo, on August 14, 2010. Each sample collected consisted of multiple grabs of bedrock. Samples were placed in heavy poly bags and labeled with a unique sample number. Representative pieces of the larger samples were submitted for whole rock and trace element geochemical analysis and for petrographic examination. Geochemical analysis was conducted to determine purity of the sample and petrography was conducted to ascertain the nature and characteristics of the quartz grains, and to determine the mineralogy of impurities.

## **8. SAMPLE PREPARATION, ANALYSES AND SECURITY**

All samples were packed into large rice bags and driven from the site in the author's 4x4 pick-up truck and placed in a locked private garage prior to shipping. Samples selected for analysis were then repackaged and couriered via commercial carrier to Acme Labs in Vancouver for analysis.

Geochemical analysis was performed by Acme Lab, which operates in compliance with the International Standards Organization (ISO) 9001 Model for Quality Assurance.

Each rock sample was jaw crushed until 70% passed through a -10 mesh (2 mm) screen. Each crushed sample was then split and a 250 g riffle split sample was then pulverized in a mild-steel ring-and-puck mill until 85% passed through a 200 mesh (75 µm) screen. The resulting sample pulp was analyzed for major oxides by XRF and for 48 elements by four acid ICP-MS. The remaining coarse reject portion of the sample was placed in storage at Acme's Vancouver facility.

## **9. INTERPRETATION AND CONCLUSIONS**

Limited geological and geochemical assessment of the Pet property has identified that the property is in part underlain by quartz sandstone to weakly metamorphosed quartzite of the Mississippian Mattson Formation. Field observations and positive results from limited analysis of selected samples from the Pet property indicate that it has potential to host bedrock material suitable for processing into frac sand.

## **10. RECOMMENDATIONS**

It is recommended that exploration of the Pet property continue and that future work build upon the encouraging, but limited work that was completed in 2010.

Future work should include: additional bedrock mapping to determine thickness of the desirable unit (Mattson Fm) and to establish locations for diamond drilling; accessing overgrown borrow pits and extracting large samples of the quartz sandstone for test processing.

## Recommended Phase I Work Program

Geological mapping of the prospective unit, systematic sampling and geochemical analysis: \$25,000  
 Field supervision, permitting, interpretation and results documentation: \$10,000  
 Drill access road construction and/or rehabilitation: \$45,000  
 Road-based diamond drilling of priority targets (1500 m of NQ @ \$300/m (all in costs): \$450,000  
 Field supervision, permitting, technical documentation and results interpretation: \$35,000  
 Total Phase 1 Budget: \$565,000

## 11. ITEMIZED COST STATEMENT – PET PROPERTY

Exploration Work type	Comment	Days		Totals
		Days	Rate	Subtotal*
<b>Personnel (Name) / Position</b>	<b>Field Days</b>			
Bob Lane, Geologist	Aug 14	1.0	\$650.00	\$650.00
Brian Kornichuk, Assistant	Aug 14	1.0	\$250.00	\$250.00
				\$900.00
<b>Office Studies</b>	<b>List Personnel</b>			
Bob Lane	Project Preparation	0.5	\$650.00	\$325.00
Tina Kwitkoski	Preparation of field maps	0.5	\$560.00	\$280.00
				\$605.00
<b>Geochemical Surveying</b>	<b>Number of Samples</b>	<b>No.</b>	<b>Rate</b>	<b>Subtotal</b>
ALS Chemex	Whole Rock and Trace Element	3	71.22	\$213.66
				\$213.66
<b>Other Operations</b>	<b>Clarify</b>	<b>Units</b>	<b>Rate</b>	<b>Subtotal</b>
Courier Costs	DHL	1.0	\$25.00	\$25.00
Thin Section Preparation	Vancouver Petrographics	3.0	40.00	120.00
Petrographic Services	Micron Geological	3.0	\$200.00	\$600.00
Report Preparation	Plateau Minerals Corp.	2.5	650.00	1625.00
				\$2370.00
				\$2370.00
<b>Transportation</b>		<b>Units</b>	<b>Rate</b>	<b>Subtotal</b>
Travel to/from Field (B.Lane)		0.4	\$650.00	\$260.00
Travel to/from Field (B.Kornichuk)		0.4	\$250.00	\$100.00
Meals - Travel		1.0	130.00	\$130.00
Fuel for Vehicles	One 4x4 Pickup	1.0	\$200.00	\$200.00
Kilometre Charges – Vehicles	One 4x4 Pickup	1100	\$0.65	\$715.00
				\$1405.00
				\$1405.00
<b>Accommodation &amp; Food</b>		<b>Units</b>	<b>Rate</b>	<b>Subtotal</b>
B. Lane – Liard River Adventures G/O	Aug 14	1.00	\$205.00	\$205.00
B. Kornichuk - Liard River Adventures G/O	Aug 14	1.00	\$205.00	\$205.00
W. Luck – Liard River Adventures G/O	Aug 14	1.00	\$205.00	\$205.00
				\$615.00
				\$615.00
<b>Helicopter</b>		<b>Units</b>	<b>Rate</b>	<b>Subtotal</b>
Hours Flown For Pet Project (incl Jet Fuel)	Interior Helicopters (West Luck – 206)	3.4	\$1482.00	\$5038.80
				\$5038.80
				\$5038.80
<b>Equipment &amp; Supplies</b>		<b>Units</b>	<b>Rate</b>	<b>Subtotal</b>
IPL - Prince George	Rice Bags, Poly Bags, Zip Ties, Crack Hammers, Chisels, PPE, FA	1.00	\$200.00	\$200.00
				\$200.00
				\$200.00
<b><i>TOTAL Expenditures</i></b>				<b>\$11,347.46</b>

## **12. REFERENCES**

Le Couteur, Peter (2011): Petrographic Report on Twenty-Four Samples from Northern BC; Private Report for Stikine Energy Corp., 17 p.

Massey, N.W.D., MacIntyre, D.G., Desjardins, P.J. and Cooney, R.T. (2005): Geology of British Columbia (compilation); BC Ministry of Energy, Mines and Petroleum Resources; Geoscience Map 2005-3.

Ross, K. (2009): Petrographic Study of Quartzites, Northeastern British Columbia; Private Report for Stikine Gold Corporation, 21 p.

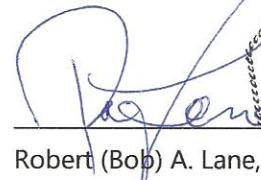
Walsh, W. (2004): Geology of the Liard Basin (compilation); BC Ministry of Energy, Mines and Petroleum Resources.

### 13. STATEMENT OF QUALIFICATIONS

I, Robert (Bob) A. Lane, PGeo, residing in Prince George, B.C., do hereby certify that:

1. I am currently employed as a consulting geologist by Plateau Minerals Corp, located at 2606 Carlisle Way, Prince George, British Columbia, Canada, V2K 4H9.
2. I obtained a Master of Science degree with Specialization in Geology in 1990 from the University of British Columbia.
3. I have worked as a geologist for more than 20 years since my graduation from university.
4. I am a Professional Geoscientist (PGeo) registered with the Association of Professional Engineers and Geoscientists of British Columbia, license #18993, and have been a member in good standing since 1992.
5. I participated in the 2010 exploration program that took place in August 2010. This report presents and summarizes the data acquired during the 2010 field season.
6. I am the author of this report on the Pet property entitled "2010 Geological Report on the Pet Property" dated June 22, 2011.

Dated this 22th day of June, 2011, at Prince George, British Columbia.



PROFESSIONAL  
PROVINCE OF  
R. A. LANE  
BRITISH COLUMBIA  
GEOLOGIST  
MSc, PGeo

Robert (Bob) A. Lane, MSc, PGeo

**APPENDIX A**

**LABORATORY CERTIFICATES**



1020 Cordova St. East Vancouver BC V6A 4A3 Canada

Acme Analytical Laboratories (Vancouver) Ltd.

[www.acmelab.com](http://www.acmelab.com)

**Client:** **Stikine Energy Corporation**  
490 - 1122 Mainland St.  
Vancouver BC V6B 5L1 Canada

Submitted By: Bob Lane  
Receiving Lab: Canada-Vancouver  
Received: August 27, 2010  
Report Date: September 14, 2010  
Page: 1 of 2

## CERTIFICATE OF ANALYSIS

VAN10004213.1

### CLIENT JOB INFORMATION

Project: NEBC Frac  
Shipment ID:  
P.O. Number  
Number of Samples: 25

### SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Method Code	Number of Samples	Code Description	Test Wgt (g)	Report Status	Lab
R200-250	23	Crush, split and pulverize 250 g rock to 200 mesh			VAN
4X4B	23	XRF Whole Rock & ICP-MS Trace Elements		Completed	VAN

### SAMPLE DISPOSAL

STOR-PLP Store After 90 days Invoice for Storage  
DISP-RJT Dispose of Reject After 90 days

### ADDITIONAL COMMENTS

Acme does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

Invoice To: Stikine Energy Corporation  
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Canada

CC: Scott Broughton  
John Mirko



This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only. All results are considered the confidential property of the client. Acme assumes the liabilities for actual cost of analysis only. \*\* asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.



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Project: NEBC Frac  
Report Date: September 14, 2010

Page: 2 of 2 Part 1

## CERTIFICATE OF ANALYSIS

VAN10004213.1

Method	Analyte	WGHT	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X 2A Leco	2A Leco	4B	4B	4B	4B		
		Wgt	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO	Na <sub>2</sub> O	K <sub>2</sub> O	MnO	TiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	Ba	LOI	SUM	TOT/C	TOT/S	Ba	Be	Co	Cs
		Unit	kg	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	
MDL		0.01	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-5.11	0.01	0.02	0.02	1	1	0.2	0.1
BV10-BK06B	Rock	2.77	82.0	1.65	0.94	6.94	0.27	0.02	0.36	0.02	0.39	0.07	<0.01	6.37	99.04	1.53	0.05	100	<1	1.8	0.5
BV10-BL14B	Rock	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	
BV10-BL14	Rock	2.37	97.7	0.61	0.67	0.02	0.04	<0.01	0.15	<0.01	0.18	0.02	<0.01	0.36	99.73	0.04	<0.02	79	<1	0.7	0.1
BV10-BL20	Rock	4.43	84.2	1.64	0.82	6.31	0.13	0.02	0.34	0.02	0.33	0.06	<0.01	5.79	99.65	1.37	<0.02	106	<1	3.2	0.5
BV10-BL23	Rock	3.04	97.1	0.46	0.62	0.46	0.04	<0.01	0.11	0.01	0.07	0.03	<0.01	0.87	99.77	0.25	<0.02	24	<1	0.6	<0.1
BV10-BL31B	Rock	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	
BV10-BL31	Rock	2.33	94.4	0.73	0.52	2.04	0.05	<0.01	0.17	0.01	0.08	0.04	<0.01	1.88	99.91	0.43	<0.02	26	<1	0.8	0.2
CR10-BL02	Rock	4.42	96.2	1.28	0.64	0.16	0.05	0.41	0.22	<0.01	0.19	0.13	<0.01	0.39	99.72	0.05	<0.02	37	<1	0.5	0.2
CR10-BK03	Rock	1.50	92.5	1.37	1.03	2.08	0.10	0.12	0.27	0.02	0.17	0.04	<0.01	2.26	99.97	0.48	<0.02	28	<1	1.0	0.2
CR10-BK13	Rock	1.49	97.6	0.87	0.44	0.02	0.07	0.03	0.19	<0.01	0.19	0.01	<0.01	0.36	99.78	<0.02	<0.02	24	<1	0.5	0.2
CR10-BL22	Rock	2.55	77.4	1.67	0.75	8.94	1.12	0.21	0.32	0.01	0.31	0.31	0.04	8.50	99.59	2.14	0.03	452	<1	1.2	0.4
CR10-BL65	Rock	1.09	97.4	0.64	0.83	0.02	0.05	<0.01	0.12	<0.01	0.15	0.02	<0.01	0.52	99.77	0.11	<0.02	24	<1	0.5	0.2
CR10-BL66	Rock	3.14	88.5	0.86	0.68	5.09	0.06	0.01	0.14	0.04	0.12	0.07	<0.01	4.46	99.98	1.07	0.05	22	<1	5.0	0.1
ND10-BL53	Rock	3.83	97.3	0.90	0.81	0.02	0.08	<0.01	0.10	<0.01	0.18	0.03	<0.01	0.48	99.95	0.03	<0.02	54	<1	0.3	0.2
ND10-BK66	Rock	3.52	97.7	0.35	1.09	0.02	0.03	<0.01	0.07	<0.01	0.09	0.01	<0.01	0.23	99.53	0.03	<0.02	3	<1	0.5	<0.1
ND10-BL67	Rock	2.25	91.9	2.99	2.16	0.01	0.21	<0.01	0.96	<0.01	0.55	0.05	<0.01	1.01	99.92	0.09	<0.02	46	<1	1.8	0.7
ND10-BL82	Rock	3.71	98.0	0.58	0.67	<0.01	0.06	<0.01	0.19	<0.01	0.05	<0.01	<0.01	0.16	99.70	0.02	<0.02	9	<1	0.5	0.1
ND10-BK87	Rock	3.34	95.9	1.93	0.36	<0.01	0.49	0.09	0.09	<0.01	0.13	<0.01	<0.01	0.31	99.33	0.02	<0.02	2	<1	0.5	<0.1
CL10-BL03	Rock	1.54	19.5	2.15	1.10	24.05	15.93	0.08	0.98	0.05	0.19	0.01	<0.01	36.15	100.2	9.40	<0.02	48	<1	1.3	0.8
CL10-BL04	Rock	2.51	88.8	5.08	1.04	0.08	0.51	0.02	2.26	0.01	0.49	0.02	<0.01	1.09	99.44	0.03	<0.02	72	<1	4.1	3.5
LR10-BL01	Rock	4.04	90.2	4.70	1.06	0.13	0.24	0.03	0.85	<0.01	0.20	0.08	0.06	2.15	99.69	0.18	<0.02	679	<1	3.6	1.1
PT10-BL02	Rock	2.32	94.4	1.89	0.99	0.12	0.17	<0.01	0.45	0.01	0.15	0.02	0.02	1.47	99.71	0.07	0.03	284	<1	0.9	1.7
PT10-BL06	Rock	3.98	95.3	2.01	0.49	0.04	0.07	<0.01	0.61	0.01	0.40	0.03	0.01	0.84	99.84	0.10	<0.02	123	<1	1.6	0.5
PT10-BL09	Rock	1.99	36.1	1.45	3.53	18.28	11.29	0.05	0.24	0.06	0.10	0.08	0.01	28.68	99.88	7.92	0.04	141	<1	1.3	0.8
ST10-BK04	Rock	2.41	98.0	0.43	0.50	0.02	0.01	<0.01	0.08	0.01	0.19	0.01	<0.01	0.35	99.61	0.04	<0.02	47	<1	0.6	0.1



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Page: 2 of 2 Part 2

## CERTIFICATE OF ANALYSIS

VAN10004213.1

Analyte	Method	4B																			
		Ga	Hf	Nb	Rb	Sn	Sr	Ta	Th	U	V	W	Zr	Y	La	Ce	Pr	Nd	Sm	Eu	Gd
		Unit	ppm																		
		MDL	0.5	0.1	0.1	0.1	1	0.5	0.1	0.2	0.1	8	0.5	0.1	0.1	0.1	0.02	0.3	0.05	0.02	0.05
BV10-BK06B	Rock	2.3	6.6	3.2	11.6	<1	64.8	0.2	3.2	1.6	24	<0.5	248.3	12.8	9.5	18.3	2.35	9.5	1.65	0.38	1.84
BV10-BL14B	Rock	L.N.R.																			
BV10-BL14	Rock	0.8	17.4	1.9	4.2	<1	22.2	0.2	2.3	1.1	14	<0.5	736.7	7.0	5.5	11.5	1.48	5.9	0.85	0.18	0.76
BV10-BL20	Rock	2.3	5.2	3.1	10.5	<1	71.9	0.2	2.5	1.9	18	<0.5	196.7	10.5	9.1	16.0	2.14	8.8	1.42	0.31	1.49
BV10-BL23	Rock	0.6	6.4	1.2	3.3	<1	14.5	0.1	1.0	0.5	<8	<0.5	283.8	4.7	4.2	8.8	1.09	4.4	0.74	0.16	0.72
BV10-BL31B	Rock	L.N.R.																			
BV10-BL31	Rock	1.2	6.3	1.2	4.8	<1	25.8	<0.1	1.0	0.6	<8	<0.5	256.0	5.9	5.3	9.5	1.24	5.1	0.82	0.20	0.92
CR10-BL02	Rock	1.0	6.1	2.5	6.3	<1	8.8	0.2	2.9	1.9	<8	<0.5	266.2	9.4	7.3	11.9	1.85	7.0	1.31	0.27	1.30
CR10-BK03	Rock	1.2	7.9	1.8	6.7	<1	46.7	0.2	2.4	0.8	<8	<0.5	338.9	6.3	8.1	16.4	1.96	6.4	1.12	0.21	0.81
CR10-BK13	Rock	1.2	3.8	1.4	5.1	<1	18.6	<0.1	1.4	0.4	9	<0.5	154.9	2.7	5.0	11.0	1.31	4.8	0.81	0.12	0.41
CR10-BL22	Rock	1.8	8.2	4.6	10.0	<1	90.7	0.3	5.4	2.4	11	<0.5	303.6	24.1	14.9	25.5	3.86	15.6	3.04	0.65	3.16
CR10-BL65	Rock	1.1	16.9	1.6	3.8	<1	26.1	0.1	1.8	1.0	<8	<0.5	672.7	5.2	7.1	13.9	1.69	6.4	1.10	0.23	0.86
CR10-BL66	Rock	0.9	4.1	1.0	3.9	<1	48.0	0.1	1.5	0.6	<8	<0.5	166.6	11.8	7.9	15.2	1.83	7.0	1.37	0.35	1.67
ND10-BL53	Rock	1.3	5.2	2.0	3.4	<1	5.4	0.2	1.8	1.0	<8	<0.5	213.1	5.9	6.6	12.8	1.60	6.0	0.89	0.12	0.61
ND10-BK66	Rock	0.8	6.0	1.0	0.8	<1	8.7	<0.1	2.0	0.6	<8	<0.5	251.9	4.8	12.9	25.1	3.65	15.9	3.12	0.46	1.31
ND10-BL67	Rock	4.1	5.8	8.9	21.4	<1	13.6	0.8	6.3	1.6	15	0.8	227.6	14.1	18.6	43.7	4.74	17.6	2.85	0.46	2.02
ND10-BL82	Rock	0.7	5.8	1.1	4.2	<1	3.2	<0.1	1.4	0.6	<8	<0.5	223.7	5.2	4.7	8.0	0.98	3.2	0.58	0.14	0.89
ND10-BK87	Rock	2.3	12.0	2.6	0.3	<1	6.0	0.2	2.1	1.2	<8	0.6	499.1	8.6	9.9	17.4	1.95	6.3	0.95	0.22	0.87
CL10-BL03	Rock	2.7	1.7	9.7	19.5	<1	49.9	0.5	3.3	0.8	13	<0.5	71.6	7.4	12.4	26.0	2.65	9.4	1.56	0.31	1.30
CL10-BL04	Rock	5.2	4.3	10.4	43.8	1	6.4	0.9	5.7	1.6	27	0.8	156.9	12.7	27.9	51.4	5.18	16.7	1.96	0.43	1.51
LR10-BL01	Rock	5.5	1.3	2.8	26.6	2	60.0	0.2	4.7	1.5	65	<0.5	49.3	10.6	20.1	37.0	4.22	14.1	2.43	0.58	2.13
PT10-BL02	Rock	2.8	1.0	2.3	17.8	<1	28.0	0.2	2.8	0.5	82	<0.5	39.7	3.0	9.2	14.6	1.68	4.8	0.70	0.13	0.44
PT10-BL06	Rock	2.6	8.7	5.4	15.3	<1	68.4	0.4	4.8	1.3	<8	<0.5	348.5	12.2	12.9	26.3	3.10	11.1	1.74	0.27	1.51
PT10-BL09	Rock	1.9	0.4	1.2	11.6	<1	40.8	<0.1	1.7	1.0	13	<0.5	14.3	8.2	8.0	8.9	1.50	6.0	1.07	0.22	1.01
ST10-BK04	Rock	0.8	13.8	2.0	2.2	<1	8.5	0.1	1.4	1.4	<8	<0.5	530.8	9.9	6.7	9.8	1.39	5.4	0.80	0.19	0.95



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Project: NEBC Frac

Report Date: September 14, 2010

Page: 2 of 2 Part 3

## CERTIFICATE OF ANALYSIS

VAN10004213.1

	Method	4B	4B	4B	4B	4B	4B	1DX													
	Analyte	Tb	Dy	Ho	Er	Tm	Yb	Lu	Mo	Cu	Pb	Zn	Ni	As	Cd	Sb	Bi	Ag	Au	Hg	Tl
	Unit	ppm																			
	MDL	0.01	0.05	0.02	0.03	0.01	0.05	0.01	0.1	0.1	0.1	1	0.1	0.5	0.1	0.1	0.1	0.1	0.5	0.01	0.1
BV10-BK06B	Rock	0.30	1.77	0.39	1.21	0.18	1.10	0.18	0.7	3.6	3.7	38	8.1	3.5	0.3	0.2	<0.1	0.2	1.0	<0.01	<0.1
BV10-BL14B	Rock	L.N.R.																			
BV10-BL14	Rock	0.14	0.91	0.22	0.75	0.14	1.05	0.20	0.3	2.0	2.0	11	4.4	1.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
BV10-BL20	Rock	0.25	1.50	0.34	0.96	0.15	1.01	0.15	1.0	2.9	3.0	33	12.6	3.3	0.2	0.1	<0.1	<0.1	<0.5	<0.01	<0.1
BV10-BL23	Rock	0.11	0.55	0.15	0.43	0.08	0.50	0.09	<0.1	1.7	1.4	5	2.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
BV10-BL31B	Rock	L.N.R.																			
BV10-BL31	Rock	0.14	0.76	0.17	0.55	0.09	0.59	0.10	<0.1	1.1	1.2	2	1.9	<0.5	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
CR10-BL02	Rock	0.22	1.20	0.29	0.88	0.15	0.95	0.17	1.8	1.6	1.4	20	3.7	1.1	0.2	0.1	<0.1	<0.1	0.6	<0.01	<0.1
CR10-BK03	Rock	0.14	0.75	0.18	0.61	0.10	0.71	0.12	0.1	1.1	1.5	3	3.7	0.5	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
CR10-BK13	Rock	0.05	0.29	0.09	0.32	0.05	0.31	0.06	0.1	0.8	1.7	2	1.8	<0.5	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
CR10-BL22	Rock	0.52	2.97	0.70	2.13	0.31	1.88	0.33	0.3	1.6	2.7	15	5.0	2.2	0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
CR10-BL65	Rock	0.13	0.75	0.19	0.66	0.13	0.92	0.18	<0.1	1.5	1.6	29	2.3	1.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.01	<0.1
CR10-BL66	Rock	0.29	1.39	0.32	0.93	0.13	0.88	0.15	<0.1	1.9	2.3	15	15.0	0.8	<0.1	<0.1	<0.1	<0.1	<0.5	0.01	<0.1
ND10-BL53	Rock	0.12	0.72	0.18	0.52	0.10	0.61	0.10	0.3	3.1	1.6	10	2.4	0.7	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
ND10-BK66	Rock	0.14	0.67	0.14	0.42	0.07	0.48	0.09	0.3	1.9	0.8	<1	1.7	2.0	<0.1	0.2	<0.1	<0.1	<0.5	<0.01	<0.1
ND10-BL67	Rock	0.39	2.49	0.50	1.42	0.22	1.30	0.21	0.2	15.2	6.4	4	4.0	1.6	<0.1	0.1	0.1	<0.5	<0.01	<0.1	
ND10-BL82	Rock	0.15	0.88	0.18	0.53	0.08	0.53	0.09	2.4	1.6	0.4	<1	1.0	<0.5	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1	
ND10-BK87	Rock	0.20	1.27	0.30	0.99	0.17	1.18	0.20	0.1	2.2	0.6	<1	0.6	<0.5	<0.1	0.1	<0.1	<0.5	<0.01	<0.1	
CL10-BL03	Rock	0.22	1.15	0.26	0.79	0.11	0.68	0.11	<0.1	0.3	0.9	6	2.8	1.8	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1	
CL10-BL04	Rock	0.29	1.86	0.44	1.35	0.20	1.47	0.21	0.1	27.2	4.1	6	5.8	3.0	<0.1	0.1	0.2	<0.1	0.6	<0.01	<0.1
LR10-BL01	Rock	0.32	1.80	0.35	1.02	0.16	0.94	0.15	0.2	8.6	5.3	36	18.5	5.2	0.1	0.3	<0.1	0.2	0.6	0.02	<0.1
PT10-BL02	Rock	0.09	0.43	0.10	0.35	0.05	0.34	0.07	0.5	2.4	17.0	8	1.9	3.2	<0.1	<0.1	<0.1	<0.1	<0.5	0.01	<0.1
PT10-BL06	Rock	0.28	1.80	0.39	1.28	0.21	1.43	0.25	0.3	1.3	1.9	20	2.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
PT10-BL09	Rock	0.16	0.87	0.20	0.55	0.09	0.42	0.08	1.5	2.9	3.7	266	13.8	4.4	1.0	<0.1	<0.1	<0.1	0.2	<0.5	<0.01
ST10-BK04	Rock	0.17	1.04	0.24	0.84	0.15	1.00	0.19	0.1	3.0	0.8	9	3.8	<0.5	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1	



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**Project:** NEBC Frac  
**Report Date:** September 14, 2010

**Page:** 2 of 2      **Part** 4

## CERTIFICATE OF ANALYSIS

VAN10004213.1

Method	Analyte	Unit	MDL
BV10-BK06B	Rock	ppm	<0.5
BV10-BL14B	Rock		L.N.R.
BV10-BL14	Rock		<0.5
BV10-BL20	Rock		<0.5
BV10-BL23	Rock		<0.5
BV10-BL31B	Rock		L.N.R.
BV10-BL31	Rock		<0.5
CR10-BL02	Rock		<0.5
CR10-BK03	Rock		<0.5
CR10-BK13	Rock		<0.5
CR10-BL22	Rock		<0.5
CR10-BL65	Rock		<0.5
CR10-BL66	Rock		<0.5
ND10-BL53	Rock		<0.5
ND10-BK66	Rock		<0.5
ND10-BL67	Rock		<0.5
ND10-BL82	Rock		<0.5
ND10-BK87	Rock		<0.5
CL10-BL03	Rock		<0.5
CL10-BL04	Rock		<0.5
LR10-BL01	Rock		<0.5
PT10-BL02	Rock		<0.5
PT10-BL06	Rock		<0.5
PT10-BL09	Rock		1.1
ST10-BK04	Rock		<0.5



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## QUALITY CONTROL REPORT

VAN10004213.1

Method	WGHT	4X	4X 2A Leco	2A Leco	4B	4B	4B	4B													
Analyte	Wgt	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	MnO	TiO2	P2O5	Ba	LOI	SUM	TOT/C	TOT/S	Ba	Be	Co	Cs	
Unit	kg	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	
MDL	0.01	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-5.11	0.01	0.02	0.02	1	1	0.2	0.1	
Pulp Duplicates																					
CR10-BL65	Rock	1.09	97.4	0.64	0.83	0.02	0.05	<0.01	0.12	<0.01	0.15	0.02	<0.01	0.52	99.77	0.11	<0.02	24	<1	0.5	0.2
REP CR10-BL65	QC		97.6	0.64	0.81	0.02	0.05	<0.01	0.12	<0.01	0.17	0.02	<0.01	0.51	99.99						
ND10-BK66	Rock	3.52	97.7	0.35	1.09	0.02	0.03	<0.01	0.07	<0.01	0.09	0.01	<0.01	0.23	99.53	0.03	<0.02	3	<1	0.5	<0.1
REP ND10-BK66	QC																	2	<1	0.5	<0.1
REP LR10-BL01	QC															0.16	<0.02				
Core Reject Duplicates																					
LR10-BL01	Rock	4.04	90.2	4.70	1.06	0.13	0.24	0.03	0.85	<0.01	0.20	0.08	0.06	2.15	99.69	0.18	<0.02	679	<1	3.6	1.1
DUP LR10-BL01	QC		90.4	4.65	1.06	0.05	0.19	0.04	0.83	0.01	0.18	0.07	0.06	2.01	99.60	0.16	<0.02	686	<1	3.7	1.2
Reference Materials																	2.84	4.20			
STD CSC	Standard																				
STD DS7	Standard																				
STD OREAS45PA	Standard																				
STD OREAS76A	Standard															0.13	17.53				
STD SO-18	Standard																	511	2	27.0	7.0
STD SO-18	Standard																	515	<1	28.1	6.9
STD SO-18	Standard	58.2	14.03	7.63	6.32	3.36	3.75	2.15	0.40	0.69	0.81	0.05	1.93	99.30							
STD SY-4(D)	Standard	49.9	20.66	6.28	8.03	0.53	7.17	1.63	0.11	0.27	0.12	0.05	4.56	99.26							
STD CSC Expected																2.94	4.25				
STD OREAS76A Expected																0.16	18				
STD DS7 Expected																					
STD OREAS45PA Expected																					
STD SY-4(D) Expected		49.9	20.69	6.21	8.05	0.54	7.1	1.66	0.108	0.287	0.131	0.034	4.56								
STD SO-18 Expected		58.47		7.67	6.42	3.35	3.71	2.17	0.39	0.69	0.83					514	1	26.2	7.1		
BLK	Blank															<0.02	<0.02				
BLK	Blank																				
BLK	Blank																				
BLK	Blank	<0.1	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01				<1	<1	<0.2	<0.1
Prep Wash																					

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## QUALITY CONTROL REPORT

VAN10004213.1

	Method	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B	4B
Analyte	Ga	Hf	Nb	Rb	Sn	Sr	Ta	Th	U	V	W	Zr	Y	La	Ce	Pr	Nd	Sm	Eu	Gd		
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
MDL	0.5	0.1	0.1	0.1	1	0.5	0.1	0.2	0.1	8	0.5	0.1	0.1	0.1	0.1	0.02	0.3	0.05	0.02	0.05	0.05	
Pulp Duplicates																						
CR10-BL65	Rock	1.1	16.9	1.6	3.8	<1	26.1	0.1	1.8	1.0	<8	<0.5	672.7	5.2	7.1	13.9	1.69	6.4	1.10	0.23	0.86	
REP CR10-BL65	QC																					
ND10-BK66	Rock	0.8	6.0	1.0	0.8	<1	8.7	<0.1	2.0	0.6	<8	<0.5	251.9	4.8	12.9	25.1	3.65	15.9	3.12	0.46	1.31	
REP ND10-BK66	QC	1.0	6.4	1.2	0.8	<1	8.5	<0.1	2.1	0.6	<8	<0.5	263.0	4.7	12.7	25.3	3.69	15.7	3.16	0.45	1.43	
REP LR10-BL01	QC																					
Core Reject Duplicates																						
LR10-BL01	Rock	5.5	1.3	2.8	26.6	2	60.0	0.2	4.7	1.5	65	<0.5	49.3	10.6	20.1	37.0	4.22	14.1	2.43	0.58	2.13	
DUP LR10-BL01	QC	5.3	1.2	2.7	26.2	<1	55.8	0.2	4.5	1.4	72	<0.5	49.0	10.6	19.4	35.9	4.08	14.8	2.48	0.58	1.95	
Reference Materials																						
STD CSC	Standard																					
STD DS7	Standard																					
STD OREAS45PA	Standard																					
STD OREAS76A	Standard																					
STD SO-18	Standard	17.2	9.5	20.2	27.4	15	407.9	7.0	11.1	16.3	195	14.5	286.2	31.5	12.3	27.8	3.39	13.1	2.71	0.85	2.77	
STD SO-18	Standard	17.5	9.4	20.6	28.4	15	413.5	7.1	11.0	16.7	193	14.5	290.1	32.5	12.8	29.1	3.57	14.8	2.77	0.87	2.80	
STD SO-18	Standard																					
STD SY-4(D)	Standard																					
STD CSC Expected																						
STD OREAS76A Expected																						
STD DS7 Expected																						
STD OREAS45PA Expected																						
STD SY-4(D) Expected																						
STD SO-18 Expected		17.6	9.8	21.3	28.7	15	407.4	7.4	9.9	16.4	200	14.8	280	31	12.3	27.1	3.45	14	3	0.89	2.93	
BLK	Blank																					
BLK	Blank																					
BLK	Blank	<0.5	<0.1	<0.1	<0.1	<1	<0.5	<0.1	<0.2	<0.1	<8	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.3	<0.05	<0.02	<0.05
BLK	Blank																					
Prep Wash																						

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## QUALITY CONTROL REPORT

VAN10004213.1

Method	4B	4B	4B	4B	4B	4B	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX		
Analyte	Tb	Dy	Ho	Er	Tm	Yb	Lu	Mo	Cu	Pb	Zn	Ni	As	Cd	Sb	Bi	Ag	Au	Hg	Tl	
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		
MDL	0.01	0.05	0.02	0.03	0.01	0.05	0.01	0.1	0.1	0.1	1	0.1	0.5	0.1	0.1	0.1	0.1	0.5	0.01	0.1	
Pulp Duplicates																					
CR10-BL65	Rock	0.13	0.75	0.19	0.66	0.13	0.92	0.18	<0.1	1.5	1.6	29	2.3	1.1	<0.1	<0.1	<0.1	0.6	<0.01	<0.1	
REP CR10-BL65	QC																				
ND10-BK66	Rock	0.14	0.67	0.14	0.42	0.07	0.48	0.09	0.3	1.9	0.8	<1	1.7	2.0	<0.1	0.2	<0.1	<0.1	<0.5	<0.01	<0.1
REP ND10-BK66	QC	0.13	0.70	0.16	0.45	0.08	0.53	0.09													
REP LR10-BL01	QC																				
Core Reject Duplicates																					
LR10-BL01	Rock	0.32	1.80	0.35	1.02	0.16	0.94	0.15	0.2	8.6	5.3	36	18.5	5.2	0.1	0.3	<0.1	0.2	0.6	0.02	<0.1
DUP LR10-BL01	QC	0.32	1.55	0.37	0.97	0.15	1.07	0.16	0.2	8.2	4.9	36	17.2	5.0	<0.1	0.2	<0.1	0.2	<0.5	0.01	<0.1
Reference Materials																					
STD CSC	Standard																				
STD DS7	Standard								22.0	111.6	65.1	407	56.8	53.0	6.5	5.5	4.4	1.3	61.5	0.24	4.3
STD OREAS45PA	Standard								1.2	610.1	19.2	120	296.2	5.0	<0.1	0.2	0.2	0.4	47.5	0.03	<0.1
STD OREAS76A	Standard																				
STD SO-18	Standard	0.51	2.86	0.62	1.80	0.27	1.77	0.27													
STD SO-18	Standard	0.52	2.91	0.63	1.89	0.28	1.78	0.28													
STD SO-18	Standard																				
STD SY-4(D)	Standard																				
STD CSC Expected																					
STD OREAS76A Expected																					
STD DS7 Expected									20.5	109	70.6	411	56	48.2	6.4	4.6	4.5	0.9	70	0.2	4.2
STD OREAS45PA Expected									0.9	600	19	119	281	4.2	0.09	0.13	0.18	0.3	43	0.03	0.07
STD SY-4(D) Expected																					
STD SO-18 Expected		0.53	3	0.62	1.84	0.27	1.79	0.27													
BLK	Blank																				
BLK	Blank								<0.1	<0.1	<0.1	<1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01	<0.1
BLK	Blank	<0.01	<0.05	<0.02	<0.03	<0.01	<0.05	<0.01													
BLK	Blank																				
Prep Wash																					



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## QUALITY CONTROL REPORT

VAN10004213.1

Method	1DX
Analyte	Se
Unit	ppm
MDL	0.5
Pulp Duplicates	
CR10-BL65	Rock <0.5
REP CR10-BL65	QC
ND10-BK66	Rock <0.5
REP ND10-BK66	QC
REP LR10-BL01	QC
Core Reject Duplicates	
LR10-BL01	Rock <0.5
DUP LR10-BL01	QC <0.5
Reference Materials	
STD CSC	Standard
STD DS7	Standard 3.2
STD OREAS45PA	Standard <0.5
STD OREAS76A	Standard
STD SO-18	Standard
STD SO-18	Standard
STD SO-18	Standard
STD SY-4(D)	Standard
STD CSC Expected	
STD OREAS76A Expected	
STD DS7 Expected	3.5
STD OREAS45PA Expected	0.54
STD SY-4(D) Expected	
STD SO-18 Expected	
BLK	Blank
BLK	Blank <0.5
BLK	Blank
BLK	Blank
Prep Wash	



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## QUALITY CONTROL REPORT

VAN10004213.1

	WGHT	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X 2A Leco	2A Leco	4B	4B	4B	4B		
	Wgt	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	MnO	TiO2	P2O5	Ba	LOI	SUM	TOT/C	TOT/S	Ba	Be	Co	Cs	
	kg	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	
	0.01	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-5.11	0.01	0.02	0.02	1	1	0.2	0.1	
G1	Prep Blank	<0.01	66.9	15.44	3.44	3.38	1.15	3.65	3.70	0.10	0.47	0.18	0.11	0.71	99.28	<0.02	<0.02	1139	2	5.2	4.3
G1	Prep Blank	<0.01	66.7	15.36	3.33	3.39	1.17	3.67	3.66	0.10	0.51	0.18	0.10	0.69	98.91	<0.02	<0.02	1123	3	4.7	4.2



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## QUALITY CONTROL REPORT

VAN10004213.1

	4B Ga ppm 0.5	4B Hf ppm 0.1	4B Nb ppm 0.1	4B Rb ppm 0.1	4B Sn ppm 1	4B Sr ppm 0.5	4B Ta ppm 0.1	4B Th ppm 0.2	4B U ppm 0.1	4B V ppm 8	4B W ppm 0.5	4B Zr ppm 0.1	4B Y ppm 0.1	4B La ppm 0.1	4B Ce ppm 0.1	4B Pr ppm 0.02	4B Nd ppm 0.3	4B Sm ppm 0.05	4B Eu ppm 0.02	4B Gd ppm 0.05	
G1	Prep Blank	18.5	3.7	23.6	127.9	2	776.2	1.4	9.8	3.9	61	<0.5	128.9	17.7	30.0	60.4	6.78	25.3	3.98	1.08	3.24
G1	Prep Blank	18.4	3.7	23.1	129.4	1	786.8	1.4	9.4	4.0	55	<0.5	134.2	17.3	30.4	60.2	6.77	23.7	3.92	1.09	3.09



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## QUALITY CONTROL REPORT

VAN10004213.1

	4B Tb ppm 0.01	4B Dy ppm 0.05	4B Ho ppm 0.02	4B Er ppm 0.03	4B Tm ppm 0.01	4B Yb ppm 0.05	4B Lu ppm 0.01	1DX Mo ppm 0.1	1DX Cu ppm 0.1	1DX Pb ppm 0.1	1DX Zn ppm 1	1DX Ni ppm 0.1	1DX As ppm 0.5	1DX Cd ppm 0.1	1DX Sb ppm 0.1	1DX Bi ppm 0.1	1DX Ag ppm 0.1	1DX Au ppb 0.5	1DX Hg ppm 0.01	1DX Tl ppm 0.1
G1	Prep Blank	0.51	2.84	0.58	1.72	0.28	1.81	0.31	<0.1	2.2	2.8	48	3.6	<0.5	<0.1	<0.1	<0.1	3.9	<0.01	0.3
G1	Prep Blank	0.49	2.64	0.56	1.63	0.27	1.74	0.32	<0.1	2.2	2.6	50	3.5	<0.5	<0.1	<0.1	<0.1	2.4	<0.01	0.3



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## QUALITY CONTROL REPORT

VAN10004213.1

1DX Se ppm 0.5		
G1	Prep Blank	<0.5
G1	Prep Blank	<0.5