

AR 2012-167

2012 Joint Assessment Report for Clear Lake Resources Inc.  
Licenses 08771 & 08772

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## 1.0 Summary

Licences 08771 and 08772 are located in a mafic-felsic volcanic and plutonic suite of rocks in the Cobequid highlands. Recent discoveries of anomalous REE indicator minerals (Th, Zr, Y, Nb) in such rocks as well as recent discovery of epithermal gold in the area (Machattie, 2011) make the Silica Mountain district a strong candidate for discovery of either type of deposit.

The 2012 work program focused on the collection and analysis of 23 sluiced stream sediment samples. Additionally 5 rock outcrop samples and radiometric data were collected at 5 of the 23 sluice sample sites.

Sluice sediments were dried, sieved, XRF analyzed for Au indicators and REE indicators and then panned for visible gold grains.

Visible gold was observed in 10 of the 23 samples (CL-12-002,004,006,007,008,020,233b,243,245, and 246).

REE indicator anomalous values were observed in two sluice samples (CL-12-243 and CL-12-244) collected in the central region of the licences which is consistent with past Clear Lake Resources work programs.

## **2.0 Introduction**

Rare earth element (REE) mineralization has been discovered in the Cobequid Highlands (MacHattie, 2010a), as such regional exploration of the Hart Lake-Byers Lake granite body and overlying Byers Brook Formation is warranted. Licenses 08771 and 08772 are majorly Byers Brook Formation located just east of the eastern extent of the main body of the Hart Lake-Byers Lake granite.

Epithermal gold mineralization has also recently been discovered in silicified basalts of the Diamond Brook Formation which overlies the Byers Brook Formation (MacHattie, 2011). As such, prospecting was completed for gold in the upper layers of the Byers Brook Formation and along the Diamond Brook Formation contact.

The 2012 work program focused on identifying areas of potential REE and gold mineralization by completing a first pass stream sluice sampling program on the more easily accessible streams on the licence.

Stream sluice samples were dried and sieved to various size fractions, resulting fractions were analyzed with a portable XRF analyzer. Finer fractions (-18,-45,-60,-80,-140) were subsequently hand panned and visually inspected for gold grains and other heavy minerals.

XRF analyses of the samples were completed using an Olympus Innovx portable DP-6000 X-ray fluorescence analyzer. The XRF was used to export REE and Au indicators. Epithermal Au indicators used were arsenic (As), antimony (Sb), lead (Pb) and zinc (Zn)(2011, MacHattie). REE indicators used were yttrium (Y), thorium (Th) zirconium (Zr) and niobium (Nb). XRF results at this point remain uncorrected due to the lack of a known set of assayed reference samples to analyze and generate XRF correction factors. Due to this, XRF results must be evaluated for anomalies rather than assuming absolute values.

A Radiation Solutions RS-230 Spectrometer was also used in conjunction with the stream sampling program to record rock outcrop radiometric total counts per second (CPS).

## **3.0 Location and Access**

The properties are located in the Silica Mountain district of Colchester County, NS., approximately 20km north of the town of Truro. The properties are easily accessible from Halifax via highway 102 north to exit 14A. Head east off of the exit onto Onslow Rd. and proceed 3.5 km until junction 311. Turn north onto highway 311. After 5km turn left, cross over the North River and continue to proceed north on Truro Rd which bi-sects the properties. An abundance of local woods and country roads provide further access to the properties. Woods roads can generally be described as good, with only a small percentage of the roads starting to become too grown in for vehicular access. See figure 1 for a location map and look at the local access roads on the properties.



# License 08771 & 08772 Location Map

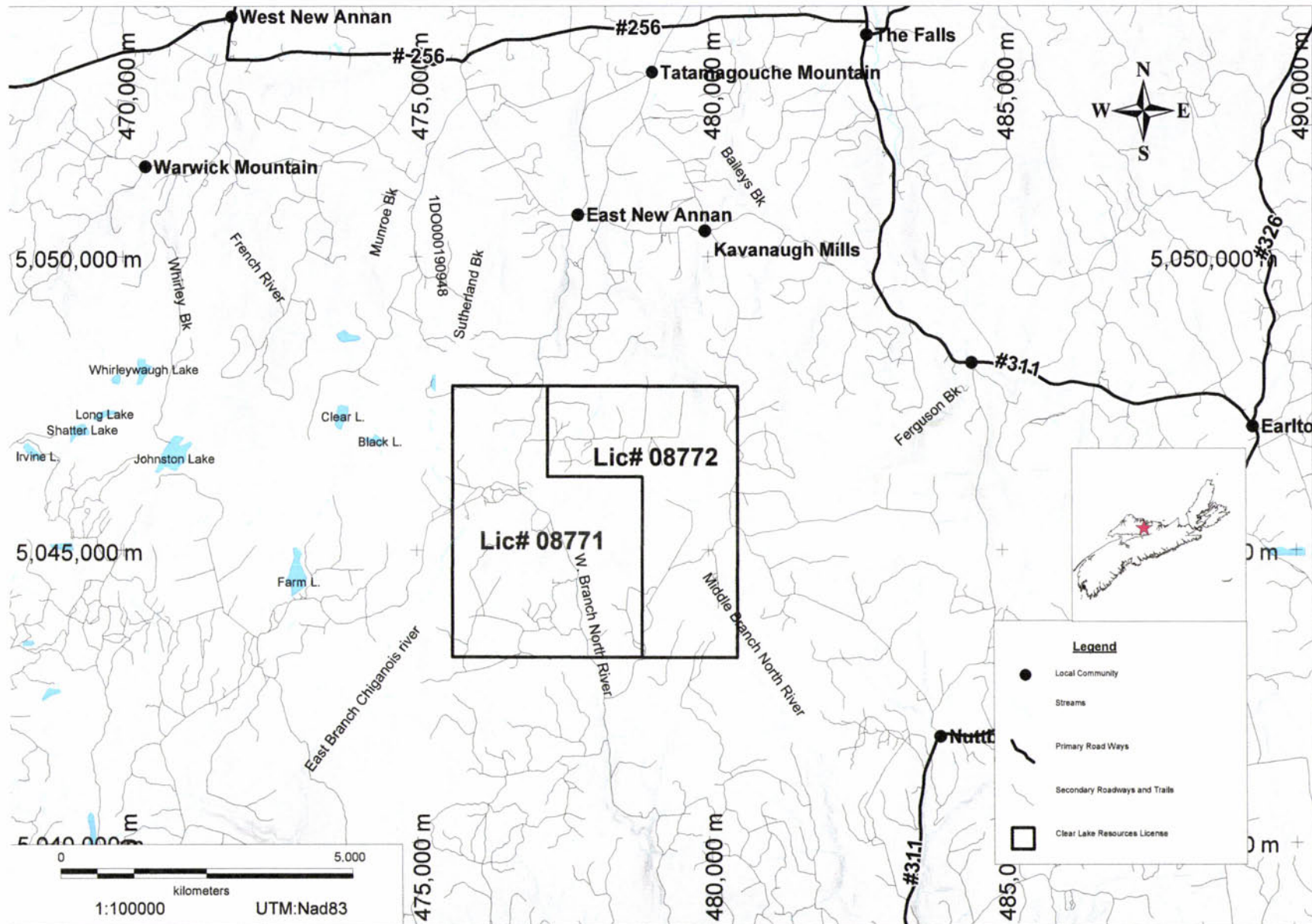


Figure 1

## 4.0 License Tabulation

License 08771 is composed of five tracts of 16 claims each. License 08772 is made up of four tracts of sixteen claims each. A detailed breakdown of the license claim composition can be seen in Table 1 below.

Table 1-Tabulation of Exploration Licenses 08771 & 08772 held in the name of Clear Lake Resources Inc.

License #	NTS Map Sheet	Tract	Claims	Date of issue
08771	11E/11B	46	ABCDEFGH JKLMNOPQ	11/19/2009
08771	11E/11B	47	ABCDEFGH JKLMNOPQ	11/19/2009
08771	11E/11B	50	ABCDEFGH JKLMNOPQ	11/19/2009
08771	11E/11B	51	ABCDEFGH JKLMNOPQ	11/19/2009
08771	11E/11B	70	ABCDEFGH JKLMNOPQ	11/19/2009
08772	11E/11B	48	ABCDEFGH JKLMNOPQ	11/19/2009
08772	11E/11B	49	ABCDEFGH JKLMNOPQ	11/19/2009
08772	11E/11B	71	ABCDEFGH JKLMNOPQ	11/19/2009
08772	11E/11B	72	ABCDEFGH JKLMNOPQ	11/19/2009

## 5.0 Previous Work

During the late 1970's and early 1980's Gulf Minerals Canada Ltd. carried out an extensive exploration program for Uranium in the Cobequid highlands. Gulf's program included geological mapping, soil and rock sampling, trenching, and drilling. Gulf also carried out ground and airborne gamma ray spectrometry surveys as well as VLF-EM- magnetometer. Unfortunately, Gulf's work was focused to the west of licenses 08771 and 08772, with just a few hand samples collected on the current licenses.

From 1889-1923 Oxford Tripoli Company produced 540 tons of Diatomaceous Earth from Silica Lake, a small pond located on license 08771. (O'Reilly, 2010)

Several gravel pits were also observed on the properties. None displayed evidence of recent activity.

In 1989 NS Mines and Energy collected regional stream sediment, fines and heavy metal concentrates over northern Nova Scotia. Several Au anomalies were reported in the Cobequid Highlands (Mills, 1989).



## 6.0 Local and Regional Geology

Regional geology of the area is dominated by four Late Devonian-Early Carboniferous mafic-felsic volcanic and plutonic units as shown in figure 2. This suite of rocks is bound to the north by unconformably overlying late Carboniferous rocks of the Cumberland Basin and to the south by the Rockland Brook fault (RBF) (MacHattie, 2010a). From west to east the units are: the Folly Lake gabbro-diorite (DCd), the Hart Lake-Byers Lake granite (Cg), the Byers Brook Formation (DCB) and the Diamond Brook Formation (DCB-M).

Locally, the RBF cuts the southern portion of the property. This section of the fault has been interpreted to be a ductile shear zone (Pe-Piper, 1989). Geological units on the property and south of the RBF, from east to west, are Horton Group sediments, an unnamed Silurian-Ordovician unit of wacke's, siltstones, shales and tuffs and a window of the HLBL. North of the RBF the licenses are dominated by felsic volcanic and volcanoclastic rocks of the BBF. Gower (1988) reports an attitude of 115/70 for the BBF.

The BBF has been further broken down into two periods of volcanism separated by a period of lacustrine siltstone deposition; both volcanic events are characterized by early pyroclastic events which grade into rhyolitic flow units (Gower, 1988).

The BBF contacts the conformably overlying DBF in the north east corner of the property. The DBF is interpreted to be post BBF volcanism with early rhyolitic flows grading to flow basalts which dominate the unit (Pe-Piper, 2002). The extrusive volcanic units are often separated by sandy and/or conglomerate facies sediments (Pe-Piper, 2002).



# 08771 & 08772 Regional Geology

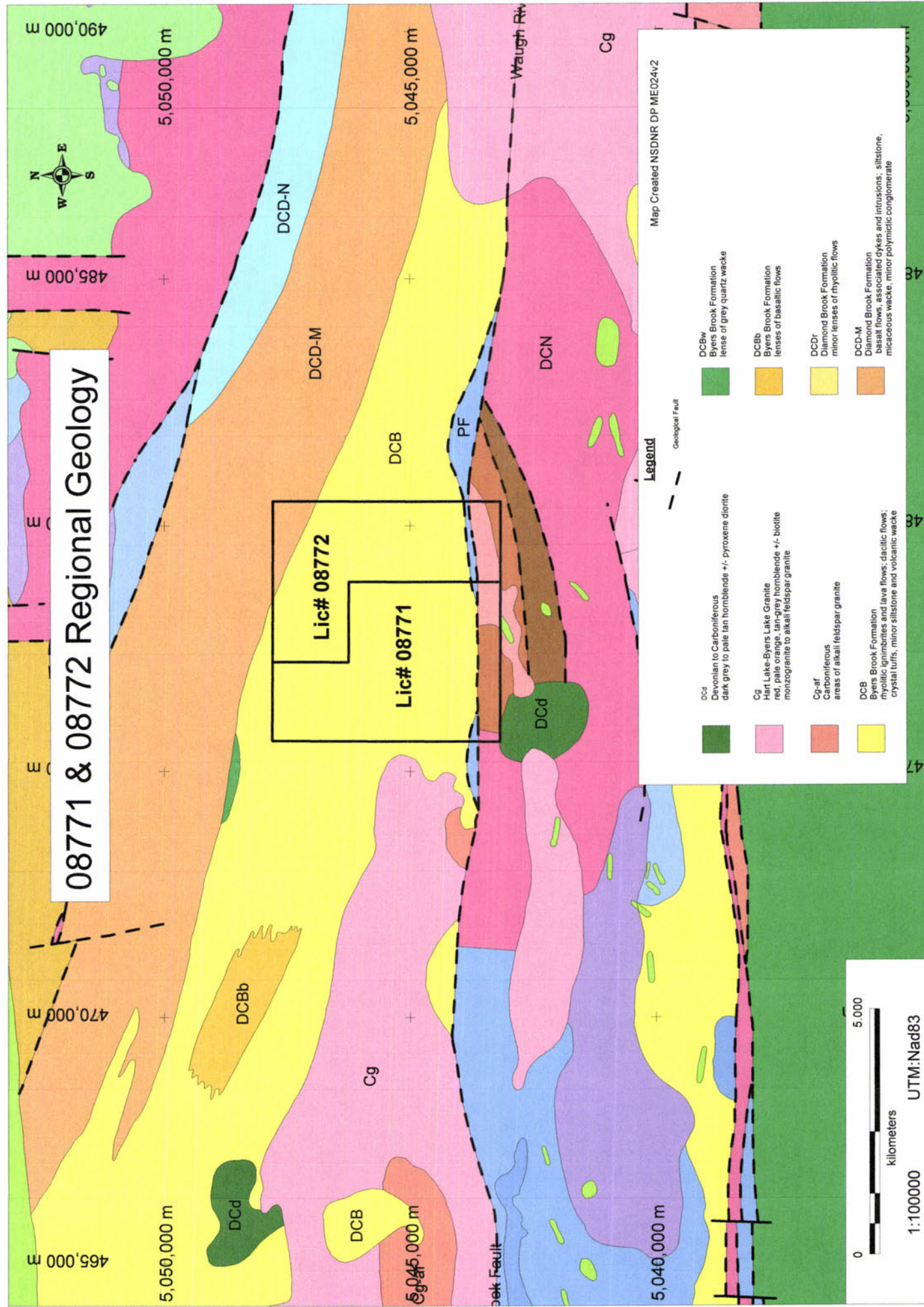


Figure 2



## 7.0 Work Performed

The work program focused on the collection stream sediment samples using a Keene Engineering A52 sluice box. In total, 23 sluice samples were collected. Set up procedure included setting sluice box in the river in the vicinity of a natural trap, such as large boulders, gravel bars or rock ledges. Material from the trap was shoveled into two gallon buckets and passed through the sluice. Approximately 100lbs (5 buckets x 20lbs/bucket) of material was fed through a ¼" screen emptying directly into the sluice. +¼" material was inspected for mineralization and discarded. Upon completion, the sluice box was carefully removed from the river and the concentrated heavy minerals were collected in a plastic sample bag, which was then tagged and transported back to the lab for further processing. GPS locations were recorded for the sluice site locations with a Garmin 60CSX GPS receiver. (See Appendix A for sluice Results).

While at the sluice site time was spend observing for outcrop, if outcrop was available, a CPS reading from the Radiation Solutions RS-230 spectrometer was recorded and a rock sample was collected. If only float and no outcrop was present around the sluice site, notes were recorded about the float, but no sample was taken. 5 rock samples and CPS readings were collected. Sampling involved collecting approximately 1-2kg of material and recording a basic description. Rock samples are stored and will be analyzed with the XRF analyzer when time permits.

Upon returning to the lab sluice samples were dried and sieved before completing analysis. This was done by putting the samples in an enclosed air tight drying room with a dehumidifier. Samples generally took 3-4 days to dry completely. When the sample was dry, the sample was classified by size fraction. This was accomplished using a Ro-tap testing sieve shaker. Sieve sizes used are displayed in table 2. Part way through the program an additional sieve, the -140 fraction, was added to the sieve shaker. This was done to make the panning of the finest fraction easier as the finer fractions would consist of more consistent grain sizes, and hence yield better panning results.

Table 2-Sieve Sizes Used

Size	Tyler Equivalent	US Sieve #
1.7mm	10 mesh	No. 12
1.00mm	16 mesh	No. 18
355µm	42 mesh	No. 45
250µm	60 mesh	No. 60
180µm	80 mesh	No. 80
104 µm	150 mesh	No. 140



Figure 3-Sample Test Vial

The No. 12 and 18 sieves were used primarily to remove the coarsest material. These fractions were inspected and retained for later analysis. Material from finer size fractions was collected with some material being put into 3.5cm diameter plastic vials. Vials were fitted with a thin plastic cover retained by a rubber band (see figure 3). The vials were then analyzed with an Olympus Innovx DP-6000 portable XRF fitted to an Innovx test stand. The analyzer was set to export epithermal gold indicators Zn, As, Pb and Sb as well as REE indicators Y, Nb, Zr and Th. XRF results can be seen in Appendix B and plotted results can be seen on Maps 1 and 2 in Appendix D.

Table 3-REE and Au indicator Elements

Commodity Sought	Indicator Elements	Reference
Rare Earth Elements	(Y, Nb, Zr, Th)	MacHattie, 2010b
Gold	(As, Sb, Pb, Zn)	MacHattie, 2011

Upon completion of XRF analyses the five finest fractions (-18,-45,-60,-80,-140) were inspected for visible gold grains. As there was not enough material from each sample fraction to utilize the Wilfley Table, each sample was carefully hand panned. The resulting heavy minerals were inspected under a binocular microscope for visible gold grains. Any visible gold was subjected to a 'smear test' which involved crushing and smearing gold grains on the bottom of a hard plastic pan using a dental pick under the microscope. Notes regarding other heavy minerals such as Fe-oxides and sulfides were also recorded and tabulated (See Appendix A-Stream Sediment Table of Results).



Figure 4-Portable XRF in test stand

## 8.0 Results of Work

Gold was visually observed in 7 of the 23 sluice samples, with 3 more samples having possible gold too fine to test with the smear test. The gold was observed in the finest fractions of all samples (ie in the -80 or -140 if the sample was sieved to -140), with one exception. The exception occurred in sample CL-12-233b in which a relatively coarse grain (0.2mm) was observed in the +80 fraction.

No correlations were observed between observed visible gold and XRF gold indicator results.

Only 5 outcrop samples and CPS readings were collected as the majority of the sluice sites were till covered. These rock samples are stored for future reference and XRF analysis.

REE indicators had anomalous Y values occurring in sample numbers CL-12-243 and CL-12-244, in which Y spiked up to 3066 and 1677 uncorrected ppm Y respectively which are approximately an order of magnitude above average background values on the licences. These two samples are from the sample



area in the middle of the licences, which has previously show up as a peak for REE indicators in past Clear Lake Resources work (2010). The 3066 uncorrected ppm value in sample CL-12-243 was also the radiometric high of 600 CPS observed in outcrop.

## **9.0 Conclusions and Recommendations**

The work program continued to provide interesting results. REE indicators are still pointing towards the central region of the licences with gold being observed throughout the property.

Further work should include continuing the sluice sampling program to try to find the source rock for the gold grains in the streams.

Further detailed prospecting in the central region for REE is warranted.



## 10.0 References

- Downey, N. 1978: Cobequid Project, exploration program 1977-78 on parts of 11E/11A, B, C and D; Gulf minerals Exploration Limite; Nova Scotia Department of Mines; Assessment Report ME 11E/11B 54-D-16(02).
- Gower, D.P. 1988: Geology and genesis of uranium mineralization in subaerial felsic volcanic rocks of the Byers Brook Formation and the comagmatic Hart Lake granite, Wentworth area, Cobequid Highlands, Nova Scotia; unpublished M.Sc. thesis, Memorial University of Newfoundland, p. 1-358.
- Mills, R.F. 1989, Geochemical Analyses of Bulk Stream Sediment Samples From Northern Nova Scotia; Nova Scotia Department of Mines and Energy, Open File Release 89-007
- MacHattie, T.G. and O'Reilly, G.A. 2009a: Timing of Iron Oxide-Copper-Gold (IOCG) Mineralization and Alteration along the Cobequid Chedabucto Fault Zone ; *in* Mineral Resources Branch, Report of Activities 2008; Nova Scotia Department of Natural Resources, Report ME 2009-1, p. 63-69.
- MacHattie, T.G. and O'Reilly, G.A. 2009b: Field and Geochemical Evidence for Contemporaneous Mafic Magmatism and Iron Oxide-Copper-Gold (IOCG) Mineralization and Alteration along the Cobequid-Chedabucto Fault Zone; *in* Mineral Resources Branch, Report of Activities 2008; Nova Scotia Department of Natural Resources, Report ME 2009-1, p. 71-83.
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- O'Reilly, G.A., 2010: The Oxford Tripoli Company Diatomite Mine at East New Annan; *in* Mineral Resources Branch, Nova Scotia Minerals Update Autumn 2010; Nova Scotia Department of Natural Resources v. 27-4, p. 5.
- Pe-Piper, G., Murphy, J.B. and Turner, D.S. 1989: Petrology, geochemistry and tectonic setting of some Carboniferous plutons of the eastern Cobequid Hills; *Atlantic Geology*, v. 25, p. 37-49.
- Pe-Piper, G., Piper, D.J.W 2002: A synopsis of the geology of the Cobequid Highlands, Nova Scotia; *Atlantic Geology*, v. 38, p.145-160.

## **11.0 Statement of Qualifications**

Lindsay John Allen  
Elk Exploration Ltd  
11 River Rd, Terence Bay River, NS  
B3T 1X2

Prospector ID #760

25 years Prospecting Experience  
Completed DNR Basic Prospecting Course 1986  
Completed DNR Advanced Prospecting Course 1987  
DNR Due Diligence Course  
Red Cross Emergency First Aid/CPR  
Boulder Buster Certification  
Inexperienced Miner  
Level 2 Handheld XRF Certification

Appendix A

Sluice Results Table



Sample Number	Sieve Fraction	Location		Licence #	Outcrop or Float Description	Outcrop CPS	Other Materials Noted						Gold				
		Easting	Northing				Arsenopyrite (AsPy)	Iron (Fe)		Black Sand		Light Colour Minerals (v/m-very minor, m-minor, avg-average)	(Y/N)	# Units	Size (mm)	Description	
								Specular Hematite	Regular Hemitite	Iron Pyrite (FeS)	%						% Magnetic
CLR-12-001	+45	479850	5046923	08772	Outcrop-dk grey basalt / mafic mix	90	0	n	y	n	40%	50%	negligible, mostly quartz	n			
CLR-12-001	+60	479850	5046923				0	n	y	y	50%	70%	m epidote, v/m garnet	n			
CLR-12-001	+80	479850	5046923				1	y	y	n	70%	80%	negligible, mostly quartz	n			
CLR-12-001	-80	479850	5046923				0	n	n	n	90%	80%	negligible, mostly quartz	n	0		
CLR-12-002	+45	479892	5046915	08772	Float-50% mafic and 50% basalt mix		3	n	y	n	50%	50%	m epidote, v/m garnet	n			
CLR-12-002	+60	479892	5046915				1	n	y	n	50%	80%	negligible, mostly quartz	n			
CLR-12-002	+80	479892	5046915				2	n	y	n	50%	90%	m epidote	n			
CLR-12-002	-80	479892	5046915				0	n	n	n	95%	95%	negligible, mostly quartz	y	3	(3)<0.05	Flakes: good condition
CLR-12-003	+45	475293	5047606	08775													
CLR-12-003	+60	475293	5047606														
CLR-12-003	+80	475293	5047606														
CLR-12-003	-80	475293	5047606														
CLR-12-004	+45	477170	5047794	08771	Float-Gravel: very mixed		0	y	y	n	30%	60%	abundant muscovite, m epidote	n			
CLR-12-004	+60	477170	5047794				0	y	y	y	50%	70%	abundant muscovite, m epidote	n			
CLR-12-004	+80	477170	5047794				1	y	y	y	60%	80%	m muscovite, m epidote	n			
CLR-12-004	-80	477170	5047794				0	n	n	n	70%	80%	negligible, mostly quartz	y	1	0.05	Flake: good condition
CLR-12-005	+45	477120	5047670	08771	Float-Gravel: very mixed		2	n	y	y	40%	70%	m epidote	n			
CLR-12-005	+60	477120	5047670				1	n	y	n	45%	60%	m epidote, v/m garnet	n			
CLR-12-005	+80	477120	5047670				0	n	y	n	60%	90%	m epidote, v/m garnet	n			
CLR-12-005	-80	477120	5047670				0	n	n	n	60%	90%	v/m garnet	n			
CLR-12-006	+45	475599	5045674	08771	Outcrop-Rhyolite	330	0	n	n	n	60%	80%	v/m muscovite, m epidote, m garnet	n			
CLR-12-006	+60	475599	5045674				0	n	n	n	60%	90%	v/m epidote, abundant garnet	n			
CLR-12-006	+80	475599	5045674				0	n	n	n	50%	90%	v/m epidote, abundant garnet	n			
CLR-12-006	-80	475599	5045674				0	n	n	n	30%	80%	v/m epidote, abundant garnet	y	4	(4)0.05	Flakes: good condition
CLR-12-007	+45	476751	5046022	08771	Float-Very mixed		0	n	y	n	50%	60%	v/m epidote, v/m garnet	n			
CLR-12-007	+60	476751	5046022				0	y	y	n	65%	70%	v/m epidote, v/m garnet	n			
CLR-12-007	+80	476751	5046022				2	n	y	n	50%	80%	v/m epidote, v/m garnet	n			
CLR-12-007	-80	476751	5046022				0	n	y	n	50%	80%	v/m epidote, v/m garnet	y	1	<0.05	Flake: good condition
CLR-12-008	+45	477343	5045490	08771	Outcrop-Pink / Brown / Black Rhyolite	500	2	n	y	n	50%	70%	v/m garnet	n			
CLR-12-008	+60	477343	5045490				0	y	y	n	90%	85%	v/m epidote, v/m garnet	n			
CLR-12-008	+80	477343	5045490				0	n	y	n	80%	85%	v/m epidote, v/m garnet	n			
CLR-12-008	-80	477343	5045490				0	n	y	n	40%	80%	v/m epidote, v/m garnet	y	2	<0.05	Flakes: good condition
CLR-12-009	+45	477640	5044852	08771	Float-Basalt plus Rhyolite		3	n	y	n	45%	90%	v/m epidote	n			
CLR-12-009	+60	477640	5044852				2	y	y	n	50%	90%	negligible, mostly quartz	n			
CLR-12-009	+80	477640	5044852				2	n	y	n	60%	90%	negligible, mostly quartz	n			
CLR-12-009	-80	477640	5044852				0	n	n	n	70%	90%	negligible, mostly quartz	n			
CLR-12-017a	+45	475849	5043382	08771	Float-50% Bass River Complex, 50% Byers Brook Formation		0	n	n	y	20%	70%	v/m garnet	n			
CLR-12-017a	+60	475849	5043382				0	n	n	y	25%	70%	negligible, mostly quartz	n			
CLR-12-017a	+80	475849	5043382				0	y	y	y	40%	90%	negligible, mostly quartz	n			
CLR-12-017a	-80	475849	5043382				0	n	n	y	70%	95%	negligible, mostly quartz	n			
CLR-12-017a	-140	475849	5043382				0	y	n	y	50%	95%	negligible, mostly quartz	n			
CLR-12-018	+45	476733	5043230	08771	Float-40% Bass River Complex, 60% Granitic - Rhyolitic		0	n	y	y	15%	50%	negligible, mostly quartz	n			
CLR-12-018	+60	476733	5043230				0	n	y	y	30%	70%	negligible, mostly quartz	n			
CLR-12-018	+80	476733	5043230				0	y	y	y	80%	70%	negligible, mostly quartz	n			
CLR-12-018	-80	476733	5043230				0	y	y	y	65%	90%	negligible, mostly quartz	n			
CLR-12-018	-140	476733	5043230				0	y	y	y	50%	95%	negligible, mostly quartz	n			



Sample Number	Sieve Fraction	Location		Licence #	Outcrop or Float Description	Outcrop CPS	Other Materials Noted							Gold			
		Easting	Northing				Arsenopyrite (AsPy)	Iron (Fe)			Black Sand		Light Colour Minerals (v/m-very minor, m-minor, avg-average)	(Y/N)	# Units	Size (mm)	Description
								Specular Hematite	Regular Hemitite	Iron Pyrite (FeS)	%	% Magnetic					
CLR-12-019	+45	476807	5043681	08771	Float-Bass River Complex, mylonetized / slatey		0	n	y	n	20%	60%	slatey grains, v/m epidote, v/m garnet	n			
CLR-12-019	+60	476807	5043681				0	y	y	n	30%	80%	slatey grains, v/m epidote, v/m garnet	n			
CLR-12-019	+80	476807	5043681				0	n	y	y	35%	90%	negligible, mostly quartz	n			
CLR-12-019	-80	476807	5043681				4	n	n	n	60%	90%	negligible, mostly quartz	n			
CLR-12-019	-140	476807	5043681				0	n	n	n	55%	90%	negligible, mostly quartz	n			
CLR-12-020	+45	476444	5043822	08771	Outcrop-dk bluish-grey Bass River Complex	100	0	n	y	n	10%	70%	v/m garnet, mostly quartz	n			
CLR-12-020	+60	476444	5043822				0	n	n	n	40%	70%	v/m garnet, mostly quartz	n			
CLR-12-020	+80	476444	5043822				0	y	y	y	60%	90%	v/m garnet, mostly quartz	n			
CLR-12-020	-80	476444	5043822				2	n	n	n	70%	95%	v/m garnet, mostly quartz	y	1	0.1	Flake: Well rounded
CLR-12-020	-140	476444	5043822				1	n	n	n	70%	90%	v/m garnet, mostly quartz	n			
CLR-12-021	+45	476009	5043944	08771	Float-50% Bass River Complex, 50% Granitic - Rhyolitic		0	n	n	n	15%	90%	negligible, mostly quartz	n			
CLR-12-021	+60	476009	5043944				0	n	n	n	35%	90%	v/m garnet	n			
CLR-12-021	+80	476009	5043944				0	n	n	n	60%	95%	v/m epidote, v/m garnet	n			
CLR-12-021	-80	476009	5043944				1	n	n	n	55%	90%	v/m garnet	n			
CLR-12-021	-140	476009	5043944				0	n	n	n	60%	90%	negligible, mostly quartz	n			
CLR-12-022	+45	475955	5044504	08771	Float-Granitic / Rhyolitic		1	n	n	n	25%	70%	negligible, mostly quartz	n			
CLR-12-022	+60	475955	5044504				0	n	n	n	30%	80%	negligible, mostly quartz	n			
CLR-12-022	+80	475955	5044504				0	n	n	n	35%	85%	negligible, mostly quartz	n			
CLR-12-022	-80	475955	5044504				0	n	n	n	60%	85%	negligible, mostly quartz	n			
CLR-12-022	-140	475955	5044504				0	n	y	n	40%	95%	negligible, mostly quartz	n			
CLR-12-023	+45	476491	5044691	08771	Float-Granitic / Rhyolitic		3	n	n	n	10%	70%	negligible, mostly quartz	n			
CLR-12-023	+60	476491	5044691				0	n	n	n	20%	90%	v/m epidote, v/m garnet	n			
CLR-12-023	+80	476491	5044691				0	n	n	n	30%	80%	v/m epidote, v/m garnet	n			
CLR-12-023	-80	476491	5044691				2	n	n	n	40%	80%	v/m epidote, v/m garnet	n			
CLR-12-023	-140	476491	5044691				0	n	n	n	30%	90%	negligible, mostly quartz	n			
CLR-12-024	+45	476464	5044575	08771	Float-Granitic / Rhyolitic		0	n	n	n	20%	80%	negligible, mostly quartz	n			
CLR-12-024	+60	476464	5044575				0	y	y	n	40%	85%	v/m epidote, v/m garnet	n			
CLR-12-024	+80	476464	5044575				0	y	y	n	45%	90%	v/m epidote, v/m garnet	n			
CLR-12-024	-80	476464	5044575				0	y	y	n	60%	90%	v/m epidote, v/m garnet	n			
CLR-12-024	-140	476464	5044575				0	n	n	n	45%	95%	negligible, mostly quartz	n			
CL-12-233b	+45	479215	5044502	08772	Float-mainly pinkish-grey basalt		0	y	y	y	30%	60%	neglible: mostly quartz	n			
CL-12-233b	+60	479215	5044502				0	y	y	n	50%	80%	v/m garnet	n			
CL-12-233b	+80	479215	5044502				0	y	y	n	60%	70%	v/m garnet	y	1	0.2	Slightly Rounded
CL-12-233b	-80	479215	5044502				0	y	y	n	60%	70%	v/m garnet	n			
CL-12-233b	-140	479215	5044502				0	y	y	n	60%	70%	v/m garnet	n			
CL-12-234	+45	480222	5042904	08772	Float-mainly sandstone? Also granitic plus quartz		0	n	y	n	50%	80%	m garnet	n			
CL-12-234	+60	480222	5042904				0	n	y	n	50%	90%	m garnet	n			
CL-12-234	+80	480222	5042904				0	n	y	n	40%	80%	m garnet	n			
CL-12-234	-80	480222	5042904				0	n	y	n	60%	75%	v/m garnet	n			
CL-12-234	-140	480222	5042904				0	n	y	n	60%	75%	v/m garnet	n			
CL-12-235	+45	478994	5043964	08772	Float-very mixed		0	n	y	n	60%	70%	v/m garnet	n			
CL-12-235	+60	478994	5043964				0	n	y	n	50%	80%	v/m garnet	n			
CL-12-235	+80	478994	5043964				0	n	y	n	80%	70%	v/m garnet	n			
CL-12-235	-80	478994	5043964				0	y	y	n	70%	70%	v/m garnet	n			
CL-12-235	-140	478994	5043964				0	y	y	n	70%	70%	v/m garnet	n			
CL-12-243	+45	477814	5046326	08772	Outcrop-dk grey basaltic rhyolite, cherty, silicious	600	0	y	y	n	35%	40%	negligible, mostly quartz	n			
CL-12-243	+60	477814	5046326				0	n	y	n	40%	50%	negligible, mostly quartz	n			
CL-12-243	+80	477814	5046326				0	n	y	n	45%	50%	negligible, mostly quartz	n			
CL-12-243	-80	477814	5046326				0	y	y	n	60%	60%	m muscovite, v/m epidote	?	1	<0.05	
CL-12-243	-140	477814	5046326				0	y	y	n	60%	60%	m muscovite, v/m epidote	n			
CL-12-244	+45	477934	5046507	08772	Float-silicious cherty basalt		0	n	y	n	30%	40%	m epidote, mostly quartz	n			

Sample Number	Sieve Fraction	Location		Licence #	Outcrop or Float Description	Outcrop CPS	Other Materials Noted							Gold			
		Easting	Northing				Arsenopyrite (AsPy)	Iron (Fe)			Black Sand		Light Colour Minerals (v/m-very minor, m-minor, avg-average)	(Y/N)	# Units	Size (mm)	Description
								Specular Hematite	Regular Hemitite	Iron Pyrite (FeS)	%	% Magnetic					
CL-12-244	+60	477934	5046507				0	y	y	n	30%	80%	m epidote, mostly quartz	n			
CL-12-244	+80	477934	5046507				0	y	y	n	25%	80%	mostly quartz	n			
CL-12-244	-80	477934	5046507				0	y	y	n	40%	60%	v/m garnet, mostly quartz	n			
CL-12-244	-140	477934	5046507				0	y	y	n	40%	60%	v/m garnet, mostly quartz	n			
CL-12-245	+45	477696	5046907	08772	Float-basalt		0	y	y	n	40%	60%	v/m epidote, mostly quartz	n			
CL-12-245	+60	477696	5046907				0	y	y	n	60%	80%	v/m epidote, mostly quartz	n			
CL-12-245	+80	477696	5046907				0	y	n	n	60%	80%	v/m epidote, mostly quartz	n			
CL-12-245	-80	477696	5046907				0	y	n	n	60%	85%	mostly quartz	n			
CL-12-245	-140	477696	5046907				0	y	n	n	60%	85%	mostly quartz	?	1	<0.05	
CL-12-246	+45	479881	5046862	08772	Float-dk purplish-brown basalt		0	y	y	n	25%	60%	v/m epidote, mostly quartz	n			
CL-12-246	+60	479881	5046862				0	y	y	n	20%	80%	v/m epidote, mostly quartz	n			
CL-12-246	+80	479881	5046862				0	y	y	n	40%	85%	v/m epidote, mostly quartz	n			
CL-12-246	-80	479881	5046862				0	y	y	n	70%	85%	v/m epidote, mostly quartz	n			
CL-12-246	-140	479881	5046862				0	y	y	n	70%	85%	v/m epidote, mostly quartz	?	1	<0.05	

**Appendix B**  
**XRF Results Table**

Sample	As_+45	Sb_+45	Pb_+45	Zn_+45	Y_+45	Th_+45	Zr_+45	Nb_+45	As_+60	Sb_+60	Pb_+60	Zn_+60	Y_+60	Th_+60	Zr_+60	Nb_+60
CLR-12-001	6	0	29	108	279	293	203	596	1	3	17	142	325	0	118	427
CLR-12-002	5	8	41	204	607	43	121	1773	0	5	20	81	453	0	148	624
CLR-12-004	3	1	27	31	494	26	200	1553	0	13	24	25	415	100	149	1103
CLR-12-005	3	0	29	107	289	100	334	1720	0	37	22	37	255	17	232	590
CLR-12-006	2	0	16	92	248	14	352	1161	0	2	18	634	273	40	187	867
CLR-12-007	8	0	46	177	846	257	191	1490	0	14	51	149	440	20	378	1577
CLR-12-008	1	4	26	86	431	52	270	1525	2	26	17	183	142	0	154	1735
CLR-12-009	10	15	17	92	633	99	235	1388	0	2	20	72	375	0	255	436
CL-12-017a	2	0	15	30	152	5	109	1316	5.9	2	14	26	304	141	230	1415
CL-12-018	10.5	0	19	26	151	0	135	695	11.8	4	24	27	242	4	136	416
CL-12-019	0	1	24	75	298	43	206	897	0	0	25	84	237	88	192	808
CL-12-020	0	2	18	49	324	0	139	854	0	0	13	39	234	0	138	1134
CL-12-021	1.1	9	23	52	266	13	223	719	0.2	0	17	32	200	30	137	742
CL-12-022	3.2	7	13	48	292	0	456	849	1	13	13	41	230	22	189	875
CL-12-023	4	13	22	160	376	46	340	1338	0	0	23	151	302	0	257	879
CL-12-024	2	1	14	75	270	17	253	947	0	8	17	68	199	61	200	926

Sample	As_+80	Sb_+80	Pb_+80	Zn_+80	Y_+80	Th_+80	Zr_+80	Nb_+80	As_-80	Sb_-80	Pb_-80	Zn_-80	Y_-80	Th_-80	Zr_-80	Nb_-80
CLR-12-001	4	0	17	84	255	64	307	890	5	2	16	62	210	61	156	1915
CLR-12-002	0	0	15	64	141	0	180	1070	0	1	12	65	170	0	187	1383
CLR-12-004	3	14	15	37	361	20	206	1532	2	13	18	94	1026	56	271	1867
CLR-12-005	0	0	14	51	245	0	134	1485	1	2	9	34	339	0	116	1818
CLR-12-006	0	0	22	1266	262	136	201	2609	0	1	38	746	251	95	526	1387
CLR-12-007	6	12	19	232	316	0	270	1442	10	13	27	151	251	0	143	1464
CLR-12-008	2	3	14	66	352	118	520	2473	3	11	15	76	461	160	233	1558
CLR-12-009	2	0	9	50	152	0	103	528	2	2	15	36	228	0	78	976
CL-12-017a	6.8	0	13	25	259	0	210	2045	8	9	21	48	201	0	313	1228
CL-12-018	3.9	0	17	25	224	63	262	1094	18	0	54	152	233	103	246	1340
CL-12-019	1.4	6	17	77	340	27	245	1262	5	29	36	168	392	162	277	1233
CL-12-020	2.9	7	14	52	247	53	163	1924	4	0	30	134	295	0	262	1143
CL-12-021	0	6	18	35	255	11	383	1581	4	22	23	68	275	129	204	1454
CL-12-022	0	0	15	53	207	87	149	1035	3	0	18	81	385	9	309	980
CL-12-023	0.7	10	27	145	396	7	685	1415	9	0	52	361	681	167	275	1931
CL-12-024	0	2	22	73	905	71	327	1415	12	9	81	187	532	229	224	1050



# APPENDIX C

## XRF Analyzer Specs and Theory

**ΔDELTA**  
*Dynamic XRF*



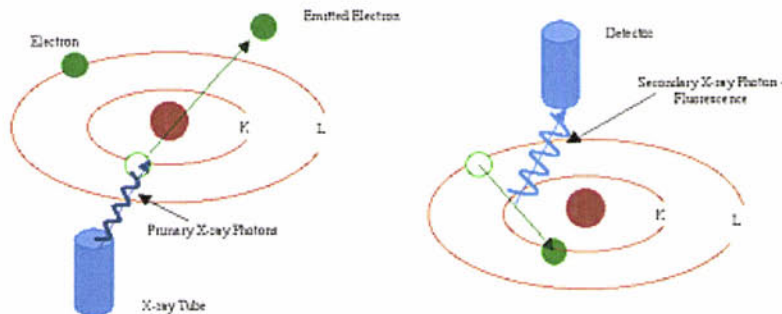
# X-Ray Fluorescence (XRF) Spectrometry

## BASIC THEORY

Although more popularly known for its diagnostic use in the medical field, the use of x-rays forms the basis of many other powerful measurement techniques, including X-ray Fluorescence (XRF) Spectrometry.

XRF Spectrometry is used to identify elements in a substance and quantify the amount of those elements present to ultimately determine the elemental composition of a material. An element is identified by its characteristic X-ray emission wavelength ( $\lambda$ ) or energy (E). The amount of an element present is quantified by measuring the intensity (I) of its characteristic emission.

All atoms have a fixed number of electrons (negatively charged particles) arranged in orbitals around the nucleus. Energy Dispersive (ED) XRF and Wavelength Dispersive (WD) XRF Spectrometry typically utilize activity in the first three electron orbitals, the K, L, and M lines, where K is closest to the nucleus.



In XRF Spectrometry, high-energy primary X-ray photons are emitted from a source (X-ray tube) and strike the sample. The primary photons from the X-ray tube have enough energy to knock electrons out of the innermost, K or L, orbitals. When this occurs, the atoms become ions, which are unstable. An electron from an outer orbital, L or M, will move into the newly vacant space at the inner orbital to regain stability. As the electron from the outer orbital moves into the inner orbital space, it emits an energy known as a secondary X-ray photon. This phenomenon is called fluorescence. The secondary X-ray produced is characteristic of a specific element. The energy (E) of the emitted fluorescent X-ray photon is determined by the difference in energies between the initial and final orbitals of the individual transitions.

This is described by the formula

$$E=hc\lambda^{-1}$$

where  $h$  is Planck's constant;  $c$  is the velocity of light; and  $\lambda$  is the characteristic wavelength of the photon.

Energies are inversely proportional to the wavelengths; they are characteristic for each element. For example the  $K\alpha$  energy for Iron (Fe) is about 6.4keV. Typical spectra for EDXRF Spectrometry appear as a plot of Energy (E) versus the Intensity (I).

### **Elemental Analysis**

XRF Spectrometry is the choice of many analysts for elemental analysis. XRF Spectrometry easily and quickly identifies and quantifies elements over a wide dynamic concentration range, from PPM levels up to virtually 100% by weight. XRF Spectrometry does not destroy the sample and requires little, if any, sample preparation. It has a very fast overall analysis turnaround time. These factors lead to a significant reduction in the per sample analytical cost when compared to other elemental analysis techniques.

Aqueous elemental analysis instrument techniques typically require destructive and time-consuming specimen preparation, often using concentrated acids or other hazardous materials. Not only is the sample destroyed, waste streams are generated during the analysis process that need to be disposed of, many of which are hazardous. These aqueous elemental analysis techniques often take twenty minutes to several hours for sample preparation and analysis time. All of these factors lead to a relatively high cost per sample. However, if PPB and lower elemental concentrations are the primary measurement need, aqueous instrument elemental analysis techniques are necessary.

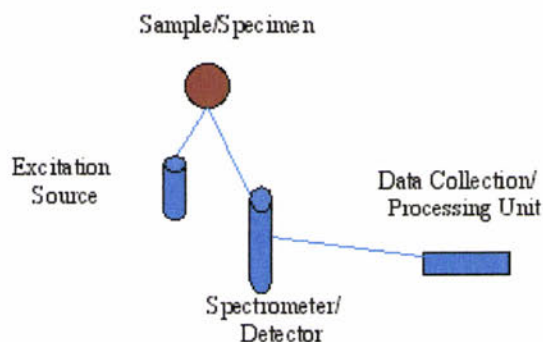
All elemental analysis techniques experience interferences, both chemical and physical in nature, and must be corrected or compensated for in order to achieve adequate analytical results. Most aqueous instrument techniques for elemental analysis suffer from interferences that are corrected for by extensive and complex sample preparation techniques, instrumentation modifications or enhancements, and by mathematical corrections in the system's software. In XRF Spectrometry, the primary interference is from other specific elements in a substance that can influence (matrix effects) the analysis of the element(s) of interest. However, these interferences are well known and documented; and, instrumentation advancements and mathematical corrections in the system's software easily and quickly correct for them. In certain cases, the geometry of the sample can affect XRF analysis, but this is easily compensated for by selecting the optimum sampling area, grinding or polishing the sample, or by pressing a pellet or making glass beads.

**Quantitative elemental analysis** for XRF Spectrometry is typically performed using Empirical Methods (calibration curves using standards similar in property to the unknown) or Fundamental Parameters (FP). FP is frequently preferred because it allows elemental analysis to be performed without standards or calibration curves. This enables the analyst to use the system immediately, without having to spend additional time setting up individual calibration curves for the various

elements and materials of interest. The capabilities of modern computers allow the use of this non-standard mathematical analysis, FP, accompanied by stored libraries of known materials, to determine not only the elemental composition of an unknown material quickly and easily, but even to identify the unknown material itself.

### Spectrometers

Innov-X Systems utilizes the EDXRF Spectrometer technique for its mechanical simplicity and excellent adaptation to portable field use. An EDXRF system typically has three major components: an excitation source, a spectrometer/detector, and a data collection/processing unit. The ease of use, rapid analysis time, lower initial purchase price and substantially lower long-term maintenance costs of EDXRF Spectrometers have led to having more systems in use today worldwide than WDXRF Spectrometer systems. Handheld, field portable EDXRF units can be taken directly to the sample as opposed to bringing the sample to the analyzer and configuring it to fit in an analysis chamber. Innov-X Systems portable, handheld EDXRF units solve real 21<sup>st</sup> century application problems: solving crimes, analyzing alloys, exposing pollution, preserving history, searching for WMD's, conserving art treasures, and a myriad of other elemental field-oriented analyses.





The Deltas' Cutting-edge features include:

- Exceptional speed and sample throughput due to state-of-the-art electronics, a floating point processor, and redesigned analytical geometry
- Ruggedized, weather and dustproof industrialized LEXAN housing – no PDA or movable screen – provides superior reliability
- Significant improvement in LODs and light element analysis resulting from the DELTA's unique 4W, 200 $\mu$ A (max) x-ray tube



- Advanced integrated technology including an accelerometer, barometer, true hot-swap battery capabilities, and other innovations
- Icon-driven UI via bright, Blanview <sup>TM</sup> color touchscreen
  - brightens in sunlight – easy to read in all environments
- Available with fully integrated camera and X-ray spot collimation
  - crisp accurate sample images that can be archived into memory
  - small spot collimation for focusing the beam to a 3mm diameter spot.

Innov-X has reinvented on-site analysis with the DELTA line; a new breed of handheld XRF. We've redesigned our analyzers from the ground up to create instruments that are both analytically superior AND rugged enough for virtually any environment. The DELTA analyzers feature the very latest in large area silicon drift detector technology, and unique 4W, 200µA (max) x-ray tubes for maximized accuracy and precision.

DELTA analyzers are also fully industrialized tools, and offer unsurpassed testing speed; yielding significantly increased productivity and throughput for operators. Take hundreds more tests per day with the DELTA analyzer. Smart on the inside. Tough on the outside. **No compromises.**

The DELTA line of analyzers feature our signature upgradeability. Customers may purchase a value-leading **Classic** model and upgrade to the analytically best **Premium** model at any time as analytical needs change - all with the same hardware platform and intuitive, friendly user interface.

The Innov-X Handheld XRF for elemental analysis meets EPA Method 6200 for metals in soil, NIOSH Method 7702 for lead in air filters, and OSHA Methods OSHA1 and OSHA1 for lead in air filters and dust wipes. The 8 RCRA Metals and Priority Pollutant Metals are easily monitored on-site with the Innov-X Handheld XRF.

*The Innov-X Systems Materials Testing & Mining Analyzers* include standard hardware and accessories. Capabilities available include Fundamental Parameters, Empirical Analysis, linear or quadratic calibration modes, LEAP for Light Element Analysis, and Single or Multi element analysis capability.

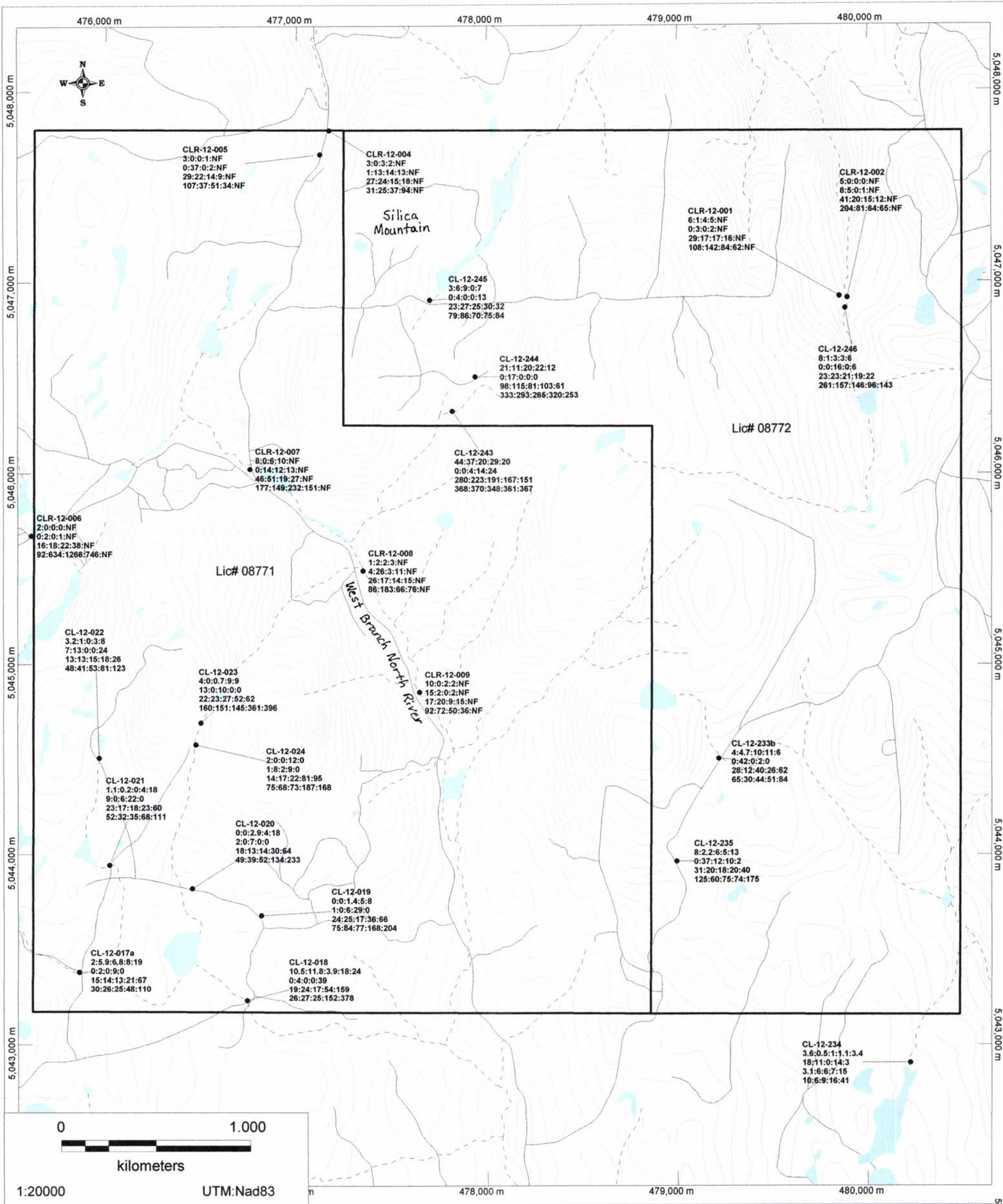
## Appendix D

### Maps



Map 1

Licences 08771 and 08772 2012 Sluice Sample Locations and XRF Results for Gold Indicators



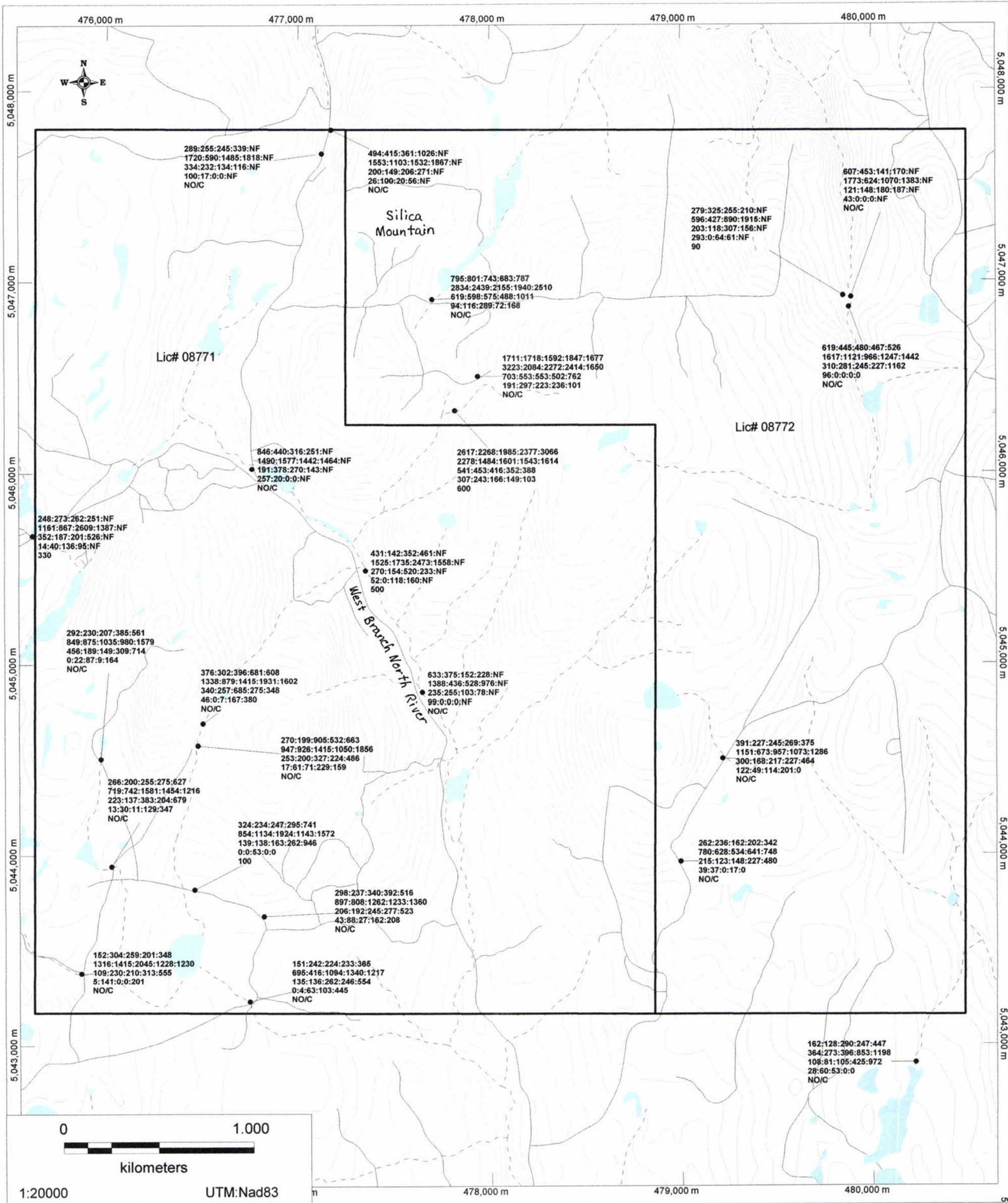
Sluice Sample Location XRF Results  
(As +45:+60:+80,-80,-140)  
(Sb +45:+60:+80,-80,-140)  
(Pb +45:+60:+80,-80,-140)  
(Zn +45:+60:+80,-80,-140)\*

Local Roads and Trails

Streams



Licences 08771 and 08772 2012 Sluice Sample Locations with CPS and REE Indicator XRF Results



Legend

- Sluice Sample Location XRF Results  
(Y +45:+60:+80,-80,-140)  
(Nb +45:+60:+80,-80,-140)  
(Zr +45:+60:+80,-80,-140)  
(Th +45:+60:+80,-80,-140)\*  
CPS Reading\*\*
  - License Boundary
  - Local Roads and Trails
  - Streams
- \* units of uncorrected ppm, NF means no fraction Sieved  
\*\* if out crop was present at site



**Form 10 - Statement of Assessment Work Expenditure**  
(pursuant to the *Mineral Resources Act*, S.N.S. 1990, c. 18, s. 43(1))

(Complete as necessary to substantiate the total claimed.)

Re: Licence No. 08771 Date of issue November 19, 2009

Type of Work		Amount Spent
1. Prospecting	<u>2</u> days	700
2. Geological mapping	_____ days	
3. Trenching/stripping/refilling	_____ m <sup>2</sup> / _____ m <sup>3</sup>	
4. Assaying & whole rock analysis	_____ #	
5. Other laboratory	<u>64</u> #	8,960
6. Grid:		
(a) Line cutting	_____ km	
(b) Picket setting	_____ km	
(c) Flagging	_____ km	
7. Geophysical surveys		
Airborne:		
(a) EM/VLF	_____ km	
(b) Mag or Grad	_____ km	
(c) Radiometric	_____ km	
(d) Combination	_____ km	
(e) Other _____	_____ km	
8. Geophysical surveys		
Ground:		
(a) EM/VLF	_____ km	
(b) Seismic soundings	_____ #	
(c) Magnetic/telluric	_____ km	
(d) IP/resistivity	_____ km	
(e) Gravity	_____ km	
(f) Other _____	_____ km	
9. Geochemical surveys		
(a) Lake, stream, spring		
(i) Water	_____ samples	
(ii) Sediments	<u>98</u> samples	
(b) (i) Rock	_____ samples	
(ii) Core	_____ samples	
(iii) Chips	_____ samples	
(c) (i) Soil	_____ samples	
(ii) Overburden	_____ samples	
(d) Gas	_____ samples	
(e) Biogeochemistry	_____ samples	
(f) Sample collection	<u>14</u> days	5,100
(g) Other _____		
10. Drilling:		
(a) Diamond (# holes/m)	_____ / _____ m	
(b) Percussion (# holes/m)	_____ / _____ m	
(c) Rotary (# holes/m)	_____ / _____ m	
(d) Auger (# holes/m)	_____ / _____ m	
(e) Reverse circulation (# holes/m)	_____ / _____ m	
(f) Logging, supervision, etc.	_____ days	
(g) Sealing (# holes)	_____ #	
11. Other (describe)		
Hotel, Mileage, Food, Chainsaw, ATV, Spectrometer		3,889 .
<b>Subtotal</b>		18,649
<b>Overhead costs</b>		
12. Secretarial services		
13. Drafting services		
14. Office expenses (rent, heat, light, etc.)	10%	1,907
15. Field supplies		420
16. Compensation paid to landowners		
17. Legal fees		
18. Other (describe)		
<b>Subtotal</b>		2,327
<b>Grand total</b>		20,975

*L. O. O.*

[illegible]

2 of 2

**Form 10 - Statement of Assessment Work Expenditure**  
(pursuant to the *Mineral Resources Act*, S.N.S. 1990, c. 18, s. 43(1))

(Complete as necessary to substantiate the total claimed.)

Re: Licence No. 08772 Date of issue November 19, 2009

Type of Work		Amount Spent
1. Prospecting	<u>2</u> days	700
2. Geological mapping	_____ days	
3. Trenching/stripping/refilling	_____ m <sup>2</sup> / _____ m <sup>3</sup>	
4. Assaying & whole rock analysis	_____ #	
5. Other laboratory	<u>43</u> #	6,020
6. Grid:		
(a) Line cutting	_____ km	
(b) Picket setting	_____ km	
(c) Flagging	_____ km	
7. Geophysical surveys		
Airborne:		
(a) EM/VLF	_____ km	
(b) Mag or Grad	_____ km	
(c) Radiometric	_____ km	
(d) Combination	_____ km	
(e) Other _____	_____ km	
8. Geophysical surveys		
Ground:		
(a) EM/VLF	_____ km	
(b) Seismic soundings	_____ km	
(c) Magnetic/telluric	_____ km	
(d) IP/resistivity	_____ km	
(e) Gravity	_____ km	
(f) Other _____	_____ km	
9. Geochemical surveys		
(a) Lake, stream, spring		
(i) Water	_____ samples	
(ii) Sediments	<u>63</u> samples	
(b) (i) Rock	_____ samples	
(ii) Core	_____ samples	
(iii) Chips	_____ samples	
(c) (i) Soil	_____ samples	
(ii) Overburden	_____ samples	
(d) Gas	_____ samples	
(e) Biogeochemistry	_____ samples	
(f) Sample collection	<u>9</u> days	3,350
(g) Other _____		
10. Drilling:		
(a) Diamond (# holes/m)	_____ / _____ m	
(b) Percussion (# holes/m)	_____ / _____ m	
(c) Rotary (# holes/m)	_____ / _____ m	
(d) Auger (# holes/m)	_____ / _____ m	
(e) Reverse circulation (# holes/m)	_____ / _____ m	
(f) Logging, supervision, etc.	_____ days	
(g) Sealing (# holes)	_____ #	
11. Other (describe)		
Hotel, Mileage, Food, Chainsaw, ATV, Spectrometer		2,404.
<b>Subtotal</b>		12,474
<b>Overhead costs</b>		
12. Secretarial services		
13. Drafting services		
14. Office expenses (rent, heat, light, etc.)	10%	1,275
15. Field supplies		280
16. Compensation paid to landowners		
17. Legal fees		
18. Other (describe)		
<b>Subtotal</b>		1,555
<b>Grand total</b>		14,029

*Sal*



[illegible]

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