2023 Exploration in the Pole Lake Area of Lackner Lake Alkalic Complex, Porcupine Mining Division

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Report for International Explorers and Prospectors Ltd., Porcupine Mining Division

NTS Reference Chapleau 41 O/14.

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EXECUTIVE SUMMARY

This report encompasses the results of 2023 geological-, lithochemical-, and radiometric-focused fieldwork conducted on claim 4204340 of the Pole Lake area in the Lackner Lake alkalic silicate rock-carbonatite complex of the Chapleau area, Porcupine Mining District. The purpose of the present work was to locate the historical "Area No. 2" niobium showing on a 1952 claim 73533 initially documented by Parsons (1955, p.9) that reported 0.79 and 1.33 wt.% Nb_2O_5. The fieldwork involved two proximal locations, along the prominent 340^0-oriented cliff area and an area 60 m to the northwest that was examined in detail.

The radiometric survey examined 22 localities with a Radionics RS-120 Super-Scintillometer. It delineated two small, ovoid, east- and northeast-oriented zones of total counts per second above 1000 with a maximum value of 3300 cps in the area of detailed work. Magmatic-foliated biotite-clinopyroxene ijolite along the cliff area revealed a considerably greater range of radioactivity of 3300 to 8700 cps.

Petrographic examination on cut slabs and thin sections was undertaken on three samples with the highest Total rare earth (TREE) content of 0.31% to 7.6 wt.%. The predominant minerals include green clinopyroxene, grey to pink nepheline, biotite, magnetite, and K-feldspar. Accessory minerals comprise pyrochlore, allanite, zircon, and apatite. Barite is present in all samples but varies from 1 to 15%. Sparse britholite was tentatively identified in sample 72301 as weathered pits that contain partly altered and unaltered red-brown grains. Sample 72307 has an abundant red-brown mineral that is inferred to be hydronephelite.

Lithochemical work was undertaken on twenty-three samples for major, minor, and trace elements. Total rare earth and niobium values vary considerably in the survey area. Exceptionally high TREE values are well known in the cliff area, where several property examinations have established anomalous values between 0.2 wt.% and 8.25 wt.%.

The detailed sampling 60 m northwest of the cliff area demonstrates that anomalous TREE values are present in a broad east-west-oriented zone where values exceed 1000 ppm. Here, TREE values have a mean of 1589 ppm in a range of 1207 to 3362 ppm within a 15- to 30-meter-wide zone open in both directions.

Associated elevated barium (mean: 1589 ppm; range 972 ppm to 1.02 wt.%) coupled with pink syenite breccia pods and veins indicate that the REE mineralization in the cliff area extends to the west.

The presence of the prominent negative cerium anomaly has now been verified in four different lithochemical databases. The anomaly is inferred to represent the depletion of Ce^{+4} via the interaction of sulfate-bearing oxidized hydrothermal fluids active along the northwest-southeast-oriented, possible fault system now marked by two prominent gorges.

There is no apparent correlation between niobium and TREE, with an R^2 of 0.02. TREE shows a weak to modest correlation with P_2O_5 (overall R^2 = 0.38) as the phosphate-bearing minerals monazite and britholite [$(Ce, Ca, Th, La, Nd)_5(SiO_4, PO_4)_3(OH, F)$] would contain most of the rare earth elements.

Niobium values are sporadic in the detailed sampling area, with a mean of 1072 ppm in a wide range of 40 ppm to 4820 ppm. Previous and present analyses from the cliff area reveal a similar range of Nb and Ta, except for one sample, which contained 1 wt.% Nb and 317 ppm Ta, the highest values in this area. All samples from the cliff area have the following means and ranges: Ta (53 ppm; range 0.6 to 139 ppm) and Nb (1292 ppm; range 21 ppm to 1 wt.%). There is a strong association between Ta and Nb (R^2= 0.79) in analyses, which implies pyrochlore is the main mineralogical control for these elements.

Barium is a significant component of the REE-mineralization in the cliff area and appears mostly contained in barite. Levels of barium exceed 1 wt. % in the area of detailed sampling, and there is a weak correlation (R^2 = 0.27) between TREE and barium. The barium data and syenite breccia pods in ijolite at 72323 with 0.7 wt.% barium suggest that the REE mineralization system is wider than previously inferred along the northwest-southeast lineament topographically marked by a prominent gorge. Based on sample distribution, this zone could have a minimum width of 40 m and a minimum strike length of 350 m.

Several recommendations for future mineral exploration include using barium combined with negative cerium anomalies as a potentially useful pathfinder guide for zones of TREE enrichment.

INTRODUCTION

This report encompasses the results of 2023 geological-, lithochemical- and radiometric-focused fieldwork conducted on claim 4204340 of the Pole Lake area in the Lackner Lake alkalic silicate rock-carbonatite complex of the Chapleau area, Porcupine Mining District. The purpose of the present work was to locate the historical "Area No. 2" niobium showing on a 1952 claim 73533 initially documented by Parsons (1955, p.9) that reported 0.79 and 1.33 wt.% Nb_2O_5. A strong radioactive zone of 33m (100 ft) strike length by a width of 3 to 5m (10-15 feet) was stated to occur along a cliff face and hosted by “dark hybrid rocks” (foliated ijolite) cut by pink syenite dykes (Parsons, 1955, p.9).

Two days of fieldwork (September 7 and October 28, 2023) were undertaken in the area of cliff exposures adjacent to the west side of Pole Lake. Twenty-three grab samples were selected in an area of detailed investigation, including three samples from a nearby location along a prominent cliff. The samples were submitted in two batches for major, minor, and trace element analysis by Activation Laboratories (Analytical Package 4-Litho) in Ancaster, Ontario that involves lithium metaborate/tetraborate fusion ICP whole rock and trace element by ICP-MS. Certificates of the analytical work are given in Appendix 1.

PROPERTY LOCATION

The Pole Lake claims are situated in the Lackner Lake niobium-rare earth element property (Figure 1), 23 km east of Chapleau, Ontario. They are readily accessible by the Nemegos Mine Road off Highway 102 and by all-terrain vehicles on the property.

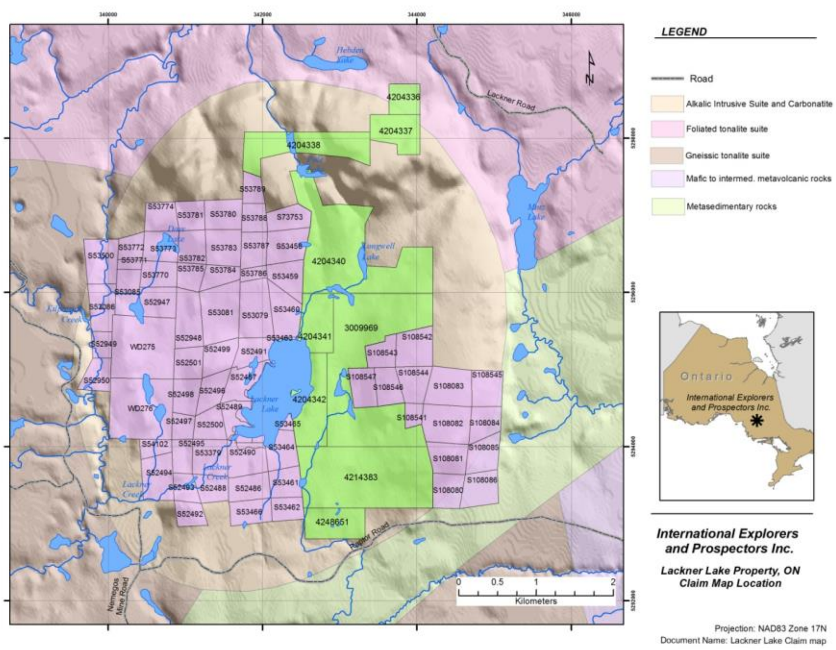

Figure 1. The claim distribution of International Explorers and Prospectors with a digital elevation model for the Lackner Lake alkalic complex and surrounding terrain.

The primary access to the Pole Lake area is via a former Ontario Lands and Forest access road to a decommissioned fire tower at the highest elevation in the area. The Pole Lake area is moderately rugged, with a maximum relief of 150m over the Lackner Lake alkalic complex, and is marked by two prominent gorges possibly produced by Pleistocene outwash activity (Gao et al., 2014). Southern parts of the complex are generally of lower relief and covered by sand and gravel outwash deposits. At higher elevations above the 440 m topographic contour, basal till with abundant boulders of nepheline syenite is a dominant surficial deposit.

GENERAL GEOLOGY

The 1138±29 Ma Lackner Lake alkalic complex is situated within the Kapuskasing structural zone that also hosts several other alkalic rock-carbonatite intrusions such as at Seabrook Lake, Borden Lake, Nemegosenda Lake and in Cargill Township (Bell and Blenkinsop, 1980; Sage, 1988b). Woolley and Kjarsgaard (2009) assigned number 210 to the Lackner Lake complex on the world carbonatite map: *see* ftp://ftp2.cits.rncan.gc.ca/pub/geott/ess_pubs/225/225115/gscof_5796_e_2008_mn01.pdf>

The Lackner Lake complex (Figure 2) exhibits a partial ring structure marked by an outer unit of nepheline syenite, an inner partial ring of ijolite and ijolite breccia, and an adjacent inner mass of nepheline syenite. Late veins and masses of magnetite- and apatite-magnetite-rich rocks are well developed around the Zone 6 deposit of Multi-Minerals Ltd and the McVittie pit, 650 m north.

The Lackner Lake alkalic complex is hosted by tonalite to granodiorite gneiss of the Kapuskasing Structural Zone. It appears as a prominent ovoid anomaly in the first vertical derivative magnetic field (GSC, 2001).

The main rock types in the Lackner Lake alkalic complex comprise foliated and massive ijolite, malignite, melteigite, ijolite breccia, leucocratic and melanocratic nepheline syenite and sparse, late dykes of carbonatite (sövite and silicocarbonatite) and apatite-magnetite masses and veins. Local fenitization of granitic gneiss host rocks has been documented by Sage (1988a).

Minor rock types include mafic and ultramafic alkalic enclaves in nepheline syenite and glimmerite, a phlogopite-rich rock considered to represent a metasomatic derivative as at the Araxa alkalic complex in Brazil (Traversa et al., 2001) and urtite. Magnetite-rich veins, commonly with green apatite, represent the second youngest intrusive unit in the complex and cross-cut most units. Carbonatite veins on the surface are rare and represent the youngest unit as they cross-cut magnetite-rich mineralization, inferred as phosphorite, at formerly undocumented historic trenches near Camp Lake (Breaks 2014).

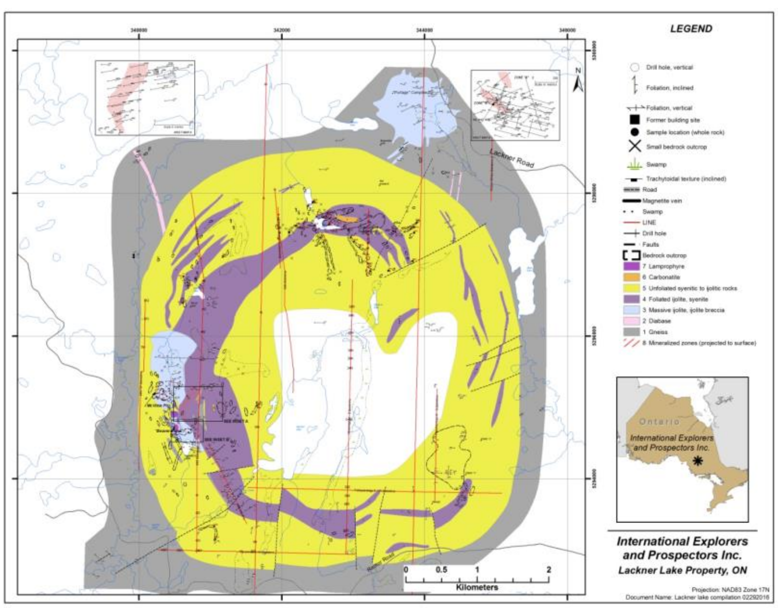

Figure 2. Geology of the Lackner Lake alkalic silicate rock-carbonatite complex after Parsons (1961b).

PREVIOUS GEOLOGICAL WORK

Initial exploration in the Pole Lake area was undertaken in 1952 by three privately incorporated companies: LeBrasseur Lackner Inc., Derraugh Lackner Inc., and MacDonnell Lackner Inc. of Buffalo, N.Y. (Parsons 1955, 1961, and Sage 1988, p.46). A magnetometer survey was conducted, and four drill holes totaling 307m (1,007 feet) investigated various high magnetic anomalies, with the nearest hole to the current project situated 4000 m west near the former fire tower. The property was later examined by G. E. Parsons for Dominion Gulf Minerals in 1955 on the Scott claims (MNDM Assessment File 63.3370 that contains an unpublished report by Parsons 1955).

"Area 2: Claim 73533. Here, syenite dykelets cutting dark hybrids plus a few small patches of apatite are quite radioactive over 10- to 15-foot width along a 100-foot length along a cliff face. The more radioactive apatite-rich patches assayed 0.79% Nb2O5 and 1.33% Nb2O5."

Sage (1988a) undertook a geological survey of the Lackner Lake complex and submitted 35 samples from the Pole Lake area for lithochemistry. In 2007, Vale Exploration conducted a one-day property examination of two areas of the Lackner Lake area (No. 6 Deposit and Pole Lake area)—high values of rare earth elements up to 8.00 wt.% Total REE and 0.20 wt.% Yttrium was documented at Pole Lake in the northern part of the Lackner Lake alkalic complex (Vale Canada Exploration 2008). This brief survey found the following maximum values (sample RX369663): niobium one wt. %, tantalum 317 ppm, Total Rare Earths (TREE) 8 wt.%, neodymium 1.9 wt.%, praseodymium 0.5 wt.%, europium 622 ppm, yttrium 0.2 wt.%, thorium 0.5 wt.% and uranium 560 ppm.

6378366 Canada Inc. and 6070205 Canada Inc. (2009) collected forty grab samples over a 150 m by 225m area of outcrops and angular boulder talus along the cliff area and delineated a 75 by 175m area of anomalous Total REE values ($mean_8$ = 4.25 wt.%; range: 1.83 to 8.25 wt.%).

Follow-up work by Breaks (2013 and 2014) examined REE-Y-Ba-Th-Nb mineralization exposed in the cliff area adjacent to Pole Lake. This work verified the anomalous Total REE values, amongst the highest yet reported in Ontario. A detailed electron microprobe mineralogical examination was undertaken on two samples from the Pole Lake REE-Y-Ba-Th-Nb occurrence [International Explorers and Prospectors 2009 sample 3446-B (6.07 wt.% TREE) and Vale Exploration 2008 sample RX369663 (8 wt.% TREE)] that verified the presence of britholite-(La), a britholite-like mineral, monazite, barite, and Y-LREO-bearing fluorapatite in hydrothermally altered nepheline syenite (Breaks 2013). Britholite-(La) and its altered equivalents occur in two textural settings:

- primary grains enveloped by later phlogopite, nepheline and K, Na feldspar, and,
- late-stage micro-vein infillings.

This work also included an analysis of a high-purity apatite mineral separate from a carbonatite dyke that contained 3.22 wt.% TREO and 1119 ppm Yttrium (Breaks 2013) with significant levels of the critical rare earths Dy (298 ppm), Eu (220 ppm), and Tb (61 ppm).

PRESENT SURVEY

Bulk rock samples and radiometric analysis locations are given in Figures 3 and 4. Location data were collected with a Garmin GPS Map 66i device. Rock samples destined for chemical lab analysis were cleaned of soil and adhered to organic material. A water-cooled diamond saw removed weathered surfaces, and a reference hand specimen was retained for each sample.

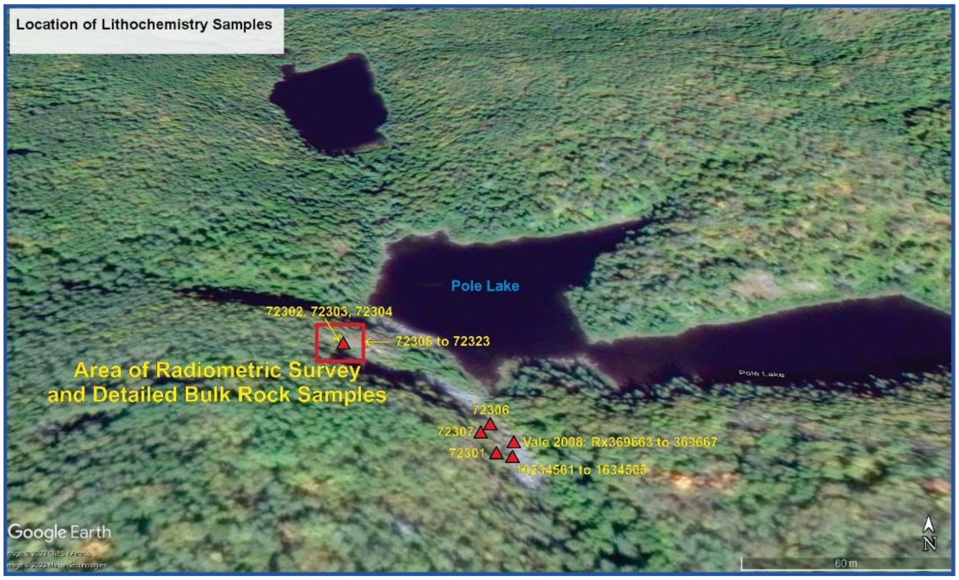

Figure 3. The location of lithochemistry samples in the Pole Lake area from the present survey and selected samples from Vale Exploration (2007) and Breaks (2014). The area of detailed sampling and radiometric measurements is indicated by the red rectangle detailed in Figures 3 and 4.

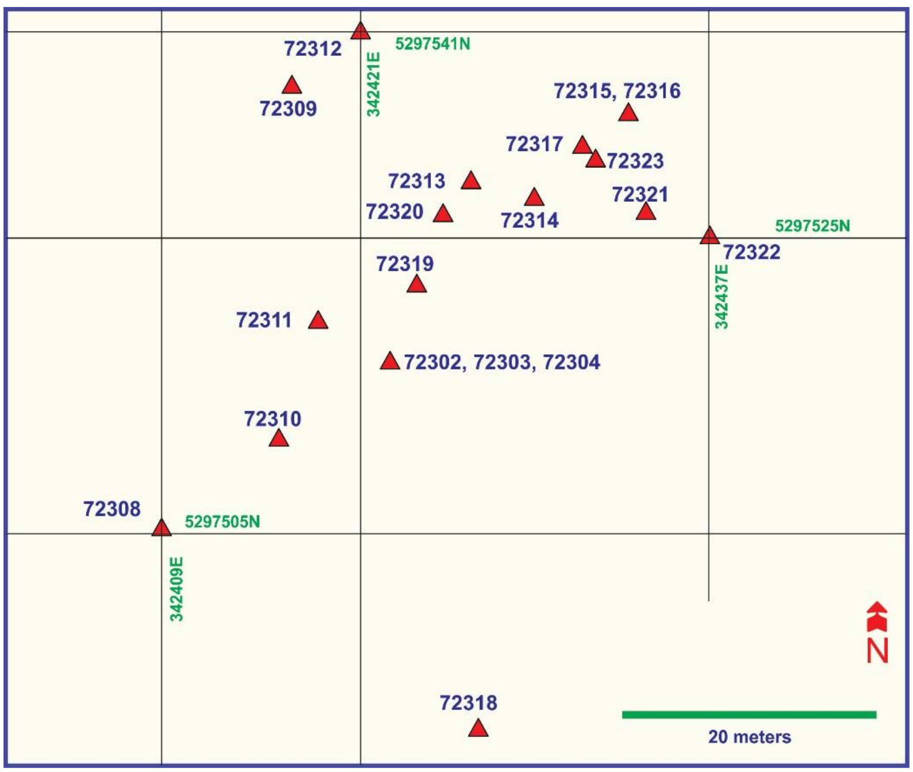

Figure 4. Detailed locations of lithochemistry samples within the inset area of Figure 3.

Radiometric Survey

The fieldwork included a radiometric examination of 22 localities with a Radionics RS-120 Super-Scintillometer (serial number 1314) loaned from the Ministry of Northern Development and Mines in Timmins. The area investigated is located in Figures 3 and 4, and the radiometric data are presented in Table 1. The latter area, which was examined in detail, shows hand-contoured total counts per second. The survey delineated two small, ovoid, east- and northeast-oriented zones of total counts per second above 1000 (Figure 5) with a maximum value of 3300 cps. In foliated ijolite, a considerably higher 3300 to 8700 cps radioactivity was encountered along the cliff face near sample sites 72301 and 72302.

Bulk Rock Sample #	Radiometric Site #	UTME	UTMN	Counts/sec
72301		342494	5297450	8700
72302		342423	5297519	3300
72303		342423	5297519	600-800
72304		342423	5297519	600-800
72306		342491	529747	15983
72307		342488	5297462	2600
72308	L1	342409	5297505	725
72309	L2	342416	5297536	750
72310	L3	342416	5297510	600-700
72311	L4	342418	5297518	600-630
72312	L5	342421	5297541	500
72313	L6	342429	5297529	1300
72314	L7	342434	5297528	600
72315	L8	342435	5297530	1300
72316	L9	342442	5297535	600
72317	L10	342438	5297532	1100
72318	L11	342429	5297491	450-500
72319	L12	342425	5297521	1050
72320	L13	342427	5297526	700
72321	L14	342443	5297527	600
72322	L15	342448	5297525	1300
72323	L16	342437	5297532	1300

Table 1. Summary of radiometric measurements collected from the Pole Lake area.

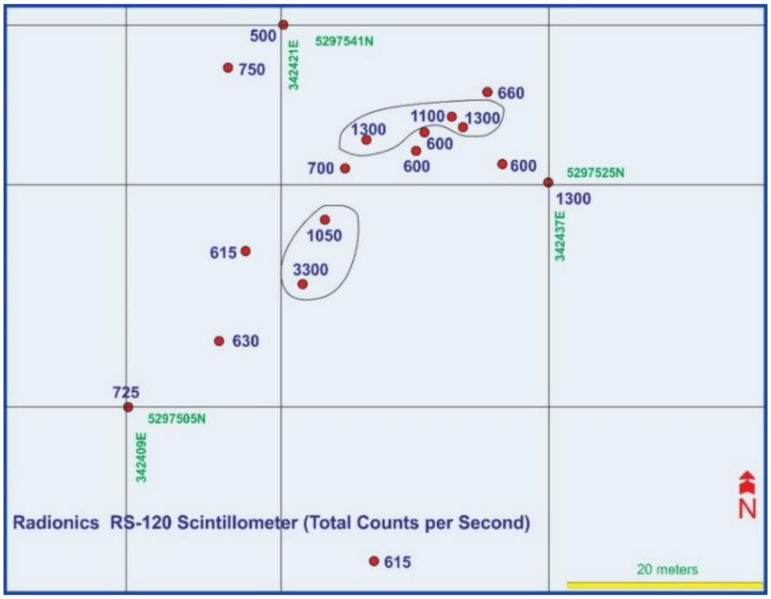

Figure 5. Radiometric measurements in total counts per second from the area of detailed examination.

PETROGRAPHY

Vancouver Petrographics Ltd. prepared three thin sections of 72301, 72302, and 72307. Sample 72301 has 7.64 wt.% Total REE, the second highest value documented by International Explorers and Prospectors in the Pole Lake area.

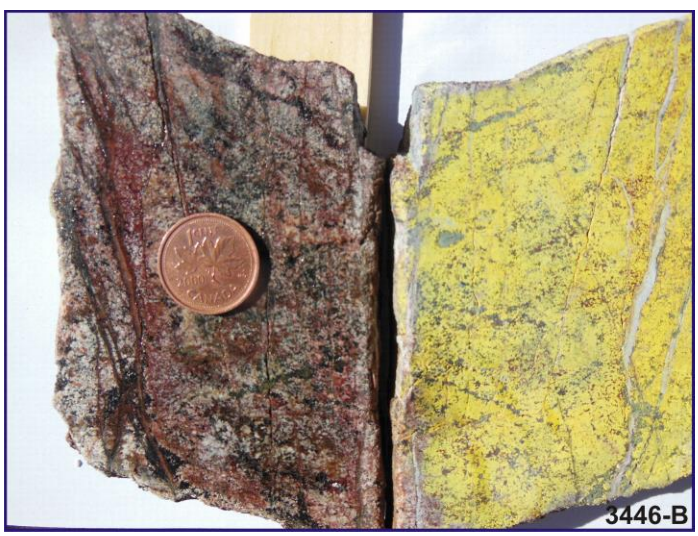

Photo 1. View of cut slab surfaces of hydrothermally altered, fine-grained barite-phlogopite-aegirine-augite nepheline syenite cut by milky quartz veinlets from Pole Lake with 6.07 wt.% total REE (sample 3446: 6378366 Canada Inc. and 6070205 Canada Inc. 2009). The left is a polished surface showing widespread hematite alteration, whereas the right side has been etched with HF and stained for feldspar and nepheline (yellow area). Rare earth minerals monazite, britholite-(La), and Y-enriched fluorapatite were documented by Breaks (2013).

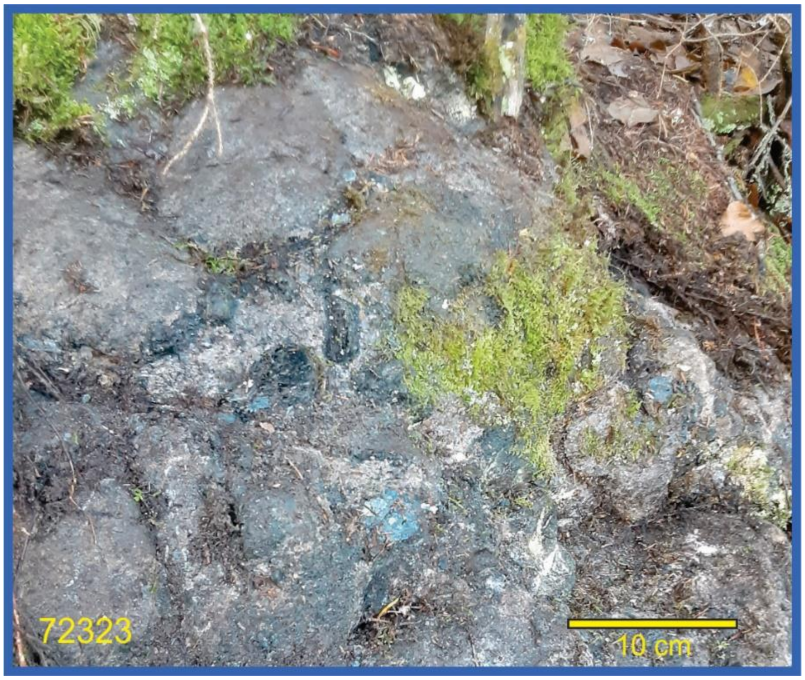

Photo 2. Outcrop of massive ijolite at analysis locality 72323 (UTME 342437, UTMN 5297532) that hosts a patch of light pink syenite breccia with angular dark mafic clasts. Assay indicated the survey's second-highest Nb (2610 ppm).

Previous work at Pole Lake revealed that the rare-earth element mineralization is associated with a deep pink, strongly hematite-altered, banded, fine-grained, barite-phlogopite-aegirine-augite nepheline syenite and relatively massive deep pink, aegirine-nepheline syenite (Breaks 2013). Hydrothermally altered britholite-monazite-barite-enriched syenite from the mineralized zone is shown in Photo 1. Massive ijolite is also cut by pink, nepheline syenite breccia veins, as shown in Photos 2 and 4.

Sample 72301 consists of a magmatic-foliated biotite-clinopyroxene ijolite that contains lens-shaped enclaves of fine-grained, more mafic rock. Clean, weathered surfaces are green-grey due to the high content of green clinopyroxene. Nepheline is relatively abundant as grey to light pink subhedral grains up to 5 by 15 mm. Sporadic white barite crystals up to 5 mm in diameter are also apparent (Photo 3). The rock consists of 50% clinopyroxene, 30 % nepheline, 10% biotite, 5% magnetite, and accessories titanite, barite, allanite, pyrochlore, and a resinous red-brown mineral inferred to be britholite. Britholite occurs as fresh, red-brown grains 1 mm in diameter and as equant partly weathered pits, up to 2 to 8mm. The mineral has high relief and grey-black first-order interference colors in thin section.

Photo 3. Biotite-clinopyroxene ijolite with magmatic foliation from site 72301, which contains 7.64 wt.% Total REE, 0.05 wt.% Nb, 0.18 wt.% Y, 0.93 wt.% Th, 94 ppm U, and 0.35 wt.% Ba. Arrows point to red-brown britholite. The larger crystal above the coin shows britholite altered to an unknown soft white mineral.

Sample 72302 consists of magnetite-biotite-clinopyroxene ijolite cut by a pink syenite breccia vein system that is almost exclusively K-feldspar and nepheline, both of which acquire a yellow stain with the HF acid etch-sodium cobaltinitrite stain technique (Photo 4).

Sample 72307 is a barite-altered rock with grey K-feldspar, a red-brown unknown mineral inferred to be hydronephelite ($NaAlSiO \cdot 0.5H_2O$), also called hydronepheline (Photo 5). The red areas in the photo consist of a soft, anhedral to subhedral, up to 7 by 15 mm, equant to elongate and appear to be of the hexagonal class. In the thin section, the mineral corresponds to an intensely altered nepheline. The red alteration is also present as thin <1mm wide veins that crosscut grey K-feldspar, which is the coarsest mineral, and up to 1.5 by 4 cm. Barite is dull white, soft, primarily massive, composes about 30% of the mode, and envelopes the deep red mineral. Accessory minerals comprise biotite, clinopyroxene, zircon, pyrochlore, magnetite, and a glossy black non-magnetic mineral (allanite).

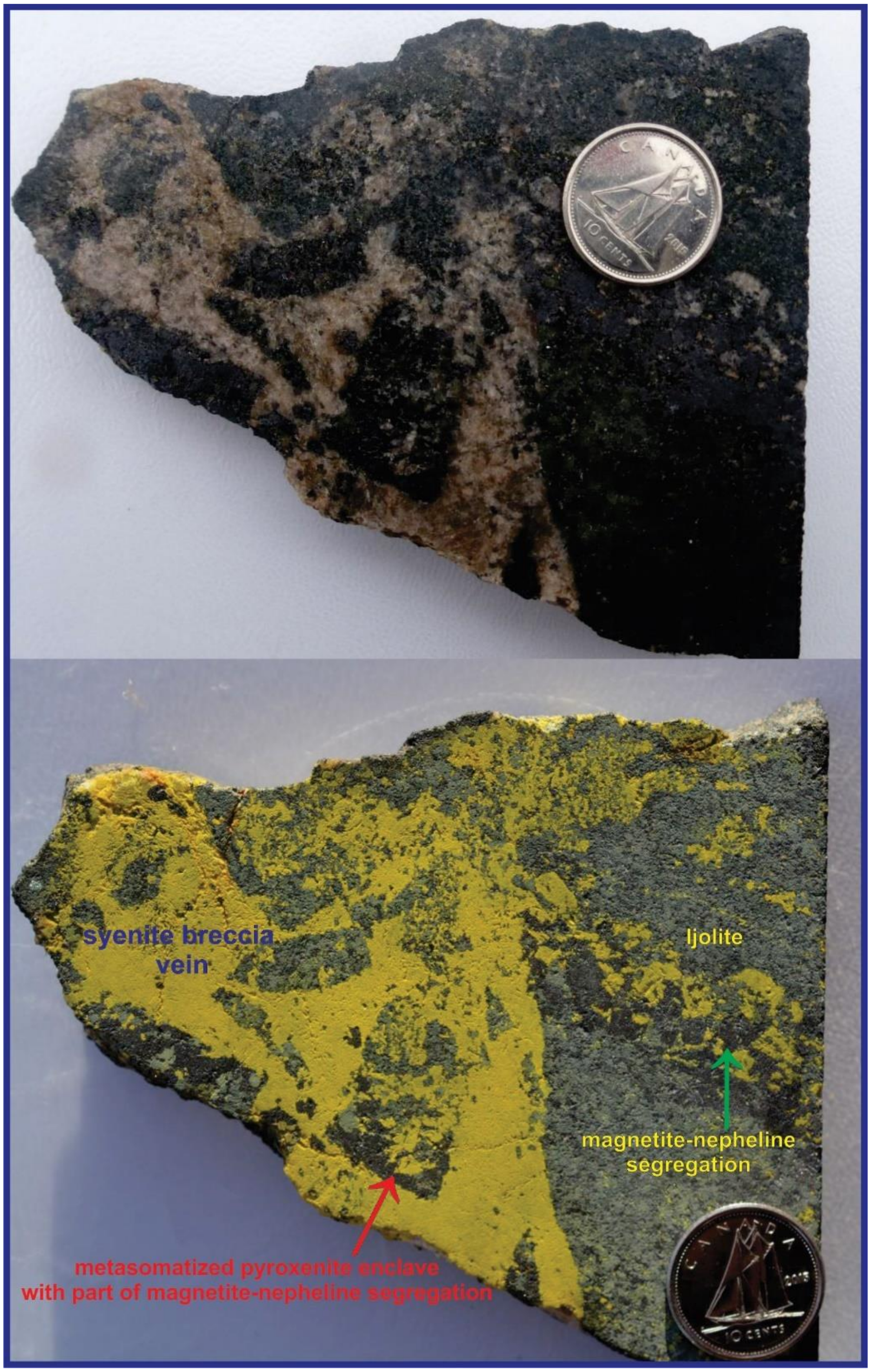

Photo 4. B*reccia* vein *at locality 72302 with 0.31 wt.% TREE and 2200 ppm Nb* developed *due to infiltration of narrow pink* nepheline *syenite dykes in cut slab stained in the lower half for K-feldspar and nepheline (both minerals stain yellow). The dull black mineral is magnetite.*

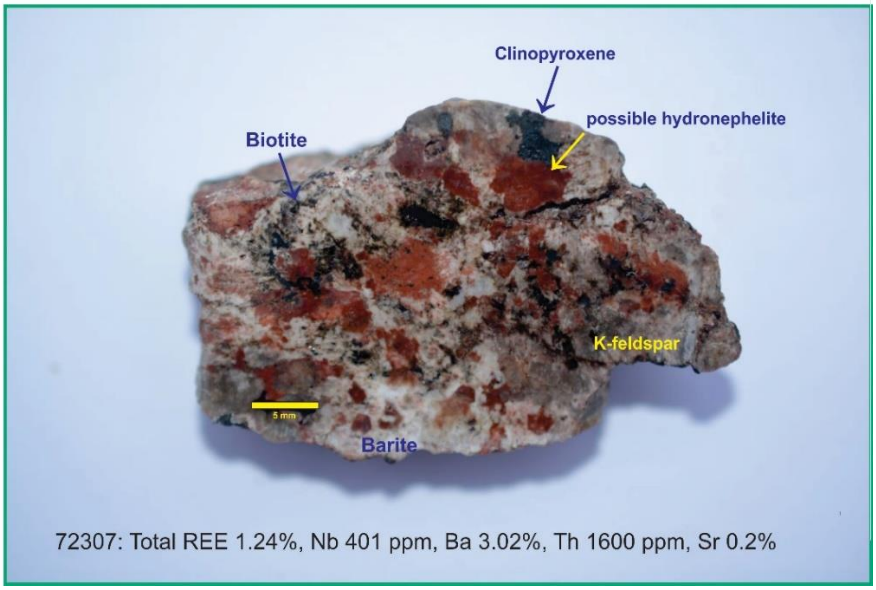

Photo 5. Cut slab of altered syenite (sample 72307) from rare earth element *zone* in *the cliff area. The mineral assemblage comprises barite, biotite, clinopyroxene, K-feldspar, nepheline,* zircon, *and a deep red-brown mineral, possibly hydronephelite.*

PETROCHEMISTRY

Bulk rock lithochemistry data were processed with the Geochemical Data Toolkit (GCD kit), which is petrogenetic software freely available at <http://www.gla.ac.uk/gcdkit/> (Janousek et al. 2006). The chemical variation of the rare-earth elements was assessed with chondrite-normalized plots calculated by the reference standard of Boynton (1984). The chondrite-normalized ratios La/YbN and Eu/Eu* are respectively employed to reveal the degree of the rare-earth element fractionation and the extent of repletion/depletion of europium. Various chemical diagrams involving Nb, Ta, Total REE, Th, U, and Ba were produced by importing metafile images from the GCD Kit into CorelDraw X4. Bulk rock chemistry data from the current project and historical work from the Pole Lake area are summarized in Table 2.

Chemical classification of the analyses from the present survey was determined in the total alkalis-silica diagram of Middlemost (1994), updated by Iacovino and Asimow (2018), for plotting in Excel (Figure 6). Most of the ijolites observed in the field are equivalent to foidolites in this diagram. Foidolite is a term for rocks that contain >65% feldspathoid minerals. Nepheline is the most widespread feldspathoid (foid) mineral in the Pole Lake area. The pink syenites are thus chemically equivalent to nepheline syenite, nepheline monzonite, nepheline monzodiorite, and nepheline gabbro.

Table 2. Summary of mean and ranges (ppm or wt.%) for 2023 work and historical analyses of Nb, Ta, TREE, Y, Ba, Th, and U for the Pole Lake area.

Sample Location	Nb (ppm)		Ta (ppm)		TREE (ppm)		Y (ppm)		Ba (ppm)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Area of 2023 detailed sampling (rectangle in Figure 3)	1072	272-4820	35	12-87	1244	432-3362	82	21-208	0.39%	0.98-1.02%
Cliff area (2023 survey)	57	37-141	184	93-280	7.9	2.5-15.6	10	3.4-14.1	1.20%	0.5-2.8%
Cliff area - Vale Exploration (2008)	2310	29 ppm to 1%	78	1.2-317	3.07%	1529 ppm to 8%	802	44-2020		
Cliff area - IEP (2009)					4.25%	1.04-8.25%				
Cliff area - Breaks (2014)	507	408-840	23	14-34	1.46%	0.48-3.40%	462	132-1150	2.54%	2.14-3.86%

Sample Location	Th (ppm)		U (ppm)		n
	Mean	Range	Mean	Range	
Area of 2023 detailed sampling (rectangle in Figure 3)	97	30-327	28	5-75	19
Cliff area (2023 survey)	198	124-322	47	14-160	3
Cliff area - Vale Exploration (2008)	2904	144-5000	200	24-560	5
Cliff area - IEP (2009)					8
Cliff area - Breaks (2014)	1830	335-5005	23	11-32	6

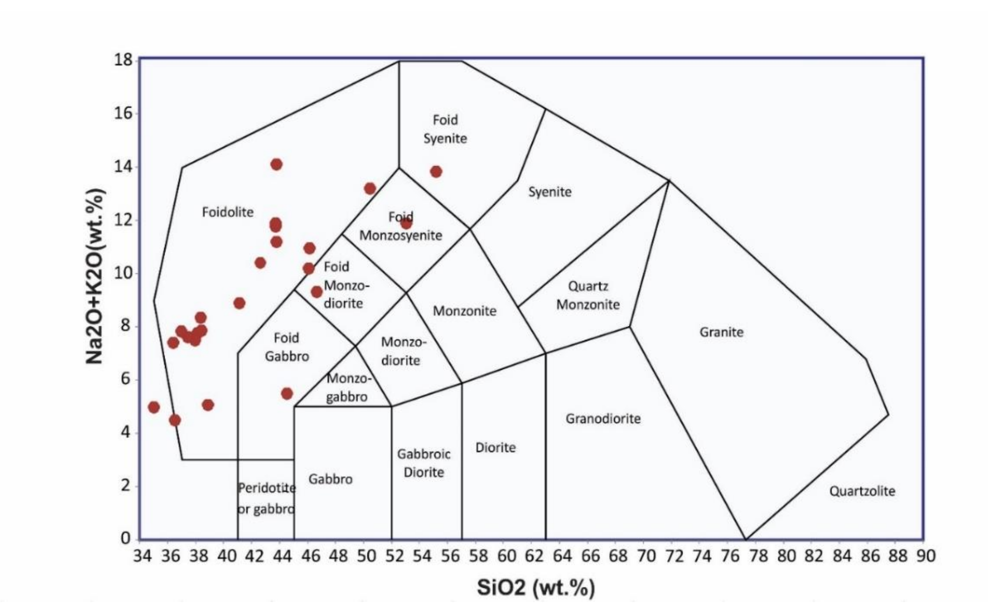

Figure 6. Chemical classification of Lackner alkalic complex rock types from Pole Lake area using the total alkalis-silica diagram of Middlemost (1994) for plutonic rocks updated by Iacovino and Asimow (2018).

The ensuing text will describe the distribution and interelement relationships between Nb, Ta, Total REE, U, Th, Ba, and P_2O_5.

Rare Earth Element Distribution

Total rare earth values vary considerably in the survey area. Exceptionally high TREE values are well known in the cliff area, where several property examinations have established anomalous values between 0.2 wt.% and 8.25 wt.%. However, little TREE and Nb data have been available in areas adjacent to the cliff bedrock and talus exposures needed to assess better the geological setting and possible widths of the REE-mineralized zone to the west of the prominent gorge oriented at 340^0 on claim 4204340.

The detailed sampling in the rectangular area 60 m northwest of the cliff area demonstrates that anomalous TREE values are present in a broad east-west-oriented zone where values exceed 1000 ppm. Here, TREE values have a mean of 1589 ppm in a range of 1207 to 3362 ppm within a 15- to 30-meter-wide zone open in both directions (Figure 7).

Associated elevated barium (mean: 1589 ppm; range 972 ppm to 1.02 wt.%) and pink syenite breccia pods and veins indicate that the REE mineralization in the cliff area extends to the west. More sample coverage will be needed to define further the limits of this potential broad zone of REE mineralization associated with barium alteration.

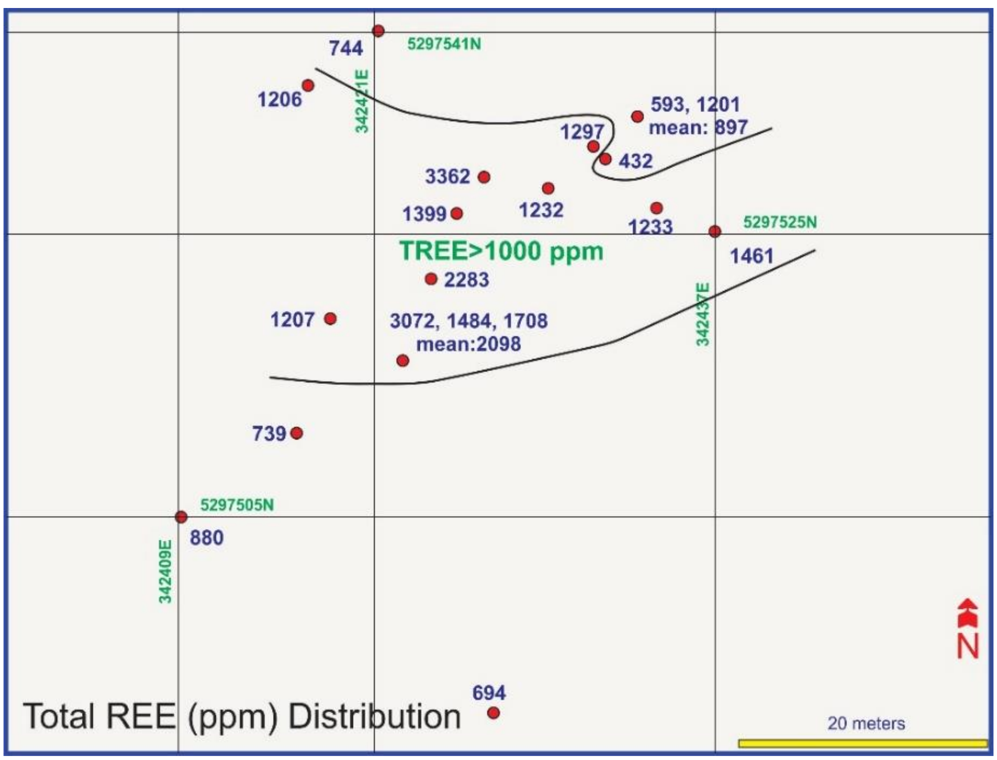

Figure 7. Distribution of total rare earth elements (ppm) in the area of detailed sampling in Figure 3.

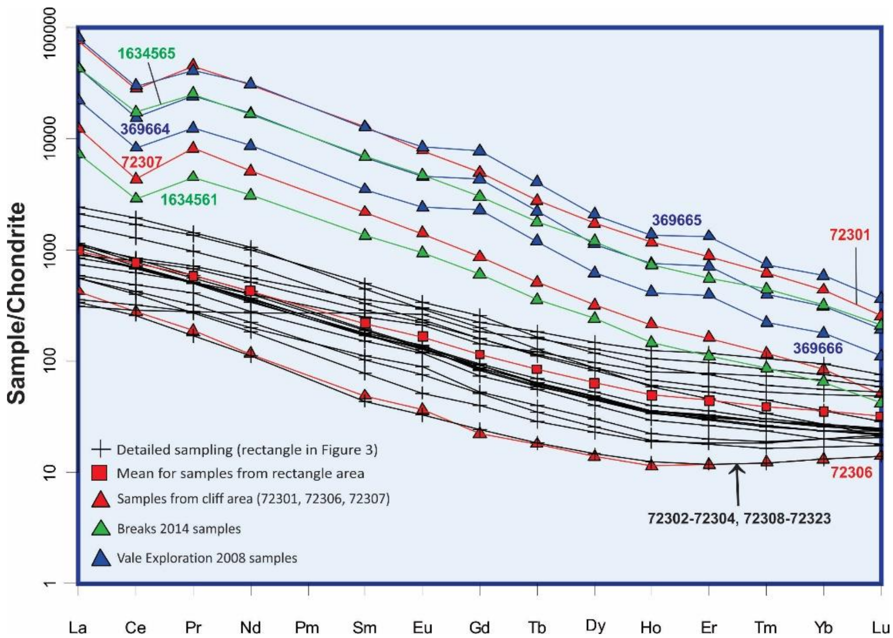

Figure 8. Chondrite-normalized rare earth element profiles for all samples from 2023 work. For comparison, analyses from the 2008 Vale Exploration property examination and later work by Breaks (2014) are included.

Chondrite-normalized profiles for all samples are shown in Figure 8. The REE chondrite-normalized diagrams are particularly useful in assessing genetic relationships between the various rare earth element-enriched alkalic rocks on the Lackner Lake property and for comparison with rare earth element mineralized carbonatite-alkalic silicate rock systems elsewhere.

Two distinct chondrite-normalized patterns are apparent:

1. Detailed sample area features relatively flat chondrite profiles in a tight band with modest TREE values (mean: 1380 ppm; range: 432 to 3362 ppm) and La/Yb ratios (mean 32.6, range: 11.2 to 90) with the absence of a negative cerium anomaly, and,

2. Samples from the cliff area (La/YbN range: 149 to 177) feature steeper patterns with considerably higher TREE (range: 1.24 to 7.63 wt.%) and prominent negative cerium anomalies.

The presence of the prominent negative cerium anomaly has been verified in four different geochemical databases [this work, Vale Exploration (2008), International Explorers and Prospectors (2009), and Breaks (2013 and 2014)]. The anomaly is inferred to represent the depletion of Ce^{+4} via the interaction of sulfate-bearing oxidized hydrothermal fluids active along the northwest-southeast-oriented, possible fault system now marked by two prominent gorges.

Negative cerium anomalies are now evident in eight samples from previous and current analyses from the Pole Lake area (Figure 4). Cerium may have been preferentially extracted, *vis-a-vis* the other rare earth elements, during alteration by oxidized hydrothermal fluids. This element can achieve a valence change from Ce^{3+} to $Ce^{4+,}$ unlike any other rare earth element (Giere, 1996). Textural evidence indicates that monazite and britholite have been altered and possibly contributed to Ce^{4+} scavenged by hydrothermal fluids. Interestingly, cerium is normally dominant in britholite-(Ce), but compositions at Pole Lake almost always show a slight excess of lanthanum over cerium, i.e., britholite-(La).

The fate of the released Ce^{4+} in a hydrothermal fluid is uncertain. However, it is postulated that a mineral such as cerianite ($(Ce^{4+}, Th)O_2$) is a potential host for Ce^{4+}. In supergene deposits formed on carbonatite in Brazil, cerianite is closely associated with monazite (Mariano, 1989b). In the Lackner Lake complex, cerianite has been verified at the Camp Lake zone (Sage, 1988a) but has yet to be recognized in the Pole Lake area.

The uneven curvature of usually smooth REE chondrite profiles for the Vale Exploration 2008 analyses is believed to represent analytical artifacts. It is particularly evident for slight positive, likely false positive anomalies over Gd, Er, and Yb (Figure 8) when compared with more recent data of this study (samples 72301, 72302, and 72307).

There is no apparent correlation between niobium and TREE, with an R^2 of 0.02 (Figure 9). TREE shows a weak to modest correlation with P_2O_5 (overall $R^2 = 0.38$) as the phosphate-bearing minerals monazite and britholite [(Ce, Ca, Th, La, Nd)$_5$(SiO_4, PO_4)$_3$(OH, F)] would contain most of the rare earth elements (Figure 10). The correlation between TREE and P_2O_5 is stronger for samples from the detailed area (R^2= 0.49).

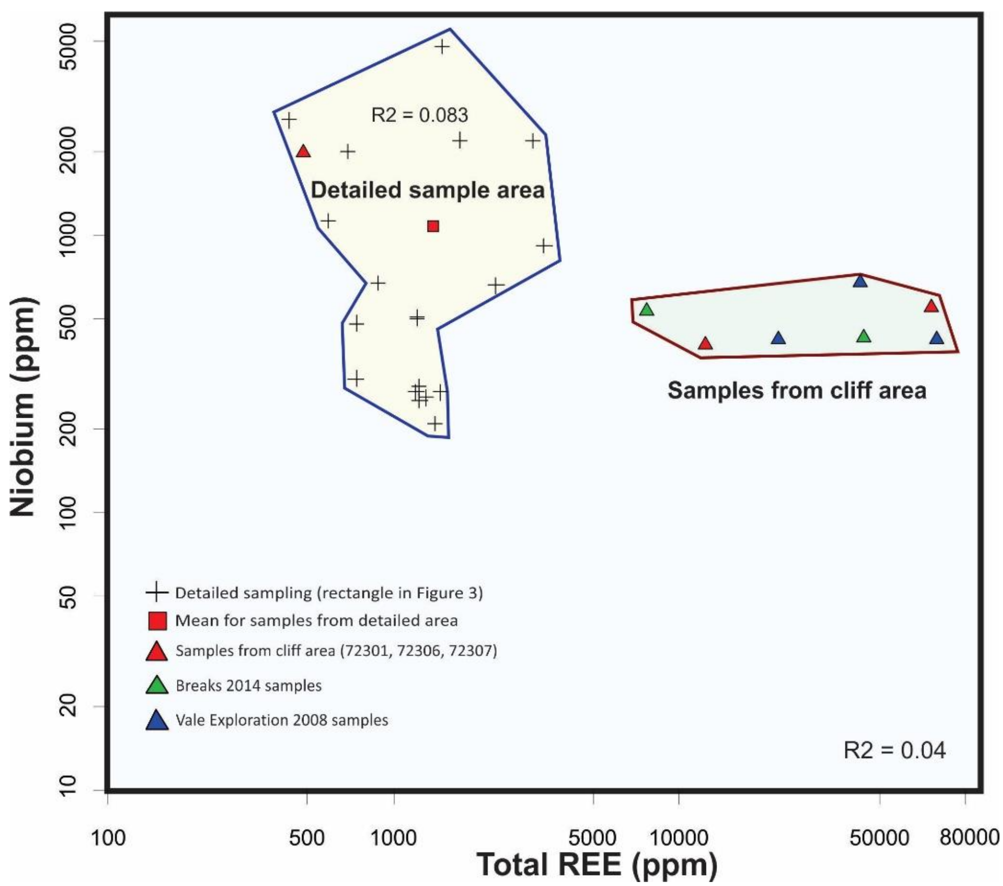

Figure 9. Niobium vs. Total REE in the present survey compared with selected analyses from previous work.

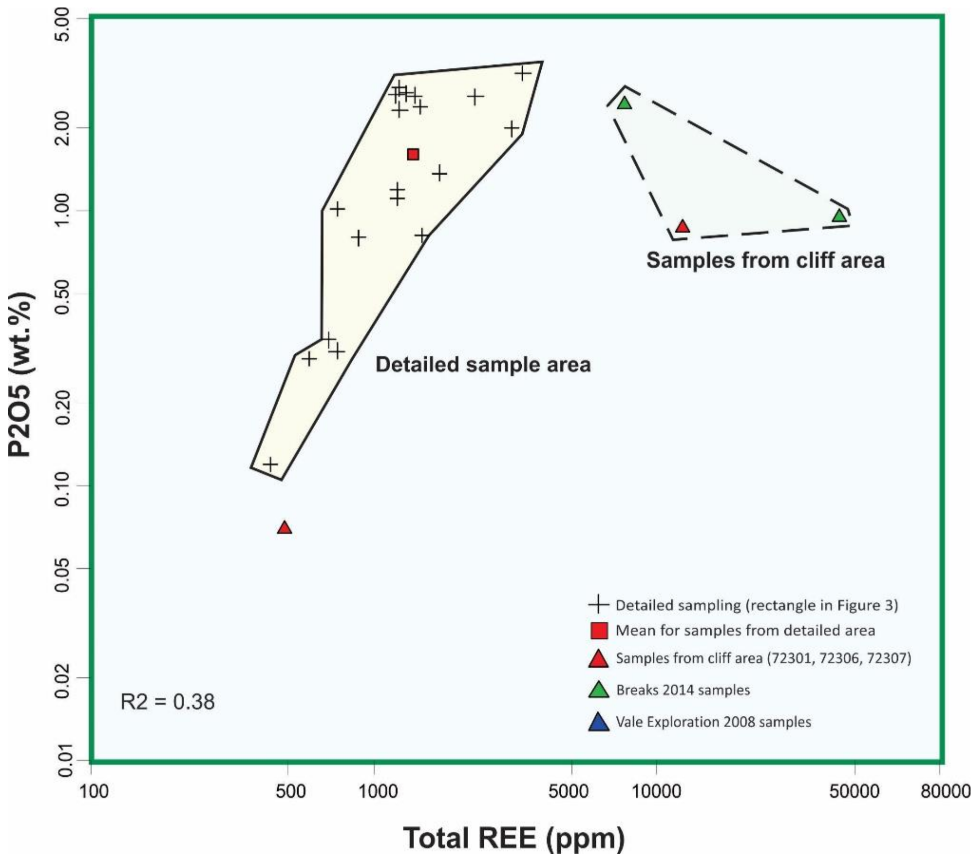

Figure 10. TREE vs P2O5 in the present survey compared with selected analyses from previous work.

Niobium and Tantalum

The area of detailed sampling revealed sporadic niobium values with a mean of 1072 ppm (range 40 ppm to 4820 ppm). Five analyses exceed 1000 ppm that are localized in two small clusters (Figure 11). There is a strong association between Ta and Nb (R^2= 0.79) in analyses from the present work, which implies pyrochlore is the main mineralogical control for these elements (Figure 12). Tantalum has a mean of 35 ppm (range of 12 to 107 ppm) for the detailed area, similar to the cliffs area (mean 27 ppm; range 17 to 58 ppm).

Previous and present analyses (n = 17) from the cliff area reveal a similar range of Nb and Ta, except sample RX369663 of Vale Exploration (2008), which contained 1 wt.% Nb and 317 ppm Ta, the highest values in this area. All samples from the cliff area have the following means and ranges: Ta (53 ppm; range 0.6 to 139 ppm) and Nb (1292 ppm; range 21 ppm to 1 wt.%).

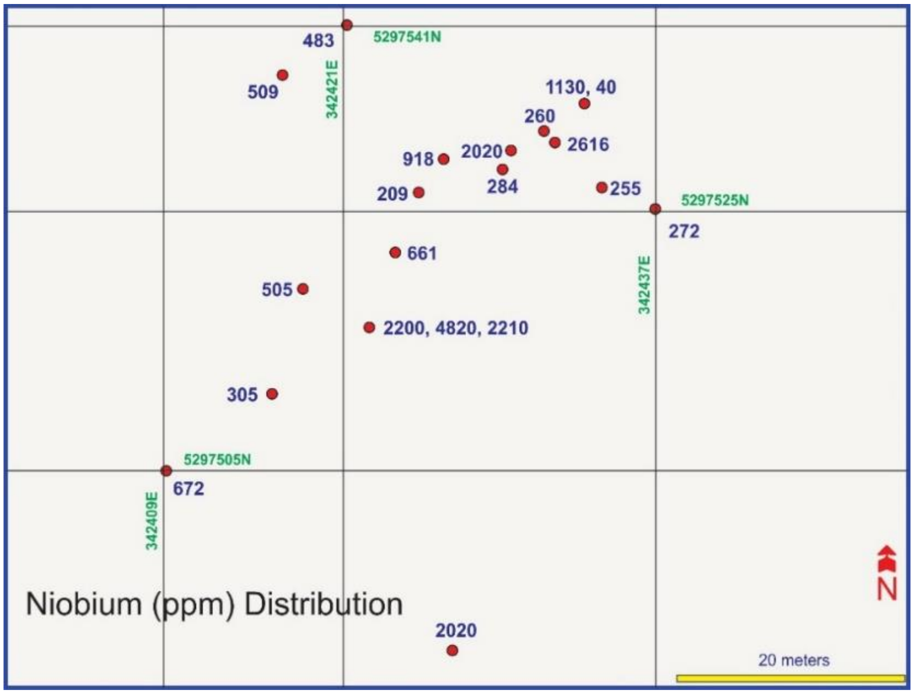

Figure 11. Distribution of niobium (ppm) in the rectangular area of detailed sampling.

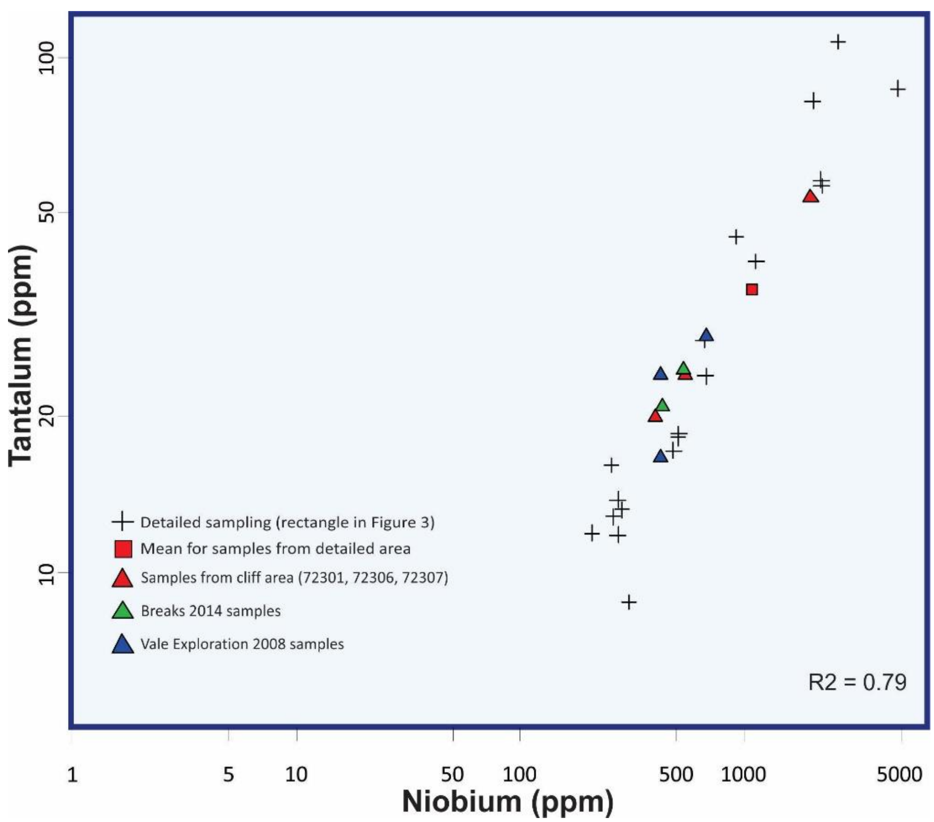

Figure 12. Niobium vs tantalum in the present survey compared with selected analyses from previous work.

Barium *versus* Total Rare Earth Elements and Niobium

Barium is a significant component of the REE-mineralization in the cliff area and appears mostly contained in barite. However, Breaks (2017) found locally significant levels of barium in pyrochlore analyses from the south-central part of the complex on claim 4248651, 4.3 km south of Pole Lake, at the site of DDH 66L-11-01 and -02 (Corstorphine, 2012). Here, several species of barium-bearing pyrochlore had a mean Ba level of 4.06 wt.% in a range of 0.00 to 12.91 wt.%.

Levels of barium exceed 1wt.% in the area of detailed sampling, and there is a weak correlation (R^2 = 0.27) between TREE and barium (Figure 13). However, it should be noted that the highest TREE values are associated with barium levels in the 2-5 wt.% range and negative cerium anomalies in the REE chondrite plot (Figure 8). Thus, barium combined with negative cerium anomalies qualifies as potentially useful pathfinder guides in future surface exploration or drill programs.

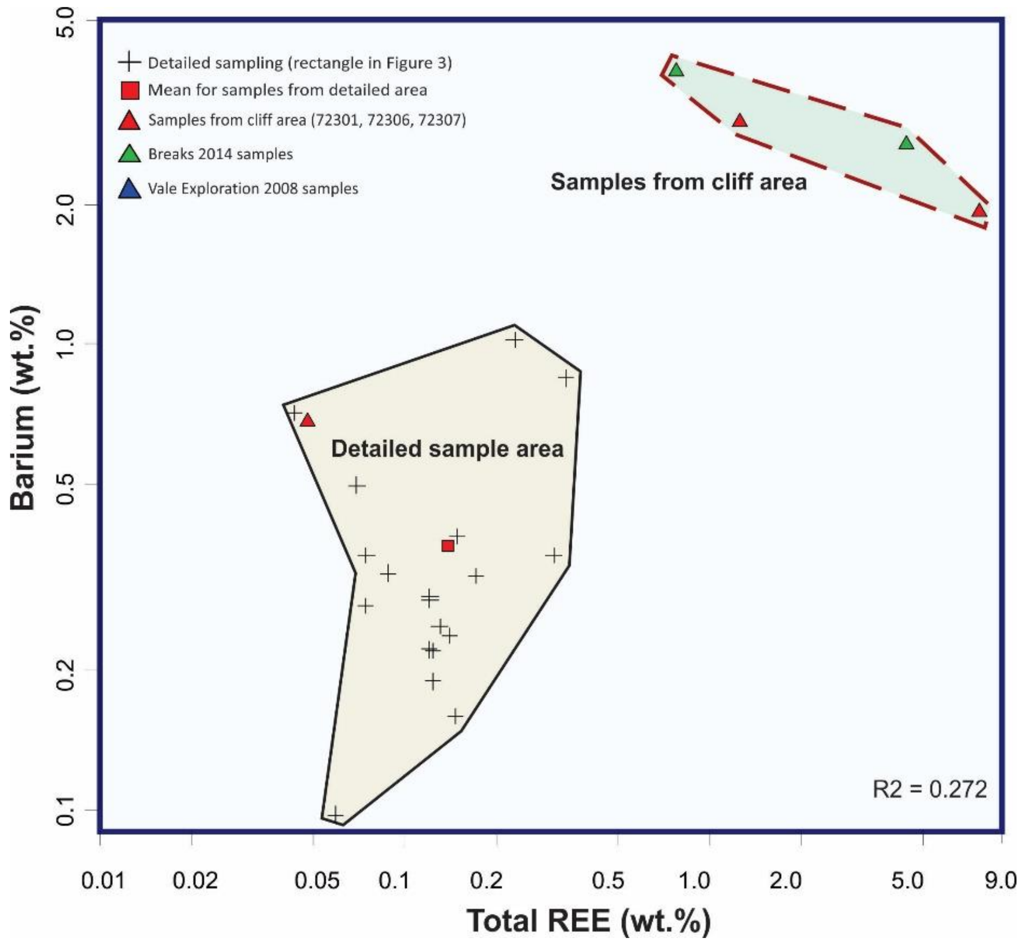

Figure 13. Barium vs. Total REE in the present survey compared with selected analyses from previous work.

Data from the detailed sampling area generally reveal barium levels lower than those in the cliff area, but several samples approach or exceed the 1 wt.% barium level [72313 (0.85 wt.%) and 72319 (1.02 wt.%)].

Overall, there is only a weak correlation between barium and TREE for present and historical data (Figure 13) from these two areas (R2 = 0.272). Niobium displays no significant correlation with barium (R2 = 0.023) for the two areas (Figure 14).

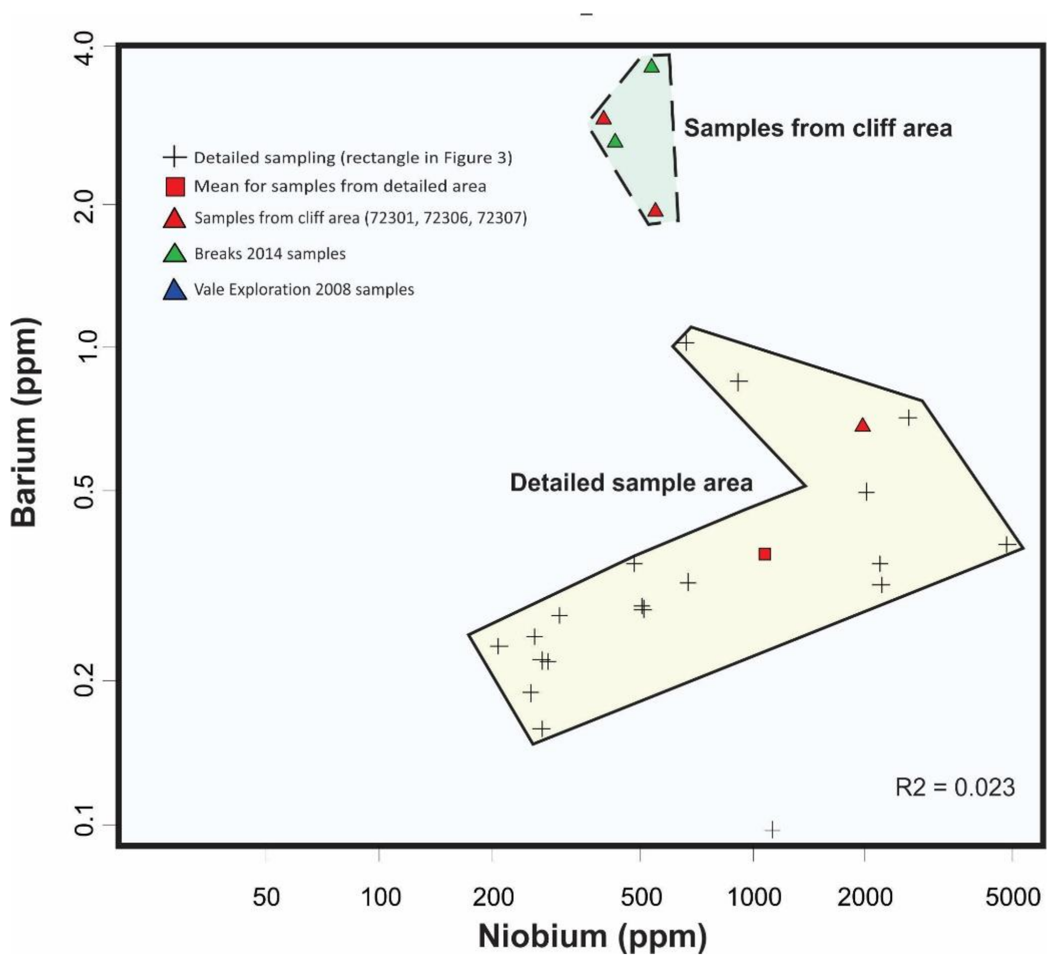

Figure 14. Barium vs niobium in the present survey compared with selected analyses from previous work.

RECOMMENDATIONS

Several recommendations ensue for the current exploration of claim 4204340:

1. the 2023 work encountered several interesting niobium anomalies with values up to 3300 ppm in an area ostensibly not explored since the 1950s, therefore, a systematic radiometric survey with RS-125 spectrometers is recommended. This instrument can undertake a general scan of total radioactivity and also obtain assay data for %K, Th ppm, and U ppm on outcrops or soils and is recommended along survey lines spaced at 50 m intervals to locate Area 2 of Parsons (1955) where historical Nb_2O_5 values up to 1.39 wt.% were documented. RS-125 spectrometers can be rented from Terraplus Inc. in Toronto: https://terraplus.ca/rentals/
2. outcrop stripping should ensue on significant anomalies detected by the spectrometer survey with bulk rock sampling across the anomalies
3. more sample coverage is needed to define further the limits of a potential broad zone of REE mineralization associated with the barium alteration. Chondrite-normalized REE plots are recommended to better discern zones of hydrothermal alteration associated with elevated barium and TREE marked by distinctive negative cerium anomalies.

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APPENDIX 1.

Bulk rock analyses from project area analyzed by Activation Laboratories Ltd.

Quality Analysis ... *Innovative Technologies*

Report No.:	**A23-14057**
Report Date:	**14-Nov-23**
Date Submitted:	**02-Oct-23**
Your Reference:	**LCK**

IEP International Expl.
168 Algonquin Blvd E
Timmins Ontario P4N 1A9

ATTN: Lionel Bonhomme

CERTIFICATE OF ANALYSIS

7 Rock samples were submitted for analysis.

The following analytical package(s) were requested:		Testing Date:
4LITHORES (1-10)	QOP WRA/ QOP WRA 4B2 (/Major/Trace Elements Fusion ICPOES/ICPMS)	2023-10-11 11:26:51
8-XRF Assay Package	QOP XRF Fusion (Fusion-XRF)	2023-11-10 13:21:38

REPORT **A23-14057**

Notes:

We recommend using option 4B1 for accurate levels of the base metals Cu, Pb, Zn, Ni and Ag. Option 4B-INAA for As, Sb, high W >100ppm, Cr >1000ppm and Sn >50ppm by Code 5D. Values for these elements provided by Fusion ICP/MS, are order of magnitude only and are provided for general information. Mineralized samples should have the Quant option selected or request assays for values which exceed the range of option 4B1. Total includes all elements in % oxide to the left of total. Zr is now being reported from FUS-ICP instead of FUS-MS.
Footnote:Ga/Ge/As semi-quantitative for samples with high REE due to interference. HREE semi-quantitative for samples with high Nd due to interference.

Values which exceed the upper limit should be assayed for accurate numbers.

Refer to the Scope of Accreditation for information on accredited elements.

SCC Accredited LAB
LAB Accrédité CCN TM

LabID: 266

CERTIFIED BY:

Mark Vandergeest
Quality Control Coordinator

ACTIVATION LABORATORIES LTD.
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Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As	Rb
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.001	0.01	0.01	1	1	5	20	1	20	10	30	1	0.5	5	1
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
72301	38.16	11.50	7.39	0.364	2.17	10.96	2.06	5.66	0.376	7.06	87.52	17	4	88	< 20	7	< 20	< 10	330	15	0.6	118	194
72302	35.05	6.67	35.02	1.264	3.64	10.41	1.99	2.94	1.000	2.00	99.76	7	21	134	30	44	30	10	950	21	1.3	11	102
72303	36.58	6.16	33.08	1.126	4.26	10.92	1.88	2.56	2.219	0.82	99.58	12	24	163	60	47	30	< 10	660	19	2.9	6	93
72304	38.93	7.53	25.39	0.987	5.39	13.74	2.76	2.27	1.253	1.38	99.85	9	24	136	20	43	40	< 10	490	18	1.5	9	79
72305	44.33	11.19	15.99	0.368	6.08	12.07	4.01	2.74	2.004	0.34	100.4	39	9	387	90	42	50	90	210	20	1.6	< 5	76
72306	55.25	18.79	6.03	0.224	0.70	1.54	4.54	9.27	0.306	0.07	98.86	1	10	37	< 20	7	< 20	10	150	25	1.0	< 5	311
72307	53.12	18.30	5.94	0.245	1.66	1.92	3.92	7.92	0.250	0.87	95.36	3	4	57	< 20	7	< 20	< 10	270	20	< 0.5	22	224

Analyte Symbol	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	2	0.5	1	0.2	2	0.5	0.1	1	0.2	0.1	2	0.05	0.05	0.01	0.05	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.005
Method Code	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
72301	4614	1750	418	549	< 2	< 0.5	< 0.1	27	< 0.2	3.5	19280	24000	22800	5560	18500	2530	578	1300	132	564	84.8	185	20.0
72302	2013	145	1143	> 1000	< 2	< 0.5	0.1	14	< 0.2	1.3	3514	653	1380	164	604	96.6	25.1	66.5	7.80	37.8	6.35	15.9	1.94
72303	1798	99.6	2998	> 1000	< 2	< 0.5	0.1	33	0.6	1.5	3861	275	645	82.0	305	55.3	16.2	41.0	5.51	28.0	4.85	12.4	1.72
72304	2068	213	1054	> 1000	< 2	< 0.5	0.1	11	0.3	2.1	3183	333	684	88.3	337	69.4	22.4	58.5	8.74	47.1	8.96	24.9	3.45
72305	930	35.4	292	241	2	< 0.5	0.1	4	< 0.2	1.8	1055	77.7	148	18.9	70.1	12.6	3.74	10.0	1.47	7.26	1.35	3.72	0.540
72306	2126	22.2	2726	> 1000	4	< 0.5	< 0.1	10	0.2	4.3	6824	132	226	22.8	69.7	9.51	2.68	5.78	0.85	4.46	0.82	2.47	0.396
72307	2053	311	437	401	< 2	< 0.5	< 0.1	14	< 0.2	3.1	30250	3880	3500	1010	3070	427	104	224	24.4	103	15.3	34.0	3.78

Analyte Symbol	Yb	Lu	Hf	Ta	W	Tl	Pb	Bi	Th	U	LOI	Nb2O5	ThO2
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	%
Lower Limit	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01		0.003	0.05
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	GRAV	FUS-XRF	FUS-XRF
72301	91.5	8.24	3.6	24.1	0.7	0.34	136	4.1	> 2000	70.1	1.83		0.93
72302	11.5	1.68	11.2	57.7	0.6	0.16	58	0.2	395	77.0	-0.25	0.220	
72303	10.3	1.56	38.3	86.9	0.7	0.15	44	0.4	327	54.2	-0.03	0.482	
72304	20.0	2.46	11.5	56.2	0.6	0.13	56	0.3	234	74.8	0.23	0.221	
72305	3.52	0.533	4.6	5.16	0.6	0.22	7	< 0.1	17.6	1.92	1.32		
72306	2.73	0.450	23.4	53.2	2.4	0.48	55	0.2	186	48.4	2.13	0.198	
72307	17.6	1.62	5.0	19.9	< 0.5	0.54	56	0.4	1580	23.2	1.20		

QC **Activation Laboratories Ltd.** **Report: A23-14057**

Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As	Rb
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.001	0.01	0.01	1	1	5	20	1	20	10	30	1	0.5	5	1
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
DH-1a Meas																							
DH-1a Cert																							
NIST 694 Meas	10.47	1.82	0.78	0.012	0.34	42.93	0.86	0.53	0.111	30.40				1690									
NIST 694 Cert	11.2	1.80	0.790	0.0116	0.330	43.6	0.860	0.510	0.110	30.2				1740									
GBW 07113 Meas	69.25	12.73	3.22	0.137	0.15	0.59	2.46	5.34	0.287	0.05		5	4	< 5									
GBW 07113 Cert	72.8	13.0	3.21	0.140	0.160	0.590	2.57	5.43	0.300	0.0500		5.00	4.00	5.00									
OKA-2 Meas																							
OKA-2 Cert																							
OKA-1 Meas																							
OKA-1 Cert																							
SY-4 Meas	50.00	20.11	6.05	0.103	0.52	7.89	6.95	1.66	0.291	0.13		< 1	3	6									
SY-4 Cert	49.9	20.69	6.21	0.108	0.54	8.05	7.10	1.66	0.287	0.131		1.1	2.6	8.0									
BIR-1a Meas	48.26	15.51	11.05	0.166	9.68	13.39	1.83	0.03	0.983	0.02		43	< 1	325	390	52	180	130	70	15			
BIR-1a Cert	47.96	15.50	11.30	0.175	9.700	13.30	1.82	0.030	0.96	0.021		44	0.58	310	370	52	170	125	70	16			
BIR-1a Meas															380	53	180	130	70	17			
BIR-1a Cert															370	52	170	125	70	16			
ZW-C Meas															60				1050	108			> 1000
ZW-C Cert															56.0				1050	99			8500
ZW-C Meas															60				1040	108			> 1000
ZW-C Cert															56.0				1050	99			8500
OREAS 101b (Fusion) Meas																44	< 20	410					
OREAS 101b (Fusion) Cert																47	9	420					
OREAS 101b (Fusion) Meas																45		420					
OREAS 101b (Fusion) Cert																47		420					
NCS DC86318 Meas																							368
NCS DC86318 Cert																							369.42
NCS DC86318 Meas																							374
NCS DC86318 Cert																							369.42
SX18-01 Meas																							
SX18-01 Cert																							
SX18-04 Meas																							
SX18-04 Cert																							
USZ 25-2006 Meas																34	70		620				35
USZ 25-2006 Cert																32.5	70.8		600				43.0
USZ 25-2006 Meas																34	70		620				
USZ 25-2006 Cert																32.5	70.8		600				
DNC-1a Meas	46.93	18.24	9.61	0.143	10.05	11.25	1.91	0.22	0.474	0.07		31		149									
DNC-1a Cert	47.15	18.34	9.97	0.150	10.13	11.49	1.890	0.234	0.480	0.07		31		148									
BCR-2 Meas	54.70	13.59	13.67	0.190	3.57	7.26	3.06	1.79	2.272	0.37		33		433									
BCR-2 Cert	54.1	13.5	13.8	0.196	3.59	7.12	3.16	1.79	2.26	0.35		33		416									
USZ 42-2006 Meas																			470			212	

QC Activation Laboratories Ltd. Report: A23-14057

Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As	Rb
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.001	0.01	0.01	1	1	5	20	1	20	10	30	1	0.5	5	1
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
USZ 42-2006 Cert																			469			224	
USZ 42-2006 Meas																			460			213	
USZ 42-2006 Cert																			469			224	
REE-1 Meas															270		30	80				119	> 1000
REE-1 Cert															277		24.7	79.7				124	1050
REE-1 Meas															280		30	80					> 1000
REE-1 Cert															277		24.7	79.7					1050
ThO2/OKA-2 2/98 Meas																							
ThO2/OKA-2 2/98 Cert																							
W-2b Meas	53.12	15.65	10.79	0.160	6.33	10.90	2.21	0.62	1.089	0.15		36	< 1	271	90	44	80	110	80	18			19
W-2b Cert	52.4	15.4	10.7	0.163	6.37	10.9	2.14	0.626	1.06	0.140		36.0	1.30	262	92.0	43.0	70.0	110	80.0	17.0			21.0
W-2b Meas															90	44	70	110	80				19
W-2b Cert															92.0	43.0	70.0	110	80.0				21.0
OREAS 149 (Fusion XRF) Meas																							
OREAS 149 (Fusion XRF) Cert																							
72307 Orig	53.20	18.43	5.90	0.243	1.67	1.92	3.94	7.90	0.249	0.88	95.54	4	4	57	< 20	7	< 20	< 10	270	20	< 0.5	22	228
72307 Dup	53.03	18.17	5.99	0.246	1.66	1.92	3.91	7.94	0.251	0.86	95.18	3	4	57	< 20	7	< 20	< 10	270	19	0.6	21	220
72307 Orig																							
72307 Dup																							
72307 Orig																							
72307 Dup																							
Method Blank															< 20	< 1	< 20	< 10	< 30	< 1	< 0.5	< 5	< 1
Method Blank															< 20	< 1	< 20	< 10	< 30	< 1	< 0.5	< 5	< 1
Method Blank	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01		< 1	< 1	< 5									
Method Blank																							

Analyte Symbol	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	2	0.5	1	0.2	2	0.5	0.1	1	0.2	0.1	2	0.05	0.05	0.01	0.05	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.005
Method Code	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
DH-1a Meas																							
DH-1a Cert																							
NIST 694 Meas																							
NIST 694 Cert																							
GBW 07113 Meas	42		392								504												
GBW 07113 Cert	43.0		403								506												
OKA-2 Meas																							
OKA-2 Cert																							
OKA-1 Meas																							
OKA-1 Cert																							
SY-4 Meas	1191		523								346												
SY-4 Cert	1191		517								340												
BIR-1a Meas	109	14.6	16	0.5					0.4		7	0.65	1.91		2.50	1.10	0.530	1.90					
BIR-1a Cert	110	16	18	0.6					0.58		6	0.63	1.9		2.5	1.1	0.55	2.0					
BIR-1a Meas		14.9							0.6			0.60	1.70		2.40	1.20	0.540						
BIR-1a Cert		16							0.58			0.63	1.9		2.5	1.1	0.55						
ZW-C Meas		33.0		213	4			> 1000	4.5	266		29.3	96.4	9.70	25.8	6.90		4.60			2.00		1.70
ZW-C Cert		33.0		198	4.30			1300	4.2	260		30.0	97	9.5	25.0	6.6		4.70			2.0		1.60
ZW-C Meas		33.0		211				> 1000	4.5	272		28.3	95.1	9.30	24.2	7.00		4.70			2.00		1.70
ZW-C Cert		33.0		198				1300	4.2	260		30.0	97	9.5	25.0	6.6		4.70			2.0		1.60
OREAS 101b (Fusion) Meas		167			20							774	1320	123	381	49.0	7.77		5.23	31.5	6.21	18.3	2.68
OREAS 101b (Fusion) Cert		178			21							789	1331	127	378	48	7.77		5.37	32.1	6.34	18.7	2.66
OREAS 101b (Fusion) Meas		169			19							787	1360	122	377	49.0	7.83		5.18	30.1	6.31	18.2	2.71
OREAS 101b (Fusion) Cert		178			21							789	1331	127	378	48	7.77		5.37	32.1	6.34	18.7	2.66
NCS DC86318 Meas		> 10000								11.4		1950	390	732	> 2000	> 1000	19.2	> 1000	510	> 1000	602	> 1000	267
NCS DC86318 Cert		17008								11.88		1960	432	737	3429	1725	18.91	2168	468	3224	560	1750	271
NCS DC86318 Meas		> 10000								11.5		1960	389	732	> 2000	> 1000	18.4		506	> 1000	607	> 1000	270
NCS DC86318 Cert		17008								11.88		1960	432	737	3429	1725	18.91		468	3224	560	1750	271
SX18-01 Meas																							
SX18-01 Cert																							
SX18-04 Meas																							
SX18-04 Cert																							
USZ 25-2006 Meas		986										> 2000	> 3000	> 1000	> 2000	819	191						
USZ 25-2006 Cert		959										19300	29000	2800	8800	900	211.00						
USZ 25-2006 Meas		993										> 2000	> 3000	> 1000	> 2000								
USZ 25-2006 Cert		959										19300	29000	2800	8800								
DNC-1a Meas	144		40								109												
DNC-1a Cert	144		38.0								118												
BCR-2 Meas	340		189								710												
BCR-2 Cert	346		188								683												
USZ 42-2006 Meas		161		33.0	35							> 2000	> 3000	> 1000	> 2000	496	83.0				7.19		
USZ 42-2006 Cert		167		31.00	34.40							21100	27600	2300	6500	539	87.22				7.86		

QC Activation Laboratories Ltd. Report: A23-14057

Analyte Symbol	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	2	0.5	1	0.2	2	0.5	0.1	1	0.2	0.1	2	0.05	0.05	0.01	0.05	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.005
Method Code	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
USZ 42-2006 Meas		162		33.0	35							> 2000	> 3000	> 1000	> 2000	505	84.0				7.19		
USZ 42-2006 Cert		167		31.00	34.40							21100	27600	2300	6500	539	87.22				7.86		
REE-1 Meas		5880		> 1000				515		1.1		1670	> 3000	442	1540	394	24.5	437	111	946	210	707	110
REE-1 Cert		5480		4050				498		1.07		1661	3960	435	1456	381	23.5	433	106	847	208	701	106
REE-1 Meas		5900		> 1000				520		1.1		1690	> 3000	446	1490	401	24.1	450	112	904	212	723	111
REE-1 Cert		5480		4050				498		1.07		1661	3960	435	1456	381	23.5	433	106	847	208	701	106
ThO2/OKA-2 2/98 Meas																							
ThO2/OKA-2 2/98 Cert																							
W-2b Meas	197	20.5	96	7.3					1.2	0.9	181	10.8	22.6		14.1	3.40	1.10		0.64	3.80	0.77	2.30	0.340
W-2b Cert	190	24.0	94.0	7.90					0.790	0.990	182	10.0	23.0		13.0	3.30	1.00		0.630	3.60	0.760	2.50	0.380
W-2b Meas												10.5	21.7		12.6	3.30			0.63		0.79		
W-2b Cert												10.0	23.0		13.0	3.30			0.630		0.760		
OREAS 149 (Fusion XRF) Meas																							
OREAS 149 (Fusion XRF) Cert																							
72307 Orig	2061	318	431	416	< 2	< 0.5	< 0.1	13	< 0.2	3.2	30310	3800	3420	1020	3010	415	105	205	24.6	104	15.5	34.4	3.82
72307 Dup	2045	305	443	385	< 2	< 0.5	< 0.1	14	< 0.2	3.0	30190	3970	3580	1000	3130	427	103	219	24.1	101	15.2	33.6	3.74
72307 Orig												> 2000	> 3000	925	> 2000	429		227					
72307 Dup												> 2000	> 3000	964	> 2000	424		222					
72307 Orig														> 1000									
72307 Dup														> 1000									
Method Blank		< 0.5		< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1		< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005
Method Blank		< 0.5		< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1		< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005
Method Blank	< 2		2								< 2												
Method Blank																							

QC **Activation Laboratories Ltd.** **Report: A23-14057**

Analyte Symbol	Yb	Lu	Hf	Ta	W	Tl	Pb	Bi	Th	U	Nb2O5	ThO2
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%
Lower Limit	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01	0.003	0.05
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-XRF	FUS-XRF
DH-1a Meas												0.09
DH-1a Cert												0.104
NIST 694 Meas												
NIST 694 Cert												
GBW 07113 Meas												
GBW 07113 Cert												
OKA-2 Meas												3.24
OKA-2 Cert												3.29
OKA-1 Meas											0.542	
OKA-1 Cert											0.529	
SY-4 Meas												
SY-4 Cert												
BIR-1a Meas	1.60	0.260	0.5				< 5					
BIR-1a Cert	1.7	0.3	0.60				3					
BIR-1a Meas	1.60	0.270	0.6				< 5					
BIR-1a Cert	1.7	0.3	0.60				3					
ZW-C Meas	15.0	2.38	10.0	83.7	320	33.1	74		45.8	19.6		
ZW-C Cert	14	2.20	9.7	82	320	34	80		43	20.0		
ZW-C Meas	14.8	2.37	10.1	84.2	324	33.3			43.7	19.2		
ZW-C Cert	14	2.20	9.7	82	320	34			43	20.0		
OREAS 101b (Fusion) Meas	17.2	2.60					< 5		36.5	398		
OREAS 101b (Fusion) Cert	17.6	2.58					20		37.1	396		
OREAS 101b (Fusion) Meas	17.3	2.63							35.9	405		
OREAS 101b (Fusion) Cert	17.6	2.58							37.1	396		
NCS DC86318 Meas	> 1000	255							67.5			
NCS DC86318 Cert	1844	264							67.0			
NCS DC86318 Meas	> 1000	256							66.3			
NCS DC86318 Cert	1844	264							67.0			
SX18-01 Meas											0.668	< 0.05
SX18-01 Cert											0.695	0.018
SX18-04 Meas											1.265	< 0.05
SX18-04 Cert											1.32	0.025
USZ 25-2006 Meas	49.5						1190					
USZ 25-2006 Cert	54.5						1100					
USZ 25-2006 Meas	49.3						1200					
USZ 25-2006 Cert	54.5						1100					
DNC-1a Meas												
DNC-1a Cert												
BCR-2 Meas												
BCR-2 Cert												
USZ 42-2006 Meas	17.5						1630		969			
USZ 42-2006 Cert	17.85						1600		946			

Analyte Symbol	Yb	Lu	Hf	Ta	W	Tl	Pb	Bi	Th	U	Nb2O5	ThO2
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%
Lower Limit	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01	0.003	0.05
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-XRF	FUS-XRF
USZ 42-2006 Meas	17.3						1640		948			
USZ 42-2006 Cert	17.85						1600		946			
REE-1 Meas	695		473						771	141		
REE-1 Cert	678		479						719	137		
REE-1 Meas	706		480						758	143		
REE-1 Cert	678		479						719	137		
ThO2/OKA-2 2/98 Meas												5.25
ThO2/OKA-2 2/98 Cert												5.226
W-2b Meas	1.90	0.320	2.5	0.45			8		2.20	0.54		
W-2b Cert	2.10	0.330	2.60	0.500			9.30		2.40	0.530		
W-2b Meas	2.00	0.320	2.5	0.45					2.20	0.52		
W-2b Cert	2.10	0.330	2.60	0.500					2.40	0.530		
OREAS 149 (Fusion XRF) Meas											0.901	< 0.05
OREAS 149 (Fusion XRF) Cert											0.915	0.01
72307 Orig	17.8	1.63	5.1	19.9	< 0.5	0.52	55	0.4	1590	23.5		
72307 Dup	17.5	1.61	4.9	19.8	< 0.5	0.56	58	0.4	1560	22.9		
72307 Orig												
72307 Dup												
72307 Orig												
72307 Dup												
Method Blank	< 0.01	< 0.002	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01		
Method Blank	< 0.01	< 0.002	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01		
Method Blank												
Method Blank											< 0.003	< 0.05

Quality Analysis ... **Actlabs** *Innovative Technologies*

Report No.:	**A23-16399-Rev plus Nb**
Report Date:	**05-Jan-24**
Date Submitted:	**08-Nov-23**
Your Reference:	**Nov 8/23**

IEP International Expl.
168 Algonquin Blvd E
Timmins Ontario P4N 1A9

ATTN: Lionel Bonhomme

CERTIFICATE OF ANALYSIS

16 Rock samples were submitted for analysis.

The following analytical package(s) were requested:		Testing Date:
4LITHORES (11+)	QOP WRA/ QOP WRA 4B2 (/Major/Trace Elements Fusion ICPOES/ICPMS)	2023-11-20 10:46:07
8-Nb2O5 - XRF Option	QOP XRF Fusion (XRF)	2024-01-02 18:25:42

REPORT **A23-16399-Rev plus Nb**

Notes:

We recommend using option 4B1 for accurate levels of the base metals Cu, Pb, Zn, Ni and Ag. Option 4B-INAA for As, Sb, high W >100ppm, Cr >1000ppm and Sn >50ppm by Code 5D. Values for these elements provided by Fusion ICP/MS, are order of magnitude only and are provided for general information. Mineralized samples should have the Quant option selected or request assays for values which exceed the range of option 4B1. Total includes all elements in % oxide to the left of total. Zr is now being reported from FUS-ICP instead of FUS-MS.
Footnote:Zr/Nb/Ta/Hf results are semi-quantitative for samples with P2O5 >0.3%.

Refer to the Scope of Accreditation for information on accredited elements.

SCC Accredited LAB
LAB Accrédité CCN TM

LabID: 266

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CERTIFIED BY:

Elitsa Hrischeva, Ph.D.
Quality Control Coordinator

Results **Activation Laboratories Ltd.** **Report: A23-16399**

Analyte Symbol	Nb	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.002	0.01	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.001	0.01		0.01	1	1	5	20	1	20	10	30	1	0.5
Method Code	FUS-XRF	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	GRAV	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
72308		43.75	18.05	11.91	0.472	2.94	8.05	7.70	4.03	0.846	0.80	0.43	98.98	4	20	27	< 20	24	30	10	300	20	1.0
72309		43.85	17.14	12.28	0.446	3.30	9.40	7.41	3.76	0.943	1.20	0.46	100.2	4	12	74	20	24	30	10	210	19	0.9
72310		43.80	17.80	10.02	0.447	2.62	10.14	7.79	4.07	0.725	0.31	0.93	98.67	3	21	20	< 20	17	30	10	180	19	0.8
72311		42.70	16.03	12.50	0.475	3.03	10.72	6.94	3.44	0.816	1.12	0.63	98.40	4	17	45	20	24	30	< 10	220	18	0.9
72312		46.73	16.32	12.74	0.340	2.71	7.20	5.03	4.25	1.408	1.02	1.04	98.77	6	5	62	< 20	21	20	20	170	18	0.9
72313		50.52	17.79	7.02	0.247	1.46	4.92	5.25	7.92	0.471	3.18	0.57	99.35	2	4	41	< 20	10	< 20	30	160	21	0.6
72314		38.01	13.22	15.04	0.366	6.25	14.09	4.20	3.24	1.509	2.81	0.82	99.56	13	6	193	20	45	80	120	150	15	1.2
72315	0.113	46.18	16.97	7.55	0.438	4.79	11.46	7.81	3.09	1.213	0.29	0.69	100.5	9	21	55	< 20	20	30	10	160	18	1.2
72316		38.43	13.39	14.69	0.366	6.34	13.90	4.85	3.46	1.536	2.65	0.75	100.4	14	6	197	20	42	70	120	140	14	0.9
72317		37.50	12.84	15.08	0.375	6.42	15.39	4.30	3.26	1.575	2.69	0.75	100.2	14	5	192	< 20	42	60	40	100	13	0.8
72318	0.202	47.32	14.27	17.82	0.644	3.63	4.24	3.25	6.45	1.062	0.37	0.66	99.71	3	9	53	< 20	28	20	50	490	23	1.2
72319		41.17	13.22	16.25	0.645	4.86	8.79	2.52	6.32	1.338	2.61	0.48	98.21	4	9	59	< 20	43	40	< 10	370	17	1.0
72320		36.45	13.06	14.27	0.376	6.51	15.59	3.91	3.45	1.543	2.64	0.93	98.72	14	5	199	20	47	60	100	140	14	0.8
72321		38.47	13.54	14.75	0.411	6.27	14.53	4.56	3.25	1.581	2.35	0.69	100.4	13	7	195	< 20	45	70	120	150	14	1.0
72322		37.04	13.61	14.99	0.434	6.30	13.38	4.71	3.07	1.638	2.40	0.79	98.35	14	7	190	< 20	48	70	100	170	16	1.1
72323	0.261	43.86	18.88	11.37	0.617	5.93	1.86	6.11	7.97	1.022	0.12	0.91	98.65	< 1	9	37	< 20	34	40	70	540	27	0.9

Results **Activation Laboratories Ltd.** **Report: A23-16399**

Analyte Symbol	As	Rb	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	5	1	2	0.5	1	0.2	2	0.5	0.1	1	0.2	0.1	2	0.05	0.05	0.01	0.05	0.01	0.005	0.01	0.01	0.01	0.01
Method Code	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
72308	6	109	1761	59.6	414	672	< 2	< 0.5	< 0.1	4	0.5	0.6	3218	183	394	49.6	167	29.5	8.56	19.1	2.61	13.0	2.14
72309	< 5	104	2012	61.9	385	509	< 2	< 0.5	< 0.1	3	< 0.2	0.5	2827	264	570	63.3	211	33.0	9.62	21.1	2.80	14.9	2.53
72310	5	125	1595	208	598	305	< 2	< 0.5	< 0.1	2	< 0.2	1.0	2742	95.7	229	34.2	163	53.1	19.3	47.0	7.59	41.7	7.52
72311	7	103	1799	154	418	505	< 2	< 0.5	< 0.1	3	0.2	0.9	2872	226	501	62.9	238	48.3	15.6	37.0	5.76	31.4	5.76
72312	< 5	115	2026	37.3	425	483	4	< 0.5	0.1	2	< 0.2	1.0	3514	174	339	38.9	134	19.9	5.58	13.2	1.66	8.24	1.38
72313	7	230	3745	89.8	250	918	< 2	< 0.5	< 0.1	3	< 0.2	2.0	8463	755	1580	177	633	88.3	21.6	52.0	6.14	27.8	4.27
72314	< 5	134	2110	67.8	285	284	2	< 0.5	0.1	2	< 0.2	1.9	2192	296	556	62.6	214	35.3	10.1	22.5	3.04	15.6	2.56
72315	< 5	87	1321	38.4	1174	> 1000	< 2	< 0.5	< 0.1	8	< 0.2	1.1	972	111	262	33.9	121	21.9	6.61	13.8	1.87	9.72	1.58
72316	< 5	139	2227	62.6	202	272	< 2	< 0.5	0.1	2	< 0.2	2.0	2204	291	547	60.9	205	33.5	9.60	21.7	2.88	14.5	2.40
72317	< 5	123	2597	66.8	399	260	< 2	< 0.5	0.1	8	< 0.2	1.5	2478	324	588	62.0	224	34.4	9.30	22.2	3.04	14.3	2.48
72318	< 5	253	1607	33.3	1668	> 1000	4	< 0.5	0.1	13	0.2	4.2	5011	175	327	33.1	110	15.1	3.80	10.4	1.36	7.29	1.35
72319	16	454	3382	118	221	661	< 2	< 0.5	0.1	6	< 0.2	20.1	10210	515	1040	120	428	64.4	17.2	41.3	5.31	26.2	4.40
72320	< 5	128	2679	62.7	148	209	< 2	< 0.5	0.1	3	< 0.2	1.8	2362	350	635	67.8	243	37.0	9.74	23.7	2.95	14.9	2.51
72321	< 5	118	2198	65.5	275	255	< 2	< 0.5	0.1	3	< 0.2	1.8	1883	291	560	61.7	219	34.0	8.88	23.6	3.04	15.2	2.58
72322	< 5	130	2092	67.5	211	272	< 2	< 0.5	0.1	3	< 0.2	1.7	1586	355	669	72.1	255	37.6	10.0	24.7	3.31	16.9	2.84
72323	< 5	356	1406	21.2	1814	> 1000	2	< 0.5	< 0.1	13	< 0.2	7.1	7138	105	210	20.8	66.7	8.56	2.40	6.26	0.87	4.69	0.88

Analyte Symbol	Er	Tm	Yb	Lu	Hf	Ta	W	Tl	Pb	Bi	Th	U
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.005	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
72308	5.51	0.768	4.18	0.572	5.6	24.0	< 0.5	0.23	9	< 0.1	77.0	8.91
72309	6.60	0.936	5.68	0.770	4.1	18.5	< 0.5	0.14	8	< 0.1	65.7	9.36
72310	20.5	2.76	15.8	2.11	6.8	8.73	0.6	0.28	6	< 0.1	37.3	2.01
72311	16.4	2.36	14.2	1.91	6.3	18.2	< 0.5	0.26	9	0.1	77.4	5.34
72312	3.78	0.538	3.57	0.562	5.8	17.2	< 0.5	0.17	14	< 0.1	30.4	9.22
72313	9.71	1.09	5.66	0.685	3.3	44.8	1.2	0.33	54	< 0.1	105	67.9
72314	6.83	0.918	5.57	0.768	5.0	13.2	3.8	0.11	15	< 0.1	39.5	19.0
72315	4.22	0.615	4.14	0.658	13.7	40.1	< 0.5	0.31	8	< 0.1	49.9	5.30
72316	6.36	0.864	4.87	0.703	5.4	11.8	< 0.5	0.20	9	< 0.1	39.3	11.4
72317	6.31	0.851	4.98	0.762	6.0	12.8	< 0.5	0.11	9	< 0.1	38.2	10.8
72318	3.87	0.587	4.18	0.700	16.7	82.2	1.6	0.38	57	0.2	111	63.5
72319	11.2	1.44	7.46	0.932	6.5	28.1	< 0.5	0.67	13	0.2	127	6.09
72320	6.19	0.840	4.94	0.718	5.9	11.9	< 0.5	0.15	9	< 0.1	40.6	10.9
72321	6.70	0.921	5.37	0.772	6.8	16.1	< 0.5	0.11	14	< 0.1	46.8	20.0
72322	7.45	0.972	5.62	0.794	6.7	13.8	< 0.5	0.18	8	< 0.1	48.1	10.4
72323	2.50	0.387	2.76	0.451	16.3	107	3.5	0.72	74	0.2	158	93.5

Analyte Symbol	Nb	Nb2O5	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.002	0.003	0.01	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.001	0.01	0.01	1	1	5	20	1	20	10	30	1	0.5
Method Code	FUS-XRF	FUS-XRF	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
GBW 07113 Meas			69.25	12.73	3.22	0.137	0.15	0.59	2.46	5.34	0.287	0.05		5	4	< 5							
GBW 07113 Cert			72.8	13.0	3.21	0.140	0.160	0.590	2.57	5.43	0.300	0.0500		5.00	4.00	5.00							
OKA-1 Meas	0.382	0.546																					
OKA-1 Cert	0.370	0.529																					
SY-4 Meas			50.00	20.11	6.05	0.103	0.52	7.89	6.95	1.66	0.291	0.13		< 1	3	6							
SY-4 Cert			49.9	20.69	6.21	0.108	0.54	8.05	7.10	1.66	0.287	0.131		1.1	2.6	8.0							
BIR-1a Meas			48.26	15.51	11.05	0.166	9.68	13.39	1.83	0.03	0.983	0.02		43	< 1	325	400	54	180	130			
BIR-1a Cert			47.96	15.50	11.30	0.175	9.700	13.30	1.82	0.030	0.96	0.021		44	0.58	310	370	52	170	125			
ZW-C Meas	0.021																60				1060	103	
ZW-C Cert																	56.0				1050	99	
OREAS 101b (Fusion) Meas																		46		430			
OREAS 101b (Fusion) Cert																		47		420			
NCS DC86318 Meas																							
NCS DC86318 Cert																							
SX18-01 Meas	0.473	0.677																					
SX18-01 Cert	0.486	0.695																					
USZ 25-2006 Meas																		34	70		630		
USZ 25-2006 Cert																		32.5	70.8		600		
DNC-1a Meas			46.93	18.24	9.61	0.143	10.05	11.25	1.91	0.22	0.474	0.07		31		149							
DNC-1a Cert			47.15	18.34	9.97	0.150	10.13	11.49	1.890	0.234	0.480	0.07		31		148							
BCR-2 Meas			54.70	13.59	13.67	0.190	3.57	7.26	3.06	1.79	2.272	0.37		33		433							
BCR-2 Cert			54.1	13.5	13.8	0.196	3.59	7.12	3.16	1.79	2.26	0.35		33		416							
USZ 42-2006 Meas																					460		
USZ 42-2006 Cert																					469		
REE-1 Meas																	280			80			
REE-1 Cert																	277			79.7			
W-2b Meas			53.12	15.65	10.79	0.160	6.33	10.90	2.21	0.62	1.089	0.15		36	< 1	271	90	46		110	80		
W-2b Cert			52.68	15.45	10.83	0.167	6.370	10.860	2.200	0.626	1.06	0.140		36.0	1.3	260	92.0	43.0		110	80.0		
OREAS 149 (Fusion XRF) Meas		0.915																					
OREAS 149 (Fusion XRF) Cert		0.915																					
72312 Orig			46.48	16.24	12.69	0.339	2.69	7.19	4.99	4.24	1.406	1.01	98.31	6	5	62	< 20	20	20	20	170	18	0.9
72312 Dup			46.97	16.40	12.79	0.341	2.72	7.20	5.06	4.27	1.411	1.03	99.24	6	5	62	< 20	21	20	20	170	18	1.0
72323 Orig																	< 20	34	40	70	550	26	0.8
72323 Dup			43.86	18.88	11.37	0.617	5.93	1.86	6.11	7.97	1.022	0.12	98.65	< 1	9	37	< 20	33	40	80	540	27	0.9
Method Blank			< 0.01	0.01	0.02	< 0.005	< 0.01	0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01	< 1	< 1	< 5							
Method Blank																	< 20	< 1	< 20	< 10	< 30	< 1	< 0.5
Method Blank			0.03	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01		< 1	< 1	< 5							
Method Blank	< 0.002	< 0.003																					

QC **Activation Laboratories Ltd.** **Report: A23-16399**

Analyte Symbol	As	Rb	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	5	1	2	0.5	1	0.2	2	0.5	0.1	1	0.2	0.1	2	0.05	0.05	0.01	0.05	0.01	0.005	0.01	0.01	0.01	0.01
Method Code	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
GBW 07113 Meas			42		392								504										
GBW 07113 Cert			43.0		403								506										
OKA-1 Meas																							
OKA-1 Cert																							
SY-4 Meas			1191		523								346										
SY-4 Cert			1191		517								340										
BIR-1a Meas			109	15.7	16						0.5		7	0.70	2.00		2.60	1.10	0.600	2.20			
BIR-1a Cert			110	16	18						0.58		6	0.63	1.9		2.5	1.1	0.55	2.0			
ZW-C Meas		> 1000		34.0		216				> 1000	4.6	274		30.8	103	10.1	27.2	7.10		4.80			2.10
ZW-C Cert		8500		33.0		198				1300	4.2	260		30.0	97	9.5	25.0	6.6		4.70			2.0
OREAS 101b (Fusion) Meas				173			20							804	1380	129	398	51.0	7.96		5.34	32.2	6.50
OREAS 101b (Fusion) Cert				178			21							789	1331	127	378	48	7.77		5.37	32.1	6.34
NCS DC86318 Meas		380		> 10000								11.4		1990	413	752	> 2000	> 1000	19.2	> 1000	499	> 1000	606
NCS DC86318 Cert		369.42		17008								11.88		1960	432	737	3429	1725	18.91	2168	468	3224	560
SX18-01 Meas																							
SX18-01 Cert																							
USZ 25-2006 Meas				1010										> 2000	> 3000	> 1000	> 2000	855	199				
USZ 25-2006 Cert				959										19300	29000	2800	8800	900	211.00				
DNC-1a Meas			144		40								109										
DNC-1a Cert			144		38.0								118										
BCR-2 Meas			340		189								710										
BCR-2 Cert			346		188								683										
USZ 42-2006 Meas	231			163		35.0	35							> 2000	> 3000	> 1000	> 2000	522	88.0			52.0	7.93
USZ 42-2006 Cert	224			167		31.00	34.40							21100	27600	2300	6500	539	87.22			57.63	7.86
REE-1 Meas		> 1000		5820		> 1000				498		1.1		1690	> 3000	436	1470	389	23.8	427	110	862	204
REE-1 Cert		1050		5480		4050				498		1.07		1661	3960	435	1456	381	23.5	433	106	847	208
W-2b Meas		21	197	21.1	96	7.2					0.8	0.9	181	11.0	24.8								
W-2b Cert		21.0	190	23.0	100	7.9					0.79	0.99	170	10.0	23.0								
OREAS 149 (Fusion XRF) Meas																							
OREAS 149 (Fusion XRF) Cert																							
72312 Orig	< 5	114	2020	37.1	419	473	4	< 0.5	0.1	2	< 0.2	1.0	3490	172	339	38.8	133	19.9	5.57	12.9	1.68	8.41	1.37
72312 Dup	< 5	116	2033	37.5	431	492	4	< 0.5	0.1	2	< 0.2	1.1	3538	175	338	38.9	135	19.9	5.60	13.4	1.64	8.06	1.39
72323 Orig	< 5	357		21.1		> 1000	2	0.5	< 0.1	12	< 0.2	7.1		106	212	20.9	67.7	8.83	2.40	6.27	0.84	4.65	0.87
72323 Dup	< 5	354	1406	21.2	1814	> 1000	2	< 0.5	< 0.1	13	0.2	7.0	7138	104	208	20.7	65.8	8.29	2.39	6.24	0.89	4.74	0.88
Method Blank			< 2		2								< 2										
Method Blank	< 5	< 1		< 0.5		< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1		< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01
Method Blank			< 2		< 1								< 2										
Method Blank																							

Analyte Symbol	Er	Tm	Yb	Lu	Hf	Ta	W	Tl	Pb	Bi	Th	U
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.005	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
GBW 07113 Meas												
GBW 07113 Cert												
OKA-1 Meas												
OKA-1 Cert												
SY-4 Meas												
SY-4 Cert												
BIR-1a Meas				0.320					< 5			
BIR-1a Cert				0.3					3			
ZW-C Meas		1.70	14.1	2.26	9.7	82.0	323	36.4			43.1	20.8
ZW-C Cert		1.60	14	2.20	9.7	82	320	34			43	20.0
OREAS 101b (Fusion) Meas	19.0	2.78	18.2	2.77					< 5		38.1	415
OREAS 101b (Fusion) Cert	18.7	2.66	17.6	2.58					20		37.1	396
NCS DC86318 Meas	> 1000	272	> 1000	258							69.8	
NCS DC86318 Cert	1750	271	1844	264							67.0	
SX18-01 Meas												
SX18-01 Cert												
USZ 25-2006 Meas			52.7						1170			
USZ 25-2006 Cert			54.5						1100			
DNC-1a Meas												
DNC-1a Cert												
BCR-2 Meas												
BCR-2 Cert												
USZ 42-2006 Meas			18.9						1690		983	
USZ 42-2006 Cert			17.85						1600		946	
REE-1 Meas	691	108	686		446						743	144
REE-1 Cert	701	106	678		479						719	137
W-2b Meas	2.70	0.410							9		2.60	
W-2b Cert	2.5	0.38							9.3		2.40	
OREAS 149 (Fusion XRF) Meas												
OREAS 149 (Fusion XRF) Cert												
72312 Orig	3.75	0.525	3.66	0.576	5.8	17.0	1.1	0.17	14	< 0.1	31.0	8.92
72312 Dup	3.80	0.550	3.47	0.548	5.8	17.4	< 0.5	0.17	13	< 0.1	29.8	9.52
72323 Orig	2.52	0.393	2.79	0.457	16.4	109	6.0	0.74	75	0.3	160	93.8
72323 Dup	2.48	0.382	2.74	0.446	16.2	105	1.0	0.70	73	0.2	155	93.2
Method Blank												
Method Blank	< 0.01	< 0.005	< 0.01	< 0.002	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
Method Blank												
Method Blank												