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Ontario

ASSESSMENT WORK REPORT

CLAIMS L 4281431 & L 4282409

Township of Lorrain

Larder Lake Mining Division

Claim Holder - Brian Anthony (Tony) Bishop client #108621

Report prepared and submitted by Tony Bishop

November 27, 2017

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ASSESSMENT REPORT FOR CLAIMS 4281431 & 4282409, Township of Lorrain, LARDER LAKE MINING DIVISION

Prepared by Brian A. (Tony) Bishop, submitted November 27, 2017

INTRO:

Hereby submitted by Brian Anthony (Tony) Bishop [Client No. 108621, 100% holder on record], on November 27, 2017, a combined assessment report for Claim no. L 4281431 (recorded on November 27, 2015 and comprising one unit) and Claim no. L 4282409 (recorded on October 21, 2016 and comprising eight units). Claim 4281431 is situated in the SW ¼ of the N ½ of Lot 5 Con 8, and 4282409 is in the S ½ of Lot 5 Con 8, and encompasses the SW ¼ of Lot 6 Con 8 and the SE ¼ of Lot 4 Con 8 in the Northeast section of Lorrain Township**,** Larder Lake Mining Division [see Appendix 2: Map 1, page 18].

Nine till samples were collected over two traverses, and subsequently processed, microphotographed etc. and examined. Electron Microprobe Analysis has been completed on selected grains (18), and 2 additional grains were tested by SEM by Geoscience Lab (Sudbury). One G10 and eleven G9's were among the findings (see Results section).

The EMP and SEM reports from Geoscience Lab (Sudbury) are also included on the digital copy of this report. For detailed information on methodologies for field work and till processing, further notes on structural geology, and discussion points on the importance of non-magnetic signatures and geo-chemical and structural geology for advances in diamond exploration in Canada, complete references etc. please refer to Bishop report on Claims 4282189 and 4282187, which adjoin these claims (Bishop, B.A. (2017b)).

PURPOSE:

The purpose of staking claim L 4281431 and the goal of the assessment work done to date and included in this report is to look for evidence and test the hypothesis that the lower segment of Lightning Lake on claim 4281431 may contain the top of a kimberlite pipe which manifests in the post-glacial topography as a circular feature. Claim 4282409 was staked to enable sampling down ice of Lightning Lake, and tie in with my adjacent claims on the southern border (4282189/4282187).

The purpose of combining the two claims in one report is to enable the findings of the target, as well as down-ice of the target, to be presented together.

ACCESS:

Access to Claim no. 4281431 and 4282409 (Lightning Lake) can be made from the town of North Cobalt.

Access to the claim is most easily gained by taking Highway 567, heading East and South from Highway 11B in North Cobalt for 6.5 km to a right turn onto a gated, former logging road, and travelling 14 kilometres to a spur skid-way where a truck can be parked south of this target. The truck was parked near UTM GPS 0606679E, 5243600N. The lake lies approximately 600 metres due north of the truck park.

Access to the shore of the lake and the rest of claim no. 4281431 can be made by travelling on foot, with care being taken while descending a steep north-northwest exposed cliff series which faces the lake on its southern side.

PREVIOUS WORK and significance to Claims 4281431 & 4282409:

No evidence of previous work can be located at the Mines Office in Kirkland Lake. Prospecting and sampling have uncovered no evidence of previous work.

GEOLOGY:

<u>Structural Geology</u>

Claim 4281431 lies entirely within diabase (Nipissing Sill) with a large area of Lorrain Granite <100m to the north, which on OGS Map 2052 is referred to as 'Nicol Lake Diabase Basin'.

Claim 4282409 is largely covered by diabase in a V shaped area, below that is Lorrain Granite. The Cross Lake Fault is ~1400m west of Lightning Lake.

Surficial Geology

The area in and surrounding these claims is comprised of some bedrock and thin till covering bedrock. On the OGS Map 2685, Quaternary Geology, this area is identified as Bedrock-Drift Complex: thin drift cover, sufficiently thick in places to subdue the bedrock topography.

This basically means that the slightly oval round lake is not a kettle lake. Round lakes are not common unless kimberlitic, which is most often seen as a round-oval lake. Lightning Lake sits in a rocky escarpment which can be inferred to be a cross fault.

FIELDWORK:

Taking many smaller till samples from various locations down-ice was deemed appropriate to mitigate the extreme nugget effect caused by KIMs potentially being restricted to thin stratigraphic horizons in the till.

Eight till samples were collected: four from 4281431, and four from 4282409. General prospecting and site examination was undertaken on each traverse.

TRAVERSES: **Please refer to Appendix 4 for Traverses for detailed narratives, maps, and coordinates/field notes.**

METHODOLOGIES: **Please refer to Appendix 5 for Methodologies for Fieldwork and Till Processing**

RESULTS:

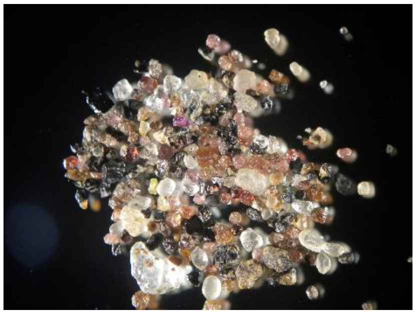
Geoscience Lab Results from Sudbury:

Of the twenty grains from claim 4281431 that were analysed at Geoscience Lab in Sudbury, eleven were G9s, and one was a G10. Spessartine, Titanite, Andradite, Quartz, and Silicate were also identified.

Lab Findings – CRT-17-0279-01 & CRT-17-0107-04	Sample Label	Features	Dimensions	Target # / Claim #
G9	SG-49	Purple, fractured/brecciated	1.3 x 2.3mm	T-12 Lightning Lake / 4281431
G9	SG-50	Purple, fractured with attached kimberlite(?)	1.2 x 1.5mm	T-12 Lightning Lake / 4281431
G9	SG-64	Purple, partially coated	0.4 x 0.7mm	T-12 Lightning Lake / 4281431
G9	SG-65	Purple frosted	0.3 x 0.4mm	T-12 Lightning Lake / 4281431
G9	SG-66	Purple	0.4 x 0.7mm	T-12 Lightning Lake / 4281431
G9	SG-67	Purple	0.25 x 0.4mm	T-12 Lightning Lake / 4281431
G9	SG-68	Pink Purple	0.3 x 0.6mm	T-12 Lightning Lake / 4281431
G9	SG-69	Purple	0.25 x 0.5mm	T-12 Lightning Lake / 4281431
G9	SG-70	Purple	0.3 x 0.5mm	T-12 Lightning Lake / 4281431
G9	SG-71	Purple	0.25 x 0.4mm	T-12 Lightning Lake / 4281431
G9	SG-72	Purple	0.4 x 0.6mm	T-12 Lightning Lake / 4281431
G10	SG-74	Pink Purple	0.2 x 0.5mm	T-12 Lightning Lake / 4281431
Spessartine	SG-61	Golden Brown?	0.25 x 0.25mm	T-12 Lightning Lake / 4281431
Titanite	SG-59	Very deep Red/Purple	0.25 x 0.5mm	T-12 Lightning Lake / 4281431
Titanite	SG-62	Black/Purple?	0.25 x 0.5mm	T-12 Lightning Lake / 4281431
Andradite	SG-73	Black/Purple/Brown?	0.5 x 0.5mm	T-12 Lightning Lake / 4281431
Quartz	SG-60	Light Purple frosted	0.25 x 0.25mm	T-12 Lightning Lake / 4281431
	SG-63	Purple	0.25 x 0.25mm	T-12 Lightning Lake / 4281431

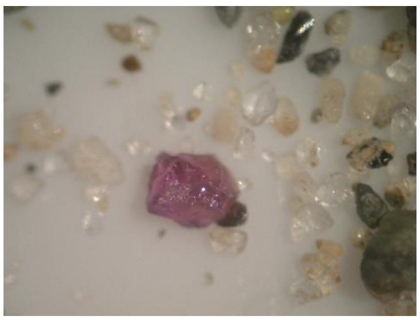
Lab Findings – CRT-17-0107-03	**Sample Label**	**Features**	**Dimensions**	**Target # / Claim #**
Silicate (epidote?)	S-D31	Yellow	1.4 x 1.8mm	4281431
Quartz	S-D32	(*) Irregular (crystalline?) bright, transparent, colourless with minor black inclusions	1.0 x 1.5mm	4281431

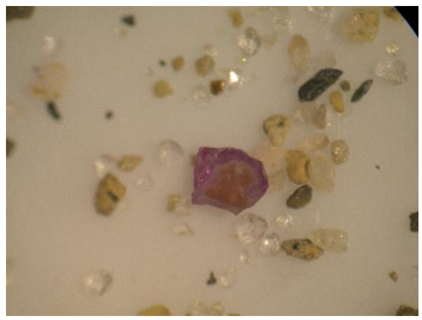
MICROSCOPE PHOTOS OF KIMs:

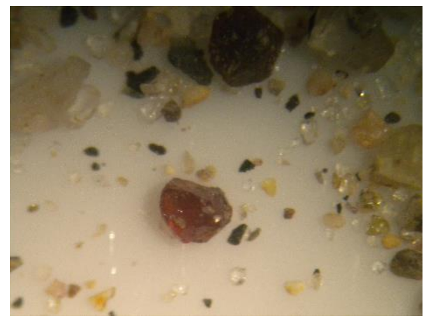

1. Some KIMs picked

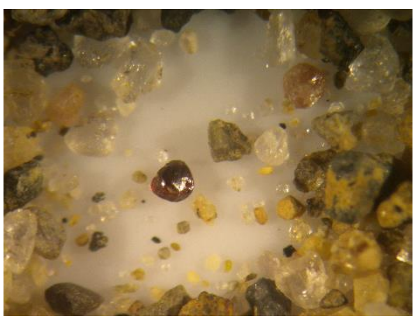

2. Purple garnet in concentrates - 1.7mm


3. Purple garnet - 0.25mm


4. Purple garnet - 0.8mm


5. Purple Garnet - 0.8mm

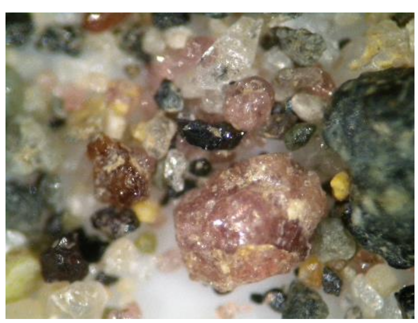

6. Red garnet - 1.0mm


7. Red garnet - 0.6mm


8. Purple garnet, fractured - 1.3 x 2.3mm


9. Some picked purple garnets – 0.2-0.7mm


10. Purple garnet, fractured - 1.2 x 1.5mm

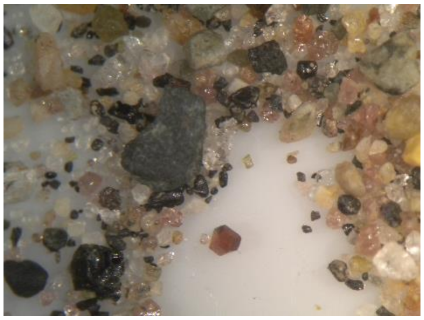

11. Pink garnet, fractured, in concentrates

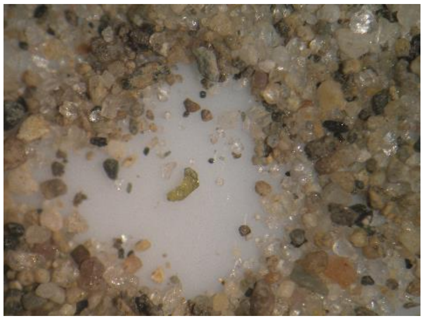

12. 1.5mm stone

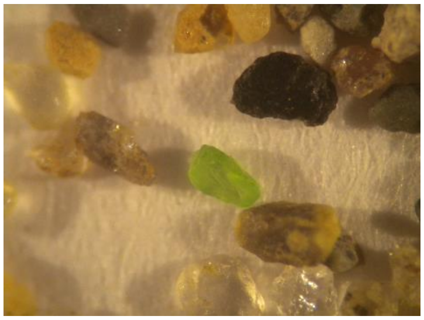

13. 2.0 x 1.0mm stone

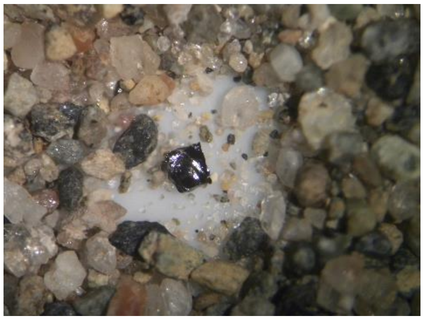

14. Yellow grains - 0.5mm

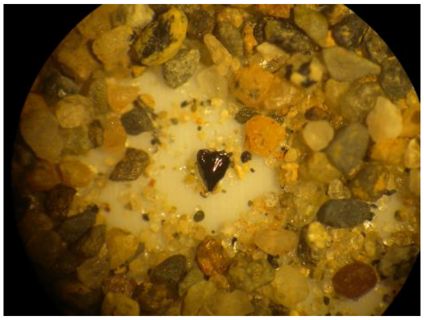

15. Brown crystal

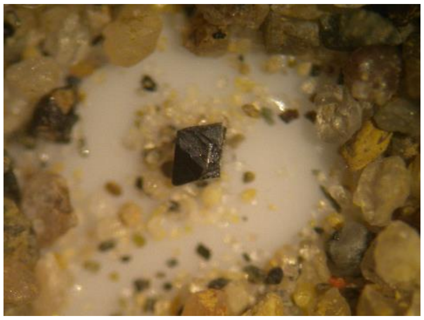

16. Red crystal - 0.5mm

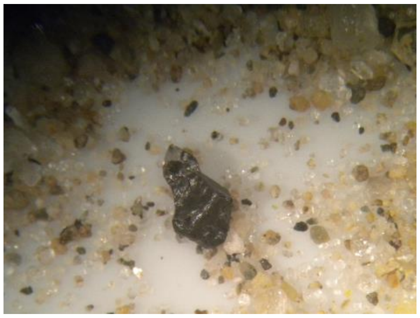

17. Cr diopside

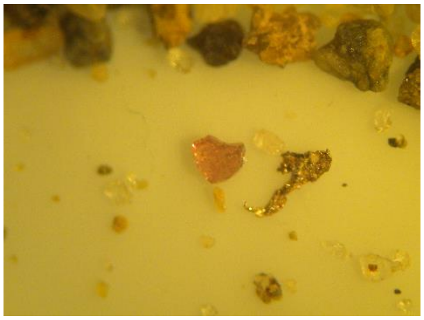

18. Green grain

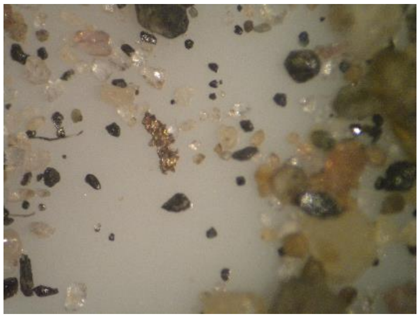

19. Black grain - 0.8mm


20. Black grain - 1.0mm


21. Euhedral chromite - 1.2mm


22. Euhedral chromite - 1.0 x 2.0mm


23. Pink garnet - 0.8mm – with silver


24. Silver in concentrates - 0.5mm

CONCLUSIONS & RECOMMENDATIONS:

Many kimberlitic grains were observed from samples taken. Not all grains could be picked but a small number of grains from these two claims were sent to the Sudbury lab for analysing. I am grouping the results together on the assumption they originate in Lightning Lake at the eastern-most round circle in the east-west long lake. One G10 and eleven G9s were found, along with other 'non-kimberlitic' grains that are still interesting.

The size of two fractured Cr pyropes [see Results: Photo 8, page 8] are of primary interest. A purple garnet (2.3mm) and the 1.5mm grain have classic kimberlite features, including attached kimberlite on the larger grain. A later report will explain in depth the importance of this and other grains found.

The Local Glacial Flow Direction map [see Appendix 3, Map 6, page 23] clearly shows the KIMs I'm finding in this claim (and other claims on the east side of the Cross Lake Fault in Lorrain) could not possibly have come from the known kimberlite pipes to the north.

As such, I will undertake more sampling programs taking new information on ice-flow directions, and utilise such instruments as the Garrett BFO and the Goldspear.

EXPENSES of Assessment Work Claims L 4281431 & L 4282409 (Oct 24, 2016 to Nov 27, 2017)

Work Type	Units of work	Cost per unit of work	Portion re 4281431	Portion re 4282409	Total Cost
Prospecting/sampling/field supervision – 2 traverses	Tony Bishop: 2 days	$500 per day	$ 500	$ 500	$1,000
Field assistant for 2 traverses	Graeme Bishop 2 days; Patrick Harrington 1 day	$285 per day	$ 285	$ 570	$ 855
Till sample processing, HMC, separating into multiple size fractions, sorting, microscope picking, interpretation of KIMs and logging results, microphotography of select grains & KIMs picked, computer storage of micro-photos, storage of picked grains & concentrates picked	Tony Bishop: 8 samples	$500 per sample	$2,000	$2,000	$4,000
Sampling plans, report preparation, map compilations,interpretations, consultations	Tony Bishop: 2 days	$500 per day	$ 500	$ 500	$1,000
Selection & mounting of grains for EMP and SEM analysis	Tony Bishop: ½ day	$500 per day		$ 250	$ 250
GeoLab EMP & SEM invoice 917052	EMP 18 grains	$16.27 per grain (inc HST)		$ 293	$ 293
	SEM 2 grains of 35	Prorated 2/35 x $336.18 (inc HST)		$ 39	$ 39
Field supplies – flagging tape, batteries, markers for sample bags	Paul's New&Used, Can Tire, Dollarama	$37 + 18 + 5= $60	$ 30	$ 30	$ 60
Office supplies – labels, highliters, paper	Dollarama, Northern Lites Computing	$6 + 6 =$12	$ 6	$ 6	$ 12
Clerical & technical services	Chloë Bishop	$400	$ 200	$ 200	$ 400
Transportation based on OPA OEC rate	2 return trips to claim @268 km each	$0.50 per km x 536 km	$ 134	$ 134	$ 268
Food re traverses	5 man days	$35 each	$ 70	$ 105	$ 175
TOTAL VALUE OF ASSESSMENT WORK			**$3,725**	**$4,627**	**$8,352**

History of Development in the Cobalt Area

Before 1900, when the surveyors for the right-of-way of the Temiskaming and North Ontario (T.&N.O.) Railway worked north from North Bay past Long Lake Station [Cobalt, ON] up to Cochrane, there was limited activity in what is now Lorrain Township. Logging expeditions entered Lake Temiskaming after coming up the Ottawa River from Montreal as early as the late 1700s and some mid-to-late 1800s colonization of Lake Temiskaming on the Quebec shore. A farming community was settled in the 1880s on a bay a bit south and east of the Bishop claims in Lorrain Township, in addition to a mission of oblate Fathers, and the posts of the Northwest Company and Hudson Bay Trading Companies not far away on Lake Temiskaming. Charles Farr founded Haileybury in the late 1880s and petitioned the government for railway access to facilitate colonization of the area. A colonization road did exist which reached the southernmost part of Lake Temiskaming on the Ontario side, but was never widely used.

The first government infrastructure nearest the claim was the building of the T. & N.O. railway which passed to the west, reaching Cobalt, Ontario in 1903-1904, where a silver and cobalt-nickel arsenide deposit was discovered. The mining boom which followed the discovery of silver at Cobalt often dominated the geological interest in the area for many decades, and although prospectors and geologists closely explored the terrain all around Cobalt (leading to the settling of Silver Centre south of these claims in 1907-08), most of the exploration was guided by the search for more silver and cobalt-nickel arsenide deposits.

In the 1980s, there was renewed interest in the geology of the area, this time in search of diamond-bearing kimberlite pipes, stimulated in part by the discovery of an 800-carat yellow diamond by a settler “somewhere in the Cobalt area” in 1904 (which was sent out and cut into a number of stones by Tiffany’s of New York, and some are still to this day retained and treasured by great-granddaughters), but became overshadowed by the vastly rich silver discoveries of the day. Soil sampling and geophysics by companies like Cabo, Tres-Or Resources Ltd., and others in addition to exploration by the Ontario Geological Survey, uncovered many kimberlite pipes/dykes, some diamondiferous, which helped to outline the existence of a Lake Temiskaming Kimberlite Field on the Lake Temiskaming structural zone, which appears to have intruded the Canadian Shield in this region approximately 148 million years before present. Deep sonar has also revealed circular features beneath the water of Lake Temiskaming itself which are inferred to be kimberlite pipes.

As well, a number of diamondiferous lamprophyres have been discovered near Cobalt, including one just NW of Latour Lake in the south part of Lorrain Twp, and another on the “Nip” Hill in Cobalt, as well as others.

Advances in Diamond Exploration in Canada: Understanding the Importance of Non-Magnetic Signatures and Geo-Chemical and Structural Geology

There seems to be a general misconception concerning the necessity of having a "magnetic bullseye" as being the primary method of locating kimberlite pipes and indeed, during the 1980s-1990s, a necessity. The following articles will help dispel that outdated belief, given more recent research and outcomes from Lac de Gras kimberlite pipes, including producing mines, and advances in geo-chemical and structural geology analysis. This is not true of the Attawapiskat area where all but one kimberlite pipe exhibits high positive mags. This is due to having a magnetically quiet Paleozoic carbonite bedrock. As well, numerous kimberlite samples have secondary magnetite that creates a larger mag than just the kimberlite pipe itself would have.

However, the geology of Lac de Gras is largely granite cut by diabase dykes, the same scenario as in Lorrain and Gillies Limit, which explains why looking for magnetic anomalies will likely result in failure to detect kimberlite pipes. The kimberlites nearby to the north in the New Liskeard/Haileybury area were, however, found by their mag signatures, but as is shown on the Geological Compilation map [see Appendix 3: Map 3, page 32], all these known pipes are in sedimentary (or metasedimentary – Peddie Pipe), a bedrock similar to Attawapiskat.

From Energie et Ressources naturelles Quebec*, Exploration Methods,* accessed online at: https://www.mern.gouv.qc.ca/english/mines/industry/diamond/diamond-methods.jsp:

- "Anomalies may be negative or positive and locally very close together (Sage, 1996; Saint-Pierre, 1999). A few diamondiferous lamproite and kimberlite intrusions do not create magnetic anomalies (Atkinson, 1989; Brummer *et al*., 1992; Fipke *et al.*, 1995)."

- **"Geophysical Surveys:** Kimberlites often form swarms that are generally associated with large, deep fractures (or faults) and with the intersection of major weakness zones in the earth's crust**….** In exploration programs for diamond-bearing kimberlite pipes between 100 m and 1,000 m in diameter world-wide (average of 300 m), the optimal flight line spacing in aeromagnetic surveys is believed to be 100 m, but a line spacing of 200-250 m is considered sufficient [for much of the world, however diamond pipes in Canada tend to be only ~50m to 200m in diameter, i.e., Lac de Gras and Attawapiskat]….In general, the cost of airborne surveys increases exponentially as the line spacing narrows. Magnetic or electromagnetic surveys spaced at 100 m are very expensive. The investment for this type of exploration can quickly become exorbitant. It is therefore important to use other techniques to target locations for conducting these surveys. The most commonly used technique consists of identifying indicator minerals in the heavy fraction of glacial deposits.

- **"Indicator Minerals:** For both kimberlites and lamproites, the "indicator minerals" must present a very specific chemical composition that reflects the prevailing pressure, temperature, and oxidation-reduction conditions for the formation or preservation of diamonds. It is therefore very important to chemically analyze as many "indicator minerals" as possible in order to ensure that a number of grains possess the right chemical composition. This unavoidably results in high costs for analyzing and interpreting results.

- **"Tracer minerals:** This is the most common method used in diamond exploration, especially in the early stages of exploration well before the considerably expensive geophysical methods are used. This method consists of looking in secondary environments (soil, streams, rivers, etc.) for minerals characteristically associated with diamond-bearing kimberlites and retracing them back to their source…. In northern regions, glaciers have eroded kimberlite rocks, dispersing the minerals that compose these rocks over large distances, either in tills or eskers….Studying glacial movement provides information on the directions and distances that glaciers traveled and makes it possible to go back to the source of the dispersal. A number of sampling campaigns based on relatively tight grids will be needed depending on progress made in the work. These sampling campaigns will take place over a number of years. They will also be difficult to carry out and very expensive."

From Geophysical Survey Methods in Diamond Exploration
Posted by: Maiko Sell in Exploration Geophysics, Exploration Methods. Accessed online at https://www.geologyforinvestors.com/geophysical-survey-methods-diamond-exploration/ :

- "Gravity surveys can be time consuming and expensive. When choosing to do a gravity survey at the exploration level, one is generally expecting to find kimberlites that have no discernible magnetic or electromagnetic response."

From http://www.pdac.ca/docs/default-source/publications---papers-presentations---conventions/jaques.pdf?sfvrsn=4

- "These companies reported the discovery of 4 new non-magnetic satellite pipes surrounding Aries kimberlite pipe using the Falcon airborne gravity gradiometer. Subsequent microdiamond sampling indicated that all were diamondiferous including the most recently discovered Niobe pipe." From page 20 of presentation at PDAC conference

From http://www.adamera.com/i/pdf/ppt/Amaruk-Project-Presentation.pdf page 9:

- "In Lac de Gras all economic kimberlites are strong EM conductors with weak magnetic signatures." Page 9
- "Many of the >200 kimberlites discovered on the Slave Craton are magnetic discoveries, often tested with only one diamond drill hole. Non-magnetic kimberlites are often *more diamondiferous* than magnetic kimberlites, and these kimberlitic phases would be missed if only magnetic anomalies were tested."

From http://www.metalexventures.com/html/attawapiskat.html on magnetics not evident on most productive pipes in Attawapiskat

From http://resourceclips.com/tag/add_ca/ Arctic Star/Margaret Lake Diamonds form JV, follow Kennady's approach to NWT kimberlites, by Greg Klein | November 15, 2016

- "De Beers considered Kelvin and Faraday low grade, based on their lack of prominent magnetic anomalies, according to the **Arctic/Margaret** JV. **Mountain Province** then spun out **Kennady** to explore the pipes. That company "applied ground geophysics, gravity and Ohm mapper EM, which revealed extensions to these kimberlites that were not revealed in the magnetics," the Diagras partners stated. "Subsequent drilling and bulk sampling has shown that these non-magnetic phases of the kimberlites have superior diamond grades to the magnetic phases and significantly increase the tonnage potential." Looking at some nearby deposits, the JV states that certain kimberlites at the **Rio Tinto NYSE:RIO**/**Dominion Diamond TSX:DDC** Diavik mine and the high-grade portions of **Peregrine Diamonds' (TSX:PGD)** majority-held DO-27 kimberlite "are non-magnetic, proof that a magnetic-only approach in the Lac de Gras field could miss significant diamondiferous kimberlite bodies."

From http://www.grizzlydiscoveries.com/index.php/investor-relations/news/91-grizzly-provides-update-for-diamond-exploration-in-northern-alberta

- "The potential for discovery of additional diamondiferous kimberlites within Grizzly's Buffalo Head Hills properties is considered high, based upon the favourable regional geological setting and the positive results of exploration conducted to date, including the identification of numerous priority geophysical targets. Grizzly's past work has shown that the focus should be on kimberlites with a weak magnetic signature with or without an accompanying electromagnetic, gravity and/or seismic signature, which have tended to yield better diamond counts in the Buffalo Head Hills kimberlite field."

From Kennedy, C.M. (2008). The Physical Properties of the Lac de Gras Kimberlites and Host Rocks with Correlations to Geophysical Signatures at Diavik Diamond Mines, NWT: http://research.library.mun.ca/10786/1/Kennedy_Carla.pdf

- "To date, the majority of kimberlites discovered using magnetic surveys have been negative magnetic anomalies. These small, circular, negative anomalies are easy to pick out in the comparatively positive magnetic background. It is assumed that there are still many kimberlites that have not yet been discovered due to their neutral or positive magnetic responses" (Kennedy, 2008, p 5).

- "In the Diavik area, diabase dykes have large positive magnetic signatures making pipes located close to these dykes difficult to detect. There is also the issue of remanent magnetization obscuring magnetic signatures" (Kennedy, 2008, p 149).

From: http://www.arcticstar.ca/s/NewsReleases.asp?ReportID=684168&_Title=Arctic-Announces-new-100-owned-Property-in-the-heart-of-the-Lac-de-Gras-dia... November 18, 2014
Arctic Announces new 100% owned Property in the heart of the Lac de Gras diamond field:

- "Twenty years of diamond exploration on the Slave Craton has proven that kimberlites can be small with complex shapes (dykes, sills, and multi-phase pipes) with complex geophysical signatures. …Many of the >200 kimberlites discovered on the Slave Craton are magnetic discoveries…Non-magnetic kimberlites are often more diamondiferous than magnetic kimberlites, and…would be missed if only magnetic anomalies were tested. The Kennady Diamonds Property (TSXv-KDI) is a recent examples of exploration success that resulted from exploring for non-magnetic kimberlite. Close-spaced airborne gravity, ground gravity, and ground EM techniques discovered high diamond grade kimberlites…. On the adjacent Ekati property, 6 new kimberlites were discovered by a modern heli-borne gravity survey. One kimberlite… is significantly diamondiferous. …The Diavik mine itself consists of non-magnetic kimberlite, detected by electromagnetic (EM) surveys. …These new discoveries represented separate, usually volcanic pyroclastic events which were always more diamondiferous than their magnetic partners. We also found diamondiferous kimberlites with no magnetic and EM signature using gravity techniques."

From Kjarsgaard, B. A. (2007). Kimberlite Pipe Models: Significance for Exploration. In B. Milkereit. *Proceedings of Exploration 07: Fifth Decennial International Conference on Mineral Exploration.* (pp. 667-677). Retrieved from http://www.dmec.ca/ex07-dvd/E07/pdfs/46.pdf

- "The physical and geochemical signatures of the host rocks are widely variable in terms of their magnetic response, electrical resistivity, density and elemental distributions. Hence a variety of kimberlite – host rock responses are possible i.e. positive anomaly, negative anomaly, or no anomaly" (Kjarsgaard, B.A., 2007, p 674).

From Shigley, J.E., Shor, R., Padua, P., Breeding, Shirey, S.B., Ashbury, D. (2016). Mining Diamonds in the Canadian Arctic: The Diavik Mine. Gems & Gemology, Summer 2016, Vol. 52, No. 2. Retrieved from https://www.gia.edu/gems-gemology/summer-2016-diamonds-canadian-arctic-diavik-mine

- "Because kimberlites weather and decompose faster than much older surrounding rocks, the pipes often occur in topographic depressions beneath lakes. …The pipes are capped by several meters of glacial till, a thin layer of lacustrine sediments, and 15–20 meters of lake water. … With the retreat of the glaciers, the pipe locations often became depressions in the land surface, which filled with water to become lakes. The lakes at pipe locations are generally deeper than those formed by just glacial action." (Shigley et al, 2016).

From Kono, M (Ed) (2010): Geomagnetism: Treatise on Geophysics. Elsevier, May 11, 2010. *Science* pp205. Retrieved from https://books.google.ca/books?id=_YDNCgAAQBAJ&pg=PA205&lpg=PA205#v=onepage&q&f=false

- "Kimberlite pipes are often found in geographically localized groups, frequently under lakes because of differential erosion, and the remanence directions within those groups is often similar. Kimberlite pipes are often associated with diabase dikes, and are also commonly intruded along pre-existing zones of weakness regional faults, geological contacts." (Kono (Ed), 2010, p 205)

From Kjarsgaard, B. A. (2007). Kimberlite Pipe Models: Significance for Exploration. In B. Milkereit. *Proceedings of Exploration 07: Fifth Decennial International Conference on Mineral Exploration.* (pp. 667-677). Retrieved from http://www.dmec.ca/ex07-dvd/E07/pdfs/46.pdf

- "Known, economically viable kimberlites range in size from thin (1 - 4 m) dykes or sills, to small pipes of ~75 m in diameter to very large pipes with sizes of ~1.5 km diameter. Just about any type of rock can host kimberlite bodies. …Kimberlites in the Lac de Gras field tend to be small (50-200m diameter) steep sided bodies…" (Kjarsgaard, B.A., 2007, p 674).

From Power, M., Hildes, D. (2007). *Geophysical strategies for kimberlite exploration in northern Canada*. Paper 89 in "Proceedings of Exploration 07: Fifth Decennial International Conference on Mineral Exploration" edited by B. Milkereit, pp1025-1031. Retrieved from https://www.911metallurgist.com/blog/wp-content/uploads/2015/10/Geophysical-strategies-for-kimberlite-exploration-in-northern-Canada.pdf

- "Kimberlite intrusions tend to occur in clusters or fields, with the large-scale distribution possibly controlled by deep seated structural features and local emplacement controlled by shallow zones of weakness such as faults or the margins of diabase dykes" (Power & Hildes, 2007, p 1025).

From Erlich, E.I., Hausel, W.D. (2002). *Diamond Deposits: Origin, Exploration, and History of Discovery*. Society for Mining, Metallurgy, and Exploration, Inc. (SME). Littleton, CO, USA

- "**Gravity.** The high relative density of kimberlite and lamproite should make these rocks detectable by gravity and seismic surveys. However, most diamondiferous intrusives are small and weathered, and gravity and seismics are generally not sensitive or practical enough to use in the search for kimberlite or lamproite. For example, Hausel, McCallum, Woodzick (1979) noted that diamondiferous kimberlite intruded in granite in the Wyoming craton showed no detectable density differences with the host granite." (Erlich & Hausel, 2002, p 313)

Map Appendix Overview

MAP 1: Claim Location

MAP 2: Road Access

MAP 3: Geological Compilation (portion of OGS P.3581)

MAP 4: Mag Map (portion of OGS Map 82 067)

MAP 5: Ice Flow Movement (from OGS OFR 6088)

MAP 6: Local Glacial Flow Direction

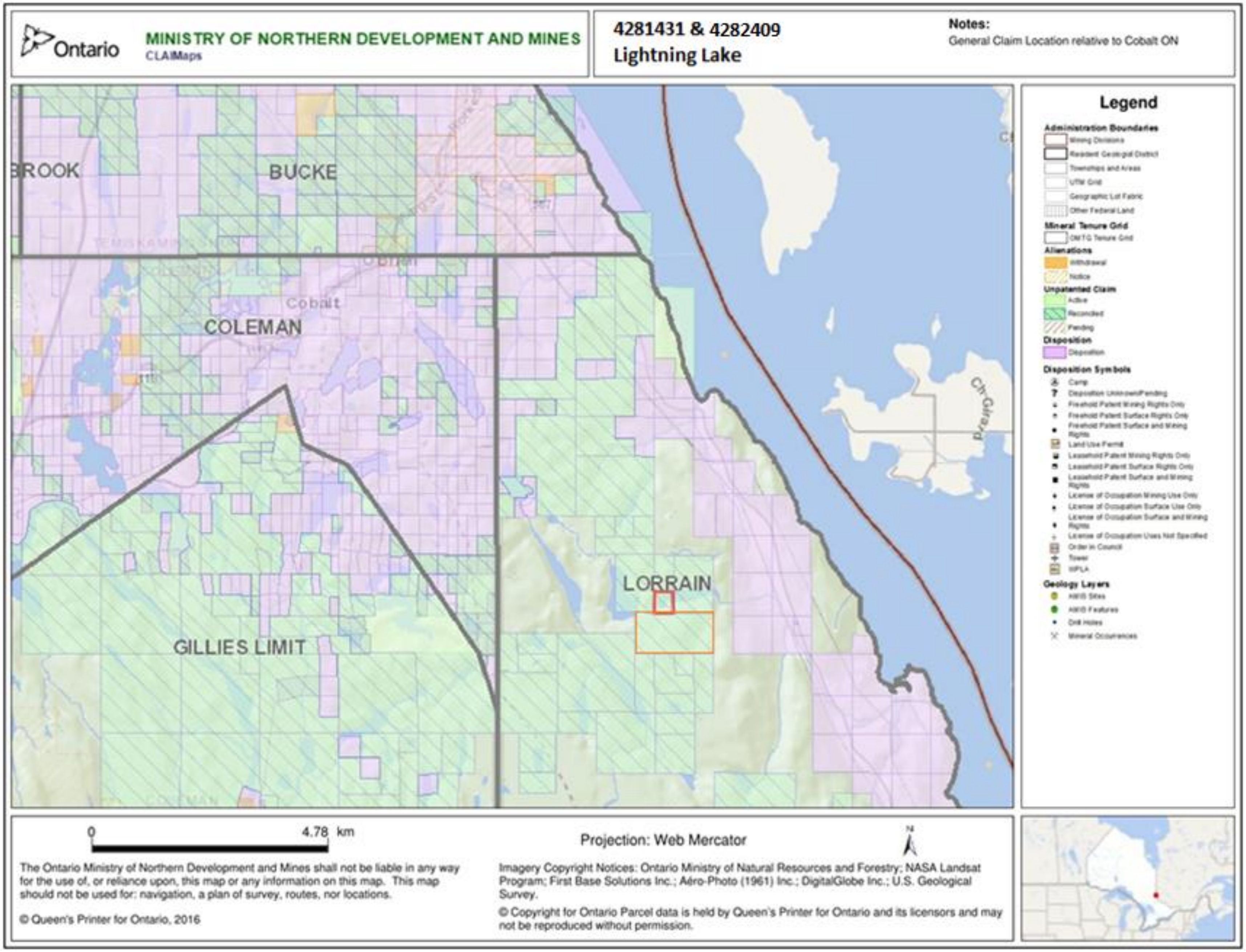
MAP 7: Lake Temiskaming Structural Zone (from OGS OFR 6088)

Map 8: Detailed Local Faults

Map 9: Down-ice glacial direction – tilted view (Google Earth)

Map 10: Straight-down view of Lightning Lake (Google Earth)

Map 1


Ontario
MINISTRY OF NORTHERN DEVELOPMENT AND MINES
CLAIMaps
4281431 & 4282409
Lightning Lake
Notes:
General Claim Location relative to Cobalt ON
BROOK
BUCKE
Cobalt
COLEMAN
LORRAIN
GILLIES LIMIT
Legend
Administration Boundaries
Mineral Tenure Grid
Alienations
Unpatented Claim
Disposition
Disposition Symbols
Geology Layers
0
4.78 km
Projection: Web Mercator
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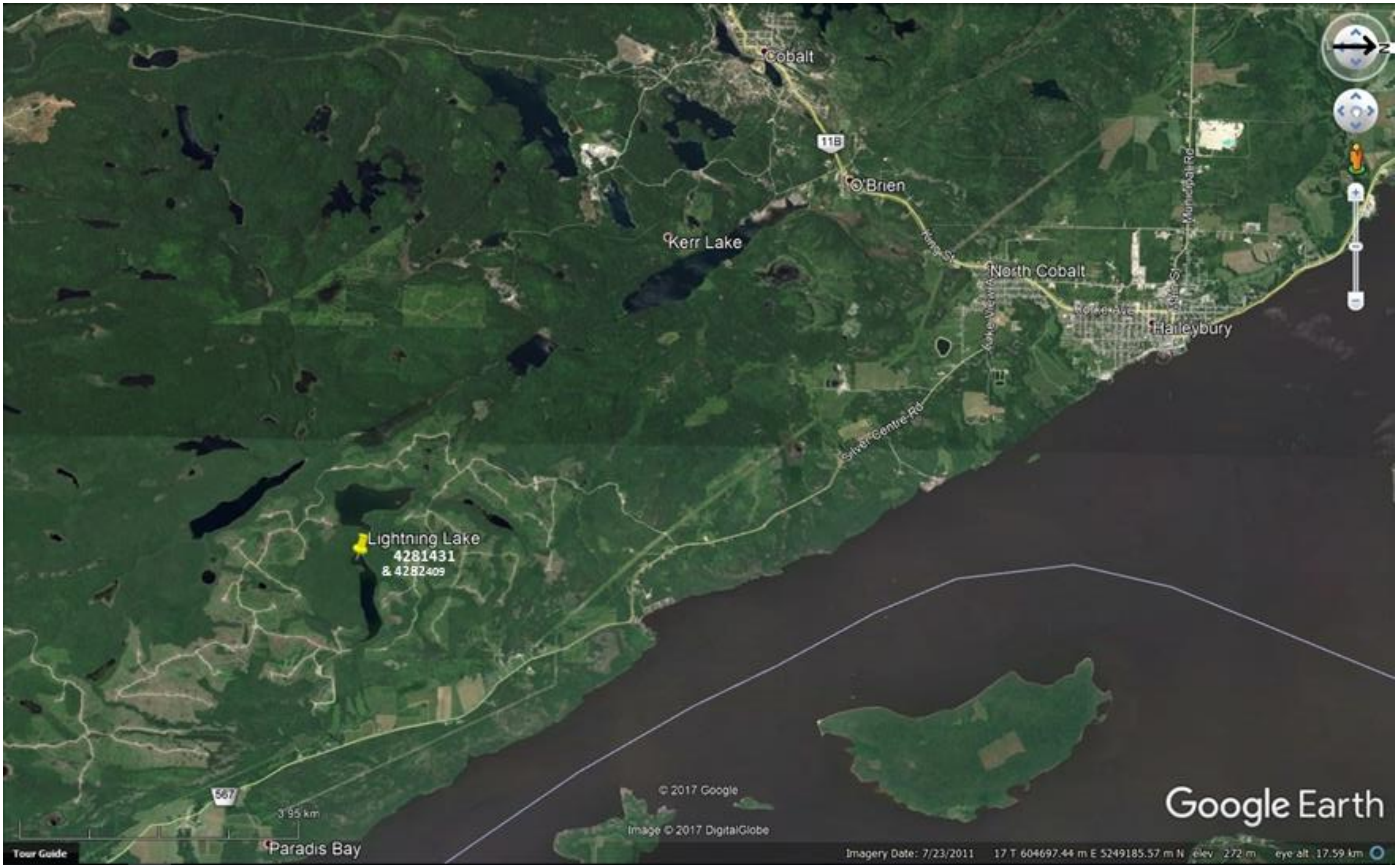
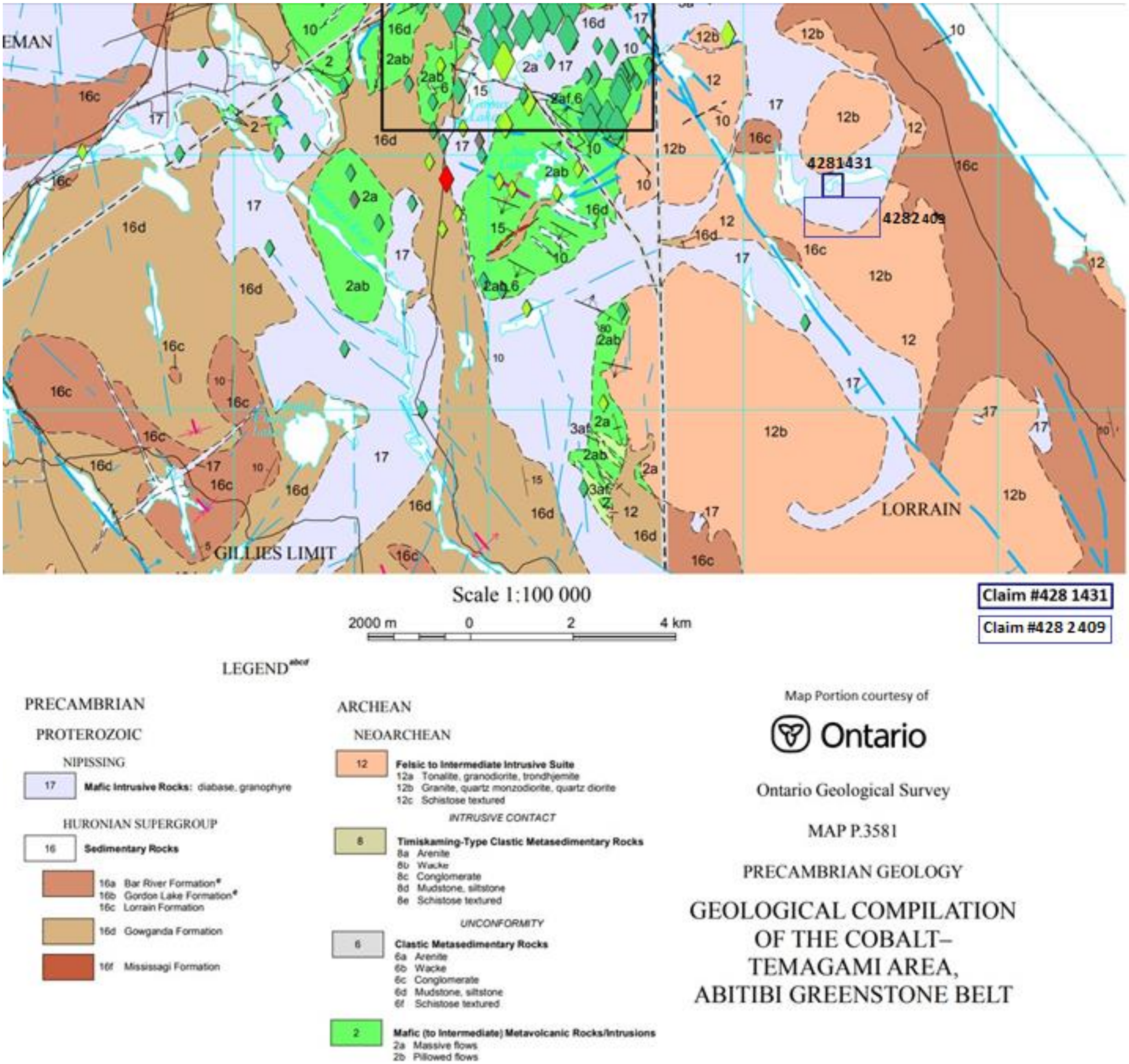
Map 2


Cobalt
11B
O'Brien
Kerr Lake
North Cobalt
Haileybury
Lightning Lake
4281431
& 4282409
567
3.95 km
Paradis Bay
Tour Guide
© 2017 Google
Image © 2017 DigitalGlobe
Google Earth
Imagery Date: 7/23/2011 17 T 604697.44 m E 5249185.57 m N elev 272 m eye alt 17.59 km

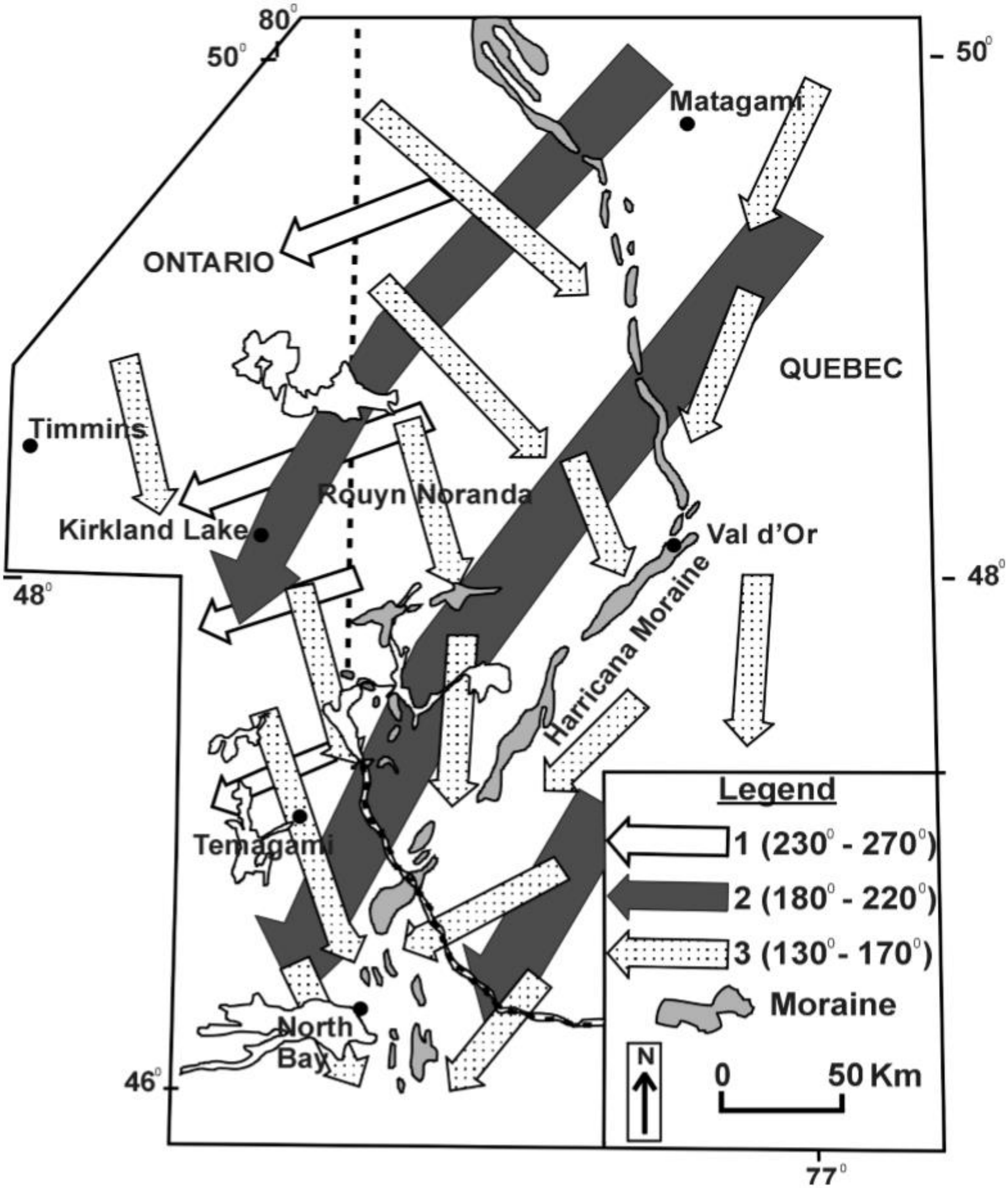
Appendix 2



Map 3

Appendix 2

Map 4

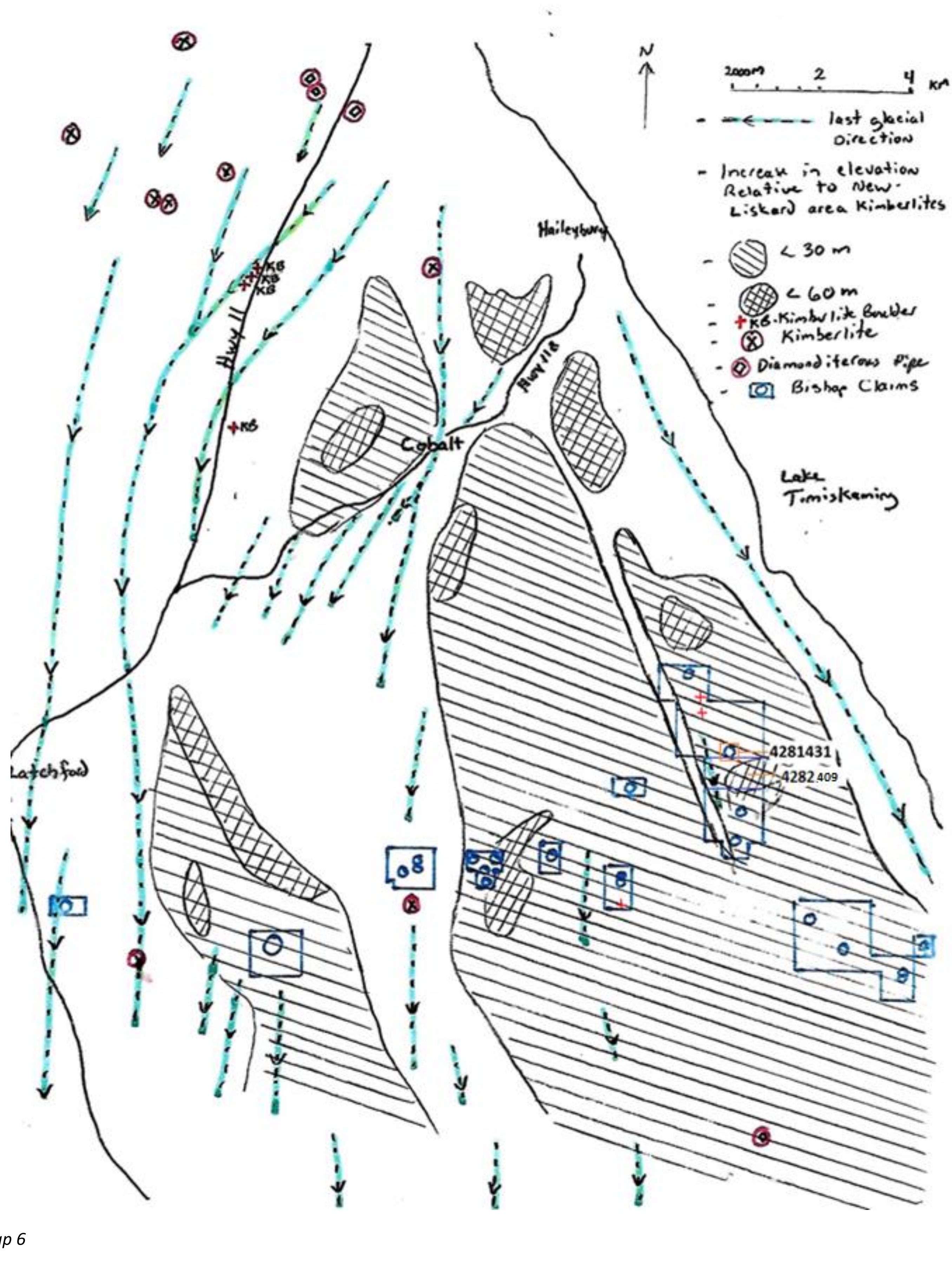


Ice flow movement in the Abitibi-Temiskaming area. The oldest ice flow event is the number 1 movement, the youngest the number 3 movement (after Veillette 1986).

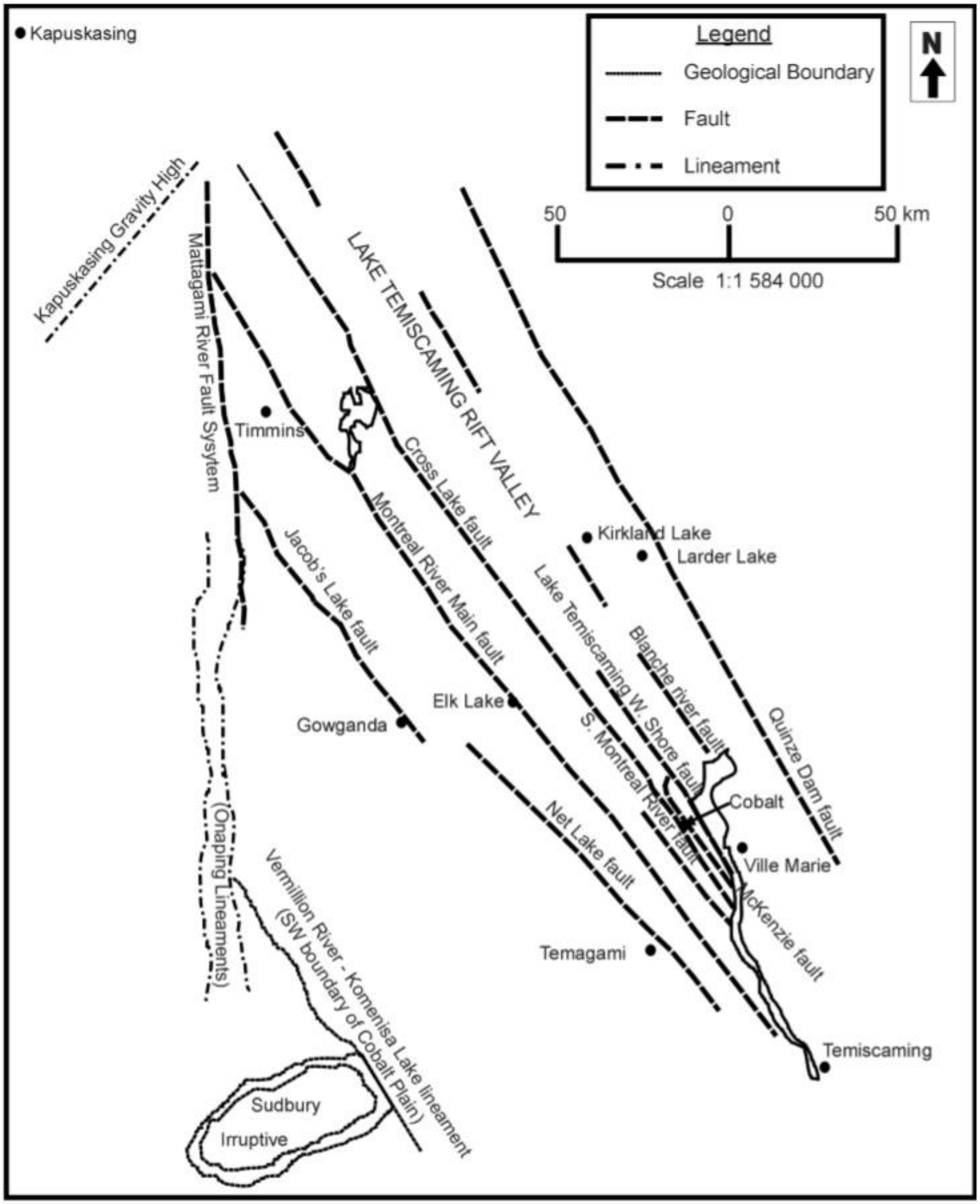
Used courtesy of
Ontario Geological Survey
Open File Report 6088

Map 5

Appendix 2



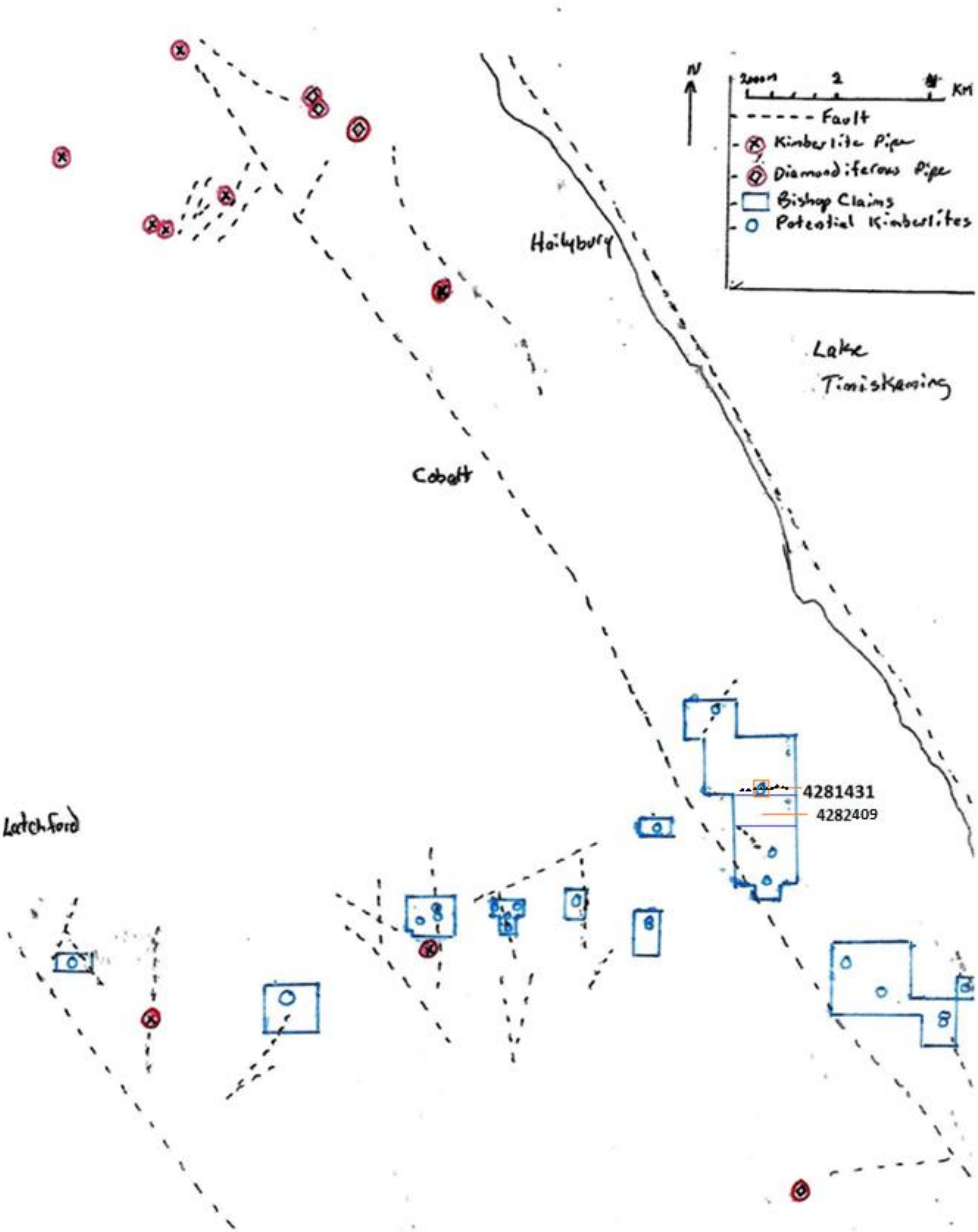
Map 6



The Lake Temiskaming Rift Valley (also known as the Lake Temiskaming Structural Zone) (after Lovell and Caine 1970).

Used courtesy of
Ontario Geological Survey
Open File Report 6088

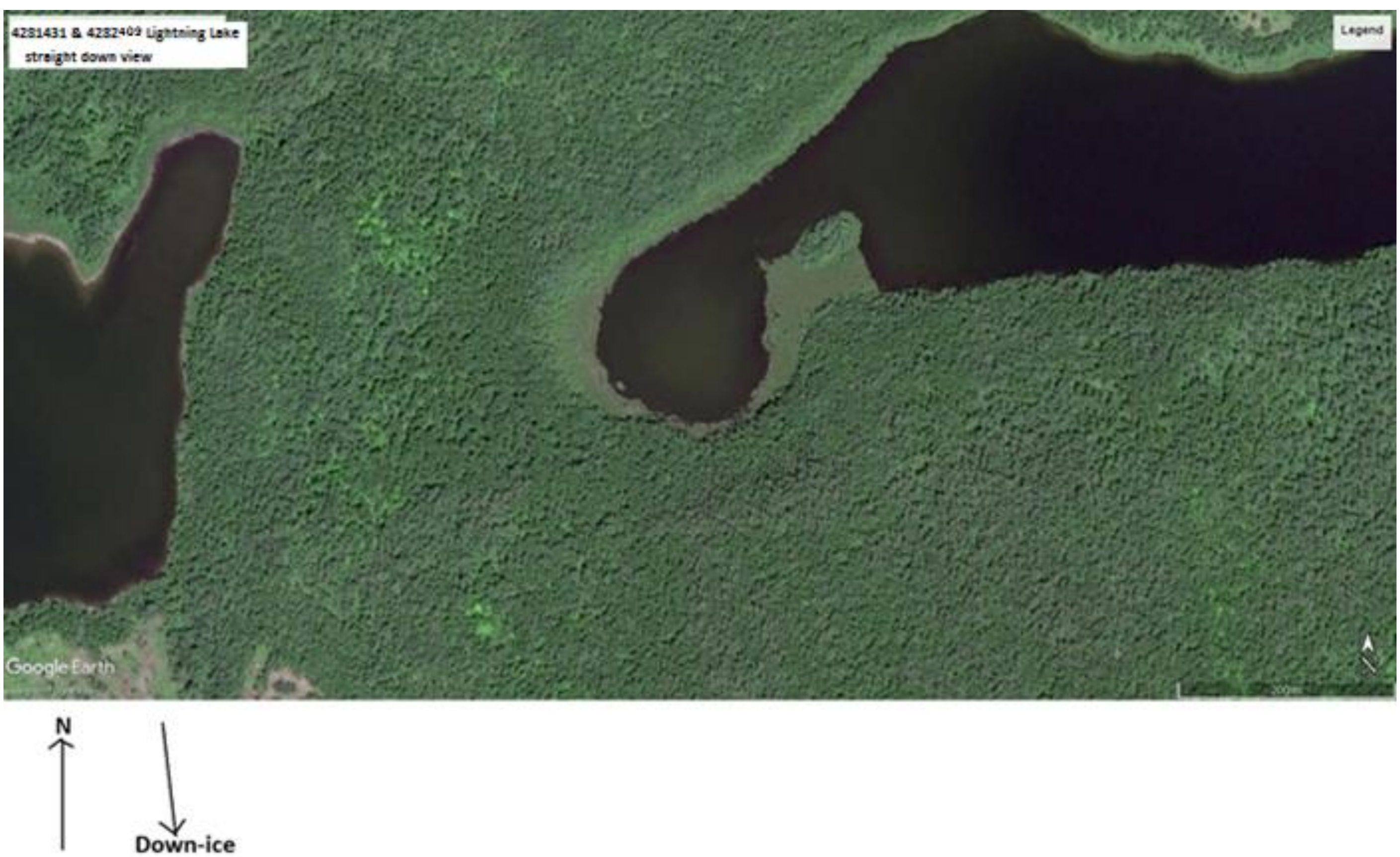
Map 7


N
KM
Fault
Kimberlite Pipe
Diamondiferous Pipe
Bishop Claims
Potential Kimberlites
Haileybury
Lake
Timiskaming
Cobalt
Latchford
4281431
4282409

Map 8

Appendix 2

Map 9



Map 10

Traverses Appendix Overview

TRAVERSE 1: October 24, 2016 – Fieldwork, Map, & Field Notes

TRAVERSE 2: October 29, 2016 – Fieldwork, Map, & Field Notes

FIELDWORK: Please refer to Appendix 6 for Methodologies for Field Work and Till Sample Processing

L 4281431 – Lightning Lake

Traverse 1: fieldwork October 24, 2016 Brian A. (Tony) Bishop, Graeme Bishop

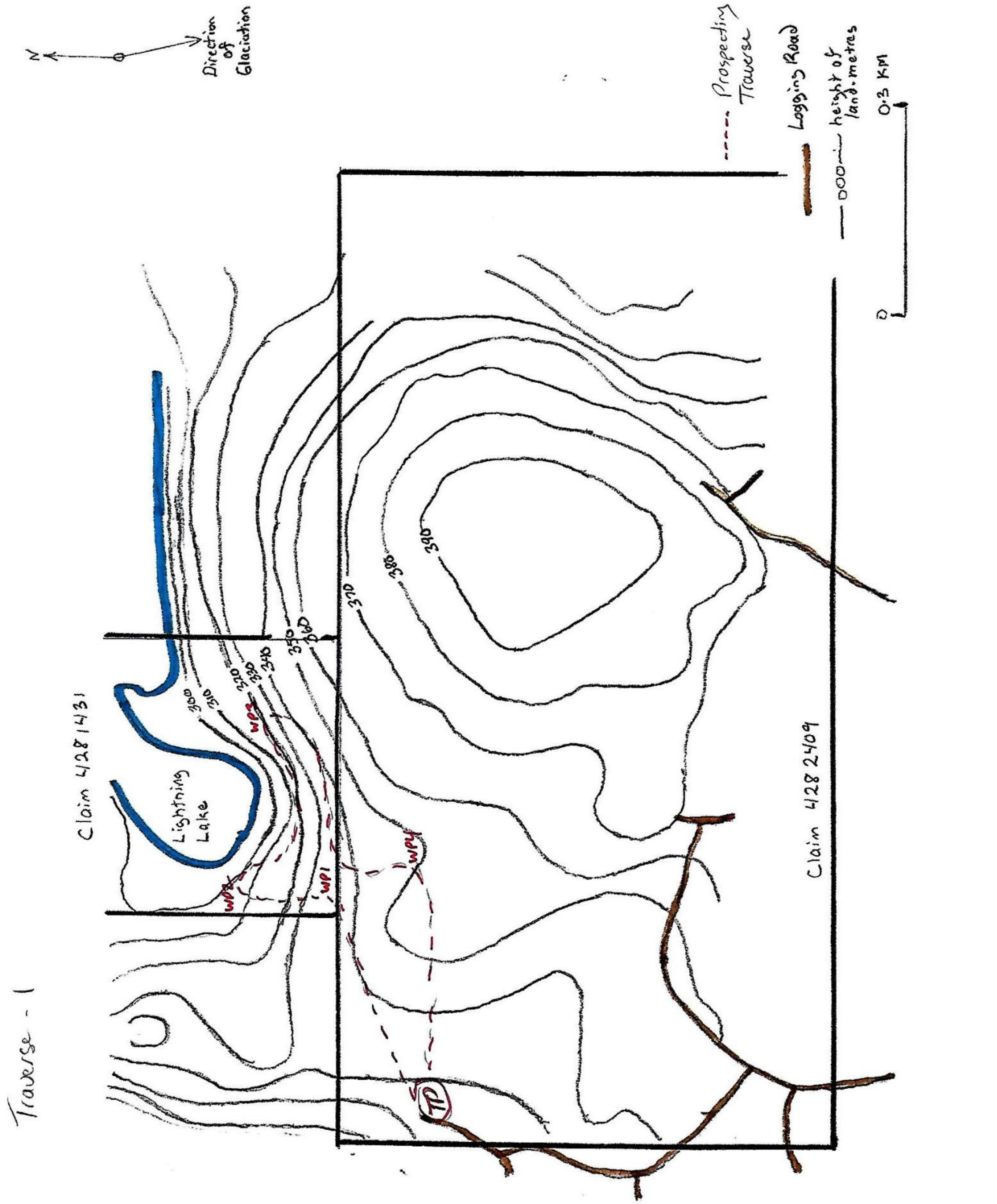
After driving to North Cobalt, we proceeded down Hwy. 567. I parked the truck at the end of a logging skidway, where Graeme and I headed approximately northwest for 500m to the #3 post area. Within the claim area south of Lightning Lake is a very steep hill that rises above the lake 30m at the southwest boundary to 65m at the southeast boundary in the distance of 120m.

A boulder littered talus covers much of the hill with sparse soil. The area that surrounds this claim is in diabase, with a larger area of Lorrain granite ~100m north of the lake. Not surprisingly, those rock types dominated the till. Specifically, we were searching for kimberlite boulders, but the steep terrain maid for slough and rough traversing. No samples were taken this trip as any extra weight would have made traveling through this terrain problematic.

Appendix 4

L 4281431 – Lightning Lake

Traverse 1: map   October 24, 2016   Brian A. (Tony) Bishop, Graeme Bishop



Traverse 1: Map

Appendix 4

L 4281431 – Lightning Lake

Traverse 1: field notes

October 24, 2016

Brian A. (Tony) Bishop, Graeme Bishop

Claim #	Location #	Coordinates 17T UTM
4281431	Corner Post #1	0606925_E / 5244600_N
4281431	Corner Post #2	0606936_E / 5244178_N
4281431	Corner Post #3	0606549_E / 5244171_N
4281431	Corner Post #4	0606538_E / 5244580_N
4282409	Corner post #1	0607764_E / 5244156_N
4282409	Corner Post #2	0607758_E / 5244156_N
4282409	Corner Post #3	0606158_E / 5243340_N
4282409	Corner Post #4	0606130_E / 5244170_N

Appendix 4

L 4281431 & L 4282409 – Lightning Lake

Traverse 2: fieldwork   October 29, 2016   Brian A. (Tony) Bishop, Graeme Bishop, Patrick Harrington

After the claim 4282409 was staked, a sampling program was drawn up by me to properly test for KIMs that might have originated in Lightning Lake if it is a surface expression of a kimberlite pipe. Because of the difficult terrain, Graeme Bishop and Patrick Harrington were enlisted to procure and carry samples while I prospected on the new claim further down-ice of Lightning Lake [see Traverse 2].

After parking at TP1, we headed to the down-ice area below Lightning Lake. Graeme went north to collect samples immediately around Lightning Lake, while Patrick sampled further south. Sampling required two people due to the number of samples and the rough terrain. I prospected mainly on 4282409 to continue the earlier Traverse 1 at a better distance from the lake for kimberlite boulder emplacement.

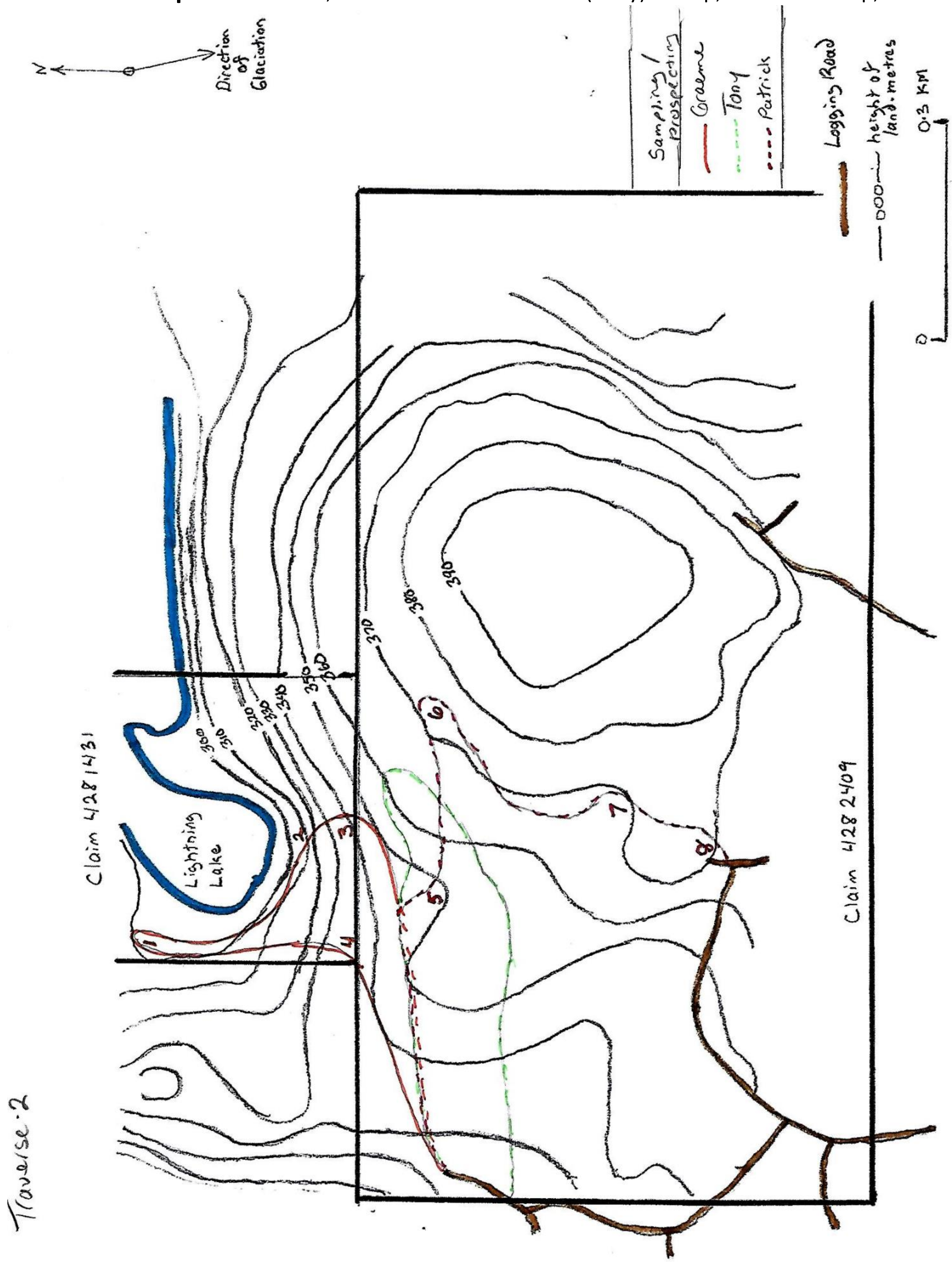
Immediately to the south-southwest of the lake is a large, steep diabase hill ~1km wide north-south and east-west, that rises to 394m at the top. Graeme and Patrick also kept an eye out for interesting mineralisation and kimberlite while sampling. Patrick collected his samples and walked south to TP2 and left his samples to be picked up by truck after meeting up with Graeme and me.

When finished, the eight samples (four from claim 4281431 and four from 4282409) were carefully recorded and stored by me for transport.

Appendix 4

L 4281431 & L 4282409 – Lightning Lake

Traverse 2: map   October 29, 2016   Brian A. (Tony) Bishop, Graeme Bishop, Patrick Harrington



Traverse 2: Map

Appendix 4

L 4281431 & L 4282409 – Lightning Lake

Traverse 2: field notes October 29, 2016 Brian A. (Tony) Bishop, Graeme Bishop, Patrick Harrington

Sample #	Coordinates 17T UTM	Activity/Description
S1	0606542_E 5244477_N	Fairly dry. 4lb 5oz; medium brown
S2	0606710_E 5244249_N	Dry. 2lb 4oz; medium brown
S3	0606774_E 5244179_N	Fairly dry. On/inside the claim line. $4^1/_4$lb; dark brown. Loamy/sandy
S4	0606553_E 5244171_N	Approximately at claim post. Dry. 3lb 6oz; medium brown. Loamy/sandy
S5	0606635_E 5244052_N	Fairly dry. 31lb 8oz; dark brown/black. Loamy/sandy
S6	0606859_E 5244080_N	Dry. 4½lb; brown. Loamy/sandy
S7	0606789_E 5243800_N	4½lb; dark brown. Loamy/sandy
S8	0606679_E 5243618_N	3lb 5oz; medium brown. Loamy/sandy

Claim #	Location #	Coordinates 17T UTM
4281431	Corner Post #1	0606925_E / 5244600_N
4281431	Corner Post #2	0606936_E / 5244178_N
4281431	Corner Post #3	0606549_E / 5244171_N
4281431	Corner Post #4	0606538_E / 5244580_N
4282409	Corner post #1	0607764_E / 5244156_N
4282409	Corner Post #2	0607758_E / 5244156_N
4282409	Corner Post #3	0606158_E / 5243340_N
4282409	Corner Post #4	0606130_E / 5244170_N

Methodologies for Field Work and Till Sample Processing

PREFACE:

Diamond exploration is unlike that for any other mineral resource. Search areas are 'limited' to ancient 'cratons' (such as the 'Canadian Shield') which in themselves are vast areas. Geological maps are, in a general sense, of little to no use, as economic kimberlite pipes, relatively small circular to semi-circular, vertical volcanoes, when found may have no direct correlation to local rock types, although locating faults and contacts between different rock types, such as granite/diabase, can be very useful once a kimberlite field has been located by geophysics or till sampling.

Locating a pipe is largely a matter of detective work. Typically mag maps have been utilized in the search for magnetic 'bulls-eyes' which are then, as funds permit, drilled to see if it is kimberlite or some other magnetic target. However, in Canada so far many of the productive pipes have little to no magnetic signature. As well, EM surveys often don't work for the same reason, as is also true of gravity surveys (i.e. no detectible mag, EM, or gravity anomaly). [See Appendix 3]

Soil sampling, either in till or streams, is the simplest and most common method of looking for kimberlites. In fact, though, the search is not directly for diamonds but for kimberlite indicator minerals (KIMs), which include certain garnets, chrome diopsides, ilmenites, chromites, zircons and others.

Stream sediment surveys are for larger scale drainage basins to initially locate KIMs. Till sampling should be then utilized to best zero in on a pipe's location.

These grains must be separated by utilizing their slightly greater specific gravity (SG) compared to most other minerals in the 'soil' samples. However, these grains are generally only 0.25mm to 2.0mm in diameter. This, and the very slightest difference in SG [see Specific Gravities chart below], make it very difficult to concentrate and recognize and pick KIMs from. Basically, commercial-grade microscopes, tweezers, and concentrators must be acquired at great initial cost with trained operators.

Specific Gravities			
	Gold	-	19.3
(KIM)	Magnetite	-	5.2
(KIM)	Zircon	-	4.6-4.8
(KIM)	Ilmenite	-	4.3
(KIM)	Garnet	-	3.5-4.3
(KIM)	Pyrope	-	3.56
(KIM)	Diamond	-	3.52
(KIM)	Cr. Diopside	-	3.3
(KIM)	Olivine	-	3.3
	Mica	-	2.9
	Dolomite	-	2.85
	Conglomerate	-	2.8
	Gabbro	-	2.8
	Calcite	-	2.7
	Granite	-	2.7
	Quartz	<=	2.65
	Feldspar	-	2.6
	Clay	-	2.2

As a result, most exploration companies utilize a dedicated lab at a cost of $500 and up per sample for concentrating, visual identification and estimate of KIM grain numbers.

Old-fashioned gold panning for KIMs as one would with gold grains is next to impossible: gold has a specific gravity (SG) of ~20 and therefore is roughly 7 times heavier than the other soil and rocks in a sample. KIMs have an SG 3.3 to 4.3, only very slightly (i.e. <1.4 times) more than most other grains in a field sample. (Common non-KIMs have an SG of ~2.6 to 2.9). As well, size matters. Even experienced individuals can have trouble with separating gold grains the size of KIMs from till or stream gravels, and one basically cannot pan gold this size out of 'black sands', i.e. magnetite. Magnetite (SG of 5.2) is commonly found in kimberlites and hence is also found with KIMs, further complicating concentration of a sample, as magnetite is actually heavier.

With the right equipment however, an individual with some background can concentrate and pick KIMs from till samples.

To further complicate issues, due to a number of glaciations in Canada in different directions, samples must be taken from tens of metres to several kilometres down-ice (usually along the last glacial direction) of the potential kimberlite source. This requires the bulk of meaningful sampling to be done off claim, sometimes a long way off claim, which then cannot be applied for assessment work to maintain that claim in good standing. Direct sampling of a kimberlite target is only accomplished by bulk sampling with a large diamond drilling program, or if near surface, directly with heavy machinery (both very costly and permit-intensive).

These initial obstacles can only be overcome by a lone prospector with determination, knowledge, the use of a collection of specialized and costly equipment, and lots of time (and patience). Even for established commercial labs the bulk of the time and cost comes down to an individual meticulously picking KIMs with a pair of tweezers while viewing the concentrates from a sample under a microscope. This lengthy time-consuming process is such that if large numbers of indicators are encountered, only a portion of the sample is picked for KIMs in a lab and then averaged (i.e. 'guestimated') to the full sample, possibly risking losing the few/any all-important G10s and other similar grains in the remaining portion.

As such, this Appendix is rather lengthy and details largely the method of processing till and stream samples by the author and achieving meaningful results.

METHODOLOGY/OVERVIEW OF FIELD WORK & TILL SAMPLE COLLECTION:

Standard 38cm x 28cm sample bags are used for collecting till samples. Small shovels are used to dig a 1' to 3' deep hole below the humus line and the bags filled ½ to ⅔ full, taped shut, and labelled. When possible, the sample is screened through a 4 mesh screen (typically just creek samples), or if not, then larger rocks and roots are removed by hand. If a sample site is very near to the transport vehicle I just remove larger cobbles and take a larger sample to be screened later, before concentrating. In between samples the equipment is cleaned as well as possible to avoid cross-contamination. GPS coordinates are taken at each sample site and then recorded if not matching the prechosen map coordinates.

The base of logging roads is basically composed of till collected immediately adjacent to the road as it is constructed. This makes for a very useful till sampling location, namely the area beside the road where the heavy machinery dug down from several to 10+ feet deep. This creates the possibility to collect from a number of horizons at various locations without mechanized equipment, thereby increasing the possibility of finding KIMs.

Whereas most approaches initially involves a regional sampling survey and then trace up-ice to the possible target, I start with identifying a potential target based on structural, glacial, landscape features, and publicly available OGS reports. I then take multiple samples to determine the likelihood of my target hypothesis, down-ice and off-ice for comparison.

My intent is basically to determine kimberlite pipe/or not a kimberlite pipe, based on a visual identification and number of KIMs picked from my till sample concentrates, and EMP analysis of an affordable minimal # of grains selected and sent for lab analysis. Interestingly, a number of exploration companies as well as ODM in Nepean have stated (within the last 5 years) that visually picked KIM grains and total number of KIMs are their criteria for continued interest in an area rather than analysis of grains. ODM said recently in an email that most companies have been adopting this approach. (From personal research it also appears that many of the most successful companies at finding new discoveries of diamondiferous kimberlite pipes now are looking for non- to low-mag and EM targets utilizing gravity surveys, which do not always produce usable results, and finally results in till sampling for KIMs as the primary prospecting tool), especially in a region with known kimberlites and certain geological backgrounds.

In their sampling programs, OGS Open File Reports on Alluvium Sampling Surveys recommend creek samples for a far more pre-concentrated material for heavy minerals including KIMs (not for some distance down-ice/water flow of a lake due to its being a heavy mineral trap), and so recommend to “maximise the distance between the sample site and the lake”, so I then thought that this is not true if the lake (heavy trap) is the source of KIMs. Large distances between sample spacing and large 10-30kg samples however, are more applicable to doing regional surveys while hunting for a ‘target’, i.e. in this case a kimberlite pipe. Also, creeks are rarely conveniently placed directly down-ice of a pipe-sized target (in Canada typically 50-200m in diameter) and they concentrate material from a large area, so when sampled can strongly skew results to high numbers of KIMs compared to till samples. In my case, where the lake itself is a potential kimberlite pipe, I take many (5-20) small 1-3 kg unscreened till samples, relatively closely spaced, from between ±50 to 1000 metres down-ice of the target, and generally combine the results into one larger sample, creating a more representative sampling of post-glacial conditions for emplacing KIMs into till.

As you can see, due to the lake being a heavy mineral trap for material up-ice/water flow, all the samples I take from ‘close’ proximity down-ice/water flow can in all probability be attributed to that lake (or in theory, a hidden pipe in very close proximity down-ice of the lake). So, any of these samples below a proposed pipe can individually or collectively statistically be attributed to this discrete target. Taking many smaller till samples from various locations down-ice was deemed appropriate to mitigate the extreme nugget effect caused by KIMs potentially being restricted to thin stratigraphic horizons in the till.

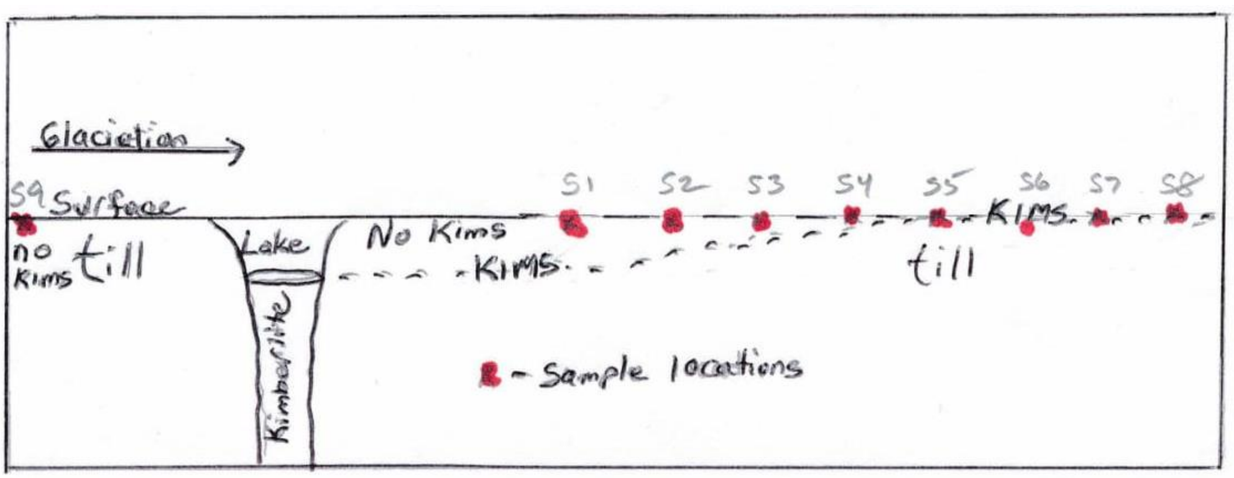


Diagram A – Side View – Till Sampling Program

- If only S1 and/or S2 and/or S3 and/or S4 in till were sampled, one would find no KIMs and conclude no kimberlite up-ice
- If any one of S5, S6, S7, or S8 were sampled one might get favourable results for KIMs
- If the S1 ↔ S8 results, after concentrating and picking KIMs, are combined to a single larger sample result the chance of finding KIMs increases dramatically even though only ‘one’ or more samples contained KIMs initially. This is demonstrably more efficient and accurate at predicting proximity to a kimberlite pipe than only one larger sample would do
- Up-ice, S9 is a check and should statistically contain little to no KIMs

- Further sampling can then help verify/delineate the source of the KIMs

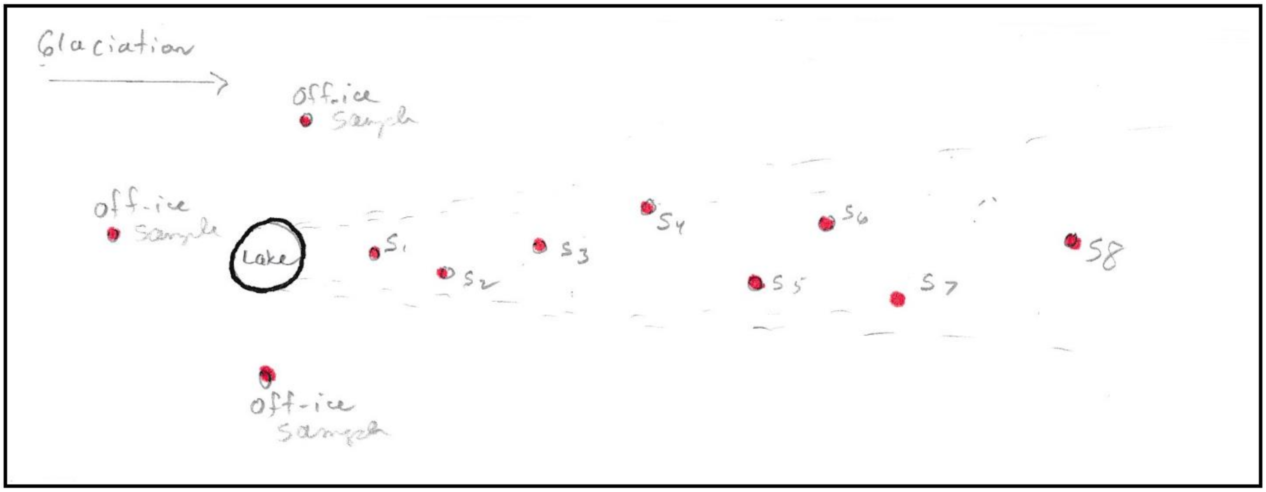


Diagram B – Top View – Till Sampling Program

- Same as Diagram A, with off-ice samples containing little-to-no KIMs if lake is a kimberlite pipe

My blended till samples increases finding one or more that are confined to the appropriate KIM emplacement zone: I concentrate off-ice samples individually/separately. When KIM counts in off-ice samples drop to very few to zero, it adds to the probability of a favourable target location.

After concentrating, picking KIMs is done under a variable power binocular microscope with multiple lighting arrangements. I try to pick all KIMs, unless, as in some cases, they are in the thousands, then numbers are estimated. This of course takes many hours to days (sometime weeks) of work, especially when photographing and entering the photos into the computer correctly labelled.

Also, to maximize local topography in the field, my knowledgeable samplers or I can make on the spot decisions in the field to sample near but not on my pre-planned coordinates (e.g., an overturned tree root nearby etc.), and GPS coordinates are accepted by field workers as possibly being $\pm$ 10-50 metres off on any given day.

The up-ice samples are processed separately, and considered separately. This initial sampling program was performed to obtain a yes/no probability of my target hypothesis. Additional sampling program(s) help further delineate these preliminary results.

Included in picking pyrope garnets are red, pink, and purple colours. Typically, Cr pyrope (by definition) garnets in most literature are considered to be red (colour comes from enhanced chromium and/or iron content) or purple depending on the article; however, McLean et al (2007) shows that the colours in the Canadian Diavik Mine A154-S kimberlite pipe garnets, in order of Chromium content which is important for diamond exploration, are as follows:

- "Orange xenocrysts have <1 wt.% Cr_2O_3, and are inferred to have eclogitic derivation
- There is a general increase in Cr content from orange → red → pink → purple. A similar trend may be seen in the data of Hawthorne et al. (1979) for garnets from the Dokolwayo kimberlite and Hlane paleoalluvial deposits in Swaziland
- Red grains increase in Cr from light → dark red
- Purple xenocrysts are more likely than pink or red to be harzburgitic (G10 or G10D), but colour alone cannot be used as a definitive test"

Pink garnets, however, are not commonly mentioned in diamond exploration literature. In samples from Canadian kimberlites, the Cr content of the pink-purple garnets seem to exceed that of the darker purple garnets when tested at the lab in Sudbury (verbal communication, Dave Crabtree, Geoscience Lab), (McLean et al, 2007), (Grutter et al, 2004); therefore, I am including pink garnets in pyrope garnet counts.

From reading a great number of articles it seems that there is no definitive rule concerning kimberlite minerals, colours of G10s can vary, some diamond pipes have no G10s at all and many other differences also occur. The differences are so numerous and interesting that a future paper or book could be compiled. A certain part of these findings will be presented in this report when applicable to certain claims.

In targeting and evaluating potential kimberlite pipes it is important also to note an article on 'Following kimberlite indicator minerals to source' in GSC OF-7374, "The corollary for exploration at Chidliak is that any source of high garnet counts in sediment samples is considered worthy of pursuit, regardless of garnet compositions" (Pell et al, 2013, p 51). With that in mind, if I attempt to normalize my results vs. sample size as compared to say, the OGS-OF report 6088 (see p 13 & 17), taking into account my samples were unscreened (until processed in the sluice and/or GoldCube®), the number of KIMs I picked could be averaged up a considerable amount in quantity.

So… I'm sampling unconsolidated till, down-ice of a heavy mineral trap (lake) and taking comparatively small samples and getting high to very high in KIM anomalous results, which in classic teachings should result in poor→ no results. Unless of course the heavy mineral trap (lake) is the source of the heavy minerals.

Sluice Efficiency Test Results

Appendix 6

Overflow Chart: collected in stainless steel pan after exiting sluice			
Dry weight from sluice = 3160 grams			
	Screened dry weight (grams)	**Magnetic portion (grams)**	**After panning dry weight (grams)**
-4+10 mesh =	1469		24
-10+20 mesh =	290	3	25
-20+28 mesh =	141	2	19
-28+35 mesh =	171	2	23
-35 mesh =	1058	x	
Total =	**3129**		

Sluice Top: expanded metal over classifying screen – no carpet			
Dry weight from sluice = 940 grams			
	Screened dry weight (grams)	**Magnetic portion (grams)**	**After panning dry weight (grams)**
-4+10 mesh =	241	15	24
-10+20 mesh =	128	6	25
-20+28 mesh =	66	3	19
-28+35 mesh =	80	3	23
-35 mesh =	419	x	
Total =	**934**		

Sluice 1: classifying screen over miner's moss			
Dry weight from sluice = 2860 grams			
	Screened dry weight (grams)	**Magnetic portion (grams)**	**After panning dry weight (grams)**
-4+10 mesh =	136	6	26
-10+20 mesh =	495	20	18
-20+28 mesh =	258	6	19
-28+35 mesh =	336	7	17
-35 mesh =	1610	x	
Total =	**2835**		

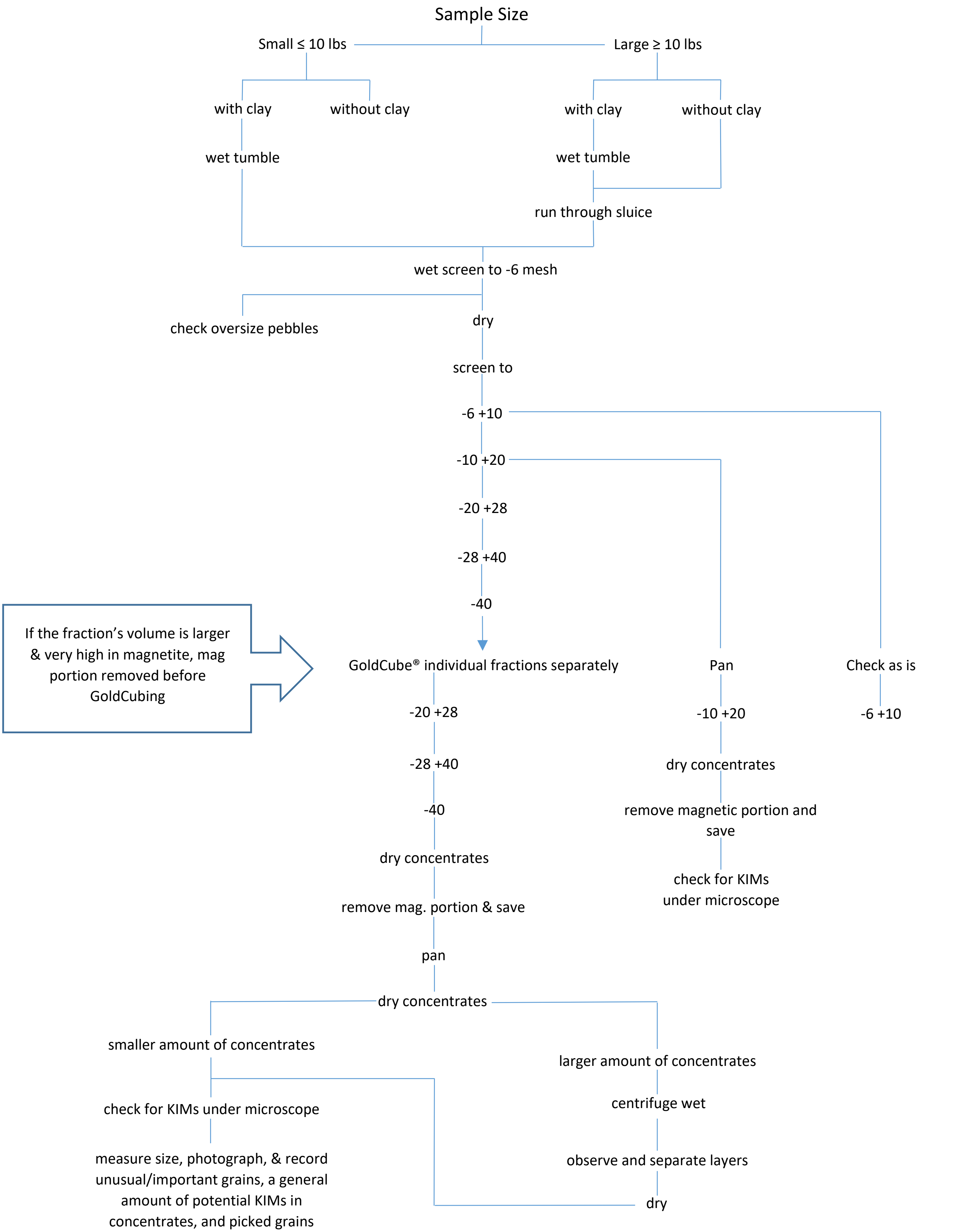
Sluice 2: classifying screen over miner's moss			
Dry weight from sluice = 3020 grams			
	Screened dry weight (grams)	**Magnetic portion (grams)**	**After panning dry weight (grams)**
-4+10 mesh =	29	1	22
-10+20 mesh =	269	8	18
-20+28 mesh =	248	6	20
-28+35 mesh =	359	7	17
-35 mesh =	2106	x	
Total =	**3011**		

Sluice 3: classifying screen over miner's moss			
Dry weight from sluice = 2550 grams			
	Screened dry weight (grams)	**Magnetic portion (grams)**	**After panning dry weight (grams)**
-4+10 mesh =	220	10	15
-10+20 mesh =	441	13	17
-20+28 mesh =	198	5	16
-28+35 mesh =	210	4	16
-35 mesh =	1425	x	
Total =	**2494**		

(note: slight differences in sluice and screen weights could be accounted for by moisture differences and loss during screening, tumbling, and container transfers, but are statistically inconsequential)

Appendix 7

Flow Sheet for Concentrating and Retrieving KIMs from Till & Stream Samples



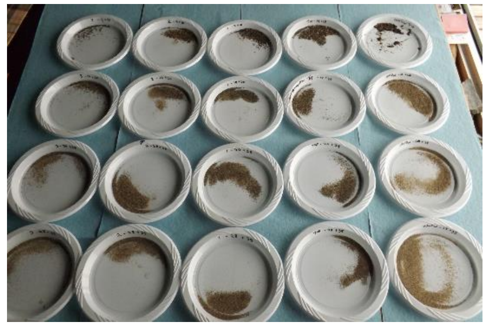
Equipment List

- Mansker Jig
- Camel Spiral Concentrator
- Custom designed proprietary tube/spiral concentrator for fine to very fine material
- Diamond sieves
- Tyler – 8 sieve Motorized Portable Sieve Shaker
- Various test sieves from -4 to -100 mesh
- 12V and 120V and motorized water pumps for concentrators as needed
- Garrett Au Pans: 15” super sluice, 10”
- Keene’s Engineering Au Pans: 14”, 12”, 10”
- Heavy duty 18” x 16” rubber panning tub
- Goldcube® fine Au/heavy mineral concentrator
- Goldspears (2 of) with extra 4’ extensions for precious metal and magnetite soil testing, wet & dry
- Scintrex-Scintillation Counter Model BGS-1S
- Rock saws: 10”, 18”, 24”, 36”
- Various metal/mineral detectors: MineLab Pro-find Pinpointer, Garrett’s BFO, ADS VLF 5khz, AT-Gold 15 khz, ATX multi-frequency pulse
- Goldfinder 14’ aircraft aluminum collapsible sluice with ¾ hp 120V submersible pump, 6 ½ hp Honda pump, dredging (3”) capability, custom designed Hungarian and expanded metal riffles, -4 mesh classifying screen
- Digiweigh digital scale, readability 0.1 gram
- Mettler PM30, 0-60lb, 0.1g scales
- Fujifilm Finepix SL, Nikon Coolpix digital cameras, custom microscope adapter for Coolpix
- Canon EOS Rebel SLR, with commercial microscope adapter
- Zeiss OPMI-1 stereo 4-25x microscope with thru the lens variable halogen lighting, 6’ articulating boom stand
- Zeiss Jena 4-25x compound microscope with separate oculars to 80x
- Bristal 40-1000x microscope
- Nikon SMZ 2B continuously variable 8-50x microscope with adjustable boom stand
- Individually switched, colour correct directed LED, incandescent, and fluorescent lighting
- Turnstile microscope viewing platform
- Diamond Selector II
- Superbright 2000SW and Superbright II LW370 portable ultraviolet lights /battery/120V
- Inova multi-wavelength LW UV LED flashlight
- Clay-Adams high speed centrifuge
- 2” Neodymium magnet in waterproof ABS shell
- Weaker 4” x 6” flat magnet cut to fit Au pans
- Various shovels, auger, containers, compasses, GPS, maps, etc. as needed for soil/rock sampling
- Electronic pH tester and pH strips
- Toyota Tacoma 4x4
- 8’ Boler, 14’ Boler trailers/portable camps

Equipment Photos

Appendix 9

1 - Goldfinder Sluice



1a - Panned and dried concentrates from sluice efficiency test ready to pick for KIMs under microscope

2 -Tyler motorized portable sieve shaker

3 - Goldcube®

4 - Variable speed industrial tumbler

5 - Microscopes

6 - 2-inch neodymium magnet

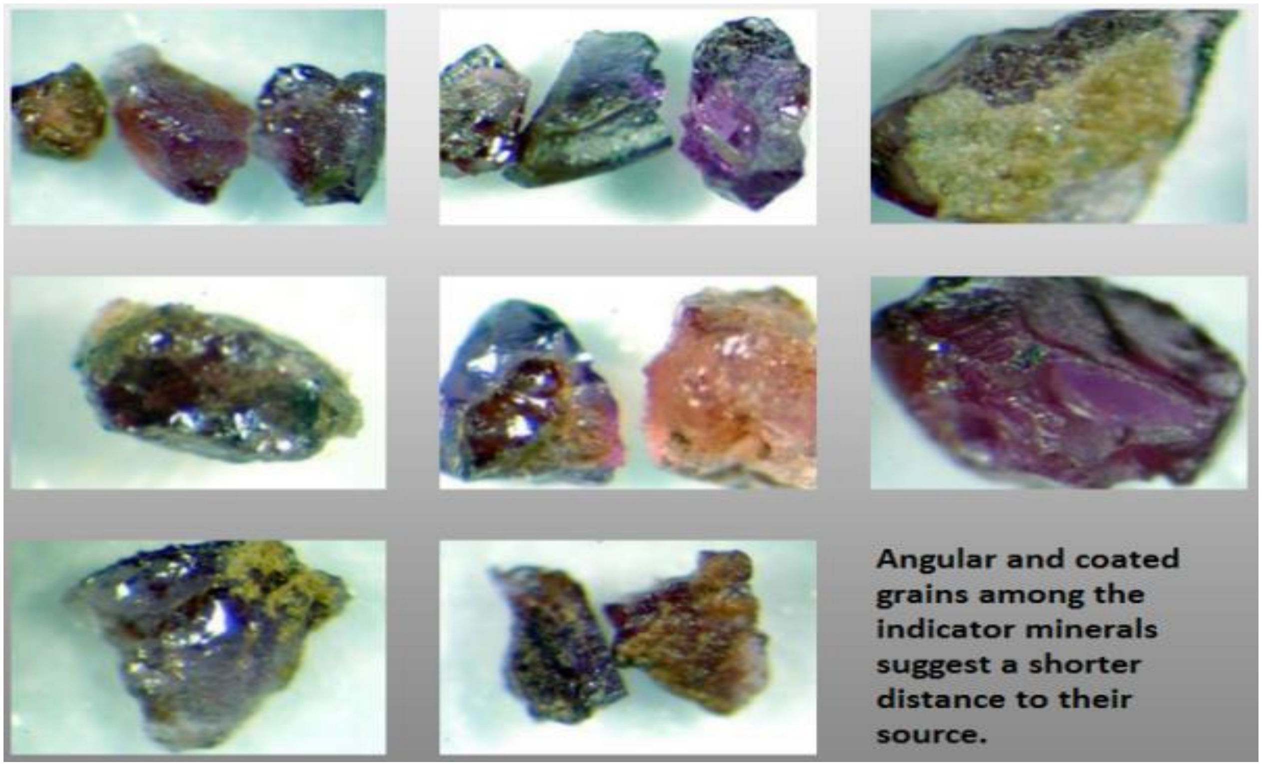
7 - Portable camp near claim

Appendix 10

Reference Photos

“Angular and coated grains among the indicator minerals suggest a shorter distance to their source” (“Arctic Star Presentation”, 2016, p 13)

Arctic Star and North Arrow Announce Drilling at Redemption Diamond Project



“Studies of the indicator minerals from the South Coppermine train, some of which are imaged to the right, show very angular habits, some with soft alteration rims, (kelphyite for pyrope and lucoxene for ilmenite), all evidence for close proximity to source. Mineral grains lose their coats and become rounded as they travel down ice in the glacier. The angular/coated grains were most abundant at the head of the South Coppermine train. One grain with kimberlite attached was also noted." (“Arctic Star Presentation”, 2016, p 13)

Appendix 11

Geoscience Labs – Certificates of Analysis

CERTIFICATE OF ANALYSIS

GEO LABS

GEOSCIENCE LABORATORIES

Ontario

Geoscience Laboratories (Geo Labs)
933 Ramsey Lake Road, Bldg A4
Sudbury, ON P3E 6B5
Phone: (705) 670-5637
Toll Free: 1-866-436-5227

Issued To:	Mr. T. Bishop 440 Grenfell Rd Swastika, ON P0K 1T0 Canada
Phone:	705-642-3937
Fax:	
Email:	bishop.ts@gmail.com
Client No:	1599

Certificate No:	CRT-17-0107-03
Certificate Date:	06/09/2017
Project Number:	
Geo Labs Job No:	17-0107
Submission Date:	06/06/2017
Delivery Via:	Email
QC Requested:	Y

Method Code reported with this certificate: SEM-101

Method Code	Description	QTY	Test Status
EMP-100	Microprobe Analysis / Grain	1	Completed
SEM-101	SEM: Rental With Operator	1	Completed

Please refer to the Geo Labs Job No. 17-0107 if you have any questions.

CERTIFIED BY :

Date: Sept 8 2017

Page 1 of 1

John Beals, GeoServices Senior Manager

Appendix 11

CERTIFICATE OF ANALYSIS

GEO LABS

GEOSCIENCE LABORATORIES

Geoscience Laboratories (Geo Labs)
933 Ramsey Lake Road, Bldg A4
Sudbury, ON P3E 6B5
Phone: (705) 670-5637
Toll Free: 1-866-436-5227

Issued To:	Mr. T. Bishop
	440 Grenfell Rd, RR#2 Swastika, ON P0K 1T0 Canada
Phone:	705-642-3937
Fax:	
Email:	bishop.ts@gmail.com
Client No:	1599

Certificate No:	CRT-17-0107-04
Certificate Date:	22/09/2017
Project Number:	
Geo Labs Job No:	17-0107
Submission Date:	06/06/2017
Delivery Via:	Email
QC Requested:	Y

Method Code reported with this certificate: EMP-100

Method Code	Description	QTY	Test Status
EMP-100	Microprobe Analysis / Grain	1	Completed
SEM-101	SEM: Rental With Operator	1	Completed

REVISED
DATE: Sep 22/2017.
RE Certificate # CRT-17-0107-02

Please refer to the Geo Labs Job No. 17-0107 if you have any questions.

CERTIFIED BY :

John Beals, GeoServices Senior Manager

Date: Sept 22 2017

Page 1 of 1

Appendix 11

Ontario

CERTIFICATE OF ANALYSIS
GEO LABS
GEOSCIENCE LABORATORIES

Geoscience Laboratories (Geo Labs)
933 Ramsey Lake Road, Bldg A4
Sudbury, ON P3E 6B5
Phone: (705) 670-5637
Toll Free: 1-866-436-5227

Issued To:	Mr. T. Bishop
	440 Grenfell Rd, RR#2 Swastika, ON P0K 1T0 Canada
Phone:	705-642-3937
Fax:	
Email:	bishop.ts@gmail.com
Client No:	1599

Certificate No:	CRT-17-0279-01
Certificate Date:	02/10/2017
Project Number:	
Geo Labs Job No:	17-0279
Submission Date:	09/14/2017
Delivery Via:	Email
QC Requested:	Y

Method Code reported with this certificate: EMP-100

Method Code	Description	QTY	Test Status
EMP-100	Microprobe Analysis / Grain	1	Completed

Please refer to the Geo Labs Job No. 17-0279 if you have any questions.

CERTIFIED BY :

John Beals, GeoServices Senior Manager

Date: Oct 2 2017

Page 1 of 1

Client	**Tony Bishop**
Mineral	**Garnet**
Sample	**Various**
Job #	**17-0107**
Analyst	**D. Crabtree**
Analyst Approved	**September 20th 2017**

GEOSCIENCE LABORATORIES REPORT
ELECTRON MICROPROBE ANALYSIS
Data reviewed by Dave Crabtree

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO[t]	Na2O	K2O	Total
Cr-Pyrope Garnet Analyses												
G10 Harzburgite Garnet (Grutter Classification)												
S-G74	41.683	0.010	20.756	0.023	4.499	22.088	3.284	0.410	7.065	0.016	0.000	99.834
S-G83	42.142	0.017	21.101	0.019	4.059	21.869	4.078	0.413	6.779	0.017	0.000	100.494
S-G91	40.929	0.026	19.480	0.029	5.713	20.867	3.765	0.377	8.595	0.018	0.000	99.799
G9 Lherzolite Garnet (Grutter Classification)												
S-G1	41.928	0.016	21.103	0.026	4.033	20.266	5.397	0.400	7.324	0.012	0.003	100.508
S-G5	41.536	0.069	20.875	0.021	4.178	20.355	4.939	0.497	7.630	0.027	0.000	100.127
S-G6	41.726	0.027	22.573	0.013	1.678	20.498	4.551	0.438	8.892	0.017	0.000	100.413
S-G10	42.109	0.002	21.274	0.013	3.680	21.500	4.587	0.377	6.724	0.013	0.003	100.282
S-G11	40.175	0.230	18.840	0.026	5.538	17.109	5.951	0.478	11.335	0.035	0.000	99.717
S-G15	41.776	0.201	21.270	0.029	3.128	20.819	4.698	0.404	7.977	0.041	0.000	100.343
S-G16	41.404	0.018	19.656	0.028	5.856	20.577	4.915	0.473	7.274	0.019	0.000	100.220
S-G24	41.729	0.023	20.961	0.015	3.940	20.956	4.978	0.423	7.441	0.019	0.000	100.485
S-G25	41.460	0.000	20.893	0.019	3.984	20.437	5.489	0.476	7.215	0.005	0.001	99.979
S-G29	41.719	0.007	21.406	0.017	3.476	21.136	4.402	0.479	7.215	0.014	0.000	99.871
S-G30	41.503	0.017	20.215	0.019	5.003	20.494	5.446	0.434	7.096	0.016	0.002	100.245
S-G36	41.606	0.018	20.361	0.020	5.000	20.641	4.962	0.470	7.182	0.025	0.000	100.285
S-G37	41.793	0.322	20.707	0.039	3.442	21.317	5.098	0.287	6.903	0.030	0.002	99.940
S-G38	41.417	0.010	19.838	0.032	5.016	18.963	5.786	0.489	8.566	0.010	0.001	100.128
S-G40	41.701	0.193	19.902	0.033	5.028	20.928	4.995	0.356	7.049	0.043	0.000	100.228
S-G41	41.636	0.228	20.473	0.024	3.980	21.250	4.802	0.392	7.312	0.046	0.000	100.143
S-G42	41.890	0.105	20.707	0.028	4.167	20.214	5.370	0.399	7.368	0.018	0.000	100.266
S-G47	41.392	0.199	19.758	0.034	5.005	19.983	5.281	0.436	8.052	0.044	0.000	100.184

All concentrations are reported as wt%.

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total
S-G48	41.823	0.131	21.166	0.029	3.545	20.549	4.863	0.460	8.058	0.022	0.002	100.648
S-G49	41.206	0.034	19.937	0.024	5.113	20.139	5.461	0.439	7.403	0.017	0.000	99.773
S-G50	41.392	0.004	20.500	0.031	4.361	20.182	5.593	0.423	7.696	0.006	0.000	100.188
S-G51	41.411	0.045	21.135	0.012	3.717	20.487	4.885	0.513	7.675	0.026	0.001	99.907
S-G52	41.938	0.145	21.202	0.037	3.486	20.141	4.947	0.409	8.014	0.027	0.000	100.346
S-G64	41.903	0.040	20.716	0.026	4.495	20.754	5.220	0.402	7.244	0.016	0.000	100.816
S-G65	41.437	0.197	19.624	0.038	5.553	20.689	5.265	0.396	7.063	0.037	0.000	100.299
S-G66	41.859	0.087	21.601	0.021	3.016	20.770	4.634	0.403	7.960	0.022	0.002	100.375
S-G67	41.066	0.320	18.159	0.025	7.077	20.068	5.831	0.379	6.983	0.040	0.000	99.948
S-G68	41.768	0.043	21.777	0.031	2.836	20.080	5.030	0.393	8.451	0.017	0.000	100.426
S-G69	41.530	0.173	19.667	0.033	5.482	20.247	5.293	0.425	7.422	0.044	0.000	100.316
S-G70	41.382	0.097	19.462	0.020	5.673	20.360	5.528	0.443	7.222	0.031	0.003	100.221
S-G71	41.412	0.066	20.628	0.022	4.183	19.342	5.800	0.581	8.397	0.016	0.000	100.447
S-G72	41.289	0.102	19.620	0.029	5.599	20.507	5.391	0.442	7.134	0.029	0.000	100.142
S-G75	41.079	0.002	19.948	0.024	5.155	19.497	6.385	0.481	7.247	0.009	0.001	99.828
S-G77	41.383	0.005	19.975	0.031	5.052	20.504	5.488	0.422	7.331	0.015	0.000	100.206
S-G80	41.298	0.090	19.228	0.043	5.653	20.267	5.683	0.364	7.399	0.023	0.000	100.048
S-G81	41.550	0.094	20.943	0.025	3.855	19.930	4.953	0.465	8.400	0.024	0.000	100.239
S-G84	41.347	0.000	20.916	0.020	3.747	20.100	5.208	0.506	8.039	0.013	0.000	99.896
S-G90	40.920	0.047	19.879	0.019	5.116	19.037	5.711	0.573	8.330	0.026	0.001	99.659
S-G93	41.128	0.084	18.771	0.040	6.828	20.239	5.396	0.450	7.128	0.010	0.000	100.074
S-G94	40.699	0.208	19.110	0.031	5.984	20.344	5.144	0.430	7.529	0.047	0.000	99.526
S-G96	41.056	0.202	18.569	0.034	6.389	20.215	5.720	0.376	7.221	0.028	0.000	99.810
G11 Hi-Ti Peridotitic Garnet (Grutter Classification)												
S-G17	41.268	0.807	18.398	0.054	5.169	19.570	6.396	0.303	8.064	0.032	0.000	100.061
S-G22	41.330	1.014	17.583	0.046	6.727	20.524	6.135	0.273	6.696	0.060	0.000	100.388
S-G92	41.535	0.658	19.707	0.040	4.495	21.091	5.267	0.303	7.206	0.061	0.000	100.363
G1 Low-Cr Megacryst Garnet (Grutter Classification)												
S-G45	41.804	0.468	21.449	0.034	1.818	20.562	4.605	0.323	8.880	0.048	0.003	99.994
S-G8	42.153	0.694	22.048	0.039	1.223	21.071	4.604	0.324	8.513	0.067	0.001	100.737

All concentrations are reported as wt%.

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total
G12 Wherlitic Garnet (Grutter Classification)												
S-G89	39.707	0.054	20.229	0.041	3.341	14.980	6.444	0.697	14.028	0.006	0.000	99.527
S-G95	40.189	0.042	17.663	0.062	7.221	16.088	7.901	0.652	10.165	0.003	0.001	99.987

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total

Crustal Garnet Analysis

Typical Spessertine Garnet Analysis

S-G39	36.838	0.105	20.363	0.006	0.001	1.813	5.502	8.620	26.595	0.008	0.000	99.851

Other Grains: Non Kimberlite Indicator Minerals (Not analysed)

S-G7	almandine
S-G9	almandine
S-G12	almandine
S-G18	almandine
S-G26	almandine
S-G27	almandine
S-G32	almandine
S-G33	almandine
S-G57	almandine
S-G73	andradite
S-G34	andradite
S-G46	fe-oxide
S-G55	fe-oxide
S-G76	K-Feldspar
S-G87	Mg-Si-Fe alt oli?
S-G20	peraluminous silicate
S-G44	peraluminous silicate
S-G78	peraluminous silicate
S-G79	peraluminous silicate
S-G82	peraluminous silicate
S-G60	quartz
S-G4	spessertine
S-G2	spessertine
S-G13	spessertine
S-G14	spessertine
S-G23	spessertine

All concentrations are reported as wt%.

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total
S-G43	spessertine											
S-G58	spessertine											
S-G61	spessertine											
S-G85	spessertine											
S-G86	spessertine											
S-G3	titanite											
S-G19	titanite											
S-G21	titanite											
S-G28	titanite											
S-G31	titanite											
S-G35	titanite											
S-G53	titanite											
S-G54	titanite											
S-G56	titanite											
S-G59	titanite											
S-G62	titanite											
S-G88	titanite											
S-G63	zircon											

changes made to labels:

S-G2 (17-0107-P02-001) originally labelled as S-G12
SG-34 andradite was originally lebelled as epidote
Job # was originally listed as 17-0170

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total

QUALITY CONTROL

Analytical Conditions:	**Majors - 20kV & 20nA. Trace 20kV & 200nA.**
Routine:	**WDS acquisition.**
Correction Procedure:	**PAP**

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total
diopAST	55.030	0.077	0.063	0.028	0.000	18.738	25.829	0.053	0.051	0.006	0.002	99.877
diopAST	55.217	0.070	0.087	0.021	0.002	18.652	25.878	0.042	0.040	0.014	0.000	100.023
garKNZ	41.020	0.432	23.063	0.025	0.087	19.207	5.190	0.298	10.265	0.019	0.000	99.606
garKNZ	41.227	0.438	23.174	0.025	0.105	19.029	5.160	0.321	10.261	0.019	0.000	99.759
garKNZ	41.144	0.434	23.062	0.027	0.097	19.106	5.180	0.316	10.227	0.025	0.000	99.618
garKNZ	41.192	0.438	23.008	0.024	0.091	19.215	5.150	0.313	10.257	0.023	0.000	99.711
garKNZ	41.080	0.434	23.066	0.026	0.097	19.224	5.177	0.312	10.274	0.019	0.000	99.709
garKNZ	41.176	0.423	22.941	0.018	0.086	19.043	5.194	0.311	10.337	0.025	0.000	99.554
garKNZ	41.375	0.438	23.263	0.016	0.102	19.222	5.245	0.305	10.276	0.017	0.000	100.259
garKNZ	41.597	0.428	23.136	0.023	0.091	18.940	5.219	0.318	10.343	0.020	0.000	100.115
garRV3	42.185	0.027	19.804	0.034	5.678	23.233	2.505	0.333	6.319	0.007	0.000	100.125
garRV3	41.952	0.028	19.836	0.031	5.697	23.169	2.513	0.330	6.318	0.008	0.002	99.884
garRV3	42.070	0.023	19.934	0.033	5.727	23.338	2.529	0.323	6.260	0.007	0.000	100.244
garRV3	42.030	0.022	19.932	0.033	5.675	23.323	2.505	0.326	6.391	0.008	0.002	100.247
garRV3	42.032	0.028	19.960	0.033	5.652	23.219	2.460	0.326	6.396	0.009	0.000	100.115
garRV3	42.146	0.028	19.752	0.037	5.674	23.251	2.493	0.320	6.389	0.007	0.003	100.100
garRV3	42.068	0.021	19.913	0.026	5.678	23.246	2.472	0.334	6.324	0.007	0.002	100.091
garRV3	41.974	0.031	19.990	0.037	5.648	23.266	2.461	0.327	6.330	0.013	0.000	100.077
Standard	garKNZ	garKNZ	garKNZ	garKNZ	garRV3	garKNZ	garKNZ	garKNZ	garKNZ	garKNZ	garKNZ	
Average wt%	41.226	0.433	23.089	0.023	5.679	19.123	5.189	0.312	10.280	0.021	L.O.D.	
Expected wt% *	41.441	0.440	23.166	n.d.	5.770	18.887	5.098	0.313	10.441	n.d.	n.d.	
Accuracy % rel.	-0.52	-1.63	-0.33		-1.58	1.25	1.78	-0.52	-1.54			
Mode	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	
Signal	Si Ka	Ti Ka	Al Ka	V Ka	Cr Ka	Mg Ka	Ca Ka	Mn Ka	Fe Ka	Na Ka	K Ka	
XTAL	TAP1	PET2	TAP1	LLiF3	LLiF3	TAP1	PET2	LiF4	LiF4	TAP1	LPET5	

All concentrations are reported as wt%.

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total
Count time (seconds)	15	20	15	20	45	15	45	20	45	20	20	
Beam Current (nA)	20	200	20	200	20	20	20	200	20	200	200	
L.O.D. (estimate)	0.027	0.006	0.023	0.006	0.012	0.023	0.012	0.008	0.018	0.006	0.003	
L.O.Q. (estimate)	0.090	0.020	0.077	0.021	0.040	0.078	0.041	0.028	0.060	0.021	0.011	

* Expected Values are from long term in-house charcterization of mineral standards.

QC notes

1) None of the reported values for these mineral standards are certified:" accuracy" is therefore based on available chemical data.
2) n.d. not determined for the specified mineral standard.
3) n.a. not applicable
4) LOD = Limit of Detection defined here as 3 x standard deviation of the total accumulated background counts.
   The L.O.D. reported here represents the minimum value in this report where the peak - background signal exceeds 3 x standard deviation of the background signal.
5) L.O.Q. = Limit of quantification (3.3 x L.O.D), precision ~ 10-30%.
6) Reported count times are for both peak and background measurements.
7) FeO^t - total Iron expressed as FeO

GEO LABS
GEOSCIENCE LABORATORIES

Ontario

Q.C. NOTE TO ACCOMPANY ANALYTICAL RESULTS

Client : Bishop

Job # : 17-0107

Test : EMP-100

Sample # : see below

Date : September 21, 2017

Please Note:

Labelling errors discovered in the report for job 17-0107 by the EMP-100 test method have been corrected. Please see the attached revised report. If you would like additional work please contact Kayla Kalmo at (705) 670-5632 or email kayla.kalmo@ontario.ca.

Sincerely,

Jennifer Hargreaves,
Quality Assurance Coordinator

Client	**Tony Bishop**	**GEOSCIENCE LABORATORIES REPORT**	
Mineral	**Various**	**ELECTRON MICROPROBE ANALYSIS**	
Sample	**Various**	Data reviewed by Dave Crabtree	
Job #	**17-0279**		
Analyst	**D. Crabtree**		
Analyst Approved	**September 28th 2017**		

Sample Label	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	ZnO	Na2O	K2O	F	Cl	Y2O3	La2O3	Ce2O3	Pr2O3	Nd2O3	Sm2O3	Gd2O3	Total
Note that low totals in some of the analyses are the result of hydration in the mineral structure, or in the case of andradite are due to the presence of Fe^{3+}																					
Titanite (Rare Earth Elements and Halogens included)																					
S-G53	29.830	36.360	1.145	0.024	0.000	27.398	0.050	1.690	0.003	0.026	0.000	0.307	0.000	0.143	0.311	0.845	0.120	0.513	0.040	0.104	98.909
S-G56	29.772	35.814	1.147	0.020	0.014	26.999	0.037	1.851	0.009	0.032	0.007	0.484	0.000	0.156	0.342	0.865	0.139	0.519	0.071	0.092	98.370
S-G59	30.263	37.306	1.460	0.013	0.007	27.952	0.098	1.186	0.000	0.000	0.000	0.265	0.000	0.097	0.032	0.279	0.045	0.227	0.000	0.045	99.275
S-G62	29.802	37.337	1.044	0.096	0.018	27.392	0.050	1.153	0.000	0.014	0.000	0.335	0.007	0.200	0.117	0.439	0.078	0.325	0.077	0.092	98.576
S-G19	29.419	35.727	1.117	0.018	0.027	26.646	0.070	2.041	0.000	0.090	0.010	0.471	0.001	0.207	0.363	0.937	0.180	0.671	0.108	0.211	98.314
S-G21	29.681	35.867	1.023	0.030	0.015	26.796	0.085	1.801	0.000	0.026	0.001	0.361	0.009	0.164	0.334	0.897	0.137	0.516	0.092	0.123	97.958
S-G28	30.285	36.374	1.205	0.027	0.000	27.776	0.048	1.456	0.000	0.002	0.007	0.335	0.009	0.104	0.127	0.470	0.070	0.331	0.080	0.084	98.790
S-G31	29.853	37.179	1.019	0.042	0.000	27.330	0.060	1.173	0.003	0.028	0.012	0.200	0.002	0.143	0.172	0.751	0.100	0.486	0.065	0.146	98.764
S-G88	29.299	35.937	0.478	0.040	0.012	25.091	0.104	2.047	0.007	0.181	0.004	0.111	0.000	0.380	0.543	1.823	0.281	1.194	0.209	0.223	97.964
S-G3	29.529	35.406	0.901	0.054	0.018	26.497	0.072	2.440	0.000	0.096	0.000	0.448	0.000	0.200	0.407	1.113	0.157	0.627	0.087	0.206	98.258
S-G35	29.673	36.179	1.284	0.032	0.000	26.710	0.055	1.322	0.006	0.022	0.000	0.313	0.007	0.240	0.119	0.742	0.169	0.807	0.201	0.161	98.042
S-G54	29.982	36.496	1.565	0.000	0.002	27.507	0.070	1.524	0.024	0.001	0.000	0.339	0.005	0.288	0.024	0.307	0.086	0.402	0.073	0.115	98.810
Almandine																					
S-G57	37.463	0.029	21.448	0.009	4.703	1.075	1.488	34.373	0.000	0.000	0.004	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.592
S-G33	38.233	0.002	22.049	0.059	8.309	1.060	0.579	30.437	0.002	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.730
S-G18	37.454	0.013	21.730	0.000	7.361	0.899	1.268	30.772	0.000	0.000	0.001	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.498
S-G32	37.403	0.099	21.211	0.040	3.545	1.641	3.045	33.609	0.000	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.593
S-G12	37.263	0.020	21.325	0.048	7.015	0.679	1.764	30.373	0.003	0.000	0.006	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.496
S-G7	36.983	0.026	21.340	0.024	3.955	1.445	5.286	31.175	0.000	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.234
S-G9a	37.144	0.134	20.782	0.014	2.581	4.170	0.318	34.531	0.006	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.680
S-G26	37.386	0.003	21.393	0.016	4.404	1.098	4.417	32.203	0.000	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.920
S-G27	37.334	0.000	21.476	0.003	4.559	1.502	4.076	31.301	0.000	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.251
Andradite																					
S-G73	36.118	0.648	6.572	0.024	0.087	32.441	0.886	20.648	0.015	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	97.439
S-G34	37.161	0.138	10.456	0.000	0.000	31.077	0.088	19.728	0.000	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.648
Spessertine																					
S-G39	37.043	0.109	20.390	0.001	2.038	5.760	8.385	26.561	0.000	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.287
S-G4	35.863	0.077	20.404	0.000	0.761	0.936	13.878	27.914	0.021	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.854
S-G13	35.716	0.069	20.075	0.001	0.367	0.486	25.392	17.323	0.059	0.006	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.494
S-G14	35.409	0.108	19.825	0.000	0.823	1.248	19.794	21.264	0.000	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.471
S-G23	35.927	0.208	19.988	0.000	0.971	0.660	19.327	21.998	0.013	0.034	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.126
S-G58	35.346	0.191	19.925	0.001	0.503	0.220	28.457	14.303	0.024	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.970
S-G61	35.773	0.026	20.863	0.002	0.884	0.616	25.809	15.635	0.015	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.623
S-G2	35.661	0.200	20.016	0.000	0.771	0.565	23.078	19.098	0.012	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.401
S-G85	35.731	0.102	19.994	0.000	0.291	0.718	21.550	21.495	0.048	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.929
S-G86	36.042	0.111	19.948	0.000	0.362	0.894	25.171	17.574	0.043	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.145
S-G43	35.640	0.035	20.224	0.009	0.893	1.030	17.628	23.617	0.011	0.028	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.115

All concentrations are reported as wt%.

Sample Label	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	ZnO	Na2O	K2O	F	Cl	Y2O3	La2O3	Ce2O3	Pr2O3	Nd2O3	Sm2O3	Gd2O3	Total
Stauralite																					
S-G78	27.283	0.607	54.209	0.048	1.847	0.000	0.330	13.122	0.191	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	97.637
S-G20	27.446	0.604	53.586	0.102	1.886	0.000	0.271	13.308	1.038	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.241
S-G82	27.022	0.549	54.851	0.062	1.796	0.014	0.271	13.600	0.231	0.000	0.009	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.405
S-G44	27.124	0.523	54.921	0.039	2.485	0.011	0.322	13.187	0.147	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.759
S-G79	27.619	0.657	53.688	0.064	1.920	0.001	0.371	13.717	0.326	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.363
Quartz																					
S-G9b	100.919	0.010	0.000	0.000	0.008	0.010	0.001	0.365	0.000	0.000	0.006	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	101.319
S-G60	100.238	0.000	0.139	0.003	0.005	0.000	0.000	0.102	0.005	0.000	0.054	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.546
Feldspar																					
S-G76	64.499	0.000	18.427	0.009	0.000	0.000	0.000	0.040	0.000	0.672	15.877	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.524
Aletered silicate (serpentine?)																					
S-G87	41.519	0.028	1.785	0.000	36.743	0.183	0.062	6.234	0.034	0.014	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	86.602

All concentrations are reported as wt%.

Sample Label	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	MgO	CaO	MnO	FeO	ZnO	Na_2O	K_2O	F	Cl	Y_2O_3	La_2O_3	Ce_2O_3	Pr_2O_3	Nd_2O_3	Sm_2O_3	Gd_2O_3	Total

QUALITY CONTROL

Analytical Conditions:	**Majors - 20kV & 20nA. REE run at 20kV & 100nA.**
Routine:	**WDS acquisition.**
Correction Procedure:	**PAP**

Sample Label	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	MgO	CaO	MnO	FeO	ZnO	Na_2O	K_2O	F	Cl	Y_2O_3	La_2O_3	Ce_2O_3	Pr_2O_3	Nd_2O_3	Sm_2O_3	Gd_2O_3	Total
albFF	68.069	0.000	19.744	0.000	0.000	0.088	0.015	0.000	0.000	11.685	0.101	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.702
albFF	67.901	0.000	19.744	0.003	0.000	0.092	0.000	0.002	0.000	11.803	0.080	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.625
diopAST	55.144	0.059	0.075	0.001	18.573	25.949	0.039	0.041	0.006	0.015	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.902
diopAST	55.469	0.066	0.055	0.009	18.653	26.167	0.035	0.060	0.000	0.009	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.523
garKNZ	41.341	0.415	23.376	0.098	19.032	5.261	0.311	10.352	0.007	0.000	0.002	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.195
garKNZ	41.523	0.423	23.090	0.101	18.989	5.165	0.285	10.183	0.000	0.000	0.003	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.762
garRV3	42.095	0.049	19.920	5.742	23.316	2.485	0.340	6.268	0.006	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	100.221
garRV3	41.695	0.016	19.976	5.592	23.391	2.477	0.365	6.356	0.000	0.006	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.874
kyaSTD	36.382	0.022	63.223	0.099	0.008	0.000	0.006	0.115	0.015	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.870
kyaSTD	36.311	0.001	63.215	0.082	0.000	0.000	0.000	0.146	0.000	0.000	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.755
Or-1	63.963	0.000	18.534	0.000	0.016	0.012	0.007	0.005	0.000	1.084	15.195	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.816
pyxBRN	50.308	0.483	7.493	0.922	17.264	17.248	0.129	4.701	0.009	0.843	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	99.400
pyxBRN	50.001	0.479	7.469	0.898	17.218	17.139	0.123	4.661	0.000	0.851	0.000	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	98.839
Standard	garKNZ	garKNZ	garKNZ	garRV3	garKNZ	garKNZ	garKNZ	garKNZ	n.a	albFF	Or-1	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	
Average wt%	41.432	0.419	23.233	5.667	19.011	5.213	0.298	10.268	n.a	11.744	15.195	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	
Expected wt% *	41.441	0.440	23.166	5.770	18.887	5.098	0.313	10.441	n.a	11.820	15.120	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	
Accuracy % rel.	-0.02	-4.84	0.29	-1.79	0.65	2.25	-4.91	-1.66		-0.64	0.50										
Mode	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	WDS	
Signal	Si Ka	Ti Ka	Al Ka	Cr Ka	Mg Ka	Ca Ka	Mn Ka	Fe Ka	Zn Ka	Na Ka	K Ka	F Ka	Cl Ka	Y La	La La	Ce La	Pr Lb	Nd La	Sm La	Gd La	
XTAL	TAP1	LLIF3	TAP1	LLIF3	TAP1	LPET5	LIF4	LIF4	LLIF3	LTAP2	LPET5	LTAP2	LPET5	LPET5	LLiF3	LLiF3	LLiF3	LiF4	LiF4	LiF4	
Count time (seconds)	15	15	15	15	15	10	25	20	15	15	15	30	20	30	10	10	10	10	10	10	
Beam Current (nA)	20	20	20	20	20	20	20	20	20	20	20	20	20	100	100	100	100	100	100	100	
L.O.D. (estimate)	0.025	0.029	0.021	0.024	0.023	0.018	0.028	0.030	0.033	0.018	0.012	0.053	0.009	0.025	0.036	0.039	0.052	0.052	0.048	0.046	
L.O.Q. (estimate)	0.085	0.096	0.071	0.078	0.076	0.060	0.093	0.100	0.110	0.060	0.040	0.176	0.032	0.082	0.120	0.129	0.172	0.173	0.159	0.154	

* Expected Values are from long term in-house charcterization of mineral standards.

QC notes

1) None of the reported values for these mineral standards are certified:" accuracy" is therefore based on available chemical data.
2) n.d. not determined for the specified mineral standard.
3) n.a. not applicable
4) LOD = Limit of Detection defined here as 3 x standard deviation of the total accumulated background counts.
   The L.O.D. reported here represents the minimum value in this report where the peak - background signal exceeds 3 x standard deviation of the background signal.
5) L.O.Q. = Limit of quantification (3.3 x L.O.D), precision ~ 10-30%.
6) Reported count times are for both peak and background measurements.
7) FeO^t - total Iron expressed as FeO

GEO LABS
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Ontario

Mineralogy Report

Client Contact: Mr. Tony Bishop
GL Job Number: 17-0107
Test Group: SEM-101
Date: August 29, 2017

Client Request:

Thirty five grains were submitted for energy dispersive (ED) x-ray analysis with the SEM in order to determine if any of the grains classify as diamond.

The samples were mounted on double-sided carbon tape and analysed non-polished and non-coated. The analysis is therefore only collected at the surface of the grain. This sample preparation technique makes it possible to identify the elements present in the grain, however this approach is not ideal for quantitative analysis. These results are therefore qualitative in nature.

Results:

None of the samples submitted for analysis were positively identified as diamond. See Appendix 1 for table of results.

Table 1. Table of results.

Grain #	ID
S-D1	quartz
S-D2	quartz
S-D3	fe-oxide
S-D4	silicate (almandine?)
S-D5	silicate (epidote?)
S-D6	silicate (epidote?)
S-D7	quartz
S-D8	quartz
S-D9	quartz
S-D10	calcite
S-D11	calcite
S-D12	calcite
S-D13	calcite
S-D14	quartz
S-D15	quartz
S-D16	quartz
S-D17	quartz
S-D18	quartz + organics?
S-D19	quartz
S-D20	silicate (epidote?)
S-D21	quartz?
S-D22	quartz+Fe-oxide or Fe-carbonate?
S-D23	Fe-oxide
S-D24	organic material
S-D25	mainly halite + Al, Si, K, P, Ca
S-D26	mixed silicate coated with organic material
S-D27	silicate (epidote?)
S-D28	organic material
S-D29	zircon
S-D30	quartz
S-D31	silicate (epidote?)
S-D32	quartz
S-D33	silicate (epidote?)
S-D34	silicate (epidote?)
S-D35	quartz

Statement of Qualifications:

I, Brian Anthony (Tony) Bishop p/l #A44063 of Kenogami (RR#2 Swastika, ON), hereby certify as follows concerning my report on Claims L 4281431 and L 4282409 in the Township of Lorrain, Larder Lake Mining Division:

I have been prospecting and placer mining part-time for 43+ years in Ontario, British Columbia, and Nova Scotia (which led to writing a book *The Gold Hunter's Guide to Nova Scotia* (Nimbus Publishing, 1988, ISBN 0-920852-93-9) which was used in prospecting courses in Nova Scotia). I have held an Ontario Prospector's License for 36 years, and was issued a Permanent Prospector's License in 2005. I have completed a number of prospecting courses given by the Ministry, and have my Prospector's Blasting Permit. I was one of the directors on the Northern Prospectors Association (NPA) in the early years when Mike Leahy revitalized/resurrected the NPA in Kirkland Lake, and with Mike, initiated the annual gold panning event as part of Kirkland Lake Gold Days.

As well, I sold and used small scale mining and concentrating/processing equipment for over 20 years. This included instructing others in their use.

On short term contracts I have performed specialized work for Cobatec, Macassa, Castle Silver Mines Inc., Gold Bullion Development Corp, as well as short stints in Ecuador and Montana.

The last three years I have devoted to full-time diamond exploration. This has included 1,000+ hours of research from many diverse sources on exploration and processing techniques.

Drawing on this research and my many years of practical experience I have assembled a complete till processing lab I feel rivals many commercial ones. Importantly, I sometimes exceed their results by testing a wider range of samples' fraction sizes and as a result have found a number of kimberlite indicator minerals, notably a number of indicators in the 2.0 – 3.0 mm size that are larger than the usual upper cut-off for commercial labs' mesh sizes. Additionally, I pick far more potential KIMs than any lab can reasonably do, given time/cost constraints. Redundancy tests are routinely performed to monitor potential losses of the KIMs and I feel my equipment and techniques closely match that of the industry.

Signed:

Brian Anthony (Tony) Bishop

November 27, 2017

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