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ASSESSMENT WORK REPORT

CLAIMS L 4282189 and 4282187

Lot 5 Con 7, Lorrain Township

Larder Lake Mining Division

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

Report prepared and submitted by Tony Bishop

November 2, 2017

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ASSESSMENT REPORT FOR CLAIMS 4282189 & 4282187 LORRAIN TOWNSHIP, LARDER LAKE MINING DIVISION

Prepared by Brian A. (Tony) Bishop, submitted November 2, 2017

INTRO:

Hereby submitted by Brian Anthony (Tony) Bishop [Client No. 108621, 100% holder on record], on November 2, 2017, a combined assessment report for Claim no. L 4282189 (recorded on November 5, 2015 and comprising one unit) and Claim no. L 4282187 (recorded on November 12, 2015 and comprising three units). Claim 4282189 is situated in the NE ¼ of the N ½ of Lot 5 Con 7, and 4282187 is in the S ½ of the N ½ and NW ¼ of the N ½ of Lot 5 Con 7 in the Northeast section of Lorrain Township**,** Larder Lake Mining Division [reference Map 1 in Appendix 4]. The first work on the claims occurred on December 13, 2015, after both had been staked and registered.

Work completed to date includes a thorough on-foot observational examination of the claims, a research component, a carefully planned and mapped out series of soil sampling, screening, concentrating, sorting and examining potential kimberlite indicator minerals (KIMs) in the 28 till samples collected, microphotography, and recording these and other findings. Electron Microprobe Analysis has been completed on selected grains (7) by Geoscience Lab (Sudbury). Aerial photography was also undertaken.

Appendices include detailed methodologies for field work and till sample processing (including results of processing efficiency test and flowchart for concentrating), narratives, maps and field notes for 5 traverses, a brief narrative on area history, 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. A Map Appendix includes general claim location and road access, geological types, faults, glacial directions, magnetics, and Google Earth views of claims.

The EMP and SEM reports from Geoscience Lab (Sudbury) as well as a video clip of the drone fly-over are also included on the DVD submitted with this report.

PURPOSE:

The purpose of staking claim L 4282189 (registered November 5, 2015) 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 claim may contain the top of a kimberlite pipe which manifests in the post-glacial topography as a small semi-circular lake, named Cedar Pond, aka the target. Claim 4282187 (registered November 12, 2015) was staked to enable sampling down ice of Cedar Pond, and tie in with my adjacent claim on the southern border (4273040).

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 the claims 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 short spur-skid way where a truck can be parked south of this target [reference Map/Access in Appendix 4] for access to 4292187. The lake on 4282189 lies approximately 300 metres uphill through a recently partially logged area, north of the truck parking.

The easiest access by foot to Cedar Pond is from the logging road ~east of claim post #2 (UTM17 0607377_E 5242920_N), parking at 0607422_E, 5242847_N (UTM17). From the truck walk ~ NW for 70 metres. Follow the claim line for ~250m. Cedar Pond is then ~50m to the north.

As the crow flies, the claims are 2.7 km from the nearest year-round road, 10.5 km from the Cobalt train station, 16 km from the Trans-Canada Highway 11, 120 km from North Bay, and 400 km from Toronto. Lake Temiskaming lies a short distance to the East.

PREVIOUS WORK:

Although there is now an identified kimberlite field in the region, no known pipes have been established in the immediate area around claims L 4282189/4282187, and no previous work of any kind on these claims has been recorded to date, according to overlays researched at the Mining Recorder's Office in Kirkland Lake. The nearest diamond exploration work was performed by Tres-Or Resources Ltd. on 2 blocks of claims, examining several magnetic targets as possible kimberlite pipes for KIMs, and reporting a small number of potential indicators including 2 pyropes, a few ilmenites, and some chromites, ~3 km south of claim 4282189.

The nearest known kimberlite pipes are over 16km Northwest of claim 4282189 and are far off-ice in direction so cannot conceivably be the source of KIMs found on these claims.

The Historical Map Archives on-line (MNDM) indicates some staking in the area in the 1960s, however no reports appear to exist of any work done.

For a brief history of development and abstract of human activity near the claim, please see Appendix 1.

GEOLOGY:

STRUCTURAL GEOLOGY:

These claims are surrounded predominantly by The Lorrain Batholith, and near a contact with granite and diabase. The Lorrain Granite Batholith is known to be intruded by Nipissing diabase dikes and sills forming distinct basins and the NE extent of the Schumann Lake Arch is present in the northern part where it and faulting also intersects the Cross Lake Fault.

The claims have conjugate, perpendicular structures relating to the Cross Lake Fault and such structures are proven to bear diamondiferous kimberlite pipes in the New Liskeard Kimberlite Field, especially on the east side of the Cross Lake Fault where the pipes are higher in diamond grade in the New Liskeard Area.

For a more detailed write-up on the structural geology, please see Appendix 2.

SUPERFICIAL TOPOGRAPHIC FEATURES:

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 in Canada.

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.

Twenty-eight till samples were collected on 5 traverses [see Photo 1, page 5]. General prospecting and site examination was undertaken on each traverse [see Photos 2-4, page 5], and an aerial survey was also conducted during Traverse #5 [see Photo 5, page 5].

From just east of Claim Post #2 on a knoll, Lake Temiskaming can be seen in a valley between the large steep hill that parallels much of Hwy 567. I later ascertained that we could see Paradis Bay [see Photo 6, page 5]. This is important because this is a natural drainage feature. A post-glacial map shows drainage from the area around Claim #4282189 to Paradis Bay along this valley where a G10 was found (see OGS Open File Report 6088, Sample 180). By local glacial direction this initially made no sense (it would have had to come from Lake Temiskaming).

This valley would have drained a melting glacier from Claim #4273040 - Paradis Pond, #4282189 - Cedar Pond, or #4281431 - Lightning Lake, all kimberlite targets. Another G10, Sample #181 from the same OGS report, found just north of the other one near Martineau Bay is in the drainage basin from #4282444 - Little Grassy Lake – another of our kimberlite targets. Both of these samples were found in stream samples flowing from the claim areas.

Photo 1 – Till Sampling, Traverse #3

Photo 2 – White/Pinkish Boulder (Ⓡ), Traverse #3

Photo 3 – Possible large boulder of kimberlite (Ⓚ), Traverse #2

Photo 4 – See Photo 3; Traverse #2

Photo 5 – Drone operators, Traverse #5

Photo 6 – view of Paradis Bay from just East of Cedar Pond

TRAVERSES: **Please refer to Appendix 5 for Traverses for detailed narratives, maps, and coordinates/field notes.**

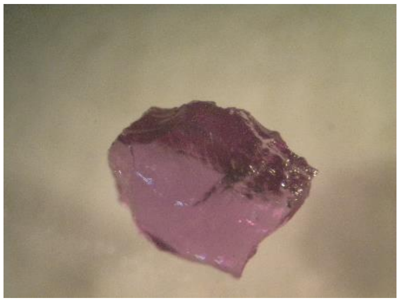
METHODOLOGIES: **Please refer to Appendix 6 for Methodologies for Fieldwork and Till Processing**

RESULTS:

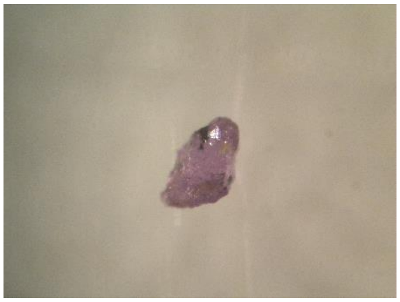
EMP-100 Geo Lab Results:

Of the seven grains from these claims that were micro-probed at Geoscience Lab in Sudbury, two were G9s. Spessartine and Almandine were also identified.

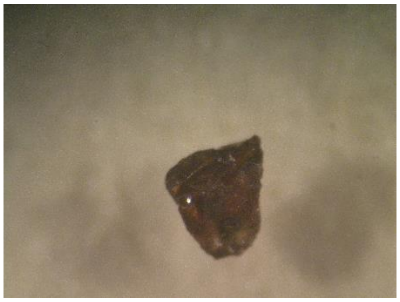
Lab Findings – CRT-17-0279-01 & CRT-17-0107-04	Sample Label	Features	Dimensions	Claim #
G9	S-G1	Purple	0.25 x 0.5 mm	428 2187 / 428 2189
G9	S-G24	Purple	1.0 x 1.5 mm	428 2187 / 428 2189
G9	S-G25	Purple	0.4 x 0.7 mm	428 2187 / 428 2189
Spessartine	S-G2	Black-Red (rare)	0.5 x 0.6 mm	428 2187 / 428 2189
Spessartine	S-G23	Brown/Red/Purple	0.5 x 0.7 mm	428 2187 / 428 2189
Almandine	S-G26	Pink (fractured, unworn)	1.0 x 1.7 mm	428 2187 / 428 2189
Almandine	S-G27	Orange-pink	1.0 x 1.3 mm	428 2187 / 428 2189



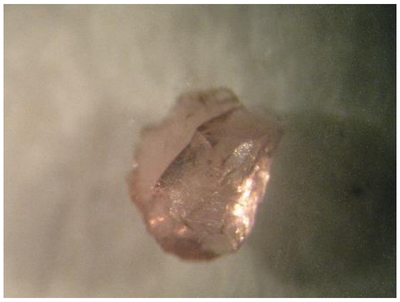
S-G24 - G9



S-G25 - G9



S-G23 - Spessartine



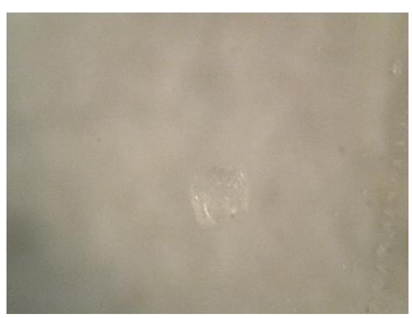
S-G26 - Almandine

S-G27 - Almandine

SEM-101 Geo Lab Results:

Lab Findings – CRT-17-0107-03	Sample Label	Features	Dimensions	Claim #
Quartz	S-D9	F-transparent, Colourless, ½ side crystal, fluoresces soft-medium white Long Wave	1.0 x 1.4 mm	4282187/4282189
Calcite	S-D10	F-transparent, Lightly frosted, Fluoresces soft-medium white Long Wave (1st loop)	0.25 x 0.25 mm	4282187/4282189
Calcite	S-D11	F-transparent, Fluoresces soft-medium white Long Wave (1st loop)	0.25 x 0.25 mm	4282187/4282189
Calcite	S-D12	F-transparent, Fluoresces soft-medium white Long Wave /colourless (1st loop)	0.2 x 0.2 mm	4282187/4282189
Calcite	S-D13	F- colourless, Fluoresces medium-blue white Long Wave transparent (1st loop)	0.3 x 0.7 mm	4282187/4282189
Quartz	S-D14	F-colourless/transparent, Fluoresces soft white Long Wave (very soft Short Wave)	0.5 x 0.9 mm	4282187/4282189
Quartz	S-D15	F-colourless/transparent, Fluoresces soft white Long Wave (very soft Short Wave)	0.5 x 1.0 mm	4282187/4282189
Quartz	S-D16	F-colourless/transparent, Fluoresces very soft white Long Wave (no Short Wave)	0.5 x 1.0 mm	4282187/4282189

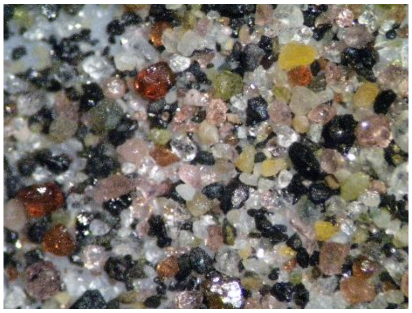
S-D9 - Quartz



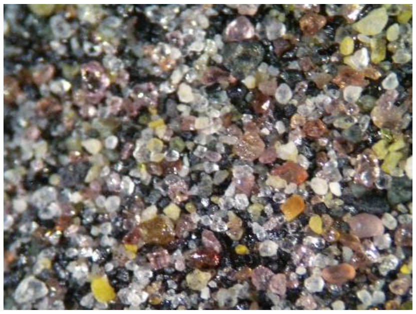
S-D11 - Calcite

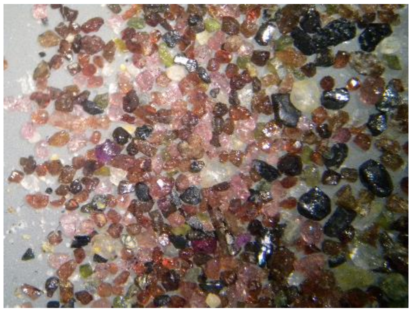
S-D13 - Calcite

MICROSCOPE PHOTOS OF KIMs:

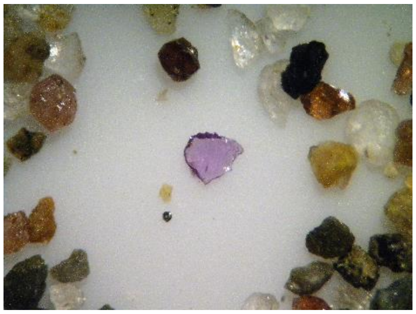

Typical view of concentrates before picking KIMs, large sample

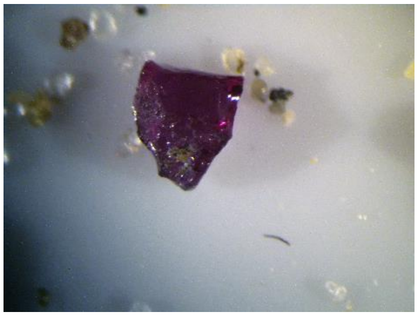

View of unpicked concentrate


Unpicked concentrate - 0.25-0.5mm


A portion of picked KIMs from large sample


Purple garnet & KIMs


Purple garnet - 0.8 x 0.8 x 0.25mm

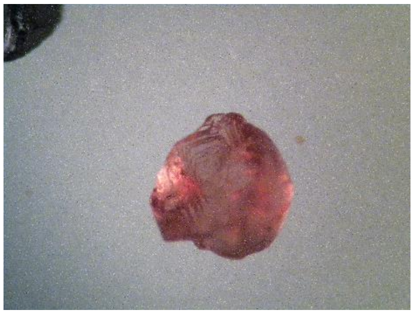

Purple garnet - 1.5mm

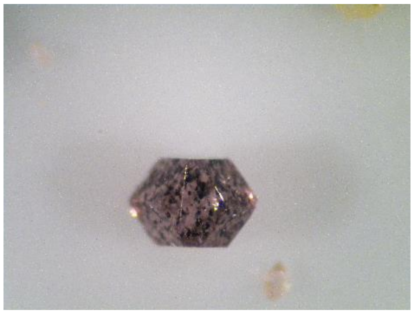

Purple garnet - 1.0mm


Purple garnet - 1.0 x 0.8 x 0.25mm


Frosted purple garnet - 1.0 x 0.5 x 0.5mm


Purple garnet - 0.8 x 0.8 x 0.5mm

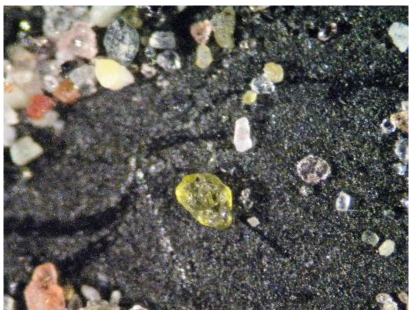

Pink stone, possible spessartine



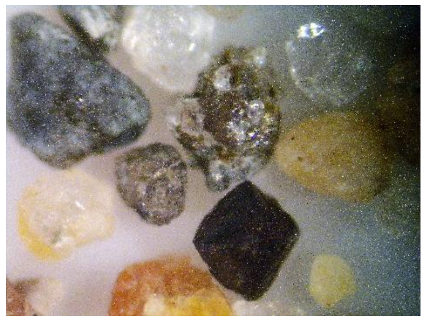
Garnet? Distorted? - 0.7 x 0.5 x 0.5mm

Yellow grain - 1.0 x 0.8 x 0.5mm

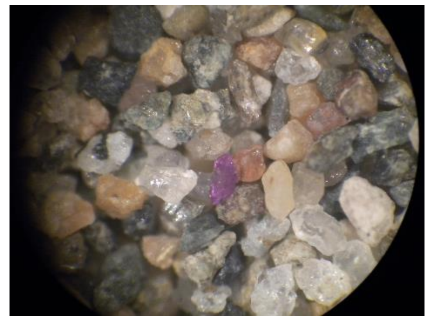
Some picked KIMs



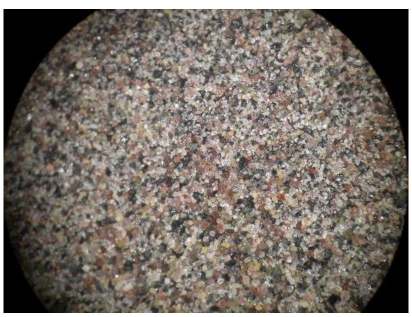
Yellow grain



Top centre grain - possible kimberlite
Bottom centre grain - rounded euhedral chromite



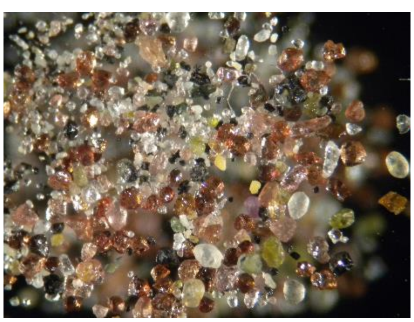
Purple garnet in concentrates



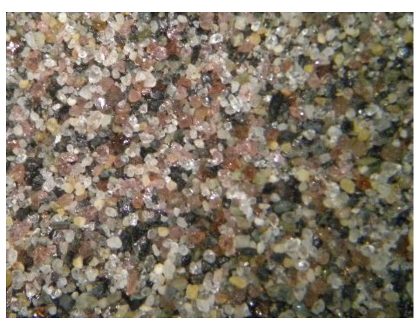
Portion of panned concentrates - 0.25-0.5mm

Picked KIMs

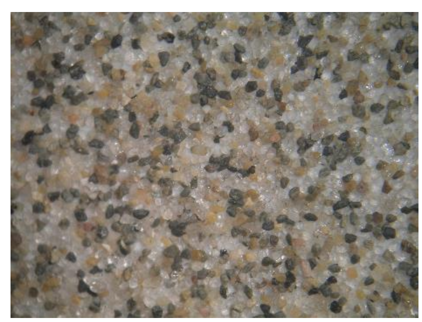
Pink-purple garnet



Picked KIMs



Unpicked concentrate from down-ice sample



Off-ice sample ~SW corner of 4282187 - no KIMs

CONCLUSIONS:

Overall, each sample produced above to well-above numbers of potential KIMs compared to samples taken off-ice (i.e. north, west, and east of the suspected kimberlite pipe). A great number (100s-1000s) of potential KIMs were found in several of the samples, the concentrates (cons) were far too numerous to fully pick.

> "To determine priority of targets, sample sites containing more than a dozen indicator minerals typically signify a proximal target. Sites containing more than 100 indicator minerals are of high priority" (Erlich & Hausel, 2002, p 311).

The authors are referring to stream samples: if dry till is sampled, the sample size should typically be much larger with much smaller expected results. This enhances the importance of large numbers of KIMs being found in till samples immediately down-ice of a lake (i.e. my targets).

Due to cost constraints, a total of seven grains were chosen from this target (all garnets, and of different colours). At the same time, grains from other suspected kimberlite targets were also sent. The first batch of grains was partly chosen to help identify odd grains, some of which were visually not the usual KIMs variety. The complete results will be addressed in the reports to which the grains originated.

Of the seven grains, three are G9s (S-G1, S-G24, and S-G25), all purple. Two are almandines (S-G26, S-G27), one pink and one orange-pink, and two are spessartines (S-G2, and S-G23).

The G9s are typical of others found in colour and chemistry. The crustal/non-kimberlitic garnets identified, labeled as such by the Sudbury lab, however, are very unusual.

The two spessartines are dark black-red, a less common colour, and brown-red-purple, which is also unusual. Spessartine is considered to be yellow-orange to deep, dark orange, brown, or black, (adapted from Lauf, R.J. (2012). and Pohwat, P., Staebler, G. (2008).).

The two almandines are transparent light orange-pink and transparent light pink, however, almandine is considered to be dark red, red-violet, brownish to black. One rare almandine-pyrope called Rhodolite is dark pink-red. Light pink garnets are rare and are mostly pyrope and about as pure as pyropes come (absolutely pure, pyrope would be colourless).

In my concentrate I'm finding a very great number of transparent light pink garnets, whereas essentially none are found in off-ice samples.

A local geologist (PEng), the local "crystal expert", and separately myself have all concluded that many of these 'non-kimberlitic' grains are, by evidence, actually kimberlitic in origin, which in itself will require much more research.

This pattern of finding very unusual non-typical grains is repeated in the cons of my other 'targets'.

RECOMMENDATIONS FOR FUTURE WORK:

From the large number of KIMs found down-ice of Cedar Pond, it is prudent to continue work towards further proving that the lake is indeed the surface expression of a kimberlite pipe. As will be seen in future reports, this target is one of seven in a line in Lorrain Twp, all more or less down-ice of each other and all approximately the same distance east of the Cross Lake Fault. These are all a short distance, 1-2km, from one to the next. This complicates somewhat interpreting sample results, however, this trend follows what one would expect in a kimberlite field. All targets are near a major fault and cross faults in an area with many known kimberlite pipes and lamproites, and are expressed as small round lakes. They are similar in size to typical diamondiferous pipes under round lakes in Lac de Gras. Similar to Lac de Gras, the aforementioned targets are also at or near contacts of granite and diabase or other rock types and are correct for kimberlite emplacement, kimberlite pipes are not visible as lakes or topographic depressions at Attawapiskat due to the post-glacial Tyrrell Sea that left a flat, featureless terrain.

As can be seen from Appendix 3 [see page 16], apparent lack of magnetic signatures have been addressed. EM and gravity, to my knowledge, have not been applied to these targets (see Erlich & Hausel, 2002, p 313, on granite and gravity), although there have been flyovers recently, apparently with geophysics over the general area (verbal communication with Dave Bowers, local farmer), probably for Cobalt mineralization.

On this and other targets I have elevated magnetite in till sample concentrates, which might relate to a nearby kimberlite. In the future, I'll use a Garrett BFO in mineral mode to check for high mineralization in till (the only type of metal detector ever made capable of this) as well as a Gold Spear (for magnetite and metallic minerals). This could very well match elevated levels of KIMs in till samples. To my knowledge, this has not yet been tried.

Continued sampling and prospecting is planned, as well as further interpretation of other non-traditional kimberlitic minerals I'm finding in concentrates, such as kyanite, zircons, and non-magnetic garnets (the latter not reported in kimberlite/diamond/garnet literature), although some have high 30% Fe, for which I'm developing a unique explanation for, as well as titanite, etc.

Unexplained fluorescent (under UV light) grains that should not fluoresce, such as quartz (analysed in Sudbury) are to say the least problematic and will be subject to further research [see S-D9, S-D14, S-D15, and S-D16 SEM-101 results on page 8]. Colour-change garnets will also be checked for more carefully in cons already picked and in futures samples. This and non-magnetic garnets will be subject to more work and research as I believe they could be very important to prospecting and preservation of diamonds in a kimberlite eruption.

If and when funds permit, a greater number of grains may be analysed in a lab. This ideally would include grains of Cr Diopside, chromite, and ilmenites, as well as zircons and more garnets.

EXPENSES of Assessment Work Claims L 4282189 & L 4282187 for November 5 & 12, 2015 – November 5 & 12, 2017 Reporting Period (Dec 13/15-Nov 2/17)

Work Type	Units of work	Cost per unit of work	Portion re 4282189	Portion re 4282187	Total Cost
Sampling plans; field survey/ prospecting – 5 traverses	Tony Bishop: 6 days	$500 per day	$500	$2,500	$3,000
Field assistant for 3 traverses	Graeme Bishop: 3 days	$285 per day	$285	$570	$855
Consulting Geologist – on-site survey & consultation (Traverse 4)	Douglas Robinson, PEng: 1 day	$850 per day		$850	$850
Aerial fly-over: Technical on-site consultation (Traverse 5)	David Crouch, PEng: ½ day (other ½ day at 4282172)	$850 per day	$425		$425
Aerial fly-over: operator, use of drone equipment, file storage	Grant Morgan: per site contract	$500 per site contract	$500		$500
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: 28 samples	$500 per sample	$2,500	$11,500	$14,000
Selection & mounting of grains for EMP and SEM analysis	Tony Bishop: ½ day	$500 per day	$125	$125	$250
Report preparation, map compilations, interpretations	Tony Bishop: 6 days	$500 per day	$1,500	$1,500	$3,000
Geologist – consultation re analysis/interpretation	Douglas Robinson, PEng: ½ day	$850 per day	$213	$212	$425
Clerical support for reports & technical computer support	Chloë Bishop	$400	$200	$200	$400
Field work supplies: batteries, flagging tape, sample tub	NCFM (12), Giant Tiger (56)		$34	$34	$68
Transportation based on OPA OEC rate	5 return trips to claim 254 km x 5 = 1,270 km	$0.50 per km x 1,270 km	$254	$381	$635
Office supplies – computer paper/printer ink	Northern Lights Computing (38); The Source (34)		$36	$36	$72
TOTAL VALUE OF ASSESSMENT WORK			**$6,572**	**$17,908**	**$24, 480**

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 subsequently tested and confirmed and cut into gemstones by Tiffany’s), 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 more than 50 known kimberlite pipes, 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.

Structural Geology

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

The claims are near intrusives including upper and the lower contacts of the diabase sills which are specifically noted as priority targets for silver where favourable mineralization is found within 150 metres of the contact. Although silver/cobalt is not our primary mineral of interest, there is good potential for locating this type of mineralization.

The claims are well situated within the Lake Temiskaming Structural Zone (LTSZ) which is known as host for a large number of diamond projects undertaken by a number of notable explorers and Public Junior Mining Companies. Locally over a dozen kimberlite pipes and lamprophyres, many diamondiferous, have been found mainly by testing magnetic anomalies. But, as is now well accepted, many of the most highly diamondiferous kimberlite pipes found and continuing to be found in Canada are not detectable by mag or often by EM. Gravity is useful in these cases but often companies are now returning to high KIM results in till and stream samples and then looking for visual round pipe-sized anomalies, either as lakes or circular depressions in the topography.

A key feature of a number of significant projects within the LTSZ is the Cross Lake Fault. Locally, this deep, regional fault is in close proximity to the east of the claim, approximately 1km away.

Publicly available OGS Geophysical Data and subsequent correlations were instrumental in the decision to stake this land given a high probability of its potential for diamonds and other mineral occurrences. This information was related to products released by the Ontario Geological Society. Lorrain & Gillies Limit have ideal conditions for kimberlite/diamond exploration.

The claims have conjugate, perpendicular structures relating to the Cross Lake Fault and such structures are proven to bear diamondiferous kimberlite pipes in the New Liskeard Kimberlite Field, especially on the east side of the Cross Lake Fault where the pipes are higher in diamond grade in the New Liskeard Area.

The Cross Lake Fault dips steeply to the East to a great depth. This would provide an easy method of transport for an ascending kimberlite and would also allow for faster ascension which is necessary for diamond preservation. This is demonstrated in the New Liskeard area pipes, where the three pipes, Bucke, Gravel, and Peddie, on the east side of the fault are all more highly diamondiferous than the many known pipes on the west side of the fault.

Eight of my kimberlite targets are on the east side of the Cross Lake Fault, very close to the same distance away from the fault as these three pipes in New Liskeard and there are cross faults near or through all of these.

As well, the nature of the rugged Archean terrain of the Lorrain Batholith is important to the diamond potential. The Granite and Diabase are both very hard and when fractured it is reasonable to infer that they are deeply fractured just as the Cross Lake Fault is a deep, regional fracture, which is still active today as part of the Ottawa-Bonnechere Graben System.

As a result, the claims' location within the Lorrain Batholith offers a prime setting to allow for Kimberlite Material to transport readily to surface and allow for better preservation of diamondiferous kimberlites. Glacial erosion would have been limited owing to the hardness of the rock when compared to softer terrains. This may allow for a preservation of a greater volume of pipe than those discovered in glacially eroded terrains. Rapid transportation of diamond bearing magma is essential to the preservation of diamond stability during transport.

Adapted in part from Prairie C – The Lorrain Batholith Project
http://www.geocities.ws/Eureka/Account/6322/PcProprt.html

Appendix 3

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 Canadian-producing mines, including advances in geo-chemical and structural geology analysis:

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)

Appendix 4

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: Lake Temiskaming Structural Zone (from OGS OFR 6088)

Map 7: Down-ice glacial direction – tilted view (Google Earth)

Map 8: Straight-down view of Cedar Pond (Google Earth)

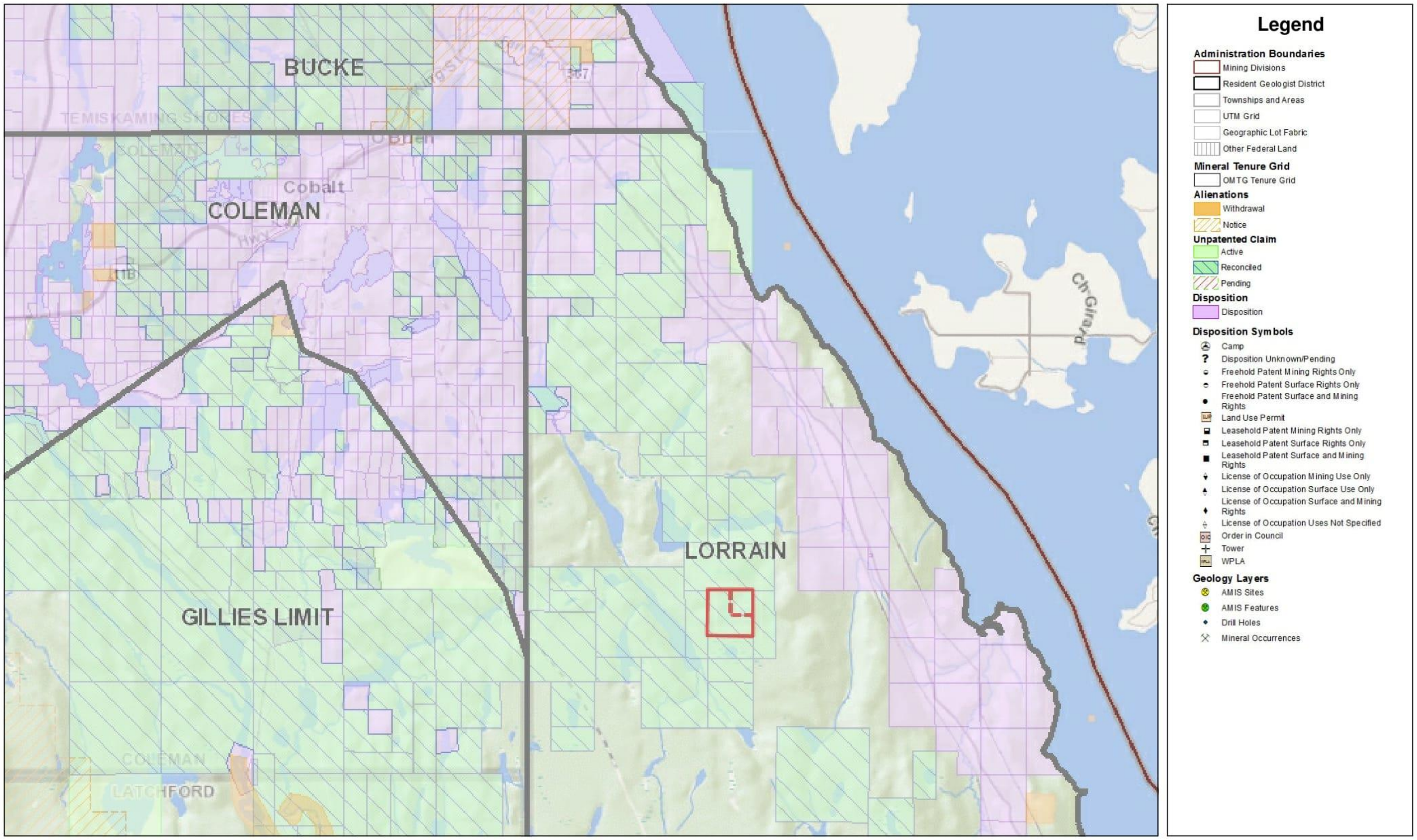
Map 1

Ontario

MINISTRY OF NORTHERN DEVELOPMENT AND MINES
CLAIMaps

4282189 & 4282187 Cedar Pond

Notes:
General location of claims relative to Cobalt ON



0 4.78 km

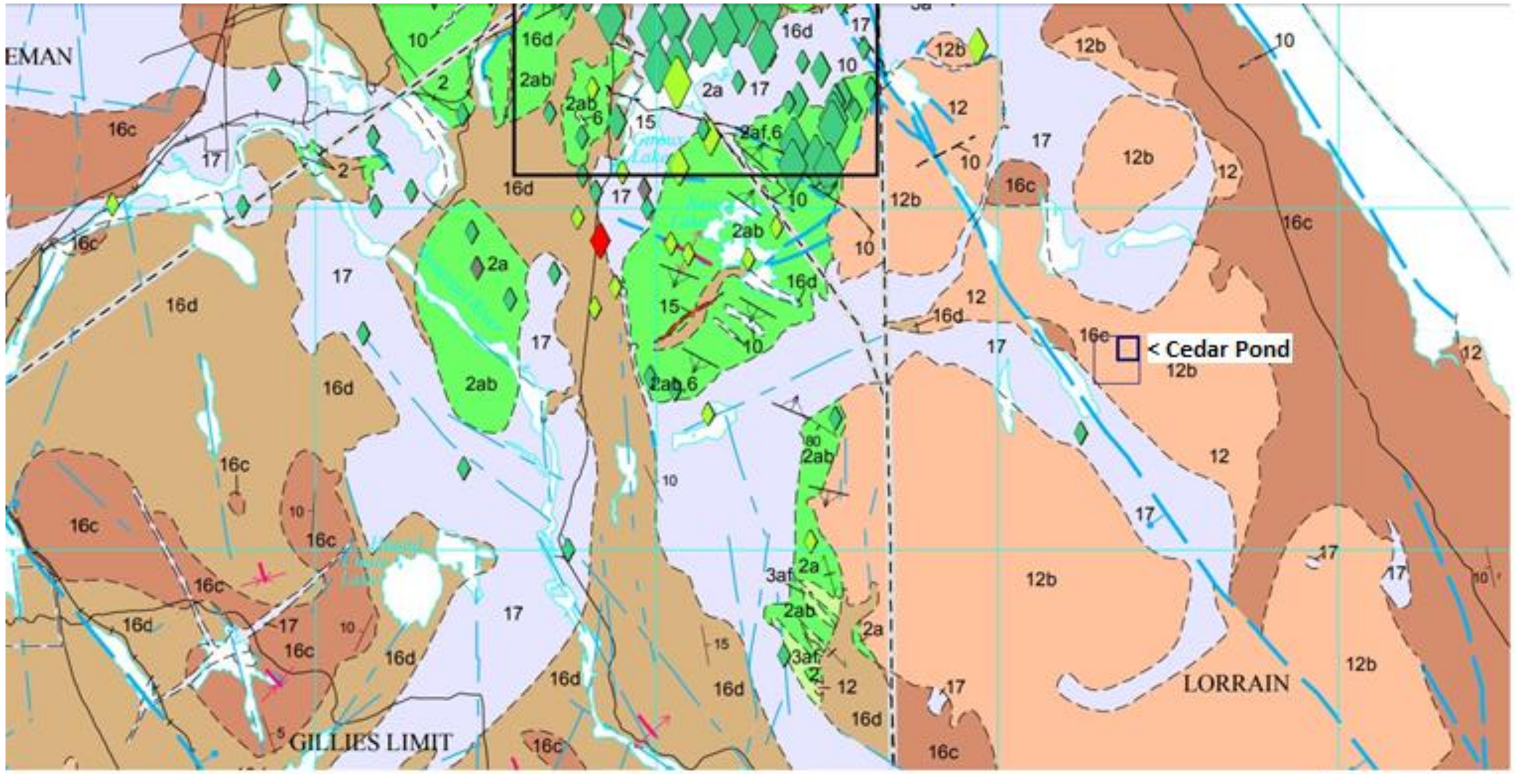
Projection: Web Mercator

The Ontario Ministry of Northern Development and Mines shall not be liable in any way for the use of, or reliance upon, this map or any information on this map. This map should not be used for: navigation, a plan of survey, routes, nor locations.

Imagery Copyright Notices: Ontario Ministry of Natural Resources and Forestry; NASA Landsat Program; First Base Solutions Inc.; Aéro-Photo (1961) Inc.; DigitalGlobe Inc.; U.S. Geological Survey.

Map 2

Appendix 4



Scale 1:100 000

2000 m 0 2 4 km

Claim #428 2189

Claim #428 2187

LEGEND[abcd]

PRECAMBRIAN

PROTEROZOIC

NIPISSING

17 **Mafic Intrusive Rocks:** diabase, granophyre

HURONIAN SUPERGROUP

16 **Sedimentary Rocks**

16a Bar River Formation[e]
16b Gordon Lake Formation[e]
16c Lorrain Formation

16d Gowganda Formation

16f Mississagi Formation

ARCHEAN

NEOARCHEAN

12 **Felsic to Intermediate Intrusive Suite**
12a Tonalite, granodiorite, trondhjemite
12b Granite, quartz monzodiorite, quartz diorite
12c Schistose textured

INTRUSIVE CONTACT

8 **Timiskaming-Type Clastic Metasedimentary Rocks**
8a Arenite
8b Wacke
8c Conglomerate
8d Mudstone, siltstone
8e Schistose textured

UNCONFORMITY

6 **Clastic Metasedimentary Rocks**
6a Arenite
6b Wacke
6c Conglomerate
6d Mudstone, siltstone
6f Schistose textured

2 **Mafic (to Intermediate) Metavolcanic Rocks/Intrusions**
2a Massive flows
2b Pillowed flows

Map Portion courtesy of

Ontario

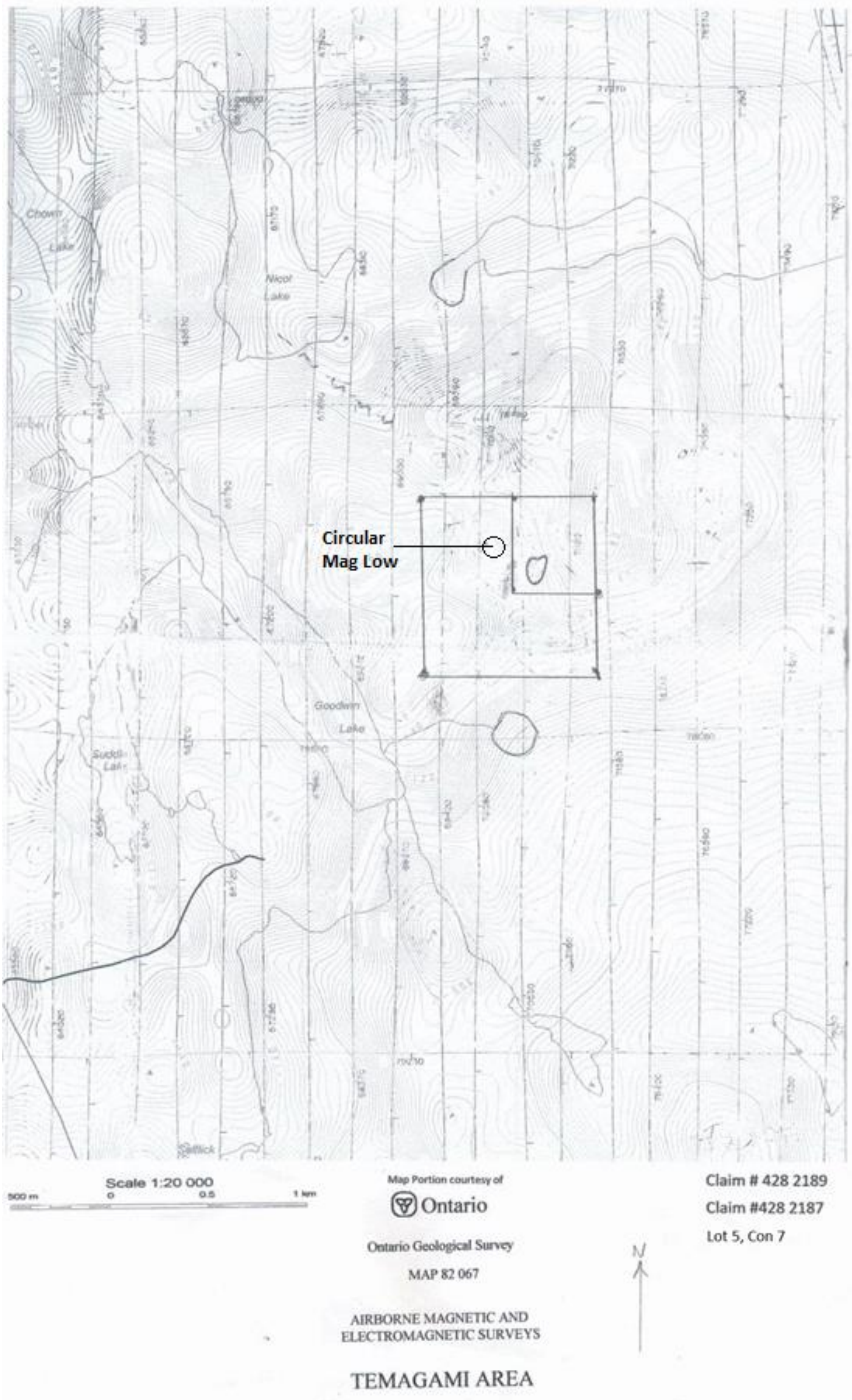
Ontario Geological Survey

MAP P.3581

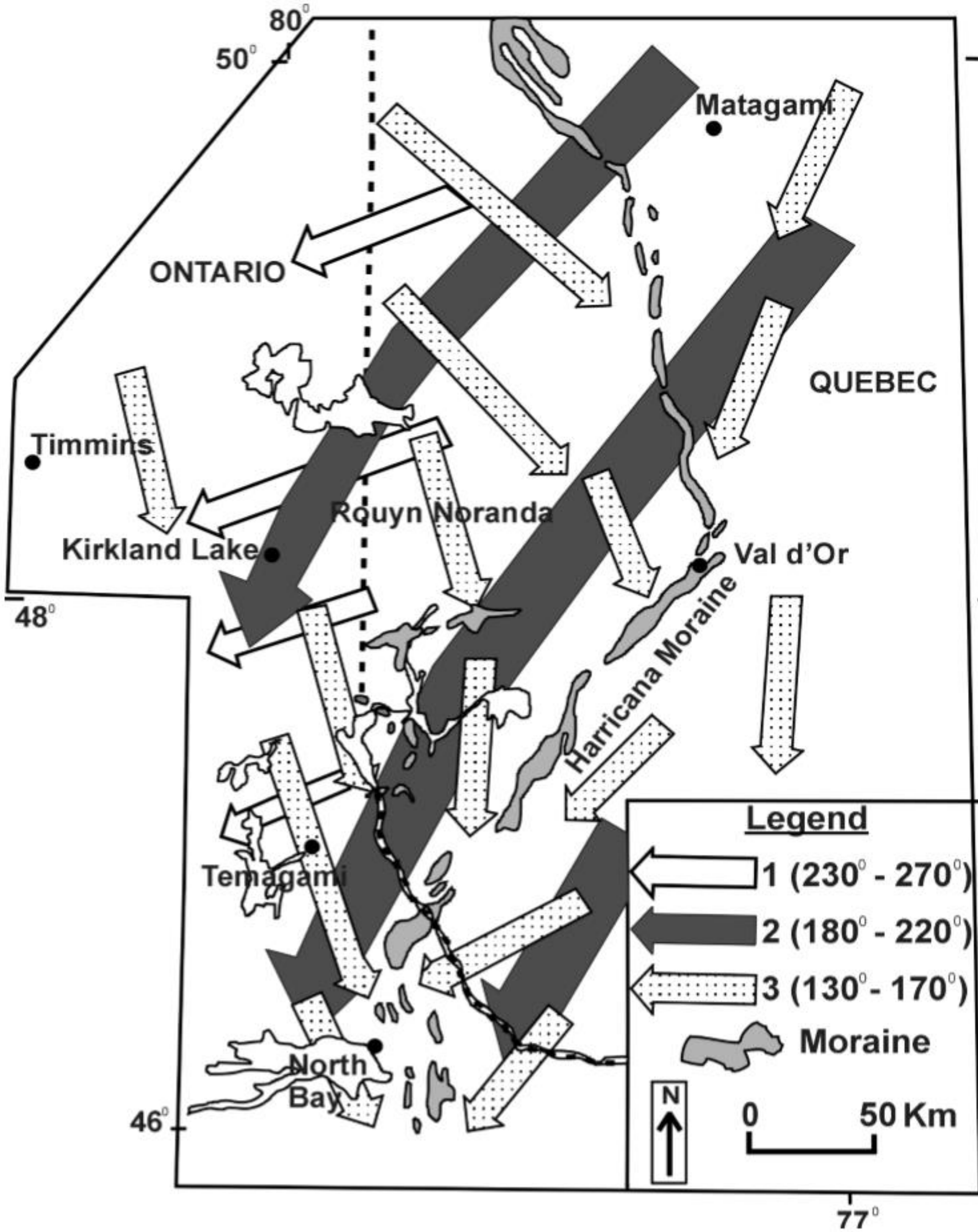
PRECAMBRIAN GEOLOGY

GEOLOGICAL COMPILATION OF THE COBALT–TEMAGAMI AREA, ABITIBI GREENSTONE BELT

Appendix 4



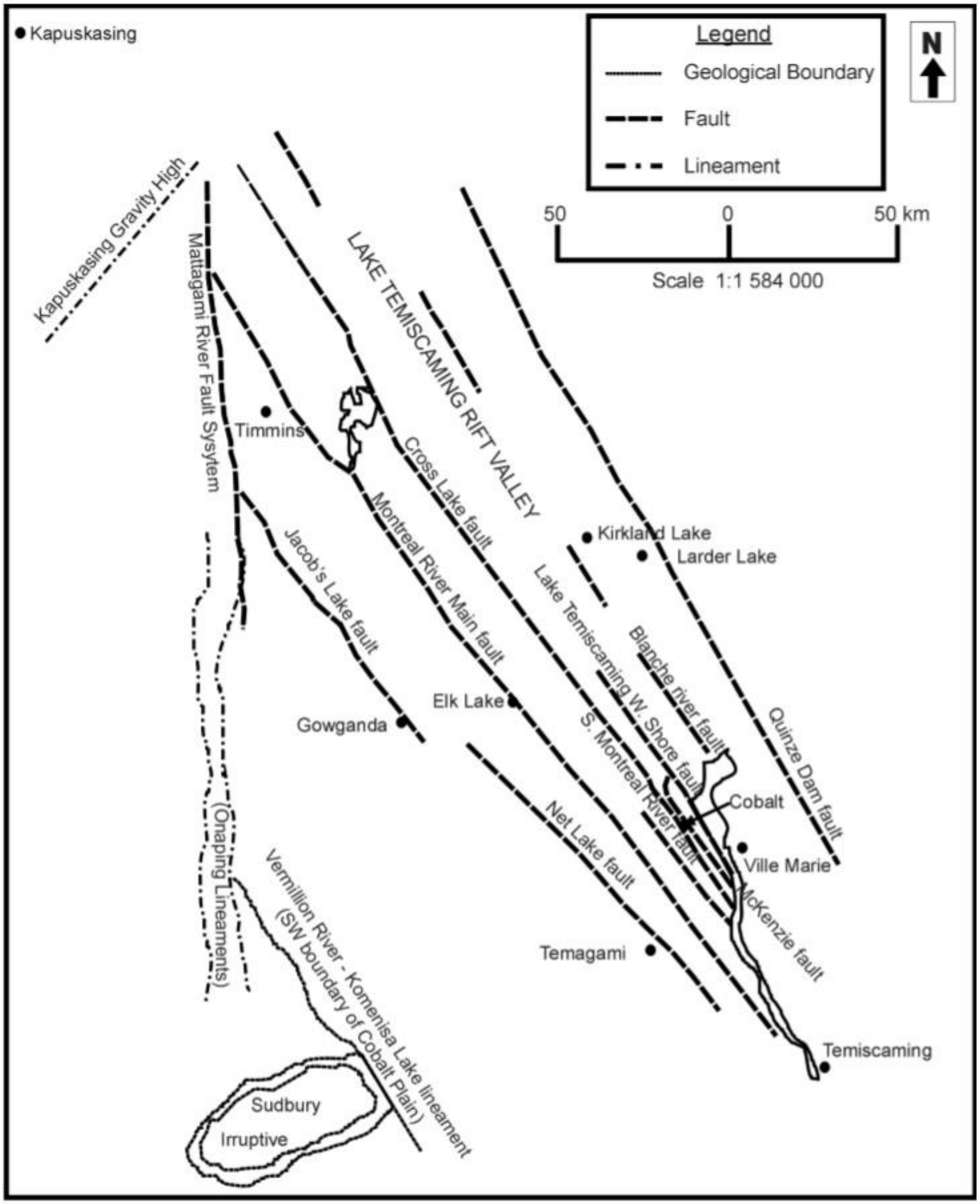
Map 4



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



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 6

Appendix 4

Map 7

Map 8

Traverses Appendix Overview

TRAVERSE 1: December 13, 2015 – Fieldwork, Map, & Field Notes

TRAVERSE 2: May 26, 2016 – Fieldwork, Map, & Field Notes

TRAVERSE 3: June 12, 2016 – Fieldwork, Map, & Field Notes

TRAVERSE 4: May 13, 2017 – Fieldwork, Map, & Field Notes

TRAVERSE 5: August 25, 2017 – Fieldwork, Map, & Field Notes

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

L 4282187 – down-ice and off-ice of Cedar Pond

L 4282189 – Cedar Pond

Traverse 1: fieldwork December 13, 2015 Brian A. (Tony) Bishop, Douglas Robinson (PEng)

Doug Robinson and I (with Graeme Bishop's accompaniment) traveled to Cobalt to investigate claims 4282187 and 4282189. Previously, I had mapped a rough idea of where to sample utilizing Google Earth and other paper maps, subject to change when on site as topography dictated. We parked on the logging road below Cedar Pond (TP). There are 2 troughs leading from Cedar Pond to the logging road, one in the direction of glaciation, the other ~200m west slightly off-ice and downhill of Cedar Pond, but possibly caused by glacial water flow, both worth checking.

From WP1 our starting point we traveled ~125m north prospecting on the way to WP2; near the end of the logged area we turned east through wet ground and started sampling on dryer ground at ① on the map of Traverse 1. A wide meandering path was taken centered along the traverse route collecting Samples ② to ⑤ and again much prospecting was done. This continued on the dry east side of the wet 'trough' until the logging road was encountered at WP4. Subsequently a sample was taken at ⑥ before returning to the truck.

No outcrops were observed on this traverse, numerous boulders were checked along the way.

The samples taken were unscreened with larger rocks/pebbles removed by hand after visual inspection.

After Doug and I finished sampling, we went with Graeme up to Cedar Pond to check the claim posts and view the lake [see Photos 7-9, page 29]. Graeme incurred no expenses this trip.

Photo 7 – Burnt tree near Claim Post #2, #4282189

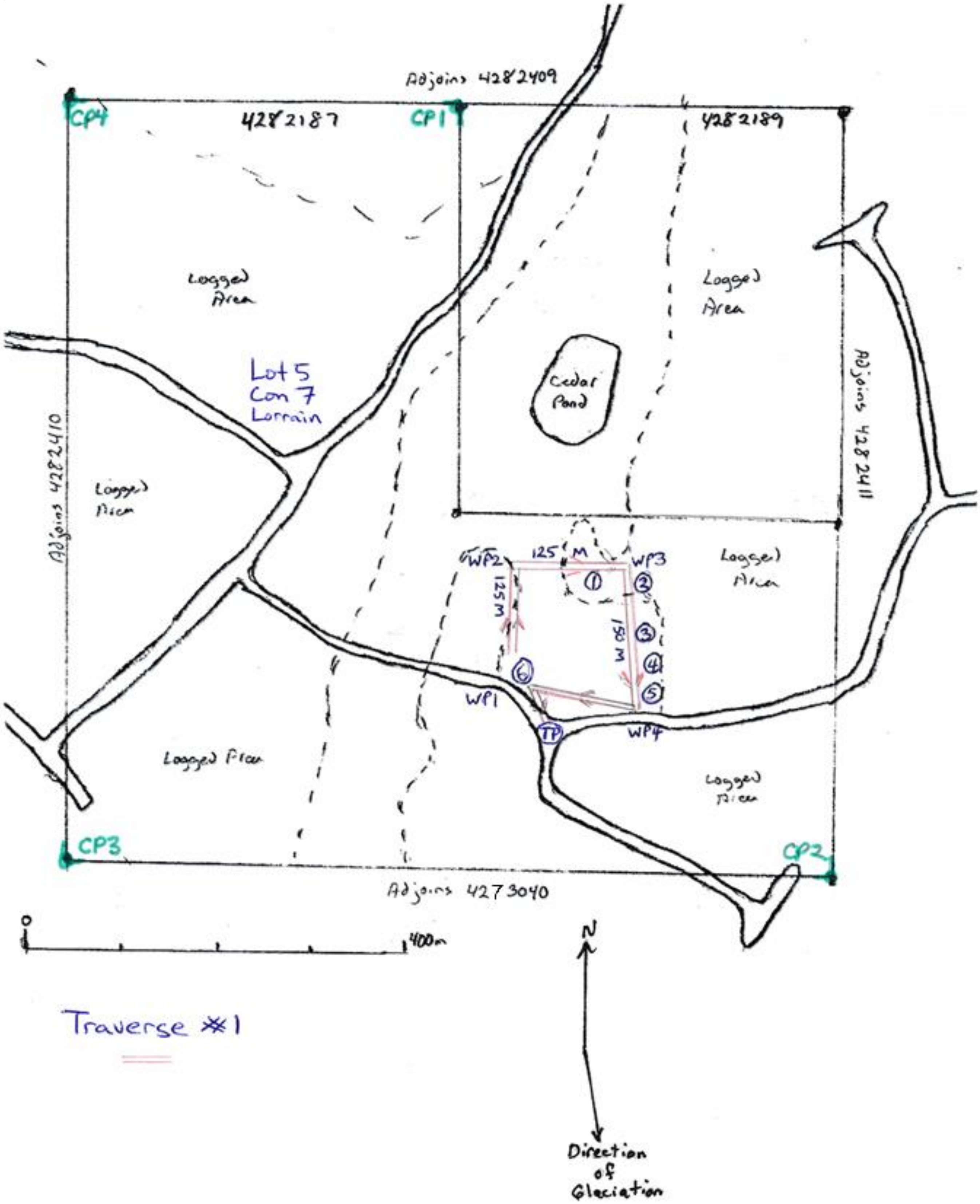
Photo 8 – Graeme at Claim Post #2, #4282189

Photo 9 – Graeme at Cedar Pond

Appendix 5

L 4282187 – down-ice and off-ice of Cedar Pond

Traverse 1: map
December 13, 2015 Brian A. (Tony) Bishop, Douglas Robinson (PEng)



Appendix 5

L 4282187 – down-ice and off-ice of Cedar Pond

Traverse 1: field notes December 13, 2015 Brian A. (Tony) Bishop, Douglas Robinson (PEng)

Sample #	**Coordinates** 17T UTM	**Activity/Description**
S1	0607133_E 5242862_N	On a raised hillock ~50' x 20' x 8' high sandy/gravel
S2	0607174_E 5242854_N	In a lower ~N-S trough of lower land – soil/sand/gravel
S3	0607193_E 5242809_N	Wet ground/poor sample overturned in water under tree root
S4	0607202_E 5242767_N	Dug under boulder for sample sand/gravel
S5	0607198_E 5242721_N	Till in large boulders sandy/gravel
S6	0607052_E 5242741_N	Took a chip from a boulder (diabase) and soil sample from road edge

Location #	**Coordinates 17T UTM**
Truck Park	0607089_E / 5242687_N
WP1	0607024_E / 5242757_N
WP2	0607041_E / 5242888_N
WP3	0607123_E / 5242884_N
WP4	0607208_E / 5242723_N

Location #	**Coordinates 17T UTM**
Corner post #1	0606970_E / 5243352_N
Corner post #2	0607386_E / 5242548_N
Corner post #3	0606588_E / 5242548_N
Corner post #4	0606568_E / 5243348_N

L 4282187 – down-ice and off-ice of Cedar Pond

Traverse 2: fieldwork May 26, 2016 Brian A. (Tony) Bishop, Graeme Bishop

On May 26, 2016, Graeme and I returned to Claim #4282187 to prospect and sample along and beside the logging road itself, continuing to assess the area down-ice of and as well, off-ice, of the presumed kimberlite that is physically represented by Cedar Pond.

As mentioned elsewhere, logging roads are wonderful for examining rocks and gravel-sized pebbles on the road and from where till was dug into beside the road to build the road. It creates a huge volume/area of clean exposed material when looking for kimberlite cobbles, and much time was spent in this form of prospecting, with several small pebbles of possible kimberlite to be further inspected at a later date. As is well known, kimberlite can often be difficult to visually identify, especially when weathered on the surface for a long time. Gravel pits or freshly made logging roads are the ideal locations for finding kimberlite boulders, especially in damp/rainy conditions.

At a junction in the road we dug Sample ① then drove to TP. There is a small flow of water ~1' across and 1-2" deep. Samples ② and ③ took advantage of a possible concentrating effect due to the small flow of water. Sample ④ is in a shallow trough from 20-50' wide that leads from Cedar Pond a bit East of South. Another likely place for KIMs, Sample ⑤ is in a similar situation but oriented at a slightly different angle from the lake being somewhat West of South.

Sample ⑥ was taken to obtain another probable off-ice sample for comparison, as was Sample ①.

An unusual large boulder (K) was found beside the logging road when prospecting and was photographed [see Photos 3 & 4, page 5].

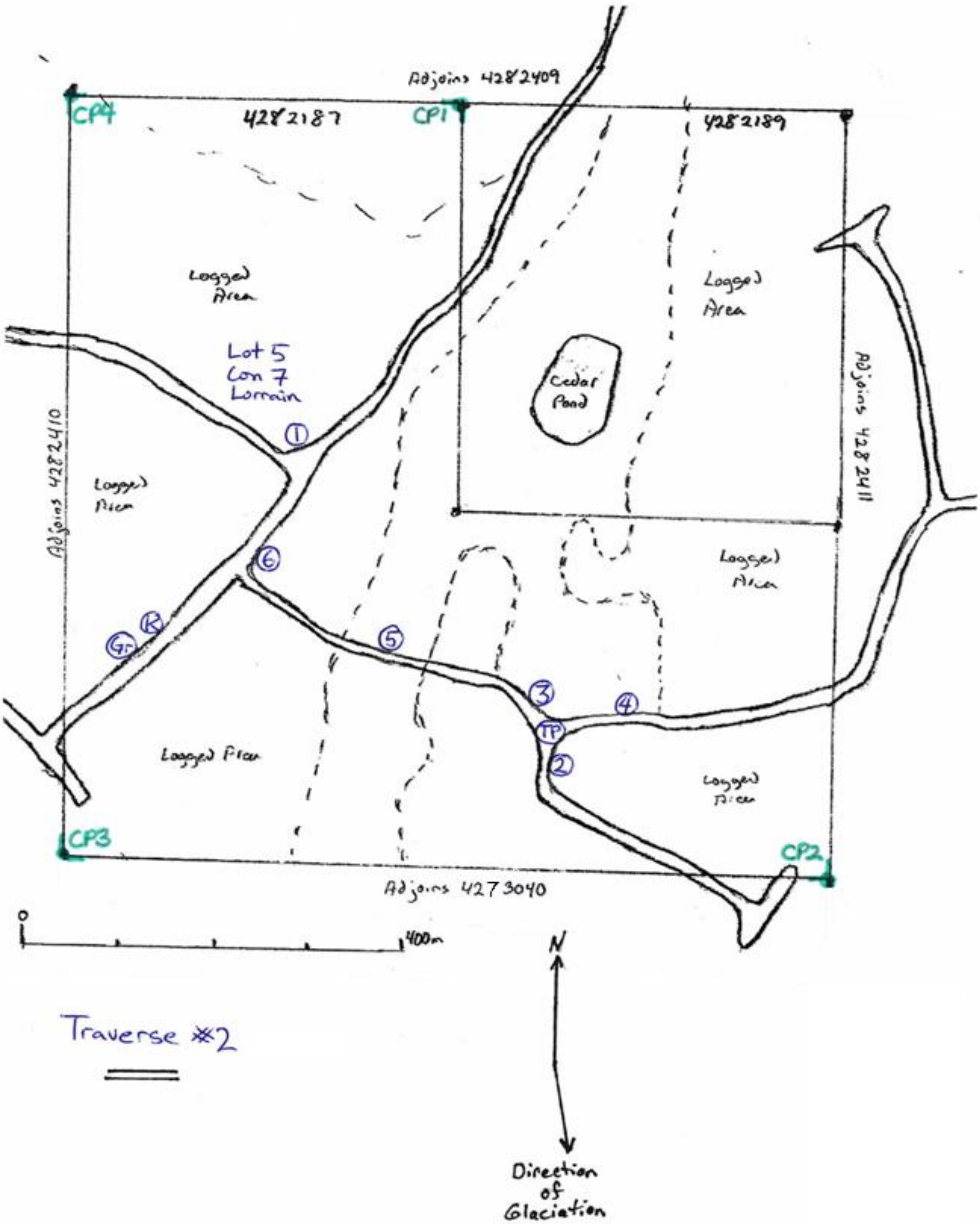
At a later date I was again viewing the many kimberlite samples at the 'K.L. Mines Office' and found one that very much resembled the rock I photographed.

Nearby is a large granite outcrop (Gr).

Appendix 5

L 4282187 – down-ice and off-ice of Cedar Pond

Traverse 2: map May 26, 2016 Brian A. (Tony) Bishop, Graeme Bishop



Appendix 5

L 4282187 – down-ice and off-ice of Cedar Pond

Traverse 2: field notes May 26, 2016 Brian A. (Tony) Bishop, Graeme Bishop

Sample #	Coordinates 17T UTM	Activity/Description
S1	0606829_E 5242964_N	Sampled in a hole dug by a machine during building of logging road. Very few potential KIMs found. From ① drove to TP
S2	0607091_E 5242669_N	Wet sample in small flow of water beside road
S3	0607087_E 5242703_N	Wet unscreened at claim road turnoff north side of road. Dug from little creek under boulder at road
S4	0607205_E 5242730_N	In a ~4' deep bouldery till created by hoe when building road
S5	0606910_E 5242766_N	In a damp till in a depressed trough leading downhill from Cedar Pond
S6	0606788_E 5242862_N	Off-ice sample
K	0606677_E 5242787_N	Possible large boulder of kimberlite? Took photo [see Photos 3 & 4, page 5] and later observed a sample of kimberlite at mine's office very similar
Gr	0606692_E 5244201_N	Large granite outcrop

Location #	Coordinates **17T UTM**
Truck Park	0607080_E / 5242692_N
Corner post #1	0606970_E / 5243352_N
Corner post #2	0607386_E / 5242548_N
Corner post #3	0606588_E / 5242548_N
Corner post #4	0606568_E / 5243348_N

Appendix 5

L 4282189 – Cedar Pond

Traverse 3: fieldwork June 12, 2016 Brian A. (Tony) Bishop, Graeme Bishop

Our 3rd traverse was planned to take samples closer to Cedar Pond on Claim #4282189 again to test for KIMs (and other minerals) and to prospect for kimberlite boulders and other minerals of interest.

From the truck (WP1) we traversed to Claim Post #2, ~75m, and paralleling the claim line walked towards Claim Post #3 for ~250m checking for boulders. From OGS Map 2052 we didn't anticipate bedrock, but there were many boulders, mostly granite and diabase. One different white rock the size of a soccer ball was encountered at Ⓡ and a chip sample was taken, possibly Lorrain conglomerate. No mineralization was observed. From WP3 we veered northwest, encountering a low lying area closer to the lake. 3 samples were taken, although the ground was wet. Near the lake a cedar growth was encountered with mossy spongy base underneath.

The lake itself is shallow and nearly round in shape, elongated slightly in a N↔S direction.

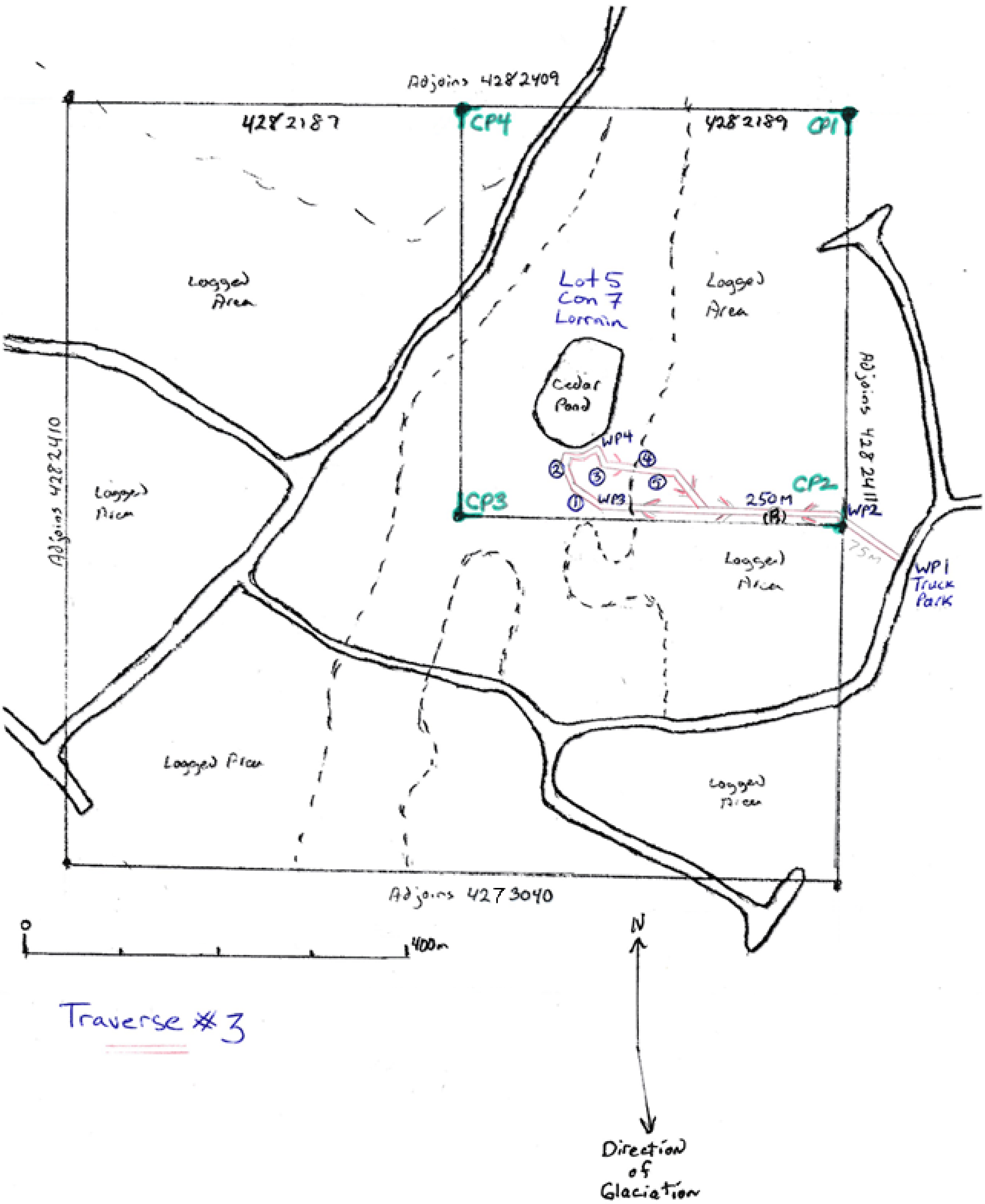
It is 118m NS, and 74m EW, with an apparent surface area of ~0.7 hectares.

Reaching solid ground, till Samples ④ and ⑤ were taken. We then walked back to the truck taking a path 50m or so north of our starting path to the lake.

Appendix 5

L 4282189 – Cedar Pond

Traverse 3: map June 12, 2016 Brian A. (Tony) Bishop, Graeme Bishop



L 4282189 – Cedar Pond

Traverse 3: field notes June 12, 2016 Brian A. (Tony) Bishop, Graeme Bishop

Sample #	Coordinates 17T UTM	Activity/Description
S1	O607161_E 5242973_N	Sandy till with gravel
S2	0607200_E 5242976_N	Sandy till with gravel
S3	0607132_E 5242979_N	Low ground as in S4 & S5 but dryer sand/gravel
S4	0607099_E 5242950_N	Damp/wet ground/till
S5	0607090_E 5242969_N	Wet ground, dry under tree root into watery ground/sand/gravel/muck
R	0607302_E 5242928_N	Took chip off a white/pinkish boulder (not bedrock) [see Photo 2, page 5]

Location #	Coordinates 17T UTM
WP1 (Truck Park)	0607421_E / 5242847_N
WP2	0607376_E / 5242920_N
WP3	0607133_E / 5242920_N
WP4	0607122_E / 5243000_N

Location #	Coordinates 17T UTM
Corner post #1	0607367_E / 5243360_N
Corner post #2	0607376_E / 5242920_N
Corner post #3	0606980_E / 5242927_N
Corner post #4	0606970_E / 5243353_N

Appendix 5

L 4282187 – down-ice of Cedar Pond

Traverse 4: fieldwork   May 13, 2017   Brian A. (Tony) Bishop, Graeme Bishop

Traverse 4 was to further establish the potential of Cedar Pond to be a kimberlite pipe by sampling further down-ice.

Graeme Bishop and I travelled to the parking spot on Claim #4282187 south of Cedar Pond. From the truck we walked the logging road to WP1, from here we spent the 1st part of the day and prospected by the SE most corner of Claim #4282187 continued to WP2.

Here we collected Sample ①, observing closely the pebbles and cobbles in and beside the road towards the Sample ② and then Sample ③ locations, then to the truck to drop the samples off.

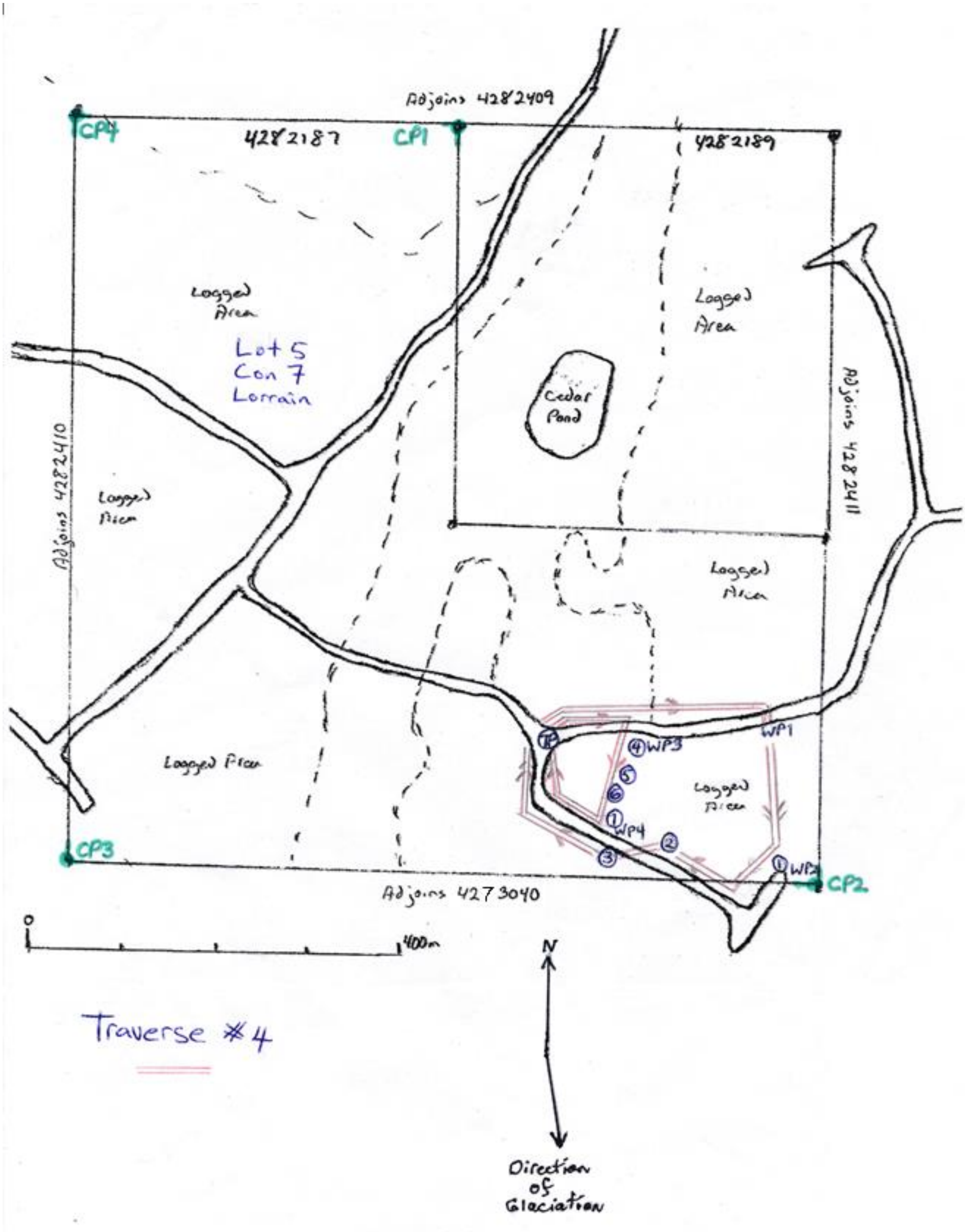
We then walked east to WP3 where in the natural trough I had previously sampled on the North side of the road towards the lake. This time we prospected and sampled the area in a southwardly direction following the same trough where we collected Samples ④, ⑤, ⑥, and ⑦, all in sand/gravelly till.

The samples were then sorted and stored safely.

Appendix 5

L 4282187 – down-ice of Cedar Pond

Traverse 4: map May 13, 2017 Brian A. (Tony) Bishop, Graeme Bishop



Appendix 5

L 4282187 – down-ice of Cedar Pond

Traverse 4: field notes   May 13, 2017   Brian A. (Tony) Bishop, Graeme Bishop

Sample #	**Coordinates** 17T UTM	**Activity/Description**
S1	0607333_E 5242567_N	Sandy till
S2	0607215_E 5242593_N	Sandy till
S3	0607159_E 5242578_N	Sandy till
S4	0607190_E 5242708_N	Wet unscreened sample.
S5	0607169_E 5242674_N	Dug down ~2' behind large sunken boulder – wet clay/muck 50' N of this a good size boulder found by Graeme, possibly kimberlite. Partly dug it out. Too big to move at present time
S6	0607152_E 5242649_N	Same gully. Clay/soil/sand
S7	0607142_E 5242620_N	Sand/gravel

Location #	**Coordinates 17T UTM**
TP (Truck Park)	0607092_E / 5242692_N
WP1	0607338_E / 5242733_N
WP2	0607348_E / 5242582_N
WP3	0607161_E / 5242720_N
WP4	0607153_E / 5242596_N

Location #	**Coordinates 17T UTM**
Corner post #1	0606970_E / 5243352_N
Corner post #2	0607386_E / 5242548_N
Corner post #3	0606588_E / 5242548_N
Corner post #4	0606568_E / 5243348_N

L 4282187 – Cedar Pond

Traverse 5: fieldwork August 25, 2017 ODM Sample Collection and Drone Survey

Brian A. (Tony) Bishop, David Crouch (PEng), Grant Morgan

ODM Sample Collection:

The purpose of this follow-up sampling program was to check very favourable results previously obtained. This entailed collecting four samples to send to ODM for independent results, from locations similar to those on the sampling plan for Traverse 2. Four larger ~3kg sets of samples were taken (see Traverse 5 map). Preparation for shipping is currently in progress. [Please refer to Methodologies, Appendix 6, for a description of what this involves]. Results will be provided in a future report.

Additional time prospecting was done south of Cedar Pond.

Aerial Fly-over:

Upon hearing of mining companies contracting an operator/owner of a camera-mounted drone to obtain an aerial view of their property in the Cobalt area at minimal cost (relative to a helicopter rental), I located an engineer, David Crouch, and owner/operator, Grant Morgan, who have experience with the technology and drone photography, who travelled from Kirkland Lake to the claim site south of Cobalt where I met them. Time was spent programming the flight path into the drone, and the flight was monitored in real-time. The resulting footage also enables individual 'frames' to be viewed to better delineate topography, outcrops, vegetation, etc. on the computer.

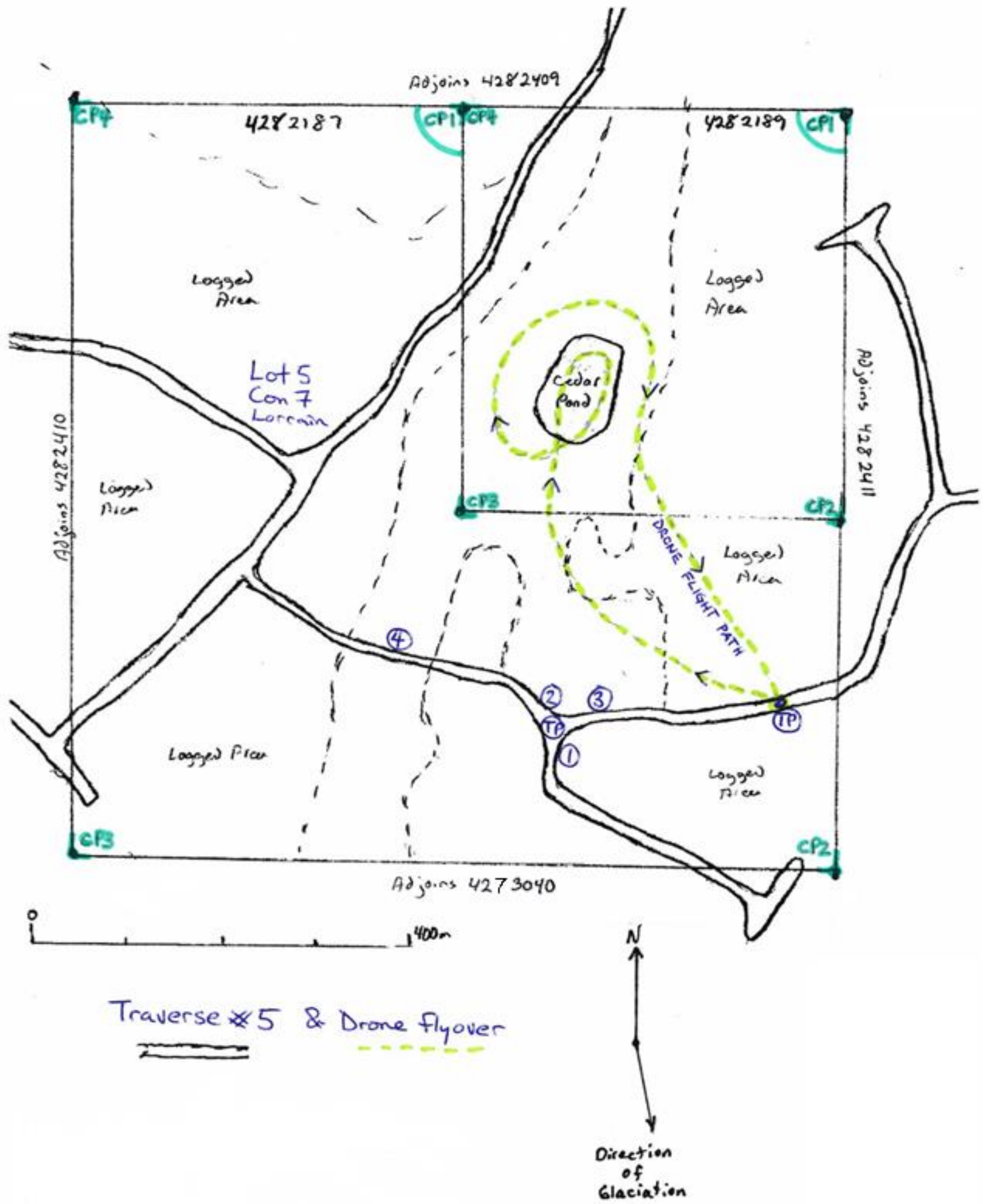
On the digital format you will see the footage start with a flyover of Paradis Pond (Claim #4273040), which is included to record the relationship of the 'target's (e.g. circular ponds on Claims #4282189 (Cedar Pond) and #4273040 (Paradis Pond)). (The footage towards Cedar Pond starts at time 2:11 on the video, as the drone approaches the skid trail where the truck is parked). I believe these targets are part of a cluster of pipes extending in a line near to and on the East side of the Cross Lake Fault from Little Grassy Lake (#4282444) to Lightning Lake (#4281431) to Cedar Pond to Paradis Pond, and possibly farther south to Claims #4282401 (Gleeson and Horseshoe Lakes) to $4282412 (Peanut Lake) and #4282404 (Mountain Lake).

Appendix 5

L 4282187 – Cedar Pond

Traverse 5: map August 25, 2017 ODM Sample Collection and Drone Survey

Brian A. (Tony) Bishop, David Crouch (PEng), Grant Morgan



L 4282187 – Cedar Pond

Traverse 5: field notes

August 25, 2017

ODM Sample Collection and Drone Survey
Brian A. (Tony) Bishop, David Crouch (PEng), Grant Morgan

Sample #	**Coordinates** 17T UTM	**Activity/Description**
S1	0607093_E 5242662_N	Sampled area where excellent results obtained previously. One set of samples collected to send to ODM. 2nd set collected and stored for future reference check. Spent the remainder of the day prospecting in the same general area for kimberlites, etc.
S2	0607180_E 5242724_N	
S3	0607073_E 5242729_N	
S4	0606906_E 5242767_N	

Location #	**Coordinates 17T UTM**
Truck Park (drone survey)	0607328_E / 5242740_N
Truck Park (sampling)	0607088_E / 5242694_N
Corner post #1	0606970_E / 5243352_N
Corner post #2	0607386_E / 5242548_N
Corner post #3	0606588_E / 5242548_N
Corner post #4	0606568_E / 5243348_N

A drone survey was also completed.

Appendix 6

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 most of the production 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, 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.

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.

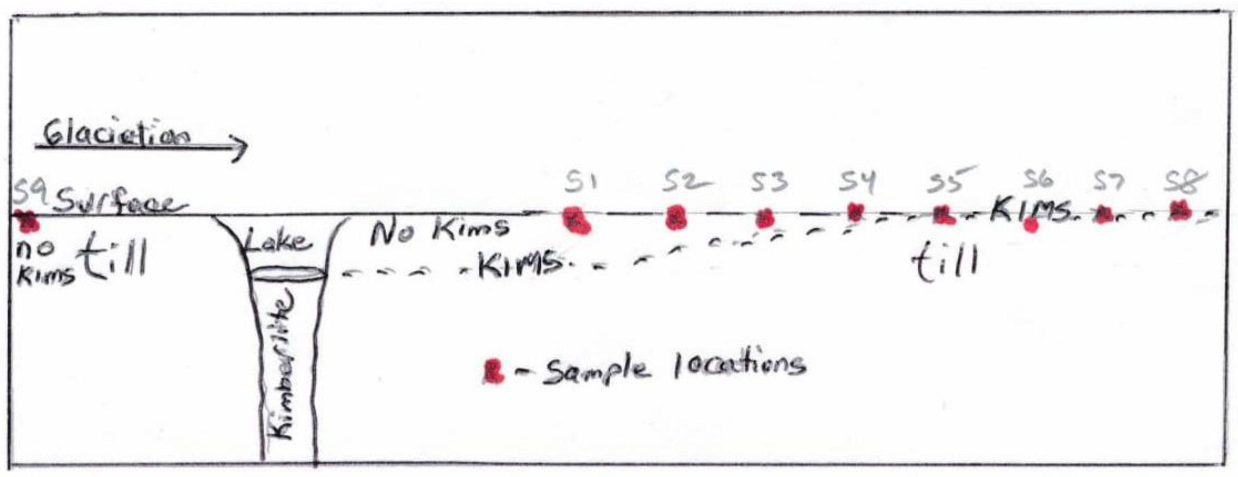
Whereas most approaches initially involves a regional sampling survey and then trace up-ice to the possible target, I start with identifying a potential target based on structural, glacial, landscape features, and publicly available OGS reports. I then take multiple samples to determine the likelihood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

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.

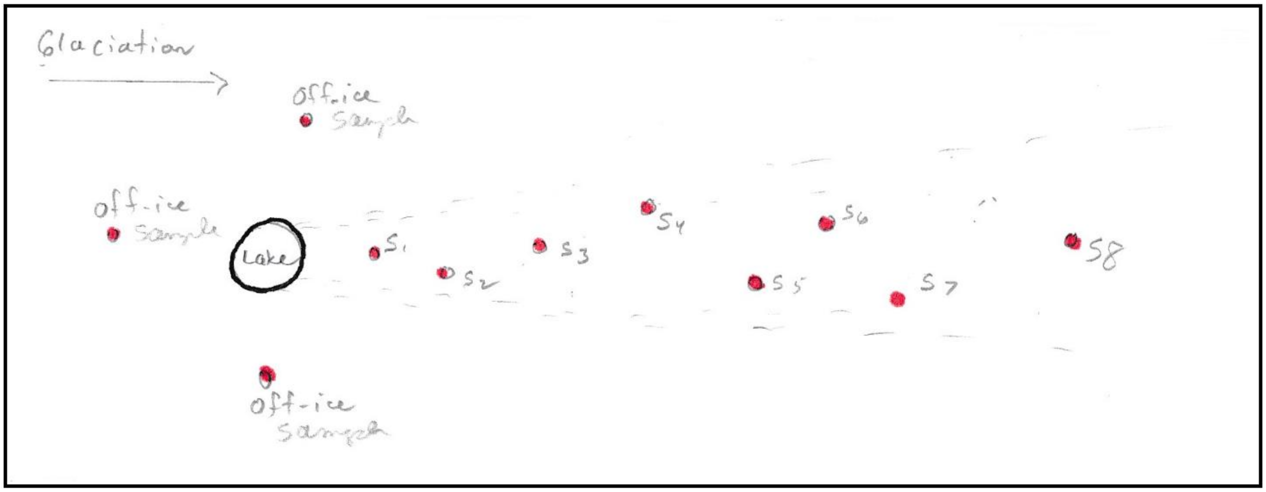
As you can see, due to the lake being a heavy mineral trap for material up-ice/water flow, all the samples I take from ‘close’ proximity down-ice/water flow can in all probability be attributed to that lake (or in theory, a hidden pipe in very close proximity down-ice of the lake). So, any of these samples 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.

① 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

② Top View – Till Sampling Program



- Same as diagram ①, 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 ± 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.

Of course, while till sampling a large part of the day/traverse is spent investigating boulders by removing moss, etc. and in this case specifically looking for kimberlite boulders (which have been located on 2 claims so far with other possible grain sized pieces that might be) or other interesting rocks with mineralization. Because this claim is in a large expanse of the Lorrain Granite Batholith, most boulders and outcrops are the characteristic pink granite with a mixed percentage of diabase from ~2/3km to the north, with mixed dolomite etc. from further north. As stated earlier, oversize from the sluice is bagged and viewed as time permits. No attempt will be made to identify every possible cobble if it is well worn and unrelated to kimberlite prospecting.

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.

METHODOLOGY FOR PROCESSING TILL SAMPLES: **Please also see Sluice Efficiency Test Results Chart [Appendix 7] and Flow Sheet for Concentrating and Retrieving KIMs from Till and Stream Samples [Appendix 8]**

EQUIPMENT:

1) GOLDFINDER CUSTOM MADE SLUICE *(since modified by the author for the efficient processing ~10 to 100+ lb soil samples, for initial kimberlite indicators / heavy mineral concentration)***:**

The Goldfinder sluice (see Equipment photo 1) is manufactured with aircraft grade aluminum in 3 sections, with sturdy fast connecting latches. It is 14' long, 14" wide, and has height adjustments at front and back of the top section, and front and back of the fully assembled sluice. From the manufacturer, it excels at saving very fine flour as well as coarser gold. The ability to save 90%+ of flour gold in any sluice is exceedingly rare [The Goldfinder sluice was tested extensively in the 1970s by designer and developer Wayne Loewen on the Saskatchewan River as well as in-house tests with known gold grains counted before and after running through the sluice]. (This particular sluice was rented from me by the then Resident Geologist Gerhard Meyer and District Geologist Gary Grabowski, both of the Kirkland Lake MRO, for testing for gold in eskers on the shores of Abitibi Lake). I determined that with certain beneficial modifications from stock it could also be very good at saving kimberlite indicator minerals (KIMs) from larger till samples.

Saving gold by gravity methods is comparatively easy as gold is about 7x heavier than indicator minerals or diamonds. To use the sluice to obtain a primary concentrate of KIMs, I removed the Hungarian riffles and the solid-backed 'miner's moss' carpet. I used a thicker, slightly more open-weave miner's moss, and overlying the miner's moss, a specific 4 mesh nylon classifying screen. This was cut to fit in the top of the sluice and overlaps the original grizzly bars to reduce the size of the feed material being concentrated prior to the miners' moss sections, and to spill the +4mm feed off the end of the top section which spills into a bucket and saved to visually check for kimberlites or other minerals of interest. A heavy duty ¾ HP submersible sump pump with a large flow rate replaced the 6 ½ HP Honda high pressure pump for a more correct water flow for the lighter material being run. This gave a 1" depth of water running above the top of the miner's moss. The sluice was run at a less steep angle than for gold to further enhance saving potential KIMs, with the first top section of the sluice adjusted to an angle with a drop of ½" over 36". The larger bottom section drops 3" every 5'. Great care must be exercised to level the sluice in the 14" width to provide an even water flow across its surface.

The modified sluice considerably reduced the original volume of material, but most importantly the modified wrap around spray bar [see Equipment photo in Appendix 10] blasts apart clay and other clumped material very quickly and the water flow then also quickly removes very fine silt, humus, and plant matter as well as +4mm rocks (previously, I would spend 1 – 2 hrs or more trying to break this clay and such by hand with various utensils and water spray, and afterwards would have to screen out the humus and then pan and classify with various screens). Efficiently saving the 1mm and smaller grains from clay/till strictly by hand methods is nearly impossible.

To test efficiency after the initial trial run using this equipment, I cleaned and kept separate the 4 carpet sections and the overflow of the sluice, which after further processing resulted in 25 separate samples of various meshes, and then checked the results under the microscope for indicators to determine if any losses were incurred and where. With this information, I was then able to make further modifications and retest to compare efficiencies which I continue to do and modify as needed.

The sluice concentrates <1.0mm are ran through the GoldCube® and the trays are cleaned (i.e. washed for concentrates). The rejects are saved and are again ran through the GoldCube®. The new rejects are discarded.

Concentrates from the 1st and 2nd run are then blended and reran through the GoldCube®. The 1st tray is then cleaned and saved separately, as are the 2nd and 3rd trays. These rejects are then saved separately. These will all be dried and demagnetized and screened into a number of different mesh fractions, and these, if individually too large to directly pick for KIMs, are carefully panned to a manageable size. Although time consuming, this results in a very efficient and consistent method of concentrating till for KIMs and other heavy minerals.

Interestingly, many professional labs still list panning as the final concentration technique. This preliminary work was all necessary to determine the efficiency of sluicing till samples for KIMs and other heavy minerals with this particular sluice. Surprisingly, the first top section with no miner's moss had an interesting number of potential KIMs as well as a 1.5mm purple garnet in my sluice efficiency test. The next carpet had very many indicators, the next a sizable number of indicators, the final carpet and overflow had no KIMs or magnetite etc. that would typically comprise a heavy concentration [see Sluice Efficiency Test Results in Appendix 7].

2) GOLDCUBE®:

The GoldCube® is a 'new' and excellent concentrator built for gold, but after much testing I've discovered it works very well for kimberlite indicators minerals and is uncomplicated and easy to use. After numerous tests (much the same as for the sluice), I determined it is very efficient for smaller sized 1-4kg till/creek samples, after wet screening the samples to 1.0-2.0mm and <1.0mm which are ran through the concentrator individually. It has a very high recovery rate for <1.0mm heavy minerals and for removing virtually all the silt sized grains, and it's easy to clean after use.

3) TYLER PORTABLE SIEVE SHAKER:

The Tyler sieve shaker (Equipment photo 2) is utilized for larger samples. For individual small samples, screening is done by hand with standard sieve screens and larger diamond screens.

4) MANSKER JIG:

I also acquired and compared the efficiency of using a Mansker Jig for concentrating till samples, as some labs and explorationists use this device extensively for this purpose. I purchased one Coleparmer 8" HHSS #40 sieve for KIMs, and one Coleparmer 8" HHSS #100 sieve for lamprophyre indicators. Based on my findings I have determined a preference for my sluicing and Goldcube® methodology, as this appears to be superior to the Mansker Jig in concentrating KIMs, more so when considering a several thousand US dollar price tag.

5) CAMEL SPIRAL CONCENTRATOR:

A Camel Spiral Concentrator, which is used by some commercial labs, was also tested for KIM concentrates and I found it to be the worst of the lot – essentially useless.

6) HIGH-SPEED CENTRIFUGE:

I acquired and tested a high-speed centrifuge to separate the final concentrate into specific gravity layers. The centrifuge only seems to work to an extent on the finest fraction of concentrates. For now I will continue to use a high quality pan for final concentrating.

7) OTHER:

I considered the use of Polytungstate for heavy liquid separation but at $2500 US for 500 ml and special licensing and equipment requirements to use this product I quickly nixed that idea.

8) MICROSCOPE:

After these steps the indicators are then visually picked out (or a number estimated, and/or photographed under the microscope if too many to pick out or count) from each fraction under a Nikon SMZ-2B 8-50x binocular microscope with the help of Pelco (ceramic or carbon-fibre tipped) medical grade tweezers, and colour correct LED lamps for top, left and right, and below lighting. LW and SW ultraviolet lamps are also used in conjunction with the microscope to further identify various mineral grains. I have also been researching and experimenting with the use of switching between incandescent, fluorescent, and LED light, as some/many kimberlite garnets are also rare colour-change garnets.

9) PHOTOGRAPIC RECORDING:

An extra but very important (and time consuming) step is to photograph many of the large/important/unusual potential KIM or other heavy mineral through the microscope ocular, recording the type, size, colour, etc. of each grain, and storing and labelling the images on the computer for later viewing or to aid when consulting with geologists and other experts in the field of mineralogy, especially as related to diamond exploration of which a number of interesting grains are represented in this report. Many photographs were taken for this claim of concentrates/various grains have been taken and stored. As well, when dealing with grains that are from 0.25 to <3.0mm in size, one simply cannot easily find a certain one in picked KIMs and show it to individuals to ascertain their potential importance, and once sent to a lab for microprobe analysis, important physical characteristics such as kelyphitic rims and physical wear are lost. Photographing all KIMs picked (or many representative grains if too numerous) also helps estimate total numbers in the sample.

PREPARATION OF FIELD SAMPLES FOR SHIPPING TO LAB (ODM):

Individual samples are washed to remove silt-sized particles and are wet screened to <4mm. These are then partially dried over several days until they are of slightly damp consistency. Each sample is thoroughly mixed and split into two ‘identical’ fractions of the same weight, bringing the ODM sample weight to their recommended 10kg size. One fraction (half of each of the four samples) is retained for concentration by me as a comparison check. The second fraction containing half of each of the four samples is put in a large tumbler and blended for one hour. For shipping, the blended till is placed in a clear garbage bag and then sealed in a white ‘feed’ bag which is then labelled for shipping to Overburden Drilling Management (ODM) for concentrating and KIM picking.

Sluice Efficiency Test Results

Appendix 7

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**		

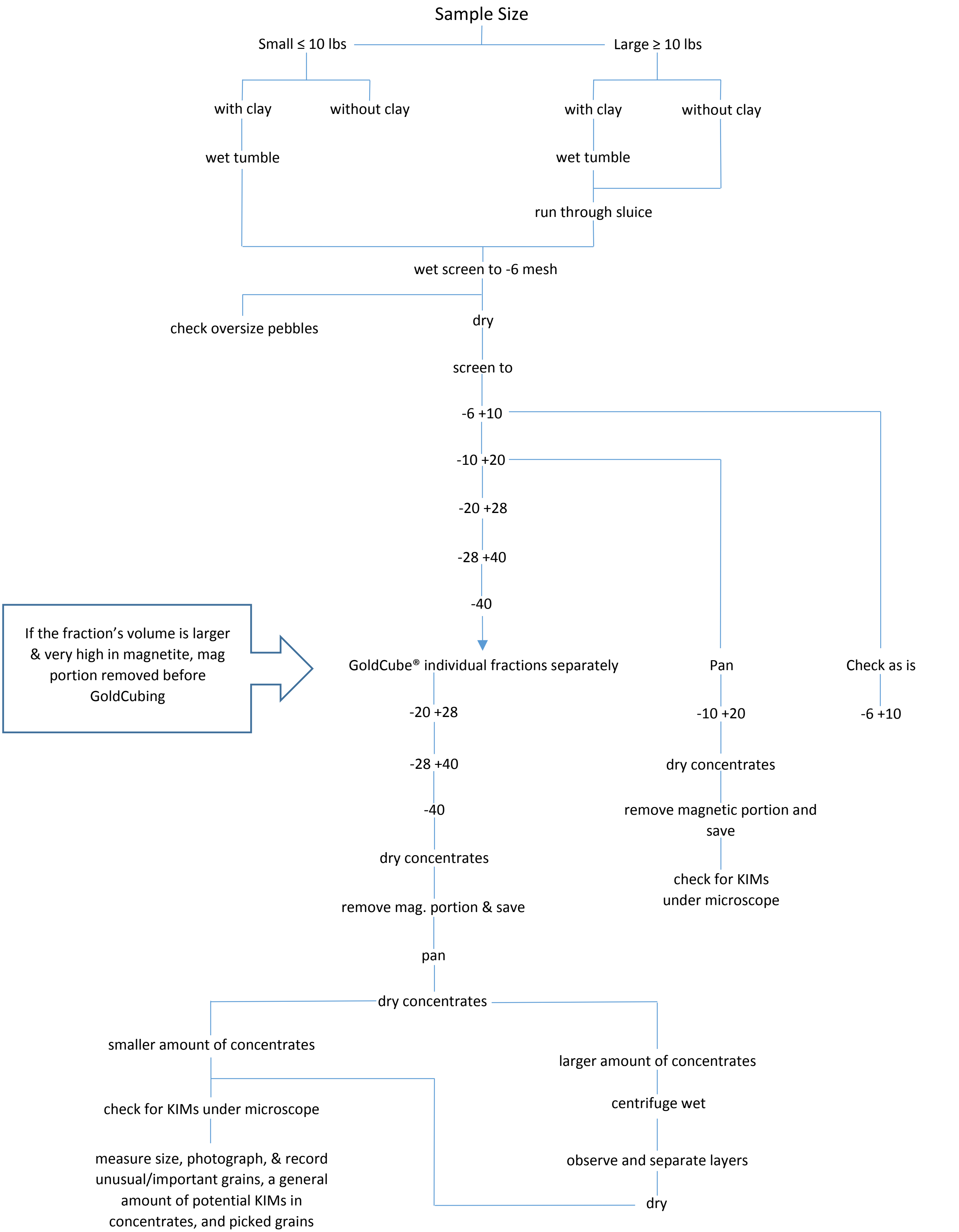
Sluice 2: classifying screen over miner's moss			
Dry weight from sluice = 3020 grams			
	Screened dry weight (grams)	**Magnetic portion (grams)**	**After panning dry weight (grams)**
-4+10 mesh =	29	1	22
-10+20 mesh =	269	8	18
-20+28 mesh =	248	6	20
-28+35 mesh =	359	7	17
-35 mesh =	2106	x	
Total =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

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

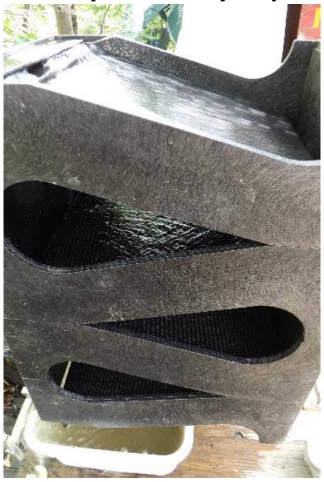
Equipment Photos

Appendix 10

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

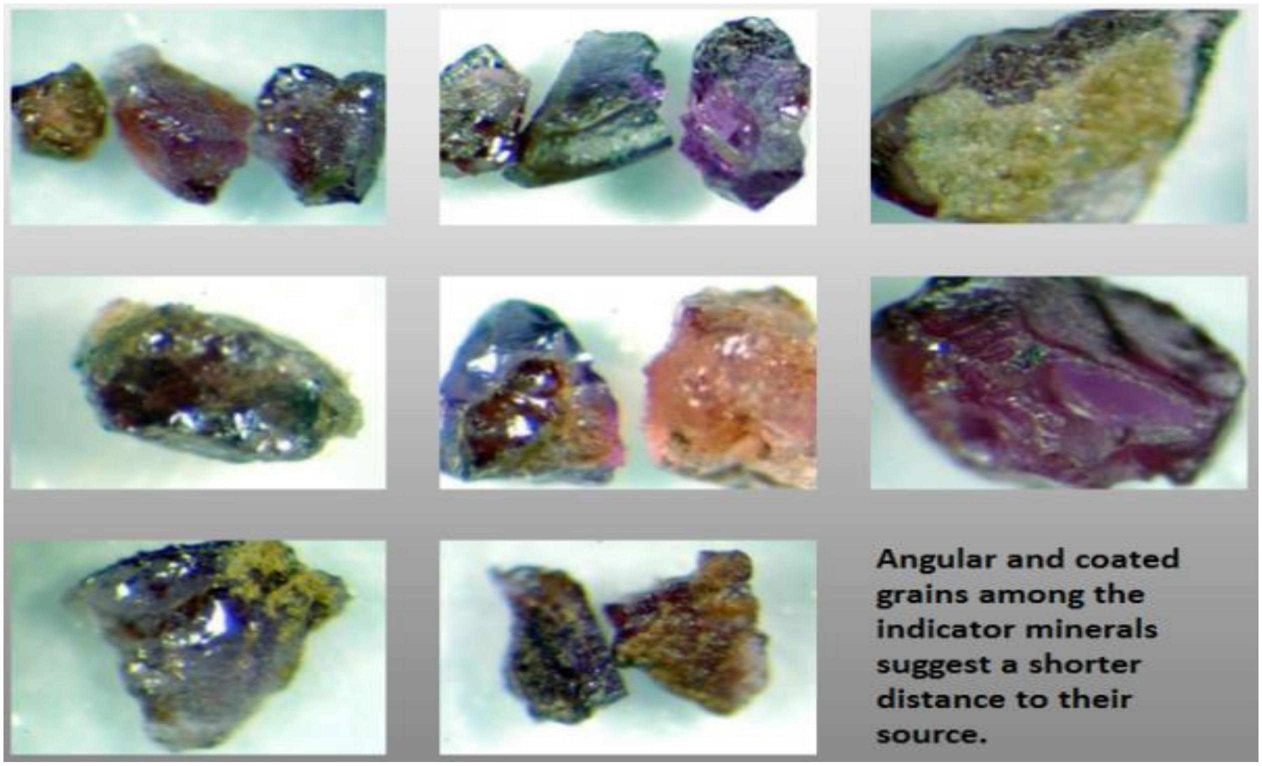
7 - Portable camp near claim

Appendix 11

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 12

Geoscience Labs – Certificates of Analysis

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 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 12

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-17-0107-04
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 12

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

Geoscience Labs – Results (see digital file for full version)

EMP-100:

GEOSCIENCE LABORATORIES REPORT
ELECTRON MICROPROBE ANALYSIS
Data reviewed by Dave Crabtree

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

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

All concentrations are reported as wt%.

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

All concentrations are reported as wt%.

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

Appendix 13

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

Appendix 13

EMP-100:

Client	Tony Bishop
Mineral	Various
Sample	Various
Job #	17-0279
Analyst	D. Crabtree
Analyst Approved	September 28th 2017

GEOSCIENCE LABORATORIES REPORT
ELECTRON MICROPROBE ANALYSIS
Data reviewed by Dave Crabtree

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+}

Sample Label	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	ZnO	Na2O	K2O	F	Cl	Y2O3	La2O3	Ce2O3	Pr2O3	Nd2O3	Sm2O3	Gd2O3	Total
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%.

QUALITY CONTROL

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

Sample Label	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	ZnO	Na2O	K2O	F	Cl	Y2O3	La2O3	Ce2O3	Pr2O3	Nd2O3	Sm2O3	Gd2O3	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

SEM-101:

GEO LABS
GEOSCIENCE LABORATORIES

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

Drone Footage

See digital file for drone footage.

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 4282189 and 4282187 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 37 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:

B. A. Bishop

Brian Anthony (Tony) Bishop

November 2, 2017

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Appreciation is expressed also to staff at MNDM Sudbury for their assistance with completing MNDM forms and procedures.

Thank you.

Client	**Tony Bishop**	**GEOSCIENCE LABORATORIES REPORT**
Mineral	**Garnet**	**ELECTRON MICROPROBE ANALYSIS**
Sample	**Various**	Data reviewed by Dave Crabtree
Job #	**17-0107**	
Analyst	**D. Crabtree**	
Analyst Approved	**September 20th 2017**	

Cr-Pyrope Garnet Analyses

G10 Harzburgite Garnet (Grutter Classification)

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

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

All concentrations are reported as wt%.

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO[t]	Na2O	K2O	Total
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
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)												

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

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total
S-G14	spessertine											
S-G23	spessertine											
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**

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	

Sample Label	SiO2	TiO2	Al2O3	V2O3	Cr2O3	MgO	CaO	MnO	FeO^t	Na2O	K2O	Total
XTAL	TAP1	PET2	TAP1	LLiF3	LLiF3	TAP1	PET2	LiF4	LiF4	TAP1	LPET5	
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


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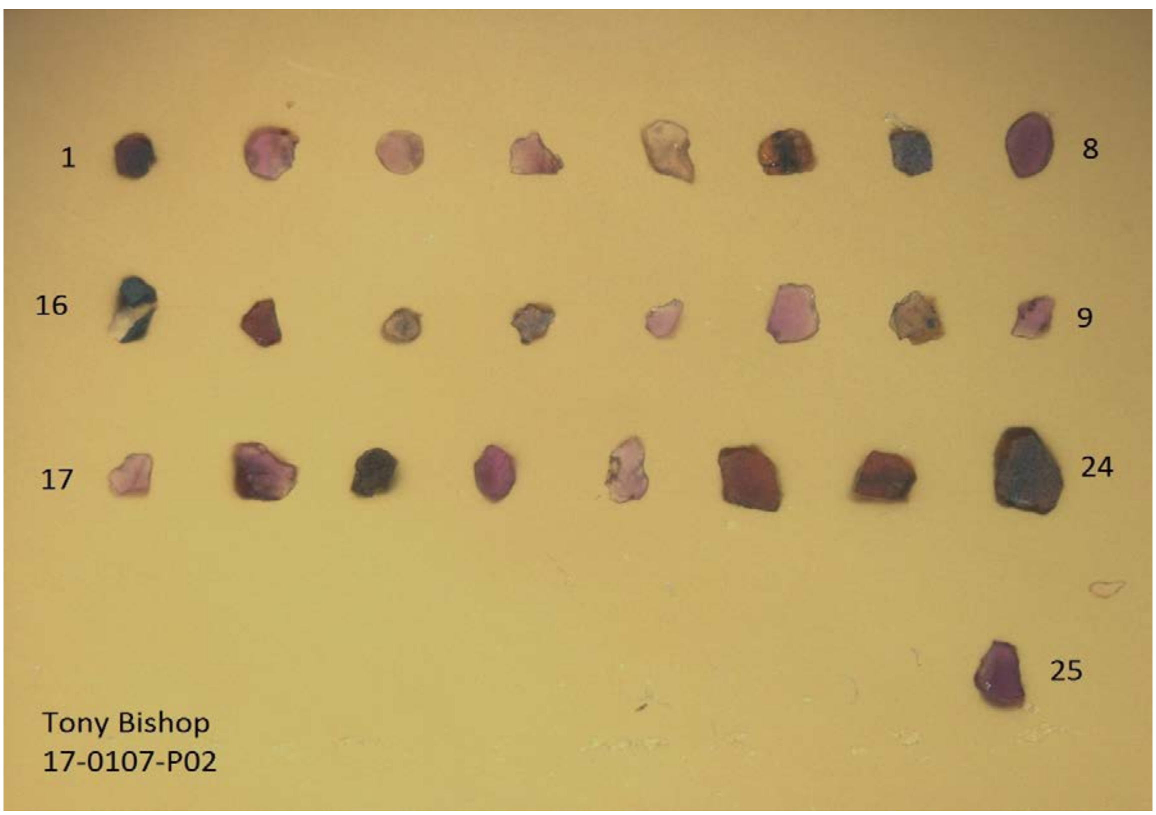
Tony Bishop
17-0107-P01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Tony Bishop
17-0107-P02


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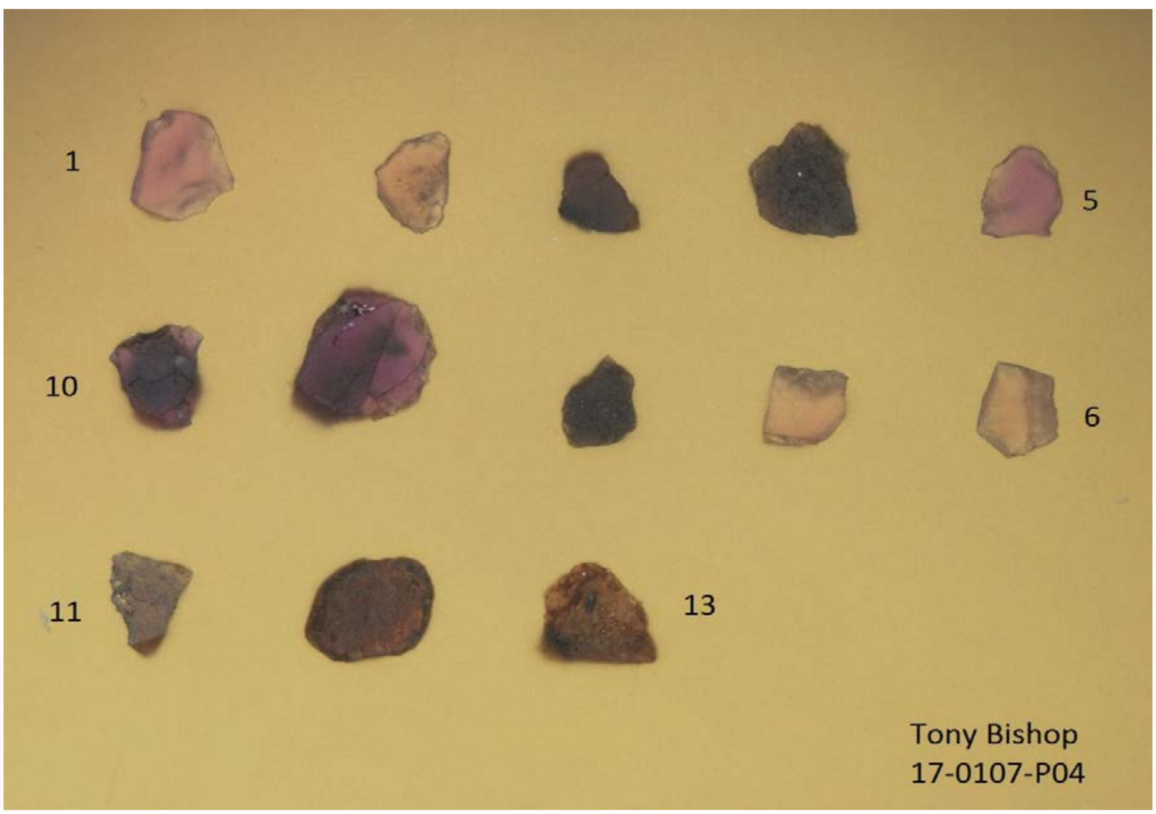
Tony Bishop
17-0107-P03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Tony Bishop
17-0107-P04

Lab I.D.	Sample Label	Min I.D.	KIM Garnet I.D. (Grutter)
17-0107-P01-001	S-G4	spessertine	
17-0107-P01-002	S-G5	pyrope	G9
17-0107-P01-003	S-G11	pyrope	G9
17-0107-P01-004	S-G13	spessertine	
17-0107-P01-005	S-G14	spessertine	
17-0107-P01-006	S-G15	pyrope	G9
17-0107-P01-007	S-G23	spessertine	
17-0107-P01-008	S-G47	pyrope	G9
17-0107-P01-009	S-G48	pyrope	G9
17-0107-P01-010	S-G52	pyrope	G9
17-0107-P01-011	S-G53	titanite	
17-0107-P01-012	S-G55	fe-oxide	
17-0107-P01-013	S-G56	titanite	
17-0107-P01-014	S-G57	almandine	
17-0107-P01-015	S-G58	spessertine	
17-0107-P01-016	S-G59	titanite	
17-0107-P01-017	S-G60	quartz	
17-0107-P01-018	S-G61	spessertine	
17-0107-P01-019	S-G62	titanite	
17-0107-P01-020	S-G63	zircon	
17-0107-P01-021	S-G64	pyrope	G9
17-0107-P01-022	S-G65	pyrope	G9
17-0107-P01-023	S-G66	pyrope	G9
17-0107-P01-024	S-G67	pyrope	G9
17-0107-P01-025	S-G68	pyrope	G9
17-0107-P01-026	S-G69	pyrope	G9
17-0107-P01-027	S-G70	pyrope	G9
17-0107-P01-028	S-G71	pyrope	G9
17-0107-P01-029	S-G72	pyrope	G9
17-0107-P01-030	S-G73	andradite	
17-0107-P01-031	S-G74	pyrope	G10
17-0107-P01-032	S-G75	pyrope	G9
17-0107-P01-033	S-G78	peraluminous silicate	
17-0107-P01-034	S-G80	pyrope	G9
17-0107-P01-035	S-G81	pyrope	G9
17-0107-P01-036	S-G89	pyrope	G12
17-0107-P01-037	S-G90	pyrope	G9
17-0107-P01-038	S-G91	pyrope	G10
17-0107-P01-039	S-G92	pyrope	G11
17-0107-P01-040	S-G93	pyrope	G9

Lab I.D.	Sample Label	Min I.D.	KIM Garnet I.D. (Grutter)
17-0107-P01-041	S-G94	pyrope	G9
17-0107-P01-042	S-G95	pyrope	G12
17-0107-P01-043	S-G1	pyrope	G9
17-0107-P01-044	S-G19	titanite	
17-0107-P01-045	S-G33	almandine	
17-0107-P02-001	S-G12	spessertine	
17-0107-P02-002	S-G10	pyrope	G9
17-0107-P02-003	S-G16	pyrope	G9
17-0107-P02-004	S-G17	pyrope	G11
17-0107-P02-005	S-G18	almandine	
17-0107-P02-006	S-G20	peraluminous silicate	
17-0107-P02-007	S-G21	titanite	
17-0107-P02-008	S-G22	pyrope	G11
17-0107-P02-009	S-G25	pyrope	G9
17-0107-P02-010	S-G28	titanite	
17-0107-P02-011	S-G29	pyrope	G9
17-0107-P02-012	S-G30	pyrope	G9
17-0107-P02-013	S-G31	titanite	
17-0107-P02-014	S-G32	almandine	
17-0107-P02-015	S-G34	epidote	
17-0107-P02-016	S-G46	fe-oxide	
17-0107-P02-017	S-G51	pyrope	G9
17-0107-P02-018	S-G77	pyrope	G9
17-0107-P02-019	S-G82	peraluminous silicate	
17-0107-P02-020	S-G83	pyrope	G10
17-0107-P02-021	S-G84	pyrope	G9
17-0107-P02-022	S-G85	spessertine	
17-0107-P02-023	S-G86	spessertine	
17-0107-P02-024	S-G88	titanite	
17-0107-P02-025	S-G96	pyrope	G9
17-0107-P03-001	S-G3	titanite	
17-0107-P03-002	S-G12	almandine	
17-0107-P03-003	S-G35	titanite	
17-0107-P03-004	S-G36	pyrope	G9
17-0107-P03-005	S-G37	pyrope	G9
17-0107-P03-006	S-G38	pyrope	G9
17-0107-P03-007	S-G39	spessetine	
17-0107-P03-008	S-G40	pyrope	G9

Lab I.D.	Sample Label	Min I.D.	KIM Garnet I.D. (Grutter)
17-0107-P03-009	S-G41	pyrope	G9
17-0107-P03-010	S-G42	pyrope	G9
17-0107-P03-011	S-G43	spessertine	
17-0107-P03-012	S-G45	pyrope	G1
17-0107-P03-013	S-G87	Mg-Si-Fe-O altered olivine?	
17-0107-P04-001	S-G6	pyrope	G9
17-0107-P04-002	S-G7	almandine	
17-0107-P04-003	S-G8	pyrope	G1
17-0107-P04-004	S-G9	almandine	
17-0107-P04-005	S-G24	pyrope	G9
17-0107-P04-006	S-G26	almandine	
17-0107-P04-007	S-G27	almandine	
17-0107-P04-008	S-G44	peraluminous silicate	
17-0107-P04-009	S-G49	pyrope	G9
17-0107-P04-010	S-G50	pyrope	G9
17-0107-P04-011	S-G54	titanite	
17-0107-P04-012	S-G76	K-Feldspar	
17-0107-P04-013	S-G79	peraluminous silicate	

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**		

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+}

Sample Label	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	ZnO	Na2O	K2O	F	Cl	Y2O3	La2O3	Ce2O3	Pr2O3	Nd2O3	Sm2O3	Gd2O3	Total
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

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
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
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	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	ZnO	Na2O	K2O	F	Cl	Y2O3	La2O3	Ce2O3	Pr2O3	Nd2O3	Sm2O3	Gd2O3	Total

QUALITY CONTROL

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

Sample Label	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	ZnO	Na2O	K2O	F	Cl	Y2O3	La2O3	Ce2O3	Pr2O3	Nd2O3	Sm2O3	Gd2O3	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

Ontario

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CERTIFICATE OF ANALYSIS

GEO LABS

GEOSCIENCE LABORATORIES

Issued To:	Mr. T. Bishop 440 Grenfell Rd, RR#2 Swastika, ON P0K 1T0 Canada
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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

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

CERTIFIED BY :

Date: ____________________

John Beals, GeoServices Senior Manager

GEO LABS
GEOSCIENCE LABORATORIES

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

Ontario

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GEO LABS

GEOSCIENCE LABORATORIES

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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:

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Ontario

CERTIFICATE OF ANALYSIS

GEO LABS

GEOSCIENCE LABORATORIES

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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 :

Date: ______________________

John Beals, GeoServices Senior Manager