ASSESSMENT REPORT – 2018 PROSPECTING PROGRAM

GULLWING-TOT LAKES PROPERTY

Dryden, Northwestern Ontario, Canada

NTS Sheets: 52F15NE and 52F16NW

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1.0 SUMMARY

J-J Minerals of Sudbury, Ontario, Canada was contracted by Power Metals Corp. ("Power Metals") of Vancouver, British Columbia, Canada to supervise a summer prospecting program at the Gullwing-Tot Lakes Property, Dryden, northwestern Ontario and to recommend a future exploration program.

The Gullwing - Tot Lakes Property is located in the Sioux Lookout Mining Division, 30 km northeast of Dryden, northwestern Ontario in Webb and Drope townships on NTS sheets 52F15NE and 52F16NW. The Property consists of 112 contiguous cell claims totaling 1216 ha and is approximately 10 km by 1.5 km in size.

The Gullwing-Tot Lake property is located within the Sioux Lookout Terrane of the Superior Province; the Sioux Lookout Terrane makes up the boundary zone of the granitoid Winnipeg River Subprovince to the north and the granite-greenstone Wabigoon Subprovince to the south. The Terrane itself is composed of mafic to intermediate metavolcanic rocks, clastic sediments, metasedimentary migmatites, and granitoid rocks including key two-mica S-type granitoids which may be the parent bodies of the pegmatite mineralization. The Sioux Lookout Terrane is the host of the Gullwing-Tot Lake Pegmatite Group. The Gullwing-Tot Lake Pegmatite group consists of multiple pegmatite dykes including: Gullwing Lake spodumene pegmatite swarm, Tot Lake spodumene pegmatite, Coates beryl-molybdenite pegmatite and about 15 Rb-Cs pegmatite dykes located in the Drope township area.

Pegmatites in the Gullwing-Tot Lake Group are found within an E-NE trending cluster that has an approximate size of 0.8-2.2 km by 15 km. These pegmatites are typically hosted in highly deformed amphibolite facies mafic metavolcanic rocks and are less commonly found in clastic metasedimentary rocks. The Gullwing-Tot Lake Pegmatite Group contains 2 key known Li-Cs-Rb-Be-Ta bearing pegmatites; the namesake Gullwing Lake and Tot Lake pegmatites.

The Gullwing Lake pegmatite, also known as the Sleeping Giant Pegmatite is located on the western edge of the Gullwing-Tot Lake Property, ranges in width from 25-80 m, is 412 m long and has Li-Nb ±Ta-Be-Mo with local REE enrichment. The dyke is separated into the south, central and north zones. The central and north zones contain spodumene in the quartz core units. Spodumene is pseudomorphed by yellow-green mica in the central zone. The north zone contains 3 spodumene-bearing, blocky microcline, quartz, albite, muscovite pods, which comprise ~10% its total surface area. The largest pod is 3 x 8 m in size and contains faint green spodumene. The spodumene in these pods can be up to 4 x 40 cm x 100 cm in size and

are intergrown with the blocky microcline, quartz, grey muscovite and albite of the quartz core. Spodumene is commonly partially to completely replaced by mauve Li-muscovite or by fine-grained albite and green mica, but in rare cases spodumene is white and unaltered.

The Gullwing Lake pegmatite has a complex alteration history with 3 different types of albitization present (see section 7.2.1 for details). Different types of albitization result in different Ta-Nb oxide mineralization styles; one unit contains dominantly Nb oxides that make up to ~1 vol% of the rock and are euhedral and up to 2x5 cm in size (Albitization I). Finer grained more Ta-rich oxide minerals are present in the Li muscovite-cleavelandite assemblages of a different type of albitization (Albitization II). The third type of albitization (Albitization III) occurs when Albitization I overprints Albitization II.

The assay highlights from grab samples on the Gullwing North outcrop include:

- 6.78 % Li_2O from pure spodumene sample, sample 159082
- 0.73 % Li_2O from spodumene – albite – quartz sample, sample 159084
- 759 ppm Ta from large Ta-oxide crystals in albite unit, sample 159254

The Tot Lake Pegmatite is the most fractionated granitic pegmatite body in the Dryden Pegmatite Field and is among the most fractionated granitic pegmatite bodies in Ontario, as evidenced by the presence of the cesium ore mineral pollucite, which is only found in 4 other pegmatites in Ontario including Power Metal's owned Marko's pegmatite on the Paterson Lake Property and the West Joe Dyke on the Case Lake Property. The chemical fractionation index of the Tot Lake Pegmatite is comparable to the world-class Tanco Pegmatite.

The Tot-Lake pegmatite is 1-6 x >48 m in size and is complexly chemically zoned with abundant variably textured spodumene bearing zones which can contain up to 78% spodumene. Pollucite in the Tot Lake pegmatite is confined to a 1 x 5 m pollucite-spodumene pod where it is found interstitially between pink spodumene crystals. Pollucite makes up to 32% of the pod.

Columbite is found in the Tot-Lake pegmatite where it is typically steely-black, euhedral and up to 1 x 2 cm in diameter. Columbite crystals typically form at the interface between altered blocky microcline and the quartz core.

Assay highlights from grab samples from Tot Lake pegmatite include:

- 4.58 % Li_2O from quartz – spodumene core, sample 159056

- 2.62 % Li_2O from quartz – spodumene core, sample 159057
- 1.68 % Li_2O and 233 ppm Ta from pink spodumene zone, sample 1590235
- 498 ppm Ta from albitized K-feldspar zone, sample 159238

Prospecting was completed on the Gullwing-Tot Lakes Property between June 26 and July 17, 2018 for a total of 22 days. The prospecting was done to explore for previously undiscovered mineralized pegmatites at surface, and to perform due diligence work on known mineralized pegmatites. The prospecting approach was to target the 4 known showings on the south side of the Gullwing Lake on the Gullwing-Tot lake property (Tot Lake, Coates, Gullwing and Drope Dykes) and their host rocks for sampling. Tot Lake pegmatite is on cell claim 116833 and 195537, Gullwing Lake pegmatite is on cell claim 192112 and 295415, Coates occurrence is on cell claim 174133 and Drope occurrence is on cell claim 285691.

During field work, numerous unmineralized pegmatites were encountered and sampled including the named Coates and Drope pegmatites. The unmineralized pegmatites typically trend E-W. They are pink to white and are dominantly composed of K-feldspar, white to smoky quartz and white to green muscovite with variable amounts of biotite, cleavelandite and red euhedral garnet. The Drope pegmatite contains abundant molybdenite.

The molybdenite was found at the Coates pegmatite as fine-grained blebs up to 0.5 cm and as stringers (samples 159052 and 159053). Sample 159232 was also from an old blast pit on the Coates pegmatite at the contact between E-W trending pink K-feldspar – quartz – molybdenite pegmatite and metasedimentary rocks. Molybdenite was also found on the south Gullwing Lake pegmatite as 1.5 cm rosettes in albite-biotite-quartz pegmatite (sample 159264).

A total of 89 prospecting grab samples were collected and 10 QC samples were inserted into the sample stream. The sample with the highest Li_2O content was sample 159082, which came from the Gullwing Lake Pegmatite and contained 6.78 weight percent (wt%) indicating a sample of nearly pure spodumene (Figure 9-1).

In addition to the grab samples collected for assays, a total of 29 outcrops were described but no samples were collected. These outcrops were either host rocks or barren pegmatites. They were not assayed as mineralization was absent, but their location is useful for geological mapping of the property.

During prospecting 14 historic features were located on Gullwing Lake pegmatite including: 5 drill collars, 1 legacy claim post, 4 sample locations marked by ribbons and 1 historic channel sample. Also 3 historic trenches were located on Tot Lake pegmatite.

Power Metals Corp recommends the following future exploration:

- Stripping and trenching to expose more of the abundant outcrop around Gullwing Lake pegmatite to search for more mineralization.
- A drill program on the Gullwing Lake Pegmatite to quantify the Li mineralization at depth
- A drill program on the Tot Lake Pegmatite to determine Li and Ta grades at depth as well as to look for an extension of the dyke
- Further prospecting on area between the Gullwing Lake Pegmatite and the Tot Lake pegmatite to find more mineralized pegmatites at surface.

2.0 INTRODUCTION

2.1 Introduction

In the summer of 2018, J-J Minerals of Sudbury, Ontario, Canada was contracted by Power Metals Corp. ("Power Metals") of Vancouver, British Columbia, Canada to supervise a prospecting program on the newly acquired Gullwing-Tot Lakes Property, Dryden, northwestern Ontario and to recommend a future exploration program.

Sources of information for this Report include Ministry of Northern Development and Mines (“MNDM”) assessment files listed in Appendix 4, references listed in section 0, and grab sample assays and notes from Power Metals’ 2018 prospecting program. Tenure information was derived from MNDM CLAIMaps website (http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/claimaps).

2.2 Terminology

Fusion - This digestion process will melt the entire sample to produce “total digestion”. This method is especially used for digestion of silicates and other resistive minerals.

ICP-MS: Inductively Coupled Plasma - Mass Spectrometer: An instrument capable of determining the concentrations of 70+ elements simultaneously by measuring the mass of ions generated by an argon gas plasma heated to 10,000°K and passing through a magnetic quadrupole to the detector. Capable of ultra low detection limits (ppb to ppt) with very wide linear ranges (up to 7 orders of magnitude) (Acme Analytical Laboratories Ltd: www.acmelab.com).

MNDM: Ministry of Northern Development and Mines which is the provincial ministry responsible for managing mining claims (Mining Lands Section) and Ontario Geological Survey.

QA/QC: Quality Assurance/ Quality Control

2.3 Units

The Metric System is the primary system of measure and length used in this Report and is generally expressed in kilometres (km), metres (m) and centimetres (cm); volume is expressed as cubic metres (m^3), mass expressed as metric tonnes (t), area as hectares (ha), and gold and silver concentrations as grams per tonne (g/t). Conversions from the Metric System to the Imperial System are provided below and quoted where practical. Many of the geologic publications and more recent documents now use the Metric System but older documents almost exclusively refer to the Imperial System. Metals and minerals acronyms in this report conform to mineral industry accepted usage and the reader is directed to www.maden.hacettepe.edu.tr/dmmrt/index.html for a glossary.

Other abbreviations include ppb = parts per billion; ppm = parts per million; oz/t = troy ounce per short ton; Moz = million ounces; Mt = million tonne; t = tonne (1000 kilograms); SG = specific gravity; lb/t = pound/ton; and, st = short ton (2000 pounds).

Dollars are expressed in Canadian currency (CAD$) unless otherwise noted. Where quoted, Universal Transverse Mercator (UTM) coordinates are provided in the datum of Canada, NAD 83, Zone 17.

2.4 Qualified Person

The Qualified Person and author for this Report is Dr. Julie Selway, Ph.D., P.Geo., Principal Geologist for J-J Minerals and a geologist in good standing with the Association of Professional Geoscientists of Ontario (APGO # 0738). Dr. Selway completed a Ph.D. in rare-element pegmatites in 1999, worked as a pegmatite geoscientist for Ontario Geological Survey for 3 years (2001-2003) and has completed 4 NI 43-101 Reports on the Georgia Lake spodumene pegmatites, Ontario, Canada for Rock Tech Lithium Inc. Dr. Selway has also over 7 years of work experience completing QA/QC reviews of drill core assays for the purpose of resource estimates. Dr. Selway has co-authored over 20 NI 43-101 Technical Reports. Certificate of Qualified Person is given in Appendix 1.

3.0 Reliance on Other Experts

The author of this Report relied on Power Metals' legal counsel and MNDM CLAIMaps website (http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/claimaps) for tenure information and title opinion.

4.0 Property Description and Location

4.1 Location

The Gullwing - Tot Lake Property is located 30 km northeast of Dryden, northwestern Ontario in Webb and Drope townships on NTS sheets 52F15NE and 52F16NW (Figure 4-1).

Figure 4-1 Regional location map for Gullwing-Tot Lake Property, NW Ontario.

4.2 Description and Ownership

The Gullwing-Tot Lake Property consists of 112 contiguous cell claims totaling 1216 ha and is approximately 10 km by 1.5 km in size. Power Metals has option agreements for all 112 cell claims (1216 ha). Power Metals holds the mining rights of the mining claims and the crown holds the surface rights. Power Metals has legal access to the Property. A detailed cell claim list is provided in Appendix 2.

4.3 Option Agreements

On April 17, 2017, Exiro Minerals ("Exiro") optioned their Paterson Lake and Gullwing-Tot Lakes Properties to Power Metals Corp. ("PWM"). PWM can earn a 100% in the Paterson Lake and Gullwing-Tot Lake Properties in consideration of paying an aggregate of $200,000, issuing $300,000 worth of Power Metal's stock, and incurring $300,000 of work on the properties, all over a two-year period. In addition (i) upon a feasibility study being completed on a property, PWM will make an additional $450,000 payment (in cash or shares at PWM's election); and (ii) Exiro will be entitled to a 0.5% NSR royalty on all production from the Properties.

4.4 Requirements to Retain the Property and Exploration Permit

In Ontario, to retain a mining claim, companies must submit an assessment file to MNDM's Geoscience Assessment Office showing that they have spent $400/per single cell claim unit and $200 per boundary claim on exploration. The initial mining claim is issued for a term of 2 years and then renewed every year afterwards.

The Gullwing-Tot Lake Property permit (PR-18-000163) is valid for three years and was issued on Nov 22, 2018. Any mobilization/demobilization on the property during this time must be reported the Ministry of Northern Development and Mines as follows: a) no less than two weeks prior to commencing the early exploration activities authorized by the permit, b) after a period of temporary suspension of activities of greater than four weeks, not less than one week prior to recommencing the early exploration activities authorized by the permit, c) not less than two weeks prior to the anticipated final demobilization, d) delivered by email to MNDM.PlansAndPermits@ontario.ca. In addition, no early exploration activities authorized by the permit shall be carried out within 30 meters of Gullwing-Tot Lake and no early exploration activities authorized by the permit shall be carried out on ice or water or, where on land, within 30 meters of Gullwing-Tot Lake.

For more information on Ontario MNDM's exploration permits see:

https://www.mndm.gov.on.ca/en/mines-and-minerals/mining-act/mining-act-modernization/exploration-permits

To the best of the QP's knowledge, there is no significant factors and risks that may affect access, title or the right or ability to perform work on the Property.

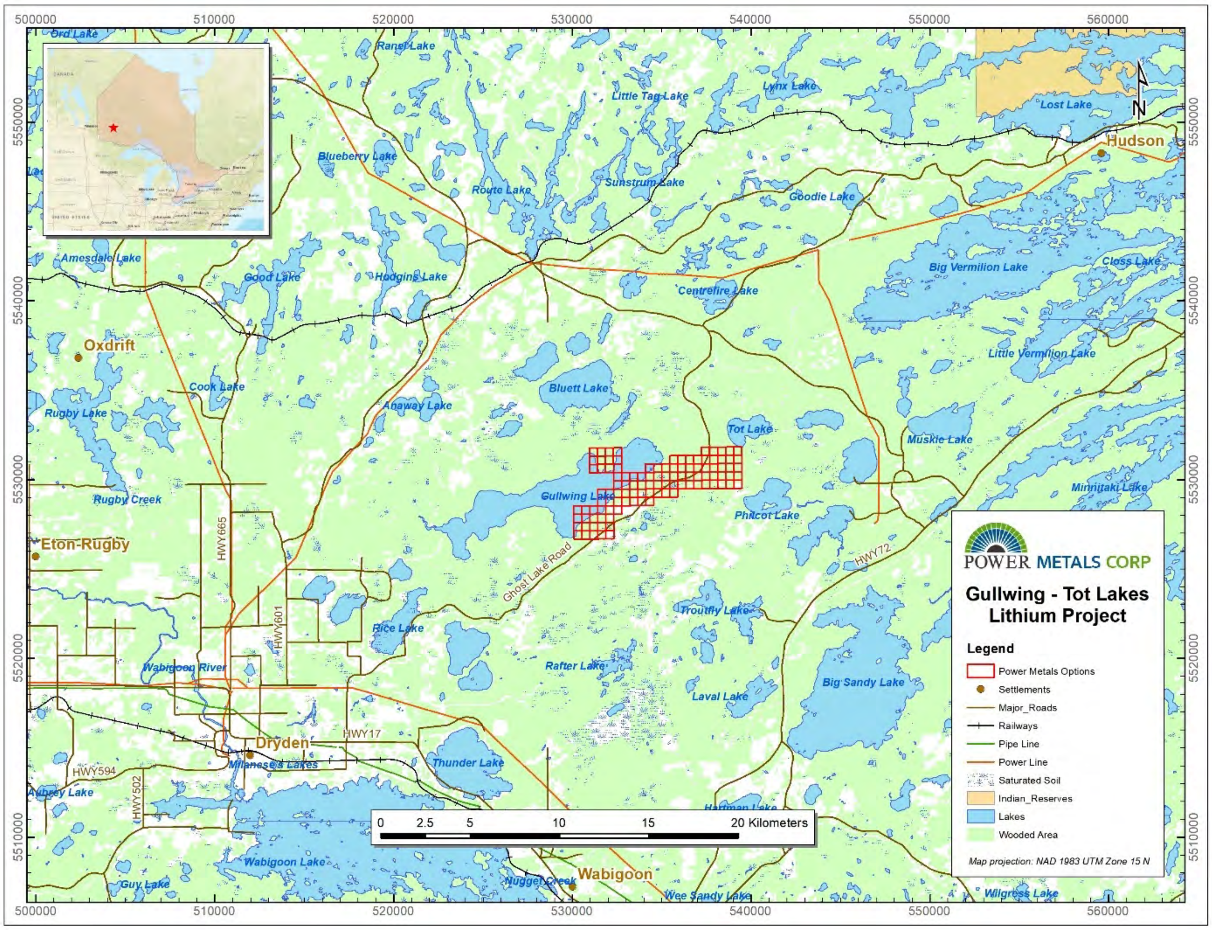

Figure 4-2 Regional location map for Gullwing-Tot Lakes Property.

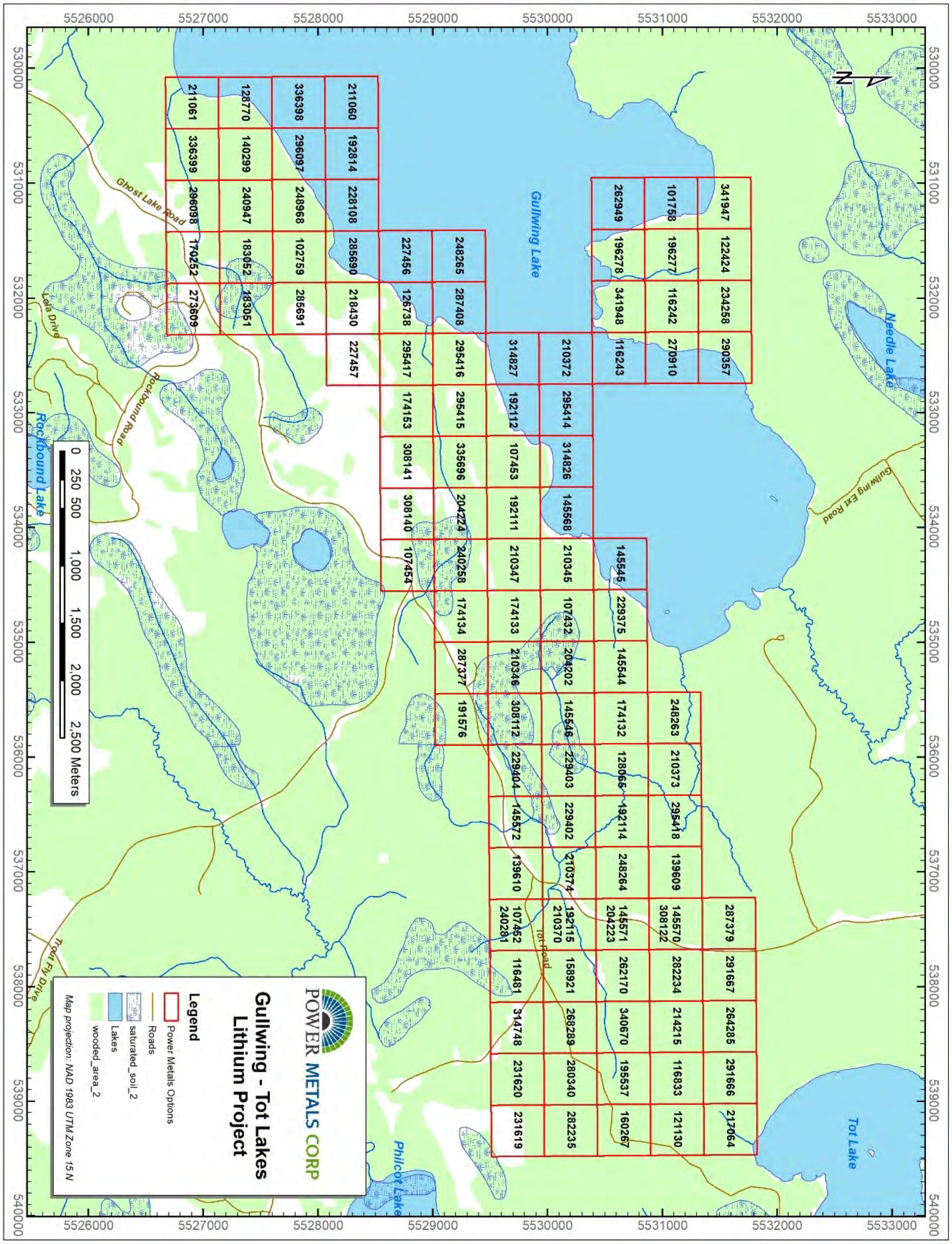

Figure 4-3 Property scale claim map for Gullwing-Tot Lakes Property.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Access

The Gullwing-Tot Lake Property has excellent access and infrastructure (Figure 5-5). The property is accessible year-round via the Ghost Lake Road, an all-weather gravel road. The Property can be accessed by driving East of Dryden along Highway 17 for 5 km then turning left onto Highway 601, continuing on Highway 601 for 5 km, then turning right onto Ghost Lake Road (Figure 5-1, Figure 5-2). The Gullwing-Tot Lake property is located 18 km down the Ghost Lake Road. A network of abandoned secondary clay and sand-based logging and drill roads dissects the property.

Figure 5-1 Turn off Highway 17 onto Highway 601.

Figure 5-2 Turn off Highway 601 onto Ghost Lake Road.

The closest commercial airport to the Property is in Winnipeg, Manitoba and in Thunder Bay, Ontario (Figure 5-5). The airport in Dryden links passengers and freight with small adjacent communities such as Kenora, Sioux Lookout, Fort Frances and Thunder Bay and can handle only small aircraft (Dryden Municipal Airport website; https://www.dryden.ca/en/explore/airport.aspx). The closest railroad access to the Gullwing-Tot Lakes Property is the Canadian Pacific Railway which travels through Dryden (Canadian Railroad Atlas; https://rac.jmaponline.net/canadianrailatlas/).

5.2 Topography Vegetation and Physiography

The Gullwing-Tot Lakes property has topography typical of the Canadian Shield; bedrock ridges covered with a thin veneer of glacial overburden. Lowlands are occupied by lakes, swamps and beaver ponds. The property has an average elevation above sea level of ~415m and local relief ranges from 15-30m.

The Gullwing-Tot Lakes Property has been recently logged and the secondary growth includes deciduous and coniferous trees such as jack pine, spruce, birch, poplars, tamarack, and alders.

The Canadian Climate normals for 1981-2010 from Environment Canada (www.climate.weatheroffice.gc.ca/climate_normals/) for Dryden (closest weather station to the property) indicate that the daily average temperature ranges from -17.4ºC in January to 18.5ºC in July. The highest average accumulation of rain for a month is 127.6 mm in July. The highest average accumulation of snow for a month is 28.4 cm in November. The highest average snow depth is 45 cm in February. Drilling can be conducted year-round except for spring thaw in mid-March and April. Geological mapping and outcrop sampling can be conducted May to November when there is no snow on the ground.

5.3 Infrastructure and Local Resources

The town of Dryden can provide accommodations, grocery stores, hardware stores and hospital for labourers (Figure 5-3). The population of town of Dryden is 7,749 people according to the 2016 Census (Statistics Canada, www.statcan.gc.ca). Dryden is on the Trans-Canada Highway, also known as Ontario Highway 17. Dryden can provide the skilled labour and field supplies required to run an exploration program.

Figure 5-3 Dryden's Max the Moose

Ontario Power Generation's Northwest Operations (NWO) group operates 11 hydroelectric stations and two thermal stations for a total of 42 generating units. With a combined capacity of about 1,046 megawatts (MW), these stations provide a clean, low cost, renewable and reliable source of power to Ontarians all year round (http://www.opg.com/communities-and-partners/host-communities/Pages/northeast.aspx). The closest hydroelectric dam to the Gullwing-Tot Lakes property is located at the Ear Falls which is 164km NW of Dryden; electricity generated by this dam is transported along 115kV transmission line to Dryden.

Sources of water on the Property includes Gullwing Lake, Tot lake and numerous swamps and various beaver ponds (Figure 5-4).

The Property's surface rights are owned by the crown and they are sufficient for future mining operations. The Gullwing-Tot Lakes Property does not a have a resource estimate and thus a discussion of potential tailings storage areas, potential waste disposal areas, heap leach pad areas and potential processing plant sites is not currently relevant to the Property.

Figure 5-4 View from the top of the central zone of the Gullwing Lake Pegmatite looking at Gullwing Lake.

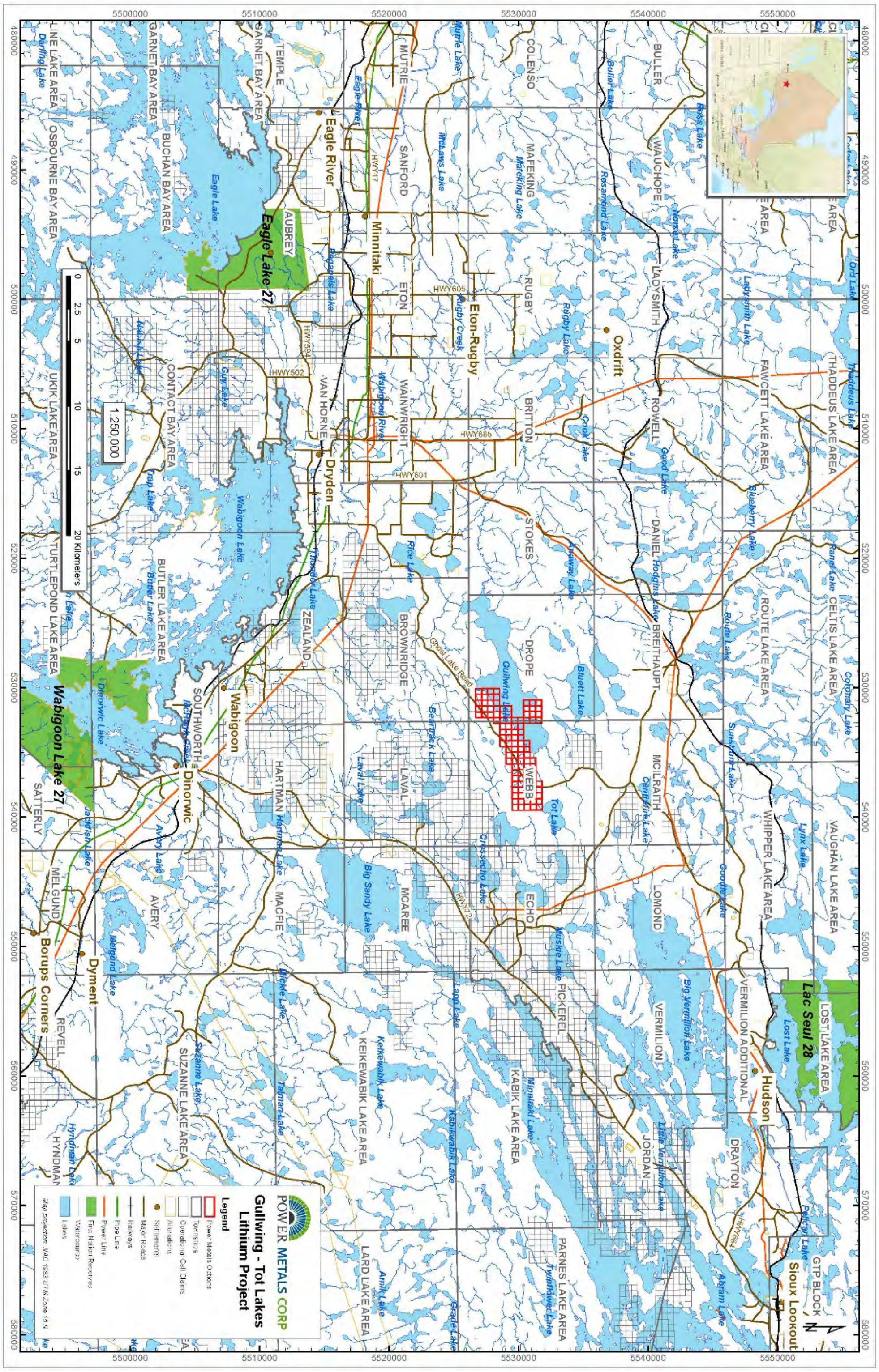

Figure 5-5 Regional infrastructure map

6.0 HISTORY

The following section will summarize all previous exploration done in the Gullwing-Tot Lakes area

6.1 1964 diamond drilling by Canol Metal M.L.

Four diamond drill holes totalling 732 ft (=223.11 m) were completed by Canol Metal M.L during August and October 1964 (MNDM report 52F16NW0130). The drill holes were located south of Tot Lake and were collared on Power Metals current claims (Figure 6-4). Pegmatite was intersected in drill hole # 1 and drill hole # 2. Spodumene and lepidolite were recorded in the log for drill hole # 1 and spodumene was recorded in the log for drill hole # 2.

6.2 1969 Airborne radiometric surveys

Coleman Morton, a Californian, conducted airborne radiometric surveys over seven of his claimed properties in the Sioux Lookout-Dryden area including Northeast Gullwing and Southwest Gullwing (MNDM report 52K01SW9511). The instrument used was a GIS-2 Gamma Ray Integrating Spectrometer, which was used to detect uranium, thorium, and potassium anomalies on the properties. The survey detected anomalies in both the Northeast Gullwing and Southwest Gullwing properties. It was reported that the highest anomalies were detected in the northwest and northeast portions of the Northeast Gullwing property, and in the southeast corner of the Southwest Gullwing property. Neither of the properties were located on Power Metals' current claims.

6.3 1970 diamond drilling by Canadian Nickel Company

One diamond drill hole totalling 324 ft (=98.76 m) was completed by the Canadian Nickel Company on the eastern shore of Gullwing Lake during July 1970 (MNDM report 52F15NE0353) (Figure 6-3). The drill hole was collared on Power Metals current properties and intersected pink quartz mica pegmatite at depth.

6.4 1972 diamond drilling by Mike Woitowicz

In 1972, four diamond drill holes totalling 439 ft (=133.81 m) were completed by Mike Woitowicz (MNDM report 52F15NE0351). The drillholes were located near the eastern shore of Gullwing Lake and all four holes were collared on Power Metals current property (Figure 6-3). White pegmatite was intersected in hole #3 and hole #4. No assays were reported.

6.5 1978 diamond drilling by Tantalum Mining Co. (Tanco)

Tantalum Mining Co. (Tanco) conducted a brief diamond drill program ~2km south of Tot Lake between December 1978 and January 1979 with three drill holes totalling 512 ft (=156.06 m; MNDM report 52F16NW0122). All three holes were collared on Power Metals current properties (Figure 6-4). Pegmatite with patchy quartz, K-felspar and muscovite was intersected in drill holes GW-1, GW-2, and GW-3. Only base metals were assayed for.

6.6 1979 diamond drilling by Rio Tinto Canadian Exploration

Diamond drilling was conducted by Rio Tinto Canadian Exploration (Rio Tinto) in the Gullwing-Tot Lake area during February 1979 (MNDM report 52F15NE0015). Four drill holes were completed totalling 1337 ft (=407.52 m): 79-G1, 79-G1A, 79-G4, and 79-G6 (Figure 6-3). Two of the holes, 79-G4 and 79-G6, were collared on Power Metals current property. The purpose of the drill holes was to test electromagnetic (EM) and HLEM anomalies around Gullwing Lake. Pegmatite was intersected in drill hole 79-G1A and 79-G4 (minor). Drill hole samples were only assayed for base metals.

6.7 1981 Patino Mines Ltd Geophysical surveys

Both magnetic and electromagnetic (EM) surveys were conducted by Patino Mine Ltd at the Patino Webb Township Property located near the eastern shore of Gullwing Lake (legacy claim 57818; MNDM report 52F15NE8293). The area surveyed is located on Power Metals' current properties. The instrument used for the magnetic survey was a Geometric "Unimag II" (model 836) portable proton magnetometer. The magnetic survey outlined a general E-W magnetic pattern in the rocks, and the steepest magnetic gradients were in the eastern part of the claim. For the EM survey, a "Geonics" EM-16 unit was used. One weak, E-W trending conductor was detected by the EM survey and was interpreted to be related to the outcrop-overburden interface or slightly conductive overburden in the area.

6.8 1994 prospecting by Mike Woitowicz

Prospecting was carried out in 1993 by Mike Woitowicz in the Gullwing Lake area as part of the Webb Twp. Base Metal Project. Work included line cutting, an EM survey, and a magnetometer survey (MNDM report 52F16NW0008). The goal of the program was to find a very-low frequency (VLF) conductor where previous drilling intersected base metal minerals. The instruments used were a RONKA EM 16 and a Scintrex MP-2 Proton Procession Magnetometer. A conductor and associated magnetic anomaly were located, potentially indicating pyrrhotite associated with Cu-Zn mineralization. Follow-up prospecting, however, failed to locate outcrops in the conductive zone. Five grab samples were taken and assayed during this program. Pegmatites were not sampled and only base metals were assayed for. The claims that were prospected during this program are located on Power Metals' current properties.

6.9 Champion Bear 1998 magnetometer survey

In 1998, Champion Bear conducted a ground magnetometer survey over a pegmatite dyke located on Claim P 1163139 in Webb Township NW Ontario (MNDM report 52F16NW2003). The western portion of Claim P 1163139 is located on Power Metals' current property. The north-south striking pegmatite dyke is located close to Tot Lake and contains both pollucite and spodumene. The goal of the survey was to determine the magnetic signature of the pegmatite dyke and to provide basic information and a control grid for continued exploration of the property. The results of the survey suggest that the pegmatite dyke has a distinct magnetic signature.

6.10 1997-1999 Prospecting of pegmatites in the Gullwing Lake area

Reconnaissance prospecting was conducted by Alex Glatz and Mike Woitowicz in 1997 proximal to the Lateral Lake Stock to look for base metal and rare metal mineralization (MNDM report 52F15NE2001). A magnetometer and EM survey were also done during this time, but did not produce any valuable results (MNDM report 52F16NW2004). Pegmatite dykes were found to intrude both the west and east sides of the granite, strike N-S, and host rare metal mineralization including lithium, tantalite, niobium, rubidium, and pollucite. Rare metal mineralization was observed in two legacy claims: 1161478 and 1163139. The entirety of legacy claim 1161478 and the western half of legacy claim 1163139 are located on Power Metals' current properties. A large pegmatite dyke called the "Sleeping Giant" was located south of Gullwing Lake that contains zones of tantalite and spodumene. It was noted that the area favourable for hosting pegmatite dykes is 9km long and 0.8 km wide.

Follow-up prospecting was conducting in 1998 by Alex Glatz and Mike Woitowicz on the Sleeping Giant pegmatite, located south of Gullwing Lake, and several other pegmatite dykes. The pegmatites are found over a 1.5 km long area located on legacy claim 1161478, which is entirely on Power Metals' current properties. The Sleeping Giant pegmatite was recorded as being 425 m long and 30 to 60 m wide. All pegmatites were sampled and assayed for tantalite, niobium, spodumene, and cesium. Assay results indicated that the most abundant rare metal is rubidium, with an average grade for all pegmatites being

1243 ppm. The highest assays were 0.31% Rb and 0.33% Rb. The rubidium is contained in feldspar, which occurs with pollucite and lepidolite.

Drilling commenced in August 1999 on the pegmatites prospected the previous year (MNDM report 52F15NE2002). The objective of drilling was to determine if the high Rb values of the pegmatites at surface could be replicated at depth. Two holes were drilled totalling 337 ft (=102.72 m) and sixty-four core samples were assayed (see Figure 6-1). In addition, 39 grab samples from nearby pegmatite dykes were analysed. Like the 1998 prospecting, rubidium was the dominant element in all pegmatite assays: Drill hole 99-01 averaged 1353 ppm Rb over 119 ft (=35.27 m) of core and hole 99-02 averaged 1243 ppm Rb over 135 ft (=41.148 m) of core.

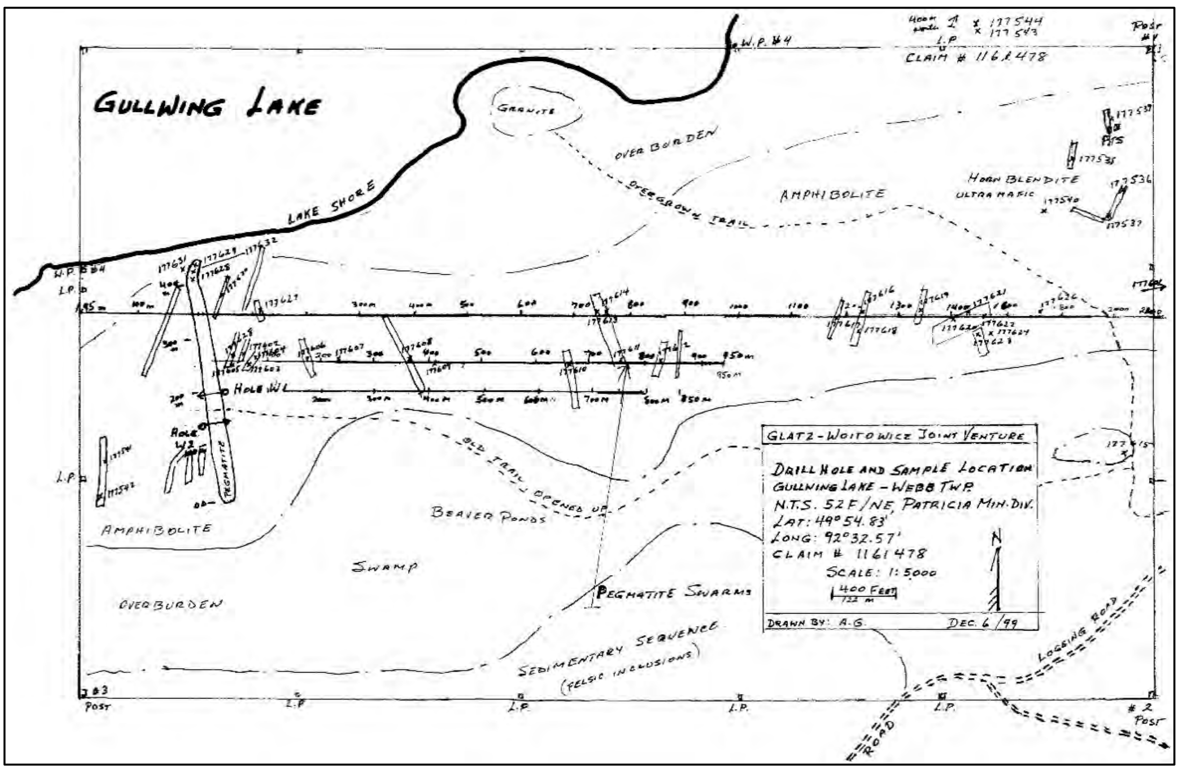

Figure 6-1. 1999 drill hole map of Sleeping Giant pegmatite and surrounding pegmatites by Alex Glatz and Mike Woitowicz. Map is taken from MNDM report 52F15NE2001.

6.11 Solitaire Minerals Corp. 2007 diamond drill program

Solitaire Minerals Corp. conducted a diamond drill program from June 16 to July 15, 2007 over the same area drilled in 1999 by Alex Glatz and Mike Woitowicz (MNDM report 20000773). A total of 7 holes totalling 717 meters were drilled (see Figure 6-2 and Figure 6-3). The goal of the program was to test the pegmatites of the 1999 diamond drill holes to see if the high cesium and rubidium values could be replicated. Drilling successfully extended the strike length and depth of the pegmatites but core assays did not indicate the same grades as the shallower 1999 holes. Pegmatite was intersected at the following intervals: within mafic flows in GW-07-01, within mafic flows and mafic gneiss in GW-07-02, within mafic flows and mafic tuffs in GW-07-03, within mafic flows and between mafic flows and biotite schist in GW-07-04 and GW-07-6, and within biotite schist in GW-07-05. All holes were assayed for base and rare metals. Lithium assay highlights included: 881 ppm Li over a 1.5 m interval in GW-07-01, and 763 ppm Li over a 1.5 m interval in GW-07-01.

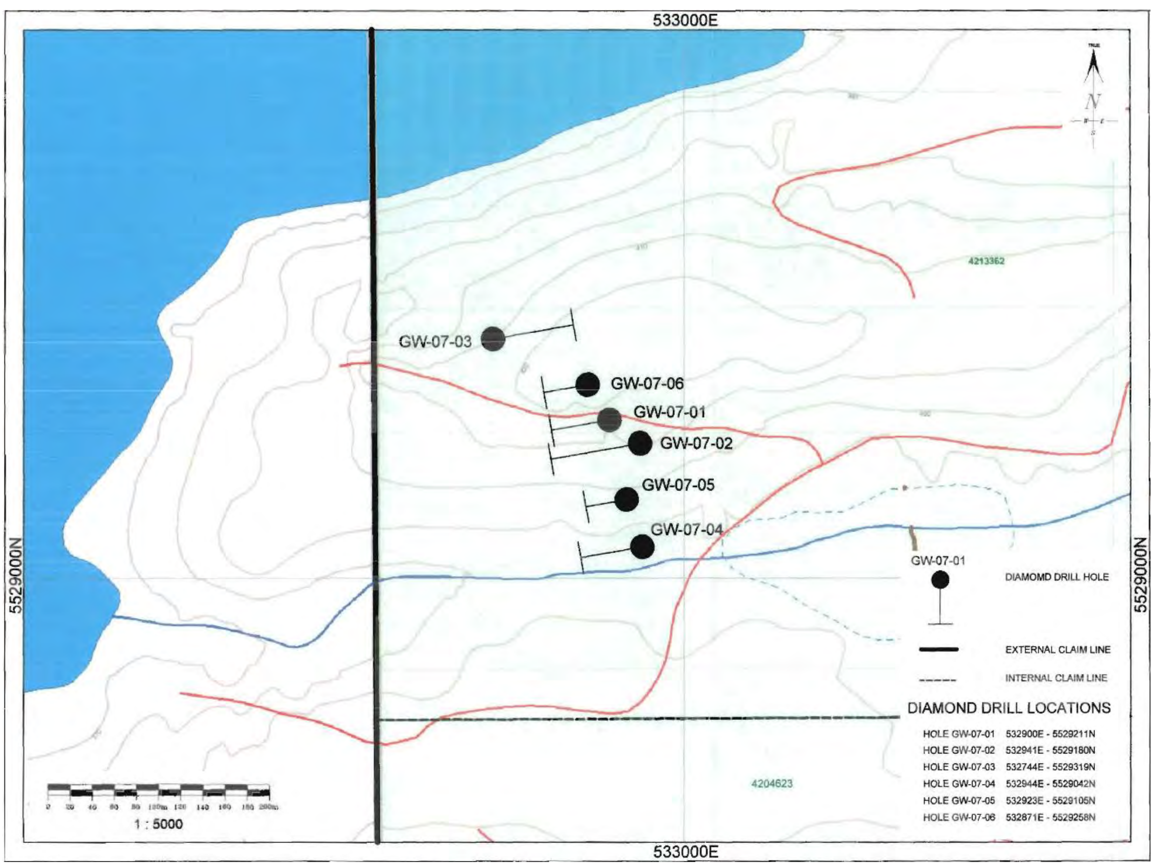

Figure 6-2. Location of drill holes from Solitaire Minerals Corp 2007 diamond drill program. Map taken and modified from MNDM report 20000773.

6.12 Solitaire Minerals Corp. 2010 geological mapping and geochemical sampling program

In early May 2010, Solitaire Minerals Corp. carried out a brief exploration program on its Lateral Lake property (MNDM report 2000006990). The program involved chip sampling along the surface expression of high-grade rubidium intercepts that were returned from 1999 drilling, further sampling of the Sleeping Giant pegmatite, and brief reconnaissance-style soil sampling. Chip sampling returned values of 1043 ppm Rb across 12 m and 887 Rb across 14 m, and largely confirmed the high-grade values of the Alex Glatz and Mike Woitowicz 1999 drill program that were not replicated in 2007 drilling by Solitaire Minerals Corp. It was interpreted that pod-like zones of high grade rubidium are present throughout the Sleeping Giant dyke, and the dyke is large enough to potentially host an economically viable rubidium-cesium deposit. The lithium, niobium, and tantalum grade were deemed not sufficient enough to represent worthwhile targets. Soil sampling identified a strong rubidium anomaly that extends for 250 m and is located ~850 m east of the Sleeping Giant Dyke

6.13 Summary of Exploration History

A summary of the historic exploration in the Gullwing-Tot Lakes area is given in Table 6-1.

Table 6-1 Summary of exploration in Gullwing-Tot Lake area

Assessment Report Number	Year of Report	Year of Work	Company	Type of Work	Description of Work
52F16NW0130	1964	1964	Canol Metal M.L.	Diamond drilling	Drilling of four holes totalling 732 ft (=223.11 m)
52K01SW9511	1969	1969	Oja Ltd	Airborne radiometric survey	Airborne radiometric surveys conducted over seven claimed properties in the Sioux Lookout-Dryden area
52F15NE0353	1970	1970	Canadian Nickel Company	Diamond drilling	Drilling of one hole totalling 324 ft (=98.76 m)

Assessment Report Number	Year of Report	Year of Work	Company	Type of Work	Description of Work
52F15NE0351	1972	1972	Mike Woitowicz and Alex Glatz	Diamond drilling	Drilling of four holes totalling 439 ft (=133.81 m)
52F16NW0122	1978	1978	Tantalum Mining Co.	Diamond drilling	Drilling of three drill holes totalling 512 ft (=156.06 m)
52F15NE0015	1979	1979	Rio Tinto Canadian Exploration	Diamond drilling	Drilling of four holes totalling 1337 ft (=407.52 m)
52F15NE8293	1981	1981	Patino Mines Ltd	Geophysical survey	Magnetic and electromagnetic (EM) surveying
52F16NW0008	1994	1994	Mike Woitowicz and Alex Glatz	Prospecting	Line cutting, EM survey, magneotmeter survey
52F16NW2003	1998	1998	Champion Bear Resources Ltd	Geophysical survey	Magnetometer survey over pegmatite dyke
52F15NE2001	1998	1997-1998	Mike Woitowicz and Alex Glatz	Prospecting	Reconnaissonce prospecting proximal to Lateral Lake Stock
52F16NW2004	1998	1998	Mike Woitowicz and Alex Glatz	Geophysical survey	Magnetometer and EM survey proximal to Lateral Lake Stock
52F15NE2002	2000	1999	Mike Woitowicz and Alex Glatz	Prospecting, diamond drilling	Drilling of two holes totalling 102.72 m, assaying of 64 core samples and 39 grab samples for rare metals

Assessment Report Number	Year of Report	Year of Work	Company	Type of Work	Description of Work
20000773	2007	2007	Solitaire Minerals Corp.	Diamond drilling	Drilling of seven holes totalling 717 m; all holes assayed for base and rare metals
2000006990	2010	2010	Solitaire Minerals Corp.	Geological and geochemical sampling	chip sampling, further sampling of pegmatites, soil sampling

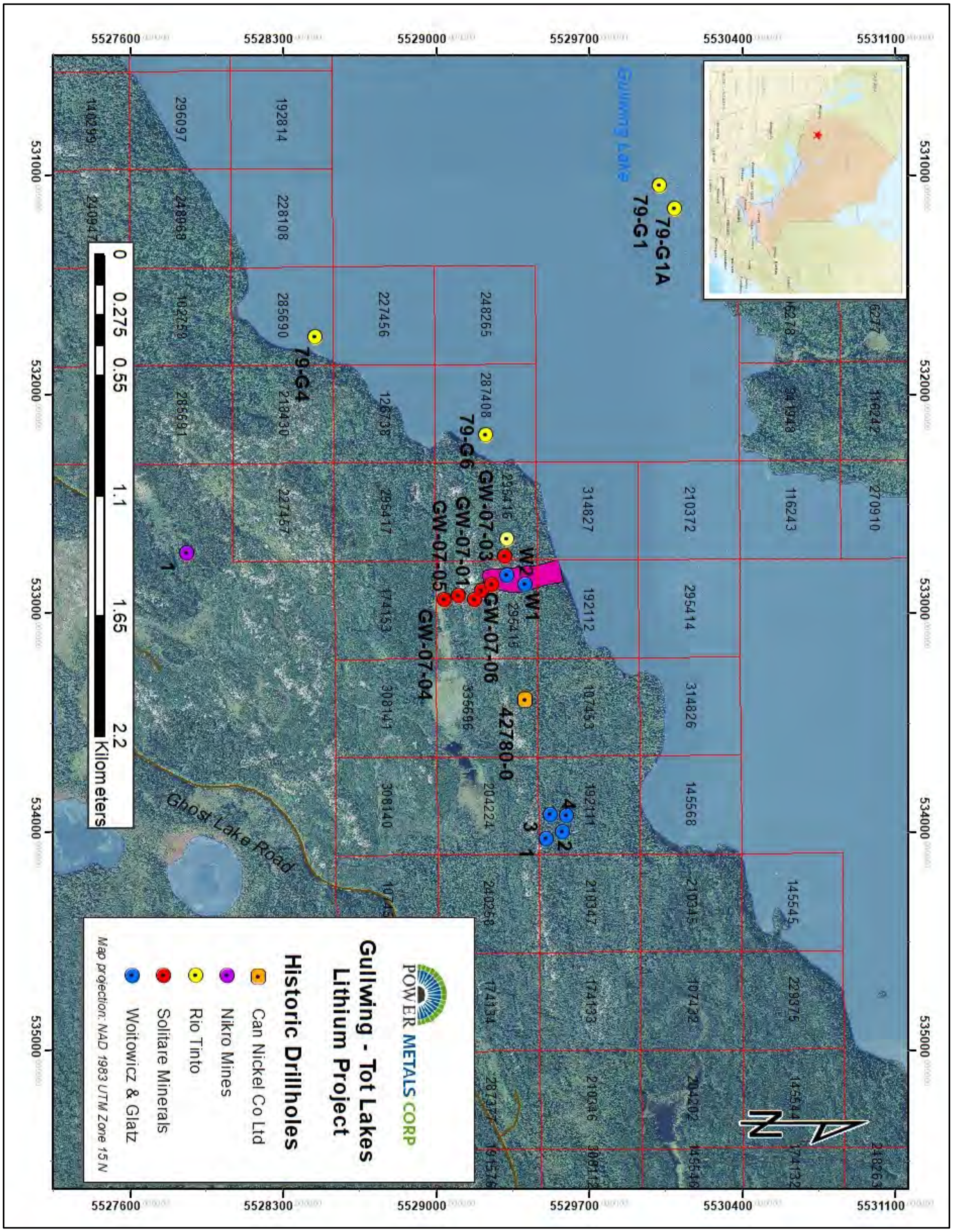

Figure 6-3. Historic drill holes in the west Gullwing-Tot Lake area

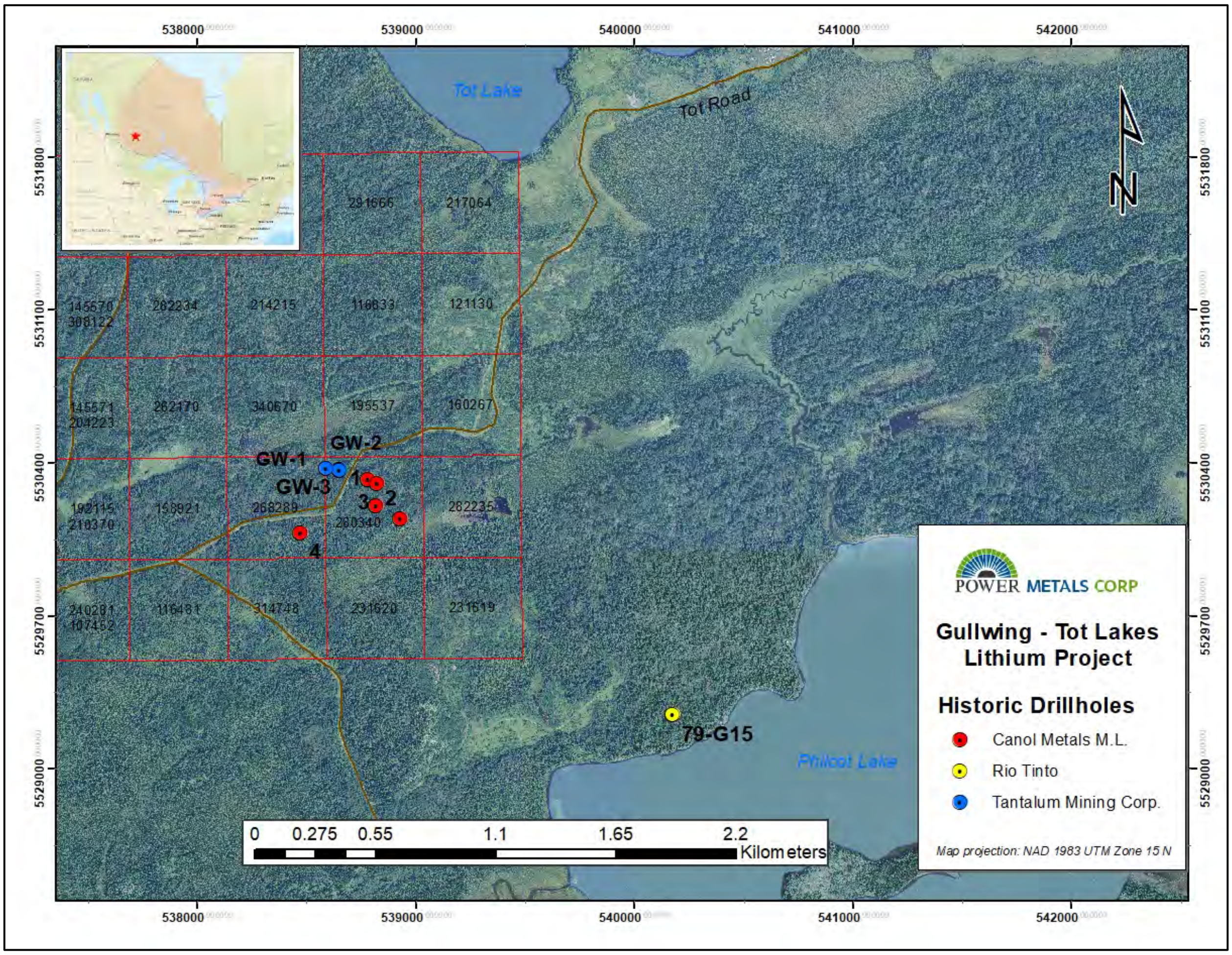

Figure 6-4. Historic drill holes in east Gullwing-Tot Lake area

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Gullwing-Tot Lake property is located within the Sioux Lookout Terrane of the Superior Province, which ranges from 15-40 km in width and is 250 km in length (Figure 7-1;Beakhouse, 1988; 1989). This Terrane makes up the boundary zone of the granitoid Winnipeg River Subprovince to the north and the granite-greenstone Wabigoon Subprovince to the south (Breaks and Janes, 1991). The Sioux Lookout Terrane is composed of mafic to intermediate metavolcanics rocks, clastic sediments, metasedimentary migmatites,-granitoid rocks and, most importantly, two-mica S-type granitoids. The Sioux Lookout Terrane is host to several rare-element mineralized pegmatites that are separated into two groups: The Mavis Lake

Pegmatite Group and the Gullwing-Tot Lake Pegmatite Group. For more information on the Mavis Lake Pegmatite Group, see Breaks and Janes, (1991).

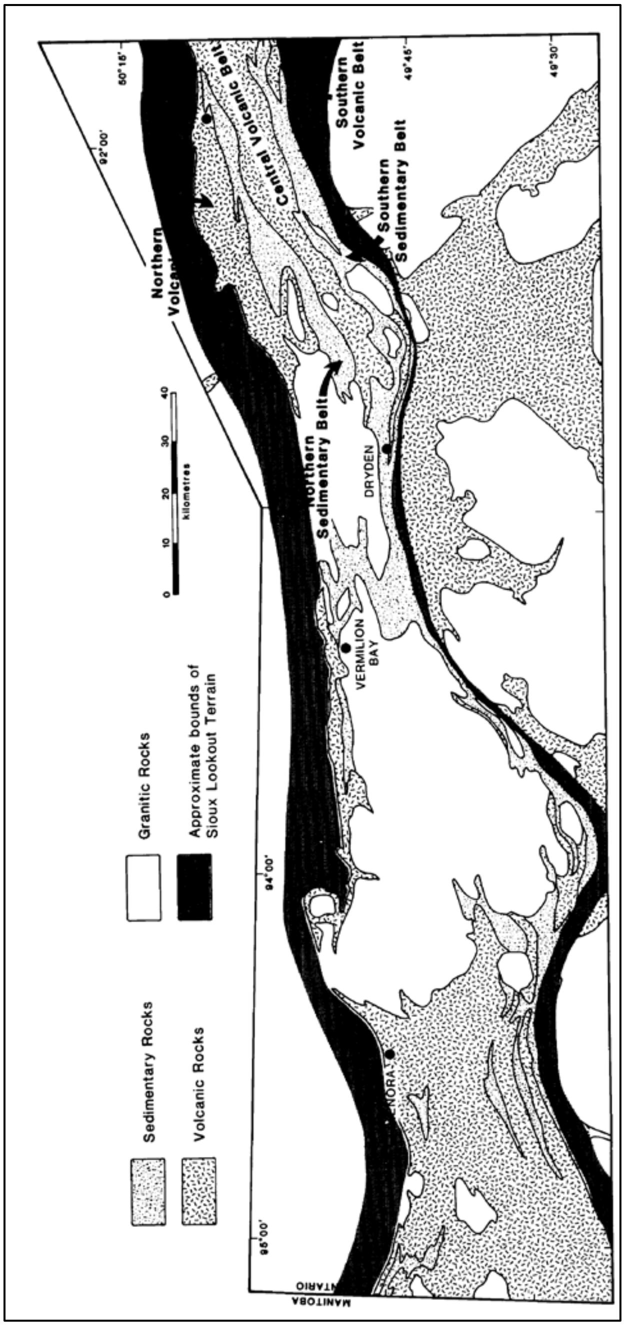

Figure 7-1. Regional Geology map of the western Superior Province showing possible extent of Sioux Lookout Terrane. Map is taken from Beakhouse, 1988.

7.2 Local and Property Geology

Pegmatites in the Gullwing-Tot Lakes Pegmatite Group are found within an E-NE trending cluster that has an approximate size of 0.8-2.2 km by 15 km. These pegmatites are typically hosted in highly deformed amphibolite facies mafic metavolcanic rocks and are less commonly hosted in clastic metasedimentary rocks (Breaks and Janes, 1991; Breaks et al, 2003). The parent granitoid to the pegmatites of the Gullwing-Tot Lakes Pegmatite Group cannot be clearly defined (Breaks et al, 2003).

The Gullwing-Tot Lake Pegmatite Group (and also the Gullwing-Tot Lake Property) contains 5 key known pegmatite occurrences which are separated into 2 groups based on metal associations: 1) a Li-Cs-Rb-Be-Ta bearing group which includes the Gullwing Lake and Tot Lake pegmatites and 2) a Mo-Bi-Cu bearing group which includes the Mica Point Pegmatite, the Coates Pegmatite and the Drope pegmatite (Figure 7-2). The most interesting of the pegmatites in the Gullwing-Tot Lake Pegmatite Group are the namesake Gullwing Lake and Tot Lake pegmatites due to the presence of Li and Ta mineralization.

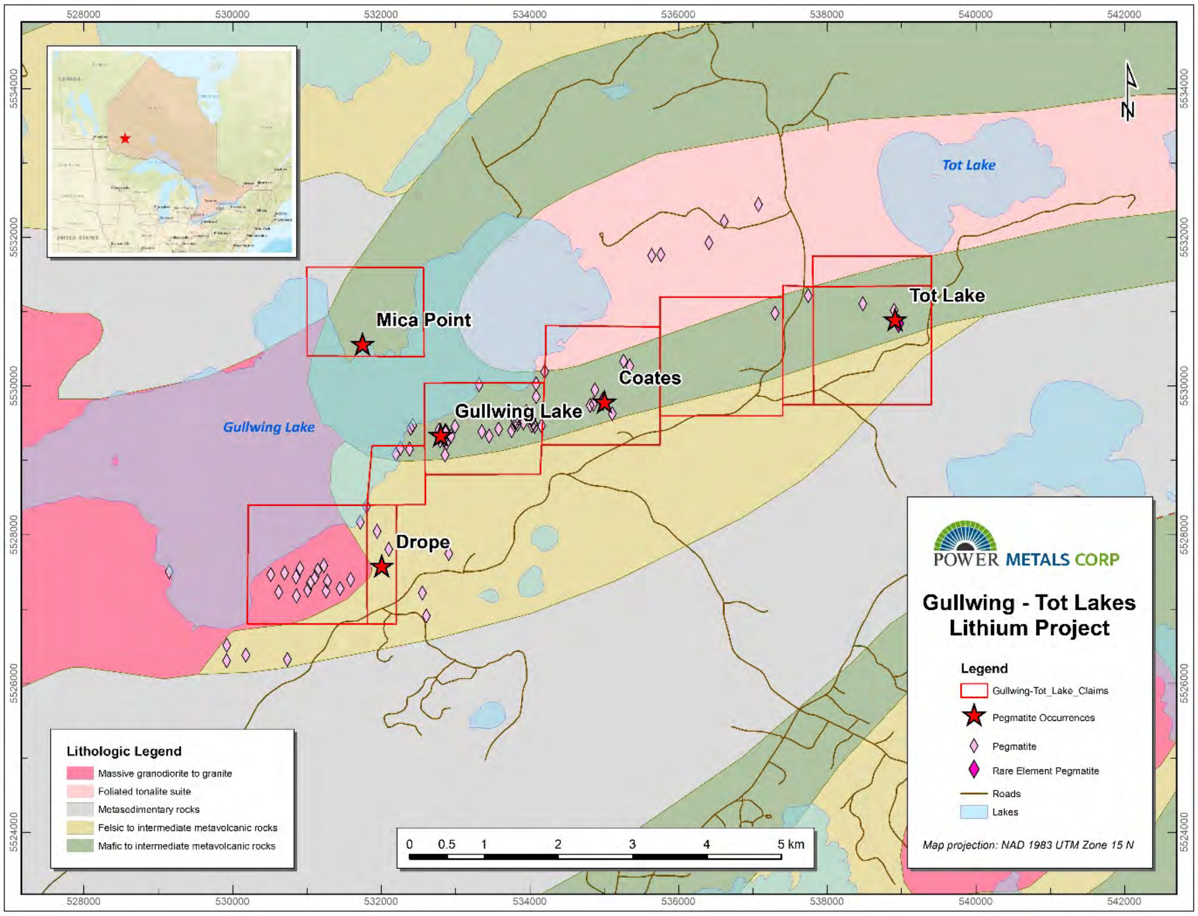

Figure 7-2 Geological map of the Gullwing-Tot Lake Property with Power Metals' claims and known pegmatite occurrences

7.2.1 Gullwing Lake Pegmatite

The Gullwing Lake pegmatite, also known as the Sleeping Giant Pegmatite (Figure 7-5) was summarized by Breaks and Janes, (1991) and Breaks et al., (2014). It is located on the western edge of the Gullwing-Tot Lakes Property, ranges in width from 25-80 m, is 412 m long and has Li-Nb ±Ta-Be-Mo with local REE enrichment. The dyke is separated into the south, central and north zones. The south and central zones are connected at depth and are dominantly composed of a fertile two-mica (bladed aggregates of muscovite and lithian siderophyllite) potassic pegmatite with local beryl and columbite. The pegmatite unit is enveloped by a finer-grained two-mica leucogranite. The south zone contains a 5-12 x 25 m mineralized core-zone that is composed of perthitic blocky microcline, massive milky quartz and books of muscovite. 1 x 2 cm columbite crystals are found in the weakly-albitized periphery zone of the core.

Unlike the south zone, the central zone is Li bearing. It contains a large 7-20 x 35 m core unit composed of muscovite, albite, blocky microcline and quartz with small pockets of green mica-albite pseudomorphs after spodumene that project into the quartz core. The altered pockets are altered by the albitization II event and contain the assemblage of white to light blue cleavelandite, green muscovite, garnet, rare beryl and platy columbite.

The north zone of the Gullwing Pegmatite is seemingly unattached from the central and south zones and notably lacks the two-mica potassic pegmatite that makes up the bulk of the south and central zones. The north zone is located ~50 m north of the south and central zones is roughly 25 x 30 m in size. The north zone is predominantly composed of quartz and blocky microcline and make up some of the coarsest grained pegmatite in the Dryden Pegmatite Field. Also contained within the north zone are abundant blocks of mafic and intermediate metavolcanics rocks. The north zone contains 3 spodumene-bearing, blocky microcline, quartz, albite, muscovite pods, which comprise ~10% its total surface area. The largest pod is 3 x 8 m in size and contains faint green spodumene. The spodumene in these pods can be up to 4 x 40 cm x 100 cm in size and are intergrown with the blocky microcline, quartz, grey muscovite and albite of the quartz core (Figure 7-3). Spodumene is partially to completely replaced by mauve Li-muscovite or by fine-grained albite and green mica.

Figure 7-3. Altered spodumene in north zone of Gullwing Pegmatite

The Gullwing Lake Pegmatite has a complex alteration history including 2 albitization events. **Albitization I** corresponds to coarse grained equigranular albite that replaces the potassic pegmatite. This event is also responsible for the intense alteration of contained and adjacent mafic and intermediate metavolcanic rocks. Metasomatism is most abundant in the north zone and results in thick biotite-plagioclase-quartz aureoles 10-100 cm in diameter (Figure 7-4). Intermediate volcanic rocks have more abundant biotite in their aureoles compared to more mafic rocks.

Albitization II is late-stage and is confined to the spodumene bearing pods of the north zone. This alteration replaces all primary minerals, which are replaced by a combination of blue to white cleavelandite, minor orange garnet, green muscovite, purple lithium muscovite and minor light green beryl. A third type of albitization, **Albitization III** occurs when albitization I is overprinted by albitization II. This results in a rock dominantly composed of fine-grained aggregates of purple Li-muscovite with minor cleavelandite and rare 1-5 mm crystals of microlite. All zones of the Gullwing Lake Pegmatite have undergone albitization with the north zone being the most affected with over 30% albitization present.

Columbite mineralization is limited to the albitized units, with the coarsest and most abundant mineralization (up to 1% of the rock and 2x5cm euhedral crystals) being present in rocks that have only undergone albitization I. Finer grained more Ta-rich oxides are present in the Li-muscovite-cleavelandite assemblages of albitization II.

Figure 7-4 North zone pegmatite with metasomatic selvedges in host mafic metavolcanics (Breaks and Janes, 1991)

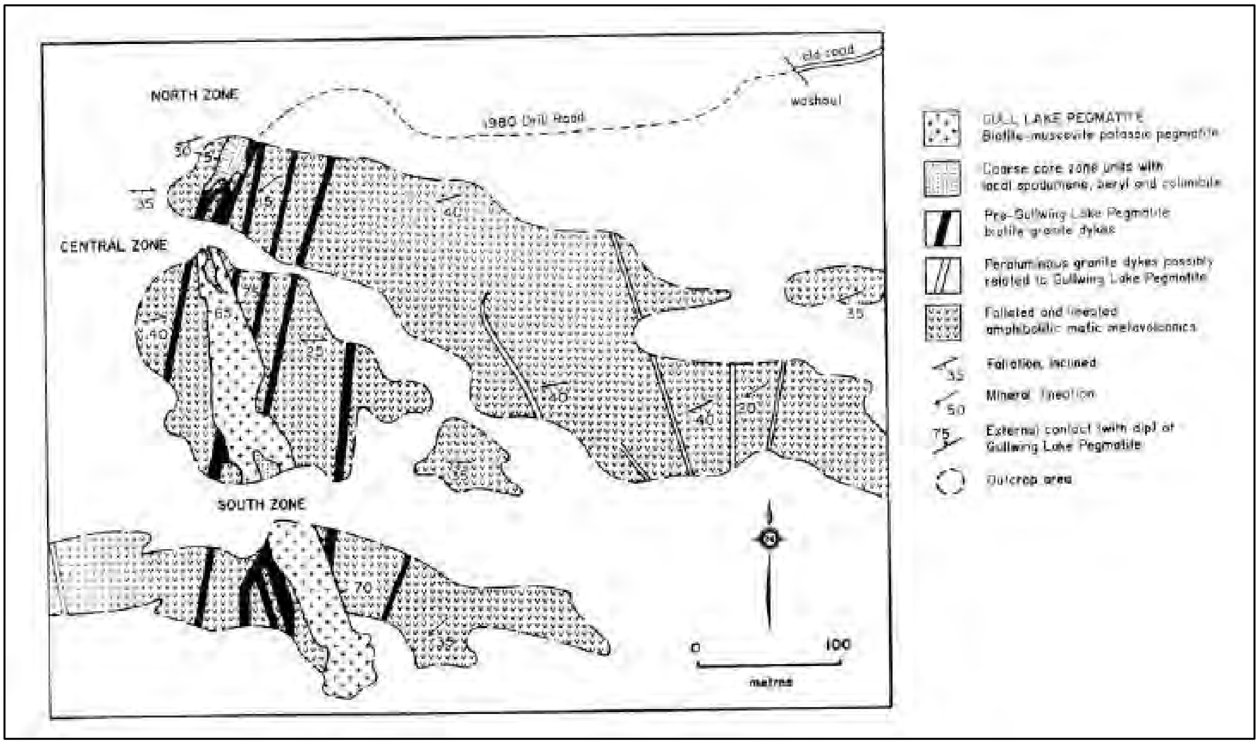

Figure 7-5 Map of the Gullwing Pegmatite from Breaks and Janes, 1991

7.2.2 Tot Lake Pegmatite

The Tot Lake Pegmatite (Figure 7-8), which was also summarized by Breaks and Janes, 1991 and Breaks et al., 2014, is the most fractionated granitic pegmatite body in the Dryden Pegmatite Field and is among the most fractionated granitic pegmatite bodies in Ontario, as evidenced by the presence of the cesium mineral pollucite, which is only found in 4 other pegmatites in Ontario. The chemical fractionation index of the Tot Lake Pegmatite is comparable to the highly evolved Tanco Pegmatite. The Tot Lake pegmatite strikes NW and is sharply discordant to the ~070° strike of the host mafic volcanic rocks. The pegmatite is 1-6 x >48 m in size and is complexly chemically zoned with 5 primary zones and 5 replacement zones. The primary zones include:

1. spodumene-microcline-albite-quartz zone with randomly oriented bladed pink spodumene crystals
2. spodumene-rich zone: spodumene-green muscovite-microcline-(quartz-albite) with subhorizontally aligned pink spodumene in layers oriented parallel to dike contacts (Figure 7-6)
3. spodumene-albite-green muscovite-(quartz) zone with medium-grained pink spodumene, poor

layers grading into zone (2)

4. orange potassium feldspar zone: microcline-quartz ±beryl ±spodumene potassic pegmatite

5. pollucite zone: pollucite-spodumene-microcline-quartz-albite (green muscovite-fluorapatite-tantalite)

Figure 7-6. Megacrystic spodumene located south of trench #3 at Tot Lake Pegmatite

Zone 2 contains especially abundant pink spodumene mineralization, with up to 78 volume %. Pollucite in the Tot Lake pegmatite is confined to a 1 x 5 m pollucite-spodumene pod where they fill the interstitial space between pink spodumene crystals. Pollucite makes up to 32% of the pod. Pollucite is identified by net-textured veining of fine-grained green and purple muscovite.

Alteration zones represent ~70% of the surface area of the pegmatite and include:

1. incipiently to moderately albitized spodumene zone (1) with secondary albite + green muscovite + lepidolite ± cookeite (Li-chlorite)

2. pervasively albitized spodumene zone (1) with secondary albite + green muscovite + alkali beryl
3. columbite zone: quartz-albitized potassium feldspar-spodumene (albitic + green muscovite alteration)-alkali beryl-columbite-spessartine
4. sodic aplite pods: albite-quartz-tourmaline-green muscovite-apatite
5. holmquistite veins in mafic metavolcanic and meta-ultramafic host rocks
6. quartz veins: quartz ±spodumene ±potassium feldspar ±tourmaline

Columbite within the columbite zone are typically steely-black, euhedral and up to 1cm x 2 cm in diameter. They typically form at the interface between altered blocky microcline and the quartz core (Figure 7-7).

Figure 7-7 Coarse grained columbite at the interface between altered blocky microcline and the quartz core at the Tot Lake Pegmatite

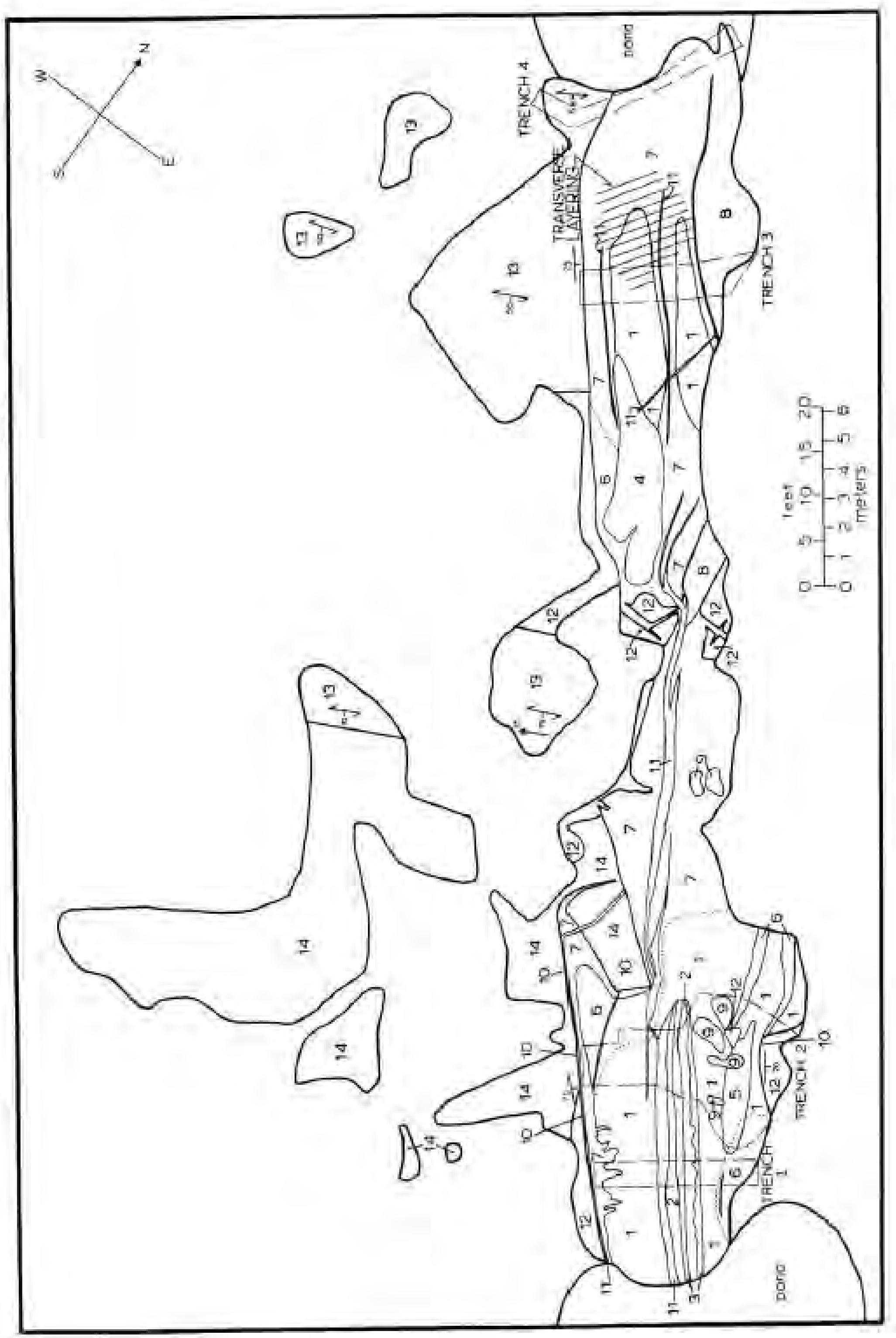

Figure 7-8 Map of the Tot Lake Pegmatite from Breaks and Janes, 1991

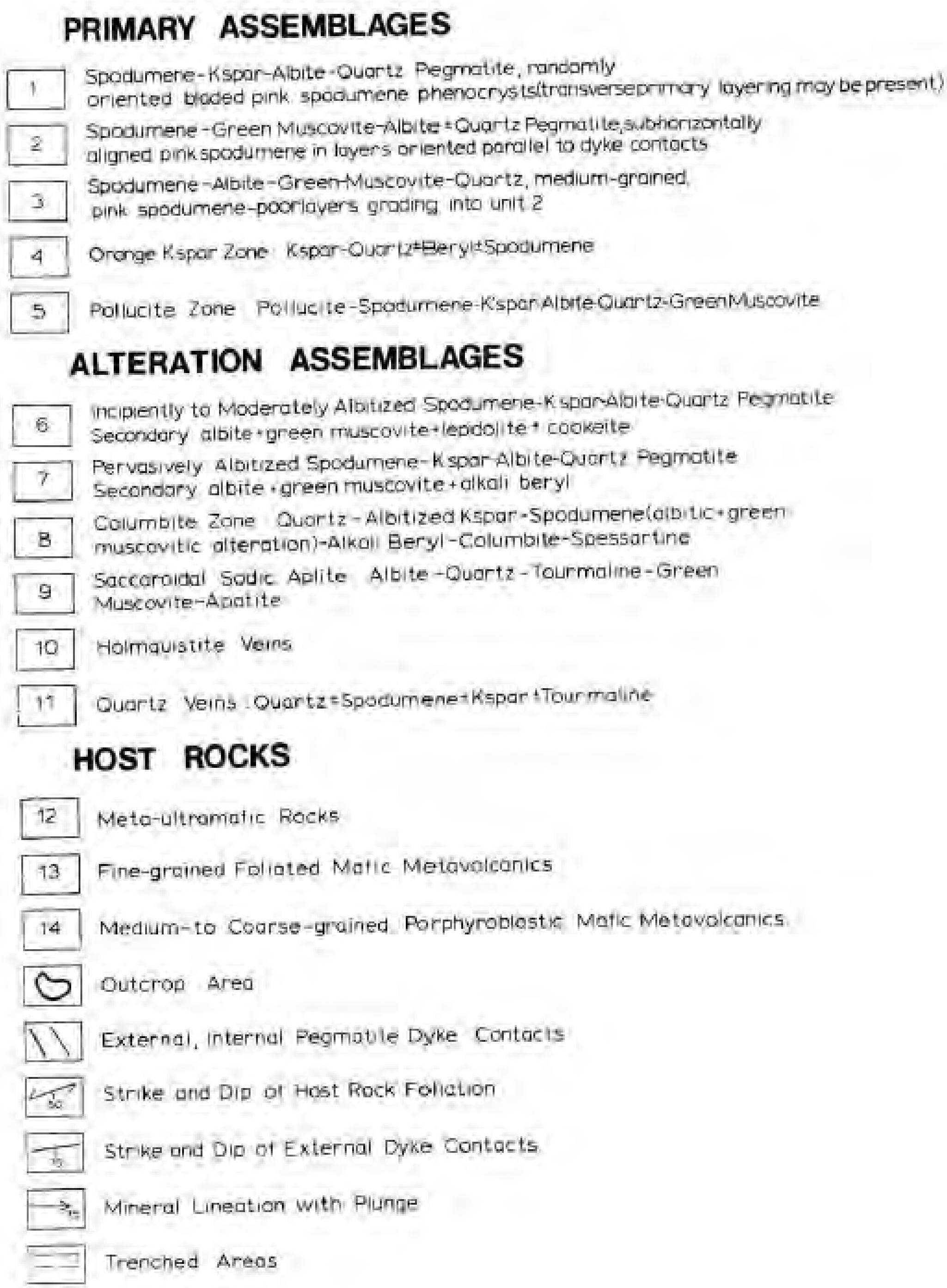

Figure 7-9 Legend for the map of the Tot Lake Pegmatite from Breaks and Janes, 1991

8.0 DEPOSIT TYPES

8.1 Rare-element pegmatites of Superior Province

Rare-element pegmatites may host several economic commodities, such as tantalum (Ta-oxide minerals), tin (cassiterite), lithium (ceramic-grade spodumene and petalite), rubidium (lepidolite and K-feldspar), and cesium (pollucite) collectively known as rare elements, and ceramic-grade feldspar and quartz (Selway *et al*., 2005). Two families of rare-element pegmatites are common in the Superior Province, Canada: Li-Cs-Ta enriched ("LCT") and Nb-Y-F enriched ("NYF"). LCT pegmatites are associated with S-type, peraluminous (Al-rich), quartz-rich granites. S-type granites crystallize from a magma produced by partial melting of preexisting sedimentary source rock. They are characterized by the presence of biotite and muscovite, and the absence of hornblende. NYF pegmatites are enriched in rare earth elements ("REE"), U, and Th in addition to Nb, Y, F, and are associated with A-type, subaluminous to metaluminous (Al-poor), quartz-poor granites or syenites (Černý, 1991a).

Rare-element pegmatites derived from a fertile granite intrusion are typically distributed over a 10 to 20 km^2 area within 10 km of the fertile granite (Breaks and Tindle, 1997). A fertile granite is the parental granite to rare-element pegmatite dykes. The granitic melt first crystallizes several different granitic units (e.g., biotite granite to two mica granite to muscovite granite), due to an evolving melt composition, within a single parental fertile granite pluton. The residual melt enriched in incompatible elements (e.g., Rb, Cs, Nb, Ta, Sn) and volatiles (e.g., H_2O, Li, F, BO_3, and PO_4) from such a pluton can then migrate into the host rock and crystallize pegmatite dykes (Figure 8-1). Volatiles promote the crystallization of a few large crystals from a melt and increase the ability of the melt to travel greater distances. This results in pegmatite dykes with coarse-grained crystals occurring in country rocks considerable distances from their parent granite intrusions.

There are several geological features that are common in rare-element pegmatites of the Superior province of Ontario (Breaks and Tindle, 2001; Breaks et al., 2003) and Manitoba (Černý et al., 1981; Černý et al., 1998) (Selway *et al*., 2005):

1. *Subprovincial Boundaries:* The pegmatites tend to occur along subprovincial boundaries.
2. *Metasedimentary-Dominant Subprovince:* Most pegmatites in the Superior province occur along subprovince boundaries, except for those that occur within the metasedimentary Quetico subprovince.

3. *Greenschist to Amphibolite Metamorphic Grade:* Pegmatites are absent in the granulite terranes.
4. *Fertile Parent Granite:* Most pegmatites in the Superior province are genetically derived from a fertile parent granite.
5. *Host Rocks:* Highly fractionated spodumene- and petalite-subtype pegmatites are commonly hosted by mafic metavolcanic rocks (amphibolite) in contact with a fertile granite intrusion along subprovincial boundaries. Pegmatites within the Quetico subprovince are hosted by metasedimentary rocks or their fertile granitic parents.
6. *Metasomatized Host Rocks:* Biotite and tourmaline are common minerals, and holmquistite is a minor phase in metasomatic aureoles in mafic metavolcanic host rocks to spodumene- and petalite-subtype pegmatites. Tourmaline, muscovite, and biotite are common, and holmquistite is rare in metasomatic aureoles in metasedimentary rocks.
7. *Li Minerals:* Most of the complex-type pegmatites of the Superior province contain spodumene and/or petalite as the dominant Li mineral, except for a few pegmatites which have lepidolite as the dominant Li mineral.
8. *Cs Minerals:* Cesium-rich minerals only occur in the most extremely fractionated pegmatites.
9. *Ta-Sn Minerals:* Most pegmatites in the Superior province contain ferrocolumbite and manganocolumbite as the dominant Nb-Ta-bearing minerals. Some pegmatites contain manganotantalite or wodginite as the dominant Ta-oxide mineral. Tantalum-bearing cassiterite is relatively rare in pegmatites of the Superior province.
10. *Pegmatite Zone Hosting Ta Mineralization:* Fine-grained Ta-oxides (e.g., manganotantalite, wodginite, and microlite) commonly occur in the aplite, albitized K-feldspar, mica-rich, and spodumene core zones in pegmatites in the Superior province.

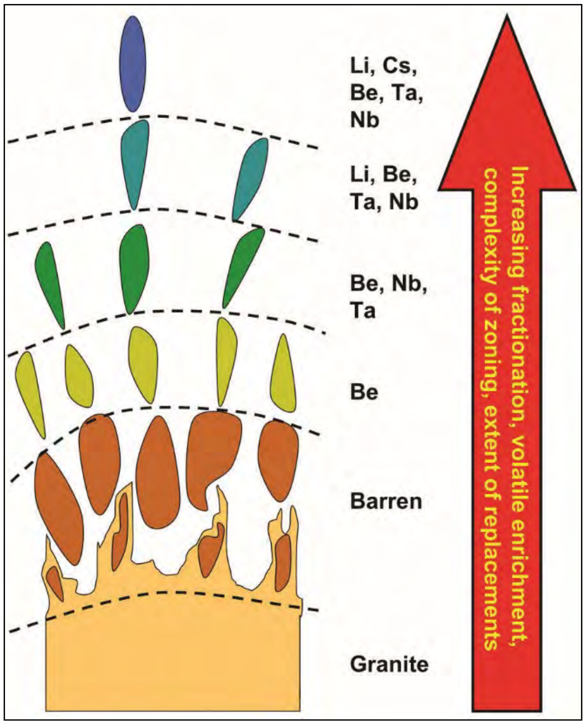

Figure 8-1 Chemical evolution of lithium-rich pegmatites with distance from the granitic source (London, 2008).

9.0 EXPLORATION

9.1 Prospecting and grab sampling

Prospecting was completed on the Gullwing-Tot Lakes Property between June 26 and July 17, 2018 for a total of 22 days. The work was performed on claims 116833, 174133, 183051, 192112, 195537, 218430, 227457, 285691, 287377, 295415, 295416, 295417, 335696 and 340670 by Power Metals' Geologists Jesse Koroscil and Anthony Valvasori. The prospecting was done to explore for previously undiscovered mineralized pegmatites at surface, and to perform due diligence work on known mineralized pegmatites. The prospecting approach was to target the 4 known showings on the south side of the Gullwing Lake on the Gullwing-Tot lake property (Tot Lake, Coates, Gullwing and Drope Dykes) and their host rocks for sampling (Figure 9-2). Tot Lake pegmatite is on cell claim 116833 and 195537, Gullwing Lake pegmatite is on cell claim 192112 and 295415, Coates occurrence is on cell claim 174133 and Drope occurrence is on cell claim 285691. All other pegmatites encountered during field work were also sampled regardless if they appeared to be mineralized. Appendix 5 shows the daily log of activities, sample maps and GPS tracks maps.

A total of 89 prospecting grab samples were collected and 10 QC samples were inserted into the sample stream. They were assayed by SGS in Lakefield, ON. Appendix 6 contains the assay certificates that include the analytical results for the grab samples. The sample with the highest Li_2O content was sample 159082, which came from the Gullwing Lake Pegmatite and contained 6.78 weight percent (wt%) indicating a sample of nearly pure spodumene (Figure 9-1).

In addition to the grab samples collected for assays, a total of 29 outcrops were described but no samples were collected. These outcrops were either host rocks or barren pegmatites. They were not assayed as mineralization was absent, but their location is useful for geological mapping of the property.

During prospecting 14 historic features were located on Gullwing Lake pegmatite (cell claim 295415 and 295416) including: 5 drill collars, 1 legacy claim post, 4 sample locations marked by ribbons and 1 historic channel sample. Also 3 historic trenches were located on Tot Lake pegmatite (cell claims 195537 and 116833).

Figure 9-1 High-grade spodumene sample, Gullwing Lake Pegmatite

9.2 Prospecting Results

Prospecting work on the Gullwing-Tot Lakes Property was predominantly focused on due-diligence work on the two known Li-Ta bearing pegmatites, the Tot Lake Pegmatite and the Gullwing Lake Pegmatite which are hosted in the same mafic metavolcanics unit. A geological map with high-grade sample locations is presented in Figure 9-2.

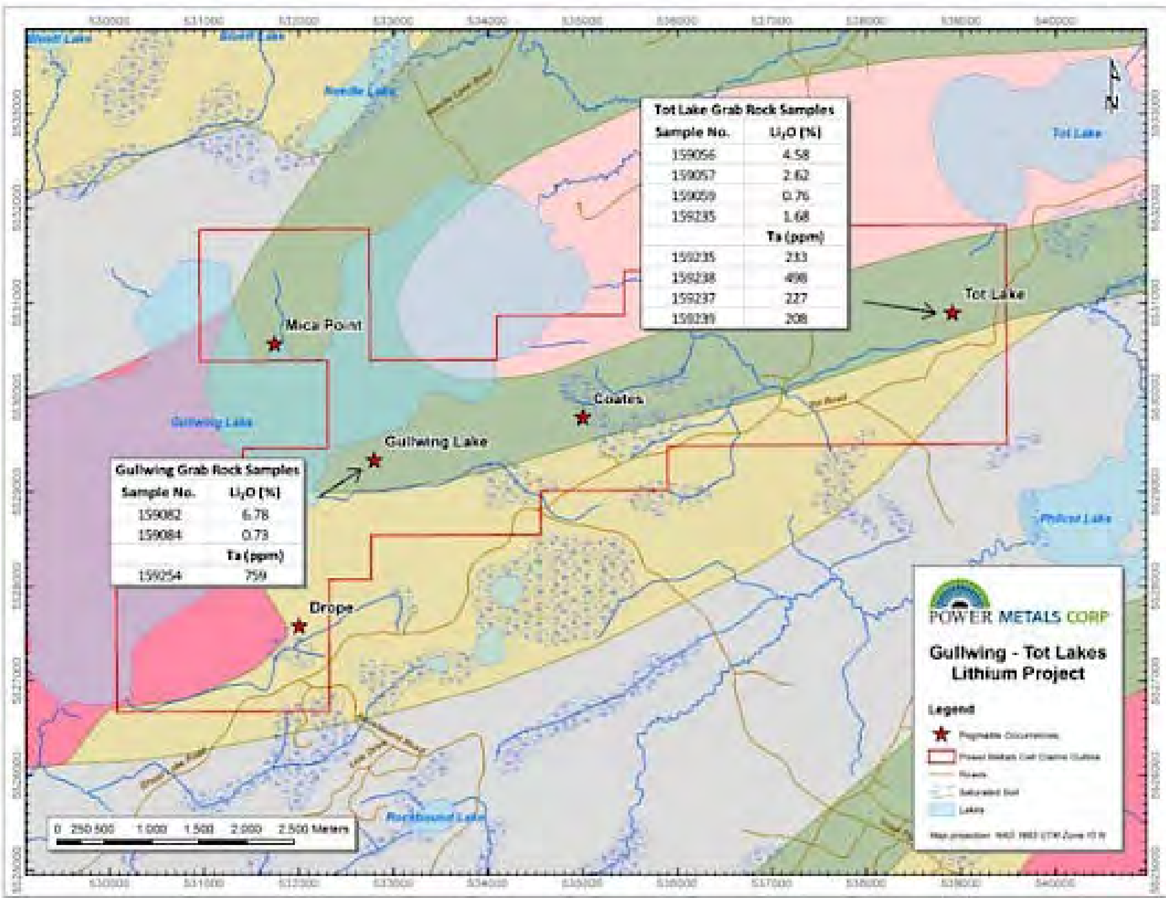

Figure 9-2 Geological map of the Gullwing-Tot Lake Property with named pegmatite occurrences and high-grade sample locations plotted

9.2.1 Tot Lake

Prospecting work on the 1-6 x >48 m Tot Lake pegmatite confirmed the presence of spectacular lithium, tantalum and cesium mineralization. Abundant spodumene is present in various zones throughout the Tot Lake outcrop notably including a zone of pale green megacrystic spodumene blades up to 75 cm long and 15 cm wide adjacent to megacrystic K-feldspar crystals in historical trench #3 (Figure 9-3, Figure 9-4). Another zone contains up to 78% spodumene, in addition to green muscovite, microcline and quartz-albite. This zone contains subhorizontally aligned pink spodumene in layers oriented parallel to dike contacts.

Some of the largest Ta-oxide crystals found in Ontario to date are present in the Tot Lake Pegmatite; these crystals are up to 1 by 2 cm in size (Figure 9-6). In addition to lithium and tantalum mineralization, impressive cesium mineralization is also present at Tot Lake in the form of pollucite (Figure 9-5). Pollucite at Tot Lake is concentrated in a 1 by 5 m pod near the southwestern end of the pegmatite dyke where it comprises 32 vol% of the pod (Breaks et al., 2014). Pollucite is rare in nature and is only known at four other pegmatite localities in Ontario (Breaks et al., 2014). Pollucite is an indicator mineral for extreme chemical fractionation.

Assay highlights from grab samples from Tot Lake pegmatite include:

- 4.58 % Li_2O from quartz – spodumene core, sample 159056 (Figure 9-3)
- 2.62 % Li_2O from quartz – spodumene core, sample 159057
- 1.68 % Li_2O and 233 ppm Ta from pink spodumene pegmatite zone, sample 1590235
- 498 ppm Ta from albitized K-feldspar zone, sample 159238 (Figure 9-6)

Figure 9-3 Spodumene – quartz core, sample 159056, Tot Lake

Figure 9-4 Megacrystic spodumene blade 75 cm long by 15 cm wide next to tape measure. Also present are megacrystic white K-feldspar crystals, Tot Lake.

Figure 9-5 Multiple white parallel spodumene blades within pollucite pod, Tot Lake.

Figure 9-6 Coarse-grained Ta-oxide in albitized K-feldspar zone, sample 159238, Tot Lake

9.2.2 Gullwing Lake Pegmatite

The Gullwing Lake pegmatite ranges in width from 25-80 m, is 412 m long. The dyke is separated into the south, central and north zones. Of the three zones, only the north zone, which is unattached from the central and south zones contained significantly mineralized samples. The north zone is predominantly composed of quartz and blocky microcline and contains some of the coarsest grained pegmatite in the Dryden Pegmatite Field. This zone contains 3 partially altered spodumene-bearing, blocky microcline, quartz, albite, muscovite pods, which comprise ~10% its total surface area. The largest pod is 3 x 8 m in size and contains faint green spodumene that can be up to 4 x 40 cm x 100 cm in size and are intergrown with the blocky microcline, quartz, grey muscovite and albite of the quartz core. Spodumene in the Gullwing Lake Pegmatite was previously thought to be replaced by mauve Li-muscovite or by fine-grained albite and green mica, however sampling by Power Metal's geologists showed that pristine spodumene is present within the Gullwing north zone (Figure 9-7).

Ta-Nb oxide mineralization is limited to albitized units within the north zone with oxides ranging up to 2x5cm euhedral crystals in size that make up a maximum of 1% of the rock (Figure 9-8). Finer grained more Ta-rich oxides are present in the Li-muscovite-cleavelandite assemblages of the north zone (Breaks and Janes, 1991).

*Figure 9-7 P*ure spodumene sample with trace lepidolite, sample 159082, Gullwing North outcrop

The assay highlights from grab samples on the Gullwing North outcrop include:

- 6.78 % Li_2O from pure spodumene sample, sample 159082 (Figure 9-7)
- 0.73 % Li_2O from spodumene – albite – quartz sample, sample 159084
- 759 ppm Ta from columbite bearing albitized unit, sample 159254 (Figure 9-8)

Figure 9-8 A large euhedral columbite crystal (1 x 2 cm) on albite, sample 159254, Gullwing North outcrop

Table 9-1Assay highlights from Gullwing-Tot Lake prospecting. Assays included if they contain >0.5% Li2O or >200ppm Ta. UTM NAD 83, Zone 15

Station	Easting	Northing	Sample	Lithology	Occurrence	Li_2O (wt%)	Ta (ppm)
AV-18-075	538930	5530873	159235	Pegmatite	Tot Lake	1.68	233
AV-18-077	538916	5530888	159237	Pegmatite	Tot Lake	0.342	227
AV-18-078	538918	5530897	159238	Pegmatite	Tot Lake	0.019	498
AV-18-079	538933	5530876	159239	Pegmatite	Tot Lake	0.004	208
AV-18-080	538932	5530877	159241	Pegmatite	Tot Lake	0.512	40
AV-18-104	532783	5529473	159254	Pegmatite	Gullwing Lake	0.007	759
JK-18-126	538935	5530873	159056	Pegmatite	Tot Lake	4.58	27.8
JK-18-126	538935	5530872	159057	Pegmatite	Tot Lake	2.62	78
JK-18-126	538934	5530872	159059	Ultramafic Volcanic	Tot Lake	0.757	18.2
JK-18-127	538936	5530878	159058	Pegmatite	Tot Lake	0.551	9.2
JK-18-157	532777	5529476	159082	Pegmatite	Gullwing Lake	6.78	7.2
JK-18-158b	532777	5529480	159084	Pegmatite	Gullwing Lake	0.733	40.6

9.2.3 Prospecting results for the rest of the property

During field work, numerous unmineralized pegmatites were encountered and sampled including the named Coates and Drope pegmatites. The unmineralized pegmatites typically trend E-W. They are pink to white and are dominantly composed of K-feldspar, white to smoky quartz and white to green muscovite with variable amounts of biotite, cleavelandite and red euhedral garnet. The Drope pegmatite contains abundant molybdenite.

The geologists examined historical workings near the Coates pegmatite and found a few old blast pits and trenches. The Coates pegmatite has strong hematite alteration and red aplitic groundmass, altered coarse-grained K-feldspar and microcline with minor quartz. The molybdenite is found as fine-grained blebs up to 0.5 cm and as stringers (samples 159052 and 159053) (Table 9-2). Sample 159232 was also from an old blast pit on the Coates pegmatite at the contact between E-W trending pink K-feldspar – quartz – molybdenite pegmatite and metasedimentary rocks.

Molybdenite was also found on the south Gullwing Lake pegmatite as 1.5 cm rosettes in albite-biotite-quartz pegmatite (sample 159264) (Figure 9-9).

Table 9-2 Elevated Mo assays from Coates and Gullwing Lake pegmatites. UTM NAD 83, Zone 15

Station	Easting (m)	Northing (m)	Elevation (m)	Sample	Mo (ppm)	Occurrence
JK-18-122	534914	5529863	397	159052	157	Coates
JK-18-122b	534915	5529863	397	159053	464	Coates
AV-18-071	534935	5529860	397	159232	2567	Coates
AV-18-113	532863	5529162	422	159264	1709	Gullwing

Figure 9-9 Molybdenite rosette with quartz, K-feldspar and biotite from Gullwing Lake pegmatite south outcrop.

9.2.4 Historic features

Five of the six historic drill holes from Solitaire Minerals Corp's 2007 drill program were located on Gullwing Lake pegmatite (MNDM assessment report 20000773, 2.3666) (Figure 6-2). The drill hole collars were located very close to the coordinates given by Solitaire and holes GW-07-02 and 05 still had the metal tag on the pickets (Table 9-3, Figure 9-10). The metal tag was found on the picket for hole GW-07-06, but the GPS coordinates were not recorded.

Table 9-3 Location of historic drill hole collars found on Gullwing Lake pegmatite. UTM NAD 83, Zone 15

Date	Station	Easting (mE)	Northing (mN)	Elevation (m)	Drill hole No.	Description
7-17-2018	JK-18-162	532949	5529169	414	GW-07-02	metal tag still on the picket. GW-17-02, Azimuth 260, Dip -45, 171m.
7-9-2018	AV-18-101	532907	5529213	423	GW-07-01	strikes 270, dips 34 degrees
7-9-2018	AV-18-115	532904	5529045	381	GW-07-04	flagging tape with label GW-07 found
7-9-2018	AV-18-116	532730	5529316	417	GW-07-03	GW-07-03 drill pad found but collar not observed
7-8-2018	Drill Hole	532923	5529107	392	GW-07-05	old drill pad for hole GW-07-05. Metal tag still on picket. Azimuth 360, dip -45, length 78m.

Figure 9-10 Metal tag on picket for historic drill hole GW-07-05.

Three historic trenches were located on Tot Lake pegmatite: Trenches #2, 3 and 4. The location of these trenches matched those plotted on Breaks and Janes (1991) outcrop map (Figure 7-8).

Table 9-4 Location of historic trenches found on Tot Lake pegmatite. UTM NAD 83, Zone 15

Date	Easting (m)	Northing (m)	Elevation (m)	Lithology	Description
7-9-2018	538940	5530868	380	Trench #2	Trench number two on the Tot Lake Pegmatite. Trenches are linear blast pits and not defined well. The trench itself runs at about 066 degrees for about 5.5m. Sample

Date	Easting (m)	Northing (m)	Elevation (m)	Lithology	Description
					point was taken at center of trench and averaged for 45 minutes.
7-2-2018	538919	5530892	395	Trench #3	Trench number three on Breaks map of the Tot Lake Pegmatite. This trench is definitely identified by an old witness sample that had TR3 2m marked on it. Although reading marker was difficult. This trench is smaller and runs at about 046 degrees for about 3m. Waypoint was taken at center of trench and averaged for about 40 minutes.
7-2-2018	538915	5530902	408	Trench #4	Trench number four on the Tot Lake occurrence as mapped by Breaks. This trench is the most northern point on the outcrop with most covered by the pond that formed from excavating to look for outcrop. Not possible to get an orientation or any sort of measurements. The gps point is roughly from center of trench and was averaged for about 40 minutes.

Figure 9-11 Historic trench #3, Tot Lake pegmatite, looking west.

10.0 Sample Preparation, Analyses and Security

10.1 Sample Security

The grab samples were transported to SGS analytical lab, Lakefield, Ontario by Manitoulin Transport. SGS analytical lab in Lakefield, Ontario has ISO 17025 certification. Every 20 samples included one external quartz blank and one external lithium standard. The ore grade Li_2O% was prepared by sodium peroxide fusion with analysis by ICP-OES with a detection limit of 0.002 % Li_2O.

10.2 Sample Preparation

A total of 99 samples including QC samples were submitted to SGS for analysis by J-J Minerals which includes 89 grab samples, 5 blanks and 5 Li standards. Every 20 samples contained one blank and one Li standard, alternating OREAS 147 and OREAS 148 (See Appendix 3). The blank was ½ inch mesh coarse silica purchased from Analytical Solutions Ltd., Toronto, Ontario. The blanks are silica-rich with typically about 97% SiO_2.

Figure 10-1 Quartz blank

10.3 Sample Analyses

The samples were initially weighed and reported at SGS using the G_WGH79 analytical code. The samples were than pulverized using analytical code PRP89. This involved weighing, drying (<1.5kg), crushing to 75%, passing 2 mm, split 250 g, and pulverize to 85% passing 75 microns. SGS then determined the specific gravity of each sample according to analytical code G_PHY03V. International standards are used to control the analysis whether the determination is done using the pycnometer, water and air measurements or the wax method. The analytical code used, G_PHY03V, involved to use of a pycnometer to determine the specific gravity of each sample. Whole rock analysis was done using the XRF analytical code GO_XRF76V. Whole rock analysis using the XRF is particularly useful for the analysis of iron ore, silicate, feldspar, gypsum, and limestone. Additional major and minor elements can be added to the borate fusion/ XRF method. Rare Earth elements can also be analysed by this technique. Sample were fused using sodium peroxide fusion analytical method GE_IC90M. Sodium peroxide is a strong oxidized flux that is basic in nature and most refractory minerals are soluble in it. Due to the fusion temperature being lower than that of lithium metaborate fusion, the hydride elements are not volatized. Lithium was analysed in each sample using analytical method GE-ICP91A at a detection limit of (0.001-5%). In the QP's opinion the sample preparation, security and analytical procedure was adequate and to industry standard for the prospecting program.

11.0 Data Verification

As check the on the sample coordinates, all samples were plotted in Arc GIS to make sure that they plotted within the Property boundaries as expected. Thus, there were no errors in the sample coordinates. As part of data verification, a check was made to make sure that the number of samples submitted for assay equals the number of assays received. Also the number of grab samples assayed plus the QC samples assayed equals the total number of assays received in the database.

11.1 Quality Control

A total of 5 quartz blanks were inserted into the sample stream with the grab samples. The pass/fail criteria for the blanks is 3 * the detection limit. All of the blanks passed which indicates that there was no contamination in the sample preparation.

A total of 3 Oreas 147 lithium standards were inserted into the sample stream with the grab samples. Oreas 147 has a certified value of 0.49 % Li_2O with a standard deviation of 0.02 % Li_2O. All of the standards passed within ± 2 * standard deviation indicating good accuracy of the assays.

A total of 2 Oreas 148 lithium standards were inserted into the sample stream with the grab samples. Oreas 148 has a certified value of 1.03 % Li_2O with a standard deviation of 0.023 % Li_2O. All of the standards passed within ± 2 * standard deviation indicating good accuracy of the assays.

12.0 Interpretation and Conclusions

The Gullwing-Tot Lake property is located within the Sioux Lookout Terrane of the Superior Province; the Sioux Lookout Terrane makes up the boundary zone of the granitoid Winnipeg River Subprovince to the north and the granite-greenstone Wabigoon Subprovince to the south. The Sioux Lookout Terrane is the host of the Gullwing-Tot Lake Pegmatite Group. The Gullwing-Tot Lake Pegmatite group consists of multiple pegmatite dykes including: Gullwing Lake spodumene pegmatite swarm, Tot Lake spodumene pegmatite, Coates beryl-molybdenite pegmatite and about 15 Rb-Cs pegmatite dykes located in the Drope township area.

Prospecting was completed on the Gullwing-Tot Lakes Property between June 26 and July 17, 2018 for a total of 22 days. The prospecting was done to explore for previously undiscovered mineralized pegmatites at surface, and to perform due diligence work on known mineralized pegmatites. The prospecting approach was to target the 4 known showings on the south side of the Gullwing Lake on the Gullwing-Tot lake property (Tot Lake, Coates, Gullwing and Drope Dykes) and their host rocks for sampling. Tot Lake pegmatite is on cell claim 116833 and 195537, Gullwing Lake pegmatite is on cell claim 192112 and 295415, Coates occurrence is on cell claim 174133 and Drope occurrence is on cell claim 285691.

Pegmatites in the Gullwing-Tot Lake Group are found within an E-NE trending cluster that has an approximate size of 0.8-2.2 km by 15 km. These pegmatites are typically hosted in highly deformed amphibolite facies mafic metavolcanic rocks and are less commonly found in clastic metasedimentary rocks. The Gullwing-Tot Lake Pegmatite Group contains 2 key known Li-Cs-Rb-Be-Ta bearing pegmatites; the namesake Gullwing Lake and Tot Lake pegmatites.

The Gullwing Lake pegmatite is located on the western edge of the Gullwing-Tot Lake Property and ranges in width from 25-80 m, is 412 m long and contains Li-Nb ±Ta-Be-Mo with local REE enrichment.

Assay highlights from grab samples on the Gullwing North outcrop include:

- 6.78 % Li_2O from pure spodumene sample, sample 159082
- 0.73 % Li_2O from spodumene – albite – quartz sample, sample 159084
- 759 ppm Ta from large Ta-oxide crystals in albite unit, sample 159254

The Tot Lake Pegmatite is the most fractionated granitic pegmatite body in the Dryden Pegmatite as evidenced by the presence of the cesium mineral pollucite, which is only found in 4 other pegmatites in Ontario including Power Metal's owned Marko's pegmatite on the Paterson Lake Property and the West Joe Dyke on the Case Lake Property.

Assay highlights from grab samples from Tot Lake pegmatite include:

- 4.58 % Li_2O from quartz – spodumene core, sample 159056
- 2.62 % Li_2O from quartz – spodumene core, sample 159057
- 1.68 % Li_2O and 233 ppm Ta from pink spodumene zone, sample 1590235

- 498 ppm Ta from albitized K-feldspar zone, sample 159238

During field work, numerous unmineralized pegmatites were encountered and sampled including the named Coates and Drope pegmatites. The unmineralized pegmatites typically trend E-W. They are pink to white and are dominantly composed of K-feldspar, white to smoky quartz and white to green muscovite with variable amounts of biotite, cleavelandite and red euhedral garnet. The Drope pegmatite contains abundant molybdenite.

The molybdenite was found at the Coates pegmatite as fine-grained blebs up to 0.5 cm and as stringers (samples 159052 and 159053). Sample 159232 was also from an old blast pit on the Coates pegmatite at the contact between E-W trending pink K-feldspar – quartz – molybdenite pegmatite and metasedimentary rocks. Molybdenite was also found on the south Gullwing Lake pegmatite as 1.5 cm rosettes in albite-biotite-quartz pegmatite (sample 159264).

13.0 RECOMMENDATIONS

Power Metals Corp recommends the following future exploration:

- Stripping and trenching to expose more of the abundant outcrop around Gullwing Lake pegmatite to search for more mineralization.
- A drill program on the Gullwing Lake Pegmatite to quantify the Li mineralization at depth
- A drill program on the Tot Lake Pegmatite to determine Li and Ta grades at depth as well as to look for an extension of the dyke
- Further prospecting on area between the Gullwing Lake Pegmatite and the Tot Lake pegmatite to find more mineralized pegmatites at surface.

14.0 References

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Appendix 1 – Certification of Qualified Person

Julie Selway
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Telephone: 705-690-7996
Email: jselway@eastlink.ca

CERTIFICATE OF QUALIFIED PERSON

I, Julie Selway, do hereby certify that:

1. I am employed as VP of Exploration for Power Metals Corp, Vancouver, British Columbia and Principal Geologist for geological consulting firm J-J Minerals, Sudbury, Ontario.
2. I am the Qualified Person for this Report entitled "Assessment Report – 2018 Prospecting Program, Gullwing-Tot Lakes Property, Dryden, Northwestern Ontario, Canada, NTS Sheets: 52F15NE and 52F16NW" dated April 11, 2019 and prepared for Power Metals Corp.
3. I hold the following academic qualifications: B.Sc. (Hons) Geology (1991) Saint Mary's University; M.Sc. Geology (1993) Lakehead University; Ph.D. Mineralogy (1999) University of Manitoba.
4. I am a member of the Association of Professional Geoscientists of Ontario (Member #0738). I am a member in good standing of the Mineralogical Association of Canada, Geological Association of Canada and Mineralogical Society of America.
5. I completed a Ph.D. on LCT granitic pegmatites in 1999 at the University of Manitoba. I worked for the Ontario Geological Survey as a pegmatite geoscientist 2001-2003. This property was included in Open File Report 6099, 2003 which I co-authored. I supervised the prospecting program at Gullwing-Tot Lakes in 2018.
6. I have not visited the Property.
7. As of the date of this certificate, to the best of my knowledge, information and belief, the report contains all scientific and technical information that is required to be disclosed to make this report not misleading.

Dated this 11th Day April 2019

PROFESSIONAL GEOSCIENTISTS
JULIE B. SELWAY
PRACTISING MEMBER
0738
ONTARIO

Julie Selway, Ph.D., P.Geo.
VP Exploration, Power Metals Corp.

Appendix 2 – Summary of Cell Claims for Gullwing-Tot Lake Property

Legacy Claim Id	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Work Required
4276554	DROPE	101758	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE	341948	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE	341947	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE	262949	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE	234258	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE	196278	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE	196277	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE	122424	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE	116242	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	102759	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	336399	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	336398	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	296098	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	296097	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	285690	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	248968	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	240947	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	228108	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	211061	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	211060	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	192814	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	183052	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	170252	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	140299	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276555	DROPE	128770	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276570	DROPE	285691	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276570	DROPE	273609	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276570	DROPE	218430	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276570	DROPE	183051	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276581	DROPE	126738	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276581	DROPE	287408	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276581	DROPE	248265	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276581	DROPE	227456	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4213362	DROPE,WEBB	210372	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	DROPE,WEBB	314827	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	DROPE,WEBB	295417	Single Cell Mining Claim	2019-08-18	Active	$ 400.00

Legacy Claim Id	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Work Required
4213362	DROPE,WEBB	295416	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4276554	DROPE,WEBB	290357	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE,WEBB	270910	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276554	DROPE,WEBB	116243	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276581	DROPE,WEBB	227457	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4213362	WEBB	335696	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	314826	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	308141	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	308140	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	295415	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	295414	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	240258	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	210347	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	210345	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	204224	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	192112	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	192111	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	174153	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	145568	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	107454	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4213362	WEBB	107453	Single Cell Mining Claim	2019-08-18	Active	$ 400.00
4276578	WEBB	128065	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	308112	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	295418	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	248264	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	248263	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	240281	Boundary Cell Mining Claim	2019-05-16	Active	$ 200.00
4276578	WEBB	229404	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	229403	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	229402	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	210374	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	210373	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	192115	Boundary Cell Mining Claim	2019-05-16	Active	$ 200.00
4276578	WEBB	192114	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	174132	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	145572	Single Cell Mining Claim	2019-05-16	Active	$ 400.00

Legacy Claim Id	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Work Required
4276578	WEBB	145571	Boundary Cell Mining Claim	2019-05-16	Active	$ 200.00
4276578	WEBB	145570	Boundary Cell Mining Claim	2019-05-16	Active	$ 200.00
4276578	WEBB	145546	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	139610	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276578	WEBB	139609	Single Cell Mining Claim	2019-05-16	Active	$ 400.00
4276596	WEBB	107432	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	287377	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	229375	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	210346	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	204202	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	191576	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	174134	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	174133	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	145545	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4276596	WEBB	145544	Single Cell Mining Claim	2019-04-22	Active	$ 400.00
4283563	WEBB	107452	Boundary Cell Mining Claim	2019-04-21	Active	$ 200.00
4283563	WEBB	308122	Boundary Cell Mining Claim	2019-04-21	Active	$ 200.00
4283563	WEBB	287379	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283563	WEBB	282234	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283563	WEBB	262170	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283563	WEBB	210370	Boundary Cell Mining Claim	2019-04-21	Active	$ 200.00
4283563	WEBB	204223	Boundary Cell Mining Claim	2019-04-21	Active	$ 200.00
4283563	WEBB	158921	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283563	WEBB	116481	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283564	WEBB	116833	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283564	WEBB	291667	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283564	WEBB	291666	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283564	WEBB	264285	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283564	WEBB	217064	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283564	WEBB	214215	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283564	WEBB	121130	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283565	WEBB	340670	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283565	WEBB	314748	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283565	WEBB	282235	Single Cell Mining Claim	2019-04-21	Active	$ 400.00

Legacy Claim Id	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Work Required
4283565	WEBB	280340	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283565	WEBB	268289	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283565	WEBB	231620	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283565	WEBB	231619	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283565	WEBB	195537	Single Cell Mining Claim	2019-04-21	Active	$ 400.00
4283565	WEBB	160267	Single Cell Mining Claim	2019-04-21	Active	$ 400.00

Appendix 3 – Li standards OREAS 147 and OREAS 148 Certificate of Analysis

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CERTIFICATE OF ANALYSIS FOR

Pegmatitic Li-Nb-Sn ORE

CERTIFIED REFERENCE MATERIAL

OREAS 147

Summary Statistics for Key Analytes.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Peroxide Fusion ICP						
Li, Lithium (wt.%)	0.227	0.011	0.221	0.232	0.221	0.233
Li_2O, Lithium oxide (wt.%)	0.488	0.023	0.477	0.500	0.476	0.501
Nb, Niobium (wt.%)	0.115	0.007	0.111	0.118	0.111	0.119
Sn, Tin (ppm)	699	37	676	723	659	739

Note: intervals may appear asymmetric due to rounding.

Table 1. Certified Values, SDs, 95% Confidence and Tolerance Limits for OREAS 147.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion						
Al, Aluminium (wt.%)	4.90	0.187	4.81	5.00	4.79	5.02
As, Arsenic (ppm)	36.0	2.72	34.8	37.1	33.8	38.2
Ba, Barium (ppm)	1936	86	1896	1976	1890	1981
Be, Beryllium (ppm)	31.2	2.33	30.2	32.3	29.8	32.7
Bi, Bismuth (ppm)	12.5	1.05	12.0	13.0	12.1	12.9
Ca, Calcium (wt.%)	1.09	0.050	1.06	1.11	1.06	1.11
Ce, Cerium (ppm)	1106	90	1037	1176	1070	1143
Co, Cobalt (ppm)	6.90	0.393	6.71	7.09	6.69	7.11
Cr, Chromium (ppm)	57	8	53	61	54	59
Cs, Cesium (ppm)	238	12	231	244	231	244
Cu, Copper (ppm)	298	15	292	305	291	306
Dy, Dysprosium (ppm)	9.20	1.10	7.99	10.42	8.65	9.76
Er, Erbium (ppm)	3.00	0.38	2.58	3.43	2.81	3.20
Eu, Europium (ppm)	10.4	0.80	9.6	11.3	9.9	11.0
Fe, Iron (wt.%)	3.23	0.122	3.18	3.29	3.18	3.29
Ga, Gallium (ppm)	22.6	3.6	20.4	24.8	21.8	23.4
Gd, Gadolinium (ppm)	24.2	3.6	20.2	28.3	23.2	25.3
Ge, Germanium (ppm)	0.75	0.15	0.58	0.92	0.65	0.84
Hf, Hafnium (ppm)	2.99	0.32	2.84	3.14	2.82	3.16
In, Indium (ppm)	2.61	0.162	2.52	2.71	2.48	2.75
K, Potassium (wt.%)	1.60	0.053	1.58	1.62	1.56	1.63
La, Lanthanum (ppm)	663	47	641	685	644	682
Li, Lithium (wt.%)	0.226	0.012	0.221	0.232	0.221	0.231
Li_2O, Lithium oxide (wt.%)	0.487	0.026	0.475	0.499	0.476	0.498
Lu, Lutetium (ppm)	0.20	0.009	0.19	0.21	0.19	0.21
Mg, Magnesium (wt.%)	0.535	0.022	0.525	0.546	0.520	0.551
Mn, Manganese (wt.%)	0.039	0.002	0.038	0.040	0.038	0.040
Mo, Molybdenum (ppm)	7.99	0.296	7.87	8.11	7.68	8.30
Na, Sodium (wt.%)	0.948	0.043	0.925	0.972	0.925	0.972
Nb, Niobium (wt.%)	0.111	0.008	0.105	0.117	0.107	0.115
Ni, Nickel (ppm)	21.2	1.49	20.6	21.8	20.3	22.1
P, Phosphorus (wt.%)	0.155	0.009	0.151	0.160	0.151	0.160
Pb, Lead (ppm)	27.8	2.02	26.7	28.8	26.7	28.8
Pr, Praseodymium (ppm)	121	3	120	122	116	126
Rb, Rubidium (ppm)	1162	63	1128	1196	1129	1195
S, Sulphur (wt.%)	0.030	0.003	0.028	0.031	0.027	0.032
Sb, Antimony (ppm)	10.6	0.68	10.2	10.9	10.0	11.1
Sc, Scandium (ppm)	10.7	0.75	10.3	11.1	10.3	11.1
Sm, Samarium (ppm)	48.7	1.48	47.1	50.4	46.5	51.0
Sr, Strontium (ppm)	299	12	293	305	292	306
Ta, Tantalum (ppm)	17.8	2.3	16.3	19.3	17.1	18.5

Note: intervals may appear asymmetric due to rounding

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion continued						
Tb, Terbium (ppm)	2.35	0.205	2.15	2.54	2.25	2.44
Th, Thorium (ppm)	93	5.5	91	96	91	96
Ti, Titanium (wt.%)	0.470	0.022	0.460	0.480	0.458	0.482
Tl, Thallium (ppm)	10.8	0.67	10.4	11.1	10.4	11.1
Tm, Thulium (ppm)	0.27	0.04	0.22	0.31	IND	IND
U, Uranium (ppm)	15.8	0.60	15.6	16.1	15.4	16.3
V, Vanadium (ppm)	60	2.5	59	62	59	62
Y, Yttrium (ppm)	26.3	1.46	25.6	27.0	25.6	27.1
Yb, Ytterbium (ppm)	1.46	0.123	1.36	1.55	1.35	1.56
Zn, Zinc (ppm)	138	5	136	141	134	143
Zr, Zirconium (ppm)	105	7	102	109	101	110
Peroxide Fusion ICP						
Al, Aluminium (wt.%)	5.04	0.111	4.98	5.09	4.93	5.14
As, Arsenic (ppm)	35.9	3.37	33.4	38.5	32.4	39.5
Ba, Barium (ppm)	1956	106	1891	2020	1904	2007
Be, Beryllium (ppm)	36.1	4.8	32.9	39.4	33.8	38.5
Bi, Bismuth (ppm)	12.6	1.00	11.7	13.5	11.8	13.4
Ca, Calcium (wt.%)	1.12	0.053	1.10	1.14	1.07	1.16
Ce, Cerium (ppm)	1198	73	1142	1253	1164	1231
Cr, Chromium (ppm)	68	7	63	74	63	74
Cs, Cesium (ppm)	234	11	226	242	227	241
Cu, Copper (ppm)	300	16	289	311	286	314
Dy, Dysprosium (ppm)	8.52	0.657	8.07	8.97	8.13	8.91
Er, Erbium (ppm)	2.79	0.276	2.60	2.98	2.58	3.00
Eu, Europium (ppm)	10.2	0.59	9.8	10.6	9.7	10.7
Fe, Iron (wt.%)	3.27	0.085	3.23	3.31	3.20	3.33
Ga, Gallium (ppm)	22.1	1.92	19.8	24.3	20.9	23.3
Gd, Gadolinium (ppm)	21.8	0.86	21.2	22.5	20.7	23.0
Hf, Hafnium (ppm)	5.45	0.84	4.54	6.35	IND	IND
Ho, Holmium (ppm)	1.33	0.18	1.20	1.46	1.29	1.38
In, Indium (ppm)	2.85	0.183	2.71	2.99	2.64	3.06
K, Potassium (wt.%)	1.64	0.059	1.62	1.66	1.58	1.70
La, Lanthanum (ppm)	698	27	676	720	684	712
Li, Lithium (wt.%)	0.227	0.011	0.221	0.232	0.221	0.233
Li_2O, Lithium oxide (wt.%)	0.488	0.023	0.477	0.500	0.476	0.501
Mg, Magnesium (wt.%)	0.549	0.024	0.538	0.560	0.537	0.561
Mn, Manganese (wt.%)	0.039	0.001	0.039	0.040	0.038	0.041
Mo, Molybdenum (ppm)	9.60	1.47	8.48	10.72	IND	IND
Nb, Niobium (wt.%)	0.115	0.007	0.111	0.118	0.111	0.119
Nd, Neodymium (ppm)	379	19	365	393	367	390

Note: intervals may appear asymmetric due to rounding.

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Peroxide Fusion ICP continued						
P, Phosphorus (wt.%)	0.156	0.009	0.151	0.160	0.150	0.161
Pr, Praseodymium (ppm)	122	3	120	123	119	124
Rb, Rubidium (ppm)	1184	94	1109	1260	1152	1216
Sb, Antimony (ppm)	10.5	0.86	9.9	11.1	9.4	11.6
Si, Silicon (wt.%)	35.58	0.779	35.01	36.15	34.76	36.40
Sm, Samarium (ppm)	47.9	3.42	45.3	50.5	46.3	49.6
Sn, Tin (ppm)	699	37	676	723	659	739
Sr, Strontium (ppm)	302	15	293	312	290	315
Ta, Tantalum (ppm)	17.8	1.9	15.3	20.3	16.6	19.0
Tb, Terbium (ppm)	2.30	0.32	2.07	2.53	2.20	2.40
Th, Thorium (ppm)	95	3.4	93	98	92	99
Ti, Titanium (wt.%)	0.483	0.018	0.475	0.490	0.467	0.498
Tl, Thallium (ppm)	10.8	0.82	10.1	11.5	10.3	11.3
Tm, Thulium (ppm)	0.33	0.06	0.30	0.37	0.30	0.37
V, Vanadium (ppm)	64	4.0	61	67	59	68
Y, Yttrium (ppm)	27.6	1.17	26.6	28.5	26.8	28.4
Yb, Ytterbium (ppm)	1.63	0.18	1.56	1.70	IND	IND
Zn, Zinc (ppm)	142	12	135	150	133	152
Zr, Zirconium (ppm)	194	29	166	222	183	205
Borate Fusion XRF						
Al_2O_3, Aluminium(III) oxide (wt.%)	9.48	0.078	9.44	9.52	9.44	9.52
BaO, Barium oxide (ppm)	2180	40	2166	2194	2108	2252
CaO, Calcium oxide (wt.%)	1.56	0.014	1.55	1.57	1.55	1.57
Fe_2O_3, Iron(III) oxide (wt.%)	4.67	0.055	4.64	4.70	4.64	4.70
K_2O, Potassium oxide (wt.%)	1.97	0.020	1.96	1.98	1.96	1.99
MgO, Magnesium oxide (wt.%)	0.945	0.018	0.937	0.954	0.932	0.958
MnO, Manganese oxide (wt.%)	0.051	0.001	0.050	0.051	0.048	0.053
Na_2O, Sodium oxide (wt.%)	1.31	0.029	1.29	1.32	1.29	1.33
Nb_2O_5, Niobium(V) oxide (wt.%)	0.169	0.005	0.165	0.172	0.163	0.174
P_2O_5, Phosphorus(V) oxide (wt.%)	0.368	0.008	0.364	0.372	0.361	0.375
SiO_2, Silicon dioxide (wt.%)	76.34	0.491	76.11	76.57	76.10	76.57
Sn, Tin (ppm)	764	47	740	788	728	799
SO_3, Sulphur trioxide (wt.%)	0.067	0.004	0.064	0.069	0.064	0.069
SrO, Strontium oxide (ppm)	332	35	305	358	IND	IND
TiO_2, Titanium dioxide (wt.%)	0.808	0.010	0.804	0.813	0.797	0.820
Thermogravimetry						
LOI^{1000}, Loss on ignition @1000°C (wt.%)	0.919	0.048	0.893	0.946	0.874	0.964

Note: intervals may appear asymmetric due to rounding.

INTRODUCTION

OREAS reference materials are intended to provide a low cost method of evaluating and improving the quality of analysis of geological samples. To the geologist they provide a means of implementing quality control in analytical data sets generated in exploration from the grass roots level through to prospect evaluation, and in grade control at mining operations. To the analyst they provide an effective means of calibrating analytical equipment, assessing new techniques and routinely monitoring in-house procedures.

SOURCE MATERIALS

Certified Reference Material OREAS 147 has been prepared from spodumene $LiAl(Si_2O_5)$-rich pegmatite ore blended with granodiorite and with minor additions of Sn oxide ore and Nb concentrate. The pegmatite was sourced from stockpile grab samples from the Greenbushes Mine owned by Talison Lithium Ltd located just south of the town of Greenbushes in the south-western corner of Western Australia. The barren I-type hornblende-bearing granodiorite was sourced from the Late Devonian Lysterfield granodiorite complex located in eastern Melbourne, Australia. The Sn lateritic ore material was sourced from the Doradilla Project located in north central NSW and the Nb concentrate was sourced from Anglo American Brasil Catalão’s niobium mine in Goiás, Brazil. The Nb concentrate was produced from niobium-rich ore developed in the saprolite zone over alkaline-carbonatite complexes.

COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 147 was prepared in the following manner:

- Drying to constant mass at 105°C;
- Milling of Li and Nb ores to 100% minus 30 microns;
- Milling of Sn ore and granodiorite to 98% minus 75 microns;
- Preliminary homogenisation and check assaying of source materials;
- Final homogenisation by blending the source materials in specific ratios to achieve target grades;
- Packaging in 10g units in laminated foil pouches.

ANALYTICAL PROGRAM

Twenty two commercial analytical laboratories participated in the program to certify the analytes reported in Table 1. The following methods were employed:

- Four acid digestion for full ICP-OES and ICP-MS elemental suites (up to 22 laboratories depending on the element) except for one laboratory who used an AAS finish for Li only;
- Peroxide fusion for full ICP-OES and ICP-MS elemental suites (up to 21 laboratories depending on the element);
- Lithium borate fusion with XRF finish for whole rock package including Nb and Ta (up to 22 laboratories depending on the element);
- Thermogravimetry for LOI at 1000° C; (9 laboratories used a conventional muffle furnace and 6 laboratories used a thermogravimetric analyser).

For the round robin program ten test units were taken at predetermined intervals during the bagging stage, immediately following homogenisation and are considered representative of the entire batch. The six samples received by each laboratory were obtained by taking two 20g scoop splits from each of three separate 300g test units. This format enabled nested ANOVA treatment of the results to evaluate homogeneity, i.e. to ascertain whether between-unit variance is greater than within-unit variance. Table 1 presents the 114 certified values together with their associated 1SD's, 95% confidence and tolerance limits and Table 2 below shows 59 indicative values. Table 3 provides performance gate intervals for the certified values based on their associated pooled standard deviations. Tabulated results of all elements together with analytical method codes, uncorrected means, medians, standard deviations, relative standard deviations and per cent deviation of lab means from the corrected mean of means (PDM[3]) are presented in the detailed certification data for this CRM (**OREAS 147 DataPack.xlsx**).

Table 2. Indicative Values for OREAS 147.

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
4-Acid Digestion								
Ag	ppm	*0.706*	Ho	ppm	*1.26*	Se	ppm	*2.46*
Au	ppm	*0.172*	Ir	ppm	*0.010*	Si	wt.%	*34.39*
B	ppm	*2.68*	Nd	ppm	*386*	Sn	ppm	*503*
Cd	ppm	*0.46*	Pt	ppm	*0.024*	Te	ppm	*0.077*
Hg	ppm	*0.042*	Re	ppm	*< 0.002*	W	ppm	*4.88*
Peroxide Fusion ICP								
Ag	ppm	*3.00*	Lu	ppm	*0.22*	Sc	ppm	*9.82*
B	ppm	*29.2*	Ni	ppm	*23.2*	Se	ppm	*< 20*
Cd	ppm	*< 10*	Pb	ppm	*30.0*	Te	ppm	*< 1*
Co	ppm	*7.39*	Re	ppm	*< 0.1*	U	ppm	*16.4*
Ge	ppm	*3.20*	S	wt.%	*0.024*	W	ppm	*6.46*
Borate Fusion XRF								
As	ppm	*52*	Gd_2O_3	ppm	*< 100*	Sm_2O_3	ppm	*< 100*
Bi	ppm	*< 100*	HfO_2	ppm	*< 100*	Ta_2O_5	ppm	*< 24*
CeO_2	ppm	*1417*	La_2O_3	ppm	*761*	ThO_2	ppm	*< 100*
Cl	ppm	*106*	Mo	ppm	*< 10*	U_3O_8	ppm	*15.0*
Co	ppm	*47.3*	Nd_2O_3	ppm	*583*	V_2O_5	ppm	*128*
Cr_2O_3	ppm	*104*	Ni	ppm	*38.6*	W	ppm	*19.2*
Cu	ppm	*291*	Pb	ppm	*36.1*	Y_2O_3	ppm	*150*
Dy_2O_3	ppm	*< 100*	Pr_6O_{11}	ppm	*483*	Yb_2O_3	ppm	*< 100*
Er_2O_3	ppm	*< 100*	Rb	ppm	*1219*	Zn	ppm	*139*
Ga_2O_3	ppm	*41.7*	Sb	ppm	*< 50*			

Note: the number of significant figures reported is not a reflection of the level of certainty of stated values. They are instead an artefact of ORE's in-house CRM-specific LIMS.

STATISTICAL ANALYSIS

Certified Values, Confidence Limits, Standard Deviations and Tolerance Limits (Table 1) have been determined for each analyte following removal of individual, laboratory dataset (batch) and 3SD outliers (single iteration). For individual outliers within a laboratory batch the z-score test is used in combination with a second method that determines the per cent deviation of the individual value from the batch median. Outliers in general are selected on the basis of z-scores > 2.5 and with per cent deviations (i) > 3 and (ii) more than three times the average absolute per cent deviation for the batch. In certain instances statistician's prerogative has been employed in discriminating outliers. Each laboratory data set mean is tested for outlying status based on z-score discrimination and rejected if > 2.5. After individual and laboratory data set (batch) outliers have been eliminated a non-iterative 3 standard deviation filter is applied, with those values lying outside this window also relegated to outlying status. The Certified Values are the means of accepted laboratory means after outlier filtering.

The 95% Confidence Limits are inversely proportional to the number of participating laboratories and inter-laboratory agreement. It is a measure of the reliability of the certified value. A 95% confidence interval indicates a 95% probability that the true value of the analyte under consideration lies between the upper and lower limits. *95% Confidence Limits should not be used as control limits for laboratory performance.*

Standard Deviation values (1SDs) are reported in Table 1 and provide an indication of a level of performance that might reasonably be expected from a laboratory being monitored by this CRM in a QA/QC program. The SD's take into account errors attributable to measurement uncertainty and CRM variability. For an effective CRM the contribution of the latter should be negligible in comparison to measurement errors. The SD values thus include all sources of measurement uncertainty: between-lab variance, within-run variance (precision errors) and CRM variability. OREAS prepared reference materials have a level of homogeneity such that the observed variance from repeated analysis has its origin almost exclusively in the analytical process rather than the reference material itself.

The SD for each analyte's certified value is calculated from the same filtered data set used to determine the certified value, i.e. after removal of any individual, lab dataset (batch) and 3SD outliers (single iteration). These outliers can only be removed after the absolute homogeneity of the CRM has been independently established, i.e. the outliers must be confidently deemed to be analytical rather than arising from inhomogeneity of the CRM. **The standard deviation is then calculated for each analyte from the pooled accepted analyses generated from the certification program.**

In the application of SD's in monitoring performance it is important to note that not all laboratories function at the same level of proficiency and that different methods in use at a particular laboratory have differing levels of precision. Each laboratory has its own inherent SD (for a specific concentration level and analyte-method pair) based on the analytical process and this SD is not directly related to the round robin program.

The majority of data generated in the round robin program was produced by a selection of world class laboratories. The SD's thus generated are more constrained than those that would be produced across a randomly selected group of laboratories. To produce more generally achievable SD's the 'pooled' SD's provided in this report include inter-lab bias. This 'one size fits all' approach may require revision at the discretion of the QC manager concerned following careful scrutiny of QC control charts.

Table 3 shows **Performance Gates** calculated for two and three standard deviations. As a guide these intervals may be regarded as warning or rejection for multiple 2SD outliers, or rejection for individual 3SD outliers in QC monitoring, although their precise application should be at the discretion of the QC manager concerned. A second method utilises a 5% window calculated directly from the certified value. Standard deviation is also shown in relative percent for one, two and three relative standard deviations (1RSD, 2RSD and 3RSD) to facilitate an appreciation of the magnitude of these numbers and a comparison with the 5% window. Caution should be exercised when concentration levels approach lower limits of detection of the analytical methods employed as performance gates calculated from standard deviations tend to be excessively wide whereas those determined by the 5% method are too narrow.

Tolerance Limits (ISO Guide 3207) were determined using an analysis of precision errors method and are considered a conservative estimate of true homogeneity. The meaning of tolerance limits may be illustrated for tin (Sn) by fusion XRF, where 99% of the time ($1-\alpha=0.99$) at least 95% of subsamples ($\rho=0.95$) will have concentrations lying between 728 and 799 ppm. Put more precisely, this means that if the same number of subsamples were taken and analysed in the same manner repeatedly, 99% of the tolerance intervals so constructed would cover at least 95% of the total population, and 1% of the tolerance intervals would cover less than 95% of the total population (ISO Guide 35). *Please note that tolerance limits pertain to the homogeneity of the CRM only and should not be used as control limits for laboratory performance.*

The homogeneity of OREAS 147 has also been evaluated in a **nested ANOVA** of the round robin program. Each of the twenty four round robin laboratories received six samples per CRM and these samples were made up of paired samples from three different, non-adjacent sampling intervals. The purpose of the ANOVA evaluation is to test that no statistically significant difference exists in the variance between-units to that of the variance within-units. This allows an assessment of homogeneity across the entire prepared batch of OREAS 147. The test was performed using the following parameters:

- Null Hypothesis, H_0: Between-unit variance is no greater than within-unit variance (reject H_0 if p-value < 0.05);
- Alternative Hypothesis, H_1: Between-unit variance is greater than within-unit variance.

P-values are a measure of probability where values less than 0.05 indicate a greater than 95% probability that the observed differences in within-unit and between-unit variances are real. The datasets were filtered for both individual and laboratory data set (batch) outliers prior to the calculation of *p*-values. This process derived no significant *p*-values across the entire 114 certified values except for indium (In) by Peroxide Fusion ICP. This isolated case is most likely due to random statistical probability as there is no other supporting evidence to suspect greater between-unit variance compared with within-unit variance. The null hypothesis is therefore retained.

It is important to note that ANOVA is not an absolute measure of homogeneity. Rather, it establishes whether or not the analytes are distributed in a similar manner throughout the packaging run of OREAS 147 and whether the variance between two subsamples from the same unit is statistically distinguishable to the variance from two subsamples taken from any two separate units. A reference material therefore, can possess poor absolute homogeneity yet still pass a relative homogeneity test if the within-unit heterogeneity is large and similar across all units.

Based on the statistical analysis of the results of the inter-laboratory certification program it can be concluded that OREAS 147 is fit-for-purpose as a certified reference material (see 'Intended Use' below).

Table 3. Pooled-Lab Performance Gates for OREAS 147.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5% window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
4-Acid Digestion											
Al, wt.%	4.90	0.187	4.53	5.28	4.34	5.46	3.81%	7.62%	11.42%	4.66	5.15
As, ppm	36.0	2.72	30.5	41.4	27.8	44.1	7.55%	15.10%	22.65%	34.2	37.8
Ba, ppm	1936	86	1764	2107	1678	2193	4.43%	8.87%	13.30%	1839	2032
Be, ppm	31.2	2.33	26.6	35.9	24.2	38.2	7.45%	14.90%	22.35%	29.7	32.8
Bi, ppm	12.5	1.05	10.4	14.6	9.4	15.6	8.39%	16.78%	25.17%	11.9	13.1
Ca, wt.%	1.09	0.050	0.99	1.19	0.93	1.24	4.64%	9.28%	13.92%	1.03	1.14
Ce, ppm	1106	90	926	1287	836	1377	8.16%	16.32%	24.47%	1051	1162
Co, ppm	6.90	0.393	6.12	7.69	5.72	8.08	5.70%	11.40%	17.10%	6.56	7.25
Cr, ppm	57	8	41	73	32	81	14.27%	28.55%	42.82%	54	60
Cs, ppm	238	12	214	261	202	273	5.05%	10.10%	15.15%	226	249
Cu, ppm	298	15	269	327	255	342	4.86%	9.72%	14.58%	283	313
Dy, ppm	9.20	1.10	7.00	11.41	5.90	12.51	11.95%	23.91%	35.86%	8.74	9.67
Er, ppm	3.00	0.38	2.24	3.77	1.86	4.15	12.73%	25.46%	38.19%	2.85	3.15
Eu, ppm	10.4	0.80	8.8	12.1	8.0	12.9	7.67%	15.33%	23.00%	9.9	11.0
Fe, wt.%	3.23	0.122	2.99	3.48	2.87	3.60	3.77%	7.55%	11.32%	3.07	3.39
Ga, ppm	22.6	3.6	15.4	29.9	11.7	33.5	16.05%	32.10%	48.15%	21.5	23.7
Gd, ppm	24.2	3.6	17.0	31.5	13.4	35.1	14.91%	29.82%	44.73%	23.0	25.5
Ge, ppm	0.75	0.15	0.45	1.05	0.30	1.20	19.93%	39.86%	59.78%	0.71	0.79
Hf, ppm	2.99	0.32	2.36	3.63	2.04	3.94	10.62%	21.24%	31.85%	2.84	3.14
In, ppm	2.61	0.162	2.29	2.94	2.13	3.10	6.21%	12.43%	18.64%	2.48	2.74
K, wt.%	1.60	0.053	1.49	1.70	1.44	1.76	3.28%	6.57%	9.85%	1.52	1.68
La, ppm	663	47	568	758	520	805	7.16%	14.33%	21.49%	630	696
Li, wt.%	0.226	0.012	0.202	0.251	0.190	0.263	5.37%	10.75%	16.12%	0.215	0.238
Li_2O, wt.%	0.49	0.03	0.43	0.54	0.41	0.57	5.37%	10.75%	16.12%	0.463	0.512
Lu, ppm	0.20	0.009	0.18	0.22	0.17	0.23	4.71%	9.42%	14.13%	0.19	0.21
Mg, wt.%	0.535	0.022	0.491	0.580	0.469	0.602	4.13%	8.26%	12.39%	0.509	0.562
Mn, wt.%	0.039	0.002	0.035	0.044	0.033	0.046	5.63%	11.25%	16.88%	0.037	0.041
Mo, ppm	7.99	0.296	7.40	8.58	7.10	8.87	3.70%	7.40%	11.10%	7.59	8.39
Na, wt.%	0.948	0.043	0.862	1.035	0.819	1.078	4.55%	9.10%	13.66%	0.901	0.996
Nb, wt.%	0.111	0.008	0.095	0.127	0.087	0.136	7.31%	14.62%	21.94%	0.106	0.117
Ni, ppm	21.2	1.49	18.2	24.2	16.7	25.6	7.03%	14.07%	21.10%	20.1	22.2
P, wt.%	0.155	0.009	0.137	0.173	0.128	0.182	5.78%	11.55%	17.33%	0.147	0.163
Pb, ppm	27.8	2.02	23.7	31.8	21.7	33.8	7.29%	14.58%	21.88%	26.4	29.1
Pr, ppm	121	3	116	126	113	129	2.14%	4.28%	6.43%	115	127
Rb, ppm	1162	63	1035	1289	972	1352	5.46%	10.92%	16.38%	1104	1220
S, wt.%	0.030	0.003	0.024	0.035	0.021	0.038	9.91%	19.82%	29.73%	0.028	0.031
Sb, ppm	10.6	0.68	9.2	11.9	8.5	12.6	6.41%	12.82%	19.23%	10.0	11.1
Sc, ppm	10.7	0.75	9.1	12.2	8.4	12.9	7.07%	14.15%	21.22%	10.1	11.2
Sm, ppm	48.7	1.48	45.8	51.7	44.3	53.2	3.05%	6.09%	9.14%	46.3	51.2
Sr, ppm	299	12	274	324	262	336	4.15%	8.30%	12.45%	284	314
Ta, ppm	17.8	2.3	13.1	22.5	10.8	24.8	13.09%	26.17%	39.26%	16.9	18.7
Tb, ppm	2.35	0.205	1.93	2.76	1.73	2.96	8.75%	17.51%	26.26%	2.23	2.46

Note: intervals may appear asymmetric due to rounding.

Table 3 continued.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5% window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
4-Acid Digestion continued											
Th, ppm	93	5.5	82	104	77	110	5.89%	11.79%	17.68%	89	98
Ti, wt.%	0.470	0.022	0.426	0.513	0.405	0.535	4.63%	9.26%	13.88%	0.446	0.493
Tl, ppm	10.8	0.67	9.4	12.1	8.8	12.8	6.26%	12.52%	18.78%	10.2	11.3
Tm, ppm	0.27	0.04	0.19	0.34	0.16	0.37	13.79%	27.59%	41.38%	0.25	0.28
U, ppm	15.8	0.60	14.7	17.0	14.1	17.6	3.76%	7.51%	11.27%	15.1	16.6
V, ppm	60	2.5	55	66	53	68	4.20%	8.41%	12.61%	57	64
Y, ppm	26.3	1.46	23.4	29.2	21.9	30.7	5.54%	11.07%	16.61%	25.0	27.6
Yb, ppm	1.46	0.123	1.21	1.70	1.09	1.83	8.47%	16.95%	25.42%	1.38	1.53
Zn, ppm	138	5	129	148	124	153	3.39%	6.77%	10.16%	132	145
Zr, ppm	105	7	92	118	86	125	6.26%	12.52%	18.78%	100	111
Peroxide Fusion ICP											
Al, wt.%	5.04	0.111	4.81	5.26	4.70	5.37	2.20%	4.40%	6.59%	4.78	5.29
As, ppm	35.9	3.37	29.2	42.7	25.8	46.0	9.37%	18.73%	28.10%	34.1	37.7
Ba, ppm	1956	106	1744	2167	1639	2273	5.40%	10.81%	16.21%	1858	2053
Be, ppm	36.1	4.8	26.5	45.8	21.7	50.6	13.31%	26.63%	39.94%	34.3	37.9
Bi, ppm	12.6	1.00	10.6	14.6	9.6	15.6	7.92%	15.84%	23.76%	11.9	13.2
Ca, wt.%	1.12	0.053	1.01	1.22	0.96	1.28	4.72%	9.44%	14.15%	1.06	1.17
Ce, ppm	1198	73	1051	1344	978	1417	6.11%	12.22%	18.33%	1138	1257
Cr, ppm	68	7	54	83	47	90	10.37%	20.73%	31.10%	65	72
Cs, ppm	234	11	211	257	200	269	4.88%	9.76%	14.65%	223	246
Cu, ppm	300	16	268	332	252	348	5.32%	10.65%	15.97%	285	315
Dy, ppm	8.52	0.657	7.21	9.83	6.55	10.49	7.71%	15.42%	23.13%	8.09	8.95
Er, ppm	2.79	0.276	2.24	3.35	1.96	3.62	9.89%	19.78%	29.67%	2.65	2.93
Eu, ppm	10.2	0.59	9.0	11.4	8.4	12.0	5.82%	11.64%	17.46%	9.7	10.7
Fe, wt.%	3.27	0.085	3.10	3.44	3.01	3.52	2.60%	5.20%	7.81%	3.10	3.43
Ga, ppm	22.1	1.92	18.2	25.9	16.3	27.8	8.72%	17.44%	26.16%	20.9	23.2
Gd, ppm	21.8	0.86	20.1	23.6	19.2	24.4	3.95%	7.91%	11.86%	20.7	22.9
Hf, ppm	5.45	0.84	3.77	7.12	2.94	7.96	15.37%	30.73%	46.10%	5.17	5.72
Ho, ppm	1.33	0.18	0.97	1.69	0.79	1.87	13.45%	26.91%	40.36%	1.27	1.40
In, ppm	2.85	0.183	2.48	3.22	2.30	3.40	6.43%	12.85%	19.28%	2.71	2.99
K, wt.%	1.64	0.059	1.52	1.76	1.46	1.82	3.59%	7.18%	10.77%	1.56	1.72
La, ppm	698	27	645	752	618	779	3.83%	7.66%	11.49%	663	733
Li, wt.%	0.227	0.011	0.206	0.248	0.195	0.259	4.69%	9.37%	14.06%	0.215	0.238
Li_2O, wt.%	0.49	0.02	0.44	0.53	0.42	0.56	4.69%	9.37%	14.06%	0.464	0.513
Mg, wt.%	0.549	0.024	0.502	0.596	0.478	0.620	4.29%	8.57%	12.86%	0.522	0.576
Mn, wt.%	0.039	0.001	0.037	0.041	0.036	0.042	2.77%	5.53%	8.30%	0.037	0.041
Mo, ppm	9.60	1.47	6.67	12.54	5.20	14.00	15.28%	30.56%	45.84%	9.12	10.08
Nb, wt.%	0.115	0.007	0.101	0.128	0.094	0.135	5.93%	11.85%	17.78%	0.109	0.120
Nd, ppm	379	19	341	416	322	435	4.98%	9.96%	14.94%	360	398
P, wt.%	0.156	0.009	0.137	0.174	0.128	0.183	5.79%	11.59%	17.38%	0.148	0.163
Pr, ppm	122	3	116	127	114	130	2.19%	4.37%	6.56%	116	128
Rb, ppm	1184	94	996	1372	902	1466	7.94%	15.88%	23.82%	1125	1243
Sb, ppm	10.5	0.86	8.8	12.2	7.9	13.1	8.21%	16.43%	24.64%	10.0	11.0

Note: intervals may appear asymmetric due to rounding.

Table 3 continued.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5% window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
Peroxide Fusion ICP continued											
Si, wt.%	35.58	0.779	34.02	37.14	33.25	37.92	2.19%	4.38%	6.57%	33.80	37.36
Sm, ppm	47.9	3.42	41.1	54.8	37.7	58.2	7.15%	14.29%	21.44%	45.5	50.3
Sn, ppm	699	37	626	773	589	810	5.28%	10.55%	15.83%	664	734
Sr, ppm	302	15	273	332	259	346	4.82%	9.65%	14.47%	287	318
Ta, ppm	17.8	1.9	14.0	21.7	12.1	23.6	10.78%	21.57%	32.35%	16.9	18.7
Tb, ppm	2.30	0.32	1.65	2.95	1.33	3.27	14.10%	28.19%	42.29%	2.19	2.42
Th, ppm	95	3.4	89	102	85	106	3.54%	7.07%	10.61%	91	100
Ti, wt.%	0.483	0.018	0.446	0.519	0.428	0.537	3.79%	7.57%	11.36%	0.459	0.507
Tl, ppm	10.8	0.82	9.2	12.4	8.3	13.3	7.59%	15.18%	22.77%	10.3	11.3
Tm, ppm	0.33	0.06	0.22	0.44	0.16	0.50	17.15%	34.30%	51.44%	0.31	0.35
V, ppm	64	4.0	56	72	52	76	6.26%	12.52%	18.78%	61	67
Y, ppm	27.6	1.17	25.2	29.9	24.1	31.1	4.23%	8.47%	12.70%	26.2	28.9
Yb, ppm	1.63	0.18	1.26	2.00	1.08	2.18	11.31%	22.62%	33.93%	1.55	1.71
Zn, ppm	142	12	119	166	107	177	8.26%	16.52%	24.78%	135	149
Zr, ppm	194	29	136	252	107	281	14.92%	29.84%	44.75%	184	204
Borate Fusion XRF											
Al_2O_3, wt.%	9.48	0.078	9.32	9.63	9.24	9.71	0.82%	1.64%	2.46%	9.00	9.95
BaO, ppm	2180	40	2100	2259	2061	2299	1.82%	3.65%	5.47%	2071	2289
CaO, wt.%	1.56	0.014	1.53	1.59	1.52	1.60	0.91%	1.81%	2.72%	1.48	1.64
Fe_2O_3, wt.%	4.67	0.055	4.56	4.78	4.50	4.83	1.17%	2.35%	3.52%	4.43	4.90
K_2O, wt.%	1.97	0.020	1.93	2.01	1.91	2.03	1.01%	2.02%	3.04%	1.87	2.07
MgO, wt.%	0.945	0.018	0.908	0.982	0.890	1.000	1.94%	3.89%	5.83%	0.898	0.993
MnO, wt.%	0.051	0.001	0.048	0.053	0.047	0.054	2.02%	4.04%	6.05%	0.048	0.053
Na_2O, wt.%	1.31	0.029	1.25	1.37	1.22	1.40	2.23%	4.46%	6.68%	1.24	1.37
Nb_2O_5, wt.%	0.169	0.005	0.159	0.179	0.154	0.183	2.94%	5.88%	8.81%	0.160	0.177
P_2O_5, wt.%	0.368	0.008	0.352	0.384	0.344	0.392	2.18%	4.37%	6.55%	0.350	0.386
SiO_2, wt.%	76.34	0.491	75.36	77.32	74.86	77.81	0.64%	1.29%	1.93%	72.52	80.15
Sn, ppm	764	47	670	858	623	904	6.15%	12.29%	18.44%	725	802
SO_3, wt.%	0.067	0.004	0.058	0.075	0.054	0.079	6.36%	12.72%	19.07%	0.063	0.070
SrO, ppm	332	35	263	401	228	435	10.41%	20.81%	31.22%	315	348
TiO_2, wt.%	0.808	0.010	0.789	0.828	0.779	0.837	1.20%	2.40%	3.59%	0.768	0.849
Zr, ppm	200	35	130	271	95	306	17.56%	35.13%	52.69%	190	210
Thermogravimetry											
LOI^{1000}, wt.%	0.919	0.048	0.823	1.016	0.774	1.064	5.25%	10.50%	15.74%	0.873	0.965

Note: intervals may appear asymmetric due to rounding.

PARTICIPATING LABORATORIES

1. Actlabs, Ancaster, Ontario, Canada
2. ALS, Brisbane, QLD, Australia
3. ALS, Lima, Peru
4. ALS, Loughrea, Galway, Ireland

5. ALS, Perth, WA, Australia
6. ALS, Vancouver, BC, Canada
7. Bureau Veritas Commodities Canada Ltd, Vancouver, BC, Canada
8. Bureau Veritas Geoanalytical, Adelaide, SA, Australia
9. Bureau Veritas Geoanalytical, Perth, WA, Australia
10. Intertek Genalysis, Perth, WA, Australia
11. Intertek Testing Services Philippines, Cupang, Muntinlupa, Philippines
12. MinAnalytical Services, Perth, WA, Australia
13. Nagrom, Perth, WA, Australia
14. PT Geoservices Ltd, Cikarang, Jakarta Raya, Indonesia
15. SGS Australia Mineral Services, Perth, WA, Australia
16. SGS Canada Inc., Vancouver, BC, Canada
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18. SGS Geosol Laboratorios Ltda, Vespasiano, Minas Gerais, Brazil
19. SGS Lakefield Research Ltd, Lakefield, Ontario, Canada
20. UIS Analytical Services, Centurion , South Africa
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22. Zarazma Mineral Studies Company, Tehran, Iran

PREPARER AND SUPPLIER

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It is packaged in 10g units in robust single-use laminated foil pouches.

INTENDED USE

OREAS 147 is intended for the following uses:

- for the monitoring of laboratory performance in the analysis of analytes reported in Table 1 in geological samples;
- for the verification of analytical methods for analytes reported in Table 1;
- for the calibration of instruments used in the determination of the concentration of analytes reported in Table 1.

STABILITY AND STORAGE INSTRUCTIONS

OREAS 149 has been prepared from spodumene $LiAl(Si_2O_5)$-rich pegmatite ore with minor additions of Sn oxide ore and Nb concentrate. It contains very little reactive sulphide and in its unopened state and under normal conditions of storage it has a shelf life beyond ten years. Its stability will be monitored at regular intervals and purchasers notified if any changes are observed.

INSTRUCTIONS FOR CORRECT USE

The certified values determined by 4-acid digestion and peroxide fusion ICP refer to the concentration levels in the packaged state. There is no need for drying prior to weighing and analysis.

In contrast the certified values determined by borate fusion XRF and for LOI at 1000° C are on a dry basis. This requires the removal of hygroscopic moisture by drying in air to constant mass at 105° C. If the reference material is not dried prior to analysis, the certified values should be corrected to the moisture-bearing basis.

HANDLING INSTRUCTIONS

Fine powders pose a risk to eyes and lungs and therefore standard precautions such as the use of safety glasses and dust masks are advised.

TRACEABILITY

The analytical samples were selected in a manner to represent the entire batch of prepared CRM. This 'representivity' was maintained in each submitted laboratory sample batch and ensures the user that the data is traceable from sample selection through to the analytical results that underlie the consensus values. Each analytical data set has been validated by its assayer through the inclusion of internal reference materials and QC checks during analysis.

The laboratories were chosen on the basis of their competence (from past performance in inter-laboratory programs) for a particular analytical method, analyte or analyte suite, and sample matrix. Most of these laboratories have and maintain ISO 17025 accreditation. The certified values presented in this report are calculated from the means of accepted data following robust statistical treatment as detailed in this report.

LEGAL NOTICE

Ore Research & Exploration Pty Ltd has prepared and statistically evaluated the property values of this reference material to the best of its ability. The Purchaser by receipt hereof releases and indemnifies Ore Research & Exploration Pty Ltd from and against all liability and costs arising from the use of this material and information.

QMS ACCREDITED

ORE Pty Ltd is accredited to ISO 9001:2015 by Lloyd's Register Quality Assurance Ltd for its quality management system including development, manufacturing, certification and supply of CRMs.

CERTIFYING OFFICER

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REFERENCES

ISO Guide 30 (1992), Terms and definitions used in connection with reference materials.

ISO Guide 31 (2000), Reference materials – Contents of certificates and labels.

ISO Guide 3207 (1975), Statistical interpretation of data - Determination of a statistical tolerance interval.

ISO Guide 35 (2006), Certification of reference materials - General and statistical principals.

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CERTIFICATE OF ANALYSIS FOR

Pegmatitic Li-Nb-Sn ORE
CERTIFIED REFERENCE MATERIAL
OREAS 148

Summary Statistics for Key Analytes.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Peroxide Fusion ICP						
Li, Lithium (wt.%)	0.476	0.011	0.472	0.481	0.462	0.491
Li_2O, Lithium oxide (wt.%)	1.03	0.023	1.02	1.04	0.996	1.06
Nb, Niobium (wt.%)	0.168	0.011	0.161	0.174	0.162	0.174
Sn, Tin (ppm)	1157	80	1108	1206	1100	1215

Note: intervals may appear asymmetric due to rounding.

Table 1. Certified Values, SDs, 95% Confidence and Tolerance Limits for OREAS 148.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion						
Al, Aluminium (wt.%)	5.27	0.170	5.18	5.35	5.15	5.38
As, Arsenic (ppm)	58	3.2	56	59	55	60
Ba, Barium (ppm)	1000	36	980	1019	975	1024
Be, Beryllium (ppm)	36.2	2.53	35.1	37.3	34.8	37.7
Bi, Bismuth (ppm)	18.9	1.17	18.3	19.5	18.4	19.5
Ca, Calcium (wt.%)	0.872	0.037	0.855	0.888	0.851	0.892
Ce, Cerium (ppm)	725	64	684	766	704	747
Co, Cobalt (ppm)	6.31	0.403	6.12	6.49	6.07	6.54
Cr, Chromium (ppm)	60	9	55	64	57	62
Cs, Cesium (ppm)	314	16	306	322	307	321
Cu, Copper (ppm)	338	16	331	345	328	347
Dy, Dysprosium (ppm)	6.66	0.93	5.65	7.68	6.36	6.97
Er, Erbium (ppm)	2.20	0.26	1.92	2.48	2.05	2.34
Eu, Europium (ppm)	7.54	0.458	6.95	8.13	7.20	7.87
Fe, Iron (wt.%)	3.02	0.132	2.96	3.08	2.95	3.09
Ga, Gallium (ppm)	29.2	2.32	27.7	30.7	28.5	29.9
Gd, Gadolinium (ppm)	17.1	2.2	14.6	19.6	16.4	17.8
Ge, Germanium (ppm)	0.55	0.10	0.44	0.67	0.50	0.60
Hf, Hafnium (ppm)	2.16	0.22	2.07	2.25	1.98	2.33
Ho, Holmium (ppm)	0.84	0.09	0.72	0.97	0.76	0.93
In, Indium (ppm)	3.98	0.202	3.86	4.10	3.84	4.12
K, Potassium (wt.%)	1.47	0.041	1.45	1.49	1.43	1.51
La, Lanthanum (ppm)	446	28	432	461	429	464
Li, Lithium (wt.%)	0.465	0.009	0.461	0.470	0.454	0.477
Li_2O, Lithium oxide (wt.%)	1.00	0.020	0.993	1.01	0.978	1.03
Lu, Lutetium (ppm)	0.17	0.02	0.15	0.19	0.16	0.18
Mg, Magnesium (wt.%)	0.454	0.020	0.445	0.463	0.440	0.468
Mn, Manganese (wt.%)	0.037	0.002	0.036	0.038	0.036	0.038
Mo, Molybdenum (ppm)	8.86	0.344	8.72	9.00	8.51	9.21
Na, Sodium (wt.%)	0.860	0.039	0.839	0.881	0.841	0.879
Nb, Niobium (wt.%)	0.169	0.010	0.162	0.176	0.165	0.173
Nd, Neodymium (ppm)	267	11	253	281	254	279
Ni, Nickel (ppm)	22.2	0.98	21.8	22.6	21.4	22.9
P, Phosphorus (wt.%)	0.131	0.005	0.128	0.134	0.127	0.134
Pb, Lead (ppm)	24.9	2.20	23.9	26.0	23.7	26.2
Pr, Praseodymium (ppm)	82	2.0	80	84	79	84
Rb, Rubidium (ppm)	1324	41	1306	1341	1290	1358
Sb, Antimony (ppm)	16.2	0.78	15.9	16.5	15.6	16.8
Sc, Scandium (ppm)	8.23	0.554	7.91	8.56	7.92	8.54
Sm, Samarium (ppm)	34.2	0.94	33.4	35.0	33.0	35.4
Sr, Strontium (ppm)	204	16	197	212	199	210

Note: intervals may appear asymmetric due to rounding

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion continued						
Ta, Tantalum (ppm)	23.1	2.9	21.2	24.9	22.1	24.0
Tb, Terbium (ppm)	1.71	0.145	1.59	1.83	1.63	1.79
Th, Thorium (ppm)	48.2	3.62	46.3	50.1	46.7	49.8
Ti, Titanium (wt.%)	0.345	0.015	0.338	0.352	0.336	0.353
Tl, Thallium (ppm)	12.2	0.59	11.9	12.5	11.9	12.4
Tm, Thulium (ppm)	0.20	0.03	0.16	0.24	IND	IND
U, Uranium (ppm)	8.10	0.332	7.95	8.25	7.82	8.39
V, Vanadium (ppm)	54	3.1	53	56	52	56
W, Tungsten (ppm)	6.45	0.373	6.31	6.59	5.92	6.98
Y, Yttrium (ppm)	18.5	2.0	17.6	19.4	17.9	19.1
Yb, Ytterbium (ppm)	1.15	0.12	1.06	1.23	1.01	1.28
Zn, Zinc (ppm)	162	5	160	164	156	169
Zr, Zirconium (ppm)	79	4.8	76	81	76	81
Peroxide Fusion ICP						
Al, Aluminium (wt.%)	5.37	0.148	5.30	5.44	5.22	5.52
As, Arsenic (ppm)	59	4.0	56	62	54	64
Ba, Barium (ppm)	1009	26	991	1027	976	1042
Be, Beryllium (ppm)	38.8	2.00	37.5	40.0	37.0	40.6
Bi, Bismuth (ppm)	19.3	1.31	18.3	20.2	18.3	20.2
Ca, Calcium (wt.%)	0.903	0.048	0.881	0.925	0.866	0.940
Ce, Cerium (ppm)	795	53	754	836	758	832
Cr, Chromium (ppm)	69	5.8	64	74	64	73
Cs, Cesium (ppm)	311	13	303	320	299	324
Cu, Copper (ppm)	351	35	328	373	334	367
Dy, Dysprosium (ppm)	6.06	0.492	5.70	6.41	5.74	6.37
Er, Erbium (ppm)	2.00	0.121	1.96	2.04	1.82	2.18
Eu, Europium (ppm)	7.22	0.425	6.93	7.52	6.82	7.62
Fe, Iron (wt.%)	3.06	0.083	3.02	3.09	2.98	3.13
Ga, Gallium (ppm)	29.2	1.50	27.9	30.6	26.7	31.8
Gd, Gadolinium (ppm)	15.8	1.34	14.9	16.6	15.0	16.6
Hf, Hafnium (ppm)	4.15	0.53	3.74	4.55	IND	IND
Ho, Holmium (ppm)	0.94	0.12	0.84	1.04	0.86	1.03
In, Indium (ppm)	4.22	0.299	3.96	4.47	3.81	4.62
K, Potassium (wt.%)	1.50	0.050	1.48	1.53	1.47	1.54
La, Lanthanum (ppm)	478	15	466	489	459	496
Li, Lithium (wt.%)	0.476	0.011	0.472	0.481	0.462	0.491
Li_2O, Lithium oxide (wt.%)	1.03	0.023	1.02	1.04	0.996	1.06
Mg, Magnesium (wt.%)	0.469	0.016	0.462	0.475	0.453	0.484
Mn, Manganese (wt.%)	0.038	0.002	0.037	0.039	0.036	0.040
Mo, Molybdenum (ppm)	10.1	0.59	9.7	10.5	IND	IND
Nb, Niobium (wt.%)	0.168	0.011	0.161	0.174	0.162	0.174
Nd, Neodymium (ppm)	260	12	251	268	248	271

Note: intervals may appear asymmetric due to rounding

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Peroxide Fusion ICP continued						
P, Phosphorus (wt.%)	0.129	0.008	0.125	0.133	0.122	0.137
Pr, Praseodymium (ppm)	82	1.9	81	83	80	84
Rb, Rubidium (ppm)	1362	79	1303	1421	1321	1403
Sb, Antimony (ppm)	16.3	0.96	15.3	17.3	15.1	17.5
Sc, Scandium (ppm)	8.64	1.43	6.86	10.42	IND	IND
Si, Silicon (wt.%)	36.00	1.065	35.36	36.63	35.11	36.88
Sm, Samarium (ppm)	34.3	3.16	32.2	36.4	33.0	35.6
Sn, Tin (ppm)	1157	80	1108	1206	1100	1215
Sr, Strontium (ppm)	209	11	204	214	198	220
Tb, Terbium (ppm)	1.58	0.141	1.47	1.69	1.45	1.71
Th, Thorium (ppm)	51	2.0	49	52	49	52
Ti, Titanium (wt.%)	0.352	0.011	0.347	0.357	0.342	0.362
Tl, Thallium (ppm)	12.3	0.73	11.6	12.9	11.6	12.9
Tm, Thulium (ppm)	0.24	0.04	0.22	0.27	0.21	0.28
U, Uranium (ppm)	8.55	0.448	8.34	8.76	7.90	9.21
V, Vanadium (ppm)	56	3.1	55	58	52	60
W, Tungsten (ppm)	6.42	1.32	5.27	7.56	IND	IND
Y, Yttrium (ppm)	19.4	1.47	18.3	20.6	18.9	20.0
Yb, Ytterbium (ppm)	1.37	0.18	1.32	1.43	IND	IND
Zn, Zinc (ppm)	159	11	153	164	149	169
Zr, Zirconium (ppm)	153	25	130	177	135	172
Borate Fusion XRF						
Al_2O_3, Aluminium(III) oxide (wt.%)	10.20	0.096	10.14	10.25	10.14	10.25
BaO, Barium oxide (ppm)	1152	55	1122	1181	IND	IND
CaO, Calcium oxide (wt.%)	1.24	0.014	1.23	1.24	1.23	1.25
Fe_2O_3, Iron(III) oxide (wt.%)	4.35	0.055	4.32	4.38	4.32	4.38
K_2O, Potassium oxide (wt.%)	1.81	0.022	1.79	1.82	1.79	1.82
MgO, Magnesium oxide (wt.%)	0.797	0.015	0.790	0.804	0.785	0.809
MnO, Manganese oxide (wt.%)	0.050	0.001	0.049	0.050	0.047	0.053
Na_2O, Sodium oxide (wt.%)	1.19	0.018	1.18	1.20	1.17	1.21
Nb_2O_5, Niobium(V) oxide (wt.%)	0.245	0.009	0.240	0.250	0.239	0.251
P_2O_5, Phosphorus(V) oxide (wt.%)	0.302	0.008	0.298	0.305	0.296	0.307
SiO_2, Silicon dioxide (wt.%)	76.59	0.399	76.40	76.78	76.34	76.84
Sn, Tin (ppm)	1181	72	1140	1223	1150	1213
SO_3, Sulphur trioxide (wt.%)	0.057	0.005	0.054	0.060	0.052	0.063
SrO, Strontium oxide (ppm)	223	29	204	243	IND	IND
TiO_2, Titanium dioxide (wt.%)	0.584	0.008	0.581	0.587	0.574	0.594
Thermogravimetry						
LOI^{1000}, Loss on ignition @1000°C (wt.%)	0.887	0.060	0.852	0.922	0.861	0.914

Note: intervals may appear asymmetric due to rounding

INTRODUCTION

OREAS reference materials are intended to provide a low cost method of evaluating and improving the quality of analysis of geological samples. To the geologist they provide a means of implementing quality control in analytical data sets generated in exploration from the grass roots level through to prospect evaluation, and in grade control at mining operations. To the analyst they provide an effective means of calibrating analytical equipment, assessing new techniques and routinely monitoring in-house procedures.

SOURCE MATERIALS

Certified Reference Material OREAS 148 has been prepared from spodumene $LiAl(Si_2O_5)$-rich pegmatite ore blended with granodiorite and with minor additions of Sn oxide ore and Nb concentrate. The pegmatite was sourced from stockpile grab samples from the Greenbushes Mine owned by Talison Lithium Ltd located just south of the town of Greenbushes in the south-western corner of Western Australia. The barren I-type hornblende-bearing granodiorite was sourced from the Late Devonian Lysterfield granodiorite complex located in eastern Melbourne, Australia. The Sn lateritic ore material was sourced from the Doradilla Project located in north central NSW and the Nb concentrate was sourced from Anglo American Brasil Catalão’s niobium mine in Goiás, Brazil. The Nb concentrate was produced from niobium-rich ore developed in the saprolite zone over alkaline-carbonatite complexes.

COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 148 was prepared in the following manner:

- Drying to constant mass at 105°C;
- Milling of Li and Nb ores to 100% minus 30 microns;
- Milling of Sn ore and granodiorite to 98% minus 75 microns;
- Preliminary homogenisation and check assaying of source materials;
- Final homogenisation by blending the source materials in specific ratios to achieve target grades;
- Packaging in 10g units in laminated foil pouches.

ANALYTICAL PROGRAM

Twenty two commercial analytical laboratories participated in the program to certify the analytes reported in Table 1. The following methods were employed:

- Four acid digestion for full ICP-OES and ICP-MS elemental suites (up to 22 laboratories depending on the element) except for one laboratory who used an AAS finish for Li only;
- Peroxide fusion for full ICP-OES and ICP-MS elemental suites (up to 21 laboratories depending on the element);
- Lithium borate fusion with XRF finish for whole rock package including Nb and Ta (up to 22 laboratories depending on the element);

- Thermogravimetry for LOI at 1000° C; (9 laboratories used a conventional muffle furnace and 6 laboratories used a thermogravimetric analyser).

For the round robin program ten test units were taken at predetermined intervals during the bagging stage, immediately following homogenisation and are considered representative of the entire batch. The six samples received by each laboratory were obtained by taking two 20g scoop splits from each of three separate 300g test units. This format enabled nested ANOVA treatment of the results to evaluate homogeneity, i.e. to ascertain whether between-unit variance is greater than within-unit variance. Table 1 presents the 117 certified values together with their associated 1SD's, 95% confidence and tolerance limits and Table 2 below shows 56 indicative values. Table 3 provides performance gate intervals for the certified values based on their associated pooled standard deviations. Tabulated results of all elements together with analytical method codes, uncorrected means, medians, standard deviations, relative standard deviations and per cent deviation of lab means from the corrected mean of means (PDM[3]) are presented in the detailed certification data for this CRM (**OREAS 148 DataPack.xlsx**).

Table 2. Indicative Values for OREAS 148.

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
4-Acid Digestion								
Ag	ppm	*0.649*	Ir	ppm	*0.007*	Si	wt.%	*34.98*
Au	ppm	*0.098*	Pt	ppm	*0.018*	Sn	ppm	*837*
B	ppm	*3.23*	Re	ppm	*< 0.002*	Te	ppm	*0.21*
Cd	ppm	*0.48*	S	wt.%	*0.024*			
Hg	ppm	*0.030*	Se	ppm	*2.20*			
Peroxide Fusion ICP								
Ag	ppm	*5.08*	Lu	ppm	*0.17*	Se	ppm	*< 20*
B	ppm	*27.5*	Ni	ppm	*26.9*	Ta	ppm	*22.2*
Cd	ppm	*< 10*	Pb	ppm	*28.4*	Te	ppm	*< 1*
Co	ppm	*< 20*	Re	ppm	*< 0.1*			
Ge	ppm	*4.27*	S	wt.%	*0.020*			
Borate Fusion XRF								
As	ppm	*81*	Gd_2O_3	ppm	*< 100*	Sm_2O_3	ppm	*< 100*
Bi	ppm	*< 100*	HfO_2	ppm	*< 100*	Ta_2O_5	ppm	*< 100*
CeO_2	ppm	*975*	La_2O_3	ppm	*613*	ThO_2	ppm	*< 100*
Cl	ppm	*107*	Mo	ppm	*< 10*	U_3O_8	ppm	*< 100*
Co	ppm	*29.2*	Nd_2O_3	ppm	*450*	V_2O_5	ppm	*121*
Cr_2O_3	ppm	*100*	Ni	ppm	*35.2*	W	ppm	*21.7*
Cu	ppm	*326*	Pb	ppm	*43.7*	Y_2O_3	ppm	*117*
Dy_2O_3	ppm	*< 100*	Pr_6O_{11}	ppm	*400*	Yb_2O_3	ppm	*< 100*
Er_2O_3	ppm	*< 100*	Rb	ppm	*1365*	Zn	ppm	*160*
Ga_2O_3	ppm	*46.7*	Sb	ppm	*18.3*	Zr	ppm	*167*

Note: the number of significant figures reported is not a reflection of the level of certainty of stated values. They are instead an artefact of ORE's in-house CRM-specific LIMS.

STATISTICAL ANALYSIS

Certified Values, Confidence Limits, Standard Deviations and Tolerance Limits (Table 1) have been determined for each analyte following removal of individual, laboratory dataset (batch) and 3SD outliers (single iteration). For individual outliers within a laboratory batch the z-score test is used in combination with a second method that determines the per cent deviation of the individual value from the batch median. Outliers in general are selected on the basis of z-scores > 2.5 and with per cent deviations (i) > 3 and (ii) more than three times the average absolute per cent deviation for the batch. In certain instances statistician's prerogative has been employed in discriminating outliers. Each laboratory data set mean is tested for outlying status based on z-score discrimination and rejected if > 2.5. After individual and laboratory data set (batch) outliers have been eliminated a non-iterative 3 standard deviation filter is applied, with those values lying outside this window also relegated to outlying status. The Certified Values are the means of accepted laboratory means after outlier filtering.

The 95% Confidence Limits are inversely proportional to the number of participating laboratories and inter-laboratory agreement. It is a measure of the reliability of the certified value. A 95% confidence interval indicates a 95% probability that the true value of the analyte under consideration lies between the upper and lower limits. *95% Confidence Limits should not be used as control limits for laboratory performance.*

Standard Deviation values (1SDs) are reported in Table 1 and provide an indication of a level of performance that might reasonably be expected from a laboratory being monitored by this CRM in a QA/QC program. The SD's take into account errors attributable to measurement uncertainty and CRM variability. For an effective CRM the contribution of the latter should be negligible in comparison to measurement errors. The SD values thus include all sources of measurement uncertainty: between-lab variance, within-run variance (precision errors) and CRM variability. OREAS prepared reference materials have a level of homogeneity such that the observed variance from repeated analysis has its origin almost exclusively in the analytical process rather than the reference material itself.

The SD for each analyte's certified value is calculated from the same filtered data set used to determine the certified value, i.e. after removal of any individual, lab dataset (batch) and 3SD outliers (single iteration). These outliers can only be removed after the absolute homogeneity of the CRM has been independently established, i.e. the outliers must be confidently deemed to be analytical rather than arising from inhomogeneity of the CRM. **The standard deviation is then calculated for each analyte from the pooled accepted analyses generated from the certification program.**

In the application of SD's in monitoring performance it is important to note that not all laboratories function at the same level of proficiency and that different methods in use at a particular laboratory have differing levels of precision. Each laboratory has its own inherent SD (for a specific concentration level and analyte-method pair) based on the analytical process and this SD is not directly related to the round robin program.

The majority of data generated in the round robin program was produced by a selection of world class laboratories. The SD's thus generated are more constrained than those that would be produced across a randomly selected group of laboratories. To produce more generally achievable SD's the 'pooled' SD's provided in this report include inter-lab bias. This 'one size fits all' approach may require revision at the discretion of the QC manager concerned following careful scrutiny of QC control charts.

Table 3 shows **Performance Gates** calculated for two and three standard deviations. As a guide these intervals may be regarded as warning or rejection for multiple 2SD outliers, or rejection for individual 3SD outliers in QC monitoring, although their precise application should be at the discretion of the QC manager concerned. A second method utilises a 5% window calculated directly from the certified value. Standard deviation is also shown in relative percent for one, two and three relative standard deviations (1RSD, 2RSD and 3RSD) to facilitate an appreciation of the magnitude of these numbers and a comparison with the 5% window. Caution should be exercised when concentration levels approach lower limits of detection of the analytical methods employed as performance gates calculated from standard deviations tend to be excessively wide whereas those determined by the 5% method are too narrow.

Tolerance Limits (ISO Guide 3207) were determined using an analysis of precision errors method and are considered a conservative estimate of true homogeneity. The meaning of tolerance limits may be illustrated for tin (Sn) by fusion XRF, where 99% of the time ($1-\alpha=0.99$) at least 95% of subsamples ($\rho=0.95$) will have concentrations lying between 1150 and 1213 ppm. Put more precisely, this means that if the same number of subsamples were taken and analysed in the same manner repeatedly, 99% of the tolerance intervals so constructed would cover at least 95% of the total population, and 1% of the tolerance intervals would cover less than 95% of the total population (ISO Guide 35). *Please note that tolerance limits pertain to the homogeneity of the CRM only and should not be used as control limits for laboratory performance.*

The homogeneity of OREAS 148 has also been evaluated in a **nested ANOVA** of the round robin program. Each of the twenty four round robin laboratories received six samples per CRM and these samples were made up of paired samples from three different, non-adjacent sampling intervals. The purpose of the ANOVA evaluation is to test that no statistically significant difference exists in the variance between-units to that of the variance within-units. This allows an assessment of homogeneity across the entire prepared batch of OREAS 148. The test was performed using the following parameters:

- Null Hypothesis, H_0: Between-unit variance is no greater than within-unit variance (reject H_0 if p-value < 0.05);
- Alternative Hypothesis, H_1: Between-unit variance is greater than within-unit variance.

P-values are a measure of probability where values less than 0.05 indicate a greater than 95% probability that the observed differences in within-unit and between-unit variances are real. The datasets were filtered for both individual and laboratory data set (batch) outliers prior to the calculation of *p*-values. This process derived no significant *p*-values across the entire 113 certified values except for neodymium (Nd) by 4-acid digest. This isolated case is most likely due to random statistical probability as there is no other supporting evidence to suspect greater between-unit variance compared with within-unit variance. The null hypothesis is therefore retained.

It is important to note that ANOVA is not an absolute measure of homogeneity. Rather, it establishes whether or not the analytes are distributed in a similar manner throughout the packaging run of OREAS 148 and whether the variance between two subsamples from the same unit is statistically distinguishable to the variance from two subsamples taken from any two separate units. A reference material therefore, can possess poor absolute homogeneity yet still pass a relative homogeneity test if the within-unit heterogeneity is large and similar across all units.

Based on the statistical analysis of the results of the inter-laboratory certification program it can be concluded that OREAS 148 is fit-for-purpose as a certified reference material (see 'Intended Use' below).

Table 3. Pooled-Lab Performance Gates for OREAS 148.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5% window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
4-Acid Digestion											
Al, wt.%	5.27	0.170	4.93	5.61	4.76	5.78	3.23%	6.47%	9.70%	5.00	5.53
As, ppm	58	3.2	51	64	48	67	5.60%	11.20%	16.80%	55	60
Ba, ppm	1000	36	927	1072	891	1109	3.64%	7.27%	10.91%	950	1050
Be, ppm	36.2	2.53	31.2	41.3	28.6	43.8	6.98%	13.97%	20.95%	34.4	38.0
Bi, ppm	18.9	1.17	16.6	21.3	15.4	22.4	6.21%	12.41%	18.62%	18.0	19.9
Ca, wt.%	0.872	0.037	0.798	0.945	0.761	0.982	4.23%	8.47%	12.70%	0.828	0.915
Ce, ppm	725	64	597	853	534	917	8.81%	17.63%	26.44%	689	762
Co, ppm	6.31	0.403	5.50	7.11	5.10	7.51	6.39%	12.79%	19.18%	5.99	6.62
Cr, ppm	60	9	42	77	34	85	14.41%	28.82%	43.23%	57	63
Cs, ppm	314	16	283	345	267	361	5.01%	10.01%	15.02%	298	330
Cu, ppm	338	16	305	370	289	386	4.78%	9.55%	14.33%	321	355
Dy, ppm	6.66	0.93	4.81	8.52	3.88	9.44	13.91%	27.82%	41.73%	6.33	7.00
Er, ppm	2.20	0.26	1.68	2.72	1.42	2.98	11.78%	23.57%	35.35%	2.09	2.31
Eu, ppm	7.54	0.458	6.62	8.46	6.17	8.91	6.07%	12.15%	18.22%	7.16	7.92
Fe, wt.%	3.02	0.132	2.76	3.29	2.63	3.42	4.37%	8.74%	13.10%	2.87	3.17
Ga, ppm	29.2	2.32	24.6	33.8	22.2	36.2	7.95%	15.90%	23.85%	27.7	30.7
Gd, ppm	17.1	2.2	12.6	21.5	10.4	23.8	13.08%	26.16%	39.24%	16.2	17.9
Ge, ppm	0.55	0.10	0.35	0.76	0.25	0.86	18.51%	37.02%	55.53%	0.53	0.58
Hf, ppm	2.16	0.22	1.72	2.59	1.51	2.81	10.08%	20.16%	30.24%	2.05	2.27
Ho, ppm	0.84	0.09	0.65	1.03	0.56	1.13	11.25%	22.50%	33.75%	0.80	0.89
In, ppm	3.98	0.202	3.57	4.38	3.37	4.58	5.08%	10.15%	15.23%	3.78	4.18
K, wt.%	1.47	0.041	1.39	1.55	1.35	1.60	2.82%	5.64%	8.46%	1.40	1.54
La, ppm	446	28	390	503	362	531	6.31%	12.62%	18.94%	424	469
Li, wt.%	0.465	0.009	0.447	0.484	0.438	0.493	1.96%	3.93%	5.89%	0.442	0.489
Li_2O, wt.%	1.00	0.020	0.963	1.04	0.943	1.06	1.96%	3.93%	5.89%	0.952	1.05
Lu, ppm	0.17	0.02	0.12	0.22	0.10	0.24	14.47%	28.93%	43.40%	0.16	0.18
Mg, wt.%	0.454	0.020	0.414	0.493	0.395	0.513	4.35%	8.70%	13.05%	0.431	0.477
Mn, wt.%	0.037	0.002	0.034	0.041	0.032	0.042	4.77%	9.54%	14.30%	0.035	0.039
Mo, ppm	8.86	0.344	8.17	9.55	7.83	9.89	3.88%	7.77%	11.65%	8.42	9.30
Na, wt.%	0.860	0.039	0.783	0.937	0.744	0.976	4.49%	8.98%	13.47%	0.817	0.903
Nb, wt.%	0.169	0.010	0.150	0.188	0.140	0.198	5.72%	11.45%	17.17%	0.160	0.177
Nd, ppm	267	11	244	289	233	300	4.19%	8.37%	12.56%	253	280
Ni, ppm	22.2	0.98	20.2	24.1	19.2	25.1	4.42%	8.85%	13.27%	21.1	23.3
P, wt.%	0.131	0.005	0.120	0.141	0.115	0.146	4.00%	7.99%	11.99%	0.124	0.137
Pb, ppm	24.9	2.20	20.5	29.3	18.3	31.5	8.85%	17.70%	26.54%	23.7	26.2
Pr, ppm	82	2.0	78	86	76	88	2.39%	4.79%	7.18%	78	86
Rb, ppm	1324	41	1242	1405	1202	1446	3.08%	6.16%	9.24%	1258	1390
Sb, ppm	16.2	0.78	14.6	17.8	13.9	18.5	4.81%	9.61%	14.42%	15.4	17.0
Sc, ppm	8.23	0.554	7.13	9.34	6.57	9.90	6.73%	13.46%	20.19%	7.82	8.65

Note: intervals may appear asymmetric due to rounding.

Table 3 continued.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5% window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
4-Acid Digestion continued											
Sm, ppm	34.2	0.94	32.3	36.1	31.4	37.0	2.75%	5.51%	8.26%	32.5	35.9
Sr, ppm	204	16	173	236	158	251	7.62%	15.25%	22.87%	194	215
Ta, ppm	23.1	2.9	17.3	28.9	14.4	31.8	12.52%	25.04%	37.57%	21.9	24.2
Tb, ppm	1.71	0.145	1.42	2.00	1.28	2.14	8.47%	16.93%	25.40%	1.62	1.80
Th, ppm	48.2	3.62	41.0	55.5	37.4	59.1	7.51%	15.03%	22.54%	45.8	50.6
Ti, wt.%	0.345	0.015	0.314	0.376	0.299	0.391	4.47%	8.94%	13.41%	0.328	0.362
Tl, ppm	12.2	0.59	11.0	13.4	10.4	13.9	4.84%	9.67%	14.51%	11.6	12.8
Tm, ppm	0.20	0.03	0.14	0.26	0.11	0.29	14.91%	29.83%	44.74%	0.19	0.21
U, ppm	8.10	0.332	7.44	8.77	7.10	9.10	4.10%	8.20%	12.30%	7.70	8.51
V, ppm	54	3.1	48	61	45	64	5.72%	11.45%	17.17%	52	57
W, ppm	6.45	0.373	5.70	7.20	5.33	7.57	5.79%	11.58%	17.36%	6.13	6.77
Y, ppm	18.5	2.0	14.5	22.5	12.6	24.4	10.71%	21.41%	32.12%	17.6	19.4
Yb, ppm	1.15	0.12	0.91	1.38	0.79	1.50	10.30%	20.60%	30.90%	1.09	1.20
Zn, ppm	162	5	151	173	146	178	3.34%	6.68%	10.03%	154	170
Zr, ppm	79	4.8	69	88	64	93	6.07%	12.14%	18.21%	75	82
Peroxide Fusion ICP											
Al, wt.%	5.37	0.148	5.07	5.66	4.92	5.81	2.77%	5.53%	8.30%	5.10	5.64
As, ppm	59	4.0	51	67	47	71	6.75%	13.51%	20.26%	56	62
Ba, ppm	1009	26	956	1062	930	1088	2.62%	5.24%	7.86%	959	1060
Be, ppm	38.8	2.00	34.8	42.8	32.8	44.8	5.15%	10.30%	15.45%	36.8	40.7
Bi, ppm	19.3	1.31	16.6	21.9	15.3	23.2	6.81%	13.63%	20.44%	18.3	20.2
Ca, wt.%	0.903	0.048	0.807	0.999	0.758	1.048	5.34%	10.68%	16.01%	0.858	0.948
Ce, ppm	795	53	689	901	636	955	6.68%	13.36%	20.03%	755	835
Cr, ppm	69	5.8	57	80	51	86	8.38%	16.76%	25.13%	65	72
Cs, ppm	311	13	286	337	273	350	4.11%	8.22%	12.32%	296	327
Cu, ppm	351	35	280	421	245	456	10.05%	20.10%	30.15%	333	368
Dy, ppm	6.06	0.492	5.07	7.04	4.58	7.53	8.12%	16.25%	24.37%	5.75	6.36
Er, ppm	2.00	0.121	1.76	2.24	1.63	2.36	6.07%	12.13%	18.20%	1.90	2.10
Eu, ppm	7.22	0.425	6.37	8.07	5.95	8.50	5.88%	11.77%	17.65%	6.86	7.58
Fe, wt.%	3.06	0.083	2.89	3.22	2.81	3.30	2.71%	5.42%	8.13%	2.90	3.21
Ga, ppm	29.2	1.50	26.2	32.3	24.7	33.8	5.14%	10.29%	15.43%	27.8	30.7
Gd, ppm	15.8	1.34	13.1	18.5	11.8	19.8	8.48%	16.96%	25.43%	15.0	16.6
Hf, ppm	4.15	0.53	3.09	5.20	2.56	5.73	12.77%	25.54%	38.31%	3.94	4.35
Ho, ppm	0.94	0.12	0.69	1.19	0.57	1.31	13.11%	26.22%	39.33%	0.89	0.99
In, ppm	4.22	0.299	3.62	4.81	3.32	5.11	7.08%	14.17%	21.25%	4.00	4.43
K, wt.%	1.50	0.050	1.40	1.60	1.35	1.65	3.30%	6.61%	9.91%	1.43	1.58
La, ppm	478	15	448	507	434	521	3.05%	6.10%	9.15%	454	501
Li, wt.%	0.476	0.011	0.455	0.498	0.444	0.509	2.26%	4.52%	6.78%	0.453	0.500
Li_2O, wt.%	1.03	0.023	0.980	1.07	0.956	1.10	2.26%	4.52%	6.78%	0.975	1.08
Mg, wt.%	0.469	0.016	0.436	0.501	0.420	0.518	3.48%	6.96%	10.44%	0.445	0.492
Mn, wt.%	0.038	0.002	0.034	0.041	0.032	0.043	4.80%	9.60%	14.41%	0.036	0.040
Mo, ppm	10.1	0.59	8.9	11.2	8.3	11.8	5.82%	11.63%	17.45%	9.6	10.6
Nb, wt.%	0.168	0.011	0.145	0.191	0.134	0.202	6.76%	13.52%	20.28%	0.160	0.176

Note: intervals may appear asymmetric due to rounding.

Table 3 continued.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5% window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
Peroxide Fusion ICP continued											
Nd, ppm	260	12	236	284	224	296	4.64%	9.28%	13.93%	247	273
P, wt.%	0.129	0.008	0.114	0.145	0.106	0.153	6.08%	12.15%	18.23%	0.123	0.136
Pr, ppm	82	1.9	78	86	76	88	2.36%	4.72%	7.08%	78	86
Rb, ppm	1362	79	1204	1520	1125	1599	5.80%	11.61%	17.41%	1294	1430
Sb, ppm	16.3	0.96	14.4	18.2	13.5	19.2	5.86%	11.72%	17.57%	15.5	17.1
Sc, ppm	8.64	1.43	5.79	11.49	4.36	12.92	16.51%	33.03%	49.54%	8.21	9.07
Si, wt.%	36.00	1.065	33.87	38.13	32.80	39.19	2.96%	5.91%	8.87%	34.20	37.80
Sm, ppm	34.3	3.16	28.0	40.6	24.8	43.8	9.20%	18.40%	27.60%	32.6	36.0
Sn, ppm	1157	80	997	1317	917	1397	6.92%	13.84%	20.76%	1099	1215
Sr, ppm	209	11	186	232	174	243	5.49%	10.99%	16.48%	198	219
Tb, ppm	1.58	0.141	1.30	1.86	1.16	2.01	8.92%	17.85%	26.77%	1.50	1.66
Th, ppm	51	2.0	47	55	44	57	4.01%	8.02%	12.03%	48	53
Ti, wt.%	0.352	0.011	0.329	0.375	0.318	0.386	3.24%	6.47%	9.71%	0.335	0.370
Tl, ppm	12.3	0.73	10.8	13.7	10.1	14.4	5.96%	11.92%	17.88%	11.6	12.9
Tm, ppm	0.24	0.04	0.17	0.31	0.13	0.35	14.89%	29.78%	44.66%	0.23	0.25
U, ppm	8.55	0.448	7.66	9.45	7.21	9.90	5.24%	10.48%	15.72%	8.13	8.98
V, ppm	56	3.1	50	62	47	66	5.42%	10.84%	16.25%	54	59
W, ppm	6.42	1.32	3.78	9.05	2.47	10.37	20.53%	41.06%	61.59%	6.10	6.74
Y, ppm	19.4	1.47	16.5	22.4	15.0	23.8	7.55%	15.10%	22.64%	18.5	20.4
Yb, ppm	1.37	0.18	1.00	1.74	0.82	1.93	13.45%	26.91%	40.36%	1.30	1.44
Zn, ppm	159	11	137	181	126	192	6.94%	13.88%	20.83%	151	167
Zr, ppm	153	25	104	203	79	227	16.12%	32.24%	48.36%	146	161
Borate Fusion XRF											
Al_2O_3, wt.%	10.20	0.096	10.00	10.39	9.91	10.48	0.94%	1.88%	2.82%	9.69	10.71
BaO, ppm	1152	55	1041	1262	986	1317	4.79%	9.57%	14.36%	1094	1209
CaO, wt.%	1.24	0.014	1.21	1.26	1.19	1.28	1.11%	2.23%	3.34%	1.17	1.30
Fe_2O_3, wt.%	4.35	0.055	4.24	4.46	4.19	4.51	1.26%	2.52%	3.77%	4.13	4.57
K_2O, wt.%	1.81	0.022	1.76	1.85	1.74	1.87	1.21%	2.42%	3.64%	1.72	1.90
MgO, wt.%	0.797	0.015	0.768	0.826	0.754	0.841	1.83%	3.66%	5.49%	0.757	0.837
MnO, wt.%	0.050	0.001	0.048	0.052	0.047	0.053	1.94%	3.88%	5.82%	0.047	0.052
Na_2O, wt.%	1.19	0.018	1.15	1.22	1.14	1.24	1.49%	2.98%	4.47%	1.13	1.25
Nb_2O_5, wt.%	0.245	0.009	0.228	0.262	0.219	0.271	3.53%	7.06%	10.59%	0.233	0.257
P_2O_5, wt.%	0.302	0.008	0.286	0.317	0.278	0.325	2.58%	5.16%	7.74%	0.286	0.317
SiO_2, wt.%	76.59	0.399	75.79	77.38	75.39	77.78	0.52%	1.04%	1.56%	72.76	80.42
Sn, ppm	1181	72	1038	1325	966	1396	6.06%	12.12%	18.19%	1122	1240
SO_3, wt.%	0.057	0.005	0.048	0.067	0.043	0.072	8.43%	16.86%	25.29%	0.054	0.060
SrO, ppm	223	29	166	280	137	309	12.81%	25.63%	38.44%	212	234
TiO_2, wt.%	0.584	0.008	0.569	0.599	0.561	0.607	1.31%	2.61%	3.92%	0.555	0.613
Thermogravimetry											
LOI^{1000}, wt.%	0.887	0.060	0.767	1.007	0.707	1.067	6.77%	13.53%	20.30%	0.843	0.932

Note: intervals may appear asymmetric due to rounding.

PARTICIPATING LABORATORIES

1. Actlabs, Ancaster, Ontario, Canada
2. ALS, Brisbane, QLD, Australia
3. ALS, Lima, Peru
4. ALS, Loughrea, Galway, Ireland
5. ALS, Perth, WA, Australia
6. ALS, Vancouver, BC, Canada
7. Bureau Veritas Commodities Canada Ltd, Vancouver, BC, Canada
8. Bureau Veritas Geoanalytical, Adelaide, SA, Australia
9. Bureau Veritas Geoanalytical, Perth, WA, Australia
10. Intertek Genalysis, Perth, WA, Australia
11. Intertek Testing Services Philippines, Cupang, Muntinlupa, Philippines
12. MinAnalytical Services, Perth, WA, Australia
13. Nagrom, Perth, WA, Australia
14. PT Geoservices Ltd, Cikarang, Jakarta Raya, Indonesia
15. SGS Australia Mineral Services, Perth, WA, Australia
16. SGS Canada Inc., Vancouver, BC, Canada
17. SGS del Peru, Lima, Peru
18. SGS Geosol Laboratorios Ltda, Vespasiano, Minas Gerais, Brazil
19. SGS Lakefield Research Ltd, Lakefield, Ontario, Canada
20. UIS Analytical Services, Centurion , South Africa
21. Zarazma Mahan Company, Mahan, Kerrman, Iran
22. Zarazma Mineral Studies Company, Tehran, Iran

PREPARER AND SUPPLIER

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It is packaged in 10g units in robust single-use laminated foil pouches.

INTENDED USE

OREAS 148 is intended for the following uses:

- for the monitoring of laboratory performance in the analysis of analytes reported in Table 1 in geological samples;
- for the verification of analytical methods for analytes reported in Table 1;
- for the calibration of instruments used in the determination of the concentration of analytes reported in Table 1.

STABILITY AND STORAGE INSTRUCTIONS

OREAS 149 has been prepared from spodumene $LiAl(Si_2O_5)$-rich pegmatite ore with minor additions of Sn oxide ore and Nb concentrate. It contains very little reactive sulphide and in its unopened state and under normal conditions of storage it has a shelf life beyond ten years. Its stability will be monitored at regular intervals and purchasers notified if any changes are observed.

INSTRUCTIONS FOR CORRECT USE

The certified values determined by 4-acid digestion and peroxide fusion ICP refer to the concentration levels in the packaged state. There is no need for drying prior to weighing and analysis.

In contrast the certified values determined by borate fusion XRF and for LOI at 1000° C are on a dry basis. This requires the removal of hygroscopic moisture by drying in air to constant mass at 105° C. If the reference material is not dried prior to analysis, the certified values should be corrected to the moisture-bearing basis.

HANDLING INSTRUCTIONS

Fine powders pose a risk to eyes and lungs and therefore standard precautions such as the use of safety glasses and dust masks are advised.

TRACEABILITY

The analytical samples were selected in a manner to represent the entire batch of prepared CRM. This 'representivity' was maintained in each submitted laboratory sample batch and ensures the user that the data is traceable from sample selection through to the analytical results that underlie the consensus values. Each analytical data set has been validated by its assayer through the inclusion of internal reference materials and QC checks during analysis. The laboratories were chosen on the basis of their competence (from past performance in inter-laboratory programs) for a particular analytical method, analyte or analyte suite, and sample matrix. Most of these laboratories have and maintain ISO 17025 accreditation. The certified values presented in this report are calculated from the means of accepted data following robust statistical treatment as detailed in this report.

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QMS ACCREDITED

ORE Pty Ltd is accredited to ISO 9001:2015 by Lloyd's Register Quality Assurance Ltd for its quality management system including development, manufacturing, certification and supply of CRMs.

CERTIFYING OFFICER

Craig Hamlyn (B.Sc. Hons - Geology), Technical Manager - ORE P/L

REFERENCES

ISO Guide 30 (1992), Terms and definitions used in connection with reference materials.

ISO Guide 31 (2000), Reference materials – Contents of certificates and labels.

ISO Guide 3207 (1975), Statistical interpretation of data - Determination of a statistical tolerance interval.

ISO Guide 35 (2006), Certification of reference materials - General and statistical principals.

Appendix 4 – Assessment files used in this report

Table 14-1 Assessment reports used in this report.

Assessment Report Number	Year of Report	Year of Work	Company	Type of Work	Description of Work
52F16NW0130	1964	1964	Canol Metal M.L.	Diamond drilling	Drilling of four holes totalling 732 ft (223.11 m)
52K01SW9511	1969	1969	Oja Ltd	Airborne radiometric survey	Airborne radiometric surveys conducted over seven claimed properties in the Sioux Lookout-Dryden area
52F15NE0353	1970	1970	Canadian Nickel Company	Diamond drilling	Drilling of one hole totalling 324 ft (98.76 m)
52F15NE0351	1972	1972	Mike Woitowicz and Alex Glatz	Diamond drilling	Drilling of four holes totalling 439 ft (133.81 m)
52F16NW0122	1978	1978	Tantalum Mining Co.	Diamond drilling	Drilling of three drill holes totalling 512 ft (156.06 m)
52F15NE0015	1979	1979	Rio Tinto Canadian Exploration	Diamond drilling	Drilling of four holes totalling 1337 ft (407.52 m)
52F15NE8293	1981	1981	Patino Mines Ltd	Geophysical survey	Magnetic and electromagnetic (EM) surveying
52F16NW0008	1994	1994	Mike Woitowicz and Alex Glatz	Prospecting	Line cutting, EM survey, magneotmeter survey
52F16NW2003	1998	1998	Champion Bear Resources Ltd	Geophysical survey	Magnetometer survey over pegmatite dyke
52F15NE2001	1998	1997-1998	Mike Woitowicz	Prospecting	Reconnaissonce prospecting proximal to Lateral Lake Stock

Assessment Report Number	Year of Report	Year of Work	Company	Type of Work	Description of Work
			and Alex Glatz		
52F16NW2004	1998	1998	Mike Woitowicz and Alex Glatz	Geophysical survey	Magnetometer and EM survey proximal to Lateral Lake Stock
52F15NE2002	2000	1999	Mike Woitowicz and Alex Glatz	Prospecting, diamond drilling	Drilling of two holes totalling 102.72 m, assaying of 64 core samples and 39 grab samples for rare metals
20000773	2007	2007	Solitaire Minerals Corp.	Diamond drilling	Drilling of seven holes totalling 717 m; all holes assayed for base and rare metals
2000006990	2010	2010	Solitaire Minerals Corp.	Geological and geochemical sampling	chip sampling, further sampling of pegmatites, soil sampling

Appendix 5 – Daily Prospecting Sheet and GPS Tracks

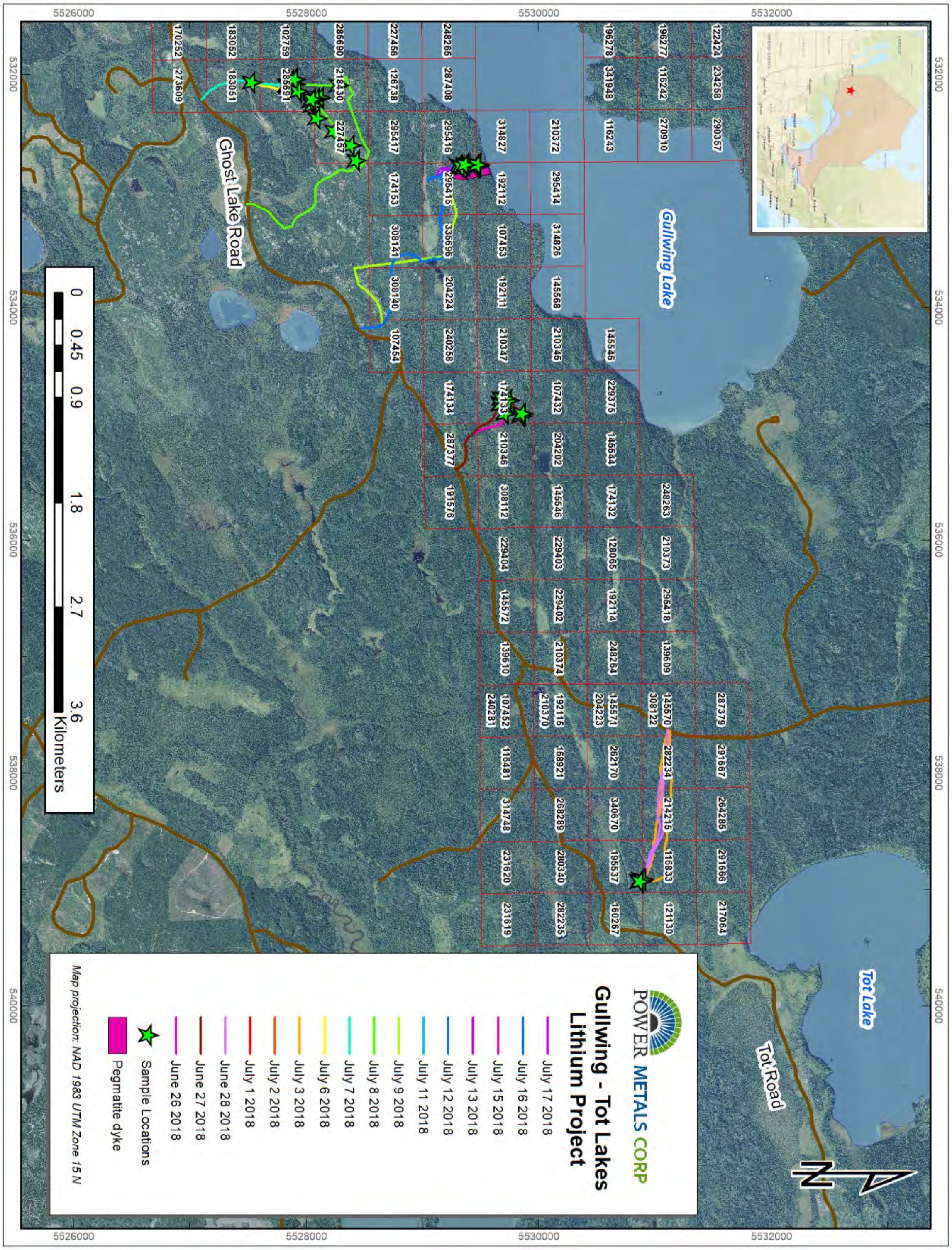

Figure 14-1. Overview map of GPS tracks and sample locations for Summer 2018 prospecting at Gullwing-Tot Lake

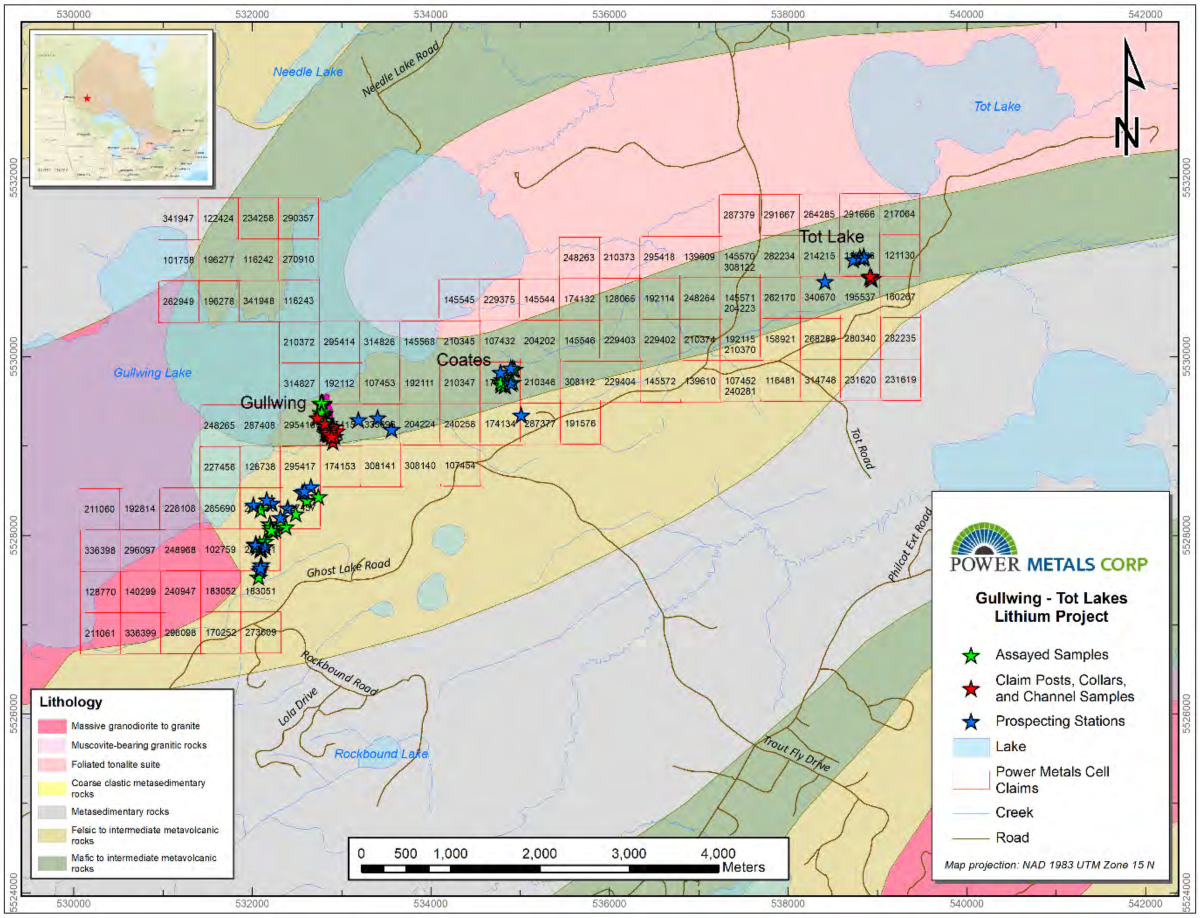

Figure 14-2 Overview sample map for 2018 prospecting program at Gullwing-Tot Lakes.

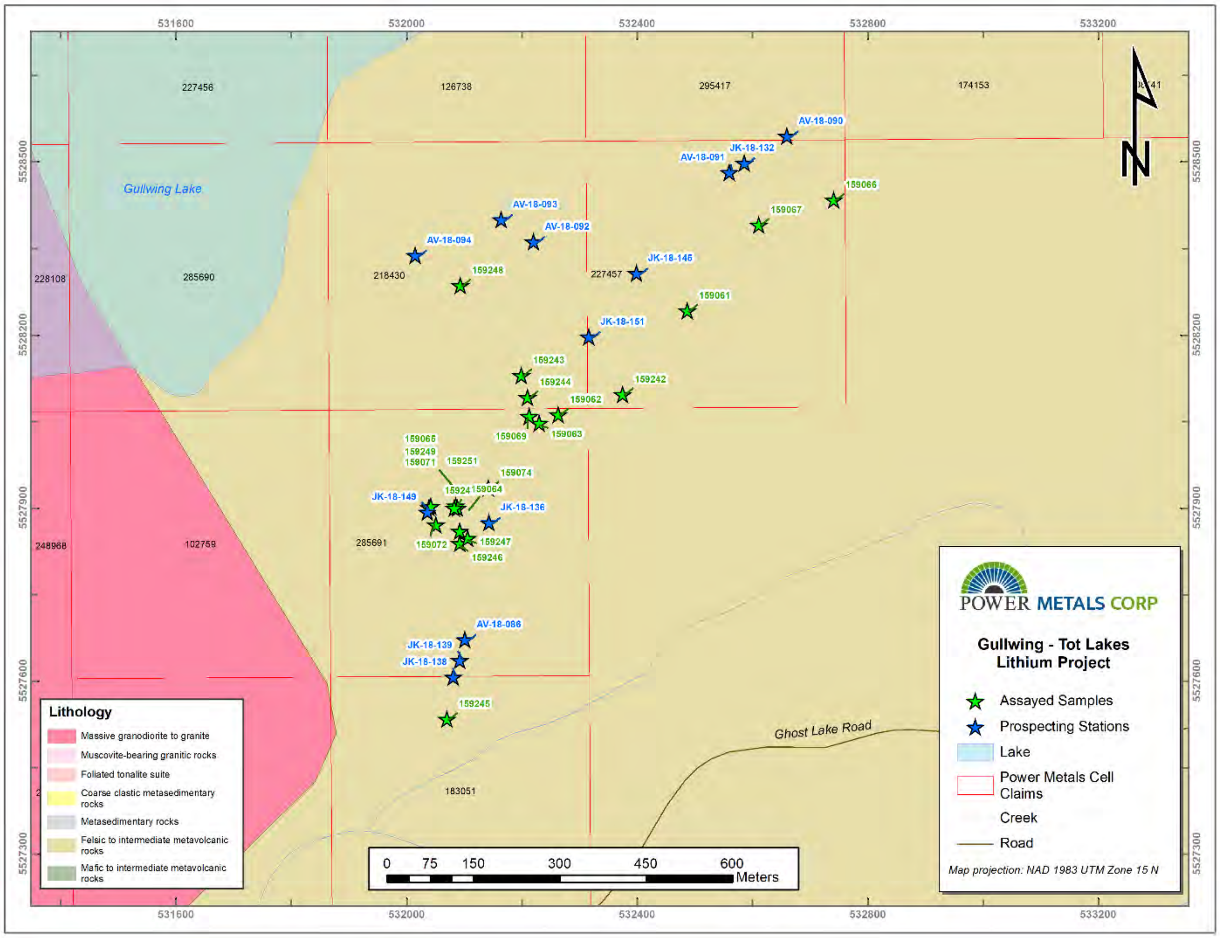

Figure 14-3 Sample map at Drope occurrence for 2018 prospecting program.

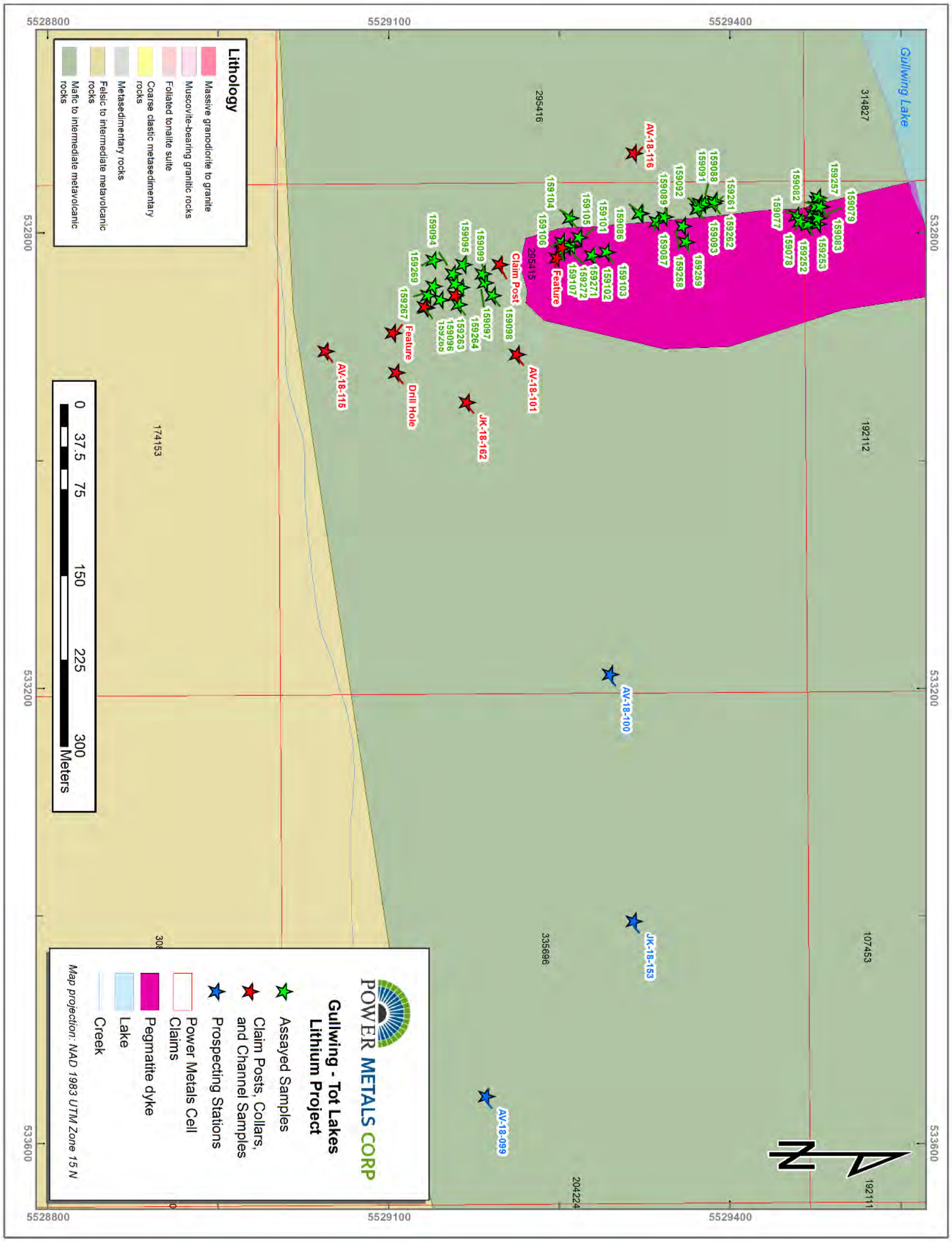

Figure 14-4 Sample map at Gullwing Lake pegmatite for 2018 prospecting program

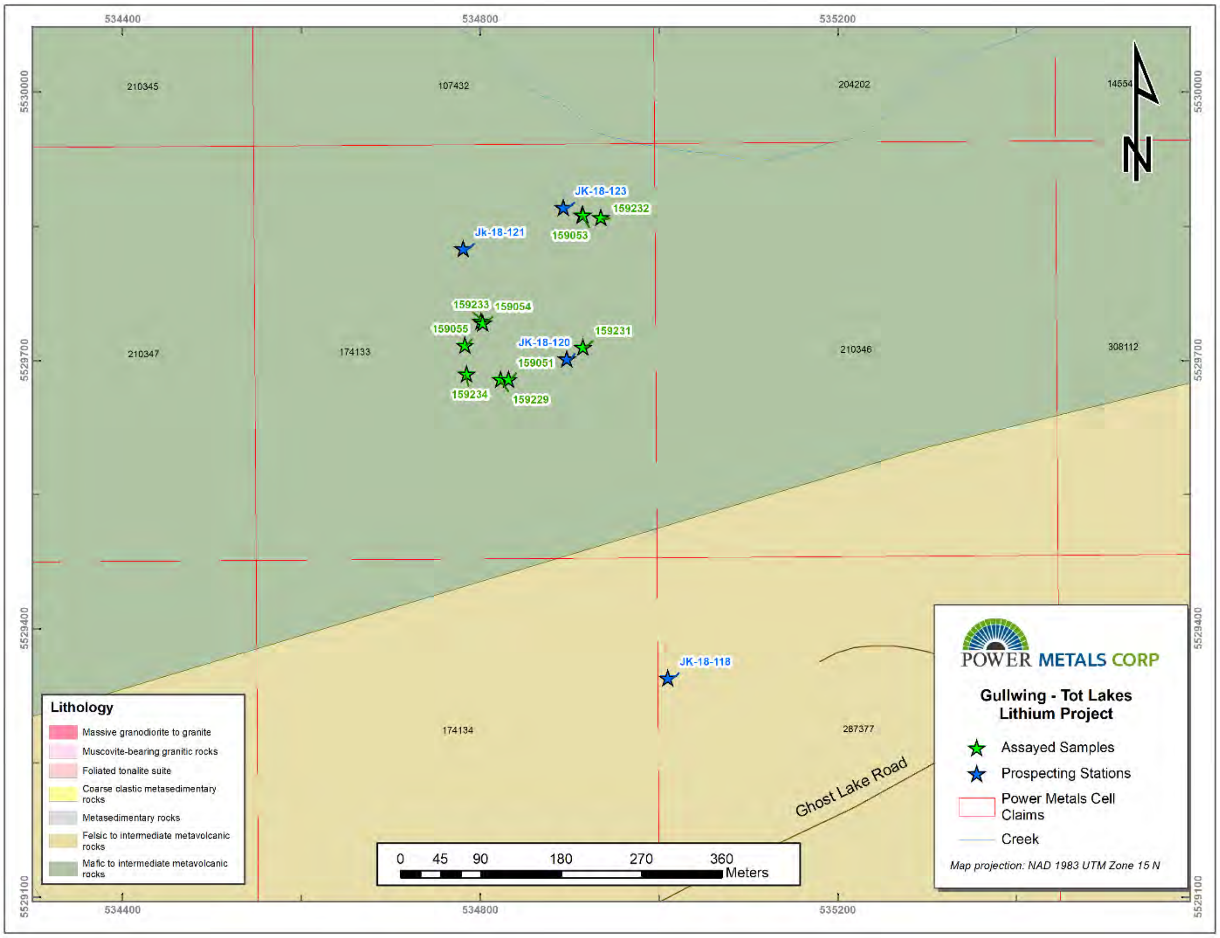

Figure 14-5 Sample map at Coates occurrence for 2018 prospecting program

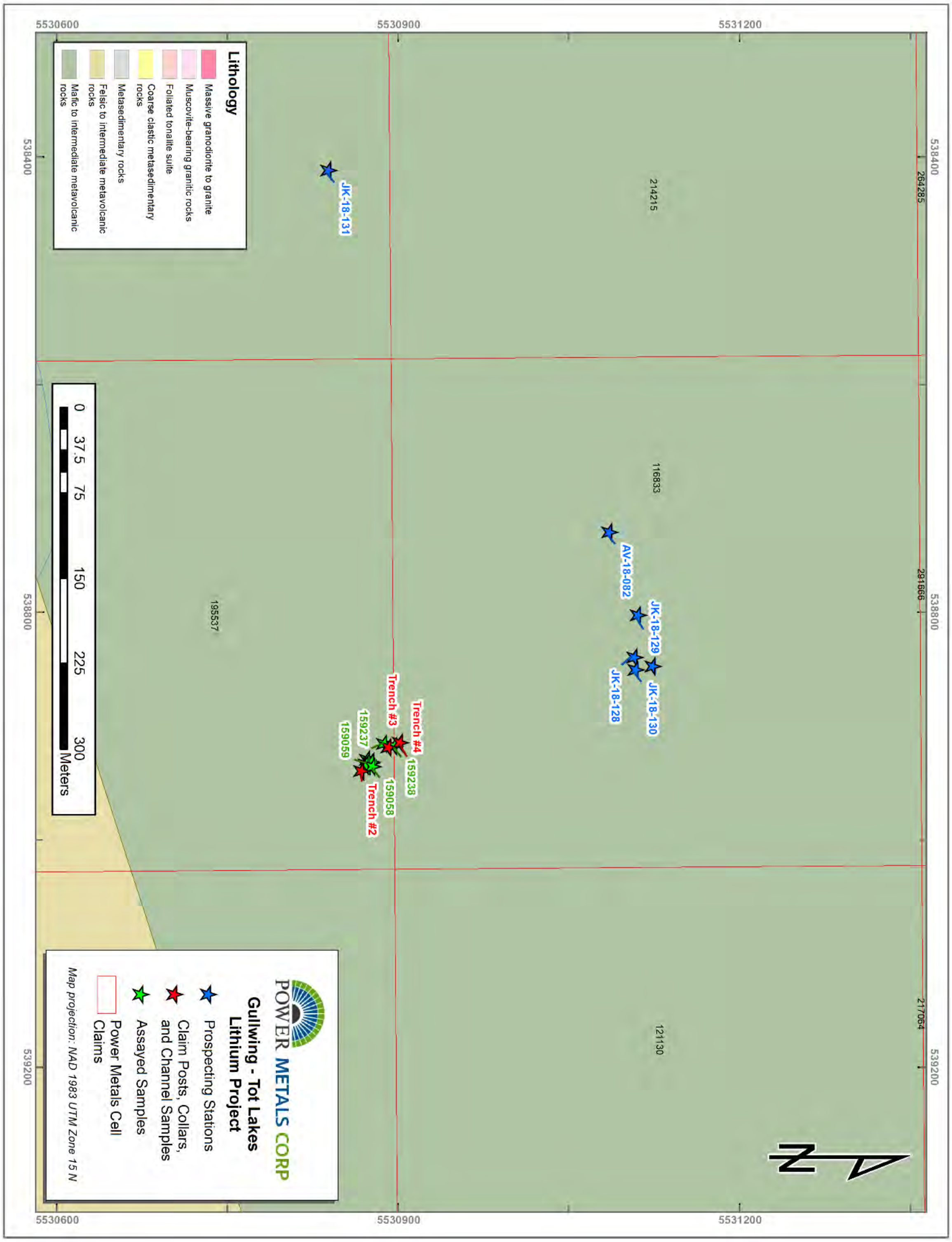

Figure 14-6 Sample map for Tot Lake pegmatite for 2018 prospecting program.

Table 14-2 Gullwing-Tot Lake daily prospecting sheets

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
AV-18-069	534823	5529679	411	159229	Pegmatite	from 2-3m wide pink peg qz ksp white mica
AV-18-070	534915	5529715	405	159231	Pegmatite	from ~N-S trending white peg qz + ksp + mica. Sample taken adjacent to micaceous contact
AV-18-071	534935	5529860	397	159232	Pegmatite	from old blast pit at the contact of E-W trending pink kspar qz moly pegmatite and metaseds. Moly present in trace amounts
AV-18-072	534801	5529744	416	159233	Pegmatite	from 0.5m white peg composed of ksp qz and white mica and garnet
AV-18-074	534785	5529685	407	159234	Pegmatite	EW trending pink peg with qz ksp and a bit of albitization. Minor moly observed
AV-18-075	538930	5530873	397	159235	Pegmatite	from tot lake showing. Pink spodumene up to 5mm in diameter and 5cm in length. Spodumene makes up up to 40% of rock. Also contains ksp, blue apatite (mm scale) tourmaline and possible black oxides although they seem more like tourmaline as some have triangular cross sections
AV-18-076	538935	5530874	395	159236	Pegmatite	from tot lake showing. Aplite with layers of fine grained black minerals. 1-3mm accicular and massive crystals. Euhedral tourmaline up to 3mm observed on adjacent sample
AV-18-077	538916	5530888	401	159237	Pegmatite	northern extent of of tot lake showing, whiter spod up to 10cm in length and ksp, qz, and green mica
AV-18-078	538918	5530897	399	159238	Pegmatite	Ta zone with megacrystic albitized ksp, tantalite up to 1.5 cm and qz
AV-18-079	538933	5530876	397	159239	Pegmatite	saccharoidal aplite
AV-18-080	538932	5530877	400	159241	Pegmatite	sample of pollucite? + qz + 20% pink spod
AV-18-081	538848	5531124	396	159262	Mafic Volcanic	
AV-18-082	538730	5531086	396	159263	Granite	
AV-18-083	532375	5528097	426	159242	Pegmatite	looking for drope. Micaceous white peg qz + ksp + musc up to 2cm in diameter. Up to 1m in diameter. Trending 330
AV-18-084	532199	5528130	429	159243	Pegmatite	pink common peg qz ksp minor white mica.
AV-18-085	532210	5528092	432	159244	Pegmatite	pink peg 2m wide striking at 325. pink ksp, musc, qz and trace grt\

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
AV-18-086	532101	5527672	425	159264	Pegmatite	chasing drope peg into cut. Extends past this point as small sum 1m peg veins that may extend along strike for a ways. Large red ksp in a matrix of finer granitoid minerals. Jones of qz and coarse musc observed. Lots of berries. Will follow up tomorrow
AV-18-087	532070	5527534	410	159245	Pegmatite	large pink peg in the middle of the cut to the south of the drope showing. 15cm pink/red ksp, qz, musc, and some albite and minor grt. Zones of qz and euhedral musc up to 2cm observed
AV-18-088	532092	5527839	426	159246	Pegmatite	near the center of the drope showing. Fine grained aplitic rock with the avg grain size of a few mm. green mica + pink ksp + albite + qz + minor layered grt and minor bt
AV-18-089	532106	5527848	424	159247	Pegmatite	from local frost heaved boulder. Vcg pink graphic kspwith green musc up to 1cm. Sample also contains bt and garnet and qz and musc. Pods of musc and qz observed
AV-18-090	532660	5528545	422	159265	Metasediment	northern ridge of rock on the way to the drop occurance in a cut. fine grained metased with a foliation defined by biotite
AV-18-091	532560	5528482	426	159266	Pegmatite	Minor ~30cm pink common pegmatite crosscutting host conglomerate in a NS direction
AV-18-092	532220	5528362	418	159267	Metasediment	Foliated metasedimentary rock with biotite defining foliation
AV-18-093	532164	5528400	416	159268	Pegmatite	minor ~40cm pink common pegmatite crosscutting host metased in a NS direction
AV-18-094	532015	5528338	403	159269	Metasediment	Foliated biotite bearing metased
AV-18-095	532093	5528286	409	159248	Metavolcanic	Fine grained pink felsic metavolcanic rock that sort of looked like an aplite in the field. contains sub mm scale red grt and green amphibole? which is schmeared on broken surface
AV-18-096	532085	5527904	431	159249	Metasediment	Sample taken from metased xenolith (3mx1m) in large white peg measuring ~10m x 2m. this peg is some of the whitest observed at the drope showing

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
AV-18-097	532039	5527901	426	159251	Pegmatite	Large white peg OC is 8x6m and looks really promising. peg itself contains megacrystic zones of graphic ksp xtals up to 50cm in diameter, musc up to 5cm in diameter and finer grained red grt associated with a qz core. the peg roughly strikes EW.
AV-18-099	533559	5529186	401	159271	Metasediment	Metaseds containing ~50cm rusty boudin of qz. host rock contains minor disseminated py and cpy and cm scale raggedy grt
AV-18-100	533188	5529295	428	159272	Pegmatite	2m wide common pink peg. individual crystals have schmeared grain bounmdaries with individual grains at ~2cm in diameter. trends at ~200
AV-18-101	532907	5529213	423		Drill Collar	unlabelled drill collar strikes 270, dips 34 degrees
AV-18-102	532792	5529478	398	159252	Pegmatite	Zone 5C of breaks in North Gullwing exposure. "equigranular albite unit" sample taken near the edge of the OC at contact with quartz zone. sample is predominantly albite with minor white to green musc on cleavage planes. rare oxides are observed in unit but not observed in sample. a bit of quartz from adjacent zone made it into the bag as well.
AV-18-103	532793	5529469	402	159253	Pegmatite	Sample from unit 5D of breaks "Bladed Bt Musc equigranular albite zone" sample is composed of bt and albite. bt is in ~10x15cm thin sheets. sheets are parallel and separated by less than 1cm of albite between them. minor white muscovite is observed on a face perpendicular to direction of biotite sheets
AV-18-104	532783	5529473	401	159254	Pegmatite	Another sample of unit 5C of Breaks "equigranular albite unit". This time it contains 2 macroscopic xtals of euhedral columbite
AV-18-105	532783	5529478	400	159255	Pegmatite	Selvedge of peg on rim of mafic volcanics. sample composed of foliated biotite and albite with minor layered red grt. ~30% bt makes up the foliation

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
AV-18-106	532772	5529477	395	159256	Pegmatite	sample taken from north end of northern zone of gullwing. composed of clevelandite, qz and green musc
AV-18-107	532769	5529478	400	159257	Pegmatite	Altered spodumene from the northwest end of outcrop. sample contains about half spodumene with minor ab, lepidolite and qz. spod were originally over 30cm long and 5 cm wide
AV-18-108	532794	5529359	428	159258	Metavolcanic	sample of mafic metavolcanic from contact on east side of central gullwing zone 5J pegmatite. sample is fine grained and pretty rusted. wp averaged for 22 minutes
AV-18-109	532808	5529362	438	159259	Pegmatite	Unit 5J of Breaks "muscovite bladed biotite equigranular albite" This sample comes from zone of less abundant bt than is typical of unit. one 5mmx5mm cube of oxide observed and put in bag. the sample is med grained and predominantly composed of orange ksp and smoky qz with minor bt and musc
AV-18-110	532772	5529387	418	159260	Pegmatite	bottom of central gullwing at most N part of outcrop. Material in bag is from units 5B (spod qz blocky ksp albite core unit) and 5G (platy albite green muscovite unit) sample taken from top of old blast pit and contains green mica replacing large (40cm x 7 cm) xtals of spod and quartz core
AV-18-111	532774	5529386	413	159261	Pegmatite	from same units as above. sample composed of clevelandite and minor qz. small black oxides observed in outcrop but it is unclear if any made it into the bag. Just kidding one piece with at least 3 that were mm scale black oxide. ox is associated with orange alteration. sample taken from edge of historic channel sample that strikes EW and is ~60cm long. WP is 20 minute average
Claim Post	532828	5529198	423		Pegmatite	line post 800m S of no 1 post for claim 205359.
Drill Hole	532923	5529107	392		Pegmatite	old drill pad for hole GW-07-05. Azimuth 360, dip -45, length 78m. Recheck the orientation of the dike and the azimuth of the hole. Seems like much more

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
						dike could have been intersected but need to recheck intended target of drill hole.
Feature	538940	5530868	380		Pegmatite	Trench number two on the Tot Lake Pegmatite. Trenches are linear blast pits and not defined well. The trench itself runs at about 066 degrees for abo0ut 5.5m. Sample point was taken at center of trench and averaged for 45 minutes.
Feature	538919	5530892	395		Pegmatite	Trench number three on Breaks map of the Tot Lake Pegmatite. This trench is definitely identified by a an old witness sample that had TR3 2m marked on it. Although reading marker was difficult. This trench is smaller and runs at about 046 degrees for about 3m. Waypoint was taken at center of trench and averaged for about 40 minutes.
Feature	538915	5530902	408		Pegmatite	Trench number four on the Tot Lake occurance as mapped by Breaks. This trench is the most northern point on the outcrop with most covered by the pond that formed from excavating to look for outcrop. Not possible to get an orientation or any sort of measurements. The gps point is roughly from center of trench and was averaged for about 40 minutes.
Feature	532888	5529104			Pegmatite	another small rock wrapped in an orange and blue ribbon. RC78059? written on it
Feature	532865	5529132			Pegmatite	another small rock wrapped in orange and blue ribbon. Has a tag that has RC736060 written on it. Believe it is another mapping grid location
Feature	532855	5529159	419		Pegmatite	orange and blue ribbon marked around small rock placed on the outcrop surface. I think it was used as a reference grid for mapping. Quartz rich-kspar-albite-biotite peg. Nonmineralized potassic pegmatite
Feature	532822	5529248	426		Pegmatite	small rock with orange and blue ribbon. RE76.205 written on it.
Feature	532813	5529253	430		Pegmatite	Terrible quality channel sample. Roughly 2m ling striking E-W. runs through potassic pegmatite. No mineralization observed.

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-118	535010	5529345	396		Metasediment	grey. Fg to mg. strongly foliated, metased. Quartz feldspathic. Strong foliation defined by alignment of fg-mg biotite. Foliation at 065. no dip.
JK-18-119	534832	5529679	399	159051	Pegmatite	very large pegmatite forming a ridge or local topo high with metavolcanics. No mineralization observed. Sample is weakly variable with a largely aplitic groundmass with pegmatitic patches. Dominantly kspar-smokey massive quartz. Minor greenish and locally red stained muscovite. contacts with the metavolcanics are sharp and planar, lack alteration halo into host and run about 100 degrees. No moly observed. sampled the aplitic margin with strong hem alt. No holm observed in host.
JK-18-120	534897	5529702	407		Pegmatite	3-4m wide pegmatite trending N-S. coarser grained with ample amounts of blocky pink and white kspar, locally showing strong quartz intergrowth. Minor muscovite. Not sampled. Sharp contacts with host metavolcanics, lack alt halo, run at 350/70.
Jk-18-121	534781	5529825	419		Pegmatite	1m wide pegmatite dike running roughly north south. Weakly zoned peg. Aplitic margins with small quartz-kspar rich core. Minimal muscovite. No oxides. No holm observed.
JK-18-122	534914	5529863	397	159052	Pegmatite	historical workings near the Coates showing. Found a few old blast pits and trenches. Trenches look like they are following the contact area between metavol. One of the Molybdenum rich e-w dikes and it looks like thatâ€™s what they were targeting. Pegmatite has strong hematite alt and an red aplitic grounmass with altered cg kspars and microcline with minor quartz. Molybdenite is often found as small fg blebs up to 0.5cm and as stringers. took two samples. both host moly. one looks like there is a pinkish alteration to the groundmass, almost looks like a carbonate.
JK-18-122b	534915	5529863	397	159053	Pegmatite	second sample from same blast pit. The first sample was from outcrop whereas this one looked like a piece of blasted loose rock. Sample has some interesting pink, localized alteration and strong hematite alt. Trace fg red garnets

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-123	534893	5529871			Pegmatite	narrow E-w dike, roughly 1m wide, dominantly kspar and microcline with lesser quartz and lacking musc. Contacts are sharp and planar at 086/58. no holm observed.
JK-18-124	534803	5529742	412	159054	Pegmatite	North south dike, about 1.5m wide. White-slight pinkish kspar, Very cg books of muscovite and massive dark grey quartz. No mineralization observed. Dike runs around 032/82.
JK-18-125	534783	5529717	416	159055	Pegmatite	small 4m round pegmatite knob. White very cg blocky kspar up to 30cm. Very cg massive smoky and milky quartz. Cg books of strong green muscovite up to 6cm. Possible localized patches of cleavlandite? Sampled an area with about 25% fg bright green muscovite. no mineralization observed. no contacts observed. metavolcanics very close by.
JK-18-126	538935	5530873	287	159056	Pegmatite	went to the Tot lake occurance. Believe it was the main outcrop, excavator has been there to strip and there are two small blast pits with strong spodumene mineralization found in pit. Pegmatite is zone with aplitic margins and quartz-spodumene rich core. Mineralization extends about 40m along strike but more work needs to be done to expose pegmatite. Spod mineralization ranges from about 10% to as much as 40-50% locally. Spod is very coarse grained, up to 40cm, often white to white with pinkish hue. The occasional finer grained spod is strong pink. Sampled a piece of frost heaved outcrop near the blast pit. sampled the quartz-spodumene core, possibly around 40-50% spod. lacks muscovite except on occasional surfaces of spod. Tried to take a high grade sample of spod to see what the deposit can do. spod ranges from 3-25cm in size.
JK-18-126	538935	5530872	287	159057	Pegmatite	very large cg spodumene. Beige to weakly pinkish hue up to 10x5cm but very narrow. Maybe 35% of sample is spodumene. Sampled from a quartz rich spod zone within central portion of showing. Will return to showing to do further work and sample the aplitic margins and follow up for pollucite.
JK-18-126	538934	5530872	396	159059	Ultramafic Volcanic	sampled the host at the contact of spod bearing pegmatite with narrow aplite at the margins and porphyroblastic ultramafic Volcanic. No Holm observed.

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-127	538936	5530878	392	159058	Pegmatite	attempted to get a pollucite grab from the area mapped as having 30% pollucite. Strong white coloration and seemed to lack cleavage. There is white kspar locally and very cg spodumenes that had been plucked so could give false impression of cleavage. sample was taken from next to the aplite pods. sample has a slight light pink hue. tried to get minimal amounts of spod in sample.
JK-18-128	538840	5531108	398		Intermediate Volcanics	small opening with 100% moss and vegetation cover, outcrop just a few inches underneath. Hard to strip because of roots. Looks like an intermediate volcanic. Weathers orange with weak porosity. Nonmineralized and nonmagnetic.
JK-18-129	538803	5531111	401		Intermediate Volcanics	strongly foliated intermediate to felsic volcanics with wedge of mafic volcanic/mafic seds. Looks like a shear zone almost. The mafic shows much stronger deformation. Boudinaged veins/lense at contact. Foliation is at 072/55. Poorly defined weak fracturing forms a set running at 140/60. No offsets observed as fracture cuts foliation and units. orientation of fracture set roughly aligns with the trend of the Tot occurance.
JK-18-130	538851	5531109	376		Intermediate Volcanics	same shear or contact as the previous station. Mapped on OGS map, the clip, as the outcrops labelled with 2 and 8s. Quartz vein up to 30cm, hematite alt with trace py. Strongly foliated mafiv vol with weak banding. Foliation is slightly variable but generally runs at 050/45. fracture sets running at 320/82 and 336/84. No peg or holm observed.
JK-18-131	538412	5530839	396		Mafic Volcanic	strongly foliated mafic volcanic, amphibolite-weakly gneissic. Small veins of felsic intrusive. So far this is what has been observed on all outcrops since the last station. Did not even observe a peg boulder in the area. Same as what has been mapped by the OGS.

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-132	532586	5528498	415		Conglomerate	strongly deformed polymicitc conglomerate. Clasts are small cobble in size and elongate in 070 derection, elongated at a ratio of roughly 5:1. cobbles of tonalite, sandstone and mafic volcanic.
JK-18-133	532487	5528242	433	159061	Pegmatite	sampled a large peg boulder, 2x1.5m subangular boulder. White kspar with weak pinkish hue, musc and quartz. Pegmatite is muscovite rich and quartz poor. Strong greenish hue to musc.
JK-18-134	532263	5528062	430	159062	Pegmatite	large outcrop of felsic-intermediate volcanic with several rusty-hem alt quartz veins 5-15cm wide. 1m wide pegmatite with a weak pinkish hue. Aplitic or strongly altered. Fine grained green musc, fg albite and minor quartz. 1-2% fg euhedral red garnets. Dike has sharp planar contacts. lack alt halo and no Holm observed. foliation of the volcanics 050. strike and dip of dike 050/80.
JK-18-135	532230	5528047	436	159063	Pegmatite	large outcrop of sandstone. Intersection of two dikes. Roughly N-S and E-W dikes. Both appear as common potassic dikes. Smaller narrower dike strikes at around 060. the second dike is wider, 2-2.5m, strikes at 352/80. appears as though the north-east trending dike is earlier and cut by N-S. No offset observed. No holm observed. Sampled the outer contact of the north south dike proximal to the dike and host rock. Sample is finer grained, green and red in color, kspar-quartz rich with fg green musc and trace fg red garnet.
JK-18-136	532143	5527875	428		Conglomerate	litho stop. Strongly foliated, polymictic pebble conglomerate. 2-10mm in size. Pegmatite is a strong red potassic peg, 1m wide. Two dikes observed, one trends at 030 and the other 320. could not get sample and close to others.
JK-18-138	532081	5527607	411		Pegmatite	Red cg common potassic peg. K-spar can be quite blocky but remains a strong red color. Cg books of musc up to 3.5cm. Clear blebby quartz. Semi continuous outcrop tracking north through cut. Leads into the Drope. In places large k-spar seems like its set into fg granitic matrix. nonmineralized and nonmag

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-139	532092	5527636	428		Conglomerate	took picture to show the contact between narrow Peg and conglomerate. Narrow alt halo reaching into the dike from the conglomerate. Halo is defined by white alt from seds, albite alt? Bedding/foliation of conglomerate is 060. Kike trends at 036.
JK-18-140	532092	5527860	428	159064	Pegmatite	sampled from very large exposure of red common peg. Red Kspar>>musc-quartz>albite and trace red fg garnet. Minor localized peg patches throughout. Sampled a fg green musc rich area. Contact is sharp at 270/85.
JK-18-141	532088	5527900	426	159065	Pegmatite	looked at the northern most exposure of the Drope. Becomes much more white and K-spar becomes coarser grained and blocky. Increased greenish musc from 0.3-1cm. Sampled a frost heaved-exfoliated fragment. Very large xenoliths of metased up to 1x4m. Dike seems to trend north south but hard to determin because of veg and ample large xenos.
JK-18-143	532741	5528434	427	159066	Pegmatite	Narrow red common peg. Kspar dominant with quartz-albite-musc. Muscovite has weak greenish hue. Nonmineralized and no alt into host and no chill. Contacts are weakly irregular but strikes roughly at 330/90.
JK-18-144	532611	5528391	425	159067	Pegmatite	large lichen covered outcrop or ridge froming local topo high. Host is metased-fg pebble conglomerate. Red finer grained peg. Kspar>>quartz>musc-biotite. Sampled along contact. No holm observed. Peg is around 2m wide and trends at 020. could not get dip.
JK-18-145	532399	5528307	426		Conglomerate	pebble conglomerate and interbedded sandstone. Bedding at 058/80.
JK-18-146	532213	5528059	435	159069	Pegmatite	sampled the finer grained aplitic phase of the peg next to contact with host. Sample has an overall green and pinkish hue to it due to fg green musc and hem alt. No oxides or min. difficult to determine true orientation but generally at 070/75. could not trace dike to the east but continues westerly.

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-146	532213	5528059	435	159068	Pegmatite	two samples taken from Drope. Sample B00159068 from common peg about 1m into dike from contact. White kspar-albite-green musc and quartz. Trace red garnets. Nonmin.
JK-18-147	532083	5527900	435	159071	Metasediment	took a sample of host at the contact with dike. No holm obsserved but did have 10-15% fg-mg biotite. No oxides observed in either peg or host.
JK-18-148	532051	5527871	439	159072	Pegmatite	another large outcrop as part of the main Drope outcrop. Possibly a more N-S trending dike. No contacts observed. Noticeably whiter blockier kspar-albite-quartz and fg green musc. Musc locally forms radiating bright green musc. Possibly replacement? Trace fg euhedral red garnet.
JK-18-149	532036	5527893			Pegmatite	picture of large whisps of replacement musc. Strong green color. Seems like elongate, deformed xenos or remnant minerals that have been replaced. See photos.
JK-18-150	532142	5527935	408	159074	Pegmatite	small ridge. White kspar up to 15cm. Greenish mg muscovite 1-3cm. Smokey massive quartz. 1% fg red garnets 1mm. Nonmin, no oxides, no holm observed in host. Strike and dip of metaseds 240/90, dike at 220/80.
JK-18-151	532316	5528197	391		Metasediment	quartz vein in in metaseds, weakly boudinaged. Veins run E-W.
JK-18-152	532042	5527903	404	159073	Pegmatite	took a sample of pure kspar to send to julie for the Rb/Cs ratio.
JK-18-153	533405	5529316	417		Mafic Volcanic	litho check, large E-W ridge forming regional topo high leading to Gullwing peg. Amphibolite grade meta with small 1-3mm subhedral black amphibole throughout.
JK-18-154	532785	5529459	396	159077	Intermediate Volcanics	sampled at the contact between aplitic layered pegmatite and intermediate volcanics. Strongly foliated with quartz-plag-biotite. Black biotite up to 4mm defines the foliation.

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-154	532785	5529459	396	159076	Mafic Volcanic	Sampled both of the volcanic units cutting into the North Gullwing outcrop on the west side near the top of the outcrop. Labelled units 1a and 2a in the map in the dryden peg tour gide by Fred Breaks. These units are a foliated biotite amphibolite (1a) and a intermediate metavolcanic or biotite tuff (2a). These units cut into a biotite garnet layered aplite-Peg. No mineralization observed and no holm observed in mafic xeno. Sample B00159076 is sampled from unit 1a. black fg-mg black euhedral amphibole up to 3,, and white plag (40-50%). sampled from the contact between the two volcanics about 1m from the contact with the pegmatite.
JK-18-155	532790	5529462	405	159078	Pegmatite	sampling the albitized 1, unit 5a - which is a local variance to the common albitization. Very large bladed biotite with possible columbite-albite intergrowth between biotite blades. This is small pod of %a near the top of the outcrop (southern end-center) of breaks map. did not observed the molybdenite that was described by breaks but could only bleach a small area. musc-biotite intergrowths reach up to 20cm locally.
JK-18-156	532787	5529478	398	159079	Pegmatite	down at the bottom of the outcrop (near northern most extent of map) sampled a sliver of the "mica nests". This unit has porphyroblastic albite set into a groundmass of fg green muscovite. Surface of the unit has a popcorn texture due to the rounded white albite. Large niobium oxides observed adjacent to "mica nests" in an aplitic unit.
JK-18-157	532777	5529476	397	159082	Pegmatite	localized pod of albitized zone, possibly albitized 2 according to breaks. One of the stippled outlines of spod pod from the north end of the outcrop, near center. Albitized microcline, very cg and blocky. Spod ranges from 5-35cm, with variable degrees of alteration intensity. Cleavelandite does have stronger presence in strongest mineralized zones. Purplish hue to quartz in localized patches due to lepidolite. sampled a very large crystal of yellowish but competent spodumene, has not been completely replaced and can still identify characteristic cleavage. Note: sample tag B00159081 was accidentally ripped and so no sample exists for B00159081, The sample at this station of the all spodumene sample is sample no. B00159082

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-158	532777	5529481	394	159083	Pegmatite	grab from the same small blast pit at the north end of the north Gullwing pegmatite. Dominantly massive smokey quartz with minor bright purple lepidolite. Sampled within cm of a strongly altered yellow spodumene.
JK-18-158b	532777	5529480	393	159084	Pegmatite	attempted to get a grab sample of a less altered near white spodumene. Sampled from blast pit near the contact with overburden. The spod was around 6cm wide with unknown length. Sample included cleavelandite-smokey quartz and white albite. Sample is around 35% spodumene in the bag.
JK-18-159	532783	5529322	434	159085	Mafic Volcanic	working at Gullwing Central outcorp. Eastern extent south side near the top of the outcrop. Found the contact between Breaks unit 5H -musc-biotite fg leucogranite and host unit 1a - foliated and lineated amphibolite. Contact is sharp but possibly a localizedfluctuation, strike and dip of sharp planar contact is 308/62. may be some possible wall rock alteration as amphiboles become slightly coarser grained and plag is clotty and interstitial. Sampled both host and leucogranite. B00159085 is the amphibolite with strong foliation and black amphibole, 2-4mm. No holm observed. roughly 30-40% beige subhedral plag. Trace fg bronzy biotite (0.5%). B00159086 sample of fg leucogranite. albite-quartz-biotite with lesser green musc. nonmineralized.
JK-18-159b	532783	5529321	434	159086	Pegmatite	sample description in previous description of JK-18-159
JK-18-160	532790	5529336	436	159087	Pegmatite	sampled fg banded aplite and peg adjacent to old blast pit on the west side of the southern extent of the outcrop. Unit 5c - equigranular albite rich zone with accesory quartz-musc. Actual sample taken may have been a local variation with small amount of peg mixed with the aplite, actual sample had minor amount of bladed biotite . Trench nearby was likely done to check for oxides in the aplitic whisps-bands. sample may host oxide.

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-161	532774	5529374	422	159088	Pegmatite	sampled from strongly albitized spodumene zone in an old blast pit. Marked on Breaks map by small stippled circle near center of Gullwing Central. Blst pit is around 2x5m running N-S down slope. Looks like they were actually chasing the oxides in bands strong albite alt next to cery cg microcline. Weathered surface has a mottled pink and white/beige appeearence with red halos often surrounding very cg books of biotite and also fg oxides? oxides may have been observed just outside quartz veining within fg more aplitic bands. oxides are euhedral, metallic luster, 2-3mm with a red halo surrounding area.
JK-18-162	532949	5529169	414		Collar	GW-07-02. metal tag still on the picket. GW-17-02, AZM 260, Dip -45, 171m. Looks like they collared into strongly foliated mafic volcanic. The core log does show a minor intersection with spod but numbers were not great.
JK-18-163	532871	5529258	428		Collar	Drill collar for drill hole GW-07-06. Azm 260, Dip -45, 84m length
JK-18-164	532786	5529343	446	159089	Pegmatite	small blast pit from the top (southern) portion of the Gullwing Central showing as mapped by Breaks. Likely blasted to follow oxides. Cg quartz-kspar-albite with minor very cg bladed biotite. Minor patches of cleavelandite. Samll localized pod of black, cg tourmaline. narrow bands of aplite which may host oxides. No spodumene in blast pit, lacks strong albite alt similar to the mineralized pods.
JK-18-165	532775	5529377	421	159091	Pegmatite	sampled the quartz core from Gullwing Central. Near the bottom of the outcrop (north end) just above the massive cg albite zone, as mapped by Breaks with stippled outline). Tried to sample just altered spodumene. Spod sampled was around 10cm long by 4cm wide. altered to a pale greenish yellow but could still identify spod cleavage. Cg green and red aggregates and books of muscovite. small garnets often found within sheets of musc. Spodumene powdered quite easily when hit with hammer or chisel.
JK-18-166	532777	5529373	418	159092	Pegmatite	different location within the same linear blast pit as the previous sample. This time targeted oxides in a strong albite alt zone with cleavelandite. Looks like altered microcline and kspar? Very cg books of green and red muscovite. Bright orange garnets within biotite and local aplitic patches between cg felds. Muscovite can be observed outside of the very cg aggregates and has a strong

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
						green hue. sampled from the edge of the blast pit near the natural topography of the outcrop but still within strong albite alt zone. Observed trace fg oxides within white aplitic patches.
JK-18-167	532779	5529372	423	159093	Pegmatite	sampling the southern extent of the blast pit near bottom of outcrop. Same blast pit and alteration zone as previous samples. Cg smokey and milky quartz. Very cg books of biotite and green musc. Minor cleavelandite 10%, very strong sodic-albite alt. Hem or a light pink alteration gives rock mottled appearence. possible oxides with very small red alt halos surrounding. nonmagnetic. sampled the quartz-spod zone as mapped by Breaks
JK-18-168	532836	5529157	423	159094	Pegmatite	prospecting the Gullwing South outcrop as mapped by Breaks. Sampled between the quartz core and finer grained, massive leucogranite. Altered pottasic peg? Long blades of biotite with a rusty hue makes unit identifiable. Albite with localized cleavelandite in very few localized patches. fg orange garnets throughout, increasing toward contact with leucogranite. No spod or oxides observed in grab sample. Believe sampled from albitized 1 zone.
JK-18-169	532828	5529166	425	159095	Pegmatite	finer grained, weakly aplitic, strongly albitized. Minor peg veins. Quartz-albite-musc. Fg red garnets throughout. No mineralization observed. Took sample as a litho rep.
JK-18-170	532845	5529159	431	159096	Pegmatite	sampled next to quartz core in strong albitized zone 1. albite-quartz-rusty red bladed biotite. Minor to trace cleavelandite locally present. Small stringers of a vibrant pink and purple mineral. Pink alteration to albitized micorcline? Gives grab a mottled pink and white appearence.

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-171	532844	5529185	417	159097	Pegmatite	sampled close to the main access trail into the Gullwing group of pegmatites. Large pod of massive milky quartz with lesser bladed biotite and kspar near by sample. Sample-aplitic fine grained albite alt zone- fg albite-quartz dominant with accessory red garnet, 2%. small rusty pits or oxides throughout sample, 0.5%, very fine grained disseminated. taken from contact zone between quartz core and pottassic peg. Unit may be layered PEG and aplite.
JK-18-172	532855	5529192	425	159098	Pegmatite	sampled unit 1a as mapped by Breaks, foliated aphibolite with trace biotite. Beige plag 30-40% with increase towards contact with dike. No holm observed. Looks like a large xenolith with irregular but sharp contacts, lacking alt halo or chill.
JK-18-173	532836	5529183	421	159099	Pegmatite	sampling from the Fullwing south outcrop. Very coarse grained quartz core with very cg white dpar at margins. Sampled large bladed biotite up to 12cm radiating away from quartz core. Checking for possible columbite within biotite blades.
JK-18-174	532804	5529268	431	159101	Pegmatite	20-40m SSW from gullwing central outcrop. Quartz biotite muscovite with lesser albitized feldspar. Biotite in very Cg aggregates. Looks like the Biotite is being altered to muscovite. Reddish hue to musch of the biotite. Sampled to check fro oxides.
JK-18-175	532820	5529279	435	159102	Pegmatite	finer grained pegmatite from small 2m square pod within the potassic peg. Dominantly fg kspar-quartz-bio. Trace red fg garnets.

Station	Easting	Northing	Elevation (m)	Sample No.	Lithology	Description
JK-18-176	532817	5529292	435	159103	Pegmatite	white finer grained peg near contact with mafic volcanic 1a. Peg lacks the bladed biotite, white kspar-albite-quartz. Fg red garnets with minor muscovite. No mineralization observed. Taken as a rep of the geochem near contact and check for oxides.
JK-18-177	532787	5529260	429	159104	Pegmatite	took two samples. One of the country rock and one of the pegmatite at contact. Mafic volcanic is unit 1a, a strongly foliated aphibolite with trace biotite. Pegmatite is white and pinkish aplite with strong fg garnets with lesser blebs of smokey quartz. contact is sharp, no alt halo, strikes at 024/vertical.
JK-18-177b	532787	5529260	429	159105	Pegmatite	sample of the pegmatite from previous description. No min oberved.
JK-18-178	532808	5529253	425	159106	Pegmatite	sampling 1-2m west of the quartz core and massive pink kspar zone at the base of the outcrop leading back to the access trail. Very fine green shean to much of the kspar grain boundaries. Strong white blocky albite nearby. No spodumene observed but very strong green color to the fg musc. fg red garnets 1%.
JK-18-179	532816	5529253	428	159107	Pegmatite	sampled adjacent to historical channel sample just 1m east of the quartz core. Channel runs E-W cutting through blocky poink kspar, albite alt finer grained zone. Fine grained green muscovite and quartz with albite. Very fine grained oxides observed 0.5%.
JK-18-180	532830	5529253			Pegmatite	contact between potassic peg and foliated amphibolite !a. small local area my be a localized measurement and not represent the overall strike of the dike. Strike and dip of sharp contact at 030/90.

Prospecting sheet abbreviations

Pet- petalite

Ksp- kfeldspar

Qz- quartz

Grt- garnet

Metaseds- metasedimentary rocks

Peg- pegmatite

Bt- biotite

Metavol- metavolcanics rock

Spess- spessartine garnet

Musc- muscovite

N- North

Py- pyrite

Aspy- arsenopyrite

Sph- sphalerite

Amph- amphibole

Xeno- xenoliths

Kspar- k feldspar

BIF- banded iron formation

Seds- sedimentary rocks

Fg- fine grained

Fol- foliation/foliated

Cg- coarse grained

Holmq- holmquistite

Mg- medium grained

Felds- feldspar

Litho- lithology

Mvol- metavolcanics

Hem- hematized

Plag- plagioclase

Appendix 6 – Grab Sample Assay Certificates

SGS

Certificate of Analysis
Work Order : LK1801808
[Report File No.: 0000016373]

Date: August 21, 2018

To: **Julie Selway**
POWER METALS CORP
SUITE 545-999 CANADA PLACE
VANCOUVER BC V6C 3E1

P.O. No.: -
Project No.: GULLWING-TOT LAKE
Samples: 49
Received: Jul 23, 2018
Pages: Page 1 to 15
(Inclusive of Cover Sheet)

Methods Summary

No. Of Samples	Method Code	Description
49	G_WGH79	Weighing of samples and reporting of weights
49	G_PRP89	Weigh, Dry, to 3kg, Crush 75% -2mm, Split to 250g, Pulverize to 85% -75µm
5	G_PHY03V	SG by pycnometer
49	GO_XRF76V	@Ore grade Borate fusion, XRF (0.5g plus 1g LOI)
49	GE_IC90M	@Package, ICPMS after Sodium Peroxide Fusion-Graphite Crucibles
49	GE_ICP91A	ICP-OES after Na_2O_2 fusion with HCl finish

Comments:

Assays not suitable for commercial exchange.
Li_2O reported as calculated from Li by ICP results.
Ag, Cd not determined due to sample matrix interference

Certified By : [signature]

Brett Pipher
Project Coordinator

SGS Minerals Services (Lakefield) is accredited by Standards Council of Canada (SCC) and conforms to the requirements of ISO/IEC 17025 for specific tests as indicated on the scope of accreditation to be found at http://www.scc.ca/en/programs/lab/mineral.shtml

Report Footer:

L.N.R.	= Listed not received	I.S.	= Insufficient Sample
n.a.	= Not applicable	--	= No result

*INF = Composition of this sample makes detection impossible by this method

M after a result denotes ppb to ppm conversion, % denotes ppm to % conversion

Methods marked with an asterisk (e.g. *NAA08V) were subcontracted
Elements marked with the @ symbol (e.g. @Cu) denote assays performed using accredited test methods

Element Method Det.Lim. Units	WtKg G_WGH79 0.001 kg	Sg G_PHY03V 0.01 sg	@LOI GO_XRF76V -10.000 %	@SiO2 GO_XRF76V 0.01 %	@Al2O3 GO_XRF76V 0.01 %	@Fe2O3 GO_XRF76V 0.01 %	@MgO GO_XRF76V 0.01 %	@CaO GO_XRF76V 0.01 %
B00159250	0.080	N.A.	0.297	98.6	0.42	0.92	0.02	0.04
B00159251	1.798	2.68	0.851	75.5	14.1	0.89	0.07	0.44
B00159252	1.609	N.A.	0.784	67.3	20.2	0.15	0.08	1.25
B00159253	1.580	N.A.	1.28	61.6	20.1	4.03	1.24	1.05
B00159254	1.139	N.A.	0.689	65.1	19.4	0.27	0.05	0.90
B00159255	1.179	N.A.	1.90	59.5	18.2	6.96	2.16	0.96
B00159256	0.959	N.A.	0.467	71.9	17.3	0.14	0.02	0.19
B00159257	0.978	N.A.	1.85	64.8	21.9	0.37	0.03	0.09
B00159258	1.455	N.A.	3.13	46.4	15.4	15.6	7.46	7.55
B00159259	0.924	N.A.	0.742	85.0	8.15	0.86	0.14	0.36
B00159260	0.045	N.A.	1.26	76.8	10.1	4.36	0.78	1.23
B00159261	2.039	2.73	2.17	64.3	22.4	0.88	0.10	0.17
B00159262	0.989	N.A.	0.946	70.7	17.4	0.43	0.06	0.45
B00159263	2.721	N.A.	1.31	65.2	19.0	2.89	0.76	1.00
B00159264	0.846	N.A.	0.801	82.2	9.94	1.11	0.22	0.58
B00159265	2.449	N.A.	0.995	74.6	13.5	0.51	0.09	0.10
B00159266	1.313	N.A.	0.598	82.6	9.81	0.46	0.05	0.31
B00159267	1.767	N.A.	0.775	75.9	13.8	0.97	0.20	0.72
B00159268	2.543	N.A.	0.713	72.1	16.2	1.21	0.07	0.94
B00159269	1.746	N.A.	0.963	75.3	13.8	0.61	0.06	0.35
B00159270	0.075	N.A.	0.0891	98.6	0.47	0.87	<0.01	<0.01
B00159271	1.601	2.69	1.50	76.1	14.0	0.81	0.25	0.40
B00159272	1.474	N.A.	0.935	72.6	17.5	0.37	0.10	0.95
B00159082	1.079	N.A.	0.798	64.4	27.1	0.28	0.04	0.04
B00159083	1.337	N.A.	0.427	97.3	1.65	0.47	<0.01	<0.01
B00159084	1.240	N.A.	0.455	84.0	10.7	0.33	0.03	0.08
B00159085	1.630	N.A.	0.847	51.5	14.5	13.1	6.42	10.8
B00159086	2.016	N.A.	0.877	75.8	14.7	0.31	0.06	0.80
B00159087	1.808	N.A.	0.878	72.6	15.4	1.31	0.37	0.90
B00159088	1.911	N.A.	0.969	68.9	18.5	0.29	0.07	0.52
B00159089	2.530	N.A.	1.72	73.3	14.7	1.39	0.37	0.39
B00159090	0.043	N.A.	1.52	76.5	10.1	4.36	0.77	1.22
B00159091	0.396	2.75	2.88	59.2	25.6	0.95	0.11	0.14
B00159092	0.959	N.A.	0.721	72.4	16.6	0.42	0.09	0.44
*Dup B00159092	N.A.	N.A.	0.740	72.5	16.7	0.42	0.09	0.43
B00159093	1.489	N.A.	1.80	70.1	16.2	1.00	0.16	0.54
B00159094	1.621	N.A.	1.08	71.1	16.0	2.34	0.56	0.90
B00159095	1.779	N.A.	1.11	71.7	16.5	1.34	0.25	0.98
B00159096	1.697	N.A.	1.27	69.4	17.1	1.88	0.53	1.06
B00159097	2.324	N.A.	0.718	74.5	15.2	1.03	0.14	1.00

Element	WtKg	Sg	@LOI	@SiO2	@Al2O3	@Fe2O3	@MgO	@CaO
Method	G_WGH79	G_PHY03V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V
Det.Lim.	0.001	0.01	-10.000	0.01	0.01	0.01	0.01	0.01
Units	kg	sg	%	%	%	%	%	%
B00159098	1.691	N.A.	1.69	49.5	12.7	17.2	6.62	9.08
B00159099	0.901	N.A.	2.09	71.2	14.2	3.97	1.11	0.76
B00159100	0.071	N.A.	0.247	98.5	0.62	0.80	0.03	0.05
B00159101	1.295	2.71	1.33	75.8	14.1	1.22	0.35	0.58
B00159102	0.625	N.A.	0.766	75.5	13.8	0.66	0.14	0.60
B00159103	1.843	N.A.	0.544	75.5	13.7	0.58	0.06	0.39
B00159104	1.681	N.A.	1.60	52.4	13.2	13.0	6.57	9.87
B00159105	1.940	N.A.	0.578	77.3	13.7	0.82	0.08	1.13
B00159106	1.630	N.A.	1.34	70.6	17.4	1.11	0.35	0.79
B00159107	1.163	N.A.	1.22	78.9	13.1	0.72	0.18	0.61
*Rep B00159268			0.672	72.4	16.4	1.22	0.06	0.95
*Rep B00159097			0.642	73.4	15.1	1.04	0.13	0.97
*Rep B00159261		2.72						

Element	@K2O	@Na2O	@TiO2	@MnO	@P2O5	@Cr2O3	@V2O5	Sum
Method	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V
Det.Lim.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0
Units	%	%	%	%	%	%	%	%
B00159250	0.08	0.10	0.03	<0.01	<0.01	0.10	<0.01	100.6
B00159251	3.83	4.27	0.02	0.08	0.05	0.03	<0.01	100.1
B00159252	0.24	10.2	<0.01	<0.01	0.01	0.01	<0.01	100.3
B00159253	2.29	7.85	0.18	0.17	0.02	<0.01	<0.01	99.9
B00159254	5.74	6.71	0.03	0.10	0.19	0.01	<0.01	99.2
B00159255	3.10	5.09	0.30	0.67	0.13	0.03	0.01	99.0
B00159256	0.36	9.84	<0.01	<0.01	0.02	0.02	<0.01	100.2
B00159257	4.71	5.84	<0.01	0.20	0.02	0.02	<0.01	99.9
B00159258	2.32	0.53	0.86	0.33	0.08	0.07	0.05	99.8
B00159259	1.10	3.49	0.04	0.02	<0.01	0.05	0.01	100.0
B00159260	1.80	1.21	0.57	0.03	0.31	<0.01	0.01	98.4
B00159261	3.33	6.55	<0.01	0.21	<0.01	<0.01	0.01	100.2
B00159262	2.00	7.86	0.01	0.17	0.03	0.03	<0.01	100.1
B00159263	1.85	7.45	0.15	0.14	0.03	0.02	0.02	99.8
B00159264	0.55	4.42	0.04	0.04	0.02	0.04	<0.01	100.0
B00159265	8.19	2.33	0.03	0.01	0.02	0.02	<0.01	100.4
B00159266	2.92	3.34	<0.01	0.01	<0.01	0.04	<0.01	100.2
B00159267	1.77	5.79	0.04	0.05	0.02	0.03	<0.01	100.1
B00159268	0.48	7.70	<0.01	0.56	0.03	0.03	<0.01	100.1
B00159269	4.51	4.27	0.02	0.11	0.01	0.02	<0.01	100.1
B00159270	0.10	0.14	0.02	<0.01	<0.01	0.13	<0.01	100.4
B00159271	3.08	3.97	0.04	0.03	0.01	0.03	<0.01	100.2
B00159272	0.66	8.30	0.01	<0.01	0.02	0.03	<0.01	101.4
B00159082	0.67	0.94	0.01	0.15	0.01	0.02	<0.01	94.5
B00159083	0.64	0.09	<0.01	0.08	<0.01	0.07	<0.01	100.7
B00159084	0.45	4.08	<0.01	0.08	0.02	0.03	<0.01	100.3
B00159085	0.42	1.67	0.77	0.22	0.06	0.02	0.04	100.4
B00159086	0.60	7.13	<0.01	0.02	0.02	0.03	<0.01	100.3
B00159087	2.43	5.78	0.07	0.11	0.02	0.03	<0.01	99.8
B00159088	2.28	8.57	0.01	<0.01	0.03	0.02	0.01	100.1
B00159089	3.02	5.06	0.06	0.03	0.05	0.03	<0.01	100.1
B00159090	1.81	1.17	0.57	0.04	0.31	<0.01	0.02	98.4
B00159091	4.96	5.55	0.02	0.20	<0.01	<0.01	<0.01	99.6
B00159092	1.75	7.66	<0.01	<0.01	0.01	0.03	<0.01	100.2
*Dup B00159092	1.78	7.69	<0.01	<0.01	<0.01	0.02	<0.01	100.4
B00159093	1.50	6.50	0.03	0.01	0.03	0.07	<0.01	97.9
B00159094	1.32	6.61	0.12	0.18	0.02	0.02	<0.01	100.2
B00159095	1.26	6.76	0.05	0.24	0.04	0.03	<0.01	100.2
B00159096	0.95	7.75	0.09	0.05	0.02	0.02	<0.01	100.2
B00159097	0.54	7.13	0.02	0.26	0.02	0.03	<0.01	100.6

Element	@K2O	@Na2O	@TiO2	@MnO	@P2O5	@Cr2O3	@V2O5	Sum
Method	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V
Det.Lim.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0
Units	%	%	%	%	%	%	%	%
B00159098	0.88	1.30	0.53	0.40	0.03	0.15	0.04	100.2
B00159099	1.76	4.66	0.16	0.13	0.02	0.04	0.01	100.1
B00159100	0.12	0.14	0.03	<0.01	<0.01	0.09	<0.01	100.6
B00159101	1.96	4.36	0.05	0.05	0.01	0.04	<0.01	99.9
B00159102	2.69	5.34	0.02	0.03	0.02	0.02	<0.01	99.6
B00159103	4.79	4.32	0.04	0.13	0.01	0.03	0.01	100.1
B00159104	0.63	1.89	0.65	0.36	0.05	0.03	0.05	100.4
B00159105	1.96	5.38	0.04	0.21	<0.01	0.03	<0.01	101.2
B00159106	1.71	6.46	0.05	0.05	0.02	0.02	<0.01	99.9
B00159107	1.26	4.95	0.03	0.02	0.01	0.04	<0.01	101.0
*Rep B00159268	0.48	7.69	<0.01	0.57	0.02	0.03	<0.01	100.4
*Rep B00159097	0.53	7.17	0.02	0.27	0.02	0.03	<0.01	99.3

Element	@Ag	@As	@Bi	@Cd	@Ce	@Co	@Cs	@Dy
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	1	5	0.1	0.2	0.1	0.5	0.1	0.05
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159250	<1	<5	0.1	<0.2	5.3	1.6	<0.1	0.39
B00159251	<1	<5	9.6	<0.2	7.7	<0.5	14.3	1.81
B00159252	<1	<5	0.4	<0.2	6.6	<0.5	4.0	0.34
B00159253	<1	<5	0.2	<0.2	4.7	6.0	206	0.54
B00159254	INF	<5	514	<0.2	6.7	<0.5	29.5	4.19
B00159255	<1	<5	0.7	0.2	331	14.0	334	76.8
B00159256	<1	<5	10.1	<0.2	0.5	<0.5	15.0	0.14
B00159257	<1	<5	13.8	<0.2	3.0	<0.5	239	1.63
B00159258	<1	<5	2.0	0.3	7.8	62.8	12.7	3.48
B00159259	<1	<5	0.5	<0.2	4.2	1.1	13.1	1.72
B00159260	INF	56	20.0	3.1	797	6.3	310	6.08
B00159261	<1	<5	2.1	0.2	0.3	<0.5	32.9	0.11
B00159262	INF	<5	0.9	<0.2	11.7	<0.5	25.4	10.1
B00159263	<1	<5	0.3	<0.2	29.4	6.0	121	5.35
B00159264	<1	<5	7.0	INF	10.9	2.1	25.3	2.97
B00159265	<1	<5	2.4	<0.2	2.6	1.0	45.8	0.89
B00159266	<1	<5	0.6	<0.2	3.2	1.0	16.5	0.99
B00159267	<1	<5	6.0	<0.2	10.5	2.9	21.6	2.12
B00159268	<1	<5	2.7	0.2	37.3	1.2	6.3	11.7
B00159269	<1	<5	18.9	<0.2	5.5	<0.5	27.8	1.88
B00159270	<1	<5	0.1	<0.2	3.2	1.0	<0.1	0.43
B00159271	<1	<5	0.4	<0.2	2.4	3.9	41.1	1.98
B00159272	<1	<5	0.2	<0.2	3.7	1.0	6.9	0.26
B00159082	<1	<5	60.6	<0.2	0.3	0.6	45.6	0.09
B00159083	<1	<5	114	<0.2	0.2	0.5	83.5	0.20
B00159084	<1	<5	3.3	<0.2	0.9	0.6	53.5	0.18
B00159085	<1	<5	1.3	<0.2	6.9	48.9	2.5	2.74
B00159086	<1	<5	1.7	<0.2	12.0	<0.5	7.2	1.93
B00159087	<1	<5	1.2	<0.2	26.9	2.3	79.3	6.10
B00159088	<1	<5	5.2	<0.2	3.9	0.7	56.5	0.37
B00159089	<1	<5	9.5	<0.2	6.5	3.3	105	1.48
B00159090	INF	48	16.8	1.2	657	5.3	261	4.97
B00159091	<1	<5	0.6	0.3	0.4	1.7	112	0.06
B00159092	<1	<5	2.3	<0.2	14.4	<0.5	30.3	0.67
*Dup B00159092	<1	<5	2.1	<0.2	12.7	<0.5	31.4	0.70
B00159093	<1	<5	>1000	0.5	66.6	0.7	33.1	5.82
B00159094	<1	<5	10.4	<0.2	21.5	3.1	59.1	3.46
B00159095	<1	<5	66.3	<0.2	47.9	1.5	47.3	11.5
B00159096	<1	<5	2.0	<0.2	18.7	2.4	28.2	5.10
B00159097	<1	<5	27.3	<0.2	16.6	0.9	22.8	4.01

Element	@Ag	@As	@Bi	@Cd	@Ce	@Co	@Cs	@Dy
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	1	5	0.1	0.2	0.1	0.5	0.1	0.05
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159098	<1	<5	1.5	<0.2	3.8	43.4	15.6	2.22
B00159099	<1	<5	3.7	<0.2	9.1	6.4	108	1.35
B00159100	<1	<5	0.6	<0.2	5.1	1.2	0.2	0.40
B00159101	<1	<5	1.6	<0.2	2.8	9.6	88.4	0.87
B00159102	<1	<5	0.9	<0.2	4.4	0.9	33.2	1.26
B00159103	<1	<5	13.3	<0.2	16.7	<0.5	23.4	2.56
B00159104	<1	<5	2.9	<0.2	5.7	36.5	3.3	2.61
B00159105	<1	<5	4.5	<0.2	9.8	0.9	10.6	2.72
B00159106	<1	<5	1.2	<0.2	4.5	1.3	41.0	0.76
B00159107	<1	<5	1.0	0.3	3.1	1.3	14.3	0.86
*Rep B00159098	<1	<5	1.5	<0.2	4.1	46.4	16.8	2.50
*Rep B00159107	<1	<5	0.6	<0.2	2.9	2.0	12.4	0.77

Element	@Er	@Eu	@Ga	@Gd	@Ge	@Hf	@Ho	@In
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.05	0.05	1	0.05	1	1	0.05	0.2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159250	0.23	<0.05	<1	0.40	1	1	0.07	<0.2
B00159251	1.01	<0.05	29	1.48	2	2	0.31	<0.2
B00159252	0.15	0.07	47	0.45	3	<1	0.05	<0.2
B00159253	0.27	0.06	58	0.55	3	<1	0.09	<0.2
B00159254	2.65	0.08	38	3.21	3	2	0.73	<0.2
B00159255	34.6	0.33	82	67.1	3	26	11.4	<0.2
B00159256	0.05	<0.05	49	0.15	5	<1	<0.05	<0.2
B00159257	0.57	<0.05	103	1.73	7	71	0.19	<0.2
B00159258	1.91	0.62	19	2.83	2	1	0.64	<0.2
B00159259	0.83	<0.05	18	1.23	2	2	0.28	<0.2
B00159260	1.85	6.90	24	13.6	4	4	0.82	4.2
B00159261	<0.05	<0.05	123	0.16	6	1	<0.05	<0.2
B00159262	3.41	<0.05	48	7.71	4	3	1.24	<0.2
B00159263	2.45	0.06	59	5.01	3	2	0.84	<0.2
B00159264	1.27	<0.05	27	2.48	2	<1	0.46	<0.2
B00159265	0.39	<0.05	27	0.67	2	1	0.12	<0.2
B00159266	0.40	<0.05	21	0.82	2	<1	0.16	<0.2
B00159267	0.86	0.06	33	2.02	2	<1	0.32	<0.2
B00159268	7.60	0.06	37	7.29	3	4	2.21	<0.2
B00159269	1.46	<0.05	31	1.32	2	3	0.38	<0.2
B00159270	0.30	0.05	<1	0.35	<1	1	0.09	<0.2
B00159271	0.75	<0.05	50	1.44	3	<1	0.27	<0.2
B00159272	0.09	<0.05	41	0.38	2	<1	<0.05	<0.2
B00159082	<0.05	<0.05	112	0.10	10	<1	<0.05	<0.2
B00159083	0.05	<0.05	9	0.17	4	<1	<0.05	<0.2
B00159084	<0.05	<0.05	37	0.48	4	2	<0.05	<0.2
B00159085	1.77	0.63	16	2.46	2	1	0.52	<0.2
B00159086	0.76	<0.05	31	2.09	2	2	0.27	<0.2
B00159087	3.43	<0.05	35	4.77	2	3	1.03	<0.2
B00159088	0.11	<0.05	46	0.68	3	<1	<0.05	<0.2
B00159089	0.60	<0.05	35	1.66	2	1	0.20	<0.2
B00159090	1.57	5.78	20	11.5	3	3	0.70	3.3
B00159091	<0.05	<0.05	138	0.08	6	<1	<0.05	<0.2
B00159092	0.06	<0.05	35	1.91	3	<1	<0.05	<0.2
*Dup B00159092	0.13	<0.05	37	2.04	3	<1	0.07	<0.2
B00159093	1.59	<0.05	58	14.3	3	<1	0.65	<0.2
B00159094	1.84	<0.05	42	3.42	2	2	0.57	<0.2
B00159095	6.21	<0.05	41	8.30	2	4	1.99	<0.2
B00159096	2.25	0.06	44	4.58	2	2	0.77	<0.2
B00159097	3.11	<0.05	32	2.61	2	4	0.80	<0.2

Element	@Er	@Eu	@Ga	@Gd	@Ge	@Hf	@Ho	@In
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.05	0.05	1	0.05	1	1	0.05	0.2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159098	1.59	0.38	15	1.54	2	<1	0.46	<0.2
B00159099	0.53	<0.05	50	1.54	2	<1	0.18	<0.2
B00159100	0.26	<0.05	<1	0.41	<1	1	0.07	<0.2
B00159101	0.31	<0.05	58	0.76	3	<1	0.11	<0.2
B00159102	0.57	<0.05	31	1.00	2	<1	0.19	<0.2
B00159103	2.13	0.05	25	2.43	2	3	0.53	<0.2
B00159104	1.63	0.46	19	2.11	2	2	0.51	<0.2
B00159105	2.49	<0.05	27	2.00	2	4	0.58	<0.2
B00159106	0.26	<0.05	59	0.96	2	<1	0.10	<0.2
B00159107	0.37	<0.05	47	0.78	2	<1	0.13	<0.2
*Rep B00159098	1.71	0.43	16	1.63	2	1	0.48	<0.2
*Rep B00159107	0.30	<0.05	41	0.63	2	<1	0.10	<0.2

Element	@La	@Lu	@Mo	@Nb	@Nd	@Pb	@Pr	@Rb
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.1	0.05	2	1	0.1	5	0.05	0.2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159250	2.7	0.06	5	<1	2.5	5	0.67	2.7
B00159251	3.2	0.26	<2	23	3.5	31	0.98	441
B00159252	3.6	<0.05	<2	220	2.6	25	0.73	39.1
B00159253	2.6	0.12	<2	279	1.8	22	0.55	1474
B00159254	2.6	0.49	<2	5898	3.8	101	0.86	1284
B00159255	96.1	6.13	<2	349	143	67	36.6	2575
B00159256	0.2	<0.05	<2	12	0.3	7	0.07	178
B00159257	0.9	0.13	3	18	1.6	23	0.39	3455
B00159258	3.2	0.29	<2	4	5.9	20	1.17	525
B00159259	1.8	0.12	<2	77	2.2	19	0.55	217
B00159260	466	0.19	9	1904	263	25	79.6	1568
B00159261	0.2	<0.05	<2	4	0.1	8	<0.05	1101
B00159262	3.8	0.50	<2	662	8.1	40	1.92	576
B00159263	9.0	0.30	2	162	12.2	33	3.05	1228
B00159264	4.8	0.15	1709	50	6.8	36	1.69	282
B00159265	1.1	0.08	4	30	1.3	56	0.32	1821
B00159266	1.5	0.08	4	11	1.6	26	0.42	583
B00159267	4.9	0.23	2	87	5.5	37	1.38	428
B00159268	14.3	1.58	<2	50	19.8	38	5.05	107
B00159269	2.1	0.44	<2	47	2.7	84	0.75	802
B00159270	2.0	0.10	<2	2	1.8	<5	0.45	3.2
B00159271	1.2	0.13	101	199	1.3	18	0.31	867
B00159272	2.1	0.05	<2	61	1.6	17	0.46	185
B00159082	0.1	0.08	<2	6	0.1	8	<0.05	522
B00159083	<0.1	<0.05	<2	5	0.1	7	<0.05	717
B00159084	0.4	<0.05	<2	40	0.6	<5	0.16	444
B00159085	3.1	0.29	<2	2	5.6	5	1.11	36.9
B00159086	5.0	0.13	<2	34	6.7	26	1.69	148
B00159087	7.4	0.73	<2	51	10.2	32	2.53	721
B00159088	1.9	0.05	<2	49	2.1	26	0.54	753
B00159089	2.6	0.26	<2	76	3.6	25	0.92	700
B00159090	396	0.16	7	1518	218	21	65.3	1307
B00159091	0.3	0.06	<2	24	0.2	12	0.06	2477
B00159092	5.7	<0.05	<2	16	8.5	15	2.11	566
*Dup B00159092	4.7	<0.05	<2	11	7.9	17	1.94	568
B00159093	24.8	0.31	3	92	40.9	592	10.2	755
B00159094	8.0	0.39	<2	105	10.7	23	2.82	607
B00159095	12.6	1.07	<2	63	17.5	31	4.45	510
B00159096	8.4	0.26	<2	90	10.5	27	2.67	315
B00159097	6.8	0.88	<2	34	8.8	28	2.22	172

Element	@La	@Lu	@Mo	@Nb	@Nd	@Pb	@Pr	@Rb
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.1	0.05	2	1	0.1	5	0.05	0.2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159098	1.5	0.26	<2	5	3.0	7	0.59	139
B00159099	3.8	0.09	<2	153	5.0	18	1.22	873
B00159100	2.9	0.07	4	1	2.3	<5	0.64	4.5
B00159101	1.5	0.05	4	127	1.4	12	0.38	857
B00159102	1.9	0.07	<2	52	1.6	27	0.44	597
B00159103	6.2	0.62	<2	46	8.5	89	2.11	842
B00159104	2.3	0.23	2	12	5.0	9	0.98	57.5
B00159105	3.3	0.31	3	37	4.5	85	1.15	298
B00159106	2.2	0.07	<2	138	2.3	13	0.60	646
B00159107	1.6	0.10	<2	148	1.5	12	0.40	452
*Rep B00159098	1.7	0.24	<2	5	3.1	8	0.61	150
*Rep B00159107	1.5	0.09	7	130	1.5	11	0.37	397

Element	@Sb	@Sm	@Sn	@Ta	@Tb	@Th	@Tl	@Tm
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.1	0.1	1	0.5	0.05	0.1	0.5	0.05
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159250	0.2	0.5	1	<0.5	0.06	1.3	<0.5	<0.05
B00159251	<0.1	1.2	7	3.5	0.26	6.2	3.1	0.17
B00159252	<0.1	0.6	1	19.2	0.06	0.5	<0.5	<0.05
B00159253	<0.1	0.5	23	32.5	0.09	0.4	11.8	<0.05
B00159254	0.2	2.2	5	759	0.62	1.2	9.5	0.52
B00159255	0.1	57.7	54	31.7	12.3	84.2	20.3	5.53
B00159256	<0.1	0.1	<1	6.1	<0.05	0.2	1.7	<0.05
B00159257	<0.1	1.1	15	49.3	0.32	17.9	25.2	0.09
B00159258	0.2	2.0	3	<0.5	0.46	0.6	3.7	0.26
B00159259	<0.1	0.9	4	16.9	0.24	3.9	1.8	0.11
B00159260	17.2	31.5	1179	20.1	1.17	45.9	12.6	0.20
B00159261	<0.1	0.1	40	2.6	<0.05	0.2	7.2	<0.05
B00159262	0.1	5.3	15	150	1.65	19.9	4.9	0.52
B00159263	<0.1	4.1	17	13.7	0.83	11.6	9.5	0.33
B00159264	0.1	2.4	6	4.8	0.47	6.5	2.5	0.17
B00159265	<0.1	0.7	3	3.6	0.13	2.0	12.7	0.05
B00159266	<0.1	0.6	3	1.4	0.15	2.0	4.8	0.06
B00159267	0.1	1.7	4	10.0	0.33	3.5	3.6	0.12
B00159268	<0.1	6.6	2	7.5	1.52	16.3	0.8	1.32
B00159269	<0.1	1.1	4	8.8	0.26	7.1	6.3	0.26
B00159270	0.3	0.3	<1	<0.5	0.06	1.4	<0.5	<0.05
B00159271	0.1	0.8	25	16.1	0.30	2.7	5.7	0.11
B00159272	<0.1	0.5	8	6.1	0.05	0.8	1.1	<0.05
B00159082	0.2	<0.1	11	7.2	<0.05	<0.1	4.6	<0.05
B00159083	0.2	<0.1	1	7.1	<0.05	0.6	5.6	<0.05
B00159084	0.1	0.6	4	40.6	0.07	1.5	3.4	<0.05
B00159085	<0.1	1.6	1	<0.5	0.37	0.5	<0.5	0.24
B00159086	<0.1	2.2	3	9.1	0.32	4.7	1.1	0.10
B00159087	<0.1	3.8	7	5.0	0.89	12.7	6.0	0.55
B00159088	0.1	0.9	10	16.1	0.08	1.5	6.1	<0.05
B00159089	<0.1	1.5	9	15.9	0.27	5.9	5.7	0.09
B00159090	13.1	26.1	919	16.3	0.97	37.4	11.0	0.17
B00159091	0.1	<0.1	41	6.4	<0.05	0.5	14.6	<0.05
B00159092	<0.1	3.2	12	1.9	0.06	4.6	3.3	<0.05
*Dup B00159092	<0.1	3.1	9	1.5	0.19	5.7	3.0	<0.05
B00159093	5.0	19.6	45	19.3	1.51	39.4	4.6	0.22
B00159094	0.1	3.5	11	9.0	0.55	7.0	5.4	0.30
B00159095	<0.1	6.4	12	8.1	1.61	17.2	3.7	0.97
B00159096	0.1	3.7	10	8.5	0.82	6.9	2.6	0.28
B00159097	<0.1	2.8	3	4.6	0.51	10.5	1.4	0.57

Element	@Sb	@Sm	@Sn	@Ta	@Tb	@Th	@Tl	@Tm
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.1	0.1	1	0.5	0.05	0.1	0.5	0.05
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159098	<0.1	0.9	2	<0.5	0.28	0.5	1.3	0.21
B00159099	<0.1	1.7	17	12.5	0.23	7.9	7.4	0.07
B00159100	0.2	0.5	<1	<0.5	0.05	1.3	<0.5	<0.05
B00159101	0.3	0.6	29	9.8	0.14	1.1	5.6	<0.05
B00159102	<0.1	0.7	4	5.2	0.19	2.4	5.1	0.08
B00159103	<0.1	2.2	1	5.4	0.38	16.6	7.0	0.40
B00159104	<0.1	1.6	2	2.0	0.35	1.1	0.6	0.21
B00159105	<0.1	1.3	<1	4.8	0.34	13.7	2.3	0.45
B00159106	<0.1	0.8	28	11.3	0.13	1.5	3.9	<0.05
B00159107	<0.1	0.6	20	11.6	0.14	1.7	2.6	0.05
*Rep B00159098	<0.1	1.0	3	<0.5	0.30	0.5	1.4	0.24
*Rep B00159107	0.1	0.5	17	10.3	0.12	1.4	2.4	<0.05

Element	@U	@W	@Y	@Yb	@Zr	Li2O
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICP91A
Det.Lim.	0.05	1	0.5	0.1	0.5	0.002
Units	ppm	ppm	ppm	ppm	ppm	%
B00159250	0.40	<1	2.3	0.3	31.6	<0.002
B00159251	6.55	1	12.4	1.6	27.7	0.011
B00159252	0.78	1	1.8	0.2	2.4	0.007
B00159253	1.09	2	4.1	0.4	1.9	0.208
B00159254	14.1	31	25.9	5.4	16.6	0.007
B00159255	25.8	2	610	45.2	351	0.297
B00159256	0.51	<1	1.1	<0.1	3.5	0.002
B00159257	5.76	1	14.5	0.6	146	0.028
B00159258	0.68	<1	18.9	1.9	46.0	0.078
B00159259	2.76	<1	11.7	0.9	18.6	0.010
B00159260	7.54	7	19.6	1.2	149	0.988
B00159261	0.09	<1	0.8	<0.1	1.6	0.025
B00159262	15.2	5	68.1	4.1	23.2	0.013
B00159263	3.58	2	37.5	2.2	21.3	0.101
B00159264	4.71	1	20.4	1.3	8.8	0.031
B00159265	1.76	<1	5.0	0.4	9.6	0.006
B00159266	0.48	<1	7.4	0.5	5.7	0.005
B00159267	2.61	<1	14.3	0.9	6.6	0.025
B00159268	8.34	<1	92.4	11.4	45.3	0.005
B00159269	42.2	<1	17.1	2.5	41.0	0.013
B00159270	0.46	<1	2.7	0.4	35.0	<0.002
B00159271	1.24	2	13.9	0.9	3.2	0.056
B00159272	0.41	<1	1.5	0.1	1.0	0.014
B00159082	0.09	<1	0.5	<0.1	1.0	6.78
B00159083	0.51	<1	1.2	<0.1	3.7	0.053
B00159084	0.67	<1	1.1	<0.1	5.5	0.733
B00159085	0.17	<1	14.8	1.7	44.3	0.034
B00159086	4.48	<1	12.2	0.8	12.8	0.017
B00159087	4.89	1	48.2	4.7	40.4	0.059
B00159088	0.64	<1	2.0	<0.1	1.9	0.010
B00159089	1.95	1	10.3	0.6	8.6	0.040
B00159090	5.86	6	16.2	1.0	125	0.981
B00159091	0.05	1	<0.5	<0.1	1.0	0.061
B00159092	0.18	<1	1.5	<0.1	1.4	0.014
*Dup B00159092	0.21	<1	3.3	<0.1	1.2	0.011
B00159093	4.66	3	38.1	1.7	8.2	0.047
B00159094	1.90	<1	24.5	2.5	21.4	0.110
B00159095	10.3	2	84.7	7.8	49.8	0.078
B00159096	4.26	<1	35.9	2.0	17.2	0.034
B00159097	6.22	<1	34.7	5.4	48.0	0.017

Element	@U	@W	@Y	@Yb	@Zr	Li2O
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICP91A
Det.Lim.	0.05	1	0.5	0.1	0.5	0.002
Units	ppm	ppm	ppm	ppm	ppm	%
B00159098	0.62	<1	13.2	1.6	28.9	0.103
B00159099	1.70	1	7.6	0.5	8.3	0.108
B00159100	0.29	<1	2.3	0.3	31.4	0.010
B00159101	0.91	3	5.7	0.4	2.2	0.130
B00159102	0.44	<1	8.3	0.5	1.9	0.033
B00159103	18.2	<1	24.3	3.8	39.6	0.007
B00159104	0.68	2	15.3	1.6	36.8	0.022
B00159105	14.2	<1	29.0	4.3	53.8	0.004
B00159106	0.95	2	4.5	0.3	1.6	0.053
B00159107	1.28	2	6.6	0.4	2.6	0.035
*Rep B00159098	0.68	<1	14.1	1.7	30.3	
*Rep B00159107	1.15	2	5.3	0.3	3.9	
*Rep B00159254						0.007
*Rep B00159102						0.031

Certificate of Analysis
Work Order : LK1801807
[Report File No.: 0000016372]

Date: August 21, 2018

To: **Julie Selway**
POWER METALS CORP
SUITE 545-999 CANADA PLACE
VANCOUVER BC V6C 3E1

P.O. No.: -
Project No.: GULLWING-TOT LAKE
Samples: 50
Received: Jul 23, 2018
Pages: Page 1 to 15
(Inclusive of Cover Sheet)

Methods Summary

No. Of Samples	Method Code	Description
50	G_WGH79	Weighing of samples and reporting of weights
45	G_PRP89	Weigh, Dry, to 3kg, Crush 75% -2mm, Split to 250g, Pulverize to 85% -75µm
4	G_PHY03V	SG by pycnometer
50	GO_XRF76V	@Ore grade Borate fusion, XRF (0.5g plus 1g LOI)
50	GE_IC90M	@Package, ICPMS after Sodium Peroxide Fusion-Graphite Crucibles
50	GE_ICP91A	ICP-OES after Na2O2 fusion with HCl finish

Comments:

Assays not suitable for commercial exchange.
Li2O reported as calculated from Li by ICP results.
Ag, Cd not determined due to sample matrix interference

Certified By : [signature]
Brett Pipher
Project Coordinator

SGS Minerals Services (Lakefield) is accredited by Standards Council of Canada (SCC) and conforms to the requirements of ISO/IEC 17025 for specific tests as indicated on the scope of accreditation to be found at http://www.scc.ca/en/programs/lab/mineral.shtml

Report Footer:

L.N.R.	= Listed not received	I.S.	= Insufficient Sample
n.a.	= Not applicable	--	= No result

*INF = Composition of this sample makes detection impossible by this method
M after a result denotes ppb to ppm conversion, % denotes ppm to % conversion
Methods marked with an asterisk (e.g. *NAA08V) were subcontracted
Elements marked with the @ symbol (e.g. @Cu) denote assays performed using accredited test methods

Element	WtKg	Sg	@LOI	@SiO2	@Al2O3	@Fe2O3	@MgO	@CaO
Method	G_WGH79	G_PHY03V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V
Det.Lim.	0.001	0.01	-10.000	0.01	0.01	0.01	0.01	0.01
Units	kg	sg	%	%	%	%	%	%
B00159051	2.081	N.A.	1.19	78.1	13.5	1.07	0.12	1.08
B00159052	2.348	N.A.	1.11	73.6	14.0	1.37	0.06	0.62
B00159053	1.546	N.A.	0.937	71.0	16.5	0.90	0.04	1.47
B00159054	1.714	N.A.	0.761	72.6	16.3	1.17	0.07	0.39
B00159055	1.252	N.A.	1.94	72.8	17.1	0.80	0.07	0.20
B00159056	1.113	N.A.	1.12	70.0	21.6	0.50	0.05	0.03
B00159057	2.058	N.A.	1.29	71.9	18.1	0.40	0.05	0.05
B00159058	1.877	N.A.	0.817	66.8	18.2	0.19	0.06	0.08
B00159059	1.030	N.A.	4.48	44.3	17.5	12.6	8.10	2.12
B00159060	0.045	N.A.	1.53	76.3	9.65	4.65	0.95	1.56
B00159061	1.537	2.75	1.72	76.9	14.7	0.75	0.06	0.14
B00159062	1.622	N.A.	1.48	76.5	14.8	0.90	0.08	0.40
B00159063	1.915	N.A.	1.66	76.6	15.1	0.95	0.08	0.33
B00159064	1.857	N.A.	0.937	75.7	14.2	0.91	0.07	0.40
B00159065	1.659	N.A.	1.34	76.1	14.1	1.08	0.10	0.30
B00159066	2.227	N.A.	1.03	75.2	15.0	0.61	0.07	0.33
B00159067	1.357	N.A.	0.766	74.6	14.1	0.72	0.09	0.26
B00159068	1.734	N.A.	1.49	76.9	14.7	0.60	0.05	0.26
B00159069	1.650	N.A.	0.925	75.4	15.4	0.81	0.10	0.81
B00159070	0.067	N.A.	0.413	97.8	0.77	1.32	0.06	0.02
B00159071	1.445	2.82	1.39	67.7	13.9	6.44	1.73	3.30
B00159072	2.052	N.A.	0.807	74.5	14.7	0.64	0.07	0.29
B00159073	0.084	N.A.	0.863	65.2	18.7	0.22	0.04	0.04
B00159074	2.215	N.A.	1.07	75.6	14.4	0.58	0.07	0.33
B00159076	1.076	N.A.	1.39	52.2	16.8	8.63	6.15	10.2
B00159077	1.045	N.A.	1.66	60.8	17.4	5.03	2.98	4.50
B00159078	1.278	N.A.	1.73	62.0	20.9	3.03	0.98	1.03
B00159079	1.430	N.A.	2.33	60.0	23.9	1.91	0.57	0.40
B00159080	0.045	N.A.	1.43	76.1	10.2	4.30	0.81	1.22
B00159229	1.409	N.A.	0.868	76.6	13.8	0.47	0.04	0.34
B00159230	0.065	N.A.	0.619	97.8	0.71	1.02	0.05	0.03
B00159231	2.376	2.71	1.82	76.3	14.3	1.02	0.15	0.45
B00159232	2.466	N.A.	0.790	73.4	14.8	0.47	0.05	0.43
B00159233	2.595	N.A.	0.571	71.5	17.7	0.30	0.05	0.46
*Dup B00159233	N.A.	N.A.	0.513	71.1	17.6	0.29	0.04	0.46
B00159234	2.418	N.A.	0.857	77.2	13.7	0.71	0.04	0.27
B00159235	1.529	N.A.	0.962	77.5	14.3	0.41	0.04	0.20
B00159236	2.247	N.A.	0.757	72.7	16.8	0.42	0.04	0.27
B00159237	3.986	N.A.	1.15	65.6	20.5	0.17	0.07	0.37
B00159238	0.936	N.A.	1.91	69.0	20.0	0.29	0.07	0.36

Element	WtKg	Sg	@LOI	@SiO2	@Al2O3	@Fe2O3	@MgO	@CaO
Method	G_WGH79	G_PHY03V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V
Det.Lim.	0.001	0.01	-10.000	0.01	0.01	0.01	0.01	0.01
Units	kg	sg	%	%	%	%	%	%
B00159239	2.295	N.A.	0.528	69.7	19.2	0.09	0.03	0.16
B00159240	0.044	N.A.	1.46	75.8	9.46	4.60	0.94	1.51
B00159241	2.351	2.74	1.26	78.7	13.8	0.32	0.04	0.15
B00159242	3.011	N.A.	1.87	75.7	14.6	1.31	0.13	0.09
B00159243	2.888	N.A.	1.28	74.0	15.2	0.80	0.09	0.26
B00159244	2.046	N.A.	0.843	76.3	13.9	0.75	0.09	0.32
B00159245	2.187	N.A.	1.04	80.5	11.0	1.37	0.10	0.08
B00159246	1.672	N.A.	0.704	77.6	13.3	0.73	0.07	0.35
B00159247	2.048	N.A.	0.874	75.1	14.5	0.76	0.08	0.28
B00159248	1.121	N.A.	0.635	73.5	15.1	0.74	0.09	0.69
B00159249	0.385	N.A.	1.19	63.4	16.4	6.44	2.22	2.09
*Rep B00159061		2.75						
*Rep B00159069			0.929	75.3	15.2	0.82	0.10	0.80
*Rep B00159238			1.84	69.0	20.0	0.30	0.07	0.36

Element	@K2O	@Na2O	@TiO2	@MnO	@P2O5	@Cr2O3	@V2O5	Sum
Method	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V
Det.Lim.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0
Units	%	%	%	%	%	%	%	%
B00159051	1.12	5.05	0.04	0.12	0.01	0.03	<0.01	101.4
B00159052	3.97	4.95	0.01	0.02	0.01	0.04	<0.01	99.8
B00159053	2.78	6.30	0.02	0.08	<0.01	0.02	<0.01	100.0
B00159054	0.42	8.01	0.01	0.84	0.01	0.03	<0.01	100.6
B00159055	3.12	3.40	0.02	0.25	<0.01	0.03	<0.01	99.7
B00159056	1.06	0.94	<0.01	0.09	<0.01	0.05	<0.01	95.4
B00159057	3.04	1.81	<0.01	0.06	0.05	0.04	<0.01	96.9
B00159058	9.63	2.17	<0.01	0.11	0.08	0.02	<0.01	98.1
B00159059	4.77	0.57	0.81	0.21	0.08	0.12	0.06	95.7
B00159060	1.94	1.29	0.81	0.06	0.39	0.01	0.01	99.1
B00159061	2.80	2.84	<0.01	0.03	0.03	0.03	<0.01	99.9
B00159062	2.64	3.20	0.01	0.06	0.01	0.02	<0.01	100.1
B00159063	2.77	3.14	0.01	0.04	0.02	0.03	<0.01	100.7
B00159064	2.61	5.07	0.01	0.15	0.05	0.03	<0.01	100.1
B00159065	3.62	3.53	0.02	0.07	0.04	0.04	<0.01	100.4
B00159066	2.97	4.98	0.02	0.07	0.01	0.03	<0.01	100.3
B00159067	5.69	4.00	0.02	0.05	0.02	0.03	<0.01	100.3
B00159068	1.95	3.92	0.01	0.09	0.02	0.03	<0.01	100.1
B00159069	0.80	6.10	0.02	0.27	0.02	0.03	<0.01	100.6
B00159070	0.15	0.20	0.04	<0.01	0.01	0.16	<0.01	101.0
B00159071	2.01	2.52	0.63	0.09	0.15	0.07	0.01	100.0
B00159072	5.19	3.86	<0.01	0.03	0.05	0.03	<0.01	100.1
B00159073	11.9	3.04	<0.01	<0.01	0.04	0.02	<0.01	100.1
B00159074	3.78	4.09	0.02	0.06	0.01	0.03	<0.01	100.0
B00159076	0.62	3.58	0.45	0.16	0.12	0.01	0.03	100.3
B00159077	2.02	3.98	0.56	0.08	0.46	0.02	0.01	99.6
B00159078	2.41	7.67	0.13	0.12	0.02	<0.01	<0.01	100.0
B00159079	5.44	4.95	0.06	0.08	0.01	0.01	<0.01	99.6
B00159080	1.79	1.17	0.57	0.04	0.30	0.01	<0.01	97.9
B00159229	2.17	6.13	<0.01	0.08	<0.01	0.03	<0.01	100.6
B00159230	0.12	0.15	0.03	<0.01	<0.01	0.13	<0.01	100.7
B00159231	1.98	4.13	0.06	0.08	0.01	0.04	<0.01	100.4
B00159232	4.58	5.16	<0.01	0.02	<0.01	0.02	<0.01	99.7
B00159233	0.13	9.73	<0.01	0.14	<0.01	0.02	<0.01	100.6
*Dup B00159233	0.13	9.68	<0.01	0.14	<0.01	0.02	<0.01	100.0
B00159234	2.14	5.40	0.03	0.08	<0.01	0.03	<0.01	100.5
B00159235	1.61	2.71	<0.01	0.23	0.12	0.05	<0.01	98.1
B00159236	0.19	8.67	<0.01	0.15	0.17	0.02	<0.01	100.2
B00159237	3.96	7.26	<0.01	0.07	0.09	0.01	<0.01	99.2
B00159238	2.81	5.26	<0.01	0.05	0.02	0.02	<0.01	99.9

Element	@K2O	@Na2O	@TiO2	@MnO	@P2O5	@Cr2O3	@V2O5	Sum
Method	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V	GO_XRF76V
Det.Lim.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0
Units	%	%	%	%	%	%	%	%
B00159239	0.18	10.9	<0.01	0.02	0.09	0.01	<0.01	101.0
B00159240	1.93	1.28	0.79	0.05	0.37	0.01	<0.01	98.2
B00159241	1.03	4.03	<0.01	0.19	<0.01	0.03	<0.01	99.5
B00159242	3.47	2.33	0.01	0.07	0.02	0.04	<0.01	99.7
B00159243	2.87	4.94	0.04	0.02	<0.01	0.03	<0.01	99.6
B00159244	3.29	4.39	0.03	0.06	<0.01	0.04	<0.01	100.0
B00159245	3.85	2.32	0.01	0.04	0.02	0.03	<0.01	100.4
B00159246	2.87	4.72	<0.01	0.09	0.04	0.03	<0.01	100.4
B00159247	4.30	4.24	0.01	0.05	0.05	0.02	<0.01	100.3
B00159248	3.82	5.38	0.04	0.03	0.01	0.02	<0.01	100.1
B00159249	3.69	3.53	0.58	0.08	0.13	0.04	0.02	99.9
*Rep B00159069	0.80	6.08	0.02	0.27	0.02	0.04	<0.01	100.4
*Rep B00159238	2.82	5.31	<0.01	0.06	0.02	0.02	<0.01	99.8

Element	@Ag	@As	@Bi	@Cd	@Ce	@Co	@Cs	@Dy
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	1	5	0.1	0.2	0.1	0.5	0.1	0.05
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159051	<1	<5	56.0	<0.2	42.8	1.0	30.3	1.09
B00159052	<1	<5	2.7	<0.2	5.0	5.8	18.6	0.30
B00159053	<1	<5	3.1	<0.2	5.5	14.1	10.2	0.71
B00159054	<1	<5	44.7	<0.2	71.9	0.7	14.2	7.74
B00159055	<1	<5	15.2	<0.2	1.4	1.1	110	1.56
B00159056	<1	<5	0.3	0.3	0.4	0.7	231	<0.05
B00159057	<1	<5	0.4	<0.2	0.3	0.6	602	<0.05
B00159058	<1	<5	0.5	<0.2	0.2	<0.5	1059	0.07
B00159059	<1	15	<0.1	0.6	3.6	35.2	>10000	2.06
B00159060	INF	33	12.4	2.1	1224	7.3	229	8.20
B00159061	<1	<5	0.8	<0.2	4.8	0.5	31.0	0.35
B00159062	<1	<5	0.2	<0.2	25.2	<0.5	29.2	5.65
B00159063	<1	<5	1.1	<0.2	12.4	<0.5	26.0	2.57
B00159064	<1	<5	2.2	<0.2	8.7	<0.5	13.2	2.41
B00159065	<1	<5	34.0	<0.2	7.2	1.3	18.4	1.30
B00159066	<1	<5	0.2	<0.2	15.6	1.2	9.2	4.98
B00159067	<1	<5	0.3	<0.2	6.9	<0.5	10.9	1.99
B00159068	<1	<5	<0.1	<0.2	21.3	<0.5	4.6	5.21
B00159069	<1	<5	0.2	0.2	40.1	0.8	1.7	13.0
B00159070	<1	<5	<0.1	<0.2	3.7	1.5	<0.1	0.83
B00159071	<1	<5	0.8	<0.2	42.7	12.7	37.4	1.49
B00159072	<1	<5	2.5	<0.2	1.8	<0.5	17.2	0.76
B00159073	<1	<5	<0.1	<0.2	1.0	<0.5	16.8	0.12
B00159074	<1	<5	0.4	<0.2	17.0	<0.5	8.5	5.79
B00159076	<1	<5	0.5	<0.2	24.0	34.1	1.2	1.55
B00159077	<1	<5	0.4	<0.2	82.4	8.5	50.2	1.97
B00159078	<1	<5	0.2	<0.2	3.6	5.1	174	0.11
B00159079	<1	<5	5.1	0.4	9.6	1.8	240	0.99
B00159080	INF	52	18.8	0.4	796	5.9	299	5.93
B00159229	<1	<5	55.5	<0.2	15.1	0.6	24.3	0.78
B00159230	<1	<5	0.2	<0.2	3.9	1.6	1.3	0.37
B00159231	<1	<5	9.3	<0.2	18.7	0.7	42.7	1.51
B00159232	<1	<5	2.3	INF	14.5	<0.5	15.2	0.41
B00159233	<1	<5	2.5	<0.2	8.6	<0.5	4.4	2.19
*Dup B00159233	<1	<5	1.9	<0.2	8.7	<0.5	4.5	2.21
B00159234	<1	<5	12.5	<0.2	10.3	<0.5	33.3	0.42
B00159235	<1	<5	18.6	0.6	1.5	0.5	374	0.99
B00159236	<1	<5	0.2	0.4	1.2	0.6	95.4	0.44
B00159237	<1	<5	0.9	0.3	0.5	1.7	479	0.13
B00159238	<1	<5	0.1	<0.2	0.2	1.2	528	<0.05

Element	@Ag	@As	@Bi	@Cd	@Ce	@Co	@Cs	@Dy
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	1	5	0.1	0.2	0.1	0.5	0.1	0.05
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159239	<1	<5	0.4	<0.2	0.7	<0.5	34.5	0.21
B00159240	INF	31	11.5	1.6	1101	6.3	219	7.72
B00159241	<1	<5	<0.1	0.2	0.3	<0.5	424	0.16
B00159242	<1	<5	<0.1	<0.2	5.4	<0.5	42.7	0.94
B00159243	<1	<5	0.5	<0.2	13.1	<0.5	12.6	2.10
B00159244	<1	<5	0.2	<0.2	15.9	<0.5	18.2	2.99
B00159245	<1	<5	46.0	<0.2	2.0	<0.5	9.8	0.96
B00159246	<1	<5	0.2	<0.2	3.6	<0.5	14.3	0.96
B00159247	<1	<5	0.7	<0.2	1.4	<0.5	14.5	0.59
B00159248	<1	<5	0.2	<0.2	1.5	<0.5	3.8	0.77
B00159249	<1	<5	0.4	<0.2	27.3	18.7	62.9	1.64
*Rep B00159239	<1	<5	0.4	<0.2	1.3	<0.5	39.5	0.22
*Rep B00159249	<1	<5	0.4	<0.2	27.8	20.0	68.2	1.78
*Std NCSDC86306	<1	16	23.8	0.5	13.5	6.3	613	1.11

Element	@Er	@Eu	@Ga	@Gd	@Ge	@Hf	@Ho	@In
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.05	0.05	1	0.05	1	1	0.05	0.2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159051	0.38	0.08	52	3.73	3	3	0.15	<0.2
B00159052	0.10	<0.05	36	0.41	2	2	<0.05	<0.2
B00159053	0.20	<0.05	48	0.84	3	1	0.09	<0.2
B00159054	4.33	<0.05	56	8.12	3	16	1.29	<0.2
B00159055	0.06	<0.05	83	4.44	2	4	0.06	<0.2
B00159056	<0.05	<0.05	78	0.05	8	<1	<0.05	<0.2
B00159057	<0.05	<0.05	59	0.09	8	2	<0.05	<0.2
B00159058	<0.05	<0.05	32	0.14	6	<1	<0.05	<0.2
B00159059	0.91	0.34	51	1.72	4	1	0.34	<0.2
B00159060	2.45	9.53	13	18.5	2	6	1.08	2.7
B00159061	0.14	<0.05	39	0.51	3	<1	<0.05	<0.2
B00159062	2.97	<0.05	30	5.05	2	2	0.96	<0.2
B00159063	1.48	<0.05	33	2.35	2	1	0.44	<0.2
B00159064	1.32	<0.05	28	1.82	2	3	0.39	<0.2
B00159065	0.64	<0.05	35	1.20	2	1	0.21	<0.2
B00159066	3.38	<0.05	34	3.30	2	2	0.98	<0.2
B00159067	0.88	0.09	31	1.77	2	1	0.30	<0.2
B00159068	2.73	<0.05	39	5.07	2	1	0.89	<0.2
B00159069	6.75	0.15	33	11.5	2	5	2.13	<0.2
B00159070	0.55	0.09	<1	0.55	<1	<1	0.16	<0.2
B00159071	1.05	0.57	16	1.09	1	8	0.30	<0.2
B00159072	0.39	<0.05	26	0.52	2	<1	0.12	<0.2
B00159073	<0.05	<0.05	22	0.13	2	<1	<0.05	<0.2
B00159074	3.29	0.06	28	4.93	2	2	1.01	<0.2
B00159076	0.94	0.61	18	1.60	2	2	0.29	<0.2
B00159077	0.81	1.72	22	3.23	<1	4	0.32	<0.2
B00159078	<0.05	<0.05	59	0.17	3	<1	<0.05	<0.2
B00159079	0.25	<0.05	119	1.65	3	<1	0.11	0.3
B00159080	1.73	6.64	22	12.8	4	4	0.77	4.1
B00159229	0.27	<0.05	46	1.55	2	3	0.10	<0.2
B00159230	0.22	0.06	1	0.34	1	1	0.07	<0.2
B00159231	0.69	<0.05	76	1.96	2	2	0.21	<0.2
B00159232	0.13	<0.05	37	1.03	2	2	0.05	<0.2
B00159233	0.56	<0.05	59	2.29	3	7	0.23	<0.2
*Dup B00159233	0.53	<0.05	61	2.31	3	8	0.27	<0.2
B00159234	0.09	<0.05	69	1.13	2	2	<0.05	<0.2
B00159235	0.10	<0.05	58	1.57	7	1	0.07	<0.2
B00159236	<0.05	<0.05	45	0.70	7	5	<0.05	<0.2
B00159237	<0.05	<0.05	54	0.19	8	3	<0.05	<0.2
B00159238	<0.05	<0.05	42	<0.05	3	<1	<0.05	<0.2

Element	@Er	@Eu	@Ga	@Gd	@Ge	@Hf	@Ho	@In
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.05	0.05	1	0.05	1	1	0.05	0.2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159239	<0.05	<0.05	39	0.40	8	3	<0.05	<0.2
B00159240	2.33	8.85	13	17.3	2	5	1.02	2.4
B00159241	<0.05	<0.05	54	0.29	6	<1	<0.05	<0.2
B00159242	0.33	<0.05	67	1.20	2	<1	0.11	<0.2
B00159243	1.25	<0.05	38	2.15	2	<1	0.38	<0.2
B00159244	1.77	<0.05	35	2.72	2	1	0.54	<0.2
B00159245	0.30	<0.05	32	0.79	2	<1	0.11	<0.2
B00159246	0.45	<0.05	28	0.71	2	<1	0.14	<0.2
B00159247	0.33	<0.05	27	0.44	2	<1	0.09	<0.2
B00159248	0.45	0.14	19	0.51	<1	3	0.14	<0.2
B00159249	1.01	0.60	20	1.78	1	4	0.33	<0.2
*Rep B00159239	<0.05	<0.05	43	0.37	9	3	<0.05	<0.2
*Rep B00159249	1.09	0.57	21	1.65	2	3	0.32	<0.2
*Std NCSDC86306	0.57	0.14	30	0.99	11	4	0.17	1.0

Element Method Det.Lim. Units	@La GE_ICM90A 0.1 ppm	@Lu GE_ICM90A 0.05 ppm	@Mo GE_ICM90A 2 ppm	@Nb GE_ICM90A 1 ppm	@Nd GE_ICM90A 0.1 ppm	@Pb GE_ICM90A 5 ppm	@Pr GE_ICM90A 0.05 ppm	@Rb GE_ICM90A 0.2 ppm
B00159051	13.7	0.10	10	69	24.5	49	5.74	513
B00159052	2.0	<0.05	157	43	2.3	69	0.61	921
B00159053	2.1	0.12	464	75	2.7	65	0.69	644
B00159054	20.4	1.12	<2	77	32.7	37	8.09	254
B00159055	0.3	0.07	4	36	0.8	11	0.18	1700
B00159056	0.1	0.22	<2	9	0.1	<5	<0.05	1707
B00159057	<0.1	<0.05	2	16	0.1	16	<0.05	4541
B00159058	0.1	0.09	<2	4	<0.1	41	<0.05	>10000
B00159059	1.8	0.27	<2	33	3.2	8	0.58	5767
B00159060	717	0.20	9	1135	360	27	104	1274
B00159061	2.1	0.16	<2	50	2.1	16	0.53	747
B00159062	9.2	0.44	<2	30	13.5	21	3.17	393
B00159063	4.7	0.28	<2	34	6.2	19	1.50	516
B00159064	3.4	0.37	<2	18	3.8	21	0.99	336
B00159065	2.7	0.16	5	40	3.8	17	0.88	409
B00159066	5.7	0.72	<2	47	8.0	37	1.92	498
B00159067	2.6	0.14	<2	49	3.8	34	0.84	492
B00159068	8.2	0.49	<2	41	12.2	19	2.70	291
B00159069	14.2	1.07	<2	62	24.2	38	5.28	75.0
B00159070	1.8	0.37	5	1	1.8	<5	0.44	2.6
B00159071	27.1	0.29	3	6	11.6	21	3.55	220
B00159072	0.8	0.11	<2	17	0.8	29	0.21	584
B00159073	0.7	<0.05	<2	<1	0.3	59	0.08	1527
B00159074	6.7	0.59	<2	36	10.2	29	2.21	328
B00159076	4.1	0.19	<2	3	7.1	16	1.48	14.0
B00159077	32.8	0.21	<2	8	39.6	22	9.57	356
B00159078	1.9	<0.05	2	121	1.1	18	0.34	1338
B00159079	3.7	0.09	<2	214	5.3	17	1.21	2491
B00159080	433	0.24	9	1548	241	24	69.0	1401
B00159229	5.4	0.09	<2	86	8.6	51	1.99	869
B00159230	1.9	0.07	5	2	1.7	<5	0.42	12.4
B00159231	6.6	0.19	2	81	9.3	20	2.38	1126
B00159232	3.9	0.06	2567	89	6.7	70	1.61	990
B00159233	3.1	0.24	4	48	5.5	18	1.43	45.0
*Dup B00159233	3.2	0.13	<2	53	5.5	18	1.43	45.7
B00159234	3.7	<0.05	34	82	5.6	63	1.32	1137
B00159235	0.4	0.21	<2	240	1.0	14	0.23	2539
B00159236	0.4	<0.05	<2	37	0.4	10	0.14	195
B00159237	0.3	<0.05	4	58	0.2	32	0.06	4184
B00159238	0.1	<0.05	<2	81	0.1	16	<0.05	2476

Element	@La	@Lu	@Mo	@Nb	@Nd	@Pb	@Pr	@Rb
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.1	0.05	2	1	0.1	5	0.05	0.2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159239	0.2	0.07	<2	71	0.3	18	0.08	154
B00159240	706	0.19	8	1057	329	25	94.8	1193
B00159241	0.2	<0.05	<2	18	0.3	7	<0.05	1230
B00159242	1.9	0.07	<2	113	2.8	6	0.68	924
B00159243	5.4	0.21	<2	44	6.6	26	1.60	506
B00159244	6.1	0.36	<2	49	8.0	38	1.93	614
B00159245	0.7	0.08	<2	65	1.0	15	0.24	647
B00159246	1.7	0.14	<2	22	1.7	25	0.43	365
B00159247	0.7	0.09	<2	21	0.6	22	0.16	523
B00159248	0.7	0.09	<2	6	0.8	32	0.16	61.7
B00159249	14.2	0.18	4	7	11.2	30	2.78	310
*Rep B00159239	0.6	0.08	<2	75	0.5	11	0.14	175
*Rep B00159249	14.9	0.18	4	7	11.3	31	2.86	333
*Std NCSDC86306	5.8	0.14	7	286	5.6	47	1.66	2398

Element	@Sb	@Sm	@Sn	@Ta	@Tb	@Th	@Tl	@Tm
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A
Det.Lim.	0.1	0.1	1	0.5	0.05	0.1	0.5	0.05
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
B00159051	0.1	6.3	6	16.0	0.26	16.5	3.6	0.05
B00159052	0.1	0.6	3	15.5	0.05	1.9	6.7	<0.05
B00159053	0.4	0.8	4	22.9	0.12	1.9	4.7	<0.05
B00159054	0.1	8.4	6	21.6	1.18	24.2	1.7	0.76
B00159055	0.1	1.3	25	77.6	0.63	1.1	11.2	<0.05
B00159056	0.1	<0.1	53	27.8	<0.05	0.8	12.2	<0.05
B00159057	0.1	<0.1	38	78.0	<0.05	1.5	40.1	<0.05
B00159058	0.1	0.1	9	9.2	<0.05	0.2	97.8	<0.05
B00159059	0.3	1.3	58	18.2	0.32	0.5	56.0	0.12
B00159060	10.2	44.9	703	17.6	1.64	88.3	11.1	0.27
B00159061	<0.1	0.6	16	23.1	0.07	1.0	4.6	<0.05
B00159062	<0.1	4.8	7	5.5	0.84	8.3	2.4	0.43
B00159063	<0.1	1.9	10	4.6	0.36	6.7	3.1	0.22
B00159064	<0.1	1.6	10	2.1	0.35	7.4	2.5	0.24
B00159065	<0.1	1.2	11	11.0	0.20	3.3	2.8	0.11
B00159066	0.3	2.9	10	5.1	0.66	9.8	3.5	0.57
B00159067	<0.1	1.7	6	4.9	0.30	3.3	3.4	0.13
B00159068	<0.1	4.8	24	5.1	0.80	7.0	1.4	0.44
B00159069	<0.1	10.2	7	7.7	1.89	12.3	<0.5	1.05
B00159070	0.2	0.4	<1	<0.5	0.10	0.8	<0.5	0.07
B00159071	<0.1	1.7	3	0.7	0.19	18.5	1.9	0.16
B00159072	<0.1	0.4	7	3.5	0.11	1.7	4.6	0.06
B00159073	<0.1	<0.1	2	<0.5	<0.05	0.1	12.0	<0.05
B00159074	<0.1	4.2	8	6.3	0.82	9.5	2.3	0.50
B00159076	<0.1	1.7	3	<0.5	0.23	2.7	<0.5	0.12
B00159077	<0.1	6.6	5	0.6	0.37	10.6	3.4	0.10
B00159078	<0.1	0.3	27	14.9	<0.05	0.1	10.5	<0.05
B00159079	<0.1	2.2	155	36.3	0.21	4.7	14.7	<0.05
B00159080	13.7	30.9	1047	21.8	1.12	44.2	12.2	0.20
B00159229	0.2	2.3	3	32.4	0.16	7.7	7.8	<0.05
B00159230	0.4	0.3	2	<0.5	0.06	1.2	<0.5	<0.05
B00159231	<0.1	2.6	22	14.2	0.26	7.7	6.6	0.11
B00159232	<0.1	1.6	2	33.0	0.10	4.6	8.1	<0.05
B00159233	<0.1	2.1	<1	39.2	0.45	2.5	<0.5	0.08
*Dup B00159233	<0.1	2.0	<1	43.9	0.45	2.4	<0.5	0.07
B00159234	<0.1	1.6	10	33.7	0.09	3.3	7.8	<0.05
B00159235	0.3	1.4	40	233	0.30	1.9	21.9	<0.05
B00159236	<0.1	0.6	3	101	0.13	1.6	1.6	<0.05
B00159237	0.2	0.2	22	227	<0.05	3.0	34.1	<0.05
B00159238	<0.1	<0.1	35	498	<0.05	0.5	17.8	<0.05

Element Method Det.Lim. Units	@Sb GE_ICM90A 0.1 ppm	@Sm GE_ICM90A 0.1 ppm	@Sn GE_ICM90A 1 ppm	@Ta GE_ICM90A 0.5 ppm	@Tb GE_ICM90A 0.05 ppm	@Th GE_ICM90A 0.1 ppm	@Tl GE_ICM90A 0.5 ppm	@Tm GE_ICM90A 0.05 ppm
B00159239	<0.1	0.2	3	208	0.06	6.9	1.3	<0.05
B00159240	9.2	41.1	660	16.5	1.52	78.8	10.3	0.25
B00159241	0.2	0.1	45	40.0	<0.05	0.4	9.2	<0.05
B00159242	<0.1	1.4	23	14.8	0.19	3.4	5.9	<0.05
B00159243	<0.1	2.1	13	4.3	0.33	5.6	3.4	0.19
B00159244	<0.1	2.7	11	4.3	0.42	6.3	4.5	0.28
B00159245	<0.1	0.6	14	5.8	0.13	2.3	4.7	<0.05
B00159246	<0.1	0.6	12	5.6	0.15	2.8	2.7	0.08
B00159247	<0.1	0.4	10	4.1	0.09	1.2	4.2	0.06
B00159248	0.1	0.3	2	0.7	0.10	0.7	0.5	0.06
B00159249	<0.1	2.0	4	0.9	0.25	8.5	2.7	0.14
*Rep B00159239	<0.1	0.3	4	216	0.06	7.5	1.3	<0.05
*Rep B00159249	<0.1	2.2	4	0.9	0.25	8.7	2.9	0.15
*Std NCSDC86306	0.2	1.3	69	562	0.17	12.9	12.7	0.10

Element	@U	@W	@Y	@Yb	@Zr	Li2O
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICP91A
Det.Lim.	0.05	1	0.5	0.1	0.5	0.002
Units	ppm	ppm	ppm	ppm	ppm	%
B00159051	3.98	1	12.7	0.5	21.2	0.011
B00159052	1.78	<1	2.3	0.1	9.7	0.005
B00159053	2.48	1	7.9	0.2	8.6	0.005
B00159054	9.22	<1	117	7.6	113	0.006
B00159055	0.54	2	12.8	<0.1	5.2	0.014
B00159056	0.23	<1	<0.5	<0.1	2.6	4.58
B00159057	1.19	<1	<0.5	<0.1	7.0	2.62
B00159058	0.20	<1	<0.5	<0.1	0.8	0.551
B00159059	1.61	2	9.3	0.8	39.6	0.757
B00159060	15.1	5	25.1	1.6	219	0.493
B00159061	1.41	2	1.8	0.2	3.0	0.004
B00159062	5.90	1	33.5	3.1	22.1	0.005
B00159063	1.96	2	16.3	1.8	13.1	0.004
B00159064	3.63	1	15.8	2.2	41.1	0.011
B00159065	3.74	2	7.8	0.9	12.1	0.010
B00159066	3.28	1	36.4	4.9	23.5	0.004
B00159067	5.08	<1	9.5	1.0	12.3	<0.002
B00159068	2.82	1	35.8	3.6	13.2	<0.002
B00159069	12.6	<1	84.2	8.2	46.2	0.003
B00159070	0.25	<1	4.9	0.5	23.7	0.003
B00159071	5.85	<1	8.2	1.2	298	0.045
B00159072	2.99	1	4.5	0.6	8.1	0.023
B00159073	0.25	<1	0.8	<0.1	0.9	<0.002
B00159074	4.14	1	36.8	4.0	18.5	0.003
B00159076	0.91	<1	7.9	0.9	60.0	0.034
B00159077	7.46	<1	8.0	0.7	168	0.174
B00159078	0.21	2	0.7	<0.1	0.7	0.188
B00159079	2.07	6	4.8	0.3	5.4	0.214
B00159080	7.37	6	18.2	1.2	162	1.00
B00159229	1.84	1	9.8	0.3	12.6	0.004
B00159230	0.35	<1	2.2	0.3	34.3	0.003
B00159231	2.66	3	14.4	1.0	12.6	0.027
B00159232	3.50	<1	4.0	0.2	7.7	<0.002
B00159233	3.58	<1	26.7	0.6	25.9	<0.002
*Dup B00159233	3.56	<1	27.4	0.6	27.0	0.003
B00159234	2.29	<1	4.3	<0.1	6.3	0.010
B00159235	0.65	6	4.4	<0.1	5.9	1.68
B00159236	1.11	<1	1.9	<0.1	19.4	0.061
B00159237	3.63	1	1.0	<0.1	9.8	0.342
B00159238	0.82	1	<0.5	<0.1	2.3	0.019

Element	@U	@W	@Y	@Yb	@Zr	Li2O
Method	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICM90A	GE_ICP91A
Det.Lim.	0.05	1	0.5	0.1	0.5	0.002
Units	ppm	ppm	ppm	ppm	ppm	%
B00159239	0.81	<1	0.9	<0.1	8.0	0.004
B00159240	13.5	5	23.4	1.4	202	0.467
B00159241	0.41	<1	0.6	<0.1	1.9	0.512
B00159242	0.63	3	4.6	0.4	8.0	0.016
B00159243	1.89	2	13.4	1.4	9.6	0.005
B00159244	3.08	<1	18.4	2.2	12.7	0.005
B00159245	5.51	1	4.3	0.3	1.7	0.023
B00159246	1.97	<1	5.9	0.7	12.3	0.010
B00159247	0.92	1	3.7	0.4	7.0	0.018
B00159248	3.20	<1	5.0	0.4	51.9	<0.002
B00159249	4.39	<1	9.1	1.1	121	0.071
*Rep B00159239	0.87	<1	0.9	<0.1	9.7	
*Rep B00159249	4.49	<1	9.5	1.2	120	
*Std NCSDC86306	5.96	200	4.1	1.0	27.5	
*Rep B00159074						0.003
*Rep B00159078						0.190