



**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 7173**

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volcanogenic massive sulphide deposit, Nunavut:
Part 1 bedrock samples**

**A.K. Hicken, M.B. McClenaghan, D. Layton-Matthews,
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INDICATOR MINERAL SIGNATURES OF THE IZOK LAKE ZN-CU-PB-AG-VOLCANOGENIC MASSIVE SULPHIDE DEPOSIT, NUNAVUT: PART 1 BEDROCK SAMPLES

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ABSTRACT

Metamorphosed volcanogenic massive sulphide deposits contain indicator minerals; however, little research has been carried out to determine which of these minerals may be useful for exploration in glaciated terrain. Few case studies have been published that document indicator mineral signatures in till around VMS deposits. To address this need, the indicator minerals that characterize the Izok Lake Zn-Cu-Pb-Ag VMS deposit, Nunavut, have been documented in bedrock and till down-ice. This report describes results for bedrock samples.

A suite of bedrock samples from mineralization and host rocks around the deposit were prepared and examined as polished thin sections and <2.0 mm heavy mineral concentrates. Selected indicator mineral compositions were examined using electron microprobe analysis. Indicator minerals that characterize the Izok Lake deposit, and will be useful for till surveys, include the ore minerals chalcopyrite, sphalerite, galena and pyrrhotite, as well as Zn-spinel gahnite, and the hydrothermal alteration mineral axinite.

INTRODUCTION

Till geochemical signatures of base metal deposits have been well documented in the literature (e.g. Coker and DiLabio, 1989; Hoffman and Woods, 1991; Kaszycki et al., 1996; Lett, 2001; Bond and Plouffe, 2002; Parkhill and Doiron, 2003) but very few studies have documented the indicator mineral dispersal signatures of volcanogenic massive sulphide (VMS) deposits in surficial sediments (e.g. Averill, 2001). To better understand the indicator mineral signatures of VMS deposits, the Geological Survey of Canada (GSC), through the Geo-Mapping for Energy and Minerals (GEM) Program (2008-2013) and in collaboration with Queen's University and Minerals and Metals Group (MMG), collected and analyzed a suite of bedrock and till samples from the Izok Lake Zn-Cu-Pb-Ag VMS deposit, western Nunavut. The Izok Lake deposit was chosen as a test site for a VMS indicator mineral study for several reasons:

- 1) the ore zone subcrops and has been subjected to glacial erosion;
- 2) the surficial geology around the deposit is favourable for a drift exploration study, with a moderately thin veneer of till (<3 m thick);
- 3) the deposit is known to contain gahnite (Zn-spinel), a potential VMS indicator mineral (Spry, 1982; Spry and Scott, 1986; Morris et al., 1997; Averill, 2001; Spry and Teale, 2009); and
- 4) the deposit has an extended exploration history, and was actively being explored at the time of this study, allowing access to ample drill logs and core, which greatly facilitated access and field logistics.

The specific objectives of the Izok Lake VMS case study are to identify which indicator minerals and trace element signatures are representative of VMS deposits

and to determine techniques for their recovery and identification from glacial sediments. The intention is that this research may then be applied to exploration for other VMS deposits in glaciated terrain of northern Canada. The purpose of this open file is to report on the indicator mineral species, abundances, and compositions in the heavy mineral fraction of mineralized and host-rock lithology within the Izok Lake deposit and the surrounding area. Raw indicator mineral data for bedrock and till samples collected for this study have been released as Open File 7075 (McClenaghan et al., 2012a). Data for re-picked, reconnaissance-scale till samples in the Izok Lake region, originally collected in 1994 for a previous GSC mapping program (Dredge et al., 1996a), have been published as Open File 7029 (McClenaghan et al., 2012b). Interpretations of indicator mineral data for till samples collected as part of this study will be published in a separate report. Till geochemical data for the <0.063 mm fraction of the till samples have been published in GSC Open File 7046 (Hicken et al., 2012).

REGIONAL SETTING

The Izok Lake deposit (65°38'00"N, 112°47'45"W) is in Nunavut, at its western border with the Northwest Territories, in the Point Lake topographic map sheet (NTS 86H). It is approximately 400 km north of Yellowknife (Fig. 1). The Izok Lake deposit subcrops under Izok Lake approximately 5 km west of the northern arm of Itchen Lake and 30 km north of Point Lake, which are two major lakes in the region. The Izok Lake area is in the Bear-Slave Upland of the Canadian Shield (Bostock, 1970) and is a glaciated landscape in which glacial deposits form the most prevalent surface material together with bedrock outcrops. The topography is generally undulating with irregular, glacially stream-

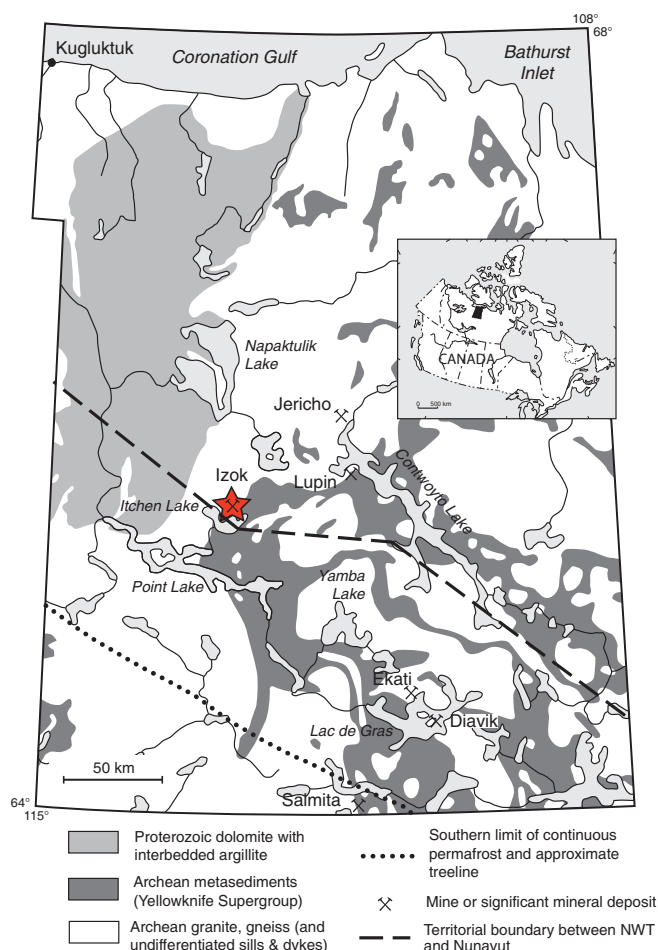


Figure 1. Location of the Izok Lake study area, which is situated near the border between Nunavut and Northwest Territories in northern Canada (modified from Dredge et al., 1999; geology after Hoffman and Hall, 1993).

lined bedrock knobs surrounded by surficial sediments and numerous lakes. The Izok Lake exploration property is accessible only by chartered aircraft.

REGIONAL GEOLOGY

The Izok Lake VMS deposit and surrounding region are located in the central Slave Province, a granitic-greenstone terrain of folded, faulted, and metamorphosed Archean rocks comprising belts of 2.67 to 2.70 billion year old metasedimentary and metavolcanic rocks of the Yellowknife Supergroup (Padgham and Fyson, 1992; Bleeker and Hall, 2007). In the Point Lake region, the Yellowknife Supergroup is locally divided into the lower Point Lake Formation and the upper Contwoyto Formation (Fig. 2). Both formations were intruded extensively by synvolcanic to post-volcanic granitic plutons, which have been dated at between 2.58 and 2.68 billion years (Bleeker et al., 1999), and subsequently crosscut by north-northwest-trending regional diabase dyke swarms belonging to the Helikian Mackenzie Swarm (Buchan and Ernst,

2004). The Slave Province has been the focus of intensive diamond drilling exploration since the early 1990s. The nearest known kimberlite pipes include the kimberlite cluster 100 km to the northwest of Izok Lake, at the northern end of Contwoyto Lake, and the Ranch Lake kimberlite, 50 km southeast of Itchen Lake.

The Izok Lake deposit is hosted within the Izok Lake volcanic belt of the Point Lake Formation (Morrison and Balint, 1993; Morrison, 2004). Dominated by felsic metavolcanic rocks with lesser intermediate and mafic metavolcanic rocks and derived metasedimentary rocks, this suite of rocks forms an arcuate belt approximately 18 km long and 1 to 5 km wide (Bostock, 1980). The northern and central parts of the Izok Lake volcanic belt are metamorphosed to upper amphibolite-sillimanite grade with characteristic minerals assemblages of hornblende, cordierite, and sillimanite (Thomas, 1978). The rocks in the southern part are of greenschist grade with a characteristic mineral assemblage of albite-epidote-chlorite.

The Izok Lake VMS deposit has a significant mineral resource of 14.8 Mt grading 2.5% Cu, 12.8% Zn, 1.3% Pb, and 71 g/t Ag enclosed within a group of five near-surface sulphide lenses (Costello et al., 2012). The bulk of the deposit lies under Izok Lake and the western most zones subcrop (Fig. 3). The deposit consists mainly of galena, sphalerite, and chalcocopyrite, with a variety of other lesser ore minerals (Money and Heslop, 1976; Morrison, 2004) listed in Table 1. The Izok Lake deposit is Ag-rich, with the principal Ag-bearing minerals being galena, tetrahedrite, pyrrargyrite, along with native silver and Ag-rich antimony and chalcocopyrite (Harris et al., 1984a). The presence of the Zn-spinel gahnite has been documented within and immediately adjacent to the deposit (Money and Heslop, 1976). The presence of sulphide-rich boulders west of Izok Lake led to the deposit's discovery in 1975 (Money and Heslop, 1976).

EXPLORATION HISTORY

Extensive geological mapping and sampling of the Point Lake map sheet (NTS 86H) has been carried out by industry, academia, and government surveys over several decades (Bostock, 1967; Money and Heslop, 1976; Thomas, 1978; Dredge et al., 1996a,b,c; 1999; Stea et al., 2009; Oviatt, 2010). Bostock conducted a detailed bedrock-mapping project, which was part of the Operation Coppermine project, from 1964 to 1966. The results of that fieldwork lead Texasgulf Incorporated to explore the Izok Lake area in 1971 for base metal deposits. Several gossanous zones were discovered during this first field season, which lead to the detection of the Hood massive sulphide deposit, 48 km to the north of Izok Lake. Texasgulf expanded their

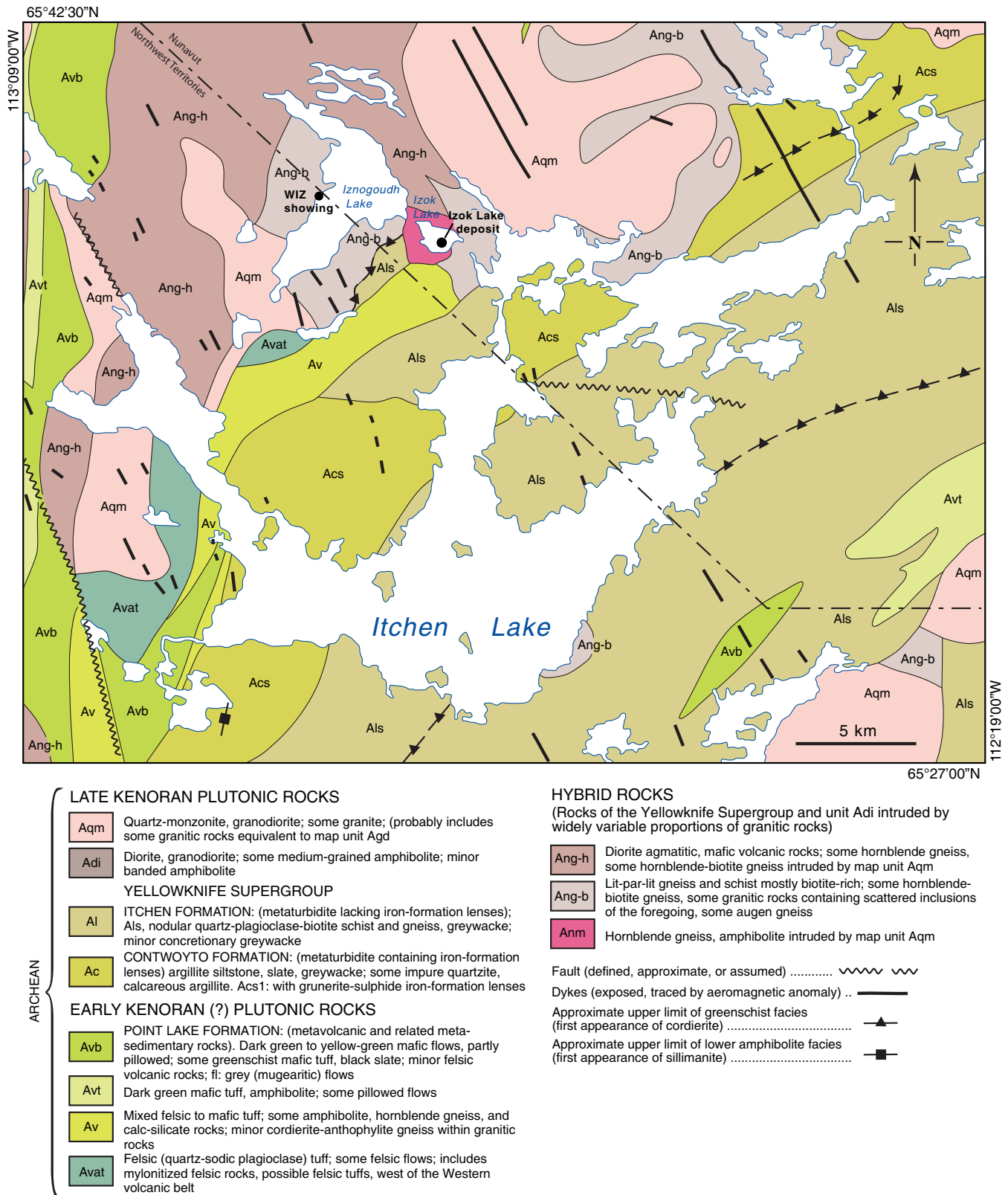


Figure 2. Bedrock geology of the Izok Lake deposit showing all major rock types, structural information, and metamorphic facies in the area (modified from Tremblay et al., 1980).

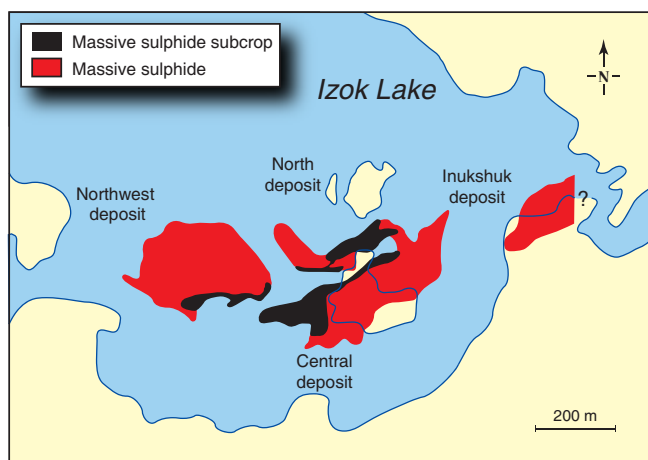


Figure 3. Local-scale bedrock geology map of the ore zone showing areas of subcrop around and within Izok Lake (modified from Morrison and Balint, 1993).

exploration and in 1974 found massive sulphide boulders with over 30% Zn along the west shore of what is now referred to as Izok Lake (Money and Heslop, 1976). In 1975, a horizontal loop electromagnetic survey, detailed mapping, soil geochemistry, and diamond drilling under Izok Lake were completed to find the source of the mineralized boulders. Between 1975 and 1977, 15,000 m were drilled and a mineral resource at Izok Lake was defined as 11.0 Mt grading 2.8% Cu, 13.7% Zn, 1.4% Pb, and 70.1 g/t Au enclosed within a group of four near-surface sulphide lenses (Morrison and Balint, 1993).

Additional exploration was not undertaken in the Izok Lake area until 1992 when Minnova Incorporated and Metall Mining Corporation acquired the property (Morrison, 2004). A feasibility study and new mineral resource was calculated and a fifth massive sulphide lens was discovered. They concluded Izok Lake could be feasible as an open pit mine, but due to its remote location, its development was put on hold. In recent years, the Izok Lake deposit has had several owners, including Inmet Mining Corporation (up to 2005), Wolfden Resources Incorporated (2006), Zinifex Limited (2007), Oz Minerals (2008), and MMG Resources (2008-present). As of the date of this report (October, 2012), the Izok Lake deposit is undergoing further evaluation and additional exploration is being conducted on the property (Costello et al., 2012).

Exploration in the region also located a gossanous sphalerite-bearing zone on the western shore of Iznogoudh Lake, informally known as the West Iznogoudh Zn (WIZ) showing (Fig. 4). In 1976, a closely spaced soil sampling survey by Texasgulf Incorporated discovered elevated values of Zn (49 samples of >72 ppm Zn) in a small area of gossanous outcrop (Heslop, 1976). Although the gossanous zone does not have a geophysical response, it corresponds

Table 1. Summary of known ore minerals occurring in the Izok Lake deposit (Money and Heslop, 1976; Thomas, 1978; Harris, 1984a,b; Harris et al., 1986; Morrison and Balint, 1993; Morrison, 2004). Note that PTS = polished thin section and HMC = heavy mineral concentrate. Detailed mineral results of the till samples will be published in a subsequent report.

Mineral	Formula	Found in PTS in this Study	Found in Bedrock HMC in this Study	Found in Till in this Study
Major and Minor Minerals in the Ore				
pyrite	FeS ₂	Yes	Yes	Yes
pyrrhotite	Fe _(1-x) S	Yes	Yes	Yes
sphalerite	(Zn,Fe)S	Yes	Yes	Yes
galena	PbS	Yes	Yes	Yes
chalcocopyrite	CuFeS ₂	Yes	Yes	Yes
magnetite	Fe ₃ O ₄	Yes	Yes	Yes
native silver	Ag	Yes	No	No
Trace and Rare Minerals in the Ore				
<i>Pb-Bearing Minerals</i>				
Jaskolskiite	Cu _{0.2} Pb _{2.2} Sb _{1.2} Bi _{0.6} S ₅	No	No	No
Izoklakeite	(Cu, Fe) ₂ Pb ₂₇ (Sb, Bi) ₁₉ S ₅₇	No	No	No
Meneghinite	Pb ₁₃ CuSb ₇ S ₂₄	No	No	No
Bournonite	PbCuSbS ₃	No	No	No
Nuffieldite	Pb ₂ Cu(Pb, Bi)Bi ₂ S ₇	No	No	No
Boulangerite	Pb ₅ Sb ₄ S ₁₁	No	No	No
Cosalite	Pb ₂ Bi ₂ S ₅	No	No	No
<i>Fe-Bearing Minerals</i>				
Marcasite	FeS ₂	No	No	No
Gudmundite	FeSbS	No	No	No
Arsenopyrite	FeAsS	No	Yes	Yes
<i>Cu-Bearing Minerals</i>				
Tetrahedrite	(Cu, Fe) ₁₂ Sb ₄ S ₁₃	No	No	No
Izoklakeite	(Cu, Fe) ₂ Pb ₂₇ (Sb, Bi) ₁₉ S ₅₇	No	No	No
Tennantite	(Cu, Fe) ₁₂ As ₄ S ₁₃	No	No	No
Stannite	Cu ₂ FeSnS ₄	No	No	No
Valleriite	4(Fe, Cu) ₃ •3(Mg, Al)(OH) ₂	No	No	No
Cubanite	CuFe ₂ S ₃	No	No	No
Covellite	CuS	No	No	No
Digenite	Cu ₉ S ₅	No	No	No
<i>Ag-Bearing Minerals</i>				
Pyrargyrite	Ag ₃ SbS ₃	No	No	No
Allargentum	Ag _{1-x} Sb _x	No	No	No
Dyscrasite	Ag ₃ Sb	No	No	No
Acanthite	Ag ₂ S	No	No	No
Stephanite	Ag ₅ SbS ₄	No	No	No
Polybasite	[(Ag, Cu) ₆ (Sb, As) ₂ S ₇][Ag ₃ CuS ₄]	No	No	No
Sternbergite	AgFe ₂ S ₃	No	No	No
<i>Bi-Bearing Minerals</i>				
Native Bismut	Bi	No	No	No
Cosalite	Pb ₂ Bi ₂ S ₅	No	No	No
<i>Mo-Bearing Minerals</i>				
Molybdenite	MoS ₂	No	Yes	No
<i>Ni-Bearing Minerals</i>				
Breithauptite	NiSb	No	No	No
<i>Sn-Bearing Minerals</i>				
Cassiterite	SnO ₂	No	No	No
<i>Co-Bearing Minerals</i>				
Cobaltite	CoAsS	No	No	No

with rocks containing visible pyrite and sphalerite (Money and Heslop, 1976). In 2009, a detailed till geochemical study was conducted by the GSC around the WIZ showing, documenting the local ice-flow history and till geochemical signatures down-ice of the showing (Oviatt, 2010).

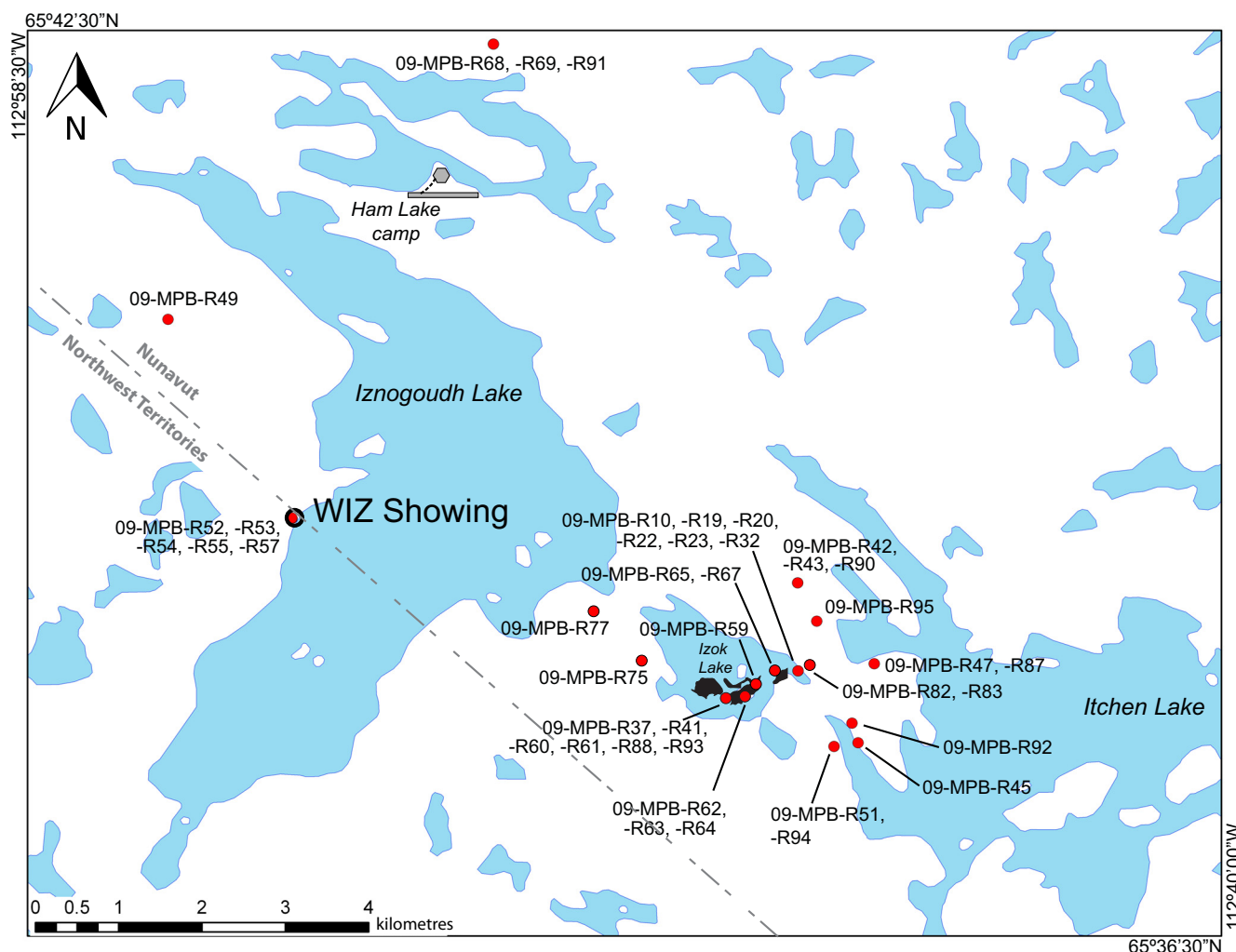


Figure 4. Location of bedrock samples collected around the Izok Lake deposit.

GLACIAL HISTORY

Observations of glacial features in the region were initially reported by Craig (1960), Blake (1963), and Bostock (1967, 1980). As part of the GSC's Slave Province National Mapping Program (NATMAP), an intensive field program was carried out in the Point Lake (NTS 86H) map sheet to better understand the regional glacial geology through surficial mapping (Dredge et al., 1996b), glacial dispersal and transport distances (Kerr et al., 1995; Dredge and Kerr, 1999), and mineralogical and geochemical analysis of reconnaissance-scale samples (Dredge et al., 1996a,c). Over the past 20 years, diamond drilling in northern Canada has built upon this regional framework and has further developed the understanding of the history of the Laurentide Ice Sheet in eastern Northwest Territories and western Nunavut (e.g. Stea et al., 2009).

Ice-flow mapping in the Point Lake area shows that glacial trajectories have undergone a systematic, clockwise rotation from southwest to northwest, occurring as a series of discrete ice-flow phases, rather than as

continuous flow change (Kerr et al., 1995; Dredge et al., 1996b; Stea et al., 2009). The oldest known phase of ice flow across the Izok Lake area has been documented by previous mapping to be in a general southwest direction (Bostock, 1980; Kerr et al., 1995; Dredge et al., 1996a,b). This earliest flow was followed by strong west- to west-northwest-trending ice-flow (Bostock, 1980; Dredge et al., 1998c). Surface morphology and ice-flow indicators (e.g. striations) within the area reflect this dominant northwest phase.

METHODS

Field Sampling

A total of 42 bedrock samples, which were collected around the Izok Lake VMS deposit (Fig. 4) in 2009, are described in this report. A subset of 21 samples were examined in detail by polished thin sections (PTS) and a sample split was sent to Overburden Drilling Management (ODM), Ottawa, for processing to recover indicator minerals. In addition, one bedrock sample (09-MPB-R53) and three float samples (09-MPB-R54, -R55, -R57) were collected at the WIZ

showing on the west side of Iznougoudh Lake to document its sulphide mineralization and any possible contribution of mineral-rich debris to the glacial dispersal train. The WIZ showing samples are also briefly described in Oviatt (2010). Rock samples 09-MPB-R68, -R69, and -R91 were collected 8 km northwest of the Izok Lake deposit because exploration diamond drill logs had noted green, gahnite-bearing zones in associating with sulphide mineralization. Some additional samples not processed and described by ODM (samples 09-MPB-R52, -R75, -R77 and -R82) were collected to study the petrography of the country rock. Other samples were collected for petrographic study of the mineral species (sample 09-MPB-R10, -R19, -R67 and -R85) (e.g. sphalerite, chalcopyrite, staurolite) and an additional sample (09-MPB-R63) was collected to augment the electron microprobe study of gahnite.

Bedrock sample numbers, lithology, and locations are listed in Appendix A. Colour photographs of each sample submitted to ODM for heavy mineral analysis are included in Appendix A2. Bedrock sample locations are plotted in Figure 4, using the UTM coordinates of the drillhole collar.

Sample Processing and Indicator Mineral Recovery

Splits of 21 bedrock samples were sent to ODM for the production of heavy mineral concentrates. A polished slab of each submitted bedrock sample was first prepared at the GSC and then examined under a binocular microscope and described by a senior geologist at ODM (Appendix B1). A polished thin section was prepared from a separate split of each sample and described by the senior author (Appendix B2).

Bedrock sample processing procedures for the recovery of indicator minerals are described in detail in GSC Open File 7075 (McClenaghan et al. 2012a). The bedrock samples were disaggregated using an electric pulse disaggregator (EPD) at ODM. The disaggregated material was sieved at 2.0 mm and the <2.0 mm material was then processed at ODM to produce a non-ferromagnetic heavy mineral concentrate for picking indicator minerals. The disaggregated sample was subjected to heavy liquid separation in methylene iodide diluted to a specific gravity of 3.2. The ferromagnetic fraction was then removed using a hand magnet and set aside for picking of the pyrrhotite. The non-ferromagnetic fraction was sieved into four-size fractions: 0.18-0.25, 0.25-0.5, 0.5-1.0, and 1.0-2.0 mm. Bedrock sample processing procedures for the recovery of indicator minerals and the weights of all the fractions produced during processing are described in detail in GSC Open File 7075 (McClenaghan et al. 2012a).

Bedrock samples were processed at ODM in a pre-determined order from least mineralized to most min-

Table 2. Summary of indicator mineral counts for the 0.25-0.5 mm non-ferromagnetic fraction of bedrock samples (09-MPB-R49, -R93, -R1) and pan concentrates of four quartz blanks (QKB-1, -2, -3, -4) processed with the preceding samples showing the sulphide mineral cross-contamination between samples. Data summarized from McClenaghan et al. (2012a).

Sample Number	Chalcopyrite 0.25-0.5 mm	Sphalerite 0.25-0.5 mm	Additional Grains 0.25-0.5 mm	Pan Concentrate Grains
QKB-1 (beginning of sample batch)	0	0	1 hornblende; ~20 steel turnings/ beads	0
09-MPB-R49	0	0	1 zoisite; 1 diopside	~40 grains pyrite; 5 grains pyrrhotite
QKB-2	0	0	1 hornblende; 2 steel turnings	0
09-MPB-R93	~40,000	~25,000		5% pyrite; 50% pyrrhotite; 30% chalcopyrite; 10% sphalerite
QKB-3	2	1	2 steel turnings	~300 grains pyrite; ~100 grains pyrrhotite; ~100 grains sphalerite
09-MPB-R61	~200	5		~2000 grains pyrite; ~1000 grains pyrrhotite; ~1000 grains galena
QKB-4	1	0		~50 grains pyrite

eralized to limit cross-contamination. The raw data are reported in this order in GSC Open File 7075 (McClenaghan et al., 2012a). Four quartz blanks were also inserted into the sample batch during processing (one at the beginning, one at the end, and the remaining two inserted in the middle of the sample batch) to monitor, as well as limit, carryover contamination (Table 2). Raw weight data and counts for the quartz blanks are listed in McClenaghan et al. (2012a).

The 0.25-0.50 mm non-paramagnetic and paramagnetic fractions, and the 0.5-1.0 mm and 1.0-2.0 mm non-ferromagnetic fractions were then examined for indicator minerals that may be associated with VMS deposits (Table 3), as well as indicators of other deposit types, including kimberlite, gold, and magmatic Ni-Cu-PGE deposits. The list of indicator minerals in Table 3 was developed by Averill (2001) based on observations of indicator mineral suites in bedrock and surficial sediments near metamorphosed base metal deposits. The abundance of selected indicator minerals in the 0.25 to 0.5 mm fraction of bedrock samples is listed in Table 4 and the abundances for sulphide minerals in four size fractions are listed in Table 5.

Electron Microprobe Analysis

Selected grains of gahnite, garnet, staurolite, and axinite from bedrock samples were mounted in 25 mm epoxy grain mounts and analyzed at Geoscience Laboratories, Sudbury, Ontario using a Cameca SX-100 Electron Probe Micro Analyzer (EPMA). Table 6 displays the routines for the probing of these grains, including the standards, analyzing crystals, count

Table 3. Common heavy indicator minerals found in hydrothermal-alteration zones associated with metamorphosed volcanogenic massive sulphide deposits in glaciated terrains (modified from Averill, 2001). Abbreviations: PTS = polished thin section; HMC = heavy mineral concentrate.**a) Base-metal indicator minerals (Averill, 2001)**

Indicator Mineral	Chemical Composition	Specific Gravity	Hardness (Mohs)	Found in PTS in this Study	Found in Bedrock HMC in this Study	Found in Till HMC in this Study
Sillimanite	Al ₂ SiO ₅	3.23	6.5-7.5	Yes	Yes	Yes
Kyanite	Al ₂ SiO ₅	3.61	4.0-7.0			Yes
Corundum	Al ₂ O ₃	4.05	9	Yes		Yes
Anthophyllite	(Mg,Fe) ₇ Si ₈ O ₂₂ (OH) ₂	3.5	5.0-6.0			
Orthopyroxene	(Mg,Fe) ₂ Si ₂ O ₆	3.4	5.0-6.0	Yes		Yes
Mg-Spinel	MgAl ₂ O ₄	3.64	8			
Sapphirine	(Mg, Al) ₈ (Al, Si) ₆ O ₂₀	3.45	7.5			
Staurolite	(Fe, Mg, Zn) ₂ Al ₆ (Si, Al) ₄ O ₂₂ (OH) ₂	3.65-3.77	7.0-7.5	Yes	Yes	Yes
Tourmaline	(Na, Ca)(Mg, Fe) ₃ Al ₆ (BO ₃) ₃ (Si ₆ O ₁₈)(OH) ₄	3.06	7.0-7.5	Yes		Yes
Dumortierite	Al ₇ (BO ₃)(SiO ₄) ₃ O ₃	3.3-3.4	7.0-8.5			
Mn-Epidote	Ca ₂ (Al, Fe, Mn) ₃ Si ₃ O ₁₂ (OH)	3.3-3.6	6.0-7.0	Yes		Yes
Spessartine	Mn ₃ Al ₂ Si ₃ O ₁₂	4.15	6.5-7.5			Yes
Gahnite	ZnAl ₂ O ₄	4.38-4.60	7.5-8.0	Yes	Yes	Yes
Franklinite	(Zn, Mn, Fe)(Fe, Mn) ₂ O ₄	5.07-5.22	5.5-6.0			
Willemite	Zn ₂ SiO ₄	3.9-4.2	5.5			
Cr-Rutile	(Ti, Cr)O ₂	4.23	6.0-6.5		Yes	Yes
Barite	BaSO ₄	3.0-3.5	4.48			
Chalcopyrite	CuFeS ₂	4.1-4.3	3.5	Yes	Yes	Yes
Cinnabar	HgS	8.18	2.0-2.5			
Loellingite	FeAs ₂	7.1-7.5	5.0-5.5			Yes
Native Gold	Au	16.0-19.3	2.5-3.0			Yes

b) Other metallic minerals of interest

Indicator Mineral	Chemical Composition	Specific Gravity	Hardness (Mohs)	Found in PTS in this Study	Found in Bedrock HMC in this Study	Found in Till HMC in this Study
Sphalerite	(Zn, Fe)S	3.9-4.2	3.4-4	Yes	Yes	Yes
Galena	PbS	7.2-7.6	2.5	Yes	Yes	Yes
Pyrite	FeS ₂	5-5.02	6.5	Yes	Yes	Yes
Pyrrhotite	Fe _(1-x) S _(x=0-0.17)	4.58-4.65	3.5-4	Yes	Yes	
Molybdenite	MoS ₂	5.5	1	Yes	Yes	
Arsenopyrite	FeAsS	6.07	5			Yes
Cassiterite	SnO ₂	6.8-7	6-7			Yes
Sperryllite	PtAs ₂	10.58	6-7			Yes

Table 4. Number of grains (and grain estimates for larger populations) of selected indicator mineral abundances in the 0.25-0.50 mm non-ferromagnetic heavy mineral concentrates of disaggregated bedrock samples normalized to 1 kg sample weight (post disaggregation <2 mm weight).

Sample Number	Lithology	Galena	Sphalerite	Chalcopyrite	Pyrite	Pyrrhotite	Gahnite	Mn-Epidote	Sillimanite	Staurolite	Spessartine	Mn-Axinite
09-MPB-R41	Felsic metavolcanic	10	40	47	21710	16700	25050	0	0	0	0	0
09-MPB-R42	Iron formation	0	0	0	6	0	0	0	0	0	0	0
09-MPB-R43	Metasediment	0	0	39	1640	8202	0	0	328	0	0	0
09-MPB-R45	Metasediment	0	0	0	0	0	0	0	224	2237	0	0
09-MPB-R47	Mafic metavolcanic	0	0	0	9792	0	0	0	0	0	0	0
09-MPB-R49	Diabase	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R51	Felsic metavolcanic	0	0	2	0	0	0	0	0	0	0	0
09-MPB-R60	Massive sulphides	0	958188	17422	871080	0	0	0	0	0	0	0
09-MPB-R61	Sulphidic chert	52	52	2064	6192	51600	361197	0	0	0	0	0
09-MPB-R62	Sulphidic breccia pipe	419	387097	129032	194	0	0	0	0	0	0	387097
09-MPB-R64	Massive sulphides	0	521739	35	347826	0	0	0	0	0	0	0
09-MPB-R65	Sulphidic breccia pipe	235	293686	293686	294	14684	0	0	0	0	0	23892
09-MPB-R69	Sulphidic alteration zone	0	193	48243	1723	68918	137836	0	0	0	0	0
09-MPB-R87	Clastic metasediment	0	0	0	4149	0	0	0	0	0	0	0
09-MPB-R88	Felsic intrusive	0	0	2	0	0	0	0	0	0	0	0
09-MPB-R90	Iron formation	0	0	0	9	0	0	0	0	0	0	0
09-MPB-R91	Felsic metavolcanic	0	0	6	955	0	0	0	0	0	0	0
09-MPB-R92	Metagabbro	0	0	0	15	197	0	0	0	0	0	0
09-MPB-R93	Massive sulphides	0	323834	518135	77720	64767	0	0	0	0	0	0
09-MPB-R94	Felsic metavolcanic	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R95	Metapelite	0	0	0	0	0	0	0	0	0	0	0

Indicator Mineral Signatures of the Izok Lake Deposit, Nunavut: Part 1 Bedrock Samples

Table 5. Comparison of the number (No.) of grains or percentage (%) of grains of galena, sphalerite, chalcopyrite, pyrite, molybdenite, arsenopyrite, pyrrhotite (in the ferromagnetic fraction), and gahnite in four size fractions of the non-ferromagnetic heavy mineral concentrate of bedrock samples from the Izok Lake deposit: 1) pan concentrate (conc), 2) 0.25-0.5 mm, 3) 0.5-1.0 mm, and 4) 1.0-2.0 mm. Abundances in the three coarsest fractions are normalized to 1 kg of <2.0 mm material.

Sample	Galena				Sphalerite				Chalcopyrite				Pyrite			
	Pan Conc (No. grains)	0.25-0.50 mm	0.5-1.0 mm	1.0-2.0 mm	Pan Conc (No. grains or %)	0.25-0.50 mm	0.5-1.0 mm	1.0-2.0 mm	Pan Conc (No. grains or %)	0.25-0.50 mm	0.5-1.0 mm	1.0-2.0 mm	Pan Conc (No. grains or %)	0.25-0.50 mm	0.5-1.0 mm	1.0-2.0 mm
09-MPB-R41	2000	10	0	0	50	40	17	0	0	47	3	0	1%	21710	0	0
09-MPB-R42	0	0	0	0	0	0	0	0	0	0	0	0	5	6	0	0
09-MPB-R43	0	0	0	0	0	0	0	0	0	39	16	0	300	1640	0	0
09-MPB-R45	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0
09-MPB-R47	0	0	0	0	0	0	0	0	0	0	0	0	5000	9792	0	0
09-MPB-R49	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0
09-MPB-R51	0	0	0	0	0	0	0	0	0	2	0	0	300	0	0	0
09-MPB-R60	0	0	0	0	35%	958188	87108	26132	0	17422	87108	26132	60%	871080	0	0
09-MPB-R61	1000	52	0	0	0	52	0	0	0	2064	516	62	2000	6192	0	0
09-MPB-R62	0	419	0	0	2000	387097	70968	32258	2500	129032	25806	9677	500	194	0	0
09-MPB-R64	0	0	0	0	40%	521739	52174	17391	10%	35	35	0	40%	347826	0	0
09-MPB-R65	400	235	0	0	1000	293686	44053	14684	2000	293686	44053	14684	50	294	0	0
09-MPB-R69	500	0	0	0	20	193	0	0	5000	48243	12405	5513	100	1723	0	0
09-MPB-R87	0	0	0	0	0	0	0	0	0	0	0	0	2000	4149	0	0
09-MPB-R88	0	0	0	0	0	0	0	0	0	2	0	0	20	0	0	0
09-MPB-R90	0	0	0	0	0	0	0	0	0	0	0	0	4	9	0	0
09-MPB-R91	3	0	0	0	0	0	0	0	0	6	0	0	1000	955	0	0
09-MPB-R92	0	0	0	0	0	0	0	0	0	0	0	0	100	15	0	0
09-MPB-R93	0	0	0	0	10%	323834	25907	4534	30%	518135	97150	25907	5%	77720	0	0
09-MPB-R94	0	0	0	0	0	0	0	0	0	0	0	0	200	0	0	0
09-MPB-R95	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0

Sample	Molybdenite				Arsenopyrite				Pyrrhotite				Gahnite			
	Pan Conc (No. grains)	0.25-0.50 mm	0.5-1.0 mm	1.0-2.0 mm	Pan Conc (No. grains)	0.25-0.50 mm	0.5-1.0 mm	1.0-2.0 mm	Pan Conc (No. grains)	0.25-0.50 mm	0.5-1.0 mm	1.0-2.0 mm	Pan Conc (No. grains)	0.25-0.50 mm	0.5-1.0 mm	1.0-2.0 mm
09-MPB-R41	0	0	0	0	0	0	0	0	2000	16700	0	0	0	25050	2338	334
09-MPB-R42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R43	0	0	3	0	0	0	0	0	100	8202	0	0	0	0	0	0
09-MPB-R45	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R49	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
09-MPB-R51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R61	0	0	0	0	0	0	0	0	1000	51600	0	0	0	361197	56760	18576
09-MPB-R62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R65	0	0	15	0	0	0	0	0	100	14684	0	0	0	0	0	0
09-MPB-R69	0	0	0	0	0	0	0	0	5000	68918	0	0	0	137836	48243	19297
09-MPB-R87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R90	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
09-MPB-R91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R92	0	0	0	0	0	0	0	0	0	197	0	0	0	0	0	0
09-MPB-R93	0	0	0	0	0	0	0	0	50%	64767	0	0	0	0	0	0
09-MPB-R94	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-MPB-R95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6. Electron microprobe operating conditions for analyses (gahnite, garnet, staurolite, and axinite) using the Cameca SX-100 Electron Micro Analyzer (EMPA) at Geoscience Laboratories, Sudbury and the JEOL JXA-8230 EMPA (chalcopyrite) at Queen's University for polished thin sections and disaggregated bedrock samples.

Gahnite in Polished Thin Section (Geoscience Labs, Sudbury, Ontario)								Garnet Disaggregated Bedrock (Geoscience Labs, Sudbury, Ontario)							
Oxide	Standard	XTAL	L.O.D. (wt%)	L.O.Q. (wt%)	Count time (sec)	Gun (kV)	Beam (nA)	Oxide	Standard	XTAL	L.O.D. (wt%)	L.O.Q. (wt%)	Count time (sec)	Gun (kV)	Beam (nA)
SiO ₂	ChrRV1	Sp1 TAP	0.008	0.028	15	20	200	SiO ₂	garKNZ	Sp1 TAP	0.026	0.087	15	20	20
TiO ₂	IlmMSU	Sp2 PET	0.024	0.082	25	20	20	TiO ₂	garKNZ	Sp2 PET	0.008	0.026	20	20	200
Al ₂ O ₃	ChrRV1	Sp1 TAP	0.036	0.121	10	20	20	Al ₂ O ₃	garKNZ	Sp1 TAP	0.022	0.074	15	20	20
V ₂ O ₃	ChrRV1	Sp3 LLIF	0.006	0.019	30	20	200	V ₂ O ₃	garKNZ	Sp3 LLIF	0.019	0.062	20	20	200
Cr ₂ O ₃	ChrRV1	Sp3 LLIF	0.018	0.059	25	20	20	Cr ₂ O ₃	garRV3	Sp4 LIF	0.010	0.032	20	20	200
Nb ₂ O ₃	IlmMSU	Sp2 PET	0.026	0.086	15	20	200	MgO	garKNZ	Sp1 TAP	0.022	0.074	15	20	20
MgO	ChrRV1	Sp1 TAP	0.008	0.027	15	20	200	CaO	garKNZ	Sp2 PET	0.012	0.039	45	20	20
CaO	ChrRV1	Sp2 PET	0.007	0.022	15	20	200	MnO	garKNZ	Sp3 LLIF	0.012	0.041	45	20	20
MnO	IlmMSU	Sp4 LIF	0.008	0.025	30	20	200	FeO*	garKNZ	Sp4 LIF	0.020	0.066	45	20	20
FeO	IlmMSU	Sp5 LLIF	0.019	0.063	25	20	20	Na ₂ O	pyxBRN	Sp1 TAP	0.008	0.026	20	20	200
NiO	ChrRV1	Sp5 LLIF	0.006	0.019	30	20	200	K ₂ O	garKNZ	Sp5 LPET	0.003	0.011	20	20	200
ZnO	GahBRZ	Sp4 LIF	0.044	0.146	25	20	20								
Garnet in Polished Thin Section (Geoscience Labs, Sudbury, Ontario)								Axinite Disaggregated Bedrock (Geoscience Labs, Sudbury, Ontario)							
Oxide	Standard	XTAL	L.O.D. (wt%)	L.O.Q. (wt%)	Count time (sec)	Gun (kV)	Beam (nA)	Oxide	Standard	XTAL	L.O.D. (wt%)	L.O.Q. (wt%)	Count time (sec)	Gun (kV)	Beam (nA)
SiO ₂	garKNZ	Sp1 TAP	0.026	0.086	15	20	20	SiO ₂	pyxBRN	Sp1 TAP	0.030	0.100	10	20	20
TiO ₂	garKNZ	Sp2 PET	0.008	0.026	20	20	200	TiO ₂	pyxBRN	Sp2 PET	0.011	0.037	20	20	100
Al ₂ O ₃	garKNZ	Sp1 TAP	0.022	0.075	15	20	20	Al ₂ O ₃	pyxBRN	Sp1 TAP	0.024	0.080	10	20	20
V ₂ O ₃	garKNZ	Sp3 LLIF	0.006	0.021	20	20	200	Cr ₂ O ₃	pyxBRN	Sp3 LLIF	0.012	0.040	50	20	20
Cr ₂ O ₃	garRV3	Sp3 LLIF	0.013	0.042	45	20	20	MgO	pyxBRN	Sp1 TAP	0.019	0.064	15	20	20
MgO	garKNZ	Sp1 TAP	0.023	0.076	15	20	20	CaO	pyxBRN	Sp2 PET	0.012	0.040	50	20	20
CaO	garKNZ	Sp2 PET	0.012	0.040	45	20	20	MnO	pyxBRN	Sp4 LIF	0.025	0.084	25	20	20
MnO	garKNZ	Sp4 LIF	0.009	0.030	20	20	200	FeO*	pyxBRN	Sp4 LIF	0.024	0.082	25	20	20
FeO*	garKNZ	Sp4 LIF	0.020	0.067	45	20	20	NiO	pyxBRN	Sp3 LLIF	0.014	0.045	20	20	100
Na ₂ O	pyxBRN	Sp1 TAP	0.007	0.025	20	20	200	ZnO	pyxBRN	Sp4 LIF	0.011	0.038	20	20	100
K ₂ O	garKNZ	Sp5 LPET	0.003	0.011	20	20	200	Na ₂ O	pyxBRN	Sp1 TAP	0.024	0.079	15	20	20
								K ₂ O	pyxBRN	Sp5 LPET	0.006	0.021	50	20	20
Staurolite Disaggregated Bedrock (Geoscience Labs, Sudbury, Ontario)								Chalcopyrite Polished Thin Section (Queen's University, Kingston, Ontario)							
Oxide	Standard	XTAL	L.O.D. (wt%)	L.O.Q. (wt%)	Count time (sec)	Gun (kV)	Beam (nA)	Oxide	Standard	XTAL	L.O.D. (wt%)	L.O.Q. (wt%)	Count time (sec)	Gun (kV)	Beam (nA)
SiO ₂	pyxBRN	Sp1 TAP	0.025	0.084	15	20	20	FeO	Chalcopyrite (M9028) S-376	LIFH	0.080	0.266	10	20	50
TiO ₂	pyxBRN	Sp4 PET	0.020	0.067	20	20	20	Cu	Chalcopyrite (M9028) S-376	LIFH	0.106	0.354	10	20	50
Al ₂ O ₃	pyxBRN	Sp1 TAP	0.023	0.076	15	20	20	S	Chalcopyrite (M9028) S-376	PET	0.032	0.106	20	20	50
Cr ₂ O ₃	pyxBRN	Sp4 PET	0.019	0.062	25	20	20	Ag	Pure Silver Standard S-376	PET	0.054	0.180	60	20	50
MgO	pyxBRN	Sp1 TAP	0.018	0.061	15	20	20								
CaO	pyxBRN	Sp5 LPET	0.015	0.051	10	20	20								
MnO	pyxBRN	Sp3 LLIF	0.019	0.063	15	20	20								
FeO*	pyxBRN	Sp3 LLIF	0.020	0.066	15	20	20								
ZnO	pyxBRN	Sp3 LLIF	0.025	0.083	20	20	20								
Na ₂ O	pyxBRN	Sp2 LTAP	0.015	0.049	15	20	20								
K ₂ O	pyxBRN	Sp5 LPET	0.011	0.038	15	20	20								
F	pyxBRN	Sp2 LTAP	0.067	0.222	30	20	20								
Cl	pyxBRN	Sp5 LPET	0.009	0.031	20	20	20								

times, operating voltage, beam current, and limits of detection (limit of detection defined here as 3 times standard deviation of the total accumulated background counts). The major elements were analyzed under 20 kV and 20 nA condition, whereas the minor/trace elements analyses were done using a higher beam current (20 kV and 200 nA). The axinite total values are low (91-92%), as boron could not be analyzed. Selected gahnite and garnet grains in polished thin section were

also analyzed at Geoscience Labs. All of the microprobe results are reported in Appendix C.

Chalcopyrite in the polished thin sections was analyzed at Queen's University using a JEOL JXA-8230 EMPA to determine the Ag content, as most of the Ag in the Izok Lake deposit has been documented as occurring in chalcopyrite (Harris et al., 1984a).

Field Emission Gun - Scanning Electron Microscope Mineral Liberation Analysis

Mineral Liberation Analysis (MLA) was completed at Queen's University using a MLA 650 Field Emission Gun (FEG) scanning electron microscope (SEM). The MLA on the SEM was used to quantitatively evaluate the relationship between grain size, mineral associations, and mineral abundances. Mineral identification was carried out using multiple energy dispersive x-ray detectors with quantitative mineralogy software. The system performed one x-ray analysis for each grey level region in a particle. Selected PTS were carbon-coated and mapped using the MLA. Mineral Liberation can be used to differentiate between minerals with different chemical compositions. For example, at Izok Lake, there is a large proportion of the Fe-rich end member of sphalerite, and the MLA could identify this. MLA was also used to classify hard to identify minerals that could have been missed in the polished thin section studies. MLA results from a sample of massive sulphides (sample 09-MPB-R60) are shown in Figure 5.

RESULTS

Hand sample and microscopic petrographic descriptions of the bedrock samples are listed in Appendix B1 and B2, respectively. The polished thin section modal abundances of the constituent minerals are listed in Table 7 and size ranges for the major sulphide minerals in Table 8. Table 4 shows the indicator mineral grain counts for the 0.25 to 0.50 mm fraction of the heavy mineral concentrates (HMC) of the 21 disaggregated bedrock samples normalized to 1 kg sample weight (post disaggregation <2 mm weight). The results in Table 4 are listed as either the number of grains or as a percentage of the 0.25-0.5 mm non-ferromagnetic fraction. The number of grains of galena, sphalerite, chalcopyrite, pyrite, molybdenite, arsenopyrite, and pyrrhotite in four size fractions of each bedrock sample are listed in Table 5: 1) the pan concentrate, 2) the 0.25-0.5 mm fraction, 3) the 0.5-1.0 mm fraction, and 4) the 1.0-2.0 mm fraction. Abundances in the three coarsest fractions are normalized to 1 kg of <2.0 mm material.

Four quartz blanks were inserted into the sample batch to monitor contamination between samples. A summary of sulphide minerals reported in each blank and the bedrock sample preceding each blank in the processing stream are reported in Table 2. The first two quartz blanks (QBK-1 and -2) show no contamination. The second two blanks (QBK-3 and -4) show minor contamination. Quartz blank QBK-3 was processed immediately after metal-rich sample 09-MPB-R93 and it was found to contain two grains of chalcopyrite and one grain of sphalerite in the 0.25-0.5 mm fraction. The pan concentrate of quartz-blank QBK-3 contained 100s of small sulphide grains. Quartz blank QBK-4 was

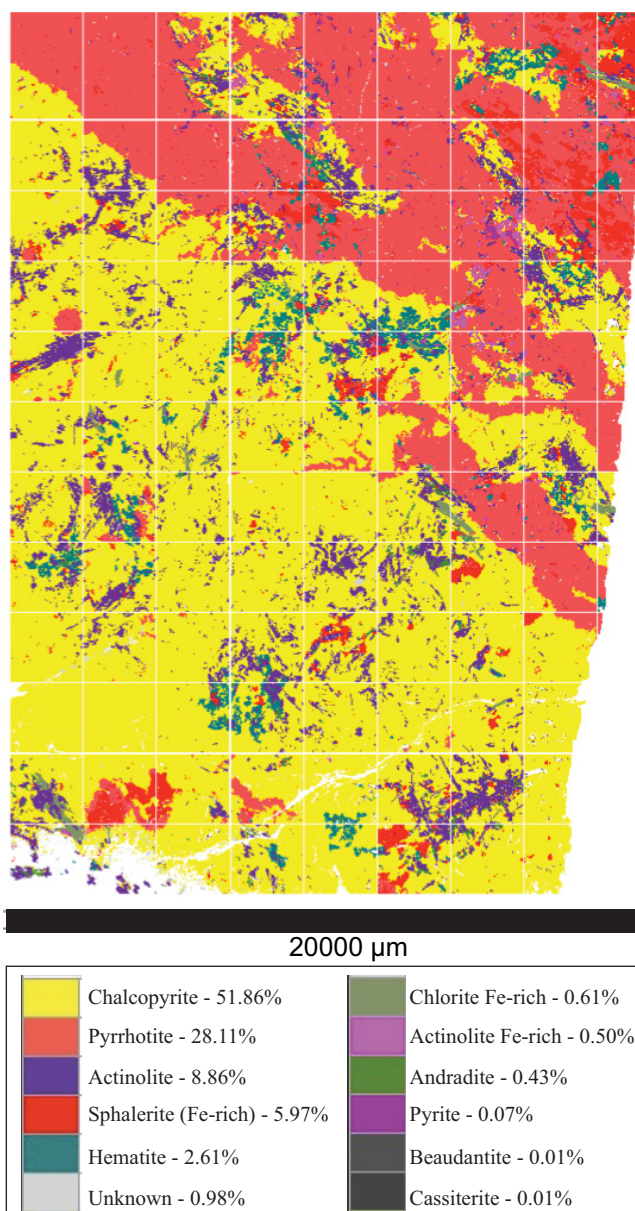


Figure 5. Mineral Liberation Analysis (MLA) image of a polished thin section from 09-MPB-R60 (massive sulphide) showing the percentages of chalcopyrite, pyrrhotite, actinolite, sphalerite, hematite/magnetite, and trace minerals.

processed immediately after metal-rich sample 09-MPB-R61 and it contained one grain of chalcopyrite in the 0.25-0.5 mm fraction. The pan concentrate for QBK-4 contained 50 grains of pyrite (Table 2). Based on the results of the quality control samples, it was decided that a quartz blank is to be inserted between each metal-rich bedrock sample during all bedrock heavy mineral processing for any GSC case study (cf. Spirito et al., 2011).

Pyrite

Pyrite is one of the most abundant sulphide minerals found in the polished thin sections that were studied,

Table 7. Summary of the modal mineralogy of the bedrock samples based on microscopic examinations of one polished thin section per sample.

Sample Number	Lithology	Quartz (%)	Biotite (%)	Pyrite (%)	Magnetite (%)	Microcline (%)	Chlorite (%)	Muscovite (%)	Zircon (%)	Gahnite (%)	Chalcopyrite (%)	Plagioclase (%)	Sphalerite (%)	Amphibole (%)	Sillimanite (%)
09-MPB-R10	Felsic metavolcanic	5	5	10		5	5				10	10	35	15	
09-MPB-R19	Massive sulphide	5	x	10	5		5	5			20		15		
09-MPB-R20	Massive sulphide	5	5		5		5				10	5	5		
09-MPB-R22	Sulphide-rich metavolcanic	30	10	10				5		15	5	5	20		
09-MPB-R23	Felsic metavolcanic	40	25	5				5	x		5	5	10		5
09-MPB-R32	Sulphide-rich altered rhyolite	25	18	40	2						2		8		
09-MPB-R37	Felsic metavolcanic	40	5		x			10		20	2	10			
09-MPB-R41A	Felsic metavolcanic	50	15	5						8	2	10			10
09-MPB-R41B	Felsic metavolcanic	50	10	10	x					15	5				5
09-MPB-R42	Iron formation (silicate facies)	30	20	x					x						
09-MPB-R43	Pelagic metasediment	55	15	15											x
09-MPB-R45	Metasediment	10	x	x											
09-MPB-R47	Mafic metavolcanic	7	5	5			5			5	3				
09-MPB-R49	Diabase		5	5								45			
09-MPB-R51	Felsic metavolcanic	50	10	x		15		20							5
09-MPB-R53	Semi-massive to massive sulphide	35	5	10		15		10			x		20		5
09-MPB-R54	Felsic metavolcanic	10	5	10	5	10		3			10	5	30		2
09-MPB-R55	Felsic metavolcanic	30	25	5		15		10			5		5		
09-MPB-R57	Felsic metavolcanic	10	15	5	2	30		5			15	10	8		
09-MPB-R59	Pegmatite	15			2	70	2	8			3				
09-MPB-R60	Massive sulphide			5	5			5			30		40		
09-MPB-R61	Sulphidic chert	10	5	10	10					20		25			15
09-MPB-R62	Sulphidic breccia pipe	5		5	5						15	5	10		
09-MPB-R63	Intermediate metavolcanic	25	10							30	5	5	15		
09-MPB-R64B	Massive sulphide			40	10		10				5		35		
09-MPB-R65	Sulphidic breccia pipe in mafic metavolcanic	10		10	10						5	10	10		
09-MPB-R67	Schist	50	10	5			5	10					x		
09-MPB-R69	Metamorphosed sulphidic alteration zone	10	5	5		25		5		40	x		5		
09-MPB-R77	Schistose felsic metavolcanic	10			5	25	20								
09-MPB-R83	Felsic metavolcanic	20		x		35									
09-MPB-R85	Felsic metavolcanic	35	20	5							2				28
09-MPB-R87	Clastic metasediment	10	5	5		30						50			
09-MPB-R88	Felsic intrusive (granite)	20		5		70	x	5							
09-MPB-R90	Iron formation	10	10	x	10										
09-MPB-R91	Felsic metavolcanic	15	15	5		10						35			
09-MPB-R92	Metagabbro	5	10	x	5							40			
09-MPB-R93A	Massive sulphide	5	10	20	15		5				15		25		
09-MPB-R93B	Massive sulphide	5	10	25	10		5				25		10		
09-MPB-R94	Felsic metavolcanic	50	20					15				15			
09-MPB-R95	Metapelite	45	15	5		20									

x = trace amounts of mineral in TS

Table 7 continued.

Sample Number	Galena (%)	Pyrrhotite (%)	Hornblende (%)	Garnet (%)	Epidote (%)	Clinopyroxene (%)	Staurolite (%)	Siderite (%)	Cordierite (%)	Tourmaline (%)	Actinolite (%)	Axinite (%)	Grunerite (%)	Augite (%)	Molybdenite (%)
09-MPB-R10															
09-MPB-R19		40													
09-MPB-R20		60													
09-MPB-R22															
09-MPB-R23															
09-MPB-R32			5												
09-MPB-R37			8												
09-MPB-R41A															
09-MPB-R41B	x														
09-MPB-R42				30									20		
09-MPB-R43		5		10											
09-MPB-R45				30			20		40						
09-MPB-R47				15			5		35		15				
09-MPB-R49		10			15	10					5			5	
09-MPB-R51															
09-MPB-R53															
09-MPB-R54		5			5										
09-MPB-R55		5													
09-MPB-R57															
09-MPB-R59															
09-MPB-R60		10						x			5				
09-MPB-R61	x	2													
09-MPB-R62		5	5								35	10			
09-MPB-R63															
09-MPB-R64B	x										10				
09-MPB-R65		5	5								20	15			
09-MPB-R67			5	15											
09-MPB-R69		5													
09-MPB-R77	x				40										
09-MPB-R83									45						
09-MPB-R85					10										
09-MPB-R87															
09-MPB-R88															
09-MPB-R90			10	40							20				
09-MPB-R91															
09-MPB-R92			40												
09-MPB-R93A		5													
09-MPB-R93B		25													
09-MPB-R94	x														x
09-MPB-R95			15												

x = trace amounts

Table 8. Comparison of sizes (mm) of key indicator minerals observed in polished thin sections, heavy mineral concentrates, and pan concentrates.

Mineral	Size Range in Polished Thin Section (mm)	Size Range in Heavy Mineral Concentrate (mm)	Size Range in Pan Concentrate (µm)
Pyrite	0.1-6	0.25-1.0	25-200
Chalcopyrite	0.1-5	0.25-1.0	15-200
Sphalerite	0.2-5	0.25-1.0	15-100
Galena	0.01-0.6	0.25-0.50	15-100
Gahnite	0.2-3.0	0.25-1.0	n/a
Staurolite	0.2-1.3	0.25-0.50	n/a
Axinite	0.4-2.0	0.25-0.50	n/a

with between 3 and 50 modal % in mineralized bedrock samples (Tables 1 and 7). The samples with the highest pyrite content (up to 50%) generally occur within the massive sulphide-rich samples (i.e. samples 09-MPB-R19, -R32, -R60, -R64B, -R93A, and R93B). High pyrite concentrations (~15%) were also occur in a metasedimentary (metapelite) sample (09-MPB-R43) and one iron formation sample (09 MPB R54). Moderately high pyrite concentrations (~10%) were also found to occur within the gahnite-rich samples (i.e. samples 09 MPB-R22, -R61, -R62, and -R65), which commonly are from the sulphide stringer. Trace amounts of pyrite occur in many of the bedrock samples. In polished thin section, pyrite concentrations ranges from 40% to trace amounts in the rocks with grain sizes that range from 0.1 to 0.9 mm. The grain shape observed in polished thin section ranged from euhedral cubic crystals to anhedral.

In bedrock heavy mineral concentrates, pyrite was identified by its crystal habit, high metallic lustre, pale yellow colour, and its non-ferromagnetic properties. The pyrite grains in the heavy mineral concentrate samples were found to be euhedral to subhedral cubic crystals, with a grain size between 0.25 and 1.0 mm (Tables 5 and 8). The massive sulphide-rich bedrock samples contain the most pyrite (100,000s grains/kg), but pyrite occurs in many other rock lithologies, including felsic metavolcanic, mafic metavolcanic, and clastic metasedimentary rocks.

Pyrite occurs in the pan concentrates of every bedrock sample submitted for heavy mineral recovery (Table 5), ranging from 4 grains to up to 5000 grains/kg. Table 4 summarizes the rock type and percentage/amount of grains in each sample; Table 8 summarizes the range in grain size in pan concentrates. Gold was not recovered from any of the bedrock heavy mineral concentrates and was not detected in any of the polished thin sections during petrographic analysis.

Chalcopyrite

Chalcopyrite is abundant in many of the sulphide-rich polished thin sections (samples 09 MPB R10, R19,

R20, -R23, -R57, -R60, -R93A, and -R93B; Table 7). It is also present in iron formation (sample 09-MPB-R54), felsic metavolcanic (samples 09 MPB R41A/R41B, 09-MPB-085), pegmatitic (sample 09-MPB-R59), and mafic metavolcanic (sample 09-MPB-R47) rocks. High (10-30%) concentrations of chalcopyrite also occur in gahnite-rich samples, where it generally occurs in or adjacent to the sulphide stringer zone (samples 09-MPB-R22, R61, -R62, -R63, and -R65) and in massive sulphide samples (09-MPB-R19, -R20, -R60, and R93.) In polished thin section, chalcopyrite ranges from 0.01 and 6.00 mm in size and is anhedral. An MLA image of sample 09 MPB-R60 (massive sulphide) shows this anhedral shape (Fig. 5).

Chalcopyrite was distinguished from pyrite in the bedrock heavy mineral concentrates by its metallic lustre and brass yellow colour, which was evident as concentrates were cleaned with oxalic acid to remove tarnish from the grains. In the 0.25 0.50 mm fraction, 1000s of grains of chalcopyrite occur in massive sulphide-rich samples 09-MPB-R60, -R61, -R62, -R65, -R69 and -R93 (Tables 4 and 5). A few grains to a few tens of grains occur in samples 09-MPB-R41, -R51, and -R91 (felsic metavolcanic), -R43 (metasediment), and -R88 (felsic intrusive). Massive sulphide sample 09 MPB-R64 contains only a few 10s of grains.

Thousands of chalcopyrite grains are present in the coarser 0.5-1.0 mm and 1.0 2.0 mm fractions of chalcopyrite-, galena- and sphalerite-rich massive sulphide samples (Table 5). In many of these samples, chalcopyrite is intergrown with sphalerite and pyrite.

Thousands of chalcopyrite grains occur in the pan concentrates of massive sulphide samples (09-MPB-R64 and -R93), sulphidic breccia pipe (sample 09-MPB-R62), and sulphidic breccia pipe in basalt (sample 09-MPB-R65) and ranged in size from 15 to 200 µm (Table 5). Sample 09-MPB-R69, a gahnite-rich massive sulphide collected from drill core approximately 8 km northwest of the Izok Lake deposit, also contained abundant chalcopyrite.

Sphalerite

In polished thin section, samples composed of between 25 and 40% sphalerite include samples 09-MPB-R60 (massive sulphide) (Fig. 6), 09-MPB-R64B (massive sulphide adjacent to gahnite), 09-MPB-R54 (felsic metavolcanic), 09-MPB-R10 (felsic metavolcanic), and 09-MPB-R93A (massive sulphide). Samples composed of between 15 and 20% sphalerite include samples 09-MPB-R62 (sulphidic breccia pipe), 09-MPB-R22 (semi-massive sulphide (up to 20% disseminated sulphides)), 09-MPB-R53 (sulphide schist), 09-MPB-R19 (massive sulphide), 09-MPB-R65 (sulphidic breccia pipe in basalt), and 09-MPB-R63 (intermediate metavolcanic). Samples composed of between 3 and

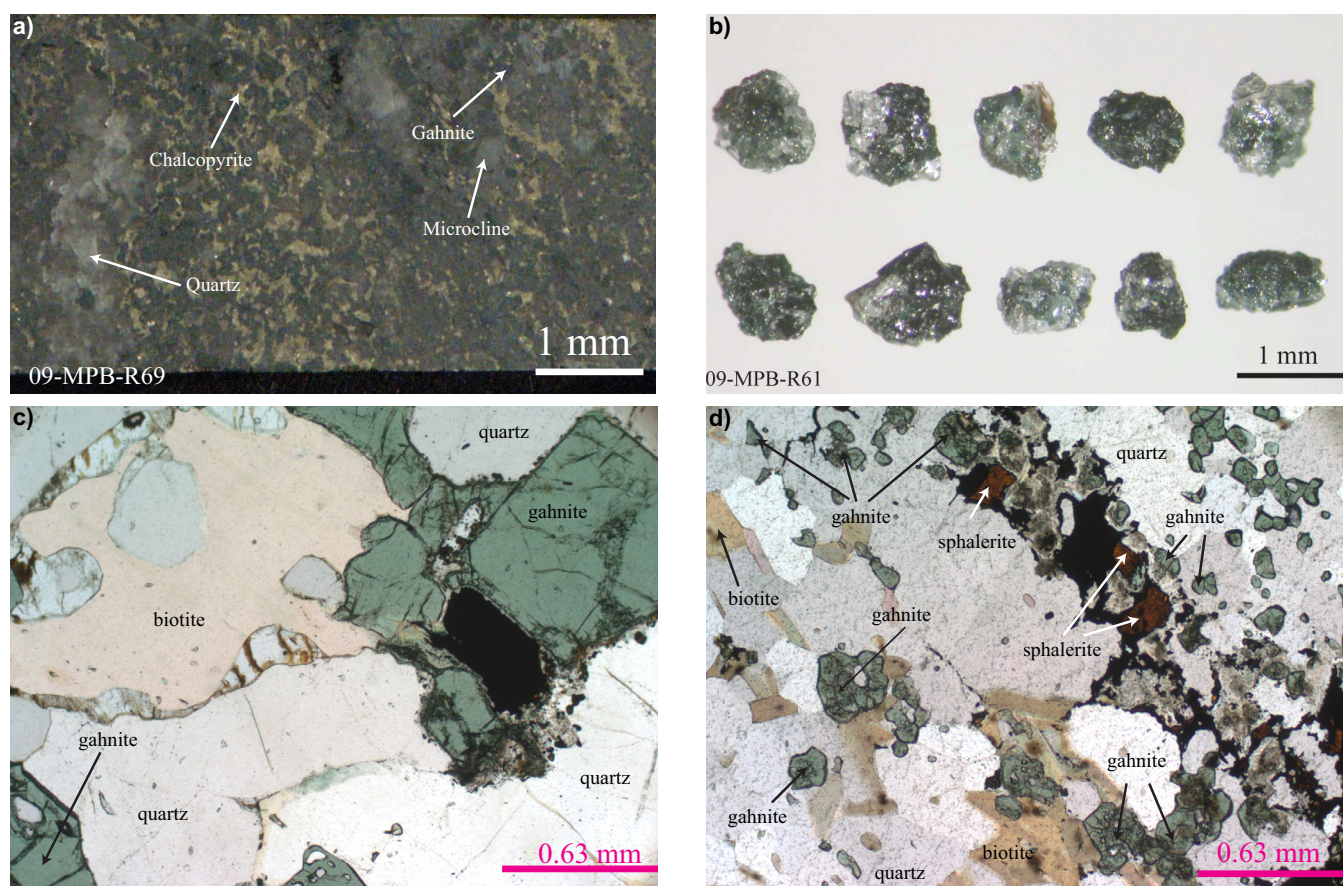


Figure 6. Gahnite in **a)** polished slab of drill core (sample 09-MPB-R69); **b)** grains from a heavy mineral concentrate of sample 09-MPB-R61; **c)** polished thin section of sample 09-MPB-R37; and **d)** polished thin section of sample 09-MPB-R41B.

10% sphalerite are samples 09-MPB-R24 (contact between sulphide and altered rhyolite), 09-MPB-R93B (massive sulphide), 09-MPB-R23 (quartz-rich rhyolite with massive sulphide), 09-MPB-R37 (contact between rhyolite and sulphide), 09-MPB-R57 (felsic metavolcanic), 09-MPB-R32 (sulphide-rich section of altered felsic metavolcanic), 09-MPB-R20 (massive sulphide), 09-MPB-R41B (felsic volcanic), 09-MPB-R55 (dacite), 09-MPB-R75 (meta-granodiorite), 09-MPB-R69 (metamorphosed sulphidic alteration zone), and 09-MPB-R27 (micaceous altered rhyolite).

In polished thin section, sphalerite ranges in size from 0.2 to 5 mm in diameter and occurs as angular or euhedral crystals (Fig. 6). Sphalerite was identified in bedrock heavy mineral concentrates by its crystal habit, black-brown-red colour, and its non-ferromagnetic properties. Hundreds of thousands of grains/kg are present in massive sulphide samples 09-MPB-R60, -R62, -R64, -R65, and -R93. Sphalerite is commonly intergrown with pyrite and chalcopyrite (Table 4).

In the coarser 0.5-1.0 mm and 1-2 mm fractions, sphalerite is present in the same samples whose the 0.25-0.5 mm fraction contained 100,000s of grains (Table 5). In pan concentrates, sphalerite ranges in size from 15 to 100 μm ; 1000s of grains are present in the

same samples that contain abundant sphalerite in the 0.25-0.5 mm fraction. Also notable is that felsic volcanic sample 09-MPB-R41 also contains sphalerite in the 0.5-1.0 mm and pan concentrate fractions.

Galena

In polished thin section, galena occurs in samples 09-MPB-R17 (contact between sulphides and pegmatite), 09-MPB-R47 (metabasalt), 09-MPB-R49 (diabase), and in 09-MBP-R64B (massive sulphides). In samples 09-MPB-R17 and -R64B, only a trace amount of galena was observed, ranging in size from 0.01 to 0.1 mm. In sample 09-MPB-R47, galena is slightly coarser grained (0.3-0.6 mm) and in sample 09-MPB-R49 galena ranges from 0.3-0.5 mm. In polished thin section, galena was identified by its cubic habit.

In the bedrock heavy mineral concentrates, 10 to 100s of grains/kg of galena occur in samples 09-MPB-R62 (sulphidic breccia pipe), -R61 (sulphidic chert), -R65 (sulphidic breccia pipe in basalt), and -R41 (felsic volcanic) in the 0.25-0.50 mm fraction. No coarse galena (>0.5 mm) was recovered from any bedrock samples.

In the pan concentrates, 100s to 1000s of galena grains were observed in samples 09-MPB-R41 (felsic

volcanic), -R61 (sulphidic chert), -R65 (sulphidic breccia pipe in basalt), -R69 (metamorphosed sulphidic alteration zone), and -R91 (felsic metavolcanic). The grains vary in size from 15 to 100 μm .

Pyrrhotite

Pyrrhotite occurs in both polished thin sections and disaggregated bedrock samples (Tables 4-6). In polished thin section, pyrrhotite occurs in samples 09-MPB-R20 (massive sulphide), -R19 (massive sulphide), -R93B (massive sulphide), -R55 (dacite), -R54 (felsic metavolcanic), -R49 (diabase), -R93A (massive sulphide), -R69 (metamorphosed sulphidic alteration zone), -R43 (metapelite), and -R61 (sulphidic chert). Samples contain between 2 and 60% pyrrhotite and it generally is intergrown with other sulphide minerals, forming anhedral grains. The pyrrhotite grains range in size from 0.1 to 3.0 mm, with the average grain size being ~ 0.3 mm. The grain shape observed in polished thin sections is cubic to subhedral cubic comminuted grains (Fig. 5).

In bedrock heavy mineral concentrates, 100 to 10,000s of grains/kg of pyrrhotite were counted in the 0.25-2.0 mm ferromagnetic fraction. Pyrrhotite was observed in samples 09-MPB-R69 (metamorphosed sulphidic alteration zone), -R93 (massive sulphide), -R61 (sulphidic chert), -R99 (sulphidized felsic metavolcanic), -R41 (felsic volcanic), -R43 (metapelite), -R65 (sulphidic breccia pipe in basalt), and -R92 (metagabbro) (Tables 4 and 5). Pan concentrates contained 100s to 1000s of grains of pyrrhotite that ranged in size from 15 to 100 μm ; these samples were recovered from the same bedrock samples that contained pyrrhotite grains in the >0.25 mm fraction.

Other Sulphide Minerals

ODM identified trace amounts of other sulphide minerals in the bedrock concentrates. Arsenopyrite was recovered from the 0.25-0.5 mm size fraction of sample 09-MPB-R90 (4 grains/kg). Molybdenite was found in sample 09-MPB-R45 (6 grains/kg) in the 0.25-0.5 mm fraction, and in sample 09-MPB-R43 (3 grains/kg) in the 0.5-1.0 mm fraction. Samples 09-MPB-R45 and -R94 were found to contain a few grains of molybdenite in the pan concentrate, which ranged in size from 25 to 75 μm . Sample 09-MPB-R91 contained 27 loellingite grains that were 25 to 75 μm in size.

Table 1 lists all of the ore minerals identified in the Izok Lake deposit in this study. Some trace and rare minerals reported to be present in the Izok ore by others (Table 1) were not found in the polished thin sections or in the disaggregated bedrock samples of this study. The absence of these rarer minerals in rocks samples examined in this study may be due to the limited number of bedrock samples included in this study,

the mineral's low abundance, and/or a grain size of less than 0.25 mm, which may have resulted in these grains to being missed during indicator mineral picking of the heavy mineral concentrates. Use of an EMP would be beneficial for identifying these trace and rare minerals.

Gahnite

Gahnite (ZnAl_2O_4) was noted during petrographic analysis of polished thin sections of samples 09-MPB-R69, -R63, -R37, -R61, -R22, -R41A, and -R41B. All these samples were either collected from the sulphide stringer zone or from the contact between the sulphide stringer zone and the host rocks. The gahnite concentration in these samples varied from 5 to 40% and ranged in size from 0.1 to 3.0 mm. The grain shape in polished thin section was cubic to subhedral and had very few inclusions; however, the gahnite grains were usually associated and intergrown with silicate and sulphide minerals.

Tens of thousands to hundreds of thousands of grains/kg of gahnite were recovered from the 0.25-0.5 mm heavy mineral concentrates of bedrock samples 09-MPB-R69 (metamorphosed sulphidic alteration zone 8 km northwest of the deposit, at 120 m depth), -R61 (sulphidic chert), and -R41 (felsic volcanic) (Table 4). Recovered gahnite grains are typically intergrown with quartz, biotite, and pyrite. Some of the gahnite grains are angular with no other attached mineral grains, whereas others have minerals adhering to them. ODM identified gahnite by its blue-green colour and its crystal habit, which was confirmed using an SEM, as crystal habit was commonly difficult to determine (Fig. 6).

Tens to hundreds of thousands of gahnite grains/kg were also recovered in the coarser fractions (0.5-1.0, 1.0-2.0 mm) of the heavy mineral concentrate of samples 09-MPB-R41 (felsic volcanic), -R69 (metamorphosed sulphidic alteration zone), and -R61 (sulphidic chert) (Table 5). These coarser gahnite grains were intergrown with silicates and sulphide minerals.

Spessartine and Almandine Garnet

Garnet is present in a variety of different bedrock lithologies. Due to its very high relief and isotropic nature, all garnet species in polished thin section were identified simply as 'garnet' in the petrographic descriptions. Bedrock samples with high concentrations (10-60%) of garnet include samples 09-MPB-R90 (iron formation), 09-MPB-R45 (metamorphosed aluminous alteration zone), 09-MPB-R42 (silicate-facies iron formation), 09-MPB-R47 (metabasalt), 09-MPB-R67 (schist), and 09-MPB-R43 (metapelite). The recovered garnets ranged in size from 0.2 to 4.5 mm and were observed in polished thin section to be subhedral (Fig. 7).

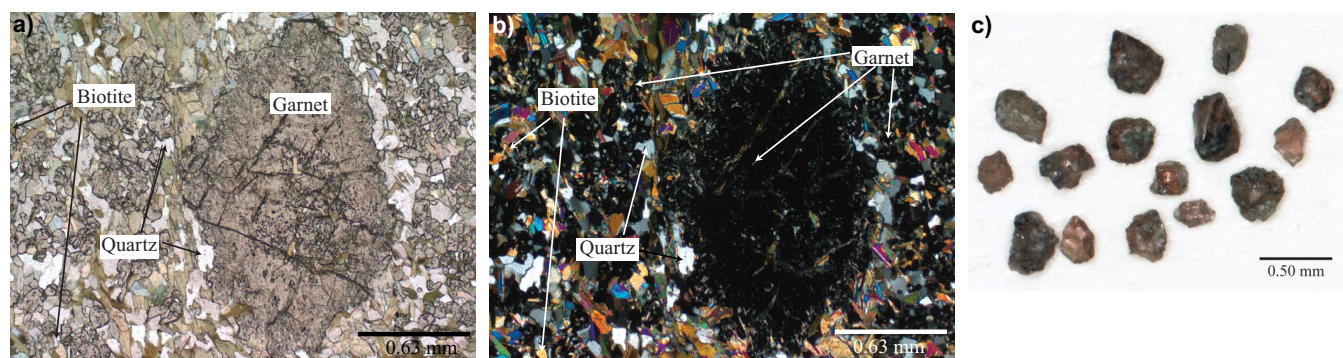


Figure 7. **a)** Garnet in a polished thin section in plane polarized light (sample 09-MPB-R42); **b)** garnet in a polished thin section in cross polarized light (sample 09-MPB-R42); and **c)** almandine garnet from the heavy mineral fraction of sample 09-MPB-R47.

Mn-bearing garnet spessartine, which can be an indicator of metamorphosed VMS deposits (Table 3), was not observed in the bedrock heavy mineral concentrates from this study.

Almandine was identified in some of heavy mineral concentrates by its characteristic dodecahedral crystal habit, lustre, and pink colour (Fig. 7c; McClenaghan et al., 2012a). However, it is not considered to be an indicator mineral.

Epidote and Tourmaline

Epidote, cordierite, and tourmaline may be indicator minerals of metamorphosed VMS deposits (Table 3). Epidote was found in polished thin sections of three samples: 09-MPB-R77 (schist), 09-MPB-R85 (gneiss), and 09-MPB-R54 (iron formation). Concentrations ranged from 5 to 40% and as 0.2 to 0.6 mm grains. Epidote and tourmaline were not observed in any of the heavy mineral concentrates.

Staurolite

Staurolite was identified in two polished thin sections: samples 09-MPB-R52 (dacite) and 09-MPB-R45 (metamorphosed aluminous alteration zone). Concentrations ranged from trace amounts to 15% and size from 0.01 to 0.10 mm.

Staurolite was observed in only one heavy mineral concentrate, sample 09-MPB-R45 (metamorphosed aluminous alteration zone), which contained 2234 grains/kg in the non-ferromagnetic fraction. It was by its orange colour and it typically 60° conjoining twin crystals.

Axinite

Axinite ($\text{Ca}_2\text{Mn}^{++}\text{Al}_2\text{BO}_3\text{Si}_4\text{O}_{12}(\text{OH})$) was first identified in the 0.25-0.50 mm size fraction of heavy mineral concentrates of two bedrock samples: 09-MPB-R62 (sulphidic breccia pipe, ~400,000 grains/kg) and -R65 (sulphidic breccia pipe in basalt, ~24,000 grains/kg). As axinite is generally difficult to identify,

SEM-MLA analysis was used to confirm its presence in polished thin sections and petrographic microscope examination revealed the axinite grains to be elongated and rectangular, with a size of 0.6 to 1.2 mm (Fig. 8).

COMPOSITIONAL CHARACTERISTICS OF INDICATOR MINERALS

Chalcopyrite

A total of ten chalcopyrite grains in each of eight polished thin sections of samples from the Izok Lake deposit and one from the WIZ showing were analyzed using the EMPA to determine Ag content (Appendix C1). Harris et al. (1984a) reported significant Ag contents in chalcopyrite from the Izok deposit and Hicken et al. (2012) reported high Ag contents in the <0.063 mm fraction of till down-ice of the deposit (). Figure 9 shows data from Harris et al. (1984a) plotted together with data from this study. The range of Ag concentrations (ppm) in the 2009 bedrock samples from the Izok Lake deposit and the WIZ showing is very similar to the range reported in 1984; previous work reported concentrations from 266 to 560 ppm, and this study found a range of less than detection limit to 1130 ppm. The highest Ag contents in chalcopyrite were found in polished thin sections 09-MPB-R22 (1130 ppm), 09-MPB-R62 (940 ppm), and 09-MPB-R93A (800 ppm), all from samples proximal to the Izok Lake deposit (Figs. 4, 9).

Spessartine and Almandine Garnet

The microprobe data for garnets are listed in Appendix C4. Detailed EMPA analysis was completed for 3 to 14 garnet grains in each polished thin section of samples 09-MPB-R42 (silicate facies iron formation), 09-MPB-R45 (metamorphosed aluminous alteration zone), 09-MPB-R47 (metabasalt), 09-MPB-R68 (schist), and 09-MPB-R90 (iron formation). When plotted on an end-member (almandine-spessartine-grossular) ternary diagram, these garnets were found to be mainly (>50%) almandine ($\text{Fe}_3\text{Al}_2(\text{SiO}_4)^3$; Fig.10).

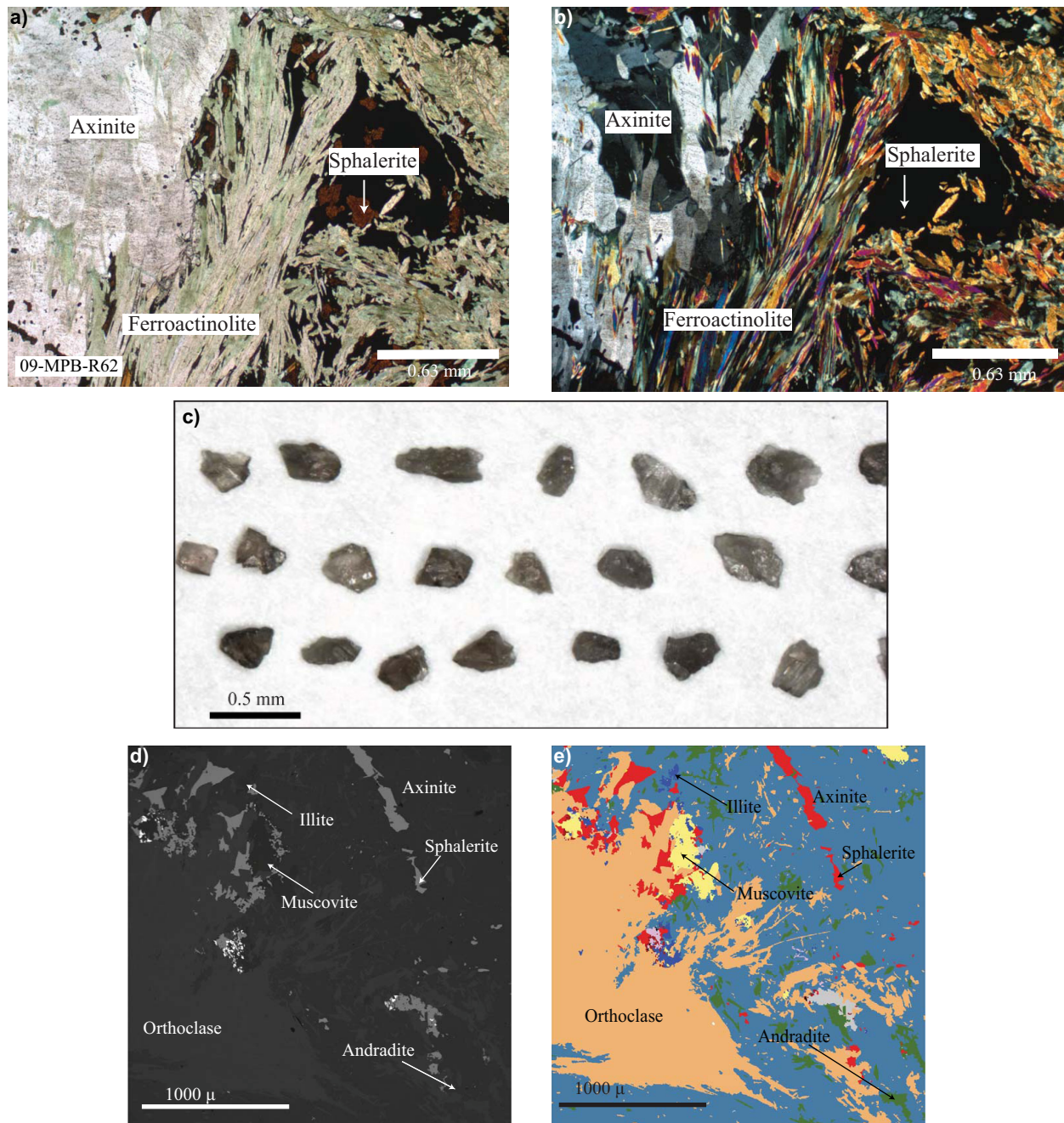


Figure 8. **a)** Axinite in plane polarized light in sample 09-MBP-R62; **b)** axinite in cross polarized light in sample 09-MPB-R62; **c)** axinite grains from the heavy mineral concentrate of sample 09-MPB-R62; **d and e)** Mineral Liberation Analysis (MLA) images of axinite in sample 09-MPB-R65.

Thirty almandine grains were picked from the heavy mineral concentrates of bedrock samples 09-MPB-R42, -R43, -R45, -R47, -R90, and -R95 and submitted for EMPA at Geoscience Labs to confirm they were indeed almandine. EMPA data for these grains are plotted in Figure 11 and indicate that original visual identifications were correct.

Staurolite

Staurolite grains (N=30) from the 0.25-0.5 mm fraction of the heavy mineral concentrate of Izok Lake bedrock

sample 09-MPB-R45 (metamorphosed aluminous alteration zone) were analyzed using EMPA. The FeO values for staurolite grains range from 13.6 to 14.2 wt%, MgO between 1.5 and 2.4 wt%, and ZnO from 0.23 to 0.66 wt%. The microprobe data are listed in Appendix C5. Data for FeO, MgO, and ZnO were plotted (Fig. 12) to determine if the grains had been visually identified correctly as staurolite and to ascertain if the grains recovered are Zn-rich (>5 wt%), as was reported by Spry and Scott (1986) and Ghosh and Praveen (2008).

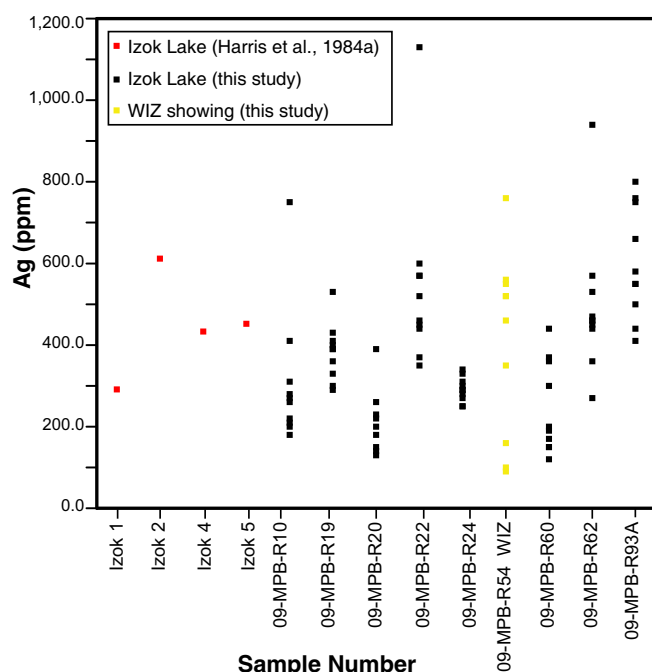


Figure 9. Plot of Ag (ppm) content in chalcopyrite in polished thin sections for samples from the Izok Lake deposit (this study), the WIZ showing (sample 09-MPB-R54), and data reported in Harris et al. (1984a) were determined by electron microprobe.

While all of the staurolite grains were confirmed to be staurolite, none were Zn-rich.

Axinite

Fifty-seven axinite grains from heavy mineral concentrate of bedrock samples 09-MPB-R62 and -R65, both sulphidic breccia pipe rocks collected close to the Izok

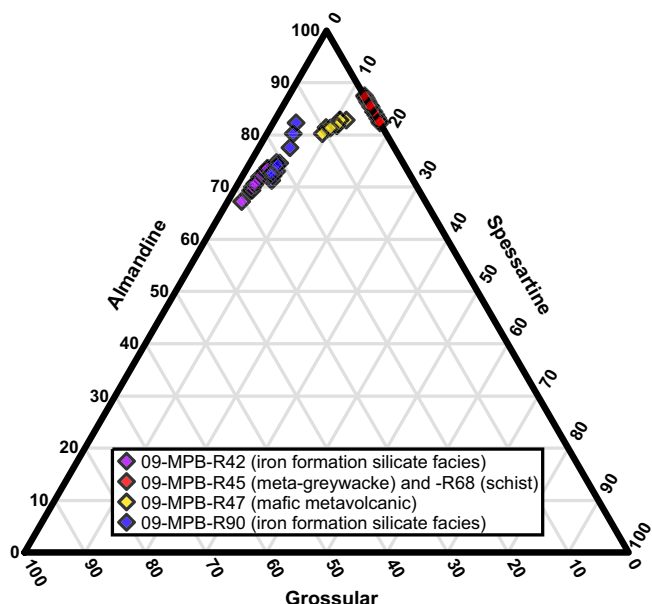


Figure 10. Ternary plot of garnet end-member compositions almandine-spessartine-grossular for garnet grains in polished thin sections (N=182).

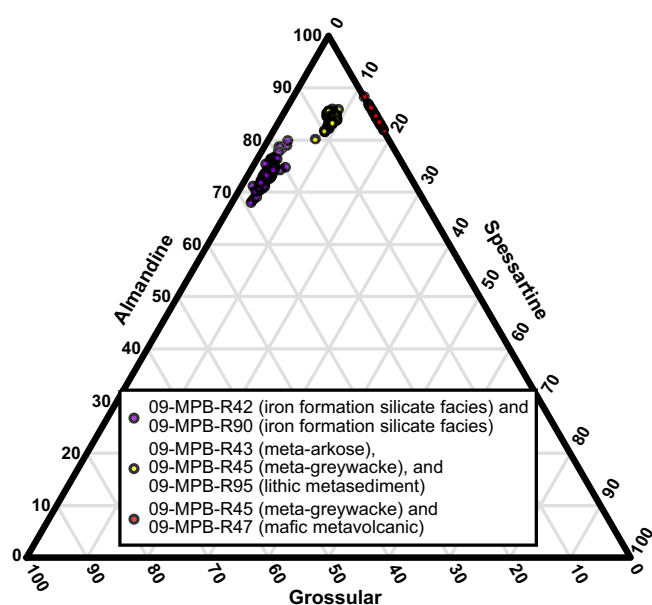


Figure 11. Ternary plot of garnet end-member compositions almandine-spessartine-grossular for 30 grains in the 0.25-0.5 mm non-ferromagnetic fraction of heavy mineral concentrates of bedrock samples (N=49).

Lake deposit, were analyzed using EMPA and the data are listed in Appendix C6. The analytical totals are low (91-92%) for because B content could not be determined. MgO contents ranged from 0.16 to 0.60 wt% and MnO values varied between 6.7 and 8.5 wt%. In general, axinite grains from both samples showed similar concentrations of MnO, MgO, and FeO. Of the three end-members of axinite (Fe-rich ferroaxinite, Mg-rich magnesioaxinite, and Mn-rich manganaxinite) (Sanero and Gottardi, 1968; Pringle and Kawachi,

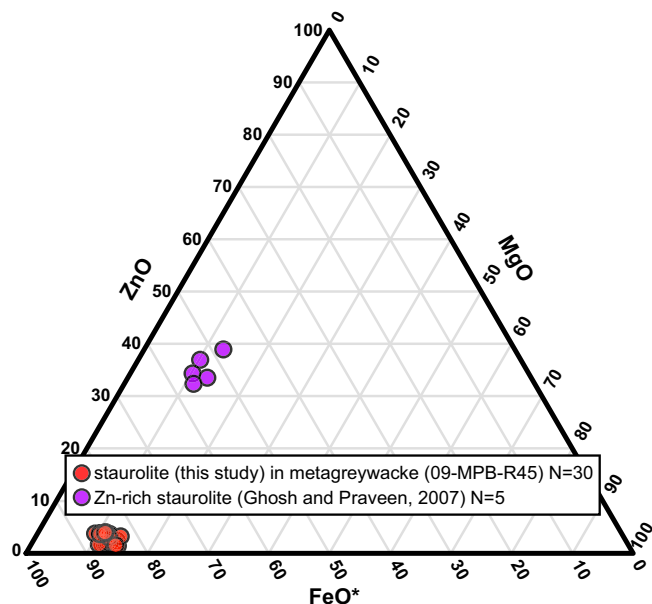


Figure 12. Ternary plot of staurolite grain compositions from Izok Lake sample 09-MPB-R45 (N=30) and Zn-rich staurolite as reported in Ghosh and Praveen (2008; N=5) using ZnO, FeO, and MgO.

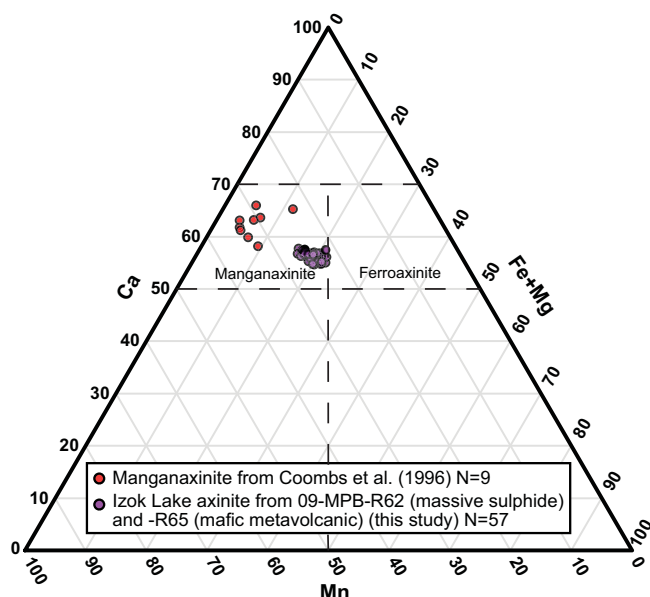


Figure 13. Ternary plot of axinite compositions (Ca-Mn-Fe+Mg) from gahnite-rich volcanic rocks in the Izok Lake deposit (samples 09-MPB-R62 and -R35) and axinite grains from bedrock samples at Meyers Pass, New Zealand (fields modified from Coombs et al., 1996).

1980), the axinite grains analyzed in this study were found to be manganaxinite, as shown by plotting compositions as mol % in Figure 13.

Gahnite

EMPA data for gahnite are listed in Appendix C2. Fifty-seven areas on 24 gahnite grains from five polished thin sections (samples 09-MPB-R37, -R41, -R61, -R63 from the Izok Lake deposit and 09-MPB-R69 from sulphide mineralization 8 km to the northwest) were analyzed by EMPA at Geoscience Labs.

Eighty-nine gahnite grains from the heavy mineral concentrate of three bedrock samples (09-MPB-R41, -R61, -R69) were analyzed in grain mounts. Bedrock sample 09-MPB-R63, from the contact between gahnite-rich and gahnite-poor volcanic rocks contained the greatest amount of ZnO (33.69 wt%). Gahnite grains from sample 09-MPB-R61 had the smallest ZnO content (26.35 wt%). A traverse across grain 4 (spots 4c-4p, Appendix C3) in a polished thin section of sample 09-MPB-061 showed that the gahnite grain is homogeneous, with the rim and core having the same chemical composition.

DISCUSSION

Sulphide Minerals

Pyrite, chalcopyrite, sphalerite, and galena are the dominant sulphide minerals that were identified in polished thin section and recovered from heavy mineral concentrates of the bedrock samples collected from the Izok Lake ore zone. These results are similar to those

reported by Money and Heslop (1976), Thomas, (1978), Morrison and Balint (1993), Morrison (2004), and Piercy (2009). Chalcopyrite grains in the Izok Lake deposit were found to contain significant amounts of Ag, up to 1130 ppm, consistent with the elevated Ag contents previously reported by Harris et al., (1984a). Suggesting that this high Ag content may be a fingerprint of VMS deposits in the region.

In the disaggregated heavy mineral concentrate bedrock samples, the size of the pyrite grains varied from 15 μ m to 1.0 mm and in polished thin section they were found to be from 0.10 to 6.0 mm. As pyrite is the most ubiquitous indicator mineral, being present in all the bedrock samples, it is therefore of limited use as an indicator mineral in the area.

Chalcopyrite in the heavy mineral concentrates varied from 15 μ m to 2.0 mm and in polished thin section was found to vary between 0.1 and 5 mm.

In the heavy mineral concentrate, the size of the galena grains ranged from 15 μ m to 0.50 mm and in the polished thin sections, from 0.01 to 0.6 mm. Unlike pyrite and chalcopyrite, the smallest galena grains were found in the polished thin sections.

Sphalerite grains in polished thin section varied in size from 0.20 to 5.0 mm, and in the heavy mineral concentrate, from 15 μ m to 2.0 mm. With a broad range in the size of the sulphide minerals observed in the samples collected (10 μ m to 6.0 mm: Table 8), both heavy mineral concentrates and polished thin sections are needed to determine the entire size range. Polished thin sections were particularly useful for determining the upper size of sulphide minerals beyond the artificial upper size limit of 2.0 mm used for heavy mineral concentrates. Galena grains were the smallest of the main ore minerals from the collected samples, and grains found to be only up to 0.6 mm in size.

The main sulphide minerals in the Izok Lake deposit (galena, sphalerite, chalcopyrite, pyrite, and pyrrhotite) are not exclusively confined to the mineralized rocks proximal to the Izok Lake deposit. A base metal showing located up-ice from the Izok Lake deposit (Fig. 2a,b) was found to contain pyrite and chalcopyrite (Appendix B2). As a result, pyrite and chalcopyrite grains in the till down-ice of the Izok Lake deposit may be either from the Izok deposit or from the base metal showing up-ice (Appendix D).

Samples collected distal to the Izok Lake deposit were also found to contain chalcopyrite and pyrite. For example, sample 09-MPB-R91, which was collected from a mineralized zone 8 km northwest of the Izok Lake deposit (Fig. 2), was also found to contain chalcopyrite and pyrite.

Samples 09-MPB-R42 and -R90 (iron formation), 1.5 km north-northeast of the ore zone (Fig. 2), both

were found to contain some pyrite, indicating that this lithology may be the source of pyrite found in the dispersal pattern seen around, and down-ice of, the Izok Lake deposit.

Sample 09-MPB-R43 (metapelite) collected 1.5 km north-northeast of the ore zone, contained significant numbers of pyrite and chalcopyrite grains in the heavy mineral concentrate. Although this drill-core sample was collected from a depth 88.0 m, the results demonstrate that metapelite in the area may contain sulphides that could have contributed to the dispersal pattern around the deposit. One possible strategy to determine if chalcopyrite grains in the dispersal train are from the Izok deposit or the WIZ showing would be to use an EMP to analyze the Ag content of the chalcopyrite grains, as the iron formation is unlikely to contain Ag-rich chalcopyrite.

Almandine Garnet

Various compositions of garnet are found in the Slave Province in a wide variety of rock types that have been affected by different metamorphic grades. The almandine is garnet found at Izok Lake in bedrock and is not considered a potential indicator mineral of metamorphosed VMS deposits (Averill, 2001).

Staurolite

Staurolite is not unique to VMS deposits. It is common throughout a number of high-grade regional metamorphic terranes, as well as hydrothermal alteration zones of VMS deposits. Staurolite in local metagreywacke indicates medium metamorphic temperature-pressure conditions, which corresponds to upper amphibolite-facies conditions (Zaleski et al., 1991; Averill, 2001). Staurolite associated with sulphide deposits tends to be Zn-rich (>5 wt%) and thus Zn-rich staurolite may be a useful exploration guide for massive sulphide deposits in metamorphosed terranes (Spry and Scott, 1986; Ghosh and Praveen, 2008). During metamorphism, staurolite can be an intermediate mineral before reacting with Zn-bearing biotite to form spinel (gahnite) (Stoddard, 1979; Dietvorst, 1980; Spry and Scott, 1986). The zinc content in the staurolite from bedrock at Izok Lake is low (<LOD to 0.7 wt%), and thus staurolite is not considered to be an indicator mineral of the Izok Lake deposit.

Axinite

Axinite occurs most commonly as a contact metamorphic and metasomatic mineral. It preferentially occurs in B-bearing calc-silicate rocks and is found in hydrothermally altered calcareous sedimentary and mafic igneous rocks that have been altered prior to metamorphism (Deer et al., 1992). The B in axinite ($\text{Ca}_2\text{Mn}^{++}\text{Al}_2\text{BO}_3\text{Si}_4\text{O}_{12}(\text{OH})$) is derived from felsic

magmas and is a common component of impure limestone protoliths that have been exposed to contact metamorphosed with granitic intrusions. Axinite is generally present in greenschist-facies metamorphosed rocks (Deer et al., 1992).

Axinite compositional data from gahnite-rich volcanic rocks from the Izok Lake deposit of this study are plotted in Figure 13 along with axinite EMPA data from Meyers Pass, New Zealand, using fields modified from Coombs et al. (1996) and after converting EMP data to mol %. This plot indicates that all of the axinite grains visually identified in bedrock samples are indeed axinite, and more specifically manganaxinite. Manganaxinite from Izok Lake rocks is not as Ca-rich as the manganaxinite from Meyers Pass, but as the chemical compositions for the Izok Lake axinite are over 50% Mn, they are still considered the Mn end-member of axinite. In this study, axinite was difficult to visually identify, both in polished thin section and in the heavy mineral concentrates. This fact combined with its possible formation in several geological settings, indicates that axinite would not be a useful indicator mineral of VMS deposits in glaciated terrains.

Gahnite

All of the gahnite grains that were visually identified and picked were later confirmed to be gahnite (Figs. 14 and 15). Gahnite commonly occurs in the stringer sulphide zone of the Izok Lake deposit (Appendix B2) with a ZnO content ranging from 26.50 to 33.70 wt%, FeO^* (raw FeO data) from 6.64 to 13.40 wt%, and MgO from 1.33 to 3.07 wt% (Figs. 14 and 15). Gahnite grains from sample 09-MPB-R69, which was collected from sulphide mineralization 8 km northwest of the Izok Lake deposit (Fig. 2), display similar compositions to grains from the Izok Lake deposit but when plotted in Figure 15, these grains form a separate cluster to the right side of all the other grains, on the border between Field 3 (metamorphosed massive sulphide deposits in Fe-Al metasedimentary deposits and metavolcanic rocks) and Field 5 (pegmatite). The size of the gahnite grains observed in the polished thin sections ranged from 0.1 to 6 mm, whereas in the heavy mineral concentrates its size was found to range from 0.25 to 2.0 mm.

Gahnite is a useful indicator mineral of VMS deposits in high-grade metamorphic terrane due not only to its high hardness (8 on Moh's scale) and chemical stability in oxidizing environments (Morris et al., 1997) but also, and perhaps more importantly, due to its high specific gravity (SG = 4.30) and distinctive blue-green colour. Averill (2001) identified gahnite as an important indicator of proximity to a metamorphosed VMS deposit (Table 3). However, one of the challenges in using gahnite as an indicator mineral is

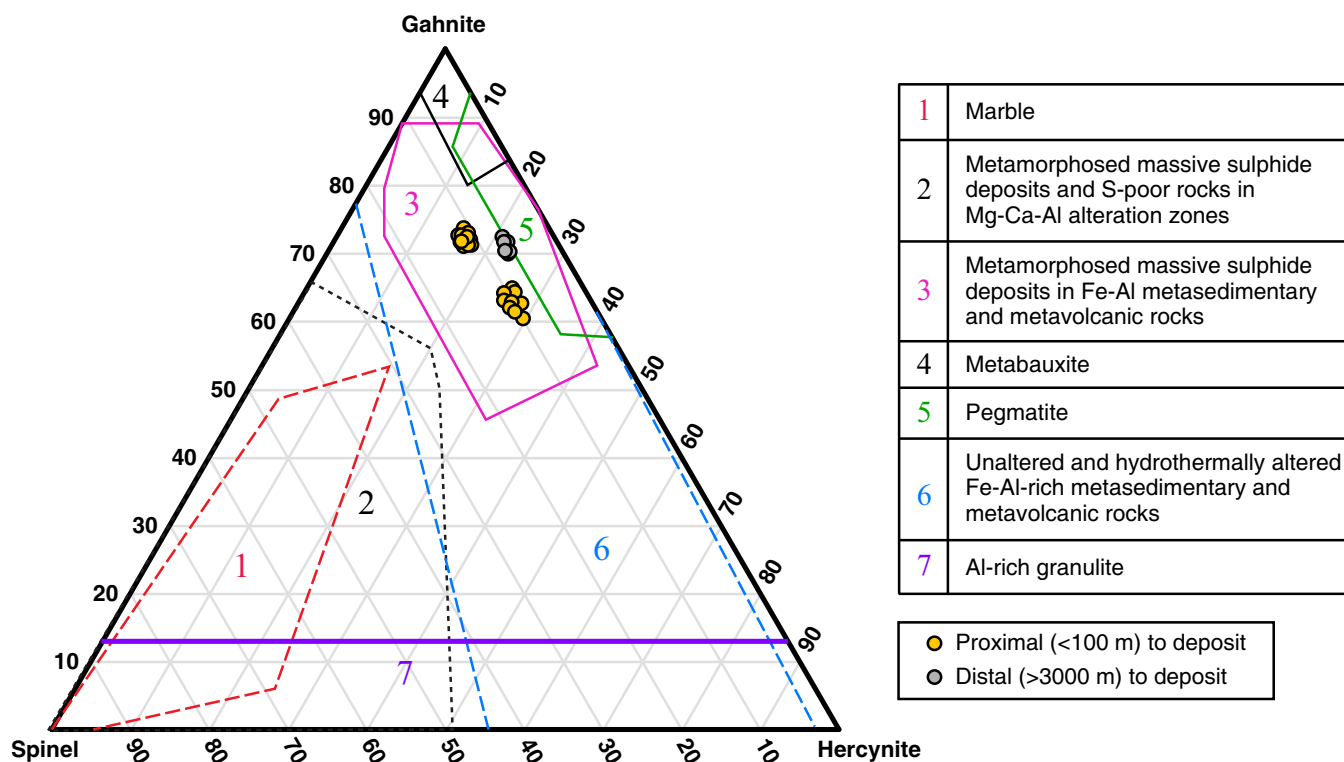


Figure 14. Ternary plot of gahnite and Zn-rich spinel group minerals from polished thin sections with end-members gahnite-hercynite-spinel using fields modified from Heimann et al. (2005).

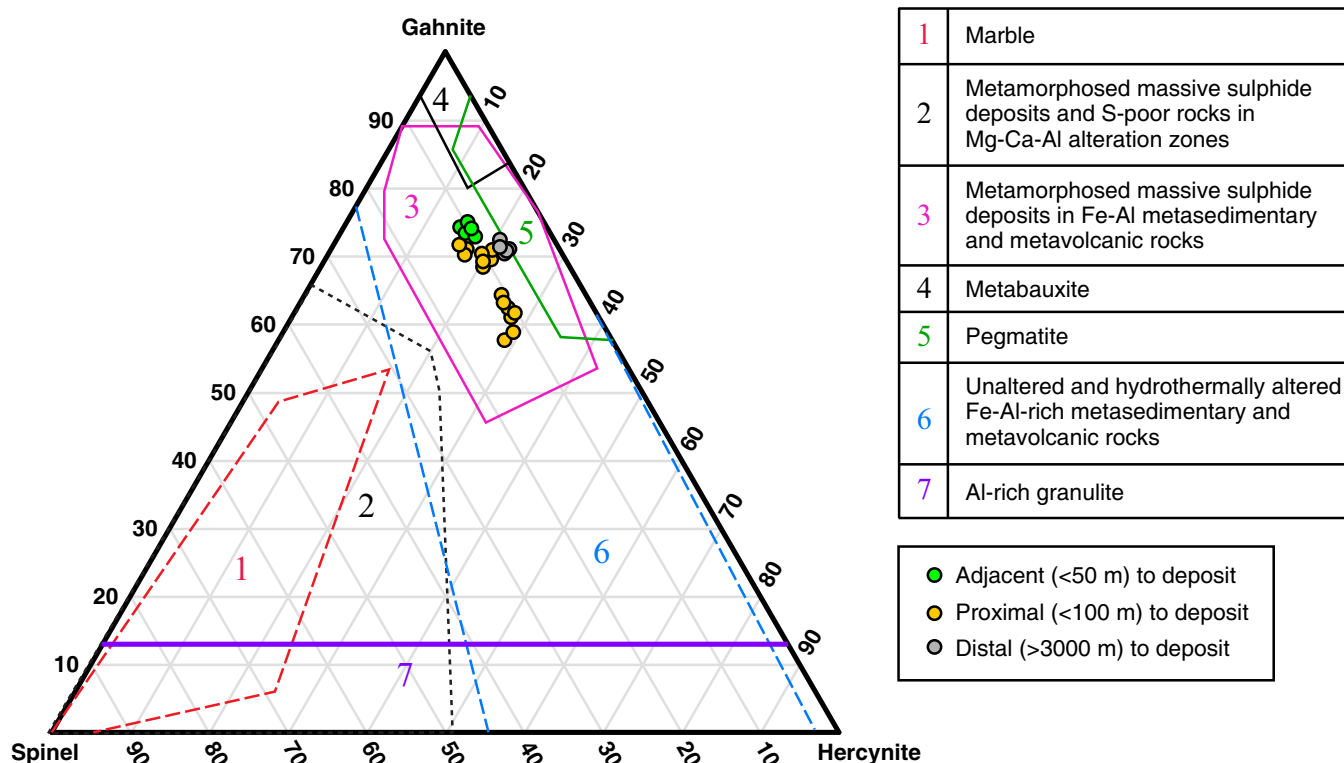
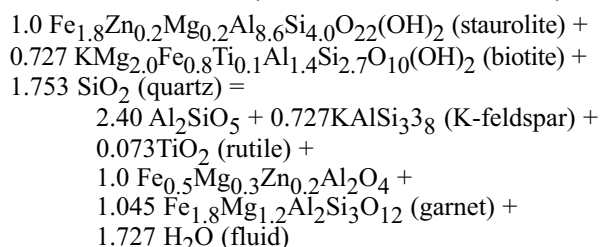


Figure 15. Ternary plot of gahnite and Zn-rich spinel group minerals from disaggregated bedrock with end-members gahnite-hercynite-spinel (fields from Heimann et al., 2005).

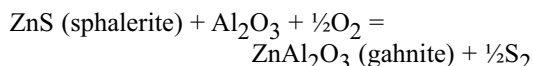
that gahnite is not unique to VMS deposits. It also occurs in pegmatite, aluminous metasedimentary rocks, skarns, marbles, and metamorphosed banded iron formation (Spry, 1982; Spry and Scott, 1986; Morris et al, 1997; Heimann et al., 2005; Spry et al., 2007; Ghosh and Praveen, 2008; Spry and Teale, 2009; Heimann et al., 2009). Because gahnite is not unique to metamorphosed VMS deposits, a method of determining the bedrock source of gahnite grains that found in surficial sediments is needed.

Gahnite compositions were evaluated using a ternary plot of molecular proportions of ZnO, FeO(t), and MgO, which were calculated by dividing the wt. % of ZnO, FeO(t), and MgO, respectively by the molecular weights of each oxide (Heimann et al., 2005). This value was then normalized to 100% and plotted in Figures 14 and 15. Morris et al. (1997) reported that gahnite from base metal deposits contain 30.2-33.0 wt% ZnO, 2.5-3.6 wt% MgO, and 6.6-10.3 wt% FeO. This was confirmed by Heimann et al. (2005), who noted similar ranges in gahnite chemistry from other VMS deposits, including gahnite grains from Colorado to that of Izok Lake (Spry, 1982; Spry and Scott, 1986; Heimann et al., 2005; Morris et al., 1997; Ghosh and Praveen, 2008; Spry and Teale, 2009; Heimann et al., 2009).

Of concern when using gahnite as an indicator mineral is that gahnite can form through a wide variety of processes in different settings. Gahnite can form by the breakdown of staurolite (Ghosh and Praveen 2008)



as well as by the breakdown of sphalerite



These reactions can either operate in isolation or together, and as such the gahnite in the Izok Lake VMS deposit may have formed by more than one process.

CONCLUSIONS

This study found that sphalerite, chalcopyrite, galena, and pyrrhotite are the most direct indicator minerals of the Izok Lake Zn-Cu-Pb-Ag VMS deposit as these minerals are the principle constituents of the target mineralization and are abundant in disaggregated bedrock samples and polished thin sections.). Gahnite was also found to be abundant in mineralized rocks in the study area. It has a distinctive blue-green colour and a relatively high specific gravity, both of which

make it a strong candidate for use as an indicator mineral. Within the Izok Lake deposit, gahnite occurs in the greatest abundance on the margin of the massive mineralization and in the sulphide stringer zone. Though gahnite can be indicative of other different deposit and rock types, gahnite formed in VMS deposits can be distinguished from that formed in pegmatite, aluminous metasedimentary rock, skarn, marble, and banded iron formation using the ternary plot developed by Spry and Scott (1986) and Heimann et al. (2005).

This study has investigated the use of polished thin sections and heavy mineral concentrates to study indicator minerals in bedrock. A disadvantage of heavy mineral concentrates is that the disaggregating of the samples and the picking of the heavy mineral concentrate for indicator minerals can be expensive. Heavy mineral concentrates have an upper size limit of 2.0 mm and thus the picking may not always be accurate. Samples may also have some contamination issues related to the disaggregation chamber that may require blanks to be inserted between each sample. One of the most important results from heavy mineral concentrates is that analyses are based on large sample sizes (100 to 500 g) compared to single polished thin sections, and thus are more accurate for determining mineral abundances. On the other hand, polished thin sections are more accurate for determining the shapes and range of sizes of indicator mineral grains and, unlike heavy mineral concentrates, it is also possible to determine mineral associations using polished thin sections.

This study has demonstrated that a combination of polished thin sections and heavy mineral concentrates of bedrock samples is preferred and that the most useful indicator mineral for VMS deposits in the amphibolite-grade glaciated terrain of the Izok Lake study area is gahnite.

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APPENDIX A1. Bedrock Sample Location Data

GSC Sample Number	Drillhole Number	MMG Sample Number	Sample Type	Dip of Drillhole (°)	Drillhole Footage (m)	Corrected Depth Based on Dip (m)	Collected By	Easting	Northing	UTM Zone	DATUM	NTS Map
09-MPB-R10	Hen 32		DDH	45	41.76	29.52	Hicken	418036	7280256	12	NAD83	86H10
09-MPB-R19	Hen 32		DDH	45	73.46	51.94	Hicken	418036	7280256	12	NAD83	86H10
09-MPB-R20	Hen 32		DDH	45	89.92	63.58	Hicken	418036	7280256	12	NAD83	86H10
09-MPB-R22	Hen 32		DDH	45	91.14	64.45	Hicken	418036	7280256	12	NAD83	86H10
09-MPB-R23	Hen 32		DDH	45	91.44	64.66	Hicken	418036	7280256	12	NAD83	86H10
09-MPB-R32	Hen 32		DDH	45	138.07	97.63	Hicken	418036	7280256	12	NAD83	86H10
09-MPB-R37	Hen 173		DDH	65	117.00	106.04	Hicken	417291	7279944	12	NAD83	86H10
09-MPB-R41	Hen 173		DDH	65	119.00	107.85	Hicken	417291	7279944	12	NAD83	86H10
09-MPB-R42	Hen 264		DDH	65	154.50	140.25	Hicken	418032	7281312	12	NAD83	86H10
09-MPB-R43	Hen 264		DDH	65	97.50	88.36	Hicken	418032	7281312	12	NAD83	86H10
09-MPB-R45	Her 4		DDH	50	135.00	103.42	Hicken	418757	7279391	12	NAD83	86H10
09-MPB-R47	Her 7		DDH	65	366.00	331.71	Hicken	418951	7280342	12	NAD83	86H10
09-MPB-R49	n/a		Grab	n/a	n/a	surface	McClenaghan	410476	7284475	12	NAD83	86H10
09-MPB-R51	Her 6		DDH	61	346.00	302.62	Hicken	418468	7279347	12	NAD83	86H10
09-MPB-R52	n/a	n/a	float	n/a	n/a	surface	Greg Duso	411964	7282087	12	NAD83	86H10
09-MPB-R53	n/a	197490	float	n/a	n/a	surface	Greg Duso	411964	7282087	12	NAD83	86H10
09-MPB-R54	n/a	197488	Outcrop	n/a	n/a	surface	Greg Duso	411964	7282087	12	NAD83	86H10
09-MPB-R55	n/a	197489	Outcrop	n/a	n/a	surface	Greg Duso	411964	7282087	12	NAD83	86H10
09-MPB-R57	n/a		Outcrop	n/a	n/a	surface	Oviatt	411961	7282093	12	NAD83	86H10
09-MPB-R59	Hen 179		DDH	69	180.00	168.04	Hicken	417264	7279929	12	NAD83	86H10
09-MPB-R60	Hen 173		DDH	65	55.00	49.85	Hicken	417291	7279944	12	NAD83	86H10
09-MPB-R61	Hen 173		DDH	65	58.00	52.57	Hicken	417291	7279944	12	NAD83	86H10
09-MPB-R62	Hen 338		DDH	90	120.00	120.00	Hicken	417314	7279934	12	NAD83	86H10
09-MPB-R63	Hen 338		DDH	90	121.50	121.50	Hicken	417314	7279934	12	NAD83	86H10
09-MPB-R64	Hen 338		DDH	90	111.00	111.00	Hicken	417314	7279934	12	NAD83	86H10
09-MPB-R65	Hen 250		DDH	64	123.00	110.55	Hicken	417393	7279948	12	NAD83	86H10
09-MPB-R67	Hen 250		DDH	64	124.00	111.45	Hicken	417393	7279948	12	NAD83	86H10
09-MPB-R68	Ham 05		DDH	66	71.00	64.86	Hicken	414381	7287783	12	NAD83	86H10
09-MPB-R69	Ham 05		DDH	66	132.00	120.59	Hicken	414381	7287783	12	NAD83	86H10
09-MPB-R75	n/a		Outcrop	n/a	n/a	surface	Hicken	416089	7280636	12	NAD83	86H10
09-MPB-R77	n/a		Grab	n/a	n/a	surface	Hicken	415845	7281172	12	NAD83	86H10
09-MPB-R82	Hen 375		DDH	68	644.50	597.57	Hicken	418381	7280269	12	NAD83	86H10
09-MPB-R83	Hen 375		DDH	68	646.00	598.96	Hicken	418381	7280269	12	NAD83	86H10
09-MPB-R85	Hen 421		DDH	45	152.80	108.05	Hicken	417119	7279394	12	NAD83	86H10
09-MPB-R87	Her 7		DDH	65	187.00	169.48	Hicken	418951	7280342	12	NAD83	86H10
09-MPB-R88	Hen 343		DDH	75	216.00	208.64	Hicken	417186	7279943	12	NAD83	86H10
09-MPB-R90	Hen 264		DDH	65	156.00	141.38	Hicken	418032	7281312	12	NAD83	86H10
09-MPB-R91	Ham 05		DDH	66	280.00	255.79	Hicken	414381	7287783	12	NAD83	86H10
09-MPB-R92	Her 3		DDH	50	14.94	11.44	Hicken	418684	7279626	12	NAD83	86H10
09-MPB-R93	Hen 173		DDH	65	61.00	55.28	Hicken	417291	7279944	12	NAD83	86H10
09-MPB-R94	Her 6		DDH	61	344.00	300.87	Hicken	418468	7279347	12	NAD83	86H10
09-MPB-R95	Hen 306		DDH	45	86.00	60.81	Hicken	418261	7280852	12	NAD83	86H10

Indicator Mineral Signatures of the Izok Lake Deposit, Nunavut: Part 1 Bedrock Samples

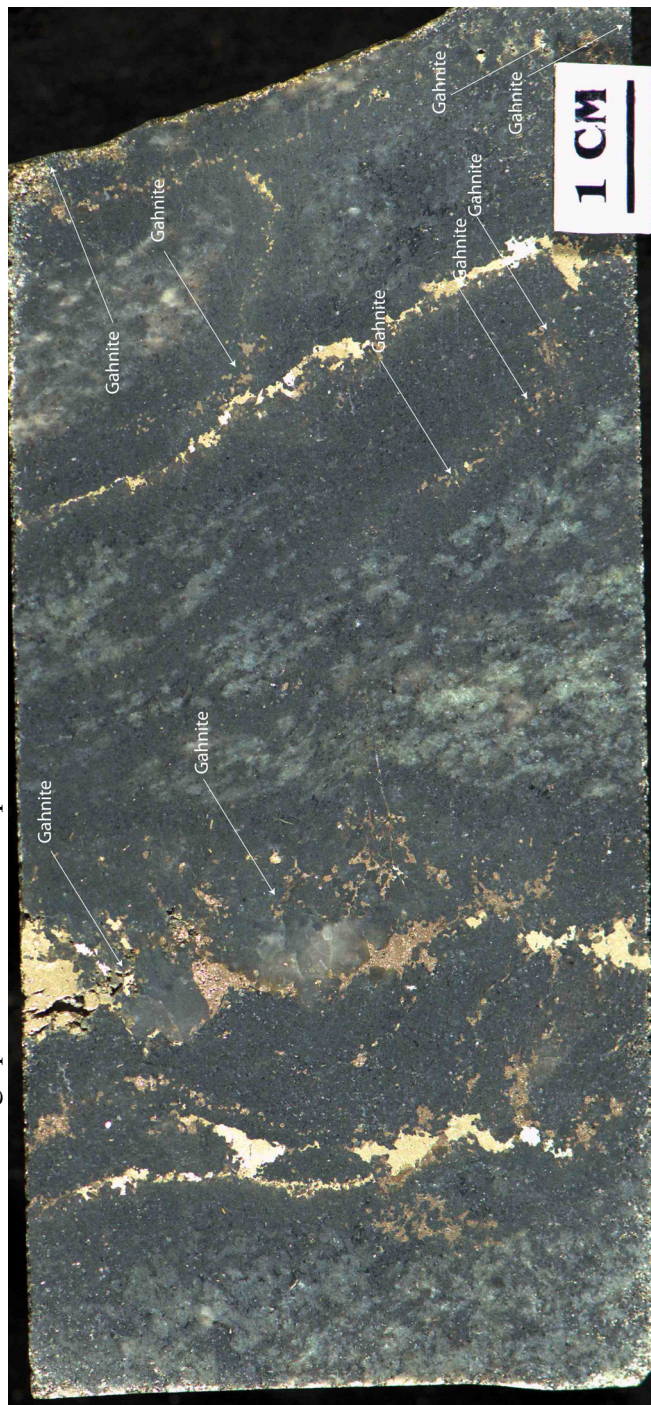
Appendix A1 continued.

GSC Sample Number	Lithology	Polished Thin Section (Y/N)	Heavy Mineral Concentrate (Y/N)	Comments
09-MPB-R10	Felsic metavolcanic	Y	N	Representative sample of sulphide-bearing felsic metavolcanic rock
09-MPB-R19	Massive sulphide	Y	N	For sample of the massive sulphide minerals and polished thin section
09-MPB-R20	Massive sulphide	Y	N	For mineralogy of fresh sulphides
09-MPB-R22	Sulphide-rich metavolcanic	Y	N	Gahnite occurs in stringer zones, collected for polished thin section
09-MPB-R23	Felsic metavolcanic &	Y	N	Contact of felsic metavolcanic rock with massive sulphides
09-MPB-R32	Sulphide-rich altered rhyolite	Y	N	Collected to examine change in mineralogy of the sulphides
09-MPB-R37	Felsic metavolcanic	Y	N	Contact of felsic metavolcanic rock with massive sulphides
09-MPB-R41	Felsic metavolcanic and sulphides	Y	Y	For gahnite composition and sphalerite comparison (2 subsamples)
09-MPB-R42	Iron formation	Y	Y	Representative sample of the iron formation. For heavy mineral and polished thin section
09-MPB-R43	Pelagic metasediment	Y	Y	Representative sample of the metasediments. For heavy mineral and polished thin section
09-MPB-R45	Metasediment	Y	Y	Representative sample of garnets in meta-sediments. For heavy minerals & polished thin section, specifically for garnet composition
09-MPB-R47	Mafic metavolcanic	Y	Y	Representative sample of the mafic flow unit. For polished thin section and heavy minerals
09-MPB-R49	Diabase	Y	Y	Representative sample of MacKenzie dyke swarm. For heavy minerals and polished thin section
09-MPB-R51	Felsic metavolcanic	Y	Y	Representative sample of the felsic metavolcanic rocks
09-MPB-R52	Felsic metavolcanic	Y	N	WIZ showing
09-MPB-R53	Semi-massive to massive sulphide	Y	N	WIZ showing
09-MPB-R54	Felsic metavolcanic	Y	N	WIZ showing
09-MPB-R55	Felsic metavolcanic	Y	N	WIZ showing
09-MPB-R57	Felsic metavolcanic	Y	N	WIZ showing
09-MPB-R59	Pegmatite	Y	N	Pegmatite containing amazonite
09-MPB-R60	Massive sulphides	Y	Y	Representative sample of the massive sulphide zone
09-MPB-R61	Sulphidic chert	Y	Y	Gahnite-bearing sample
09-MPB-R62	Sulphidic breccia pipe	Y	Y	Green mineral, possible gahnite or actinolite, collected for polished thin section
09-MPB-R63	Intermediate metavolcanic	Y	N	Sample of sulphides at the contact of gahnite-rich/gahnite-poor rocks
09-MPB-R64	Massive sulphide	Y	Y	Massive sulphide section adjacent to gahnite; second representative sample of the massive sulphide
09-MPB-R65	Sulphidic breccia pipe	Y	Y	Breccia pipe in basaltic metavolcanic
09-MPB-R67	Schist	Y	N	Collected adjacent to sulphidic breccia pipe for context
09-MPB-R68	Schist	Y	N	Green mineral, possible gahnite, collected for polished thin section
09-MPB-R69	Sulphidic alteration zone	Y	Y	Gahnite-bearing sulphide zone
09-MPB-R75	Gossanous meta-diorite	Y	N	Gossanous rock, collected for mineralogy
09-MPB-R77	Schistose felsic metavolcanic	Y	N	Representative sample of metamorphosed rhyolite
09-MPB-R82	Felsic metavolcanic	Y	N	Odd porphyroblastic texture, sampled for polished thin section
09-MPB-R83	Felsic metavolcanic	Y	N	Representative sample of metamorphosed rhyolite
09-MPB-R85	Felsic metavolcanic	Y	N	Metamorphosed dacite, adjacent to gahnite-bearing rocks, for polished thin section
09-MPB-R87	Clastic metasediment	Y	Y	Representative sample of clastic metasediments
09-MPB-R88	Felsic intrusive (granite)	Y	Y	Representative sample of the granite, for heavy minerals and polished thin section
09-MPB-R90	Iron formation	Y	Y	Representative sample of the iron formation, for heavy mineral and polished thin section
09-MPB-R91	Felsic metavolcanic	Y	Y	Representative sample of the felsic metavolcanic rocks
09-MPB-R92	Metagabbro	Y	Y	Representative sample of the metamorphosed gabbroic rocks
09-MPB-R93	Massive sulphides	Y	Y	Representative sample of the massive sulphide zone (2 subsamples)
09-MPB-R94	Felsic metavolcanic	Y	Y	Representative sample of the felsic metavolcanic rocks
09-MPB-R95	Metapelite	Y	Y	Representative sample of clastic metasediments

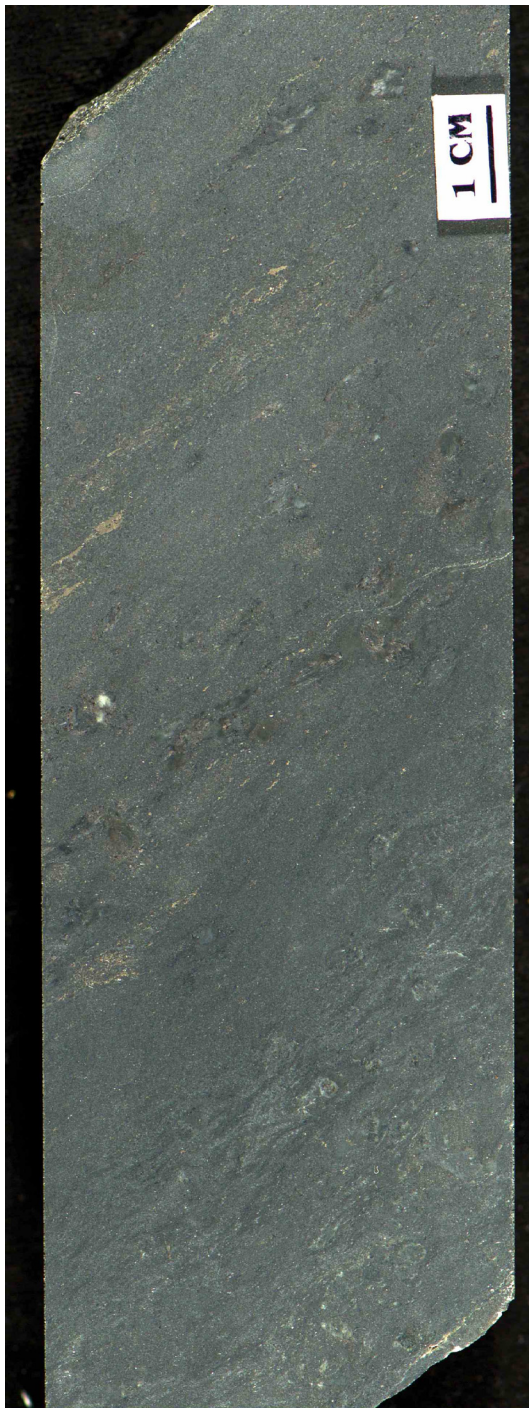
Sample 09-MPB-R41B. Gahnite-rich felsic metavolcanic sample. The gahnite in this sample occurs as small, dispersed subangular crystals. The remainder of the sample is mainly quartz with some biotite, sillimanite, and sulphide minerals.

Sample 09-MPB-R42. Iron formation (silicate facies); hand sample is dark grey with some larger crystals of quartz. Sample has abundant large crystals of garnet, with some smaller garnet crystals that have been disseminated throughout the matrix. The mica minerals appear to have formed a metamorphic flow texture, strongly foliated due to shearing.

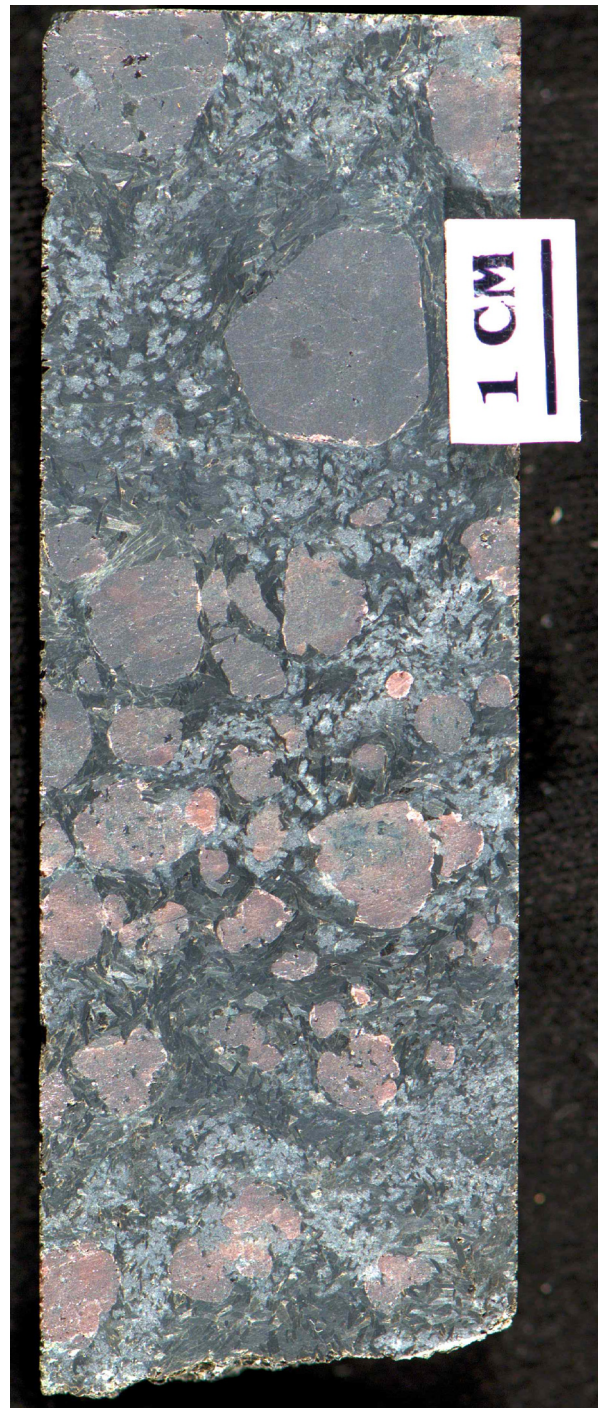
APPENDIX A2. Photographs of bedrock samples.



APPENDIX A2 continued.

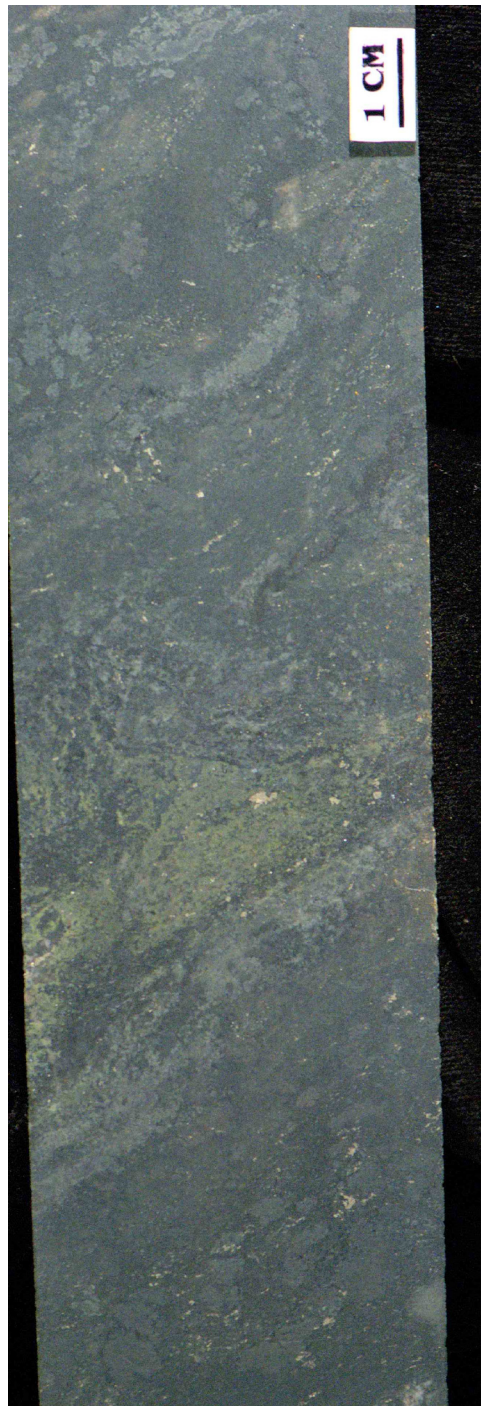


Sample 09-MPB-R43. Metapelite; hand sample is medium- to dark grey, fine-grained with some larger grains of quartz. Sample is generally fine- to medium-grained with a matrix mainly consisting of quartz and biotite. There are some sulphide minerals present in the form of pyrite and pyrrhotite.

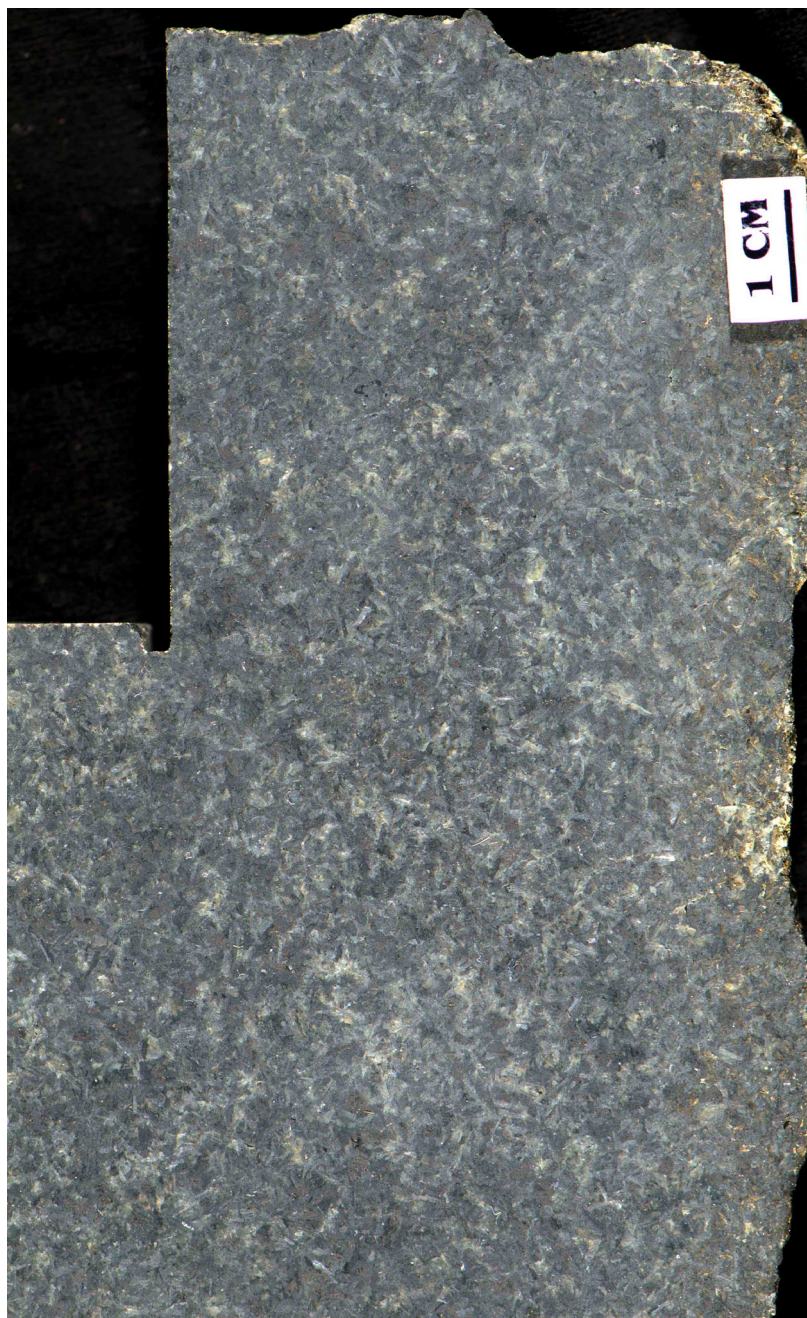


Sample 09-MPB-R45. Metamorphosed metasediment (alteration zone); hand sample is dominated by a white, hard mineral (cordierite) and garnet. The sample is a fine- to medium-grained sedimentary rock. The majority of this sample is made of garnet and cordierite.

APPENDIX A2 continued.



Sample 09-MPB-R47. Mafic meta-volcanic; hand sample is black-green fine-grained metamorphosed basaltic volcanic rock.



Sample 09-MPB-R49. Diabase (Mackenzie dyke swarm); hand sample is dark green-grey with a medium- to coarse-grained crystalline matrix. The majority of the sample is made up of plagioclase that is being altered to sericite. There is also hornblende, biotite, augite, and magnetite, with trace amounts of pyrite and pyrrhotite. Hand sample is weakly magnetic.

APPENDIX A2 continued.



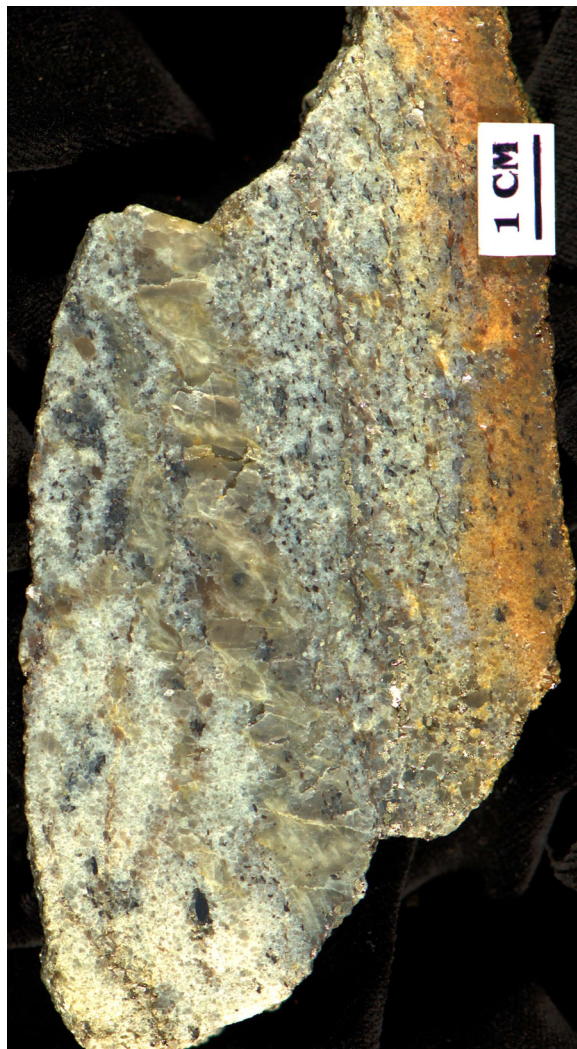
Sample 09-MPB-R51. Felsic metavolcanic; hand sample is light white-grey fine-grained felsic volcanic rock, logged as a dacite. The majority of this sample is made up of microcline, quartz, biotite, and muscovite. This sample contains very little (trace) metallic minerals.



Sample 09-MPB-R53. Schist with limonite alteration; hand sample shows strong schistose to gneissic texture and is heavily altered by limonite. Approximately 1/3 of the sample consists of sulphide minerals. Sample comprises medium-grained quartz, feldspar, and muscovite with sphalerite and pyrite.

APPENDIX A2 continued.

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Sample 09-MPB-R55. Felsic metavolcanic rock. Medium grey felsic rock, containing various amounts of quartz, biotite, and feldspar.

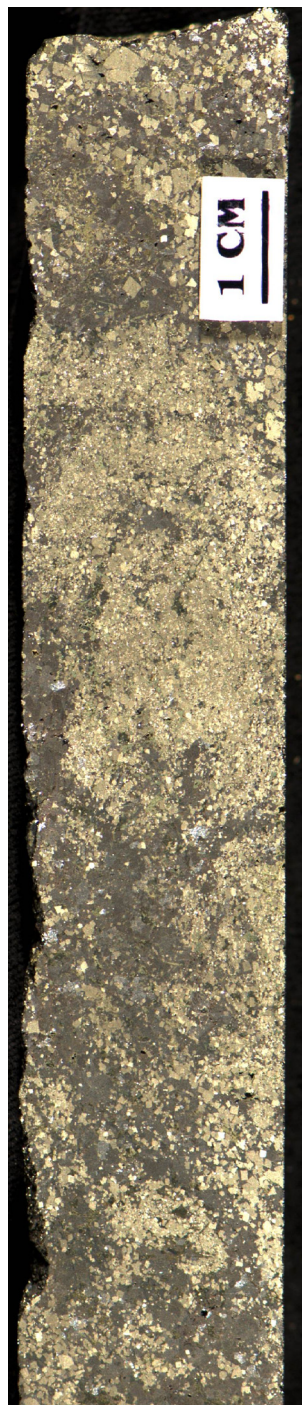


Sample 09-MPB-R57. Felsic metavolcanic rock. Majority of the sample consists of fine- to medium-grained feldspar, quartz and microcline. Sulphide minerals are present, with chalcopyrite being the most predominant followed by sphalerite, pyrite, and magnetite.



Sample 09-MPB-R54. Sulphide-rich felsic metavolcanic. Sample is sphalerite, pyrite, chalcopyrite, and pyrrhotite with matrix of epidote, microcline, biotite, and muscovite. Strong schistose texture in hand sample.

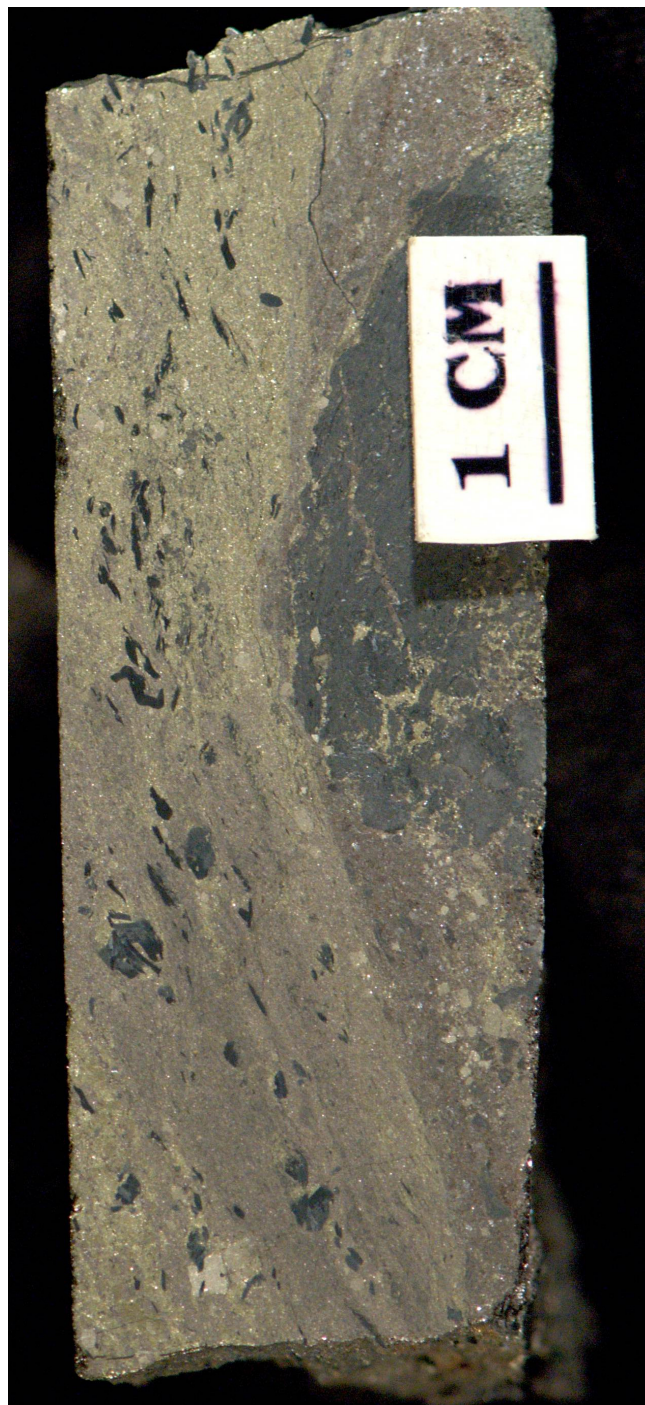
APPENDIX A2 continued.



Sample 09-MPB-R60. Massive sulphides, hand sample is dominated by sphalerite, chalcocopyrite, pyrrhotite, and magnetite. The majority of the sample is deep red-brown iron-rich sphalerite and pyrite with some magnetite and chalcocopyrite.

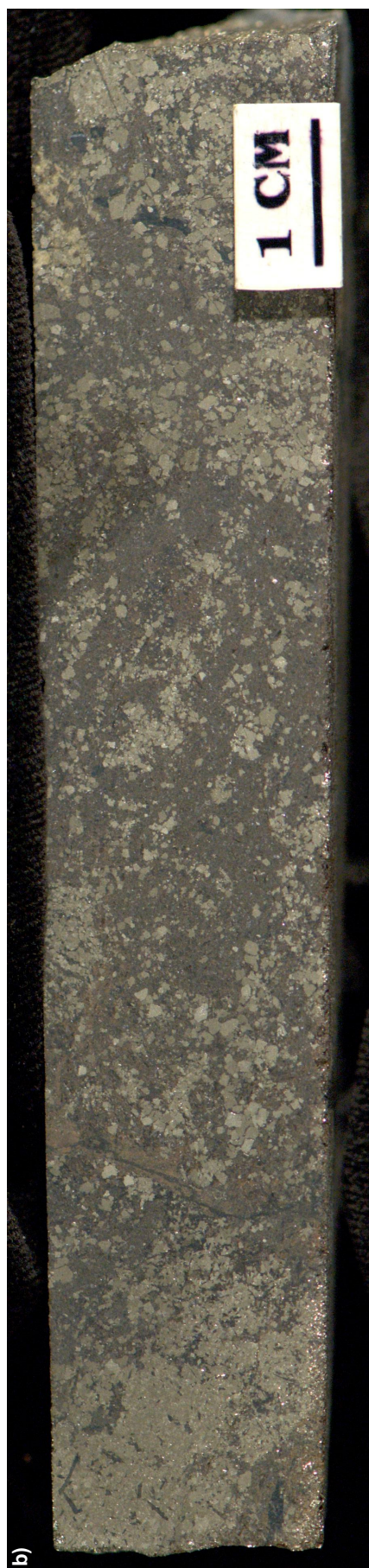


Sample 09-MPB-R61. Sulphidic chert, hand sample is dark brown in colour and has disseminated sulphides throughout. Gahnite-rich sample that has the gahnite occurs as large to medium grains and some smaller grains. Sillimanite occurs as chaotic laths. Plagioclase and quartz comprise the matrix and magnetite, pyrite, chalcocopyrite, and pyrrhotite comprise the sulphide content. Hand sample is magnetic.



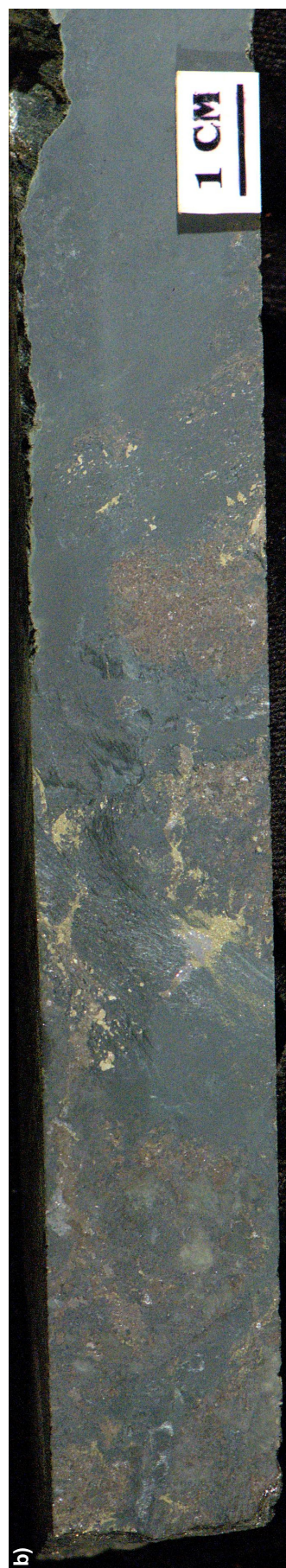
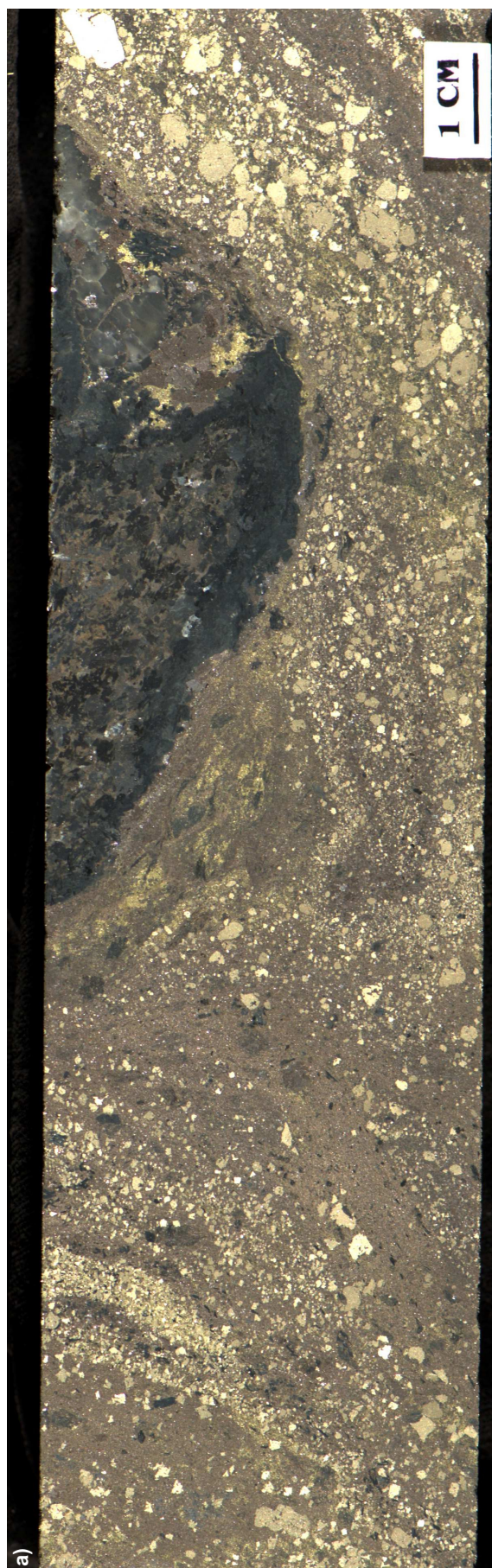
Sample 09-MPB-R62. Sulphidic breccia pipe, hand sample is dominated by sulphide minerals and actinolite (ferroactinolite). Matrix is fine-grained. Contact between dacite and massive sulphide, consisting of quartz, plagioclase, hornblende, sphalerite, ferroactinolite, chalcocopyrite, and magnetite.

APPENDIX A2 continued.



Sample 09-MPB-R64 a and b). Massive sulphide, hand sample is brown-bronze in colour and has a fine-grained matrix. Most of the sample consists of recrystallized Fe-rich sphalerite and pyrite. Some sphalerite is found within the magnetite with a trace amount of galena.

APPENDIX A2 continued.

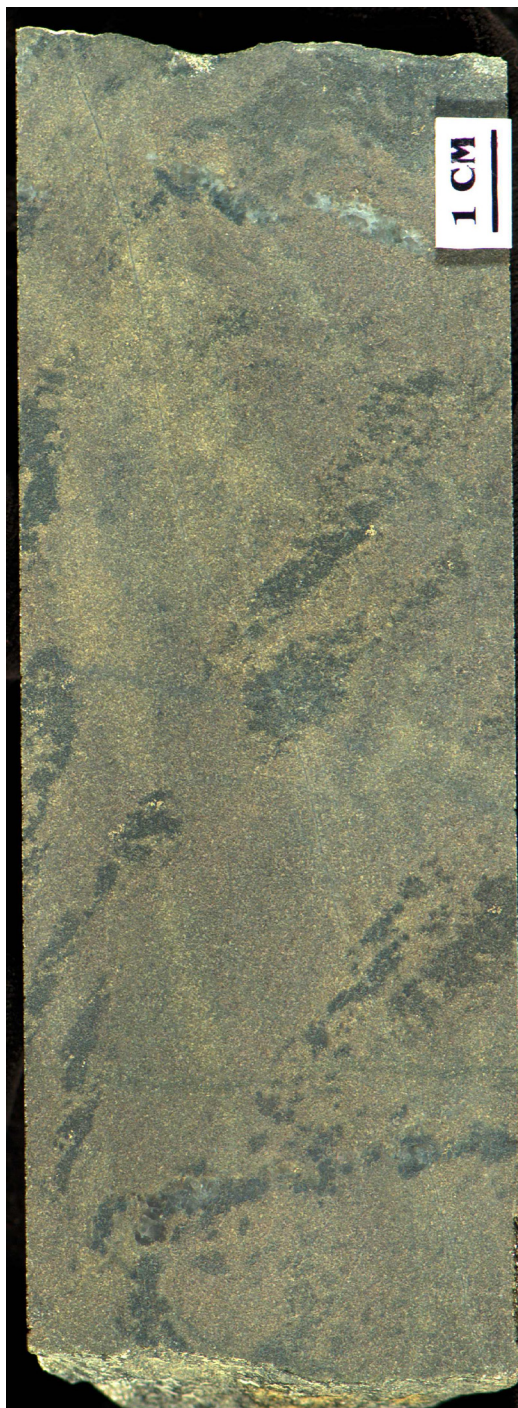


Sample 09-MPB-R65. Sulphidic breccia pipe in basalt, with secondary sulphide mineralization; hand sample is a fine-grained brown-purple colour with large inclusions of other rocks (brecciated texture). Two distinct phases occur in this rock; the primary phase is dominated by plagioclase, quartz, and hornblende, and the secondary phase has sphalerite, ferroactinolite, chalcopyrite, and magnetite.

APPENDIX A2 continued.



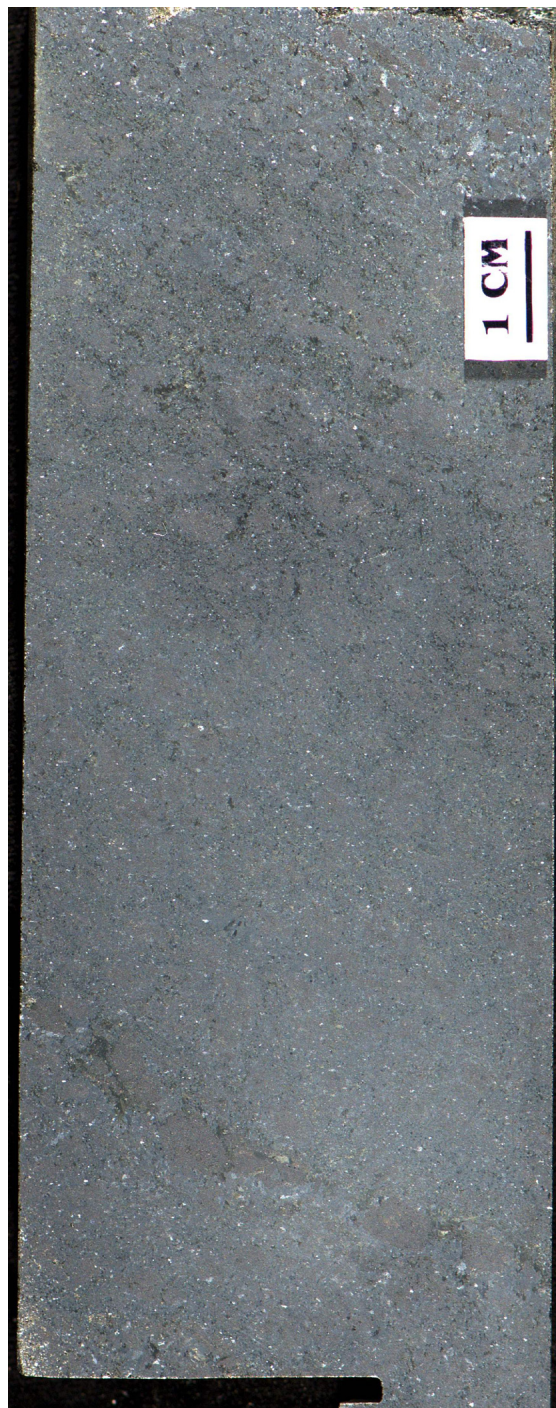
Sample 09-MPB-R69. Schist, hand sample is brown-purple in colour and is fine-grained. This sample consists mainly of fine-grained quartz; muscovite with some chlorite and garnet.



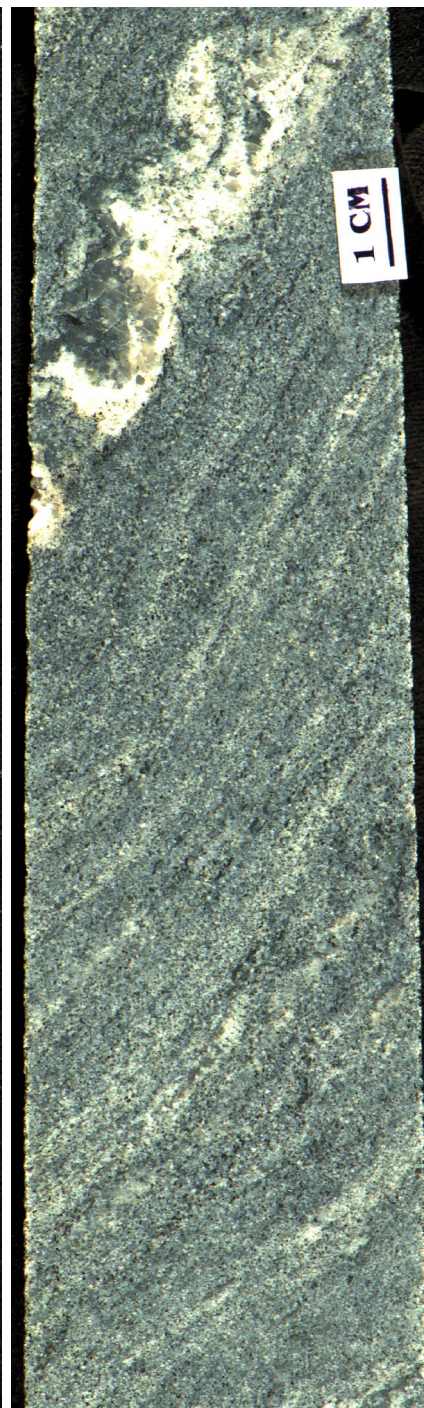
Sample 09-MPB-R87. Metagreywacke; hand sample grey-white with very fine-grained matrix, sedimentary in origin. Sample is mainly made up of fine-grained quartz and plagioclase that is being altered to sericite. Only a minor amount of pyrite and biotite in sample, with visible metamorphic foliation.



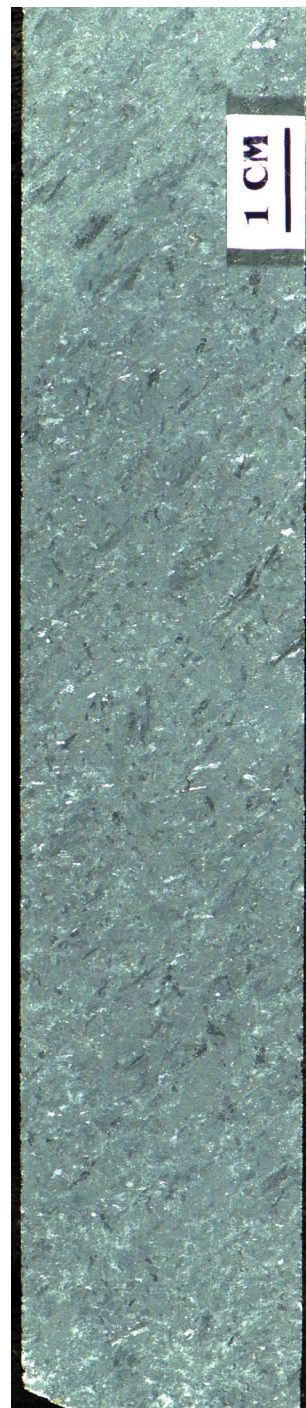
Sample 09-MPB-R88. Aplite, hand sample white-grey medium-grained felsic volcanic rock. The majority of the sample consists of albite and quartz. There is some muscovite present and a trace amount of chlorite.



Sample 09-MPB-R90. Iron formation; hand sample is dark grey in colour with a fine-grained matrix. Sample mainly consists of almandine and iron-rich biotite/hornblende. The matrix consists of fine-grained quartz with biotite/hornblende. Magnetite occurs in the cracks and spaces within the almandine crystals. Hand sample is slightly magnetic.



Sample 09-MPB-R91. Felsic metavolcanic; hand sample white-grey in colour with a medium-grained matrix. Sample mainly consists of feldspars (plagioclase and microcline) with biotite and quartz. This sample is equigranular and the protolith is a rhyolite.

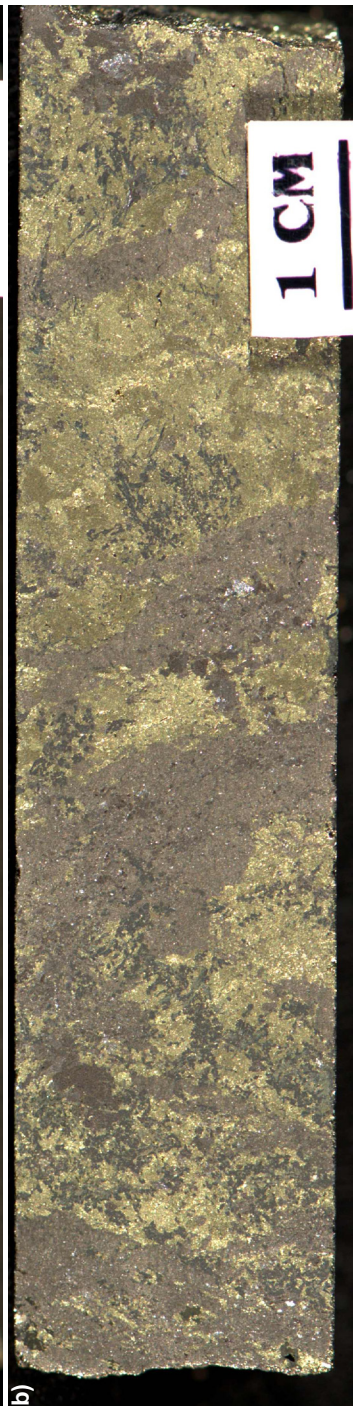


Sample 09-MPB-R92. Metagabbro; hand sample is black-grey in colour with a medium-grained matrix. Sample mainly consists of medium-grained hornblende and plagioclase with a minor amount of sulphide minerals (magnetite and pyrite).

APPENDIX A2 continued.



Sample 09-MPB-R93. Massive sulphide; hand sample is brown-purple in colour (weathered sulphides). **a)** Sample consists of mainly sphalerite, pyrite, magnetite, chalcopyrite, and pyrrhotite; hand sample is weakly magnetic. **b)** Sample is mainly massive sulphides with chalcopyrite, pyrite, pyrrhotite, sphalerite, and magnetite being the most prevalent. There are also a couple accessory minerals consisting of biotite, quartz, and chlorite.



Sample 09-MPB-R64. Felsic meta-volcanic; hand sample is white-grey in colour with a medium-grained matrix. Sample consists of quartz, biotite, muscovite, and plagioclase with no sulphide minerals present.

Sample 09-MPB-R95. Amphibolite-grade metapelite; hand sample is white-grey in colour with a medium-grained ground-mass. Sample consists mainly of a matrix of quartz and sericite alteration with larger grains of biotite and hornblende.



APPENDIX A2 continued.

APPENDIX B1. Binocular Microscope Descriptions of Hand Specimens and Sawn Diamond Drill Core, Izok Lake, Nunavut

S.A. Averill

November 13, 2009

09-MPB-R41

FELSIC METAVOLCANIC. Sawn drill core. Pale grey, strongly foliated, mostly nonmagnetic, varitextured, amphibolite-facies metavolcanic consisting mainly of medium-grained, (0.2-0.5 mm), granulose (metamorphically recrystallized) quartz (40%) and plagioclase (25%) with 15% muscovite and 5% biotite flakes, 3% sillimanite and 1 to 50% (average 10%) dark green gahnite (SEM confirmed). Local coarser-grained (1-2 mm) patches are more leucocratic (plagioclase-rich) with prominent sillimanite sheaves. Rock is cut by 5% coarse-grained (1-2 mm) quartz + sulphide stringer zones up to 5 mm wide containing 50% pyrite (i.e. 2-3% of overall sample) and 10% pyrrhotite bordered by transverse hairline fractures lined with red-brown sphalerite (0.1% of sample) and traces of chalcopyrite and galena. Gahnite concentration is highest (up to 50%) in the areas containing these sphalerite-bearing fractures.

09-MPB-R42

IRON FORMATION (silicate facies). Sawn drill core. Banded dark green and pale pink, strongly foliated, non-magnetic, porphyroblastic, amphibolite facies metasediment consisting of pale grey, medium-grained (0.2-0.4 mm) grunerite (50%; SEM confirmed), pale pink Mn-almandine (30%; SEM confirmed; variably occurs as 1-2 mm metacrysts) and biotite (20%) with negligible quartz and feldspar, no magnetite and no sulphides.

09-MPB-R43

METAPELITE. Sawn drill core. Medium grey, strongly foliated, nonmagnetic to moderately magnetic (in bands), porphyroblastic, amphibolite-facies clastic metasediment consisting of subequal proportions of fine-grained (0.1-0.2 mm) quartz, plagioclase and biotite with 5% sillimanite as large (1-5 mm) metacrysts, trace almandine as smaller (0.5-1 mm) metacrysts and 1% finely disseminated (0.05 mm) to coarse stringer (3-5 mm) pyrrhotite and trace pyrite. Sulphides are mainly concentrated within and near a folded, 1 cm thick bed of recrystallized chert.

09-MPB-R45

METAMORPHOSED ALUMINOUS ALTERATION ZONE. Sawn drill core. Dark grey, pink-spotted, massive to weakly foliated, nonmagnetic, distinctly porphyroblastic, amphibolite facies rock consisting of

coarsely grained (0.5-2 mm) cordierite (50%), biotite (30%) and staurolite (0.5%) with 20% larger (3-10 mm), equant almandine metacrysts. No magnetite or sulphides.

09-MPB-R47

METABASALT. Sawn drill core. Dark green, moderately foliated, nonmagnetic, weakly porphyroblastic, upper greenschist facies metavolcanic consisting of fine-grained (0.1-0.2 mm) to patchily coarser grained (0.5-1 mm) chlorite + actinolite (35%; chlorite dominant), saussuritized plagioclase (60%) and quartz (<5%) with 0.2% finely disseminated ilmenite (variably altered to leucoxene) and 2% larger (1-3 mm), pale pink, incipient (intermixed with above silicates) almandine metacrysts. Also present are 5% epidote-rich patches containing 1% titanite. Sulphide content (pyrite as 0.1-1 mm grains) averages 0.5% but reaches 3% in epidote-rich alteration zones.

09-MPB-R49

DIABASE. Sawn hand specimen. Medium grey, massive, unmetamorphosed, diabasic-textured, strongly magnetic intrusive rock consisting of coarse-grained (1-3 mm), subhedral laths of dark brown augite (40%; SEM confirmed) and fresh, well-twinned plagioclase (60%) with 3% similar-sized but anhedral magnetite grains, <1% quartz, no olivine and trace fine-grained interstitial pyrrhotite.

09-MPB-R51

FELSIC METAVOLCANIC. Sawn drill core. Pale grey, strongly foliated, nonmagnetic, veritextured, amphibolite facies metavolcanic consisting of fine to medium-grained (variably 0.2 or 0.5 mm), granulose (metamorphically recrystallized) quartz (30%) and plagioclase (40-55%) with 15% biotite in fine-grained zones and 30% muscovite flakes plus trace sillimanite in medium-grained zones which probably represent former sericitic alteration patches. Biotite is locally clustered in 2-3 mm wisps that may reflect former chlorite phenocrysts. No Fe/Ti oxides or sulphides.

09-MPB-R60

MASSIVE SULPHIDES. Sawn drill core. Mottled brass-yellow and red-brown, massive to weakly foliated, moderately to very strongly magnetic, recrystallized chemical metasediment consisting of medium to coarse-grained pyrite (50-60%), sphalerite (40%) and

magnetite (variable 0-10%; average 3%) with 2% interstitial chalcopryrite (restricted to sphalerite + magnetite-rich zones) and 3% vug-filling supergene (formed during core storage) siderite (SEM confirmed).

09-MPB-R61

SULPHIDIC CHERT. Sawn drill core. Mottled pale grey and green, mineralogically chaotic, (probably brecciated), unfoliated, moderately to very strongly magnetic chemical metasediment, consisting of finely recrystallized (0.1-0.2 mm) chert (50%) and gahnite (30-40%) with 5% similarly fine-grained pyrrhotite + 2% chalcopryrite concentrated in convoluted bands along chert-gahnite contacts, 0.2% finely disseminated sphalerite and much coarser-grained (2-3 mm) metacrysts of pyrite (1%), magnetite (variable 1-20%; average 5%) and biotite (2%; variably chlorite).

09-MPB-R62

SULPHIDIC BRECCIA PIPE. Sawn drill core. Sample contains two distinct phases. Main (earliest) phase (80% of sample) is mottled grey-green and red-brown and consists of fine-grained (0.2-0.3 mm) quartz + plagioclase (50%) and hornblende (10%; variably ferroactinolite) with 40% coarser-grained (1-3 mm) sphalerite. Other (later) phase (20% of sample) is a breccia cement consisting of 1-10 mm wide veinlets of coarse-grained (0.5-2 mm), dark green ferroactinolite (70%; SEM confirmed), chalcopryrite (30%) and magnetite (trace).

09-MPB-R64

MASSIVE SULPHIDES. Sawn drill core. Mottled honey-yellow to red-brown with brassy metallic overprint, massive, finely recrystallized, strongly magnetic chemical metasediment consisting of fine to medium-grained (0.1-1 mm) pyrite (40%), honey-yellow (mostly) to red-brown sphalerite (40%) and galena (trace) with vestiges of an original framboidal texture, 10% coarser-grained (2-5 mm) magnetite and 10% finely bladed (0.2-1 mm long) actinolite (SEM confirmed; colourless rather than green).

09-MPB-R65

SULPHIDIC BRECCIA PIPE IN BASALT. Sawn drill core. Sample consists of two distinct phases – primary and breccia infill – in subequal proportions. Primary phase is a dark green, massive, nonmagnetic metavolcanic consisting of fine-grained (0.1-0.2 mm), recrystallized plagioclase (60%), quartz (<10%) and hornblende (30%) which has been replaced by 20% coarse-grained (0.5-1 mm) sphalerite occurring in 3-5 mm veinlets and patches. Breccia infill is also nonmagnetic, crosscuts the primary phase and consists of very coarse-grained (up to 20 mm) ferroactinolite (70%;

SEM confirmed), chalcopryrite (30%) and galena (trace).

09-MPB-R69

METAMORPHOSED SULPHIDIC ALTERATION ZONE. Sawn drill core. Mottled pale grey and brassy metallic, massive, strongly magnetic, amphibolite facies rock consisting of coarsely granoblastic (1-3 mm) plagioclase (50%), quartz (3%), biotite (2%) and gahnite (10%) with 25% interstitial, net-textured sulphides consisting subequally of pyrrhotite and chalcopryrite with only 0.5% sphalerite which is generally finer-grained (0.1-0.3 mm) than and occurs as rims on the other sulphides and gahnite.

09-MPB-R87

METAGREYWACKE. Sawn drill core. Pale buff-grey, strongly foliated, nonmagnetic, amphibolite-facies, clastic metasediment consisting of fine-grained, granular (metamorphically recrystallized) quartz (25%) and plagioclase (50-60%) with 20% interstitial biotite flakes (variably chlorite in isolated streaks) and 0.1% each of finely disseminated ilmenite and pyrite (locally recrystallized to coarser, 0.5-1 mm grains in dilational fold noses).

09-MPB-R88

APLITE. Sawn drill core. Leucocratic, white, massive, nonmagnetic, hypabyssal intrusive rock consisting of fine-grained (0.3-1 mm), faintly graphic-textured, white, untwinned albite (70%; SEM confirmed) and quartz (30%) with trace chlorite and no FeTi-oxides or sulphides.

09-MPB-R90

IRON FORMATION. Sawn drill core. Mottled brown-pink (metacrysts) and green-black (groundmass), weakly foliated, strongly magnetic, porphyroblastic, oxide-silicate facies chemical metasediment consisting of 60% large (2-3 mm), inclusion-riddled almandine metacrysts in a finer-grained (0.2-0.5 mm) groundmass consisting of hornblende and Fe-biotite (both SEM confirmed) in a 10:1 ratio with 5% very fine-grained (0.1-0.2 mm) magnetite. Almandine metacrysts are heavily dusted with and clouded by the three groundmass minerals in similar proportions.

09-MPB-R91

FELSIC METAVOLCANIC. Sawn drill core. Pale grey, strongly foliated, nonmagnetic, slightly migmatitic (10% felsic neosome), amphibolite-facies metavolcanic consisting of medium-grained (0.2-0.5 mm), granulose (metamorphically recrystallized) quartz (40%) and plagioclase (50%) with 10-15%

biotite flakes (no muscovite) and trace pyrite. Neosome is much coarser grained (2-3 mm) and consists subequally of quartz, cloudy white plagioclase and fresher, perthitic K-spar. Texture is consistent with meta-greywacke but high quartz content indicates a felsic volcanic protolith.

09-MPB-R92

METAGABBRO. Sawn drill core. Dark green, moderately foliated, nonmagnetic, amphibolite facies intrusive rock consisting of coarse-grained (1-3 mm) green-black to brown hornblende (60%; both colour phases SEM confirmed), colourless (recrystallized) plagioclase (40%) and quartz (1%) with 0.5% interstitial ilmenite.

09-MPB-R93

MASSIVE SULPHIDES. Sawn drill core. Banded (crudely bedded at 2-15 mm scale), brassy metallic to grey-brown, very strongly magnetic, coarsely recrystallized chemical metasediment consisting of coarse-grained (1-4 mm) pyrrhotite (50%), chalcopyrite (35%) and red-brown to black sphalerite (15%) with no magnetite. 1-2% supergene (formed during core storage) siderite in vugs and as thin, bladed crystal overgrowths on sawn surfaces.

09-MPB-R94

FELSIC METAVOLCANIC. Sawn drill core. Pale to medium silvery-grey, strongly foliated, nonmagnetic, recrystallized and coarsely mica-streaked, amphibolite facies metavolcanic consisting of medium-grained (0.3-1 mm) quartz (20%), colourless (recrystallized) plagioclase (50%), biotite (15%) and muscovite (15%). Micaceous streaks constitute 10% of sample and consist of coarser-grained (3-5 mm) flakes of biotite and muscovite with possible trace sillimanite (not SEM confirmed). Muscovite probably reflects volcanogenic aluminous (sericitic) alteration with accompanying Na depletion and micaceous streaks may represent former altered fractures. No FeTi-oxides or sulphides.

09-MPB-R95

METAPELITE. Sawn drill core. Medium grey, strongly foliated, nonmagnetic, porphyroblastic, amphibolite-facies clastic metasediment consisting of fine-grained (0.1-0.2 mm) quartz (20%), plagioclase (50%) and biotite (25%; partly as coarser, 1-3 mm metacrysts) with 0.2% almandine as 2-3 mm augen metacrysts. No FeTi-oxides or sulphides.

APPENDIX B2. Petrographic Descriptions of Bedrock Samples from the Izok Lake Deposit, the WIZ Showing, and the Surrounding Rocks

Note the following abbreviations:

Fine-grained = <0.1 mm
Medium-grained = 0.1-0.5 mm
Coarse-grained = >0.5 mm

PTS = polished thin section
xpl = cross-polarized light
ppl = plane-polarized light

09-MPB-R10

Location: Drill hole Hen-32,
E: 418035.98, N: 7280255.77

Lithology: Felsic metavolcanic (with sulphide minerals)

Description: Fe-rich sphalerite with some pyrite and chalcopyrite, heavily altered by sericite.

Minerals:

Sphalerite 35% – medium- to coarse-grained, reddish brown in ppl (Fe-rich) and medium grey in reflected light, generally interstitial pyrite and chalcopyrite, 0.2-1.3 mm subrounded grains, limonitic alteration present.

Amphibole 15% – medium- to coarse-grained, elongated slender rectangular crystals.

Plagioclase 10% – medium- to coarse-grained, lamellar twinning, anhedral, low birefringence, white-grey interference colours.

Pyrite 10% – fine- to medium-grained anhedral, white blocky crystals (0.3-0.8), generally inter-growing around chalcopyrite and sphalerite, limonitic alteration present.

Chalcopyrite 10% – fine-grained subrounded to angular crystals of brass-yellow colour. Intergrowing around pyrite and sphalerite, forms fine elongated ribbons, 0.01-0.4 mm in size, limonitic alteration present.

Chlorite 5% – fine-grained

Quartz 5% – intergrown with plagioclase and microcline, subrounded crystals.

Microcline 5% – fine- to medium-grained, cross-hatch twinning, anhedral crystals that are altered by fine-grained sericite.

Biotite 5% – fine- to medium-grained elongate crystals, sericite alteration.

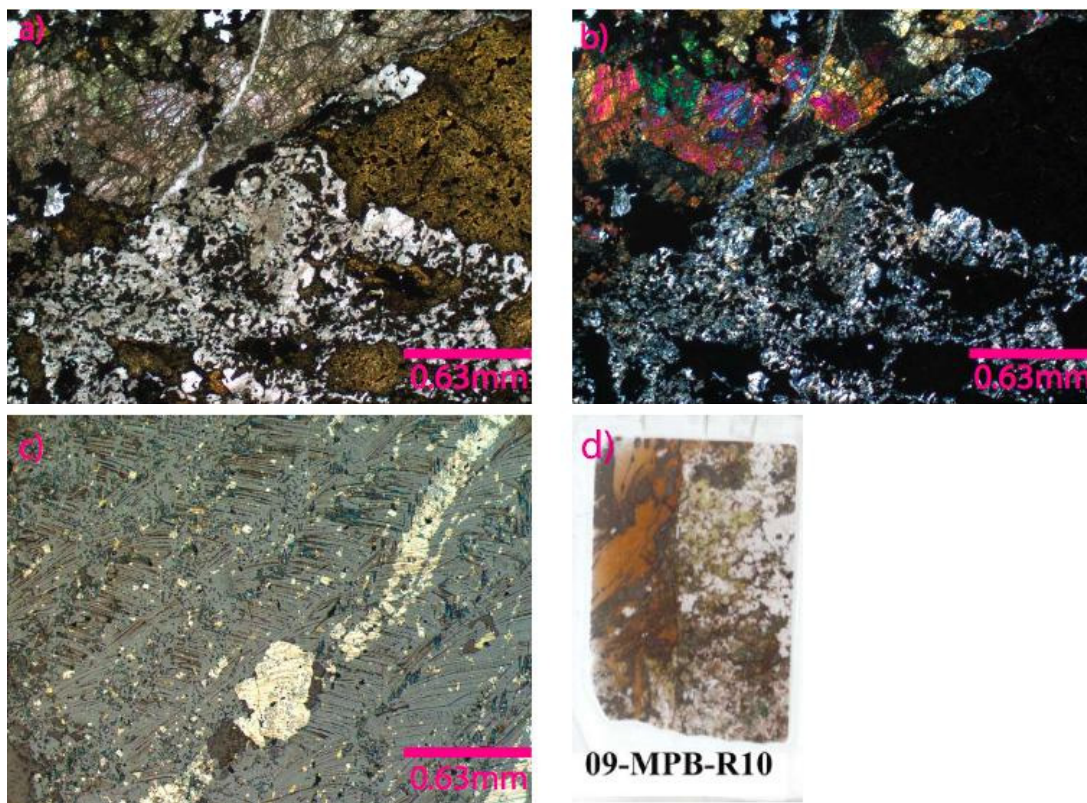


Plate 1. a) PTS image of 09-MPB-R10 in ppl showing coarse-grained sphalerite with fine-grained biotite, plagioclase, and microcline. b) PTS image of 09-MPB-R10 in xpl showing the high interference colours of amphibole. c) PTS image of 09-MPB-R10 in reflected light showing the sphalerite, chalcopyrite, and pyrite. d) Scanned image of thin section slide.

APPENDIX B2 continued.

09-MPB-R19

Location: Drill hole Hen-32,
E: 418035.98, N: 7280255.77

Lithology: Massive sulphide

Description: high proportion of sulphide minerals in sample, mostly pyrrhotite, chalcopyrite, sphalerite and pyrite. Hand sample is weakly magnetic.

Minerals:

Pyrrhotite 40% – medium- to coarse-grained, light grey in reflected light, subrounded, occurring with sphalerite, pyrite, and chalcopyrite, 0.2-0.6 mm in size

Chalcopyrite 20% – medium- to coarse-grained, yellow reflectance, medium reflectivity, anhedral masses that are from 2.5-4.0 mm.

Sphalerite 15% – medium- to coarse-grained, reddish-brown in ppl and medium grey in xpl, low reflectance, intergrowths of pyrite, chalcopyrite, and pyrrhotite, 0.5-2 mm in size.

Pyrite 10% – fine- to medium-grained, cream white to pure white in reflected light, high reflectance and forms cubic crystals.

Chlorite 5% – fine-grained, minor, blue in xpl and green in ppl, pale yellow/green pleochroism, parallel extinction.

Quartz 5% – fine- to medium-grained, undulatory extinction, anhedral.

Muscovite 5% – fine-grained, white in ppl and high interference colours in xpl, altered by sericite.

Magnetite 5% – medium-grained, grey, low reflectance, opaque, cubic to subrounded grains, grain size is from 0.4 to 0.6mm.

Biotite (tr.) – fine-grained, minor, brown elongated crystals in ppl and medium interference colours in xpl, sericite alteration.

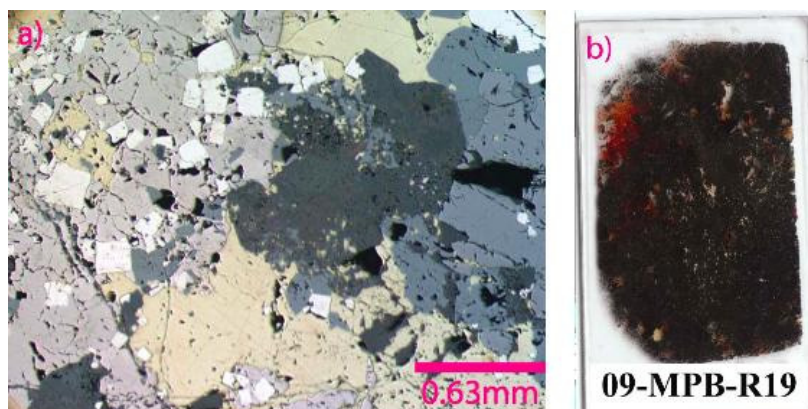


Plate 2. a) PTS of 09-MPB-R19 in reflected light showing the fine-grained cubic pyrite, and massive sphalerite, chalcopyrite, and pyrrhotite. b) Scanned image of thin section slide.

APPENDIX B2 continued.

09-MPB-R20

Location: Drill hole Hen-32,
E: 418035.98, N: 7280255.77

Lithology: Massive sulphide

Description: The majority of this sample is made up of large, crystalline metallic minerals with the most common being pyrrhotite with some chalcopyrite and sphalerite occurring around it. There are very little non-metallic minerals but those that occur are dominated by quartz, plagioclase, chlorite, and biotite. All of these non-metallic minerals have undergone sericite alteration.

Minerals:

Pyrrhotite 60% – medium- to coarse-grained, euhedral, cubic, cream white to grey in reflected light, square to anhedral grains, 0.4 to 1.5 mm in size.

Chalcopyrite 10% – medium-grained, yellow/brass in reflected light, medium reflectivity, grain size approximately 0.3-0.5 mm.

Sphalerite 5% – fine- to medium-grained, grey in reflected light, low reflectance, deep red-brown and translucent (Fe-rich) in transmitted light, blocky crystals, 0.5 to 1.5 mm in size.

Magnetite 5% – fine- to medium-grained, medium reflectivity, occurring within the sphalerite, grain size ~0.3 mm.

Biotite 5% – fine-grained, brown in ppl and red/brown in xpl, minor sericite alteration, pebbly extinction of interference colours.

Quartz 5% – fine- to medium-grained, subrounded, minor, found within the spaces between the sulphides, undulatory extinction.

Plagioclase 5% – fine-grained, lamellar twinning, occurring with quartz, low birefringence, grey-white interference colours, altered to sericite (cloudy crystals).

Chlorite 5% – fine-grained, green in ppl and anomalous blue in xpl, pleochroic, occurring with biotite.

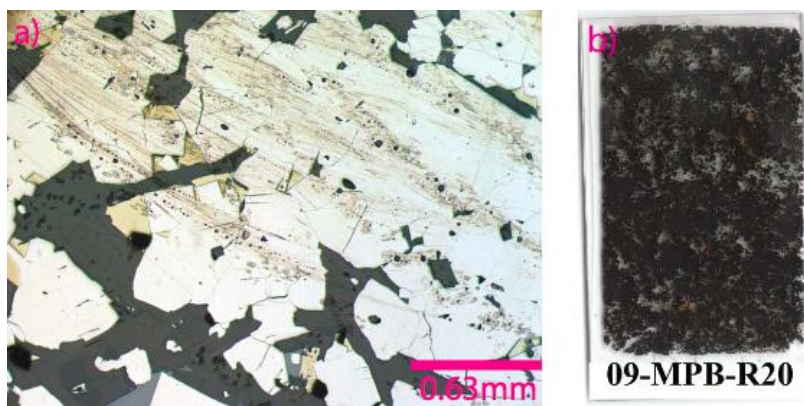


Plate 3. a) PTS 09-MPB-R20 in reflected light. b) Scanned image of thin section slide.

APPENDIX B2 continued.

09-MPB-R22

Location: Drill hole Hen-32,
E: 418035.98, N: 7280255.77

Lithology: Sulphide-bearing metavolcanic rock, within the stringer zone of VMS. Sample is visibly gahnite-rich with pale green crystalline masses.

Description: Gahnite-rich sample that contains sphalerite, pyrite, and chalcopryite. The matrix of the sample is made up of muscovite, biotite, which is altered by sericite, and larger grains of quartz and plagioclase. Hand sample shows secondary layering (metamorphic segregation) of the fine-grained minerals.

Minerals:

Quartz 30% – medium- to coarse-grained, subrounded, two distinct sizes of grains, one of which is medium-sized and occurs in the matrix and one of which occurs as coarser crystals, undulatory extinction, anhedral.

Sphalerite 20% – medium- to coarse-grained, deep red-brown translucent (Fe-rich) crystals in ppl, subrounded to subangular, 0.4 to 0.6 mm in size.

Gahnite 15% – medium- to coarse-grained crystals, green in ppl and isotropic, cubic to subrounded, grain size 0.2 to 0.8 mm.

Biotite 10% – medium- to coarse-grained elongated fibrous crystals, brown in ppl and red/brown colours in xpl, sericite alteration.

Pyrite 10% – medium-grained, high reflectance, cubic to subangular, occurs with sphalerite and chalcopryite, grain size ~0.4 mm.

Chalcopryite 5% – medium- to coarse-grained, brass yellow colour in reflected light, anhedral, grain size between 0.3 and 0.6 mm.

Muscovite 5% – medium-grained, white in ppl, high interference colours in xpl, much of it is altered to sericite

Plagioclase 5% – fine- to medium-grained, lamellar twinning, occurs with quartz, small subrounded crystals.

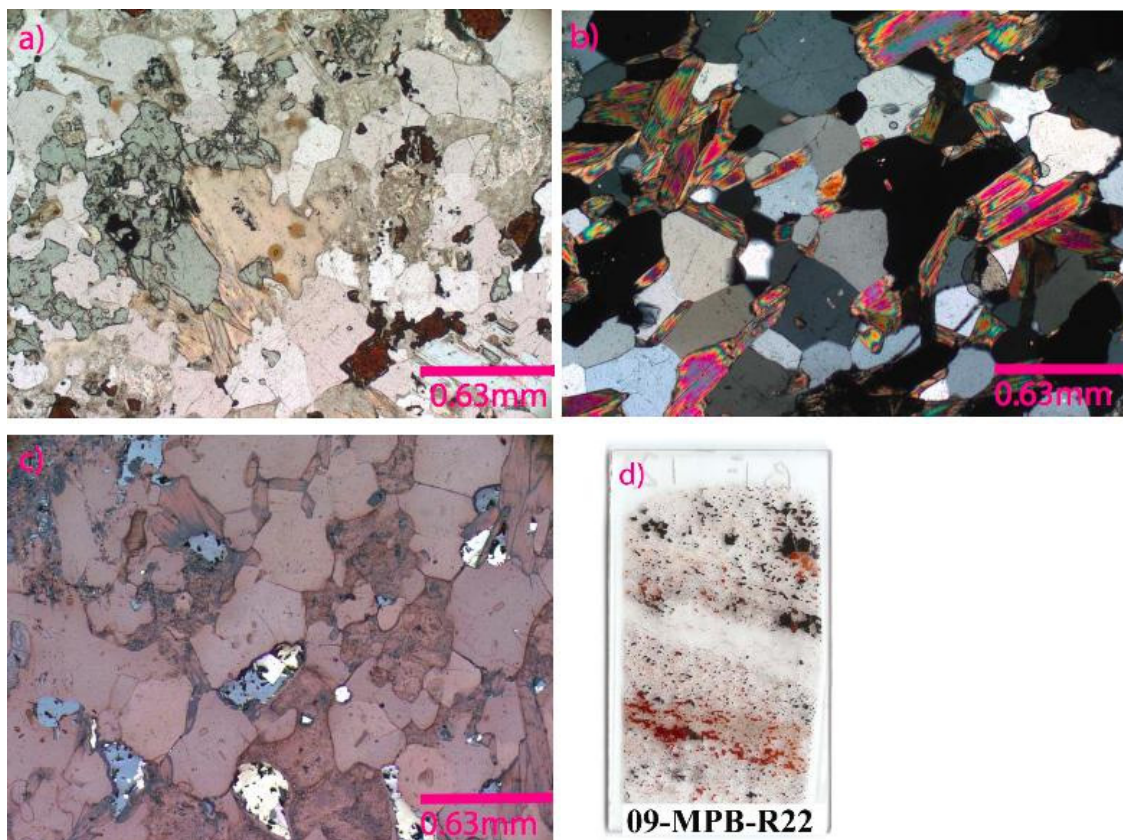


Plate 4. a) PTS 09-MPB-R22 in ppl showing fine- to medium-grained gahnite, sphalerite, quartz and feldspars. b) PTS 09-MPB-R22 in xpl showing quartz, biotite, and muscovite. c) PTS 09-MPB-R22 in reflected light. d) Scanned image of thin section slide.

APPENDIX B2 continued.

09-MPB-R23

Location: Drill hole Hen-32,
E: 418035.98, N: 7280255.77

Lithology: Rhyolite with massive sulphides; hand sample dominated by large (0.5 cm) quartz crystals within a fine-grained matrix of disseminated sulphides.

Description: Biotite and quartz-rich with very fine-grained sericitic alteration. Sulphide minerals are mainly sphalerite, pyrite, and chalcopyrite.

Minerals:

Quartz 40% – coarse grains, subrounded, two distinct sizes of grains, one of which is medium-grained and occurs in the matrix and the other occurs as coarse-grained crystals, undulatory extinction.

Biotite 25% – coarse, elongated crystals, light brown in ppl and fibrous orange-brown in xpl, one cleavage, pebbly extinction, fine-grained fraction is affected by sericite alteration.

Sphalerite 10% – coarse-grained, deep red-brown translucent (Fe-rich) in reflected light, medium grey, low reflectance, 0.5 to 2 mm.

Pyrite 5% – fine- to medium-grained, cream white colour in reflected light, high reflectance, subangular, cubic.

Chalcopyrite 5% – fine- to medium-grained, brass yellow low reflectance colour, medium reflectivity, grain size between trace and 0.2 mm.

Muscovite 5% – fine-grained, white in ppl and high interference colours in xpl, elongated crystals, sericite alteration.

Sillimanite 5% – medium-grained, bright interference colours, looks fibrous and needle-like crystal habit, upper second-order interference colours.

Plagioclase 5% – lamellar twinning, occurring with quartz, small subrounded crystals.

Zircon (tr.) – fine-grained, abundant anhedral grains with radiation halos in the biotite.

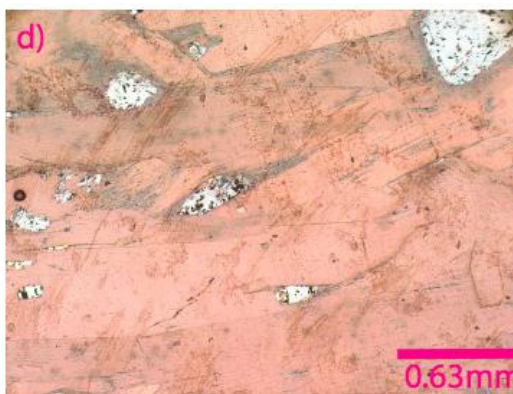
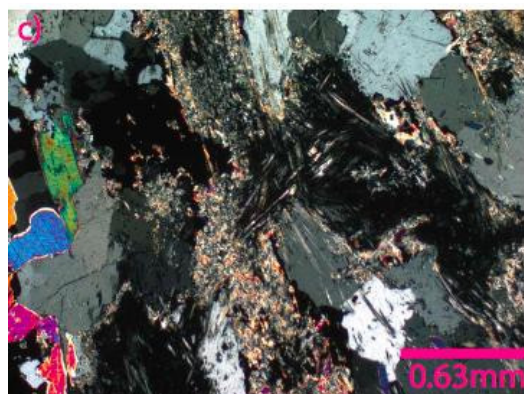
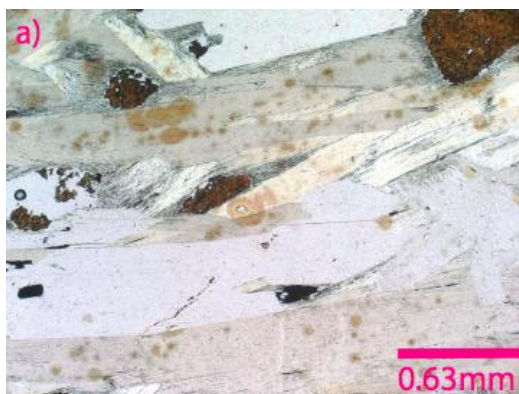


Plate 5. a) PTS 09-MPB-R23 in ppl showing very coarse-grained quartz, biotite, and feldspar. Zircons making red-brown halos (radioactive decay). b) PTS 09-MPB-R23 in xpl. c) PTS 09-MPB-R23 in xpl showing the medium- to fine-grained fraction of quartz and the sericite alteration. d) PTS 09-MPB-R23 in reflected light showing minor sulphides. e) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R32

Location: Drill hole Hen-32,
E: 418035.98, N: 7280255.77

Lithology: Sulphide-rich section of altered felsic metavolcanic; hand sample is white-grey in colour and dominated by quartz and disseminated sulphides.

Description: The majority of the sample is made of pyrite and quartz with about 10% sulphides.

Minerals:

Pyrite 40% – medium- to coarse-grained, cubic, cream white to grey colour in reflected light, some grains are subrounded.

Quartz 25% – medium- to coarse-grained, subangular to subrounded crystals that make up most of the matrix, crystals exhibit undulatory extinction.

Biotite 18% – fine- to medium-grained, elongated crystals, light brown in ppl and orange-brown in xpl, pebbly extinction of interference colours.

Sphalerite 8% – fine- to medium-grained, deep red-brown translucent (Fe-rich) crystals in ppl, medium grey, low reflectance, generally forms elongated laths that are 0.1 to 0.8 mm in size.

Hornblende 5% – fine- to medium-grained, dark green (Fe-rich) elongate pleochroic crystals, distinctive cleavage angles (i.e. intersect at 56 and 124 degrees).

Magnetite 2% – fine-grained to medium, grey crystals, occurring within the sphalerite, also forms elongated laths that are <0.1 to 0.5 mm in size.

Chalcopyrite 2% – fine- to medium-grained, slightly cubic, yellow reflectance, grain size ~0.2 mm and smaller.

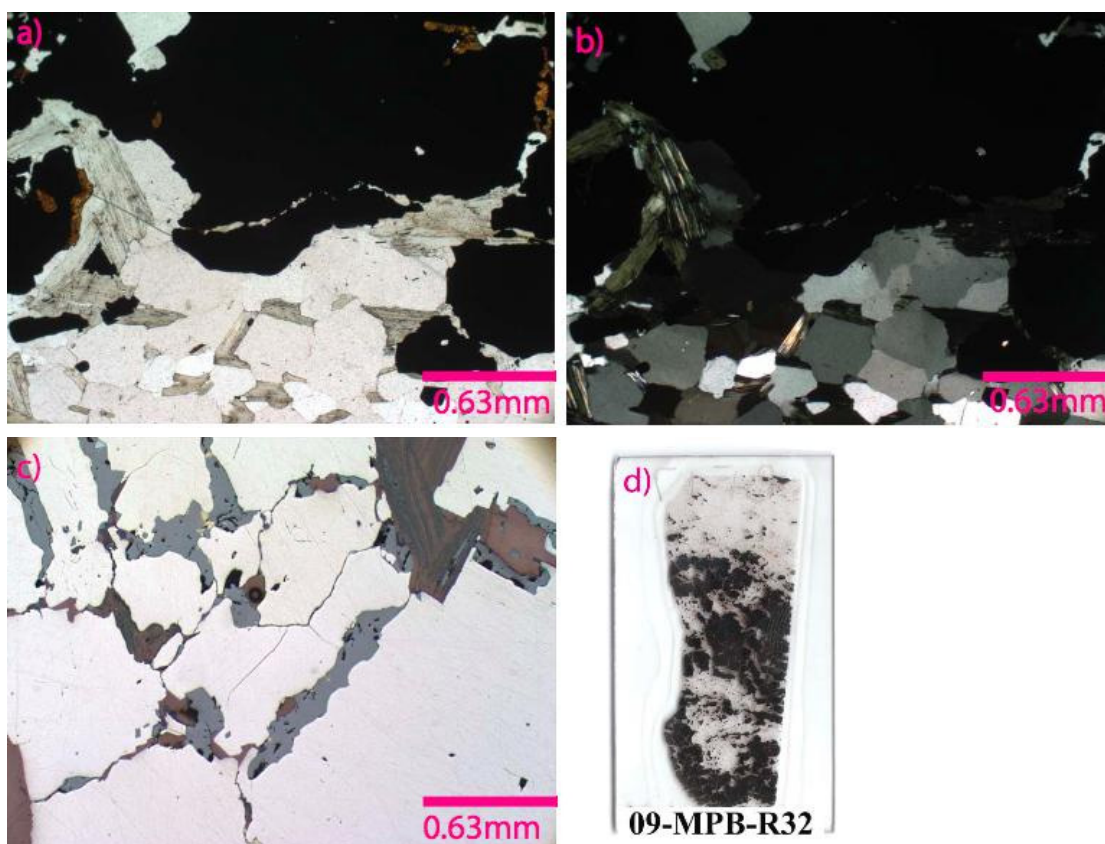


Plate 6. a) PTS image of 09-MPB-R32 in ppl showing the medium- to coarse-grained quartz. b) PTS image of 09-MPB-R32 in xpl. c) PTS image of 09-MPB-R32 in reflected light showing the coarse-grained pyrite and medium-grained sphalerite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R37

Location: Drill hole Hen-173,
E: 417290.63, N: 7279944.38

Lithology: Rhyolite with sulphides; hand sample is a white-grey fine- to medium-grained felsic volcanic rock, disseminated sphalerite and chalcopyrite. Gahnite occurs as medium- to large-grained green crystals.

Description: Sample fairly rich in gahnite, which occurs as large green crystals in ppl. The rest of the matrix is consists of mainly quartz, biotite, muscovite, and some sulphide minerals.

Minerals:

Quartz 40% – medium- to coarse-grained (metamorphically recrystallized), anhedral, undulatory extinction.

Gahnite 20% – medium- to coarse-grained, blocky and green in ppl and isotropic, grain size is 0.4 to 3.0 mm.

Sphalerite 10% – coarse-grained, deep red-brown translucent (Fe-rich) blocky crystals in ppl that are medium grey in reflected light with a low reflectance, grain size is 1.5 to 1.7 mm.

Muscovite 10% – coarse-grained, colorless in ppl, low relief, high birefringence, bird's eye extinction.

Hornblende 8% – fine- to medium-grained, pleochroic, moderate relief, light green colour in ppl, occurring with the muscovite, distinctive cleavage.

Biotite 5% – medium- to coarse-grained, dark brown, pleochroic, some chlorite alteration, pebbly extinction of interference colours.

Pyrite 5% – fine-grained, anhedral, cream white in colour under reflected light, weakly disseminated throughout matrix.

Chalcopyrite 2% – medium- to coarse-grained, yellow reflectance, medium reflectivity, cubic disseminated in matrix, anhedral masses, generally the grain size is 0.3 to 1.0mm.

Magnetite (tr.) – fine-grained occurring within the sphalerite as very small fine-grained crystals, opaque, grain size is <0.1 mm.

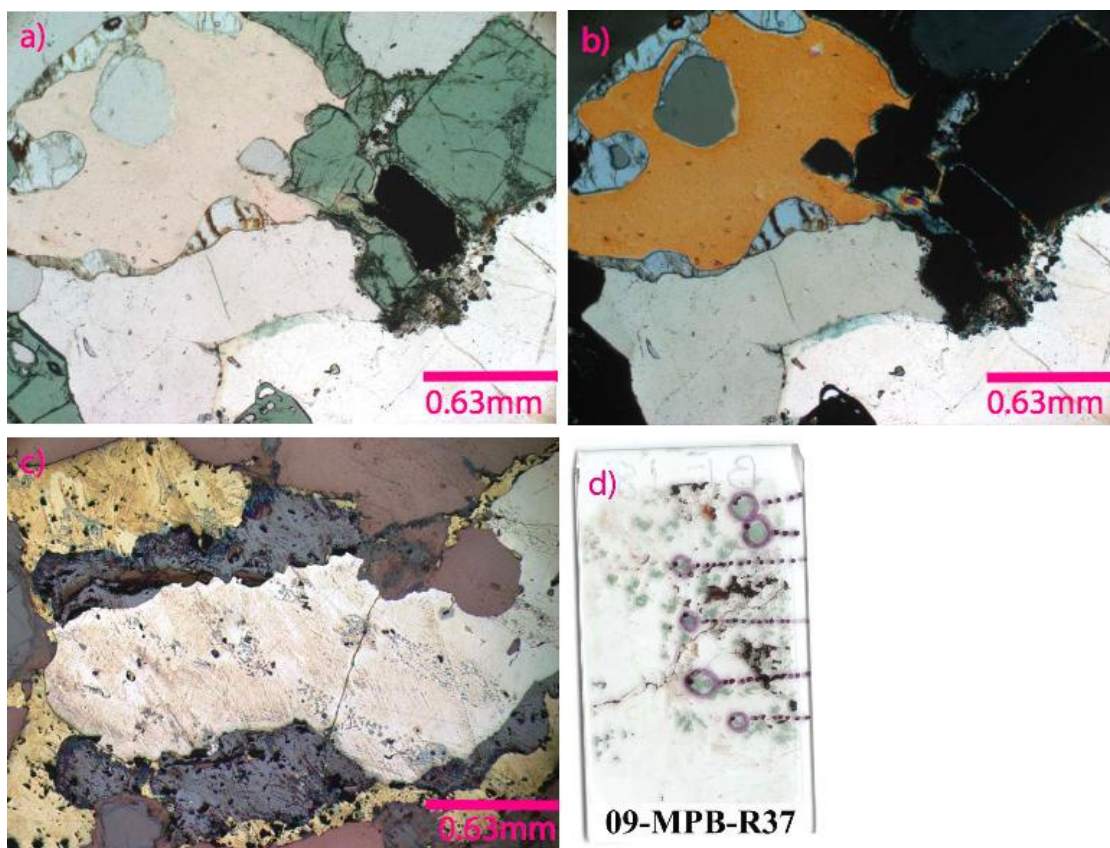


Plate 7. a) PTS of 09-MPB-R37 in ppl showing the large, blocky gahnite, and large-grained quartz. b) PTS of 09-MPB-R37 in xpl. c) PTS of 09-MPB-R37 in reflected light showing the large grains of chalcopyrite and sphalerite that have been weathered. d) Scanned thin section image of slide showing Scanning Electron Microscope (SEM) tracks.

APPENDIX B2 continued.

09-MPB-R41

Location: Drill hole Hen-173, E: 417290.63, N: 7279944.38

Lithology: Felsic metavolcanic; hand sample is white-grey fine- to medium-grained felsic volcanic. This sample was split into two parts for polished thin section study.

09-MPB-R41A

Description: This subsample mainly consists of quartz and biotite. There is a minor amount of gahnite, sillimanite, and plagioclase.

Minerals:

Quartz 50% – fine- to medium-grained interlocking crystals, granulo texture, undulatory extinction, forms the matrix.

Biotite 15% – fine- to medium-grained, forms elongate rectangular crystals that are brownish in ppl and orange-brown in xpl.

Sillimanite 10% – medium-grained, fibrous looking grains that are lath and occur as a sheave, high relief, second-order interference colours in xpl.

Plagioclase 10% – fine- to medium-grained, lamellar twins, occurs with quartz.

Gahnite 8% – medium and coarse-grained, green crystals in ppl and isotropic, forms weakly dispersed rounded grains throughout sample, grain size is 0.5 to 0.8 mm. Leucocratic inclusions occur within the gahnite.

Pyrite 5% – fine-grained, white in reflected light, high reflectivity, generally forms weakly dispersed anhedral masses throughout sample.

Chalcopyrite 2% – fine- to medium-grained, minor sulphide, occurring within the pyrite, yellow-brass colour in reflected light, medium reflectivity, grain size is 0.05 - 0.4 mm.

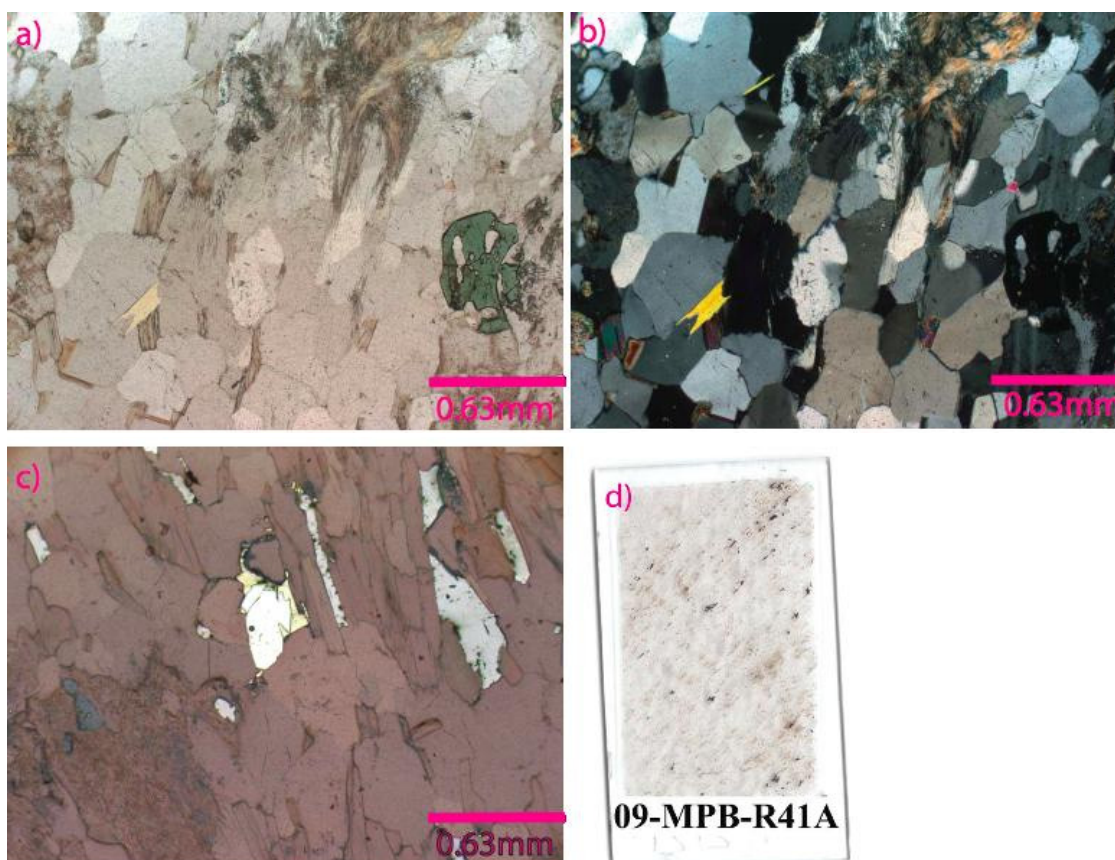


Plate 8. a) PTS image of 09-MPB-R41A in ppl showing the medium- to coarse-grained gahnite and quartz. b) PTS image of 09-MPB-R41A in ppl showing the fine- to medium-grained pyrite and chalcopyrite. c) PTS image of 09-MPB-R41A in xpl. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R41B

Description: This subsample is gahnite-rich felsic metavolcanic rock. The gahnite in this sample occurs as small, dispersed subangular crystals. The remainder of the sample is mainly quartz with some biotite, sillimanite, and sulphide minerals, as described in 09-MPB-R041A.

Minerals:

Quartz 50% – coarse-grained, anhedral, subrounded crystals that exhibit undulatory extinction.

Gahnite 15% – fine- to medium-grained, weakly dispersed subangular, high-relief crystals, green in ppl, grain size is 0.05 to 0.6 mm.

Pyrite 10% – fine- to medium-grained, cream white in reflected light, high reflectance, subangular cubes, occurs with sphalerite and chalcopyrite.

Biotite 10% – fine- to medium-grained, dark brown, pleochroic, anhedral, pebbly extinction of interference colours.

Chalcopyrite 5% – fine- to medium-grained, yellow in reflected light, occurs with the pyrite, subangular, 0.05-0.4 mm grain size.

Sillimanite 5% – fine-grained, high relief, fibrous looking elongate crystals with second-order interference colours.

Sphalerite 5% – medium- to coarse-grained, deep red-brown translucent (Fe-rich) subangular cubes in ppl, grain size 0.3 to 0.6 mm.

Magnetite (tr.) – occurring as fine- to medium-grained anhedral grains within the sphalerite, 0.01-0.2 mm in size.

Galena (tr.) - fine-grained, white in reflected light, high birefringence, grain sizes <0.1 mm.

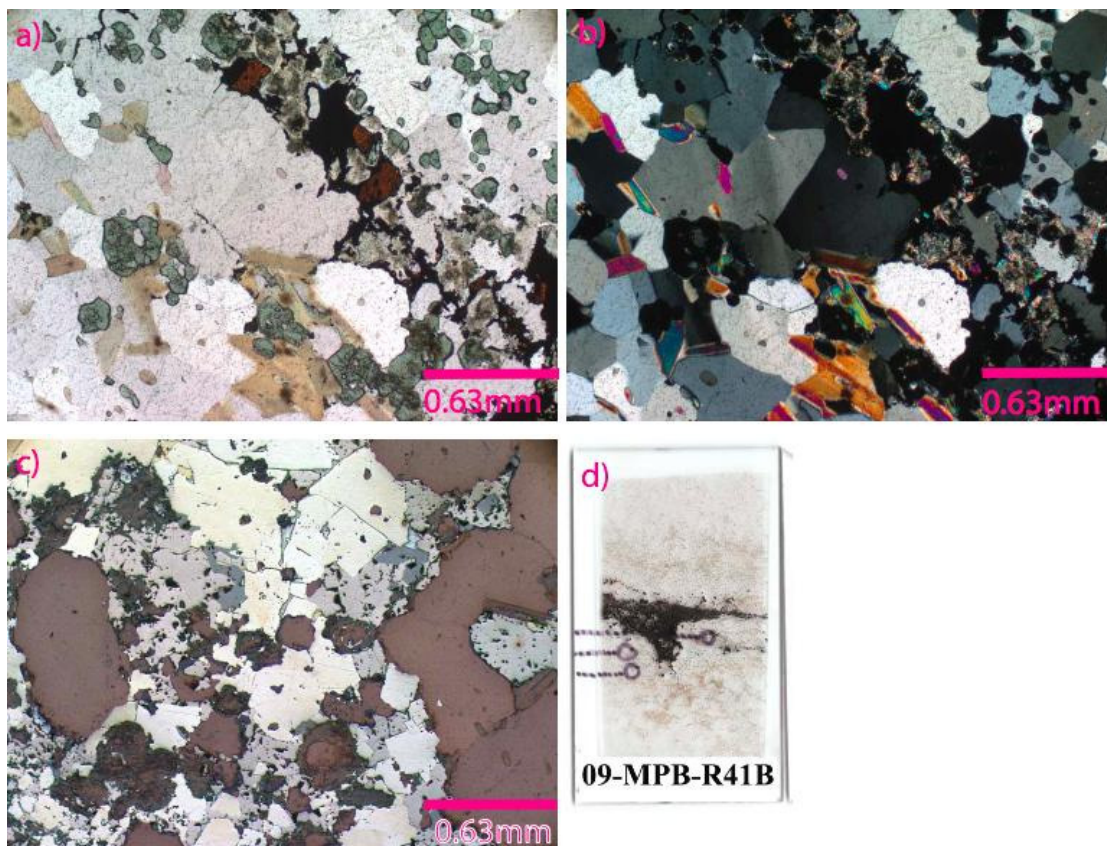


Plate 9. a) PTS image of 09-MPB-R41B in ppl showing the fine- to medium-grained, high relief crystals of gahnite and coarse-grained quartz. b) PTS image of 09-MPB-R41B in xpl. c) PTS image of 09-MPB-R41B in reflected light showing the fine- to medium-grained pyrite and the coarse-grained sphalerite. d) Scanned thin section image of slide showing SEM tracks

APPENDIX B2 continued.

09-MPB-R42

Location: Drill hole Her-3,

E: 417290.63, E: 7279944.38

Lithology: Iron formation (silicate facies); hand sample is dark grey with some larger crystals of quartz.

Description: Sample has abundant large crystals of garnet, with some smaller garnet crystals that have been disseminated throughout the matrix. The mica minerals appear to have formed a metamorphic flow texture, strongly foliated due to shearing.

Minerals:

Garnet 30% – coarse-grained, isotropic, colourless to light pink in ppl, high relief, biotite and muscovite form around the crystal boundaries.

Quartz 30% – fine- to medium-grained, anhedral with interlocking grain boundaries, undulatory extinction.

Grunerite 20% – fine-grained, colourless, subhedral and intergrown with biotite, second-order interference colours.

Biotite 20% – fine-grained, dark brown, pleochroic, anhedral, forms around garnet (flowing), some sericitic alteration.

Zircon (tr.) – forms as small, fine-grained well-rounded grains with high relief in the biotite.

Pyrite (tr.) - fine-grained, cream white, high reflectance, occurs mainly as weakly disseminated crystals throughout the sample, grains <0.1 mm.

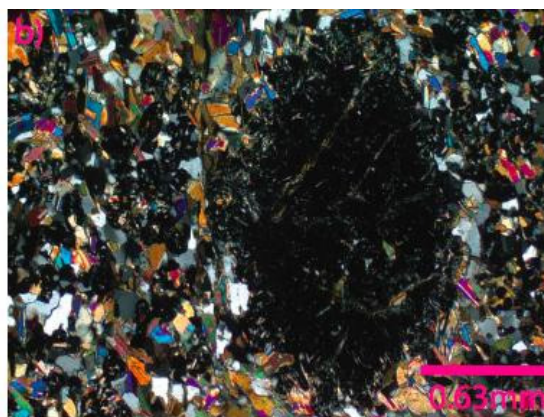


Plate 10. a) PTS image of 09-MPB-R42 in ppl showing fine-grained ground mass and large garnet. b) PTS image of 09-MPB-R42 in xpl. c) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R43

Location: Drill hole Hen-264,
E: 418032.2, N: 7281312.28

Lithology: Metapelite; hand sample is medium- to dark grey, fine-grained with some larger grains of quartz.

Description: Sample is generally fine- to medium-grained with a matrix mainly consisting of quartz and biotite. There are some sulphide minerals present in the form of pyrite and pyrrhotite.

Minerals:

Quartz 55% – fine- to medium-grained, anhedral crystals with interlocking grain boundaries, undulatory extinction.

Biotite 15% – fine- to medium-grained, dark brown, pleochroic, anhedral, forms around garnet, pebble extinction of interference colours in xpl.

Pyrite 15% – fine- to medium-grained, white reflectance, anhedral, forms in large crystals.

Garnet 10% – medium- to coarse-grained, isotropic, colourless in ppl, high relief, biotite and quartz forms around them.

Pyrrhotite 5% – coarse-grained, forms elongated cubic sections, lighter in colour than the pyrite in reflected light, forms 1.0 m crystals.

Sillimanite (tr.) - fine-grained, fibrous looking, high relief, third-order interference colours, forms small tabular laths.

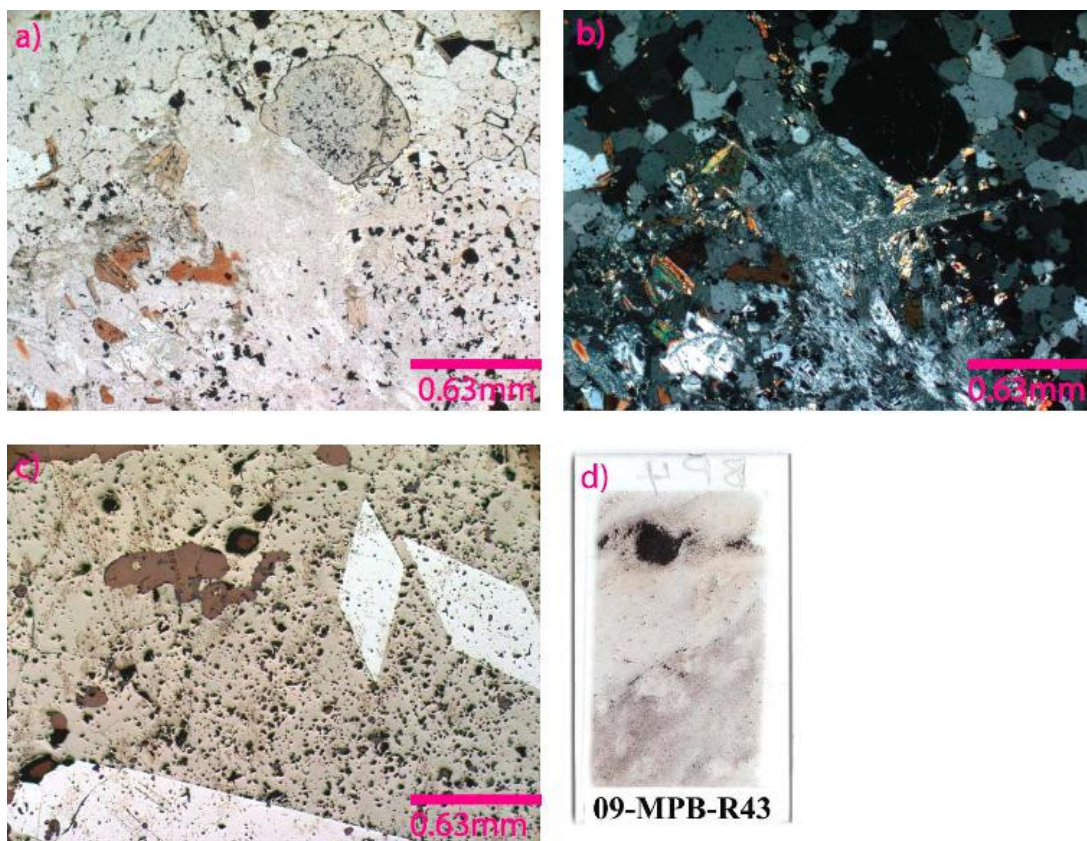


Plate 11. a) PTS 09-MPB-R43 in ppl showing fine-grained ground mass and anhedral garnet. b) PTS 09-MPB-R43 in xpl. c) PTS 09-MPB-R43 showing the coarse- to medium-grained sulphide minerals, specifically showing pyrrhotite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R45

Location: Drill hole Her-4,

E: 418757.35, N: 7279391.39

Lithology: Metamorphosed metasediment (alteration zone); hand sample is dominated by a white, hard mineral (cordierite) and garnet. The sample is a fine- to medium-grained sedimentary rock.

Description: The majority of this sample is made of garnet and cordierite.

Minerals:

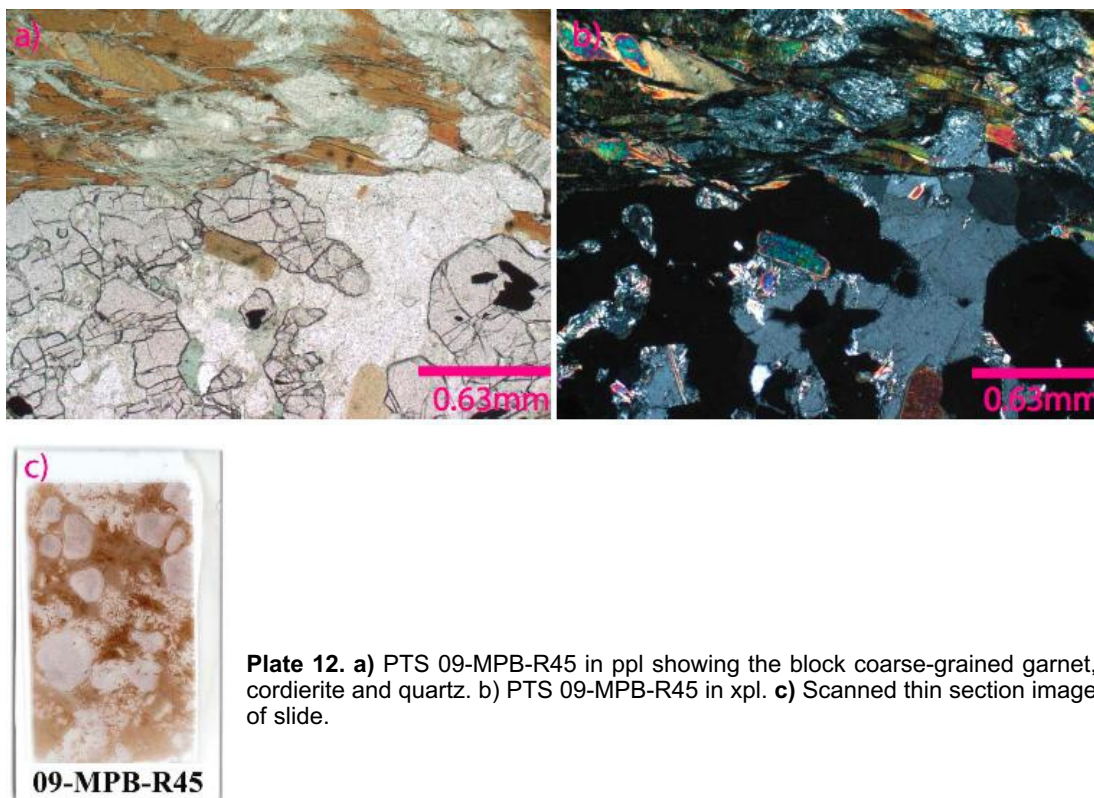
Cordierite 40% – medium- to coarse-grained, being broken down in ppl, anhedral, similar birefringence to quartz, grain size 0.2 to 1.4 mm.

Garnet 30% – medium- to coarse-grained, colourless in ppl, subhedral, isotropic, and high relief.

Staurolite 20%– medium- to coarse-grained, yellow with quartz inclusions in ppl, pleochroic, anhedral, elongated crystals, pebbly extinction of interference colours.

Quartz 10%- medium- to coarse-grained, anhedral with interlocking grain boundaries, undulatory extinction.

Pyrite (tr.) - fine-grained, cream white, high reflectance, grains <0.1 mm.



APPENDIX B2 continued.

09-MPB-R47

Location: Drill hole Her-7,
E: 418951.31, N: 728341.55

Lithology: Mafic metavolcanic; hand sample is black-green fine-grained metamorphosed basaltic volcanic rock.

Description: This sample has relatively little sulphide content and is mainly formed of chlorite, amphibole, biotite, garnet and quartz. This sample has well shaped, circular/octahedral garnet metacrysts.

Minerals:

Chlorite 35% – fine- to medium-grained, low first order interference colours, anhedral, biaxial, sub-angular, occurs in the matrix with the biotite, quartz, and amphibole.

Actinolite 15% – coarse- to fine-grained, pale green colour in ppl, forms some elongated crystals, some are aligned in a foliation direction, with some twinning.

Garnet 15% – fine, medium and coarse grain size, isotropic, high refractive index, well shaped crystals of varying size, looks to have tiny inclusions of other minerals.

Quartz 12% – fine- to medium grain subrounded crystals that can either be singular or intergrown with other quartz grains and the fine-grained matrix of chlorite and biotite.

Biotite 5% – fine- to medium-grained, elongated crystals, darker brown than amphibole and higher interference colours.

Staurolite 5% – fine-grained, pale orange-yellow pleochroism, high relief, has some quartz inclusions.

Pyrite 5% – fine- to medium-grained, white-grey, cubic, high reflectance, intergrown with chalcopyrite, grain size is 0.05 to 0.4 mm.

Galena 5% – medium-grained, isotropic, cubic, purple-grey, grain size is 0.3 to 0.6 mm.

Chalcopyrite 3% – fine- to medium-grained, yellow reflectance, medium reflectivity, occurs with pyrite, grain size 0.09 to 0.5 mm.

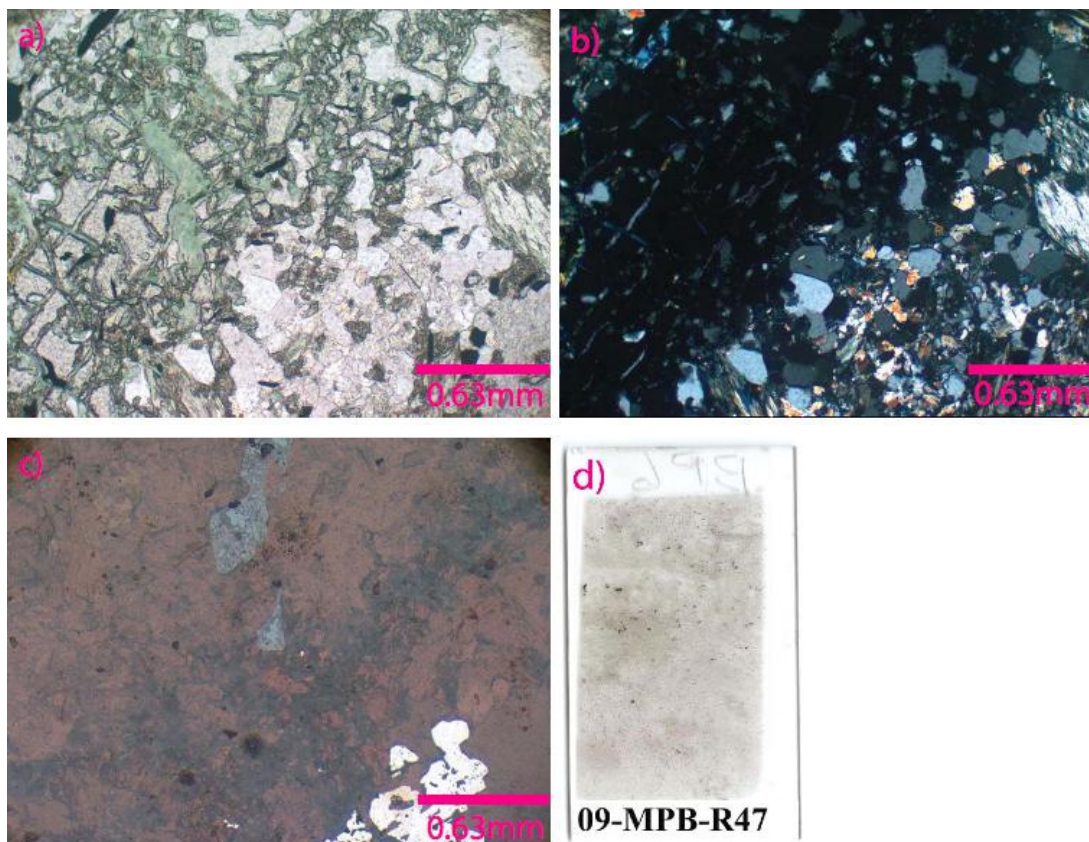


Plate 13. a) PTS image of 09-MPB-R47 in ppl showing the fine- to medium-grained chlorite and high relief garnet with acicular actinolite and quartz. b) PTS image of 09-MPB-R47 in xpl. c) PTS image of 09-MPB-R47 in reflected light. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R49

Location: Field grab sample,
E: 410476, N: 7284475

Diabase (MacKenzie dyke swarm); hand sample is dark green-grey with a medium- to coarse-grained crystalline matrix.

Description: The majority of the sample is made up of plagioclase that is being altered to sericite. There is also hornblende, biotite, augite, and magnetite, with trace amounts of pyrite and pyrrhotite. Hand sample is weakly magnetic.

Minerals:

Plagioclase 55% – fine- to medium-grained, first order interference colours, anhedral, blocky, albite twinning, being altered to sericite.

Clinopyroxene 25% – fine- to medium-grained, high relief, second-order interference colours, brownish-green, 90° cleavage angles.

Biotite 5% – fine- to medium-grained, bird's eye extinction of interference colours, brown, elongate crystals.

Actinolite 5% – fine- to medium-grained, light green, pleochroic, distinctive cleavage angles.

Magnetite 5% – anhedral grains of magnetite, 1-3 mm

Pyrrhotite 3% – medium- to coarse-grained, creamy white, high reflectance, anhedral to euhedral, 0.4-3 mm grain size.

Pyrite 2% – fine-grained, cream white, high reflectance, occurring mainly as weakly disseminated crystals throughout sample, occurring with galena and pyrrhotite, grains <0.1 mm.

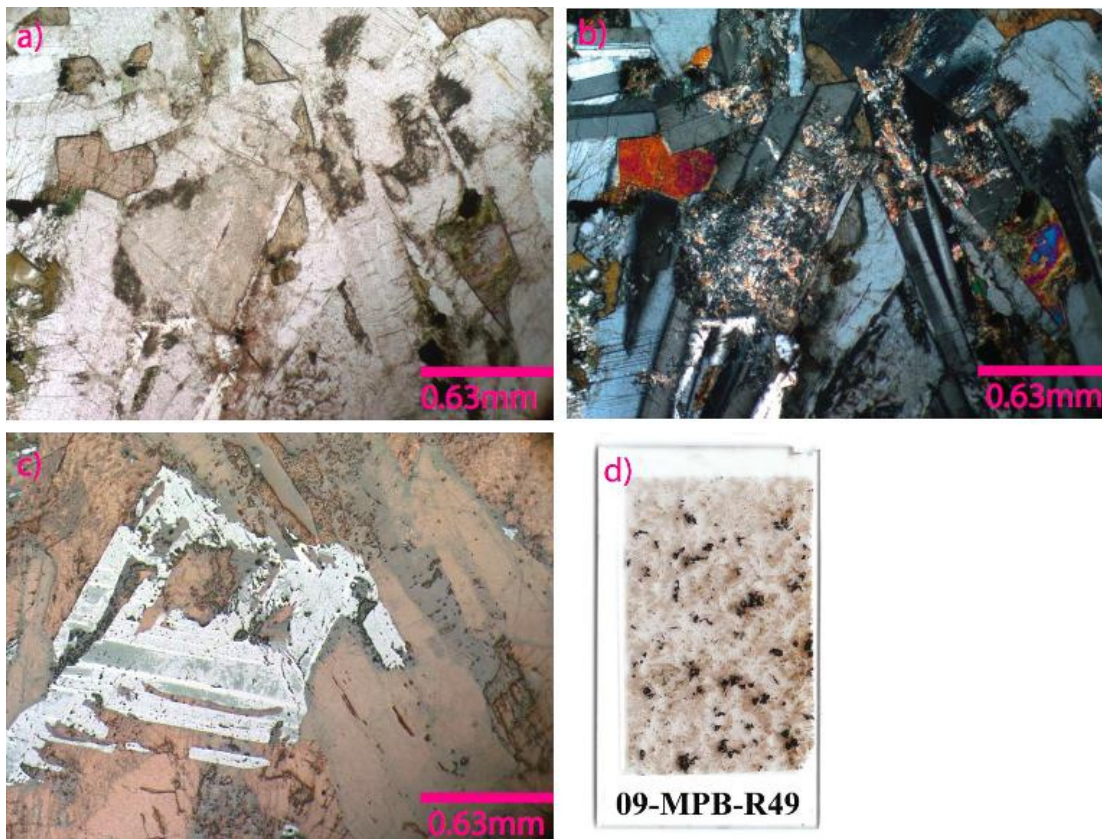


Plate 14. a) PTS image of 09-MPB-R49 in ppl showing medium- to coarse-grained plagioclase and clinopyroxene. b) PTS image of 09-MPB-R49 in xpl. c) PTS image of 09-MPB-R49 in reflected light. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R51

Location: Drill hole Her-6,

E: 418467.67, N: 7279346.57

Lithology: Felsic metavolcanic; hand sample is light white-grey fine-grained felsic volcanic rock, logged as a dacite.

Description: The majority of this sample is made up of microcline, quartz, biotite, and muscovite. This sample contains very little (trace) metallic minerals.

Minerals:

Feldspar (microcline) 35% – medium- to coarse-grained, cross-hatch twinning, anhedral crystals generally surrounded by quartz, biotite, and muscovite.

Quartz 30% – medium- to coarse-grained, granulose texture, undulous extinction, anhedral crystals that are intergrowing with sericite, edges not sharp.

Muscovite 20% – medium- to coarse-grained, colourless to lightly coloured in ppl and second-order interference colours in xpl, forms elongated euhedral crystals.

Biotite 10% – medium- to coarse-grained brown in ppl and brown-orange in xpl, forms slightly elongated crystals but some have a more cubic face.

Sillimanite 5%– fine- to medium-grained, fibrous, bladed habit, second order interference colours.

Pyrite (tr.) – cream white colour, high reflectance, slightly cubic, fine-grained crystals 0.8 mm in size.

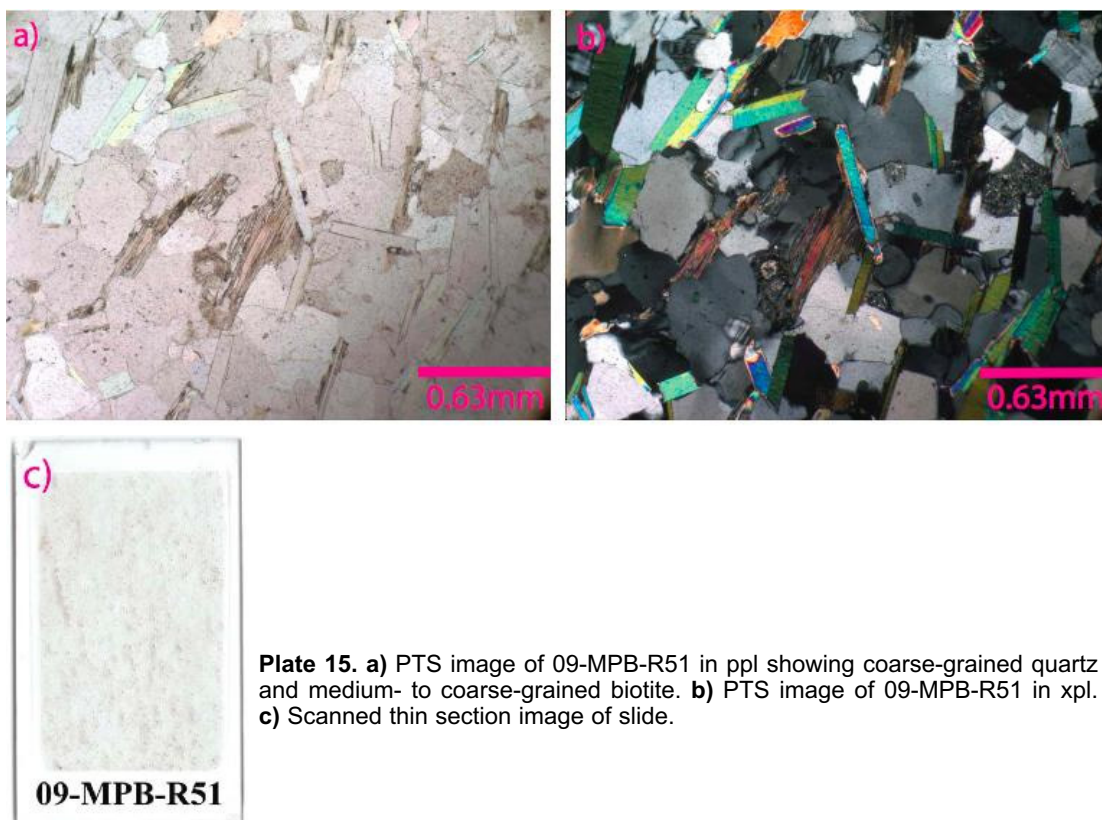


Plate 15. a) PTS image of 09-MPB-R51 in ppl showing coarse-grained quartz and medium- to coarse-grained biotite. b) PTS image of 09-MPB-R51 in xpl. c) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R52

Location: Field sample, grab/float from the WIZ showing, E: 411964, N: 7282087

Lithology: Felsic metavolcanic; hand sample is black-grey in colour with a fine-grained matrix.

Description: This sample is mainly made up of fine- to medium-grained quartz, actinolite and biotite. Very little sulphides found.

Minerals:

Quartz 40% – fine- to medium-grained, undulatory extinction, interlocking crystals growing with microcline, forms anhedral fine- to medium-grained crystals.

Actinolite 20% – fine- to medium-grained, light green, pleochroic, distinctive cleavage angles.

Staurolite 15% – fine-grained, pleochroic yellow colour with abundant quartz inclusions, yellow in ppl and grey in xpl.

Microcline 10% – fine- to medium-grained, cross-hatch twinning, anhedral crystals, forms with quartz to make up the matrix.

Biotite 10% – fine- to medium-grained, brown elongated crystals with orange-brown interference colours, sericite alteration, pebbly extinction of interference colours.

Sillimanite 5% – fine-grained, fibrous looking, high relief, third-order interference colours and tabular laths.

Pyrite (tr.) – white-yellow, minor, forms small broken down cubes, fine-grained (0.05-0.08 mm).



APPENDIX B2 continued.

09-MPB-R53

Location: Field sample, grab/float from the WIZ showing, MMG assay number: 197490
E: 411964, N: 7282087

Lithology: Schist with limonite alteration; hand sample shows strong schistose to gneissic texture and is heavily altered by limonite. Approximately 1/3 of the sample consists of sulphide minerals.

Description: Sample comprises medium-grained quartz, feldspar, and muscovite with sphalerite and pyrite.

Minerals:

Quartz 35% – medium- to coarse-grained, edges not sharp, forms anhedral grains, undulatory extinction under xpl.

Sphalerite 20% – coarse-grained, deep red-brown translucent (Fe-rich), medium grey, low reflectance, anhedral masses, grain sizes from 1.5 to 4.0 mm.

Microcline 15% – fine- to medium-grained, cross-hatch twinning, subrounded grains, making up the matrix with quartz.

Pyrite 10% – medium-grained, white-yellow, high reflectance, cubic, anhedral, usually occurs with the sphalerite, 0.1-0.3 mm.

Muscovite 10% – medium-grained, white in ppl, high birefringence colours, anhedral, elongated crystals.

Sillimanite 5% – fine- to medium-grained, fibrous looking (fibrolite), high relief, bladed habit, third-order interference colours.

Biotite 5% – fine- to medium-grained, brown in ppl and brown-orange in xpl, elongated to short tabular crystals.

Chalcopyrite – trace amounts, described in Oviatt (2010).

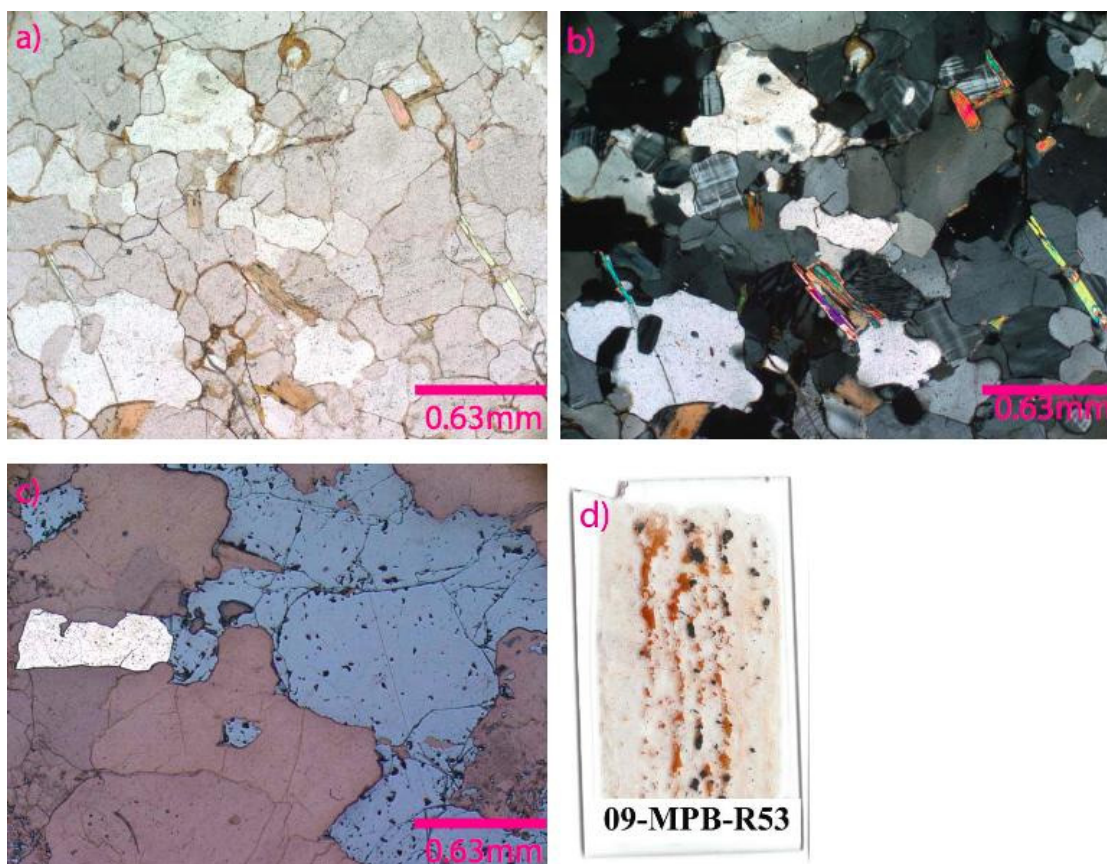


Plate 17. a) PTS of 09-MPB-R53 in ppl showing medium- to coarse-grained quartz and feldspar. b) PTS of 09-MPB-R53 in xpl. c) PTS image of 09-MPB-R53 in reflected light showing coarse-grained sphalerite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R54

Location: Field sample, outcrop sample from the WIZ showing, MMG assay number: 197488, E: 411964, N: 7282087

Lithology: Sulphide-rich felsic metavolcanic rock.

Description: Sample is sphalerite, pyrite, chalcopyrite, and pyrrhotite with matrix of epidote, microcline, biotite, and muscovite. Strong schistose texture in hand sample.

Minerals:

Sphalerite 30% – medium- to coarse-grained, orange-red-brown translucent (Fe-rich), medium grey, low reflectance, anhedral masses, grain sizes from 0.7 to 5 mm.

Pyrite 10% – medium- to coarse-grained, white-yellow colour, high reflectance, some cubic, anhedral, 0.3-2.0 mm.

Quartz 10% – medium- to coarse-grained, edges not sharp, forms anhedral grains, undulatory extinction under xpl.

Chalcopyrite 10% – medium- to coarse-grained, anhedral, medium reflectivity, anhedral masses, grain size is between 0.4 and 0.8 mm.

Microcline 10% – Cross-hatched twinning, subrounded grains forms the matrix of the sample.

Pyrrhotite 5% – White medium-grained masses, high reflectance, subangular in shape, grain size is between 0.2 and 0.5mm.

Magnetite 5% – medium-grained, low reflectance, opaque, euhedral crystals, grain size between 0.3 and 0.6 mm.

Epidote 5% – fine-grained, yellow-green in ppl, bright interference colours and complex zoning.

Biotite 5% – fine- to medium-grained, brown in ppl, orange-brown in xpl, anhedral cubes.

Muscovite 3% – anhedral elongated medium-grained crystals that are slightly coloured in ppl and brightly coloured in xpl.

Sillimanite 2% – fine-grained, high relief, fibrous looking, high relief, cubic to rectangular laths.

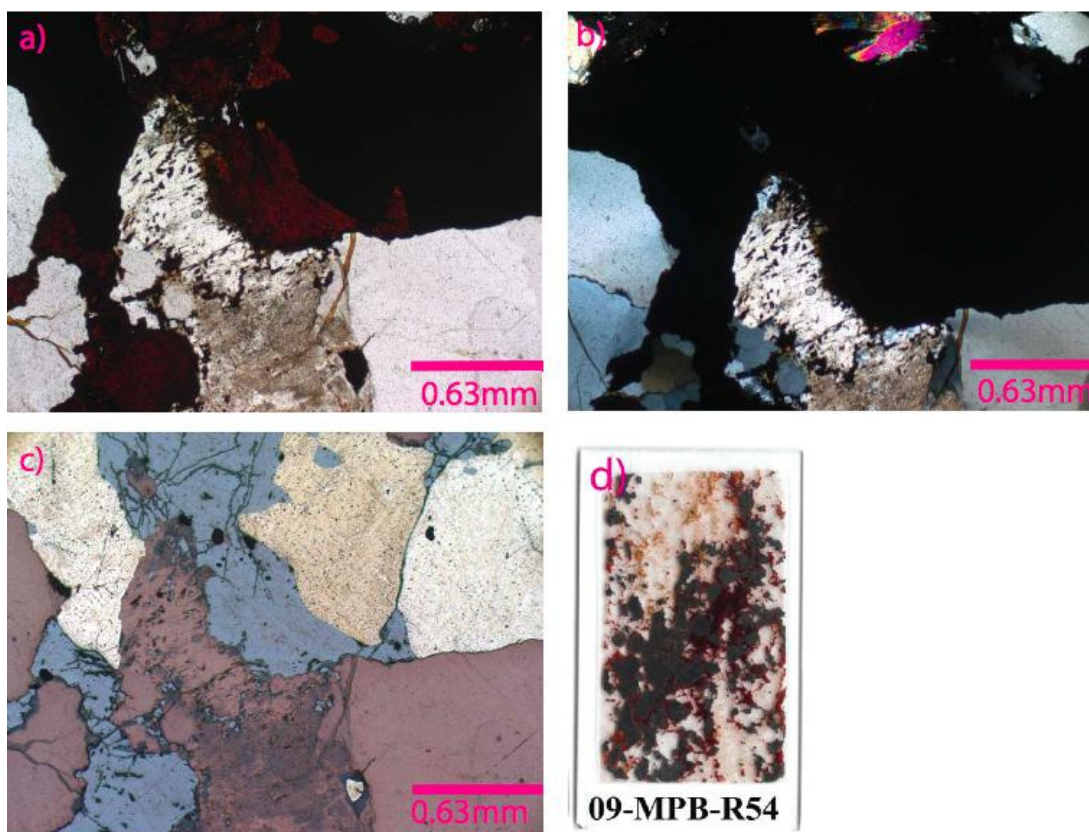


Plate 18. a) PTS of 09-MPB-R54 in ppl showing the coarse-grained matrix. b) PTS of 09-MPB-R54 in xpl. c) PTS image of 09-MPB-R54 showing coarse-grained sulphides. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R55

Location: Field sample, grab/float from the WIZ showing, MMG assay number: 197489, E: 411964, N: 7282087

Lithology: Felsic metavolcanic rock.

Description: Medium grey felsic rock, containing various amounts of quartz, biotite, and feldspar.

Minerals:

Quartz 30% – coarse-grained, makes up most of the matrix making anhedral masses that are sub-rounded, undulatory extinction under xpl.

Biotite 25% – fine-grained, fibrous looking but lower interference colours than sillimanite, crystals are elongated, likely in response to a shearing event (metamorphic).

Microcline 15% – fine-grained, cross-hatched twinning, makes up the matrix, certain areas look broken up by other mineral with blocky, polysynthetic twins.

Muscovite 10% – fine-grained, slightly coloured in ppl, crystal laths of varying lengths, anhedral and high interference colours, but some are elongated but not cubic or rectangular. Looks like some foliation near the small fractures indicating a zone of shearing.

Sphalerite 5% – medium- to coarse, deep red-brown, translucent (Fe-rich) blocky to anhedral, small grains, grain size between 0.09 and 0.6 mm.

Chalcopyrite 5% – coarse-grained, anhedral masses, yellow-bronze colour, medium reflectivity; grains between 0.6 and 1.0 mm.

Pyrrhotite 5% – medium-grained, pinkish colour, medium reflectance, anhedral grains, grain size between 0.2 and 0.4 mm.

Pyrite 5% – fine-grained, cream white, high reflectance, cubic form, grain size between 0.08 and 0.1 mm.

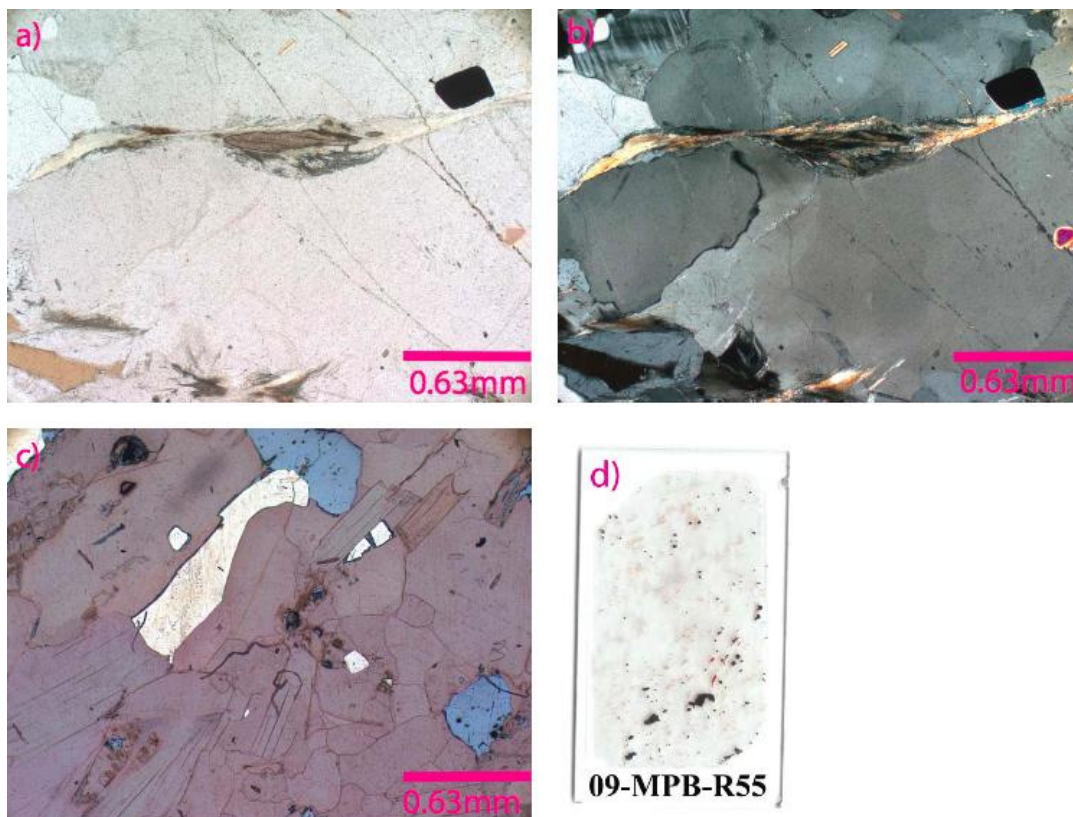


Plate 19. a) PTS image of 09-MPB-R55 in ppl showing very coarse-grained quartz. b) PTS image of 09-MPB-R55 in xpl. c) PTS image of 09-MPB-R55 in reflected light showing fine- to medium-grained sulphides. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R57

Location: Field sample, grab/float from the WIZ showing, E: 411961, N: 7282093

Lithology: Felsic metavolcanic rock.

Description: Majority of sample made up of fine- to medium-grained feldspar, quartz and microcline. Sulphide minerals are present, with chalcopyrite being the most predominant followed by sphalerite, pyrite, and magnetite.

Minerals:

Microcline 30% – medium- to coarse-grained, cross-hatch twinning, makes up the matrix, certain areas look fractured and infilled with other mineral (quartz?).

Biotite 15% – fine- to medium-grained, brown in ppl and brown-orange in xpl, generally forms elongated crystals that are zoned.

Chalcopyrite 15% – medium- to coarse-grained, yellow reflectance, medium reflectivity, anhedral masses, and, grain size between 0.5 and 2.5 mm.

Plagioclase 10%- fine- to medium-grained, twin lamella present, forms broken crystals, first-order interference colours.

Quartz 10% – medium- to coarse-grained, anhedral masses, small to large grained, subrounded, undulatory extinction.

Sphalerite 8% – medium- to coarse-grained, deep red-brown, translucent (Fe-rich) subhedral to anhedral, grains between 0.4 and 0.6mm.

Pyrite 5% – fine- to medium-grained, white, high reflectance, forms slightly cubic crystals, 0.08-0.4 mm.

Muscovite 5% – medium- to coarse-grained, slightly coloured in ppl and brightly coloured in xpl, forms elongated crystals that occur at a random orientation.

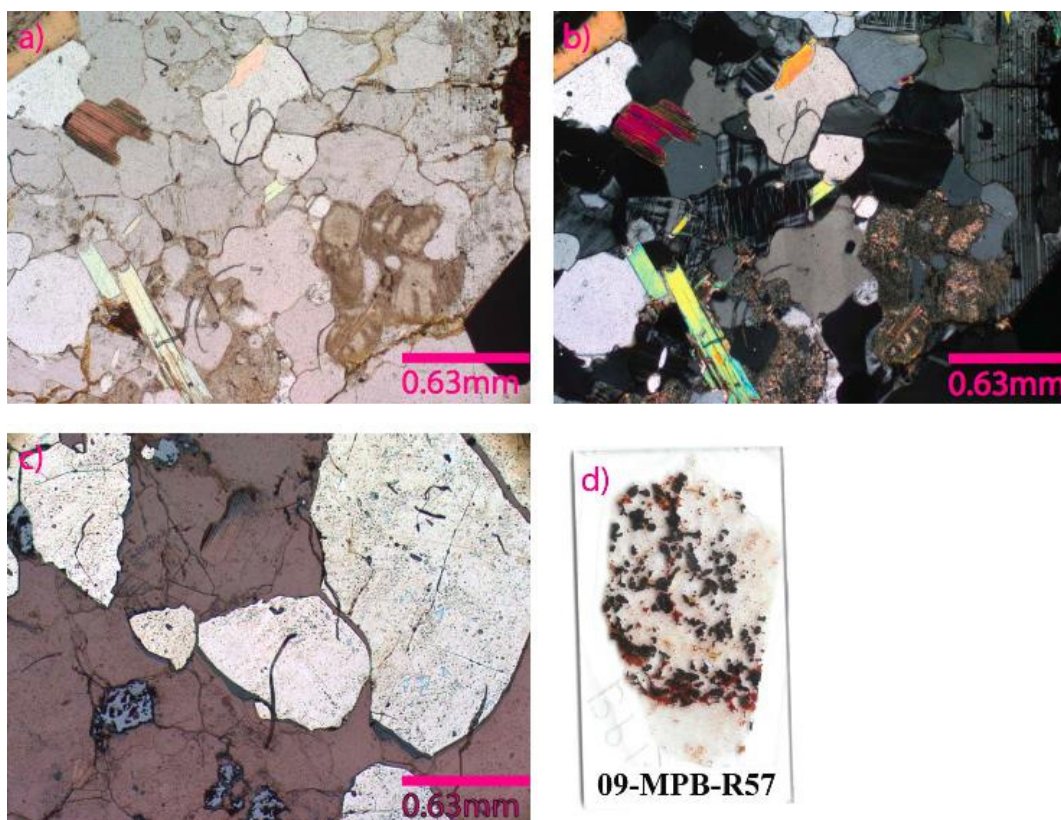


Plate 20. a) PTS of 09-MPB-R57 in ppl showing medium- to coarse-grained quartz, feldspars and micas. b) PTS of 09-MPB-R57 in xpl. c) PTS image of 09-MPB-R57 in reflected light showing sulphides. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R59

Location: Drillhole Hen-179,
E: 417264.76, N: 7279929.29

Lithology: Pegmatite, hand sample is white with large crystals of green-white feldspar (amazonite).

Description: This pegmatite sample is made mainly of microcline and quartz with a small amount of magnetite, chlorite, and muscovite, and trace amount of chalcopyrite.

Minerals:

Microcline (var. amazonite) 70% – coarse-grained, cross-hatched twinning, anhedral crystals, comprises the majority of the sample.

Quartz 15% – coarse-grained, undulatory extinction, large anhedral masses.

Muscovite 8% – medium- to coarse-grained, slightly coloured in ppl and brightly coloured in xpl, forms elongate crystals that are rectangular in shape, slightly anhedral

Chalcopyrite 3% – coarse-grained, yellow reflectance, medium reflectivity, anhedral masses, and fine-grained, forms anhedral masses, individual grains hard to see, anhedral masses range from 0.7 to 1.5 mm.

Magnetite 2% – medium-grained, medium grey, low reflectance, forms slightly cubic forms, small anhedral grains, grain size between 0.1 and 0.4 mm.

Chlorite 2% – medium-grained, greenish in ppl and bluish in xpl, forms only one visible large crystal that is anhedral and subrounded.

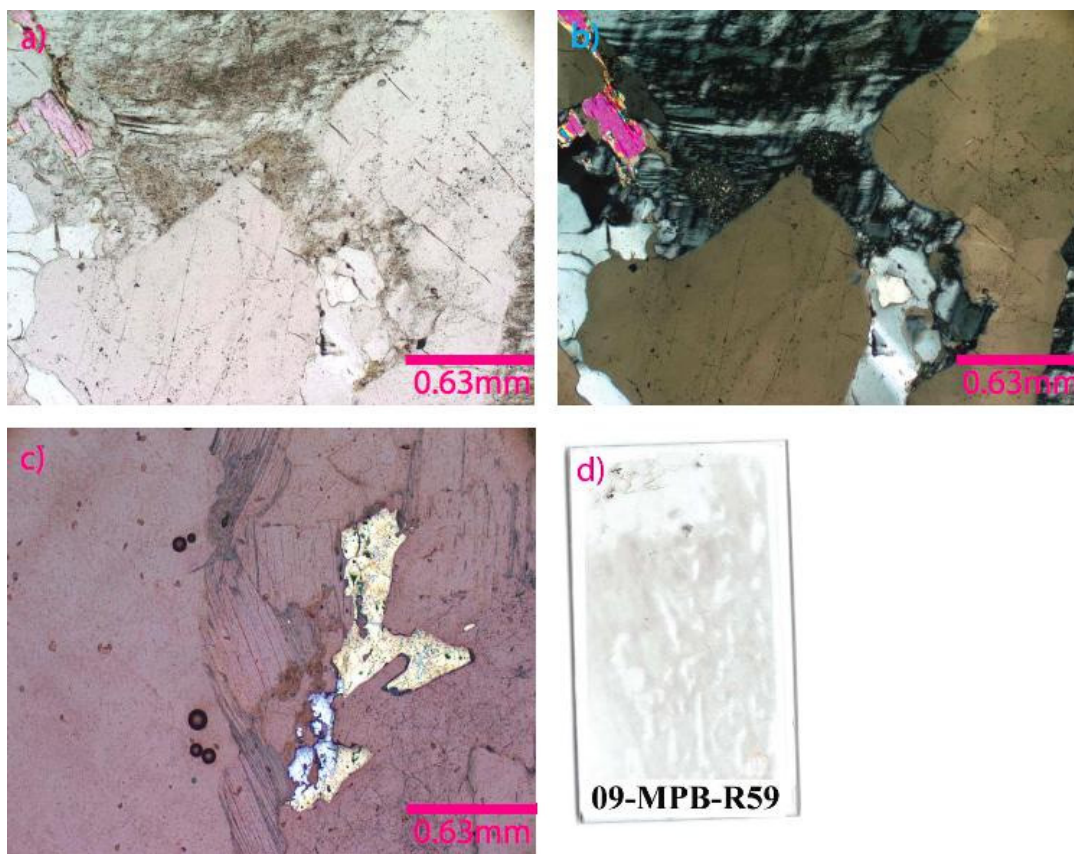


Plate 21. a) PTS image of 09-MPB-R59 in ppl showing coarse-grained microcline and quartz. b) PTS image of 09-MPB-R50 in xpl. c) PTS image of sulphides under reflected light. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R60

Location: Drillhole Hen-173,
E: 417290.63, N: 7279944.38

Lithology: Massive sulphides, hand sample is dominated by sphalerite, chalcopyrite, pyrrhotite, and magnetite.

Description: The majority of the sample is deep red-brown iron-rich sphalerite and pyrite with some magnetite and chalcopyrite.

Minerals:

Sphalerite 40% – medium- to coarse-grained, deep red-brown, translucent (Fe-rich) in ppl, euhedral to anhedral large masses, light grey in reflected light, comprises the matrix, grain size 0.3-2.5 mm.

Chalcopyrite 30% – fine- to medium-grained, yellow-bronze coloured, medium reflectivity, forms inclusions of sphalerite or pyrite, grain size less than 0.09-0.4 mm.

Pyrrhotite 10% – medium-grained, white to light pink colour, forms anhedral grains that are fine-grained, grain size 0.3-0.5 mm.

Actinolite 5% – fine- to medium-grained, finely bladed, acicular, colourless in ppl and interference colours are dominated by green and brown hues.

Pyrite 5% – fine- to coarse-grained, euhedral crystals, high reflectance, white to light grey in reflected light, grain size between 0.05 and 1.0 mm.

Magnetite 5% – medium- to coarse-grained, grey, low reflectance, forms larger crystals than previously seen in other samples (see images below), grain size from 0.1 to 1.2 mm.

Muscovite 5% – fine- to medium-grained, slightly coloured in ppl and brightly coloured in xpl, forms elongate crystals that are rectangular in shape, slightly anhedral.

Siderite (tr.) – fine-grained, yellowish colour, intergrown with sulphide minerals.

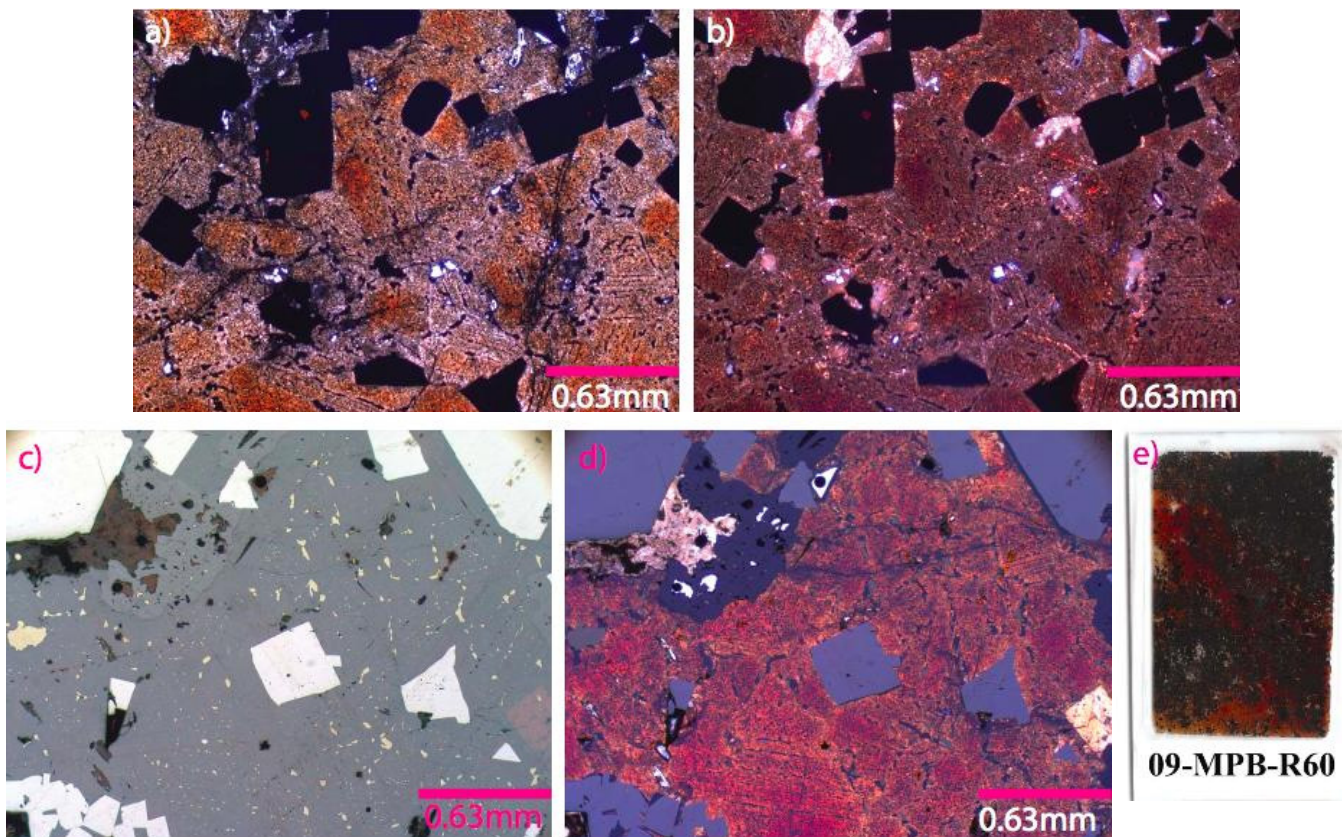


Plate 22. a) PTS image of 09-MPB-R60 in ppl showing massive sphalerite, pyrite and medium- to coarse-grained magnetite. b) PTS image of 09-MPB-R60 in xpl. c) PTS image of 09-MPB-R60 in reflected light. d) PTS image of 09-MPB-R60 in reflected light with ppl turned up to distinguish the magnetite from sphalerite. e) scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R61

Location: Drillhole Hen-173,
E: 417290.63, N: 7279944.38

Lithology: Sulphidic chert, hand sample is dark brown in colour and has disseminated sulphides throughout.

Description: Gahnite-rich sample that has the gahnite occurs as large to medium grains and some smaller grains. Sillimanite occurs as chaotic laths. Plagioclase and quartz comprise the matrix and magnetite, pyrite, chalcopyrite, and pyrrhotite comprise the sulphide content. Hand sample is magnetic.

Minerals:

Plagioclase 25% – medium- to coarse-grained, very good examples of twin lamellae, consists of most of the matrix, subhedral crystals.

Gahnite 20% – medium- to coarse-grained, subhedral in shape, wide range (i.e. light and dark) of green colours. Ranges in size from very fine-grained up to large grains, but these grains generally occur in masses or aggregates, grain size between 0.1 and 0.7 mm.

Sillimanite 15% – fine- to medium-grained, chaotic laths that are fibrous, second-order purple-blue interference colours.

Quartz 10% – medium- to coarse-grained, occurring as small anhedral grains and occurs with the plagioclase to comprise the matrix.

Magnetite 10% – medium-grained, grey, low reflectance forms as slightly cubic medium-grained crystals, grain size 0.2-0.5 mm. Magnetite has recrystallized, forms coarser grains than pyrrhotite and chalcopyrite.

Pyrite 10% – medium-grained, white to pale yellow in colour, occurring as euhedral cubic crystals, slightly larger grained than the magnetite.

Biotite 5% – fine- to medium-grained, brown in ppl and green-brown in xpl. Occurs as short tabular crystals.

Chalcopyrite 3% – medium- to coarse-grained, brass yellow in colour, medium reflectivity, is intergrown with the pyrite and pyrrhotite, grain size 0.2-0.6 mm.

Pyrrhotite 2% – medium-grained white to pale pink colour, forms 0.3-0.5 mm anhedral grains.

Galena (tr.) – fine-grained, very light in colour, only a small amount present, occurs with the other sulphides, <0.1mm in size.

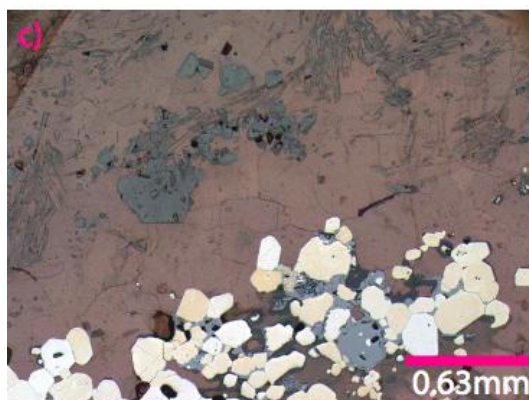
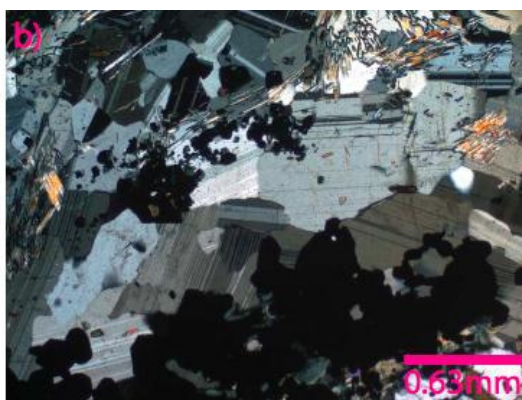
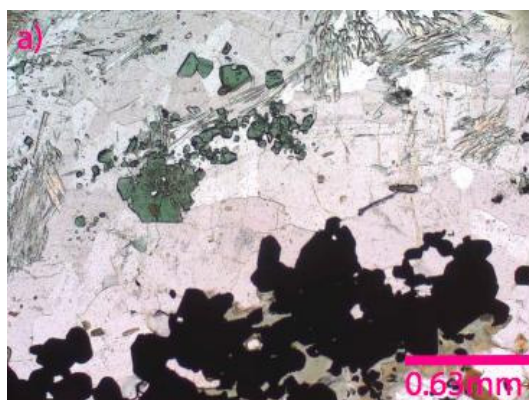


Plate 23. a) PTS image of 09-MPB-R61 in ppl showing the fine- to medium-grained gahnite and sulphides. b) PTS image of 09-MPB-R61 in xpl. c) PTS image of 09-MPB-R61 in reflected light. d) Scanned thin section image of slide with SEM tracks.

APPENDIX B2 continued.

09-MPB-R62

Location: Drillhole Hen-338,
E: 417314.09, N: 7279933.64

Lithology: Sulphidic breccia pipe, hand sample is dominated by sulphide minerals and actinolite (ferroactinolite). Matrix is fine-grained.

Description: Contact between dacite and massive sulphide, consisting of quartz, plagioclase, hornblende, sphalerite, ferroactinolite, chalcopyrite, and magnetite.

Minerals:

Ferroactinolite 35% – coarse- to fine-grained, greenish colour in ppl, forms some elongated crystals, some are aligned in a foliation direction, has some twins.

Chalcopyrite 15% – fine- to coarse-grained, brass yellow colour, medium reflectivity, occurs within pyrite and magnetite, large range of grain size from 0.09 to 3.0 mm.

Axinite 10% – medium-grained, forms elongated crystals, low birefringence, medium-order interference colours.

Sphalerite 10% – medium-grained, deep red-brown, translucent (Fe-rich) subhedral to anhedral large

masses, generally intergrown with the other sulphides, grain size 0.2-0.5 mm.

Pyrite 5% – medium- to coarse-grained, white-yellow, occurs as euhedral cubes or as large anhedral masses.

Quartz 5% – fine- to medium-grained, undulatory extinction, fine- to medium-grained, occurs in the matrix, only present in great quantities in the earlier phase of the thin section.

Pyrrhotite 5% – medium-grained, light pink in colour, generally intergrown with the sphalerite, low reflectance, 0.1-0.5 mm in size.

Plagioclase 5% – medium-grained, twin lamellae present, makes up most of the matrix and occurs with quartz, fine- to medium-grained and subrounded.

Hornblende 5% – medium-grained, green-brown in ppl, a couple of the samples show the characteristic cleavages.

Magnetite 5% – medium-grained, grey, low reflectance, grain size 0.1-0.4 mm.

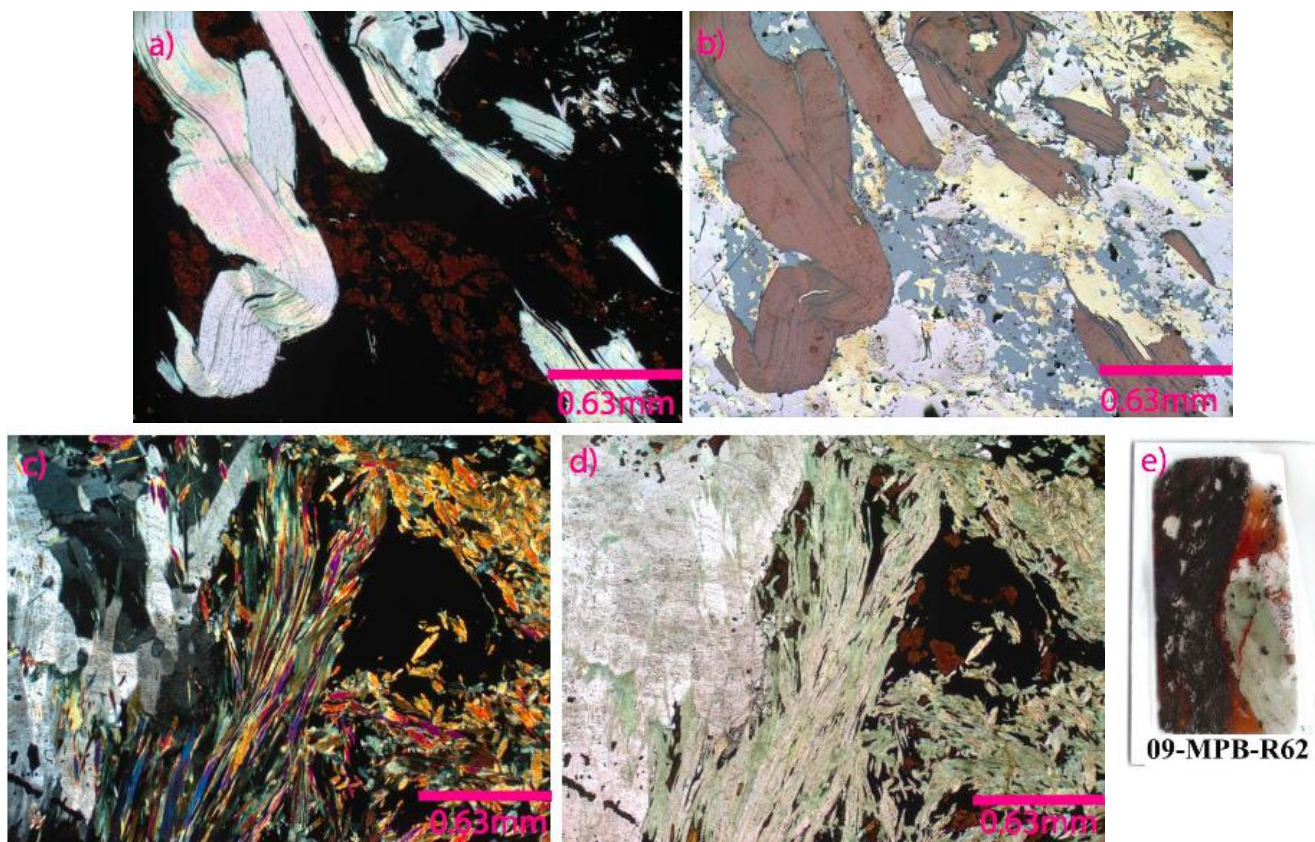


Plate 22. a) PTS image of 09-MPB-R60 in ppl showing massive sphalerite, pyrite and medium- to coarse-grained magnetite. b) PTS image of 09-MPB-R60 in xpl. c) PTS image of 09-MPB-R60 in reflected light. d) PTS image of 09-MPB-R60 in reflected light with ppl turned up to distinguish the magnetite from sphalerite. e) scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R63

Location: Drillhole Hen-338,
E: 417314.09, N: 7279933.64

Lithology: Intermediate metavolcanic (sulphide-rich), hand sample is grey-black with larger crystals of quartz and sulphide lenses. Gahnite occurs as medium-grained green crystals.

Description: Sample rich in gahnite and sphalerite. There is also plagioclase, biotite, quartz, and chlorite that comprise most of the matrix of the sample.

Minerals:

Gahnite 30% – medium- to coarse-grained, green, anhedral in ppl, always displays high relief with uneven grain boundaries, typically fractured, isotropic, grain sizes are less than 0.1 to 0.6 mm.

Quartz 25% – medium- to coarse-grained, undulatory extinction, forms around the plagioclase, forms anhedral crystals that comprise most of the matrix.

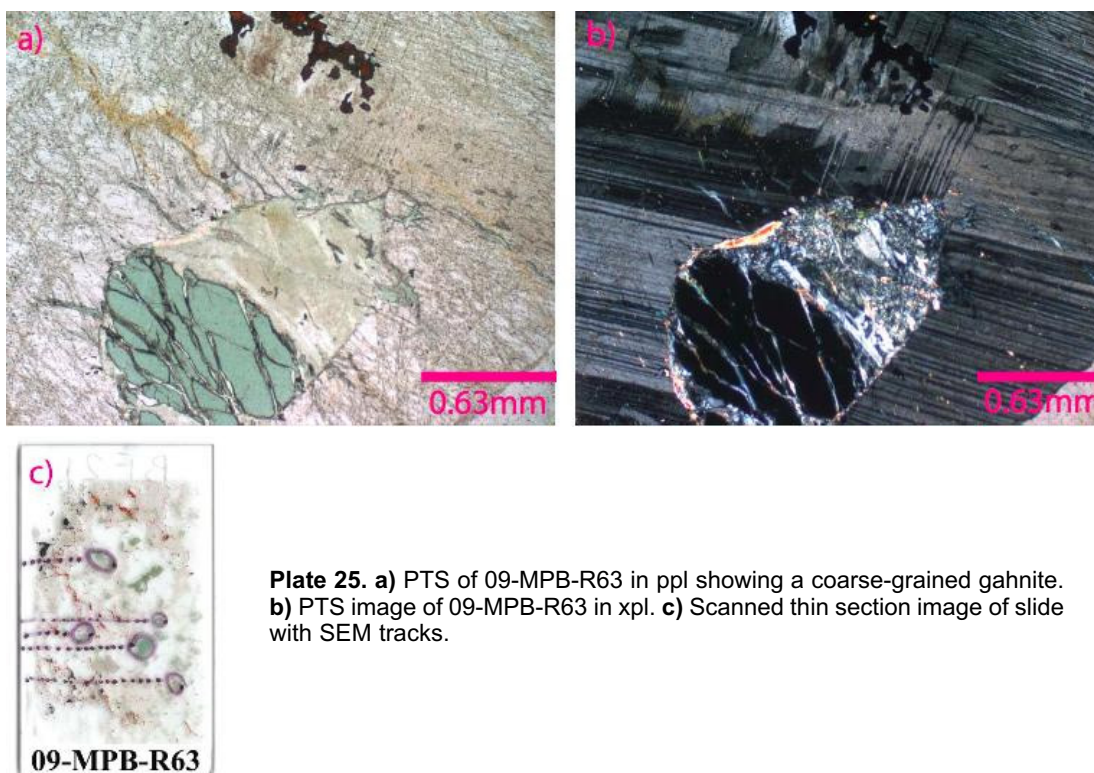
Sphalerite 15% – medium- to coarse-grained, Fe-rich, red-brown in ppl, forms anhedral masses 0.2-0.6 mm.

Chlorite 10% – medium-grained, greenish-brown in ppl, forms subhedral masses, blue in xpl, pleochroic, parallel extinction.

Biotite 10% – medium-grained, slightly brown in ppl, forms elongated crystals that are rectangular in shape, forms with the quartz and plagioclase.

Chalcopyrite 5% – medium-grained, bronze yellow colour, forms anhedral masses that are being weakly dispersed throughout the sample 0.2-0.5 mm.

Plagioclase 5% – medium- to large grained, twin lamellae present, occurs in the matrix with quartz.



APPENDIX B2 continued.

09-MPB-R64

Location: Drillhole Hen-338,
E: 417314.09, N: 7279933.64

Lithology: Massive sulphide, hand sample is brown-bronze in colour and has a fine-grained matrix.

Description: Most of the sample consists of recrystallized Fe-rich sphalerite and pyrite. Some sphalerite is found within the magnetite with a trace amount of galena.

Minerals:

Sphalerite 35% – medium- to coarse-grained, Fe-rich red-yellow-brown colour, translucent, medium grey, low reflectance, forms anhedral masses that range in size from 0.2 to 4 mm.

Pyrite 40% – fine-, medium- and coarse-grained, strong white-yellow reflectance, cubic or cube-like shapes (slightly broken down), some grains are small, but the majority of the grains form large masses, 0.09-1 mm.

Magnetite 10% – medium-grained, medium grey, low reflectance, opaque, generally occurring with and in sphalerite, grain size from 0.2 to 0.5 mm.

Actinolite 10% – fine- to medium-grained (SEM confirmed), finely bladed, almost fibrous looking, colourless in ppl and interference colours are dominated by green and brown hues.

Chalcopyrite 5% – fine-grained, brass-yellow colour, medium reflectivity, occurs within pyrite and magnetite, large range of grain size <0.1 mm.

Galena (tr.) – fine-grained, very light in colour, only a small amount present, occurs with the other sulphides, <0.1mm in size.

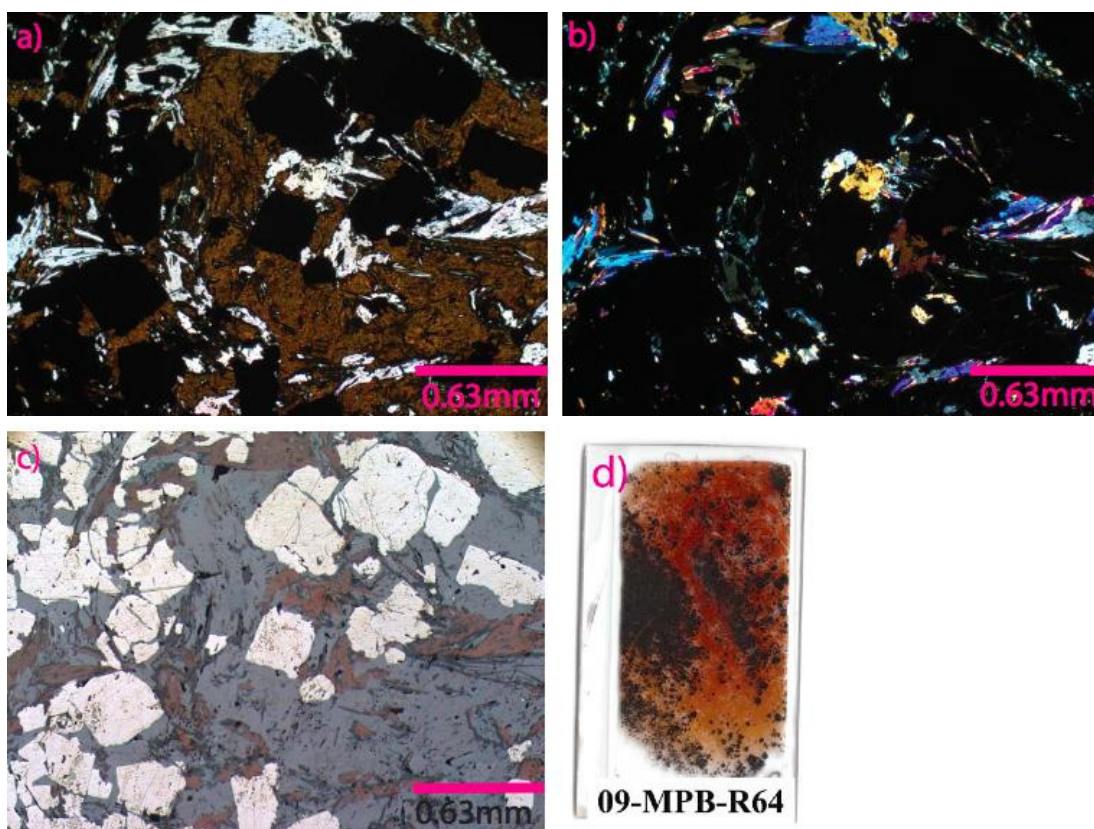


Plate 26. a) PTS image of 09-MPB-R64B in ppl showing massive grains of sphalerite. b) PTS image of 09-MPB-R64B in xpl. c) PTS image of 09-MPB-R64B in reflected light showing the sphalerite and pyrite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R65

Location: Drillhole Hen-250,
E: 417393.3, N: 7279947.72

Lithology: Sulphidic breccia pipe in basalt, with secondary sulphide mineralization; hand sample is a fine-grained brown-purple colour with large inclusions of other rocks (brecciated texture).

Description: Two distinct phases occur in this rock; the primary phase is dominated by plagioclase, quartz, and hornblende, and the secondary phase has sphalerite, ferroactinolite, chalcopryrite, and magnetite.

Minerals:

Ferroactinolite 20% – medium- to coarse-grained, large elongated crystals that are light green-blue in ppl and has a high order of interference colours in xpl.

Axinite 15% – medium-grained, forms elongated crystals, low birefringence, medium-order interference colours.

Sphalerite 10%- medium- to coarse-grained, Fe-rich red-yellow-brown colour, translucent, medium grey, low reflectance, forms anhedral masses, contains inclusions of magnetite, grain size 0.2-0.7 mm.

Quartz 10% – fine- to medium-grained, undulatory extinction, anhedral, forms in the primary phase of the thin section, occurs with plagioclase.

Plagioclase 10% – twin lamellae present, makes up the matrix with the quartz, fine- to medium-grained, occurs in the primary phase of the thin section.

Magnetite 10% – medium-grained, grey, low reflectance, opaque, generally occurring with and in sphalerite, grain size ranges from 0.1 to 0.4 mm.

Pyrite 10% – medium-grained, white, high reflectance, cubic in appearance, forms both cubes and masses of crystals, grain size 0.1-0.3 mm.

Chalcopryrite 5% – medium- to coarse-grained, yellow-bronze interference colours, medium reflectivity, occurs within pyrite, grain size ranges from 0.2 to 0.7 mm.

Hornblende 5% – medium-grained, forms slightly elongated crystals that are twinned under cross polars; some show the typical hornblende cleavage.

Pyrrhotite 5% – medium-grained, light pink in colour, generally intergrown with the sphalerite, low reflectance, 0.1-0.5 mm in size.

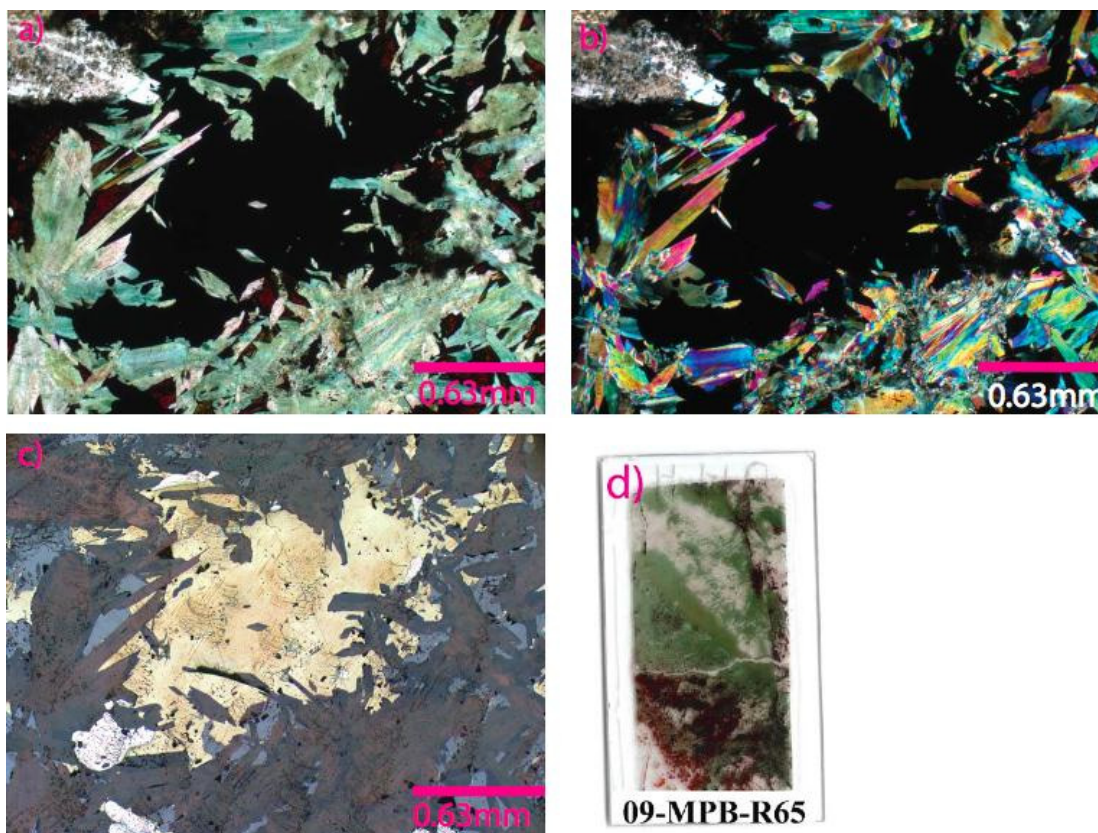


Plate 27. a) PTS image of 09-MPB-R65 in ppl showing tabular ferroactinolite. b) PTS image of 09-MPB-R65 in xpl. c) PTS image of 09-MPB-R65 in reflected light showing coarse-grained chalcopryrite and sphalerite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R67

Location: Hen-250, E: 417393.3, N: 7279947.72

Lithology: Schist, hand sample is brown-purple in colour and is fine-grained.

Description: This sample consists mainly of fine-grained quartz; muscovite with some chlorite and garnet.

Minerals:

Quartz 50% – fine-grained, undulatory extinction, granoblastic crystals that are forms the fine-grained matrix, anhedral.

Garnet 15% – coarse-grained, isotropic, pale in colour, high relief, euhedral.

Muscovite 10% – medium- to coarse-grained, slightly coloured in ppl, bird's-eye extinction, a lot of it is broken up and in-filled by quartz.

Biotite 10% – medium-grained, slightly brown in ppl, forms tabular elongated crystals.

Chlorite 5% – medium-grained, greenish-brown in ppl, pristine, forms subhedral grains, blue in xpl.

Hornblende 5% – medium-grained, forms slightly elongated crystals that are twinned under cross polars; some show the typical hornblende cleavage.

Pyrite 5% – medium-grained, white-yellow, high reflectance, forms medium- to fine-grained cubic crystals that are weakly disseminated throughout the sample, 0.2-0.4 mm.

Sphalerite (tr.) – fine-grained, Fe-rich translucent, medium grey, low reflectance crystals in the sample, fine-grained and weakly disseminated throughout the sample, grain size ~0.1 mm.

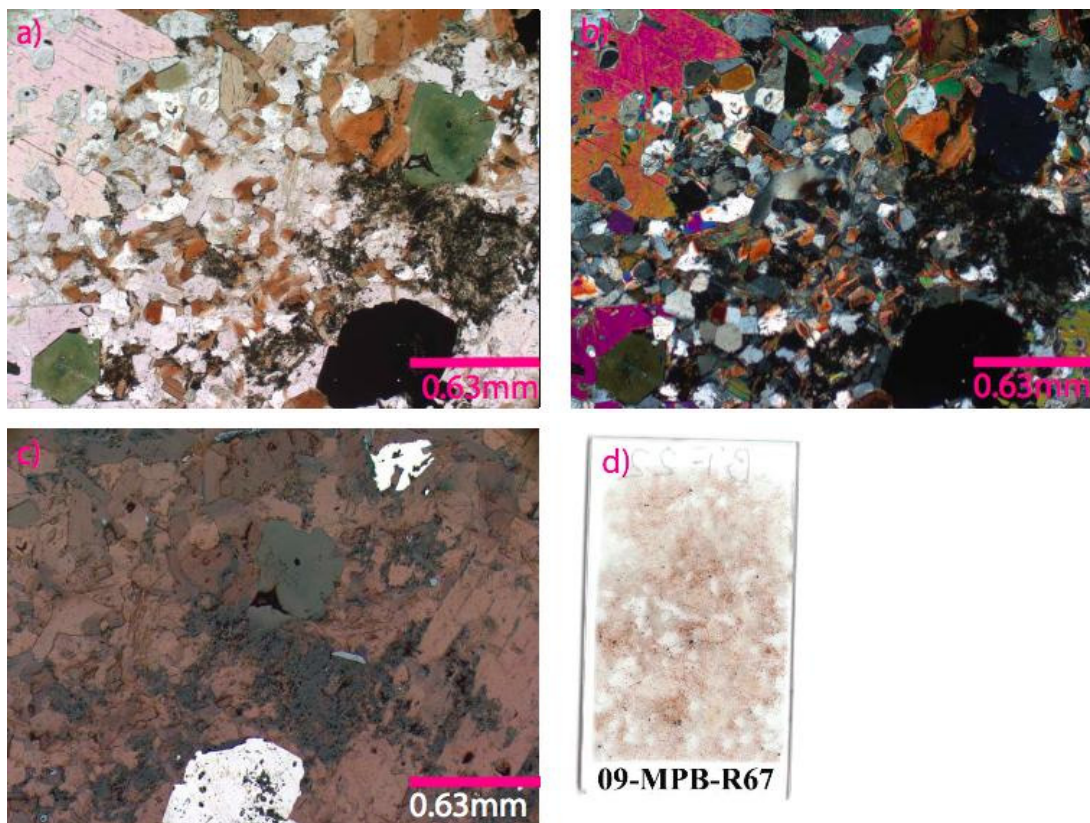


Plate 28. a) PTS image of 09-MPB-R67 in ppl showing fine-grained ground mass. b) PTS image of 09-MPB-R67 in xpl. c) PTS image of 09-MPB-R67 in reflected light. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R68

Location: Drillhole Ham-05,
E: 414380.81, N: 7287783.45

Lithology: Schist, hand sample is brown-black with a fine-grained matrix.

Description: Sample is dominated by biotite, garnet, quartz, and sericite-altered microcline.

Minerals:

Biotite 35% – medium- to coarse-grained, slightly brown in ppl, pleochroic, forms elongated crystals that are rectangular in shape, forms around the quartz and altered microcline

Quartz 20% – fine- to medium-grained, undulatory extinction, forms the fine-grained matrix, forms with altered microcline.

Sericite-altered microcline 15% – fine-grained, looks to be sericite-altered microcline, but in places it could be sericite-altered plagioclase. Comprises the fine-grained matrix with fine-grained quartz.

Muscovite 10% – fine-grained, slightly coloured in ppl, bird's-eye extinction of brightly coloured interference colours in xpl, forms with biotite, quartz, and sericite-altered microcline

Garnet 10% – coarse-grained, isotropic, pale in colour, high relief, euhedral.

Hornblende 5% – fine- to medium-grained, forms slightly elongated crystals that are twinned under cross polars; some show the typical hornblende cleavage, forms mainly with the biotite, can only tell apart from biotite by the bird's-eye extinction.

Magnetite 5% – medium-grained, grey, low reflectance, opaque, generally occurring as weakly disseminated fine-grained crystals throughout the sample, grain size ranges from 0.1 to 0.3 mm, slightly magnetic in hand sample.

Zircon (tr.) – fine-grained, abundant anhedral grains with radiation halos in biotite.

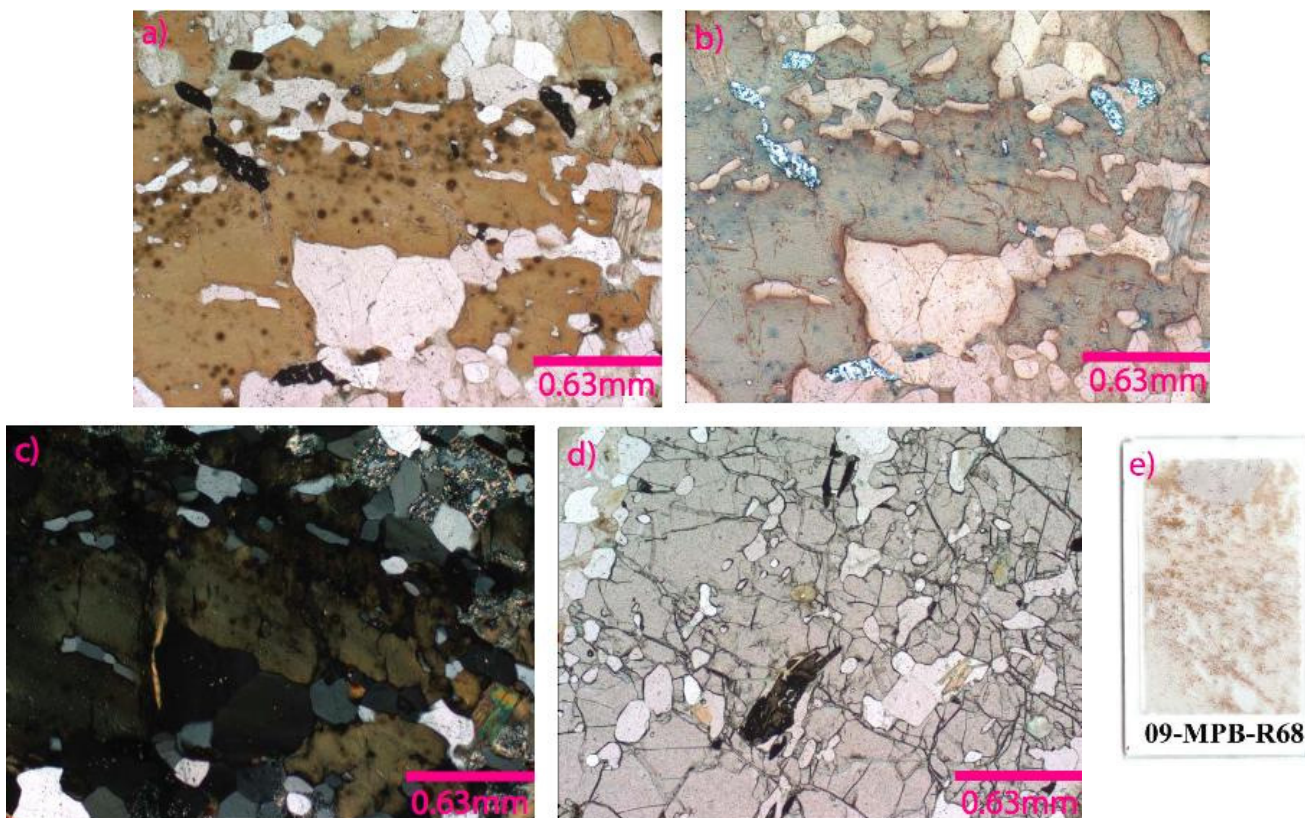


Plate 29. a) PTS image of 09-MPB-R68 in ppl showing fine-grained matrix. b) PTS image of 09-MPB-R68 in reflected light showing minor sulphides. c) PTS image of 09-MPB-R68 in xpl. d) PTS of 09-MPB-R68 in ppl showing massive garnet crystal and zircons with radiation halos. e) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R69

Location: Drillhole Ham-05,
E: 414380.81, N: 7287783.45

Lithology: Metamorphosed sulphidic alteration zone, sample has a fine- to medium-grained matrix with disseminated sulphide minerals and gahnite. The gahnite seems to be associated and forms with sulphide minerals.

Description: Sample dominated by granoblastic angular gahnite with some quartz, microcline, biotite, muscovite, sphalerite, and pyrrhotite.

Minerals:

Gahnite 40% – coarse-grained, green in ppl, isotropic, high relief, large grains (1.5 mm).

Microcline 25% – medium- to coarse-grained, characteristic cross-hatch twinning present, forms large angular masses around 0.75 mm in size, sericite alteration in some crystals.

Quartz 10% – coarse-grained, undulatory extinction, generally forms in anhedral masses up to 1 mm in size.

Biotite 5% – medium- to coarse-grained, forms elongated crystals that show bird's eye extinction and are generally brown-orange in colour.

Muscovite 5% – medium-grained, brightly coloured, forms with the biotite and quartz.

Sphalerite 5% – medium- to coarse-grained, deep red-orange-brown, translucent, medium grey, low reflectance, occurring as small subhedral masses weakly disseminated throughout sample, grain size 0.1-0.7 mm.

Pyrite 5% – medium-grained, white, high reflectance, cubic in appearance, forms both cubes and masses of crystals, grain size 0.1-0.3 mm.

Pyrrhotite 5% – medium-grained, pale pink in colour, generally intergrown with the sphalerite, low reflectance, 0.1-0.5 mm in size.

Chalcopyrite (tr.) -fine-grained, yellow-bronze interference colours, medium reflectivity, occurs within the pyrite, grain size <0.1 mm.

Galena (tr.) - fine-grained, white in reflected light, high birefringence, grain size <0.1 mm.

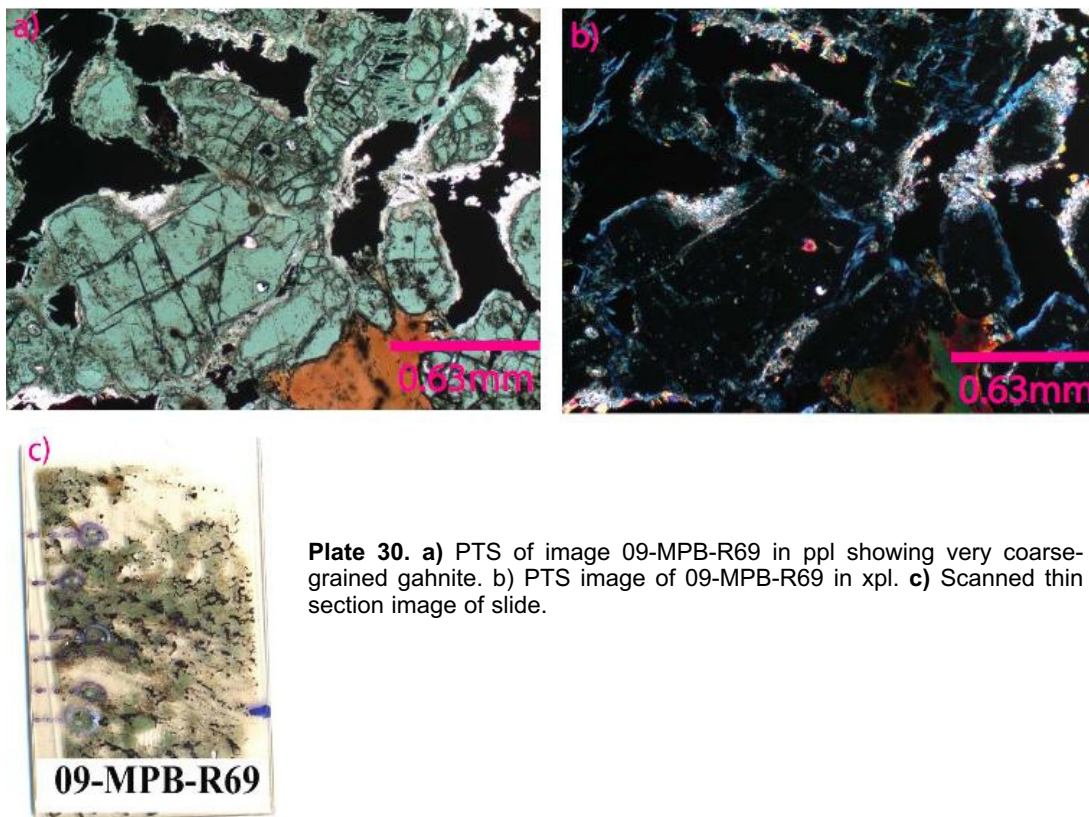


Plate 30. a) PTS of image 09-MPB-R69 in ppl showing very coarse-grained gahnite. b) PTS image of 09-MPB-R69 in xpl. c) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R75

Location: Field sample (bedrock) grab,
E: 416089, N: 7280636

Lithology: Gossanous rock, meta-granodiorite; sample white-grey in colour and is a medium-grained felsic volcanic.

Description: This sample displays foliation and banding of felsic and mafic minerals. Possible anatexis (partial melting). The majority of the sample is dominated by sericite alteration.

Minerals:

Microcline 70% – fine-, medium-, and coarse-grained, distinctive cross-hatched twinning, low birefringence and white-grey interference colours, sericite alteration on majority of crystals.

Muscovite 10% – fine- to medium-grained, elongated bladed medium-sized crystals that are tabular shape, slightly coloured in ppl and orange-pink in xpl. Some crystals are large rectangular masses.

Quartz 10% – fine- to medium-grained anhedral interlocking grains, grows with microcline to make matrix.

Sphalerite 5% – medium- to coarse-grained, deep red-orange-brown, translucent, medium grey, low reflectance, occurs as small subhedral masses weakly disseminated throughout sample, grain size ranges from 0.1 to 0.7 mm.

Chalcopyrite 3% – medium- to coarse-grained, yellow reflectance, medium reflectivity, occurs as anhedral masses, many samples have little cubes of pyrite, grain size ranges from 0.2 to 0.8 mm.

Pyrite 2% – fine- to medium-grained, white reflectance, high reflectivity, forms as small, anhedral crystals weakly disseminated throughout the sample.

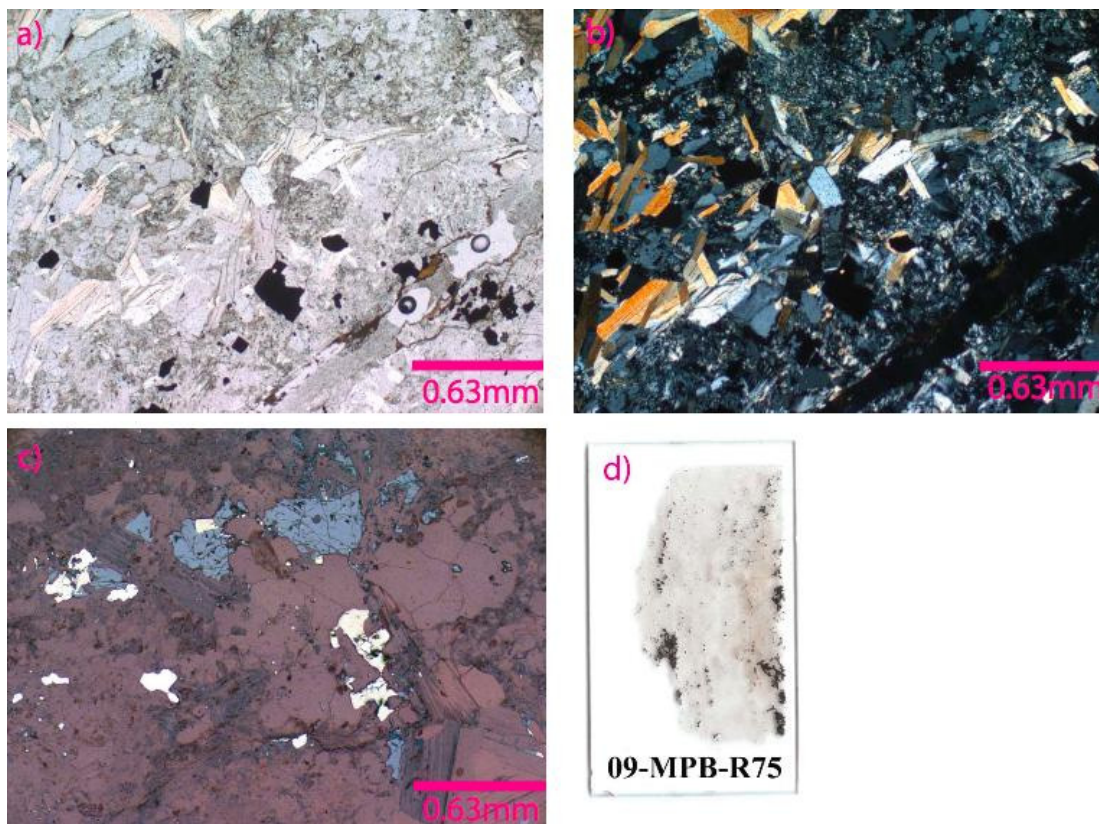


Plate 31. a) PTS image of 09-MPB-R75 in ppl showing sericite alteration of the matrix. b) PTS image of 09-MPB-R75 in xpl. c) PTS image of 09-MPB-R75 in reflected light showing sulphides. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R77

Location: Field sample, (bedrock) grab,
E: 415845, N: 7281172

Lithology: Schist, hand sample is a fine-grained grey-black volcanic rock with a metamorphic fabric.

Description: Dominated by large grained epidote (poikiloblasts) and slightly smaller grained chlorite. The matrix is made up of sericite alteration and interlocking quartz crystals that are fine-grained and anhedral.

Minerals:

Epidote 40% – medium- to coarse-grained, yellow to yellow-green in thin section, higher order interference colours, distinctive relief in ppl, forms coarse-grained anhedral crystals that are roughly rectangular in shape, parallel extinction, high relief, altered to sericite.

Microcline 25% – fine- to medium-grained, low birefringence, white-grey interference colours, comprises the majority of the fine-grained matrix, forms around chlorite and epidote.

Chlorite 20% – medium- to coarse-grained, greenish in ppl, could be biotite breaking down to chlorite, in xpl there is low birefringence and has anomalous interference colours, bladed/elongated crystals.

Quartz 10% – fine- to medium-grained interlocking anhedral crystals, occurs with sericite alteration to form the matrix of the sample, undulatory extinction.

Magnetite 5% – medium-grained, weakly disseminated throughout sample, opaque, occurs as fine-grained laths to subhedral masses, medium grey, low reflectance, grain size 0.2-0.4 mm.

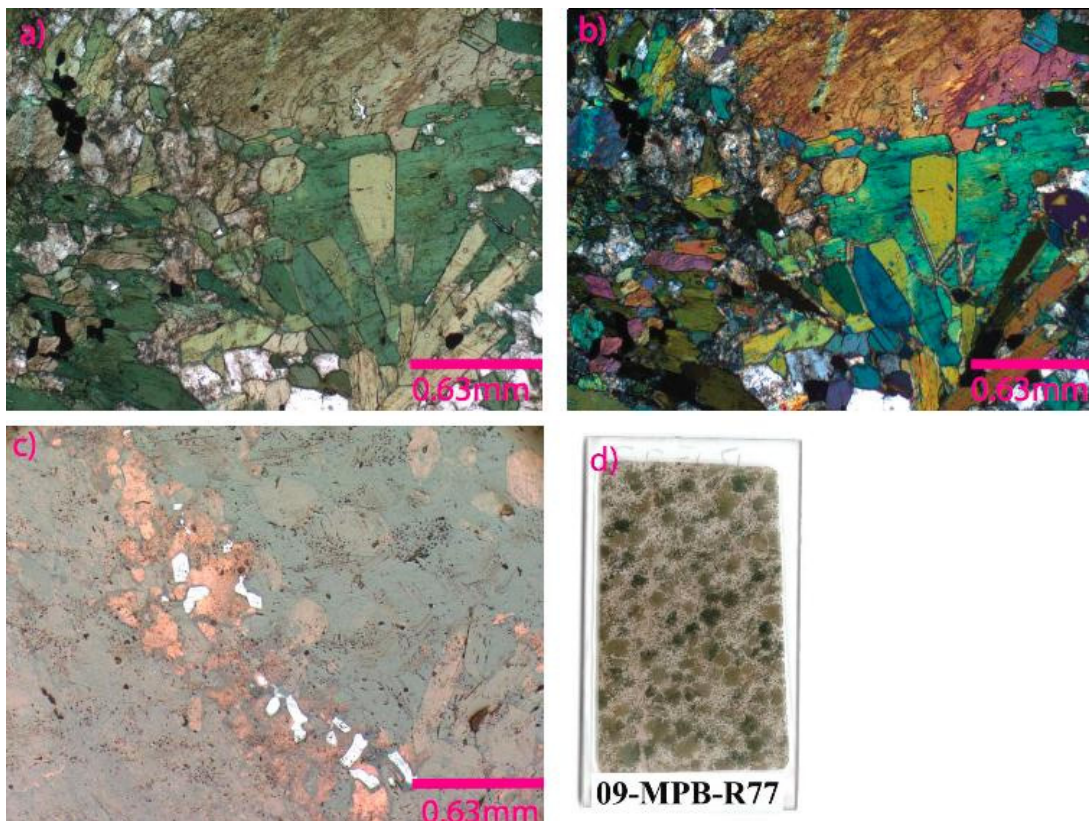


Plate 32. a) PTS image of 09-MPB-R77 in ppl showing coarse-grained epidote. b) PTS image of 09-MPB-R77 in xpl. c) PTS image of 09-MPB-R77 in reflected light showing fine- to medium-grained sulphides. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R82

Location: Drillhole Hen-375, E: 418381, N: 7280269

Lithology: Rhyolite, hand sample is a grey-white fine-grained felsic volcanic rock with phenocrysts of microcline (amazonite).

Description: The majority of the sample is quartz and sericite alteration, both of which are fairly fine-grained.

Minerals:

Microcline (amazonite) 40% – very fine-grained, white-grey interference colours, some cross-hatch twinning but the grains are fairly cloudy from the sericite alteration, can actively see other minerals (i.e. biotite) being altered, forms matrix with the quartz.

Quartz 40% – fine- to medium-grained anhedral interlocking crystals, undulous extinction, comprises the majority of the matrix.

Biotite 20% – biotite is altered by the sericite, difficult to see original features but second-order interference colours, and high birefringence.

Pyrite (tr.) – fine-grained, cream white, high reflectance, high relief, weakly disseminated throughout sample, occurs as cubes, grain size ~0.08 mm.

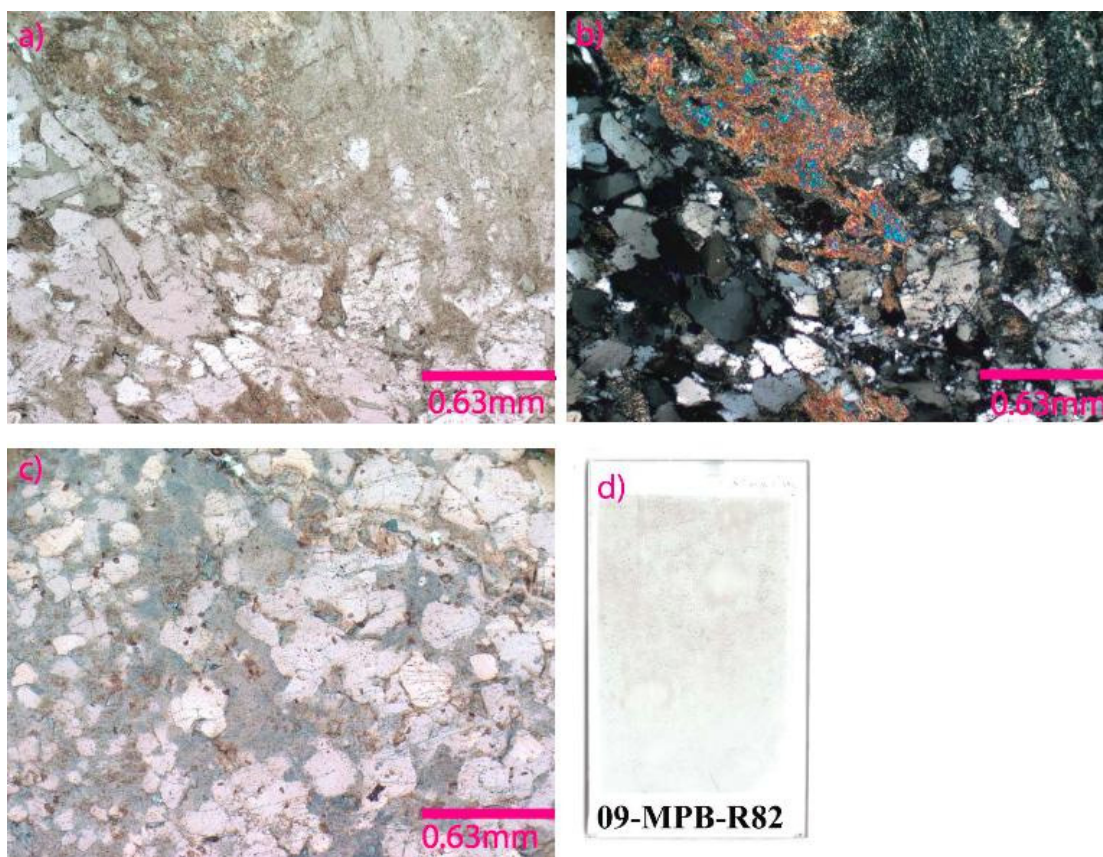


Plate 33. a) PTS image of 09-MPB-R82 in ppl showing fine-grained ground mass. b) PTS image of 09-MPB-R82 in xpl. c) PTS image of 09-MPB-R82 in reflected light. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R83

Location: Drillhole Hen-375, E: 418381, N: 7280269

Lithology: Rhyodacite, hand sample is black-pink in colour and has larger phenocrysts of cordierite.

Description: Sample dominated by corundum and sericite alteration with a matrix of quartz, sericite alteration. Trace pyrite also found.

Minerals:

Cordierite 45% – medium- to coarse-grained, being broken down in ppl, anhedral, altered to sericite, similar birefringence to quartz, grain size 0.2-1.4 mm.

Microcline 35% – fine-grained, being altered to sericite as it is cloudy in ppl and xpl but is still retaining some of the original features of microcline (twinning and interference colours)

Quartz 20% – fine- to medium-grained interlocking, anhedral crystals that form the majority of the matrix, undulatory extinction.

Pyrite (tr.) – fine-grained cubic white, high-relief crystals that are very weakly disseminated throughout the sample, grain size ~0.08 mm.

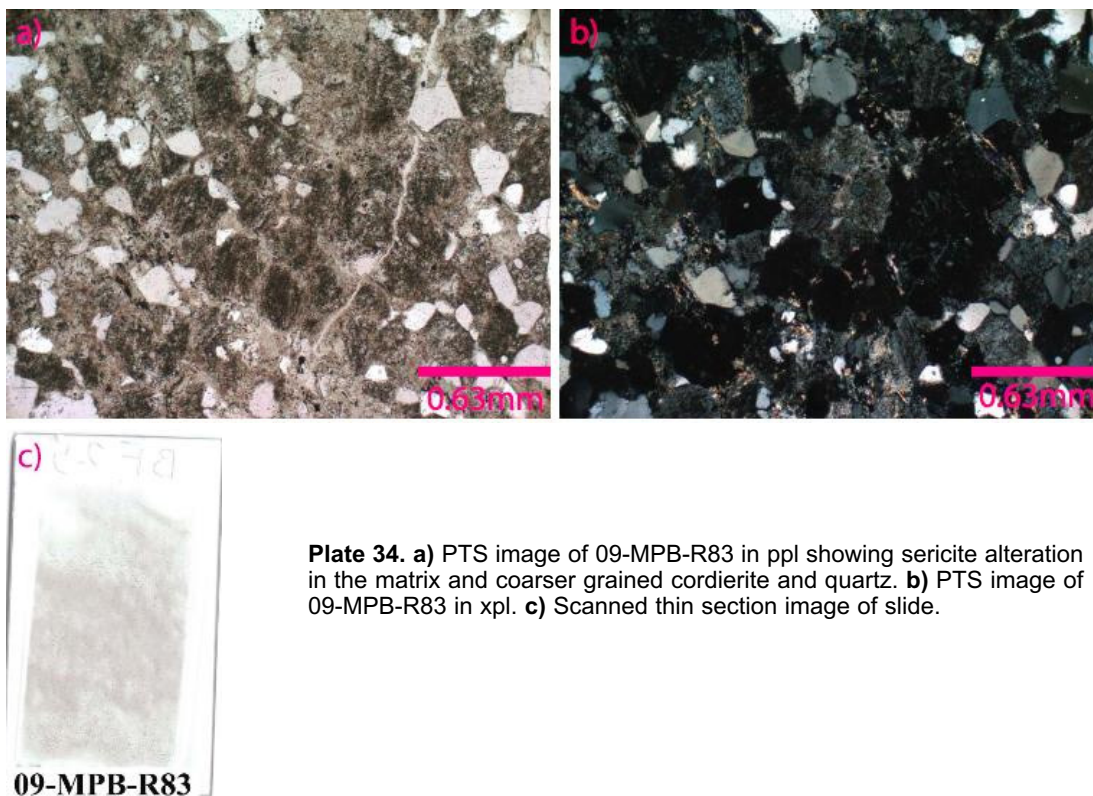


Plate 34. a) PTS image of 09-MPB-R83 in ppl showing sericite alteration in the matrix and coarser grained cordierite and quartz. b) PTS image of 09-MPB-R83 in xpl. c) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R85

Location: Drillhole Hen-421, E: 417119, N: 7279394

Lithology: Gneiss, hand sample is white-grey and dominated by a fine-grained matrix with porphyroblasts of quartz.

Description: The majority of this sample is dominated by sillimanite and quartz with accessory minerals biotite, pyrite, chalcopyrite, and epidote.

Minerals:

Quartz 35% – fine- to medium-grained anhedral masses that are interlocking and form the majority of the matrix, undulatory extinction, low-order interference colours.

Sillimanite 28% – fine- to medium-grained, elongated, blade-like crystals that also have a fibrous appearance (sheave texture), exhibiting orange interference colours in xpl, third-order interference colours.

Biotite 20% – fine- to medium-grained, elongated crystals that are rectangular in shape and slightly orange-brown in ppl with bright interference colours in xpl.

Epidote 10% – medium-grained, high relief, second- to third-order interference colours, forms large anhedral crystals.

Pyrite 5% – medium- to coarse-grained, white, high reflectance, occurs as slightly cubic to anhedral masses, usually occurs with chalcopyrite cores, 0.4-1.2 mm.

Chalcopyrite 2% – medium-grained, yellow reflectance, medium reflectivity, generally occurs within pyrite, occurs as small anhedral masses, grain size 0.2-0.5 mm.

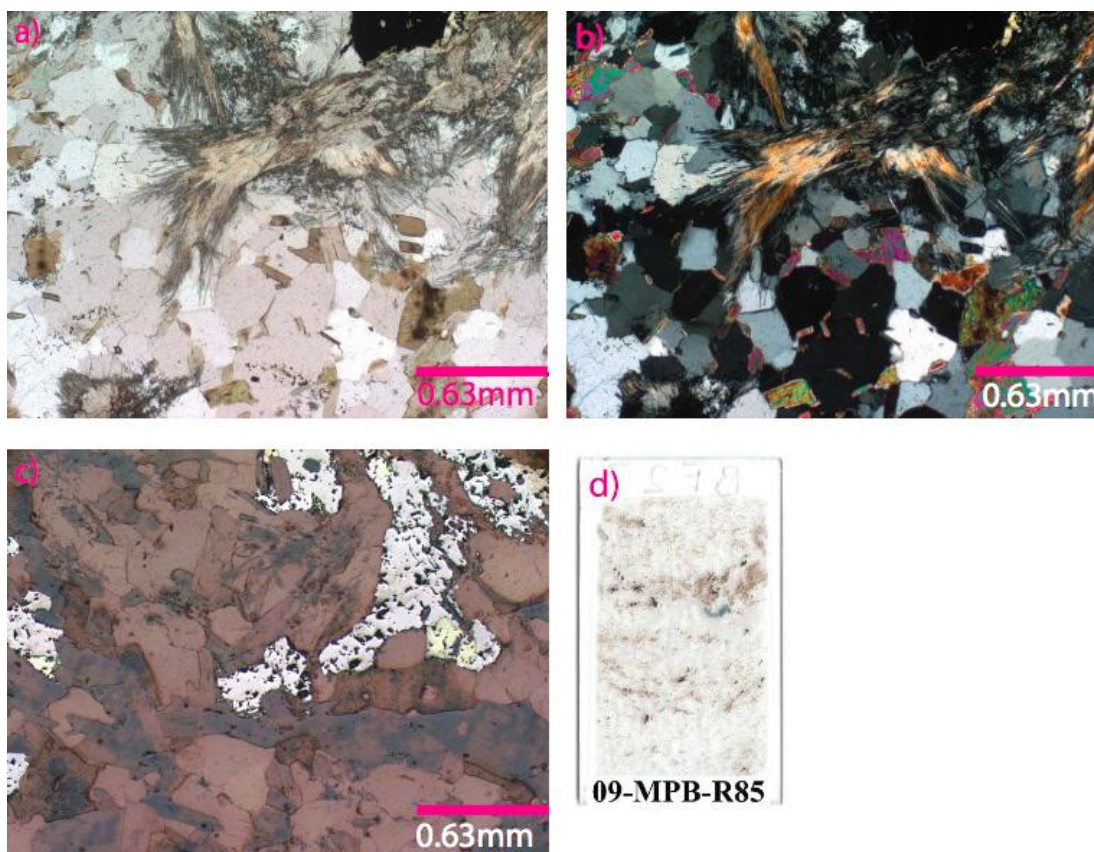


Plate 35. a) PTS image of 09-MPB-R85 in ppl showing fine- to medium-grained matrix with bladed sheaves of sillimanite. b) PTS image of 09-MPB-R85 in xpl. c) PTS image of 09-MPB-R85 in reflected light showing medium- to coarse-grained pyrite with minor chalcopyrite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R87

Location: Drillhole Her-7,

E: 418951.31, N: 7280341.55

Lithology: Metagreywacke; hand sample grey-white with very fine-grained matrix, sedimentary in origin.

Description: Sample is mainly made up of fine-grained quartz and plagioclase that is being altered to sericite. Only a minor amount of pyrite and biotite in sample, with visible metamorphic foliation.

Minerals:

Plagioclase 50% – fine- to medium-grained, lamellar twinning, occurs in the matrix with the quartz and the sericite alteration, being broken down by the sericite alteration, low-order interference colours.

Microcline 30% – fine- to medium-grained, cross-hatch twinning, low-order interference colours, low birefringence, sericite alteration .

Quartz 10% – fine- to medium sized recrystallized sub-hedral crystals that are joined together, comprises the majority of the matrix together with sericite-altered feldspar, undulatory extinction.

Biotite 5% – fine- to medium-grained, occurs in an interstitial manner, chlorite alteration, orange-brown interference colours.

Pyrite 5% – medium- to coarse-grained, cream white, high reflectance, occurs mainly as weakly disseminated crystals throughout sample, but a couple of pieces are larger crystals that occur as anhedral masses, grain size 0.3-1.5 mm.

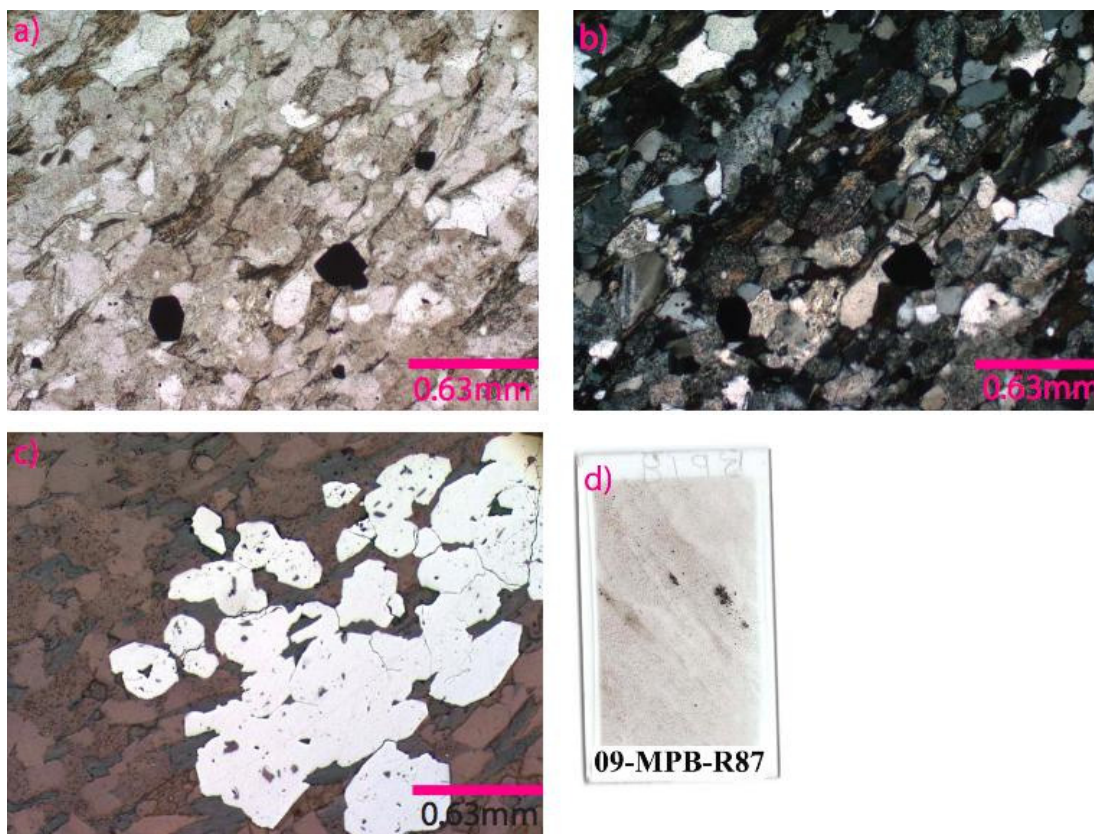


Plate 36. a) PTS image of 09-MPB-R87 in ppl showing fine-grained matrix with sericite alteration. b) PTS image of 09-MPB-R87 in xpl. c) PTS image of 09-MPB-R87 in reflected light showing medium- to coarse-grained pyrite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R88

Location: Drillhole Hen-343,
E: 417186.38, N: 7279943.22

Lithology: Aplite, hand sample white-grey medium-grained felsic volcanic rock.

Description: The majority of the sample consists of albite and quartz. There is some muscovite present and a trace amount of chlorite.

Minerals:

Albite 70% – medium- to coarse-grained, occurs as tabular crystals, first-order interference colours, low birefringence, appears to be altered to sericite as these crystals have a cloudy appearance.

Quartz 20% – fine-grained, anhedral crystals occurs as intergrowths with albite, undulatory extinction, low-order interference colours.

Muscovite 5% – fine- to medium-grained bladed crystals, slightly brightly coloured in ppl, with high-order interference colours in xpl.

Pyrite 5% – fine-grained, cream white, high reflectance, occurs mainly as weakly disseminated crystals throughout sample, grains <0.1 mm.

Chlorite (tr.) – fine-grained, slightly greenish colours in ppl and blue in xpl.

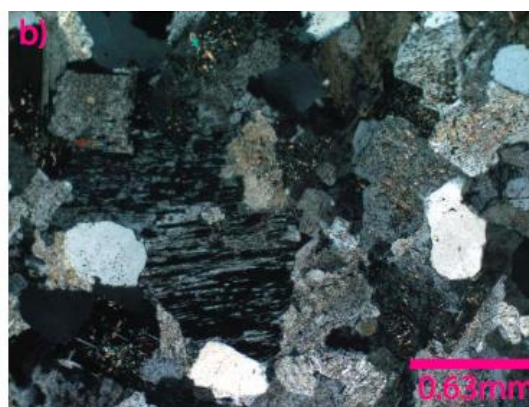


Plate 37. a) PTS image of 09-MPB-R88 in ppl showing fine-grained matrix that has been altered by sericite. b) PTS image of 09-MPB-R88 in xpl. c) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R91

Location: Drillhole Ham-05,
E: 414380.81, N: 7287783.45

Lithology: Felsic metavolcanic; hand sample white-grey in colour with a medium-grained matrix.

Description: Sample mainly consists of feldspars (plagioclase and microcline) with biotite and quartz. This sample is equigranular and the protolith is a rhyolite.

Minerals:

Plagioclase 35% – medium- to coarse-grained, twin lamellae, anhedral crystals, low birefringence, greyish colour, comprises a large portion of the matrix.

Microcline 30% – fine- to coarse-grained, cross-hatched twinning, low birefringence, lack of colour, anhedral grains, grows with the plagioclase and makes up a portion of the matrix.

Quartz 15% – fine- to medium-grained, undulatory extinction, anhedral, intergrown with both the microcline and plagioclase to form the matrix.

Biotite 15% – fine- to medium-grained, very green-brown in ppl, forms anhedral masses to finer grained elongated tabular crystals, green-orange in xpl.

Pyrite 5% – fine-grained, cream white, high reflectance, occurs mainly as weakly disseminated crystals throughout sample, grains <0.1 mm.

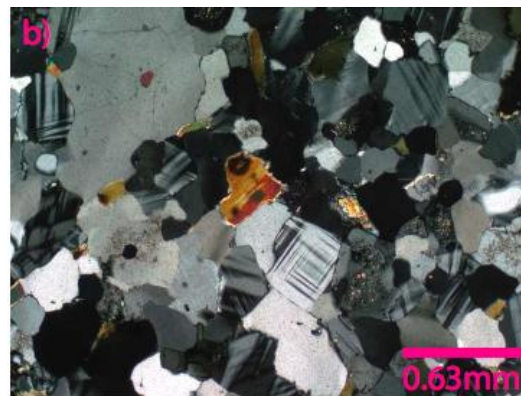


Plate 39. a) PPL image of 09-MPB-R91 in ppl showing medium- to coarse-grained matrix of biotite, quartz and feldspars. b) PPL image of 09-MPB-R91 in xpl. c) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R92

Location: Drillhole Her-3,
E: 418684.03, N: 7279626.22

Lithology: Metagabbro; hand sample is black-grey in colour with a medium-grained matrix.

Description: Sample mainly consists of medium-grained hornblende and plagioclase with a minor amount of sulphide minerals (magnetite and pyrite).

Minerals:

Hornblende 40% – coarse-grained, moderate relief, pleochroic, diagnostic cleavage, green-brown hornblende, euhedral crystals form tabular crystals.

Plagioclase 40% – fine- to medium-grained, colourless plagioclase intergrown with hornblende, biotite, and quartz.

Biotite 10% – mainly occurs with hornblende, more brown-orange in ppl than the hornblende (more green) but looks pretty similar in xpl, pebbly extinction of interference colours.

Quartz 5% – fine-grained, undulatory extinction, anhedral crystals, low-order interference colours.

Magnetite 5% – fine-grained, grey, opaque occurs generally around the biotite and hornblende, grain size is less than 0.1 mm.

Pyrite (tr.) - fine- to medium-grained, occurs as weakly disseminated fine-grained crystals and larger anhedral masses throughout sample, grains range from <0.1 to 0.5 mm.

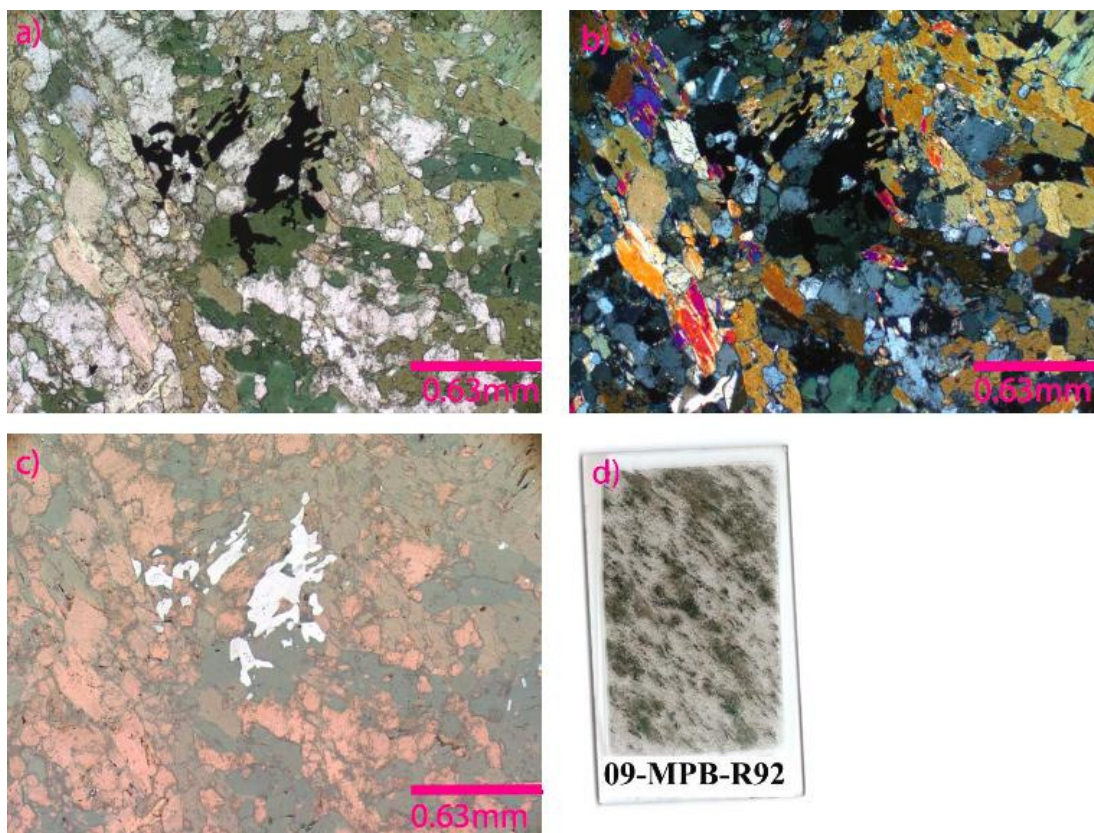


Plate 40. a) PTS image of 09-MPB-R92 in ppl showing matrix of sample. b) PTS image of 09-MPB-R92 in xpl. c) PTS image of 09-MPB-R92 in reflected light showing magnetite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R93

Location: Drillhole Hen-173, E: 417290.63, N: 7279944.38

Lithology: Massive sulphide; hand sample is brown-purple in colour (weathered sulphides). Two samples are described, with varying proportions of the sulphide mineral content.

09-MPB-R93A

Description: Sample consists of mainly sphalerite, pyrite, magnetite, chalcopyrite, and pyrrhotite; hand sample is weakly magnetic.

Minerals:

Sphalerite 25% – medium- to coarse-grained, occurring as anhedral masses that are red-brown in colour, translucent, occurs with magnetite crystals, medium grey, low reflectance, grain size ranges from 0.2 to 0.7 mm.

Pyrite 20% – medium- to coarse-grained, cubic to slightly anhedral in shape, occurring with chalcopyrite, magnetite and pyrrhotite, cream white to white in colour, high reflectance, grain size ranges from 0.2-1.3 mm.

Magnetite 15% – medium-grained, occurs as anhedral crystals, intergrown with sphalerite, pyrite, and chalcopyrite, medium grey, low reflectance, grain size 0.2-0.5 mm.

Chalcopyrite 15% – fine- to coarse-grained, yellow reflectance, medium reflectivity, occurs as both small grains found within pyrite and much larger grains that form large anhedral masses, anhedral masses 0.09-1.6 mm.

Biotite 10% – medium- to coarse-grained, sericite-altered elongated rectangular crystals, brown-green in ppl and higher order interference colours in xpl.

Pyrrhotite 5% – medium-grained, pinkish grains in the pyrite, high reflectance, anhedral in shape, grain size 0.2-0.4 mm.

Quartz 5% – fine- to medium-grained, undulatory extinction, anhedral crystals that are mainly occur with biotite.

Chlorite 5% – fine-grained crystals that are clear to green in ppl and dark blue in ppl.

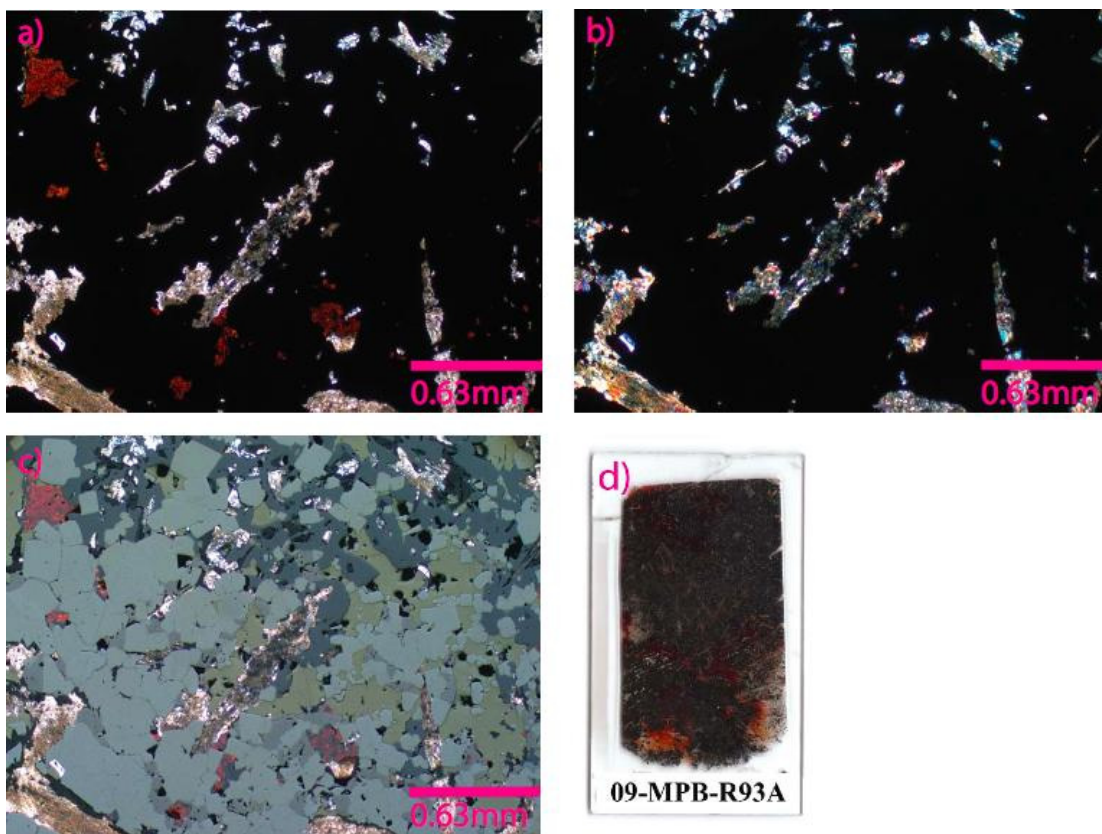


Plate 41. a) PTS image of 09-MPB-R93A in ppl showing very few gangue minerals. b) PTS image of 09-MBP-R93A in xpl. c) PTS image of 09-MPB-R93A in reflected light showing pyrite, chalcopyrite, sphalerite and pyrrhotite. d) Scanned image of thin section slide.

APPENDIX B2 continued.

09-MPB-R93B

Description: Sample is mainly massive sulphides with chalcopyrite, pyrite, pyrrhotite, sphalerite, and magnetite being the most prevalent. There are also a couple accessory minerals consisting of biotite, quartz, and chlorite.

Minerals:

Chalcopyrite 25% – coarse-grained, yellow reflectance, medium reflectivity, anhedral masses ranging from 0.8 to 5 mm.

Pyrite 25% – medium- to coarse-grained, occurs with the pyrrhotite as euhedral cubes, cream-white, grain size ranges from 0.4 to 1.2 mm.

Pyrrhotite 10% – medium- to coarse-grained, slightly pinkish, occurs within the pyrite and chalcopyrite, forms anhedral grains, grain size ranges from 0.2 to 0.6 mm.

Sphalerite 10% – medium-grained, grey, low reflectance, translucent, Fe-rich, brown-red-orange colour in ppl, forms anhedral masses that usually have magnetite inclusions, grain size ranges from 0.1-0.3 mm.

Magnetite 10% – medium- to coarse-grained, grey, low reflectance, occurs within the sphalerite as anhedral grains, grains range in size from 0.3 to 0.7 mm.

Biotite 10% – fine- to medium-grained, slightly brown in ppl and orange-brown in xpl, forms elongated crystals that are euhedral.

Quartz 5% – fine- to medium grains, interlocking anhedral grains that occur as rounded masses within the sulphides, undulatory extinction.

Chlorite 5% – fine-grained, green-white in ppl and blue in xpl, forms with quartz and biotite between the sulphide masses.

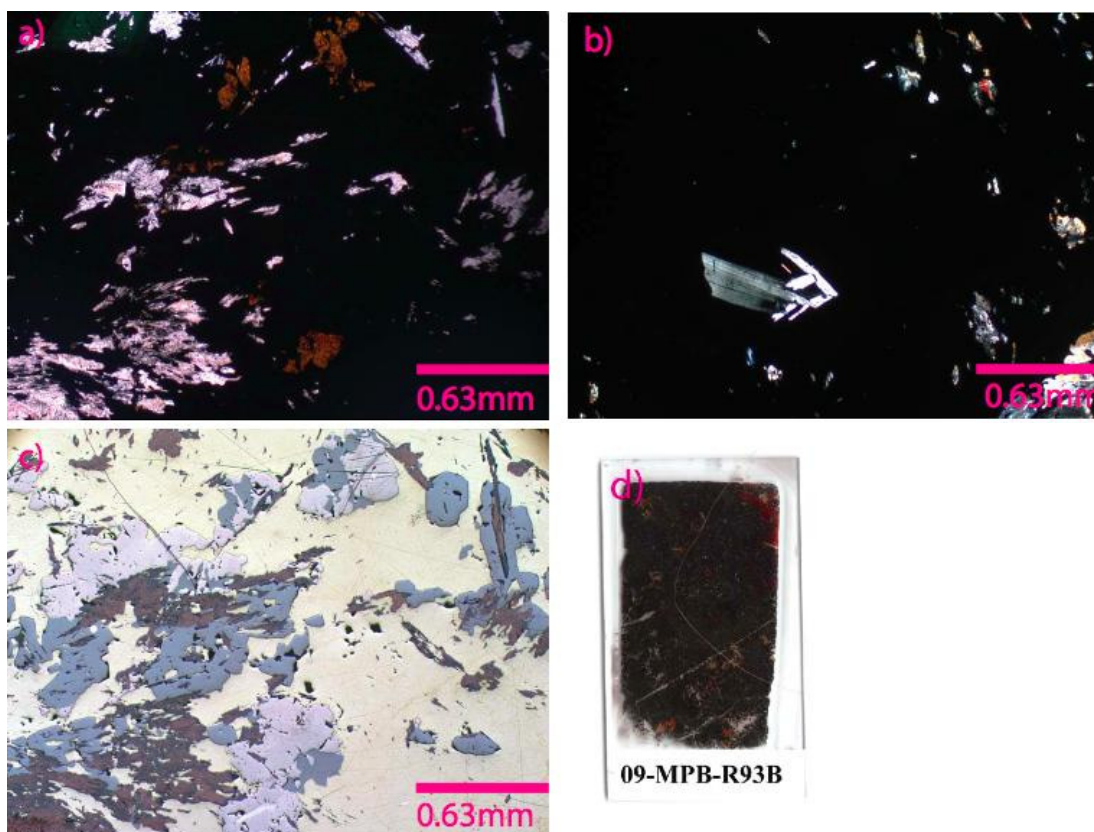


Plate 42. a) PTS image of 09-MPB-R93B in ppl showing very few gangue minerals. b) PTS of 09-MPB-R93B in xpl. c) PTS image of 09-MPB-R93B in reflected light showing massive chalcopyrite and finer grained magnetite, sphalerite and pyrite. d) Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R94

Location: Drillhole Her-6,
E: 418467.67, N: 7279346.57

Lithology: Felsic metavolcanic rock; hand sample is white-grey in colour with a medium-grained matrix.

Description: Sample consists of quartz, biotite, muscovite, and plagioclase with no sulphide minerals present.

Minerals:

Quartz 50% – fine- to medium-grained interlocking anhedral crystals that make up the majority of the matrix, undulatory extinction, generally occurs with plagioclase.

Biotite 20% – medium- to coarse-grained, brown elongated large crystals in ppl and orange-brown crystals in xpl that are rectangular and euhedral in shape.

Plagioclase 15% – fine- to medium-grained, lamellar twins, fine-grained anhedral crystals that are grow with quartz and comprise the matrix

Muscovite 15% – medium- to coarse-grained, elongated large crystals that are slightly coloured in ppl and high-order interference colours in xpl, euhedral and rectangular in shape, occurs as larger grains in a finer grained matrix of quartz and plagioclase (+/- sericite alteration).

Galena (tr.) - fine-grained, white in reflected light, high birefringence, grain sizes <0.1 mm.

Molybdenite (tr.) - fine-grained (<0.1 mm), blue-white in reflected light.

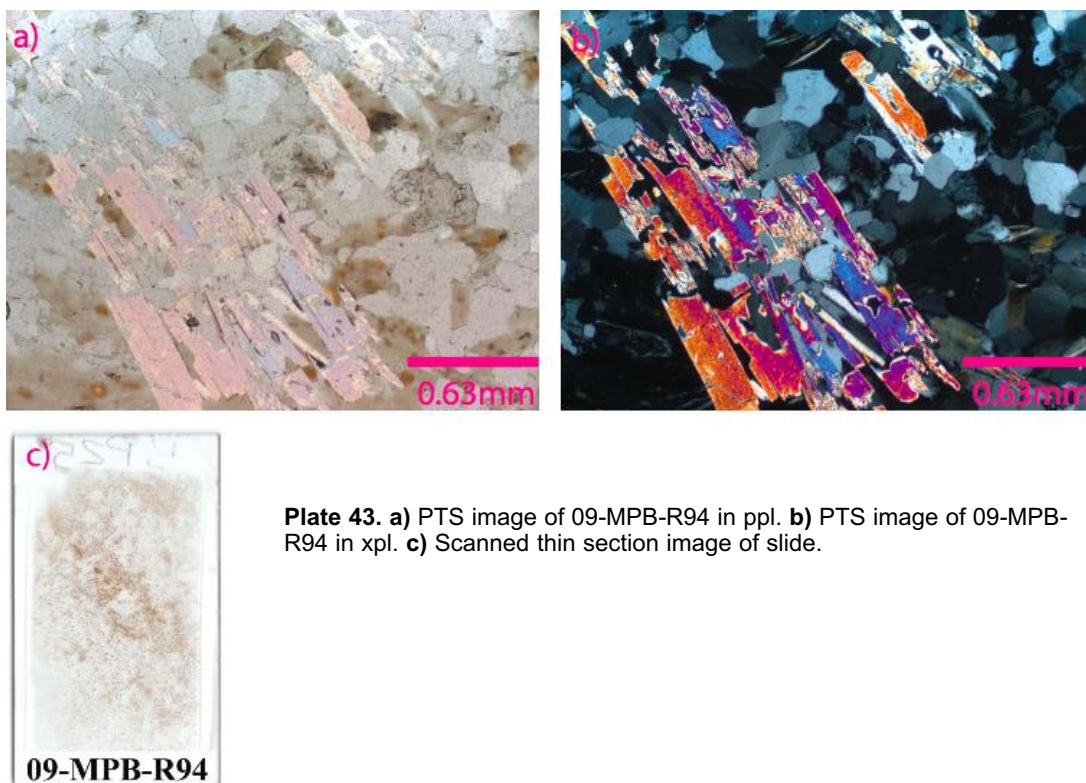


Plate 43. a) PTS image of 09-MPB-R94 in ppl. **b)** PTS image of 09-MPB-R94 in xpl. **c)** Scanned thin section image of slide.

APPENDIX B2 continued.

09-MPB-R95

Location: Drillhole Hen-306,
E: 418260.55, N: 7280852.44

Lithology: Metapelite; hand sample is white-grey in colour with a medium-grained groundmass.

Description: Sample consists mainly of a matrix of quartz and sericite alteration with larger grains of biotite and hornblende. Amphibolite-grade metamorphic rock.

Minerals:

Quartz 45% – fine- to medium-grained, rounded interlocking crystals that are anhedral in shape, comprises most of the matrix.

Microcline/Plagioclase 20% – very fine-grained, generally occurs between grains of quartz in the fine-grained matrix, original crystal shape and characteristics replaced by sericite alteration.

Biotite 15% – medium- to coarse-grained, brown elongate crystals in ppl, brown-orange-greenish in xpl with bird's eye extinction, forms rectangular crystals.

Hornblende 15% – medium-grained, pleochroic, distinctive cleavage angles, light brown to white in ppl and green-brown in ppl with no bird's eyes extinction, also forms elongate rectangular crystals.

Pyrite 5% – fine-grained (<0.1 mm) cream-white to white in colour in reflected light, high reflectance, euhedral grains.

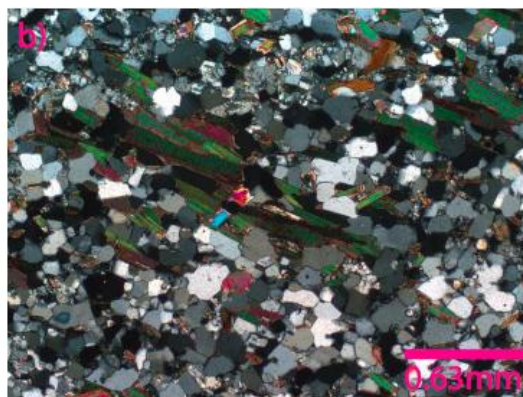


Plate 44. a) PTS image of 09-MPB-R95 in ppl showing fine-grained matrix with larger grains of quartz. b) PTS image of 09-MPB-R95 in xpl. c) Scanned thin section image of slide.

APPENDIX C1. Electron microprobe data for chalcopyrite grains in polished thin sections

Sample Number	Mount or Section	Mount/Section Number	Grain Number	Size	Mineral	Ag (wt%)	Ag (ppm)	S (wt%)	Fe (wt%)	Cu (wt%)	Total (wt%)
09-MPB-R10	Section	PTS 09-MPB-R10	1	n/a	Chalcopyrite	0.075	750.000	34.708	30.221	33.900	98.904
09-MPB-R10	Section	PTS 09-MPB-R10	2	n/a	Chalcopyrite	0.041	410.000	34.766	30.438	34.073	99.318
09-MPB-R10	Section	PTS 09-MPB-R10	3	n/a	Chalcopyrite	0.018	180.000	34.915	30.568	34.271	99.772
09-MPB-R10	Section	PTS 09-MPB-R10	4	n/a	Chalcopyrite	0.026	260.000	34.906	30.815	34.082	99.829
09-MPB-R10	Section	PTS 09-MPB-R10	5	n/a	Chalcopyrite	0.027	270.000	34.810	30.473	34.011	99.321
09-MPB-R10	Section	PTS 09-MPB-R10	6	n/a	Chalcopyrite	0.020	200.000	34.954	30.662	34.113	99.749
09-MPB-R10	Section	PTS 09-MPB-R10	7	n/a	Chalcopyrite	0.028	280.000	35.034	30.570	34.152	99.784
09-MPB-R10	Section	PTS 09-MPB-R10	8	n/a	Chalcopyrite	0.031	310.000	34.986	30.570	34.136	99.723
09-MPB-R10	Section	PTS 09-MPB-R10	9	n/a	Chalcopyrite	0.022	220.000	34.696	30.559	34.124	99.401
09-MPB-R10	Section	PTS 09-MPB-R10	10	n/a	Chalcopyrite	0.021	210.000	35.036	30.050	34.098	99.205
09-MPB-R20	Section	PTS 09-MPB-R20	1	n/a	Chalcopyrite	0.014	140.000	34.760	30.546	34.550	99.870
09-MPB-R20	Section	PTS 09-MPB-R20	2	n/a	Chalcopyrite	0.013	130.000	34.851	30.628	34.361	99.853
09-MPB-R20	Section	PTS 09-MPB-R20	3	n/a	Chalcopyrite	0.015	150.000	34.872	30.621	34.285	99.793
09-MPB-R20	Section	PTS 09-MPB-R20	4	n/a	Chalcopyrite	0.039	390.000	34.876	30.588	34.472	99.975
09-MPB-R20	Section	PTS 09-MPB-R20	5	n/a	Chalcopyrite	0.026	260.000	34.851	30.501	34.443	99.821
09-MPB-R20	Section	PTS 09-MPB-R20	6	n/a	Chalcopyrite	0.018	180.000	34.839	30.615	34.556	100.028
09-MPB-R20	Section	PTS 09-MPB-R20	7	n/a	Chalcopyrite	0.020	200.000	34.817	30.820	34.078	99.735
09-MPB-R20	Section	PTS 09-MPB-R20	8	n/a	Chalcopyrite	0.000	0.000	34.920	30.487	34.473	99.880
09-MPB-R20	Section	PTS 09-MPB-R20	9	n/a	Chalcopyrite	0.022	220.000	35.065	30.601	34.159	99.847
09-MPB-R20	Section	PTS 09-MPB-R20	10	n/a	Chalcopyrite	0.023	230.000	35.272	30.823	34.210	100.328
09-MPB-R19	Section	PTS 09-MPB-R19	1	n/a	Chalcopyrite	0.053	530.000	34.823	30.822	34.229	99.927
09-MPB-R19	Section	PTS 09-MPB-R19	2	n/a	Chalcopyrite	0.041	410.000	34.811	30.685	34.282	99.819
09-MPB-R19	Section	PTS 09-MPB-R19	3	n/a	Chalcopyrite	0.036	360.000	34.957	30.686	34.177	99.856
09-MPB-R19	Section	PTS 09-MPB-R19	4	n/a	Chalcopyrite	0.039	390.000	34.974	30.769	34.209	99.991
09-MPB-R19	Section	PTS 09-MPB-R19	5	n/a	Chalcopyrite	0.043	430.000	34.847	30.687	34.180	99.757
09-MPB-R19	Section	PTS 09-MPB-R19	6	n/a	Chalcopyrite	0.040	400.000	34.660	30.316	33.995	99.011
09-MPB-R19	Section	PTS 09-MPB-R19	7	n/a	Chalcopyrite	0.039	390.000	35.010	30.678	34.262	99.989
09-MPB-R19	Section	PTS 09-MPB-R19	8	n/a	Chalcopyrite	0.030	300.000	34.891	30.662	34.127	99.710
09-MPB-R19	Section	PTS 09-MPB-R19	9	n/a	Chalcopyrite	0.029	290.000	34.877	30.763	34.141	99.810
09-MPB-R19	Section	PTS 09-MPB-R19	10	n/a	Chalcopyrite	0.033	330.000	34.761	30.750	34.160	99.704
09-MPB-R24	Section	PTS 09-MPB-R24	1	n/a	Chalcopyrite	0.025	250.000	34.825	30.449	34.091	99.390
09-MPB-R24	Section	PTS 09-MPB-R24	2	n/a	Chalcopyrite	0.028	280.000	34.721	30.284	33.974	99.007
09-MPB-R24	Section	PTS 09-MPB-R24	3	n/a	Chalcopyrite	0.025	250.000	34.544	30.435	34.137	99.141
09-MPB-R24	Section	PTS 09-MPB-R24	4	n/a	Chalcopyrite	0.029	290.000	34.786	30.576	34.027	99.418
09-MPB-R24	Section	PTS 09-MPB-R24	5	n/a	Chalcopyrite	0.027	270.000	34.734	30.608	34.124	99.493
09-MPB-R24	Section	PTS 09-MPB-R24	6	n/a	Chalcopyrite	0.030	300.000	34.789	30.660	34.099	99.578
09-MPB-R24	Section	PTS 09-MPB-R24	7	n/a	Chalcopyrite	0.031	310.000	34.933	30.713	34.175	99.852
09-MPB-R24	Section	PTS 09-MPB-R24	8	n/a	Chalcopyrite	0.033	330.000	34.938	30.690	34.301	99.962
09-MPB-R24	Section	PTS 09-MPB-R24	9	n/a	Chalcopyrite	0.034	340.000	34.948	30.788	34.229	99.999
09-MPB-R24	Section	PTS 09-MPB-R24	10	n/a	Chalcopyrite	0.029	290.000	34.870	30.618	34.093	99.610
09-MPB-R62	Section	PTS 09-MPB-R62	1	n/a	Chalcopyrite	0.045	450.000	34.969	30.305	34.229	99.548
09-MPB-R62	Section	PTS 09-MPB-R62	2	n/a	Chalcopyrite	0.046	460.000	34.788	30.413	34.019	99.266
09-MPB-R62	Section	PTS 09-MPB-R62	3	n/a	Chalcopyrite	0.047	470.000	34.925	30.018	34.052	99.042
09-MPB-R62	Section	PTS 09-MPB-R62	4	n/a	Chalcopyrite	0.057	570.000	34.859	30.215	34.169	99.300
09-MPB-R62	Section	PTS 09-MPB-R62	5	n/a	Chalcopyrite	0.036	360.000	34.775	30.101	33.878	98.790
09-MPB-R62	Section	PTS 09-MPB-R62	6	n/a	Chalcopyrite	0.044	440.000	34.711	30.326	33.933	99.014
09-MPB-R62	Section	PTS 09-MPB-R62	7	n/a	Chalcopyrite	0.094	940.000	34.814	30.459	34.281	99.648
09-MPB-R62	Section	PTS 09-MPB-R62	8	n/a	Chalcopyrite	0.027	270.000	34.811	30.215	34.006	99.059
09-MPB-R62	Section	PTS 09-MPB-R62	9	n/a	Chalcopyrite	0.053	530.000	34.900	30.474	34.074	99.501
09-MPB-R62	Section	PTS 09-MPB-R62	10	n/a	Chalcopyrite	0.046	460.000	35.006	30.176	34.120	99.348
09-MPB-R60	Section	PTS 09-MPB-R60	1	n/a	Chalcopyrite	0.020	200.000	34.882	30.120	33.701	98.723
09-MPB-R60	Section	PTS 09-MPB-R60	2	n/a	Chalcopyrite	0.015	150.000	35.044	29.989	33.765	98.813

Indicator Mineral Signatures of the Izok Lake Deposit, Nunavut: Part 1 Bedrock Samples

Sample Number	Mount or Section	Mount/Section Number	Grain Number	Size	Mineral	Ag (wt%)	Ag (ppm)	S (wt%)	Fe (wt%)	Cu (wt%)	Total (wt%)
09-MPB-R60	Section	PTS 09-MPB-R60	3	n/a	Chalcopyrite	0.030	300.000	34.932	29.818	33.721	98.501
09-MPB-R60	Section	PTS 09-MPB-R60	4	n/a	Chalcopyrite	0.037	370.000	34.987	29.879	33.707	98.610
09-MPB-R60	Section	PTS 09-MPB-R60	5	n/a	Chalcopyrite	0.036	360.000	35.046	29.994	33.636	98.712
09-MPB-R60	Section	PTS 09-MPB-R60	6	n/a	Chalcopyrite	0.044	440.000	34.985	29.858	33.845	98.732
09-MPB-R60	Section	PTS 09-MPB-R60	7	n/a	Chalcopyrite	0.015	150.000	34.781	30.030	33.598	98.424
09-MPB-R60	Section	PTS 09-MPB-R60	8	n/a	Chalcopyrite	0.012	120.000	34.877	30.240	33.653	98.782
09-MPB-R60	Section	PTS 09-MPB-R60	9	n/a	Chalcopyrite	0.019	190.000	34.915	30.272	33.470	98.676
09-MPB-R60	Section	PTS 09-MPB-R60	10	n/a	Chalcopyrite	0.017	170.000	34.912	29.837	33.498	98.264
09-MPB-R22	Section	PTS 09-MPB-R22	1	n/a	Chalcopyrite	0.057	570.000	34.844	30.290	34.383	99.574
09-MPB-R22	Section	PTS 09-MPB-R22	2	n/a	Chalcopyrite	0.035	350.000	34.976	30.067	34.380	99.458
09-MPB-R22	Section	PTS 09-MPB-R22	3	n/a	Chalcopyrite	0.052	520.000	35.056	30.135	34.006	99.249
09-MPB-R22	Section	PTS 09-MPB-R22	4	n/a	Chalcopyrite	0.046	460.000	34.847	29.597	33.929	98.419
09-MPB-R22	Section	PTS 09-MPB-R22	5	n/a	Chalcopyrite	0.045	450.000	34.895	30.381	34.275	99.596
09-MPB-R22	Section	PTS 09-MPB-R22	6	n/a	Chalcopyrite	0.060	600.000	34.899	30.409	34.125	99.493
09-MPB-R22	Section	PTS 09-MPB-R22	7	n/a	Chalcopyrite	0.057	570.000	34.860	30.518	34.376	99.811
09-MPB-R22	Section	PTS 09-MPB-R22	8	n/a	Chalcopyrite	0.037	370.000	34.912	30.442	34.543	99.934
09-MPB-R22	Section	PTS 09-MPB-R22	9	n/a	Chalcopyrite	0.044	440.000	35.130	30.273	34.242	99.689
09-MPB-R22	Section	PTS 09-MPB-R22	10	n/a	Chalcopyrite	0.113	1130.000	34.947	30.094	34.065	99.219
09-MPB-R54	Section	PTS 09-MPB-R54	1	n/a	Chalcopyrite	0.010	100.000	34.994	30.652	34.122	99.778
09-MPB-R54	Section	PTS 09-MPB-R54	2	n/a	Chalcopyrite	0.009	90.000	35.020	30.604	34.178	99.811
09-MPB-R54	Section	PTS 09-MPB-R54	3	n/a	Chalcopyrite	0.046	460.000	35.034	30.726	34.018	99.824
09-MPB-R54	Section	PTS 09-MPB-R54	4	n/a	Chalcopyrite	0.055	550.000	34.967	30.274	34.205	99.501
09-MPB-R54	Section	PTS 09-MPB-R54	5	n/a	Chalcopyrite	0.016	160.000	34.976	30.132	34.091	99.215
09-MPB-R54	Section	PTS 09-MPB-R54	6	n/a	Chalcopyrite	0.056	560.000	34.903	30.905	34.100	99.964
09-MPB-R54	Section	PTS 09-MPB-R54	7	n/a	Chalcopyrite	0.052	520.000	34.967	30.595	34.217	99.831
09-MPB-R54	Section	PTS 09-MPB-R54	8	n/a	Chalcopyrite	0.076	760.000	34.858	30.628	34.228	99.790
09-MPB-R54	Section	PTS 09-MPB-R54	9	n/a	Chalcopyrite	0.035	350.000	34.882	30.394	34.369	99.680
09-MPB-R54	Section	PTS 09-MPB-R54	10	n/a	Chalcopyrite	0.052	520.000	34.934	30.775	34.170	99.931
09-MPB-R93A	Section	PTS 09-MPB-R93A	1	n/a	Chalcopyrite	0.075	750.000	34.854	29.867	33.987	98.783
09-MPB-R93A	Section	PTS 09-MPB-R93A	2	n/a	Chalcopyrite	0.076	760.000	34.769	30.104	33.859	98.808
09-MPB-R93A	Section	PTS 09-MPB-R93A	3	n/a	Chalcopyrite	0.044	440.000	35.029	30.114	34.115	99.302
09-MPB-R93A	Section	PTS 09-MPB-R93A	4	n/a	Chalcopyrite	0.055	550.000	34.961	30.261	33.867	99.144
09-MPB-R93A	Section	PTS 09-MPB-R93A	5	n/a	Chalcopyrite	0.080	800.000	34.913	30.072	33.864	98.929
09-MPB-R93A	Section	PTS 09-MPB-R93A	6	n/a	Chalcopyrite	0.050	500.000	35.319	30.282	33.872	99.523
09-MPB-R93A	Section	PTS 09-MPB-R93A	7	n/a	Chalcopyrite	0.055	550.000	34.840	30.324	33.747	98.966
09-MPB-R93A	Section	PTS 09-MPB-R93A	8	n/a	Chalcopyrite	0.058	580.000	34.942	30.228	33.928	99.156
09-MPB-R93A	Section	PTS 09-MPB-R93A	9	n/a	Chalcopyrite	0.066	660.000	34.993	30.227	33.847	99.133
09-MPB-R93A	Section	PTS 09-MPB-R93A	10	n/a	Chalcopyrite	0.041	410.000	35.239	30.356	33.906	99.542

Appendix C2. Electron microprobe data for gahnite in polished thin section and grain mounts. "FeO*" values are the raw FeO data and "FeO (new)" values are the recalculated values that take combine the Fe⁺³ and Fe⁺² component

Sample Number	Mount or Section?	Mount or Section Number	Grain Number	Size (mm)	Mineral	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₅	Cr ₂ O ₃	Nb ₂ O ₅	MgO	CaO	MnO	FeO*	NiO	ZnO	Total	Fe ₂ O ₃	FeO (new)	TOTAL
09-MPB-R37	Section	PTS 09-MPB-R37	1	n/a	Gahnite	blue-green	0.039	0.000	56.145	0.000	0.000	0.022	2.081	0.004	0.381	9.616	0.004	31.508	99.801	1.388	8.367	99.940
09-MPB-R37	Section	PTS 09-MPB-R37	2	n/a	Gahnite	blue-green	0.047	0.000	56.235	0.000	0.006	0.011	1.830	0.000	0.374	9.413	0.000	32.047	99.962	1.185	8.347	100.080
09-MPB-R37	Section	PTS 09-MPB-R37	3	n/a	Gahnite	blue-green	0.031	0.000	55.912	0.000	0.010	0.035	1.767	0.000	0.372	9.533	0.002	32.010	99.673	1.356	8.313	99.809
09-MPB-R37	Section	PTS 09-MPB-R37	4	n/a	Gahnite	blue-green	0.038	0.000	56.107	0.003	0.000	0.020	1.835	0.000	0.374	9.475	0.003	31.997	99.851	1.289	8.315	99.981
09-MPB-R37	Section	PTS 09-MPB-R37	5	n/a	Gahnite	blue-green	0.044	0.000	56.126	0.002	0.000	0.009	2.253	0.002	0.367	9.680	0.000	31.566	100.049	1.687	8.162	100.218
09-MPB-R37	Section	PTS 09-MPB-R37	6	n/a	Gahnite	blue-green	0.070	0.000	55.905	0.000	0.008	0.015	2.190	0.005	0.377	9.608	0.000	31.343	99.519	1.481	8.275	99.668
09-MPB-R37	Section	PTS 09-MPB-R37	7	n/a	Gahnite	blue-green	0.042	0.000	56.351	0.004	0.002	0.008	2.287	0.003	0.365	9.469	0.000	31.666	100.198	1.525	8.096	100.351
09-MPB-R37	Section	PTS 09-MPB-R37	8	n/a	Gahnite	blue-green	0.043	0.003	56.204	0.004	0.008	0.001	2.234	0.004	0.361	9.181	0.001	31.837	99.881	1.424	7.900	100.023
09-MPB-R37	Section	PTS 09-MPB-R37	9	n/a	Gahnite	blue-green	0.045	0.003	56.340	0.000	0.003	0.000	2.394	0.000	0.377	9.303	0.000	31.187	99.651	1.237	8.190	99.775
09-MPB-R37	Section	PTS 09-MPB-R37	10	n/a	Gahnite	blue-green	0.054	0.013	56.263	0.001	0.010	0.000	2.409	0.000	0.369	9.250	0.000	31.163	99.532	1.202	8.168	99.652
09-MPB-R37	Section	PTS 09-MPB-R37	11	n/a	Gahnite	blue-green	0.044	0.000	56.368	0.001	0.000	0.028	2.398	0.000	0.366	9.348	0.005	31.087	99.645	1.192	8.275	99.765
09-MPB-R37	Section	PTS 09-MPB-R37	12	n/a	Gahnite	blue-green	0.085	0.000	56.176	0.000	0.004	0.038	2.305	0.000	0.362	9.297	0.000	31.427	99.693	1.269	8.155	99.820
09-MPB-R41f	Section	PTS 09-MPB-R41f	1	n/a	Gahnite	blue-green	0.034	0.000	56.669	0.001	0.012	0.005	2.336	0.004	0.415	11.878	0.000	28.337	99.689	1.083	10.903	99.798
09-MPB-R41f	Section	PTS 09-MPB-R41f	2	n/a	Gahnite	blue-green	0.061	0.000	56.450	0.000	0.000	0.040	2.303	0.000	0.417	12.147	0.002	27.884	99.304	1.005	11.242	99.405
09-MPB-R41f	Section	PTS 09-MPB-R41f	3	n/a	Gahnite	blue-green	0.035	0.000	57.005	0.004	0.009	0.042	2.400	0.005	0.435	11.873	0.000	28.387	100.195	1.026	10.950	100.298
09-MPB-R41f	Section	PTS 09-MPB-R41f	4	n/a	Gahnite	blue-green	0.044	0.000	56.783	0.000	0.000	0.017	2.398	0.000	0.411	12.227	0.000	27.878	99.757	1.041	11.290	99.861
09-MPB-R41f	Section	PTS 09-MPB-R41f	5	n/a	Gahnite	blue-green	0.034	0.000	56.135	0.000	0.000	0.028	2.339	0.004	0.401	11.726	0.000	29.253	99.920	1.841	10.069	100.104
09-MPB-R41f	Section	PTS 09-MPB-R41f	6	n/a	Gahnite	blue-green	0.036	0.000	56.658	0.000	0.000	0.022	2.385	0.000	0.395	11.534	0.000	28.856	99.886	1.217	10.440	100.008
09-MPB-R61	Section	PTS 09-MPB-R61	1	n/a	Gahnite	blue-green	0.030	0.000	56.595	0.001	0.000	0.020	2.660	0.000	0.759	13.410	0.001	26.657	100.133	1.848	11.746	100.318
09-MPB-R61	Section	PTS 09-MPB-R61	2	n/a	Gahnite	blue-green	0.026	0.003	57.247	0.000	0.000	0.005	3.065	0.000	0.728	12.819	0.002	26.350	100.246	1.388	11.569	100.386
09-MPB-R61	Section	PTS 09-MPB-R61	3	n/a	Gahnite	blue-green	0.021	0.000	56.663	0.000	0.014	0.019	2.445	0.000	0.464	8.300	0.000	32.615	100.539	1.430	7.013	100.682
09-MPB-R61	Section	PTS 09-MPB-R61	4	n/a	Gahnite	blue-green	0.035	0.000	56.183	0.000	0.000	0.011	2.467	0.000	0.464	8.296	0.001	32.221	99.677	1.432	7.007	99.821
09-MPB-R61	Section	PTS 09-MPB-R61	5	n/a	Gahnite	blue-green	0.041	0.000	56.519	0.002	0.000	0.020	2.545	0.011	0.455	7.914	0.000	32.501	100.008	1.248	6.791	100.133
09-MPB-R61	Section	PTS 09-MPB-R61	6	n/a	Gahnite	blue-green	0.037	0.000	56.113	0.000	0.000	0.017	2.709	0.006	0.471	8.788	0.000	32.068	100.207	2.057	6.937	100.413
09-MPB-R61	Section	PTS 09-MPB-R61	7	n/a	Gahnite	blue-green	0.038	0.000	56.001	0.000	0.000	0.041	2.678	0.004	0.480	8.635	0.000	31.959	99.835	1.888	6.936	100.024
09-MPB-R61	Section	PTS 09-MPB-R61	8	n/a	Gahnite	blue-green	0.031	0.000	56.268	0.000	0.000	0.034	2.611	0.000	0.471	8.337	0.002	32.109	99.866	1.533	6.957	100.019
09-MPB-R61	Section	PTS 09-MPB-R61	9	n/a	Gahnite	blue-green	0.031	0.000	56.078	0.000	0.009	0.034	2.591	0.000	0.484	8.599	0.002	32.361	100.190	1.981	6.817	100.388
09-MPB-R61	Section	PTS 09-MPB-R61	10	n/a	Gahnite	blue-green	0.051	0.001	55.588	0.000	0.000	0.024	2.621	0.000	0.474	8.717	0.000	31.948	99.425	2.052	6.870	99.630
09-MPB-R61	Section	PTS 09-MPB-R61	1	n/a	Gahnite	blue-green	0.038	0.000	56.253	0.003	0.000	0.013	2.654	0.000	0.464	8.400	0.001	32.330	100.155	1.782	6.797	100.334
09-MPB-R61	Section	PTS 09-MPB-R61	2	n/a	Gahnite	blue-green	0.045	0.000	56.555	0.001	0.000	0.035	2.611	0.003	0.440	7.832	0.000	32.494	100.016	1.224	6.731	100.138
09-MPB-R61	Section	PTS 09-MPB-R61	3	n/a	Gahnite	blue-green	0.037	0.000	56.010	0.007	0.000	0.030	2.661	0.000	0.463	8.466	0.000	32.159	99.834	1.851	6.801	100.020
09-MPB-R61	Section	PTS 09-MPB-R61	4	n/a	Gahnite	blue-green	0.042	0.017	55.912	0.002	0.000	0.031	2.624	0.005	0.472	8.666	0.000	31.923	99.693	1.829	7.020	99.876
09-MPB-R61	Section	PTS 09-MPB-R61	5	n/a	Gahnite	blue-green	0.046	0.000	55.931	0.001	0.012	0.010	2.620	0.008	0.468	8.569	0.000	32.220	99.887	1.952	6.812	100.082
09-MPB-R61	Section	PTS 09-MPB-R61	6	n/a	Gahnite	blue-green	0.034	0.000	56.570	0.001	0.000	0.039	2.643	0.000	0.453	8.225	0.000	32.208	100.172	1.386	6.978	100.311
09-MPB-R61	Section	PTS 09-MPB-R61	7	n/a	Gahnite	blue-green	0.047	0.003	56.701	0.000	0.000	0.023	2.557	0.000	0.454	7.846	0.002	32.429	100.063	1.049	6.903	100.168
09-MPB-R61	Section	PTS 09-MPB-R61	8	n/a	Gahnite	blue-green	0.041	0.000	55.922	0.000	0.000	0.000	2.613	0.000	0.456	8.530	0.000	32.271	99.833	1.951	6.774	100.029
09-MPB-R61	Section	PTS 09-MPB-R61	9	n/a	Gahnite	blue-green	0.044	0.000	55.806	0.006	0.006	0.016	2.559	0.001	0.480	8.592	0.000	32.186	99.696	1.938	6.849	99.890
09-MPB-R61	Section	PTS 09-MPB-R61	10	n/a	Gahnite	blue-green	0.036	0.000	55.638	0.000	0.000	0.007	2.587	0.002	0.468	8.501	0.000	32.318	99.555	2.092	6.618	99.765
09-MPB-R61	Section	PTS 09-MPB-R61	11	n/a	Gahnite	blue-green	0.039	0.000	55.911	0.000	0.020	0.010	2.629	0.006	0.471	8.617	0.000	31.978	99.680	1.861	6.942	99.867
09-MPB-R61	Section	PTS 09-MPB-R61	12	n/a	Gahnite	blue-green	0.030	0.000	55.788	0.000	0.000	0.025	2.670	0.002	0.468	8.656	0.000	32.106	99.753	2.091	6.774	99.963
09-MPB-R61	Section	PTS 09-MPB-R61	13	n/a	Gahnite	blue-green	0.038	0.000	55.620	0.000	0.008	0.004	2.587	0.000	0.466	8.386	0.000	32.317	99.426	2.008	6.580	99.627
09-MPB-R61	Section	PTS 09-MPB-R61	14	n/a	Gahnite	blue-green	0.029	0.000	55.678	0.001	0.000	0.013	2.727	0.002	0.479	8.566	0.000	32.418	99.913	2.388	6.417	100.153
09-MPB-R63	Section	PTS 09-MPB-R63	1	n/a	Gahnite	blue-green	0.049	0.018	56.141	0.002	0.000	0.000	2.325	0.000	0.448	8.000	0.000	33.294	100.276	1.689	6.480	100.445
09-MPB-R63	Section	PTS 09-MPB-R63	2	n/a	Gahnite	blue-green	0.045	0.000	55.541	0.002	0.000	0.019	2.309	0.002	0.454	8.201	0.002	33.416	99.993	2.243	6.182	100.217
09-MPB-R63	Section	PTS 09-MPB-R63	3	n/a	Gahnite	blue-green	0.053	0.000	55.751	0.000	0.000	0.028	2.244	0.005	0.441	7.829	0.002	32.645	99.000	1.247	6.707	99.125
09-MPB-R63	Section	PTS 09-MPB-R63	4	n/a	Gahnite	blue-green	0.056	0.002	56.285	0.006	0.000	0.000	2.179	0.000	0.445	7.635	0.002	32.854	99.466	0.869	6.854	99.553
09-MPB-R63	Section	PTS 09-MPB-R63	5	n/a	Gahnite	blue-green	0.044	0.000	55.841	0.000	0.015	0.000	2.203	0.000	0.455	7.847	0.003	33.265	99.673	1.588	6.418	99.832
09-MPB-R63	Section	PTS 09-MPB-R63	6	n/a	Gahnite	blue-green	0.039	0.001	55.794	0.003	0.003	0.043	2.121	0.001	0.453	7.693	0.000	33.695	99.848	1.669	6.192	100.015
09-MPB-R63	Section	PTS 09-MPB-R63	7	n/a	Gahnite	blue-green	0.056	0.000	56.180	0.000	0.000	0.000	2.337	0.000	0.451	8.024	0.000	33.470	100.517	1.831	6.376	100.701

Indicator Mineral Signatures of the Izok Lake Deposit, Nunavut: Part 1 Bedrock Samples

Appendix C2 continued.

Sample Number	Mount or Section?	Mount or Section Number	Grain Number	Size (mm)	Mineral	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₅	Cr ₂ O ₃	Nb ₂ O ₅	MgO	CaO	MnO	FeO*	NiO	ZnO	Total	Fe ₂ O ₃	FeO (new)	TOTAL	
09-MPB-R63	Section	PTS 09-MPB-R63	8	n/a	Gahnite	blue-green	0.065	0.000	55.877	0.000	0.009	0.011	2.104	0.002	0.457	7.694	0.000	33.393	99.611	1.373	6.459	99.749	
09-MPB-R69	Section	PTS 09-MPB-R69	1	n/a	Gahnite	blue-green	0.042	0.000	55.854	0.000	0.000	0.030	1.551	0.000	0.574	9.842	0.002	31.847	99.742	1.361	8.617	99.878	
09-MPB-R69	Section	PTS 09-MPB-R69	2	n/a	Gahnite	blue-green	0.046	0.000	55.828	0.006	0.015	0.012	1.556	0.004	0.598	9.711	0.000	31.390	99.165	0.994	8.816	99.264	
09-MPB-R69	Section	PTS 09-MPB-R69	3	n/a	Gahnite	blue-green	0.044	0.000	55.972	0.000	0.000	0.027	1.527	0.002	0.594	9.879	0.000	31.981	100.026	1.395	8.624	100.166	
09-MPB-R69	Section	PTS 09-MPB-R69	4	n/a	Gahnite	blue-green	0.046	0.007	55.763	0.000	0.000	0.018	1.547	0.000	0.579	9.940	0.000	32.085	99.984	1.620	8.482	100.146	
09-MPB-R69	Section	PTS 09-MPB-R69	5	n/a	Gahnite	blue-green	0.047	0.000	55.779	0.000	0.003	0.025	1.515	0.005	0.579	9.885	0.000	32.155	99.994	1.586	8.458	100.153	
09-MPB-R69	Section	PTS 09-MPB-R69	6	n/a	Gahnite	blue-green	0.047	0.000	55.455	0.000	0.000	0.012	1.400	0.004	0.580	9.405	0.001	31.807	98.710	1.021	8.486	98.813	
09-MPB-R69	Section	PTS 09-MPB-R69	7	n/a	Gahnite	blue-green	0.050	0.006	55.978	0.001	0.005	0.035	1.442	0.000	0.595	9.561	0.002	32.606	100.280	1.431	8.273	100.423	
09-MPB-R69	Section	PTS 09-MPB-R69	8	n/a	Gahnite	blue-green	0.081	0.000	55.882	0.008	0.010	0.022	1.331	0.000	0.633	9.999	0.000	31.845	99.811	1.140	8.973	99.925	
09-MPB-R69	Section	PTS 09-MPB-R69	9	n/a	Gahnite	blue-green	0.053	0.000	55.992	0.006	0.000	0.012	1.612	0.000	0.601	9.728	0.000	32.209	100.214	1.522	8.359	100.366	
09-MPB-R69	Section	PTS 09-MPB-R69	10	n/a	Gahnite	blue-green	0.039	0.000	56.111	0.002	0.016	0.009	1.527	0.004	0.587	9.668	0.000	32.211	100.173	1.321	8.480	100.306	
09-MPB-R69	Section	PTS 09-MPB-R69	11	n/a	Gahnite	blue-green	0.076	0.000	55.126	0.000	0.002	0.056	1.524	0.000	0.581	10.002	0.000	31.090	98.457	1.266	8.863	98.584	
09-MPB-R69	Section	PTS 09-MPB-R69	12	n/a	Gahnite	blue-green	0.063	0.016	55.612	0.005	0.002	0.021	1.516	0.000	0.589	9.679	0.000	31.874	99.376	1.286	8.521	99.504	
09-MPB-R41	Mount	10-0591-P01	31	0.25-0.50	Gahnite	blue-green	0.068	0.001	56.657	0.000	0.000	0.000	0.021	2.485	0.000	0.397	11.431	0.000	28.795	99.856	1.176	10.373	99.973
09-MPB-R41	Mount	10-0591-P01	32	0.25-0.50	Gahnite	blue-green	0.043	0.002	56.276	0.000	0.000	0.018	2.242	0.002	0.415	12.644	0.001	28.136	99.779	1.581	11.221	99.937	
09-MPB-R41	Mount	10-0591-P01	33	0.25-0.50	Gahnite	blue-green	0.055	0.000	56.423	0.002	0.000	0.010	2.279	0.000	0.422	12.785	0.000	28.283	100.258	1.740	11.219	100.432	
09-MPB-R41	Mount	10-0591-P01	34	0.25-0.50	Gahnite	blue-green	0.073	0.000	56.283	0.000	0.000	0.014	2.101	0.002	0.388	11.527	0.000	29.082	99.470	1.113	10.526	99.582	
09-MPB-R41	Mount	10-0591-P01	35	0.25-0.50	Gahnite	blue-green	0.060	0.000	56.445	0.001	0.000	0.026	2.289	0.005	0.446	13.315	0.003	27.572	100.163	1.682	11.801	100.332	
09-MPB-R41	Mount	10-0591-P01	36	0.25-0.50	Gahnite	blue-green	0.097	0.000	56.351	0.000	0.000	0.015	2.126	0.000	0.411	12.487	0.005	28.811	100.302	1.620	11.029	100.465	
09-MPB-R41	Mount	10-0591-P01	37	0.25-0.50	Gahnite	blue-green	0.054	0.005	56.149	0.000	0.011	0.024	2.135	0.000	0.410	12.510	0.000	28.570	99.868	1.658	11.018	100.034	
09-MPB-R41	Mount	10-0591-P01	38	0.25-0.50	Gahnite	blue-green	0.060	0.000	56.642	0.000	0.014	0.022	2.440	0.000	0.403	12.317	0.000	28.484	100.381	1.592	10.884	100.541	
09-MPB-R41	Mount	10-0591-P01	39	0.25-0.50	Gahnite	blue-green	0.066	0.000	56.267	0.003	0.000	0.015	2.095	0.000	0.402	12.510	0.000	28.975	100.331	1.790	10.899	100.510	
09-MPB-R41	Mount	10-0591-P01	40	0.25-0.50	Gahnite	blue-green	0.044	0.000	55.748	0.000	0.006	0.042	2.085	0.001	0.412	12.300	0.000	29.059	99.697	1.988	10.512	99.896	
09-MPB-R41	Mount	10-0591-P01	41	0.25-0.50	Gahnite	blue-green	0.068	0.000	56.573	0.000	0.000	0.013	2.287	0.000	0.413	12.083	0.000	28.593	100.030	1.327	10.889	100.163	
09-MPB-R41	Mount	10-0591-P01	42	0.25-0.50	Gahnite	blue-green	0.052	0.000	56.507	0.000	0.000	0.014	2.263	0.000	0.404	12.520	0.000	28.381	100.142	1.533	11.141	100.295	
09-MPB-R41	Mount	10-0591-P01	43	0.25-0.50	Gahnite	blue-green	0.045	0.000	56.476	0.000	0.002	0.011	2.071	0.003	0.397	12.155	0.003	29.038	100.201	1.468	10.834	100.349	
09-MPB-R41	Mount	10-0591-P01	44	0.25-0.50	Gahnite	blue-green	0.059	0.000	56.515	0.000	0.004	0.008	2.261	0.000	0.401	11.693	0.001	28.875	99.817	1.224	10.592	99.939	
09-MPB-R41	Mount	10-0591-P01	45	0.25-0.50	Gahnite	blue-green	0.053	0.003	56.253	0.003	0.006	0.028	2.234	0.001	0.433	12.694	0.000	28.093	99.800	1.581	11.271	99.959	
09-MPB-R41	Mount	10-0591-P01	46	0.25-0.50	Gahnite	blue-green	0.074	0.000	56.270	0.000	0.000	0.011	2.380	0.000	0.388	11.405	0.005	29.065	99.598	1.386	10.158	99.737	
09-MPB-R41	Mount	10-0591-P01	47	0.25-0.50	Gahnite	blue-green	0.056	0.000	56.513	0.001	0.000	0.000	2.373	0.000	0.402	12.263	0.001	28.578	100.187	1.610	10.814	100.349	
09-MPB-R41	Mount	10-0591-P01	48	0.25-0.50	Gahnite	blue-green	0.081	0.000	56.686	0.001	0.000	0.004	2.395	0.002	0.404	12.487	0.000	28.115	100.175	1.370	11.255	100.312	
09-MPB-R41	Mount	10-0591-P01	49	0.25-0.50	Gahnite	blue-green	0.062	0.000	56.549	0.003	0.000	0.031	2.311	0.001	0.396	12.217	0.000	28.048	99.618	1.104	11.223	99.728	
09-MPB-R41	Mount	10-0591-P01	50	0.25-0.50	Gahnite	blue-green	0.063	0.000	56.859	0.000	0.000	0.015	2.078	0.000	0.406	12.116	0.000	28.817	100.354	1.073	11.150	100.461	
09-MPB-R41	Mount	10-0591-P01	51	0.25-0.50	Gahnite	blue-green	0.042	0.004	56.295	0.000	0.000	0.039	2.276	0.000	0.385	12.196	0.000	28.806	100.044	1.691	10.674	100.213	
09-MPB-R41	Mount	10-0591-P01	52	0.25-0.50	Gahnite	blue-green	0.035	0.000	56.033	0.000	0.000	0.018	2.202	0.000	0.406	12.367	0.003	28.533	99.596	1.721	10.819	99.769	
09-MPB-R41	Mount	10-0591-P01	53	0.25-0.50	Gahnite	blue-green	0.043	0.000	55.697	0.000	0.000	0.014	2.057	0.000	0.380	12.369	0.003	29.348	99.911	2.207	10.383	100.132	
09-MPB-R41	Mount	10-0591-P01	54	0.25-0.50	Gahnite	blue-green	0.047	0.013	56.038	0.000	0.000	0.030	2.032	0.004	0.413	12.283	0.001	28.250	99.110	1.212	11.192	99.232	
09-MPB-R41	Mount	10-0591-P01	55	0.25-0.50	Gahnite	blue-green	0.052	0.000	55.925	0.000	0.000	0.013	2.224	0.007	0.394	12.667	0.000	28.386	99.667	1.899	10.958	99.857	
09-MPB-R41	Mount	10-0591-P01	56	0.25-0.50	Gahnite	blue-green	0.067	0.000	56.302	0.000	0.000	0.007	2.393	0.000	0.414	12.695	0.000	27.909	99.785	1.616	11.240	99.947	
09-MPB-R41	Mount	10-0591-P01	57	0.25-0.50	Gahnite	blue-green	0.063	0.000	56.383	0.002	0.010	0.010	2.246	0.001	0.394	11.955	0.000	28.780	99.844	1.389	10.705	99.983	
09-MPB-R41	Mount	10-0591-P01	58	0.25-0.50	Gahnite	blue-green	0.058	0.000	56.287	0.000	0.000	0.005	2.440	0.000	0.401	12.311	0.000	28.172	99.673	1.580	10.889	99.831	
09-MPB-R41	Mount	10-0591-P01	59	0.25-0.50	Gahnite	blue-green	0.047	0.000	56.054	0.000	0.000	0.028	2.115	0.004	0.393	12.416	0.000	29.384	100.440				

Appendix C2 continued.

Sample Number	Mount or Section?	Mount or Section Number	Grain Number	Size (mm)	Mineral	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₃	Cr ₂ O ₃	Nb ₂ O ₅	MgO	CaO	MnO	FeO*	NiO	ZnO	Total	Fe ₂ O ₃	FeO (new)	TOTAL
09-MPB-R61	Mount	10-0591-P01	68	0.25-0.50	Gahnite	blue-green	0.041	0.000	56.118	0.003	0.007	0.004	2.602	0.002	0.475	8.281	0.002	32.396	99.929	1.744	6.711	100.104
09-MPB-R61	Mount	10-0591-P01	69	0.25-0.50	Gahnite	blue-green	0.054	0.000	55.903	0.002	0.006	0.023	2.694	0.000	0.481	8.701	0.000	32.258	100.122	2.174	6.745	100.340
09-MPB-R61	Mount	10-0591-P01	70	0.25-0.50	Gahnite	blue-green	0.041	0.000	55.793	0.003	0.009	0.027	2.724	0.004	0.474	8.568	0.002	32.370	100.074	2.267	6.528	100.241
09-MPB-R61	Mount	10-0591-P01	71	0.25-0.50	Gahnite	blue-green	0.051	0.000	56.108	0.001	0.011	0.020	2.555	0.003	0.466	8.508	0.001	32.730	100.455	2.046	6.667	100.660
09-MPB-R61	Mount	10-0591-P01	72	0.25-0.50	Gahnite	blue-green	0.059	0.000	55.899	0.001	0.000	0.026	2.558	0.000	0.489	8.488	0.002	32.538	100.061	2.021	6.669	100.263
09-MPB-R61	Mount	10-0591-P01	73	0.25-0.50	Gahnite	blue-green	0.062	0.000	55.869	0.000	0.000	0.004	2.712	0.000	0.478	8.786	0.000	32.395	100.305	2.360	6.663	100.542
09-MPB-R61	Mount	10-0591-P01	74	0.25-0.50	Gahnite	blue-green	0.076	0.000	56.282	0.003	0.000	0.000	2.605	0.000	0.476	7.891	0.002	33.044	100.378	1.738	6.327	100.552
09-MPB-R61	Mount	10-0591-P01	75	0.25-0.50	Gahnite	blue-green	0.062	0.000	55.850	0.000	0.017	0.035	2.695	0.004	0.474	8.615	0.001	32.442	100.194	2.237	6.602	100.418
09-MPB-R61	Mount	10-0591-P01	76	0.25-0.50	Gahnite	blue-green	0.042	0.000	55.612	0.001	0.000	0.030	2.735	0.000	0.494	8.567	0.001	32.453	99.936	2.442	6.370	100.180
09-MPB-R61	Mount	10-0591-P01	77	0.25-0.50	Gahnite	blue-green	0.060	0.000	56.060	0.000	0.007	0.025	2.625	0.002	0.487	8.582	0.000	32.490	100.339	2.061	6.727	100.546
09-MPB-R61	Mount	10-0591-P01	78	0.25-0.50	Gahnite	blue-green	0.050	0.000	56.078	0.002	0.011	0.034	2.551	0.000	0.470	8.567	0.000	32.664	100.426	2.054	6.719	100.632
09-MPB-R61	Mount	10-0591-P01	79	0.25-0.50	Gahnite	blue-green	0.039	0.008	55.749	0.000	0.006	0.034	2.656	0.001	0.480	8.462	0.000	32.387	99.822	2.124	6.550	100.035
09-MPB-R61	Mount	10-0591-P01	80	0.25-0.50	Gahnite	blue-green	0.052	0.001	56.344	0.003	0.012	0.000	2.718	0.001	0.486	8.186	0.000	32.432	100.234	1.719	6.640	100.406
09-MPB-R61	Mount	10-0591-P01	81	0.25-0.50	Gahnite	blue-green	0.058	0.000	55.841	0.002	0.000	0.018	2.573	0.006	0.468	8.499	0.000	32.429	99.833	1.922	6.770	100.026
09-MPB-R61	Mount	10-0591-P01	82	0.25-0.50	Gahnite	blue-green	0.037	0.000	56.161	0.000	0.002	0.006	2.749	0.004	0.476	8.549	0.000	32.290	100.273	2.055	6.699	100.479
09-MPB-R61	Mount	10-0591-P01	83	0.25-0.50	Gahnite	blue-green	0.056	0.000	55.946	0.000	0.007	0.004	2.643	0.000	0.473	8.270	0.000	32.439	99.837	1.878	6.581	100.025
09-MPB-R61	Mount	10-0591-P01	84	0.25-0.50	Gahnite	blue-green	0.047	0.002	56.124	0.000	0.000	0.004	2.667	0.000	0.480	8.565	0.000	32.847	100.736	2.325	6.473	100.969
09-MPB-R61	Mount	10-0591-P01	85	0.25-0.50	Gahnite	blue-green	0.063	0.000	56.309	0.003	0.010	0.000	2.740	0.003	0.475	8.072	0.001	32.795	100.470	1.895	6.367	100.660
09-MPB-R61	Mount	10-0591-P01	86	0.25-0.50	Gahnite	blue-green	0.044	0.000	56.464	0.000	0.000	0.041	2.661	0.000	0.472	8.441	0.000	32.391	100.515	1.741	6.874	100.689
09-MPB-R61	Mount	10-0591-P01	87	0.25-0.50	Gahnite	blue-green	0.041	0.000	56.254	0.005	0.000	0.007	2.721	0.004	0.481	8.116	0.002	32.629	100.260	1.868	6.435	100.447
09-MPB-R61	Mount	10-0591-P01	88	0.25-0.50	Gahnite	blue-green	0.044	0.000	55.597	0.002	0.000	0.031	2.697	0.000	0.495	8.424	0.000	32.460	99.749	2.294	6.360	99.979
09-MPB-R61	Mount	10-0591-P01	89	0.25-0.50	Gahnite	blue-green	0.075	0.000	56.152	0.000	0.000	0.000	2.592	0.000	0.451	8.368	0.000	32.809	100.453	1.970	6.596	100.650
09-MPB-R69	Mount	10-0591-P01	90	0.25-0.50	Gahnite	blue-green	0.061	0.002	55.685	0.003	0.000	0.012	2.594	0.000	0.585	10.257	0.002	31.825	100.025	1.773	8.662	100.203
09-MPB-R69	Mount	10-0591-P01	91	0.25-0.50	Gahnite	blue-green	0.059	0.000	55.905	0.000	0.000	0.018	1.644	0.002	0.591	10.353	0.001	31.679	100.251	1.710	8.814	100.423
09-MPB-R69	Mount	10-0591-P01	92	0.25-0.50	Gahnite	blue-green	0.054	0.000	56.106	0.003	0.002	0.035	1.489	0.000	0.585	10.034	0.000	32.086	100.393	1.429	8.748	100.536
09-MPB-R69	Mount	10-0591-P01	93	0.25-0.50	Gahnite	blue-green	0.055	0.000	55.923	0.000	0.000	0.025	1.654	0.000	0.567	10.235	0.003	31.765	100.227	1.671	8.732	100.395
09-MPB-R69	Mount	10-0591-P01	94	0.25-0.50	Gahnite	blue-green	0.040	0.000	55.790	0.000	0.002	0.020	1.468	0.000	0.570	10.010	0.000	32.071	99.971	1.555	8.611	100.126
09-MPB-R69	Mount	10-0591-P01	95	0.25-0.50	Gahnite	blue-green	0.057	0.000	56.088	0.000	0.007	0.000	1.429	0.002	0.593	9.754	0.002	32.336	100.266	1.323	8.563	100.399
09-MPB-R69	Mount	10-0591-P01	96	0.25-0.50	Gahnite	blue-green	0.059	0.000	55.951	0.004	0.000	0.034	1.447	0.000	0.589	9.802	0.000	32.214	100.100	1.360	8.578	100.236
09-MPB-R69	Mount	10-0591-P01	97	0.25-0.50	Gahnite	blue-green	0.056	0.000	56.183	0.000	0.000	0.006	1.629	0.001	0.599	10.170	0.001	31.742	100.385	1.466	8.851	100.531
09-MPB-R69	Mount	10-0591-P01	98	0.25-0.50	Gahnite	blue-green	0.052	0.000	56.003	0.003	0.000	0.021	1.631	0.000	0.593	10.338	0.000	31.407	100.046	1.463	9.022	100.192
09-MPB-R69	Mount	10-0591-P01	99	0.25-0.50	Gahnite	blue-green	0.049	0.000	55.969	0.000	0.009	0.000	1.497	0.000	0.586	10.037	0.004	32.264	100.415	1.647	8.555	100.580
09-MPB-R69	Mount	10-0591-P01	100	0.25-0.50	Gahnite	blue-green	0.044	0.000	56.093	0.000	0.008	0.041	1.520	0.000	0.593	10.126	0.002	31.973	100.400	1.491	8.784	100.549
09-MPB-R69	Mount	10-0591-P01	101	0.25-0.50	Gahnite	blue-green	0.040	0.000	55.742	0.005	0.000	0.012	1.526	0.000	0.568	10.033	0.002	32.080	100.007	1.680	8.522	100.176
09-MPB-R69	Mount	10-0591-P01	102	0.25-0.50	Gahnite	blue-green	0.054	0.000	55.696	0.001	0.003	0.036	1.383	0.000	0.643	9.788	0.000	31.941	99.546	1.269	8.647	99.673
09-MPB-R69	Mount	10-0591-P01	103	0.25-0.50	Gahnite	blue-green	0.050	0.003	56.408	0.004	0.000	0.043	1.554	0.000	0.595	9.957	0.000	32.149	100.762	1.348	8.744	100.897
09-MPB-R69	Mount	10-0591-P01	104	0.25-0.50	Gahnite	blue-green	0.061	0.000	56.342	0.000	0.001	0.007	1.582	0.000	0.606	10.113	0.000	32.146	100.858	1.537	8.730	101.012
09-MPB-R69	Mount	10-0591-P01	105	0.25-0.50	Gahnite	blue-green	0.063	0.000	56.164	0.000	0.000	0.018	1.487	0.000	0.595	9.777	0.000	32.284	100.388	1.332	8.579	100.522
09-MPB-R69	Mount	10-0591-P01	106	0.25-0.50	Gahnite	blue-green	0.040	0.000	56.039	0.002	0.000	0.027	1.493	0.003	0.589	9.720	0.000	32.290	100.202	1.402	8.458	100.343
09-MPB-R69	Mount	10-0591-P01	107	0.25-0.50	Gahnite	blue-green	0.049	0.000	56.156	0.000	0.000	0.031	1.577	0.000	0.600	9.739	0.000	32.017	100.168	1.278	8.590	100.296
09-MPB-R69	Mount	10-0591-P01	108	0.25-0.50	Gahnite	blue-green	0.059	0.000	56.113	0.000	0.002	0.005	1.557	0.003	0.580	9.987	0.005	32.140	100.450	1.515	8.624	100.602
09-MPB-R69	Mount	10-0591-P01	109	0.25-0.50	Gahnite	blue-green	0.065	0.004	56.419	0.002	0.008	0.028	1.656	0.003	0.607	10.007	0.000	31.639	100.435	1.167	8.956	100.552
09-MPB-R69	Mount	10-0591-P01	110	0.25-0.50	Gahnite	blue-green	0.051	0.000	56.289	0.002	0.000	0.043	1.526	0.000	0.584	9.614	0.004	32.273	100.385	1.200	8.535	100.505
09-MPB-R69	Mount	10-0591-P01	111	0.25-0.50	Gahnite	blue-green	0.071	0.016	56.082	0.003	0.011	0.040	1.456	0.000	0.618	9.705	0.003	32.394	100.398	1.327	8.511	100.531
09-MPB-R69	Mount	10-0591-P01	112	0.25-0.50	Gahnite	blue-green	0.091	0.000	55.837	0.000	0.000	0.017	1.508	0.001	0.583	10.144	0.000	31.544	99.726	1.261	9.009	99.852
09-MPB-R69	Mount	10-0591-P01	113	0.25-0.50	Gahnite	blue-green	0.054	0.000	56.333	0.002	0.000	0.022	1.592	0.000	0.589	10.183	0.005	31.624	100.405	1.264	9.046	100.531
09-MPB-R69	Mount	10-0591-P01	114	0.25-0.50	Gahnite	blue-green	0.042	0.000	55.856	0.004	0.008	0.036	1.630	0.001	0.599	10.272	0.000	31.678	100.125	1.685	8.756	100.294
09-MPB-R69	Mount	10-0591-P01	115	0.25-0.50	Gahnite	blue-green	0.051	0.000	56.182	0.000	0.000	0.024	1.514	0.002	0.584	9.645	0.000	32.244	100.245	1.247	8.523	100.370
09-MPB-R69	Mount	10-0591-P01	116	0.25-0.50	Gahnite	blue-green	0.071	0.013	55.867	0.001	0.000	0.025	1.425	0.004	0.568	9.771	0.001	32.503	100.247	1.493	8.427	100.397
09-MPB-R69	Mount	10-0591-P01	117	0.25-0.50	Gahnite	blue-green	0.052	0.000	55.727	0.002	0.000	0.023	1.471	0.004	0.589	9.687	0.000	32.545	100.099	1.660	8.193	100.265

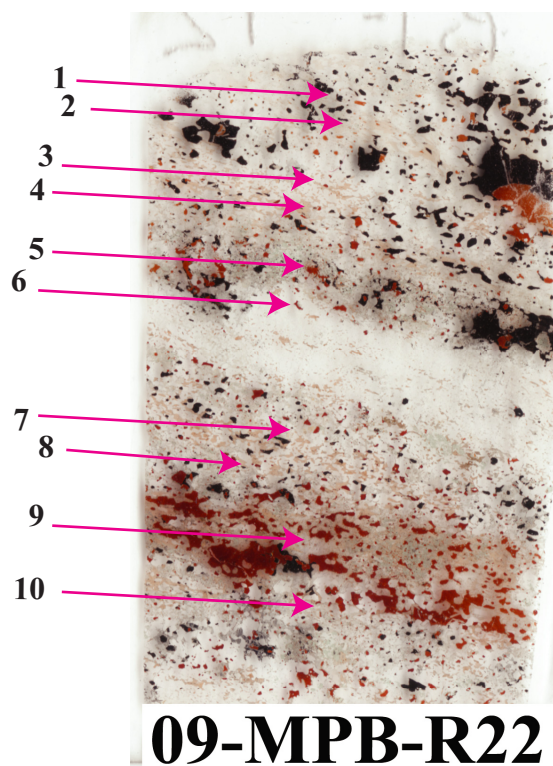
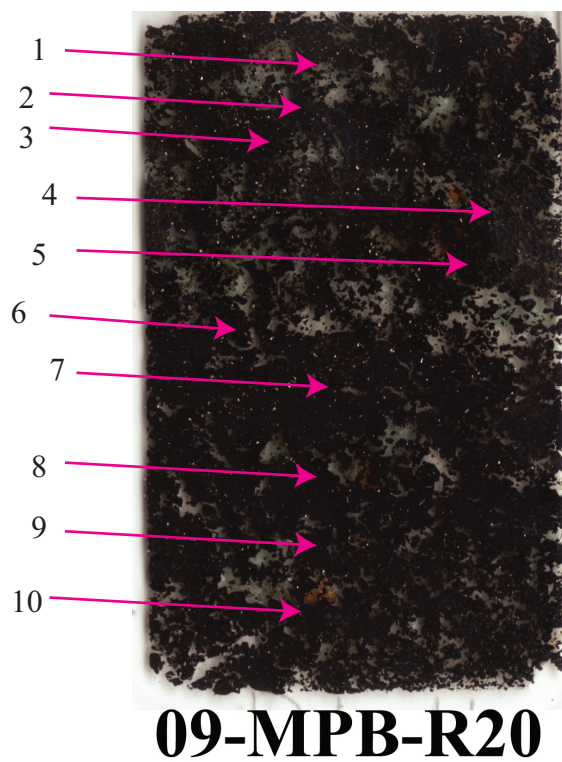
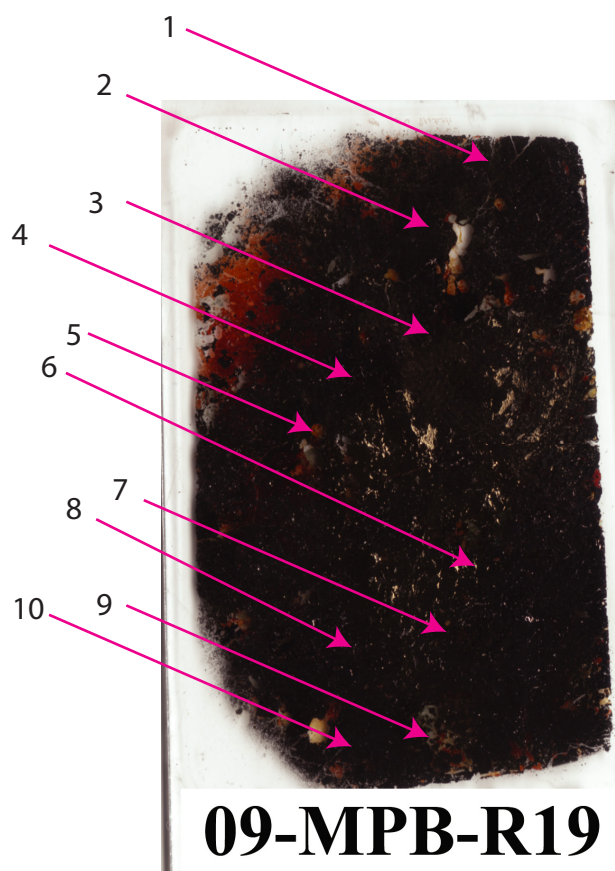
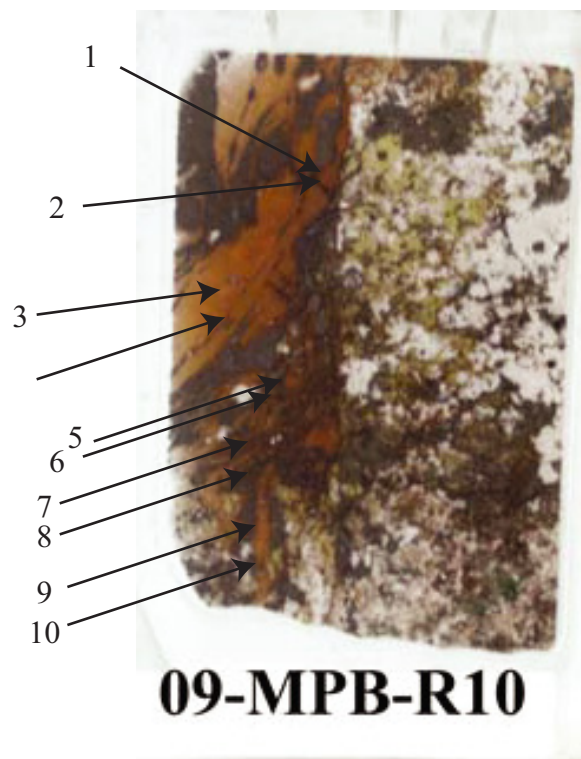
Indicator Mineral Signatures of the Izok Lake Deposit, Nunavut: Part 1 Bedrock Samples

Appendix C2 continued.

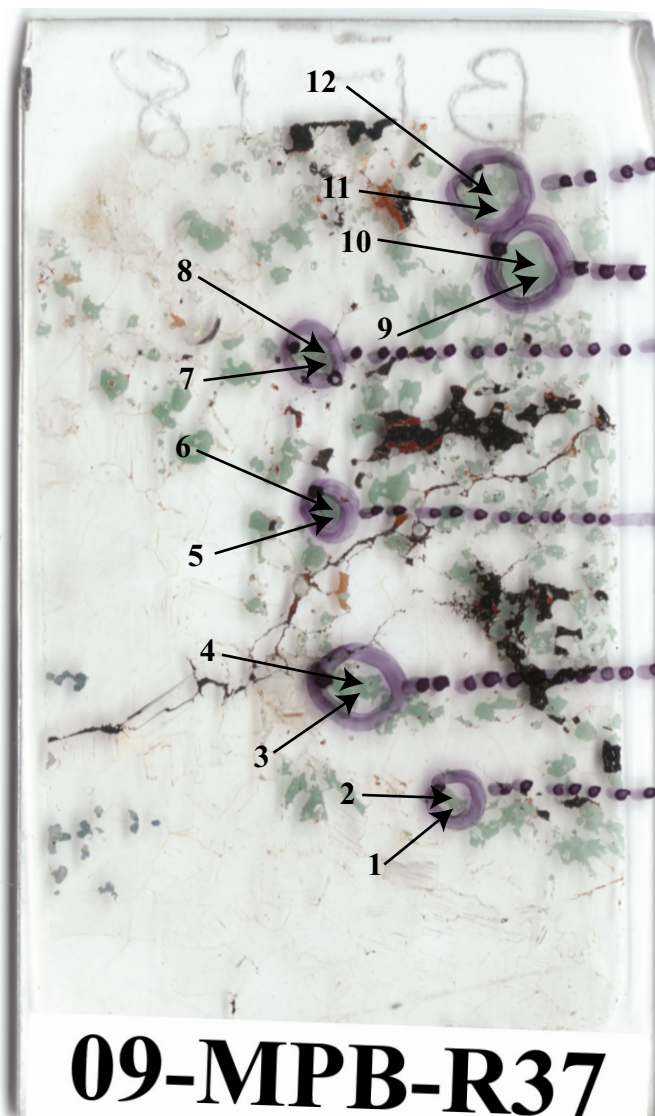
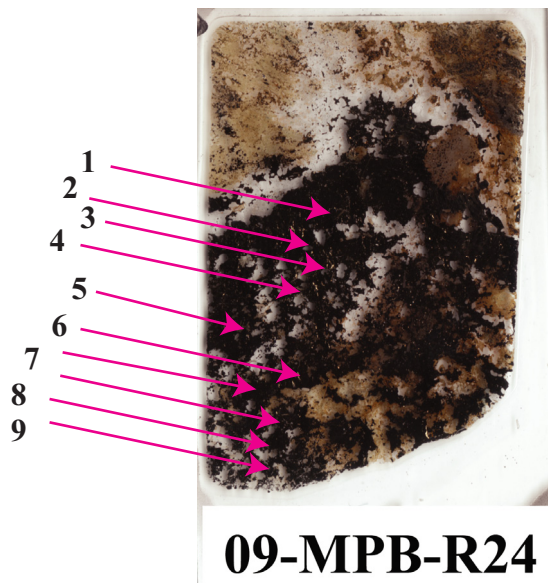
Sample Number	Mount or Section?	Mount or Section Number	Grain Number	Size (mm)	Mineral	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₅	Cr ₂ O ₃	Nb ₂ O ₅	MgO	CaO	MnO	FeO*	NiO	ZnO	Total	Fe ₂ O ₃	FeO (new)	TOTAL
09-MPB-R69	Mount	10-0591-P01	118	0.25-0.50	Gahnite	blue-green	0.062	0.000	55.972	0.000	0.000	0.000	1.546	0.000	0.581	10.205	0.000	31.870	100.235	1.551	8.809	100.391
09-MPB-R69	Mount	10-0591-P01	119	0.25-0.50	Gahnite	blue-green	0.076	0.024	55.689	0.000	0.016	0.014	1.508	0.003	0.583	9.729	0.000	32.352	99.994	1.551	8.334	100.149
09-MPB-R61	Mount	11-0332-P02	18	0.5-1.0	Gahnite	blue-green	0.042	0.000	56.304	0.000	0.005	0.021	2.263	0.000	0.443	7.804	0.000	33.832	100.716	1.754	6.226	100.891
09-MPB-R61	Mount	11-0332-P02	19	0.5-1.0	Gahnite	blue-green	0.064	0.017	56.337	0.000	0.000	0.000	2.621	0.002	0.438	7.704	0.004	32.433	99.619	1.166	6.654	99.736
09-MPB-R61	Mount	11-0332-P02	20	0.5-1.0	Gahnite	blue-green	0.045	0.010	56.111	0.000	0.009	0.026	2.334	0.007	0.506	7.773	0.000	32.950	99.771	1.381	6.530	99.909
09-MPB-R61	Mount	11-0332-P02	21	0.5-1.0	Gahnite	blue-green	0.051	0.000	56.322	0.004	0.005	0.029	2.406	0.000	0.475	8.056	0.002	33.146	100.496	1.679	6.546	100.664
09-MPB-R61	Mount	11-0332-P02	22	0.5-1.0	Gahnite	blue-green	0.039	0.000	55.931	0.001	0.003	0.002	2.625	0.000	0.485	8.651	0.005	32.685	100.426	2.350	6.537	100.662
09-MPB-R61	Mount	11-0332-P02	23	0.5-1.0	Gahnite	blue-green	0.041	0.000	55.903	0.007	0.000	0.000	2.655	0.003	0.490	8.802	0.002	32.379	100.282	2.316	6.718	100.514
09-MPB-R61	Mount	11-0332-P02	24	0.5-1.0	Gahnite	blue-green	0.041	0.000	56.215	0.000	0.000	0.010	2.656	0.000	0.518	7.887	0.004	32.785	100.116	1.762	6.302	100.293
09-MPB-R61	Mount	11-0332-P02	25	0.5-1.0	Gahnite	blue-green	0.035	0.000	56.433	0.000	0.004	0.011	2.712	0.002	0.469	7.840	0.000	32.743	100.248	1.631	6.372	100.411
09-MPB-R61	Mount	11-0332-P02	26	0.5-1.0	Gahnite	blue-green	0.033	0.006	56.109	0.001	0.000	0.022	2.516	0.001	0.496	8.491	0.000	32.593	100.268	1.940	6.745	100.462
09-MPB-R61	Mount	11-0332-P02	27	0.5-1.0	Gahnite	blue-green	0.038	0.000	56.138	0.000	0.006	0.017	2.676	0.001	0.481	8.153	0.000	32.941	100.452	2.099	6.264	100.662
09-MPB-R61	Mount	11-0332-P02	28	0.5-1.0	Gahnite	blue-green	0.092	0.000	56.547	0.000	0.003	0.034	2.073	0.004	0.476	7.373	0.002	33.623	100.226	0.858	6.600	100.312
09-MPB-R61	Mount	11-0332-P02	29	0.5-1.0	Gahnite	blue-green	0.058	0.002	56.431	0.002	0.000	0.000	2.711	0.000	0.486	8.624	0.000	32.651	100.966	2.124	6.713	101.178
09-MPB-R61	Mount	11-0332-P02	30	0.5-1.0	Gahnite	blue-green	0.058	0.000	56.938	0.000	0.000	0.016	2.690	0.002	0.442	7.936	0.002	32.494	100.578	1.189	6.866	100.697
09-MPB-R61	Mount	11-0332-P02	31	0.5-1.0	Gahnite	blue-green	0.194	0.017	56.997	0.000	0.000	0.029	2.023	0.006	0.429	7.563	0.000	33.915	101.172	0.655	6.974	101.237
09-MPB-R61	Mount	11-0332-P01	58	0.5-1.0	Gahnite	blue-green	0.039	0.012	56.543	0.000	0.001	0.023	2.497	0.001	0.441	7.733	0.005	32.242	99.534	0.839	6.978	99.618
09-MPB-R61	Mount	11-0332-P01	59	0.5-1.0	Gahnite	blue-green	0.053	0.000	56.568	0.000	0.003	0.023	2.613	0.000	0.448	7.859	0.003	32.336	99.906	1.129	6.844	100.019
09-MPB-R69	Mount	11-0332-P02	1	0.5-1.0	Gahnite	blue-green	0.049	0.018	56.051	0.001	0.002	0.023	2.674	0.002	0.523	8.086	0.004	32.474	99.908	1.779	6.485	100.087
09-MPB-R69	Mount	11-0332-P02	2	0.5-1.0	Gahnite	blue-green	0.072	0.000	56.256	0.000	0.000	0.017	1.380	0.000	0.573	10.233	0.000	32.535	101.065	1.612	8.782	101.227
09-MPB-R69	Mount	11-0332-P02	3	0.5-1.0	Gahnite	blue-green	0.029	0.000	56.165	0.000	0.018	0.036	1.479	0.000	0.606	10.044	0.000	32.066	100.444	1.433	8.754	100.587
09-MPB-R69	Mount	11-0332-P02	4	0.5-1.0	Gahnite	blue-green	0.045	0.009	56.283	0.000	0.000	0.024	1.448	0.004	0.608	9.798	0.002	32.635	100.855	1.497	8.451	101.005
09-MPB-R69	Mount	11-0332-P02	5	0.5-1.0	Gahnite	blue-green	0.036	0.000	56.235	0.000	0.010	0.034	1.417	0.001	0.630	9.932	0.000	32.188	100.482	1.323	8.741	100.614
09-MPB-R69	Mount	11-0332-P02	6	0.5-1.0	Gahnite	blue-green	0.043	0.000	56.210	0.003	0.000	0.009	1.471	0.000	0.610	9.701	0.000	32.247	100.293	1.253	8.573	100.419
09-MPB-R69	Mount	11-0332-P02	7	0.5-1.0	Gahnite	blue-green	0.043	0.000	56.267	0.000	0.000	0.036	1.522	0.000	0.607	9.848	0.000	32.359	100.682	1.465	8.530	100.829
09-MPB-R69	Mount	11-0332-P02	8	0.5-1.0	Gahnite	blue-green	0.133	0.000	56.791	0.000	0.012	0.010	1.541	0.008	0.579	10.040	0.000	32.297	101.410	1.147	9.007	101.525
09-MPB-R69	Mount	11-0332-P02	9	0.5-1.0	Gahnite	blue-green	0.055	0.008	56.565	0.004	0.000	0.037	1.535	0.001	0.618	9.791	0.000	32.356	100.969	1.258	8.658	101.095
09-MPB-R69	Mount	11-0332-P02	10	0.5-1.0	Gahnite	blue-green	0.041	0.000	56.306	0.000	0.000	0.027	1.491	0.001	0.604	9.859	0.000	32.398	100.728	1.443	8.561	100.873
09-MPB-R69	Mount	11-0332-P02	11	0.5-1.0	Gahnite	blue-green	0.063	0.000	56.499	0.006	0.000	0.026	1.415	0.000	0.654	9.999	0.000	31.942	100.605	1.043	9.061	100.709
09-MPB-R69	Mount	11-0332-P02	12	0.5-1.0	Gahnite	blue-green	0.054	0.000	56.264	0.002	0.007	0.010	1.489	0.000	0.595	9.868	0.000	32.335	100.624	1.397	8.611	100.764
09-MPB-R69	Mount	11-0332-P02	13	0.5-1.0	Gahnite	blue-green	0.050	0.000	56.500	0.000	0.003	0.024	1.220	0.001	0.552	9.729	0.000	32.526	100.604	0.915	8.906	100.696
09-MPB-R69	Mount	11-0332-P02	14	0.5-1.0	Gahnite	blue-green	0.045	0.000	56.522	0.000	0.000	0.008	1.570	0.000	0.598	10.185	0.001	31.948	100.877	1.374	8.948	101.015
09-MPB-R69	Mount	11-0332-P02	15	0.5-1.0	Gahnite	blue-green	0.042	0.000	56.417	0.001	0.000	0.013	1.495	0.000	0.596	9.907	0.000	32.159	100.632	1.262	8.771	100.758
09-MPB-R69	Mount	11-0332-P02	16	0.5-1.0	Gahnite	blue-green	0.040	0.007	56.617	0.003	0.000	0.036	1.434	0.000	0.622	9.627	0.003	32.326	100.714	0.989	8.737	100.813
09-MPB-R69	Mount	11-0332-P02	17	0.5-1.0	Gahnite	blue-green	0.051	0.000	56.309	0.002	0.004	0.027	1.450	0.004	0.589	9.933	0.000	32.398	100.765	1.413	8.661	100.906

APPENDIX C3.

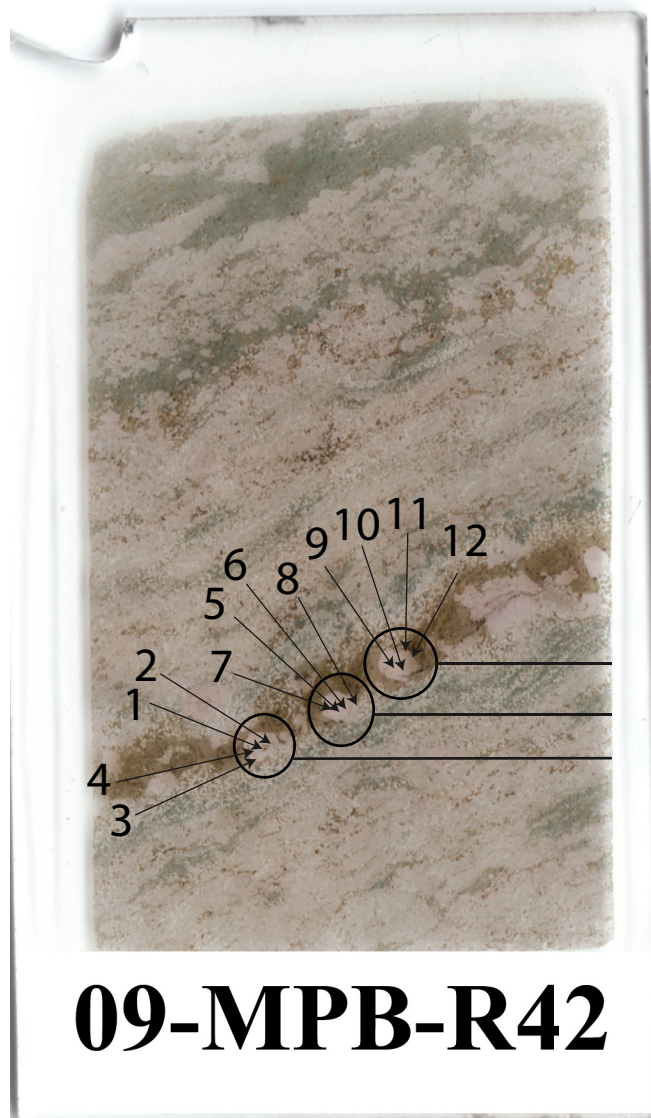
Thin section and grain mount maps for bedrock heavy mineral concentrate indicator minerals



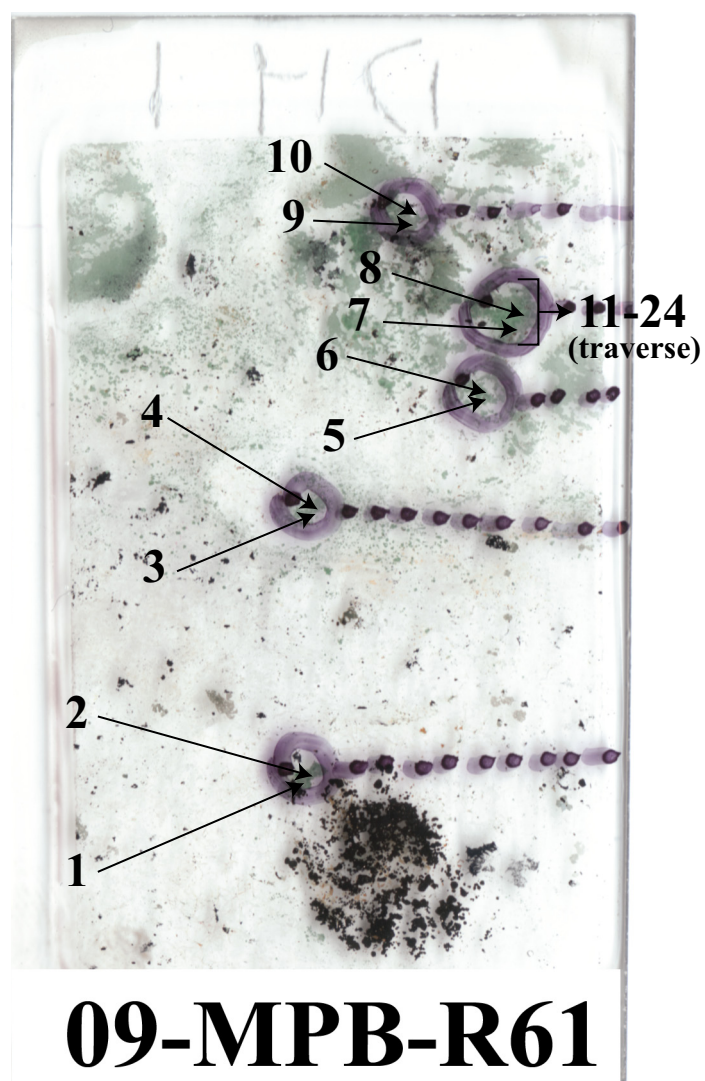
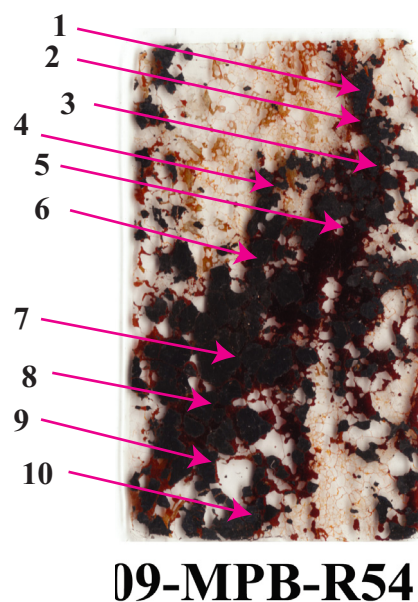
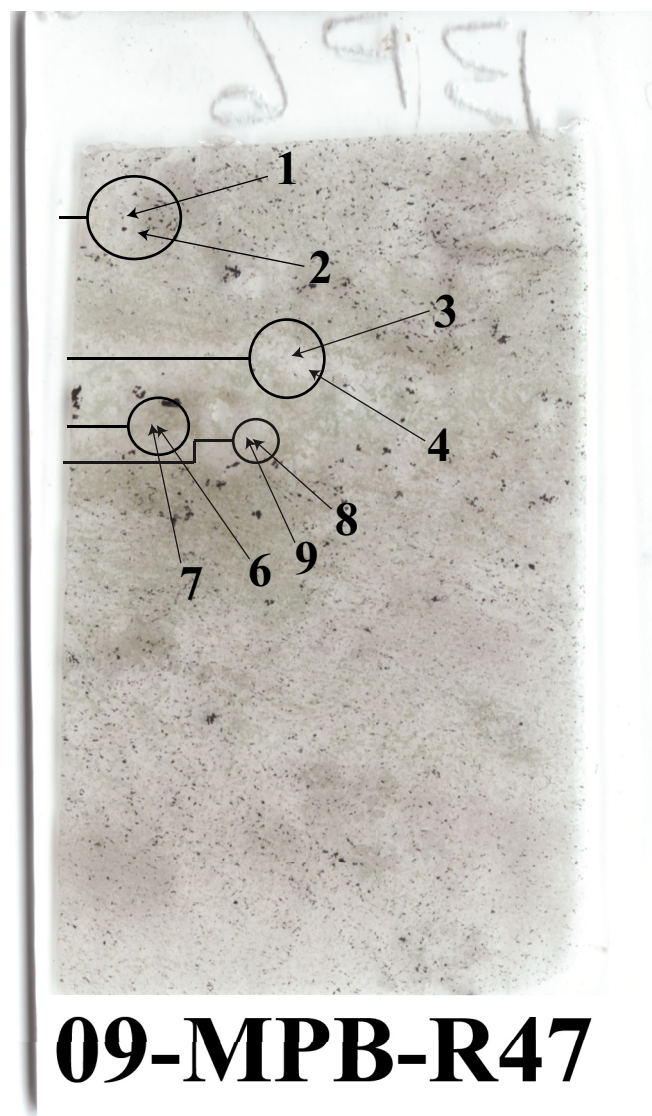
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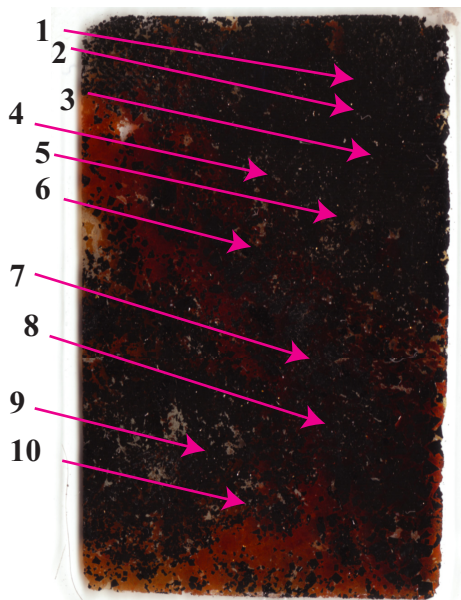
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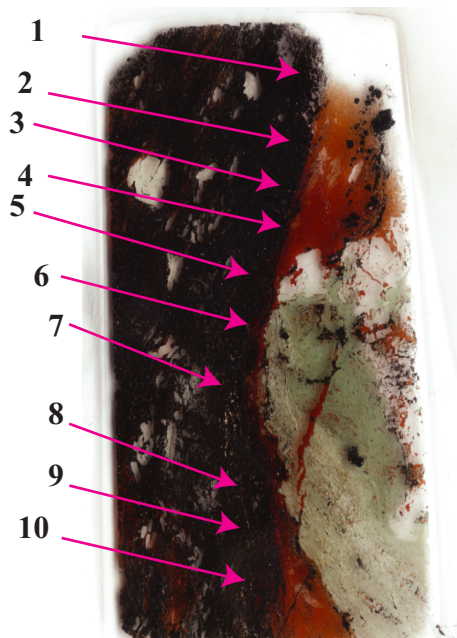
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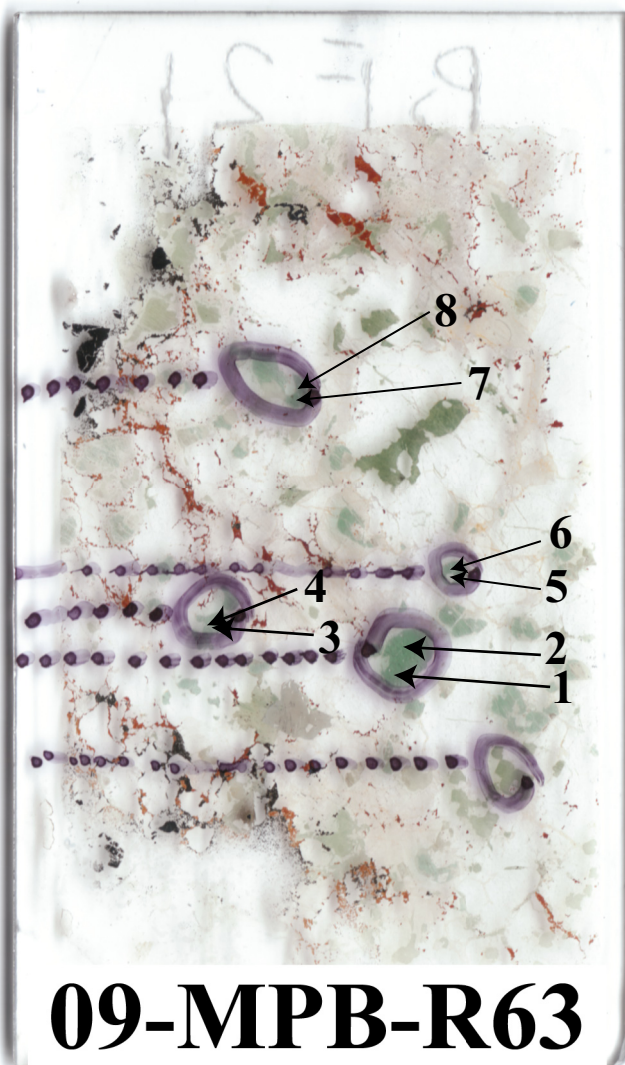
APPENDIX C3 continued.



09-MPB-R60



09-MPB-R62

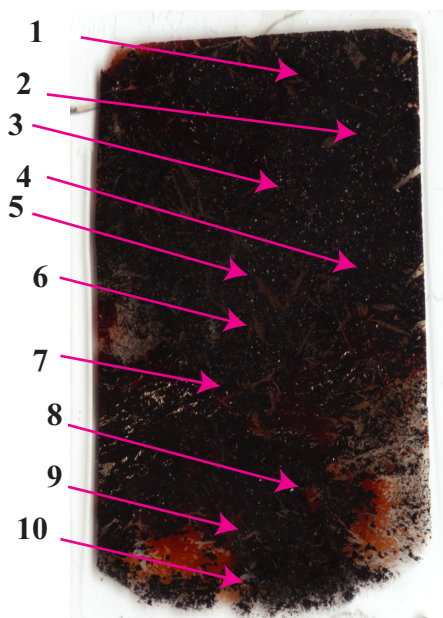
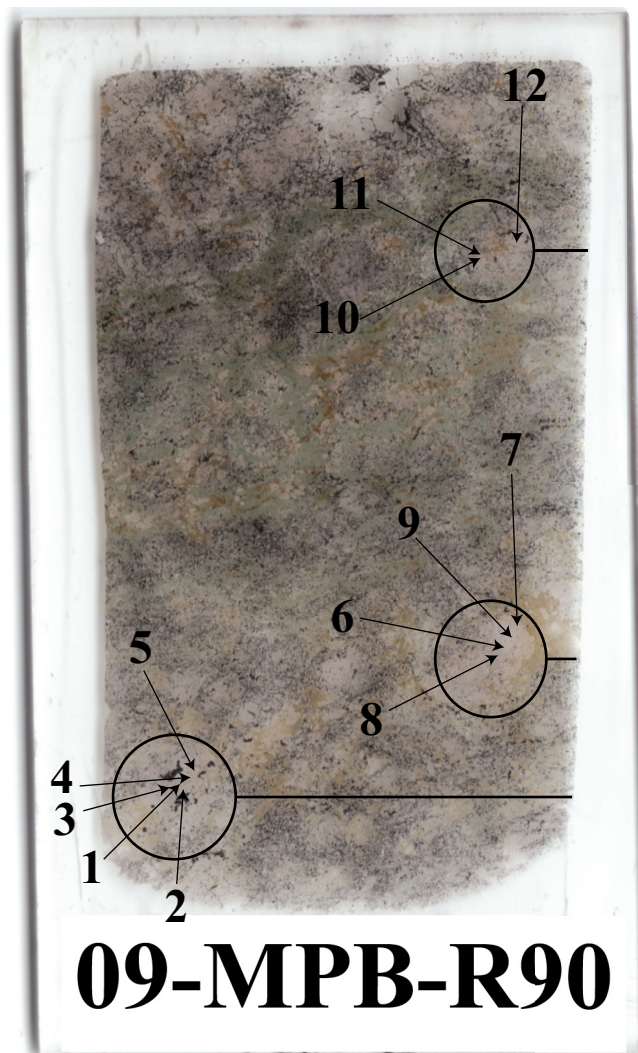
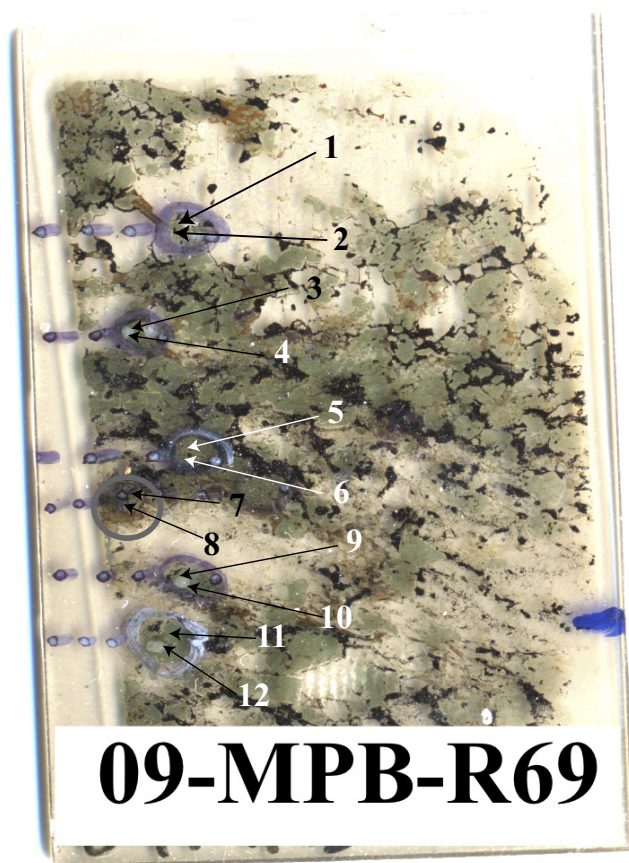


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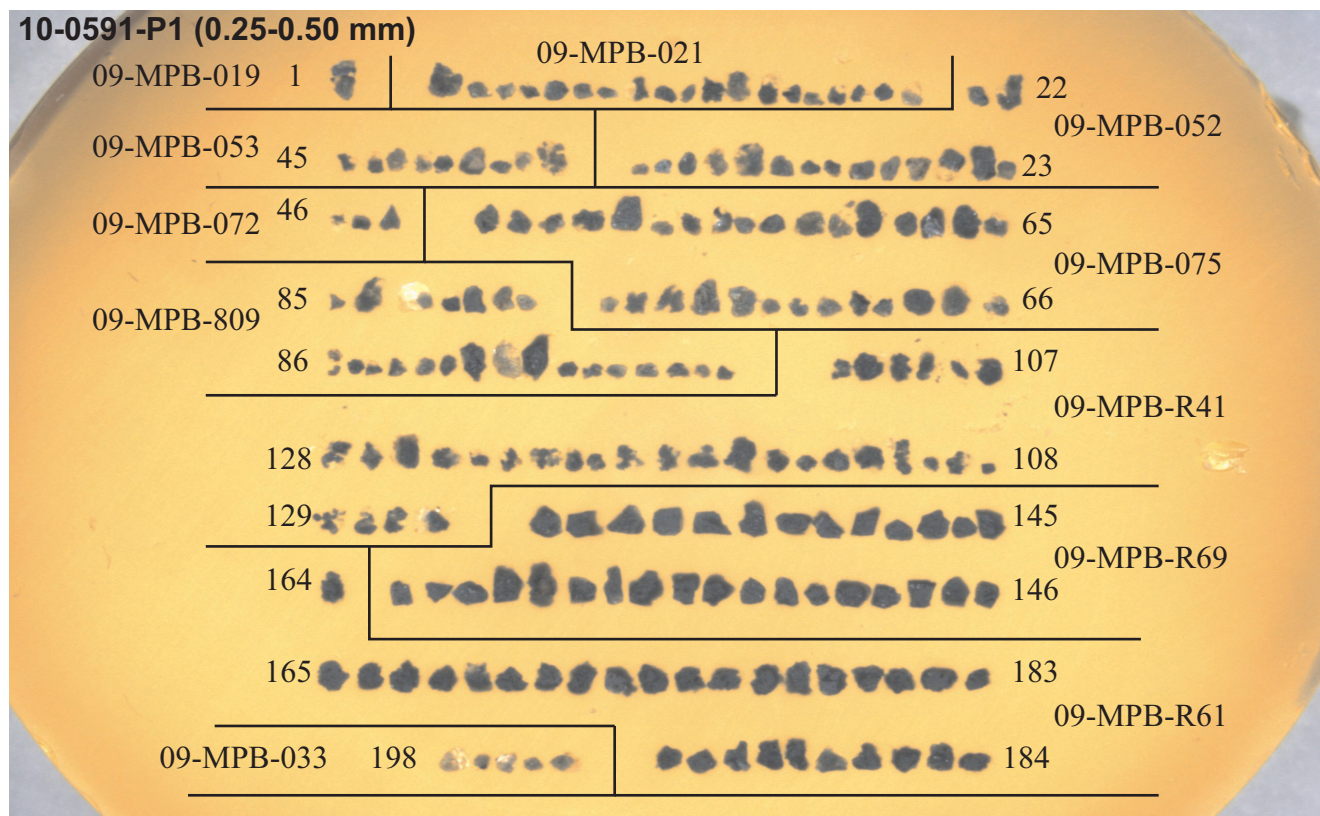
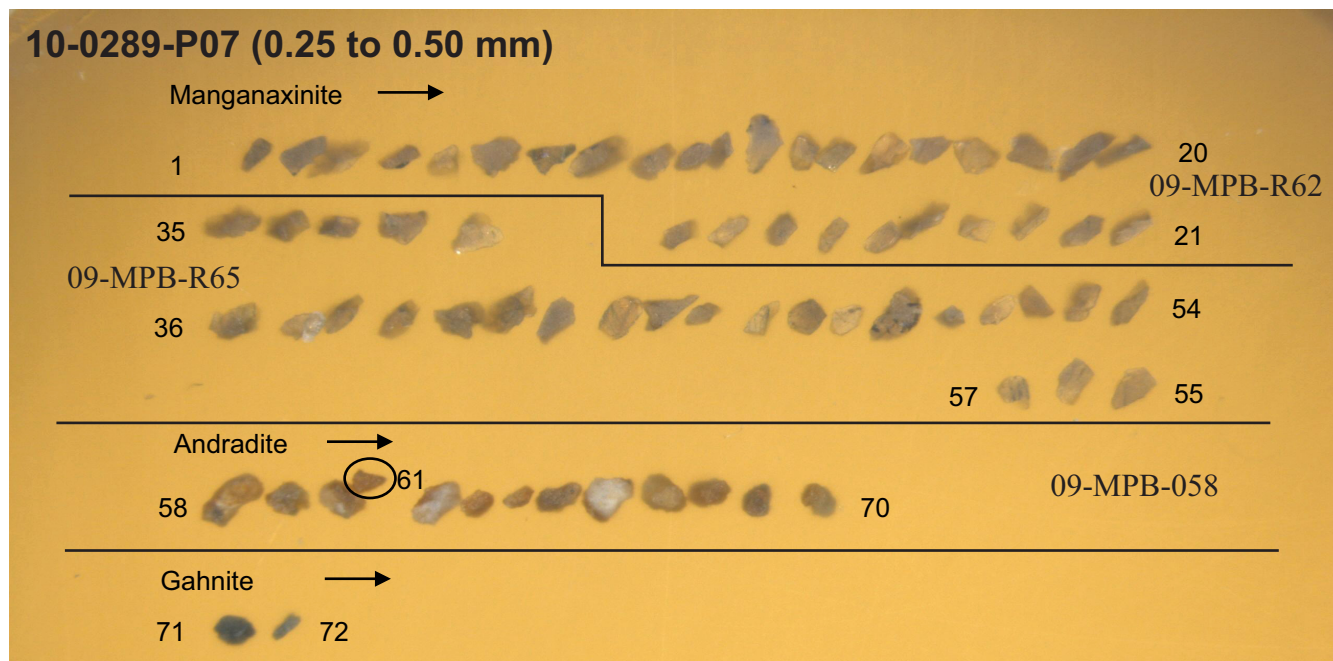
09-MPB-R68

APPENDIX C3 continued.

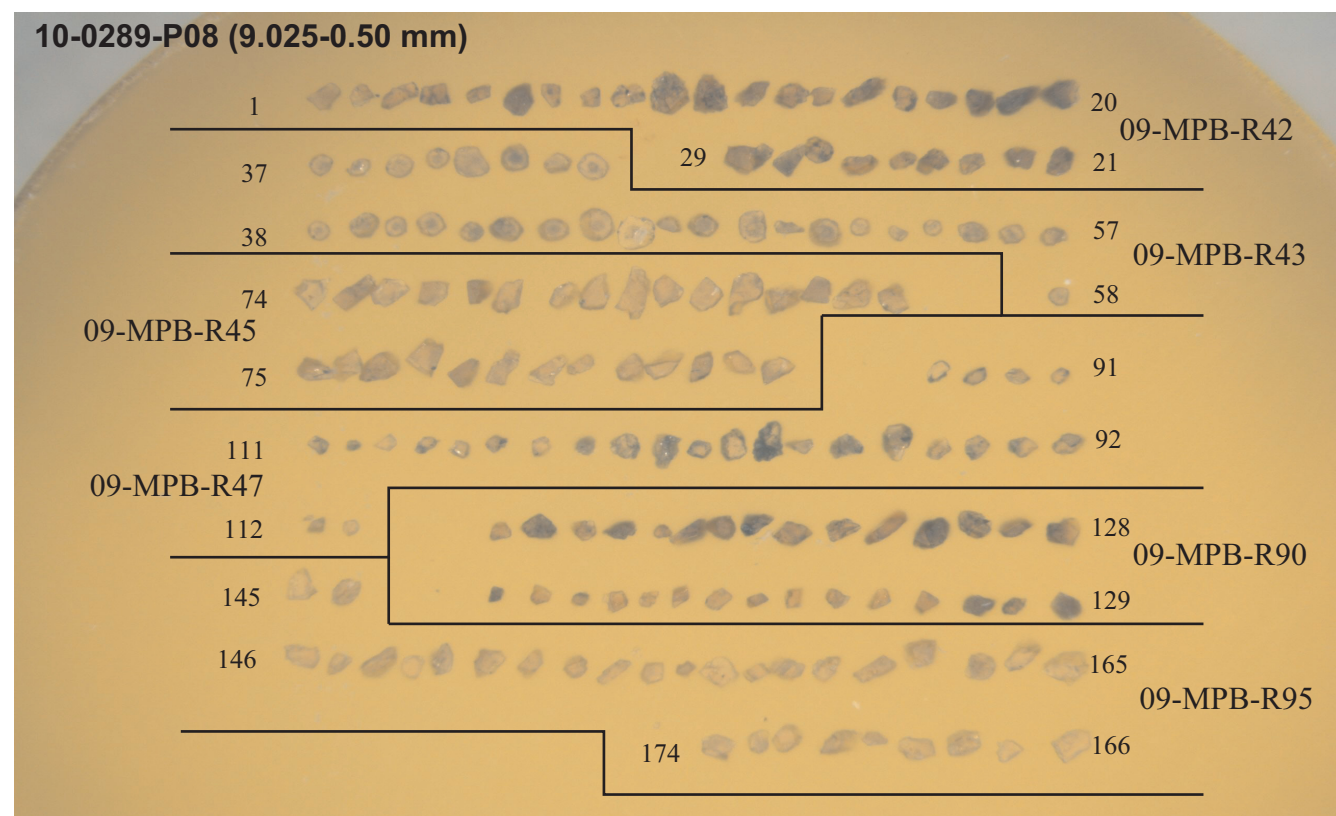
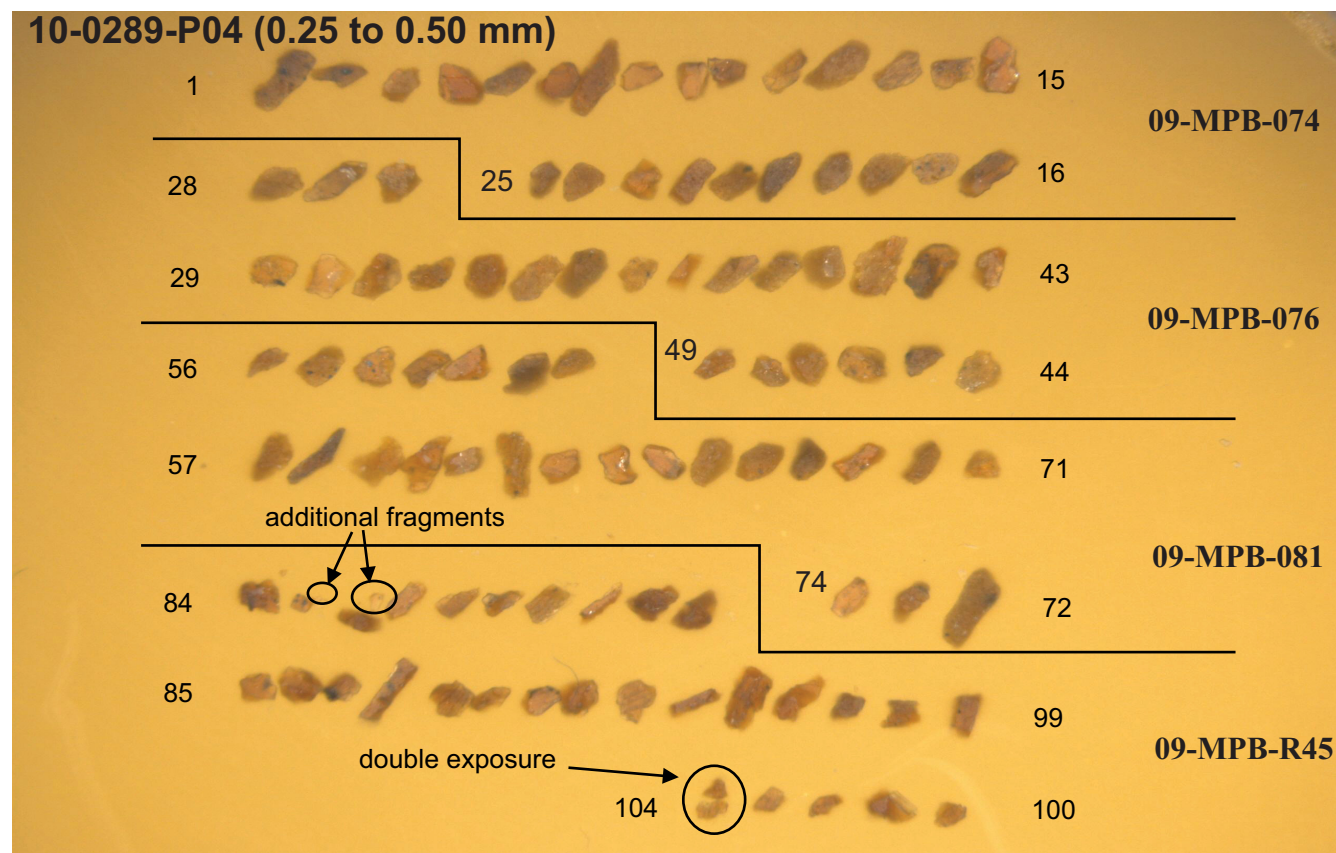


09-MPB-R93A

APPENDIX C3 continued.



APPENDIX C3 continued.



Appendix C4. Electron microprobe data for garnet in polished thin sections and grain mounts.

Sample Number	Mount or Section	Grain Number	Size (mm)	Mineral	Mineral Subtype	Mineral Subtype Confirmed by	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₃	Cr ₂ O ₃	Nb ₂ O ₅	CaO	MnO	FeO*	Na ₂ O	K ₂ O	Total	
09-MPB-R42	Section	PTS 09-MPB-R42	1	n/a	Garnet	Almandine	EMPA	Pink	36.987	0.013	20.714	0.000	0.000	1.179	8.872	2.195	29.848	0.005	0.004	99.817
09-MPB-R42	Section	PTS 09-MPB-R42	2	n/a	Garnet	Almandine		Pink	37.095	0.032	21.038	0.004	0.000	1.105	9.581	2.083	29.389	0.010	0.003	100.339
09-MPB-R42	Section	PTS 09-MPB-R42	3	n/a	Garnet	Almandine		Pink	36.567	0.007	20.793	0.000	0.000	1.133	8.928	2.470	29.372	0.007	0.003	99.280
09-MPB-R42	Section	PTS 09-MPB-R42	4	n/a	Garnet	Almandine		Pink	36.938	0.041	20.922	0.002	0.000	0.969	10.086	2.162	28.472	0.014	0.002	99.607
09-MPB-R42	Section	PTS 09-MPB-R42	5	n/a	Garnet	Almandine		Pink	37.087	0.012	20.931	0.006	0.000	1.141	8.992	2.124	29.860	0.005	0.000	100.158
09-MPB-R42	Section	PTS 09-MPB-R42	6	n/a	Garnet	Almandine		Pink	36.329	0.020	20.565	0.000	0.000	1.127	9.218	2.100	29.712	0.013	0.006	99.090
09-MPB-R42	Section	PTS 09-MPB-R42	7	n/a	Garnet	Almandine		Pink	36.722	0.007	20.738	0.002	0.001	1.410	7.601	2.686	30.433	0.018	0.002	99.621
09-MPB-R42	Section	PTS 09-MPB-R42	8	n/a	Garnet	Almandine		Pink	36.977	0.010	20.919	0.000	0.001	1.203	9.262	2.355	29.176	0.006	0.003	99.912
09-MPB-R42	Section	PTS 09-MPB-R42	9	n/a	Garnet	Almandine		Pink	36.878	0.022	20.783	0.000	0.000	1.089	9.402	2.072	29.491	0.011	0.004	99.750
09-MPB-R42	Section	PTS 09-MPB-R42	10	n/a	Garnet	Almandine		Pink	37.075	0.010	21.004	0.000	0.009	1.134	8.896	2.135	29.898	0.008	0.000	100.168
09-MPB-R42	Section	PTS 09-MPB-R42	11	n/a	Garnet	Almandine		Pink	37.029	0.000	20.684	0.000	0.000	1.349	7.759	2.696	30.543	0.010	0.008	100.078
09-MPB-R42	Section	PTS 09-MPB-R42	12	n/a	Garnet	Almandine		Pink	36.739	0.004	20.722	0.000	0.000	1.378	7.584	2.692	30.522	0.006	0.003	99.649
09-MPB-R42	Mount	10-0289-P08	1	0.25-0.5	Garnet	Almandine	Pink	36.626	0.054	20.399	0.001	0.000	0.808	6.136	7.980	28.007	0.000	0.000	100.011	
09-MPB-R42	Mount	10-0289-P08	2	0.25-0.5	Garnet	Almandine	Pink	37.390	0.007	20.563	0.000	0.004	1.369	8.015	3.135	29.593	0.000	0.000	100.076	
09-MPB-R42	Mount	10-0289-P08	3	0.25-0.5	Garnet	Almandine	Pink	36.883	0.004	20.531	0.006	0.000	1.475	7.390	3.254	30.160	0.000	0.000	99.703	
09-MPB-R42	Mount	10-0289-P08	4	0.25-0.5	Garnet	Almandine	Pink	37.086	0.007	20.470	0.001	0.000	1.429	7.973	3.112	29.566	0.006	0.000	99.651	
09-MPB-R42	Mount	10-0289-P08	5	0.25-0.5	Garnet	Almandine	Pink	37.058	0.002	20.553	0.001	0.007	1.602	7.346	3.139	30.252	0.000	0.001	99.961	
09-MPB-R42	Mount	10-0289-P08	6	0.25-0.5	Garnet	Almandine	Pink	36.918	0.034	20.304	0.001	0.000	1.116	6.239	3.013	32.199	0.008	0.001	99.833	
09-MPB-R42	Mount	10-0289-P08	7	0.25-0.5	Garnet	Almandine	Pink	37.237	0.003	20.572	0.000	0.000	1.602	7.358	3.102	30.042	0.000	0.000	99.917	
09-MPB-R42	Mount	10-0289-P08	8	0.25-0.5	Garnet	Almandine	Pink	37.340	0.000	20.545	0.003	0.000	1.596	7.358	3.117	30.031	0.000	0.000	99.989	
09-MPB-R42	Mount	10-0289-P08	9	0.25-0.5	Garnet	Almandine	Pink	37.200	0.015	20.694	0.000	0.000	1.331	9.213	2.530	28.860	0.005	0.000	99.847	
09-MPB-R42	Mount	10-0289-P08	10	0.25-0.5	Garnet	Almandine	Pink	37.125	0.000	20.553	0.006	0.009	1.605	7.453	3.189	29.979	0.002	0.000	99.919	
09-MPB-R42	Mount	10-0289-P08	11	0.25-0.5	Garnet	Almandine	Pink	37.382	0.011	20.295	0.000	0.000	1.091	7.507	2.931	30.492	0.004	0.002	99.715	
09-MPB-R42	Mount	10-0289-P08	12	0.25-0.5	Garnet	Almandine	Pink	37.107	0.006	20.996	0.000	0.000	1.890	7.006	2.647	30.414	0.000	0.000	100.065	
09-MPB-R42	Mount	10-0289-P08	13	0.25-0.5	Garnet	Almandine	Pink	36.942	0.065	20.601	0.001	0.000	0.813	6.233	7.919	27.788	0.000	0.000	100.360	
09-MPB-R42	Mount	10-0289-P08	14	0.25-0.5	Garnet	Almandine	Pink	37.215	0.000	20.964	0.002	0.000	1.415	7.887	3.124	29.533	0.000	0.000	100.140	
09-MPB-R42	Mount	10-0289-P08	15	0.25-0.5	Garnet	Almandine	Pink	37.178	0.094	20.421	0.001	0.000	0.677	7.904	7.341	26.536	0.014	0.000	100.166	
09-MPB-R42	Mount	10-0289-P08	16	0.25-0.5	Garnet	Almandine	Pink	37.180	0.012	20.723	0.000	0.000	1.207	7.580	2.345	30.940	0.016	0.005	100.008	
09-MPB-R42	Mount	10-0289-P08	17	0.25-0.5	Garnet	Almandine	Pink	36.984	0.011	20.598	0.002	0.000	1.337	7.042	2.438	31.524	0.019	0.003	99.959	
09-MPB-R42	Mount	10-0289-P08	18	0.25-0.5	Garnet	Almandine	Pink	36.938	0.037	20.449	0.000	0.000	1.145	5.663	5.261	30.442	0.011	0.000	99.945	
09-MPB-R42	Mount	10-0289-P08	19	0.25-0.5	Garnet	Almandine	Pink	37.184	0.007	20.585	0.000	0.007	1.368	8.182	3.060	29.612	0.006	0.002	100.012	
09-MPB-R42	Mount	10-0289-P08	20	0.25-0.5	Garnet	Almandine	Pink	37.067	0.034	20.522	0.000	0.009	0.954	5.574	6.368	29.409	0.004	0.002	99.943	
09-MPB-R42	Mount	10-0289-P08	21	0.25-0.5	Garnet	Almandine	Pink	36.844	0.017	20.335	0.004	0.000	0.851	5.447	7.596	29.022	0.003	0.002	100.120	
09-MPB-R42	Mount	10-0289-P08	22	0.25-0.5	Garnet	Almandine	Pink	36.641	0.020	20.490	0.000	0.000	0.916	5.410	7.602	28.925	0.000	0.001	100.004	
09-MPB-R42	Mount	10-0289-P08	23	0.25-0.5	Garnet	Almandine	Pink	37.100	0.015	20.677	0.003	0.000	1.047	7.857	2.858	30.234	0.003	0.001	99.795	
09-MPB-R42	Mount	10-0289-P08	24	0.25-0.5	Garnet	Almandine	Pink	36.845	0.103	20.461	0.000	0.005	0.995	5.490	6.622	29.539	0.007	0.003	100.071	
09-MPB-R42	Mount	10-0289-P08	25	0.25-0.5	Garnet	Almandine	Pink	37.301	0.001	20.685	0.003	0.007	1.365	8.460	3.104	28.995	0.001	0.000	99.920	
09-MPB-R42	Mount	10-0289-P08	26	0.25-0.5	Garnet	Almandine	Pink	37.349	0.011	20.870	0.004	0.000	1.471	8.946	2.306	28.966	0.003	0.003	99.929	
09-MPB-R42	Mount	10-0289-P08	27	0.25-0.5	Garnet	Almandine	Pink	37.154	0.015	20.822	0.003	0.006	1.499	8.273	2.721	29.264	0.000	0.003	99.758	
09-MPB-R42	Mount	10-0289-P08	28	0.25-0.5	Garnet	Almandine	Pink	37.320	0.012	20.575	0.000	0.007	1.614	7.507	3.045	30.276	0.000	0.000	100.356	
09-MPB-R42	Mount	10-0289-P08	29	0.25-0.5	Garnet	Almandine	Pink	37.298	0.015	20.847	0.000	0.000	1.306	9.469	2.482	28.601	0.000	0.000	100.017	
09-MPB-R42	Mount	10-0289-P08	30	0.25-0.5	Garnet	Almandine	Pink	36.847	0.015	20.435	0.000	0.002	1.081	6.081	4.235	30.998	0.000	0.020	99.714	
09-MPB-R42	Mount	10-0289-P08	31	0.25-0.5	Garnet	Almandine	Pink	36.771	0.027	20.803	0.000	0.000	0.930	6.009	7.171	28.329	0.000	0.000	100.041	
09-MPB-R43	Mount	10-0289-P08	32	0.25-0.5	Garnet	Almandine	Pink	36.812	0.014	20.837	0.017	0.013	2.555	1.799	11.217	26.407	0.012	0.000	99.682	
09-MPB-R43	Mount	10-0289-P08	33	0.25-0.5	Garnet	Almandine	Pink	36.642	0.010	20.835	0.009	0.001	2.487	1.781	11.760	26.054	0.011	0.003	99.592	
09-MPB-R43	Mount	10-0289-P08	34	0.25-0.5	Garnet	Almandine	Pink	36.668	0.020	20.712	0.016	0.020	2.488	1.692	11.570	26.209	0.007	0.000	99.403	
09-MPB-R43	Mount	10-0289-P08	35	0.25-0.5	Garnet	Almandine	Pink	36.452	0.071	20.687	0.014	0.016	2.452	1.705	11.601	26.182	0.019	0.000	99.198	
09-MPB-R43	Mount	10-0289-P08	36	0.25-0.5	Garnet	Almandine	Pink	36.546	0.012	20.746	0.012	0.017	2.491	1.675	11.669	25.979	0.006	0.000	99.153	

Indicator Mineral Signatures of the Izok Lake Deposit, Nunavut: Part 1 Bedrock Samples

Appendix C4 continued.

Sample Number	Mount or Section	Mount Number	Grain Number	Size (mm)	Mineral	Subtype ODM	Mineral Subtype Confirmed by EMPA	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₅	Cr ₂ O ₃	Nb ₂ O ₅	CaO	MnO	FeO*	Na ₂ O	K ₂ O	Total
09-MPB-R43	Mount	10-0289-P08	35	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.646	0.008	20.955	0.005	0.000	2.552	1.854	11.352	26.141	0.015	0.000	99.530
09-MPB-R43	Mount	10-0289-P08	36	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.753	0.010	21.059	0.002	0.004	2.618	1.574	11.643	26.423	0.005	0.002	100.093
09-MPB-R43	Mount	10-0289-P08	37	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.492	0.003	20.681	0.008	0.005	2.479	1.709	11.640	26.153	0.018	0.002	99.190
09-MPB-R43	Mount	10-0289-P08	38	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.475	0.017	20.927	0.007	0.000	2.382	1.619	12.036	26.033	0.014	0.000	99.406
09-MPB-R43	Mount	10-0289-P08	39	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.723	0.002	20.809	0.004	0.006	2.658	1.704	11.254	26.581	0.010	0.000	99.854
09-MPB-R43	Mount	10-0289-P08	40	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.852	0.014	20.869	0.021	0.008	2.556	1.652	11.675	26.151	0.018	0.000	99.815
09-MPB-R43	Mount	10-0289-P08	41	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.748	0.011	20.758	0.016	0.012	2.537	1.643	11.553	26.239	0.015	0.001	99.532
09-MPB-R43	Mount	10-0289-P08	42	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.441	0.005	20.925	0.000	0.015	2.498	1.582	11.768	26.135	0.005	0.000	99.375
09-MPB-R43	Mount	10-0289-P08	43	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.839	0.009	20.738	0.011	0.006	2.342	1.784	11.936	26.025	0.006	0.000	99.694
09-MPB-R43	Mount	10-0289-P08	44	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.723	0.025	20.831	0.010	0.003	2.604	1.737	11.497	26.267	0.006	0.000	100.502
09-MPB-R43	Mount	10-0289-P08	45	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.540	0.004	20.774	0.006	0.011	2.508	1.619	11.578	26.372	0.006	0.001	99.419
09-MPB-R43	Mount	10-0289-P08	46	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.908	0.035	20.895	0.015	0.009	2.751	1.935	11.125	26.307	0.007	0.000	99.786
09-MPB-R43	Mount	10-0289-P08	47	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.728	0.020	20.944	0.011	0.003	2.648	2.054	11.003	26.249	0.011	0.000	99.670
09-MPB-R43	Mount	10-0289-P08	48	0.25-0.5	Garnet	Almandine	Almandine	Pink	40.303	0.473	19.850	0.021	0.007	2.196	1.738	11.380	25.253	0.002	0.000	101.223
09-MPB-R43	Mount	10-0289-P08	49	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.879	0.006	20.775	0.002	0.005	2.595	1.620	11.569	26.355	0.012	0.000	99.818
09-MPB-R43	Mount	10-0289-P08	50	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.670	0.004	20.722	0.010	0.012	2.727	1.860	11.151	26.207	0.018	0.000	99.382
09-MPB-R43	Mount	10-0289-P08	51	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.651	0.011	20.802	0.003	0.006	2.232	1.902	12.170	25.540	0.018	0.000	99.336
09-MPB-R43	Mount	10-0289-P08	52	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.844	0.021	20.843	0.014	0.003	2.465	1.732	11.738	26.243	0.016	0.000	99.918
09-MPB-R43	Mount	10-0289-P08	53	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.877	0.012	20.609	0.016	0.022	2.214	1.756	12.098	26.233	0.005	0.000	99.842
09-MPB-R43	Mount	10-0289-P08	54	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.762	0.010	20.815	0.004	0.015	2.353	1.633	12.031	26.200	0.004	0.000	99.825
09-MPB-R43	Mount	10-0289-P08	55	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.636	0.006	20.740	0.012	0.022	2.153	1.879	12.124	26.147	0.016	0.000	99.735
09-MPB-R43	Mount	10-0289-P08	56	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.621	0.006	20.738	0.019	0.014	2.145	1.731	12.345	25.906	0.015	0.000	99.538
09-MPB-R43	Mount	10-0289-P08	57	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.704	0.009	20.797	0.012	0.019	2.261	1.697	11.999	26.234	0.013	0.001	99.745
09-MPB-R43	Mount	10-0289-P08	58	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.766	0.001	20.835	0.011	0.005	2.192	1.919	12.055	25.832	0.020	0.000	99.635
09-MPB-R43	Mount	10-0289-P08	1	n/a	Garnet	Almandine	Almandine	Pink	36.700	0.010	20.772	0.010	0.016	2.169	1.836	12.061	25.951	0.007	0.000	99.531
09-MPB-R45	Section	PTS 09-MPB-R45	1	n/a	Garnet	Almandine	Almandine	Pink	36.888	0.024	21.165	0.012	0.022	4.512	1.125	8.858	35.235	0.011	0.003	99.857
09-MPB-R45	Section	PTS 09-MPB-R45	2	n/a	Garnet	Almandine	Almandine	Pink	37.118	0.013	21.108	0.010	0.002	4.034	1.274	1.104	35.533	0.006	0.001	100.202
09-MPB-R45	Section	PTS 09-MPB-R45	3	n/a	Garnet	Almandine	Almandine	Pink	37.221	0.010	21.242	0.017	0.004	4.700	0.958	0.900	35.307	0.032	0.006	100.398
09-MPB-R45	Section	PTS 09-MPB-R45	4	n/a	Garnet	Almandine	Almandine	Pink	37.163	0.005	21.166	0.014	0.000	4.458	1.135	1.030	35.419	0.008	0.004	100.401
09-MPB-R45	Section	PTS 09-MPB-R45	5	n/a	Garnet	Almandine	Almandine	Pink	37.314	0.012	21.272	0.008	0.008	4.525	1.156	0.731	35.185	0.006	0.001	100.217
09-MPB-R45	Section	PTS 09-MPB-R45	6	n/a	Garnet	Almandine	Almandine	Pink	37.471	0.451	21.241	0.017	0.003	4.277	2.043	1.047	34.348	0.006	0.002	100.905
09-MPB-R45	Section	PTS 09-MPB-R45	7	n/a	Garnet	Almandine	Almandine	Pink	37.210	0.001	21.002	0.014	0.000	3.983	2.402	1.882	33.611	0.015	0.003	100.123
09-MPB-R45	Section	PTS 09-MPB-R45	8	n/a	Garnet	Almandine	Almandine	Pink	36.918	0.005	21.095	0.009	0.001	4.070	1.353	1.067	35.489	0.004	0.003	100.015
09-MPB-R45	Section	PTS 09-MPB-R45	9	n/a	Garnet	Almandine	Almandine	Pink	37.123	0.013	21.232	0.006	0.011	4.807	1.012	0.731	35.177	0.072	0.028	100.211
09-MPB-R45	Section	PTS 09-MPB-R45	10	n/a	Garnet	Almandine	Almandine	Pink	37.180	0.008	21.279	0.001	0.007	4.097	1.294	1.018	35.567	0.015	0.001	100.467
09-MPB-R45	Section	PTS 09-MPB-R45	11	n/a	Garnet	Almandine	Almandine	Pink	37.165	0.020	21.079	0.019	0.001	3.984	2.322	1.106	34.495	0.007	0.003	100.202
09-MPB-R45	Section	PTS 09-MPB-R45	12	n/a	Garnet	Almandine	Almandine	Pink	37.182	0.044	21.181	0.020	0.013	4.158	2.148	0.859	34.462	0.007	0.003	100.077
09-MPB-R45	Section	PTS 09-MPB-R45	13	n/a	Garnet	Almandine	Almandine	Pink	37.435	0.009	21.374	0.009	0.013	4.867	0.959	0.656	35.128	0.022	0.012	100.484
09-MPB-R45	Section	PTS 09-MPB-R45	14	n/a	Garnet	Almandine	Almandine	Pink	36.806	0.006	20.963	0.020	0.000	4.208	2.286	1.161	34.314	0.015	0.006	99.984
09-MPB-R45	Mount	10-0289-P08	59	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.393	0.006	21.196	0.005	0.000	4.707	1.067	0.751	35.016	0.007	0.002	100.150
09-MPB-R45	Mount	10-0289-P08	60	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.457	0.031	20.846	0.013	0.005	4.586	0.972	0.799	35.086	0.000	0.000	99.794
09-MPB-R45	Mount	10-0289-P08	60d	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.525	0.033	21.018	0.009	0.001	4.530	0.982	0.774	35.228	0.004	0.000	100.104
09-MPB-R45	Mount	10-0289-P08	61	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.021	0.134	20.930	0.018	0.004	2.776	2.441	3.505	33.637	0.006	0.001	100.472
09-MPB-R45	Mount	10-0289-P08	62	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.329	0.011	20.982	0.013	0.004	4.611	1.064	0.918	35.079	0.010	0.000	100.024
09-MPB-R45	Mount	10-0289-P08	63	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.148	0.018	20.989	0.009	0.004	4.554	1.044	0.816	35.240	0.008	0.000	99.829
09-MPB-R45	Mount	10-0289-P08	64	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.368	0.010	21.092	0.018	0.000	4.197	1.445	1.299	35.132	0.008	0.000	100.568
09-MPB-R45	Mount	10-0289-P08	65	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.351	0.010	21.244	0.000	0.000	4.573	1.230	0.866	34.953	0.005	0.001	100.253
09-MPB-R45	Mount	10-0289-P08	66	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.406	0.014	20.885	0.013	0.004	4.703	0.818	0.808	35.346	0.007	0.001	100.005

Appendix C4 continued.

Sample Number	Mount or Section	Grain Number	Size (mm)	Mineral	Subtype ODM	Mineral Confirmed by EMPA	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₅	Cr ₂ O ₃	Nb ₂ O ₅	CaO	MnO	FeO*	Na ₂ O	K ₂ O	Total
09-MPB-R45	Mount	67	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.349	0.011	21.059	0.009	0.007	4.725	1.121	0.611	34.919	0.002	0.000	99.812
09-MPB-R45	Mount	68	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.318	0.001	21.158	0.006	0.000	4.685	1.063	0.887	35.176	0.000	0.000	100.294
09-MPB-R45	Mount	69	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.411	0.011	21.108	0.014	0.012	4.727	1.104	0.809	35.033	0.008	0.000	100.236
09-MPB-R45	Mount	70	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.027	0.015	20.779	0.020	0.120	4.057	1.209	1.224	35.438	0.008	0.001	99.897
09-MPB-R45	Mount	71	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.222	0.010	21.062	0.010	0.007	4.422	1.076	0.758	35.433	0.000	0.000	100.000
09-MPB-R45	Mount	72	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.805	0.009	21.130	0.007	0.000	4.329	1.122	1.027	35.401	0.003	0.001	99.834
09-MPB-R45	Mount	73	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.047	0.024	20.621	0.023	0.079	3.716	1.218	1.038	35.936	0.004	0.001	99.706
09-MPB-R45	Mount	74	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.469	0.013	21.186	0.006	0.002	4.913	0.843	0.478	35.301	0.002	0.004	100.218
09-MPB-R45	Mount	75	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.256	0.014	20.985	0.011	0.012	4.503	1.049	0.782	35.362	0.007	0.000	99.981
09-MPB-R45	Mount	76	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.147	0.006	20.819	0.020	0.008	4.793	1.063	1.173	34.635	0.008	0.000	99.672
09-MPB-R45	Mount	77	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.935	0.017	20.932	0.008	0.006	4.693	1.085	0.830	35.043	0.001	0.000	99.549
09-MPB-R45	Mount	78	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.519	0.006	20.976	0.006	0.015	4.563	0.927	0.873	35.378	0.009	0.000	100.271
09-MPB-R45	Mount	79	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.091	0.011	21.076	0.008	0.000	4.649	0.929	0.735	35.464	0.008	0.000	99.970
09-MPB-R45	Mount	80	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.385	0.011	20.971	0.011	0.000	4.686	0.989	0.945	35.084	0.006	0.000	100.078
09-MPB-R45	Mount	80d	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.377	0.009	21.004	0.004	0.000	4.720	1.027	0.958	34.977	0.003	0.000	100.079
09-MPB-R45	Mount	81	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.204	0.016	20.971	0.013	0.013	4.442	1.034	0.928	35.437	0.005	0.000	100.064
09-MPB-R45	Mount	82	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.491	0.019	21.045	0.014	0.015	4.686	1.135	0.977	34.901	0.006	0.002	100.291
09-MPB-R45	Mount	83	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.306	0.006	21.142	0.009	0.000	4.465	1.031	1.010	35.296	0.005	0.000	100.269
09-MPB-R45	Mount	84	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.464	0.007	20.959	0.008	0.002	5.011	0.873	0.746	34.838	0.001	0.000	99.908
09-MPB-R45	Mount	85	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.272	0.008	21.062	0.009	0.000	4.053	1.065	1.096	35.705	0.002	0.000	100.270
09-MPB-R45	Mount	86	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.504	0.121	20.906	0.010	0.004	4.479	1.142	0.920	34.647	0.000	0.000	99.732
09-MPB-R45	Mount	87	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.623	0.014	21.134	0.019	0.015	4.843	0.922	0.821	35.051	0.001	0.002	100.445
09-MPB-R47	Section	PTS 09-MPB-R47	n/a	Garnet	Almandine	Almandine	Pink	37.143	0.041	20.844	0.070	0.295	3.394	3.114	4.790	30.566	0.008	0.002	100.266
09-MPB-R47	Section	PTS 09-MPB-R47	2	n/a	Garnet	Almandine	Pink	37.074	0.055	21.047	0.099	0.244	3.408	3.406	4.734	30.235	0.028	0.002	100.331
09-MPB-R47	Section	PTS 09-MPB-R47	3	n/a	Garnet	Almandine	Pink	37.481	0.037	21.123	0.048	0.205	3.918	2.831	4.106	30.741	0.017	0.000	100.508
09-MPB-R47	Section	PTS 09-MPB-R47	4	n/a	Garnet	Almandine	Pink	37.080	0.149	21.008	0.061	0.221	3.805	3.017	4.057	30.714	0.018	0.001	100.131
09-MPB-R47	Section	PTS 09-MPB-R47	5	n/a	Garnet	Almandine	Pink	37.313	0.014	21.293	0.021	0.002	4.118	2.976	3.598	30.567	0.015	0.007	99.924
09-MPB-R47	Section	PTS 09-MPB-R47	6	n/a	Garnet	Almandine	Pink	37.096	0.024	21.133	0.063	0.026	3.837	3.003	3.731	30.812	0.013	0.014	99.750
09-MPB-R47	Section	PTS 09-MPB-R47	7	n/a	Garnet	Almandine	Pink	37.354	0.023	21.269	0.030	0.003	3.927	2.786	4.086	30.680	0.017	0.001	100.175
09-MPB-R47	Section	PTS 09-MPB-R47	8	n/a	Garnet	Almandine	Pink	37.354	0.031	21.231	0.041	0.018	3.712	2.733	4.186	30.909	0.013	0.002	100.252
09-MPB-R47	Mount	88	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.575	0.005	21.264	0.019	0.015	4.872	2.525	1.742	32.128	0.004	0.001	100.149
09-MPB-R47	Mount	89	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.532	0.031	21.091	0.036	0.034	4.785	2.483	1.643	32.486	0.003	0.000	100.125
09-MPB-R47	Mount	90	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.677	0.063	21.031	0.090	0.047	4.573	1.836	2.180	32.743	0.006	0.000	100.246
09-MPB-R47	Mount	91	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.491	0.033	21.135	0.049	0.067	4.877	1.952	1.404	33.197	0.002	0.001	100.207
09-MPB-R47	Mount	92	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.419	0.012	21.043	0.041	0.055	4.820	1.990	1.379	33.149	0.002	0.003	99.912
09-MPB-R47	Mount	93	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.332	0.023	21.132	0.062	0.071	4.689	2.057	1.806	32.971	0.007	0.000	100.150
09-MPB-R47	Mount	94	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.545	0.047	21.036	0.021	0.028	4.993	2.220	1.702	32.466	0.002	0.000	100.060
09-MPB-R47	Mount	95	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.584	0.028	21.231	0.020	0.015	5.081	2.132	1.497	32.815	0.006	0.001	100.410
09-MPB-R47	Mount	96	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.642	0.011	21.102	0.026	0.046	4.710	2.327	1.575	32.550	0.000	0.000	99.989
09-MPB-R47	Mount	97	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.376	0.043	20.969	0.087	0.094	4.307	2.249	2.366	32.574	0.007	0.000	100.071
09-MPB-R47	Mount	98	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.550	0.006	21.160	0.017	0.026	4.906	2.323	1.339	32.850	0.003	0.001	100.180
09-MPB-R47	Mount	99	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.562	0.027	21.244	0.019	0.049	4.957	2.381	1.369	32.320	0.013	0.000	99.942
09-MPB-R47	Mount	100	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.542	0.016	21.131	0.029	0.044	4.722	2.589	1.572	32.529	0.005	0.000	100.178
09-MPB-R47	Mount	100d	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.538	0.023	21.149	0.023	0.049	4.701	2.594	1.572	32.616	0.010	0.001	100.276
09-MPB-R47	Mount	101	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.773	0.018	21.251	0.016	0.033	4.784	2.608	1.711	32.233	0.008	0.000	100.435
09-MPB-R47	Mount	102	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.408	0.031	21.151	0.041	0.069	4.576	2.232	1.624	33.008	0.007	0.000	100.146
09-MPB-R47	Mount	103	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.702	0.078	21.136	0.022	0.031	4.860	2.145	1.362	33.022	0.001	0.000	100.358
09-MPB-R47	Mount	104	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.345	0.027	20.939	0.085	0.098	4.458	2.219	1.886	32.804	0.001	0.001	99.864

Indicator Mineral Signatures of the Izok Lake Deposit, Nunavut: Part 1 Bedrock Samples

Appendix C4 continued.

Sample Number	Mount or Section	Mount Number	Grain Number	Size (mm)	Mineral	Subtype ODM	Mineral Subtype Confirmed by EMPA	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₅	Cr ₂ O ₃	Nb ₂ O ₅	CaO	MnO	FeO*	Na ₂ O	K ₂ O	Total
09-MPB-R47	Mount	10-0289-P08	105	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.298	0.039	21.128	0.070	0.076	4.888	1.952	1.429	33.015	0.016	0.000	99.909
09-MPB-R47	Mount	10-0289-P08	106	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.288	0.044	20.876	0.080	0.128	4.571	1.971	1.842	33.060	0.004	0.000	99.863
09-MPB-R47	Mount	10-0289-P08	107	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.279	0.042	20.915	0.075	0.077	4.684	2.173	1.446	32.872	0.004	0.001	99.568
09-MPB-R47	Mount	10-0289-P08	108	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.512	0.026	21.084	0.036	0.020	4.677	2.024	1.372	33.093	0.007	0.000	99.881
09-MPB-R47	Mount	10-0289-P08	109	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.368	0.018	20.972	0.099	0.104	4.557	2.092	1.978	32.688	0.005	0.000	99.850
09-MPB-R47	Mount	10-0289-P08	110	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.557	0.015	21.194	0.029	0.011	4.772	2.164	1.519	32.769	0.007	0.006	100.042
09-MPB-R47	Mount	10-0289-P08	111	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.471	0.033	21.044	0.041	0.038	4.660	2.363	1.801	32.608	0.005	0.000	100.063
09-MPB-R47	Mount	10-0289-P08	112	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.202	0.019	21.184	0.049	0.043	4.368	1.916	2.363	32.807	0.000	0.000	99.950
09-MPB-R47	Mount	10-0289-P08	113	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.364	0.026	21.096	0.056	0.098	4.791	2.183	1.776	32.803	0.010	0.000	100.201
09-MPB-R68	Section	PTS 09-MPB-R68	1	n/a	Garnet	Almandine	Almandine	Pink	37.135	0.005	21.215	0.000	0.009	4.080	0.593	2.116	35.306	0.018	0.003	100.480
09-MPB-R68	Section	PTS 09-MPB-R68	2	n/a	Garnet	Almandine	Almandine	Pink	37.054	0.009	21.310	0.003	0.000	4.446	0.684	1.956	34.777	0.006	0.004	100.248
09-MPB-R68	Section	PTS 09-MPB-R68	3	n/a	Garnet	Almandine	Almandine	Pink	37.132	0.010	21.436	0.009	0.000	4.426	0.731	1.951	34.610	0.016	0.004	100.324
09-MPB-R90	Section	PTS 09-MPB-R90	1	n/a	Garnet	Almandine	Almandine	Pink	36.708	0.015	20.849	0.008	0.000	1.648	6.443	4.464	29.333	0.006	0.002	99.477
09-MPB-R90	Section	PTS 09-MPB-R90	2	n/a	Garnet	Almandine	Almandine	Pink	37.180	0.008	20.922	0.000	0.000	2.097	7.383	3.426	28.686	0.004	0.004	99.711
09-MPB-R90	Section	PTS 09-MPB-R90	3	n/a	Garnet	Almandine	Almandine	Pink	36.881	0.056	20.811	0.000	0.007	1.881	6.255	4.735	29.010	0.005	0.001	99.640
09-MPB-R90	Section	PTS 09-MPB-R90	4	n/a	Garnet	Almandine	Almandine	Pink	37.310	0.000	20.866	0.000	0.000	1.740	7.129	4.544	28.522	0.024	0.011	100.146
09-MPB-R90	Section	PTS 09-MPB-R90	5	n/a	Garnet	Almandine	Almandine	Pink	36.587	0.003	20.246	0.000	0.000	1.784	6.840	3.793	28.403	0.008	0.029	97.693
09-MPB-R90	Section	PTS 09-MPB-R90	6	n/a	Garnet	Almandine	Almandine	Pink	36.516	0.007	20.848	0.005	0.006	1.410	4.128	5.729	31.135	0.003	0.001	99.788
09-MPB-R90	Section	PTS 09-MPB-R90	7	n/a	Garnet	Almandine	Almandine	Pink	36.999	0.036	21.061	0.000	0.000	2.029	6.792	3.734	29.136	0.003	0.010	99.802
09-MPB-R90	Section	PTS 09-MPB-R90	8	n/a	Garnet	Almandine	Almandine	Pink	36.542	0.024	20.538	0.002	0.000	1.665	4.730	4.794	31.465	0.017	0.007	99.782
09-MPB-R90	Section	PTS 09-MPB-R90	9	n/a	Garnet	Almandine	Almandine	Pink	37.038	0.009	20.883	0.000	0.016	1.998	7.185	3.732	29.022	0.010	0.005	99.898
09-MPB-R90	Section	PTS 09-MPB-R90	10	n/a	Garnet	Almandine	Almandine	Pink	36.819	0.011	20.835	0.000	0.000	1.788	7.256	3.451	29.650	0.000	0.016	99.827
09-MPB-R90	Section	PTS 09-MPB-R90	11	n/a	Garnet	Almandine	Almandine	Pink	36.900	0.046	20.896	0.000	0.000	2.015	5.438	3.585	31.112	0.026	0.006	100.023
09-MPB-R90	Section	PTS 09-MPB-R90	12	n/a	Garnet	Almandine	Almandine	Pink	36.722	0.080	20.599	0.003	0.000	1.863	6.694	3.078	30.064	0.022	0.005	99.538
09-MPB-R90	Mount	10-0289-P08	114	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.747	0.005	20.595	0.000	0.000	1.322	6.572	3.473	31.524	0.003	0.000	99.842
09-MPB-R90	Mount	10-0289-P08	115	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.864	0.007	20.682	0.000	0.000	1.285	8.010	2.724	30.067	0.000	0.001	99.641
09-MPB-R90	Mount	10-0289-P08	116	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.948	0.007	20.696	0.001	0.007	1.198	8.070	2.839	30.026	0.000	0.000	99.791
09-MPB-R90	Mount	10-0289-P08	117	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.952	0.009	20.650	0.000	0.000	1.218	7.115	3.060	31.134	0.000	0.001	100.139
09-MPB-R90	Mount	10-0289-P08	118	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.004	0.002	20.539	0.000	0.001	1.492	7.140	3.442	30.415	0.000	0.000	100.036
09-MPB-R90	Mount	10-0289-P08	119	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.871	0.001	20.746	0.002	0.000	1.472	7.413	2.644	30.906	0.003	0.000	100.057
09-MPB-R90	Mount	10-0289-P08	120	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.000	0.025	20.737	0.000	0.000	1.266	8.489	2.387	29.939	0.000	0.000	99.842
09-MPB-R90	Mount	10-0289-P08	121	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.270	0.018	20.819	0.000	0.002	1.395	7.656	2.578	30.701	0.002	0.002	100.442
09-MPB-R90	Mount	10-0289-P08	122	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.091	0.034	20.751	0.000	0.000	1.156	8.923	2.353	29.694	0.000	0.000	100.001
09-MPB-R90	Mount	10-0289-P08	123	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.984	0.010	20.643	0.001	0.000	1.397	7.600	2.740	30.601	0.000	0.000	99.976
09-MPB-R90	Mount	10-0289-P08	124	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.971	0.082	20.789	0.003	0.002	1.302	8.673	1.948	30.313	0.004	0.000	100.087
09-MPB-R90	Mount	10-0289-P08	125	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.823	0.008	20.486	0.008	0.000	1.227	7.549	3.348	30.215	0.000	0.000	99.664
09-MPB-R90	Mount	10-0289-P08	126	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.912	0.006	20.565	0.002	0.000	1.392	7.730	2.287	30.971	0.006	0.000	99.869
09-MPB-R90	Mount	10-0289-P08	127	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.977	0.018	20.947	0.000	0.000	1.168	8.425	2.421	30.183	0.004	0.001	100.143
09-MPB-R90	Mount	10-0289-P08	128	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.934	0.002	20.735	0.000	0.002	1.421	7.234	2.721	30.870	0.000	0.000	99.918
09-MPB-R90	Mount	10-0289-P08	128d	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.119	0.002	20.695	0.001	0.002	1.461	7.208	2.699	30.904	0.001	0.000	100.090
09-MPB-R90	Mount	10-0289-P08	129	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.825	0.081	20.394	0.006	0.000	1.440	5.580	3.399	32.124	0.006	0.001	99.855
09-MPB-R90	Mount	10-0289-P08	130	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.897	0.013	20.613	0.000	0.001	1.560	7.721	3.037	30.013	0.000	0.003	99.856
09-MPB-R90	Mount	10-0289-P08	131	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.767	0.034	20.655	0.000	0.000	1.318	5.371	3.204	32.642	0.000	0.002	99.993
09-MPB-R90	Mount	10-0289-P08	132	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.864	0.092	20.534	0.000	0.000	1.070	8.216	3.011	30.128	0.004	0.000	99.918
09-MPB-R90	Mount	10-0289-P08	133	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.859	0.082	20.636	0.000	0.000	1.260	7.760	2.633	30.684	0.006	0.000	99.920
09-MPB-R90	Mount	10-0289-P08	134	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.033	0.018	20.813	0.004	0.000	1.395	7.859	2.521	30.305	0.000	0.000	99.947
09-MPB-R90	Mount	10-0289-P08	135	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.890	0.013	20.688	0.003	0.000	1.463	6.989	2.754	30.990	0.000	0.000	99.790
09-MPB-R90	Mount	10-0289-P08	136	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.977	0.078	20.722	0.006	0.000	1.073	7.820	2.817	30.792	0.004	0.002	100.289

Appendix C4 continued.

Sample Number	Mount or Section	Grain Number	Size (mm)	Mineral	Subtype ODM	Mineral Subtype Confirmed by EMPA	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₅	Cr ₂ O ₃	Nb ₂ O ₅	CaO	MnO	FeO*	Na ₂ O	K ₂ O	Total
09-MPB-R90	Mount	137	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.000	0.029	20.773	0.000	0.006	1.316	8.627	2.428	29.677	0.004	0.000	99.860
09-MPB-R90	Mount	138	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.030	0.000	20.605	0.000	0.000	1.289	7.708	2.872	30.525	0.000	0.000	100.030
09-MPB-R90	Mount	139	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.928	0.098	20.692	0.005	0.002	1.559	8.246	2.885	29.442	0.000	0.001	99.857
09-MPB-R90	Mount	140	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.048	0.070	20.767	0.000	0.000	1.186	8.432	2.295	30.323	0.000	0.000	100.121
09-MPB-R90	Mount	141	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.830	0.004	20.679	0.000	0.000	2.095	6.971	3.029	30.060	0.005	0.000	99.673
09-MPB-R90	Mount	142	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.048	0.005	20.652	0.001	0.000	1.486	7.325	2.638	30.873	0.001	0.000	100.030
09-MPB-R90	Mount	143	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.415	0.102	20.449	0.000	0.004	0.657	6.448	8.474	27.173	0.002	0.001	99.725
09-MPB-R95	Mount	144	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.706	0.011	20.980	0.007	0.006	2.855	1.689	10.305	27.378	0.007	0.002	99.945
09-MPB-R95	Mount	145	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.642	0.001	20.768	0.003	0.004	2.698	1.958	11.273	26.412	0.002	0.002	99.761
09-MPB-R95	Mount	146	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.965	0.011	21.022	0.005	0.000	2.771	1.809	10.375	27.381	0.001	0.001	100.340
09-MPB-R95	Mount	147	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.534	0.006	20.894	0.000	0.000	2.490	1.757	11.768	26.387	0.001	0.000	99.837
09-MPB-R95	Mount	148	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.953	0.011	21.061	0.007	0.005	2.793	1.953	10.342	27.251	0.006	0.000	100.381
09-MPB-R95	Mount	148d	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.518	0.016	21.023	0.006	0.000	2.724	1.992	10.368	27.369	0.007	0.000	100.024
09-MPB-R95	Mount	149	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.796	0.013	20.826	0.003	0.001	2.884	1.671	11.159	26.856	0.008	0.000	100.217
09-MPB-R95	Mount	150	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.842	0.008	20.947	0.002	0.000	2.797	1.716	10.802	27.283	0.001	0.001	100.399
09-MPB-R95	Mount	151	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.863	0.010	21.183	0.015	0.008	2.737	2.424	10.786	26.447	0.000	0.000	100.473
09-MPB-R95	Mount	152	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.795	0.011	20.938	0.006	0.000	2.673	2.154	10.388	27.083	0.000	0.000	100.047
09-MPB-R95	Mount	153	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.546	0.015	20.938	0.006	0.009	2.733	1.921	10.525	27.088	0.000	0.000	99.782
09-MPB-R95	Mount	154	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.877	0.019	21.039	0.003	0.000	2.979	1.682	11.271	26.684	0.002	0.000	100.554
09-MPB-R95	Mount	155	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.791	0.008	20.869	0.002	0.000	2.577	2.076	11.731	26.033	0.004	0.002	100.091
09-MPB-R95	Mount	156	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.870	0.244	20.723	0.011	0.001	2.625	2.307	11.446	26.191	0.005	0.002	100.425
09-MPB-R95	Mount	157	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.854	0.010	20.984	0.008	0.004	2.762	2.537	10.399	26.774	0.002	0.000	100.335
09-MPB-R95	Mount	158	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.898	0.017	21.006	0.004	0.000	2.896	2.259	10.325	26.938	0.007	0.000	100.349
09-MPB-R95	Mount	159	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.719	0.012	21.056	0.006	0.000	2.613	1.729	11.214	26.870	0.004	0.000	100.222
09-MPB-R95	Mount	160	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.664	0.007	20.844	0.000	0.008	2.645	2.032	11.348	26.428	0.006	0.000	99.981
09-MPB-R95	Mount	161	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.814	0.002	20.968	0.002	0.000	2.614	1.705	11.092	26.611	0.004	0.000	99.812
09-MPB-R95	Mount	162	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.739	0.020	20.798	0.016	0.004	2.559	2.386	11.947	25.345	0.001	0.000	99.815
09-MPB-R95	Mount	163	0.25-0.5	Garnet	Almandine	Almandine	Pink	37.184	0.015	20.731	0.007	0.012	2.652	2.043	11.148	26.719	0.000	0.001	100.512
09-MPB-R95	Mount	164	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.886	0.021	20.983	0.005	0.000	2.807	2.107	10.625	26.687	0.006	0.000	100.126
09-MPB-R95	Mount	165	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.732	0.000	21.092	0.006	0.005	2.835	1.610	10.522	27.500	0.007	0.000	100.308
09-MPB-R95	Mount	166	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.926	0.013	21.058	0.006	0.004	2.911	1.649	11.105	26.773	0.008	0.000	100.451
09-MPB-R95	Mount	167	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.903	0.007	20.999	0.003	0.000	2.866	1.972	10.700	26.759	0.001	0.000	100.209
09-MPB-R95	Mount	168	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.836	0.028	21.005	0.005	0.000	2.820	2.122	10.264	27.339	0.007	0.000	100.427
09-MPB-R95	Mount	168d	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.627	0.011	21.041	0.004	0.004	2.776	1.991	10.321	27.229	0.008	0.000	100.013
09-MPB-R95	Mount	169	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.881	0.018	21.030	0.005	0.000	2.764	2.117	10.001	27.379	0.007	0.000	100.200
09-MPB-R95	Mount	170	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.737	0.046	20.723	0.006	0.000	2.405	3.031	11.350	25.492	0.002	0.000	99.792
09-MPB-R95	Mount	171	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.940	0.000	20.964	0.005	0.001	2.862	1.787	10.930	26.641	0.006	0.000	100.137
09-MPB-R95	Mount	172	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.746	0.014	21.114	0.005	0.001	2.772	2.005	11.059	26.411	0.005	0.001	100.133
09-MPB-R95	Mount	173	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.862	0.009	20.920	0.005	0.013	2.836	1.987	10.979	26.615	0.013	0.000	100.239
09-MPB-R95	Mount	174	0.25-0.5	Garnet	Almandine	Almandine	Pink	36.693	0.000	20.983	0.005	0.004	2.846	1.954	10.236	27.078	0.001	0.000	99.799

Appendix C5. Electron microprobe data for staurolite in grain mounts.

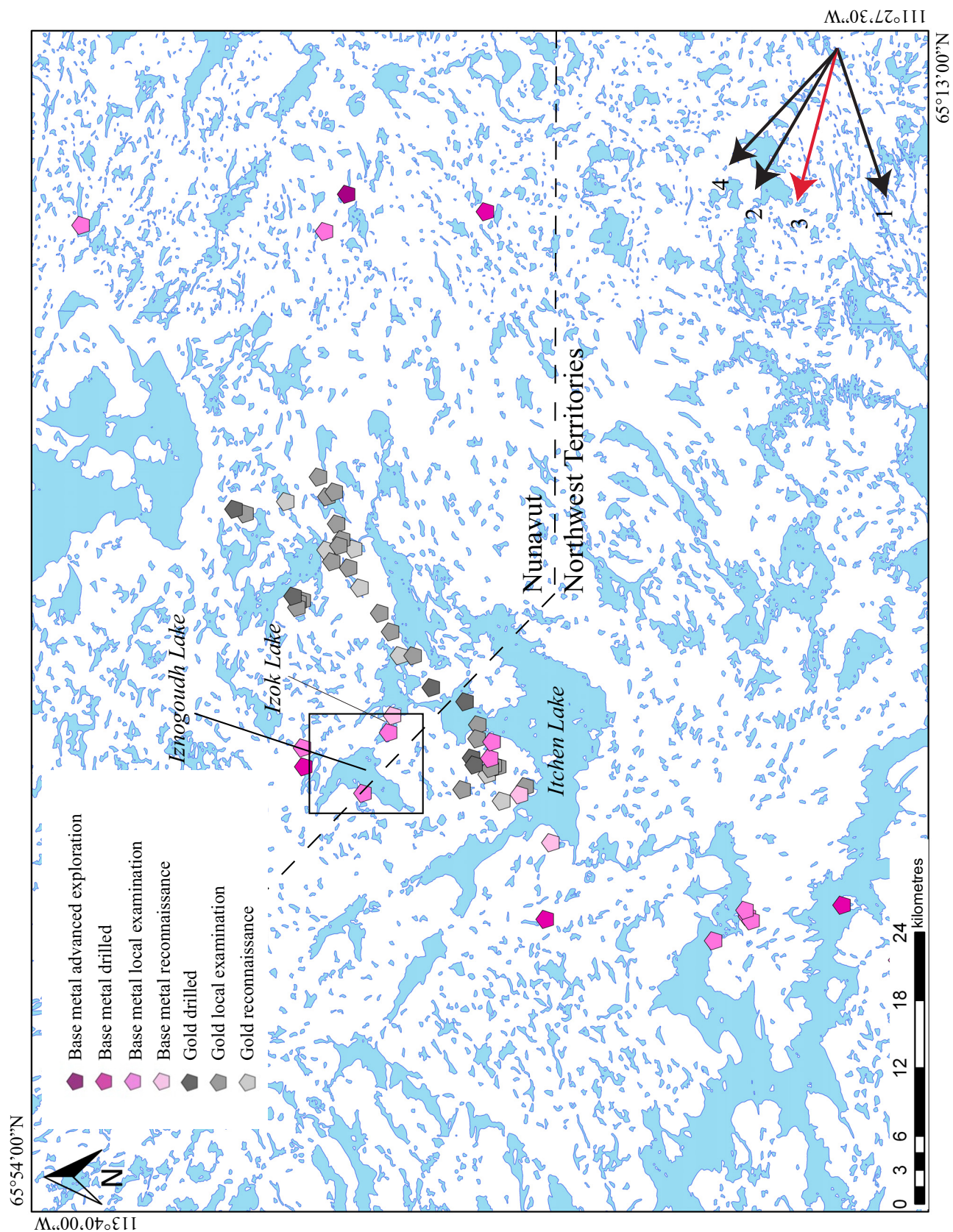
Sample Number	Mount or Section	Mount or Section Number	Grain Number	Size (mm)	Mineral	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	MgO	CaO	MnO	FeO*	ZnO	Na ₂ O	K ₂ O	F	Cl	Total
09-MPB-R45	Mount	10-0289-P04	75	0.25-0.5	Staurolite	Black	27.130	0.552	53.422	0.017	1.838	0.000	0.089	14.112	0.594	0.000	0.000	0.027	0.001	97.782
09-MPB-R45	Mount	10-0289-P04	76	0.25-0.5	Staurolite	Black	26.738	0.520	53.762	0.021	1.869	0.004	0.078	14.220	0.611	0.000	0.000	0.025	0.003	97.850
09-MPB-R45	Mount	10-0289-P04	77	0.25-0.5	Staurolite	Black	26.810	0.532	54.157	0.025	1.937	0.000	0.033	13.984	0.309	0.000	0.000	0.009	0.000	97.796
09-MPB-R45	Mount	10-0289-P04	78	0.25-0.5	Staurolite	Black	26.756	0.520	54.045	0.046	1.725	0.000	0.067	13.949	0.602	0.000	0.000	0.022	0.004	97.736
09-MPB-R45	Mount	10-0289-P04	79	0.25-0.5	Staurolite	Black	27.090	0.595	53.891	0.005	1.698	0.004	0.038	14.054	0.567	0.000	0.001	0.096	0.000	98.039
09-MPB-R45	Mount	10-0289-P04	80	0.25-0.5	Staurolite	Black	27.244	0.471	53.885	0.055	1.805	0.000	0.081	13.983	0.640	0.000	0.002	0.062	0.005	98.233
09-MPB-R45	Mount	10-0289-P04	81	0.25-0.5	Staurolite	Black	27.199	0.569	53.081	0.011	2.259	0.000	0.029	13.761	0.388	0.000	0.000	0.039	0.002	97.336
09-MPB-R45	Mount	10-0289-P04	82	0.25-0.5	Staurolite	Black	26.700	0.611	53.837	0.012	1.953	0.000	0.099	13.807	0.596	0.000	0.000	0.066	0.006	97.687
09-MPB-R45	Mount	10-0289-P04	83	0.25-0.5	Staurolite	Black	25.983	0.530	54.466	0.042	1.835	0.000	0.094	14.102	0.638	0.000	0.004	0.042	0.000	97.736
09-MPB-R45	Mount	10-0289-P04	84	0.25-0.5	Staurolite	Black	26.694	0.507	53.781	0.000	1.914	0.004	0.071	14.204	0.281	0.000	0.000	0.043	0.000	97.500
09-MPB-R45	Mount	10-0289-P04	85	0.25-0.5	Staurolite	Black	26.967	0.452	53.744	0.029	1.982	0.004	0.078	13.909	0.527	0.000	0.000	0.081	0.000	97.770
09-MPB-R45	Mount	10-0289-P04	86	0.25-0.5	Staurolite	Black	25.494	0.392	54.949	0.006	1.805	0.000	0.099	13.983	0.586	0.000	0.000	0.057	0.000	97.370
09-MPB-R45	Mount	10-0289-P04	87	0.25-0.5	Staurolite	Black	27.119	0.511	53.411	0.014	2.023	0.000	0.035	14.166	0.310	0.000	0.000	0.079	0.000	97.666
09-MPB-R45	Mount	10-0289-P04	88	0.25-0.5	Staurolite	Black	26.881	0.554	54.191	0.017	1.546	0.002	0.098	14.044	0.601	0.000	0.000	0.071	0.000	98.004
09-MPB-R45	Mount	10-0289-P04	89	0.25-0.5	Staurolite	Black	26.865	0.547	53.103	0.023	1.829	0.000	0.075	14.079	0.614	0.000	0.000	0.101	0.002	97.147
09-MPB-R45	Mount	10-0289-P04	90	0.25-0.5	Staurolite	Black	27.045	0.534	53.627	0.024	2.106	0.000	0.038	14.004	0.324	0.000	0.002	0.042	0.006	97.752
09-MPB-R45	Mount	10-0289-P04	91	0.25-0.5	Staurolite	Black	26.991	0.592	52.856	0.018	2.003	0.000	0.076	13.905	0.340	0.000	0.003	0.000	0.000	96.783
09-MPB-R45	Mount	10-0289-P04	92	0.25-0.5	Staurolite	Black	26.640	0.495	54.507	0.013	2.368	0.000	0.030	13.803	0.237	0.000	0.005	0.000	0.000	98.096
09-MPB-R45	Mount	10-0289-P04	93	0.25-0.5	Staurolite	Black	25.661	0.354	55.753	0.008	1.721	0.000	0.105	13.742	0.581	0.000	0.000	0.117	0.009	98.050
09-MPB-R45	Mount	10-0289-P04	94	0.25-0.5	Staurolite	Black	26.630	0.484	53.916	0.015	1.692	0.008	0.091	14.197	0.638	0.000	0.001	0.047	0.000	97.718
09-MPB-R45	Mount	10-0289-P04	95	0.25-0.5	Staurolite	Black	26.898	0.533	53.583	0.029	2.021	0.004	0.079	13.989	0.554	0.000	0.011	0.038	0.003	97.741
09-MPB-R45	Mount	10-0289-P04	96	0.25-0.5	Staurolite	Black	25.886	0.402	53.884	0.021	2.342	0.003	0.072	13.861	0.542	0.000	0.008	0.000	0.004	97.024
09-MPB-R45	Mount	10-0289-P04	97	0.25-0.5	Staurolite	Black	26.792	0.531	53.602	0.061	1.853	0.000	0.103	14.071	0.604	0.000	0.002	0.037	0.000	97.655
09-MPB-R45	Mount	10-0289-P04	98	0.25-0.5	Staurolite	Black	27.058	0.469	53.665	0.020	1.816	0.016	0.029	14.134	0.273	0.000	0.002	0.069	0.009	97.560
09-MPB-R45	Mount	10-0289-P04	99	0.25-0.5	Staurolite	Black	26.646	0.485	54.141	0.012	1.995	0.004	0.080	13.930	0.499	0.000	0.000	0.002	0.000	97.793
09-MPB-R45	Mount	10-0289-P04	100	0.25-0.5	Staurolite	Black	27.014	0.450	53.983	0.000	2.250	0.006	0.032	13.607	0.243	0.000	0.000	0.028	0.000	97.612
09-MPB-R45	Mount	10-0289-P04	101	0.25-0.5	Staurolite	Black	26.858	0.551	53.970	0.016	1.833	0.000	0.047	14.019	0.662	0.000	0.000	0.000	0.000	97.956
09-MPB-R45	Mount	10-0289-P04	102	0.25-0.5	Staurolite	Black	26.524	0.566	54.836	0.014	1.728	0.003	0.101	13.824	0.595	0.000	0.000	0.000	0.000	98.190
09-MPB-R45	Mount	10-0289-P04	103	0.25-0.5	Staurolite	Black	27.215	0.588	53.546	0.014	1.664	0.000	0.213	13.848	0.585	0.000	0.007	0.100	0.002	97.779
09-MPB-R45	Mount	10-0289-P04	104	0.25-0.5	Staurolite	Black	26.736	0.546	53.764	0.023	1.821	0.001	0.091	13.996	0.643	0.000	0.000	0.074	0.000	97.696

Appendix C6. Electron microprobe data for axinites in grain mounts.

Sample Number	Mount or Section	Mount or Section Number	Grain Number	Size (mm)	Mineral	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	MgO	CaO	MnO	FeO*	NiO	ZnO	Na ₂ O	K ₂ O	Total
09-MPB-R62	Mount	10-0289-P07	1	0.25-0.5	Manganaxinite	Brown	42.170	0.018	16.380	0.007	0.185	19.024	7.944	6.081	0.000	0.016	0.036	0.003	91.863
09-MPB-R62	Mount	10-0289-P07	2	0.25-0.5	Manganaxinite	Brown	42.009	0.098	16.894	0.002	0.341	18.975	7.375	5.887	0.000	0.023	0.004	0.001	91.607
09-MPB-R62	Mount	10-0289-P07	3	0.25-0.5	Manganaxinite	Brown	42.283	0.051	17.186	0.003	0.306	19.084	7.370	5.524	0.005	0.027	0.014	0.000	91.850
09-MPB-R62	Mount	10-0289-P07	4	0.25-0.5	Manganaxinite	Brown	41.985	0.010	16.180	0.000	0.230	19.157	8.082	5.860	0.000	0.050	0.000	0.000	91.554
09-MPB-R62	Mount	10-0289-P07	5	0.25-0.5	Manganaxinite	Brown	42.148	0.033	16.093	0.000	0.253	19.105	7.340	6.709	0.015	0.021	0.006	0.000	91.722
09-MPB-R62	Mount	10-0289-P07	6	0.25-0.5	Manganaxinite	Brown	42.364	0.017	17.182	0.000	0.190	19.339	8.052	4.755	0.003	0.021	0.000	0.002	91.925
09-MPB-R62	Mount	10-0289-P07	7	0.25-0.5	Manganaxinite	Brown	42.216	0.021	17.101	0.000	0.602	18.582	7.486	5.885	0.007	0.028	0.000	0.000	91.929
09-MPB-R62	Mount	10-0289-P07	8	0.25-0.5	Manganaxinite	Brown	42.365	0.016	17.017	0.003	0.160	19.182	7.905	5.364	0.001	0.017	0.019	0.000	92.049
09-MPB-R62	Mount	10-0289-P07	9	0.25-0.5	Manganaxinite	Brown	42.164	0.013	16.937	0.000	0.227	19.202	7.926	5.240	0.007	0.023	0.015	0.000	91.754
09-MPB-R62	Mount	10-0289-P07	10	0.25-0.5	Manganaxinite	Brown	42.345	0.000	16.613	0.006	0.211	19.192	8.112	5.136	0.004	0.021	0.013	0.000	91.654
09-MPB-R62	Mount	10-0289-P07	11	0.25-0.5	Manganaxinite	Brown	42.072	0.016	17.107	0.005	0.494	19.034	6.962	6.123	0.000	0.030	0.016	0.000	91.859
09-MPB-R62	Mount	10-0289-P07	12	0.25-0.5	Manganaxinite	Brown	42.027	0.004	16.830	0.003	0.269	19.130	7.531	5.571	0.000	0.018	0.018	0.000	91.401
09-MPB-R62	Mount	10-0289-P07	13	0.25-0.5	Manganaxinite	Brown	42.492	0.023	17.180	0.000	0.187	18.987	8.066	5.134	0.000	0.026	0.000	0.001	92.096
09-MPB-R62	Mount	10-0289-P07	14	0.25-0.5	Manganaxinite	Brown	41.916	0.009	16.051	0.000	0.198	19.038	7.890	6.125	0.000	0.019	0.000	0.003	91.249
09-MPB-R62	Mount	10-0289-P07	15	0.25-0.5	Manganaxinite	Brown	42.380	0.023	15.906	0.000	0.235	19.186	7.623	6.006	0.006	0.008	0.006	0.000	91.979
09-MPB-R62	Mount	10-0289-P07	16	0.25-0.5	Manganaxinite	Brown	42.355	0.017	16.915	0.003	0.248	19.059	8.012	5.424	0.000	0.023	0.002	0.003	92.061
09-MPB-R62	Mount	10-0289-P07	17	0.25-0.5	Manganaxinite	Brown	42.420	0.018	17.360	0.000	0.175	19.261	7.741	5.113	0.001	0.020	0.011	0.000	92.120
09-MPB-R62	Mount	10-0289-P07	18	0.25-0.5	Manganaxinite	Brown	42.347	0.018	17.078	0.001	0.224	19.233	8.352	4.879	0.000	0.015	0.000	0.005	92.151
09-MPB-R62	Mount	10-0289-P07	19	0.25-0.5	Manganaxinite	Brown	42.004	0.005	16.130	0.000	0.227	19.205	7.883	5.976	0.000	0.020	0.023	0.001	91.474
09-MPB-R62	Mount	10-0289-P07	20	0.25-0.5	Manganaxinite	Brown	42.162	0.006	17.100	0.005	0.480	19.057	7.261	5.880	0.000	0.024	0.027	0.000	92.001
09-MPB-R62	Mount	10-0289-P07	21	0.25-0.5	Manganaxinite	Brown	42.417	0.014	17.168	0.001	0.197	19.074	8.029	5.149	0.000	0.016	0.027	0.001	92.091
09-MPB-R62	Mount	10-0289-P07	22	0.25-0.5	Manganaxinite	Brown	42.237	0.009	16.980	0.005	0.231	19.060	7.367	5.716	0.003	0.025	0.008	0.001	91.643
09-MPB-R62	Mount	10-0289-P07	23	0.25-0.5	Manganaxinite	Brown	42.564	0.015	17.413	0.000	0.185	19.204	7.799	5.058	0.000	0.018	0.000	0.000	92.254
09-MPB-R62	Mount	10-0289-P07	24	0.25-0.5	Manganaxinite	Brown	42.513	0.022	17.080	0.001	0.326	19.196	7.189	5.824	0.000	0.020	0.003	0.000	92.174
09-MPB-R62	Mount	10-0289-P07	25	0.25-0.5	Manganaxinite	Brown	42.376	0.038	17.099	0.000	0.255	19.107	8.036	5.062	0.007	0.020	0.019	0.000	92.017
09-MPB-R62	Mount	10-0289-P07	26	0.25-0.5	Manganaxinite	Brown	41.798	0.020	16.371	0.000	0.241	18.828	7.953	6.138	0.000	0.010	0.009	0.000	91.367
09-MPB-R62	Mount	10-0289-P07	27	0.25-0.5	Manganaxinite	Brown	42.094	0.020	16.773	0.001	0.212	19.054	8.150	5.797	0.000	0.017	0.017	0.003	92.136
09-MPB-R62	Mount	10-0289-P07	28	0.25-0.5	Manganaxinite	Brown	42.532	0.008	16.950	0.005	0.271	19.093	7.789	5.392	0.003	0.019	0.002	0.000	92.065
09-MPB-R62	Mount	10-0289-P07	29	0.25-0.5	Manganaxinite	Brown	42.316	0.021	16.573	0.013	0.299	18.914	7.898	5.979	0.010	0.021	0.010	0.000	92.053
09-MPB-R62	Mount	10-0289-P07	30	0.25-0.5	Manganaxinite	Brown	42.190	0.020	17.023	0.010	0.244	19.235	7.836	5.191	0.012	0.018	0.016	0.000	91.794
09-MPB-R65	Mount	10-0289-P07	31	0.25-0.5	Manganaxinite	Brown	42.247	0.010	17.279	0.001	0.174	19.218	7.945	4.988	0.000	0.017	0.004	0.000	91.884
09-MPB-R65	Mount	10-0289-P07	32	0.25-0.5	Manganaxinite	Brown	42.321	0.011	17.063	0.001	0.259	19.186	7.627	5.531	0.000	0.026	0.000	0.000	92.025
09-MPB-R65	Mount	10-0289-P07	33	0.25-0.5	Manganaxinite	Brown	41.952	0.007	16.365	0.000	0.191	19.263	7.791	6.117	0.010	0.015	0.018	0.000	91.727
09-MPB-R65	Mount	10-0289-P07	34	0.25-0.5	Manganaxinite	Brown	42.704	0.027	17.305	0.010	0.201	19.287	7.811	5.242	0.011	0.019	0.000	0.000	92.616
09-MPB-R65	Mount	10-0289-P07	35	0.25-0.5	Manganaxinite	Brown	42.466	0.004	17.130	0.000	0.274	19.088	7.951	5.258	0.000	0.020	0.000	0.000	92.189
09-MPB-R65	Mount	10-0289-P07	36	0.25-0.5	Manganaxinite	Brown	41.691	0.020	16.223	0.000	0.278	19.243	7.547	6.465	0.005	0.012	0.019	0.000	91.503
09-MPB-R65	Mount	10-0289-P07	37	0.25-0.5	Manganaxinite	Brown	42.562	0.011	17.191	0.009	0.179	19.143	7.842	5.193	0.000	0.003	0.013	0.003	92.148
09-MPB-R65	Mount	10-0289-P07	38	0.25-0.5	Manganaxinite	Brown	42.366	0.005	16.736	0.000	0.352	19.195	7.616	5.615	0.023	0.016	0.001	0.000	91.925
09-MPB-R65	Mount	10-0289-P07	39	0.25-0.5	Manganaxinite	Brown	42.232	0.017	16.968	0.004	0.273	19.212	7.523	5.748	0.000	0.018	0.000	0.000	91.996
09-MPB-R65	Mount	10-0289-P07	40	0.25-0.5	Manganaxinite	Brown	42.266	0.004	17.265	0.011	0.376	19.076	7.259	5.607	0.002	0.020	0.009	0.000	91.894
09-MPB-R65	Mount	10-0289-P07	41	0.25-0.5	Manganaxinite	Brown	42.424	0.000	16.860	0.000	0.210	19.125	8.264	5.169	0.000	0.020	0.007	0.003	92.081

Appendix C6. Electron microprobe data for axinite in grain mounts.

Sample Number	Mount or Section	Mount or Section Number	Grain Number	Size (mm)	Mineral	Colour	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	MgO	CaO	MnO	FeO*	NiO	ZnO	Na ₂ O	K ₂ O	Total
09-MPB-R65	Mount	10-0289-P07	42	0.25-0.5	Manganaxinite	Brown	42.060	0.007	17.072	0.000	0.370	19.320	6.736	5.953	0.009	0.025	0.000	0.000	91.553
09-MPB-R65	Mount	10-0289-P07	43	0.25-0.5	Manganaxinite	Brown	42.044	0.021	17.060	0.000	0.250	18.941	7.798	5.666	0.007	0.023	0.000	0.001	91.811
09-MPB-R65	Mount	10-0289-P07	44	0.25-0.5	Manganaxinite	Brown	42.079	0.025	17.096	0.002	0.247	19.129	7.994	5.197	0.005	0.018	0.014	0.002	91.808
09-MPB-R65	Mount	10-0289-P07	45	0.25-0.5	Manganaxinite	Brown	41.885	0.019	16.418	0.002	0.233	18.924	8.045	6.085	0.002	0.009	0.000	0.000	91.622
09-MPB-R65	Mount	10-0289-P07	46	0.25-0.5	Manganaxinite	Brown	42.281	0.007	17.174	0.004	0.341	19.154	7.488	5.413	0.000	0.022	0.000	0.000	91.883
09-MPB-R65	Mount	10-0289-P07	47	0.25-0.5	Manganaxinite	Brown	42.262	0.003	17.092	0.000	0.311	19.081	7.760	5.315	0.000	0.033	0.011	0.000	91.867
09-MPB-R65	Mount	10-0289-P07	48	0.25-0.5	Manganaxinite	Brown	41.857	0.024	16.189	0.000	0.256	19.215	7.584	5.681	0.000	0.030	0.012	0.000	90.848
09-MPB-R65	Mount	10-0289-P07	49	0.25-0.5	Manganaxinite	Brown	42.230	0.013	17.053	0.000	0.226	19.155	7.366	5.759	0.000	0.026	0.000	0.000	91.828
09-MPB-R65	Mount	10-0289-P07	50	0.25-0.5	Manganaxinite	Brown	42.172	0.008	16.399	0.000	0.169	19.044	7.743	6.092	0.000	0.008	0.010	0.000	91.644
09-MPB-R65	Mount	10-0289-P07	51	0.25-0.5	Manganaxinite	Brown	41.889	0.005	15.970	0.003	0.231	19.251	8.161	6.095	0.000	0.013	0.007	0.000	91.625
09-MPB-R65	Mount	10-0289-P07	52	0.25-0.5	Manganaxinite	Brown	42.400	0.014	17.373	0.000	0.224	19.274	8.285	4.603	0.001	0.016	0.016	0.000	92.204
09-MPB-R65	Mount	10-0289-P07	53	0.25-0.5	Manganaxinite	Brown	42.556	0.023	16.987	0.001	0.210	19.239	7.744	5.448	0.000	0.013	0.007	0.000	92.228
09-MPB-R65	Mount	10-0289-P07	54	0.25-0.5	Manganaxinite	Brown	42.759	0.013	17.219	0.003	0.204	19.141	8.385	4.658	0.000	0.005	0.007	0.000	92.392
09-MPB-R65	Mount	10-0289-P07	55	0.25-0.5	Manganaxinite	Brown	42.214	0.009	17.063	0.000	0.233	19.090	8.401	5.060	0.000	0.012	0.000	0.000	92.082
09-MPB-R65	Mount	10-0289-P07	56	0.25-0.5	Manganaxinite	Brown	41.671	0.008	16.036	0.003	0.176	19.081	7.984	6.183	0.008	0.016	0.016	0.000	91.181
09-MPB-R65	Mount	10-0289-P07	57	0.25-0.5	Manganaxinite	Brown	42.450	0.013	17.249	0.004	0.233	19.050	8.465	5.005	0.000	0.015	0.019	0.000	92.503



Appendix D. Map of all known mineral showings in the Point Lake region. The historic orientation of ice-flow in the area is indicated by arrows, with the dominant flow direction in red.