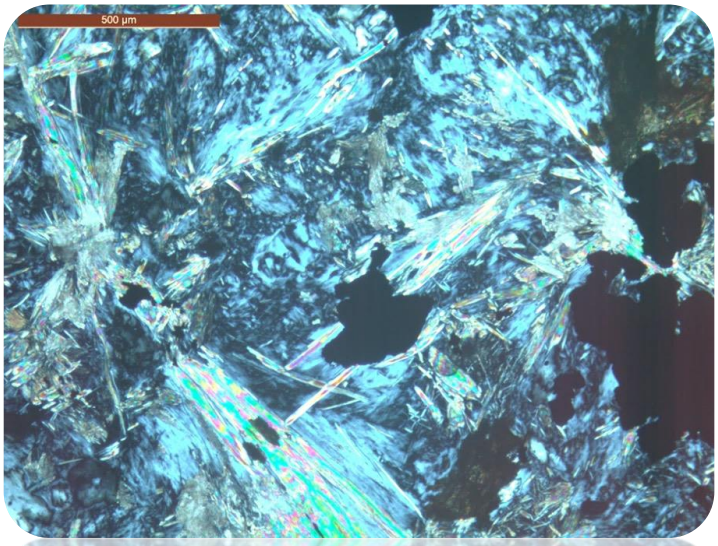
Mineral Resources Tasmania

Laboratory Report

LJN2019-119

MINERALOGICAL/PETROLOGICAL ANALYSES, RENISON MINE



An unpublished Mineral Resources Tasmania Report for:

Renison mine

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Date: 26 September 2022

Mineral Resources Tasmania
Department of State Growth

Tasmanian Government

SUMMARY

The sample contains magnetite, serpentine, magnesite, dolomite, brucite, szaibelyite (a Mg borate) and trace cassiterite. The rock is a retrogressed high temperature magnesian skarn that has probably formed by granite-related metamorphism of Ca-Mg-Fe carbonates, with later retrogression including B-rich metasomatism.

INTRODUCTION

One sample of core was submitted for mineralogical/petrological analysis with details shown in Table 1. The aim of the analysis was to describe the petrology and identify the major minerals.

Table 1: Sample details.

Reg#	Field No.	Location	Sample Description
G409296	UG975/281m	Renison mine	Magnetite ore

SAMPLE PREPARATION

The sample was split into representative subsamples and prepared as a polished thin section for polarised light microscopy, at UTAS. It was also examined by stereomicroscopy, and analysed for mineralogy by XRD (X-Ray diffraction), in the Mineral Resources Tasmania (MRT) laboratories, Rosny.

GEOLOGY

The DDH U6975 contains abundant magnetite and green minerals from 273m to 286m. The contact with coarse grained granite is at 296.2m. Between the green magnetite rock and the granite (from 286 to 296.2m) it is more or less massive magnetite.

SAMPLE DESCRIPTION

The sample in hand specimen is an unfoliated, mottled, granular, skarn-like rock containing abundant black magnetite in disseminations and clumped

+ aggregates to about a cm in diameter. The magnetite grains are up to about 1mm in diameter. The matrix is a variable mixture of granular white and pale green to pale brown minerals. (Fig. 1).

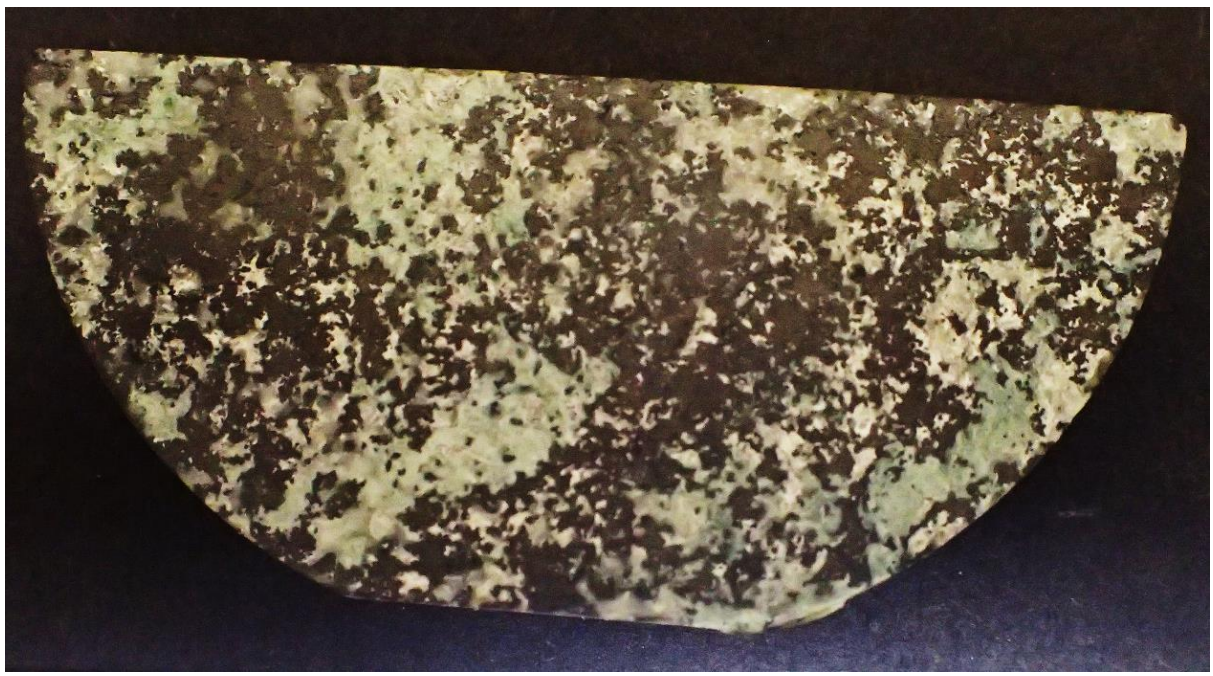

Figure 1: Cut section of drillcore containing black magnetite, green serpentine and white carbonates, szaibelyite and brucite. Sample G409296. FOV: about 50 mm.

The sample in thin section shows the rock is composed of mostly magnetite, serpentine, carbonates and szaibelyite, with minor brucite and trace cassiterite. The mineral proportions below are approximate vol. %. It is medium to fine grained and unfoliated, with no veining (Figs 2 - 11).

Serpentine comprises about 25-30% of the rock, and is fined grained and pale green, probably iron bearing. Some is in plates to almost 1mm in length (Figs 2 - 3) and some appears to be pseudomorphing a primary mineral, probably olivine or a humite-group mineral about 1mm in grainsize (Figs 5). XRD indicates it is mostly antigorite, fitting the platey material, but the pseudomorphic material appears to be lizardite.

The magnetite comprises about 20-25% of the rock, in disseminations of skeletal and moderately to highly poikiloblastic crystals to about 1mm (Figs 7 - 11). Inclusions appear to be serpentine and possibly brucite. The skeletal nature suggests a rapid growth.

Carbonate comprises about 20-25% of the rock, and is medium to fined grained (<0.5mm) (<and pale brownish, possibly iron bearing. XRD indicates it is a mixture of magnesite and dolomite (Figs 2, 5, 6).

Szaibelyite (a rare Mg borate) comprises about 15-20% of the rock, and is colourless, highly fibrous (<1mm long), commonly in radiating clusters and appears to replace the carbonates (Figs 2 - 3).

Brucite comprises about 5-10% of the rock, and is colourless, highly rounded to tabular crystals, some zoned or twinned (<1mm long). It appears to be partly altered to serpentine (Figs 4 - 6).

Cassiterite (tin oxide) comprises about 1-2% of the rock, and is dark brown, skeletal to prismatic aggregates (<0.25 mm long), commonly in radiating clusters and in places appears to replace the szaibelite (Figs 3,8, 11).

There are sparse grains of a primary mineral, perhaps olivine or a humite-group mineral, to about 0.5mm (Figs 5).

The only sulphide detected was very sparse, fine pyrite, as inclusions in magnetite, and may have been largely altered to magnetite (Figs 10).

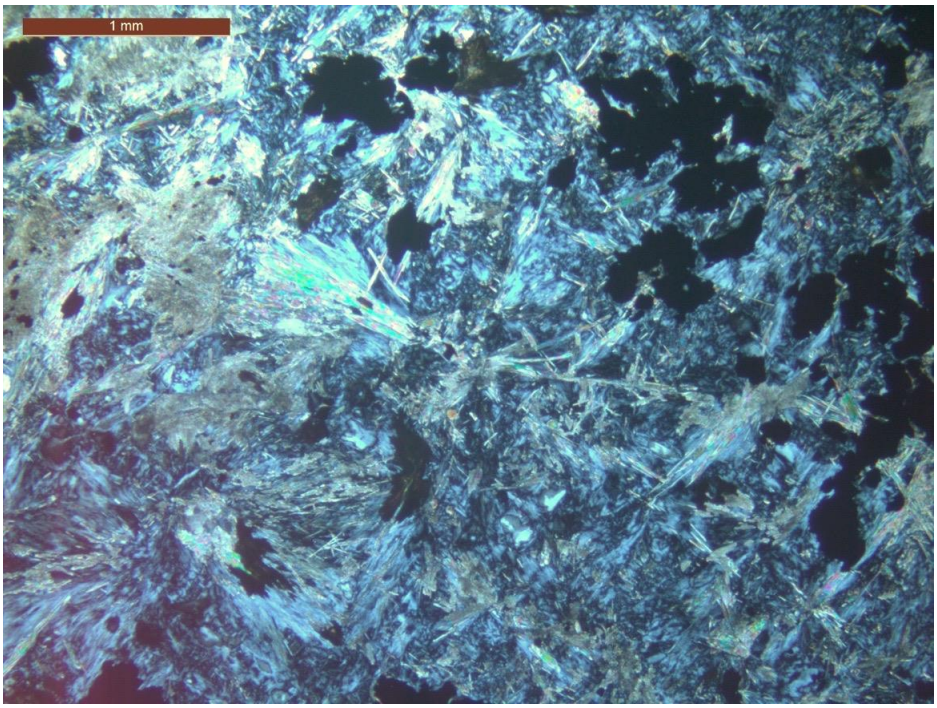

Figure 2: Sample G409296, Polarised transmitted light, crossed polars, showing black magnetite, and patches of fibrous szaibelyite (high birefringence) in blue-grey serpentine, plus pale brownish carbonate.

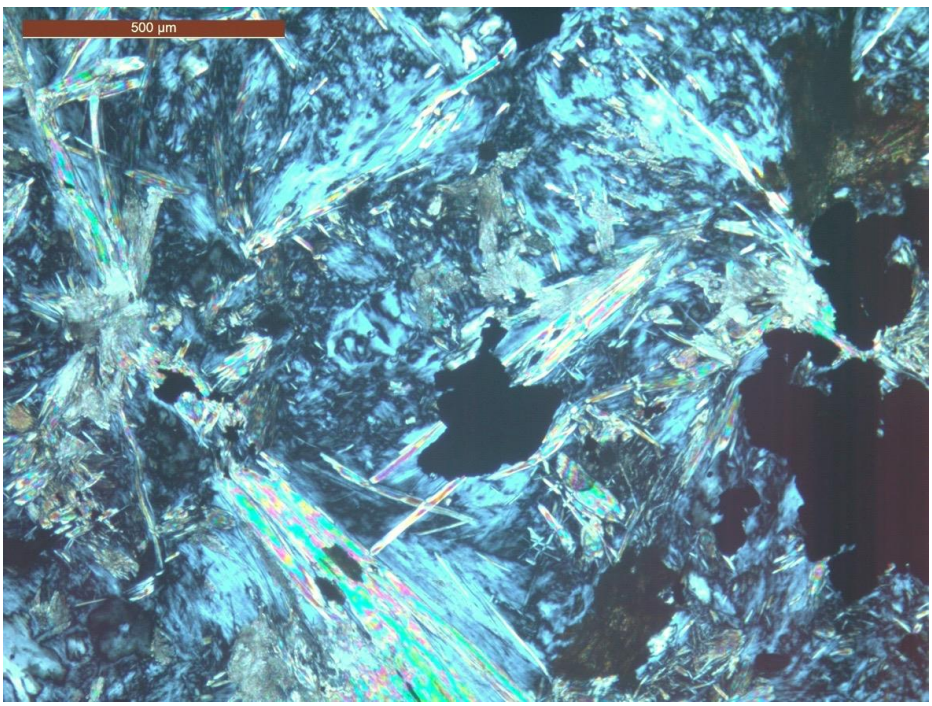

Figure 3: Sample G409296, Polarised transmitted light, crossed polars, showing black magnetite, and patches of fibrous szaibelyite (high birefringence) in blue-grey serpentine, plus pale brownish carbonate and some dark brown cassiterite (lower right).

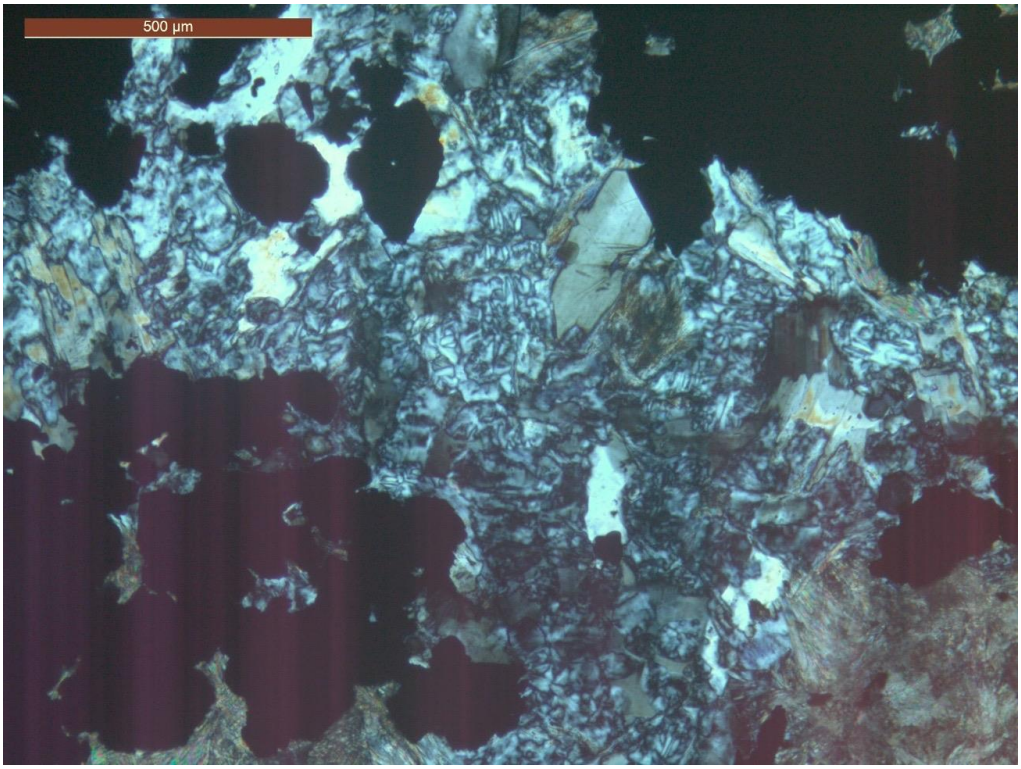

Figure 4: Sample G409296, Polarised transmitted light, crossed polars, showing black magnetite, and patches of brucite (white – pale grey) in serpentine (blue-grey), with brownish carbonate altering to fibrous szaibelyite.

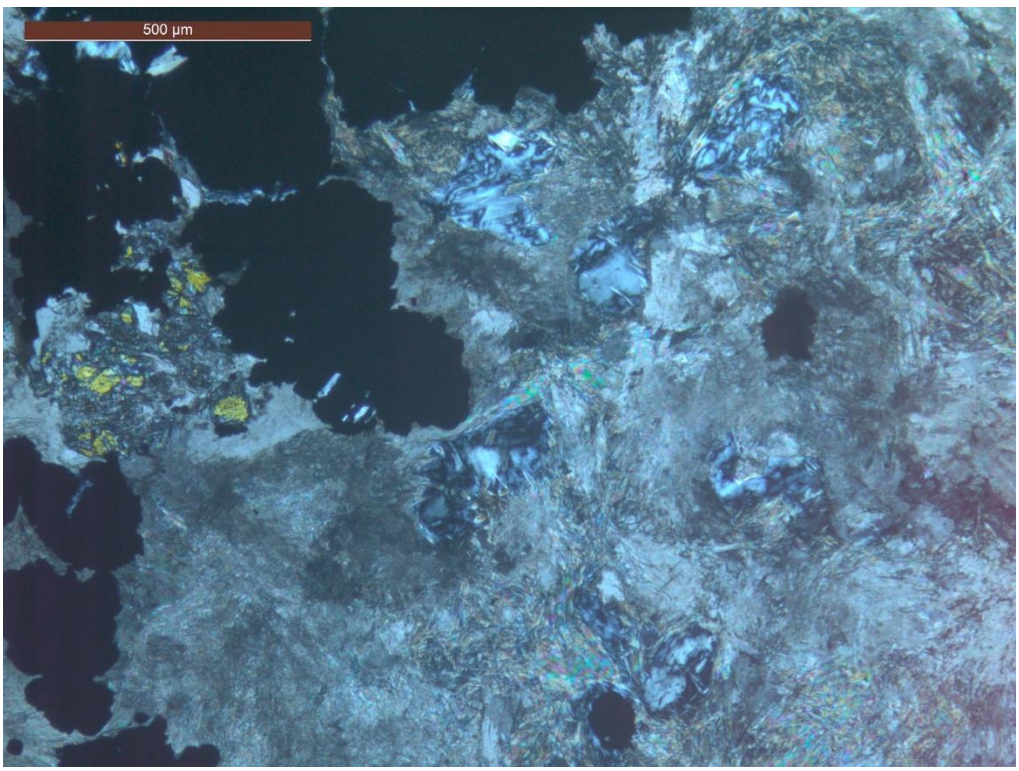

Figure 5: Sample G409296, Polarised transmitted light, crossed polars, showing black magnetite, and patches of brucite and serpentine, plus an unidentified yellow mineral, in brownish carbonate altering to fibrous szaibelyite.

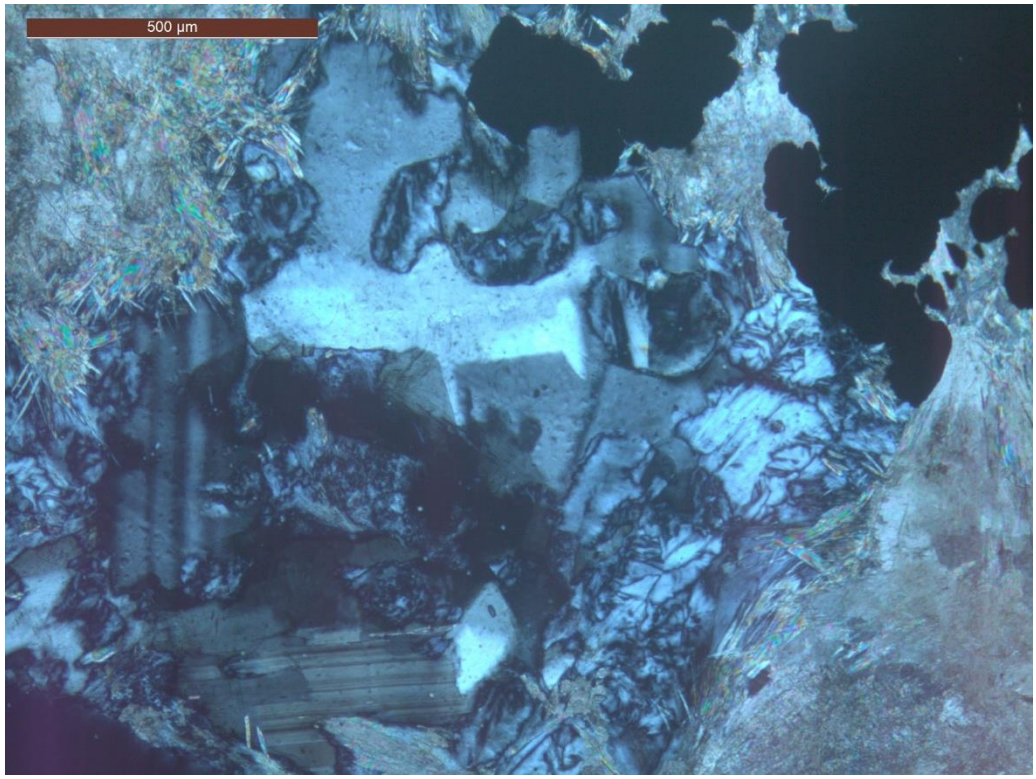

Figure 6: Sample G409296, Polarised transmitted light, crossed polars, showing black magnetite, coarse grained twinned brucite (centre) and fine blue-grey serpentine, with brownish carbonate (upper left and lower right) altering to fibrous szaibelyite.

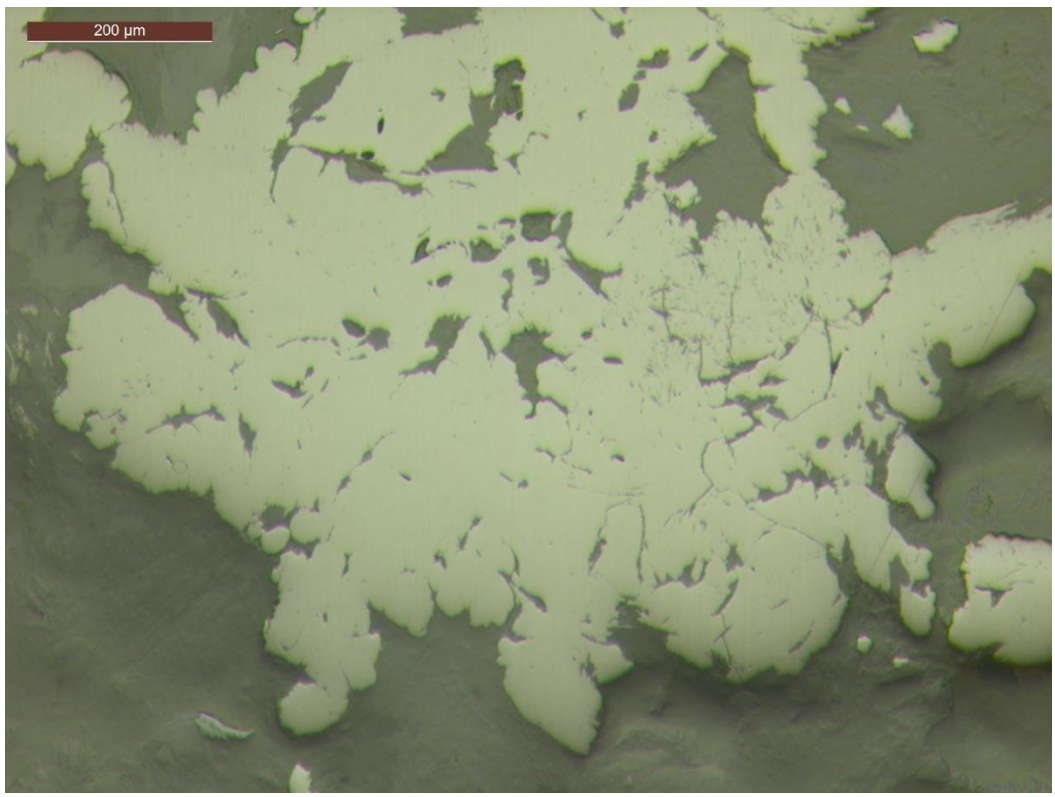

Figure 7: Sample G409296, Polarised reflected light, uncrossed polars, showing poikiloblastic magnetite (creamy grey) crystals in a serpentine-carbonate-szaibelyite rich matrix.

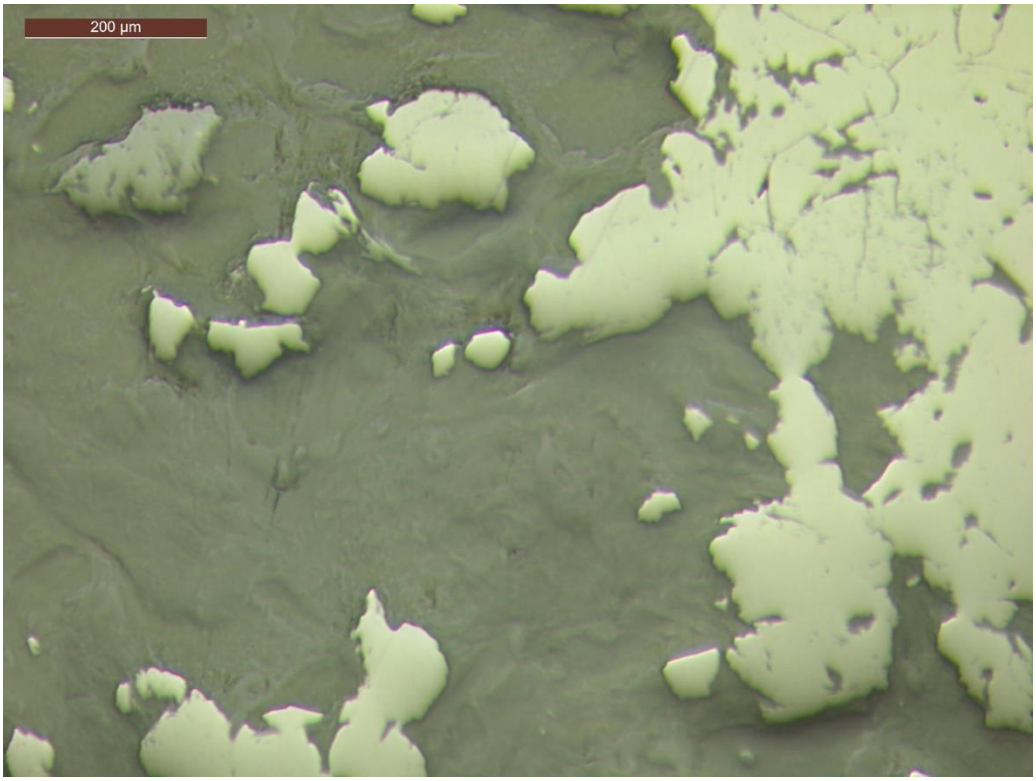

Figure 8: Sample G409296, Polarised reflected light, uncrossed polars, showing poikiloblastic magnetite (cream) crystals and highly skeletal cassiterite (pale grey, upper left) in a serpentine-carbonate-szaibelyite rich matrix.

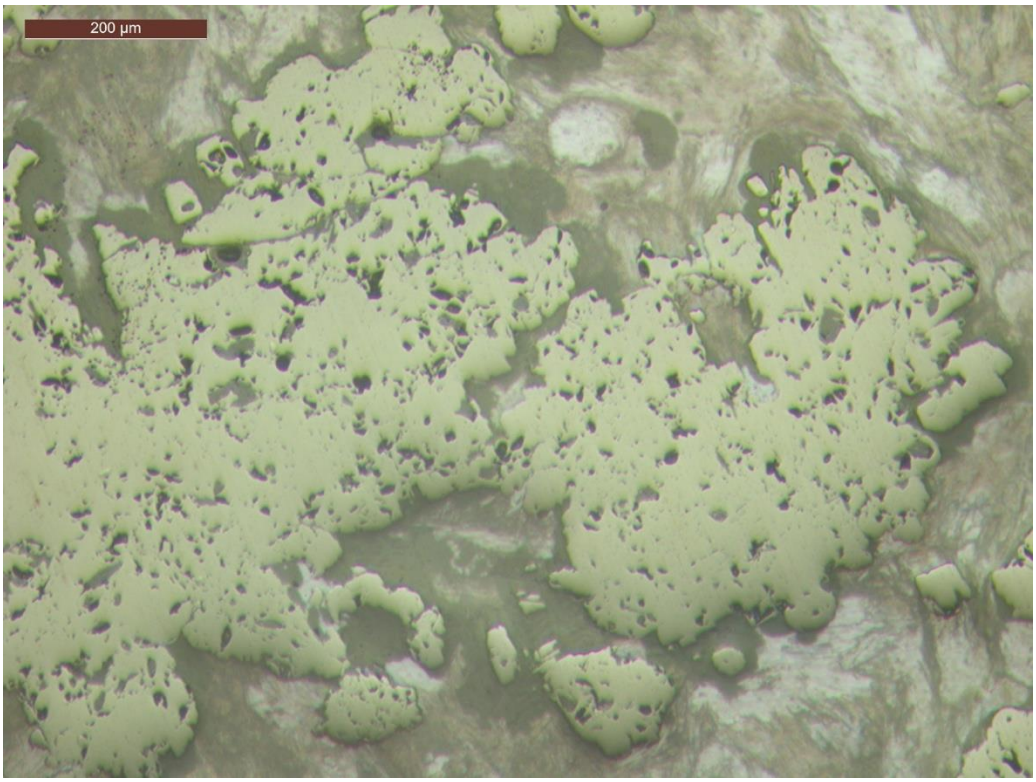

Figure 9: Sample G409296, Polarised reflected and transmitted light, uncrossed polars, showing skeletal/poikiloblastic magnetite (creamy grey) in a serpentine-carbonate-szaibelyite rich matrix

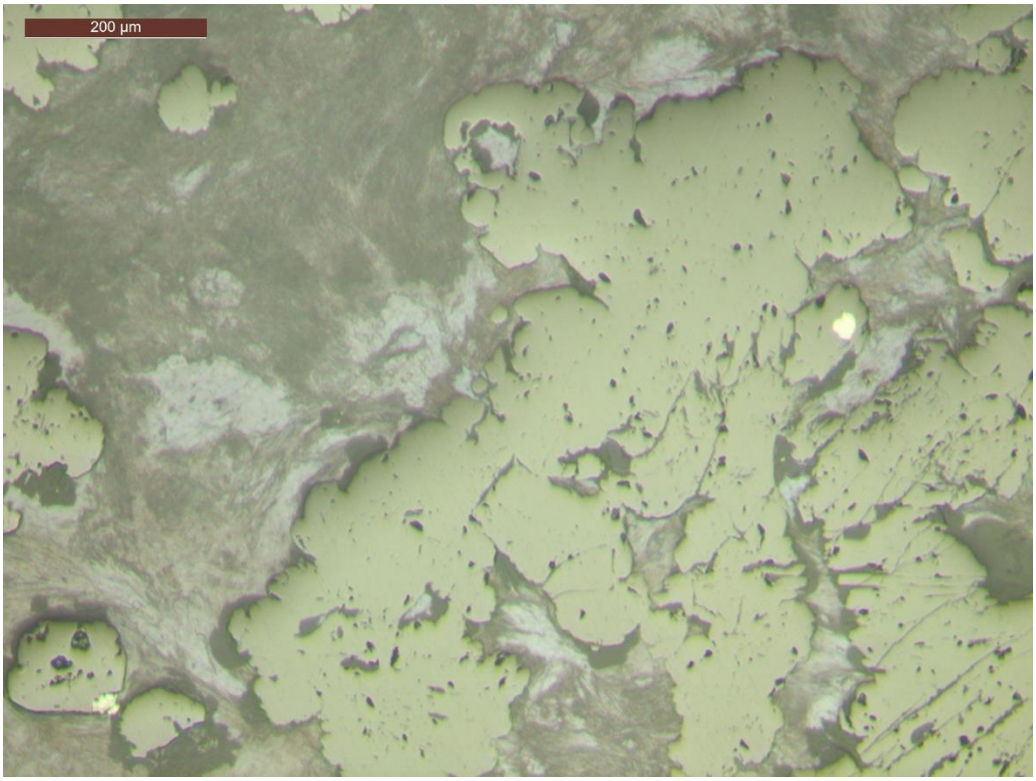

Figure 10: Sample G409296, Polarised reflected and transmitted light, uncrossed polars, showing small pyrite crystals (bright white) in skeletal/poikiloblastic magnetite (creamy grey) in a serpentine-carbonate-szaibelyite rich matrix.

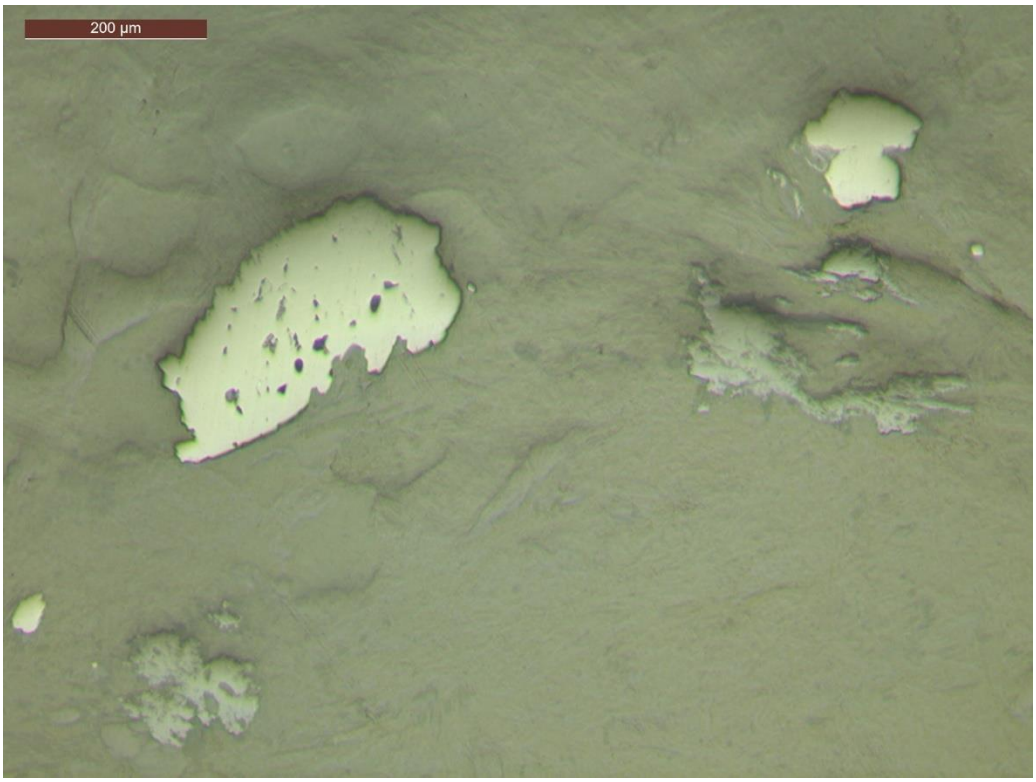

Figure 11: Sample G409296, Polarised reflected light, uncrossed polars, showing poikiloblastic magnetite (cream) crystals and highly skeletal cassiterite (pale grey) in a serpentine-carbonate-szaibelyite rich matrix.

XRF

The sample was analysed for major elements on a fused disc, in a Bruker ASX58 XRF (X-ray fluorescence spectrometer), with proprietary Bruker software and a series of commercial standards. The results are shown in Appendix 1.

XRD ANALYSES

The samples were prepared, examined and analysed in the MRT laboratories, Rosny Park, Tasmania. They were run on a Rigaku Miniflex 600 X-Ray Diffractometer system: a 600W generator 150mm goniometer with a Cu tube; 40kV/15mA, sample spinner and a Scintillation counter (SC) with Be window, -3^{o} to 145^{o} 2Ø scanning range and 2^{o} - 145^{o} 2Ø measuring range, with a scanning speed of 0.01 to 100^{o}/min, a graphite counter monochromator and a Kß Ni- filter. The analysis software used is the PDXL2 using the ICCD database. The XRF data was incorporated using MINSQ to refine the results (Herrmann and Berry, 2002).

The raw results are shown in Appendix 1, and with refined results in Table 2. These indicate mostly magnetite, ferroan dolomite and serpentine with minor to trace szaibelyite, chlorite, brucite, magnesite, apatite, cassiterite and clinopyroxene (diopside).

Table 2: XRD Summary: Raw XRD and adjusted by the MINSQ program. Approx. Wt.%.

Mineral	XRD	MINSQ
Magnetite	63(±10)	52.5
Diopside	?	0.5
Fe-Dolomite	4(±2)	15.5
Mg Chlorite	4(±2)	1.5
Apatite	ND	1.0
Cassiterite	2(±1)	1.5
Brucite	2(±1)	2.0
Szaibelyite	4(±2)	3.5
Serpentine	22(±4)	20.5
Magnesite	1(±1)	1.0
TOTAL	100	99.5

SUMMARY AND DISCUSSION

The results indicate that the sample is a magnesian magnetite skarn comprising mostly magnetite, ferroan dolomite and serpentine with minor to trace szaibelyite, chlorite, brucite, magnesite, apatite, cassiterite and clinopyroxene. It has formed from granite-related, high temperature metamorphism and retrograde metamorphism incorporating hydrous, B-rich metasomatism.

R.S. Bottrill

MINERALOGIST/PETROLOGIST

T Coyte

SENIOR TECHNICAL OFFICER

REFERENCES

W. Herrmann & R.F. Berry (2002). *MINSQ – a least Squares spreadsheet method for calculating mineral proportions from whole rock major element analyses.* Centre for Ore Deposit Research University of Tasmania.

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Appendix 1: Laboratory Report: XRD Analyses

Client: Bluestone
Sample Source: Renison mine
MRT Job Number: LJN2019-119
Analysis: Approximate Mineralogy
Method: X-Ray Diffraction
Analyst: T Coyte
Lab Manager: R Bottrill
Date: 16/12/2019

Analysis Results – G409296

General information

Analysis date	2019/12/3	XRD	Rigaku Miniflex 600
Job Number	LJN2019-119		
Sample ID	G409296	Operator:	T.Coyte
Comment:	Original RIR Method. Sample heated to 580, magnetite coverts to hematite, Chlorite and Serpentine break down, Cold HCl Leach – Confirms Dolomite, and possibly magnesite		

Analysis results

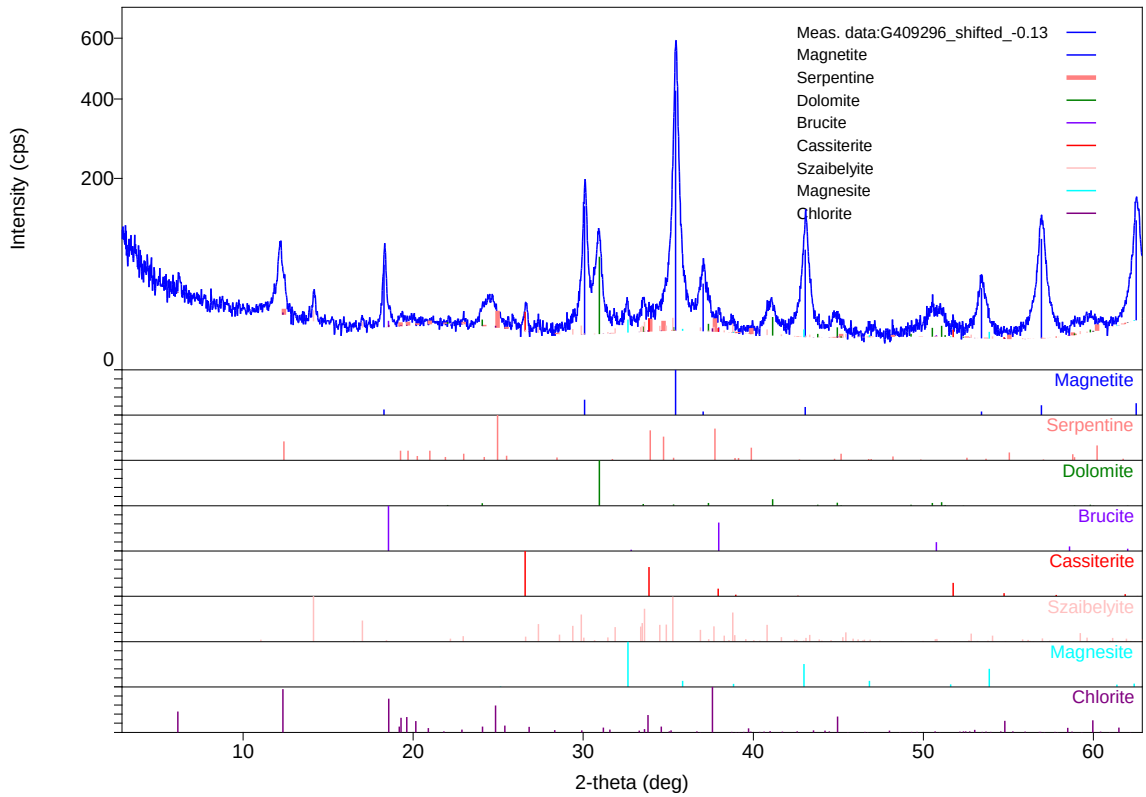
Phase name	Content (%)	Formula
Magnetite	63(±10)	Fe_3O_4
Serpentine	22(±4)	$(Mg,Fe,Ni, Mn,Zn)_{2-3}(Si,Al,Fe)_2O_5(OH)_4$
Dolomite	4(±2)	$CaMg(CO_3)_2$
Szaibelyite	4(±2)	$MgBO_2(OH)$
Chlorite	4(±2)	$Mg_5Al(AlSi_3O_{10})(OH)_8$
Brucite	2(±1)	$Mg(OH)_2$
Cassiterite	2(±1)	SnO_2
Magnesite	1(±1)	$Mg(CO_3)$

Peak overlap may interfere with identifications and quantitative calculations.

Amorphous minerals and minerals present in trace amounts may not be detected.

*Possible trace mineral <1%, peaks at 6.367 - Clinopyroxene?

Phase data pattern



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Appendix 2: Laboratory Report: XRF Analyses

Client: Bluestone
Sample Source: Renison mine
MRT Job Number: LJN2019-119
Analysis: Chemistry
Method: X-Ray Fluorescence (majors)
Analyst: T Coyte
Lab Manager: R Bottrill
Date: 16/12/2019

Sample No.	G409296
SiO2	9.39%
TiO2	0.05%
Al2O3	0.54%
Fe2O3	55.89%
MnO	0.33%
MgO	14.81%
CaO	5.13%
Na2O	0.02%
K2O	0.01%
P2O5	0.37%
LOI	10.03%
Total	96.57%