Mineral Resources Tasmania

Mineralogical/Petrology Report

MPR2012/103

XRD ANALYSES: OONAGALABI DRILLCORE, NORTERN TERRITORY

An unpublished Mineral Resources Tasmania report for

NT Geological Survey

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Department of Infrastructure, Energy and Resources
Mineral Resources Tasmania

Tasmania
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SUMMARY

XRD analysis confirms the presence of amphiboles in both samples, as suggested by the Hylogger, although the exact nature of these is unclear; the XRD suggests they may be Li-rich amphiboles.

SAMPLES

The details of the samples submitted for XRD by Belinda Smith, Northern Territory Geological Survey (NTGS), are given in Table 1 below.

Table 1: Sample details:

TSG File Name	HyLogger Sample #	Description	Depth (m)	Expected mineralogy	Comment/Instruction
7963300_SLX001	010348	Oonagalabi, SLX001	73.989	?REE amphibole (unknown)	Please try to identify REE mineral, it appears to be some sort of amphibole
7963300_SLX001	015195	Oonagalabi, SLX001	107.63	?REE amphibole (unknown)	Please try to identify REE mineral, it appears to be some sort of amphibole

INTRODUCTION & BACKGROUND

The Hylogger IR spectroscopic analyses of drillcore being conducted by various Geological Surveys in Australia routinely return analyses indicating various minerals that often cannot be readily confirmed in the hand specimens, and require XRD (X-ray diffraction) or other methods for confirmation.

The objective of this study is mostly to determine the presence or absence of different phases in two samples, from the Oonagalabi prospect in the Northern Territory.

ANALYTICAL TECHNIQUES

The samples were prepared, examined and analysed by XRD and microscopy in the MRT laboratories, Rosny Park, Tasmania. They were also tested for chemistry in the SEM (Scanning Electron Microscope) facility in the Forensic Science Services Laboratories, Government Analysts Laboratories, New Town, Tasmania.

MICROSCOPY

The samples were examined by stereomicroscopy in the MRT laboratories. Sample 010348 is a banded, foliated metamorphic or metasomatic rock with what appears to be both pink and green bladed amphiboles to a few mm in size, and quartz, with possible phlogopite-biotite mica in some patches. There is very little weathering or alteration. Sample 015195 is very similar. There are traces of chalcopyrite and sphalerite in the first sample but no REE minerals could be identified in either.

XRD

The samples were run on an automated Philips X-Ray diffractometer system: PW 1729 generator, PW 1050 goniometer and PW 1710 microprocessor with nickel-filtered copper radiation at 40kV/30mA, a graphite monochromator (PW1752), sample spinner and a proportional detector (sealed gas filled PW1711). The PW1710 system is presently driven by the CSIRO XRD software: "PW1710 for Windows" and "XPLOT for Windows". Interpretation and quantification is largely manual, using a series of prepared standards of the more common minerals to enable some semi-quantitative analysis.

SEM

The core samples were sub-sampled and analysed in the SEM in the FSST (Forensic Science Services Tasmania) laboratories, New Town, Tasmania. It was run on a Camscan CS3200 SEM with a SiriusSDU-10133-LE-S Silicon Drift EDAX (energy dispersive X-ray) detector and proprietary analytical processing software.

RESULTS

The XRD results are attached in Appendix 1 and the SEM results in Appendix 2; these are all summarised in Table 2, with comparison to the Hylogger results. The results are discussed further below.

Table 2: Results summary:

HyLogger Sample #	Client ID	Description	Depth (m)	Expected mineralogy	Result
010348	7963300_SLX001	Oonagalabi, SLX001	73.989	?REE amphibole (unknown)	Amphibole (possibly an intermediate between calcic and lithic groups), minor quartz.
015195	7963300_SLX001	Oonagalabi, SLX001	107.63	?REE amphibole (unknown)	Amphibole (possibly an intermediate between calcic and lithic groups).

DISCUSSION AND CONCLUSIONS

The XRD results indicate the presence of dominant amphiboles in both samples, including both the green and pink parts of the samples. The green and pink amphiboles appear to be very similar in XRD pattern and composition. The XRD analysis indicates both show strong low angle (110) peaks about 8.22Å, lower than most amphiboles and this is strongly suggestive of either an orthoamphibole (e.g. anthophyllite or gedrite) or a Li-rich amphibole.

The EDAX analyses, however, show the composition of both samples is Ca-Mg rich and do not fit any orthoamphiboles or any known Li-rich amphiboles. The pink amphibole is more Al-rich, similar to magnesiohornblende, while the green one resembles actinolite, although the derived formulae do not fit well, and the compositions are a poor fit for the XRD patterns. The two minerals may both possibly be Li-Ca-Mg amphiboles, nominated provisionally during a recent IMA revision of the amphiboles, but with endmembers or species as yet unnamed (http://www.mindat.org/min-43533.html and Hawthorne et al., 2012).

No REE-bearing minerals could be identified.

REFERENCES

Frank C. Hawthorne, Roberta Oberti, George E. Harlow, Walter V. Maresch, Robert F. Martin, John C. Schumacher, Mark D. Welch (2012): Nomenclature of the amphibole supergroup, *American Mineralogist*, Volume 97, pages 2031–2048.

R. Bottrill — **MINERALOGIST/PETROLOGIST**

R. Woolley — **TECHNICAL OFFICER**

Appendix 1: XRD Analysis

Mineral Resources Tasmania Laboratory Report

Client: B. Smith, NTGS
Sample Source: not stated
MRT Job Number: MPR2012/103
Analysis: Approximate Mineralogy
Method: X-Ray Diffraction

Results (approx wt %)

Sample	*HyLogger Ref.*	*Depth (m)*	*Minerals Identified*
SLX001	010348	73.99	Amphibole[1] (major), Quartz (minor)
SLX001	015195	107.63	Amphibole[1]

Peak overlap may interfere with identification and quantitative calculations.

Amorphous material (e.g. some hydrous iron oxides, organic matter) and minerals present in trace amounts may not be detected.

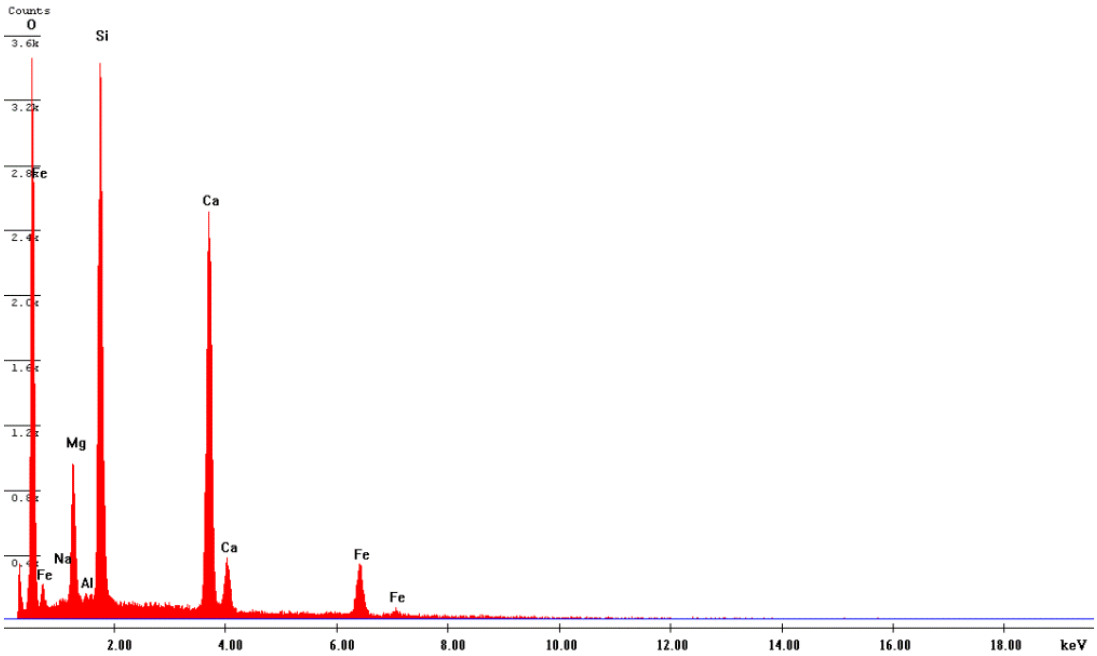
[1] major peaks at 8.22Å-8.23Å, 4.13Å, 3.23Å, 3.05Å, 2.75Å (plus many smaller peaks); possible Orthoamphibole (Anthophyllite, Ferrogedrite, etc), but does not match any particular member of the group; small peaks cannot, therefore, be assigned with certainty and some may relate to other minerals (potentially containing the rare-earth elements).

Analyst: R.N. Woolley
Date: 14 December 2012

Appendix 2: SEM Spectra

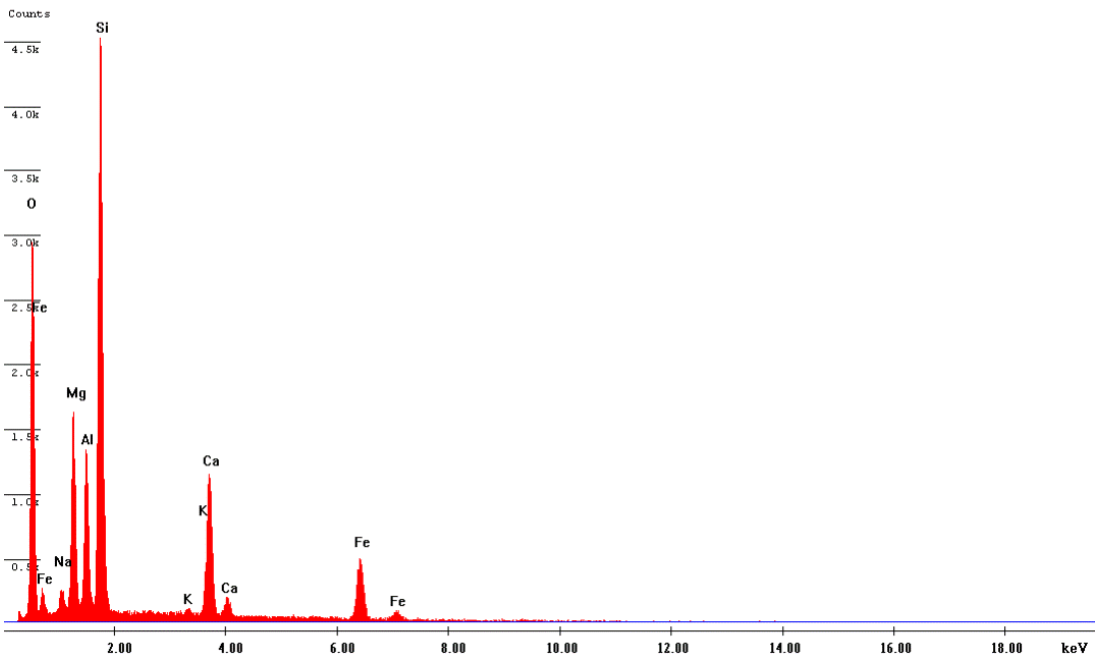
C:\Documents and Settings\Administrator\My Documents\Ralph\NTGS10348.spc

Label A: NTGS10348



C:\Documents and Settings\Administrator\My Documents\Ralph\NTGS15195.spc

Label A: NTGS15195



Appendix 2: SEM Spectra

Semiquantitative EDAX analyses

NTGS15195a	pink		NTGS15195		
Element	Atoms%	Formula	Atoms%	Formula	ave
Na	1.63	0.6	1.23	0.4	0.5
Mg	8.85	3.3	8.47	2.8	3.0
Al	5.42	2.0	5.96	1.9	2.0
Si	17.79	6.6	20.5	6.7	6.6
k	0	0.0	0.22	0.1	0.0
Ca	4.26	1.6	5.48	1.8	1.7
Mn	0.12	0.0	0	0.0	0.0
Fe	2.85	1.1	4.93	1.6	1.3
					0.0
<Total>	40.92	15.1	46.79	15.2	15.2

NTGS10348a	green		NTGS10348		
Element	Atoms%	Formula	Atoms%	Formula	ave
Na	0.46	0.2	0.23	0.1	0.2
Mg	8.87	4.3	4.74	2.9	3.6
Al	0.19	0.1	0.04	0.0	0.1
Si	13.64	6.6	13.68	8.3	7.5
K	0	0.0	0	0.0	0.0
Ca	6.7	3.2	11.11	6.8	5.0
Mn	0.17	0.1	0	0.0	0.0
Fe	4.08	2.0	2.9	1.8	1.9
					0.0
<Total>	34.11	16.4	32.7	19.9	18.2