Mineral Resources Tasmania

Mineralogical/Petrology Report

MPR2012/098

BASALT ANALYSES: QUEEN HILL–SEVERN PROSPECTS

An unpublished Mineral Resources Tasmania report for

Ray Hazeldene, Stellar Resources

by R S Bottrill & R. N. Woolley

3 June 2013

Department of Infrastructure, Energy and Resources
Mineral Resources Tasmania

Tasmania
Explore the possibilities

SUMMARY

The samples studied included five basalt samples and one carbonate sample from three drillholes in the Severn and Queen Hill tin prospects, Zeehan. The XRD analyses and petrology indicate that there are probably two distinct basalts: the Queen Hill basalts which are highly vesicular basalts altered to sericite-chlorite-quartz-dolomite assemblages and the Severn basalts altered to albite-chlorite-calcite-quartz assemblages. The Severn basalts are MORB-type tholeiitic basalts most consistent with many of the Neoproterozoic basalts of NW Tasmania, especially the Ahrberg Group and Bowry Group basalts, or possibly the Spinks Ck or Crimson Creek basalts. The Queen Hill basalts are somewhat more alkaline (Zr-rich) and best fit with the Oonah Formation basalts of Late Proterozoic age.

INTRODUCTION

The objective of this study is to determine the nature (petrology and geochemistry) of four samples of host rock and ore sample from drillcore from the Severn and Queen Hill tin prospects. The sample details are given in Table 1.

Table 1: Sample details: Samples submitted

MRT Reg. No.	Field. No./ID	Location	Description
G404193	ZS121/315.6	Severn Pr, Zeehan	Basalt
G404194	ZS121/308.7	Severn Pr, Zeehan	Basalt
G404195	ZQ117/541.7	Queen Hill Pr, Zeehan	Basalt
G404196A	ZQ117/415.8	Queen Hill Pr, Zeehan	Basalt
G404196B	ZQ118/415.9	Queen Hill Pr, Zeehan	Basalt
G404197	ZQ118/96.8	Queen Hill Pr, Zeehan	Basalt
G404198	ZQ117/333.4	Queen Hill Pr, Zeehan	Carbonate zone

The samples were all prepared as petrographic thin sections and examined microscopically (stereomicroscope and Polarised reflected light microscopy (PRLM)) and some were also analysed by X-ray diffraction (XRD) to check the mineralogy in the Mineral Resources Tasmania Laboratories, Rosny Park and Mornington. They were also prepared and analysed by X-Ray Fluorescence (XRF) in our Mornington and Rosny laboratories.

SAMPLE DESCRIPTIONS

The samples were examined and described using a variety of stereomicroscopes and reflecting and transmitted polarised light microscopes in MRT.

G404193 ZS121/315.6 Severn Pr, Zeehan Basalt

Under the stereomicroscope the sample is an unweathered, fine-medium grained, grey crystalline mafic rock, with abundant white carbonate veining. No sulphides could be identified.

Under PTLM, the sample is an unfoliated plagioclase-phyric basalt or fine grained dolerite with fine chlorite (+/- serpentine?) pseudomorphs after pyroxenes, abundant relatively coarse opaques (magnetite and/or ilmenite, or their alteration products?) and abundant brown carbonate in the matrix, plus some carbonate veins.

G404194 ZS121/308.7 Severn Pr, Zeehan Basalt

Similar to the above, with some coarser carbonate-magnetite(?) veins and more mottled carbonate alteration. There are sparse green chlorite-filled vesicles to a few mm diameter.

G404195 ZQ117/541.7 Queen Hill Pr, Zeehan Basalt

Under the stereomicroscope the sample is an unweathered, very fine grained, dark grey, highly vesicular mafic rock. No sulphides could be identified.

Under PTLM, the sample is an unfoliated, highly vesicular basalt with some zones of weak spherulitic/microlitic textures; most areas are replaced by chlorite-sericite-clays and abundant carbonates.

G404196A ZQ117/415.8 Queen Hill Pr, Zeehan Basalt

Under the stereomicroscope the sample is an unweathered, very fine grained, dark grey, highly vesicular mafic breccia. No sulphides could be identified.

Under PTLM, the sample is an unfoliated, clastic rock composed of pumice-like clasts of highly vesicular basalt in a cherty, quartz-rich matrix.

G404196B **ZQ117/415.9** **Queen Hill Pr, Zeehan** **Basalt**

Under the stereomicroscope the sample is an unweathered, fine grained, rounded clast of a grey, highly vesicular mafic rock, about 5cm diameter. No sulphides could be identified.

Under PTLM, the sample is an unfoliated vesicular basalt with some spherulitic/microlitic textures replaced by carbonates and cherty quartz.

G404197 **ZQ118/96.8** **Queen Hill Pr, Zeehan** **Basalt**

Very similar to the above sample, but less altered.

XRF

The samples were analysed for trace elements on a fused disk in a Bruker ASX58 XRF, with proprietary Bruker software and a series of commercial standards. The results are shown in Appendix 1.

The XRF (X-Ray Fluorescence) analyses (Appx. 1) indicate that the analysed samples are all basaltic rocks, similar to most other Late Proterozoic to Early Cambrian basalts in north-western Tasmania (Fig. 1).

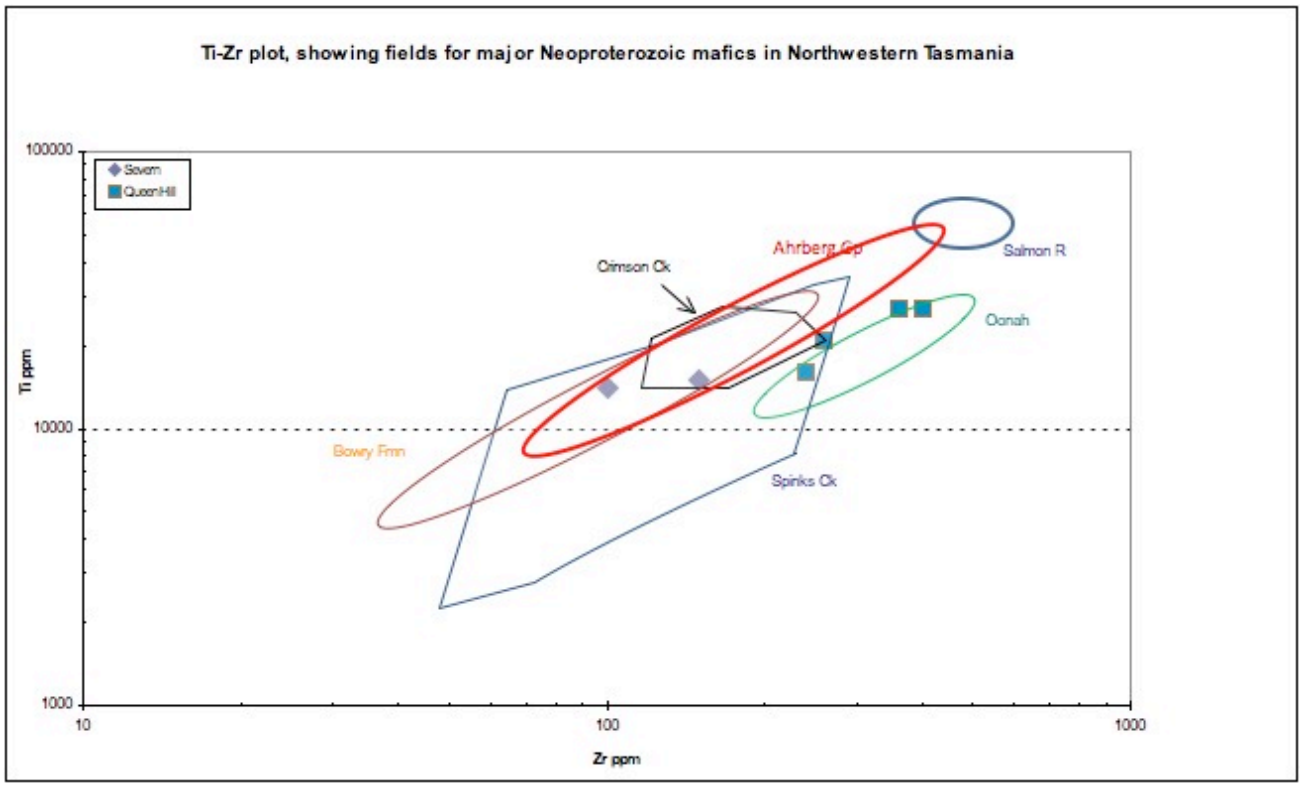

Fig. 1: Plot of Ti/Zr values of the analysed basalt, showing the fields for other Late Proterozoic basalts in northeastern Tasmania (data from Bottrill and Taheri in prep.).

XRD

The samples were all prepared, examined and analysed in the MRT laboratories, Rosny. They 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 manual using a series of prepared standards of the more common minerals to enable some semi-quantitative analysis. The results are shown in Appendix 3.

The XRD (X-Ray Diffraction) analyses indicate that the two basalt samples are both highly altered but are quite different in mineralogy (Appx. 3). The carbonate sample is different to the carbonates in either basalt analysed (Appx. 3).

DISCUSSION AND SUMMARY

The samples studied included five basalt samples and one carbonate sample from three drillholes in the Severn and Queen Hill tin prospects, Zeehan. The XRD analyses and petrology indicate that there are probably two distinct basalts: the Queen Hill basalts which are highly vesicular basalts altered to sericite-chlorite-quartz-dolomite assemblages and the Severn basalts altered to albite-chlorite-calcite-quartz assemblages.

The Severn basalts are MORB-type tholeiitic basalts most consistent with many of the Neoproterozoic basalts of NW Tasmania (*Bottrill and Taheri in prep.)*, especially the Ahrberg Group and Bowry Group basalts, or possibly the Spinks Ck or Crimson Creek basalts (Fig. 1). The basalts of the Cleveland-Waratah sequence are also very similar chemically to the Ahrberg Group and Bowry Formation basalts, despite being considered to be early Cambrian in age. The Queen Hill basalts are distinctly more alkaline (Zr-rich) and best fit with the Oonah Formation basalts of Late Proterozoic age (Fig. 1).

R. Bottrill

MINERALOGIST/PETROLOGIST

R. Woolley

TECHNICAL OFFICER

Disclaimers

While every care has been taken in the preparation of this report, no warranty is given as to the correctness of the information and no liability is accepted for any statement or opinion or for any error or omission. No reader should act or fail to act on the basis of any material contained herein. Readers should consult professional advisers. As a result the Crown in Right of the State of Tasmania and its employees, contractors and agents expressly disclaim all and any liability (including all liability from or attributable to any negligent or wrongful act or omission) to any persons whatsoever in respect of anything done or omitted to be done by any such person in reliance whether in whole or in part upon any of the material in this report.

These analyses collected in the MRT laboratories, along with some other data on the samples submitted, may enter the MRT databases but every attempt will be made to ensure the data remains closed file and not be available externally, except at your request.

Appendix 1: XRD Analysis

Mineral Resources Tasmania Laboratory Report

Client: R. Hazeldene, Stellar Resources Ltd
Sample Source: Zeehan
Job Number:
MPR2012/099
Analysis: Approximate Mineralogy
Method: X-Ray Diffraction

Results:

Sample	*MRT Reg. No.*	*XRD Mineralogy*
ZS121/308.7	G404194	Albite (35%-50%), Chlorite (25%-35%), Calcite[1] (15%-25%), Quartz (5%-10%)
ZQ117/541.7	G404195	Mica[2] (25%-35%), Quartz (25%-35%), Chlorite (25%-35%), Fe-Dolomite[3] (5%-10%), Anatase (2%-5%)
ZQ117/333.4	G404198	Mg-Siderite[4] (35%-50%), Quartz (35%-50%), Mica (2%-5%), Pyrite (<2%), Chlorite (<2%), Tourmaline[5] (<2%), Rutile[5] (<2%)

Peak overlap may interfere with identifications and quantitative calculations
Amorphous material (e.g. organic matter) and minerals present in trace amounts may not be detected

[1] main peak at 3.028Å (Calcite = 3.035Å); some replacement of Ca by Mg/Fe/Mn?
[2] pattern conforms to 1M
type
[3] main peak at 2.900Å (Ankerite = 2.906Å, Dolomite = 2.888Å)
[4] main peak at 2.773Å (Magnesite = 2.742Å, Siderite = 2.795Å); may also include Ca/Mn?
[5] identified in residue after treatment with warm HCl

Analyst: R.N. Woolley
Date: 21 November 2012

Appendix 2: XRF Analyses

Client: Stellar
Sample Source: Zeehan
Job Number: MPR2012/098
Analysis: Chemistry (results in wt.%)
Method: X-Ray Fluorescence

	G404193	G404194	G404195	G404196A	G404196B	G404197	
Element	ZS121/315.6	ZS121/308.7	ZQ117/541.7	ZQ117/415.9	ZQ117/415.1	ZQ118/96.8	
SiO_2	46.70	45.51	49.25	42.86	45.81	47.36	
TiO_2	2.00	1.86	3.62	3.64	2.12	2.76	
Al_2O_3	13.39	13.83	18.37	17.02	12.13	15.01	
Fe_2O_3	14.51	12.19	7.02	10.76	5.14	8.33	
MnO	0.19	0.17	0.12	0.07	0.22	0.29	
MgO	5.27	5.85	7.00	9.72	6.34	7.80	
CaO	5.48	6.99	2.12	2.92	8.87	4.06	
Na_2O	3.58	4.02	0.09	1.11	4.75	4.04	
K_2O	0.46	0.37	4.06	2.08	0.43	1.52	
P_2O_5	0.21	0.21	0.69	0.82	1.22	0.79	
SO_3	0.25	0.17	0.00	0.02	0.05	0.00	
L.O.I.	7.88	8.78	6.92	8.74	12.67	7.78	
Total	99.92	99.95	99.26	99.76	99.75	99.74	
	G404193	G404194	G404195	G404196A	G404196B	G404197	

^{T} based on total sulphur content as determined by trace element analysis

^{C} corrected to compensate for sulphur lost as SO_2

^{D} value obtained from fused disc

FeO and CO_2 figures not available

Analyst: Richie Woolley
Date: 28 November 2012

Jafar Taheri
Senior Geochemist

Appendix 2A: XRF Analyses

Client: Stellar
Sample Source: Zeehan
Job Number: MPR2012/098
Analysis: Chemistry (results in ppm)
Method: X-Ray Fluorescence

		G404193	G404194	G404195	G404196A	G404196B	G404197
Element	Detection Limit (ppm)	ZS121/315.6	ZS121/308.7	ZQ117/541.7	ZQ117/415.9	ZQ117/415.1	ZQ118/96.8
As	3	7	7	46	3	5	8
Ba	5	250	120	800	660	250	460
Bi	1	3	3	1	2	bdl	1
Ce	5	30	21	220	165	155	150
Cl (%)		0.004	0.010	0.003	0.003	0.008	0.004
Co	2	41	36	29	40	23	38
Cr	1	78	175	260	270	155	270
Cs	3	12	14	125	43	11	17
Cu	2	88	79	22	77	31	56
Ga	1	19	18	20	21	9	16
La	6	16	12	160	105	93	96
Mo	1	bdl	bdl	1	1	bdl	bdl
Nb	1	14	11	145	135	82	94
Nd	7	27	15	82	62	56	58
Ni	2	54	62	155	200	96	195
Pb	2	bdl	bdl	9	10	7	3
Rb	1	16	18	340	83	34	78
S (%)		0.10	0.07	0.00	0.01	0.02	0.00
Sb	2	bdl	bdl	7	bdl	n/a	n/a
Sc	2	45	45	22	23	24	27
Sn	2	3	2	125	3	2	2
Sr	1	350	230	43	125	230	220
Th	2	bdl	bdl	10	12	11	10
U	1	2	Bdl	7	4	4	3
V	2	390	290	210	200	140	250
W	2	bdl	bdl	8	bdl	n/a	n/a
Y	1	38	30	27	28	26	26
Zn	1	120	83	96	125	55	74
Zr	2	150	100	400	360	240	260

Analysts: Richie Woolley and Lia Seaton

Date: 29 November 2012

Jafar Taheri
Senior
Geochemist