1987/38. Completion report: Sub-basalt Drilling Project Hole 1

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Abstract

SBDP Hole 1 penetrated approximately 282 m of latest Eocene and Oligocene basalt and minor sediments unconformably overlying siltstone and limestone of the Ordovician Gordon Group.

INTRODUCTION

A proposal for pattern drilling of the basalt-covered terrain north of Que River in north-west Tasmania was put forward in December 1984 for inclusion in the Mt Read Volcanics Project. In mid-1986 pre-collaring of the first four holes was undertaken, and diamond drilling commenced in October 1986. This report is the first in a series which will be written for each of the holes completed in the programme.

The hole is located on Goderich Plain at (fig. 1):-

Easting	387 980.2 m
Northing	5 417 973 m

Chemical analyses were performed by the Department of Mines Laboratories, Launceston; XRD analyses were by R. N. Woolley under the supervision of R. S. Bottrill; palynology was by Dr R. Morgan, Maitland, South Australia; downhole logging was done by J. V. Wright.

STRATIGRAPHY

The first 114 m of the hole was precollared; a lithological log of the fully-cored section (110-394.0 m) is presented as Appendix 1.

Basalt, often very vescicular, was encountered between 114 m and 270.8 metres. Fresh basalt, suitable for dating, was not seen, and some degree of deuteric alteration is ubiquitous. Zones of brecciation, as seen at 214 m and 256 m, are probably of hyaloclastic origin and indicate that at least part of the pile was extruded either in or into water.

Sediments, consisting of sand, carbonaceous siltstone and minor gravel, were encountered between 270.8 m and 282.0 m.

Basement rocks from 282.0 m to 291.7 m consist of fine-grained pelitic sediments containing marine brachiopods and bryozoans. Occasional patches of weathered limestone are present.

Stylolitic interbedded micrite and dolosiltite is present between 291.7 m and 303.7 m. The rock is similar to limestone sequences of the Gordon Group from elsewhere in western Tasmania.

Brown clay and silty clay encountered between 303.7 m and 316.3 m is possibly a cavern filling, but no palynomorphs were detected.

Limestone present between 316.3 m and 394.0 m (TD) is identical to that previously described.

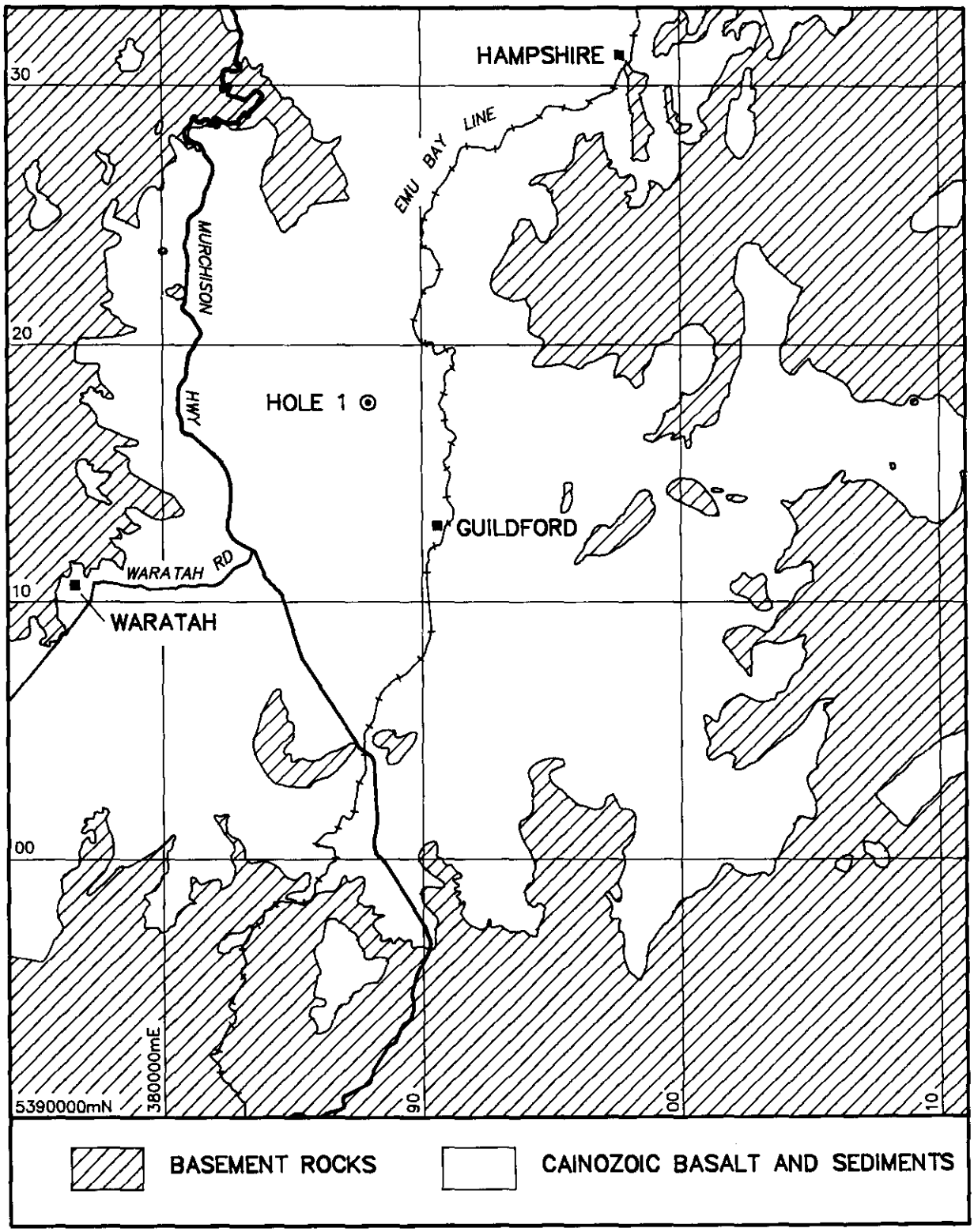

Figure 1. *Location map*

5 cm

PALYNOLOGY

Three samples were submitted for age determination. The first two (274.2 m and 276.0 m) were grey mudstone from the sequence below the basalt, and the third, found to be barren, was an orange-coloured sandy clay from the possible cavern sequence within the Gordon Limestone.

A checklist of determined palynomorphs is presented as Appendix 2. The microflora is dominated by trilete spores with *Cyathidites spp.* and

Ischyosporites gremius very common, and frequent but subordinate *Nothofagidites spp.* Abundant leaf debris was seen in both samples. Pollen and spore diversity is low, and these samples are assigned to the Upper *Nothofagidites asperus* Zone (Stover and Partridge, 1973; Stover and Evans, 1973; Partridge, 1976) by containing *Periporopollenites vesicus* and common *Nothofagidites* spp. without older or younger indicators. The Upper *N. asperus* Zone spans the Eocene-Oligocene boundary and is of latest Eocene to earliest Oligocene age. The microflora is similar to the 'older microflora' of Brown and Forsyth (1984).

Lacustrine environments are indicated by the presence of the non-marine dinoflagellate *Saeptodinium tasmaniense* (common at 276.0 m) and the freshwater alga *Botryococcus*. *S. tasmaniense* was described from mudstone interbedded with basalt near Mt Bischoff in north-western Tasmania by Harris (1973).

BASALT ANALYSES

Analyses of four relatively fresh basalt samples are presented in Table 1. An alkali-silica diagram (fig. 2) shows that the anlysed samples are similar to olivine tholeiites of the Wwaratah area (Brown and Forsyth, 1984).

XRD DETERMINATIONS

Samples of vesicle infillings were collected, and mineral determinations made by XRD. Depths of samples and mineral species present are:-

130.0 m	-	Montmorillonite
141.7 m	-	Calcite Herschelite Phillipsite Montmorillonite
148.3 m	-	Montmorillonite Chabazite
188.5 m	-	Chabazite Phillipsite Montmorillonite
240.6 m	-	Chabazite Phillipsite

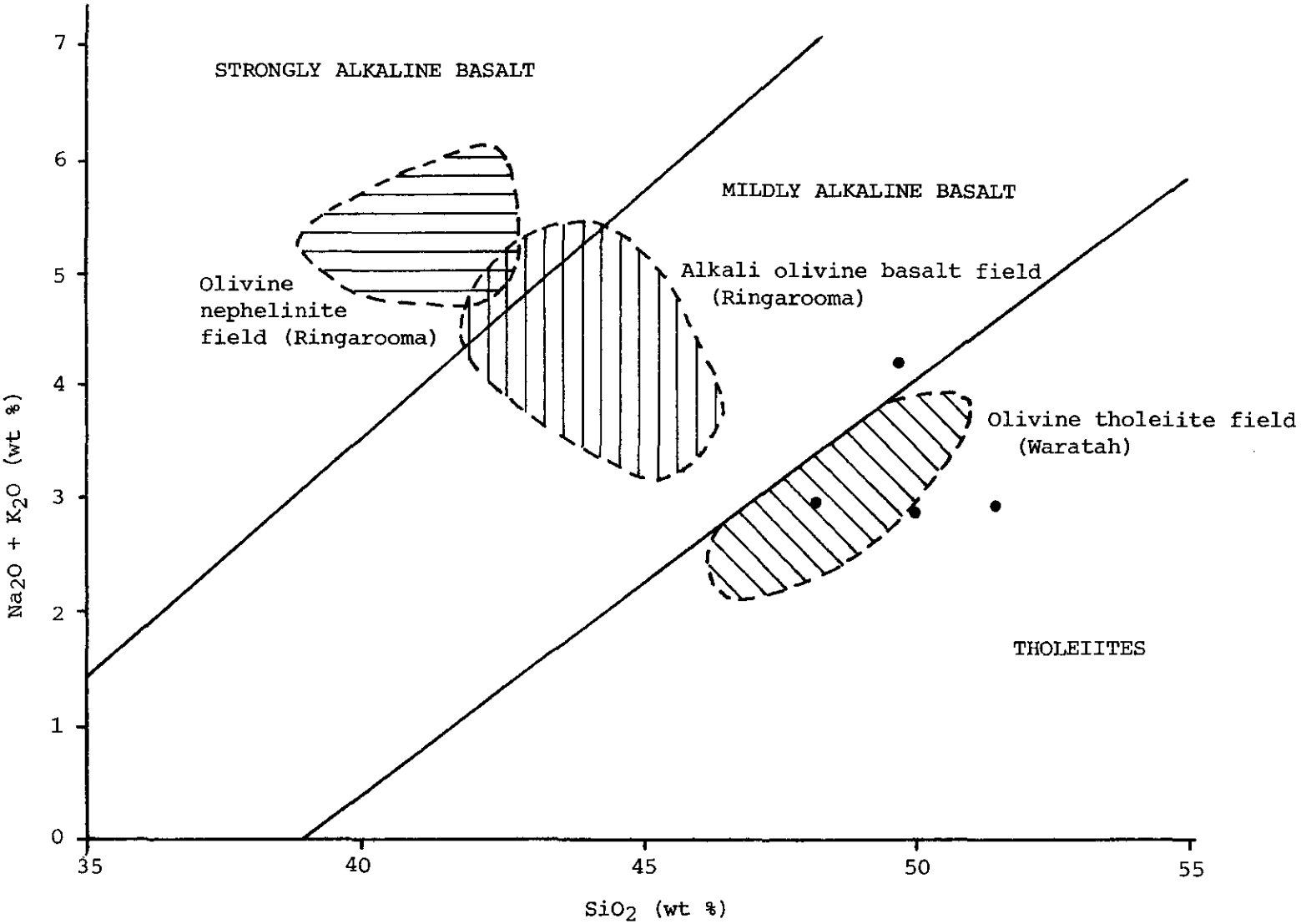

Figure 2. *Alkali-silica diagram (after Brown, 1986), Tertiary basalt SBDP Hole 1*

5 cm

GEOPHYSICAL LOGGING

An attempt was made in early April 1987 to run a gamma-ray log in the hole, but the hole had caved below 112 m, and only the precollared section could be logged. Analysis of the log indicates relatively solid basalt in the section 0-112 m, with no significant sedimentary horizons.

SUMMARY

The hole has extended the known distribution of the Gordon Group to the south-west of the Kara Mine, and so extended the area which is prospective for massive sulphide tin deposits or tungsten skarn deposits.

A summary geological log is:-

Depth (m)	*Description*
0 - 271	?Oligocene basalt
271 - 282	Late Eocene/Oligocene sediments
282 - 304	Gordon Group (Ordovician)
304 - 316	Cavern fill (indeterminate age)
316 - 394	Gordon Group

REFERENCES

BROWN, A. V. 1986. Geology of the Dundas - Mt Lindsay - Mt Youngbuck region. *Bull. geol. Surv. Tasm.* 62.

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PARTRIDGE, A. D. 1976. The geological expression of eustasy in the early Tertiary of the Gippsland Basin. *APEA J.* 16:73-79.

STOVER, L. E.; EVANS, P. R. 1973. Upper Cretaceous-Eocene spore-pollen zonation, offshore Gippsland Basin, Australia. *Spec. Publ. geol. Soc. Aust.* 4:55-72.

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[19 August 1987]

Table 1. *CHEMICAL ANALYSES, SBDP HOLE 1.*

Reg. no.	871834	871835	871836	871837
Depth (m)	125.3	171.4	224.5	245.6
Oxides (%)				
SiO_2	51.38	48.19	49.93	49.71
TiO_2	1.51	1.57	1.55	1.75
Al_2O_3	14.11	13.83	13.61	13.43
Fe_2O_3	1.97	4.66	6.00	3.69
FeO	8.54	6.98	5.39	7.12
MnO	0.16	0.16	0.15	0.14
MgO	8.10	9.40	8.20	8.96
CaO	9.28	7.89	8.75	8.26
Na_2O	2.69	2.23	2.41	3.14
K_2O	0.25	0.72	0.45	1.05
P_2O_5	0.20	0.25	0.28	0.35
$+H_2O$	1.70	3.42	2.51	2.32
CO_2	0.11	0.18	0.17	0.13
Total S	<0.05	<0.05	<0.05	<0.05
Trace elements (g/t)				
Ag	5	7	7	6
As	12	15	<10	14
Ba	<9	52	22	110
Bi	6	13	5	<5
Ce	42	48	54	57
Co	47	53	51	45
Cr	370	340	300	390
Cu	54	56	56	44
Ga	18	18	19	18
La	6	<6	<6	14
Mo	4	2	2	3
Nb	9	10	11	22
Nd	13	12	14	18
Ni	150	165	185	155
Pb	<4	<4	<4	<4
Rb	5	13	7	25
Sc	24	16	15	18
Sn	4	<4	<4	<4
Sr	270	240	290	380
Ta	<9	<9	<9	<9
Th	<4	<4	<4	<4
U	<5	<5	<5	5
V	160	155	155	185
W	400	640	470	120
Y	21	17	20	19
Zn	110	110	115	105
Zr	96	105	92	125

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DIAMOND DRILL CORE GEOLOGICAL RECORD

HOLE No. BDP-1
REF. No. _____ SHEET No. 1 of 3

INTERVAL From (m)	INTERVAL To (m)	REC. (%)	Core lift	Core loss	Depth (m)	Graphic Log	Min	DESCRIPTION	SPECIMEN Number	SPECIMEN Depth	SPECIMEN Prep'n
					110			114-142.5 Dark coloured vesicular or massive basalt; zones with vesicles indicated on graphic log.			
					120					125.3	T5,Anal
					130					130.0	XRD
					140			142.5-143.2 Khaki-coloured, weathered brecciated basalt		141.7	XRD
								143.2-270.8 Basalt, as above			
					150					148.3	XRD
					160						
					170						
					180						
					190					188.5	XRD
					200						
					210						
		80			220			214.5 Clear top of one flow and brecciated base of one above			

5 cm

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GEOLOGICAL SURVEY BRANCH

DIAMOND DRILL CORE GEOLOGICAL RECORD

HOLE No. BDP-1
REF. No. _____ SHEET No. 2 of 3

INTERVAL From (m)	INTERVAL To (m)	REC. (%)	Core lift	Core loss	Depth (m)	Graphic Log	Min	DESCRIPTION	SPECIMEN Number	SPECIMEN Depth	SPECIMEN Prep'n
					220						
										224.5	T5,Anal
					230						
										240.6	XRD
					240						
										245.6	T5,Anal
					250						
								256 m - brecciated base of flow - inclusion of coal 30 mm and sediments			
					260						
										274.2	Paly
										276.0	Paly
					270			270.8 - 274.0 m Grey fine-(coarse) sand, well-sorted some clay			
		40						274.0 - 276.1 m Brown-grey carbonaceous siltstone			
		55						276.1 - 282.0 m Grey/khaki poorly sorted conglomeratic sandstone and gravel, clasts variable in origin, but usually rounded			
					280						
		90						282.0 - 291.7 m Brown clay/silt. Marine fossils brachs., bryozoa - weathered limestone			
					290						
		90						291.7 - 303.7 m Grey mottled limestone. Micrite and dolosiltite, stylolites			
					300						
		80						303.7 - 316.3 m Brown clay and silty clay. ?Cavern filling		308.5	Paly
		95			310						
		70						316.3 - 394.0 m Ogl as above. Occasional calcirudite.			
		65			320						
					330						

5 cm

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DIAMOND DRILL CORE GEOLOGICAL RECORD

HOLE No. BDP-1
REF. No. _____ SHEET No. 3 of 3

INTERVAL From (m)	INTERVAL To (m)	REC. (%)	Core lift	Core loss	Depth (m)	Graphic Log	Min	DESCRIPTION	SPECIMEN Number	SPECIMEN Depth	SPECIMEN Prep'n
					330						
					340						
					350						
					360						
					370						
		80									
		90			380						
					390						
					400						

5 cm

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APPENDIX 2

TASDM SBDF#1

DESCRIPTION:

ALL DEPTHS IN METRES

CHECKLIST OF GRAPHIC ABUNDANCE BY LOWEST APPEARANCE

= Abundant
= Common
= Few
= Rare
= Very Rare
? = Questionably Present
. = Not Present

		#SAEPTODINIUM TASMANIENSE*	*BOTYOCOCCUS*	CYATHIDITES AUSTRALIS	DACRYCARPITES AUSTRALIENSIS	DICTYOPHYLLIDITES SPP.	DILWYNITES GRANULATUS	DILWYNITES TUBERCULATUS	FOVEOTRILETES BALTEUS	HALORAGACIDITES HARRISII	ISCHYOSPORITES GREMIUS	LAEVIGATOSPORITES	LYGISTEPOLLENITES FLORINII	MATONISPORITES ORNAMENTALIS	NOTHOFAGUS ASPERUS	NOTHOFAGUS BRACHYSPINULOSUS	NOTHOFAGUS EMARCIDUS/HETERUS	NOTHOFAGUS FLEMINGII	PERIPOROPOLLENITES VESICUS	PHYLLOCLADIDITES MAWSONII	STEREISPORITES ANTIQUISPORITES	VERRUCATOSPORITES SP.	VERRUCOSISPORITES CF. CRISTATUS	VERRUCOSISPORITES KOPUKUENSIS	MATONISPORITES ORNAMENTALIS CF	MICROFOVEOSPORITES	NOTHOFAGUS DEMINUTUS	PROTEACIDITES SPP.	RUGULATISPORITES MICRAULAXUS
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
274.2 CORE																													
276.0 CORE																													

5 cm