889001 Prospect 602

CSR LIMITED - MINERALS DIVISION

EXPLORATION GROUP

DIAMOND DRILLING - 1980

LEAD BLOCKS - CUNI AREA

E.L. 15/76, DUNDAS

TASMANIA

EMR 85/81

SYDNEY
August 1981

P.M. MACNAMARA

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PLANS (in pocket)

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KEYWORDS

TASMANIA
8 SK 55-Ø5
1980
DIAMOND
DRILLING
SOIL
GEOCHEMISTRY
MAGNETICS
EM
TIN
LEAD
COPPER
ZINC
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GOLD
NICKEL
CHROMIUM
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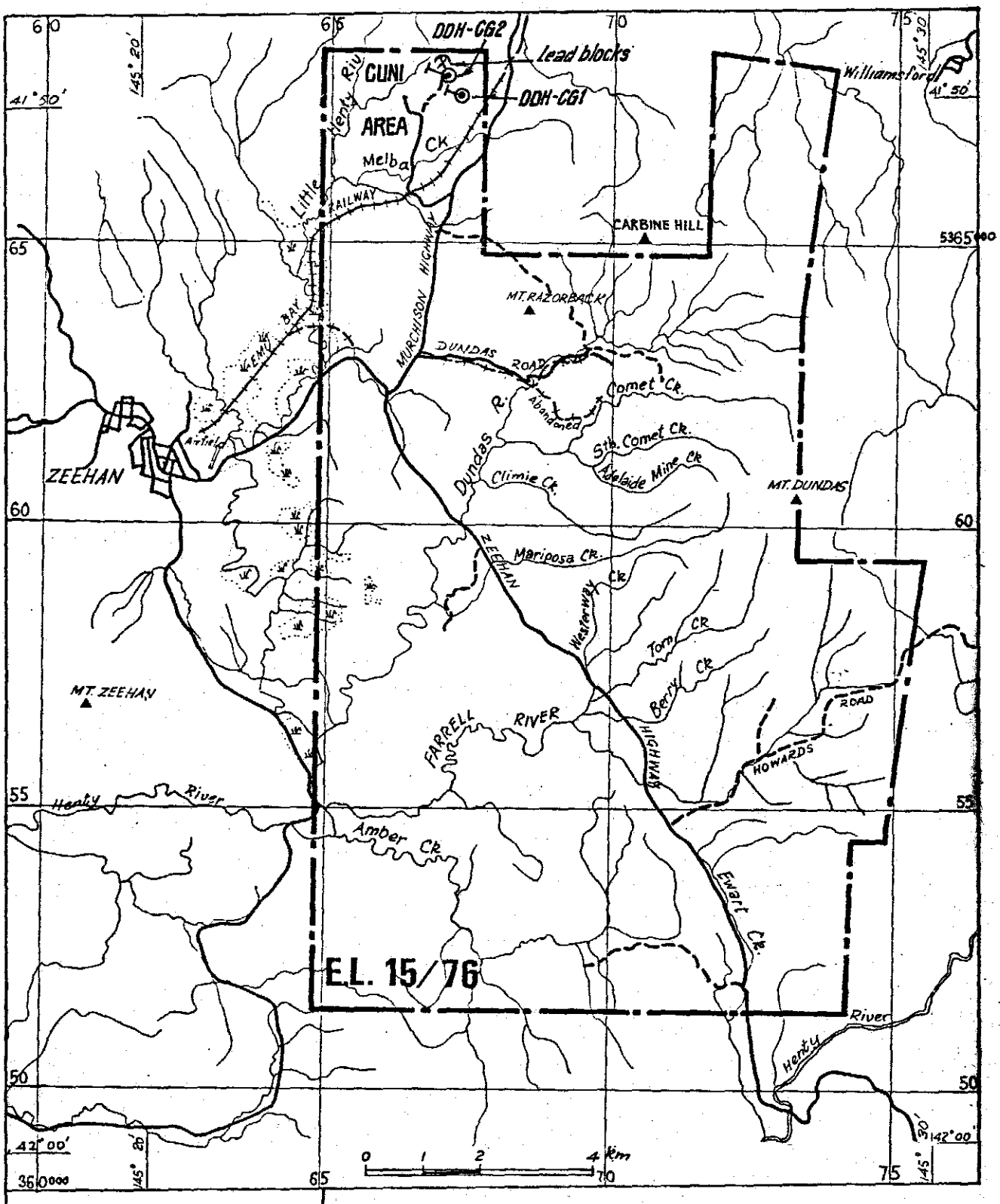

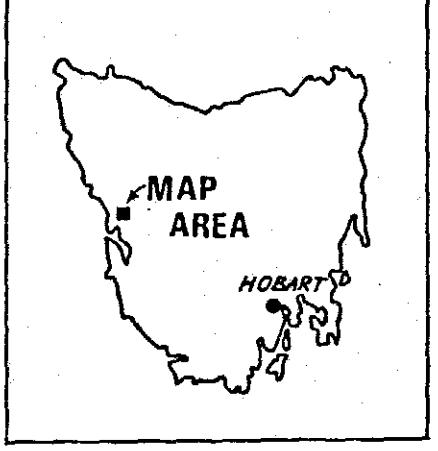

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E.L. 15/76 DUNDAS TAS. - GUNI AREA

FIG. 1 LOCATION MAP DDH-CG1, DDH-CG2 & LEAD BLOCKS

1. INTRODUCTION

1.1 The Cuni area is 7 km northeast of Zeehan in the northwest corner of E.L. 15/76, Dundas (Figure 1). In past years, it produced small tonneages of rich copper-nickel and silver-lead ores.

Tasmania Department of Mines records, such as Blissett (1962), have reported on these small mines which occur along two subparallel north-south trending lines of lode. To the west are the Five Mile copper-nickel deposits associated with ultramafic rocks. Approximately 700 m to the east, is the Lead Blocks-McKimmie silver-lead-zinc line in black shales and volcanoclastics. This report is mainly concerned with drilling carried out on the silver-lead-zinc line near the old Lead Blocks Mine.

1.2 Drainage sampling during 1977-1978 (Macnamara, 1979) indicated a number of anomalous tin, silver-lead-zinc and copper-nickel anomalies in the Cuni area.

To locate the source of the anomalies and possible drilling targets, grid lines were cut and soil sampling carried out over the Cuni, Nevada and Razroback Grids in 1979 and 1980 (see DRG No. K555-10). A number of silver-lead-zinc-tin-copper anomalies were located near Lead Blocks on the Cuni Grid (Macnamara, 1980).

1.3 Additional line cutting, soil sampling plus ground magnetic and VLF-EM surveys were carried out in late 1979 and early 1980 to check these anomalies. Silver-lead-zinc-tin soil anomalies were confirmed 500 m southeast of Lead Blocks and at Lead Blocks itself. Moderate to weak magnetic "highs" and EM cross-overs occurred in the immediate vicinity of these geochemical anomalies.

1.4 Two drill sites were chosen to test these targets for possible stratabound mineralisation, such

the stannite and silver-lead type currently being tested near Zeehan. A total of 797 m of core was drilled in two holes in the period August to November 1980.

1.5 This report covers the results of the drilling and the geophysical surveys in the immediate vicinity of the two drill holes, up to early 1981. Additional geochemical work carried out in the Cuni area in the first half of 1981 is being assessed at present in conjunction with 1979-1980 geochemical work and will be the subject of a separate report.

2. SUMMARY

2.1 Geochemical soil sampling carried out by augering in 1979 and early 1980 indicated a Sn-Cu-Zn-Pb-Ag anomaly 500 m southeast of the Lead Blocks silver-lead prospect. It occurs on Cuni Grid line 7458N, at 7300E (see DRG No. K555-10). The geochemical anomaly is associated with a (?)calcareous black shale containing silty greywacke or tuff bands and is 100 m west of a major serpentinite body.

2.2 The most strongly anomalous values indicated in -20 and -80 mesh soil are on line 7485N. These are :-

Easting	Sn	Cu	Zn	Pb	Ag	Ca	(ppm)
7300E	600	900	2100	1.3%	112	300	
7290E	3	120	760	350	5	3000	

An associated 20 gamma magnetic anomaly extends weakly 50 m each side of line 7485N, while a number of EM "cross-overs" occur in the general vicinity (DRG No's. K555-23 and 24). These features plus enhanced Sn-Cu-Zn-Pb response westwards for several hundred metres (Macnamara, 1980a), plus a probable southward extension of Lead Blocks mineralisation seen on line 7550N were the targets for diamond drill hole CG1 (DRG No. K555-10).

2.3 At Lead Blocks, mapping indicated a number of narrow, apparently stratabound parallel silver-lead lodes which had been worked in the early 1900's. These were the target for DDH CG2 (DRG No. K555-18).

2.4 Both the CG1 and CG2 targets appeared to offer some potential for stratabound and possibly stratiform-syngenetic mineralisation. However in both drill holes the only strong mineralisation intersected occurred as coarse grained carbonate zones carrying galena and sphalerite - apparently in veins. In addition, weak sphalerite disseminations occur through much of the core, possibly of syngenetic origin.

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2.5 The main mineralised intersections are outlined below. They occur in a sequence of fine to medium grained greywackes (or volcanoclastics) usually adjacent to black pyritic shale. These all belong to the Crimson Creek Formation, presumably several hundred metres (at least) above the Oonah Quartzite and Slate.

DDH No.	Depth (m)	Interval (m)	Sn (ppm)	Cu (ppm)	Zn (%)	Pb (%)	Ag (ppm)	Au (ppb)
CG1	72.15	0.15	125	640	3.1	0.2	14	5
	130.85	0.40	90	460	1.26	1.3	54	10
	288.95	0.9	565	1500	24.7	2.4	71	10
CG2	88.94	0.86	115	520	5.4	4.7	129	55

2.6 The best intersection obtained was in CG1 at 288.95 m depth where 0.9 m of 24.7% Zn, 2.4% Pb and 71 g Ag/tonne was cored. This is probably a southward extension of the Lead Blocks lode.

CG2 intersected at 88.94 m depth 0.86 m of 5.4% Zn, 4.7% Pb and 129 g Ag/tonne beneath Lead Blocks workings.

2.7 None of the mineralised zones are of economic width, although the grades are reasonable.

The association of elevated tin (and possibly gold) values with the silve-lead-zinc is of prospecting interest. High tin and gold values, for instance, could be associated with the strongest types of silver-lead-zinc mineralisation. Soil geochemical data elsewhere on the Cuni, Nevada and Razorback grids is currently being evaluated to determine whether additional drill targets can be selected.

3. EXPLORATION PRIOR TO DRILLING

3.1 Following on from drainage geochemical sampling (Macnamara, 1979) and other field work, a grid was cut across the eastern part of the Cuni area in 1979. This was soil sampled in 1979-1980 and a number of anomalies detected (see Table 1 - Macnamara, 1980). The best Sn-Cu-Zn-Pb-Ag result was obtained on line 7485N around 7300E, with values to 600 ppm Sn, 900 ppm Cu, 0.21% Zn, 1.3% Pb and 112 ppm Ag in a slightly calcareous blue-black pyritic shale. Moderate Cu-Zn-Pb values extended westwards to at least 7130E. Check analyses and check sampling confirmed the anomaly.

3.2 Ground magnetics surveys indicated a 20 gamma magnetic high associated with the 7485N/7300E geochemical anomaly, extending weakly to adjacent lines 50 m to the north and south. VLF-EM profiles indicated a number of cross-overs and some measure of continuity on adjacent lines.

3.3 The Lead Blocks silver-lead prospect was mapped at this stage (see DRG No. K555-18). A number of narrow subparallel lodes, worked in the early 1900's for silver-lead, were noted. These are apparently stratabound and follow the local schistosity-bedding planes in a NNW to northerly strike direction and dip steeply eastwards.

As the Lead Blocks-McKimmie silver-lead "line-of-lode" was also apparently parallel to the strike of the sediments, a stratabound and possibly stratiform-type mineralisation seemed feasible.

3.4 During soil augering, a ferruginous "gossan" capping was located 150 m southwards along strike of the Lead Blocks workings on line 7550N. This apparently represented a southward extension of the Lead Blocks mineralisation and is possibly the surface expression of mineralisation intersected in DDH CG1 at 288.95 m (see Section 2.6).

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3.5 Soil augering and geochemical data indicated black pyritic shales and greywacke siltstones (volcanoclastics?) occurred in the area of interest. Sparse exposure and magnetic and VLF-EM profiles indicated steep dips to the east. The Lead Blocks workings indicated north to north-northwest strike trends in the sediments, and that east-dipping stratabound mineralisation was probably present.

3.6 The best method of checking the mineralisation at depth appeared to be drilling westwards at as shallow an angle as possible in order to traverse maximum stratigraphic section. Diamond drill holes CG1 and CG2 were sited accordingly.

4. DRILL HOLE DATA

4.1 Diamond drill holes CG1 and CG2 collar positions are shown on Figure 1 and DRG No. K555-10.

4.2 DDH CG1 was collared on Cuni grid line 7485N at 7357E (approximately AMG 5367480 m N/367380 m E). It was angled at -45° plunge in the direction 277°M, and terminated at 356.6 m depth.

Profiles are shown on DRG No's. K555-24 and 25. A summary log is outlined in Section 5. The full drill log plus petrography is shown in Appendices I and II. Logging was commenced by geologist P.M. Macnamara, and completed by R.E. Williams.

4.3 DDH CG2 was collared at Cuni Grid position 7782N/7076E (approximately AMG 5367800N/367090 m E). it was angled at -46½° plunge in the direction 290°M, to a depth of 440 m.

Profiles are shown on DRG No's. K555-26 and 27. A summary log is outlined in Section 6. A full drill log plus petrology is shown in Appendices III and IV. Logging was carried out by geologist, R.E. Williams.

4.4 DDH CG2 was extended further than originally intended as lithologies intersected indicated the Oonah Quartzite and Slate contact with the Crimson Creek Formation might be close by at depth. However, the drill was still in Crimson Creek Formation at 440 m depth and the hole was terminated.

5. SUMMARY LOG - DDH CG1

5.1 Set out below is a summary of DDH CG1 (Appendices I and II). Asterisks mark the position of the best mineralisation intersections which are also listed in Section 5.2.

.. **0-8 m.** Brown clay.

.. **8-71.5 m.** Greywacke, sandstone and siltstone, greenish-grey, banded at 50-65° to C.A. (core axis). Black shale 68.45-68.70 m with contacts 65° to C.A.

T.S. (Thin section descriptions - see Appendix II for details).

24.5 m : metadolerite(?)
37.8 m : basic amphibolitised tuff
46.5 m : basic tuff or greywacke
55.7 m : actinolite schist or calc tuff
58 m : andesitic tuff
64.2 m : andesitic tuff
70.2 m : lithic quartz wacke
71.5 m : volcanic breccia

.. **71.5-73.55 m.** Greywacke, chloritic, distinctive dark grey (possibly a tuff?).

*72.15-72.30 m (0.15 m) = a carbonate zone (vein?) with pyrrhotite-galena containing (in ppm) 125 Sn, 640 Cu, 31.% Zn, 0.16% Pb, 14 Ag.

.. **73.55-93.65 m.** Greywacke, f.g., limey, banded, dark grey. Black shale bands to 90 m. Banding 50-70° to C.A.

T.S.
79.5 m : quart feldspar wacke

*Minor carbonate-pyrrhotite-sphalerite veinlets 73.55-76.20 m.

/....

.. **93.65-94.05 m.** As for 73.55-93.65 m, but red (hematitic) coloration obvious. A contact alteration effect in an oxidising environment?

T.S.
93.65 m : quartz feldspar wacke/shale contact.

.. **94.05-103.3 m.** Dolerite, porphyritic, grey; trace pyrrhotite-chalcopyrite.

T.S.
94.05 m : porphyritic basalt
99.60 m : dolerite
103.0 m : dolerite

.. **103.3-130.85 m.** Greywacke, f.g. medium grey, black shale bands. Red and grey chert bands 103-105 m. Minor quartz-carbonate veinlets. Lower contact 45° to C.A. at 130.85 m.

T.S.
103.3 m : dolerite/sediment contact
107.0 m : sheared shale
118.4 m : shale and quartz plagioclase wacke
103.6 m : shale and wacke.

.. **130.85-131.25 m.** Shale, black with cream siliceous zone containing pyrite-sphalerite-tetrahedrite(?).

*0.4 m of (in ppm) 90 Sn, 460 Cu, 1.26% Zn, 1.35% Pb, 54 Ag.

.. **131.25-133.75 m.** Shale, "cherty", hard, medium grey, minor black shale bands.

T.S.
132.1 m : sheared chlorite-illite claystone.

.. **133.75-149.50 m.** Dolerite (as for 94-103.3 m); crude banding 55° to C.A.

T.S.

137.0 m : dolerite (as for 99.6, 103, 103.3 m)
141.3 m : dolerite with flow banded "inclusion" of basalt.
146.15 m : dolerite

.. **149.5-166.40 m.** Serpentinite and dolerite. Crude banding 65° to C.A. in places.

T.S.

149.50 m : serpentinised peridotite/dunite
159.50 m : dolerite
165.7 m : serpentinised peridotite.

.. **166.40-180.80 m.** Shale, banded, grey and black, pyritic. 70° banding/cleavage.

.. **180.8-197.5 m.** Greywacke, siltstone and shale interbands. Banding 70° to C.A.

.. **197.5-198 m.** Grey chert, black chloritic shale.

.. **198-212.40 m.** As for 180.8-197.5 m.

.. **212.40-230.6 m.** Shale, black with greywacke bands.

.. **230.6-241.5 m.** Greywacke, black shale bands.

.. **241.5-280.35 m.** Shale, black with minor greywacke. Banding 80° to C.A.

.. **280.35-288.95 m.** Greywacke-black shale interbands. Banding 70° to C.A.

.. **288.95-289.85 m.** Massive sulphide with carbonate veins. Non-banded. A carbonate vein?

*0.9 m of (in ppm) 565 Sn, 0.15% Cu, 24.7% Zn, 2.4% Pb, 71 Ag.

.. **289.85-291.6 m.** Shale, black and grey, some greywacke banding 70° to C.A.

*1.75 m of (in ppm) 25 Sn, 60 Cu, 1700 Zn, 510 Pb, 3 Ag.

.. **291.6-297 m.** Shale, grey and black, greywacke siltstone interbands at 70° to C.A.

.. **297-341 m.** Greywacke, interbedded, black and grey shale.

.. **341-356.6 m.** Shale, black and grey, siltstone interbands.

End of hole 356.6 m.

5.2 Minor sphalerite is common in many parts of the core. Much of it is unrelated to obvious veining and may be syngenetic. Lesser amounts of galena, and chalcopyrite also occur.

The main mineralised zones intersected occur as carbonate zones, possibly veins. These are :-

Depth (m)	Interval (m)	Sn (ppm)	Cu (ppm)	Zn (%)	Pb (%)	Ag (ppm)
72.15	0.15	125	640	3.1	0.16	14
130.85	0.40	90	460	1.26	1.35	54
288.95	0.9	565	1500	24.7	2.4	71

6. SUMMARY LOG - DDH CG2

6.1 Set out below is a summary of DDH CG2 (Appendices III and IV). An asterisk marks the position of the best mineralised intersection, which is also listed in Section 5.2.

.. **0-14.8 m.** Clay (after sandstone).

.. **14.8-32 m.** Shale, grey black plus 10% sandstone, banding (bedding) and schistosity) 70° to C.A. (core axis). Minor pyrite.

.. **32-88.94 m.** Shales and sandstones, interbanded, grey. Banding 45-60° to core axis. Minor pyrite.

.. **88.94-89.8 m.** Quartz-carbonate-sulphide zone (vein?). Banded 70-85°. Galena and sphalerite.

*0.68 m of (in ppm) 115 Sn, 520 Cu, 5.4% Zn, 4.76% Pb, 129 Ag, 0.05 Au.

.. **89.8-150.3 m.** Sandstone, grey,and shale interbedded. Minor pyrite.

.. **150.3-176.0 m.** Shales, grey and black, minor sandstones. Banding 50-70° to C.A. Minor pyrite.

.. **176-274.5 m.** Sandstones and shales, interbanded, grey. Minor black shale.

.. **274.5-328.80 m.** Sandstone, siltstone, shale, interbanded, red colour mainly, some green-grey.

Minor sphalerite-galena-pyrite bands. Bedding 60-80° to C.A.

.. **328.8-334.6 m.** Shale, siltstones and f.g. sandstones interbanded, grey green. Banding 60-80°.

/....

.. **334.6-374.0 m.** Sandstones, grey and shales, grey and black, interbedded. Bedding 45-80^{o} to c.a. Pyrite in black shales.

.. **374.0-377.5 m.** Shales and greywackes, grey-green, carbonate veined and fractured.

.. **377.5-386.15 m.** Lithic sandstones and mudstones, minor grit zones, brick-red. Bedding 70-90^{o} to C.A. Minor quartz-carbonate veining.

.. **386.15-388.7 m.** Gabbro, dark blue-green, carbonate-rich. Banded zones in upper and lower sections. Contacts parallel bedding.

.. **388.7-406.90 m.** Shale, siltstone and sandstone, red and green.

.. **406.90-412.20 m.** Gabbro (as for 286.15-288.70 m).

.. **412.20-440.0 m.** Shales and sandstones, grey green.

End of hole 440 m.

6.2 DDH CG2 was collared approximately 75 m east of the Lead Blocks silver-lead workings and drilled westwards at -45^{o}W. Only minor mineralisation was intersected below the Lead Blocks lodes, in a quartz-carbonate zone (a vein?).

Depth (m)	Interval (m)	Sn (ppm)	Cu (ppm)	Zn (%)	Pb (%)	Ag (ppm)	Au (ppb)
88.94	0.86	115	520	5.4	4.76	129	55

/....

7. CONCLUSIONS

7.1 A number of narrow carbonate, siliceous carbonate and pyrrhotite? siliceous carbonate zones were intersected during drilling, up to 1 m wide. These carried high Pb-Zn-Ag values and were enriched in Sn and Cu while anomalous gold occurred in at least one case.

Mineralisation may be stratabound but the coarse-grained nature of the carbonate lode material suggests the carbonate zones are fracture-filling veins.

While some of the mineralised carbonate zones were banded, little evidence was noted which would suggest a syngenetic or exhalite origin to the carbonate.

7.2 Elevated Sn, and possibly Au values may occur in the more strongly mineralised Pb-Zn-Ag zones. For this reason, Sn and Au values may assist in discriminating geochemical anomalies associated with weak and strong mineralisation.

7.3 While the mineralised zones intersected are of uneconomic width, mineralisation grade is quite strong. Wider zones may occur in the Cuni area, and like Lead Blocks, be stratabound. Soil geochemical data is at present being evaluated to determine whether other drill targets exist on the Cuni, Nevada and Razorback grids.

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PMM/SS
August 1981

APPENDIX I

DDH CG1 - DRILL LOG AND ASSAYS

AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J170R   Client: C.S.R. LIMITED,   Area Contact:
Address: G.P.O. BOX 483, SYDNEY. N.S.W.   Address:

Date Received 17/10/80
Date Completed 17/10/80

Order No.: 21805   Sample Type: DRILL CORE   No. of Samples: 3

SAMPLE NO.	Pb	Zn	Ag
	%	%	m
	101-B	101-B	101-B
CG1-602 018		3.10	
CG1-602 032	1.35	1.26	54
CG1-602 066	2.40	24.7	71

UNITS LEGEND ----- m - Parts per million   b - Parts per billion   % - percent
g - Grams   a - Absorbance

Signature: A. J. Juilcam

88003

ARCHIVE INQUIRY

DATE 31/10/80

Client C032 C.S.R. LIMITED, | Batch J170 | Date rec. 16/09/80 | Sample Type DRILL CORE | Invoice CLOSED | S/S Area S

Elements :	Cu	m	Pb	m	Zn	m	Ag	m	Bi	m	Co	m	Cr	m	Ni	m	Au	b	Sn	m
Methods :	1		1		1		1		1		1		1		1		120-A		XRF 1A	
Order No.: 21805																				
CG1-602 001	80		80		230		4		60		180		110		130		5		<5	
CG1-602 002	50		50		320		3		50		150		100		145		3		<5	
CG1-602 003	35		70		370		3		50		100		155		190		5		<5	
CG1-602 004	80		70		260		2		40		65		55		115		3		<5	
CG1-602 005	60		20		175		2		40		55		70		130		5		<5	
CG1-602 006	90		30		130		2		35		55		80		210		3		<5	
CG1-602 007	110		40		170		2		45		55		110		120		5		<5	
CG1-602 008	70		35		140		3		50		55		70		120		3		<5	
CG1-602 009	90		25		80		2		40		45		30		75		3		<5	
CG1-602 010	35		30		70		2		50		70		105		210		5		<5	
CG1-602 011	80		25		55		1		40		45		70		125		5		<5	
CG1-602 012	30		20		60		1		30		40		80		105		5		<5	
CG1-602 013	115		30		95		2		55		60		30		60		3		<5	
CG1-602 014	140		35		75		3		65		75		35		135		5		<5	
CG1-602 015	90		45		600		3		55		75		45		230		5		<5	
CG1-602 016	40		40		110		2		45		40		35		130		3		<5	
CG1-602 017	200		380		720		5		65		85		35		95		5		10	
CG1-602 018	640		0.16	%	>1.0	%	14		90		80		50		65		5		125	
CG1-602 019	115		900		660		6		60		70		40		85		10		25	
CG1-602 020	75		175		290		2		40		30		35		110		5		10	
CG1-602 021	120		165		0.17	%	3		45		35		25		95		10		15	
CG1-602 022	35		30		85		1		35		30		60		80		10		5	
CG1-602 023	50		75		145		2		45		35		25		65		10		<5	
CG1-602 024	40		30		75		2		45		35		30		85		5		5	
CG1-602 025	50		30		90		1		45		35		50		80		5		<5	
CG1-602 026	165		50		90		2		50		60		20		75		5		<5	
CG1-602 027	155		35		100		2		50		50		25		90		5		<5	
CG1-602 028	15		35		60		2		45		35		40		95		5		<5	
CG1-602 029	30		40		75		2		45		35		30		75		5		<5	
CG1-602 030	70		45		125		3		55		60		30		100		5		<5	
CG1-602 031	70		90		290		3		55		60		35		105		5		<5	
CG1-602 032	460		>1.0	%	>1.0	%	>25		125		120		55		75		10		90	
CG1-602 033	65		380		900		4		55		55		20		100		5		<5	
CG1-602 034	60		50		190		3		45		45		15		75		5		<5	
CG1-602 035	130		40		85		3		50		60		30		100		5		<5	
CG1-602 036	90		210		0.12	%	3		50		50		70		110		5		15	
CG1-602 037	110		50		390		4		55		70		95		220		5		<5	
CG1-602 038	90		165		600		3		55		60		75		200		10		5	
CG1-602 039	95		0.11	%	0.22	%	7		60		80		60		290		10		20	
CG1-602 040	90		70		0.36	%	3		50		80		105		200		5		15	
CG1-602 041	85		110		380		3		50		70		40		135		5		<5	
CG1-602 042	70		40		230		2		45		70		50		135		10		<5	
CG1-602 043	70		45		145		3		50		55		45		125		5		5	

CG1-602 044	50	45	175	3	50	65	45	125	5	5
CG1-602 045	45	135	300	3	45	70	85	145	10	10
CG1-602 046	45	70	280	3	50	65	120	135	10	5
CG1-602 047	70	50	165	2	55	70	105	145	10	<5
CG1-602 048	65	40	120	2	50	65	115	140	10	<5
CG1-602 049	420	105	0.43 %	5	55	65	85	125	5	10
CG1-602 050	75	40	160	3	50	65	75	140	5	<5
CG1-602 051	75	45	130	3	55	65	55	130	5	<5
CG1-602 052	75	40	130	2	50	65	55	135	5	<5
CG1-602 053	60	50	115	2	50	45	25	90	5	<5
CG1-602 054	70	35	130	2	45	65	105	140	5	5
CG1-602 055	60	70	400	2	75	55	35	85	5	<5
CG1-602 056	60	40	125	2	50	60	75	125	10	5
CG1-602 057	65	120	250	3	60	55	35	95	10	<5
CG1-602 058	70	95	210	3	65	50	25	75	10	<5
CG1-602 059	90	60	185	3	65	50	20	85	5	<5
CG1-602 060	80	130	500	3	60	50	20	85	10	<5
CG1-602 061	80	95	330	2	50	50	30	100	5	<5
CG1-602 062	70	680	0.33 %	4	45	45	25	100	5	15
CG1-602 063	110	980	0.24 %	4	50	50	35	115	5	10
CG1-602 064	125	150	430	1	55	50	35	100	5	<5
CG1-602 065	40	540	0.20 %	3	45	55	45	125	10	20
CG1-602 066	0.15 %	>1.0 %	>1.0 %	>25	55	70	45	55	10	565
CG1-602 067	60	510	0.17 %	3	45	55	35	105	5	25
CG1-602 068	70	240	860	3	45	55	30	110	10	10
CG1-602 069	60	45	130	2	60	60	70	120	10	<5
CG1-602 070	75	35	140	2	50	65	85	130	5	<5
CG1-602 071	70	210	270	3	55	70	115	140	5	<5
CG1-602 072	60	50	160	2	50	60	70	115	10	10
CG1-602 073	65	55	195	3	55	70	65	140	5	<5
CG1-602 074	70	35	125	2	50	60	110	135	10	<5
CG1-602 075	70	35	120	3	45	65	100	150	10	<5
CG1-602 076	135	40	160	2	55	70	85	135	5	<5
CG1-602 077	65	90	500	3	55	70	100	135	10	<5
CG1-602 078	80	40	260	3	60	75	105	155	5	<5
CG1-602 079	80	50	155	3	55	55	25	90	5	<5
CG1-602 080	80	30	115	2	55	75	100	135	5	<5
CG1-602 081	65	40	115	3	75	55	30	95	10	<5
SR7-600 112	30	25	110	2	40	40	15	65	5	<5
SR7-600 113	30	25	75	2	40	30	25	75	10	<5
SR9-600 114	15	20	50	2	40	30	25	65	5	<5
	Cu	Pb	Zn	Ag	Bi	Co	Cr	Ni	Au	Sn

A. J. [illegible]

COPY

8890025

CSR Limited

DRILL LOG—Sample Data Sheet

CGI

Area EL 15/76 | Prospect Number 602 | Approximate AMG Co-ordinates N/S 5367,480 | Inclination -45½ | Hole Number CG1

State TAS | 1:100,000 Sheet 7914 | E/W 367,380 | Azimuth T/M/G 277°

Location DUNDAS | Local Grid Used CUN 1 | Collar RL | Depth 356 m

Date Started 28-7-80 | Date Completed | Contractor A.D.D | Driller G. ARCHER | Drill Type F 30

Hole Size H to 26.2 m; NQ to 63; BQ to 356 | Lab Rep No | Analytical Method(s) | Logged by P MacNAMARA

Sample Type: M—Creekmud, S—Soil, SA—Soil auger, RC—Drill core, RP—Percussion chips, R—Rock, F—Float, CC—core chips, CS—core split

Reference

Metres	Sample Number / Year	Sample Type	A % core recov'd; B weight (kg); C sample fraction	From E/W	To N/S	Interval m	Sn	Cu	Zn	Pb	Bi	Ag	Au (ppb)	Co	Description
	80 CG1.602														0–6.5m: BROWN CLAY – completely weathered (hardness, H<1) med brn – greywacke sst? No obvious veining.
	CG1.602.001	CC		0.0	3.70	3.70	<5	80	230	80	60	4	5	180	
	CG1.602.002	CC		3.70	6.50	2.80	<5	50	320	50	50	3	3	150	6.5–8.0m: ? GREYWACKE Sst? – completely to highly weathered 10–30mm broken fragments, khaki green, limonite impregnated. H~1. No veining.
	CG 602 003	CC		6.50	8.00	1.5	<5	35	370	70	50	3	5	100	
															8 → 59.20m Grey wacke SANDSTONE AND SILTSTONE – essentially (1) greenish grey well banded greywacke sst and (2) green-blue grey less well banded greywacke siltstone and sandstone.
	CG1.602.004	CC		8.00	14.00	6.00	<5	80	260	70	40	3	3	65	
	CG1.602.005	CC		14.00	21.30	7.30	<5	90	175	20	40	3	5	55	(1) 8–21.3m: g/wacke sst & slst well black schistose "colour" parallel to bedding. Grainsize ≤0.5mm. Banding (bedding) to Core axis = 48°/8.15m, 11.5m; 47–52°/12.7–18m, 65–60°/21.3–21.5m, 55–60°/22→25m. Weathering: highly to moderately weathered 8–12.2m, 10–30mm fragments to 12.2m, 10–80mm 12.2m→21.3m.
	CG1.602.006	CC		21.30	25.40	4.10	<5	90	130	30	35	2	3	55	
	007	CC		25.40	30.00	4.60	<5	110	170	40	45	2	5	55	(2) 21.3–25.4m: blue green grey, moderately banded greywacke sst and slst; flyllitic schistose sheen // bedding which is mainly 65° to C.A. Limonite stain on some fractures, weathering slight. No obvious hornfelsing, alteration, veining or sulphides – minor quartz veins only.
	008	CC		30.00	35.00	5.00	<5	70	140	35	50	3	3	55	
	009	CC		35.00	39.00	4.00	<5	90	80	25	40	2	3	45	
	010	CC		39.00	45.00	6.00	<5	35	70	30	50	2	5	70	
	011	CC		45.00	50.00	5.00	<5	60	55	25	40	1	5	45	(3) 25.4–39m: greenish grey greywacke sst with green FeMg (?) rich bands alternating with lower FeMg rich bands. Grainsize ≤0.5mm, bands 2–3mm wide. Banding 65°/25.4, 62°/30m, 60°/31m, 55°/32–33m, 65°/36→39m. No strong veining or obvious sulphides or alteration. Minor limonite stain on frs. Slight weathering (H 5→6).
	012	CC		50.00	55.00	5.00	<5	30	60	20	30	1	5	40	
	013			55.00	59.20	4.20	<5	115	95	30	55	2	3	60	(4) 39–55m: As for 21.3–25.4m. Bedding 650 at 40 42 50 53m depth. No obvious hornfelsing. Schistose texture/banding/bedding. Many irregular quartz veins. No sulphides. Minor limonite on some fractures.

Reference

920688

CSR Limited

DRILL LOG—Sam[illegible] Data Sheet

CGI

Area | Prospect Number | Co-ordinates N/S | Inclination | Date Started | Hole Size | Sample Type: M—Creekmud, S—Soil, SA—Soil auger, RC—Drill core, RP—Percussion chips, R—Rock, F—Float | Hole Number CG1

State | 1:100,000 Sheet | E/W | Azimuth T/M/Grid | Date Completed | Lab Rep No | Reference

Location | Grid Used | Collar RL | Depth | Contractor | Analytical Method(s) | cc core chips

Driller | Logged by P.M.M | cs drill core

Drill Type

Metres	Sample Number / Year	Sample Type	A % core recov'd B weight (kg) C grade fraction	From E/W	To N/S	Interval m	Chemical Analyses (ppm or %) Sn	Cu	Zn	Pb	Bi	Ag	Au (ppb)	Co	Description
	80 CG1602/														
	CG1 602 014	CC		59·20	64·00	4·80	<5	110	75	35	65	3	5	75	(5) 55 – 59.2m: Banded dark greenish black unit with 20–30% paler grey bands 0.5–5mm wide – greywacke or possibly a basic tuff, but similar to the above. FeMgs 1–2mm, up to 7mm grainsize. Minor carbonate in frs. Banding 62–65° to CA. No ilmenite, except traces on a few fractures. 8–15 per metre 25° thin qtz veins from 53.20 – 59.2m at 30° to bedding. (ie ~ 80° to bedding dip) Veins are quartz ± minor sulphide or calcite. Sparse cpy and bornite in veinlets.
	CG1 602 015	CC		64·00	68·45	4·45	<5	90	600	45	55	3	5	75	59.20 – 68.45m dark greenish grey to grey, banded to more massive rock (as above) – GREYWACKE or basic tuff? H=6. Dark green FeMgs in bands alternate with pale grey bands. Banding 65°/59.20, 55/60.30m, 65/62.30m, 60°/61m. Banding indistinct below 62.5m. Veining: white carbonate ± qtz ± cpy, pyr ~6/m at 20–50° to CA. Trace py–cp in cb veinlets.
	CG1 6 KC			68·45	71·15	2·70	<5	40	110	40	45	2	3	40	
															68.45 – 68.70m
															Black shale with green (?) silty bands. Banding crenulated 60–70° to CA. Irregular qtz veinlets with trace py.
	CG1 7	CC		71·15	72·15		IP	200	770	360	65	5	5	85	68.70 – 71.15m Grey WACKE (or basic tuff), f.g (<0.5mm) finely banded & massive, medium grey (Fine grained equivalent of 59.20 → 68.45m?) Thin black shale bands decrease downwards from 20% to 5%. 10% (rock) Carbonate. Bandings (bdds) 70°/69m, 75°/69.5m, 70°/70m, 65°/71m. Contact 71.15m at ~ 45°. Sparse fine veinlets 0.5–2mm wide 30° minor 60° some irregular short gash veinlets. No sulphide in body of rock. Rare carbonate (cb) veinlets, trace sulphide.
				72·30	72·55	11·25									

Reference Cb – white carbonate
po – pyrrhotite

120888

CSR Limited

DRILL LOG—Sample Data Sheet

Area		Prospect Number		Co-ordinates N/S		Inclination	
State		1:100,000 Sheet		E/W		Azimuth T/M/Grid	
Location		Grid Used		Collar RL		Depth	

Date Started ______ Date Completed ______ Contractor ______ Driller ______ Drill Type ______

Hole Size ______ to ______ / ______ to ______ / ______ to ______ Lab Rep No ______ Analytical Method(s) ______ Logged by ______

Sample Type: M–Creekmud, S–Soil, SA–Soil auger, RC–Drill core, RP–Percussion chips, R–Rock, F–Float, CC – core chip, CS – split core

Hole Number: CG1

Reference ______

Metres	Sample Number / Year	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From E/W	To N/S	Interval m	Sn	Cu	Zn	Pb	Bi	Ag	Au (ppb)	Co
	80 CG1 602													
	CG1 602018	CS		72.15	72.30	0.15	125	640	3.1%	1600	90	14	5	80
	CG1 602019	CS		72.55	73.55	1.00	25	115	660	900	60	6	10	70
	020	CS		73.55	74.55	1.00	10	75	290	175	40	2	5	30
	021	CS		74.55	76.20	1.65	15	120	1700	165	45	3	10	35
	022	C		76.20	81.00	4.80	5	35	85	30	35	1	10	30
	023	CC		81.00	86.00	5.00	<5	50	145	75	45	2	10	35
	024	CC		86.00	90.00	4.00	5	40	75	30	45	2	5	35
	025	CC		90.00	94.05	4.05	<5	50	90	30	45	1	5	35

Description

71.15 — 73.55m . dk grey, massive chloritic greywacke (tuff?) composed of greenish grey 1-3mm irregular felsic (?) fragments with similar matrix material and dark greenish grey fine chloritic material.
Minor narrow (1mm) veins and minor dissem Cb – po – galena ± (?) stibnite. Rock speckled with pink-brown fibrous silicate (antigorite?).
The unit has a distinctive appearance
Lower contact 30-60°, indistinct.
Banding 60°/73m 65°/73.20
Banded green carbonate zone 72.15 – 72.30 with bands of po, py, sphalerite, possibly a vein. Banding (55-70° to CA). Upper contact 65°, slickensided. Section is 75% carbonate — 10% po — plus pyrite, some sphalerite. Zone parallels banding each side of zone but may be an infilling vein.
Two 10mm wide 50° similar carbonate – sphalerite – galena banded veinlets 73.3 – 73.4m.
Elsewhere in zone 71.15 – 73.30 cream carbonate 1-5 mm wide 70° carbonate veinlets occur some associated with po. Po also occurs as short gash veinlets and splashes throughout the section. In addition, 0.5-2mm veinlets of sphalerite ± pyrite at 70° in a few places.

73.55 – 93.65 GREYWACKE, <0.5mm fine grained banded dark grey), limey, with black shale bands significant to 90m. Shaly bands 1-30mm average 5mm up to 20% of core in places.
Banding 55°/75.1, 58°/75.8m, 55°/77.8m, 75°/80.5, 81.5, 82.2; 60°/84.5, 65°/86.5m, 55°/87m, 60°/88.2, 70°/89.5m, 50°/91.2m.
Basal contact 50°
Core cut by numerous (~50/m) Cb veinlets at 45°, 20°, 80° 1-10mm wide.
Mineralization: sphalerite occurs in 1mm wide irregular veinlets 73.55 – 76.20. Po also present as separate short, 1mm wide gash veins possibly // bedding in part. Green Cb-pyrite zone 75.3 – 75.35m at 30°-60° to CA.
There is little sulphide disseminated in the body of the rock which contains a fair amount of carbonate (HCl tested).

Reference ______

CSR Limited

DRILL LOG—Sample Data Sheet

CGI

Area | Prospect Number | Co-ordinates N/S | Inclination | Hole Number CG1
State | 1:100,000 Sheet | E/W | Azimuth T/M/Grid | (DDH / RDH / RCH)
Location | Grid Used | Collar RL | Depth | Reference

Date Started | Date Completed | Contractor | Driller | Drill Type | Logged by RMACNAMARA | Lab Rep No | Analytical Method(s) | Hole Size ___ to ___ | ___ to ___ | ___ to ___

Sample Type: M—Creekmud; S—Soil; SA—Soil auger; RC—Drill core; RP—Percussion chips; R—Rock; F—Float; cc - core chip; cs - split core

Metres	Sample Number / Year	Sample Type	A % core recov'd; B weight (kg); C sample fraction	From E/W	To N/S	Interval m	Chemical Analyses (ppm or %) Sn	Cu	Zn	Pb	Bi	Ag	Au	Co	Description
	89CG1.602/														93.65 – 94.05 As for 73.55 – 93.65m except for a red coloration in fels (hematitic)
	CG1.602.026	cc		94.95	99.00	4.95	<5	165	90	50	50	2	5	60	Contacts 93.65/ 55° 94.05m/ 50° to CA
															The 94.05m contact is along a dk green laid chlorite 2mm wide Zone.
	CG1.602.027	cc		99.00	103.3	4.30	<5	155	100	35	50	2	5	50	94.05 – 103.3m DOLERITE (or coarse grained Volcanic ?) dk grey to dk grey grey
	028	cc		103.3	110.0	6.70	<5	15	60	35	45	2	5	35	"porphyritic" (3mm) felspathic (70%) rock fine FeMg's and a f.g. felspar – FeMg – chlorite matrix (30%) Brown to mauve mineral (= FeMg ?) Disseminated trace pyrrhotite (po) and chalcopyrite (cp) Basal contact indistinct 20 – 30° to CA, possibly chilled, marked with 1–2mm wide white CO3 – Zone
															(A) Possibly finer grained 94.05 → 94.60m – ? due to chilling? No apparent banding: 5–10%/1–5mm wide/45°, 70° qtz and CO3 = veins, trace S= only
															(B) Coarser grained Zone almost Pegmatitic 94.60 – 95.7m with strong disseminated Pyrrhotite – Epy – Pyrite Banding 50 – 60° with pyroxides // banding ; Some qtz ± CO3 veinlets/ 1–5mm wide/ 45°/ 60°
															(C) 95.7 – 100.20m: paler, grey altered, mottled and veined alteration and veining 0 – 10° to CA cut early series of veins (45–70°) Alteration → qtz – chlorite, med grn grey, mottled ~ 0–10° to CA. qtz ± CO3= veins ± po–cp
															(D) 100.20 – 103.30m: Silicified "porphyritic" less altered zones with some altered mottled zones as in 95.7 – 100.2 2.5% qtz) qtz – CO3 veinlets ± po–cp at 45°, 70° to CA.
															Possible chilling 103 → 103.3m

Reference

670888

CSR Limite[redacted]

DRILL LOG—Sam[redacted] Data Sheet

[redacted]

Area		Prospect Number		Co-ordinates N/S	
State		1:100,000 Sheet		E/W	
Location		Grid Used		Collar RL	
Inclination		Azimuth T/M/Grid		Depth	

Date Started ____ Date Completed ____ Contractor ____ Driller ____ Drill Type ____

Hole Size ____ to ____ / ____ to ____ / ____ to ____ Lab Rep No ____ Analytical Method(s) ____ Logged by P.M.M.

Sample Type: M–Creekmud S–Soil SA–Soil auger RC–Drill core RP–Percussion chips R–Rock F–Float CC core chips CS Split Core

Hole Number CG1

Reference ____

Metres	Sample Number (Year)	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From	To	Interval m	Sn	Cu	Zn	Pb	Bi	Ag	Au (ppb)	Co
	86 CG1 602													
	CG1 602029	CC		110.00	116.00	6.00	<5	30	75	40	45	2	5	35
	CG1 602030	CC		116.00	122.00	6.00	<5	70	125	45	55	3	5	60
	CG1 602031	CC		122.00	130.85	8.85	<5	70	290	90	55	3	5	60
	CG1 602032	CS		130.85	131.25	0.40	90	460	1.26%	1.35%	125	54	10	120
	033	CS		131.25	132.50	1.25	55	65	900	380	55	4	5	55
	034	CS		132.50	133.75	1.25	<5	60	190	50	45	3	5	45
	035	CC		133.75	140.00	6.25	<5	130	85	40	50	3	5	60

Description

103.3 → 130.85 m GREY WACKE med grey <0.5mm (f.g.) massive to banded greywacke sst and slst. H~6. Numerous black shale bands occur throughout gen 1–20mm wide and < 10% of core but 30% 111.3 — 112.7, 116.5 – 122.5 126.2 — 128.4

Lower contact 45°/130.85 against black sh.

Some red and grey cherty zones 103.6 — 103.7, 105.15m. Irregular black bands (sh?) 60° to core axis 103.75m

Bedding 62/105.4 55°/106.2 75°/107.5 60°/108.5 60°/109.6 60°/110.5 56°/112.2, 60°/114.2. 57°/116.0 50–70°/117–119 Crenulated 55°/119–122 76°/122.3 70°/126 65°/125 70°/129 55/130

Mineralization: Irregular white qtz and cb veinlets 1–5mm wide occur at 10°, 25° and irregularly ≈ 5% of core. No strong sulphide associated.

Black shales have increased pyrite associated possibly 1% of the black shale bands = pyrite. Cleavage // bedding.

130.85 — 131.25 (0.23m recovered) Black shale 130.85 — (?) 131.05m then 0.02m of cream colored hard, acid-resistant (non-carbonate) mineral in zone associated c̄ strong pyrite, grey metallic sulphide (tetrahedrite) sphalerite. Sulphides banded crudely 45° — 55°.

131.25 — 133.75m CHERT or siliceous Shale f.g. med grey with some silty bands of similar color plus minor black sh. bands. 131.25/60° contact; slickensides 60–70° lower contact

Rock is highly pyritic with pyrite as thin stockwork veinlet type fracture (2–5% pyrite)! No other S= obvious

Reference ____

889030

CSR Limited — DRILL LOG—Sample Data Sheet

Area | State | Location | Prospect Number | 1:100,000 Sheet | Grid Used | Co-ordinates N/S | E/W | Collar RL | Inclination | Azimuth T/M/Grid | Depth

Date Started | Date Completed | Contractor | Driller | Drill Type | Hole Size ___ to ___ | Lab Rep No | Analytical Method(s) | Logged by

Sample Type: M–Creekmud, S–Soil, SA–Soil auger, RC–Drill core, RP–Percussion chips, R–Rock, F–Float, CC – core chips, CS – Split core

Hole Number: CG1 / CG1

Reference

Metres	Sample Number / Year	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From E/W	To N/S	Interval m	Sn	Cu	Zn	Pb	Bi	Ag	Au	Co
	80 CG1602/													
	CG16.02.036	CC		140.00	149.50	9.50	15	90	0.12%	210	50	3	5	59
	037	CC		149.50	156.00	5.50	<5	119	399	59	55	4	5	70
	038	CC		156.00	161.00	5.00	5	90	600	165	55	3	19	69
	039	CC		161.00	166.40	5.40	29	95	0.22%	0.11%	69	7	19	89

Description

133.75 – 149.50m DOLERITE (, similar to section 94 – 103.3m.) dark grey in places blackish grey, med to coarse grained (0.5 – 3mm) "porphyritic" (filled) FeMg rich rock, massive, non banded. Almost pegmatitic in appearance 136.20 – 139.70, will very crude 45° – 60° layering.
Black bands at 55° to CA at 136.75 – 136.95m = chlorite alteration (or black shale ??) grey black zone, 70° to CA on contact 134.50 – 134.80 and irregular zone of similar type 143.95 – 146.65, 147 – 149.5.

Veining: 133.75 – 137m / 10% 1 – 10mm wide qtz – cb veining highly irregular 0 – 60° to CA anastomozing. Elsewhere veining 5% qtz – cb. highly irregular short fracture filling, little sulphide associated.

Sphalerite in fractures and band / 60°, 45° / 148.1 – 148.2

149.5 – 166.40 : GABBRO ? mainly pale greenish grey altered H 4→5 serpentinized 2mm grained gabbro altered to chlorite FeMg + clayey feldspar.

165.20 – 166.40 : consists of coarser grained ? serpentinized dark green rock possibly with a chilled margin. Has 4mm "phenocrysts" of pale green colour : H = 5, crude banding 65 – 70°. Similar material 148 – 149.50 ?
Veining : 2% 5 – 10mm wide 10° qtz veinlets or qtz + chlorite. Also sphalerite veinlets.
Banded cream cb – qtz – black chlorite zone 65° 165.6 – 165.65m.

No pyrite or cp obvious, but sp occurs in fractures locally especially towards the base of this section.

Reference

13088

CSR Limited

DRILL LOG—Sample Data Sheet

Area		Prospect Number		Co-ordinates N/S		Inclination		Date Started		Hole Size	to	Sample Type:	Hole Number	CG1
State		1:100,000 Sheet		E/W		Azimuth T/M/Grid		Date Completed			to	M–Creekmud, S–Soil, SA–Soil auger, RC–Drill core, RP–Percussion chips, R–Rock, F–Float, CS core split, CC core chip	Reference	
Location		Grid Used		Collar RL		Depth		Contractor		Lab Rep No				
								Driller		Analytical Method(s)				
								Drill Type		Logged by	R. WILLIAMS			

Metres	Sample Number (Year)	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From E/W	To N/S	Interval	Sn	Cu	Zn	Pb	Ag	Au		
	040	CC		166.40	171.00	4.60	15	90	0.36%	79	3	5		
	CG1.602.041	CC		171.00	176.00	5.00	45	85	380	110	3	5		
	042	CC		176.00	180.80	4.80	45	70	230	49	2	10		
	043	CC		180.80	183.00	2.20	5	70	145	45	3	5		
	044	CC		183.00	189.50	6.50	5	50	115	45	3	5		
	045	CC		189.50	191.50		10	45	300	135	3	10		

Description

166.40 – 180.80 m
Shale: strongly cleaved, banded grey black pyritic
(Heavy core, less core badly broken)
Cleavage ∠70° // banding (bedding)
Pyrite – m.g. cubic, disseminated // bedding ~ 3–5%
Weak to moderate qtz-ch veining 5mm/10 cms

180.80 m – 183.00 m. Interbedded shales and siltstones: Pale grey to grey green shale (50%) to sandy siltstones (50%)
Numerous graded beds and indicate facing is uphole
Cleavage (weak) ∠70° // bedding
No sulphides
Weak, irregular qtz-ch veining

183.00 – 188.20 m Greywacke with minor shale & siltstone bands.
Dominantly (70%) fine grey green greywacke with grey green shale and siltstone bands (30%). Numerous graded beds give facing uphole
Cleavage (weak) ∠70° // bedding
Weak to v. weak narrow (<2 mm) qtz-ch veining irregular.
No sulphides

188.20 – 189.50 m Shale: Black poorly banded irregular qtz-ch veined shale. Sharp upper contact (188.2)
Lower contact gradational (interbedded shale/siltstone)
Qtz-ch veining irregular <2 mm
except at 188.86 2cm vein at ∠45°
Cleavage moderate ∠70°
Trace py

189.50 – 191.50 m Interbedded greywacke & shale. Grey green greywacke (70%) and black shale (30%)
Graded bedding gives facing is uphole
Cleavage (weak) ∠70°. Bedding ∠65–70°
Considerable soft [illegible] deformation
V. weak narrow (1–2mm) qtz-ch veining
No sulphides

Reference

880032

CSR Limited

DRILL LOG—Sam[illegible] Data Sheet

Area		Prospect Number	
State		1:100,000 Sheet	
Location		Grid Used	
Co-ordinates N/S		Inclination	
E/W		Azimuth T/M/Grid	
Collar RL		Depth	
Date Started		Hole Size	to
Date Completed			to
Contractor			to
Driller		Lab Rep No	
Drill Type		Analytical Method(s)	
		Logged by	
Sample Type: M–Creekmud, S–Soil, SA–Soil auger, RC–Drill core, RP–Percussion chips, R–Rock, F–Float		Hole Number	
		Reference	

Metres	Sample Number / Year	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From E/W	To N/S	Interval	Sn	Cu	Zn	Pb	Ag	Au			Description
	046	CC		191.50	197.50	6.0	5	45	280	70	3	10			191.50 – 197.50 m Greywacke with minor shales. Dominantly weakly banded grey green greywacke (?%) with minor interbeds of black and grey green shale (?%) Grading indicates facing is up hole Bedding ∠70° Cleavage (weak) ∠70-80° Weak to moderate irregular qtz-cb veining; narrow (1-2mm) Predominant ∠s 70°, 30° No sulphide mineralisation
	047	CC		197.50	198.00	0.50	<5	70	165	50	2	10			197.50 – 198.00 m Interbedded Shales and Cherts. Mottled black siliceous shales (50%) and grey cherts (50%) Minor relict sandstone bands. Mottled chert bands are due to silicification of sst. Considerable interformational disruption (No bedding ∠s) Qtz-cb veining – weak, irregular, narrow (1-2mm) No sulphides
	048	CC		198.00	200.40	2.40	<5	65	120	40	2	10			198.00 – 200.40 m Greywacke with minor shales. Dominantly grey green fine sst – greywacke (70%) with banded grey-green (25%) and black (5%) shales Cleavage (weak) // bedding ∠70° Grading ⇒ facing uphole No significant sulphides
	049	CS		200.40	201.70	1.30	10	420	0.43%	1.05	5	5			200.40 – 201.70 m Interbedded Shales and Siltstone – Greywackes Black shale (65%) and grey-green siltstone – greywacke; lower contact is graded giving upholes facing. Minor py only. at 201.30 – 201.40 m Bands of patchy diss aggregates of py (3%) and minor (<3%) cp. Cleavage // bedding ∠70-75° 10mm qtz-cb vein @ 201.47 ∠75° Irregular qtz-cb veining over 5cms at lower contact
	050	CC		201.70	207.00	5.30	<5	75	160	40	3	5			201.70 – 212.40 m Interbedded Greywacke & Shales; grey green greywacke (60%); grey green shales (30%) Black shale (10%) Massive (v. weak cleavage // bedding)
	051	CC		207.00	212.40	5.40	<5	75	130	45	3	5			Bedding ∠70° Graded bedding ⇒ uphole facing V. weak irregular qtz-cb veining: main veining ∠40° No sulphides

Reference

889033

CSR Limited

DRILL LOG—Sample Data Sheet

Area		Prospect Number		Co-ordinates N/S		Inclination		Date Started		Hole Size	to	Sample Type: M–Creekmud, S–Soil, SA–Soil auger, RC–Drill core, RP–Percussion chips, R–Rock, F–Float	Hole Number
State		1:100,000 Sheet		E/W		Azimuth T/M/Grid		Date Completed			to		Reference
Location		Grid Used		Collar RL		Depth		Contractor		Lab Rep No			
								Driller		Analytical Method(s)			
								Drill Type		Logged by			

Metres	Sample Number / Year	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From E/W	To N/S	Interval	Sn	Cu	Zn	Pb	Bi	Ag	Au	Co	Description
	052	CC		212.40	220.00	7.60	<5	75	130	40	50	2	5	65	212.40 – 230.60 m Shales with interbedded sst
	053	CC		220.00	225.00	5.00	<5	60	115	50	50	2	5	45	
	081	CC		225.00	230.60	5.60	<5	65	115	49	75	3	10	55	
	054	CC		230.60	232.50	1.90	5	70	130	35	45	2	5	65	230.60 – 232.50 m Sandstone with minor shale
	055	CC		232.50	235.50	3.0	<5	60	400	70	75	2	5	55	232.50 – 235.50 m Shale and Greywacke
	056	CC		235.50	241.50	6.00	5	60	125	40	50	2	10	60	235.50 – 241.50 m Sandstone and Shale
	057	CC		241.50	248.00	6.50	<5	65	250	130	60	3	10	55	241.50 m – 280.35 m Shale with v. minor sst bands
	058	CC		248.00	254.50	6.50	<5	70	210	95	65	3	10	50	

Chemical Analyses (ppm or %)

212.40 – 230.60 m Shales with interbedded sst

Banded black shale (80%) interbedded with grey, grey black shale and sst beds (20%)
Bedding ∠ 60 – 90° – predominantly 70° – [illegible]
Cleavage ∠ 70°
Qtz-cb veining – moderate to intense – irregular especially where soft rock deformation (slumping)
Sulphides – irregular diss py (≤1% overall) aggregates to v. short distances over 3 cm etc

230.60 – 232.50 m Sandstone with minor shale

Interbedded grey green sst. (95%) and black shale (5%); shale interbeds generally < 2 mm
massive (breaking on shale bands)
No good bedding – shale interbeds deformed
No sulphides or veining

232.50 – 235.50 m Shale and Greywacke

Interbedded black shale (70%) and grey green greywacke (3%)
Slumping and flame structures → upside facing
Cleavage // bedding ∠ 75° – 80°
Moderate irregular Qtz-cb veining (≤ 3 mm wide)
No sulphides

235.50 – 241.50 m Sandstone and Shale

Interbedded grey green sandstone (60%) and black shale (40%) sst is massive
Bedding ∠° – contorted except for massive sst units which are poorly bedded.
Cleavage ∠ 70° – 80°
Qtz-cb veining irregular; moderate in shales weak to nil in sst
No significant sulphides

241.50 m – 280.35 m Shale with v. minor sst bands

Dominantly massive to banded black shale (95%) with minor narrow (< 5 cms) bands of grey sst – siltstone (5%)
Cleavage (moderate) ∠ 80°

Reference

880634

CSR Limited

DRILL LOG—Sample Data Sheet

Area		Prospect Number	
State		1:100,000 Sheet	
Location		Grid Used	
Co-ordinates N/S		Inclination	
E/W		Azimuth T/M/Grid	
Collar RL		Depth	
Date Started		Hole Size	to
Date Completed			to
Contractor			to
Driller		Lab Rep No	
Drill Type		Analytical Method(s)	
Logged by		Hole Number	
Reference			

Sample Type: M–Creekmud, S–Soil, SA–Soil auger, RC–Drill core, RP–Percussion chips, R–Rock, F–Float

Metres	Sample Number (Year)	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From E/W	To N/S	Interval (m)	Sn	Cu	Zn	Pb	Bi	Ag	Au	Co	Description
	059	CC		254.50	261.00	6.50	<5	90	185	60	65	3	5	50	contd. Bedding [illegible] ~ <80°
															Qtz - cb veining is irregular varying from moderate
															intensity to 250.50 m then [illegible] [illegible]
	060	CC		261.00	267.50	6.50	<5	80	500	130	60	3	10	50	frequent veining // bedding
															Traces py (< 1%)
	061	CC		267.50	274.00	6.50	<5	80	330	95	50	2	5	50	Major veining 244.60 m - 15 mm vein @ <30°
															245.20 - 10 mm " " <45°
															247.20 - 15 mm " " <30°
	062	CC		274.00	280.35	6.35	15	70	0.33%	680	45	4	5	45	247.50 - 15 mm " " <45°
															250.50 - 15 mm " " <45°
															266.60 - 10 cm zone at irregular <°
															269.20 - 10 mm vein at <70°
															273.80 - 20 mm " " <70°
															273.90 - 10 mm " " <60°
															279.30 - 10 mm " " <30°
	063	CC		280.35	284.0	3.65	10	110	0.44%	980	50	4	5	50	280.35 – 288.95 m Greywacke and Shale
															Interbedded grey-green mto. greywacke (50%)
	064	CC		284.00	287.95	3.95	<5	125	430	150	55	1	5	50	and black shale (50%)
															Unit is strongly brecciated (especially sst) with
															healing by shale material.
	065	CS		287.95	288.95	1.00	20	40	0.30%	540	45	3	10	55	Cleavage (weak) <30°, 70°
															Banding variable (disrupted) ~ <70°
															Nil sulphides
															Many 1 mm qtz - cb veins
															Many qtz - cb veins @ 281.70 - 1 cm vein
															284.55 - 5 cm zone
															286.10 - 75 cm @ <30°
	066	CS		288.95	289.85	0.90	565	0.15%	24.7%	2.4%	55	71	10	70	288.95 – 289.85 m MASSIVE SULPHIDES with Cb veining
															Coarsely crystalline massive sulphide with
															brecciated in part with qtz - cb veining
															and fracture infilling
															Sulphides (50%) - 40% Sp. 10% ga
															trace py, [illegible] Sp [illegible] brown to black,
															possible [illegible].
															Minor inclusions of sst & shale.
															— LOOKS LIKE FRACTURE FILLING. VEIN
															SULPHIDES WITH Cb TYPICAL VEIN TYPE
															No obvious banding of sulphides.
															Contact <° irregular.

Reference

80038

CSR Limited

DRILL LOG—Sam[illegible] Data Sheet

Area		Prospect Number		Co-ordinates N/S		Inclination		Date Started		Hole Size	to	Sample Type: M–Creeknud, S–Soil, SA–Soil auger, RC–Drill core, RP–Percussion chips, R–Rock, F–Float	Hole Number
State		1:100,000 Sheet		E/W		Azimuth T/M/Grid		Date Completed			to		DDH / PDH / RDH
Location		Grid Used		Collar RL		Depth		Contractor		Lab Rep No			Reference
								Driller		Analytical Method(s)			
								Drill Type		Logged by			

Metres	Sample Number (Year)	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From (E/W)	To (N/S)	Interval	Sn	Cu	Zn	Pb	Bi	Ag	Au	Co
	067	CS		289.85	291.60	1.75	25	60	0.17%	510	45	3	5	55
	068	CC		291.60	297.0	5.40	10	70	860	240	45	3	10	55
	069	CC		297.00	303.50	6.50	<5	60	130	45	60	2	10	60
	070	CC		303.50	310.00	6.50	<5	75	140	35	50	2	5	65
	071	CC		310.00	316.50	6.50	<5	70	270	210	55	3	5	70
	072	CC		316.50	323.00	6.50	10	60	160	50	50	2	10	60
	073	CC		323.00	329.50	6.50	<5	65	195	55	55	3	5	70
	074	CC		329.50	336.00	6.50	<5	70	125	35	50	2	10	60
	075	CC		336.00	341.60	5.60	<5	70	120	35	45	3	10	65

Chemical Analyses (ppm or %)

Description

<u>289.85 – 291.60 m</u> <u>Shales and slts</u>

Interbedded black and grey shales (60%) and grey green slt (40%); in part brecciated.
Bedding ∠ 70°; facing is uphole.
No significant sulphides
Weak, irregular qtz - cb veining.

<u>291.60 – 292.60 m</u> <u>Finely banded grey shale</u>

Cleavage // bedding ∠70°
No sulphides; weak qtz - cb veining.

<u>292.60 – 297.00 m</u> <u>Shales and slts</u>

Interbedded grey and black shales (80%) and grey slts (20%); grading ⇒ uphole facing.
Bedding // cleavage ∠70°
15cms qtz - cb veining (@ 294.50 m)
Remainder weak - moderate irregular qtz - cb veining

<u>296.75 – 299.50 m</u> <u>Massive qtz - cb vein</u>

At ∠10° - 0° to 3cms wide; No sulphides; inclusions of host rocks

<u>297.00 – 341.60 m</u> <u>Greywacke and shale</u>

Interbedded black and grey shale (30%) and grey green greywacke (70%). Numerous facings are uphole.
Bedding ∠ 65 - 75°
No sulphides

Weak irregular qtz - cb veining except as below
<u>314.68 – 316.50 m</u> strong qtz - cb veining, irregular, appears to be brecciated zone; aggregate 50 cms over veined interval
<u>321.60 – 323.75 m</u> moderate irregular veining 1-2 mm with some to 10 mm; aggregate [illegible]
<u>326.70 m</u> 3cms zone of qtz - cb veinlets
<u>332.60 m</u> 2cms veinlet ∠60°
<u>338.65 m</u> irregular veining to 1cm.
<u>339.60 m</u> 2cms qtz - cb vein at ∠30°
<u>340.50 m</u> 1cms qtz - cb vein at ∠30°

Reference

880036

CSR Limited

DRILL LOG—Samp Data Sheet

Area | State | Location | Prospect Number | 1:100,000 Sheet | Grid Used | Co-ordinates N/S | E/W | Collar RL | Inclination | Azimuth T/M/Grid | Depth

Date Started | Date Completed | Contractor | Driller | Drill Type

Hole Size ___ to ___ | Lab Rep No | Analytical Method(s) | Logged by

Sample Type: M—Creekmud; S—Soil; SA—Soil auger; RC—Drill core; RP—Percussion chips; R—Rock; F—Float

Hole Number | Reference

Metres	Sample Number (Year)	Sample Type	A % core recov'd / B weight (kg) / C sample fraction	From (E/W)	To (N/S)	Interval	Sn	Cu	Zn	Pb	Bi	Ag	Au	Co
	076	CC		341.60	344.30	2.70	<5	135	160	40	55	2	5	79
	077	CC		344.30	349.70	5.40	<5	65	500	90	55	3	10	79
	078	CS		349.70	350.70	1.00	<5	80	260	40	60	3	5	75
	079	CS		350.70	354.80	4.10	<5	80	155	50	55	3	5	55
	080	CS		354.80	355.80	1.00	<5	80	115	30	55	2	5	75

Chemical Analyses (ppm or %)

Description

341.60 – 344.30m Shales & Silts

Interbedded black and grey shales (70%) and grey silts (30%)
Massive with weak cleavage // bedding planes ∠ 60°
Graded bedding ⇒ upside facing
Minor py on joint surfaces.
Minor weak qtz-cb veining

344.30 – 350.70 m Silts and shales

Massive grey green silts (70%) with interbedded grey and black shales (30%). Shales, in part, [illegible] in ~~[illegible]~~ brecciated sections of silts.

Weak qtz-cb veining with significant veins at:

346.90 m 1cm qtz-cb vein at 45°.
348.80 m " " " " 70°
350.70 m irregular veins aggregate 2cms/10cms
No significant sulphides

350.70 – 354.80 m Banded Black Shale

Weak to moderate irregular qtz-cb veining.
Cleavage ∠ 60-90°; Bedding [illegible]
5% sulphides as aggregated diss py, stronger pyrr [illegible] – mainly as aggregates on cleavage planes
Minor po at 353.80m

354.80 – 356.60 m. Silts and Shales

Interbedded grey green silt (70%) and black & grey shales (30%)
Silts brecciated in part with fracture infilling by dark shaley material
No significant sulphides or qtz-cb veining
Bedding & cleavage ∠ 65°

END OF HOLE 356.60m

ACID TUBE SURVEYS (R Williams)

200m : 47° (as read) = 38° true
300m : 40° (as read) = 32½° true

Reference

1708037

APPENDIX II

DDH CG1 - PETROGRAPHY

889039

MINPET SERVICES

76 McLachlan Avenue, Rushcutters Bay, N.S.W. 2011

REPORT NO. 5/81

PETROGRAPHY OF C G 1 D D H SPECIMENS

ZEEHAN, TASMANIA (PROJ. 600)

(for P.M. MacNamara, C.S.R. Ltd., Sydney).

January, 1981.

889040

CONTENTS

1. INTRODUCTION

Drill core specimens from C G 1, Zeehan, Tasmania are described from thin sections. Most specimens have been subjected to intense deformation though sufficient relict characteristics remain (in most cases) to make identification possible.

The preservation of diopsidic augite in dolerite specimens was all the more remarkable considering the extent of brecciation.

.../

2. SUMMARY

D.D.H. C.G.1.

MPS 1281 24.5 m.

Field note : Rock type?

Identification : Metadolerite, sheared.

MPS 1282 37.8 - 37.87 m.

Field note : Basic tuff ?

Identification : Basaltic tuff

MPS 1283 46.5 - 46.56 m.

Field note : Green-grey finely banded basic tuff or greywacke.

Identification : Impure carbonate sediment, possibly tuffaceous - altered to a tremolite actinolite schist.

MPS 1284 55.70 m.

Field note : Rock type ? Contact ?

Identification : Altered calc silicate sediment shows relict graded bedding - tuffaceous.

No evidence of contact metamorphism.

MPS 1285 58 m.

Field note : Rock type ?

Identification : Andesitic crystal tuff lava, propylitised and metamorphosed.

.../

MPS 1286 64.2 m.

Field note : Rock type ?

Identification: Andesitic crystal tuff, coarse grained.

MPS 1287 70.20 m.

Field note : Banded greywacke and shale.

Identification : Subfeldspathic lithic wacke with shale bands.

MPS 1288 71.50 m.

Field note : Rock type ? Sulphides ?

Identification : Volcanic breccia - intermediate. No sulphides present but segregations of leucoxene/limonite.

MPS 1289 79.50 m.

Field note : Rock type ?

Identification : Quartz feldspar wacke underlying black silty shale. Prolifically veined and veins are brecciated, dislocated.

MPS 1290 93.65 m.

Field note : Contact ? Rock type.

Identification : Granophyre breccia, before silicified at shale contact. Both rocks extensively altered. Brecciated granite contact with shale.

MPS 1291 94.05 m.

Field note : Rock type

Identification : Porphyritic basalt with holocrystalline groundmass. Brecciated, veined by dolerite.

.../

MPS 1292 99.60 m.

Field note : Rock type

Identification : Dolerite, medium grained intrusive, brecciated, altered.

MPS 1293 103 m.

Field note : Describe rock types and contact.

Identification: Dolerite, medium grained intrusive, brecciated, sheared - veined by KF: carbonate and chlorite.

MPS 1294 103.3 m.

Field note : Contact , fine grained dolerite/sediment.

Identification : Dolerite, medium grained, brecciated, sheared, argillic altered.

MPS 1295 107 m.

Field note : Banded medium grained sandstone/greywacke with fine grained cherty bands.

Identification : Banded shale, fine grained, veined and sheared. Banding is due to variation in illite, chert, carbonate components in bands.

MPS 1296 118.40 m.

Field note : Banded black shale / fine grained greywacke.

Identification : Banded shale metasediment grades into quartz-plagioclase wacke with abundant pyrite.

MPS 1297 130.60 m.

Field note : Banded sediments.

Identification: Banded metasediments, fine grained - wackes to shales, show graded bedding.

.../

MPS 1298 132.10 m. (2 almost identical thin sections)

Field note : Banded sediments

Identification : Claystone, metamorphosed/sheared.

MPS 1299 137.0 m.

Field note : Rock type ?

Identification : Dolerite, medium grained, strongly brecciated, much replaced by carbonate and chlorite, part amphibolitised.

MPS 1300 141.30 m.

Field note : Volcanic or intrusive or greywacke ?

Identification : Dolerite, medium grained, brecciated, has a basalt cognate xenolith ?

MPS 1301 146.15 m.

Field note : Rock type ?

Identification : Metadolerite, fine grained, extensively chlorite veined and silicified in part of section.

MPS 1302 149.50 m.

Field note : Rock type?

Identification : Serpentinised peridotite (or dunite). Textures insufficiently preserved to indicate the peridotite type.

MPS 1303 159.50 m.

Field note : Rock type ?

Identification : Dolerite, medium grained.

MPS 1304 165.70 m.

Field note: Serpentinite or serpentinised sediment ? Check rock type etc.

Identification: Serpentinised peridotite - wehrlite ?, brecciated, sheared.

3. PETROGRAPHIC IDENTIFICATION

DDH C G 1

MPS 1281 24.5 m.

Field notes: Rock type ?

Petrographic description: Sheared basic rock (relict textures indicate likely metadolerite).

Mineralogy:

Quartz	-
K Feldspar	5
Plagioclase	35
Actinolite	50
Chlorite	10
Magnetite	<1

Texture:

A sheared banded mainly actinolite : plagioclase rock. Minor chlorite is present in the interstices of plagioclase crystals. Bands of largely actinolite alternate with those largely of plagioclase due to differentiation by shear, a beginning schistosity. Both minerals are present as sheared lenticles including augen (to 0.6 x 0.25 mm) of the mineral. Within the plagioclase layers chlorite as ragged pale green lenticles and crushed blebs occupy the interstices and to a greater degree occur as inclusions in recrystallised plagioclase.

The rock is probably a metamorphosed, sheared dolerite with no evidence of amygdule relicts, low iron oxides. Any magnetite was removed by shear forces. Minor K feldspar differentiated into cross fractures. The feldspar is present as discontinuous vein lenticles; it has a wider size range than the plagioclase.

Alteration: Dynamometamorphic.

Metamorphism: Brecciation and more extensive shear.

.../

MPS 1282 37.8 to 37.87 m.

Field notes: Basic tuff.

Petrographic description: Metamorphosed (sheared) basalt or tuff, probably tuffaceous.

Mineralogy:

Actinolite	49
Plagioclase	30
Diopsidic augite	10
Epidote	7
Chlorite	-
Phlogopite	2
Magnetite	2

Texture:

A sheared mainly actinolitic rock containing lenticles with brecciated and healed plagioclase and with epidote granules forming the alternate lenticles (~ 0.15 mm wide). Scattered plagioclase subhedra and large augen forms (0.05 to 0.14 mm) occur throughout, oriented mainly with the general direction of actinolite laminae.

Similarly diopsidic augite augen often rather larger than plagioclase but generally similar size range. Several scattered en echelon lenticles are enriched in a mosaic of subhedral augite and epidote grains, the lenticle being flanked by actinolite laminae.

Alteration:

Basalt or basaltic tuff, metamorphosed to plagioclase amphibolite. Sheared → actinolite.

Metamorphism:

Strongly sheared.

Note: The absence of any obvious altered glassy matter and an actinolite : plagioclase imbalance for a basalt indicates this rock to be a metamorphosed basic tuff rather than a sheared porphyritic basalt. Lack of residual chlorite probably eliminates possibility that this is a greywacke.

.../

MPS 1283 46.5 - 46.56 m.

Field notes: Green grey finely banded basic tuff or greywacke.

Petrographic description: Strongly sheared, mainly tremolite / actinolite, originally impure banded carbonate sediment, possibly tuffaceous.

Tremolite : actinolite schist.

Mineralogy:

Quartz	2
K feldspar	5
Plagioclase (albite)	4
Tremolite/actinolite#	84
Chlorite	2
Muscovite	1
Magnetite	2

Texture:

Strongly sheared tremolite / actinolite rock of mainly just that. The mineral is specked with iron oxides, consists of thin sheared laminae of tremolite / actinolite. En echelon fractures contain twinned albite as augen; other albite grains are brecciated, flanking a quartz vein - similarly brecciated and mixed with plagioclase fragments and amphibole. Albite augen are commonly mosaics of the mineral flanked by brecciated amphibole showing a crenulation cleavage. Fractures perpendicular or with an obtuse angle to the main cleavage contain potash feldspar.

Alteration:

Slightly ferruginous carbonate → tremolite / actinolite of very pale green colour.

Metamorphism:

Strongly sheared with few augen, but indications of a crenulation cleavage developing.

Note: Lack of plagioclase (augen where present) suggests the rock to be a strongly altered and sheared limestone sediment since there is little or no quartz present.

.../

much paler than actinolite of MPS 1252

MPS 1284 55.70 m.

Field notes: Rock type ? Contact ?

Petrographic description: Tremolite / actinolite chlorite schist, altered calc silicate sediment shows relict graded bedding - tuffaceous.

Mineralogy:

Quartz	1
K feldspar	2
Albite	7
Tremolite/actinolite	78
Chlorite	10
Muscovite	2
Magnetite	<1
Hornblende (brown)	<1

Texture:

Mineralographically similar to MPS 1283 but this section indicates that banding is not entirely due to shear, as here there is a type of graded bedding of very fine tremolite : actinolite laths. Individual laths become broader and longer and vary from 0.01 x 0.02 to 0.7 x 0.4 mm, varying in size right through the depth of one sequence. The bottom bands have albite and actinolite as coarse augen. Chlorite rich bands appear near the junction of each succession. One hornblende grain with fine particles of iron oxide separating along cleavages is enveloped in actinolite lenticles. The amphibole becomes more green towards the coarser bands at bottom of each sequence. Fine cross fractures contain K feldspar.

Alteration:

Impure calcareous sediment → tremolite-actinolite : albite, etc.
Part kaolinisation of albite.

Metamorphism: Strongly sheared after alteration.

.../

889050

MPS 1285 58 m.

Field notes: Rock type ?

Petrographic description: Andesitic crystal tuff, propylitised, metamorphosed.

Mineralogy:

Host rock		Vein	
Plagioclase	20	Pyrrhotite	10
K feldspar	-	K feldspar	10
Sericite	25	CO_3	25
Tremolite/actinolite	25	Kaolinite	35
Clinozoisite	10	Chlorite	20
Chlorite	10		
Carbonate	5		
Kaolinite	5		

Texture:

A coarse banded tuffaceous rock. Mainly large grains (0.1 to 3 mm) of subrounded to angular fragments of actinolite along bands show some in situ brecciation. These are within and between sericitised plagioclase in a fine matrix of chlorite and clinozoisite showing flow banding (could be due to shear ?). Other coarse rounded actinolite grains are embedded in finely sheared actinolite and chlorite only.

Chlorite and carbonate veins pervade all other structures.

All succeeding lenticles, (i) coarse actinolitic; (ii) fine actinolitic with flow banding; (iii) fragmented sericite (after plagioclase) are subparallel to converging. Veins of chlorite, kaolinite and carbonate cuts across structures altering the rock minerals. A broad vein (~ 1 mm) has a chloritic core and kaolinite wall zones. Tributary veins contain chlorite, carbonate or kaolinite. One vein contains K feldspar and pyrrhotite, within the core zone.

Alteration:

Propylitic → argillic with minor epidotisation, chloritisation carbonation, but also kaolinitic.

Metamorphism - Shear / brecciation.

.../

889051

MPS 1286 64.2 m.

Field notes: Rock type.

Petrographic description: Andesitic crystal tuff, coarse grained.

Mineralogy:

		Veins KF	100
Plagioclase) Sericite)		40	
Tremolite/actinolite,	fragments	24	
	matrix	24	
Clinozoisite		2	
Chlorite		10	
Carbonate		-	
Kaolinite		-	

Texture:

Similar to MPS 1285 but less low grade alteration. Coarse (to 2 mm) tremolite / actinolite as rounded grains or fragments making up rounded forms; also plagioclase, some clear, otherwise cloudy with sericite or packed with clinozoisite. Oblong clinozoisite with rounded corners or ovoid forms and some perfect euhedral forms. All the above clasts are distributed in flow banded layers with moderate to abundant tremolite in the flow bands. These flow bands contain small rounded sericitised plagioclase fragments. Tremolite also simulates unoriented fine hornblende (?) crystallites.

Alteration:

Hornblende (?) → tremolite / actinolite.
Plagioclase → sericite + clinozoisite.

Metamorphism:

Moderate shear.

.../

MPS 1287 70.20 m.

Field notes: Banded greywacke or shale.

Petrographic description: Banded subfeldspathic lithic wacke, with shale bands.

Mineralogy:

Quartz	50
K Feldspar	3
Plagioclase	-
Sericite)	33
Chlorite)	
Kaolinite	5
Biotite	1
Muscovite flakes	<1
Leucoxene/iron oxides	3
Carbonate	5
Collophane	<1

Texture:

The most abundant clasts present are quartz of sand size (0.05 to 0.6 mm, median 0.08mm); varying from subrounded to angular and elongate, mostly subangular. There are alternate coarse and fine quartz (and twinned K feldspar of similar size range) in a groundmass of mixed chlorite, sericite and less kaolinite. The chlorite (probably chloritic clay) is pale and with a higher than normal B.R. Occasional broad bands of clear calcite traverse the rock. These have replaced clay minerals etc. and have disturbed the clast bands. Otherwise carbonate replacement of some feldspar clasts and matrix is erratic. Carbonate in lamellar type pockets. In some broad bands coarse clasts are missing and rock becomes a shale. The change is transitional.

Alteration:

Carbonation of plagioclase and matrix in bands or 'pockets'.

Metamorphism:

Moderate shear.

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MPS 1288 71.50 m.

Field notes: Rock type, sulphides?

Petrographic description: Volcanic breccia - intermediate. No sulphides but segregation of brownish leucoxene / limonite.

Mineralogy:

Quartz		15
Sericite) Carbonate)	Plagioclase	35
Chlorite		30
Kaolinite		15
Rutile/iron oxides		5

Texture:

Carbonated and sericitised coarse plagioclase breccia (+ 2 mm in size) are sheared with broad chlorite, kaolinite finely sheared into zones (0.8 mm even width) is underlain by a finely brecciated carbonate (altered plagioclase) horizon. Below the carbonate is a large wedge of silicified flow banded glassy matter which shows flow, perpendicular to main shear direction of this rock. This overlies finely brecciated carbonate intermixed with chlorite over more silicified glass embedded in brecciated carbonate and chlorite. With the exception of the chloritised and silicified zones all hyaline volcanic textures are destroyed.

Alteration:

Plagioclase → sericite + carbonate.
Hyaline matter → quartz, chlorite, kaolinite.

Metamorphism:

Brecciation / shear.

Note: A difficult rock to interpret, because of the brecciation / shear overprint.

.../

MPS 1289 79.50 m.

Field notes: Rock type?

Petrographic description: Quartz feldspar wacke underlying black silty shale. Prolifically veined and veins brecciated. dislocated.

Mineralogy:

Wacke:

Quartz	75
K Feldspar	10
Plagioclase	2
Chlorite	10
Carbonate	2
Magnetite	1
Zircon	<1

Veinlets:

Quartz)	
Carbonate)	variable
KF)	

Shale:

Chlorite	40
Carbonate	10
Quartz/Chert	43
Carbonaceous matter	7

Veinlets as above.

Texture:

Wacke:

Quartz angular > subangular grains from silt size to sand size with K feldspar and a little plagioclase has been brecciated and sheared into lenticles and further brecciated. The groundmass interstices is of fine quartz : chlorite : carbonate with a sprinkling of coarse rounded magnetite and a large zircon grain. One coarse (+ 1 mm wide) quartz vein traversing the section, has been badly crushed and sheared into separate subparallel lenticles. A banding to quartz breccia is noted. Subsequent veins of K feldspar and thin carbonate have also been brecciated partly to vein fragments. Texture is fairly uniform all over.

Shale:

Towards the bottom of the wacke the matrix becomes more abundant in chlorite in places and is in sharp contact with shale elsewhere, but the finely sheared, banded laminated shale shows fine laminae of quartz in parallel bands with an abundant chlorite matrix and fine rhythmic

.../

horizons of carbonaceous material. Fine carbonate lenticles are part brecciated veinlets of the mineral, then like the earlier brecciated KF veinlets these cut across the shear planes, but are earlier than carbonate. Paragenesis of veining is KF, quartz and finally carbonate.

Alteration:

Due to metamorphism.

Metamorphism:

Strong shear.

MPS 1290 93.65 m.

Field notes: Contacts? Rock types?

Petrographic description: A silicified granophyre breccia: shale contact.

Both extensively altered and cataclased → healed.

Brecciated granite contact with shale.

Mineralogy:

	Breccia	Shale
Quartz	75 - 85	40
K Feldspar	2 - 10	3
Plagioclase	-	-
Biotite	-	10
Chlorite	10	20 - 40
Muscovite		5 - 30
Carbonate	5	-
Kaolinite	2	-

Texture:

Wacke

This half of the section is an irregular quartz feldspar breccia of clear grains of granophyre fragments and twinned feldspar. Contains fragments of up to 3.5 mm containing coarse sutured quartz with some interstitial kaolinite in vugs; quartz simulates feldspar forms, euhedra / phenocrysts of silicified porphyritic granite. Remaining section is of fragments of quartz, feldspar and abundant granophyre fragments of intraformational breccia. Quartz varying from small grains

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(0.04 mm) to large plates (0.6 mm) is often in mosaics. On one side KF is fine cherty looking aggregates in quartz breccia and may have been introduced by KF veins. The main interstitial mineral is fine granular chlorite distributed unevenly between breccia fragments, deposited in vein-like fractures.

A brecciated vein of muscovite : KF : quartz which dilates 0.07 to 1 m.m. and contracts and disappears into breccia. Similarly for a vein (0.2 - 0.6 mm) of clear mosaics of even decussate KF grains and quartz which is brecciated into three displaced fragments at the dividing line between breccia and shale.

Shale

A sharp contact with granite breccia. Shale is seen to be brecciated with large (several mms) of 'shale' embedded in the granite breccia.

Large fragments in granite contain quartz feldspar veinlet truncated networks. Groundmass is of quartz, feldspar breccia, 'granules' and flecks of red-brown biotite scattered throughout, a granular chlorite matrix and fine granular K feldspar. Truncated veinlets of chlorite, K feldspar, quartz occupy spaces between breccia fragments (intraformational).

The main body of 'shale' is similar to the above but contains muscovite in brecciated masses and a network of fine KF veinlets.

Alteration: (related to veining paragenesis).

(i) quartz : KF
(ii) muscovite
(iii) chlorite : carbonate

Metamorphism:

Granite / shale, K feldspathised, etc. as above, brecciated.

Possibly two brecciations, since there appears to be brecciation at KF : quartz cementation and further brecciation where chlorite : carbonate were introduced. Breccia more or less intraformational.

.../

MPS 1291 94.05 m.

Field notes: Rock types?

Petrographic description: Porphyritic basalt with holocrystalline groundmass. Brecciated, veined by dolerite.

Mineralogy:

Host:

Augite (diopsidic)	55
Chlorite	10
Plagioclase#	25
Magnetite	6
Quartz	4

Veins:

(i)	Actinolite	70
	Plagioclase	30
(ii)	KF	10
	Chlorite	70
	Carbonate	20

Selvage:

Chlorite	10
Epidote	50
Carbonate	30

Texture:

A fine grained intergrowth of augite and sericitised plagioclase forms a fine holocrystalline groundmass pocked by coarse scattered iron oxides. Phenocrysts (~ 0.5 mm) of augite or groups of intergrowths are scattered throughout. Some post-contact metamorphic brecciation has taken place, followed by veining by chlorite which has replaced augite in areas adjoining veins. A broad, cross-cutting actinolite : plagioclase vein (altered dolerite) has a broad outer selvage of epidote / carbonate and inner selvage of thin chlorite. This is cut across by a thin KF : chlorite : carbonate vein which broadens out into a mosaic of fine carbonate > KF with thin chlorite selvages. Coarse fragments of silicified ophitic textured augite containing plagioclase laths are present.

Alteration: Augite → actinolite (vein)
Dolerite → plagioclase altered → scapolite / idocrase.
KF / chlorite veined; doleritic aplite veins.

Metamorphism: Brecciation, recrystallisation.

Note: Quartz filled amygdules are present.

to idocrase and what appears to be scapolite elsewhere.

MPS 1292 99.60 m.

Field notes: Rock types?

Petrographic description: Brecciated medium grained, dolerite intrusive, altered.

Mineralogy:

	Host rock	Veins
Augite	35	
Plagioclase	40	
Potash feldspar	<1	50
Chlorite	15	35
Actinolite	2	
Ilmenite	4	
Quartz	2	5
Epidote		10
Tremolite/ actinolite	2	

Texture:

Slightly sericitised faintly twinned decussate plagioclase occupy spaces between augite grains and have ophitic arrangement within augite plates. The augite shows brecciation and local alteration to tremolite/ actinolite. Fine radiate structures, spherulitic into quartz in cavities (may be partly tridymite from quartz where these are very fine radiate fibres). Section shows fine fragments of augite and plagioclase embedded in a matrix of fine granular chlorite. Breccia zones (to 3 mm wide) are sinuous across the section and have suffered later microfaulting. Large skeletal ilmenite structures (to 2.5 mm) are scattered through the section. Potash feldspar ± chlorite veinlets, irregular but with a fine regular sutured mosaic of KF and interstitial chlorite cut across host rock and have K feldspathised and chloritised the host along fractures adjoining the vein.

Alteration: Plagioclase → faintly sericitic + albite.
Augite → faintly to tremolite, more so to chlorite.
Retrograde.

Metamorphism:

Brecciation, recrystallisation.

.../.

889059

MPS 1293 103 m.

Field notes: Describe rock types and contact.

Petrographic description: Dolerite,medium grained intrusive, brecciated, sheared and veined by KF : carbonate and chlorite.

Mineralogy:

		Vein 1	Vein 2
Diopsidic augite (zAc 50^{o}-53^{o}	40		
Plagioclase	38		
Potash Feldspar	<1	20 - 80	0 - 20
Quartz	3		
Carbonate	2	80 - 20	
Chlorite	7		100 - 80
Sericite	5		
Ilmenite (to leucoxene + iron oxides)	5		

Texture:

Coarse broad prisms of augite remaining unbrecciated, 0.4 x 0.6 to 2 x 1.5 mm, including twin crystals and intergrowths show minor to strong brecciation (~ 50 v. % of section finely brecciated) with large areas between medium crystals of finely brecciated plagioclase and augite intermixed with chlorite. Ophitic plagioclase laths in silicified augite plates are seen. Much of the plagioclase is sericitised and partly silicified. Sheared grains of ilmenite, now mainly leucoxene, are distributed evenly and emphasise the strong shear forces involved.

Two types of vein pervade section, one broad (~ 7 → 4 mm, uneven) is of finely sheared intermixed K feldspar and carbonate. One vein of the above type shows flexure where it has begun to cross the shear direction along pre shear brecciation fractures and was then forced back to the general shear direction.

Other narrower veins which follow the shear direction contain mostly chlorite with, in places, brecciated K feldspar.

Alteration: Plagioclase → sericite (+ albite)) induced by shear
Augite → chlorite.)

Metamorphism: Brecciation and strong shear.

Note: No actual contact noted.

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889060

MPS 1294 103.3 m.

Field notes: Contact fine grained dolerite with sediments.

Petrographic description: Medium grained dolerite, brecciated, sheared - argillic alteration.

Mineralogy:

		V. 1.[#]	V. 2.	V. 3.	S. 3.[X]
Diopsidic augite	50				
Plagioclase	28				
Potash feldspar	-				
Quartz	2	0 - 10		70	
Carbonate	5			30	
Chlorite	5	90 - 100	30		
Sericite					100
Illite	5				
Ilmenite (to leucoxene)	5				

Texture:

Very similar to specimen from 103 m., but less plagioclase recognisable, which was brecciated and argillised to hydromuscovite (illite) rather than to sericite. Coarse brecciated augite crystals show argillised interstices of brecciated plagioclase. The whole veined by chlorite in the general shear direction. Surprisingly, at one end of the section, augite is remarkably fresh, but with adjoining argillised plagioclase. Towards opposite end of the thin section, brecciation becomes more common and fractures are filled by chlorite, with increasing (to end of section) illite and carbonate. Much of the former is in broad selvages flanking V. 3 veins.

The 'sedimentary' quartz is pegmatitic vein quartz, marginally brecciated; fractures in the breccia are filled by V. 3 carbonate. In fact this is an example of quartzose V. 3. At one end of section fine plagioclase laths in decussate array are albitised / carbonated, but are structurally intact.

Scattered large ilmenite grains are present.

Alteration: Plagioclase → carbonate, albite → hydromuscovite.
Augite → [locally] chlorite.
Ilmenite → leucoxene + iron oxides.

Metamorphism: Brecciation → strong shear.

.../

[#] V.1. = Vein No. 1; [X] S.3. = Selvage to Vein No. 3.

MPS 1295 107 m.

Field notes: Banded medium grained sandstone / greywacke with fine grained cherty bands.

Petrographic description: Banded shale, fine grained, finely sheared after veining.

Mineralogy:

		Veins	
Quartz - chert	12 - 62	Q.[#] 95	20
Illite	30 - 80		
Carbonate	5		
Chlorite	2		
Leucoxene	3		
Potash feldspar		5	80

Texture:

Very fine grained cherty quartz intermixed with fine flaky illite or present as narrow en echelon distributed lenticles; alternate with pure fine flakey illite or illite intermixed with fine carbonate granules and / or leucoxene with patchy iron oxide. Ruptured veins of rather coarser quartz than host rock but brecciated and interspersed with potash feldspar grains and cut across by later, finer fractures containing mostly KF. Chlorite segregation along 'veins'.

Alteration: -

Metamorphism: Intense shear, but no mylonite structures.

Note: Some very fine lenticles of irregular aspect are chlorite segregations. Deep water sediment - absence of coarse clasts suggests.

[#] Quartz only

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MPS 1296 118.40 m.

Field notes: Banded black shale / fine grained greywacke.

Petrographic description: Banded shale metasediment grades into quartz - plagioclase wacke, with abundant pyrite.

Mineralogy:

	'Wacke'	'Shale' (with quartz bands)
Quartz	15	8
Plagioclase	5	
Illite / Chloritic clay	15	32
Kaolinite	25	5
Leucoxene	7	5
Pyrite	5	-
Chert	20	20
Carbonate	5	30
Chlorite	3	

Texture:

Two different sedimentary facies with no sharp contact. One grades into the other.

Wacke:

Banded augen of quartz, quartz breccia and cherty clasts and plagioclase as clear twinned subhedra are concentrated into bands which are foliated. Several quartz grains are perfect spheres and were at some time subjected to rotational grinding. However, presently the clasts have interfoliae of chert, carbonate and leucoxene aggregates separated by fine continuous foliae of sericite/illite, and kaolinite which make up the rest. There are sheared out pyrite / pyrrhotite in en echelon distributed broad lenticles and intergrown with carbonate and chlorite. There is a strong crenulation of 60^{0} and brecciated quartz veins penetrate along the crenulation plane. The vein is strongly brecciated at intervals and healed.

Shale:

Finely laminated, largely fine grained sheared sericite, as broad bands (2 - 3 mm) containing thin laminae of leucoxene, carbonate, kaolinite and separated by quartz breccia bands and laminae (with some

.../

microfaulting of bands and resulting perpendicular cross veins). The deformation imprint makes identification between laminae and veins impossible. The appearance of the rock under low power magnification is that of a quartz banded paper shale.

Alteration: -

Metamorphism: (i) Strong deformation of quartz wacke. Microfaulting of 'paper shales'.

(ii) Pyrite was distributed along bands but during deformation the mineral was forced into a microfault.

(iii) Abundance of leucoxene and chlorite clay, suggests an origin from a close-by basic rock source.

MPS 1297 130.60 m.

Field notes: Banded metasediment.

Petrographic description: Fine grained banded metasediments, wackes to shales, show graded bedding.

Mineralogy:

	chlorite	fine wackes	shale	quartz bands	coarse wacke
Quartz (including chert)		30	3	70	41
Illite/chlorite clay		45	82		
Muscovite		1			
Kaolinite		7	2		
Carbonate		10	3		20
Leucoxene		7	10		7
Chlorite	100			30	30
Sericite/Muscovite					2

Texture:

A fine grained sediment demonstrating graded bedding. Three of the four beds described above grade one into the other. The fourth bed is of mildly sheared equigranular quartz with a narrow interstices of chlorite. The bands occur distributed parallel to bedding direction in shale sequence. The rhythmic bands join to form one thick band (1.2 mm thick) showing a condensation of band sequences on a micro scale, not caused by shear.

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The fine wacke is similar to the wacke of 118.40 m. but rather finer grained, angular > subangular fine sand to silt size quartz grains and chert, and chert/quartz aggregates show shear and 'tailing' of grains into groundmass minerals. Chert and clay mixtures and segregations form laminae between the clasts, as do alternate clear carbonate laminae and scattered muscovite laminae. A slight crenulation is rarely seen. Narrow laminae (~ 0.1 mm wide) of chlorite follow the banding. Scattered leucoxene fragments are present.

In the shale there appears a greater abundance of fine ubiquitous leucoxene in a finely banded clay, chert with clear parallel carbonate laminae - parallel with each other and with the banding. Scattered silty quartz porphyroclasts occur.

The coarse wacke is of rounded and flat round quartz clasts (~ 0.20 mm), mildly foliated with interstitial ovoid carbonate grains of variable size range, carbonate laminae, irregular leucoxene aggregates and clay.

Alteration: -

Metamorphism: Shear - moderate.

Note: Part of a fine turbiditic sequence deposited in deep water. The abundance of leucoxene (and in several sections before) reminds one of sediments at Mt. Gunson (MG 14 area) adjoining the dolerite dyke.

.../

MPS 1298 132.10 m. (2 sections, almost identical)

Field notes: Banded sediments.

Petrographic description: Claystone, metamorphosed / sheared.

Mineralogy:

		Fractures (1)	Fractures (2)
Sericite / illite	70 - 85		
Chloritic clay	25 - 15	10 - 90	
Leucoxene	4 - 6		
K feldspar		10 - 90	
Carbonate			40
Quartz	< 1		50
Magnetite			10

Texture:

A curious claystone with only traces of clastic quartz. A vaguely banded rock of fine illite, often as minute aggregates alternating with chloritic clay as bands and laminae. At one end of the succession, bands of alternating fine illite and chloritic clay become towards opposite (lower, upper?) part of succession what appear to be parallel, short, pinched-out laminae of sericite (~ 0.1 mm length) in a groundmass of chloritic clay. Irregular tension fractures contain carbonate, quartz and magnetite (the latter may form a narrow selvage) and earlier K feldspar : chloritic clay as veins or fracture-fill; these have a heterogeneous mineral distribution.

Alteration:

There may be sericitised feldspar fragments in part of the succession, though, if that were the case, one would expect to see quartz clasts? So a metamorphic brecciation effect?

Metamorphism:

Moderate shear.

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MPS 1299 137 m.

Field notes: Rock type.

Petrographic description: Dolerite, medium grained, strongly brecciated, grossly replaced by carbonate and chlorite, less quartz veined; part amphibolitised.

Mineralogy:

Primary:

Augite	36
Plagioclase	40
Actinolite	20
Leucoxene	4

Secondary:

Quartz → chert	30
Carbonate	40
Chlorite → sericite	30

Veins: (i) Quartz

(ii) Carbonate / chlorite.

Texture:

Similar to 99.60 m., 103 m. and 103.3 m. Brecciated diopsidic augite with many fragments containing faintly twinned plagioclase laths of a medium grained dolerite. A regular close network of chlorite veins have cut pegmatitic quartz veins (now sheared into a broad dilated lenticle) and are in turn cut by clear carbonate veining. Veins occupy brecciation fractures.

A massive chlorite vein structure, dilated to +10 mm wide appears to have penetrated breccia fractures and then progressively replaced the pyroxene / feldspar breccia flanking the vein. Abundant similarly oriented carbonate : quartz and chlorite vein replacement occurs at the lower end of the thin section. Carbonate replacement of ophitic plagioclase and chlorite replacement of host augite plates indicates clearly the primary dolerite texture.

Alteration:

Pyroxene → chlorite

Plagioclase → carbonate or silicified (earlier process).

Metamorphism:

Strong brecciation and shear.

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MPS 1300 141.30 m.

Field notes: Volcanic or intrusive or greywacke.

Petrographic description: Dolerite, medium grained, brecciated with a basalt cognate (?) xenolith.

Mineralogy:

Augite+	30	Vein	KF	100
Plagioclase*	40			
Chlorite	27			
Leucoxene (Ilmenite)	3			
Scapolite (replaces plagioclase/glass in basalt.				

Texture:

Rather similar to other brecciated and altered dolerites in this drill-core. Brecciated large augite grains, still fresh or part chloritised and plagioclase laths, part to almost wholly saussuritised to clinozoisite show ophitic to subophitic intergrowths to augite. The saussuritisation is particularly evident in a broad (~ 1 mm wide) area of fine brecciation of all minerals, which traverses the section. A clear KF vein of pegmatitic texture cuts through this breccia zone filling a fissure in the material. The veins have narrow marginal selvage zones, which impart no KF to other fissure material. Large ilmenite grains, now leucoxenised and sheared have developed into dendrites in the fine breccia zone.

In one corner of the section is a flow banded (glassy texture) fragment of basalt. The flow bands may be traced up one side of the section and show recrystallisation with scapolite mosaics. A finely brecciated contact with dolerite.

Alteration:

Plagioclase → scapolite (basalt).
Augite → chlorite (slight).
Plagioclase → sericite + clinozoisite (dolerite).
Epidotisation (saussuritic) + scapolitic hydrothermal.

Metamorphism: Strong brecciation.

+ Clear unaltered, but brecciated.

* Altered to clinozoisite / sericite.

.../

MPS 1301 146.15 m.

Field notes: Rock type?

Petrographic description: Metadolerite, fine grained extensively chlorite veined and silicified in part of section.

Mineralogy:

Primary:

Augite (to actinolite)	38	(1) Veins: Chlorite 30, iron oxides 70
Plagioclase	55	(2) Veins: Quartz 100
K Feldspar	2	(3) Veins: KF
Ilmenite	5	

Texture:

Remarkably clear in places though brecciated and augite is altered to actinolite. Broad plates (~ 0.5 mm) of diopsidic augite (pleochroism dark green, pale green, brown) are clear and contain clear elongate prismatic plagioclase. Generally section is divided up into small segments of dolerite by iron oxide stained networks of chlorite veins along which a narrow pegmatitic quartz has moved (along contraction fissures?). Along a breccia zone (see 141.30 m.) of fine pyroxene fragments and some plagioclase. The iron oxide : chlorite penetration is almost complete, and produces a broad branching network of alteration veinlets, which however, never penetrate the clear, fresh dolerite segments except where intensely brecciated. At one end of section all minerals are extensively silicified by a quartz vein entering chloritised breccia crush zone. Dolerite textures are preserved.

Alteration: Localised in breccia zones.

plagiocase) chlorite + iron oxides
diopsidic augite)

Quartz veins + broad fine chertified zones.

Metamorphism:

Moderate brecciation.

.../

MPS 1302 149.50

Field notes: Rock type.

Petrographic description: Serpentinised peridotite (or dunite). Not possible to indicate type (Harzburgite, etc.).

Mineralogy:

Antigorite	30	Vein Quartz
Iddingsite	40	
Serpophite	25	
Magnetite	2	
Chlorite	3	

Texture:

Iddingsite of red brown colour, pleochroic, has a fibrous lamellar appearance, appears as aggregates in mosaics, pseudomorphing olivine grains (to maximum 0.6 x 0.3 mm). The mineral pseudomorphs the grains completely or in association with blotchy fine serpophite or with fine interconnecting veins of the latter. The olivine shapes occur fairly densely together in unoriented groups. In places where antigorite is abundant the 'interstices' between olivine grains are in fact grains of olivine pseudomorphed by antigorite and with islands of iddingsite as if antigorite replaced iddingsite? Chlorite is present as veinlets within and between olivine grains.

Quartz is of coarse pegmatitic appearance in veins and is rarely clear of inclusions containing abundant iddingsite and/or antigorite. Brecciation of olivine grains is apparent in all matrix zones. Coarse magnetite has become brecciated and altered to leucoxene and limonitic oxides.

Alteration: Serpentinisation, local chloritisation and silicification.

Metamorphism: Brecciation.

.../

MPS 1303 159.50 m.

Field notes: Rock type?

Petrographic description: Dolerite, medium grained.

Mineralogy:

			Veins	
Diopsidic augite	30	(i)	KF	30
Diopsidic augite (to tremolite)	5		Carbonate	70
Plagioclase (argillised) (sericitised)	48	(ii)	Chlorite	70
Chlorite	15		Kaolinite	30
Magnetite	2			

Texture:

This is the most brecciated of the dolerites in this drill-hole, but is of similar original texture as large plates (to 1 mm) of twinned euhedral diopsidic augite with ophitic plagioclase (~ 0.8 x 0.2 mm), which has become argillised and obscured by limonite inclusions. Apart from fine fractures roughly parallel to cleavage containing fine iron oxide inclusions the pyroxene is clear. However, in places parts of pyroxene are altered to acicular tremolite / actinolite. Plagioclase is less easily identifiable but shows blotchy argillic alteration, chlorite patches and sericite/illite (low B.R.) and sericite alone. Plagioclase as larger grains (outside pyroxene grain walls) is most commonly sericitised.

Veins of K feldspar fill fractures but impart nothing to rock groundmass. Veins of chlorite > kaolinite alter mineral composition.

Alteration:

Plagioclase - argillised, albitised.
Augite - amphibolitised locally.

Metamorphism:

Mild brecciation.

.../

MPS 1304 165.70 m.

Field notes: Serpentinite or serpentinised sediment. Check rock type, etc.

Petrographic description:

Serpentinised peridotite possibly a medium grained wehrlite, brecciated, sheared.

Mineralogy:

Iddingsite	35
Talc	39
Antigorite	2
Chrysotile	15
Perovskite	2 ?
Chromite	3
Potash Feldspar	1
Carbonate	3

Texture:

The original medium grain shapes of olivine (now talc or iddingsite) are clearly seen and grains are commonly aggregated and show some brecciation. Most shear zones contain talc (after olivine) and interstices are filled by chrysotile as low B.R. fine fibrous aggregates. Carbonate is deposited in the groundmass near shear fractures containing chrysotile. Perfect octahedra and sheared chromite grains are present in non shear and shear zones. Many grains altered to talc appear to have the shapes of augite as seen in 159.50 m.

Alteration:

Olivine) → iddingsite → talc
Augite) chrysotile
shear

APPENDIX

PROJECT 602.

DIAMOND DRILL HOLE CG1

	SAMPLE Nº	(DEPTH)	DESCRIPTION.
81	CG1	- 24.5m	rock type?
82	"	37.8 - 37.87	lump tuff?
83		46.5 - 46.56	green grey fairly [illegible] spare Tuff or greywacke
84	"	55.70	rock type? contact?
85	"	58	rock type?
86	"	64.2	rock type?
87	"	70.20	banded greywacke & shale?
88	"	71.50	rock type? sulphides?
89	"	79.50	rock type?
90	"	93.65	contacts? rock types?
91	"	94.05	rock types?
92	"	99.60	rock types?
93	"	103	Describe rock types & contact
94	"	103.3	Contact f.g. dolerite / sediment?
95	"	107	Banded m.g. SST / greywacke ̄c f.g. shaly bands.
96	"	118.40	Banded black shale / f.g. greywacke.
97	"	130.60	Banded sediments?
98	"	132.10	" " ?
99	"	137	rock type?
1300	"	141.30	Volc or intrusive or g/wacke?
01	"	146.15	rock type?
02	"	149.50	" " ?
03	"	159.50	" " ?
04	"	165.70	Serpentinite or serpentinised sediment - check rock type etc.

R.E. WILLIAMS

APPENDIX III

DDH CG2 - DRILL LOG AND ASSAYS

AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: L105 Client: C.S.R. LIMITED, Address: G.P.O. BOX 483, SYDNEY. N.S.W.

Area Contact: MR. P. MACNAMARA. Address: P.O. BOX 196, ZEEHAN. TAS. 7469.

Date Received 13/11/80
Date Completed 24/12/80

Order No.: 10135,36 PROSP.602 Sample Type: DDH CORE-CHP&SPL No. of Samples: 88

SAMPLE NO.	Cu	Pb	Zn	Ag	Bi	Co	Cr	Ni	Au	Sn
	m	m	m	m	m	m	m	m	b	m
	1	1	1	1	1	1	1	1	120-A	XRF 1A
CG2-602-001	75	240	440	2	45	25	35	85	45	<5
CG2-602-002	90	130	0.10 %	3	45	45	35	120	15	<5
CG2-602-003	60	90	540	2	35	30	20	90	15	<5
CG2-602-004	80	55	310	2	40	55	20	110	10	<5
CG2-602-005	70	60	440	2	50	60	25	130	10	<5
CG2-602-006	100	320	400	2	40	50	30	95	20	<5
CG2-602-007	70	360	300	2	45	50	30	105	15	5
CG2-602-008	70	70	330	2	50	60	30	115	10	<5
CG2-602-009	60	110	340	2	35	45	15	70	15	15
CG2-602-010	70	60	300	3	30	35	25	75	5	<5
CG2-602-011	75	40	300	5	35	40	75	110	5	<5
CG2-602-012	70	35	260	1	20	40	90	115	3	5
CG2-602-013	60	40	240	2	25	45	110	105	3	5
CG2-602-014	60	125	230	2	50	50	55	115	10	<5
CG2-602-015	65	40	185	2	40	55	55	115	10	5
CG2-602-016	125	40	170	2	40	50	80	115	5	<5
CG2-602-017	50	130	370	1	30	40	25	95	10	<5
CG2-602-018	290	70	110	1	45	30	30	100	5	15
CG2-602-019	520	>1.0 %	>1.0 %	>25	70	55	35	50	55	115
CG2-602-020	30	420	0.12 %	3	60	50	90	110	20	45
CG2-602-021	75	310	0.16 %	2	50	55	60	135	5	10
CG2-602-022	85	55	105	2	50	55	65	110	5	<5
CG2-602-023	60	80	190	2	50	55	95	120	3	<5
CG2-602-024	60	45	110	2	45	55	90	125	20	<5
CG2-602-025	75	50	115	2	50	55	65	110	3	<5
CG2-602-026	30	290	0.50 %	3	50	45	65	85	<3	60
CG2-602-027	75	160	320	2	50	55	50	110	10	5
CG2-602-028	90	60	110	2	55	55	35	115	3	<5
CG2-602-029	75	40	130	2	55	55	65	110	3	<5
CG2-602-030	65	40	110	2	50	55	55	105	3	5

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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44 Balaclava Street
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TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: L105 Client: C.S.R. LIMITED, Area Contact: MR. P. MACNAMARA.
Address: G.P.O. BOX 483, Address: P.O. BOX 196,
Date Received 13/11/80 SYDNEY, ZEEHAN. TAS. 7469.
Date Completed 24/12/80 N.S.W.

Order No.: 10135,36 PROSP.602 Sample Type: DDH CORE-CHP&SPL No. of Samples: 88

SAMPLE NO.	Cu	Pb	Zn	Ag	Bi	Co	Cr	Ni	Au	Sn
	m	m	m	m	m	m	m	m	b	m
	1	1	1	1	1	1	1	1	120-A	XRF 1A
CG2-602-031	85	160	490	3	55	60	55	120	<3	5
CG2-602-032	60	110	310	2	40	40	55	70	5	5
CG2-602-033	55	50	100	2	40	40	15	75	<3	<5
CG2-602-034	70	95	200	2	40	40	25	70	3	5
CG2-602-035	100	500	0.20 %	3	55	50	20	75	<3	<5
CG2-602-036	55	50	100	2	50	50	30	90	<3	5
CG2-602-037	115	50	110	2	40	45	40	75	<3	10
CG2-602-038	55	45	110	2	45	40	30	85	3	5
CG2-602-039	40	40	80	2	40	45	30	125	5	<5
CG2-602-040	40	190	0.13 %	3	40	35	55	75	5	10
CG2-602-041	60	100	190	2	35	40	20	75	5	5
CG2-602-042	50	55	180	2	40	40	25	75	10	<5
CG2-602-043	40	40	110	2	40	40	40	120	3	<5
CG2-602-044	55	170	470	3	50	50	30	80	5	10
CG2-602-045	60	60	180	2	40	40	25	80	3	5
CG2-602-046	55	150	230	3	45	40	20	70	<3	5
CG2-602-047	70	80	185	2	50	40	25	90	3	<5
CG2-602-048	65	50	160	2	40	45	25	80	3	<5
CG2-602-049	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
CG2-602-050	115	45	120	2	45	55	30	80	<3	5
CG2-602-051	115	45	120	2	40	45	40	95	3	<5
CG2-602-052	55	70	145	2	45	40	40	95	<3	5
CG2-602-053	65	60	80	2	40	40	25	70	3	25
CG2-602-054	20	30	120	2	30	35	25	80	<3	<5
CG2-602-055	15	40	120	1	45	40	25	75	10	<5
CG2-602-056	40	40	115	2	45	45	30	95	5	<5
CG2-602-057	15	40	110	2	40	40	25	75	5	5
CG2-602-058	140	40	125	2	35	40	30	90	5	<5
CG2-602-059	35	40	75	2	40	50	30	70	15	140
CG2-602-060	350	45	130	2	40	50	30	85	5	40

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: L105 Client: C.S.R. LIMITED, Area Contact: MR. P. MACNAMARA.
Address: G.P.O. BOX 483, Address: P.O. BOX 196,
Date Received 13/11/80 SYDNEY, ZEEHAN. TAS. 7469.
Date Completed 24/12/80 N.S.W.

Order No.: 10135,36 PROSP.602 Sample Type: DDH CORE-CHP&SPL No. of Samples: 88

SAMPLE NO.	Cu	Pb	Zn	Ag	Bi	Co	Cr	Ni	Au	Sn
	m	m	m	m	m	m	m	m	b	m
	1	1	1	1	1	1	1	1	120-A	XRF 1A
CG2-602-061	20	45	100	1	40	40	25	80	5	5
CG2-602-062	35	45	125	2	50	50	30	95	10	15
CG2-602-063	95	50	180	2	50	45	25	90	5	10
CG2-602-064	60	60	120	2	40	45	25	95	5	<5
CG2-602-065	65	45	120	2	40	50	30	95	3	<5
CG2-602-066	90	70	250	2	50	45	25	80	5	<5
CG2-602-067	55	50	120	2	45	40	40	90	3	5
CG2-602-068	90	70	175	2	45	55	25	80	<3	<5
CG2-602-069	85	55	155	2	55	50	35	105	20	5
CG2-602-070	60	40	130	2	55	50	30	100	15	5
CG2-602-071	50	125	390	2	55	50	40	115	10	5
CG2-602-072	115	45	140	2	50	55	45	115	5	<5
CG2-602-073	15	40	120	2	40	50	35	100	3	5
CG2-602-074	175	130	230	3	60	85	290	360	<3	<5
CG2-602-075	15	40	110	2	40	45	25	75	10	5
CG2-602-076	95	45	145	2	40	50	40	105	5	<5
CG2-602-077	65	50	120	2	40	50	45	105	5	10
CG2-602-078	30	45	120	2	40	50	40	100	5	<5
CG2-602-079	30	50	130	2	45	50	30	105	<3	5
CG2-602-080	105	80	340	2	60	65	50	155	3	20
CG2-602-081	85	65	145	2	55	65	50	135	5	<5
CG2-602-082	100	70	270	3	45	55	60	140	3	5
CG2-602-083	75	50	160	2	50	50	80	120	3	<5
CG2-602-084	160	80	200	2	60	100	530	640	3	<5
CG2-602-085	20	40	110	2	45	50	95	110	3	<5
CG2-602-086	175	135	130	3	65	100	400	480	5	<5
CG2-602-087	75	15	125	2	35	50	30	95	3	5
CG2-602-088	60	55	110	2	50	50	50	100	3	<5

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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44 Balaclava Street
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TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: L10SR
Client: C.S.R. LIMITED,
Address: G.P.O. BOX 483,
SYDNEY,
N.S.W.

Area Contact:
Address:

Date Received 24/12/80
Date Completed 24/12/80

Order No.: 10135,6 PROSP.602
Sample Type: DDH CORE-CHP&SPL
No. of Samples: 1

SAMPLE NO.	Pb % 101-B	Zn % 101-B	Ag m 101-B
CG2-602-019	4.76	5.40	129

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

10688

CSR LIMITED — DETAILED DRILL LOG

AREA: 0 | PROJECT NUMBER: 603 | DATE STARTED: 30/9/80 | CO-ORDINATES N/S: 7782800 | COLLAR R.L.: | AREA OF INFLUENCE: | HOLE NUMBER: CG2

STATE: TAS | LOCATION: | INCLINATION: -16.5° | DATE COMPLETED: 6/10/80 | E/W: 7076000 | DEPTH: 440.0 | DRILL TYPE: RC | HOLE SIZE & ASSAY TYPE: HQ TO 5.8 m; NQ TO 98.9; BQ TO 440.0

AZIMUTH GRID: 290.5 | CONTRACTOR: ADD. | DRILLER: R. FRIMLEY. | A.M.G. 5367800N 367090E | LOGGED BY: R.E. Williams | DATE OF LOGGING: SEPT/OCT 1980

PAGE 1 OF

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE 1:	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL m	SAMPLE NUMBER CG2-602-	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Ba	Ag	Au
1.5	2.5	0–32.0 m INTERBEDDED GREY SHALES & GREY GREEN SANDSTONES																
		0–0.3m Clay Soil					0:0.0	6:5	6:5.0	0.01	C	<5	75	440	240	45	2	145
1.5	5.0	0.3–14.8m Dominantly khaki → brown clay rich oxidised sandstones with minor narrow shale bands. Most of core is badly broken																
0.3	5.8	No sulphides																
		Bedding < 5° variable - slumped shales in massive sets					6:5	12:0.0	5:5.0	0.02	C	<5	90	0.1%	180	45	3	15
1.2	7.8	14.8m Base of major weathering: more pg at 14.8m																
1.8	10.8	14.8m – 32.0m Dominantly grey khaki shales (90%) with interbedded grey and khaki green - grey sst units					12:0.0	14:8.0	2:8.0	0.03	C	<5	60	540	90	35	2	15
3.0	13.8	Shales well banded < 5° to																
		Cleavage // bedding																
3.0	16.8	Grading and plane structures give up hole facing					14:8.0	21:3.0	6:5.0	0.04	C	<5	50	310	55	40	2	10
1.7	19.8	Pyrite mineralisation is minor (< 3%); predominantly on joint and fracture surfaces.																
2.6	22.8	No significant veining																
1.6	25.8																	
2.5	28.8						21:3.0	27:0.0	5:7.0	0.05	C	<5	70	440	60	50	2	10
2.3	31.8	32.0 – 44.0m BRECCIATED SHALES & SANDSTONES																
3.0	34.8	Variable mixture of grey sst's, in part massive, in part brecciated: brecciated section in shale matrix					27:0.0	32:0.0	5:0.0	0.06	C	<5	100	400	320	40	2	20
3.0	37.8																	
1.65	39.45	No significant veining or sulphide mineralisation																
							32:0.0	38:0.0	6:0.0	0.07	C	5	70	300	360	45	2	15
1.55	40.8																	
1.85	42.8																	
1.60	46.45																	
							38:0.0	44:0.0	6:0.0	0.08	C	<5	70	330	70	50	2	10
1.35	46.8																	

880079

CSR LIMITED DETAILED DRILL LOG

CSR

AREA: D | PROJECT NUMBER | STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID

DATE STARTED | DATE COMPLETED | CONTRACTOR | DRILLER

AMG CO-ORDINATES N/S 5367800 E/W 367090

COLLAR R.L. | DEPTH | AREA OF INFLUENCE | DRILL TYPE

HOLE NUMBER 2.

PAGE ____ OF ____ | HOLE SIZE ____ TO ____ | & ____ TO ____ | ASSAY TYPE ____ TO ____

LOGGED BY R.E. Williams. | DATE OF LOGGING

C = Chip

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE 1:	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER 663-602-	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Ag	Au
1.10	49.15	44.0 – 59.5 m DOMINANTLY INTERBEDDED GREY (70%)					44:0.0	5.0:0.0	6.0.0	0.9	C	15	60	340	110	35	2	15
		SHALES & SANDSTONES (25%)																
1.50	49.80																	
		Mnr black shale bands (5%)																
1.20	51.70	Bedding // cleavage < 70°																
		SSts massive & fmg																
1.20	52.80	Mnr black shale bands are weakly pyritic (< 3%)					5.0:0.0	5.5:0.0		1.0	C	45	70	300	60	30	3	5
2.50	55.80	Grey shales well banded, facings are ↓ shale																
0.60	56.60	Mnr grey shale bands in SSt units																
0.60	57.50	No significant veining or infillides																
1.40	58.80	@ 57.5 m mnr (10 cm²) bubble of qtz-cb vein					5.5:0.0	5.9:5.0		1.1	C	45	75	300	110	35	5	5
2.10	60.90	59.5 – 67.9 m MASSIVE FG-FMG GREY SANDSTONE WITH MNR																
0.90	61.80	GREY SHALE BANDS																
2.50	63.95	No significant veining or infillides																
0.85	64.8	67.9 – 78.6 m. DOMINANTLY GREY TO BLACK SILICEOUS					5.9:5.0	6.9:0.0		1.2	C	5	70	260	35	20	1	3
1.50	65.9	SHALES (60%) WITH INTERBEDDED FMG.																
1.90	67.8	GREY SSTS (40%)																
3.0	70.8																	
3.0	73.8	Shales massive with faintly cleavage (~70° CA) only																
2.35	76.15	in black clay rich bands					6.9:0.0	6.7:8.0		1.3	C	5	60	240	40	25	3	3
0.65	76.8																	
3.0	79.8	Weak (~1mm) qtz-cb veining except at																
		75.20 m – 2 x 10 mm cb veins					6.7:8.0	7.4:5.0		1.4	C	45	60	230	125	50	2	10
3.0	82.8	Veining < 5° variable																
		Banding (// cleavage) < 55-60°																
2.4	85.2																	
0.6	85.8	78.6 – 83.60 m MASSIVE FMG GREY SANDSTONE, MNR GREY					7.4:5.0	7.8:6.0		1.5	C	5	65	185	40	40	2	10
		SHALE BANDS																
1.4	87.2	Bedding variable < 45-60°																
		Grading ⇒ ↓ shale facing					7.8:6.0	8.3:6.0		1.6	C	45	125	170	40	40	2	5
1.6	88.8	No infillides																
		V. rare qtz-cb veining																
							8.3:6.0	8.7:9.4		1.7	C	45	50	370	130	30	1	10
		83.60 – 88.94 m INTERBEDDED GREY SHALES (60%) & GREY																
		SANDSTONES (40%)																
		Grading ⇒ ↓ shale facing																
		Cleavage (weak) // bedding < 45° - 60°					8.7:9.4	8.8:9.4		1.8	S	15	290	110	70	45	1	5
		Weak qtz-cb veining																
		Nil infillides																

880880

CSR LIMITED DETAILED DRILL LOG

AREA 0 | PROJECT NUMBER | DATE STARTED | DATE COMPLETED | CONTRACTOR | DRILLER | CO-ORDINATES N/S | E/W | COLLAR R.L. | DEPTH | AREA OF INFLUENCE | DRILL TYPE F30 | HOLE NUMBER CG2 | LOGGED BY R.E.N. | DATE OF LOGGING SEPT/OCT 1990 | STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID | HOLE SIZE | & ASSAY TYPE | PAGE ___ OF ___

3.

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER CG2-602-	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Ag	Au
3.0	91.8	88.94 - 89.80m QTZ-CB-SULPHIDE COMPOSITE VEIN																
		WITH INCLUDED FRAGMENTS OF GREY					88;94	89;80		1,9	S	115	520	5.4%	4.76%	70	124	55
		SST - HOST ROCK					89;80	90;80		2,0	S	45	30	9.42%	420	60	3	20
3.0	94.8	Veining mainly cb(siderite), banding ∠ 70-85°					90;80	97;00		2,1	C	10	75	0.16%	310	50	2	5
		Hw contact ∠ ~80°, Lwr ~ ∠ 80°																
		Sulphides as disrem aggregates; massive veins to																
3.0	97.8	10mm and as jointed veining																
		Estimated 10% gn, 5% sp																
1.1	98.9	NC/SA					97;00	103;50		22	C	45	85	105	55	50	2	5
		88.90 - 119.50m INTERBEDDED GREY SSTS (70%) AND																
2.1	101.0	LAMINATED GREY SHALES (30%)																
		Bedding ∠ 50-70°																
		Nil sulphides except with minor qtz-cb veins																
3.0	104.0						103;50	110;00		23	C	45	60	1910	80	50	2	3
		2ry - cb & cb veining weak and irregular (50%)																
		or // bedding planes (50%); only minor																
3.0	107.0	sulphides except																
		@ 90.30 3 cms composite banded qtz-cb vein																
		∠ 45°; minr (5%) sp-gn.																
3.0	110.0	@ 93.0 4 cms vein as above except ∠ 70°					110;00	115;00		24	C	45	60	110	45	45	2	20
		@ 93.8 5 cms vein as above ∠ 60° - appears to																
		be first stage tension gash filling with																
3.0	113.0	2nd stage of cb sulphides open space																
		veining					115;00	119;50		25	C	45	75	115	50	50	2	3
		@ 95.0 5 cms wide qtz-cb vein in massive																
3.0	116.0	SSTs; contact ∠ 70°, no sulphides																
		@ 103.50 irregular qtz-cb vein over 5-10 cms.																
							119;50	125;00		26	C	60	30	0.5%	290	50	3	<3
3.0	119.0	Grading & flame structures give uphole facing																
		119.50 - 125.0m FG. GREY-CREAM SANDSTONE WITH																
3.0	122.0	MINOR INTERBEDDED GREY-BLACK SHALE																
		Unit is brecciated with cream coloured cb																
2.35	124.35	veining ranging from massive cb over 15 cms																
0.40	125.0	wide to brecciated zones healed with cb																
		veining to stronger veining of cb.																
		Most veining is irregular																
		Nil sulphides except 15 cms cb vein at 120.50m has																
		blotchy aggregates sp-gn (< 10% over 15 cms)																

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CSR LIMITED DETAILED DRILL LOG CSR

AREA 0 | PROJECT NUMBER | DATE STARTED | CO-ORDINATES N/S | COLLAR R.L. | AREA OF INFLUENCE | HOLE NUMBER 4.

STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID | DATE COMPLETED | CONTRACTOR | DRILLER | E/W | DEPTH | DRILL TYPE | LOGGED BY | DATE OF LOGGING | HOLE SIZE | & | ASSAY TYPE | PAGE ___ OF ___ | TO | TO | TO

100% CORE RECOVERY & ALL 3 METRE RUNS.

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER CG2-602-	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Ag	Au
		125.0 m – 132.0 INTERBEDDED CREAM SST (40%) AND GREY BLACK SHALES (60%)					125.00	132.00		27	C	5	75	320	160	50	2	10
		Shale units irregular with disrupted contacts – appears to be soft rock deformation																
		Grading and flame structures give offhole facing																
		No significant sulphides																
		2½-cb veining weak except																
		@ 127.0 15 cms of brecciated rock healed with veining																
		@ 131.40 – 132.0 2-10 mm wide irregular cb vein running along core axis																
		132.0 – 139.20 MASSIVE OLIVE GREY FMG SANDSTONE (85%) WITH INTERBEDDED GREY BLACK SHALE (15%)					132.00	139.20		29	C	<5	90	110	60	55	2	3
		Shale also as infillings in brecciated sections of SSTs. Shale units disrupted – soft rock deform's																
		Nil sulphides																
		Weak to nil qtz-cb veining except @ 133.90 – 5 cms qtz-cb vein.																
		139.20 – 150.30 INTERBEDDED OLIVE GREY SANDSTONE (50%) WITH GREY BLACK SHALES (50%)					139.20	145.00		29	C	<5	75	130	40	55	2	3
		Narrower shale units are deformed (soft rock)																
		Grading ⇒ offhole facing																
		Weak qtz-cb veining (irregular) except 145.50 – 10 cms qtz-cb veining with included host rock.																
		Nil sulphides																
							145.00	150.30		30	C	<5	65	110	40	50	2	3
							150.30	155.00		31	C	5	85	490	160	55	3	<3
							155.00	160.00		32	C	5	60	310	110	40	2	5
		150.30 – 176.0 m DOMINANTLY INTERBEDDED GREY & BLACK SHALES (85%) AND GREY SANDSTONES (15%)					160.00	165.00		33	C	<5	55	100	50	40	2	<3
		Grading & flame structures ⇒ offhole facing																
		SST units are brecciated and healed with shale					165.00	170.00		34	C	5	70	200	95	40	2	3
		Considerable deformation of bedding in some shale sections																
		More regular sections ⇒ bedding ∠ 55-70°																
		Sulphides – 3% py overall – in black shale units – in well bedded sections the py forms aggregated bands on bedding planes (max 2 mm – in deformed bedding sections the py forms aggregates to 4 mm dia					170.00	176.00		35	C	<5	100	0.2%	500	55	3	<3
		2½-cb veining irregular & variable – weak with patches of moderate veining (170.6 – 173.50)																
		Cleavage // to bedding																

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CSR LIMITED DETAILED DRILL LOG

CSR

AREA | PROJECT NUMBER | DATE STARTED | CO-ORDINATES N/S | COLLAR R.L. | AREA OF INFLUENCE | HOLE NUMBER 5.

STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID | DATE COMPLETED | CONTRACTOR | DRILLER | E/W | DEPTH | DRILL TYPE | LOGGED BY | DATE OF LOGGING | PAGE ___ OF ___ | HOLE SIZE ___ TO ___ | & ___ TO ___ | ASSAY TYPE ___ TO ___

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER CG2-602-	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Ag	Au
100% CORE RECOVERY - 8 ALL 3m RUNS		176.0 – 193.80m INTERBEDDED GREY SANDSTONES (50%) AND GREY (MNR BLACK) SHALES (50%) Shale units are narrow and disrupted. Bedding < variable < 50°-85° Cleavage // bedding Nil sulphides qtz-cb veining 176.0 – 182.m moderate, narrow (< 3mm) irregular veining with some 10mm regular veining at < from 40-70° 182 – 193.80m nil to weak veining Facing is uphole					176.0	182.50		36	c	5	55	100	50	50	2	<3
							182.50	188.00		37	c	10	115	110	50	40	2	<3
		193.80 – 197.20m MASSIVE GREY GREEN FG. SANDSTONE (95%) WITH MNR GREY SHALE INTERBEDS (5%) Nil sulphides Weak irregular narrow qtz-cb veins					188.00	193.80		38	c	5	55	110	45	45	2	3
							193.80	197.20		39	c	<5	40	80	40	40	2	5
		197.20 – 200.0 m MASSIVE FG. CREAM BUFF COLOURED SANDSTONE (90%) MNR (10%) NARROW DK. GREY TO CREAM SHALE INTERBEDS. Bedding < 80-50° Cleavage // bedding Moderate cb veining with mnr sulphides					197.20	200.00		40	c	10	40	0.13%	190	40	3	5
							200.00	200.50		41	c	5	60	190	100	35	2	5
		200.0 – 212.20 m INTERBEDDED SHALES & SANDSTONES Rapid alternation of shales & sst's with disrupted bedding Sst's fg. - cream to grey; Shales cream - grey - black Cb veining weak to moderate Weak veins (1-2mm) // to bedding in shaley sections Composite (often discrete) qtz-cb veins with < 30° @ 205.0m (10mm wide) 211.0m (15mm ") 201.0m 15mm massive qtz-cb vein with mnr (5%) dk fg sulphide (sphalerite) Sulphides - mnr aggregates (< 1%) py in black shale					200.50	206.50		42	c	<5	50	180	55	40	2	10
							206.50	212.20		43	c	<5	40	110	40	40	2	3
		212.20 – 217.0 m DOMINANTLY MASSIVE FG-FMG GREY-GREEN SANDSTONE (90%) WITH INTERBEDDED GREY SHALE (10%) Weak irregular qtz-cb veining in sst units (not in shales)																

CSR LIMITED — DETAILED DRILL LOG

AREA D | PROJECT NUMBER | DATE STARTED | CO-ORDINATES N/S | COLLAR R.L. | AREA OF INFLUENCE | HOLE NUMBER 6.

STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID | DATE COMPLETED | CONTRACTOR | DRILLER | E/W | DEPTH | DRILL TYPE | LOGGED BY | DATE OF LOGGING | HOLE SIZE | & | ASSAY TYPE | PAGE ___ OF ___ | TO | TO | TO

100% CORE RECOVERY — ALL 3 METRE RUNS

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE 1:	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER CG2-602-	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Ag	Au
		217.0 – 228.0 INTERBEDDED CREAM TO GREY SANDSTONES & GREY TO BLACK SHALES					217:00	223:00		44	c	10	55	470	170	50	3	5
		Rapid variation of bedding																
		Weak, in part moderate, irregular cb, qtz-cb veining																
		At 220.0m – 10cms section of semi-massive cb with inclusions of angular fragments of host rock = leached brecciated zone?					223:00	228:00		45	c	5	60	180	60	40	2	3
		Minor py in black shale																
		Facings questionable																
		228.0 – 231.50 DOMINANTLY BLACK SHALE (85%) MNR GREY SHALE (15%)					228:00	231:50		46	c	5	55	230	150	45	3	<3
		Bedding disrupted; moderate qtz-cb veining, mainly fine (1-2mm) // to bedding or irregular; several massive veins to 15mm // to bedding					231:50	238:00		47	c	65	70	165	80	50	2	3
		Minor py (< 3%) Cleavage faintly // to bedding																
		231.50 – 245.20 INTERBEDDED GREY-GREEN SSTS AND BLACK & GREY SHALES.					238:00	245:20		48	c	45	65	160	50	40	2	3
		Bedding disrupted																
		Minor py (total << 1%) aggregates in black shale																
		Minor qtz-cb veining – bedding plane veins and some irregular veins																
							245:20	251:00		49	c							
		245.20 – 269.15m INTERBEDDED FG. SSTS, SILTSTONES AND SHALES, V. MNR BLACK SHALE UNITS																
		Dominantly pale grey green in colours; SST units are massive																
		Bedding < 50°-70° – some bedding badly disrupted.					251:00	257:50		50	c	5	115	120	45	45	2	<3
		2½-cb veining is weak overall – significant as below																
		@ 250m – several narrow (1cm max.) regular < 30° veins mnr py																
		252.70m 1cm vein @ < 30°					257:50	263:00		51	c	45	115	120	45	40	2	3
		254.60m 15mm vein @ < 30°																
		261.0m irregular vein 2cm @ < 30°-10°																
		262.70 – .90 irregular, narrow veining																
		266.70 – 267.10 irregular qtz-cb vein from 1mm to 20mm wide along core axis					263:00	269:15		52	c	5	55	145	70	45	2	<3
		268.0 1cm vein @ < 30°																
		Sulphides – mnr py in veining; mnr py in black shale bands – as aggregates on bedding planes																

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CSR LIMITED — DETAILED DRILL LOG CSR

AREA 0 | PROJECT NUMBER | DATE STARTED | CO-ORDINATES N/S | COLLAR R.L. | AREA OF INFLUENCE | HOLE NUMBER 7.

STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID | DATE COMPLETED | CONTRACTOR | DRILLER | E/W | DEPTH | DRILL TYPE | LOGGED BY | DATE OF LOGGING

PAGE ___ OF ___ | HOLE SIZE ___ TO ___ | & ___ TO ___ | ASSAY TYPE ___ TO ___

100% Core Recovery - All 3 metre runs!

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE 1:	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER (62-602-)	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Ag	Au
		269.15 – 270.40 MASSIVE PLE CREAM-GREEN FMG SST-SILTSTONE WITH Cb MATRIX. MNR BRECCIATED BLACK & GREY SHALE INCLUSIONS. Bedding $\angle^s$ 60-90° Blotchy, irregular qtz-cb veining No significant sulphides.					269:15	274:50		0513	c	25	65	80	60	40	2	3
		270.40 – 274.50 INTERBEDDED GREY TO GREY-GREEN MASSIVE SILTSTONE/SST AND GREY TO CREAM SHALES Shales less devolved bedding; some bedding $\angle$60° Irregular qtz-cb veining in brecciated zone					274:00	281:00		0514	c	45	20	120	30	30	2	<5
							281:00	287:50		0515	c	45	15	120	40	45	1	10
		271.0 – 271.30 mnr segregation of py in shales of above unit																
		274.50 – 329.80 DOMINANTLY INTERBEDDED RED SANDSTONE/SILTSTONE/SHALE POSSIBLY PARTLY WATERLAIN PYROCLASTICS Majority of siltstone is deep red brown in colour Finer grained unit (shales) often show deformed bedding (high energy environment?) Grading in coarse grained units quite well developed Cleavage // bedding in finer grained units bedding $\angle^s$ vary 80-60° Minor Units Greenish coloured sst/shale at 274.80 – 275.10 with minor irregular qtz cb veining 289.30 – 289.70 red & green sst/sh 303.60 – 303.80 ple greenish 318.10 – 326.90 ~~red grey fg sst~~ red grey fg sst greenish sst/shales.					287:50	291:00		0516	c	45	40	115	40	45	2	5
							291:00	300:00		0517	c	5	15	110	40	40	2	5
							300:50	307:00		0518	c	45	140	125	40	35	2	5
		326.10 – 326.90 red grey fg sst – magnetic unit					307:00	313:50		0519	c	140	35	75	40	40	2	15
		Qtz-Cb veining irregular & variable. (1) fine (< 2mm) regular @ <30° with variable intensity to mill to moderate (weak to mod) at 280 m (2) Massive (to 3 cms) irregular veins with no sulphides.					313:50	320:00		0520	c	40	350	130	45	40	2	5
		Sulphides Narrow bands of sp-gn-py associated with bleached zones at: 283.50 – 5 mm wide stronger zones @ 70° in bleached zones 15 cms wide. 287.50 – 1 cm wide sp-gn stringers @ <60° in 5 cms bleached & minable qtz-cb veined zones					320:00	325:00		0521	c	5	20	100	45	40	1	5
							325:00	328:80		0522	c	115	35	125	45	50	2	10

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CSR LIMITED DETAILED DRILL LOG

AREA Ø | PROJECT NUMBER | DATE STARTED | DATE COMPLETED | CONTRACTOR | DRILLER | CO-ORDINATES N/S | E/W | COLLAR R.L. | DEPTH | AREA OF INFLUENCE | DRILL TYPE | HOLE NUMBER 8 | LOGGED BY | DATE OF LOGGING | PAGE OF | HOLE SIZE TO & TO | ASSAY TYPE TO

STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE 1:	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER CG2-602-	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Ag	Au
100% CORE RECOVERY - ALL 3 METRE RUNS		274.50 - 328.80 CONT'D																
		316.30 Mm stringer (total < 1 cm) of sp-gn in 15 cm of bleached zone, weakly qtz-cb veined.																
		326.80 2% qtz-cb veining (aggregates < 1 cm) in bleached zone with vein of black mineral																
		329.00 diss py over 2cms width																
		MNR UNIT 309.50 - 313.90 Wider section of bleaching mainly to cream & pink with minor sections of ple green zones. Similar rock types to main zone at 313m																
		@ 313m - 5cm irregular cb veining with weak (< 5%) po																
		328.80 - 334.60m PLE GREY-GREEN INTERBEDDED SHALES SILTSTONES AND FG. SANDSTONES. Bedding < 5° variable 80-60° Rare, weak qtz-cb gash veining Mnr blotchy aggregates of py (< 1%) Bedding disrupted in shales					328:80	331:60		0631	c	10	95	180	50	50	2	5
		334.60 - 339.0m INTERBEDD GREY GREEN MASSIVE FG. SSTS AND GREY & BLACK SHALES Fewer grained rocks have disrupted bedding Bedding < 80-50° Weak qtz-cb veining, mixture of irregular & regular (45-30°) Minor aggregates py < 1%					334:60	339:00		0644	c	45	60	120	60	40	2	5
		339.0 - 346 DOMINANTLY MASSIVE GREY GREEN SST GRADING DOWN INTO INTERBEDDED GREY & GREY GREEN SHALES AND GREY GREEN SSTS. Grading gives uphole facing Bedding < 60-80° Weak qtz-cb veining Very minor py					339:00	346:00		0655	c	45	65	120	45	40	2	3
		346 - 364.60m INTERBEDDED GREY GREY GREENISH SHALES AND SSTS AND REGULARLY BANDED BLACK & GREY SHALES - appears to have 2 different sources of sediment material					346:00	352:00		0666	c	45	90	250	70	50	2	5
							352:00	358:00		0671	c	5	55	120	50	45	2	3
		CONT'D OVER PAGE																

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CSR LIMITE DETAILED DRILL LOG CSR

AREA 0 | PROJECT NUMBER | INCLINATION | AZIMUTH T/M/GRID | STATE | LOCATION

DATE STARTED | DATE COMPLETED | CONTRACTOR | DRILLER

CO-ORDINATES N/S | E/W | COLLAR R.L. | DEPTH | LOGGED BY | DATE OF LOGGING

AREA OF INFLUENCE | DRILL TYPE | HOLE NUMBER 9. | PAGE ___ OF ___ | HOLE SIZE ___ TO ___ | & ___ TO ___ | ASSAY TYPE ___ TO ___

100% CORE RECOVERY - ALL 3 METRE RUNS.

SUMMARY DESCRIPTION	START DEPTH	FINISH DEPTH	SAMPLE NUMBER CG2-602-	SAMPLE TYPE	Sn	Cu	Zn	Pb	Bi	Ag	Au
346 - 364.60m (CONT'D)											
Sulphides - patchy massive sulphides (py) on bedding planes in black shale units - where soft rock deformation has occurred, the py has formed blotchy aggregates	358.00	364.60	068	C	45	90	175	70	45	2	<3
- py ~ 2% in black shale units											
Soft rock deformation of black and grey shale units is characteristic and is different to that in the grey green shales											
Bedding ∠s ~70°											
Minor weak qtz-cb veining											
364.60 - 374.0 INTERBEDDED GREY GREEN MASSIVE SANDSTONES & SHALES	364.60	369.00	069	C	5	85	155	55	55	2	20
Bedding disrupted - ∠s vary from 45-70°											
In part the finer grained material has flowed.	369.00	374.00	070	C	5	60	130	40	55	2	15
Weak cb & qtz-cb veining											
Minor py with veining											
374.0 - 377.50 BRECCIATED & Cb VEINED P/E GREY-GREEN SHALES & GREYWACKES	374.00	377.50	071	C	5	50	390	125	55	2	10
Lower contact is gradational											
Qtz-cb veining (complex) - several phases of veining @ 374.15 6 cms wide, bleaching extends 10 cms each side.											
@ 367.70 25 cms wide complex vein with minor py. - bleaching extends above & below.											
& other minor narrow (<1cm) veining											
No significant sulphides.											
377.50 - 386.15m MASSIVE LITHIC SSTS & INTERBEDDED MUDSTONES.	377.50	382.00	072	C	<5	115	140	45	50	2	5
Some minor grit zones. (70% SSt, 30% Mudstones)											
Colour is distinctive - brick red brown.											
Bedding core ∠s 70-90°											
Weak to moderate qtz-cb veining variable core ∠s; thickness mainly < 2mm.	382.00	386.15	073	C	5	15	120	40	40	2	3
No significant sulphides.											

CSR LIMITED — DETAILED DRILL LOG CSR

AREA Ø | PROJECT NUMBER | DATE STARTED | CO-ORDINATES N/S | COLLAR R.L. | AREA OF INFLUENCE | HOLE NUMBER 10

STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID | DATE COMPLETED | CONTRACTOR | DRILLER | E/W | DEPTH | DRILL TYPE | LOGGED BY | DATE OF LOGGING | HOLE SIZE | & | ASSAY TYPE | PAGE OF | TO

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE 1:	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER CG2-602-	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Ag	Au
100% CORE RECOVERY TO 437.0 m - ALL 3 METRE RUNS		386.15 - 389.70 m DK BLUE GREEN FMG CARBONATE RICH ROCK - STRONGLY ALTERED GABBRO (REACTS STRONGLY WITH CONC HCl) Banded zones on offset and especially longer contacts 60-70° which is // to bedding Minor dissem. py Minor weak qtz-cb veining					388.15	388.70		0.71	S	45	175	230	130	60	3	55
		388.70 - 390.0 m INTERBEDDED RED & GREEN SEDIMENTS DOMINANTLY RED MUDSTONES & GREEN CHLORITIC SHALES Minor sg. dissem py at offset contacts 2% qtz-cb veining @ 389.30 - 12 mm vein @ <30° 389.45 - 15 mm vein @ <35°					388.70	390.00		0.72	C	5	15	110	40	40	2	10
		390.0 - 405.0 INTERBEDDED MASSIVE RED BROWN COLOURED LITHIC SANDSTONES AND MUDSTONES Grading gives offhole facing Bedding <90° - 70° Minor weak qtz-cb veining					390.00	390.50		0.73	C	<5	95	145	45	40	2	5
							390.50	400.00		0.74	C	10	65	120	50	40	2	5
							400.00	400.50		0.75	C	<5	30	120	45	40	2	5
		405 - 406.90 FG. PLE GREY-GREEN SHALES / SILTSTONES. Minor fg sst (dolomitic) Strong bleaching & pink colouration with qtz-cb veining @ 405.70; 406.80 Minor irregular qtz-cb veining with minor selvedges					405.00	406.90		0.76	C	5	30	130	50	45	2	<5
		406.90 - 412.20 STRONGLY CARBONATED FMG GABBRO (?) Offset contact gradational / 5 cms Lower contact gradational with included shale frags / 1m 2% qtz-cb veining irregular except @ 406.70 - 2 cms wide vein 408.40 ~ 2 cms wide vein with bleached zone Minor py.					406.90	409.20		0.77	S	20	105	340	80	60	2	3
							409.20	411.70		0.81	S	45	85	145	65	55	2	5
		412.20 - 440.0 INTERBEDDED GREY TO GREY GREEN SHALES AND SSTS Bedding varies from regular <70° to downhole Facings are offhole					411.70	417.20		0.82	C	5	100	270	70	45	3	3

80988

CSR LIMITED DETAILED DRILL LOG

AREA 0 | PROJECT NUMBER | DATE STARTED | CO-ORDINATES N/S | COLLAR R.L. | AREA OF INFLUENCE | HOLE NUMBER 11.

STATE | LOCATION | INCLINATION | AZIMUTH T/M/GRID | DATE COMPLETED | CONTRACTOR | DRILLER | E/W | DEPTH | DRILL TYPE | LOGGED BY | DATE OF LOGGING | HOLE SIZE | & | ASSAY TYPE | PAGE OF | TO | TO | TO

CORE LOST ON LAST RUN 537 - 540.0 ONLY 0.90 m RECOVERED
PRESUME LIFTERS HAD BROKEN & LET CORE DROP OUT OF BARREL.

% CORE RECOVERY	METRES	SUMMARY DESCRIPTION	VISUAL LOG	LOG SCALE 1:	ROCK TYPE	S.G.	START DEPTH	FINISH DEPTH	SAMPLE INTERVAL	SAMPLE NUMBER	TYPE	ACCEPTED ASSAY Sn	Cu	Zn	Pb	Bi	Hg	Mo
		412.20 - 440.0 (CONT'D)																
		Variable qty - cb veining - mostly irregular with minr sulphides					417:20	422:00		0833	C	55	75	160	50	50	2	3
		but 413.0 - 3cms wide vein					422:00	423:00		0845	S	55	160	290	80	60	2	3
		413.20 2 cms wide vein @ 30°					423:00	424:50		0855	C	45	20	110	40	45	2	3
		414.40 8cms wide composite vein					424:50	425:90		0866	S	45	175	180	135	65	3	5
		Sandy units have cb matrix					425:90	432:00		0877	C	5	75	125	65	35	2	3
		MNR UNITS IN 412.20 - 440.					432:00	437:00		0888	C	45	60	110	55	50	2	3
		422 - 423m Cb altered serpentinite fg - mg																
		424.50 - 425.90 Serpentinite fg - mg.																
		N.B. CORE AT BOTTOM OF HOLE NOT REC'D.																

Down hole surveys (casing to 99m)

0m	-46.5°	
125 m	43°	281°M
175	-38	282 M
225	-33	284 M
275	-29°	283 M
315	-27	in rods
360	-26	in rods

1-2

CSR LOG SHEET

Area ______ State ______ Prospect No. ______ 1:100,000 Sheet ______ Title ______ Hole No. CG 2.

SURVEY DATA

DEPTH	AZIMUTH	ANGLE	COMMENTS
0	277° MAG	-46.5	COMPASS & CLINOMETER
125m	281° MAG	-43°	EASTMAN SINGLE SHOT CAMERA.
175m	282.5° MAG	-37.75°	" "
225m	284° MAG	-33°	" "
275m	283° MAG	-29°	" "
315m	—	-27.5°	" " READING IN RODLINE, LANDING COLLAR REMOVED
360m	—	-26°	" " " " " "

DOWN HOLE CALCULATIONS.

FROM	TO	DISTANCE	ANGLE	GRID BEARING	VERTICAL ADVANCE	R.L.	HORIZONTAL ADVANCE	LATITUDE	DEPARTURE
0	62.5	62.5	-46.5°	290.5	-45.33	-45.33	43.02	+15.06	-40.29
62.5	150	87.5	-43°	294.5	-59.67	-105.00	63.99	+26.54	-58.23
150	200	50	-37.75°	296	-30.61	-135.61	39.53	+17.73	-35.53
200	250	50	-33	297.5	-27.23	-162.84	41.93	+19.36	-37.19
250	290	40	-29	296.5	-19.39	-182.23	34.98	+15.06	-31.30
290	337.5	47.5	-27.5	296.5*	-21.93	-204.16	42.13	+18.80	-37.70
337.5	380	42.5	-26	296.5*	-18.63	-222.79	38.20	+17.04	-34.18
380	440	60	-25*	296.5*	-25.38	-248.17	54.38	+24.26	-48.66

* = ASSUMED READINGS.

Reference ______

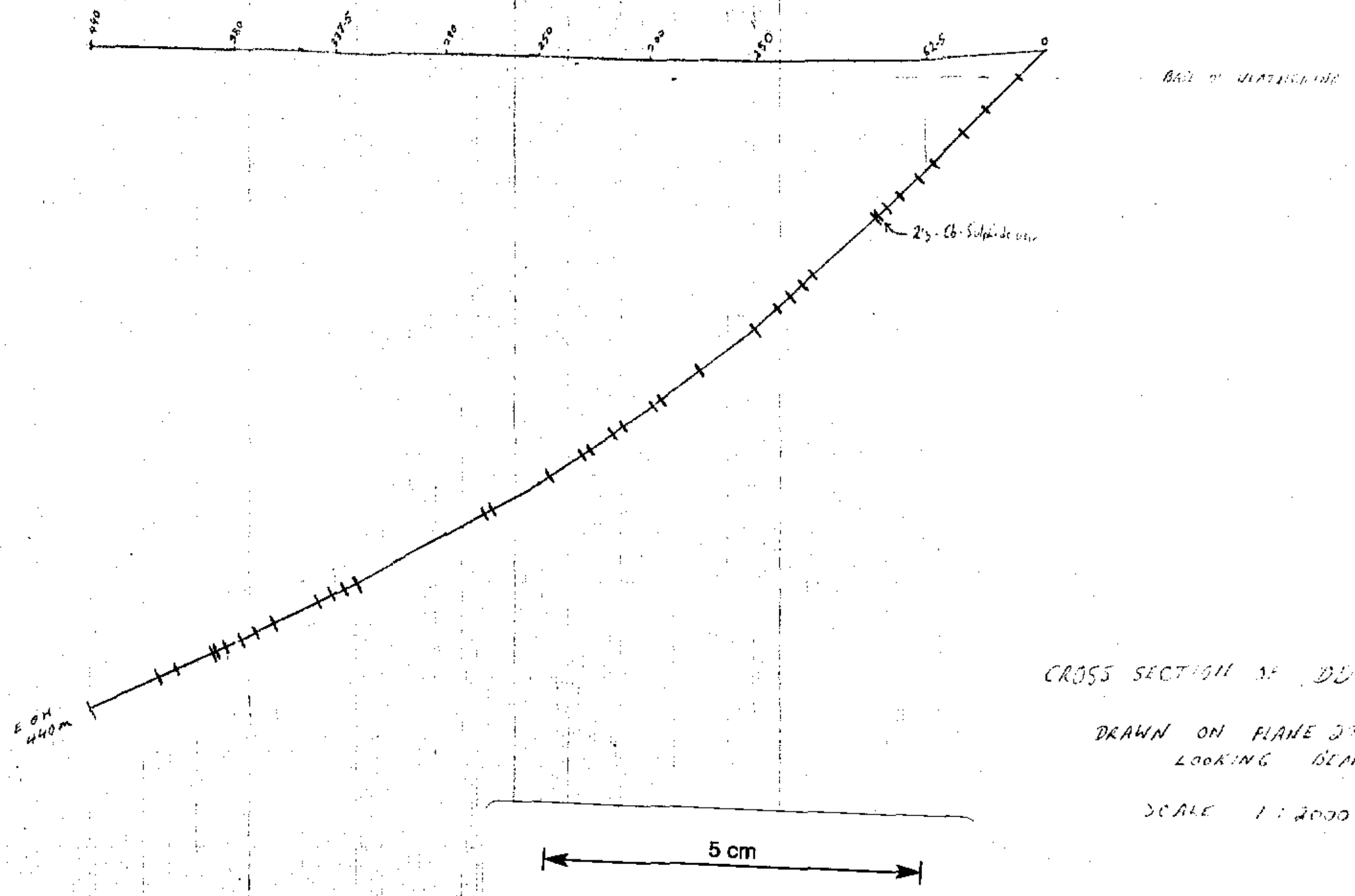
060688

2-2.

CSR

LOG SHEET

Area ______ State ______ Prospect No. ______ 1:100,000 Sheet ______ Title ______ Hole No. ______



CROSS SECTION OF DDH C56

DRAWN ON PLANE 295°
LOOKING BEARING 25°

SCALE 1 : 2000

160988

Reference ______

APPENDIX IV

DDH CG2 - PETROLOGY

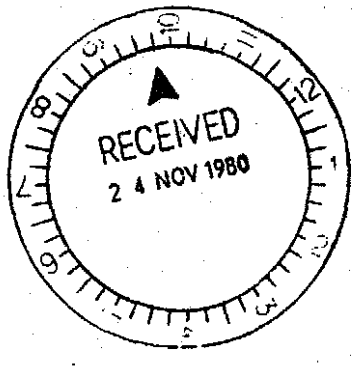
889093

Central Mineralogical Services

39 Beulah Road
Norwood, S.A. 5067
Telephone 42 5659

The Chief Geologist
C.S.R. Limited
G.P.O. Box 483
SYDNEY / N.S.W. 2001

19th November, 1980



REPORT CMS 80/10/18

YOUR REFERENCE:	Purchase Order No. 21819
DATE RECEIVED:	8th October, 1980
SAMPLE NOS.:	DDH-CG 2 - 16 samples
SUBMITTED BY:	R.E. Williams
WORK REQUESTED:	Petrology

H.W. Fander, M. Sc.

REPORT CMS 80/10/18

Notes:

Due to the generally similar to semi-monotonous nature of the bulk of this suite, brief petrological descriptions were prepared in tabulated form. These incorporate data from stereobinocular and petrological microscopic examination of thin-sections and related offcuts, together with comments on probable correlations.

The bulk of the suite comprises variously chloritised, carbonated and sericitised "tuffaceous" psammopelites. These rocks are of vaguely turbiditic character and are typically silty fine to medium sandstones with minor pelitic intercalations. Finer details are somewhat obscured by alteration, but the volcanic debris is of (basic to) intermediate character.

Colour varies from green (chloritic) to reddish and reflects variation in oxidation of clastic opaques. General features are fairly typical of the upper tuffaceous units of Crimson Creek Formation, specifically the Crimson Creek Argillites ("Dreadnought Hill Member"). This correlation tends to be confirmed by the thick nature of the sequence (> 400 m) and by an absence of intercalated carbonate horizons. Implicit here is the inclusion of the reddish, oxidised zones and minor carbonaceous pelitic horizons with the Crimson Creek Argillites, rather than the Red Rock and Renison Bell Members.

Thoroughly altered dolerites appear below circa 385 m. These rocks are of minor intrusive character on the basis of relict fabrics, but conceivably could represent the cores of relatively thick flows. This may be resolved from field evidence.

Alteration effects are pervasive, but of low "grade" and probably largely a reflection of diagenesis/incipient metamorphism. There are no tangible contact-metamorphic or metasomatic features.

D. Cowan, B. Sc.

Central Mineralogical Services

Sample No.	Classification - Composition	Fabric	Accessories	Comments
DDH-CG 2 267 m (T.S. 34107)	Volcanomict Greywacke. Framework (65-70 %), angular to subangular chloritic, sericitic micorcrystalline lava clasts, subordinate similarly altered feldspar, quartz. Matrix chlorite, subordinate sericite, patchy carbonate.	Massive to weakly bedded/ Incipiently graded, silty fine to medium sand. Weakly slumped, microfaulted.	Conspicuous clastic opaques (leucoxenised). Minor chloritised biotite, muscovite, chert fragments.	Volcanic components poorly resolved due alteration, but of basic-intermediate character, reworked rather than primarily pyroclastic. Minor chlorite-carbonate veining.
281 m	Tuffaceous Psammopelite. Clastic splintery to subangular sericite-carbonate-chlorite-stained feldspar, lava clasts, subordinate quartz. Pervasively hematite-stained pelitic matrix, interbeds.	Slumped, fractured/ carbonate-chlorite healed silty fine to medium sand, locally graded. Silty pelite interbeds.	Clastic opaques, minor chert, quartz-sericite pelite clasts, sparse muscovite flakes.	Clastic components closely analogous to 267 m, but with conspicuous, mildly abraded shard fragments. Thus more distinctly reworked tuffaceous. Carbonate is dolomite-ankerite.
292.1 m	Tuffaceous Psammopelite. Variably sericitised/ carbonate -stained, splintery to subangular feldspar, subordinate lava clasts. Hematite stained pelitic matrix, sparse pelitic interbeds.	Closely analogous to 281 m, but relatively homogeneous. Very incipiently sheared.	Clastic opaques, quartz, sparse muscovite, pelite and chert fragments. Minor chlorite, vein carbonate.	Closely analogous to 281, but unbrecciated. Carbonate (-chlorite) veinlets predate incipient tectonic fabric.
307.2 m	Tuffaceous Psammite. Variably sericite-carbonate-chlorite-stained, splintery to angular feldspars and lava clasts, relatively minor quartz. Hematite stained pelitic matrix.	Very similar to 292.1m (weakly bedded, silty fine sand/fine sandy silt). Very incipiently sheared.	Clastic opaques, muscovite flakes, chert and pelite fragments. Rare chloritised biotite flakes.	Strong affinities with 281, 292.1, 307.2 m, but relatively massive, homogeneous. Incipient carbonate-chlorite veining, predates incipient tectonic fabric.
317 m	Tuffaceous Psammopelite. Psammite as above, but with accessory to frequent clasts sericitic shale, silty shale/siltstone with conspicuous sericitic microshard fragments, muscovite flakes.	Planar to transcurrent bedding (pelite). Marked slump structures. Minor carbonate-chlorite veinlets.	Clastic opaques, leucoxenic semi-opaques. Sparse chert fragments.	Typical silty fine sand with minor medium sand component in slumped, discordant contact with tuffaceous pelite.
343 m	Tuffaceous Psammite. Thoroughly sericitised; chloritised, splintery to subanguaar lava clasts, shard fragments, subangular feldspars, minor quartz. Sericite-stained, poorly resolved chloritic matrix. Pervasive hematite.	Weakly banded silty fine sand, fine sandy silt. Sporadic chloritic microfaults.	Clastic opaques, mica flaes, pelite clasts, chert fragments. Sparse pyrite euhedra (mean 200 µ).	Closely related to 281, 292.1, 307.2, and 317, but less oxidised. Pyrite cubes exhibit incipient pressures shadows, bedded distribution, recrystallized syngenetic.
353 m	Tuffaceous Psammopelite. Variably carbonate, sericitised, chloritised lava clasts, shardy to subangular feldspar, minor quartz-sericite-chlorite matrix. Sericite shale, silty shale interbeds.	Weakly graded silty fine sand with millimetric-scale slumped shaly interbeds.	Clastic opaques, mica flakes, chert and minor pelite clasts. Rare detrital tourmaline.	Typical of zone 281 - 353 m, particularly sim. 343 m, but with volcanic components slightly relatively abraded/reworked.
355.6 m	Tuffaceous Psammite/Carbonaceous Pelite. Psammite similar 353 m, but sericitic, incipiently carbonaceous. Interbedded pelite comprises sericite, cryptocrystalline quartz, carbonaceous matter in varying proportions.	Massive to weakly bedded silty fine to medium sand. Sub- to millimetric bedded pelite. Frequent microfaults.	Clastic opaques, muscovite, biotite flakes, chert and pelite clasts. Conspicuous fine pyrite in pelite.	Transition to reduced (asagainst weakly to strongly oxidised) conditions. Pyrite is framboidal in part, distinctly bedded, "syngenetic".
363.7 m (T.S. 34115)	Tuffaceous Psammite/Carbonaceous Pelite. Psammite as above (355.6 m). Pelite comprises sericite, subordinate ultrafine quartz and carbonaceous matter in varying proportions; conspicuous pyrite.	Similar to 355.6 m, but slumped, contorted, with intermediate calcite- and late quartz veinlets.	Clastic opaques, minor muscovite, chert, pelite clasts. Minor chlorite (veinlets with quartz).	Closely related to 355.6 m. Pyrite extensively recrystallized to fine cubes with incipient pressure shadows.

Central Mineralogical Services

Sample No.	Classification - Composition	Fabric	Accessories	Comments
DDH-CG 2 388 m (T.S. 34116)	Altered Microgabbro. Chlorite-calcite-stained albitised plagioclase laths, completely chloritised/carbonated pyroxene, disseminated leucoxenised opaques. Patchy sericite-chlorite veins,	Relict doleritic fabric, irregularly veined, patchy, chlorite-healed brecciation.	Evenly disseminated, fine-grained pyrite.	Thoroughly altered, extensively deformed, marginal or minor basic intrusive.
392.15 m	Tuffaceous Psammite. Extensively chloritised, sericite- and carbonate-stained, angular to subround lava clasts, subordinate feldspars, shard fragments, minor quartz. Hematite-stained aggregates. pelitic matrix.	Weakly bedded, incipiently microfractured, silty fine to medium sandstone.	Relatively conspicuous clastic opaques. Minor clastic muscovite, biotite, chert fragments.	Similar and closely related to 281, 292.1, 307.2, 317 m, but slightly coarser-grained. Conceivably a fault-repetition.
415.5 m	Volcanomict Psammopelite. Extensively chloritised, sericitised/weakly sheared subangular lava clasts, minor feldspar, quartz, shard fragments. Chlorite-sericite matrix and interbedded pelite	Weakly sheared, silty fine to medium sand with variably segmented, rafted silty shale interbeds.	Clastic muscovite, opaques, minor chert, pelite clasts. Sparse quartz-calcite veinlets,	Essentially typical of zone 267-363.7 m but with relatively well-rounded lava clasts (volcanomict rather than distinctly reworked tuffaceous).
422.3 m	Sheared, Altered Microgabbro. Fine semi-schistose, calcite-stained chlorite aggregates, patchy, sericite-stained quartz and albite. Disseminated pyrite, leucoxenised opaques. bands.	Patchy, vague, relict doleritic fabric. Brecciated, sheared. Minor late calcite veinlets.	Rare, extremely fine, near-opaque ?sphalerite. traces pyrite.	Affinities with 388 m, but more extensively deformed and altered.
425.3 m	Talc-Chlorite Schist. Semi-schistose, pale green talc, closely intergrown isotropic Mg-chlorite and microcrystalline carbonate.	Generally featureless. Patchy, vague pyroxene-derived microtextures.	Minor traces quartz, sparse leucoxenised/oxidised opaques.	Problematical. Thoroughly altered/sheared pyroxenic ultramafic or metasomatic rock ("skarn"). Alternately, a relatively basic variant of 388, 422.3 m.
432.8 m	Volcanomict Psammopelite. Thoroughly chloritised/carbonated, angular to subrounded lava clasts, subordinate feldspar, shard fragments, minor quartz. Chlorite-carbonate matrix.	Massive to weakly graded silty fine to medium sand with partly rafted, deformed, silty shale partings.	Clastic opaques, mica flakes, sparse chert clasts. Frequent calcite veinlets.	More or less typical of 267-363.7 m zone, but rather similar to 415.5 m. Conceivably a fault repetition. At least two phases of deformation.
408.0 m (T.S. 34122)	Altered Microgabbro. Colourless to pale green Mg-chlorite aggregates, variably stained with microcrystalline quartz, carbonate, sericite. Frequent leucoxenised opaques.	Vague, but diagnostic relict medium-coarse, doleritic. Patchy brecciation.	----	Affinities with 388, 422.3, 425.3 m.

343,000yd E
344,000yd E
345,000yd E
346,000yd E
347,000yd E
348,000yd E
850,000yd N
849,000yd N
848,000yd N
847,000yd N
846,000yd N
845,000yd N
844,000yd N
843,000yd N
6200E
7300E
8341N
8221N
5,368,000m N
7890N
7700N
7550N
7485N
7300N
7118N
7083N
5,367,000m N
6750N
6446N
6080N
5,366,000m N
5696N
5700N
5487N
1680N
1200N
1000N
5,365,000m N
5000N
4000 N
4220N
5,364,000m N
3480N
3000 N
2560 N
5,363,000m N
8000E
5,362,000m N
365,000mE
366,000mE
367,000mE
368,000mE
369,000mE
370,000mE
602 CG 13
602 CG 306
602 CG 309
602 CG 517
602 NEV 122
602 NEV 77
602 NEV 1
602 RG 209
602 RG 208
602 RG 207
602 RG 206
602 RG 205
602 RG 204
602 RG 203
602 RG 202
602 RG 201
602 RG 200
DDH CG2
DDH CG1
LEAD BLOCKS
NEV 3.
NEV 2.
NEV 1
CUNI
NEVADA
RAZORBACK
Creek
Melba Flats
Melba Creek
Nevada Creek
Little Henty River
Henty River
GRAND PRIZE
Razorback
Rivulet
Dundas
HIGHWAY
ZEEHAN

889097

REFERENCE

- Watercourse
- Road, track
- Railway
- EL boundary
- Mine
- Soil sample traverse
- Soil sample location

CSR LIMITED-MCD

E.L. 15/76 DUNDAS, West TAS.

SOIL SAMPLING - DRILL HOLE LOCATIONS CUNI, NEVADA & RAZORBACK GRIDS

5 cm

SCALE	1:10,000
DRAWN	P.M.M. / P.R.
DATE	
REVISED	Jan '81

DRG No. K555-10

6800 E 6850 6900 6950 7000 7050 E

7850 N

MAG.

FINE GRAINED SANDSTONE
067 - 45 SE
130 - 75 NE

BEDDING
MINOR LODE WITH GALENA, CHALCOPYRITE, PYRITE QUARTZ, SIDERITE AND ZINCBLENDE } SHEAR ZONE

220 - 20 NW
078 - 85 SE
320 - 67 NE
075 - 80 SE
065 - 45 SE
325 - 60 NE

QUARZITIC FRACTURE
103 - 79 S
129 - 74 S
080 - 01 N
054 - 75 N
351 - 57 SE
343 - 73 E

CG-2

FINE GRAINED S'STONE
349 - 79 E
344 - 69 E
358 - 81 E
040 - 02 NW
110 - 01 E
164 - 68 E
129 - 85 W
133 - 29 E
130 - 66 E - BEDDING

GREYWACKE WITH BLUE-GREY LAMINAE
326 - 81 E
244 - 32 W
054 - 74 S
286 - 44 S } CONJUGATE SHEARS
360 - 32 W }
MALACHITE OCCURS ON SOME SURFACES

WATER RACE

FINE GRAINED SANDSTONE AND MUDSTONE
055 - 55 SE
333 - 80 NE
330 - 85 NE - MINERALIZED
290 - 90
255 - 05 S
135 - 75 NE
195 - 65 E - FAINT BANDING - BEDDING ?

OLD CONCRETE FOUNDATIONS
MINE SHAFT UNDER

HILL

FINE GRAINED SANDSTONE
100 - 89 E
104 - 86 E
110 - 82 E
164 - 87 W
133 - 88 E

SANDSTONE
330 - 85 NE
030 - 55 E
280 - 65 N
230 - 55 N } CONJUGATE SHEARS
340 - 20 SW }
170 - 80 SW - DILATIONAL FRACTURE SURFACE WITH FINE QUARTZ CRYSTAL MAT
340 - 40 NE

MUDSTONE
050 - 40 SE
310 - 85 NE
005 - 40 E
300 - 50 E (HEAVY IRON STAINING)

MINE DUMP

WATER RACE

HILL

DUMPS

SWAMPY

TRACK

WATER RACE

HILL

7850 7800 7750 7700 7650 7600

REFERENCE

- SHAFT
- SHAFT WITHIN SMALL PIT OR TRENCH
- SHAFT WITH SURROUNDING WASTE DUMP
- OPEN TRENCH OR SMALL PIT
- INTERPRETED TREND OF NEAR-SURFACE WORKINGS
- WATER CHANNEL OR RACE WAY
- MINE MULLOCK DUMPS
- BASE OF HILL

STRIKE - DIP
123 - 45 E - OF FRACTURE PLANES OR BEDDING (AS SHOWN)

889098

5 cm

MAP COMPILED FROM A CHAIN AND COMPASS SURVEY FROM KNOWN GRID PEGS ON LINES 7700 N AND 7800 N - CUNI GRID

CSR LIMITED - MCD

SURFACE MAP OF LEAD BLOCK WORKINGS CUNI GRID

E.L. 15/76 **DUNDAS, TASMANIA**

SCALE	1 : 500
DRAWN	JA / CJL
DATE	OCT 1980
REVISED	

K555 - 18

6600mE 6700 6800 6900 7000mE 7100 7200 7300 7400 7500mE 7600

TILT %

LINE 7700N

+20 +10 0 -10 -20

LINE 7550N

% +20 +10 0 -10 -20

% LINE 7485N +20 +10 0 -10 -20

0 -10 -20

LINE 7450N

% LINE 7300N +20 +10 0 -10 -20 -30 -40

889099

5 cm

REFERENCE

In phase component

Out of phase component

1 cm = 10% tilt angle

6600mE 6700 6800 6900 7000mE 7100 7200 7300mE

CSR LIMITED-MCD

CUNI GRID E.L.15 76 DUNDAS TAS.

VLF-EM PROFILES

SCALE	: 1:2500	DRG.No.
DRAWN	: P.M.M / P.R	K555-23
DATE	: Aug. '81	
REVISED	:	

6600mE 6800 7000mE 7200 7400 7600mE

LINE 7550N
MAGNETIC PROFILE

62500γ
62400γ

LINE 7485N
MAGNETIC PROFILE

62500γ
62400γ

TILT %
+20
+10
0
-10
-20
-30
-40

LINE 7485N
VLF-EM

DDH CG1
COLLAR 7485N, 7357E

0.15m Zn, Pb, Ag
0.40m Zn, Pb, Ag
0.9m Zn, Pb, Ag

REFERENCE

VLF-EM
In phase component
Out of phase (Quadrature)
1cm = 10% tilt angle

CG1 PROFILE
Greywacke, tuff
Shale
Black shale
Dolerite
Serpentinite
Carbonate-quartz-sulphide zone

62500γ
62400γ
62300γ
62200γ
62100γ

LINE 7450N
MAGNETIC PROFILE

6600mE 6800 7000mE 7200 7400 7600mE

889100

CSR LIMITED-MCD

CUNI GRID E.L.15 76 DUNDAS TAS.

DDH CG1
MAGNETIC & VLF-EM PROFILES

5 cm

SCALE · 1 2500	DRG No.
DRAWN · P.M.M /P.R	K555-24
DATE Aug '81	
REVISED	

REFERENCE

COLLAR DDH CG1 ATM GRID 5 367 480m N
537 380m E
LOCAL GRID Line 7485 N / 7357 E

DDH CG1 is in the Crimson Creek Formation

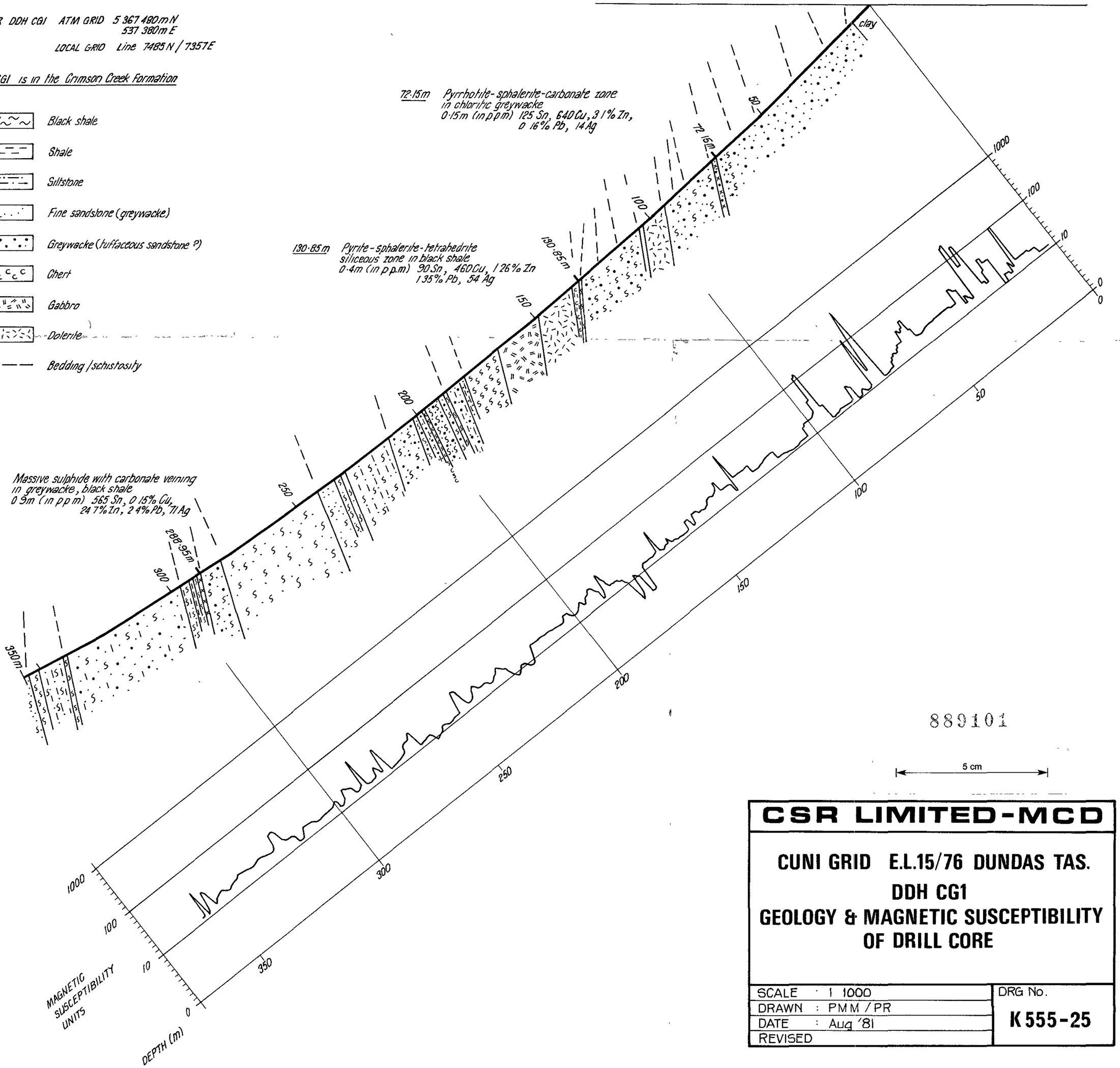
- Black shale
- Shale
- Siltstone
- Fine sandstone (greywacke)
- Greywacke (tuffaceous sandstone ?)
- Chert
- Gabbro
- Dolerite
- Bedding / schistosity

DDH CG1

72·15m Pyrrhotite-sphalerite-carbonate zone in chloritic greywacke
0·15m (in p.p.m) 125 Sn, 640 Cu, 3·1% Zn, 0·16% Pb, 14 Ag

130·85m Pyrite-sphalerite-tetrahedrite siliceous zone in black shale
0·4m (in p.p.m) 90 Sn, 460 Cu, 1·26% Zn, 1·35% Pb, 54 Ag

288·95m Massive sulphide with carbonate veining in greywacke, black shale
0·9m (in p.p.m) 565 Sn, 0·15% Cu, 24·7% Zn, 2·4% Pb, 71 Ag



889101

5 cm

CSR LIMITED-MCD

CUNI GRID E.L.15/76 DUNDAS TAS.
DDH CG1
GEOLOGY & MAGNETIC SUSCEPTIBILITY OF DRILL CORE

SCALE : 1 1000	DRG No.
DRAWN : PMM / PR	K 555-25
DATE : Aug '81	
REVISED	

6800mE 7000mE 7200mE 7400mE 7600mE

LINE 7793N
MAGNETIC PROFILE

62500γ
62400γ

LINE 7700N
VLF - EM

Quadrature
In phase

LINE 7700N
VLF - EM
Tilt Angle
%
+20
+10
0
-10
-20

62500γ

LINE 7700N
MAGNETIC PROFILE

7700N MAGNETIC PROFILE

DDH CG2
COLLAR 7782N, 7076E

clay
0.86m of 5.4% Zn, 4.7% Pb, 129 p.p.m Ag
100
200
300
400
440m

62400γ
62300γ
62200γ

Black shale
Shale
Siltstone
Sandstone
Gabbro

5 cm

CSR LIMITED-MCD

CUNI GRID E.L.15/76 DUNDAS TAS.
DDH CG2
MAGNETIC & VLF-EM PROFILES

SCALE	1:2500	DRG No.
DRAWN	P.M.M / P.R.	K555-26
DATE	Aug. '81	

6800mE 7000mE 7200mE 7600mE

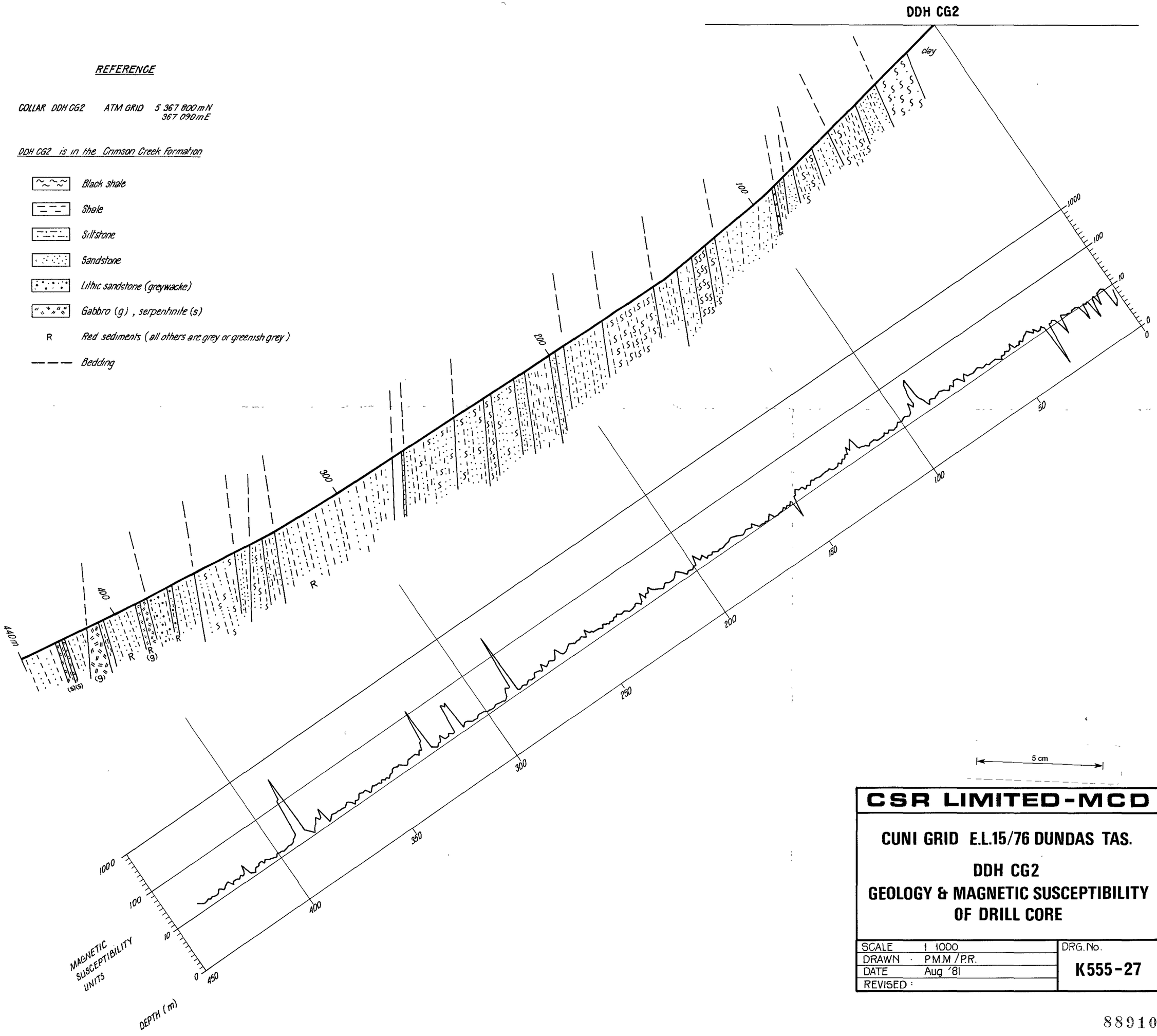
889102

REFERENCE

COLLAR DDH CG2 ATM GRID 5 367 800 mN
367 090 mE

DDH CG2 is in the Crimson Creek Formation

- Black shale
- Shale
- Siltstone
- Sandstone
- Lithic sandstone (greywacke)
- Gabbro (g), serpentinite (s)
- R Red sediments (all others are grey or greenish grey)
- Bedding



5 cm

CSR LIMITED-MCD

CUNI GRID E.L.15/76 DUNDAS TAS.

DDH CG2

GEOLOGY & MAGNETIC SUSCEPTIBILITY OF DRILL CORE

SCALE	1 1000	DRG. No.
DRAWN	P.M.M / P.R.	K555-27
DATE	Aug '81	
REVISED :		

889103.