687001

PROJECT 258
K-55-3

PLACER EXPLORATION LIMITED

RENEWAL REPORT [illegible]

EXPLORATION LICENCE NO. 39/85

BULGOBAC RIVER, TASMANIA

PLACER EXPLORATION REPORT TAS 1/89

HOBART

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KEYWORDS

TASMANIA	EXPLORATION
BASE METALS	GOLD
EL 39/85	SK 55-03
BULGOBAC RIVER	QUE RIVER SHALES
QUE ROAD	HELLYER BASALT
DRILLING	GEOCHEMISTRY
GRAVITY	MT READ
UTEM	SOPHIA
GEOLOGY	8014
GEOPHYSICS	PETROLOGY

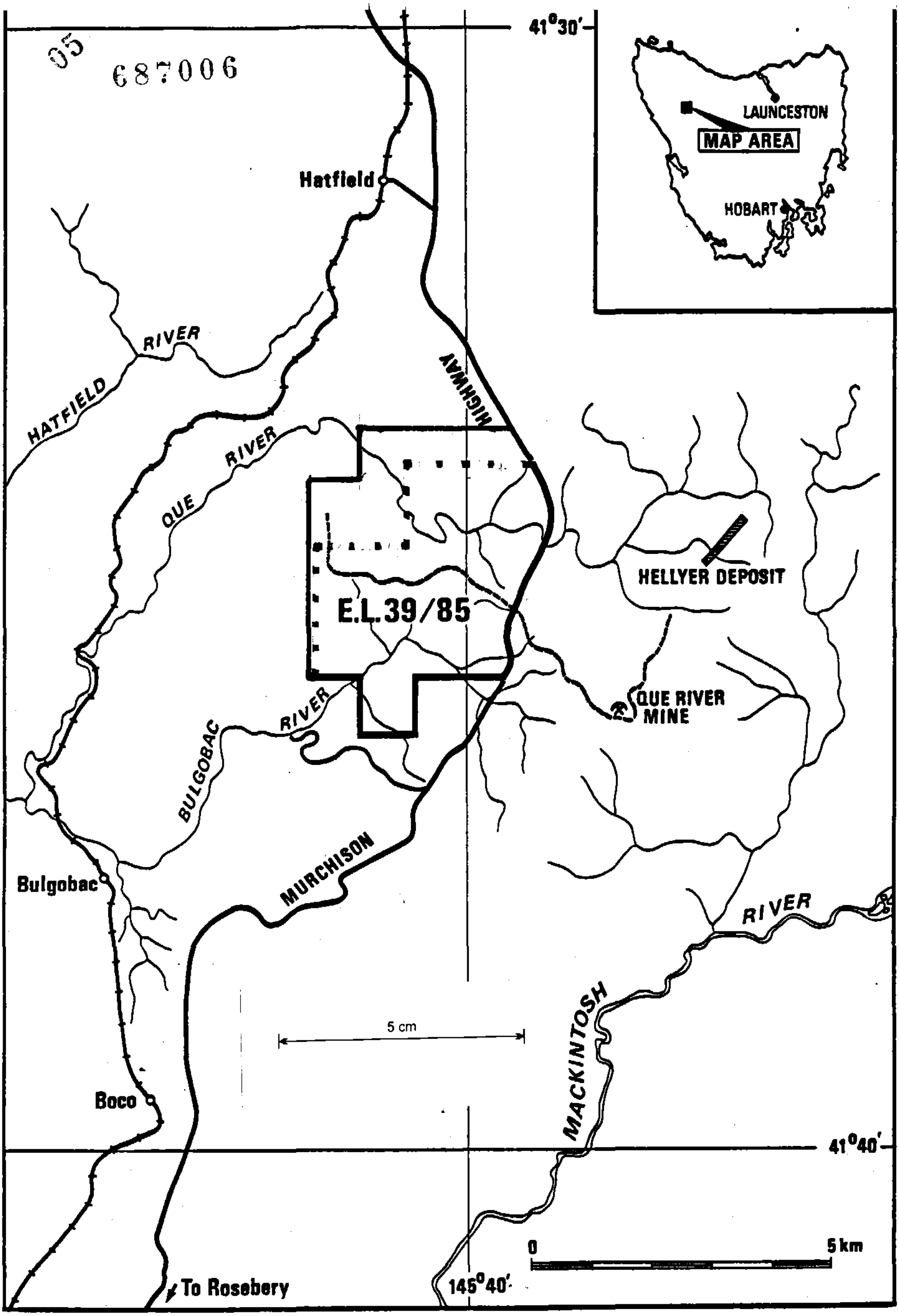

FIG. 1 LOCATION MAP E.L.39/85 BULGOBAC RIVER TAS.

1. INTRODUCTION

EL 39/85, "Bulgobac River", is located 60 km SSW of Burnie, a major industrial town and port on the NW coast of Tasmania. The Murchison Highway forms the eastern boundary of the 11 km^2 title which was granted on 14 February, 1986. Aberfoyle's Que River and Hellyer mines are located immediately east of the adjacent Murchison Highway (Figure 1).

The EL was granted after an application under the recently introduced tender system. The area, which had been held by Comstaff Pty Ltd as part of EL 5/63, became available when EL 5/63 was reduced to the maximum allowable area of 125 km^2.

In June 1988, the area of EL 39/85 was increased to 16 km^2 (Figure 1). This was caused by the Department of Mines adjusting the Licence boundaries to the AMG kilometre graticules on the relinquishment of the adjacent Exploration Licence (EL 12/72 formerly held by EZ).

Infrastructure in the area is excellent with major electricity transmission lines passing through Aberfoyle's nearby mining leases; the Murchison Highway being the eastern boundary of the title area; the close proximity of EZ's Burnie to Rosebery railway line; abundant water and current road construction bringing population centres within commuting distances of any possible mining operation.

The exploration target in EL 39/85 is a volcanogenic polymetallic base and precious metal deposit similar to the nearby Hellyer deposit. The Hellyer deposit has a published resource of 15m tonnes indicated at 13.0% Zn, 6.9% Pb, 0.4% Cu, 156 g/t Ag and 2.3 g/t Au with a further 4.0m tonnes inferred (Aberfoyle, 1987).

This report summarises the investigations completed by CSR and Placer Exploration Ltd (the purchaser of CSR's Mineral Group) in the third twelve month term of the Licence ending on February 14, 1989.

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2. SUMMARY

Exploration continued throughout 1988, although at a reduced rate during the purchase of CSR's Mineral Group by Placer Exploration Ltd in mid-1988. This exploration work consisted of extending the original grid to cover almost the entire Licence area, traversing this grid with geological mapping (with associated petrology) and a 50m spaced gravity survey, the diamond drilling of two more holes (with associated geochemistry and petrology), a UTEM III survey over parts of the grid north of Que Road and the rehabilitation of the northern drill access track.

Results of this work suggested the most prospective area of the Licence for further exploration is a 1.0 x 1.5 km block between BRDO2 and BRDO4 and dominantly south of BRDO1 (northern limit is between BRDO1 and Que Road). This block contains an abnormal thickness of Que River Shale and Hellyer Basalt and is bounded by growth faults active during the deposition of the units and being a possible source of the basalts.

An attempt will be made to complete an EM survey to the bottom of BRDO1. This survey, using Zonge Engineering's high performance transmitter, is planned to search a significant depth below the bottom of the hole as well as a 200-400m radius around the hole. If anomalies are observed and located, these will be targets for further drilling. If no anomalies are located, then consideration will be given to a wide spaced pattern drilling programme of the 1.0 x 1.5 km block to a depth of 850 - 1100m.

3. LOCATION AND GENERAL

EL 39/85 is centred 5 km west of the Hellyer base metal deposit and 25 km north of Rosebery on the west coast of Tasmania. The 6 km (N-S) by 4 km (E-W) area is adjacent to and west of Aberfoyle's EL 106/87 containing both the Hellyer and Que River base metal deposits (Figure 1).

Excellent access to the Licence area is provided by the sealed Murchison Highway, which forms the eastern boundary. The forestry constructed gravel Que Road bisects the Licence from east to west providing good driving access to within 2 km of most parts. Access is further improved by a forestry track to the Bulgobac River (in the south of the Licence) and CSR constructed drill tracks in the central area to the south of Que Road. A CSR drill track to the north of Que Road has been rehabilitated.

Most of the northwestern half of the Licence is a plateau underlain by a cover of Tertiary Basalt flows. These flows weather to form a rich soil supporting a thick rain-forest vegetation. Most of this rainforest was selectively logged earlier this century (evidenced by large old butts and numerous overgrown skidways) while the area around the western end of Que Road was clear felled in recent times.

The southwestern portion of the Licence is underlain by relatively flat lying late Middle Cambrian volcani-clastics and sediments overlying the Que/Hellyer volcanic sequence. Much of the volcaniclastics support only button grass type vegetation which is now periodically burnt by the forestry industry. To the south,the volcaniclastics and intrusives are covered by rainforest, horizontal and regrowth.

The Licence is drained by two main drainages. The area to the north of Que Road is drained by the Que River while the south is drained by the Bulgobac River. These rivers join to the west of the Licence and drain via the Huskisson River to the Pieman River. The Que and Bulgobac Rivers and their tributaries are deeply incised in steep gorges resulting in a plateau area at an elevation of 630-680m and drainages at depths to 480m above sea level.

4. PREVIOUS EXPLORATION

The Gold Hill prospect, located immediately north of the Que River mine, was located by prospecting activity in the 1920s. Prospectors followed pannable gold upstream from the Que River to locate Gold Hill. Consequently, it is probable that prospecting activity extended into EL 39/85. However, no mineral occurrences are recorded within EL 39/85 and exploration to date has not located any evidence of early prospecting.

Forestry operations were undertaken in the late 1960s - early 1970s in the plateau area on the western section of EL 39/85. The area logged was the myrtle rainforest growing on red soils developed over Tertiary basalt. Access to this area was by a gravelled road, the "Que Road", from the Murchison Highway.

Geological mapping of the area was undertaken on a limited basis by geologists employed by Rio Tinto as part of a joint venture with EZ in the 1950s. Department of Mines' geologists mapped part of the area as shown on the published Mackintosh 1" = 1 mile geological map.

In 1969-1971, Comstaff Pty Ltd completed stream sediment and geological mapping of the area as part of a reconnaissance programme on EL 5/63. Results for this stream sediment sampling are available on open-file reports at the Department of Mines. Evidence of this sampling programme was observed during geological mapping of EL 39/85.

The programme undertaken by Comstaff consisted of detailed -80 mesh stream sediment sampling and limited heavy mineral concentrate stream sediment sampling. This sampling produced two areas in or adjacent to EL 39/85 which were followed up:

(i) Debussey Creek resulted from an anomalous gold assay in a heavy mineral concentrate stream sediment sample, and

(ii) Sock Creek area resulted from anomalous -80 mesh stream sediment samples.

The Debussey Creek anomaly was followed up with additional stream sediment geochemistry and A° horizon soil sampling with negative results. Additional follow-up in 1984 located only one sample with detectable gold in a heavy mineral concentrate, Comstaff Pty Ltd (1985).

The Sock Creek anomalies were followed up and the Sock Creek vein type Ag-Pb-Zn mineralisation discovered. The Sock Creek prospect is located 1 km southwest of the south-west corner of EL 39/85. The follow-up sampling programme in the Sock Creek area extended into EL 39/85 with grid lines being cut into the Hash and Joint Creek areas. It is believed that geological mapping, soil geochemistry and a moving loop EM system was undertaken on these grid lines, but no data for this work are available on open-file reports at the Department of Mines.

In 1975, as part of a larger programme on EL 5/63, an INPUT EM and magnetics survey was flown over the area. Within EL 39/85, no follow-up to this survey was undertaken as the major conductive zones located were interpreted to be due to surficial or stratigraphic conductors, Butt et al. (1975).

After EL 39/85 was granted to CSR in February 1986, as a result of a successful tender application for the Bulgobac Exempt Area (ETA 8464), work was commenced in the search for a polymetallic volcanogenic deposit. An initial programme of geological mapping and geophysical surveys involving aeromagnetics, grid based VLF-EM, induced polarisation, CSAMT and gravity, resulted in the drilling of two diamond drill holes. These two vertical holes BRD01 to 860.5m and BRD02 to 676m tested CSAMT anomalies with some supporting gravity anomalies. Weak mineralisation in the hanging wall Hellyer Basalt was intersected in BRD01. However, the greatly increased thicknesses of the Que River Shales and the Hellyer Basalt intersected in these holes suggests the mineralisation host horizons are deeper than the effective depth penetration of electrical geophysics. O and C isotope data on calcite veining and vesicle infilling from within the Hellyer Basalt in BRD 01 and 02 indicated formation temperatures of 150°C and 110-120°C, respectively. Downhole EM was successfully completed to the full depth of BRD02, but reached only 700m in BRD01 with no anomalies being detected (Williams 1987a, 1987b).

5. REGIONAL GEOLOGY AND MINERALISATION

The lithologies of exploration interest are the Cambrian calc-alkaline Mt Read Volcanics which host important base metal deposits at My Lyell, Hercules, Rosebery, Que River and Hellyer. The regional geology is described in numerous publications, e.g. Corbett and Lees (1987).

Prior to the discovery of the Que River Deposit in 1974, the geology of the area of EL 39/85 was poorly investigated. Knowledge of the geology and structure of the area progressed with exploration undertaken by Aberfoyle, Comstaff and EZ on various ELs within the general area. Mapping was undertaken by the Department of Mines prior to preparation of the explanatory notes on the Mackintosh 1 mile map (Collins et al., 1981).

Collins (op cit) postulated the following sub-division of the Mt Read Volcanics in the Que River area:

(i) a western volcano-sedimentary sequence of which the Que River Beds (Que River Shales), of late Middle Cambrian age, were interpreted as the basal sediments in the Que River area, and

(ii) an eastern (central) volcanic sequence which in the Que River area was dominantly andesitic.

The boundary between the two sequences was interpreted to be discordant and in places in faulted contact.

With the discovery of the Hellyer deposit in the early 1980s, and the consequent generation of more detailed knowledge of the stratigraphy and structure, the Que River Shale was interpreted to be in conformable contact with the underlying volcanics. Thus, the stratigraphy hosting the Hellyer deposit could be projected down dip into the eastern area of EL 39/85.

Previous conceptual thinking regarded the volcanics at Que River-Hellyer as forming part of Corbett's "Central Volcanic Sequence". However, recent geological mapping (Komyshan, 1986) and trace and whole rock analyses (Crawford, 1987) have resulted in a revised interpretation of the Que River-Hellyer volcanics as forming the basal part of the Dundas Group. This can be equated with Corbett's "Western Sequence" to the northwest of the Henty Fault Zone.

Exploration undertaken since granting of EL 39/85 has extended the area of potential host stratigraphy for Hellyer-Que River type mineralisation. However, drilled thicknesses of the Que River Shale have exceeded those indicated by previous mapping and drilling on adjacent titles.

6. CURRENT EXPLORATION

6.1 Access and Gridding

Pre-existing vehicular access within EL 39/85 was previously described (Williams, 1987a). This covered walking access cut for creek mapping and gridding for geophysics.

In late 1987 (Williams 1987b) the geophysical grid was extended by 32.3 line kilometres (Drg. No. 7612-14). In the current period this grid was surveyed. Contract surveyors, using closed loops, surveyed the outer perimeter of the grid and tied this to the state first order highway survey. Drill access tracks and drill holes were also tied to the survey. Grid lines were levelled by Licence holder's staff and tied to the perimeter survey at each end. All grid lines and access positions are shown on Drg. No. 7612-14.

6.2 Geological Mapping

Mapping completed during the period has all been on the newly cut grid. This mapping (Drg. No. 7612-13) generally confirmed the earlier geological mapping of Williams (1987).

The only remaining mapping to be completed is the mapping of the Que River and some of its small tributaries in the far northwest of the extended Licence (north of AMG 5397000mN). Several attempts were made to map this area but were prevented by high water levels in the Que River.

Petrology was completed on 30 samples taken from the grid mapping. This thin section examination by A. Crawford is included as Appendix I.

6.3 Diamond Drilling

The following 2 hole programme was proposed for the current period to February 1989.

DDH BRD 03: a stratigraphic hole immediately south of Que River and west of the Murchison Highway.

DDH BRD 04: an angled hole on a westerly azimuth to test the pyritised and altered volcanic stratigraphy west of 1750E on Line 7600N.

These two holes were completed:

(i) BRD 03 - was as proposed to a final depth of 541.4m

(ii) BRD 04 - was as proposed to a final depth of 301.0m

Core logging was undertaken using a computerised format. Appendix II includes a description of this system and the detailed drill logs for BRD 03 and BRD 04.

DDH BRD 03:

This hole, collared immediately west of the Murchison Highway and south of the Que River, was primarily drilled to test the stratigraphy in an area of flat gravity response. The geological data proprovided vital information for the 3D gravity interpretation.

The lithologies intersected in this hole were:

TABLE 1 WHOLE ROCK ANALYSES continued...

Sample No.		DDH BRD	DEPTH (m)	MgO	Na_2O	P_2O_5	Al_2O_3	CaO	Fe_2O_3	K_2O	MnO	SiO_2	TiO_2	CO_2	SO_3	LOI	Cr(XRF)	Zr
A295	051	02	376.6	–	–	–	–	–	–	–	–	–	–	–	–	–	750	90
	052	02	382.6	8.3	1.95	0.097	11.35	7.4	7.45	0.29	0.18	52.7	0.31	5.66	0.63	9.01	920	85
	053	02	391.6	–	–	–	–	–	–	–	–	–	–	–	–	–	270	160
	054	02	400.6	–	–	–	–	–	–	–	–	–	–	–	–	–	260	120
	055	02	403.6	–	–	–	–	–	–	–	–	–	–	–	–	–	760	90
	056	02	424.6	–	–	–	–	–	–	–	–	–	–	–	–	–	340	120
	057	02	442.6	9.1	2.65	0.33	11.60	8.37	9.35	0.89	0.23	50.4	0.51	3.36	0.16	5.89	370	130
	058	02	475.6	–	–	–	–	–	–	–	–	–	–	–	–	–	870	130
	059	02	496.6	–	–	–	–	–	–	–	–	–	–	–	–	–	380	140
	061	02	502.6	6.55	3.95	0.41	15.95	5.57	9.8	1.51	0.14	50.0	0.58	0.62	2.20	3.47	110	140
	062	02	547.6	8.3	2.25	0.65	12.0	11.6	10.1	1.01	0.24	48.4	0.54	2.42	0.43	4.14	570	150
	063	02	607.6	6.55	1.90	0.35	10.9	9.53	7.4	2.48	0.15	56.0	0.5	2.26	0.33	3.57	710	110
	064	02	673.6	7.45	2.20	0.87	9.25	20.1	7.8	0.52	0.19	38.7	0.51	10.58	0.33	12.50	710	110
	065	01	584.0	8.7	2.85	0.29	11.65	10.0	9.85	1.74	0.21	49.3	0.68	0.45	0.05	2.30	400	130
	066	01	691.8	7.45	2.25	0.30	11.45	7.3	10.05	1.43	0.17	54.2	0.63	0.99	0.08	2.59	400	120
	067	01	831.0	9.95	0.36	0.30	12.9	7.35	11.8	3.66	0.28	46.8	0.67	2.01	0.10	5.57	1100	130
	068	01	855.7	–	–	–	–	–	–	–	–	–	–	–	–	–	9	230
	075	Hellyer Mine		5.7	0.29	0.080	8.5	15.2	6.9	3.66	0.17	40.2	0.41	16.84	3.63	17.0	320	96
A321	402	03	336.3	7.3	2.5	0.788	11.8	10.3	9.05	0.53	0.15	46.7	0.58	6.60	0.22	10.43	450	170
	405	03	404.4	7.8	3.66	0.172	16.0	5.0	10.7	10.2	0.19	50.8	0.57	0.14	0.06	3.75	190	110
	407	03	413.1	8.3	3.3	0.119	16.0	5.15	10.9	1.10	0.19	50.0	0.58	0.48	0.06	4.02	180	100
	409	03	422.4	7.5	2.5	0.383	14.7	8.15	9.55	2.92	0.19	48.9	0.59	1.06	0.42	3.71	290	100
	412	03	433.5	3.45	5.94	0.147	16.8	1.87	6.6	0.70	0.20	60.8	0.50	0.56	0.34	2.87	120	1200
	414	03	450.8	3.4	5.4	0.135	14.9	2.19	6.65	0.5	0.16	61.8	0.46	1.46	0.56	3.55	150	170
UNITS				%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm
DETECTION				0.005	0.005	0.007	0.1	0.01	0.05	0.01	0.01	0.1	0.01	0.02	0.02	0.01	5	5
METHOD				104	104	401/	408	408	408	408	408	408	408	612	613	615	401	401

*All analyses completed by ANALABS.

TABLE 1 WHOLE ROCK ANALYSES

Sample No.		DDH BRD	DEPTH (m)	V	Cr	Co	Ni	Cu	Zn	As	Rb	Sr	Y	Nb	Mo	Ag	Sn	Sb	Ba	La	W	Au	Pb
A295	051	02	376.6	140	280	35	177	52	1600	13	15	280	15	3	6	x	x	8	150	50	x	0.001	146
	052	02	382.6	140	196	45	186	80	82	5	10	250	15	3	x	x	3	x	300	55	x	0.003	30
	053	02	391.6	180	100	33	65	133	2900	20	15	290	25	8	5	0.3	x	3	560	90	x	0.003	1300
	054	02	400.6	140	130	30	94	83	2750	19	50	280	20	6	4	0.5	5	x	>999	60	x	0.001	1050
	055	02	403.6	160	220	38	180	44	420	8	7	270	15	7	x	0.1	x	x	120	40	x	0.004	137
	056	02	424.6	160	90	34	74	11	1450	5	15	230	20	5	5	0.1	x	x	370	55	x	0.002	104
	057	02	442.6	170	85	37	85	96	79	4	25	380	20	4	x	0.2	x	x	650	70	x	0.001	37
	058	02	475.6	110	230	42	195	50	1250	21	10	190	20	6	3	0.1	x	x	180	85	x	0.002	87
	059	02	496.6	160	95	35	110	65	94	16	80	450	20	5	5	0.1	5	x	>999	95	x	0.002	19
	061	02	502.6	160	35	31	60	82	70	14	45	640	20	7	6	x	x	x	850	87	x	0.002	12
	062	02	547.6	120	125	40	140	101	160	10	30	580	25	8	5	x	x	x	750	90	x	0.003	116
	063	02	607.6	70	170	36	157	68	55	12	70	280	20	9	5	x	x	x	920	70	x	0.006	17
	064	02	673.6	70	200	43	165	75	5	5	15	310	20	4	x	x	x	x	250	70	x	0.003	10
	065	01	584.0	60	401	28	57	44	48	5	45	500	20	8	6	x	6	x	>999	80	x	0.002	7
	066	01	691.8	75	60	35	72	73	156	10	40	560	20	9	3	x	x	x	>999	70	x	0.002	49
	067	01	831.0	60	185	60	335	44	410	9	80	240	25	5	3	x	4	4	>999	120	x	0.003	183
	068	01	855.7	x	20	15	32	10	70	9	20	150	30	15	8	0.1	3	x	170	150	x	0.004	11
	075	Hellyer	Mine	40	120	29	66	40	77	19	65	180	15	9	15	x	3	x	–	–	–	0.001	14
A321	402	03	336.3	270	–	35	87	101	59	2	15	450	25	7	x	x	x	x	690	150	x	0.001	x
	405	03	404.4	220	–	35	50	17	59	6	25	440	20	3	5	x	x	x	1300	30	x	x	x
	407	03	413.1	230	–	36	45	10	65	2	30	460	20	6	x	x	x	3	1200	25	x	0.002	x
	409	03	422.4	260	–	38	91	88	50	9	75	380	20	x	x	x	x	x	2300	80	x	0.001	x
	412	03	433.5	120	–	22	82	31	444	5	20	510	30	10	3	x	6	4	800	80	x	x	90
	414	03	450.8	110	–	23	95	26	134	8	15	300	25	10	x	x	3	4	330	75	x	x	36
UNITS				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
DETECTION				5	5	1	1	1	1	1	5	5	5	5	3	0.1	3	3	10	10	20	0.001	1
METHOD				401	101 AA	102	102/101	102	102/101	114	401	401	401	401	401	102	401	401	401	401	401/408	336	102

*All analyses completed by ANALABS.

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0-301	Que River Shale
301-426	Hellyer Basalt
426-427	"Mixed" Sequence?
427-458	Footwall Andesite
458-541 EOH	Dundas Group (greywacke and shale sequence)

Re-interpretation of Komysham's mapping suggests that the Que-Hellyer volcanics thin northwards on to a basement of Dundas Group sediments. This appears to be the case in BRD 03.

<u>DDH BRD 04</u>

This hole collared at -55° and drilled on a 292°m azimuth, was designed to test the postulated fault striking NNE-SSW in the proximity of Mutter Creek. The pyritised volcanics in Mutter Creek were also of interest. The data were required for the 3-D gravity interpretation.

The lithologies intersected were:

0- 86	Volcaniclastics
86-205	Que River Shale
205-209	Fault Zone
209-301	Greywacke, etc. = Dundas Group

Core samples from DDHs BRD 03 and BRD 04 were selected for thin section petrography. This petrology (Appendix III) was undertaken by A. Crawford and included a brief examination of the BRD 01 and BRD 02 thin sections and utilised the geochemistry associated with the thin section samples (Table 1).

No mineralisation warranting split sampling was intersected in any of the drill holes. However, selected intervals were sampled to confirm the visual estimates of sphalerite and galena mineralisation. In addition, 15 samples were analysed for a full suite of whole rock and trace elements. These data are presented as Table 1. Table 2 presents the data for standard samples analysed with the samples shown in Table 1, the accepted values for these standards and the analytical methods utilised.

All the samples analysed for whole rock and trace elements have a related thin section description (Appendix III). All these samples have suffered extensive alteration as indicated by the analyses.

Recent work by Dr A. Crawford demonstrated, on the basis of Ti/Zn ratios, that the Hellyer Basalt can be divided into two units. Interestingly enough, David Leaman came to the same conclusion from the specific gravities used in his gravity interpretation. These units are as follows:-

Unit 1		e.g.	A321402 in BRD 03
	Ti/Zn	22-25	A321052 in BRD 03)
			A321057 in BRD 02)
			A321061 in BRD 02)
Unit 2	Ti/Zn	32-37	A321064 in BRD 02
			A321064 in BRD 01
			A321064 in BRD 01

Crawford suggests that the Hellyer Basalt sequences, which he classifies as unusual shoshonitic magmas, represent discrete large basaltic volcanic centres constructed upon Central Volcanic Sequence basement. Alteration and mineralisation in the Hellyer basalt is hangingwall to the orebody and thus it is probable that the mineralisation-related intrusive was the shoshonitic magma which was eventually extruded as the Hellyer Basalt.

TABLE 2 STANDARD SAMPLES

Standard Sample No.	Tas Bas A295060	A156249	A321418	Quoted	GX1H A156250	Quoted	GX10 A161050	Quoted
V	160	150	90	164	55		X	
Cr(AAS)	35	40			90		80	
CR(XRF)	150	150	160	197	160	180	25	
Co	50	54	-	-	10	6	2	
Ni	132	147	-	153	59	58	5	
Cu	44	47	-	64	71	72	4	
Zn	103	116	-	118	41	35	6	
As	6	5	-	-	12	11	2	
Rb	20	20	20	16.5	340		25	
Sv	990	1000	1000	1012	90		x	
Y	20	20	20	23	45		x	
Zv	260	260	250	261	270		30	
Nb	55	50	60	61	10		3	
Mo	8	6	9	-	190	200	x	
Ag	x	x	-	-	0.3	<1	x	
Sn	x	x	x	-	5	<10	35	36.8
Sb	x	35	x	-	4	10	x	
Ba	190	190	150	204	410	440	15	
La	60	60	70	43	45		x	
W	45	85	40	-	55	53	x	
Au	0.001	-	x	-	0.057	0.057	0.002	
Pb	6	6	-	5	11	14	x	
MgO	8.3	7.9	8.1	8.16	-		-	
Na_2O	5.0	5.0	5.05	5.43	-		-	
P_2O_5	0.98	0.85	1.065	0.97	-		-	
Al_2O_3	13.8	14.2	14.1	14.14	-		-	
CaO	8.01	8.08	7.6	7.81	-		-	
Fe_2O_3	12.85	12.9	12.5	12.65	-		-	
K_2O	1.99	1.9	1.82	1.86	-		-	
MnO	0.17	0.17	0.17	0.17	-		-	
SiO_2	44.7	44.8	44.9	44.56	-		-	
TiO2	2.34	2.35	2.20	2.31	-		-	
FeO	9.55	9.3		-	-		-	
CO_2	0.44	0.26	0.18	-	-		-	
SO_3	0.10	0.05	0.06	-	-		-	
LOI	1.41	1.44	1.58	1.56	-		-	

O and C isotopes have been analysed for calcites from the Hellyer Basalt intervals in BRD 01, 02 and 03. The calcites were from veins and from vesicle infillings. This work was undertaken by the Tasmanian Department of Mines as part of their Mt Read Project. Preliminary results show temperatures of 150°C in BRD 01 and 110-120°C in BRD 02 (G. Green). Green suggests that temperatures of 150° for BRD 01 would, in the context of data available over the Hellyer ore body, suggest BRD 01 was within 50 to 250m of a similar hydrothermal event. These data need closer examination.

Thus the diamond drilling completed to date has indicated:

(i) the presence of the horizon prospective for the location of a Hellyer-type deposit occurs at depth within EL 39/85

(ii) a surprising increase in the thicknesses of the Que River Shale (430m) and the Hellyer Basalt (300m) has decreased the effective application of geophysics to target drill holes and has increased the hole depth required.

(iii) CSAMT can be applied as a mapping tool to a depth of 500m in the area surveyed, but the phase anomalies tested do not appear to be of significance.

(iv) the positive gravity anomaly can be explained by increased thickness of Que River Shale and Hellyer Basalt. However, this increased thickness thus suggests a basin bounded by growth faults which must then be considered as a prime environment to generate and host the target deposit.

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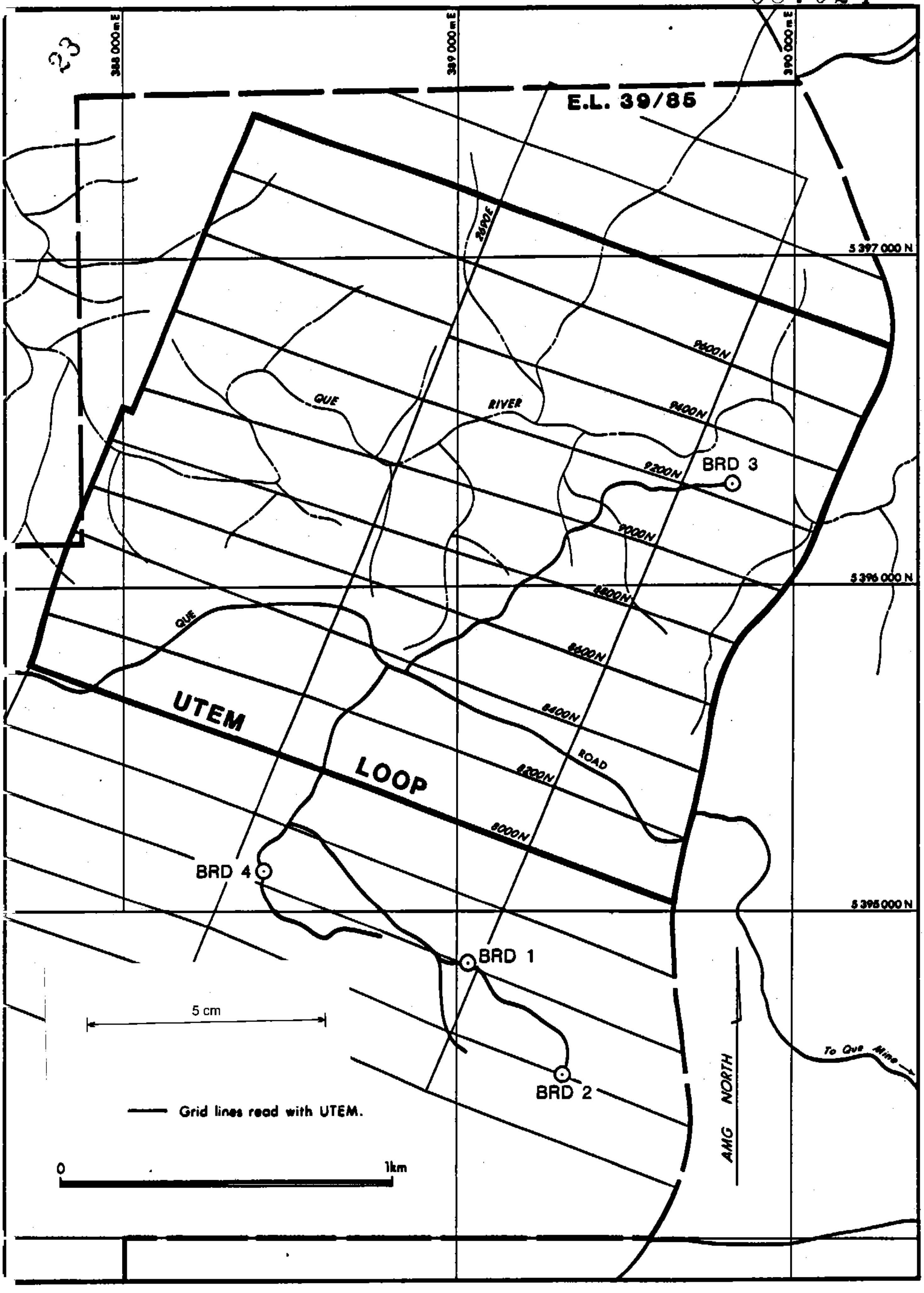

FIG. 2 UTEM COVERAGE BULGOBAC RIVER TAS.

(v) near-surface gravity responses on the positive gravity anomaly generate too much geophysical noise to enable resolution of the gravity response of an orebody at 900m depth.

(vi) the target horizon within the positive gravity anomaly is located at greater than 850m depth below surface.

(vii) O and C isotope studies indicate higher temperatures of vesicle infilling and veining in BRD 01 than 02. The suggestion is that BRD 01 is, in the context of the data, above the Hellyer deposit, 50 to 250m lateral from an orebody (G. Green, pers. comm.).

6.4 UTEM

A fixed-loop TEM survey (using UTEM III equipment) was completed over the northern half of the grid area, where CSAMT results had indicated possible shallower depths to the base of the Hellyer Basalt. The survey was conducted on 200 metre spaced lines, with readings at 50 metre intervals, recording both the horizontal and vertical components of the magnetic field. The transmitter loop location and surveyed area are shown in Figure 2 and results are included in Appendix IV.

Only one feature of interest is evident in the UTEM profiles - at approximately 1450E on Lines 8200N and 8400N. An early-time (Channels 10 to 7) residual Z component cross-over and coincident X component peak are consistent with a steeply dipping, poor quality conductor. The anomaly position however coincides with an inferred fault position in an area of Tertiary basalt cover and is interpreted as a probable weathering feature in the pre-basalt surface. Elsewhere in the survey area, the results are generally uniform, with variations in the TEM response reflecting thickness of the major shale and volcanic units, intersected in DDH 3.

6.5 Gravity

A gravity survey undertaken by the Department of Mines (Hudspeth and Richardson, 1985) indicated a significant gravity anomaly over the Hellyer deposit. With this encouragement, a gravity survey was undertaken during the summer of 1986/87 over the gridded area immediately west of the Murchison Highway to cover the areas of favourable stratigraphy delineated by the available geological mapping.

Technical details on this survey are included in Appendix II in Williams (1987a).

The area covered by gravity surveying was extended over most of the original licence area during the summer of 1987/88. Further details of this survey, which was undertaken by Solo Geophysics with Leaman Geophysics processing the data are included as Appendix V. This Appendix includes Leaman's 3-D modelling and interpretation.

Data from CSR's surveys, the Department of Mines detailed surveys on the Que River and Hellyer areas and the regional survey data from the Mt Read project have been integrated and are presented as Figure 3.

Three dimensional modelling of the geological interpretation derived from all available data has been completed by Leaman Geophysics. This modelling has indicated that the abnormal thicknesses of Que River Shale and underlying volcanics, which are hangingwall to the expected ore position, are

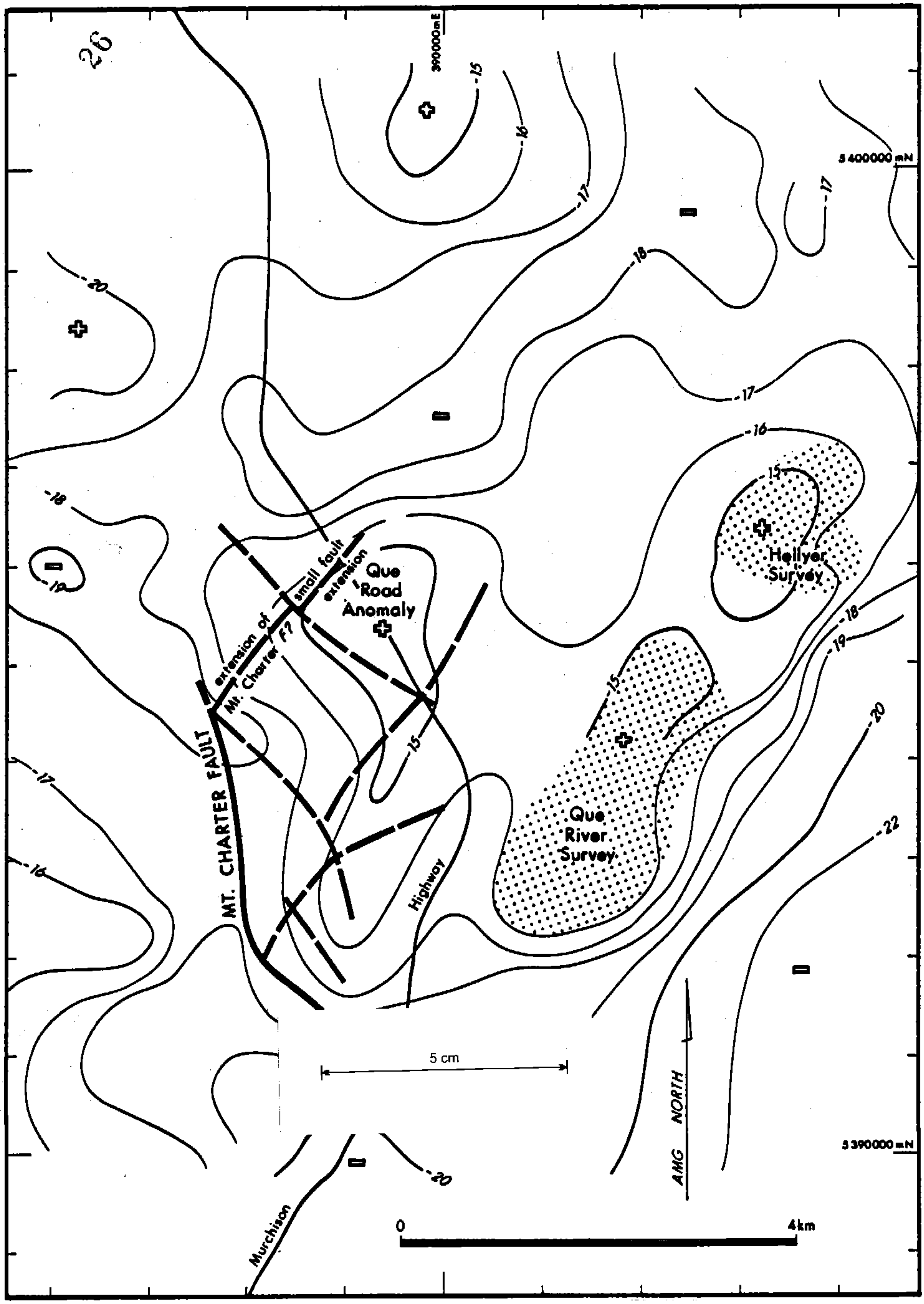

FIG. 3 GRAVITY COMPOSITE BULGOBAC RIVER TAS.

restricted to a small block where boundaries appear to have been growth faults during deposition of the units. This small basin, measuring 1.5 x 1.0 km is shown on Figure 3.

6.6 Developmental Geophysics

With the drillhole data indicating a depth penetration of about 500m by CSAMT, the problem remains of exploration at depths greater than 500m. Current thinking is that the large fixed loop EM systems such as UTEM would have no greater depth penetration. Gravity remains as one technique by which real data can be collected, but the decrease in anomaly magnitude due to increasing depth, again reduces the ability to detect Hellyer-sized massive sulphides.

Downhole EM is known to detect massive sulphides at depths of at least 1300m and is thus a viable exploration tool.

Consideration is being given to testing the potential of using a grounded fixed loop EM system. A large transmitter system such as that manufactured by Zonge may be suitable to generate the primary EM field. A SIROTEM receiver could be used to measure the secondary field. The Placer Dome Inc. geophysicist has become involved in the geophysical exploration aspect of the project.

6.7 Rehabilitation

On completion of the evaluation of DDH BRD 03 it was concluded there was little potential for a mineral deposit occurring in the area north of Que Road. The drill access track to BRD 03 was thus of no further use and was rehabilitated.

An attempt to rehabilitate the drill access track going southeast beyond BRD 04 was abandoned after the excavator became bogged. The boggy area was drained and partially covered. Further rehabilitation of this area will be attempted when next there is heavy machinery on site.

7. PROPOSED EXPLORATION

Exploration to be completed within the next renewal period (to February 1990) should include further evaluation of the defined graben structure (the area of potential mineralisation) and completion of mapping in the north-western corner of the Licence (in preparation for half relinquishment of EL 39/85 in February 1991).

A) GRABEN EVALUATION

STAGE 1

Evaluation of the CSR drilling and of the application of downhole geophysics has shown that drill hole BRD 01 is the only hole useful for further exploration of the downfaulted graben basin containing prospective host rocks to Hellyer style mineralisation. Holes BRD 02 and 04 pass out of the graben at shallow depth while BRD 03 is well outside of the graben area.

It is intended to determine if BRD 01 remains open. A downhole geophysical survey will then be completed to the bottom of BRD 01. Using Zonge Engineering's large generator, and several 1 km square loops it is considered, from theoretical modelling, that such a search radius of 400m will be obtained (looking for Hellyer sized orebody). Also it is thought that the techniques involved will "see" to an appreciable depth below the bottom to the hole.

Shifting loops should enable determination of the location of any anomalies.

STAGE 2

Further drilling will be required to follow up anomalies located in Stage 1.

STAGE 3

If no downhole EM anomaly is located then a widely spaced drilling programme (of up to a further 3 holes to depths of about 1100m each) will be considered over the area of the downfaulted, highly prospective, graben structure to test beyond the range of the BRD 01 survey and to permit further downhole geophysics if warranted.

These drilling programmes would have associated rock geochemistry, petrology and isotope studies.

It is anticipated that Stage 1 and a portion of Stage 2 and/or Stage 3 will be completed during 1989.

B) NORTHWEST EL 39/85 EVALUATION

Geological mapping of the Que River north of 5397000mN should be completed. This should include mapping of all small tributaries as well as the main river course.

8. CONCLUSIONS AND RECOMMENDATIONS

Exploration has vindicated the original geological concept of the subsurface extension of the Hellyer-Que River host rocks into EL 39/85. However, no significant mineralisation was intersected in the four diamond drill holes completed to date.

Although the drilling has shown the target stratigraphy to be at a greater depth than originally interpreted, the greater thickness of Que River Shale and the Hellyer Basalt are considered to be favourable factors in the application of the Kuroko-type model to the search for Hellyer-type deposits.

The use of O and C isotopes to determine temperatures of calcite formation in the Hellyer Basalt shows considerable promise as a technique to select favourable areas.

It is recommended that exploration be continued with an emphasis on completing the subsurface geophysical evaluation of the area around and below BRD 01.

Further drilling is required within the downfaulted graben structure either at downhole EM defined targets or on a wide spaced grid. Downhole EM should be completed as the drilling of each hole is finished.

Geological mapping of the drainages in the northwestern area of the Licence should be completed to ensure that no prospective ground is relinquished in 1991 if the Licence area has to be reduced by half.

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APPENDIX I

PETROLOGY OF SURFACE ROCK SAMPLES

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Dear Peter:

Herewith are the descriptions of the thirty samples from the Placer E.L. west of Hellyer. They were all fairly similar (felsic tuffs and lavas, with a couple of sediments), and I always find it very hard to write something different (and real or 'honest') about four or five samples which look very similar, thus a few of the descriptions are fairly short. However, I spent a long time after doing the descriptions going through the samples again and looking for groupings which might be useful in your regional and lease-wide correlation. Several groupings were evident.

1. Samples 85604, 08, 09 and 15 are almost identical crystal-lithic tuffs with an unusual and distictive groundmass texture. Could these be from the same unit.
2. Likewise for samples 85616, 07, 28 and 29, which are very nice rhyolitic lavas with pronounced similarities.
3. Also, vitric tuffs 85606, 17, 19 and 27 are very similar, especially the last three, and it should be checked whether these could be from the same unit.

One of the greywackes (85625) was very mica-rich and Precambrian-derived, and looks very Animal Creek Greywacke-ish, whereas the other (85623) is a locally derived volcanogenic greywacke. Overall, there is very little Precambrian component in the stuff I looked at. One final point worthy of note is that the rhyolites and rhyolitic pyroclastics contained virtually no FeTi oxide microphenocrysts, which are far more common in Central Volcanic Sequence and Western Sequence rhyolites than these presumed Southwell-Subgroup correlates.

Don't hesitate to get into contact re any problems or questions with this work.

Best wishes
Tony Crawford

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PETROGRAPHIC REPORT

Rocks from EL west of Hellyer

For Placer Exploration Ltd. 7/12/88

by

Anthony J. Crawford

Geology Department

University of Tasmania

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SAMPLE: 85601

SUMMARY:

This sample is a layered rhyolitic crystal-lithic tuff or epiclastic with layering being defined by variation in the ratio of quartz+feldspar crystal fragments to matrix.

HAND SPECIMEN:

An orienatated sample, with the thin section cut parallel to strike. On faces cut parallel to strike and at 45^{0} to strike, prominent coarse banding (bedding?) is visible, defined by lighter and darker grey-green layers at least 3cm thick. The rock is composed dominantly of crystal fragments with sparse obvious lithic fragments, and is clearly tuffaceous.

THIN SECTION DESCRIPTION:

This sample is less clearly layered in thin section than in cut hand specimen. It is composed of abundant crystals and crystal fragments of feldspar and quartz and subordinate lithic fragments in a heterogeneous, generally fine-grained tuffaceous matrix. Quartz phenocrysts up to 2mm across vary from somewhat rounded euhedra to anhedral fragments; the latter are dominant. Feldspar crystals are mainly angular fragments of albitized plagioclase which show very minor spotting by sericite. Occasional small lithic fragments are very fine-grained felsic volcanics, and are generally very difficult to distinguish from the variable groundmass.

The layering visible in this rock in hand-specimen is due to changes in the ratio of crystal fragments to groundmass. The darker bands contain fewer crystal fragments and more matrix, which is a quartz-albite-chlorite-sericite mixture with relatively abundant pale green chlorite. Lighter coloured bands are more crystal-rich, and in one layer, crystals are so concentrated that matrix is only a minor component and many crystals are in mutual contact. Whereas this rock clearly contains a dominant tuffaceous component, it is difficult to say with certainty whether it is a crystal-lithic tuff, or an epiclastic in which grains have been reworked to some degree. The lack of rounding of fragments suggests the former, while the apparent winnowing of matrix from some layers might indicate an epiclastic origin.

SAMPLE NUMBER: 85602

SUMMARY:

This rock was either a rhyolitic lava with sparse quartz and feldspar phenocrysts, or a decidedly crystal fragment-poor rhyolitic crystal vitric tuff.

HAND SPECIMEN:

This is a buff to light grey coloured rather featureless rock which would pass easily for a weathered quartzite. It is massive, structureless and shows no sign of phenocrysts, fragments or bedding.

THIN SECTION DESCRIPTION:

This rock in thin section is clearly not a quartzite, but a highly altered rhyolitic vitric tuff or formerly very glassy rhyolitic lava. The most obvious primary features of the rock are subhedral to fragmentary quartz crystals of clearly volcanic origin; these constitute around 3-5 modal % of the rock. Subordinate phenocrysts of feldspar have been albitized and then replaced by sericite, or sericite and pale green chlorite. In many instances, the micaceous mineral which replaces the feldspar phenocrysts is red-brown stained, either oxidized chlorite or sericite. The same material is liberally scattered throughout the groundmass, which is dominantly a very fine-grained, almost irresolvable quartz-albite-sericite intergrowth, almost certainly replacing felsic glass.

The rock is transected by a number of sub-parallel veinlets up to 5mm wide composed of a highly irregular mosaic of quartz and albite, with local concentrations of sericite; small angular areas of recrystallization of the groundmass to coarser-grained quartz and albite suggest that much of the veining developed by in-situ pressure solution and recrystallization

This rock could have been either a rhyolitic lava or a rather crystal-poor rhyolitic vitric tuff. The poorly-phyric nature of the sample and the fairly even textured formerly glassy groundmass make me lean towards a non-fragmental origin for the sample, although I note that many of the quartz phenocrysts are broken.

SAMPLE: 85603

SUMMARY:

This sample was a quartz+feldspar-phyric rhyolitic crystal lithic tuff with a glass-rich matrix.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a dark grey rock with abundant phenocrysts of feldspar and common dark grey rock fragments which appear to include both porphyritic felsic lava fragments and green and almost black cherty fragments.

THIN SECTION DESCRIPTION:

This sample is composed of approximately equal proportions of quartz and feldspar phenocrysts and rock fragments, which each constitute around 5-10 modal% of the rock. Quartz phenocrysts are euhedral to rounded, to 1mm, and frequently show some dissolution reaction with the groundmass, as well as quartz-feldspar 'tubes' representing former melt inclusions. Feldspar phenocrysts are up to 3mm long, and are composed of subhedral to almost rounded crystals of albitized plagioclase which show slight alteration to sericite. Rock fragments are dominantly fine-grained felsic volcanics which in many instances in thin section are difficult to discern from the groundmass. They are generally slightly rounded. One large rock fragment about 4mm long is quite different, being composed of a slightly schistose, strained quartz sandstone with abundant grain overgrowths and only a small amount of clayey (micaceous?) matrix; it has a definite 'Precambrian' look about it, and contains a single large zircon grain.

The groundmass of this sample is heterogeneous. It was formerly highly glassy, but has extensively devitrified ('recrystallized') to varying degrees, and some areas of groundmass are almost 0.5mm-long intergrown crystals of secondary albite and minor quartz and sericite. A fine mesh of pale sericite pervades some parts of the rock, but rarely makes up more than about 5 modal% of any area. Abundant small angular areas of pale green chlorite showing strongly anomalous deep blue birefringence occur throughout the groundmass.

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SAMPLE: 85604

SUMMARY:

This rock is a sparsely quartz+feldspar-phyric vitric crystal tuff. It is very similar to 85608, 85609 and 85615.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a slightly weathered, mottled cream to light-grey felsic crystal tuff or lava with visible feldspar phenocrysts.

THIN SECTION DESCRIPTION:

This sample is a relätively sparsely quartz+feldpsar-phyric crystal tuff composed of angular quartz grains and even less abundant feldspar crystal fragments. The quartz and feldspar grains are always less than 0.2mm long. Feldspar is albite and is only very slightly flecked by sericite.

The groundmass is very heterogeneous-textured and is essentially quartz-feldspar intergrowths with variable grainsizes. Coarser-grained areas are made up of intimately-sutured 0.1mm laths and rosettes of albite and subordinate quartz which grade sharply (ie. over a very small distance) but gradually into areas of much finer-grained quartz-albite intergrowths. Minor localizations of pale green chlorite are dispersed through the rock, and the small amount of sericite in the sample has weathered to a rusty red colour. A number of small, rounded to flattened lithic fragments in this sample were probably pumiceous.

This sample is petrographically very close to 85608,9 and 15, based especially on the irregular patches of coarser-grained recrystallization in the groundmass which almost resemble holocrystalline lithic fragments of dacite or andesite.

SAMPLE: 85605

SUMMARY:

This sample is a sparsely quartz+feldspar-phyric, trachytic-textured rhyodacitic lava.

HAND SPECIMEN:

In a freshly-cut face, this sample is a fine-grained medium brown rock with an unusual texture defined by darker brown squiggles in a cream matrix. No phenocrysts are evident.

THIN SECTION DESCRIPTION:

In thin section, this sample is clearly a pilotaxitic-textured rhyodacitic lava. The unusual squiggly texture visible in hand specimen is still obvious in thin section, and is due to curved and curling domains of groundmass somewhat more enriched in chlorite than adjacent domains. This is more likely to be a feature developed during post-eruption (low-grade burial metamorphic?) modification of the lava flow, perhaps during devitrification and recrystallization of the relatively minor glassy component in the vitrophyric groundmass.

Phenocrysts probably total less than 2 modal% of this lava. Sparse small quartz phenocrysts are overgrown by quartz from the groundmass, but former phenocryst outlines are still visible. Feldspar phenocrysts are elongate prisms of albite and show only very limited sericite alteration.

The rock contains several prominent rounded vesicles which have been filled by albite and a dirty red-brown opaque oxide (goethite?). The vitrophyric groundmass has a trachytic texture defined by flow-oriented feldspar microlites. Small areas of secondary quartz have grown in the groundmass, which is pervaded by wispy chlorite and more dense chloritic areas, as described above. Several small rosettes of epidote-clinozoisite are also present in the groundmass. Veinlets zoned from quartz to green chlorite to goethite(?) transect the rock, but are always narrower than 0.3mm.

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SAMPLE: 85606

SUMMARY:

This rock is a fine-grained rhyolitic vitric tuff containing sparse crystal fragments of quartz and feldspar in a groundmass which probably originally contained a high proportion of glass shards.

HAND SPECIMEN:

This is a whitish-cream fine-grained felsic lava or tuff with sparse phenocrysts less than 0.5mm long.

THIN SECTION DESCRIPTION:

This sample is a fairly uniform-textured felsic volcanic with rare angular crystal fragments of quartz and albite. The quartz grains often show strong resorption at contacts with the groundmass, and albite grains show minimal alteration to sericite. The groundmass is very fine-grained and was almost certainly highly glassy (including glassy lithic fragments), but shows some textural variation because of varying degrees of recrystallization of devitrified glass. There is some 'ghost' suggestion in places that the groundmass may have been composed of abundant glass shards, but the devitrification and recrystallization has almost obliterated the former diagnostic shapes of the glass shards. Glass has recrystallized as a generally fine-grained quartz-albite-chlorite intergrowth; chlorite is pale brown and has exceptionally low birefringence; sericite is a very minor component of this rock, occurring as flecks through the groundmass.

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SAMPLE: 85607

SUMMARY:

This is a well-preserved quartz+feldspar-phyric rhyolite with a uniform equigranular groundmass probably grown from devitrification of a formerly glassy groundmass. It is very similar to lava 85616 and 85628 and 29.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a buff-coloured feldspar+quartz-phyric rhyolitic lava with phenocrysts up to 3mm long.

THIN SECTION DESCRIPTION:

This is a very well-preserved rhyolitic lava with approximately 10 modal% of phenocrysts of quartz and a similar amount of feldspar in a uniform groundmass. Quartz phenocrysts are generally subrounded, due to resorption, and all contain rounded melt inclusions which have devitrified to exceptionally fine-grained pale brown material. Feldspar phenocrysts are euhedral to somewhat rounded subhedra, and show slight sericite flecking.

The groundmass is quite uniform, equigranular mosaic of quartz and feldspar with interstitial sericite and minor chlorite. Flakes of green secondary biotite are present in minor amounts through the groundmass, intergrown with secondary quartz. A few grains of leucoxenized FeTi oxide and spindle shaped sphene crystals are also present. This sample is quite similar to rhyolitic lavas 85616 and 85628 and 29.

SAMPLE: 85608

SUMMARY:

This sample is a crystal-lithic tuff.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a mottled green and cream coloured crystal lithic tuff, with abundant crystals of pale feldspar and quartz, and subordinate darker coloured fine-grained lithic fragments.

THIN SECTION DESCRIPTION:

This sample is a crystal lithic tuff dominated by angular crystal fragments of quartz and feldspar up to 5mm across, although the average grainsize is probably closer to 0.5-1mm. Quartz fragments are angular to rounded (resorbed) subhedra with abundant devitrified melt inclusions attesting to their volcanic origin. Feldspar grains are subhedral to angular albite after more calcic plagioclase, and are slightly sericite-flecked. Lithic fragments are mainly of very fine-grained formerly glassy felsic volcanics or tuff. They are generally more rounded than the crystal fragments. Lithic fragment boundaries are usually difficult to locate, as they merge imperceptibly with the groundmass. This is due to both having suffered devitrification of the dominant glassy component, followed by extensive recrystallization as very fine-grained quartz and feldspar.

Whereas most of the groundmass is very fine-grained, some irregularly-distributed and sometimes anastomosing groundmass areas of almost holocrystalline, medium-grained interlocking laths of albitized plagioclase and minor chlorite and occasional large euhedral zircons grains look very like andesitic or dacitic rock fragments. This almost bimodal distribution of groundmass textures and grainsizes is quite diagnostic, and evident also in slides 85615

The heterogeneous groundmass of this sample consists of a fine- to very fine-grained intergrowth of quartz and albite, probably after a dominant glassy component. Pale green-yellow chlorite and sericite are also present, and a feature of this sample is the presence of euhedral spindle-shaped crystals of sphene in the groundmass.

SAMPLE: 85609

SUMMARY:

This is a relatively coarse-grained (to 1cm) quartz+feldspar-phyric crystal-lithic tuff that contains the variably recrystallized fine- to medium-grained formerly vitric groundmass also seen in samples 85604, 85608, and 85615.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a dark grey-red feldspar+quartz-phyric crystal-lithic tuff with a few very fine-grained black lithic fragments.

THIN SECTION DESCRIPTION:

This sample is dominated by broken euhedra of feldspar and angular quartz grains up to 8mm long. The quartz contains abundant devitrified melt inclusions, attesting to its volcanic origin. Feldspar fragments are albitized plagioclase, and they are slightly to totally altered to pale sericite. Lithic fragments are common but not abundant and are frequently difficult to differentiate from the heterogeneous groundmass. They are all very fine-grained vitric tuffs or tuffaceous siltstone, and are rarely larger than 3mm.

The groundmass is very variable in the degree to which former glass has devitrified. Some areas are composed of very fine-grained devitrified vitric material, while others are recrystallized to the extent that these areas of groundmass are made up of interlocking blocky albite laths and rosettes with minor interstitial quartz. These coarser-grained areas are very reminiscent of subvolcanic (holocrystalline) andesitic rock fragments, but the fact that the same texture commonly extends outward from 'fragments' into meandering veinlets through finer-grained groundmass indicates that it a recrystallization feature. Slightly Fe-stained yellow sericite pervades the rock, sometimes occurring as patches and seams, and small localized areas of ink-blue birefringent chlorite and calcite are also present.

This rock is virtually identical to 85604, 85608 and 85615 and the possibility that they are from the same stratigraphic unit should be considered.

SAMPLE: 85610

SUMMARY:

This sample is a fine-grained, layered crystal vitric tuff.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a dense, grey-green and cream banded fine-grained tuff or tuffaceous sediment with several distinct layers less than 1cm thick.

THIN SECTION DESCRIPTION:

This sample is probably a fine-grained epiclastic sandstone, although it could be a layered tuff with relatively few crystal fragments. Layering is indistinct in thin section, and is defined mainly by some variation in the amount of chlorite in the matrix, which probably reflects the original variation in abundance of glassy material in the matrix. One layer contains a number of formerly vitric lithic fragments which are sericitized, but which have shapes suggestive of flattened pumice fragments. The small amount of identifiable detrital grains are angular quartz and feldspar, the latter often sericitized; the grainsize is less than 1mm.

The groundmass of this rock is a fairly even-textured, very fine-grained intergrowth of quartz and albite with abundant dispersed sericite; it was probably originally quite rich in glassy dertritus. The rock is cut by a number of quartz, quartz-albite and quartz-albite-goethite(?) veinlets, and a number of narrow high strain zones are intensely sericitized.

The layer with flattened pumice fragments, and the absence of obvious reworking suggest to me that this sample is more likely to have been a distal tuff rather than a tuffaceous sediment.

SAMPLE: 85611

SUMMARY:

This sample is a formerly glassy sparsely plagioclase-phyric dacitic or rhyodacitic lava.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a fractured and slightly weathered mottled grey-cream indeterminate felsic volcanic or tuff.

THIN SECTION DESCRIPTION:

This rock is clearly a felsic lava in thin section, composed of around 10 modal% of slightly resorbed and reacted subhedra of albite to about 2mm long, which show abundant chloritized melt inclusions aligned parallel to crystal growth faces. The feldspar phenocrysts commonly occur grouped two or three together in glomeroclots, and they show very little sericite flecking. There is no evidence of the former presence of mafic phenocrysts.

The groundmass of this sample is composed of two slightly different-textured domains which are best seen under uncrossed polars. The 'cleaner' of these domains is a mosaic-textured quartz-albite intergrowth containing only very minor chlorite, whereas the 'dirtier' areas are somewhat finer-grained quartz-albite intergrowths but with notably more abundant interstitial pale yellow-green chlorite. These domains are generally bleb-shaped and up to 5mm across. This texture is typical of devitrification and recrystallization from a uniform, homogeneous glass, with the two domains representing areas of different degrees of incipient ordering and crystallization from the glass. During burial metamorphism-induced recrystallization, the two domains showed slightly different styles of recrystallization.

The rock is cut by a number of anastomosing veinlets of quartz to 1mm wide in thin section.

48

687049

SAMPLE: 85612

SUMMARY:

This sample is an excellent vitric crystal tuff with a very well preserved glass-shard texture and sparse quartz phenocryst fragments.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a mottled dark-grey and creamy brown dense fine-grained felsic lava or vitric tuff with few visible phenocrysts but the characteristic dendritic texture of devitrified glass.

THIN SECTION DESCRIPTION:

This rock is a vitric crystal tuff with one or two modal% of angular volcanic quartz grains less than 0.5mm across set in a matrix with an excellent glass-shard texture. The matrix consists of very fine-grained quartz-albite intergrowth in which are embedded up to 60 modal% of sericitized glass shards mainly less than 0.1mm long, and less abundant slightly curved and larger flattened pumice fragments now composed of very fine-grained quartz and feldspar.

Around 5-10 modal% of the rock is composed of a dirty brown isotropic mineral or mineral mixture distributed unevenly through the rock, and not appearing to replace any particular phase; it is sometimes intergrown on a very fine scale with calcite and may be ferruginized sericite. It also occurs defining very thin stylolitic partings across the sample. A few small (<0.5mm) slightly rounded lithic fragments, probably also formerly glassy tuff, are present in the rock.

49

687050

SAMPLE: 85613

SUMMARY:

This sample is an felsic, ignimbritic lithic crystal tuff.

HAND SPECIMEN:

On a freshly-cut surface, this is a white to pale grey ignimbritic tuff with large phenocrysts of feldspar and quartz and numerous flattened pumice fragments, and a well-defined stylolitic fracture.

THIN SECTION DESCRIPTION:

This well-preserved ignimbritic tuff is composed of approximately 3-5 modal% of quartz and feldspar phenocryst fragments and perhaps 10-15 modal% of lithic fragments in a devitrified and recrystallized formerly glassy fragmental matrix. The quartz and feldspar crystal fragments are up to 4mm across and are generally angular fragments or resorbed subhedra (feldspar). The latter are slightly sericitized. The lithic fragments are often hard to distinguish from the matrix, but are virtually all formerly pumice, vitric tuffs or felsic lava fragments. Pumice fragments are flattened and generally more sericitized than other lithic clasts.

The groundmass of this rock was probably a welded fragmental tuff, composed of very small vitric lithic fragments, some glass shard material and comminuted pumice. It is traversed by numerous stylolitic wavy fracture dissolution planes along which tiny opaques have concentrated, and sericitization has been more intense. This feature serves to overestimate the amount of this rock which is composed of flattened pumice fragments, and enhance the ignimbritic appearance to the sample.

50

687051

SAMPLE: 85614

SUMMARY:

This is a crystal tuff dominated by crystal fragments of volcanic quartz and weathered feldspar (clay), although a small component of detritus serived from Precambrian metamorphics is notable.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a palr brown, fairly weathered slightly ferruginous sandstone or tuff.

THIN SECTION DESCRIPTION:

This rock is a weathered crystal tuff dominated by sub-millimeter-sized angular to subhedral grains of volcanic quartz and feldspar. The quartz grains are mainly crystal fragments and some contain devitrified melt inclusions; they constitute around 30 modal% of the sample. However, a small proportion of the quartz grains are polycrystalline and show evidence of strain and subgrain recrystallization, and maybe derived from the Precambrian. Feldspar grains are now represented by isotropic red-brown clayey aggregates which make up around 5 modal% of the rock; presumably, they were sericitized albite which was replaced or altered to Fe-stained clay minerals during surface weathering.

The groundmass of this sample was originally highly vitroclastic, and there is some suggestion of former glassy shards. Glass has devitrified into a variable-textured very fine-grained quartz-albite groundmass.

SAMPLE: 85615

SUMMARY:

This sample is a rhyolitic crystal lithic tuff with a devitrified and recrystallized vitric tuffaceous matrix. It is very similar to samples 85608 and 85609.

HAND SPECIMEN:

This sample on a freshly cut face is white to pale grey and pink and appears quite altered. It is clearly a fine- to medium-grained fragmental volcanic with occasional lithic fragments to around 1cm long.

THIN SECTION DESCRIPTION:

Thin section examination shows this sample to be a crystal lithic tuff with about 10-15 modal % of angular to slightly resorbed volcanic quartz fragments and slightly less abundant subhedral to angular crystal fragments of albitized plagioclase feldspar which contain minor sericite flecking. These crystal fragments are mainly less than 1mm long. Most lithic fragments composed of very fine-grained quartz-albite-sericite-chlorite replacing devitrified glass in rhyolitic vitric tuff or glassy lava. These are mainly less than 1mm across, although some fragments are almost 1cm long.

The groundmass of this sample is heterogeneous, due to variable recrystallization of a major vitric component in the matrix, including areas which are almost holocrystalline. This groundmass texture has been observed also in 85608 and 85609, and consists of interlocking broad laths and rosettes of albite with minor interstitial chlorite. These grade into areas of finer-grained groundmass recrystallization. Patches and veinlets of yellow to bright red coloured oxidized chlorite or sericite traverse parts of the rock and highlight lithic fragment boundaries which are otherwise difficult to recognize.

SAMPLE: 85616

SUMMARY:

This sample is a well-preserved quartz+feldspar-phyric rhyolitic lava.

HAND SPECIMEN:

On a freshly-cut surface, this sample is an olive green, dense porphyritic rhyolite with small (<1mm) phenocrysts of feldspar and quartz.

THIN SECTION DESCRIPTION:

This sample shows an excellent porphyritic volcanic texture defined by subequal amounts of albite and quartz phenocrysts in a fine-grained equigranular groundmass. The phenocrysts total around 20 modal% of the rock and are euhedral to subhedral prisms up to 4mm across. Quartz phenocrysts are usually slightly rounded (resorbed) and contain abundant excellent melt inclusions which have devitrified to an exceedingly fine-grained quartz-albite intergrowth. Feldspar phenocrysts are albitized plagioclase, and show only minimal sericite alteration; they often occur in multi-grain clots. A single small phenocryst of chloritized biotite is present, and sparse FeTi oxide microphenocrysts have been altered to leucoxene and goethite.

The groundmass of this sample is very uniform and equigranular, composed of a mosaic of quartz and albite grains surrounded by narrow rims of pale green to light brown chlorite and minor sericite. The texture suggests that the groundmass may have developed from devitrification of rhyolitic glass. In the more weathered part of the rock, the dominant mineralogical change is an oxidation of the green chlorite to a red chlorite-like mineral. This sample is clearly a rhyolitic lava.

SAMPLE: 85617

SUMMARY:

This rock is a relatively fine-grained rhyolitic lithic crystal tuff containing flattened pumice fragments and subordinate quartz and feldspar crystal debris.

HAND SPECIMEN:

This sample on a freshly-cut face is a mottled cream, grey and green rock with phenocrysts of feldspar and occasional distinct lithic fragments usually less than 3mm long.

THIN SECTION DESCRIPTION:

This sample is a relatively crystal fragment-poor lithic crystal tuff with flattened pumice fragments and rare devitrified glassy shards visible. Angular volcanic quartz and feldspar fragments usually less than 0.5mm long form only 2-3 modal% of the rock; the feldspar (albite) shows very minor sericite alteration. Probably 25-30 modal% of this rock is composed of indistinct somewhat rounded aphyric fragments of vitric tuff or devitrified rhyolitic glass. Other extremely fine-grained fragments are wavy-elongate and were probably flattened pumice fragments.

The heterogeneous quartz-feldspar groundmass contains local concentrations of yellow chlorite and pale sericite and irregular spotty patches of dirty brown isotropic leucoxene(?) possibly after FeTi oxides. Ghost relics of former glass shards are discernible in a few places, and suggest that glassy shard material may have constitute far more of this rock than is evident following recrystallization of the glass. This sample is very similar to samples 85619 and 85627.

54

SAMPLE: 85618

SUMMARY:

This sample is a rhyolitic crystal lithic tuff or epiclastic.

HAND SPECIMEN:

On a freshly-cut face, this sample is a mottled light brown to dark grey crystal lithic tuff or epiclastic with some dark lithic fragments to 1.5cm across, and abundant feldspar crystal fragments.

THIN SECTION DESCRIPTION:

This sample is dominated by abundant crystal fragments of quartz and feldspar derived from felsic volcanics. Quartz fragments, which constitute around 20 modal% of this rock, are up to 4mm across and are subhedral to angular with abundant chloritized melt inclusions. Feldspar grains are mainly 0.5-2mm across, and constitute around 40 modal % of the rock. They are entirely albite after more calcic plagioclase, and show minor flecking by sericite. They are generally blocky euhedra or fragments thereof.

As in many of these samples, lithic samples obvious in hand specimen are far less notable in thin section. Most are very fine-grained felsic lava or vitric tuff, and a few contain crystal fragments of both quartz and feldspar. A few more holocrystalline lithic fragments are composed of interlocking feldspar and minor blue-birefringent chlorite and may represent shallow andesitic or dacitic intrusives. The matrix of this sample is modally less abundant and rather more chlorite-rich than many of the other samples. The overwhelming proportion of fragments relative to groundmass give a vague impression that this rock may be epiclastic rather than pyroclastic in origin, although it is impossible to say for certain.

SAMPLE: 85619

SUMMARY:

This is a devitrified vitric tuff with sparse crystal fragments of quartz and feldspar; it is almost identical to 85606, and may represent the same stratigraphic unit.

HAND SPECIMEN:

This is a massive, white to fawn coloured felsic lava or tuff with few discernible phenocrysts; it is cut by a number of quartz veinlets up to 3mm wide.

THIN SECTION DESCRIPTION:

This massive, uniform textured rock consists of sparse angular fragments of volcanic quartz and even fewer sericitized feldspar crystal fragments in a very fine-grained mottled groundmass composed of quartz, feldspar and dirty brown chlorite and subordinate sericite. It was probably a vitric tuff, in which the fragmental, very fine-grained glassy groundmass has devitrified and recrystallized. This sample is strikingly similar to sample 85606 in both hand specimen and thin section, except that in this rock, any evidence for the former presence of glass shards in the matrix has been totally obliterated by groundmass recrystallization. Also this rock is cut by a few quartz veinlets which were not evident in 85606.

687057

SAMPLE: 85620

SUMMARY:

This rock is a fairly altered, relatively coarse-grained lithic crystal tuff with most lithic fragments being vitric tuff or glassy rhyolitic material.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a speckled brown, dense but fairly altered lithic tuff, with some fragments up to 7mm across.

THIN SECTION DESCRIPTION:

In thin section, the tuffaceous nature of this sample is evident, although individual fragments are not easily discernible. About 3 modal% of the rock consists of highly angular volcanic quartz fragments to about 1mm across maximum, and a similar amount is constituted by angular albitized feldspar grains which show only minor sericite alteration. Lithic fragments were originally mainly vitric tuff or glassy rhyolitic lava, but glass has devitrified to quartz and albite. Some fragments seem to be flattened rhyolitic pumice with a pronounced fine-grained, wavy banded appearance in the devitrified glass. A fine meshwork of pale sericite pervades this rock, and patchy calcite alteration makes up around 10 modal% of the sample.

SAMPLE: 85621

SUMMARY:

This sample is a devitrified aphyric glassy rhyolite, which was (auto) brecciated during or after eruption; in thin section it has a distinctive leopard-spot devitrification texture.

HAND SPECIMEN:

On a freshly-cut surface, this rock is a massive, pink-grey-cream crystal-poor felsic lava which appears to have been autobrecciated, or brecciated after solidifcation during a local, brittle deformation-silicification event.

THIN SECTION DESCRIPTION:

This rock has a strikingly unusual and distinctive texture in thin section. The entire section is probably composed of only three or four fragments of rhyolitic lava. These are phenocryst-free, and probably originally contained a very large glassy component. The glass, with former perlitic curved cracks still visible in places, has extensively devitrified and recrystallized into small-scale leopard skin-type spots which are very obvious under uncrossed polars, but which merge with surrounding matrix under crossed polars. Both the spots, which are mainly 0.05-0.2mm across, and the surrounding matrix are composed of very fine-grained quartz-feldspar intergrowths, but the areas between the spots is coarser-grained than in the spots. The margins of the spots are defined by a narrow rim of oxidized chlorite or sericite. The spots probably originated by variations to which the rhyolite developed incipient crystallization (eg. as in snowflake obsidian) and how these incipiently crystallized versus still glassy domains reacted to burial metamorphism-related devitrification-recrystallization.

The rock is transected by a number of quartz and calcite veinlets, and there appears to have been significant remobilization of silica during devitrification and subsequent brecciation. Meshworks of sericite define small shear planes through the rock, and pale sericite is fairly abundant throughout.

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687059

SAMPLE: 85622

SUMMARY:

This sample is an obviously fragmental rhyolitic lava breccia or coarse-grained lithic crystal tuff.

HAND SPECIMEN:

On a freshly-cut surface, this sample is seen to be a coarse-grained, fairly highly altered lava breccia containing prominent angular fragments to 2cm long of pink and light green felsic aphyric volcanic fragments.

THIN SECTION DESCRIPTION:

The coarse fragmental nature of this sample is considerably less obvious in thin section than hand specimen, although it is still quite clear that the rock is a lithic crystal tuff or lava breccia. Lithic fragments include aphyric and quartz+feldspar-phyric felsic volcanics; in the latter, crystals are subhedral or euhedral quartz and albitized plagioclase flecked by sericite. The same crystal population is present as discrete grains in the matrix of the rock, although these are more commonly fractured and angular. The groundmass probably originally included much detrital glassy material, which has devitrified and recrystallized to quartz-albite mosaics of variable grain size. Veinlets and patches of pale sericite occur throughout the rock, and small deformation-induced quartz-albite veinlets cut both crystals and matrix. Several localizations (multi-crystal grains?) composed mainly of deep red cubic oxide grains to 0.5mm across are present, and may represent oxidized pyrite. Whether the pyrite accumulations were primary clasts or secondary features is impossible to judge.

SAMPLE: 85623

SUMMARY:

This sample is a volcanogenic quartz arenite.

HAND SPECIMEN:

This is a cream to pink coloured quartzite or quartz arenite with maximum grainsize around 1mm.

THIN SECTION DESCRIPTION:

This sample is a quartz arenite composed of around 40 modal% of angular to subrounded volcanic quartz grains, about 25 modal% of very fine-grained felsic volcanic fragments and the remainder a quartz-rich silty matrix. Quartz fragments show occasional preserved crystal faces and devitrified melt inclusions, and are clearly virtually all of volcanic origin. Lithic fragments are far more rounded than the quartz grains, and appear to be dominantly very fine-grained formerly vitric tuff or lava, and perhaps occasional chert or siltstone fragments.

This sample appears to be very largely derived from a nearby felsic-volcanic dominated terrain. There is minimal evidence for a component derived from the Precambrian, and in this regard the rock is unlikely to be correlatable with either the micaceous Animal Creek Greywacke or the Murrays Road Greywacke in the Southwell Subgroup.

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SAMPLE: 85624

SUMMARY:

This sample is a lithic crystal tuff with distinctive fragments of devitrified spherulitic rhyolite in a crystal tuff matrix.

HAND SPECIMEN:

On a freshly-cut surface this sample is a mottled brown-green rock with abundant plagioclase phenocrysts and fine-grained rock fragments.

THIN SECTION DESCRIPTION:

This is a lithic crystal tuff composed of abundant distinctive devitrified spherulitic rhyolite fragments embedded in a matrix of 'cleaner' quartz+plagioclase-rich crystal tuff. The rhyolitic fragments are sparsely feldspar-phyric and were originally highly glassy. The glass has devitrified to a pronounced spherulitic texture with cores of spherulites being a quartz-albite mosaic bordered by narrow rims of sericite from adjacent spherulites. In addition to the spherulitic rhyolite clasts, the crystal tuff matrix consists of abundant highly angular crystal fragments of volcanic quartz and feldspar in a very uniform fine-grained groundmass of quartz and feldspar with minor sericite.

61

SAMPLE: 85625

SUMMARY:

This rock is a quartz-rich micaceous greywacke derived entirely from a pelitic metamorphic terrain; it is very similar to the Animal Creek Greywacke.

HAND SPECIMEN:

This sample is a dark grey fine-grained quartz arenite cut by a number of narrow meandering veinlets of quartz.

THIN SECTION DESCRIPTION:

This rock is a quartz-rich greywacke containing abundant mica and some metamorphic rock fragments. Quartz grains are angular with intimately sutured grain boundaries in poly-crystalline grains, and are generally less than 0.5mm across. They often show patchy and fan-like extinction and are very unlike the volcanic-derived quartz seen in the majority of the rocks examined from this area. Detrital grains of muscovite and subordinate chloritized biotite are abundant but not orientated parallel to bedding. Occasional lithic clasts are pelitic schist or slate. Stylolitic pressure solution has compacted this rock and led to dissolution and mobilization of silica, and the concentration of tiny opaque oxides and micas on stylolite surfaces.

The majority of the detritus constituting this quartz-rich micaceous greywacke is clearly derived from Precambrian pelitic metamorphics. The volcanic component in this sample seems to be minimal, and in this respect, plus the dominant metamorphic component, it is quite different from the volcanogenic quartz arenite 85623. This micaceous greywacke is reminiscent in thin section of the Animal Creek Greywacke, in that it derived from a proximal pelitic Precambrian terrain.

SAMPLE: 85626

SUMMARY:

This is a vitric crystal tuff with flattened pumice fragments and sparse quartz crystal debris. It is almost identical to sample 85627, and very similar to 85617 and 85619.

HAND SPECIMEN:

On a fresh-cut surface, this is a mottled cream-grey rock with little obvious structure, but a hint of a fragmental volcanic texture.

THIN SECTION DESCRIPTION:

This sample consists of a few modal % of angular volcanic quartz fragments less than 1mm long in a groundmass dominated by flattened pumice fragments and devitrified glassy material including some still-evident shards. Most pumice fragments are rather curved and more sericitic than adjacent fragments of devitrified glassy lava or tuff. Fine, wispy sericite pervades the groundmass.

SAMPLE: 85627

SUMMARY:

This rock is a vitric lithic crystal tuff with lithic fragments to 1 cm in a matrix containing abundant devitrified glassy shards.

HAND SPECIMEN:

On a freshly-cut surface, this sample appears to be a dark grey-green lithic tuff, with poorly-defined pink to grey fine-grained felsic volcanic fragments up to 1cm across.

THIN SECTION DESCRIPTION:

This sample is composed of around 10 modal% of angular crystal fragments of volcanic quartz and feldspar (slightly sericitized), and notably larger and more abundant lithic fragments of formerly glassy felsic tuff or lava. Boundaries of the latter fragments are very difficult to discern from the quartz-feldspar mosaic matrix, as both have undergone devitrification of original felsic glass. Curved, flattened pumice fragments and abundant devitrified glass shards are abundant in the matrix of this rock.

The groundmass is partially sericitized and contains abundant relatively large zircons and sphene crystals; where it is affected by surficial weathering alteration, the main mineralogical change is an oxidation of the pale green chlorite and sericite in the rock to a rusty red colour.

In many respects this sample is similar to 85619.

SAMPLE: 85628

SUMMARY:

This sample is a quartz+feldspar-phyric rhyolitic lava. It is possibly a slightly more weathered version of the same unit represented by 85616.

HAND SPECIMEN:

On a freshly-cut surface, this sample is a weathered brown quartz+feldspar-phyric rhyolitic lava.

THIN SECTION DESCRIPTION:

This sample is a slightly more weathered, but otherwise strikingly similar sample to rhyolitic lava 85616. It consists of 15-20 modal% of phenocrysts to 3mm across of quartz and feldspar. Quartz phenocrysts are variably resorbed and show excellent melt inclusions. Feldspar phenocrysts are albitized plagioclase, and are generally slightly rounded subhedra, with only very minor sericite alteration. The groundmass is uniform and equigranular, composed of a mosaic of quartz, feldspar and red-brown oxidized chlorite. The sample is clearly a rhyolitic lava. I suggest that there is a strong possibility that this sample and 85616 are from the same unit.

SAMPLE: 85629

SUMMARY:

This is a light coloured quartz+feldspar-phyric rhyolitic lava, very similar to slightly less weathered sample 85607, and samples 85616 and 85628.

HAND SPECIMEN:

This is a cream-coloured quartz+feldspar-phyric massive rhyolitic lava.

THIN SECTION DESCRIPTION:

This sample is a quartz+feldspar-phyric rhyolitic lava with a uniform equigranular groundmass. Quartz phenocrysts constitute around 10 modal% of the rock and are extensively resorbed and rounded; they contain devitrified melt inclusions. Feldspar phenocrysts are slightly rounded blocky subhedra of albitized plagioclase which show slight sericitization. Neither type of phenocryst is bigger than 3mm across.

The groundmass is a very even-textured mosaic of intergrown quartz and albite with subordinate sericite and chlorite; it may have developed from devitrification of a formerly glassy groundmass. Sericite has absorbed iron and stained red-brown in some areas.

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SAMPLE: 85630

SUMMARY:

This sample is a slightly autobrecciated and probably formerly pillowed feldspar-phyric dacitic lava.

HAND SPECIMEN:

On a freshly cut surface, this is a dark grey feldspar-phyric lava with an unusual textural variation ranging from dense very fine-grained rinds and sparse fragments, to more even-textured porphyritic 'lava'. Feldspar phenocrysts in the weathered parts of the rock are replaced by yellow-brown clay.

THIN SECTION DESCRIPTION:

The textural variation noted above is the most significant feature of this rock in thin section. Part of the slide is composed of a dense pale green-yellow mat of chlorite in which are embedded perfectly euhedral phenocrysts of albitized plagioclase to around 1mm long, and sparse leucoxenized FeTi oxide microphenocrysts. I interpret this to represent a formerly glassy rim of a flow unit (pillow?). The remainder of the rock is composed of a relatively well-preserved vitrophyric dacitic lava dominated by phenocrysts of albitized plagioclase (to 5mm long in hand specimen) which are partly or totally replaced by sericite. Rare quartz phenocryst fragments are present, but there is no clear-cut evidence that this lava contained mafic phenocrysts originally. The groundmass consists of tiny lath-like actinolite crystals after primary clinopyroxene set in an extremely fine-grained quartz-albite matrix. The texture of the groundmass is variable, and a few discrete volcanic fragments very similar to the host rock are present; this suggests that the rock may have undergone some autobrecciation during eruption. The overall feeling is that this rock represents an autobrecciated, probably pillowed felsic lava, probably a dacite judging by the amount of former mafic microlites in the groundmass. The absence of a gradual transition from the formerly glassy flow margin to the more vitrophyric interior suggests also that some degree of autobrecciation and 'breaking-off' of pillow rims may have occurred during eruption.

APPENDIX II

DRILL LOGS

687069

Minerals Exploration And Development Group

CSR

TO OVERSEAS GEOLOGISTS

REFERENCE RJF/BW/OSA:43

FROM R J FOUNTAIN

DATE 20 FEBRUARY 1987

DRILL LOGGING FOR INDONESIAN GOLD PROSPECTS
MODIFIED FOR BULGOBAC RIVER PROJECT, TASMANIA

INTRODUCTION

Experience with computer logging formats in 1986 suggested the need for clarification of the underlying principles behind using the system, and also better explanation of the coding systems used, to minimize between geologist variations.

AIMS AND PRINCIPLES OF THE SYSTEM

The basic purpose of a drill log is to provide a geologic framework for interpretation of the assay results encountered in the hole, as well as a record of the important features of the geology encountered. It is neither possible, desirable or economic to record all the geologic features encountered in a drill hole. In the computer logging system, two basic types of data are allowed for, comprising:

1) routinely occurring data, such as core recovery, oxidation state, alteration state and mineralogy, sulphide content, vein and fracture density; and

2) 'one off' type information such as the occurrence of an unusual mineral, rock type or other fracture, and qualitative descriptions of geological features.

The first group of data types, if recorded sensibly, can be used to control statistical analyses etc. of assays, or included in routine downhole plots for presentation. The second group of information is not useable for these purposes and is stored in a comment field, together with any fuller explanation of routine occurrences or observations.

To be effective, the system presupposes that every assay interval has a corresonding logged interval. The logging interval, subject to the above comment, can be of any length, although in practical terms there is rarely any point in assaying any interval less than 0.5m long.

DETAILED DRILL LOG SHEET - CODING PROCEDURES

1. Header

This is self evident. The hole number identifies the prospect for the system, eg. WAD001 = Watuasah hole 1, and the
type of drilling (eg. WAD = diamond drilling, WAP = percussion, WAR = reverse circulation, WAT = trench samples). The computer system will work provided that all lithology codes and mineral species fields are the same and clearly defined for each prospect.

2. Depth to - Columns 1-5

Record the depth to the base of the logged interval in metres, to 2 decimal places.

3. Core Recovery - Columns 6-9

Record the measured core recovery for the interval, in metres to 2 decimal places.

3. Lithology - Columns 10-15

Space is provided to record up to two lithologies for the logged interval, using a three letter code for each. It is acceptable to use either a standardized general coding system, or to develop a set of prospect or project specific rock type codes, provided that these are consistent and defined for (at least) each prospect. It is helpful if these codes match those used in surface mapping of the prospect.

4. Oxidation - Column 16

Record the extent of oxidation of iron minerals, particularly sulphides, by the extent of limonite development, using single letter codes as follows:

0 (or blank)	Unoxidised-sulphides quite fresh - no limonites present.
1	Trace oxidation - sulphides fresh but minor limonite coating joints or fractures.
2	Weakly oxidized - most sulphides preserved but significant limonite developed on joints and in joint selvages.
3	Moderately oxidized - sulphides replaced by limonites in about 50% of the rock.
4	Strongly oxidized - limonite throughout with minor remaining sulphides.
5	Completely oxidized, limonite throughout, no remaining sulphides.

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Fields 5-11. Record the sulphide content of the logged interval, as follows:

Field 5 (Total %). Record the total of sulphides present, on a volume percent basis, using a two letter code as follows:

	TR	present but less than 0.5% by volume
	01	0.5-1.5% by volume
	99	98.5-99.5% by volume
then	AL	99.5-100%

Field 6 Grainsize. Record the average grainsize of sulphide minerals present, using single letter codes eg. c = coarse > 2mm, m = medium (0.5-2mm), F = fine <0.5mm.

Fields 7-11. These two character fields record the mode of occurrence and relative proportions of the most common sulphides. Fields are allowed for pyrite (py), chalcopyrite (cpy), pyrrhotite (po), galena (ga) and sphalerite (sp).

Codes used are a single letter code for the dominant mode of occurrence of the mineral in the loged interval, eg.

D = disseminated	A = vesicular
V = within veins	B = banded; bedded
F = coating fractures	

and a single letter/number code to record the relative proportion of each sulphide species of the total sulphide using the codes.

Blank - mineral not present

T = trace, mineral present but less than 5% of the total sulphide

1 = 5-15% of the total sulphide

to 9 = 85-95% of the total sulphide

and A = >95% of the total sulphide.

The proportion codes should sum to 10, unless significant proportions of a different sulphide to those listed occurs. The estimated volume percentage of any mineral can be obtained by multiplying the total sulphide percent (field 5) by the proportion code for that mineral and dividing by 10.

Sulphide minerals not included in the above list should be noted in the comments column.

Fields 12 to 24 record alteration mineralogy.

Field 12 - Alteration Intensity - col. 30 - Record alteration intensity as a single number code as follows:

0 - Fresh unaltered rock with original texture and >95% of original rock forming minerals intact.

1 - Partly altered, original textures preserved and 5-35% of original minerals replaced by alteration products.

2 - Moderately altered, overall original textures preserved but 35-65% of original minerals replaced by alteration products.

3 - Strongly altered, original textures visible but 65-95% of original minerals replaced by alteration products.

4 - Completely altered, original textures still preserved but original minerals replaced by alteration products.

5 - Intensely altered - as above but original rock texture only poorly preserved.

6 - Fubarite - original rock mineralogy and textures completely obliterated.

Fields 13-24 Alteration Mineralogy Cols. 31-54. Twelve two column fields are allowed, to record the presence of specific alteration minerals. For each mineral two columns are provided. The first column for each mineral is for a single letter code for the estimated volume percentage of the mineral;

blank = not present,
T = present but less than 5%,
1 = 5-15%, 2 = 15-25%,...., 9 = 85-95%,
A = +95%.

In the second column, use a single letter code to record the dominant mode of occurrence of the mineral;

P = pervasively disseminated,
W = wallrock selvages adjacent to veins or fractures,
F = coatings on fracture surfaces,
V = as vein fill material.

The minerals to record are:
LIMONITE, ALBITE, CHLORITE,
EPIDOTE, K-FELDSPAR,
SERICITE, CLAY MINERALS,
SILICIFICATION (not veining),
CALCITE, JAROSITE/ALUNITE,
BARITE, AND MAGNETITE.

Quartz Veining. Space is provided to routinely record only one vein set per logged interval. To make this workable, only quartz and quartz composite (eg quartz-calcite, quartz-barite, quartz-sulphide) veins should be recorded here (N.B. for NTT assume all barite veins have some quartz). Calcite, jarosite-alunite or straight pyrite veining can be accommodated the alteration mineralogy or sulphide columns, with appropriate comments in the comment field.

Field 25 Vein type - Columns 55-56. Record here a two letter code to specify the vein type. Include barite veins with quartz veins. Letter codes QU = quartz, QB - quartz-barite, QC = quartz-calcite TC = tremolite, QE = quartz-chlorite-carbonate-epidote, EC = carbonate-epidote, etc. In the case of breccia fill use codes QX or BX. Attempts to record too many very different vein types in different logged intervals will render the system unworkable from a plotting or statistical point of view.

Field 26 Veining % - columns 57-58. Record the estimated volume percent of veining using 2 digit codes as for total sulphide percentage.

Field 27 Veins/metre (columns 59-60). Record the average number of veins per metre on a 0-99 scale.

Field 28 Angle to core axis (aca) column 61. Record the dominant angle between veins and the core axis using a single number code:

0 = parallel to, through to
9 = 90° to core axis

or letter codes such as

R = random, or
S = stockwork

Fields 29-32 deal with structure.

Field 29 - Bedding angle (column 62). Record the angle between the bedding trace and core axis using a single digit code, 0 = parallel to 9 = perpendicular.

Field 30 - Fractures/metre (columns 63, 64). Record the average number of fractures (not healed) per metre in the logged interval on a 0-99 numeric scale.

Field 31, Joint angle (columns 65). Record the dominant joint direction with a single digit angle code (0-99) if appropriate, or R for random.

Field 32, Hardness (column 66). This is a potentially very useful measure to assess aspects like ripability or grindability of the rock. Record using a single digit code as follows:

1 very soft easily crumbled by hand
2 soft - broken by hand with difficulty
3 moderate - broken with hammer, but does not ring when hit by hammer
4 hard - broken by hammer, and rings when struck by hammer
5 very hard - broken with difficulty with hammer.

Fields 33, 34, Faulting. Record the percentage of the logging interval occupied by fault gauge, using a 2 letter percentage code in columns 67-68, and the angle of the zone to the core axis with a single letter code (0-9) in column 69.

Field 35, Unit Code (columns 70-71). This is for a 2 letter or digit code to identify major rock units, to correlate with field mapping units, and/or to control compositing of assay values. In many cases this information will be added or changed by later interpretations, but the ability to lump data together in a controlled way is very important for computer processing of data.

Field 38, Comments. No specific field is allowed on paper sheets - the LOGGER system stores comments in dBASE MEMO fields which can be up to 4K bits of information. On paper sheets subsequent lines can be used as required. Although there is no real limit at present on the length of comments, it is much easier to format drill log reports if they are kept relatively concise.

R J Fountain
(Modification by R E Williams)

LITHOLOGICAL CODING
DDH'S BRD01 AND 02

MST	mudstone
SHA	shale
SLT	siltstone
SST	sandstone
BAS	basalt-massive
BAV	basalt-vesicular
BAP	basalt-pillowed
BPB	basalt-pillow breccia
BAB	basalt-breccia
RVC	rhyolitic volcaniclastics
VCG	volcanic conglomerate
EPI	epiclastic

05/04/88

68078

Project :　　　　　　RA : 0　Code :

HOLE : BRD003　Coords : 389952.6E 5396407.3N　Collar RL : 610.3
Logged by : REW/PDE　Driller : ORTNER　Rig id : J49
Commenced : / /　Completed : / /
Start Log : 3.60　Total Depth : 541.40
Tot Oxid Depth : 0.00　Part Oxid Depth : 0.00

Target Description

STRATIGRAPHIC DRILLHOLE TO ASSIST GRAVITY INTERPRETATION

Mineralisation

NONE OF SIGNIFICANCE

Significant Results

Alteration Details

General Comments

C — OLE RIVER SHALE (MUDSTONE)

Geological Notes

DOWNHOLE SURVEY DATA:

Depth	Dip	Azimuth	Core Size
60.00	-90.00	0.00	HQ
120.00	-88.00	126.50	NQ
180.00	-87.00	74.50	NQ
240.00	-84.00	54.50	NQ
277.00	-82.00	48.50	NQ
340.00	-82.00	38.50	NQ
400.00	-82.50	39.50	NQ
463.00	-82.00	35.50	NQ
508.00	-81.00	31.50	NQ
538.00	-81.00	31.50	NQ

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DEPTH TO	Core Recov	Sample Number	LITH'GY Maj	LITH'GY Min	OXID	--SULPHIDES-- VoEPyCoCcSaSp %s%a%a%a%a%a z	--ALTERATION-- ILiSiChEpKfSeClSiCaJaBaNa (Int)	VEINING TyVoNoA	STRUCTURE BaJaFa	H	FAULT BgAng pc	SU tm ri at	Comments
3.60	0.60		MST	SHA	1	TRFDA	0		7	0			
4.40	0.80		MST		1	TRFDA	0			0			
6.20	1.50		MST		1	TRFDA	0			0			
7.40	0.90		MST		0	TRFDA	0			0			
8.50	0.92		RVC	SWK	2	TRFDA	0			0			
9.50	1.40		MST		0	TRFDA	0			0			
11.50	2.00		MST	SHA	0	TRFDA	0		7	0			
12.70	1.20		MST		0	TRFDA	0			0			
14.00	1.20		MST		0	TRFDA	0			0			
16.70	2.70		MST		0	TRFDA	0			0			
20.30	3.60		MST		0	TRFDA	0	GCTR031		0			
22.40	2.10		MST		0	TRFDA	0			0			
24.10	1.60		MST		0	TRFDA	0			0			
25.40	1.20		MST		0	TRFDA	0			0			
27.30	1.60		MST	SHA	0	TRFDA	0		7	0			
28.00	0.60		MST		0	TRFDA	0			0			
29.00	1.50		SHA	MST	0	TRFDA	0			2			
30.80	0.70		SHA		0	TRFDA	0			0			
32.30	1.20		SHA		0	TRFDA	0			0			
34.30	1.50		SHA		0	TRFDA	0			2			
34.60	0.50		SHA		0	TRFDA	0			0			
35.20	0.40		SHA		0	TRFDA	0			0			
36.90	1.50		SHA		0	02FDA	0			0			
40.20	2.50		SHA	MST	0	TRFDA	0	GCTR021	6	0			
42.10	2.00		MST		0	TRFDA	0			0			
43.90	1.30		MST		0	TRFDA	0	GC01042		0			
46.40	3.00		MST		0	TRFDA	0	GCTR03R		0			
49.40	3.00		MST		0	TRFDA	0	GC01364		0			
52.40	3.00		MST		0	TRFDA	0	GCTR05R		0			
55.40	3.00		MST		0	TRFDA	0	GCTR03R		0			
58.40	3.00		MST		0	TRFDA	0	GCTR03R		0			
60.00	1.50		MST		0	05FDA	2	GCTR020		0			
61.40	1.50		MST		0	TRFDA	0	GCTR02R		0			
64.40	3.00		MST		0	TRFDA	0	GCTR05R		0			
67.40	3.00		MST	SHA	0	TRFDA	0	GCTR05R	7	0			
69.40	2.00		SHA	SLT	0	TRFDA	0	GCTR05R	7	0			
71.40	2.00		SHA	SLT	0	TRFDA	0	GCTR25R		0			
72.50	1.10		SHA	SLT	0	01FDA	0	GCTR04R		0			
73.10	0.50		SHA	SLT	0	TRFDA	0			0			
74.50	1.60		SHA	SLT	0	01FDA	0	GCTR04R		0			
76.40	1.60		MST		0	TRFDA	0	GCTR04R		0			
79.40	2.90		MST		0	TRFDA	0	GCTR052		0			
80.90	1.50		MST		0	TRFDA	2	GCTR01R		0			
84.00	3.10		MST		0	TRFDA	0	GCTR01R		0			
85.40	1.40		MST		0	TRFDA	0	GCTR01F		0			
88.40	3.00		MST		0	TRFDA	0	GCTR01R		0			
91.40	3.00		MST	SHA	0	TRFDA	0	GCTR21R	7	2			
97.40	6.00		MST		0	TRFDA	0	GCTR23R		0			
100.40	3.00		MST	SHA	0	TRFDA	0	GC0125R	7	2			
103.40	2.50		SHA		0	01FDA	0	GCTR05R		2			

DEPTH TO	Core Recov	Sample Number	LITH'GY Maj	LITH'GY Min	OXID	--SULPHIDES-- VoGPyCpCoGaSp XsZaZaZaZaZa	-------ALTERATION-------- ILiBiChEpKfSeClSiCaJaBaMa Int	VEINING TyVoNoA	STRUCTURE BaJaFm	H	FAULT GgAng pc	SU tn ri at	Comments
106.40	3.00		SHA		0	TRFDA	0	0CTR05R	8	0			
109.40	3.00		SHA		0	TRFDA	0	0CTR05R	7	0			
112.40	3.00		MST	SHA	0	TRFDA	0	0CTR05R	7	0			
115.20	3.50		MST		0	TRFDA	0	0CTR05R		0			
117.60	2.70		MST		0	TRFDA	0	0CTR05R		0			
118.40	0.50		MST		0	TRFDA	0	0CTR03R		0			
118.90	0.40		MST		0	TRFDA	0	0CTR03R		0			
120.70	1.80		MST		0	TRFDA	0	0CTR03R		0			
121.40	0.70		MST		0	TRFDA	0	0CTR03R		0			
122.70	1.30		MST		0	TRFDA	0	0CTR03R		0			
124.00	1.20		MST		0	TRFDA	0	0CTR03R		0			
125.00	0.60		MST		0	TRFDA	0	0CTR03R		0			
126.40	1.40		MST		0	TRFDA	0	0CTR04R		0			
129.40	3.00		SHA	MST	0	TRFDA	0	0CTR07R	7	0			
130.00	0.60		SHA	MST	0	TRFDA	0	0CTR02R		0			
132.70	2.70		SHA	SST	0	TRFDA	0	0CTR02R		0			
135.40	2.70		SHA	SST	0	TRFDA	0	0CTR05R	6	0			
138.40	3.20		MST		0	TRFDA	0	0CTR05R		0			
141.50	3.10		SHA		0	01FDA	0	0CTR032		0			
143.10	1.60		SHA		0	01FDA	0	0CTR03R	7	0			
145.40	2.30		SHA		0	01FDA	0	0CTF03R		0			
148.40	3.00		SHA		0	TRFDA	0	0CTR06R		0			
151.40	3.00		MST		0	01FDA	0	0CTR04R		0			
154.40	3.20		MST		0	TRFDA	0	0CTR03R		0			
157.40	3.02		MST		0	TRFDA	0	0CTR03R		0			
160.40	3.20		SHA		0	TRFDA	0	0CTR03R	5	0			
163.40	3.00		MST		0	TRFDA	0	0CTR031		0			
166.40	3.00		MST		0	TRFDA	0	0CTR05R		0			
169.30	2.90		SHA	SST	0	TRFDA	0	0CTR02R	7	0			
172.20	2.50		SHA		0	TRFDA	0	0CTR08R		0			
173.40	1.40		MST		0	TRFDA	0	0C0106R		0			
175.10	1.70		MST		0	TRFDA	0	0C0105R		0			
177.40	2.30		MST		0	TRFDA	0	0C0106R		0			
180.20	2.20		MST	SLT	0	TRFDA	0	0CTR04R		0			
181.40	1.20		MST		0	TRFDA	0	0CTR04R		0			
184.20	2.50		MST		0	TRFDA	0	0CTR05R		0			
184.90	0.70		MST		0	TRFDA	0	0CTR021		0			
187.40	2.50		MST		0	01FDA	0	0CTR05R		0			
190.40	3.02		MST		0	TRFDA	0	0CTR04R		0			
193.40	3.02		MST		0	TRFDA	0	0CTR052		0			
195.20	1.30		MST		0	TRFDA	0	0CTR03R		0			
196.40	1.22		MST		0	TRFDA	0	0C01051		0			
199.40	3.02		MST	SHA	0	01FDA	0	0CTR041	5	0			
202.40	3.20		MST		0	TRFDA	0	0CTR041		0			
205.40	3.20		MST		0	TRFDA	0	0C0104R		0			
207.00	1.20		MST		0	TRFDA	0	0CTR04R		0			
208.40	1.40		MST		0	TRFDA	0	0C0105R		0			
210.90	2.40		MST		0	TRFDA	0	0CTR05R		0			
211.50	0.70		MST		0	TRFDA	0			0			
212.[illegible]	[illegible]		[illegible]		0	[illegible]	[illegible]	[illegible]		0			

DEPTH TO	Core Recov	Sample Number	LITH'GY Maj	LITH'GY Min	OXID	--SULPHIDES-- VoGPyCpCoGaSp ZsZaZaZaZaXa z	ALTERATION Int	ALTERATION LiBiChEpKfSeClSiCaJaBaMa	VEINING TyVoNoA	STRUCTURE BaJaFa	STRUCTURE H	FAULT GgAng pc	SU tn ri at	Comments
214.40	2.00		MST		0	TRFDA	0		QCTR02R		0			
217.40	3.00		MST		0	TRFDA	0		QC01103		0			
220.40	3.00		MST		0	TRFDA	0		QC01103		0			
222.90	2.50		MST	SST	0	TRFDA	0		QC01102		0			
226.00	3.10		MST		0	02FDA	0		QC01072		0			
229.20	3.20		MST	SHA	0	TRFDA	0		QCTR042		0			
232.30	3.10		MST		0	TRFDA	0		QCTR01R		0			
232.90	0.50		MST		0	TRFDA	0		QCTR011		0			
235.40	2.50		MST		0	TRFDA	0		QCTR01R		0			
238.40	3.00		MST		0	TRFDA	0		QC0105R		0			
240.50	2.10		MST		0	TRFDA	2				2			
241.40	0.90		MST		0	TRFDA	2		QCTR02R		0			
244.40	3.00		MST	SHA	0	TRFDA	0		QCTR072	7	2			
247.40	3.00		MST	SHA	0	TRFDA	0		QCTR052		0			
250.40	3.00		MST		0	TRFDA	0		QCTR04R		2			
253.40	3.00		MST		0	TRFDA	0		QCTR04R		0			
256.40	3.00		MST		0	TRFDA	0		QCTR04R		0			
259.50	2.20		MST		0	TRFDA	0		QCTR04R		0			
260.30	2.30		MST		0	TRFDA	0		QCTR05R		2			
260.80	0.30		MST		0	TRFDA	0				0			
262.70	2.00		MST		0	TRFDA	0		QCTR247		0			
263.10	0.10		MST	SHA	0	TRFDA	0			7	0			
263.90	0.80		MST		0	TRFDA	0				0			
264.90	1.10		MST		0	TRFDA	0				0			
265.10	0.10				0	TRFDA	0				2			
268.10	3.00		MST		0	TRFDA	0		QC0104R		0			
271.40	3.30		SHA	MST	0	TRFDA	0		QCTR02R	6	0			
272.70	1.20		SHA	MST	0	01FDA	0		QCTR04R		2			
274.40	1.40		SHA	MST	0	02FDA	0		QCTR04R		0			
274.90	0.50		MST		0	TRFDA	0		QCTR04R		2			
277.40	2.50		MST		0	02FDA	0		QCTR06R		0			
280.40	2.c0		MST	SLT	0	TRFDA	0		QCTR04R		0			
282.50	1.50		MST		0	REFDA	0		QCTR04R		0			
285.00	2.40		MST		0	TRFDA	0		QCTR036		2			
285.30	0.30		MST		0	TRFDA	0		QCTR03R		0			
286.30	0.90		MST		0	TRFDA	0		QCTR05R		0			
289.30	3.10		MST		0	TRFDA	0		QCTR05R		0			
291.50	1.70		MST		0	TRFDA	0		QCTR061		2			
294.20	2.30		MST		0	TRFDA	0		QC0108R		2			
295.00	0.80		MST		0	TRFDA	0		QCTR05R		2			
296.40	2.90		MST		0	TRFDA	2		QCTR05R		2			
298.40	2.00		MST		0	01FDA	0		QCTR05R		0			
298.90	0.50		MST		0	03FDA	2		QCTR05R		0			
299.90	0.90		MST	SLT	0	07FDA	0		QCTR05R	4	0			
301.40	1.50		MST	SLT	0	10FDA	0		QCTR08R	6	2			
304.40	3.00		BAP	BAS	0	03FDA	1	1P	QC25202		2			
307.40	3.00				0	TRFDA	0		QC99012		2			
310.40	3.00			BAS	0	05FD?	1	1P	QC70012		2			
313.40	3.00		BAS		0	TRFDA	1	1P	QC2510R		2			
31[illegible]	[illegible]		[illegible]	?AV	0	0[illegible]	1	[illegible]	QC[illegible]		0			

DEPTH TO	CORE RECOV	Sample Number	LITH'GY MAJ	LITH'GY MIN	OXI[O]	--SULPHIDES-- VoGPyCpPoGaSp % mXaXaXaXaX	------ALTERATION--------- ILiAlChEpX+SeClSiCaJaBaMa (Int)		VEINING TyVoMoA	STRUCTURE BaJaFm H	FAULT GgAng pc	SU to ri at	Comments
319.40	3.00		BAV		0	01FD9D1	1	1P	0C1015R	0			
322.40	3.00		BAV	BAB	0	TRFDA	1	1P	0C0515R	0			
325.40	3.00		BAV		0	TRFDA	1	1P	0C0510R	0			
328.40	3.00		BAV		0	TRFDA	1	1P	0C0512R	0			
331.40	3.00		BAS	BAV	0	01FDA	1	1P	0C0306R	0			
334.40	3.00		BAS	BAV	0	01FD9D1	1	1P	0C1010R	0			
337.40	3.00		BAS	BAV	0	TRFDA	1	1P	0C0510R	0			336.3 = A321401 T/S SPARSELY AUGITE + OLIVINE PHYRIC METABASALT – HYDROTHERMALLY ALTERED
339.60	2.20		BAS		0	TRFDA	1	1P	0C0015R	0			≠ A321402 = ANALYSIS
342.70	3.10		BAS		0	TRFDA	1	1P	0C0012R	0			
345.80	3.10		BAS		0	TRFD0D2	1	1P	0C0712R	0			
348.90	3.10		BAS		0	TRFDA	1	1P	0C0712R	0			
352.00	3.10		SHA	BAV	0	02FDA	1	1P	0C0100R	0			
354.70	2.70		SHA		0	02FDA	0		0C0105R	0			
357.00	3.10		BAB	SHA	0	01FDA	1	1P	0C4005R	0			
359.90	2.10		SHA	BAV	0	01FDA	1	1P	0C25044	0			
361.40	1.50		SHA		0	01FDA	0		0CTR05R	0			
364.40	3.00		BAV	SHA	0	TRFD9D1	1	1P	0C0110R	0			
367.40	3.00		BAV	BAP	0	TRFDA	1	1P	0C0110R	0			
370.00	2.60		BAV	BAP	0	01FDA	1	1P	0C0300R	0			
373.10	3.10		BAV		0		1	1P	0C0210R	0			
375.40	2.20		SHA	BAV	0	01FFA	1	1P	0CTR05R	0			
376.40	1.00		SHA	MST	0	01FFA	0		0CTR05R	0			
378.00	1.50		SHA	MST	0	01FFA	0		0CTR05R	0			
379.50	1.50		SHA	MST	0	02FDA	0		0CTR05R	0			
382.40	2.90		EPI	SHA	0	05FDA	0		0C0101R 6	0			381.3m = A321403 T/S LITHIC VITRIC TUFF – HIGHLY ALTERED PYROCLASTIC ROCK COMPOSED OF VESICULAR GLASSY FRAGMENTS OF PILOTAXITIC TEXTURE ANDESITE
384.90	2.52		SHA	MST	0	02FDA	0		0CTR042	0			
388.00	3.10		MST	SHA	0	01FDA	0		0CTR024 6	0			
391.10	3.10		MST	SHA	0	TRFDA	0		0CTR024 4	0			
394.20	3.10		BAB	SHA	0	01FDA	0		0C0004R	0			
397.30	3.10		BAB	BAS	0	TRFDA	0		0C0110R	0			
400.40	3.10		BAS	BAB	0	TRFVA	0		0CTR00R	0			
403.40	3.00		BAS		0	TRFDA	0		0CTR00R	0			
406.40	3.00		BAS		0	TRFD5 D5	0		0C0107R	0			≠ A321405 = ANALYSIS
409.40	3.00		BAS		0	TRFD5 D5	0		0C0107R	0			409.4 = A321404 T/S AUGITE PHYRIC METABASALT
412.40	3.00		BAS	BAV	0		0		0C0200R	0			≠ A321407 = ANALYSIS
415.40	3.00		BAS	BAB	0		0		0C0500R	0			413.1m = A321406 T/S AUGITE + PLAGIOCLASE PHYRIC METABASALT
418.40	3.00		BAS		0		0		0C0400R	0			
421.40	3.20		BAS	BAV	0		0		0C04074	0			≠ A321409 = ANALYSIS
424.40	3.20		BAV	EPI	0		0		0C0105R	0			422.4m = A321408 T/S AUGITE + OLIVINE PHYRIC METABASALT
427.40	3.20		BAB	EPI	0	TRFDA	0		0CTR05R	0			424.1m = A321410 T/S EXTENSIVELY RECRYSTALLISED RHYOLITIC OR RHYODACITIC LAVA
430.40	3.00		BAB		0	TRFDA	0		0CTA02R	0			
433.40	3.00		BAB	BAV	0	TRFDA	0		0C0106R	0			
436.40	3.00		BAB	BAV	0	TRFDA	0		0CTR05R	0			433.5m = A321411 T/S VIRTUALLY APHYRIC, SLIGHTLY VESICULAR META ANDESITE
439.40	3.20		BAB	BAV	0	TRFDA DTDTDT	0		0C0106R	0			≠ A321412 = ANALYSIS
442.40	3.00		BAB	BAV	0	TRFA5 A5	0		0CTR05R	0			
445.40	3.20		BAB	BAV	0	TRFDA	0		0CTR07R	0			
448.40	3.00		BAV	BAB	0	TRFD5 A5	0		0CTR07R	0			
451.40	3.20		BAV	BAB	0	TRFDA	0		0CTR07R	0			450.9m = A321413 T/S VIRTUALLY APHYRIC, SLIGHTLY VESICULAR META ANDESITE
454.40	3.20		BAB		0	TRFDA	0		0C01852	0			≠ A321414 = ANALYSIS
457.40	3.00		BAS	BAB	0	TRFDA	0		0CTR06R	0			

HELLYER BASALTS
↑
= "MIXED SEQUENCE"
↓
FOOTWALL ANDESITES

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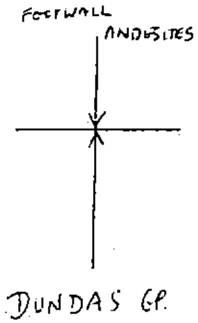
68083

Page No. 5
05/24/88

DEPTH TO	CORE RECOV	Sample Number	LITH'GY MAJ	LITH'GY MIN	QI[D	--SULPHIDES-- VoGPyCpPoGaSp % a%a%a%a%a%	------ALTERATION--------- ILiAlChEpK(SeClSiCaJaBaKa nt	VEINING TyVoNoA	STRUCTURE BaJaFa	H	FAULT GgAng pc	SU tn ri at	Comments
460.40	3.00		BAS	BAB	0	TRFDA	0	QCTR06R		0			
463.40	3.00		BAB	BAS	0	TRFDA	0	QCTR06R		0			
463.80	0.40		BAS	BAB	0		0	QCTR06R		0			
466.30	2.50		BAS	BAB	0	TRFDA	0	QC0104R		0			
469.40	3.10		BAB	GWK	0	TRFDA	0	QCTR05R	5	0			
472.40	3.00		GWK	BAB	0	01FDA	0	QC0105R		0			
474.20	1.80		GWK	SHA	0	TRFDA	0	QCTR03R	7	0			
475.40	1.10		GWK		0	01FDA	0	QCTR05R		0			
478.40	3.00		SHA	GWK	0	TRFDA	0	QC0106R		0			
481.40	3.00		SHA	GWK	0	TRFDA	0	QC2405R	6	0			
484.20	2.80		GWK	SHA	0	TRFDA	0	QC01045	6	0			
487.30	3.10		GWK	SHA	0	TRFDA	0	QCTR04R	6	0			481.2m = A321415 T/S IMMATURE QTZ WACKE ± SHALE CLASTS
490.40	3.10		GWK		0	TRFDA	0	QCTR04R		0			
493.40	3.00		GWK	SHA	0	TRFDA	0	QCTR024	5	0			
495.00	1.60		GWK		0	TRFDA	0	QC0100R		0			
496.40	1.40		GWK	SHA	0	TRFDA	0	QCTR05R		0			
498.00	1.60		GWK	SHA	0	TRFDA	0	QC0104R	5	0			
501.20	3.20		GWK		0	TRFDA	0	QC0104R		0			
504.30	3.10		GWK	SHA	0	TRFDA	0	QC0105R		0			
506.40	2.10		GWK		0	TRFDA	0	QC0105R		0			
508.30	1.70		GWK		0	TRFDA	0	QCTR04R		0			
511.40	3.10		GWK		0	TRFDA	0	QCTR03L		0			
514.40	3.00		GWK		0	TRFDA	0	QCTR02R	6	0			
517.40	3.00		GWK		0	TRFDA	0	QCTR03R		0			
520.40	3.00		GWK		0	TRFDA	0	QCTR02R		0			518.6m = A321416 T/S IMMATURE QTZ WACKE
523.40	3.00		GWK		0	TRFDA	0	QCTR05R	6	0			
526.40	3.00		GWK		0	TRFDA	0	QCTR03R		0			
529.40	3.00		GWK		0	TRFDA	0	QCTR04R		0			
532.40	3.00		GWK		0	TRFDA	0	QCTR02R		0			
535.40	3.00		GWK		0	TRFDA	0	QCTR05R	6	0			
538.40	3.00		GWK	SHA	0	TRFDA	0	QC01044	6	0			
541.40	3.00		GWK	SHA	0	TRFDA	0	QCTR034	6	0			540.5m = A321417 T/S BANDED SILTSTONE-SHALE



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 18/07/88

Project : RA : 0 Code :

HOLE : ?RD004 Coords : 0.0E 0.0N Collar RL : 0.0
Logged by : REWMPDE Driller : ORTNER Rig id : J49
Commenced : / / Completed : / /
Start Log : 3.00 Total Depth : 301.00
Tot Oxid Depth : 0.00 Part Oxid Depth : 20.60

Target Description

1 generate data for gravity interpretation.
2 test pyritised volcanics outcropping in Mutter Creek= I.P. anomaly
3 test for interpreted N-S fault.

Mineralisation

Significant Results

Alteration Details

General Comments

Geological Notes

DOWNHOLE SURVEY DATA:

Depth	Dip	Azimuth	Core Size
0.00	0.00	0.00	
54.00	-56.00	293.50	NQ
114.00	-55.50	294.50	NQ
169.00	-55.00	0.00	NQ
225.00	-56.00	290.50	NQ
277.00	-55.00	289.50	NQ

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DEPTH TO	CORE RECOV	Sample Number	LITH'GY MAJ	MIN	D I D	--SULPHIDES-- VoGPyCpPoGaSp	------ALTERATION--------- ILiAlChEpKfSeClSiCaJaSaMa	VEINING TyVoNoA	STRUCTURE BaJaFe H	FAULT GgAng pc	SU tn ri at	Comments
3.00	0.20		RVC		2	TRFDA	0		0			
4.00	0.30		RVC		2	TRFDA	0		0			
5.00	1.60		GWK		0	TRFDA	0		0			
5.40	1.00		RVC		2	TRFDA	0		0			
7.00	0.90		RVC		2	TRFDA	0		0			
9.80	0.70		MST	SHA	0	01FDA	0		0			
10.00	0.50		GWK		1	TRFDA	0		0			
11.10	0.60		GWK		1	TRFDA	0		0			
12.10	0.50		GWK		1		0		0			
13.00	0.50		GWK	SHA	1		0		0			
15.50	2.00		GWK	VCG	1	TRFDA	0		0			
16.90	0.50		VCG		1	TRFDA	0		0			
18.60	1.50		GWK	VCG	1	TRFDA	0		0			
20.60	1.30		GWK	VCG	1	TRFDA	0		0			
22.20	1.20		VCG		0	TRFDA	0	QC0105R	0			
23.90	1.60		VCG		0	05FDA	0	QC2105R	0			@22.6m = A321422 T/S VITRIC LITHIC TUFF COMPOSED OF POORLY DEFINED ANGULAR TO SUB
27.00	3.10		VCG		0	01FDA	0	QC0105R	0			-ROUNDED FRAGMENTS OF FORMERLY GLASSY RHYOLITIC LAVA.
30.10	3.00		VCG		0	02FDA	0	QC0105R	0			
33.00	3.00		VCG		0	TRFDA	0	QC0105R	0			
34.00	0.00		RVC		0	05FDA	0	QC0105R	0			
37.00	3.00		VCG	RVC	0	01FDA	0	QC0105R	0			@39.3m = A321423 T/S FORMERLY A GLASSY, FELSPAR PHYRIC RHYOLITIC LAVA WITH
39.70	2.00		VCG	GWK	0	01FDA	0	QC0105R	0			SPARSE CLINOPX PHENOXTS.
42.00	3.10		VCG		0	TRFDA	0	QC0103R	0			@42.5m = A321424 T/S RHYOLITIC VITRIC XTAL TUFF
45.00	2.60		GWK	VCG	0	05FDA	0	QC0105R	0			
46.60	1.70		VCG		0	02FDA	0	QC0202R	0			
48.60	1.70		VCG	GWK	0	TRFDA	0	QCTR02R	0			
50.00	1.60		GWK		0	TRFDA	0	QC0110R	0			
51.50	1.40		GWK	VBI	0	TRFDA	0	QC0106R	0			
53.50	2.00		GWK		0	TRFDA	0	QCTR04R 3	0			
55.00	1.50		GWK		0	TRFDA	0	QCTR05R	0			
57.60	2.30		GWK		0	TRFDA	0	QC0104R	0			
60.70	3.10		VCG	GWK	0	TRFDA	0	QCTR03R	0			
63.00	3.10		VCG	GWK	0	TRFDA	0	QC0102R	0			
65.90	2.00		VCG	SHA	0	TRFDA	0	QCTR02R	0			
69.00	3.10		VCG	MST	0	03FDA	0	QC0102R	0			
72.10	3.10		VCG	MST	0	02FDA	0	QCTR02R	0			@70.2m = A321425 T/S – EPICLASTIC COMPOSED OF PYROCLASTIC (FORMERLY GLASSY CRYSTAL LITHIC
75.20	3.10		VCG		0	01FDA	0	QCTR02R	0			RHYOLITIC TUFFS) AND LAVA (RHYOLITIC) FRAGMENTS IN A MATRIX CONTAINING METAMORPHIC DERIVED QTZ AND MUSCOVITE GRAINS.
78.30	3.10		VCG		0	05FDA	0	QCTR02R	0			@77.2m = A321426 T/S – SLIGHTLY REWORKED LITHIC TUFF COMPOSED OF ABUNDANT ANGULAR FRAGMENTS
81.20	2.90		VCG		0	05FDA	0	QCTR02R	0			OF FORMERLY GLASSY RHYOLITIC LAVA CONTAINING PHENOCRYSTS OF ALBITE
84.30	3.10		VCG		0	05FDA	0		0			@82.0m = A321427 T/S – VITRIC LITHIC TUFF COMPOSED OF ABUNDANT ANGULAR FRAGMENTS OF
87.50	3.20		MST	VCG	0	05FDA	0	QC0103R	0			FORMERLY GLASSY RHYOLITE AND RHYODACITIC LAVA
89.30	1.90		MST	SHA	0	01FDA	0	QCTR033	0			
90.00	0.70		MST	SHA	0	01FDA	0		0			
93.10	3.10		MST	SHA	0	01FDA	0	QC0302R 7	0			
96.20	3.10		MST	SHA	0	01FDA	0	QC0300R	0			
98.50	2.30		SHA	MST	0	01FDA	0	QCTR05R	0			
100.00	1.50		SHA		0	01FDA	0	QCTR05R	0			
103.00	3.00		SHA		0	01FDA	0	QCTR03R 8	0			
106.00	3.00		SHA	MST	0	01FDA	0	QCTR03R	0			
109.00	3.00		MST	SHA	0	01FDA	0	QC01004 6	0			

DEPTH TO	CORE RECOV	Sample Number	LITH'GY MAJ	LITH'GY MIN	OXID	--SULPHIDES-- Vo% GPyCpPoGaSp	ALTERATION Int	VEINING TyVoNoA	STRUCTURE BaJaFa	H	FAULT GgAng pc	SU tm ri at	Comments
111.20	2.20		SHA	MST	0	01FDA	0	0C0106R		0			
112.00	0.80		SHA		0	01FDA	0	0C0108R		0			
115.00	3.00		SHA		0	01FDA	0	0CTR05R	7	0			
118.00	3.00		SHA	MST	0	01FDA	0	0C0108R		0			
119.70	1.70		MST		0	01FDA	0	0C0108R		0			
122.10	2.40		MST		0	01FDA	0	0C0110R		0			
123.10	1.00		MST		0	01FDA	0	0C0110R		0			
124.90	1.00		MST	SHA	0	01FDA	0	0C0110R		0			
127.00	3.10		MST	SHA	0	01FDA	0	0C0110R		0			
130.00	3.00		MST	SHA	0	01FDA	0	0CTR07R	7	0			
133.00	3.00		MST	SHS	0	01FDA	0	0C01003		0			
136.00	3.00		MST	SHS	0	01FDA	0	0CTR063		0			
139.00	3.00		MST	SHA	0	01FDA	0	0CTR063		0			
142.00	3.00		SHA	MST	0	01FDA	0	0CTR05R	5	0			
143.20	1.20		SHA		0	01FDA	0	0C0110R	5	0			
144.70	1.50		SHA		0	01FDA	0	0CTR05R		0			
145.80	1.10		SHA		0	01FDA	0	0CTR003	5	0			
146.90	0.00		SHA		0	01FDA	0	0C0107R		0			
148.00	1.10		SHA	MST	0	01FDA	0	0C0110R		0			
149.50	1.50		SHA	MST	0	01FDA	0	0C0108R		0			
151.00	1.50		MST	SHA	0	01FDA	0	0C0108R		0			
154.00	3.00		SHA	MST	0	03FDA	0	0C0110R	6	0			
157.00	3.00		SHA		0	03FDA	0	0C0110R		0			
160.00	3.00		SHA		0	03FDA	0	0C0110R		0			
160.60	0.60		MST		0	03FDA	0	0C0110R		0			
163.00	2.40		MST	SHA	0	01FDA	0	0C0110R	6	0			
166.00	3.00		MST	SHA	0	01FDA	0	0CTR10R	5	0			
169.00	3.00		MST	SHA	0	01FDA	0	0CTR08R		0			
172.00	3.00		MST		0	01FDA	0	0C0114R		0			
175.00	3.00		MST		0	01FDA	0	0C0114R		0			
178.00	3.00		MST		0	01FDA	0	0C0550R		0			
181.00	3.00		MST		0	01FDA	0	0C0320R		0			
184.00	3.00		MST		0	01FDA	0	0C0310R		0			
187.00	3.00		MST		0	01FDA	0	0C0420R		0			
190.00	3.00		SHA		0	01FDA	0	0C0110R	7	0			
193.00	3.00		SHA	MST	0	01FDA	0	0C0115R	6	0			
196.00	3.00		SHA	MST	0	01FDA	0	0C0215R	7	0			
199.00	3.00		MST	SHA	0	01FDA	0	0C0112R	7	0			
202.00	3.00		MST		0	01FDA	0	0C0115R		0			
205.00	3.00		MST		0	01FDA	0	0C0112R		0			
208.00	3.00		MST	GWK	0	05FDA	0	0C0210R		0			
211.00	3.00		GWK	SHA	0	TRFDA	0	0C0210R		0			
214.00	3.00		GWK	SHA	0	TRFDA	0	0C0212R	4	0			
217.00	3.00		GWK		0	TRFDA	0	0C0212R		0			
220.00	3.00		GWK	MST	0	05FDA	0	0C0110R	8	0			
223.00	3.00		GWK	MST	0	05FDA	0	0CTR06R		0			
226.00	3.00		MST	GWK	0	02FDA	0	0C0210R		0			
229.00	3.00		VBX	GWK	0	03FDA	0	0CTR10R		0			
232.00	3.00		GWK	VBX	0	01FDA	0	0CTR10R		0			D232·0 = A321419 T/S RHYOLITIC VITRIC CYRSTAL TUFF + PYRITE.
235.00	3.00		GWK	VBX	0	01FDA	0	0C0106R		0			

DEPTH TO	CORE RECOV	Sample Number	LITH'GY MAJ	LITH'GY MIN	OXID	--SULPHIDES-- VoGPyCpPoGaSp % a%a%a%a%a%	------ALTERATION--------- ILiAlChEpKfSeClSiCaJaBaMa Int	VEINING TyVoNoA	STRUCTURE BaJaFn	H	FAULT GgAng pc	SU tn ri at	Comments
238.00	3.00		GWK	SHA	0	02FDA	0	QCTR00R	7	0			
241.00	3.00		VBX	GWK	0	TRFDA	0	QCTR00R		0			@ 243.0 = A321420 – T/S EPICLASTIC SEDIMENT CONTAINING LARGE FRAGMENTS OF
244.00	3.00		VBX	GWK	0	01FDA	0	QCTR04R	7	0			DARK GREYWACKE MATRIX
247.00	3.00		VBX	GWK	0	02FDA	0	QCTR04R		0			@ 247.0 = A321421 – T/S EPICLASTIC IMMATURE QTZ ARENITE CONTAINING ANGULAR
250.00	3.00		VBX	GWK	0	01FDA	0	QC0200R		0			FORMERLY GLASSY RHYOLITIC MAGMA
253.00	3.00		VBX	GWK	0	01FDA	0	QC0100R		0			@ 250.0 = A321422 – T/S EXTENSIVELY SERICITIZED RHYOLITIC VITRIC CRYSTAL
256.00	3.00		GWK	SHA	0	TRFDA	0	QC0110R		0			
259.00	3.00		GWK		0	TRFDA	0	QC0110R		0			
262.00	3.00		GWK	SHA	0	TRFDA	0	QC0100R		0			
265.00	3.00		GWK	VBX	0	TRFDA	0	QC0106R		0			
268.00	3.00		GWK	SHA	0	TRFDA	0	QC0110R		0			
271.00	3.00		GWK	MST	0	TRFDA	0	QC0100R		0			
274.00	3.00		GWK		0	TRFDA	0	QC0300R		0			
277.00	3.00		GWK	SHA	0	TRFDA	0	QC0100R	6	0			
280.00	3.00		GWK	SCG	0	TRFDA	0	QC0215R		0			
283.00	3.00		GWK		0	TRFDA	0	QC0210R		0			
286.00	3.00		GWK		0	TRFDA	0	QC0210R		0			
289.00	3.00		GWK		0	TRFDA	0	QC0525R		0			
292.00	3.00		GWK		0	TRFDA	0	QC0215R		0			
295.00	3.00		GWK		0	TRFDA	0	QC0210R		0			
298.00	3.00		GWK		0	TRFDA	0	QC0210R		0			
301.00	3.00		GWK		0	TRFDA	0	QC0100R		0			

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APPENDIX III

PETROLOGY OF DRILL CORE SAMPLES

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PETROGRAPHIC REPORT

Rocks from Hellyer Area

For CSR Exploration Ltd. 5/3/88

by

Anthony J. Crawford
Geology Department
University of Tasmania

INTRODUCTION

We have shown in the April 1986 and July 1987 AMIRA Reports to Dr. Ross Large that the Ti/Zr ratio of altered lavas is a very useful parameter to employ in the interpretation of such suites. Not only is this ratio considered to reflect pristine levels (due to the immobility of Ti and Zr on the scale of a flow unit), but it also decreases smoothly across the fractionation range from basalt, andesite, dacite to rhyolite (due to the appearance and gradual precipitation of FeTi oxides as crystallization progresses, decreasing Ti but not Zr in residual magmas). In the accompanying paper (Crawford et al. 1988) we have shown that individual units within just the basaltic-andesitic compositional spectrum of the Mount Read Volcanics have distinctive and clustered Ti/Zr ratios. For example, the Tullah andesites and the Que Footwall andesites have Ti/Zr ratios between 30 and 35, whereas those andesites intruding the Central Volcanic Complex acid lavas around Leach Hill and Crown Hill have Ti/Zr ratios from 17-21. Careful use of this ratio, together with consideration of other chemical (eg. rare earth elements) and petrographic features of the rocks under examination, allows important within-belt correlations to be made where field data (and sometimes detailed petrographic studies) cannot distinguish between various units. This is especially true for regional correlation, and has been central to my argument that the basaltic accumulation in the Lynch Creek area S of Queenstown is a time and chemical equivalent of the Hellyer basalt. It is along these lines, therefore, that the following interpretation of the Bulgobac samples has been developed.

It is worth noting that the Zr/Nb ratio is also an excellent petrogenetic indicator and tracer, but due to the low Nb (<10ppm) in the Mount Read Volcanics mafic lavas, very careful analytical porcedures (long count time on XRF) are required to get accurate data.

INTERPRETATION OF THIN SECTION EXAMINATION OF BULGOBAC SAMPLES

The basalts examined in thin section from Drillhole BRD 03 include A321401, 404, 406 and 408; the latter three show excellent textural preservation and minimal secondary alteration, and therefore should have compositions little removed from their primary compositions. Petrographically, these freshest lavas are identical to those I have seen from the Hellyer area, given the small variation between individual samples. Characteristic are:

1. the rather squat, equidimensional augite phenocrysts, often with significant zoning (including well-developed sector zoning in some samples),
2. the presence of sparse (but significant) small deep red chromite euhedra, usually incorporated in altered olivine phenocrysts, which are invariably subordinate to augite phenocrysts or absent in some samples,
3. the rarity or complete absence of plagioclase phenocrysts, which is most unusual in a suite of orogenic lavas such as the Mount Read Volcanics (and is a petrographic feature which first drew to my attention the probable equivalence of the Hellyer basalts and those around Lynch Creek and Swan Creek some 50km further south).

I have no hesitation in drawing a petrographic correlation between the basalts examined from BRD 03 and those exposed within the Hellyer EL.

GEOCHEMICAL CONSIDERATIONS

Three analyses of basalts are available from the Hellyer lease area. Two of these (334161, 162) are for rocks given to the author by Doug Jack (Aberfoyle) as representative of the least-altered 'basalts' at Hellyer. They are not from the mine area, but are from further south on the Aberfoyle lease, and are reported in the July 1987 AMIRA Report. The third (MR437) is an analysis of a basalt outcropping beneath the transmission lines (CP913959) near the Hellyer Mine, and is taken from Corbett's analyses in the soon-to-be-publshed "Geology of Tasmania".

SAMPLE	MR437	334161	334162
SiO2 %	56.4	48.3	55.6
TiO2	0.56	0.82	0.77
Al2O3	13.0	13.6	18.6
FeO*	9.0	9.45	10.5
MnO	0.19	0.16	0.23
MgO	8.29	11.2	4.60
CaO	8.05	8.54	3.08
Na2O	2.84	1.18	4.12
K2O	1.24	2.97	1.93
P2O5	0.35	0.42	0.57
Ni (ppm)	85		17
Cr	430		5
V	310		302
Sc	32		31
Zr	150	189	187
Nb	6	13	11
Y	17	31	32
Sr	610	391	595
Rb	32	48	46
Ba	1130		3407
Ti/Zr	22	26	25

It can be seen from the above analyses that whereas the three samples cannot be comagmatic (note, for example, that unlike predicted from simple fractionation, most primitive lava 334161 has the highest Nb contents, and P2O5 and Zr abundances well above more evolved basalt MR437), Ti/Zr (and Zr/Nb) ratios are very close, suggesting that these lavas belong to the same magmatic suite.

Now referring to CSR data for lavas from BRD 03, it is evident that there are at least two magmatic groups represented amongst the basalts analyzed. The first of these, represented only by A321402, has Ti/Zr around 23 and is from close to the top of the basalt in the drillhole. It is close compositionally to the basalt outcropping in the Hellyer EL (MR437 above), which is also close to the top of the Hellyer Basalt, and is therefore considered to be a distinct geochemical unit (herein Unit 1) with Ti/Zr values around 22-25. Significantly, Unit 1 also is present in the upper 225m of the basalt section in BRD 02, for which analyzed basalts A321052, 057, 061 and 062 have Ti/Zr ratios from 22-25. Unit 1 probably does not extend as far west as BRD 01, as none of the analyzed basalts have Ti/Zr ratios within this range. It is noted, however, that no samples were analyzed from the upper 50m or so of basalts encountered in BDR 01; as Unit 1 is located immediately below the basal shales, it is possible that it occurs in these top 50m of unanalyzed lavas.

The remaining analyzed basalts in BDR 03 have Ti/Zr ratios from 32-37, and are referred to Unit 2. Basalts with the same range of Ti/Zr occur beneath Unit 1 basalts in BDR 02 (A321064) and are present at the End of Hole, and also in BDR 01, where they constitute the bulk of the basalt section (270m) except for the unanalyzed top 50m of basalt.

Therefore, we can identify two broad basaltic units within the basalt section drilled in the Bulgobac River EL, an upper Unit 1 with Ti/Zr= 22-25, and a lower Unit 2, with Ti/Zr from 32-37. In BDR 02, sample A321063 has a Ti/Zr = 28, intermediate between the two groupings recognized, and significantly, this lava occurs in the transition zone from Unit 1 to Unit 2 somewhere between the 547m and 607m levels in this hole. Unit 1 is thickest (at least 160m) in BDR 02, is less than 73m thick in BDR 03 further north, and may be absent (or less than about 50m thick) in BDR 01. Unit 2 is less than 100m thick in BDR 03, greater than 3m thick in BDR 02 (which bottomed in Unit 2), and well over 200m thick in BDR 01. It appears, therefore, to be thickening westward.

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FURTHER OBSERVATIONS

1. The aphyric andesite in the bottom of MDR 03 (A321412, Thin Section 321411) is chemically very close to the typical Que River and Hellyer Footwall andesites. These lavas all have Ti/Zr ratios around 25-35, close to the range for the much more primitive Hellyer basalts; it is clear, therefore, that they cannot belong to the same magmatic suite as the Hellyer basalts, since Ti/Zr decreases quite dramatically during fractionation. Unpublished REE studies strongly support this interpretation; the Que Footwall andesites have significantly ***less*** LREE contents than the basalts, whereas if they were comagmatic they should have considerably ***higher*** LREE contents.

2. The same andesites discussed above appear to me to be compositionally identical to typical Central Volcanic Sequence lavas from around Tullah. I cannot, therefore, support Corbett's interpretation of a significant break separating the Central Volcanic Complex and his Dundas Group (my Western Volcanic Sequence).

3. As I have noted in the last AMIRA Report, the pronounced chemical similarities between the Hellyer basalt and those basalts lying SW and NW of Queenstown (in the Lynch Creek and Swan Creek areas) strongly suggest to me that they represent part of the same unusual shoshonitic magmatic event. These lavas are not present in the Central Volcanic Complex, and I suggest that Corbett's interpretation that the basalts W of Queenstown dip under the Central Volcanic Complex, and are therefore older than the latter, must be considered unlikely. A far simpler scenario is one in which the Hellyer basalts and the Lynch Ck. sequence are correlates and represent discrete large basaltic volcanic centres constructed upon the Central Volcanic Sequence basement. These rocks are referred to the Western Volcanic Sequence. A third basaltic volcano may be represented by the abundant basalts and andesites in the Beulah area. The Noddy Creek

Volcanics on Sorell Peninsula, however, although andesite-dominated, appear to be correlates of the Central Volcanic Complex.

687096

95

SAMPLE NUMBER: **A321401** 336.3m BRP 03

HAND SPECIMEN:
Fine-grained grey-green basalt with phenocrysts to 1mm of augite and patches of black chlorite; a 3mm-wide vein of calcite traverses the core sample

SUMMARY: This rock is a hydrothermally-altered, sparsely augite+olivine-phyric metabasalt with extensive patchy development of calcite and epidote, and veins of calcite.

THIN SECTION:

This is a sparsely olivine+augite-phyric basalt in which the phenocrysts have been totally pseudomorphed by calcite and chlorite respectively. Euhedral olivine phenocrysts, mainly less than 1mm long, formerly constituted less than 1 modal % of the rock and have been replaced by pale green chlorite which shows intense anomalous blue interference colours. Augite phenocrysts were also a primary phase in this lava, but intense alteration of both these and the groundmass by a very fine-grained epidote-calcite intergrowth has obliterated most phenocryst outlines, leaving only occasional shadowy outlines with typical augite shapes as evidence of the former presence of augite phenocrysts. It is estimated that these probably constituted less than 10 modal % of this rock.

The fine-grained crystalline groundmass was originally composed of interlocking lath-shaped plagioclase microlites and anhedral augite plates, with minor granular FeTi oxides and interstitial glass. Plagioclase laths have been completely albitized, although some contain flecks of sericite and tiny globular masses of pumpellyite(?). Irregular murky brown patches to 2mm across are abundant in the groundmass of this rock and are composed of a very fine-grained intergrowth of calcite and epidote. Former interstitial glass has been replaced by pale green chlorite identical to that replacing olivine phenocrysts, and the same material also occurs filling tiny gashes and larger fractures throughout the groundmass.

A vein of calcite approximately 3 mm thick cuts the rock. In thin section, it shows an unusual internal structure. Subgrains growing from the vein margins are relatively long and thin, and are aligned perpendicular to the vein length (comb-layering), whereas those growing in the central portion of the vein are more equidimensional and mosaic- textured. Although the vein margins appear relatively sharp in hand-specimen, thin section examination shows the margins to be generally more diffuse, with some elongate calcite crystals extending beyond the vein into the groundmass.

This style of alteration, with extensive and localized calcite-epidote development, is not characteristic of the regional burial metamorphism as observed by the author elsewhere within the Mount Read Volcanics; rather, I suggest it represents local hydrothermal alteration superimposed upon a pre-existing regional burial metamorphic assemblage (typically prehnite-pumpellyite facies).

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SAMPLE NUMBER: **A321403** 357.3m 82003

HAND SPECIMEN: This dark grey-green rock is obviously fragmental, with volcanic clasts to 1 cm, but the majority of fragments are 3-5 mm across set in a lighter grey-green tuffaceous matrix.

SUMMARY: This rock is a highly altered pyroclastic rock composed of vesicular glassy framents of pilotaxitic-textured andesite mainly less than 5mm across; it is best classified as a lithic vitric tuff.

THIN SECTION:

This unusual pyroclastic is composed of diverse fragments of formerly glassy and highly vesicular andesite, mainly around 5 mm across. Phenocrysts were originally calcic plagioclase and subordinate augite, although both have been thoroughly replaced by calcite, sericite, and minor albite, epidote and chlorite. Most plagioclase phenocrysts were blocky euhedra to 1mm across; these are now composed dominantly of relatively coarsely-crystalline sericite (muscovite?). Former glass has altered to colourless to honey coloured palagonite, which has been in turn largely altered to calcite, quartz and sericite. Most vesicles (mainly < 0.5mm) have been filled by calcite or pale yellow-green chlorite. The best preserved fragments show a pilotaxitic alignment of pseudomorphed plagioclase and clinopyroxene groundmass microlites; abundant elongate and flattened vesicles probably developed during viscous flow rather than during tectonic deformation. Abundant rounded, almost concretionary bodies to 0.5mm diameter resemble lapilli-ash and have been totally replaced by calcite. Large irregular patches of calcite occur between fragments, and also replace large areas of formerly glassy fragments.

The majority of volcanic fragments in this rock appear to be derived from the same highly vesicular, glassy, pilotaxitic-textured andesite. Similar lavas, though rarely as vesicular as this, have been noted by the author further south in the Mount Read Volcanic belt, mainly from the Central Volcanic Complex. The rock's texture is suggestive of rapid eruption and explosive quenching in a shallow subaqueous setting. The rock is probably best classified as a lithic vitric tuff. As for the previous sample, the alteration style in this rock is hydrothermal rather than pervasive regional metamorphism.

687098

SAMPLE NUMBER: A321404 404.4 m 3RD 03

HAND SPECIMEN: This rock is a pale grey-green fine-grained uniform-textured massive lava with visible microphenocrysts of clinopyroxene.

SUMMARY: This is an augite-phyric metabasalt which has been metamorphosed at prehnite-pumpellyite facies conditions, but which shows no sign of local hydrothermal alteration. It is fairly typical of least-altered Mount Read Volcanics metabasalts from the Western Volcanic Sequence.

THIN SECTION:

This rock is a metabasalt containing approximately 15 modal % of augite phenocrysts in a microcrystalline intersertal textured groundmass. Augite phenocrysts are dominantly colourless euhedra less than 0.5 mm long, and are typically fractured but unaltered; some show well-developed hourglass zoning. The groundmass is composed of albitized plagioclase microphenocrysts and microlites separated by areas of chloritized glassy mesostasis, thin anhedral plates of augite, and tiny granules of altered FeTi oxides. Albitized plagioclase laths often contain trains and patches of microspheres of epidote-pumpellyite group minerals; traces of K-feldspar, possibly primary, are present in the groundmass. Irregular patches of pale green chlorite with strong anomalous blue interference colours occur throughout the rock, and are often lined with semi-circular to globular blebs of secondary quartz. Rare small patches of calcite are present in the groundmass.

This Mount Read Volcanics metabasalt is fairly typical of the basalts from the Western Volcanic Sequence (Corbett's Dundas Group) in the Hellyer area. The preservation of augite phenocrysts, absence of actinolite, and the presence of albite-chlorite-quartz-epidote-(pumpellyite?) assemblages suggest a prehnite-pumpellyite facies of burial metamorphism, also typical of this area away from mineralization. There is no sign in this lava of the extensive calcite-dominated hydrothermal alteration obvious in the previous two rocks.

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SAMPLE NUMBER: A321406 4/3 ... BRD 03

HAND SPECIMEN: This rock is a pale grey-green fine-grained uniform-textured massive lava with visible microphenocrysts of clinopyroxene.

SUMMARY: This is an augite+plagioclase-phyric metabasalt which has been metamorphosed at prehnite-pumpellyite facies conditions; it is transected by narrow veinlets of calcite.

THIN SECTION:

In most respects, this lava is very similar to the preceding sample. However a number of minor differences are noted. Firstly, this rock contains a few blocky albitized plagioclase euhedra to 0.7mm across. Secondly, the groundmass of this sample is slightly more glassy and the plagioclase microlites somewhat more acicular than in A321404, and patches of secondary quartz (mainly spherical blebs) and chlorite are larger. Narrow veinlets composed of a fine-grained mosaic of secondary quartz and albite have been partially overprinted by calcite patches.

This metabasalt may well be from the same flow as sample A321404, given the striking similarities between thes two lavas. The more abundant glass and more acicular plagioclase microlites in this sample suggest it comes from closer to a flow margin than A321404.

88

SAMPLE NUMBER: **A321408** 422.4 m DAD 03

HAND SPECIMEN:

This is a fine-grained grey-green metabasalt with phenocrysts to 2 mm of augite, and a few veinlets of calcite transecting the drill core sample.

SUMMARY:

This rock is an augite+olivine-phyric metabasalt, characteristically plagioclase-phenocryst free like many of the relatively primitive basalts from the Western Volcanic Sequence of the Mount Read Volcanics.

THIN SECTION:

This rock was originally an olivine + augite-phyric basalt with about 2 modal % of olivine phenocrysts and 15 modal % of augite phenocrysts set in a microcrystalline groundmass charged with plagioclase microlites. Former olivine phenocrysts were euhedral, less than 1 mm long, and some contain one or two deep red chromite grains. All olivine crystals have been totally pseudomorphed by intergrowths of calcite and minor chlorite. Augite phenocrysts remain unaltered and are dominantly euhedral to subhedral stubby prisms, usually less than 1 mm long, but occasionally reaching 2 mm in length. They are frequently aggregated together in glomerocrystic clots, and many phenocrysts show simple twinning and zoned extinction, indicative of compositional zoning from core to rim. Intimately intergrown grain boundaries between adjacent augite crystals in many glomeroclots are suggestive of these 'phenocrysts' being fragments of disaggregated clinopyroxenite plucked from the walls or floor of a magma chamber during ascent or eruption. The outermost rims of many such crystals are ragged and diffuse, showing clear evidence of reaction with groundmass; this is further support for the idea that many such phenocrysts were out of equilibrium with the magma which was transporting them.

Groundmass is microcrystalline, and originally contained only a very small proportion of glass. Bladed microlites of albitized plagioclase dominate the groundmass, and are separated by very small granular, anhedral augite grains and FeTi oxide grains which have altered to tiny globular masses of leucoxene. Some of the larger groundmass plagioclase grains contain sericite flecking and tiny grains of another alteration mineral, possibly pumpellyite. Interstitial areas formerly composed of glassy mesostasis have been replaced by very pale green chlorite, which also fills small cracks and fractures throughout the rock. Metamorphic grade is prehnite-pumpellyite facies; the preservation of abundant augite, and paucity of calcite (particularly as veins and groundmass alteration) suggest that this rock shows a pervasive regional burial metamorphic alteration, and is not associated with hydrothermal alteration.

687101

100

SAMPLE NUMBER: **A321410** 424.1m BRD03

HAND SPECIMEN:

This is a light to medium grey metavolcanic (?) rock containing abundant altered feldspar phenocrysts and transected by abundant calcite and quartz veinlets. Small patches and veinlets of black chlorite are common, and darker, chlorite-rich areas define a weak foliation perpendicular to the length of the drill core.

SUMMARY:

This rock is an extensively recrystallized rhyolitic or rhyodacitic lava which had a highly glassy groundmass, now devitrified to albite, quartz and chlorite.

THIN SECTION:

This formerly glassy volcanic rock contains about 15 modal % of altered feldspar phenocrysts and rare recrystallized quartz phenocrysts in a very heterogeneous formerly glassy groundmass. Phenocrysts are generally blocky, dirty albite euhedra less than 2mm long. Many feldspar phenocrysts show areas of subgrain recrystallization to fresh, clear albite, while others which show no twinning and extensive alteration to sericitic aggregates may have been formerly K-feldspar.

The groundmass of this rock is complex with patchy, mosaic textures suggestive of an origin from devitrification and crystallization of Si-rich glass (ie. rhyolite or rhyodacite). In places, the groundmass approaches snow-flake textures, with coarser-grained albite-quartz intergrowths surrounded by much finer grained mosaic intergrowths of the same minerals. A weak fracture cleavage transects the rock approximately perpendicular to the drillcore, and is defined by anastomosing laminae of pale green chlorite. The same mineral occurs as tiny flakes and aggregates throughout the devitrified groundmass, as do patches and trains of an opaque mineral, probably FeTi oxides.

Veinlets of secondary quartz and albite are common in this sample, and are sometimes themselves replaced totally or in part by calcite. Where quartz-albite veins cut former plagioclase (albite) phenocrysts the albite phenocrysts have been 'cleaned up', due to solution and relocation of fine-grained alteration products abundant in the feldspar phenocrysts.

SAMPLE NUMBER: A321411

HAND SPECIMEN:

This is a light to medium grey-green metavolcanic rock containing sparse feldspar phenocrysts and rounded to elliptical patches of black chlorite, possibly representing filled vesicles. The rock is cut by calcite and quartz veinlets less than 1mm thick.

SUMMARY:

This rock is a virtually aphyric, slightly vesicular meta-andesite with a relatively coarse-grained groundmass, suggesting that the sample is from the interior portion of a thick flow, or may represent a shallow intrusive (dyke?) in the lava sequence.

THIN SECTION:

This rock is essentially holocrystalline and aphyric, and contains only one or two rounded and reacted albitized plagioclase phenocrysts less than 1mm long in a crystalline groundmass composed dominantly of albitized plagioclase. The rock is remarkably poor in mafics; the only evidence for the presence of a pyroxene is uncommon tiny, interstitial yellow-red birefringent anhedral grains which may be augite. Albite crystals in the groundmass show a broad flow alignment and are an unusual pale buff-brown colour due to the presence of abundant micron-sized sericite(?) inclusions. Epidote with a weak pale yellow pleochroism forms very ragged and irregular patches in the groundmass, pale green chlorite is abundant filling angular interstices between the feldspar crystals, and tiny globules of leucoxene after FeTi oxides are abundant. Diffuse areas of 'cleaner', finer-grained groundmass, with a mosaic, rather than flow-texture, and composed dominantly of quartz and albite, may represent areas of groundmass which have recrystallized. Rounded to elliptical vesicles to 3 mm across, constituting about 2 modal % of the rock, are filled with pale green chlorite with inky blue anomalous interference colours; these are sometimes lined by fibrous to blocky secondary quartz. Veins of secondary quartz and albite transect the sample, and at least one veinlet also contains fibrous pale green actinolite. Calcite veinlets cut vesicle fillings and other veins, and are clearly the last phase of alteration which affected this rock.

COMMENT:

This sample is unusual, but has its counterparts within the Mount Read Volcanics. The nearest things to it which I have seen are some of the more evolved of the Henty Dyke Swarm lavas from further south, around Stirling Valley and Hercules. These dykes are known only to intrude the Central Volcanic Complex. It would be vital to show whether or not this rock is chemically akin to the evolved Henty Swarm dykes, as it would require the dyke swarm to be post-Western Volcanic Sequence in age. This has important tectonic ramifications.

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SAMPLE NUMBER: A321413 LSC-S... 3K203

HAND SPECIMEN:

This is a light to medium grey-green metavolcanic rock with sparse feldspar phenocrysts, transected by abundant calcite and quartz veinlets.

SUMMARY:

This rock is a virtually aphyric, slightly vesicular meta-andesite with a relatively coarse-grained groundmass, and is very similar in most respects to Sample A321411 above. This rock however, is permeated by abundant patchy secondary calcite throughout the groundmass, and does not show the areas of clean, recrystallized groundmass which characterize A321411.

THIN SECTION:

This rock is likely to be from the same unit (dyke or thick flow) as A321411. It is an aphyric andesite containing only a few albite phenocrysts. The remainder of the rock is a crystalline intergrowth dominated by albitized plagioclase with abundant interstitial chlorite, minor epidote and fresh FeTi oxides granules and dust. The rock is mottled by irregular patches of very fine-grained calcite which forms dirty brown aggregates which entirely overprint areas of groundmass rather than selectively replacing certain minerals. Vesicles are filled by granular crystalline quartz. Veinlets of quartz and albite are common, and are partly replaced by calcite. The calcite alteration event has overprinted a previous pervasive regional burial metamorphic assemblage of albite-chlorite-epidote and quartz.

SAMPLE NUMBER: A321415 456·3m BRDC5

HAND SPECIMEN:

This rock is a dark greywacke containing large, very angular and irregular-shaped rip-up clasts of a black, very fine-grained sediment up to 10 cm long.

SUMMARY:

This sample is an immature quartz wacke derived from a local pelitic metamorphic source. It contains clasts of shale presumably ripped up from the substrate during deposition of the greywacke.

THIN SECTION:

The sandstone matrix of this greywacke is composed of detrital grains dominated by quartz (generally less than 0.2 mm across) and muscovite,. Quartz grains are notably angular, and some are compound grains showing undulose extinction and subgrain recrystallization. Muscovite occurs as euhedral elongate 'books' and cleavage flakes showing typical high birefringence; some crystals have been bent around quartz grains during compaction. Other detrital minerals include sparse flattish, elongate grains of serpentine, and some large, deep red chromite grains. Detrital grains in the greywacke are cemented by calcite, which makes up more than 30 modal & of the rock, and appears to have overgrown large areas of matrix.

Abundant large black clasts (most more than 1 cm in maximum dimension) in the greywacke are composed of dark shale or slate containing occasional angular detrital grains of quartz and abundant finer muscovite flakes. In places, a parting defined by concentrations of muscovite and tiny trains of opaque grains cuts the shale. The shale also contains abundant very fine-grained calcite. The general lithological similarity of the dark shale clasts and their unusual angular outlines, suggests that they may represent rip-up clasts from a bed broken up during deposition of the greywacke.

The greywacke is a very immature sediment, composed of locally derived grains from a pelitic metamorphic terrain. The presence of the chromite and serpentine grains is important, as these are presumably derived from the 'ophiolitic' mafic-ultramafic complexes of the west coast, such as the Heazlewood River Complex. As we believe these were emplaced sometime in the middle Cambrian and immediately eroded, at least this greywacke is post-allochthon. I presume the same applies to the lavas higher up in the same drillhole.

SAMPLE NUMBER: **A321416** 575·6m 2CD 03

HAND SPECIMEN:

This rock is a dark grey, fine-grained very uniform greywacke showing no sign of bedding or other sedimentary features.

SUMMARY:

This sample is an immature quartz wacke derived from a nearby, dominantly pelitic metamorphic source.

THIN SECTION:

This rock is almost identical in thin section to the quartz wacke host rock of sample A321415. It is a fine sandstone with the largest detrital grains averaging around 0.5 mm across, but most grains are between 0.1 and 0.5 mm across. The majority of the detrital grains in this rock are angular quartz, most of which show undulose extinction and occasional subgrain recrystallization, suggesting a pelitic metamorphic source. Abundant relatively coarse-grained muscovite flakes and several still partly euhedral grains of garnet support the latter interpretation about source. As in A321415, large euhedral chromite grains are also present, and these, together with occasional serpentine grains, indicate that the west coast mafic-ultramafic complexes were also being eroded into the basin into which these quartz wackes were being deposited. Some fairly rounded grains of olive-green pleochroic amphibole may be derived from amphibolites in the metamorphic source terrain, or else from Central Volcanic Complex hornblende andesites that mainly outcrop further south, between Tullah and Queenstown. Patches of calcite replace matrix and constitute only 5-10% of this sample.

The principal differences between this rock and A321415 are that this sample has no shale clasts, and that the calcite cement so abundant in A321415 is rare in this sample, which appears to be cemented by silica. The amount of cement is much reduced relative to A321415.

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687106

SAMPLE NUMBER: **A321417** 326 5 m BAD 63

HAND SPECIMEN:

This dark grey fine-grained sedimentary rock contains well-defined layering defined by darker bands of shale. Thinner shale lamellae (<2mm) show ripple-like disposition within a lighter coloured siltstone matrix, and very irregular bedding in terms of the thickness and persistence of beds across the drill core.

SUMMARY:

This sedimentary rock is a banded siltstone - shale containing angular detrital quartz and abundant muscovite.

THIN SECTION:

This rock is a banded siltstone-shale composed of bands of lighter siltstone and darker shale; detrital grains are dominantly angular quartz showing undulose extinction and ragged, partly resorbed grain boundaries indicating some post-burial dissolution. Muscovite flakes mainly lying parallel with banding are abundant, and the other minor but ubiquitous constituent of the siltstones is interstitial calcite.

Shale bands are significantly poorer in detrital quartz than the siltstone layers, but are notably darker in colour, due to concentration of abundant tiny equidimensional opaque grains along layering defined by muscovite. Implications for the source of the detritus constituting this rock are probably the same as for the previous two samples; a pelitic metamorphic source is indicated.

It could be argued that the darker, quartz-poor and opaque-rich shale has been derived from the surrounding siltstone by a process of pressure solution leaching of silica and concentration of opaques along resultant stylolitic cleavage planes. This style of formation of banding from an originally homogeneous sediment is well documented by Glasson and Keays (1976: Econ. Geol.) from the Ordovician greywacke - shale succession at Clunes, near Ballarat.

687107

SAMPLE NUMBER: 321419 232.0m BRD-04

HAND SPECIMEN: Drillcore specimen showing excellent fragmental texture composed of angular fragments of pinky-grey rhyolitic lava with sericitized feldspar phenocrysts in a very dark grey matrix. Patchy devitrification of the formerly glassy rhyolitic fragments is obvious. The matrix contains small disseminations and local concentrations of very fine-grained pyrite.

SUMMARY: This rock was a rhyolitic vitric crystal tuff, which has undergone low grade burial metamorphism leading to devitrification and partial recrystallization.

THIN SECTION:

This rock was originally an acid vitric crystal tuff containing rhyolitic fragments with about 5-10 modal % of albite and subordinate K-feldspar phenocrysts In an extremely heterogeneous formerly glassy matrix characterized by pronounced variations in the extent of devitrification and recrystallization. Phenocrysts are generally blocky euhedra, but are frequently fragmented; they are partially replaced by wispy patches of sericite and are rarely longer than 1mm maximium dimension.

The groundmass of this sample was originally highly glassy. Abundant curved, cuspate former glass shards have been replaced by very fine-grained quartz-feldspar agrregates, and former perlitic cracks in glass are common. The groundmass is composed of sericite-rich and sericite-free areas, the former being finer-grained and more abundant than the latter. Seicite-free areas are polycrystalline aggregates of quartz and albite with complex mosaic intergrowth textures, undulose extinction in quartz and intimately intergrown grain boundaries. These areas occasionally coalesce into poorly-defined meandering veins, and may represent areas in which limited fluid movement mobilized K2O and other components of sericite, which were leached away. Sericite-rich areas are generally very fine-grained areas of devitrified acid glass in which 0.01-0.5 mm-sized patches of quartz with very diffuse grain boundaries and undulose extinction are crystallizing from the devitrified glass. Localized areas of intense sericitization may represent former K feldspar phenocrysts, or areas in which K feldspar crystallized from the devitrifying glass, to be later sericitized during pervasive burial metamorphism.

Meandering, diffuse veinlets dominated by pale green chlorite and almost ribbon quartz and minor muscovite flakes traverse the rock, and often have margins rich in Fe-oxides or hydroxides. Some of the narrower of these have a similar appearance to, and probable similar origin to stylolites in limestone, in which fluid fronts moving through the rock leach out part of the more soluble components, and leave concentrations of more insoluble material along irregular fronts.

This rock was a rhyolitic vitric crystal tuff, which has undergone low grade burial metamorphism leading to devitrification and partial recrystallization.

SAMPLE NUMBER: 32420 243.0 m BRD-04

HAND SPECIMEN: Drillcore specimen containing two lithological units, a grey rhyolte with abundant pink phenocrysts of sericitized feldspar, and an area of black greywacke. Although it is difficult to tell from the sample available, it appears that the rhyolitic lava fragments, which are up to 10 cm across, are embedded in greywacke.

SUMMARY: An epiclastic sediment containing large fragments of rhyolite in a dark greywacke matrix.

THIN SECTION:

This thin section includes two quite distinct domains, one a feldspar-phyric glassy rhyolitic lava, the other a quartz arenite. The rhyolite contains about 5 modal % of feldspar phenocrysts, the majority of which are euhedral albite; sericitized K feldspar phenocrysts are subordinate. Phenocrysts are frequently aggregated together in multi-crystal clots. Irregular patches of calcite replace parts of albite phenocrysts. There are no fresh or altered mafic phenocrysts.

The groundmass of this rhyolite was formerly glassy, but has devitrified and recrystallized. Secondary quartz and albite growing from the devitrified groundmass have irregular shapes and undulose extinction. The remaining, unrecrystallized groundmass is riddled with very fine-grained sericite, and very small areas rich in epidote and sphene may represent alteration of FeTi oxide microphenocrysts. Other areas to 2mm diameter are enriched in opaque euhedra with cubic outlines, probably pyrite. These are not associated with veins or calcite alteration.

An irregular contact between the rhyolite and a quartz arenite sediment traverses the thin section. The arenite is composed dominantly of angular detrital quartz grains rarely larger than 0.4mm across. Rare quartz grains contain muscovite flakes, and muscovite flakes up to 0.5mm long are abundant in the interstitial areas between quartz grains. A second type of mica grain, now altered to chlorite and FeTi oxides, are less abundant than muscovite and were probably originally biotite. The matrix of this immature sediment is a silty mud. The clast mineralogy and immaturity, and the angular nature of the quartz grains suggest that this sediment is locally derived from a Precambrian pelitic metamorphic source.

stylolites in limestone, in which fluid fronts moving through the rock leach out part of the more soluble components, and leave concentrations of more insoluble material along irregular fronts.

This rock was a rhyolitic vitric crystal tuff, which has undergone low grade burial metamorphism leading to devitrification and partial recrystallization.

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SAMPLE NUMBER: **321421** 247.0m BAD-04

HAND SPECIMEN: Drillcore specimen containing cream-pink angular clasts of rhyolitic lava up to at least 10cm across in a subordinate black greywacke matrix.

SUMMARY: This rock is an epiclastic immature quartz arenite containing angular fragments of formerly glassy rhyolitic magma. Pervasive low-grade metamorphism has devitrified the rhyolite and led to extensive sericitization and recrystallization to quartz and albite.

THIN SECTION:

As for the previous sample, this thin section is composed of two domains, a devitrified rhyolite and a quartz arenite.

In most respects the two lithologies in this section are very similar to those described in sample 321420. However, the rhyolite is generally more sericitized in 321421, and also calcite veinlets and patches are more abundant in this sample. The quartz arenite is identical in this section to that in 321420.

111

SAMPLE NUMBER: 321422 250.0m BRD-04

HAND SPECIMEN: Drillcore specimen of a speckled very dark grey acid tuff containing abundant pink, sericitized feldspar grains and large (to 3mm across) quartz phenocrysts in a black tuffaceous matrix.

SUMMARY: This rock is an extensively sericitized rhyolitic vitric crystal tuff containing unusual lensoidal aggregates of quartz crystal fragments.

THIN SECTION:

This rock is an extensively altered rhyolitic vitric crystal tuff characterized by several large 'quartz eyes' to 6mm long. Feldspar phenocrysts constitute about 30-40 modal % of the rock and include both albite and sericitized K feldspar, and are up to 2mm long, although most are < 0.5mm long. Quartz phenocrysts are fragmented euhedra which show uniform extinction and small rounded, devitrified melt inclusions. The formerly glassy matrix has devitrified to quartz, albite, K felspar and minor chlorite, but has been extensively sericitized. Coarse, swirling veins and patches of sericite are a dominant feature of this rock, and contain aggregates of pyrite(?) grains which are widespread through the rock.

An intriguing feature of this rock is the presence of several lensoidal aggregates (eyes) composed of 20-40 angular fragments of quartz phenocrysts, many of which contain rounded, devitrified melt inclusions. Sericitized groundmass seems to wrap around these structures in places, which have an overall appearance suggestive of an accretionary origin. Groundmass between quartz grains in the eyes is almost sericite free, perhaps because the dense aggregation of quartz prevented ingress of fluids associated with sericitization of glass. Although it is impossible to be certain, it is possible that these eyes formed during pyroclastic flow by accretion and aggregation of quartz grains coated by sticky rhyolitic magma. However if this is the case, it is strange that no feldspar crystal fragments are embedded in the aggregates.

112

SAMPLE NUMBER: 321423 34.3m BRD-04

HAND SPECIMEN: Drillcore specimen: grey, highly fractured and veined rhyolitic lava (?) with fairly extensive alteration and brecciation, particularly around veins of very fine-grained pyrite. Yellow epidote (?)-chlorite spots are common.

SUMMARY: This sample was formerly a glassy, feldspar-phyric rhyolitic lava with sparse phenocrysts of clinopyroxene(?); glass has completely devitrified and partially recrystallized to dominantly quartz and albite.

THIN SECTION:

This rock was originally a glassy rhyolitic lava with phenocrysts of feldspar and a sparse mafic phase now completely altered. Feldspar phenocrysts constitute about 5-10 modal % of the sample, and are mainly extensively sericitized, slightly rounded albite euhedra from 0.4 to 2mm long. Several ragged, reacted quartz phenocrysts to 1mm across are also present. Equidimensional microphenocrysts to 0.4mm of a former mafic phase are widespread but not volumetrically abundant in this rock; these are composed of rims of an opaque Fe oxide phase and a core of sericite in which are embedded small crystals of sphene and epidote. Although it is difficult to say with certainty, it seems likely that this mafic phase was clinopyroxene. Small microphenocrysts of FeTi oxide and dust of the same mineral are scattered through the rock.

The groundmass of this sample was formerly glassy, but devitrification and recrystallization has led to development of a patchy texture with secondary grains of quartz, albite and K feldspar (mainly sericitized) growing from the glass and producing a microscopic mosaic or snowflake texture. Veinlets of sericite and quartz are abundant and traverse the rock in irregular fashion. Some of the larger quartz veinlets, up to 1mm wide, are composed of fibrous quartz which grades inperceptibly into the recrystallized matrix of the rock. Other veinlets have very sharp margins against the groundmass.. Rare small patches of calcite occur within the quartz veinlets.

SAMPLE NUMBER: 321424 42·8m BRD-04

HAND SPECIMEN: Drillcore specimen showing pronounced fragmental texture coupled with intense recrystallization-alteration. Dark formerly glassy volcanic fragments to 1cm show abundant sericitized feldspar phenocrysts, and very diffuse margins, which grade into an highly sericite-veined lighter grey matrix.

SUMMARY: This sample was originally a rhyolitic vitric crystal tuff with abundant fragments of formerly glassy lava containing phenocrysts of feldspar and a mafic phase (now altered). It has been extensively altered, with the development of sericite-rich veins and replacement areas.

THIN SECTION:

This rock consists of approximately 10 modal % of feldspar phenocrysts, 1 modal % of a pseudomorphed mafic microphenocryst phase and sparse fragments of quartz phenocrysts in a formerly glassy groundmass which has devitrified and recrystallized. Feldspar phenocrysts are mainly 0.5-1mm long, slightly rounded euhedra and fragments of euhedra which are variably sericitized and contain occasional patches of calcite. Less abundant quartz phenocrysts are partially resorbed and rounded. Small pseudomorphed crystals of a former mafic phase are more abundant in this sample than in the previous five samples. These are composed of black rims of an opaque oxide phase surrounding a sericite core containing small grains of sphene and epidote, and while the presence of (Ca and Ti in) these phases suggests a calcic precursor (probably clinopyroxene), the overall appearance is more reminiscent of olivine alteration in basalts. It may be that these microphenocrysts were formerly Fe-rich fayalitic olivine, which is not uncommon in some modern rhyolites, and that breakdown releasing ferric iron localized sites of growth of epidote and sphene.

The groundmass of this sample is particularly heterogeneous in terms of grainsize and distribution of sericite-rich areas. The formerly glassy groundmass has devitrified and recrystallized, with the growth of secondary quartz and albite from altering glass. In parts of the matrix, these secondary phases form an almost microcrystalline groundmass, while in other areas the secondary quartz and albite form a complex mosaic texture with grainsize up to 0.1mm. Sericite riddles the groundmass, but in some areas it forms trains and streaky masses which coalesce to form veinlets. There are some shadowy suggestions of the former presence of curved glass shards, although these may equally well represent former curved perlitic cracks in a glassy lava groundmass.

114

SAMPLE NUMBER: 321425 70.2m BRD-04

HAND SPECIMEN: Drillcore specimen showing pronounced fragmental texture, with angular light grey rhyolitic lava fragments with feldspar phenocrysts set in a darker grey finer-grained matrix. Some fragments show quenched or altered margins. Small irregular segregations of very fine-grained pyrite are present, often localized in matrix adjacent to fragment boundaries.

SUMMARY: This sample was originally an epiclastic composed of pyroclastic (formerly glassy crystal-lithic rhyolitic tuffs) and lava (rhyolite) fragments, and a matrix containing metamorphic-derived quartz and muscovite grains.

THIN SECTION:

This sample clearly shows a fragmental texture dominated by angular fragments of formerly glassy to microlitic rhyolitic lavas and very fine-grained tuffs. Most lithic fragments resemble the six samples described above in general petrographic features and implications; they contain dominantly albite phenocrysts in devitrified formerly glassy groundmasses variably recrystallized to quartz, albite and sericite. Several lava fragments are of a rock somewhat more mafic than the rhyolites described above, and contain, in addition to albitized plagioclase phenocrysts, sparse elongate chlorite pseudomorphs after a pyroxene.

Matrix between the lithic fragments in this sample is silty to medium sand-sized, and includes abundant angular quartz grains with undulose extinction and muscovite flakes to 0.5mm long, both of which are probably derived from Precambrian pelitic metamorphics. Clusters of very small pyrite(?) crystals occur in both the tuff fragments and the matrix. Several veinlets to 1mm wide of relatively coarse-grained quartz and minor calcite traverse the rock.

115

SAMPLE NUMBER: 321426   77.2 m   BRD-04

HAND SPECIMEN: Drillcore specimen of an acid tuff breccia containing large, formerly glassy rhyolitic fragments(to at least12cm long) which contain yellowish pseudomorphs after feldspar phenocrysts, and are traversed by narrow veinlets of calcite. These are set in a dark grey tuffaceous matrix.

SUMMARY: This sample is a slightly reworked lithic tuff composed of abundant angular fragments of formerly glassy rhyolitic lava containing phenocrysts of albite.

THIN SECTION:

This sample is distinctly fragmental, with lava fragments forming more than 90% of the rock. Most fragments are formerly glassy to microlitic rhyolitic lava with devitrified groundmasses recrystallized to varying degrees, and generally containing abundant sericite. Euhedral albite phenocrysts are present in some fragments, and in others they are quite rounded and reacted. Most are replaced by sericite, which is likely to be the pale yellow-green pseudomorph phase visible in hand specimen. Sparse quartz phenocrysts are rounded and resorbed, and microphenocrysts of a former mafic phase (described in detail for sample 321424) are a minor but ubiquitous phase. The small amount of darker coloured matrix between lava fragments is a silty to sandy ash containing occasional angular grains of metamorphic quartz and muscovite. This minor non-volcanic component suggests that this tuff may be lightly reworked, with intermixing of some detritus from erosion of the nearby Precambrian pelitic metamorphics.

116

SAMPLE NUMBER: 321427 82.0m BRD-04

HAND SPECIMEN: Drillcore specimen of a rhyolitic tuff breccia containing fragments of grey rhyolite containing pink feldspar phenocrysts set in a pinkish-cream matrix texturally little different to the fragments.

SUMMARY: This sample is a vitric lithic tuff composed of abundant angular fragments of formerly glassy rhyolitic and rhyodacitic lava containing phenocrysts of albite and sparse chloritized pyroxene.

THIN SECTION:

Fragments very from sub-mm to more than 1cm in diameter, and are mainly composed of formerly glassy rhyolitic lava containing around 5-10 modal % of albite phenocrysts. The latter are slightly rounded blocky to elongate euhedra less than 1mm long; most are partly sericitized and contain trains of tiny chlorite inclusions replacing melt inclusions which are arranged in patterns outlining former crystal shapes (due to capture on the face of rapidly growing crystals). Sparse microphenocrysts of chlorite after a pyroxene are present in some fragments, as are former fayalite(?) microphenocrysts now altered to Fe oxides and chlorite-sericite

The formerly glassy groundmass of most fragments has devitrified, with incipient recrystallization being localized along perlitic (?) cracks through the glass. The resulting effect is visually very like a mesh-texture in serpentinite, with coarser areas of recrystallization (to albite, quartz and sericite) following the meshwork of cracks, whereas interior parts of areas bounded by cracks are even more fine-grained (micro-crystalline) and almost isotropic under crossed polars. Tiny prismatic apatite crystals are not uncommon in the groundmass of these fragments.

The section is traversed by several chlorite-rich veins, one 4mm wide. The vein chlorite is almost colourless, and shows low birefringent colours (grey, anomalous olive green-khaki), whereas chlorite filling small patchy holes and irregular fractures is slightly more green pleochroic, and shows anomalous blue interference colours. Patches of calcite occur within the chlorite veins, but are rare outside veins.

This rock is a rhyolitic to rhyodacitic lithic vitric tuff, derived very largely from the ejectamenta of a single explosive eruption. There is little evidence that this tuff was reworked prior to 'deposition'.

SAMPLE NUMBER: 321428 22.6m BRD-04

HAND SPECIMEN: Drillcore specimen containing angular fragments to at least 10 cm of light grey rhyolitic lava containing feldspar phenocrysts in a darker grey matrix which contains fragments and grains of the same rhyolite. Calcite veinlets traverse some of the larger fragments and extend into the matrix and around the margins of some fragments.

SUMMARY: This sample is a vitric lithic tuff composed of poorly-defined angular to subrounded fragments of formerly glassy rhyolitic lava containing phenocrysts of albite.

THIN SECTION:

This sample is a vitric lithic tuff composed of fragments to about 1cm long of devitrified, formerly glassy rhyolitic volcanic fragments which contain albite phenocrysts, sparse altered fayalite(?) phenocrysts and rare large resorbed and reacted, rounded quartz phenocrysts. Albite phenocrysts have reacted around the margins and have intimately sutured boundaries with the groundmass. Larger albite phenocrysts are almost rounded, whereas small, more lath-like albite phenocrysts and micro-phenocrysts show little reaction along crystal margins; this suggests there may have been two generations of feldspar phenocrysts in this rhyolitic magma.

The formerly glassy groundmass is devitrified and has commenced to recrystallize, with the growth of a mosaic of secondary quartz and albite, and minor K feldspar, from the glass. Sericite meshes pervade the groundmass, and thicken along boundaries between fragments, where they sometimes widen to form meandering veins. The groundmass is traversed by veinlets of secondary quartz and small gashes and cavities are filled by pale green chlorite which shows deep blue anomalous interference colours.

The overwhelming majority of poorly-defined but petrographically identical fragments in this tuff are probably derived from the same explosive eruption. The rock is a rhyolitic vitric lithic tuff.

118

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APPENDIX IV

UTEM SURVEY

119

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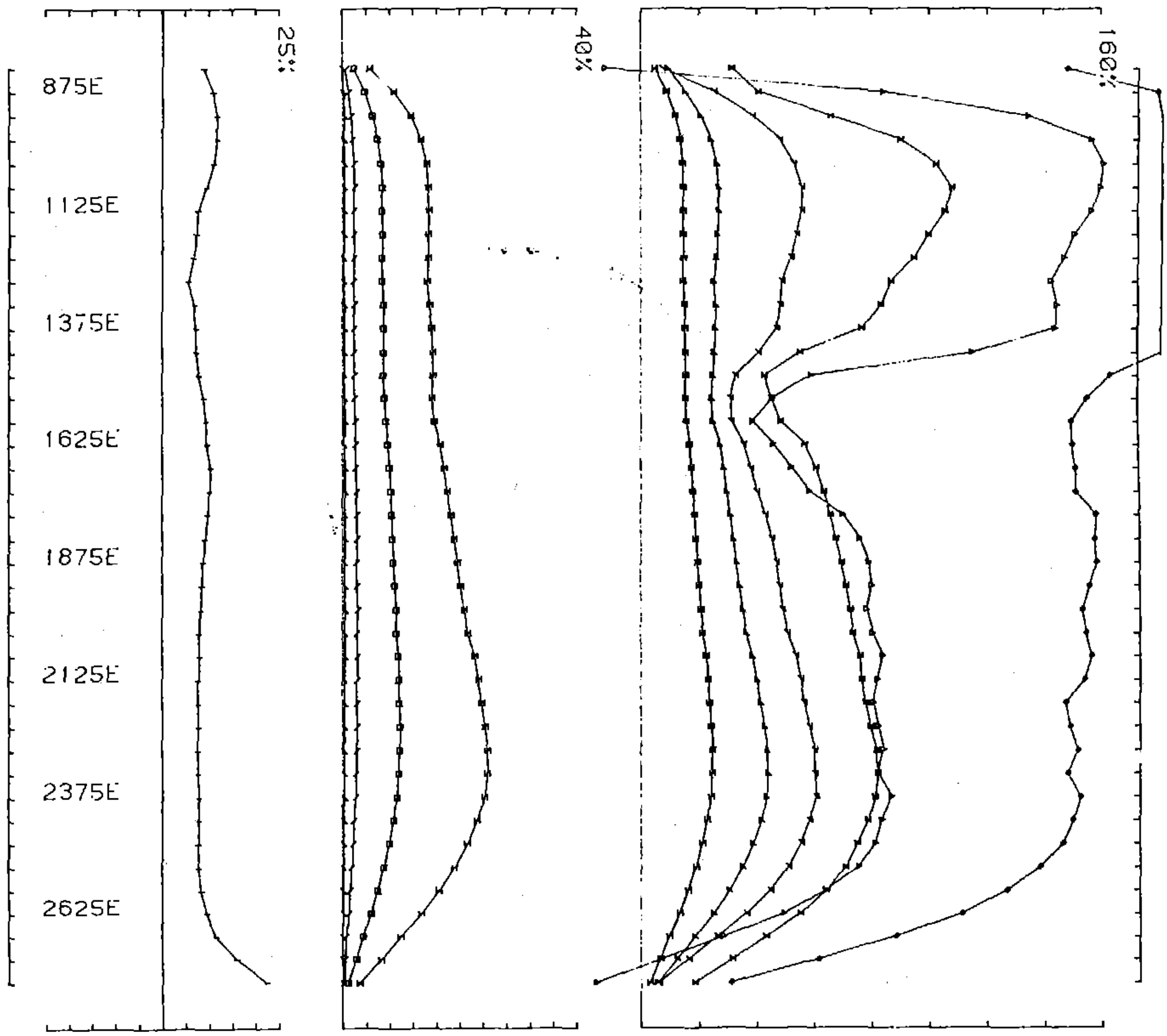

UTEM SURVEY at QUE ROAD for C.S.R.

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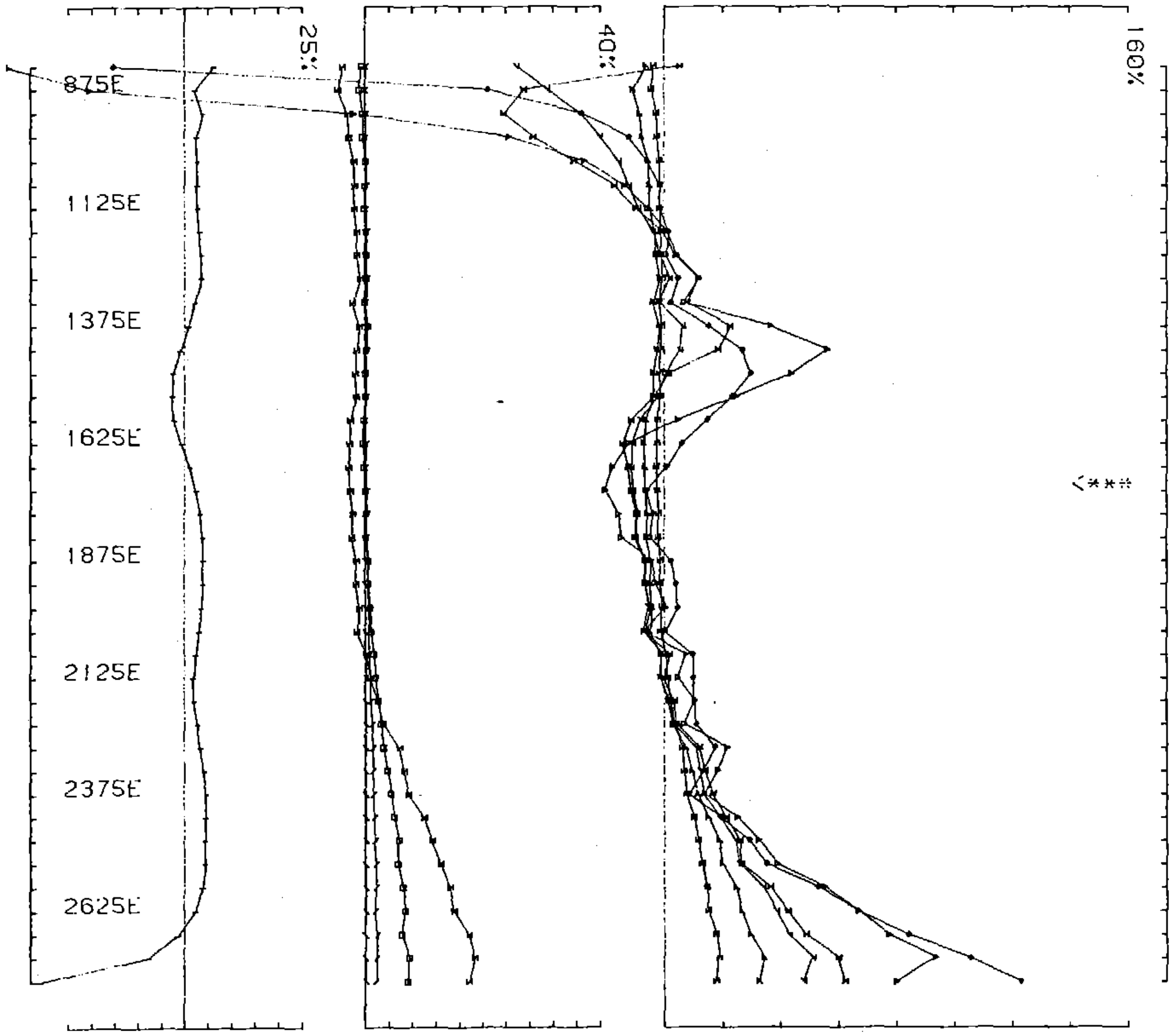
20



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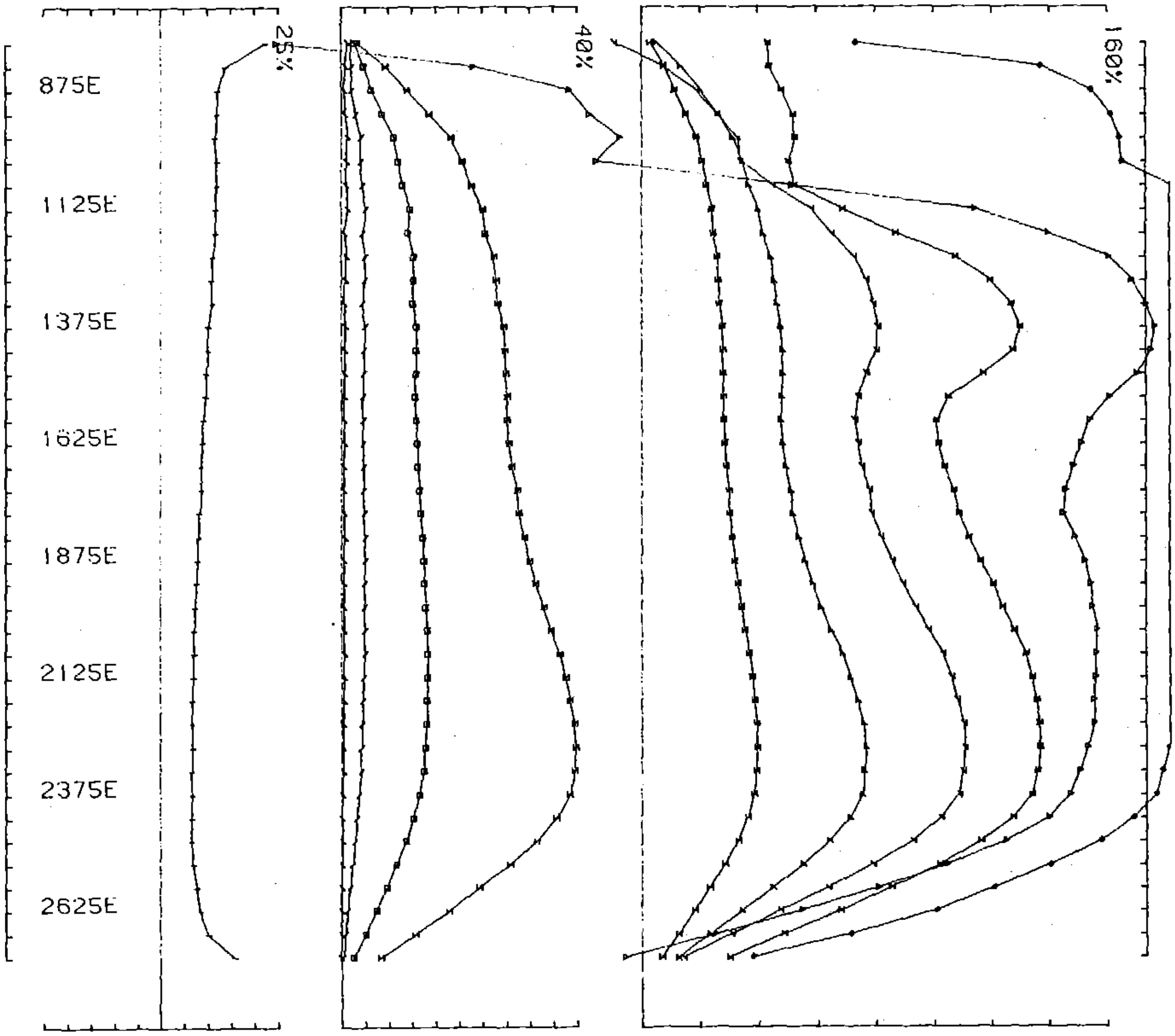

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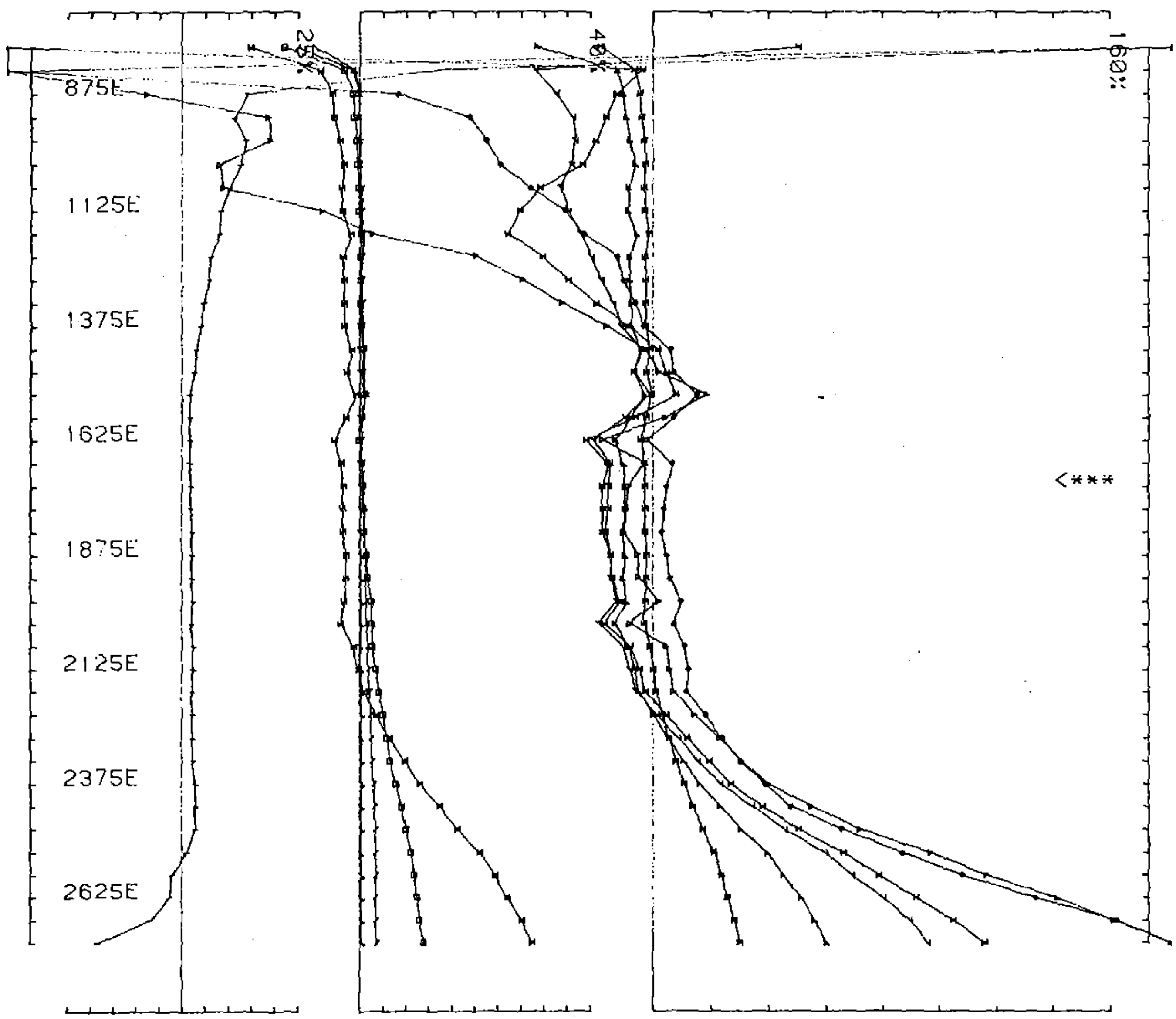
122

687122



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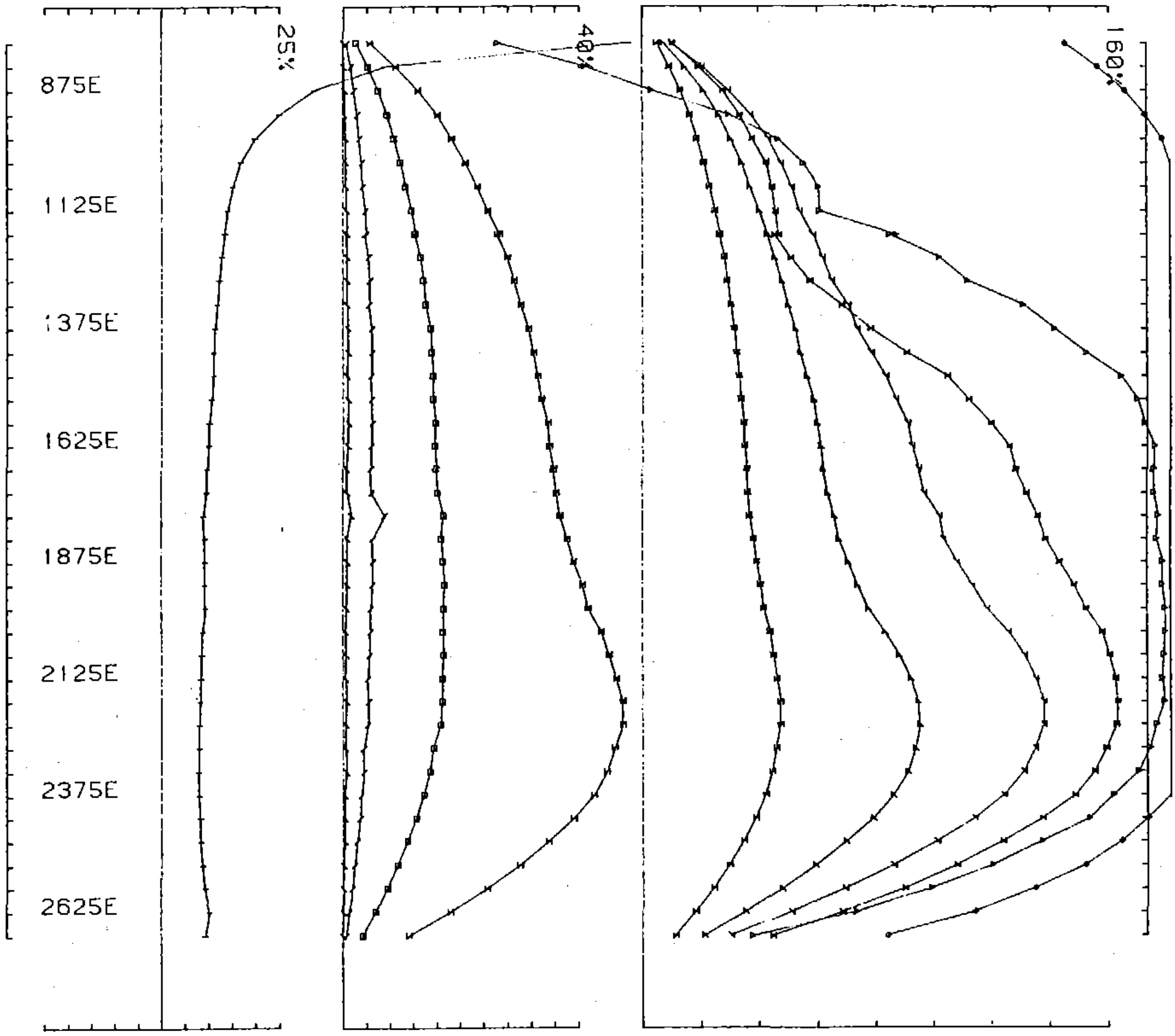
Loop 0001 line 8400N component Hx secondary field Ch 1 point norm .

123

687123



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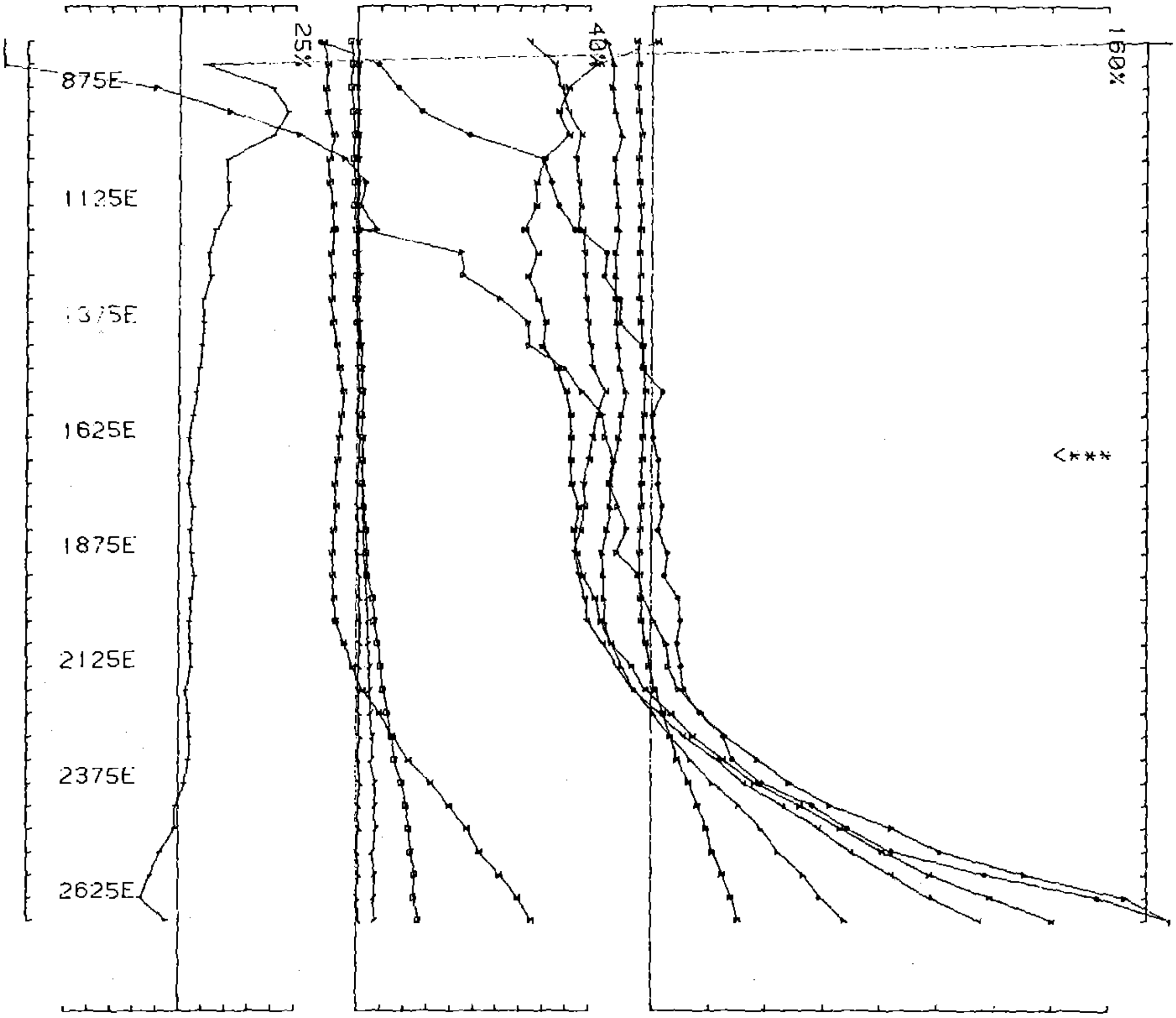
687124



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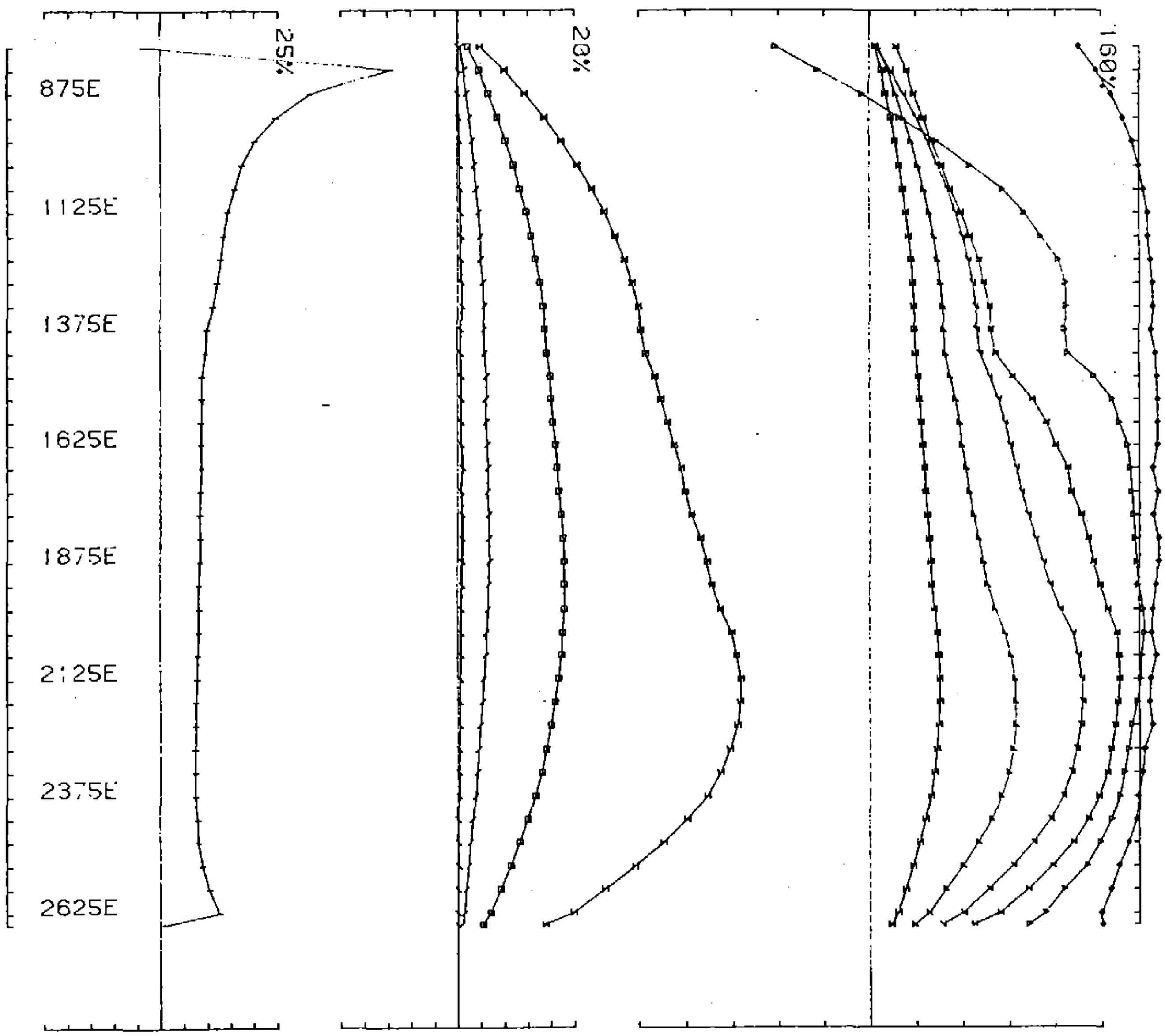
Loop 0001 line 8600N component Hx secondary field Ch 1 point norm

25

687125



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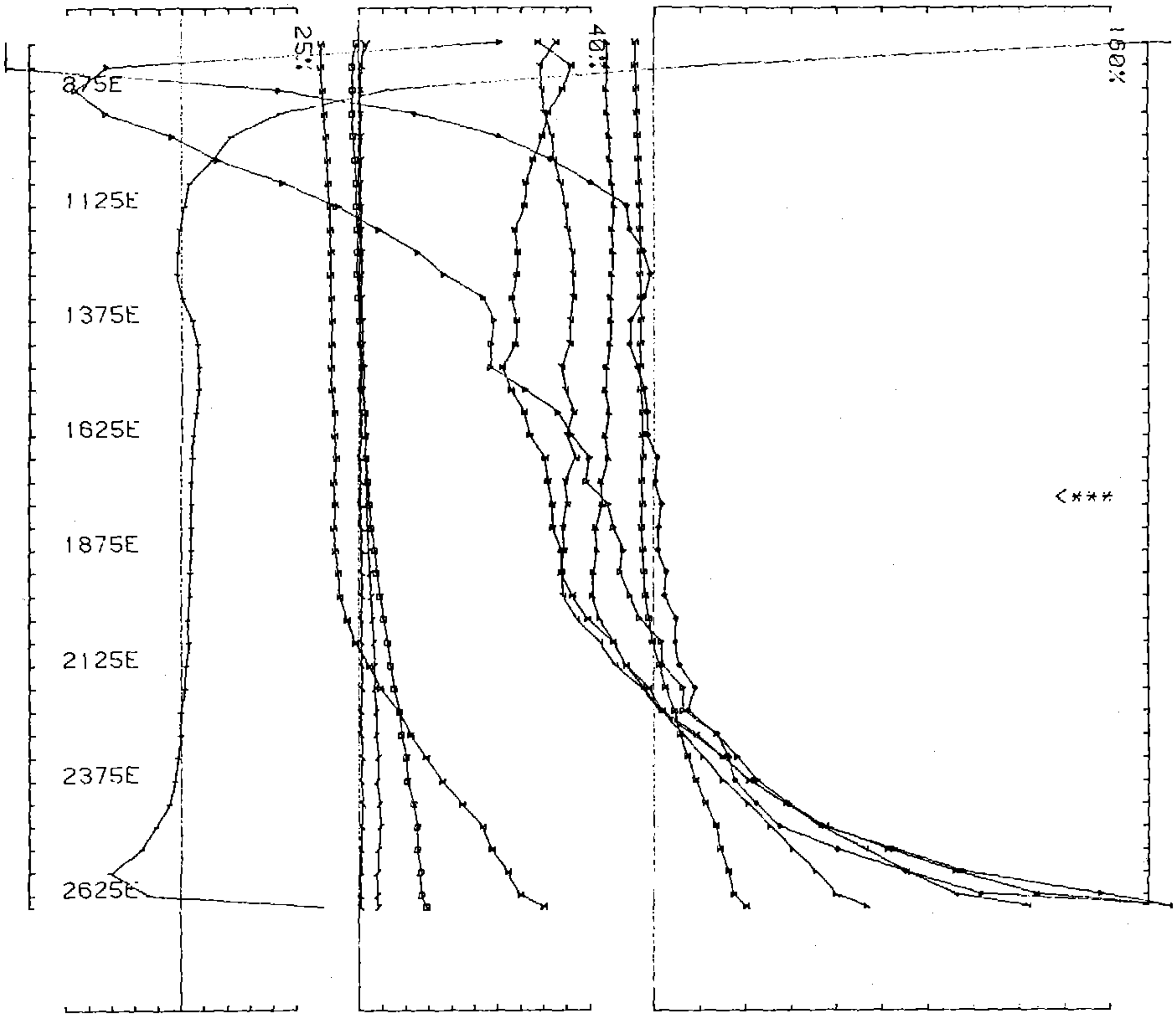
126

687126



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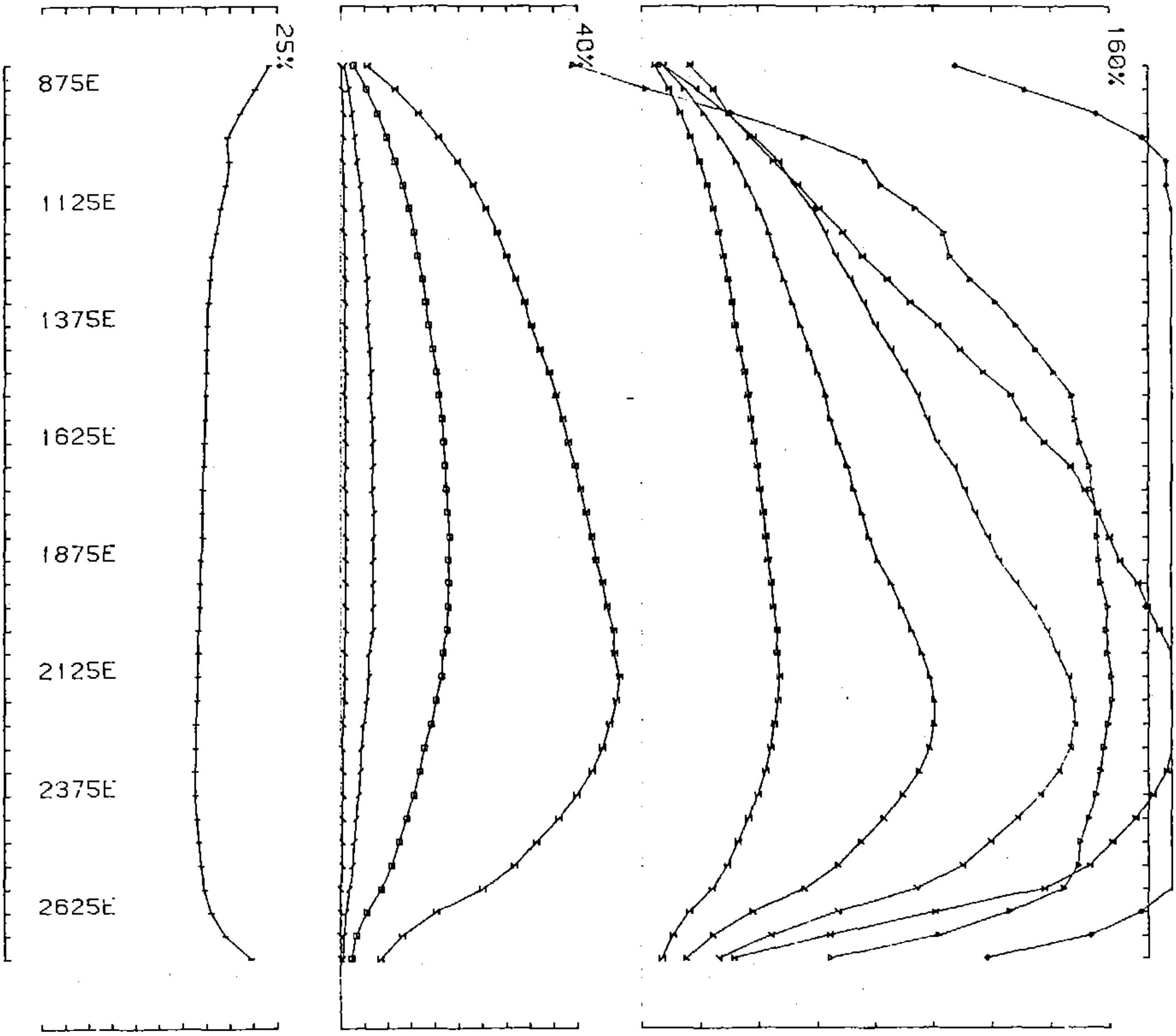
Loop 0001 line 8800N component Hx secondary field Ch 1 point norm

127

687127



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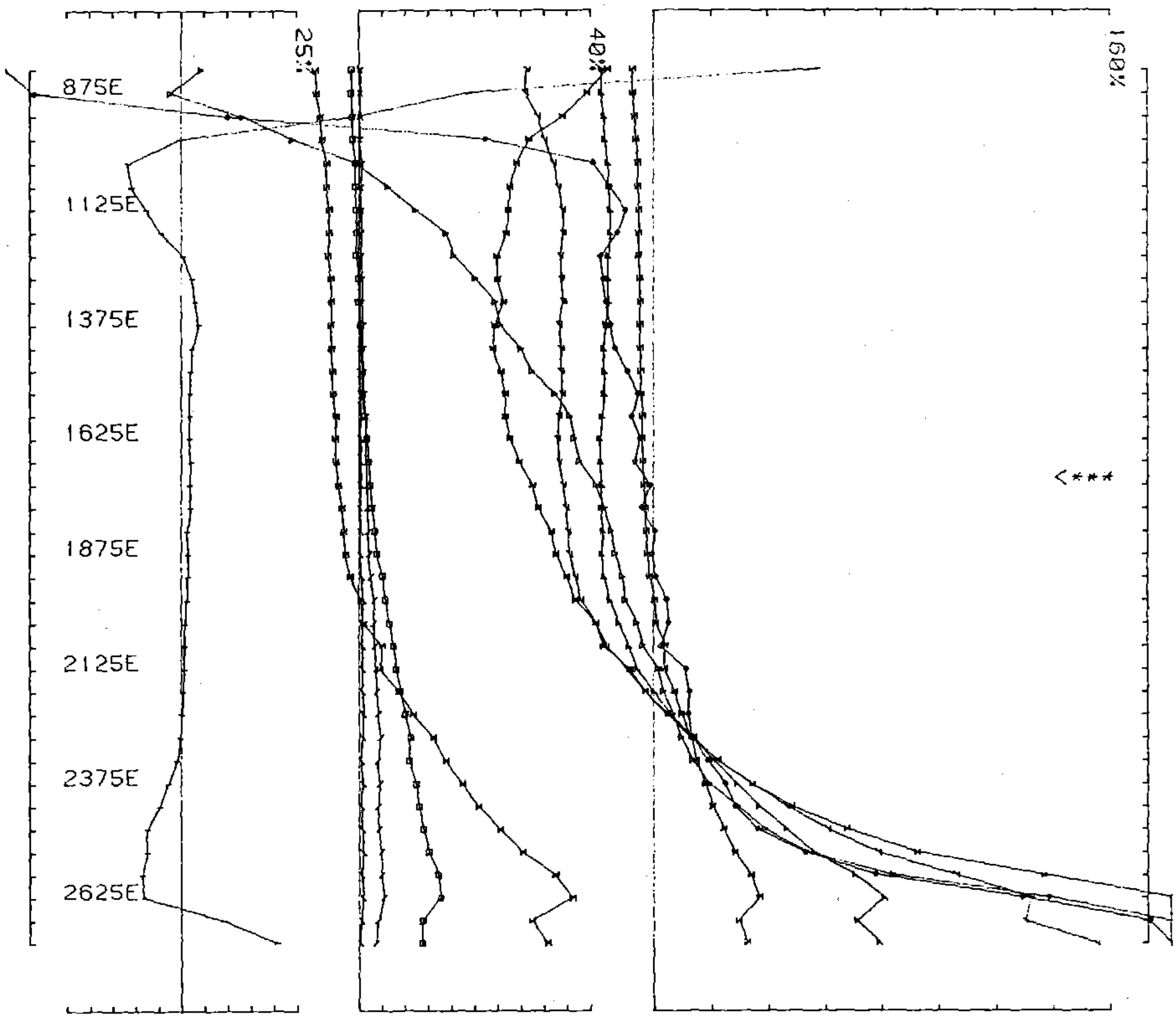
687128



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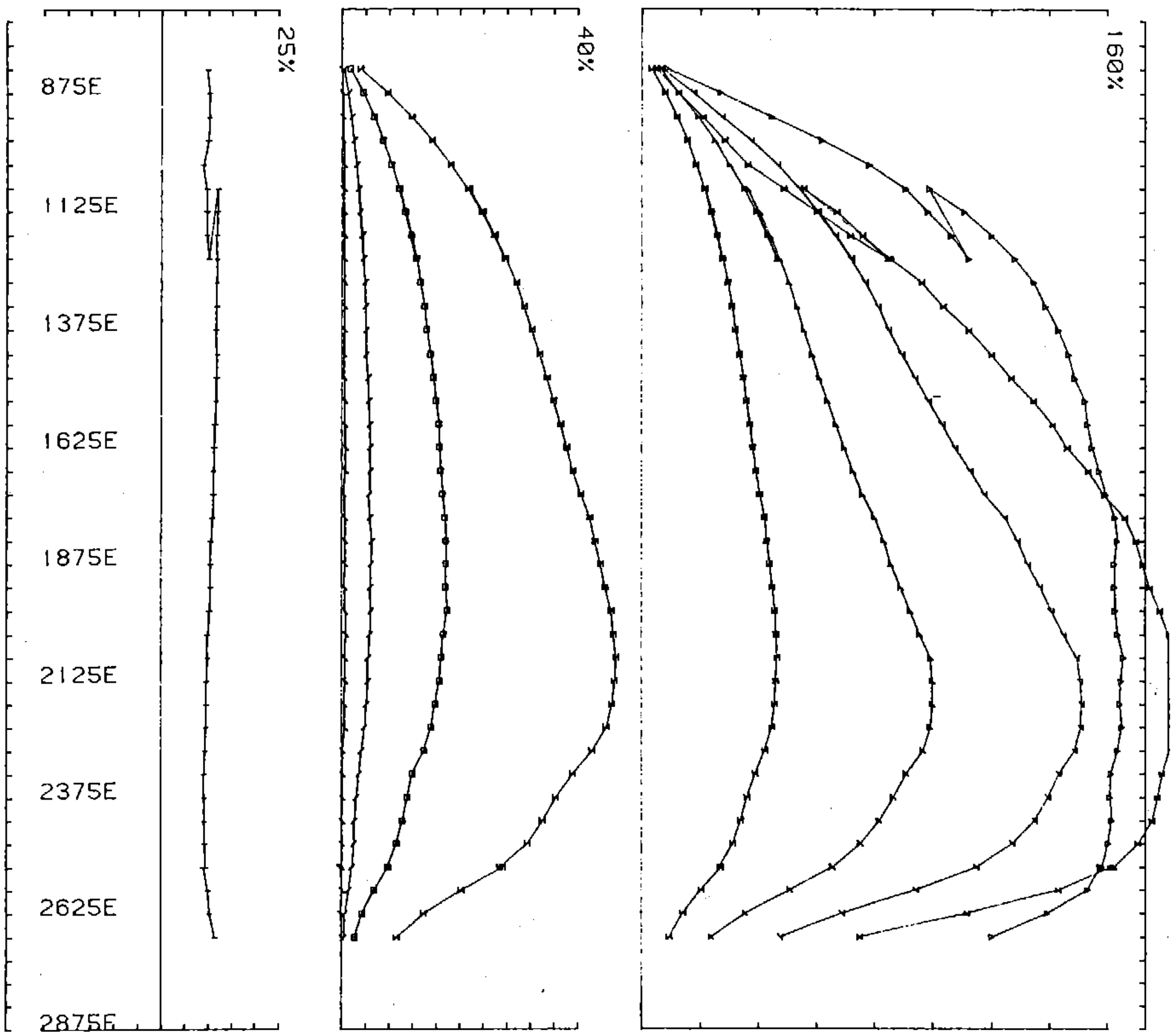
687129



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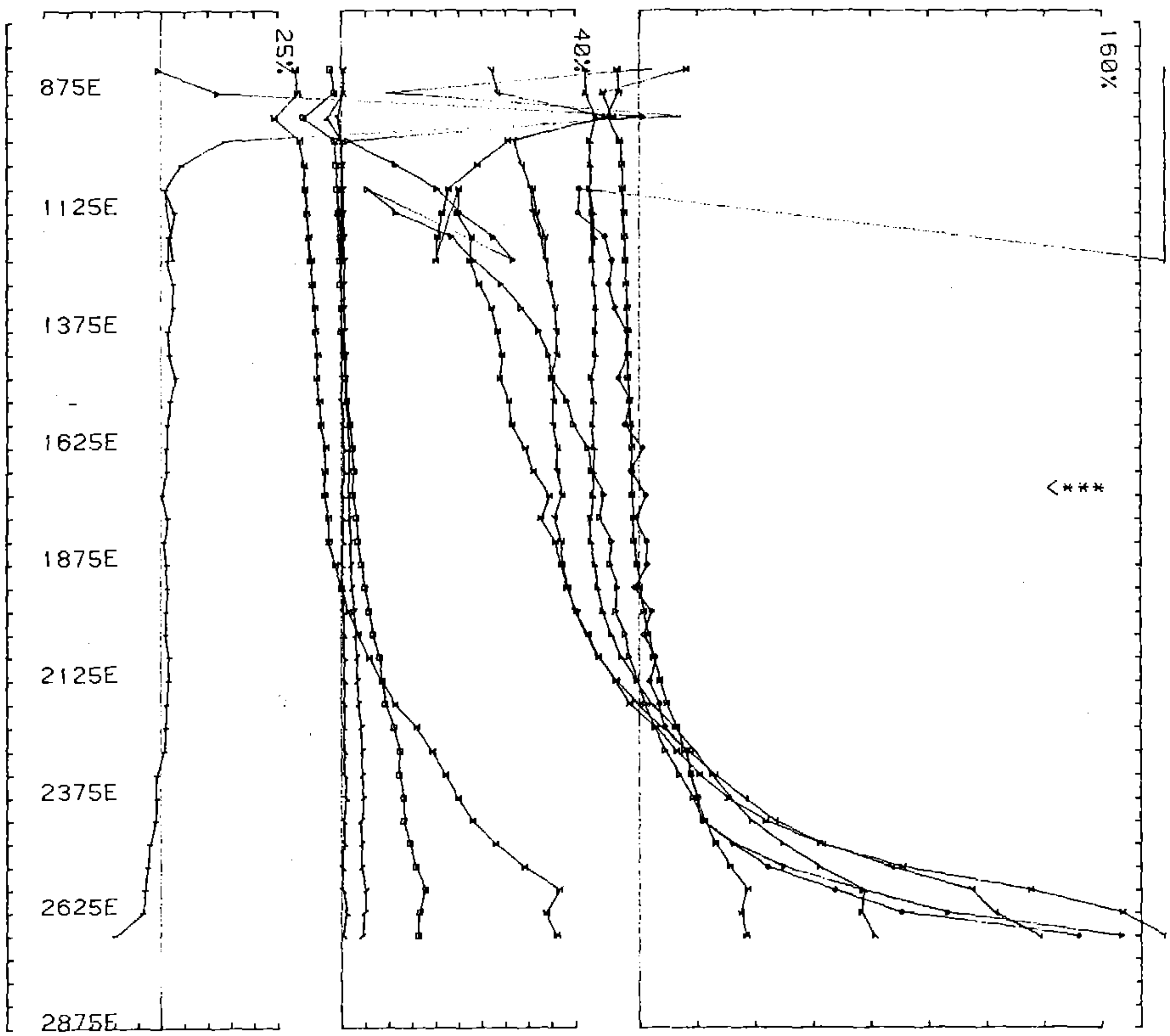
Loop 0001 line 9200N component Hz secondary field Ch 1 contin. norm.

130

687130



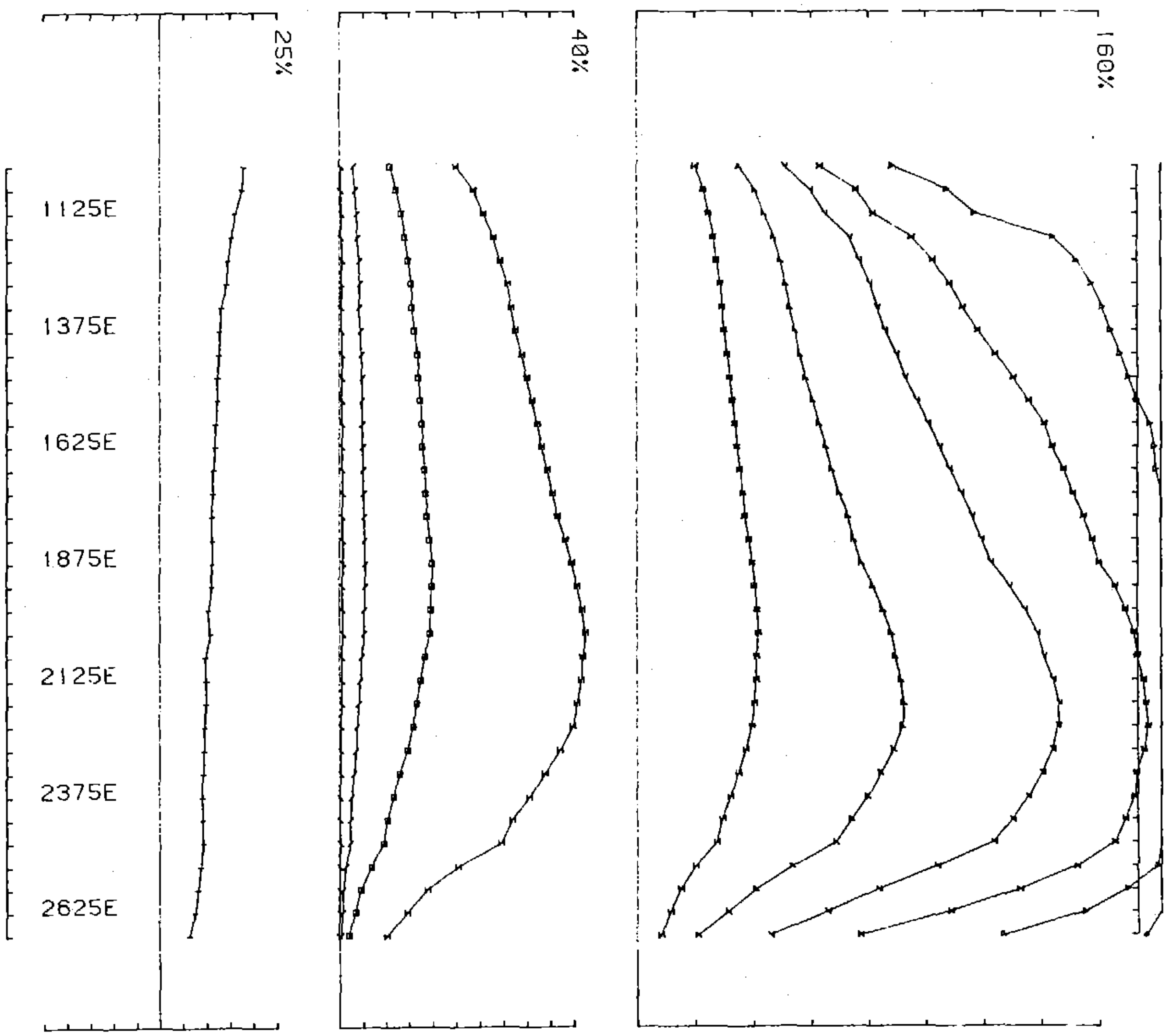
UTEM SURVEY at QUE ROAD for C.S.R.

conducted by PMM PAO job 8726 base freq (hz) 26.230 10/12/87

Loop 0001 line 9200N component Hx secondary field Ch 1 point norm.

687131

131



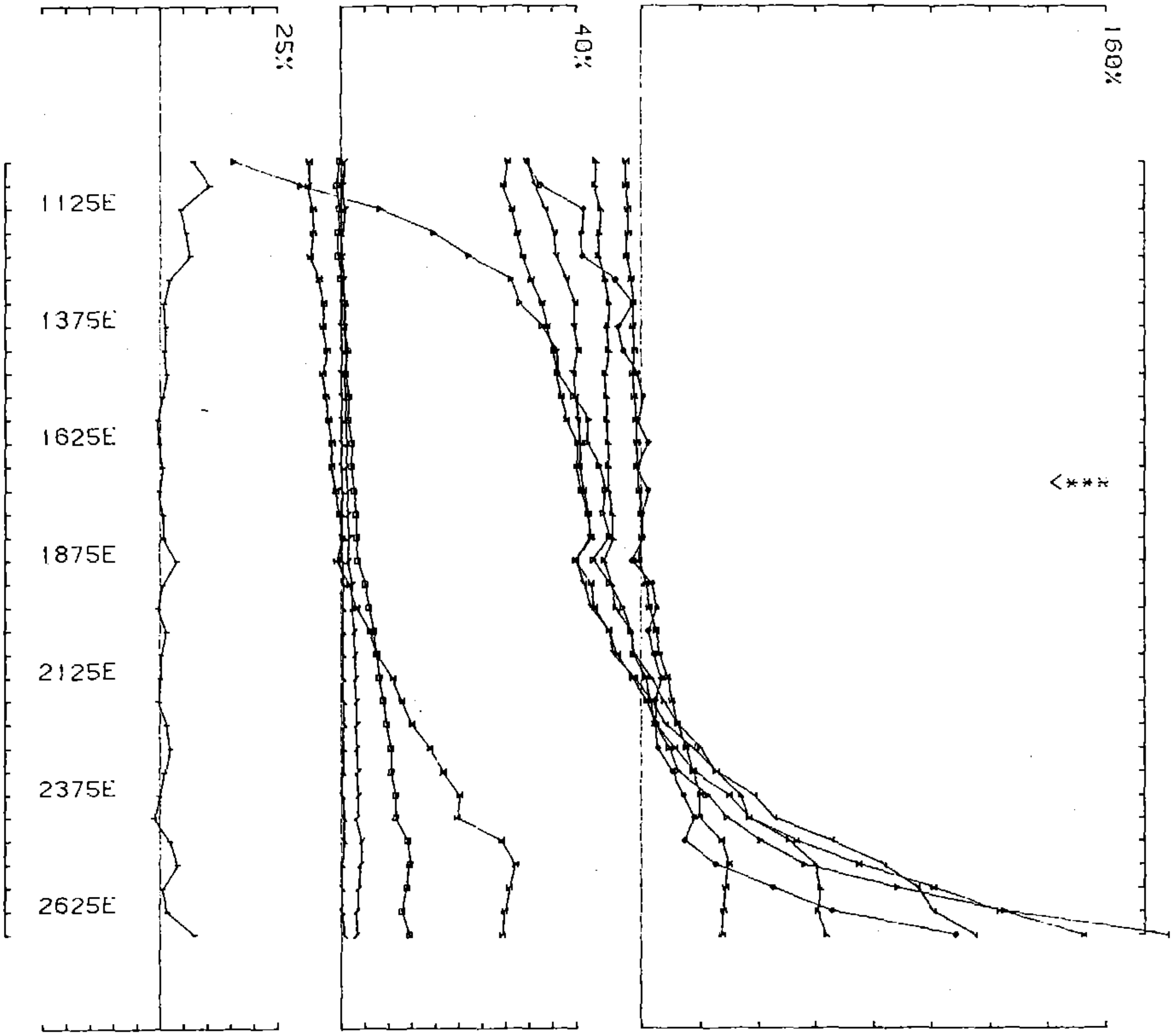
UTEM SURVEY at QUE ROAD for C.S.R.

conducted by PMM PAO job 8726 base freq (hz) 26.230 10/12/87

Loop 0001 line 9400N component Hz secondary field Ch 1 contin. norm.

687132

132



UTEM SURVEY at QUE ROAD for C.S.R.

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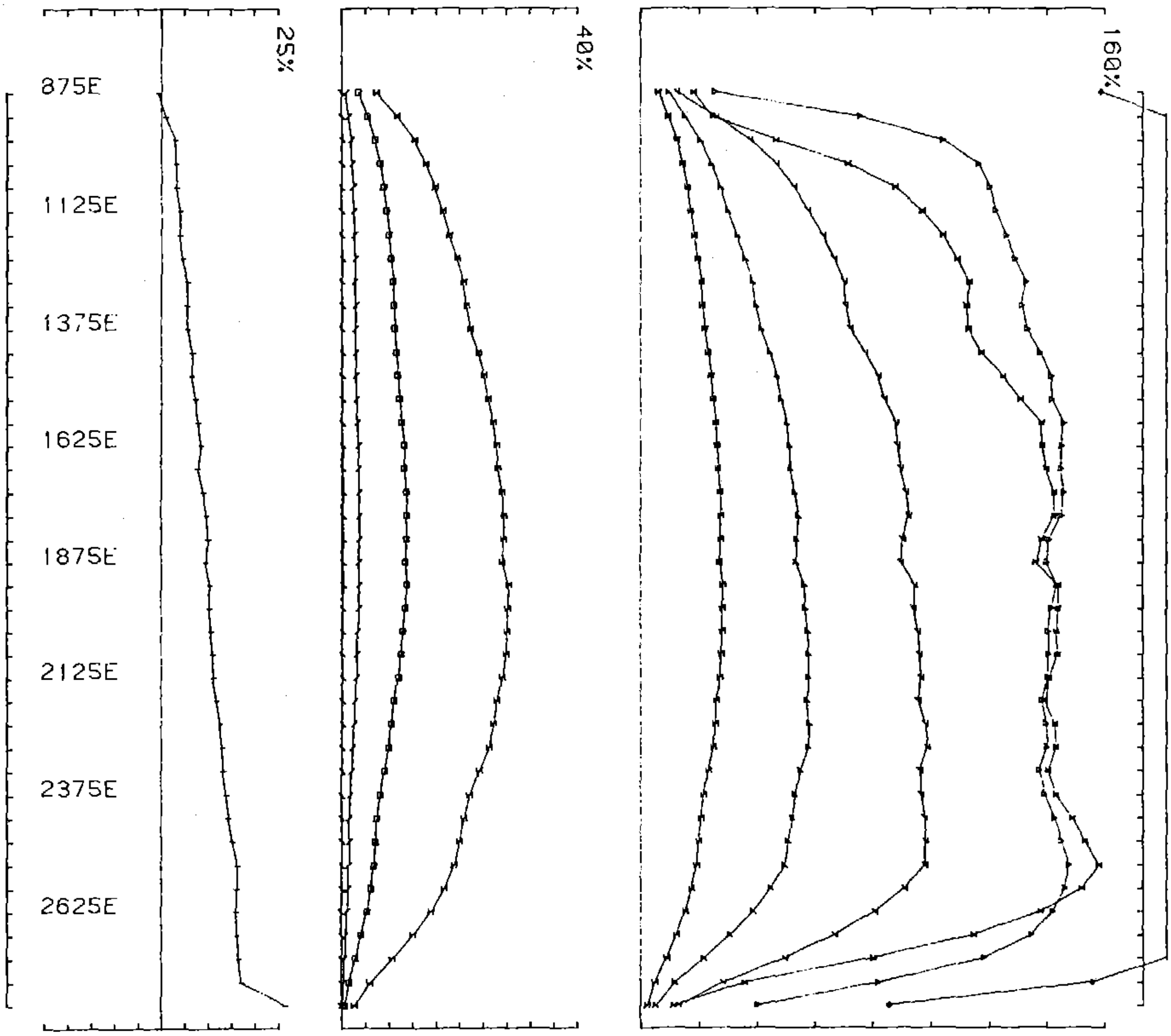
687133



UTEM SURVEY at QUE ROAD for C.S.R.

conducted by PMM PAO job 8726 base freq (hz) 26.230 10/12/87

Loop 0001 line 9600N component Hz secondary field Ch 1 contin. norm.

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APPENDIX V

1987/88 GRAVITY SURVEY

135
LEAMAN GEOPHYSICS
Survey Review, Specification, Reduction, Interpretation
Wide Experience Most Methods
Specialties:- Gravity, Magnetics, Seismic Methods

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TELEPHONE: (002) 47 8849

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EL 39/85 BULGOBAC RIVER

QUE ROAD GRAVITY SURVEY
REDUCTION AND INTERPRETATION REPORT
for
CSR LTD MINERALS DIVISION
by
Dr. D.E. Leaman

April 1988

CSRQUERD

SUMMARY

An extensive gravity survey of most of EL 39/85, Bulgobac River in NW Tasmania has revealed that abnormal thicknesses of Que River Shale and underlying volcanics revealed by drilling are localised to a small block whose boundaries appear to have been growth faults during the deposition of the units.

Three dimensional modelling has established that the changes in thickness, of the order of 100 per cent, occur in short lateral distances and that the units are reasonably systematic and predictable away from controlling structures. The effect is less pronounced for the Que River Shale than for the underlying mafic and intermediate volcanics. More massive basalts and denser overall sections are restricted to the region immediately south or west of the marginal faults close to the Murchison Highway.

The general rise in Bouguer anomaly across EL 39/85 reflects the thickness and disposition of both Que River Shale and basalt. The anomalies are eroded by the influence of patchy Tertiary cover, largely sediment or thickened soils, and localised pockets of deep weathering of the exposed pyroclastic units. These effects, within a more limited survey, give the illusion of dense, localised masses no more than 250 m deep. The perspective of a broad survey, however, shows these effects to be artifacts of near surface alteration and that the anomalies are generated by units hundreds of metres thick and up to 800 m deep as is revealed by drilling.

Within this framework it is not possible to resolve any response which may be induced directly by mineralisation or an ore body. The value of the survey resides in its ability to permit development of a coherent geological and structural model for the units of the area whose correlates less than 5 km away contain both the Que River and Hellyer ore bodies.

Further evaluation and definition of the massive extrusive basalt piles and their magnetic properties may lead to recognition of the vent system and thus sources for mineralisation. These cannot be far removed from the growth faults, and massive volcanic piles, identified by the present work.

INTRODUCTION

The area surveyed lies within EL 39/85 held by CSR Limited and is located on the western side of the Murchison Highway adjacent to the mining leases held by Aberfoyle Ltd for the Que River Mine.

The gravity survey described in this report represents the work of two field seasons. The initial survey was reported by Leaman (1987). Although no comprehensive interpretation was undertaken it was felt that the anomaly pattern was sufficient to encourage drilling when coupled with other results (e.g. CSAMT) and the need to establish stratigraphy.

Four holes have now been completed (see Map 1). These have revealed unexpected thicknesses of Que River Shale and the underlying basaltic sequence. Apparent mass or conductor targets could not be explained.

The limited coverage of the primary survey led me to express concern that the anomaly suggested could be part of some larger feature and that the gradients assessed to suggest a maximum depth of 250 m to an ore density contrast could be induced by surface weathering or alteration - i.e., subtraction effects. The drilling results indicate that this was probably the case.

In view of the depth range to the predicted target section of volcanics - in excess of 600 m below surface - it became critical that some appreciation of structure and unit distribution be made. Few geophysical methods are suitable for such study; especially at the established depths.

The gravity survey was thus extended to cover most of the licence area with two objectives:-

- to place the previous survey and the drilling results in perspective, and
- to enable assessment of the area leading, if possible, to a coherent geological model of the area which might indicate prospective or critical areas.

THE GRAVITY SURVEY:

The initial observations were made by G.L. Rau of Solo Geophysics between January 30 and February 6, 1987. La Coste and Romberg meter number 561 with a scale constant of 1.00928 was used.
The survey was tied to Mines Department Que River alternate base; station 8551.9976, 980177.5 mGal.
The grid used was surveyed and levelled and the coverage was based on a station spacing of 50 m on lines 200 m apart. The base line was 2400 E. The grid was oriented to match the larger Aberfoyle grids in the region. The highway was used as a subsidiary base line.
Five tie points were used, each linked by drift controlled multiple observations.

1. Que River base
2. 2400E,8300N -3.1 divisions with respect to base
3. 2400E,7600N -0.19 divisions
4. 2400E,8800N -0.38 divisions
5. highway,9300N 7.7 divisions

The survey increments were also undertaken by G.L. Rau of Solo Geophysics between December 14, 1987 and February 11, 1988 using La Coste and Romberg meter 556 with a scale constant of 1.01387. The new work was ultimately tied to Que River base and tie points in the original survey. Some additional tie points were established.

1. station 312 -3.03 divisions with respect to base
2. station 456 25.27 divisions
3. station 688 -3.42 divisions
4. station 726 -8.85 divisions

Two variants from normal practice were noted.
1. Due to unstable surface conditions many stations were observed at tripod levels some 700 to 900 mm above ground level.
2. Some loops were not completed in balanced formats; i.e., they were terminated on a tie point different from the start point. Although all loops were referred to tie points and all differences were properly established this is not ideal practice and complicates corrections for loops affected. Some residual uncertainty is inevitable but is unavoidable in difficult terrain where opportunities for simple closes and short loop times are limited.

The reduction was completed using a density of 2.67 t/cu m and the old ellipsoid (for compatibility with the TASGRAV data base). Terrain corrections were applied up to Hammer zone M. Near station compensation was based on special notes of the conditions up to 50 m from the observation point for the initial survey and 30 m for the new survey.

Compensation for the raised meter levels at some stations was included within the terrain correction since the Free-Air effect can be directly applied to the height of the meter but the Bouguer correction is inadequate by an amount equal to the elevation of the meter above ground. This means that should the reduction density be changed any adjustment can be simply applied to the correction column as a scalar correction.

Note that the Bouguer anomaly value attaches to the position of the meter and this may have been up to 1 m above ground level.

The gravity observations were found to be reproducible within 0.02 mGal after loop and drift corrections in most cases; exceptions were always restricted to loops not closed to the starting point. Only two misclosures greater than 0.04 mGal were found.
Errors due to position or height errors are not believed to exceed 0.01 mGal. The terrain and, where necessary, Bouguer slab adjustment corrections range between 0.2 and 1.1 mGal for this relatively low relief area. Possible errors are considered to lie in the range 0.02 to 0.07 mGal.
The RMS error is thus of the order of 0.05 mGal or less and the values can be safely contoured with intervals of about 0.15 mGal.

Some problems may attach to precise location of certain line segments west of 1200E. These have not been fully resolved and were generated by confusing identification of stations, and their own reference points, by surveyors. A "best judgment" alignment is shown in Map 1 but some tens of metres may be involved along the central part of 800E. While of concern this error source is not significant in terms of this presentation or use of the reduced data since the elevations are reliable and the potential position error amounts to no more than 0.02 mGal.

Map 1 (folder) presents the distribution of stations, assigned station numbering and Bouguer values. The body of the number system is derived from surveyor loops rather than line references. This was done to avoid, or at least minimise, risk of confusion from any attempt to renumber or recode the coordinate or level information when combining it with the observed gravity and gravity correction information. It is recommended that future surveys be coded on a line basis and that surveyors note the peg numbers as a cross check on location. Confusion also arose during the survey extension when surveyors referred to their own, not the gravity, number system.

Contours in map 1 have been drawn with variable density but a contour interval of 0.125 mGal has been used for much of the survey area. Note that all values labelled and contoured include a scalar addition of 15 mGal and this value should be removed if the plot is to be compared with state datum maps.

Tables 1 and 2 (Appendix) contain the observations prepared for reduction and the reduced results of the Bouguer anomaly. The numbering system should be referred to the above comments and Map 1. The tables include the results for the entire survey (including corrections and omissions for the initial survey).

INTERPRETATION

Inspection of Map 1 reveals that the gravity field presents a number of features. Each of these is described below. The subsequent quantitative assessment was designed to evaluate the gross geological bases for them and determine which characters are anomalous.

The use of a 15 mGal shift to the Bouguer values has produced a central positive segment in the survey. The artificial creation of a zero enhances the recognition of this relatively positive zone which lies south of Que Road and west of the highway. This feature was partly defined by the original survey but the extended coverage shows the effect to cover an area of at least 1 km by 1 km. The peak value lies on line 7200N. The most obvious part of this feature arcs from 7800N/1600E to 7600N/2700E and then south to cross the highway. There is no direct geological explanation for this character and the southern extension of the feature is oblique to the exposure of several units (refer Komyshan (1986) and CSR mapping).
The relatively positive region is limited to the south and west by the Mt Charter Fault but Bouguer values near the fault are much less than near lines 7600 or 7800N. No other significant positive effects are evident in the survey.

Negative effects fall within two principal classes.
The largest negative anomalies can be directly correlated with the exposure of Tertiary basalts and associated, often concealed, sediments. These materials generate a moderate magnetic response but clearly possess a substantial negative density contrast. The combined gravity and magnetic responses would suggest that the basalt content is very minor and that the material is either wholly sediment with a coating of brown soil and occasional basalt fragments or very deeply and erratically weathered. Features of Tertiary origin occur near 800E and north of the Que River.
Lesser negative anomalies occur south and west of Que Road within the grossly positive region described above. There is no clear pattern to these features. Some might be considered to be due to unmapped portions of the Tertiary section but shales and pyroclastics or porphyries can often be found within the areas defined by these responses. Since such materials, even if surface weathered, do not produce extreme contrasts it must be presumed that pockets of deep weathering have been integrated. The most significant of these features, centred on 7200N/2400E, could be due to unmapped Tertiary sediment, deep weathering and a contribution from a porphyry. Only the first two options can produce the gradients and scale of effect observed. Such effects corrode the gross positive form of the gravity field south of Que Road.

North of Que Road, but south of Que River, the field is relatively smooth and plateau like. This character contrasts with the features described south of the road.

Limited data control exists in the south of the area but a negative contrast can be recognised across the Mt Charter Fault. This shows that the materials to the south west, the greywacke sequence, are less dense than the shale and pyroclastic sequence to the north east. This contrast could superficially explain the broad positive response south of Que Road but not the anomaly step near line 7800N. There is no surface evidence for any structure or compositional change which could account for the difference in the gravity field north and south of this northing.

Some of the features and apparent paradoxes are explained or complicated by the results of the initial drilling programme. Consider condensed logs for the four holes drilled to date.

1. 0-75 m pyroclastics
   -527 m Que River Shale
   -850 m basaltic sequence, volcanics
   -860 m mixed sequence, greywackes etc

2. 0-66 m pyroclastics
   -373 m Que River Shale
   -676+m basaltic sequence

3. 0-301 m Que River Shale
   -458 m basaltic sequence, volcanics
   -541 m greywacke etc

4. 0-86 m pyroclastics
   -205 m Que River Shale
   -209 m shear/fault
   -301 m greywacke etc

The drilling reveals that the Que River Shale thickens from about 300 m to more than 450 m between holes 3 and 1 and from 310 m to 450 m between holes 2 and 1. Yet, consideration of mapping and exposure to the immediate east of, and along, the Murchison Highway would suggest a maximum thickness of 200 m.
Similar variations can be quoted for the basaltic sequence; less than 100 m near the highway but more than 300 m in holes 1 and 2. A more consistent regional thickness was noted in hole 3. Review of Komyshan (1986) would indicate that the volcanic sequence is variable across the region between EL 39/85 and the Henty Fault Zone several kilometres to the east.

Some density determinations are available for the materials encountered in holes 1 and 2. The relatively acid pyroclastics exposed over much of the area south of the Que River and north east of the Mt Charter Fault have a density of about 2.67 to 2.69 t/cu m. The Que River Shales have a densities of about 2.76 to 2.77 t/cu m in bulk. This value may be locally raised by additional pyrite content but most present determinations would suggest that the rock contains little pyrite. The basaltic sequence in holes 1 and 2 is distinctive and presents a bimodal density distribution. Part of each sequence is quite dense, averaging 2.90 t/cu m, while a large part is of the order of 2.80 t/cu m. The dense segment is discrete in each case. The basal sequence, mixed greywacke succession, considered representative of the material south of the Mt Charter Fault has a density of about 2.71 t/cu m.

Consideration of the drilling results and the implied contrasts suggested by the determinations described above suggests that the observed gravity field reflects the general changes in thickness of shale or volcanics or both. In each case there is a positive contrast with respect to the underlying mixed or greywacke sequence whether deep in the section or as exposed SW of the Mt Charter Fault. It is not immediately obvious that the scale of observed variations in the gravity field are consistent with these units and the implied thickness-contrast product or whether other influences are present. For example, there is no immediate explanation for the N-S extension of the positive axis near the highway and across it. Only shale is exposed.

A three dimensional model was attempted in order to evaluate the general structure and stratigraphic patterns in the area. This was initially controlled by the four drill holes and the established surface exposure distribution. The model was iterated until a consistent and geologically believable concept was attained.
There is no assurance that the model described below is valid across the entire area or that it is precise. Not all aspects of it have been tested and some ambiguity resides in the conclusions due to the presence of high contrast near surface effects. The model described is, however, internally consistent in so far as present work has evaluated it and it satisfies all current controls.

It should be considered an interim description.

The initial model was generated by inferring structure contours for upper pyroclastics, Que River Shale, mafic volcanics and mixed sequence from Komyshan (1986) and CSR detailed mapping. This was then varied to allow for the thicknesses observed in drill holes. This model was iterated and revised several times using a set of five control profiles. The profiles were chosen for convenience, interest or special character and are essentially random. Nothing was assumed. The profiles used were baseline 2400E, lines 7200, 7600 and 8400N and an arbitrary transverse from 387000E/5394000N to 390000E/5395000N.

The gravitational attraction of the model was calculated for each profile. Each of the four components was calculated separately and a resultant compared with the observed profile. The model was evaluated by the quality of profile match and the absolute level of that match. The latter factor is most critical. The coherence of the match is indicated in the top right hand corner of each profile figure (Figures 1 to 5). The shift differential between the calculated and observed profile must be the same for all profiles for the same model and contrasts for the model to be a valid solution. This aspect of the modelling process is not intuitive. Respect of it does expose deficiencies since it is not valid to force a fit by varying contrasts in different profile aspects. However a particular piece of geology is viewed it can only present a single effective contrast. Three dimensional models are sensitive to this factor since some response from each component modelled appears, with varying weight, on each profile. Separate calculation of the components allows, for any given geometry or iteration of the model, establishment of a response-contrast array and production of a set of possible resultants. Comparison of the requirements for the entire profile set enables geometric deficiencies and the relevant contrast ranges to be determined. Considerable fine detailing is possible by extended iteration but any coherent solution should be tested and then refined after test.

The unambiguous presence of near surface negative high contrast sources has led to use of the matching of the outer envelope of the anomalies observed. This has been done on the basis that wherever the rock mass is unaltered or unweathered or not covered by thick soils the Bouguer anomaly would be greatest for that lithology or part of the structure. Such a process may not precisely define the function for an unweathered rock mass but will approach it asymptotically.

The model has been divided into two parts; above 500 m ASL and below 500 m. 500 m represents the lowest point in the surveyed area. Above 500 m the model consists only of surface materials, including Tertiary rocks,and the upper pyroclastics and part of the Que River Shale. Since the pyroclastics have a mean density very close to the Bouguer density assumption and thus contribute nothing to the Bouguer anomaly they have been ignored. Their lower surface (the upper surface of the shales) is significant and the volume of shale between the contact and 500 m has been estimated and its attraction deducted from the Bouguer values along each of the profiles modelled. Thus each observed profile, as used below, is a compensated profile adjusted for the near surface parts of the model. The upper part of the model has not been varied throughout the iteration process since the shale contribution is relatively minor and no significant errors have been introduced by ignoring possible fine structure at the level of the base of the pyroclastics.

All extended modelling has been directed at the geology below 500 m ASL. This procedure removes high level broad effects, sharpens soil anomalies and increases resolution of deeper sources. The model elements and profiles shown in Figures 1 to 5 have a reference level of 500 m.

Consider now the primary coherent solution based on the five initial test profiles. All evolution of the current model was based on analysis of these profiles.

LINE 2400E (Figure 1)

There is a general increase in Bouguer anomaly from north to south with a relatively pronounced step midway. This feature is shown to be of regional impact in Map 1. The anomaly character south of it is much more erratic. The minima could be related to the values at the northern end which would imply that the elevated features represent positive contrasts of relatively local disposition. Consideration of the drill control and the overall requirement to derive a model with systematic stratigraphic or structural changes shows that the general characteristics are explained by a gross change in positive contrast from north to south which corresponds to changes in thickness of both shale and volcanics. The anomaly step, however, could be interpreted in two ways; either the units thicken rapidly over less than 300 m or there is a marked change in density in at least one of them. Since there is no evidence for variations in the shale of the magnitude required then the cause must lie in the volcanics.

This conclusion is consistent with the observations in holes 1 and 3. The volcanics in hole 3 and most of hole 1 are variable in type and character but there is a section in which massive basalts occur. Consideration of the thickness controls on both shale and volcanics provided by holes 1 and 3 shows that the variation in anomaly form can be directly related to the change in composition and thickness of the basalt section with only minor contribution from the shale member.

A minor deficiency in specification of the model produced the anomaly rise at the N end of the profile as suggested in the Figure and would be revised in the next iteration.

LINE 7200N (Figure 2)

The observed profile is irregular and was selected as a sample of the extreme character south of Que Road. The overall effect, however, is that of a broad positive and fragments of the crestal anomalies show features consistent with an "eroded", large anomaly. The strong gradients associated with the negative effects clearly demonstrate that the sources for these are very shallow and begin within the soil profile.

This profile confirms the need to match the extreme positive asymptote for the profiles and shows that the irregularity in the southern part of 2400E is related to surface alteration of some kind and that the solution offered is sound.

Modelling shows that the shale and volcanics generate the broad response. Each contributes about half the effect but the profile match depends on a proportion of about 20% massive basalt in the volcanic section. The shift differential is not satisfied in any other way. This is also consistent with line 2400E.
The Figure also presents an option providing for some variation in the position of the Mt Charter Fault. Other alternatives are possible including some thinning of the volcanic section or shale against the fault or thickening of the upper pyroclastic section.

LINE 7600N (Figure 3)

The solution offered is relatively poor but is consistent with the general thrust of other profiles, the match criteria and the implied geology.
The calculated profile is much too high in the region adjacent to the Mt Charter Fault. Inspection of the model components shows that the modelled thickness of both shale and volcanics may be excessive. It is probable that both units thin westward although a 20% reduction in bulk density contrast for the volcanics would produce much the same effect. This would also generate the moderate gradient from west to east. Such an option is not simply modelled but would imply an increase in the wedge of massive basalt from west to east much as occurs on line 2400E from north to south. (A similar inference is possible on line 7200N but the profile is too fragmental due to surface source effects) It should be noted that the basic contrast used for the volcanics of 0.13 t/cu m is equivalent to a section density of 2.80 t/cu m. The implied reduction is equivalent to removal of about 100 m of basalt of density 2.90 t/cu m such as known to exist in holes 1 and 2. Thus the character of these lines reflects the variation in composition of the volcanic section and that the most positive effects east of the Murchison Highway and south of Que Road indicate the localised presence of pods of massive basalt. Such material is not universal.

The alternatives presented in the Figure offer a viable solution; reduction in density rather than thickness in volcanics and a placement of the Mt Charter Fault some 250 m to the east of the current model (Figure 6) and as used in a previous iteration. Further iteration would restore this geometry.

Note that the form ascribed to the upper pyroclastic unit is based on mapped dips in surface exposure. The correlation between the form of this surface and those below it should not be taken too literally at this stage. It is possible, however, that the depression in observed values could reflect more consistent synclinal structuring as suggested by the broken line. A minimum lowering of the shale top of 70 m is implied. Such variation is not generally supported by surface implication of drilling but thickened pockets may exist in the short wavelength folds.

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LINE 8400N (Figure 4)

The concept developed in previous lines may be tested at 8400N. The profile match is obtained without recourse to any density increase in the volcanic component and is consistent with 2400E. The present model, in fact, contains too much volcanics north of 7800N. This profile, when coupled with 2400E, suggests that the section as drilled in hole 3 persists for several hundred metres and is only varied near the E-W change in the anomaly pattern near line 7900N.

The profile variation included allows for use of lower density or thinner volcanics to the west. The materials may well be absent west of the inferred fault - a partial extension of an arm of the Mt Charter Fault (refer Figure 9)

LINE 9387 (Figure 5)

This line provides an alternative perspective on the southern part of the area. The overall effect of the model is as noted for lines 7200 and 7600N. The match is excellent east of 2000E but deficient to the west.
Some appraisal of the discrepancy has been attempted although the model requires some major revisions. The Figure shows the effect of reducing the volcanic contrast to normal background (equivalent to a unit bulk density of 2.80 t/cu m). This improves the fit but does not wholly satisfy the match requirements. It seems likely that both the volanics and shale thin to the south west by at least 10% in addition to the change in composition of the volcanics unless the inferred folded character of the upper surface of the shale is incorrect. Such problems were suggested for line 7600N and a variation of 50 m could account for the differences.

Much more work would be required to establish which of these factors is dominant.

The current model is shown in Figure 6. Figure 6A gives a complex plot of the structure contours as used in the current model. It is not possible to clearly label all of these at the scale presented but their sectional transformation is given for all profiles. In order to relate the model to a geological basemap these contours have been overprinted in Figure 6B. Note that the placement of the NE-trending arm of the Mt Charter Fault is not correct in this iteration (discussed above) and should be revised back to its position in the previous iteration.
Various suggestions for modifications have been indicated above with respect to the sample profiles. More detailed assessment is not justified without at least one more drill hole SW of holes 1 and 2 or a further test of the basalt pile concept.

The basic model evolved was tested by modelling two additional random profiles and applying the contrast and matching factors implied by the reference profiles. The results are shown in Figures 7 and 8 for lines 1600E and an oblique NW-trending line (8306) which tests much of the positive feature south of Que Road. The latter profile, from 388/5396 to 390000 mE/5393000 mN, also samples the exposed up dip segments of most units as exposed near or east of the highway.

LINE 1600E (Figure 7): This difficult profile shows that the central anomaly is related to the basalt pile at depth but that the volcanics thin or reduce in density southward consistent with other profiles. Most other effects are related to Tertiary and other shallow sources.

LINE 8603 (Figure 8): This profile demonstrates the general veracity of the model as presently evolved. Most features are reflected. Deficiencies relate to the precise character of the exposed units but this is not especially relevant to this study and could be refined in further iterations, and to a possibly more emphatic surface syncline involving the pyroclastics and upper surface of the shale. The sustainability of this option is hazarded by the intersections in holes 1, 2 and 4. Some surface change is more likely.

The model has resolved a number of issues. The gross anomaly character is deeply sourced and related directly to the thickness of the shale and underlying volcanics. The nature of the marginal gradients and their location is directly related to the composition of the volcanics and in particular the proportion of massive basalt. The anomaly distribution thus indicates localised piles of massive volcanics along two axes within the area, axes along which the thickness of the shale and especially volcanics changes abruptly. Growth faults are implied with peak activity during deposition of the volcanic sequence and tapering activity during the deposition of part of the shale. The piles of massive volcanics do not extend far to the south west and it seems probable that the section also thins in this direction which might suggest that the Mt Charter Fault, as mapped, represents a rejuvenated growth fault system itself and is the western half of a small extensional block system.
This is suggested in Figure 9 where the relationship between the implied near E-W structure near 7900N and the N-S structure a little west of the highway are essentially subparallel to the interpreted and mapped forms for the Mt Charter Fault. The gravity data and model would suggest that igneous activity was concentrated near the NE corner of this fault system. This area must be considered prospective since active vent systems were involved.

A NNE-trending arm for the Mt Charter Fault is indicated in Figure 6 and, although its position is not precisely determined by the present study, may have exercised some control on Tertiary deposition or topography.

The model also explains the principal anomaly paradox - why the relatively positive axis trends N-S near the highway in an area where the shale is exposed and virtually E-W south of Que Road. The gravity field reflects the abrupt changes in unit thickness and composition (shale and volcanics) which occur locally and thus pinpoints the hidden structure which has stimulated the change in unit character.

An evaluation of the limits of resolution of an orebody were also attempted within the framework of the basic model. Figure 10 provides a comparison of the attraction of a single massive body with contrast of 1 t/cu m at differing depths. The target volume translates into an equivalent of 80 million tonnes of anomalous mass and could thus include both ore and gangue. Tests show that such a mass might be resolved at the depths involved only in certain parts of the area and only where the data set is not overly disrupted by surface source effects. It must be stated that the essential value of the survey and this interpretation is not related to direct location of an ore body but the geological understanding of a peculiar structural and sedimentological environment and the focus on that part of it which is geologically anomalous and which might contain ore deposits. Thus the identification of the zones containing massive lavas and the *implication* of vent systems is relevant to the overall goals of the exploration.

REFERENCES

Komyshan, P., 1986. Geology of the Mt Charter-Hellyer area. Map 1, Mt Read Volcanics Project, Dep. Mines Tasm.

Leaman, D.E., 1987. Que Road Gravity Survey. Reduction and Appraisal report. For CSR Ltd, by Leaman Geophysics.

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APPENDIX

Table 1: File CSRQUERD gravity data prepared for reduction

incl station number, coordinates, elevation, gravity difference with respect to base station, combined terrain correction and Bouguer adjustment for raised meter.

Table 2: File CSRQUEBA reduced gravity values at density 2.67

incl number, coordinates, elevation, gravity values, correction and Bouguer anomaly.

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GRAVITY DATA

CSR QUE ROAD GRAVITY SURVEY FEB 1987
980177.50 8551.9976 1.00928 561 10187
0 1 0 1 1 1 8700

1	1	389951	5395964	626.47	5.30	0.36
2	2	389748	5395572	661.69	-1.22	0.35
3	3	389921	5395924	630.19	4.51	0.36
4	4	389758	5395618	658.72	-0.83	0.36
5	5	389890	5395886	634.32	3.71	0.37
6	6	389770	5395668	655.33	-0.14	0.36
7	7	389859	5395846	638.37	2.96	0.38
8	8	389784	5395716	651.48	0.60	0.38
9	9	389830	5395805	642.66	2.20	0.39
10	10	389804	5395762	647.21	1.38	0.39
11	11	389738	5395523	664.32	-1.70	0.31
12	12	389730	5395474	666.72	-2.12	0.30
13	13	389716	5395425	669.07	-2.52	0.29
14	14	389707	5395375	672.30	-3.16	0.28
15	15	389699	5395327	674.51	-3.58	0.28
16	16	389634	5394973	681.25	-4.96	0.28
17	17	389640	5395026	681.40	-4.88	0.28
18	18	389681	5395280	679.52	-4.57	0.27
19	19	389648	5395075	680.85	-4.73	0.29
20	20	389674	5395230	677.81	-4.21	0.27
21	21	389658	5395125	680.00	-4.69	0.29
22	22	389668	5395175	678.74	-4.47	0.29
23	23	389676	5394571	666.15	-1.27	0.36
24	24	389631	5394923	680.68	-4.65	0.28
25	25	389666	5394620	669.01	-1.87	0.33
26	26	389635	5394872	679.63	-4.38	0.29
27	27	389659	5394672	672.01	-2.65	0.33
28	28	389640	5394822	678.43	-3.95	0.30
29	29	389651	5394726	676.01	-3.56	0.32
30	30	389645	5394776	678.28	-3.91	0.30
31	31	389674	5394222	657.05	0.80	0.32
32	32	389684	5394522	662.55	-0.33	0.36
33	33	389684	5394271	655.55	1.16	0.33
34	34	389690	5394472	658.82	0.45	0.37
35	35	389690	5394320	653.64	1.64	0.33
36	36	389692	5394421	656.12	1.05	0.33
37	37	389694	5394371	653.89	1.50	0.33
38	38	389622	5394081	660.09	0.11	0.30
39	39	389644	5394126	658.97	0.17	0.31
40	40	389660	5394174	658.15	0.46	0.32
41	41	389595	5394037	659.94	0.27	0.30
42	42	389983	5396004	623.01	5.99	0.37
43	43	390011	5396045	619.48	6.58	0.35
44	44	390035	5396089	615.83	7.20	0.34
45	45	390058	5396134	612.87	7.66	0.31
46	46	390086	5396230	612.69	7.68	0.31
47	47	390112	5396271	614.74	7.23	0.32
48	48	390130	5396321	617.49	6.54	0.36
49	49	389341	5395520	670.35	-3.15	0.39
50	50	389360	5395567	665.09	-2.08	0.39
51	51	389379	5395613	665.44	-2.11	0.41

108	108	389248	5395289	658.55	-0.37	0.39
109	109	389074	5395252	654.97	0.30	0.39
110	110	389267	5395335	658.97	-0.52	0.38
111	111	389030	5395270	651.04	1.08	0.38
112	112	389285	5395382	665.72	-1.93	0.37
113	113	388986	5395288	653.97	0.35	0.38
114	114	389333	5395363	669.26	-2.71	0.37
115	115	389379	5395344	672.54	-3.34	0.38
116	116	389239	5395400	661.20	-0.89	0.36
117	117	389194	5395419	659.80	-0.76	0.35
118	118	389148	5395437	661.91	-1.33	0.34
119	119	389102	5395455	663.03	-1.60	0.35
120	120	389008	5395493	658.80	-0.81	0.36
121	121	389056	5395474	661.97	-1.48	0.37
122	122	389226	5394974	669.59	-2.05	0.38
123	123	389181	5394993	666.85	-1.44	0.38
124	124	389243	5394752	658.88	0.30	0.40
125	125	389197	5394772	659.25	0.25	0.40
126	126	389152	5394790	659.59	0.18	0.41
127	127	389105	5394810	660.29	0.00	0.40
128	128	389060	5394827	661.03	-0.19	0.39
129	129	389014	5394846	662.46	-0.53	0.39
130	130	388968	5394866	665.60	-1.25	0.40
131	131	388923	5394885	667.43	-1.48	0.41
132	132	389289	5394733	658.16	0.47	0.42
133	133	389380	5394697	661.31	-0.17	0.41
134	134	389610	5394602	673.96	-3.32	0.41
135	135	389426	5394678	665.23	-1.00	0.41
136	136	389564	5394621	673.35	-2.85	0.40
137	137	389472	5394659	667.81	-1.54	0.39
138	138	389518	5394640	671.13	-2.24	0.41
139	139	389347	5394487	647.38	2.75	0.46
140	140	389392	5394466	653.48	1.57	0.45
141	141	389438	5394446	655.28	1.07	0.44
142	142	389229	5394331	628.16	6.53	0.56
143	143	389275	5394310	630.90	6.03	0.50
144	144	389364	5394275	649.42	2.45	0.46
145	145	389410	5394256	654.29	1.80	0.44
146	146	389457	5394237	654.40	1.28	0.43
147	147	389297	5394089	647.80	2.88	0.45
148	148	389484	5394016	655.99	1.35	0.41
149	149	389344	5394072	650.19	2.76	0.44
150	150	389437	5394034	654.02	1.90	0.41
151	151	389390	5394053	652.48	2.26	0.42
152	152	389407	5395548	665.62	-2.13	0.39
153	153	389453	5395529	670.80	-3.15	0.38
154	154	389499	5395511	676.87	-4.33	0.38
155	155	389545	5395492	676.11	-4.08	0.37
156	156	389591	5395473	674.55	-3.71	0.37
157	157	389637	5395454	672.19	-3.24	0.38
158	158	389953	5396407	610.28	7.78	0.44
159	159	389906	5396424	609.97	7.79	0.47
160	160	389859	5396441	608.43	8.03	0.48
161	161	389765	5396051	636.81	3.00	0.42
162	162	389811	5396033	629.68	4.39	0.43
163	163	389789	5396255	622.91	5.50	0.46

220	220	388222	5395183	584.04	13.54	0.70
221	221	388177	5395203	597.67	10.62	0.67
222	222	388132	5395223	608.80	8.16	0.68
223	223	388087	5395243	621.11	5.52	0.73
224	224	388042	5395263	629.18	3.69	0.72
225	225	387997	5395283	630.23	3.53	0.61
226	226	387952	5395303	628.60	3.74	0.67
227	227	388862	5395123	653.86	0.74	0.40
228	228	388815	5395142	643.81	2.71	0.43
229	229	388768	5395162	637.00	4.09	0.44
230	230	388722	5395181	640.84	3.23	0.46
231	231	388676	5395199	639.69	3.42	0.47
232	232	388630	5395208	633.85	4.54	0.47
233	233	388584	5395239	622.86	6.69	0.48
234	234	388537	5395258	618.72	7.57	0.57
235	235	388492	5395276	617.79	7.64	0.57
236	236	388447	5395296	609.81	9.02	0.58
237	237	388402	5395316	611.17	8.50	0.59
238	238	388357	5395336	622.28	5.91	0.60
239	239	388312	5395356	634.39	3.27	0.59
240	240	388267	5395376	649.84	-0.55	0.61
241	241	389272	5394955	674.72	-3.25	0.38
242	242	389319	5394936	673.87	-3.17	0.42
243	243	389366	5394917	665.12	-1.18	0.39
244	244	389412	5394898	663.62	-0.85	0.38
245	245	389258	5395178	667.34	-2.09	0.36
246	246	389304	5395161	671.38	-2.96	0.37
247	247	389350	5395142	674.64	-3.75	0.37
248	248	389396	5395123	677.62	-4.35	0.36
249	249	389442	5395104	678.90	-4.55	0.37
250	250	389489	5395086	679.45	-4.57	0.36
251	251	389535	5395066	680.09	-4.72	0.37
252	252	389426	5395324	675.66	-3.88	0.38
253	253	389518	5395287	682.26	-5.32	0.37
254	254	389564	5395267	683.89	-5.77	0.39
255	255	389610	5395248	685.56	-5.89	0.38
256	256	389656	5395229	680.81	-4.83	0.37
257	257	389672	5396086	649.94	0.27	0.46
258	258	389719	5396068	640.84	2.13	0.48
259	259	389530	5396558	637.62	1.11	0.61
260	260	389576	5396543	634.57	1.82	0.65
261	261	389623	5396525	630.60	2.75	0.64
262	262	389670	5396508	624.89	4.20	0.62
263	263	389718	5396492	614.52	6.45	0.62
264	264	389765	5396475	606.85	8.11	0.58
265	265	389813	5396458	606.80	8.16	0.53

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GRAVITY DATA

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1	400	389323	5395474	671.89	-2.62	0.28
2	401	389120	5395584	665.78	-2.04	0.29
3	402	389028	5395626	657.82	-0.55	0.28
4	403	388949	5395671	657.29	-0.60	0.28
5	404	388854	5395721	653.45	0.15	0.28
6	405	388765	5395768	649.57	0.68	0.29
7	406	388741	5395865	652.96	-0.14	0.31
8	407	388674	5395925	654.96	-1.27	0.33
9	408	388581	5395932	660.96	-3.12	0.36
10	409	388480	5395932	660.41	-3.14	0.40
11	410	388369	5395938	655.27	-2.12	0.45
12	411	388280	5395911	650.65	-1.12	0.39
13	412	388192	5395854	645.09	-0.01	0.35
14	413	388118	5395796	641.13	0.54	0.36
15	414	388024	5395749	640.17	0.65	0.37
16	415	387942	5395699	642.03	0.09	0.39
17	416	387846	5395671	647.95	-1.39	0.40
18	417	387764	5395715	654.90	-3.15	0.46
19	418	387667	5395731	653.14	-2.98	0.45
20	419	387571	5395724	650.51	-2.65	0.44
21	420	387460	5395704	650.23	-2.51	0.38
22	421	387357	5395709	650.28	-2.65	0.35
23	422	387265	5395744	647.21	-2.03	0.36
24	423	387190	5395798	645.14	-1.40	0.37
25	424	387102	5395854	643.84	-0.95	0.36
26	425	387003	5395882	643.01	-1.23	0.36
27	426	386907	5395889	643.11	-1.42	0.38
28	427	386813	5395893	645.05	-1.86	0.39
29	428	386710	5395893	642.91	-1.55	0.41
30	429	386607	5395912	643.00	-1.68	0.41
31	430	386535	5395935	643.86	-1.89	0.42
32	431	386526	5396064	636.59	-0.48	0.43
33	432	386525	5396165	634.27	0.14	0.44
34	433	386533	5396263	635.98	-0.07	0.44
35	434	386542	5396355	640.25	-0.63	0.45
36	435	386542	5396468	644.70	-1.20	0.46
37	436	386536	5396563	645.57	-1.49	0.48
38	437	386532	5396668	640.55	-0.50	0.50
39	438	386527	5396765	638.35	-0.07	0.52
40	439	389575	5394003	659.16	0.34	0.30
41	440	388801	5392931	660.22	1.21	0.44
42	441	386895	5393821	527.24	25.27	0.87
43	442	386873	5393774	539.63	23.02	0.69
44	443	386865	5393727	549.04	21.26	0.69
45	444	386881	5393678	559.39	19.27	0.65
46	445	386899	5393614	561.57	18.95	0.71
47	446	386930	5393592	566.60	17.82	0.68
48	447	386968	5393558	576.94	15.69	0.67
49	448	386993	5393513	588.37	13.52	0.63
50	450	387025	5393471	593.87	12.59	0.62
51	451	387063	5393445	596.39	12.33	0.59

52	452	387096	5393405	596.68	12.26	0.57
53	453	387129	5393367	599.87	11.69	0.55
54	454	387149	5393320	602.52	11.17	0.53
55	455	387149	5393274	604.11	10.82	0.50
56	456	387142	5393225	607.68	9.92	0.48
57	457	387124	5393176	613.55	8.76	0.52
58	458	387106	5393131	618.02	7.81	0.50
59	459	387086	5393087	623.16	6.90	0.48
60	460	387099	5393033	631.49	5.34	0.46
61	461	387132	5392993	639.59	3.79	0.48
62	462	387156	5392957	645.59	2.62	0.50
63	463	387148	5392905	651.25	1.63	0.56
64	464	387150	5392857	652.96	1.45	0.44
65	465	387172	5392809	652.05	1.62	0.39
66	466	387182	5392758	651.11	2.04	0.39
67	467	387208	5392723	649.79	2.23	0.38
68	468	387247	5392689	644.80	3.57	0.36
69	469	387285	5392661	642.74	4.02	0.35
70	470	386893	5393885	542.85	22.19	0.87
71	471	386911	5393931	560.05	18.84	0.85
72	472	386931	5393977	560.24	18.61	0.83
73	473	386950	5394022	552.24	20.23	0.82
74	474	386966	5394069	558.59	18.97	0.85
75	475	386984	5394114	543.93	21.75	0.71
76	476	387001	5394160	564.84	17.59	0.63
77	477	387019	5394206	580.35	14.60	0.63
78	478	387038	5394253	587.64	13.12	0.68
79	479	387055	5394299	587.42	13.42	0.67
80	480	387073	5394346	585.19	13.70	0.66
81	481	387000	5394434	587.19	13.26	0.61
82	482	386954	5394455	592.97	12.16	0.63
83	483	386908	5394476	596.19	11.52	0.68
84	484	386864	5394497	596.87	11.42	0.69
85	485	386818	5394518	596.51	11.47	0.66
86	486	386772	5394539	594.33	11.94	0.62
87	487	386726	5394560	606.48	9.36	0.60
88	488	386680	5394581	617.54	7.07	0.59
89	489	386634	5394602	627.41	5.13	0.53
90	491	386588	5394623	629.42	4.91	0.51
91	492	386542	5394644	630.59	4.65	0.48
92	493	386496	5394665	635.85	3.36	0.51
93	495	386450	5394686	641.22	2.02	0.54
94	496	386404	5394707	646.08	0.63	0.62
95	497	386358	5394728	642.45	1.45	0.65
96	498	386318	5394520	610.99	8.21	0.86
97	499	386374	5394500	614.53	7.49	0.83
98	500	386420	5394479	616.77	7.05	0.79
99	501	386466	5394458	615.84	7.32	0.81
100	502	386510	5394437	617.31	7.14	0.82
101	503	386556	5394416	619.38	6.73	0.83
102	504	386602	5394395	621.24	6.36	0.84
103	505	386694	5394353	596.93	11.47	0.83
104	506	386742	5394332	582.57	14.31	0.91
105	507	386788	5394311	576.30	15.63	0.96
106	508	386834	5394290	561.91	18.37	1.02
107	509	386880	5394269	568.27	17.24	1.10

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108	510	386926	5394248	570.25	16.71	1.00
109	511	386972	5394227	554.71	19.52	0.96
110	512	387090	5394390	576.68	15.09	0.61
111	513	387136	5394369	571.85	16.13	0.57
112	514	387181	5394348	568.65	16.82	0.63
113	515	387227	5394327	562.83	17.94	0.68
114	516	387262	5394306	552.73	20.04	0.68
115	517	387307	5394285	550.36	20.36	0.69
116	518	387353	5394264	554.54	19.37	0.63
117	519	387398	5394243	556.15	19.24	0.58
118	520	387444	5394222	543.34	21.78	0.56
119	521	387489	5394201	544.16	21.62	0.52
120	522	387534	5394180	554.65	19.55	0.54
121	523	387579	5394159	565.71	17.54	0.55
122	524	387624	5394138	563.84	18.12	0.58
123	525	387669	5394117	568.45	17.12	0.59
124	526	387711	5394096	575.47	15.76	0.60
125	527	387757	5394075	585.38	14.05	0.63
126	529	387802	5394054	596.94	11.84	0.64
127	530	387848	5394033	609.37	9.49	0.68
128	531	387894	5394012	621.87	6.96	0.67
129	532	387940	5393991	627.72	5.79	0.63
130	533	387990	5393970	634.72	4.42	0.60
131	534	388037	5393949	645.00	2.35	0.58
132	535	388083	5393928	648.16	1.65	0.57
133	536	388130	5393907	647.69	2.11	0.56
134	537	387940	5393991	630.89	5.22	0.63
135	538	387930	5393950	639.64	3.33	0.78
136	539	387913	5393903	643.34	2.66	0.86
137	540	387896	5393855	641.45	3.27	0.80
138	541	387879	5393807	633.10	5.02	0.75
139	542	387933	5393786	639.16	3.89	0.74
140	543	387978	5393765	645.83	2.57	0.73
141	544	387090	5393714	649.86	1.21	0.70
142	545	388069	5393723	659.39	0.05	0.71
143	546	387834	5393828	627.09	6.10	0.74
144	547	387789	5393849	617.32	7.95	0.76
145	548	387743	5393870	611.97	8.93	0.77
146	549	387698	5393891	597.17	11.84	0.79
147	550	387653	5393912	588.93	13.47	0.78
148	551	387607	5393933	581.09	14.77	0.79
149	552	387562	5393954	595.49	11.73	0.80
150	553	387527	5393975	602.88	10.26	0.79
151	554	387471	5393996	599.60	10.88	0.78
152	555	387426	5394017	601.75	10.33	0.79
153	556	387381	5394038	590.17	12.54	0.81
154	557	387336	5394059	578.44	14.71	0.87
155	558	387290	5394080	562.68	17.66	0.88
156	559	387245	5394101	540.53	21.86	0.90
157	560	387200	5394122	529.41	23.90	0.95
158	561	387155	5394143	529.97	23.98	0.96
159	562	387109	5394164	536.98	22.68	0.96
160	563	387064	5394185	543.85	21.51	0.98
161	564	387091	5394392	575.90	15.72	0.65
162	565	387109	5394438	580.78	14.60	0.67
163	566	387127	5394485	579.00	14.65	0.69

164	567	387144	5394531	583.26	13.25	0.73
165	568	387098	5394548	597.97	10.16	0.65
166	569	387050	5394565	611.47	7.22	0.62
167	570	387003	5394582	621.70	5.08	0.60
168	571	386956	5394599	625.17	4.64	0.59
169	572	386910	5394616	626.95	4.46	0.56
170	573	386864	5394632	626.38	4.89	0.55
171	574	386818	5394649	622.04	6.06	0.54
172	575	386772	5394666	618.18	7.08	0.51
173	576	386726	5394683	632.07	4.06	0.51
174	577	386680	5394700	638.55	2.66	0.49
175	578	386634	5394717	643.56	1.33	0.50
176	579	386586	5394735	646.07	0.66	0.52
177	580	389668	5398101	698.69	-12.64	0.25
178	581	389694	5398061	697.72	-12.23	0.25
179	582	389726	5398011	692.37	-11.51	0.26
180	583	389756	5397959	686.89	-10.29	0.28
181	584	389784	5397915	684.76	-9.84	0.29
182	585	389816	5397868	683.27	-9.49	0.28
183	586	389843	5397825	681.07	-9.07	0.27
184	587	389873	5397776	677.56	-8.48	0.27
185	588	389902	5397731	673.92	-7.86	0.26
186	589	389935	5397680	672.19	-7.60	0.27
187	590	389963	5397635	673.41	-7.77	0.27
188	591	389993	5397586	676.26	-8.18	0.28
189	592	390007	5397549	676.28	-8.48	0.28
190	593	390034	5397508	678.74	-8.33	0.27
191	594	390061	5397444	679.63	-8.27	0.29
192	595	390079	5397396	680.02	-8.29	0.30
193	596	390103	5397339	680.76	-8.05	0.29
194	597	390122	5397284	680.91	-8.05	0.29
195	598	390150	5397221	681.26	-8.05	0.27
196	599	390179	5397145	678.70	-7.43	0.27
197	600	390191	5397100	676.62	-7.01	0.28
198	601	390216	5397051	674.13	-6.55	0.29
199	602	390237	5396997	669.62	-5.71	0.31
200	604	390251	5396957	665.90	-4.98	0.32
201	605	390270	5396904	660.86	-3.98	0.35
202	606	390284	5396842	655.14	-2.78	0.38
203	607	390292	5396770	651.92	-2.08	0.40
204	608	390289	5396723	649.33	-1.48	0.40
205	609	390282	5396671	646.11	-0.68	0.40
206	610	390257	5396592	640.58	0.53	0.36
207	611	390229	5396540	634.99	1.72	0.37
208	612	390204	5396484	628.72	3.29	0.36
209	613	390178	5396432	622.81	4.83	0.35
210	614	390158	5396385	618.68	6.03	0.35
211	615	387331	5395760	647.91	-2.15	0.36
212	616	387302	5395809	646.42	-1.74	0.27
213	617	387294	5395854	644.99	-1.27	0.39
214	618	387272	5395903	644.53	-0.99	0.40
215	619	387248	5395955	645.69	-1.06	0.42
216	620	387229	5396017	648.12	-1.53	0.43
217	621	387228	5396061	651.19	-2.30	0.44
218	622	387703	5395736	655.24	-3.42	0.42
219	623	387681	5395694	663.95	-5.47	0.58

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220	624	387660	5395650	671.03	-7.03	0.62
221	625	387639	5395605	677.06	-8.45	0.66
222	626	387617	5395560	679.18	-8.84	0.63
223	627	387595	5395516	681.82	-9.33	0.62
224	628	387574	5395472	683.30	-9.65	0.63
225	629	387552	5395427	680.97	-9.12	0.63
226	630	387532	5395382	674.70	-7.80	0.60
227	631	387512	5395338	669.15	-6.61	0.60
228	632	387489	5395293	662.93	-5.40	0.57
229	633	387444	5395312	659.31	-4.51	0.56
230	634	387489	5395293	650.47	-2.30	0.57
231	635	387579	5395245	642.46	-0.24	0.58
232	636	387629	5395226	635.80	1.34	0.59
233	637	387679	5395207	628.04	3.10	0.62
234	638	387729	5395188	620.08	4.85	0.61
235	639	387779	5395169	614.88	6.05	0.61
236	640	387829	5395150	598.83	9.52	0.60
237	641	387899	5395130	591.87	10.99	0.59
238	642	387944	5395306	628.60	3.82	0.57
239	643	387899	5395326	628.05	3.81	0.60
240	644	387854	5395347	630.76	3.09	0.66
241	645	387809	5395368	639.26	0.99	0.70
242	646	387754	5395389	645.48	-0.76	0.70
243	647	387709	5395410	654.10	-2.98	0.68
244	648	387664	5395430	670.33	-6.68	0.65
245	649	387619	5395451	682.03	-9.37	0.60
246	650	387574	5395472	684.14	-9.71	0.58
247	651	387240	5396115	647.89	-1.49	0.46
248	652	387271	5396156	645.83	-1.15	0.47
249	653	387275	5396218	646.26	-1.35	0.48
250	654	387266	5396288	644.33	-1.03	0.48
251	655	387263	5396343	643.57	-0.99	0.49
252	656	387240	5396391	638.78	0.08	0.50
253	657	387192	5396429	635.58	0.68	0.50
254	658	387148	5396462	630.94	1.58	0.51
255	659	386780	5395804	649.19	-2.46	0.39
256	660	386790	5395722	645.66	-1.71	0.39
257	661	386776	5395662	643.57	-1.23	0.38
258	662	386765	5395593	643.20	-1.17	0.38
259	663	386750	5395531	643.10	-1.02	0.37
260	664	386716	5395507	643.30	-1.02	0.37
261	665	387171	5394592	570.03	15.85	0.68
262	666	387221	5394569	565.15	16.92	0.72
263	667	387267	5394546	559.13	18.23	0.70
264	668	387313	5394523	553.10	19.55	0.68
265	669	387358	5394500	551.04	20.12	0.63
266	670	387403	5394477	548.11	20.68	0.61
267	671	387450	5394453	546.79	21.06	0.65
268	672	387495	5394430	545.47	21.46	0.62
269	673	387542	5394407	543.61	21.83	0.68
270	674	387589	5394384	544.94	21.66	0.71
271	675	387634	5394361	546.95	21.11	0.73
272	676	387678	5394338	551.82	20.13	0.75
273	677	387723	5394315	557.44	19.04	0.76
274	678	387767	5394292	563.85	17.98	0.78
275	679	387812	5394269	571.13	16.70	0.74

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276	680	387857	5394246	582.20	14.62	0.70
277	681	387900	5394223	594.44	12.18	0.64
278	682	387940	5394200	602.54	10.70	0.60
279	683	387942	5394195	599.59	11.43	0.43
280	684	387961	5394241	593.19	12.82	0.44
281	685	387980	5394287	589.79	13.84	0.46
282	686	387999	5394333	587.84	14.04	0.47
283	687	388107	5394349	582.23	14.88	0.49
284	688	388061	5394368	584.74	14.34	0.48
285	689	387978	5394406	571.43	17.07	0.50
286	690	387932	5394425	568.99	17.37	0.50
287	691	387885	5394444	560.01	18.97	0.49
288	692	387838	5394463	552.03	20.54	0.48
289	693	387792	5394482	550.12	20.66	0.52
290	694	387745	5394501	548.74	20.86	0.55
291	695	387699	5394520	548.23	20.83	0.57
292	696	387652	5394539	547.41	20.88	0.59
293	697	387606	5394558	550.13	20.13	0.60
294	698	387559	5394577	550.47	20.08	0.63
295	699	387493	5394596	552.00	19.88	0.65

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QUEOBS 2

GRAVITY DATA

CSR QUE ROAD GRAVITY SURVEY JAN 1988 (2)

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1	700	387447	5394615	555.47	19.27	0.64
2	701	387401	5394634	557.72	18.41	0.62
3	702	387354	5394653	570.53	15.42	0.61
4	703	387308	5394672	570.11	15.36	0.60
5	704	387261	5394691	577.32	13.66	0.58
6	705	387215	5394710	593.62	10.26	0.57
7	706	387216	5394715	597.18	9.51	0.60
8	707	387660	5395650	677.22	-8.54	0.51
9	708	387705	5395628	683.69	-10.04	0.51
10	709	387795	5395584	658.83	-4.23	0.50
11	710	387840	5395562	648.72	-1.71	0.49
12	711	387885	5395540	642.99	-0.28	0.48
13	712	387930	5395518	641.43	0.30	0.49
14	713	387975	5395496	640.56	0.66	0.50
15	714	388020	5395474	641.65	0.72	0.50
16	715	388065	5395452	645.96	0.02	0.53
17	716	388110	5395430	650.25	-0.65	0.56
18	717	388155	5395408	655.89	-1.79	0.58
19	718	388200	5395386	657.94	-2.14	0.60
20	719	388245	5395364	649.84	-0.46	0.61
21	720	387390	5395076	634.87	0.77	0.62
22	721	387394	5395073	633.34	1.18	0.62
23	722	387440	5395055	630.23	2.01	0.66
24	723	387486	5395037	625.98	3.07	0.70
25	724	387532	5395019	618.01	4.97	0.73
26	727	387578	5395001	612.49	6.30	0.76
27	728	387670	5394965	597.15	9.20	0.85
28	729	387716	5394946	590.86	10.79	0.88
29	730	387762	5394927	581.94	12.72	0.91
30	731	387908	5395692	642.85	0.02	0.47
31	732	387861	5395709	643.70	-0.37	0.44
32	733	387814	5395726	644.43	-0.65	0.45
33	734	387767	5395743	645.66	-1.10	0.45
34	735	387720	5395760	645.20	-1.02	0.46
35	736	387731	5395799	645.35	-1.15	0.54
36	737	387744	5395877	635.11	1.47	0.59
37	738	387758	5395877	635.11	1.32	0.62
38	739	387769	5395920	631.40	2.10	0.63
39	740	387780	5395930	631.33	2.11	0.56
40	741	387827	5395914	629.44	2.64	0.56
41	742	387874	5395898	633.88	1.80	0.58
42	743	387920	5395882	634.06	1.85	0.57
43	744	387967	5395866	635.18	1.62	0.54
44	745	388014	5395850	637.98	1.10	0.53
45	746	388061	5395834	639.61	0.76	0.50
46	747	388107	5395818	642.33	0.30	0.48
47	748	388154	5395802	645.63	-0.14	0.46
48	749	388200	5395786	648.32	-0.60	0.45
49	750	388247	5395770	649.73	-0.78	0.44
50	751	388294	5395754	651.69	-1.00	0.44
51	752	388341	5395738	655.15	-1.63	0.45

52	753	388387	5395722	651.36	-0.75	0.44
53	754	388434	5395706	645.62	0.85	0.45
54	755	388481	5395690	641.38	2.02	0.45
55	756	388528	5395674	637.69	2.74	0.44
56	758	388472	5395488	631.73	4.58	0.48
57	759	388425	5395505	637.54	3.25	0.48
58	760	388378	5395572	646.15	1.10	0.48
59	761	388331	5395539	657.33	-1.85	0.45
60	762	388284	5395556	661.96	-2.78	0.46
61	763	388237	5395573	660.81	-2.60	0.47
62	764	388190	5395590	654.83	-1.46	0.45
63	765	388143	5395607	648.12	-0.33	0.46
64	766	388096	5395624	644.17	0.22	0.46
65	767	388049	5395641	642.11	0.49	0.43
66	768	388002	5395658	641.86	0.33	0.47
67	769	387955	5395675	642.41	0.04	0.46
68	770	388485	5395914	660.08	-3.31	0.51
69	771	387804	5394908	569.92	15.42	0.89
70	772	387846	5394890	559.50	17.96	0.93
71	773	387890	5394872	562.04	17.73	0.91
72	774	387932	5394853	571.24	16.07	0.90
73	775	387974	5394834	576.72	15.08	0.91
74	776	388135	5394805	602.93	9.57	0.89
75	777	388177	5394770	635.03	2.54	0.92
76	779	388220	5394787	623.04	5.41	0.91
77	780	388100	5394567	561.78	18.26	0.65
78	781	388054	5394583	554.78	19.64	0.63
79	782	388008	5394600	553.65	19.83	0.62
80	783	387960	5394619	552.67	19.86	0.61
81	784	387908	5394637	551.62	19.93	0.60
82	785	387866	5394654	550.65	19.99	0.58
83	786	387818	5394673	550.26	19.89	0.55
84	787	387770	5394692	551.19	19.71	0.53
85	788	387722	5394711	551.97	19.37	0.51
86	789	387674	5394730	554.84	18.52	0.52
87	790	387626	5394749	563.83	16.58	0.54
88	791	387580	5394767	570.68	15.13	0.55
89	792	387533	5394785	581.22	12.81	0.55
90	793	387487	5394803	591.61	10.42	0.52
91	794	387440	5394822	604.30	7.64	0.51
92	795	387393	5394841	610.70	6.49	0.50
93	797	387346	5394860	612.15	6.09	0.49
94	798	387297	5394878	610.43	6.46	0.46
95	799	387280	5394840	608.50	6.65	0.50
96	800	388527	5395897	659.42	-3.10	0.50
97	801	388574	5395879	656.53	-2.18	0.47
98	802	388620	5395861	651.19	-0.67	0.46
99	803	388665	5395843	649.35	0.00	0.43
100	804	388710	5395824	650.71	0.03	0.43
101	805	388755	5395806	652.84	-0.40	0.41
102	806	388802	5395797	647.10	0.96	0.39
103	807	388847	5395778	650.09	0.42	0.39
104	808	388892	5395760	652.12	0.11	0.38
105	809	388937	5395740	654.89	-0.42	0.39
106	810	388985	5395718	655.06	-0.37	0.39
107	811	389123	5395882	643.57	1.69	0.42

108	812	389077	5395900	636.28	3.11	0.45
109	813	389031	5395918	633.18	3.62	0.44
110	814	388985	5395936	642.75	1.75	0.43
111	815	388938	5395954	643.29	1.72	0.43
112	816	388892	5395972	642.68	1.77	0.48
113	817	388845	5395990	651.14	-0.92	0.46
114	818	388799	5396006	645.26	1.21	0.46
115	819	388752	5396024	648.79	0.11	0.48
116	820	388760	5396076	650.52	-0.27	0.48
117	821	388769	5396220	632.50	3.33	0.55
118	822	388816	5396203	624.30	5.14	0.54
119	823	388863	5396186	631.07	3.72	0.52
120	824	388910	5396169	633.00	3.36	0.48
121	825	388957	5396152	624.37	5.37	0.44
122	829	389004	5396135	629.88	4.27	0.45
123	830	389051	5396118	634.17	3.51	0.44
124	831	389098	5396101	634.66	3.49	0.40
125	832	389145	5396084	635.21	3.56	0.39
126	833	389192	5396067	639.03	2.73	0.39
127	834	389239	5396050	645.17	1.40	0.37
128	835	389286	5396033	649.74	0.47	0.36
129	836	389333	5396016	652.06	-0.02	0.38
130	837	388706	5396042	663.25	-3.77	0.49
131	838	388659	5396060	665.74	-4.50	0.51
132	839	388613	5396078	662.37	-4.05	0.55
133	840	388520	5396114	645.81	-0.85	0.61
134	841	388473	5396132	640.68	-0.02	0.68
135	842	388426	5396150	625.54	3.37	0.72
136	843	388380	5396168	616.31	5.45	0.73
137	844	388333	5396186	611.11	6.66	0.75
138	845	388287	5396204	609.88	6.65	0.77
139	846	388194	5396240	591.77	10.04	0.78
140	847	388150	5394556	567.27	16.38	0.60
141	848	388102	5396276	590.18	10.25	0.81
142	849	388055	5396294	588.94	10.52	0.82
143	852	388009	5396312	576.00	12.99	0.90
144	853	387962	5396328	567.75	14.61	0.94
145	854	387916	5396346	568.89	14.33	0.66
146	855	387890	5396163	611.45	6.18	0.69
147	856	387935	5396144	612.03	6.44	0.62
148	857	387981	5396125	614.46	6.09	0.54
149	858	388026	5396106	613.98	6.23	0.51
150	859	388072	5396087	618.41	5.35	0.50
151	860	388117	5396068	626.20	3.59	0.50
152	861	388162	5396049	631.56	2.39	0.51
153	862	388908	5394464	671.23	-2.73	0.70
154	863	388252	5396011	642.79	0.11	0.49
155	864	388297	5395992	649.37	-1.25	0.48
156	865	388345	5395976	654.30	-2.33	0.48
157	866	388391	5395957	658.86	-3.20	0.49
158	867	388427	5395938	660.16	-3.36	0.48
159	868	389298	5394521	642.40	3.80	0.45
160	869	389313	5394570	651.61	2.03	0.43
161	870	389296	5394629	651.02	2.08	0.43
162	871	389229	5394682	654.24	1.40	0.41
163	872	389171	5394729	655.58	1.13	0.39

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164	873	389089	5394767	656.77	0.79	0.40
165	874	389015	5394846	662.22	-0.41	0.39
166	875	388943	5394853	667.00	-1.49	0.40
167	876	389092	5394567	662.82	-0.73	0.58
168	877	389037	5394575	661.62	-0.43	0.55
169	878	388985	5394630	662.15	-0.67	0.55
170	879	388963	5394698	657.62	0.52	0.42
171	880	388949	5394777	662.21	-0.36	0.47
172	881	388888	5394925	662.53	-0.66	0.32
173	882	388810	5394967	660.02	-0.26	0.42
174	883	388752	5395015	658.61	-0.06	0.42
175	884	388676	5395089	647.52	1.90	0.49
176	885	388629	5395169	638.85	3.59	0.48
177	886	388574	5395232	622.49	6.92	0.47
178	887	388499	5395284	615.88	8.11	0.54
179	888	388729	5395648	647.65	1.31	0.42
180	889	388650	5395545	637.10	3.52	0.45
181	890	388521	5395471	626.13	5.87	0.46
182	891	388568	5395454	630.15	5.15	0.45
183	894	388615	5395437	636.99	3.62	0.47
184	895	388662	5395420	642.27	2.66	0.45
185	896	388709	5395403	647.09	1.73	0.44
186	897	388756	5395386	649.78	1.26	0.43
187	898	388803	5395368	652.80	0.50	0.43
188	899	388851	5395347	655.57	0.12	0.42
189	900	388579	5395360	628.68	5.57	0.48
190	901	388620	5395642	646.25	1.38	0.42
191	902	388689	5395623	644.85	1.78	0.45
192	903	388735	5395604	643.59	2.23	0.36
193	904	388848	5394487	666.38	-1.81	0.58
194	905	388803	5394505	657.65	0.05	0.59
195	906	388756	5394525	650.27	2.14	0.61
196	907	388709	5394545	639.15	4.50	0.65
197	908	388672	5394565	630.54	6.15	0.67
198	909	388627	5394582	625.40	7.11	0.69
199	911	388582	5394600	620.97	7.84	0.73
200	912	388537	5394617	638.45	3.59	0.77
201	913	388492	5394639	652.74	-0.08	0.77
202	914	388446	5394661	660.42	-2.28	0.79
203	915	388302	5394683	658.98	-1.79	0.78
204	916	388356	5394705	652.04	-0.33	0.76
205	918	388311	5394727	646.74	0.75	0.84
206	919	388266	5394750	642.83	1.21	0.84
207	920	388196	5394537	575.32	15.81	0.57
208	921	388243	5394518	580.57	14.80	0.53
209	922	388290	5394499	579.06	15.17	0.48
210	923	388373	5394461	568.67	17.59	0.50
211	924	388419	5394442	574.44	16.52	0.53
212	925	388466	5394423	575.87	16.40	0.55
213	926	388508	5394404	585.05	14.58	0.59
214	927	388555	5394385	595.74	12.46	0.63
215	928	388602	5394367	610.18	9.54	0.72
216	929	388696	5394329	644.91	2.46	0.63
217	930	388742	5394310	652.11	1.03	0.72
218	931	388788	5394291	654.48	0.58	0.77
219	932	388834	5394272	653.06	0.91	0.81

220	933	389097	5394919	664.49	-0.93	0,38
221	934	389052	5394938	662.81	-0.61	0.38
222	935	389009	5394960	660.48	-0.18	0,39
223	936	388966	5394979	657.97	0.32	0.40
224	937	388922	5394998	657,29	0.49	0.40
225	938	388876	5395017	656.64	0.35	0.41
226	939	388831	5395036	658.96	-0.06	0.43
227	940	388787	5395055	658.60	-0.13	0.45
228	941	388771	5394125	600.79	11.63	0.72
229	942	388792	5394175	621.92	7.62	0,66
230	943	388752	5394080	610.00	9.97	0.60
231	944	388730	5394100	588.34	13.87	0,63
232	945	388637	5394140	592.14	13.36	0.61
233	946	388591	5394159	580.10	15.66	0.63
234	947	388545	5394178	581.50	15.09	0,61
235	948	388478	5394197	588.75	13.67	0,57
236	949	388432	5394216	577.54	15.84	0.54
237	950	388386	5394235	577.25	15.84	0,54
238	951	388339	5394254	578.25	15.63	0.50
239	952	388293	5394273	579.32	15.34	0,47
240	953	388238	5397057	636.90	1.16	0.90
241	954	388200	5394311	577.45	15.72	0,44
242	955	388153	5394330	574.89	16.27	0.45
243	956	388023	5394349	568.67	17.24	0.49
244	957	388038	5394157	602.25	11.26	0,50
245	958	388085	5394136	602.50	11.33	0.48
246	959	388131	5394119	606.96	10.60	0.49
247	960	388177	5394100	616.17	8.72	0,49
248	961	388223	5394082	626.41	6.51	0.48
249	962	388270	5394064	627.09	6.55	0.47
250	963	388316	5394046	629.88	5.99	0.47
251	964	388363	5394027	622.37	7.59	0.46
252	965	388409	5394008	610.51	9.94	0,44
253	966	389755	5397101	667.26	-5,90	0.45
254	967	388502	5393971	614.31	9.13	0.42
255	968	388549	5393953	626.71	6.43	0.43
256	969	388595	5393934	633.89	4.97	0.41
257	970	388640	5393916	638.23	4.08	0.41
258	971	388685	5393898	636.72	4.61	0.42
259	972	388704	5394944	585.44	14.27	0.45
260	973	388798	5394061	623.93	7.47	0.63
261	974	388844	5394042	628.38	6.88	0.53
262	975	388890	5394023	630.96	6.30	0.47
263	976	388936	5394004	636.49	5.10	0.41
264	977	388982	5393985	643.83	3.84	0.43
265	978	389028	5393966	650.40	2.55	0.41
266	979	389074	5393947	655.22	1.52	0.40
267	980	389120	5393928	654.72	1.51	0.43
268	981	390004	5397237	679.23	-8.01	0.37
269	982	389959	5397256	678.82	-8.13	0.38
270	983	389914	5397275	677.23	-8.04	0.40
271	984	389869	5397294	673.91	-7.47	0.40
272	985	389823	5397314	670.56	-6.73	0.42
273	986	389778	5397333	665.11	-5.93	0.43
274	987	389733	5397352	657.62	-4.62	0.40
275	988	389688	5397371	657.58	-4.68	0.40

276	990	389643	5397390	661.59	-5,46	0.42
277	991	389598	5397409	668.82	-6,97	0.40
278	992	389552	5397429	675.81	-8,45	0.39
279	993	389507	5397448	678.71	-9,08	0.37
280	994	389462	5397467	680.07	-9,32	0.38
281	995	389417	5397486	682.27	-10,02	0.35
282	997	389372	5397505	686.98	-11.11	0.36
283	998	389327	5397525	691.78	-11.47	0.35
284	999	389280	5397545	693.17	-10.87	0.34

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GRAVITY DATA

QUEOBS3

CSR QUE ROAD GRAVITY SURVEY JAN 1988 (3)
980177.50 8551.9976 1.01387 556 10188

0	1	0 1 1 1	8800			
1	1000	389229	5397384	680.88	-9.06	0.41
2	1001	389204	5397334	679.46	-8.75	0.42
3	1002	389158	5397353	677.78	-8.27	0.42
4	1003	389112	5397372	677.65	-8.39	0.42
5	1004	389066	5397391	678.29	-8.65	0.41
6	1005	389020	5397410	680.23	-8.92	0.42
7	1006	388975	5397430	683.64	-9.69	0.43
8	1007	388929	5397449	684.06	-9.86	0.45
9	1008	388883	5397468	682.86	-9.64	0.46
10	1009	388837	5397487	679.48	-9.05	0.47
11	1010	388792	5397506	677.77	-8.52	0.50
12	1011	388746	5397526	674.71	-8.11	0.53
13	1012	389220	5397327	680.13	-8.86	0.42
14	1014	389250	5397315	679.91	-8.85	0.40
15	1015	389296	5397295	679.82	-8.64	0.42
16	1016	389342	5397276	678.88	-8.41	0.45
17	1017	389388	5397257	672.97	-7.23	0.45
18	1018	389434	5397238	665.21	-5.62	0.46
19	1019	389480	5397219	659.14	-4.45	0.48
20	1020	389526	5397200	656.99	-3.97	0.49
21	1021	389572	5397180	654.04	-3.39	0.51
22	1022	389617	5397161	652.61	-3.24	0.50
23	1023	389663	5397142	655.79	-3.86	0.49
24	1024	389709	5397123	660.39	-4.66	0.47
25	1025	389801	5397083	672.43	-6.56	0.45
26	1026	389847	5397064	676.47	-7.78	0.45
27	1027	389893	5397045	678.43	-7.98	0.44
28	1028	389939	5397026	679.23	-7.98	0.43
29	1029	389985	5397007	679.93	-8.05	0.43
30	1030	390031	5397988	680.64	-9.10	0.42
31	1031	390077	5396970	688.19	-8.09	0.42
32	1032	389865	5396880	677.73	-7.73	0.43
33	1033	389911	5396861	676.86	-7.69	0.47
34	1034	389947	5396842	671.18	-6.62	0.47
35	1035	389993	5396823	665.65	-5.33	0.47
36	1036	390039	5396804	663.33	-4.75	0.46
37	1037	390085	5396785	664.78	-5.03	0.48
38	1038	390131	5396766	664.82	-5.01	0.49
39	1039	389814	5396895	677.62	-7.83	0.48
40	1040	389767	5396914	677.55	-7.95	0.49
41	1041	389722	5396933	678.37	-8.19	0.52
42	1042	389673	5396950	678.24	-8.12	0.53
43	1043	389626	5396971	672.41	-7.08	0.50
44	1044	389579	5396990	663.84	-5.45	0.49
45	1045	389534	5397007	655.96	-3.77	0.48
46	1046	389485	5397028	650.58	-2.74	0.46
47	1047	389433	5397049	648.66	-2.10	0.47
48	1048	389390	5397066	651.14	-2.52	0.47
49	1049	389343	5397088	656.54	-3.75	0.45
50	1050	389296	5397107	663.37	-5.18	0.46
51	1051	389252	5397128	666.88	-5.79	0.45

52	1052	389204	5397145	665.69	-5.40	0.43
53	1053	389157	5397164	663.05	-4.86	0.42
54	1054	389116	5397181	659.61	-4.01	0.44
55	1055	389073	5397197	657.15	-3.46	0.43
56	1056	389027	5397216	660.38	-4.31	0.44
57	1057	388981	5397234	668.59	-6.01	0.42
58	1058	388935	5397254	673.91	-7.13	0.42
59	1059	388889	5397275	676.27	-7.70	0.40
60	1060	388843	5397293	676.44	-7.93	0.42
61	1061	388797	5397311	673.91	-7.51	0.43
62	1062	388752	5397329	671.44	-7.25	0.44
63	1063	388704	5397348	668.73	-6.82	0.45
64	1064	388658	5397366	666.39	-6.13	0.47
65	1065	388612	5397385	664.43	-5.78	0.49
66	1066	388563	5397404	661.28	-4.96	0.51
67	1067	388519	5397423	659.10	-4.43	0.49
68	1068	388472	5397441	658.64	-4.41	0.48
69	1069	388426	5397460	658.54	-4.39	0.46
70	1070	388379	5397479	657.49	-4.23	0.48
71	1071	388366	5397399	663.77	-5.31	0.49
72	1072	388327	5397306	656.91	-3.81	0.50
73	1073	388325	5397300	656.17	-3.64	0.51
74	1074	389009	5396988	645.65	-0.91	0.42
75	1075	389055	5396970	643.36	-0.01	0.44
76	1076	389101	5396952	644.36	-0.30	0.44
77	1077	389148	5396934	645.31	-0.62	0.45
78	1078	389194	5396916	646.00	-0.79	0.46
79	1079	389240	5396898	647.23	-1.11	0.48
80	1080	389286	5396880	648.63	-1.17	0.48
81	1081	389332	5396862	645.49	-0.82	0.49
82	1082	389378	5396844	646.45	-1.08	0.44
83	1083	389424	5396826	649.89	-1.66	0.44
84	1084	389470	5396808	655.41	-2.93	0.48
85	1085	389517	5396790	661.93	-4.41	0.53
86	1086	389564	5396772	669.11	-6.01	0.55
87	1087	389610	5396754	670.78	-6.20	0.60
88	1088	389656	5396736	666.32	-5.31	0.58
89	1089	389702	5396718	666.07	-5.09	0.56
90	1090	389748	5396700	666.57	-5.42	0.53
91	1091	389795	5396682	657.35	-3.67	0.50
92	1092	389530	5396558	637.42	1.15	0.61
93	1093	389484	5396576	639.78	0.57	0.60
94	1094	389438	5396594	638.23	0.81	0.57
95	1095	389392	5396612	634.82	1.55	0.56
96	1096	389346	5396631	629.77	2.65	0.54
97	1097	389300	5396649	620.50	4.67	0.55
98	1100	389253	5396667	611.68	6.61	0.52
99	1101	389207	5396685	610.22	7.08	0.49
100	1102	389161	5396703	621.35	5.03	0.48
101	1103	389115	5396721	630.25	3.22	0.47
102	1104	389069	5396739	633.48	2.57	0.50
103	1105	389023	5396758	638.62	1.52	0.51
104	1106	388977	5396776	640.70	1.10	0.49
105	1107	388931	5396794	639.87	1.21	0.51
106	1108	388885	5396803	642.16	0.68	0.52
107	1109	388838	5396822	647.87	-0.75	0.54

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108	1110	388746	5396858	653.31	-1.82	0.57
109	1111	388700	5396876	652.47	-1.57	0.59
110	1112	388654	5396894	653.69	-1.83	0.63
111	1113	388608	5396913	656.68	-2.82	0.64
112	1114	388561	5396931	659.36	-3.57	0.73
113	1115	388515	5396949	661.65	-4.17	0.79
114	1116	388469	5396967	658.07	-3.17	0.87
115	1117	388422	5396985	651.16	-1.66	0.88
116	1118	388376	5397003	645.19	-0.46	0.87
117	1119	388330	5397021	640.93	0.41	0.87
118	1120	388284	5397039	634.20	1.56	0.85
119	1121	388192	5397077	636.46	1.04	0.92
120	1122	388146	5397095	634.47	1.18	0.95
121	1123	388100	5397114	629.48	1.70	0.99
122	1124	388052	5397133	622.82	3.28	1.05
123	1125	389475	5396389	617.37	6.48	0.49
124	1126	389428	5396406	617.01	6.38	0.50
125	1127	389380	5396424	612.68	7.25	0.48
126	1128	389333	5396442	612.55	7.17	0.49
127	1129	389239	5396478	610.25	7.63	0.48
128	1130	389192	5396496	613.21	7.00	0.50
129	1131	389145	5396514	607.30	8.13	0.52
130	1132	389098	5396532	602.47	8.98	0.51
131	1133	389051	5396550	607.66	7.94	0.48
132	1134	389004	5396568	625.29	4.49	0.50
133	1135	388910	5396604	631.36	3.35	0.53
134	1136	388863	5396622	627.54	4.21	0.52
135	1137	388816	5396640	634.03	2.49	0.54
136	1138	388769	5396658	633.59	2.57	0.53
137	1139	388722	5396676	630.43	3.20	0.55
138	1140	388675	5396694	630.20	3.10	0.53
139	1141	388628	5396712	630.09	3.06	0.58
140	1142	388581	5396730	623.17	4.65	0.60
141	1143	388534	5396748	617.65	5.64	0.65
142	1144	388487	5396766	618.51	5.34	0.67
143	1145	388440	5396784	616.25	5.69	0.68
144	1146	388393	5396802	621.76	4.55	0.69
145	1147	388346	5396820	633.19	2.15	0.69
146	1148	388299	5396838	641.44	0.29	0.72
147	1149	388252	5396856	638.50	1.09	0.73
148	1150	388205	5396874	631.93	2.43	0.75
149	1151	388158	5396892	624.62	3.75	0.80
150	1152	389398	5396191	640.77	2.03	0.44
151	1153	389351	5396209	639.52	1.35	0.43
152	1154	389304	5396227	635.61	3.09	0.44
153	1155	389257	5396245	636.39	2.78	0.42
154	1156	389210	5396263	640.15	1.92	0.44
155	1157	389163	5396281	637.64	2.25	0.42
156	1158	389116	5396299	634.58	3.05	0.44
157	1159	389069	5396317	626.39	4.62	0.42
158	1160	389022	5396335	623.62	5.05	0.41
159	1161	388975	5396353	623.69	4.94	0.43
160	1162	388928	5396371	620.97	5.37	0.42
161	1163	388881	5396389	611.03	7.41	0.46
162	1164	388834	5396407	596.70	10.14	0.48
163	1165	388787	5396425	596.20	10.34	0.51

164	1166	388740	5396443	594.76	10.46	0.55
165	1167	388693	5396461	605.91	8.29	0.60
166	1168	388646	5396479	612.99	6.83	0.75
167	1169	388600	5396497	612.74	6.79	0.72
168	1170	388553	5396515	600.57	9.09	0.68
169	1171	388506	5396533	583.93	12.10	0.66
170	1172	388459	5396551	562.73	15.70	0.62
171	1173	388412	5396569	547.86	18.34	0.67
172	1174	388365	5396587	546.62	18.62	0.73
173	1175	388318	5396605	546.13	18.60	0.76
174	1177	388271	5396623	565.50	15.07	0.75
175	1178	388224	5396641	593.90	9.79	0.93
176	1179	388177	5396659	609.69	6.60	1.02
177	1180	388130	5396677	605.93	7.27	1.10
178	1181	388083	5396696	594.80	9.47	1.13
179	1182	388002	5396394	582.49	11.87	0.92
180	1183	387970	5396499	539.15	19.78	0.90
181	1184	388017	5396482	554.40	17.12	0.88
182	1185	387064	5396465	557.12	16.55	0.83
183	1186	388158	5396431	555.66	16.98	0.71
184	1187	388205	5396414	559.30	16.45	0.80
185	1188	388252	5396397	555.61	17.08	0.73
186	1189	388299	5396380	549.86	17.95	0.72
187	1190	388346	5396363	549.04	17.98	0.80
188	1191	388393	5396356	539.24	19.36	0.83
189	1192	388487	5396322	533.01	19.43	0.73
190	1193	388534	5396305	569.33	13.71	0.76
191	1194	388581	5396288	602.50	8.34	0.73
192	1195	388628	5396271	620.95	5.31	0.71
193	1196	388675	5396254	633.15	3.00	0.65
194	1197	388722	5396237	638.60	2.05	0.62
195	1198	389140	5394900	665.40	-1.09	0.37
196	1199	389186	5394891	665.31	-1.09	0.38
197	1200	389230	5394872	664.28	-0.88	0.39
198	1201	389277	5394853	662.51	-0.60	0.39
199	1202	389320	5394834	660.49	-0.08	0.39
200	1203	389366	5394815	660.13	0.01	0.39
201	1204	389314	5394796	659.97	0.04	0.40
202	1205	389461	5394777	662.90	-0.52	0.39
203	1206	389508	5394758	665.75	-1.16	0.40
204	1207	389554	5394739	667.98	-1.63	0.40
205	1208	389600	5394720	672.11	-2.55	0.41
206	1209	389647	5394700	676.13	-3.55	0.42
207	1210	389361	5394752	657.88	0.61	0.40
208	1211	389340	5394716	654.23	1.43	0.41
209	1212	389572	5394495	663.37	-0.51	0.40
210	1213	389525	5394514	662.52	-0.41	0.41
211	1214	389480	5394533	661.25	-0.08	0.40
212	1215	389435	5394552	659.88	0.24	0.40
213	1216	389392	5394571	656.99	0.87	0.41
214	1217	389347	5394590	655.43	1.24	0.41
215	1218	389302	5394609	650.04	2.23	0.42
216	1220	389282	5394566	644.31	3.38	0.46
217	1221	389259	5394527	645.07	3.21	0.49
218	1222	389245	5394480	643.39	3.39	0.49
219	1223	389226	5394432	644.94	2.95	0.51

220	1224	389207	5394390	638.21	4.29	0.54
221	1225	389023	5394738	654.52	1.02	0.49
222	1226	388078	5394757	658.82	-0.02	0.47
223	1227	388933	5394776	661.30	-0.32	0.46
224	1228	388888	5394795	662.42	-0.60	0.46
225	1229	388843	5394814	662.03	-0.59	0.44
226	1230	388798	5394833	656.30	0.46	0.50
227	1231	388754	5394852	650.59	1.42	0.53
228	1232	388709	5394871	643.95	2.74	0.57
229	1233	388273	5397721	653.11	-3.17	0.64
230	1234	388181	5397759	643.63	-1.37	0.66
231	1235	388135	5397777	639.48	-0.52	0.71
232	1236	388090	5397795	636.96	-0.17	0.76
233	1237	388045	5397813	631.65	0.53	0.83
234	1238	387998	5397831	621.79	2.46	0.87
235	1239	387952	5397849	613.01	4.35	0.90
236	1240	387906	5397867	602.68	6.38	0.98
237	1241	388365	5397240	656.43	-3.66	0.60
238	1242	388411	5397222	654.52	-3.21	0.57
239	1243	388458	5397204	653.63	-2.84	0.55
240	1244	388504	5397186	653.98	-3.00	0.52
241	1245	388550	5397168	656.01	-3.38	0.50
242	1246	388596	5397150	660.74	-4.37	0.47
243	1247	388643	5397132	666.54	-5.51	0.44
244	1248	388689	5397114	671.46	-6.48	0.43
245	1249	388735	5397096	673.28	-6.84	0.42
246	1251	388781	5397078	672.69	-6.60	0.40
247	1252	388827	5397060	672.56	-6.53	0.38
248	1253	388873	5397042	669.53	-6.05	0.39
249	1255	388919	5397024	659.01	-3.70	0.41
250	1256	388966	5397006	652.03	-1.82	0.41

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LEAMAN GEOPHYSICS GRAVITY REDUCTION

CSR QUE ROAD GRAVITY SURVEY FEB 1987

BASE VALUE	BASE NUMBER	METER	CAL DATE	SCALE	DENSITY	ELEV DATUM
980177.50	8551.9976	561	10187	1.0093	2.67	0.00

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8700.0001	389951.0	5395964.0	626.47	980182.85	980321.49	0.36	-15.06
8700.0002	389748.0	5395572.0	661.69	980176.27	980321.80	0.35	-15.03
8700.0003	389921.0	5395924.0	630.19	980182.05	980321.52	0.36	-15.15
8700.0004	389758.0	5395618.0	658.72	980176.66	980321.77	0.36	-15.17
8700.0005	389890.0	5395886.0	634.32	980181.24	980321.55	0.37	-15.17
8700.0006	389770.0	5395668.0	655.33	980177.36	980321.73	0.36	-15.11
8700.0007	389859.0	5395846.0	638.37	980180.49	980321.59	0.38	-15.15
8700.0008	389784.0	5395716.0	651.48	980178.11	980321.69	0.38	-15.06
8700.0009	389830.0	5395805.0	642.66	980179.72	980321.62	0.39	-15.10
8700.0010	389804.0	5395762.0	647.21	980178.89	980321.65	0.39	-15.06
8700.0011	389738.0	5395523.0	664.32	980175.78	980321.84	0.31	-15.08
8700.0012	389730.0	5395474.0	666.72	980175.36	980321.88	0.30	-15.08
8700.0013	389716.0	5395425.0	669.07	980174.96	980321.92	0.29	-15.07
8700.0014	389707.0	5395375.0	672.30	980174.31	980321.96	0.28	-15.13
8700.0015	389699.0	5395327.0	674.51	980173.89	980322.00	0.28	-15.16
8700.0016	389634.0	5394973.0	681.25	980172.49	980322.29	0.28	-15.51
8700.0017	389640.0	5395026.0	681.40	980172.57	980322.24	0.28	-15.36
8700.0018	389681.0	5395280.0	679.52	980172.89	980322.04	0.27	-15.22
8700.0019	389648.0	5395075.0	680.85	980172.73	980322.20	0.29	-15.26
8700.0020	389674.0	5395230.0	677.81	980173.25	980322.08	0.27	-15.23
8700.0021	389658.0	5395125.0	680.00	980172.77	980322.16	0.29	-15.35
8700.0022	389668.0	5395175.0	678.74	980172.99	980322.12	0.29	-15.34
8700.0023	389676.0	5394571.0	666.15	980176.22	980322.61	0.36	-15.00
8700.0024	389631.0	5394923.0	680.68	980172.81	980322.33	0.28	-15.35
8700.0025	389666.0	5394620.0	669.01	980175.61	980322.57	0.33	-15.03
8700.0026	389635.0	5394872.0	679.63	980173.08	980322.37	0.29	-15.32
8700.0027	389659.0	5394672.0	672.01	980174.83	980322.53	0.33	-15.19
8700.0028	389640.0	5394822.0	678.43	980173.51	980322.41	0.30	-15.15
8700.0029	389651.0	5394726.0	676.01	980173.91	980322.49	0.32	-15.29
8700.0030	389645.0	5394776.0	678.28	980173.55	980322.45	0.30	-15.17
8700.0031	389674.0	5394222.0	657.05	980178.31	980322.89	0.32	-15.02
8700.0032	389684.0	5394522.0	662.55	980177.17	980322.65	0.36	-14.80
8700.0033	389684.0	5394271.0	655.55	980178.67	980322.85	0.33	-14.91
8700.0034	389690.0	5394472.0	658.82	980177.95	980322.69	0.37	-14.78
8700.0035	389690.0	5394320.0	653.64	980179.16	980322.81	0.33	-14.76
8700.0036	389692.0	5394421.0	656.12	980178.56	980322.73	0.33	-14.78
8700.0037	389694.0	5394371.0	653.89	980179.01	980322.77	0.33	-14.81
8700.0038	389622.0	5394081.0	660.09	980177.61	980323.01	0.30	-15.25
8700.0039	389644.0	5394126.0	658.97	980177.67	980322.97	0.31	-15.37
8700.0040	389660.0	5394174.0	658.15	980177.96	980322.93	0.32	-15.19
8700.0041	389595.0	5394037.0	659.94	980177.77	980323.04	0.30	-15.16
8700.0042	389983.0	5396004.0	623.01	980183.55	980321.46	0.37	-15.00
8700.0043	390011.0	5396045.0	619.48	980184.14	980321.43	0.35	-15.08
8700.0044	390035.0	5396089.0	615.83	980184.77	980321.39	0.34	-15.15
8700.0045	390058.0	5396134.0	612.87	980185.23	980321.35	0.31	-15.26
8700.0046	390086.0	5396230.0	612.69	980185.25	980321.28	0.31	-15.20
8700.0047	390112.0	5396271.0	614.74	980184.80	980321.25	0.32	-15.21
8700.0048	390130.0	5396321.0	617.49	980184.10	980321.20	0.36	-15.28

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8700.0049	389341.0	5395520.0	670.35	980174.32	980321.84	0.39	-15.27
8700.0050	389360.0	5395567.0	665.09	980175.40	980321.80	0.39	-15.19
8700.0051	389379.0	5395613.0	665.44	980175.37	980321.77	0.41	-15.09
8700.0052	389398.0	5395659.0	666.98	980174.96	980321.73	0.42	-15.16
8700.0053	389417.0	5395705.0	668.61	980174.55	980321.69	0.44	-15.18
8700.0054	389435.0	5395752.0	667.57	980174.75	980321.66	0.43	-15.16
8700.0055	389454.0	5395798.0	664.05	980175.37	980321.62	0.41	-15.22
8700.0056	389472.0	5395844.0	662.96	980175.57	980321.58	0.38	-15.23
8700.0057	389490.0	5395891.0	660.46	980176.03	980321.54	0.37	-15.24
8700.0058	389545.0	5396030.0	652.23	980177.58	980321.43	0.37	-15.19
8700.0059	389582.0	5396122.0	648.91	980177.98	980321.36	0.41	-15.32
8700.0060	389125.0	5395876.0	648.49	980178.24	980321.55	0.40	-15.36
8700.0061	389169.0	5395858.0	649.82	980178.08	980321.57	0.39	-15.28
8700.0062	389214.0	5395840.0	647.62	980178.70	980321.58	0.37	-15.12
8700.0063	389259.0	5395822.0	650.12	980178.24	980321.60	0.38	-15.10
8700.0064	389303.0	5395804.0	652.17	980177.81	980321.61	0.38	-15.14
8700.0065	389347.0	5395787.0	657.22	980176.75	980321.63	0.40	-15.20
8700.0066	389480.0	5395734.0	670.79	980174.12	980321.67	0.43	-15.18
8700.0067	389391.0	5395769.0	662.66	980175.72	980321.64	0.42	-15.15
8700.0068	389525.0	5395716.0	671.30	980174.08	980321.69	0.41	-15.15
8700.0069	389314.0	5395585.0	663.28	980175.78	980321.79	0.39	-15.15
8700.0070	389268.0	5395605.0	667.08	980175.06	980321.77	0.39	-15.11
8700.0071	389222.0	5395624.0	666.32	980175.15	980321.76	0.39	-15.15
8700.0072	389175.0	5395643.0	665.10	980175.39	980321.75	0.39	-15.15
8700.0073	389129.0	5395661.0	663.83	980175.59	980321.73	0.38	-15.18
8700.0074	389083.0	5395680.0	659.81	980176.27	980321.71	0.37	-15.29
8700.0075	389570.0	5395699.0	669.61	980174.45	980321.70	0.41	-15.13
8700.0076	389614.0	5395681.0	666.78	980175.07	980321.71	0.41	-15.08
8700.0077	389508.0	5395937.0	654.99	980177.12	980321.51	0.28	-15.27
8700.0078	389643.0	5395885.0	661.21	980175.88	980321.55	0.38	-15.24
8700.0079	389553.0	5395919.0	657.41	980176.66	980321.52	0.37	-15.18
8700.0080	389464.0	5395955.0	656.54	980176.73	980321.49	0.35	-15.27
8700.0081	389419.0	5395972.0	655.72	980176.71	980321.48	0.36	-15.42
8700.0082	389374.0	5395990.0	654.99	980176.82	980321.46	0.36	-15.44
8700.0083	389598.0	5395902.0	659.88	980176.11	980321.54	0.37	-15.26
8700.0084	389626.0	5396102.0	652.64	980177.45	980321.38	0.44	-15.23
8700.0085	389536.0	5396139.0	644.83	980178.84	980321.34	0.40	-15.26
8700.0086	389489.0	5396156.0	640.06	980179.72	980321.33	0.40	-15.31
8700.0087	389442.0	5396172.0	640.23	980179.51	980321.32	0.39	-15.48
8700.0088	389527.0	5395983.0	653.74	980177.37	980321.47	0.37	-15.14
8700.0089	389600.0	5396169.0	650.37	980177.68	980321.32	0.42	-15.29
8700.0090	389563.0	5396076.0	648.65	980178.17	980321.40	0.40	-15.24
8700.0091	389330.0	5396007.0	652.06	980177.44	980321.45	0.38	-15.37
8700.0092	389079.0	5394873.0	663.62	980176.92	980322.36	0.30	-14.60
8700.0093	389097.0	5394919.0	664.49	980176.68	980322.32	0.38	-14.56
8700.0094	389116.0	5394966.0	664.12	980176.62	980322.29	0.38	-14.65
8700.0095	389135.0	5395012.0	664.08	980176.65	980322.25	0.38	-14.59
8700.0096	389090.0	5395030.0	661.75	980176.88	980322.23	0.31	-14.87
8700.0097	389044.0	5395049.0	659.70	980177.27	980322.22	0.38	-14.81
8700.0098	388998.0	5395067.0	658.07	980177.66	980322.20	0.37	-14.73
8700.0099	388952.0	5395086.0	657.35	980177.69	980322.19	0.34	-14.85
8700.0100	388907.0	5395105.0	658.04	980177.49	980322.17	0.40	-14.84
8700.0101	389153.0	5395058.0	663.40	980176.67	980322.21	0.38	-14.67
8700.0102	389172.0	5395104.0	662.83	980176.64	980322.18	0.36	-14.79

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NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8700.0103	389191.0	5395150.0	663.51	980176.38	980322.14	0.35	-14.90
8700.0104	389210.0	5395197.0	663.56	980176.21	980322.10	0.36	-15.01
8700.0105	389165.0	5395216.0	661.96	980176.44	980322.08	0.36	-15.08
8700.0106	389229.0	5395243.0	661.23	980176.61	980322.06	0.37	-15.02
8700.0107	389120.0	5395234.0	657.40	980177.42	980322.07	0.36	-14.98
8700.0108	389248.0	5395289.0	658.55	980177.13	980322.03	0.39	-14.97
8700.0109	389074.0	5395252.0	654.97	980177.80	980322.05	0.39	-15.03
8700.0110	389267.0	5395335.0	658.97	980176.98	980321.99	0.38	-15.02
8700.0111	389030.0	5395270.0	651.04	980178.59	980322.04	0.38	-15.01
8700.0112	389285.0	5395382.0	665.72	980175.55	980321.95	0.37	-15.08
8700.0113	388986.0	5395288.0	653.97	980177.85	980322.02	0.38	-15.15
8700.0114	389333.0	5395363.0	669.26	980174.76	980321.97	0.37	-15.19
8700.0115	389379.0	5395344.0	672.54	980174.13	980321.98	0.38	-15.19
8700.0116	389239.0	5395400.0	661.20	980176.60	980321.94	0.36	-14.92
8700.0117	389194.0	5395419.0	659.80	980176.73	980321.92	0.35	-15.06
8700.0118	389148.0	5395437.0	661.91	980176.16	980321.91	0.34	-15.21
8700.0119	389102.0	5395455.0	663.03	980175.89	980321.89	0.35	-15.24
8700.0120	389008.0	5395493.0	658.80	980176.68	980321.86	0.36	-15.23
8700.0121	389056.0	5395474.0	661.97	980176.01	980321.88	0.37	-15.29
8700.0122	389226.0	5394974.0	669.59	980175.43	980322.28	0.38	-14.76
8700.0123	389181.0	5394993.0	666.85	980176.05	980322.26	0.38	-14.67
8700.0124	389243.0	5394752.0	658.88	980177.80	980322.46	0.40	-14.66
8700.0125	389197.0	5394772.0	659.25	980177.75	980322.44	0.40	-14.62
8700.0126	389152.0	5394790.0	659.59	980177.68	980322.43	0.41	-14.60
8700.0127	389105.0	5394810.0	660.29	980177.50	980322.41	0.40	-14.63
8700.0128	389060.0	5394827.0	661.03	980177.31	980322.40	0.39	-14.67
8700.0129	389014.0	5394846.0	662.46	980176.97	980322.38	0.39	-14.72
8700.0130	388968.0	5394866.0	665.60	980176.24	980322.36	0.40	-14.80
8700.0131	388923.0	5394885.0	667.43	980176.01	980322.35	0.41	-14.65
8700.0132	389289.0	5394733.0	658.16	980177.97	980322.48	0.42	-14.62
8700.0133	389380.0	5394697.0	661.31	980177.33	980322.51	0.41	-14.69
8700.0134	389610.0	5394602.0	673.96	980174.15	980322.59	0.41	-15.46
8700.0135	389426.0	5394678.0	665.23	980176.49	980322.52	0.41	-14.77
8700.0136	389564.0	5394621.0	673.35	980174.62	980322.57	0.40	-15.10
8700.0137	389472.0	5394659.0	667.81	980175.95	980322.54	0.39	-14.84
8700.0138	389518.0	5394640.0	671.13	980175.24	980322.55	0.41	-14.89
8700.0139	389347.0	5394487.0	647.38	980180.28	980322.67	0.46	-14.60
8700.0140	389392.0	5394466.0	653.48	980179.08	980322.69	0.45	-14.62
8700.0141	389438.0	5394446.0	655.28	980178.58	980322.71	0.44	-14.80
8700.0142	389229.0	5394331.0	[illegible].16	980184.09	980322.80	0.56	-14.59
8700.0143	389275.0	5394310.0	[illegible].90	980183.59	980322.82	0.50	-14.63
8700.0144	389364.0	5394275.0	[illegible].42	980179.97	980322.85	0.46	-14.67
8700.0145	389410.0	5394256.0	654.29	980179.32	980322.86	0.44	-14.41
8700.0146	389457.0	5394237.0	654.40	980178.79	980322.88	0.43	-14.93
8700.0147	389297.0	5394089.0	647.80	980180.41	980323.00	0.45	-14.72
8700.0148	389484.0	5394016.0	655.99	980178.86	980323.05	0.41	-14.75
8700.0149	389344.0	5394072.0	650.19	980180.29	980323.01	0.44	-14.39
8700.0150	389437.0	5394034.0	654.02	980179.42	980323.04	0.41	-14.57
8700.0151	389390.0	5394053.0	652.48	980179.78	980323.03	0.42	-14.48
8700.0152	389407.0	5395548.0	665.62	980175.35	980321.82	0.39	-15.15
8700.0153	389453.0	5395529.0	670.80	980174.32	980321.84	0.38	-15.19
8700.0154	389499.0	5395511.0	676.87	980173.13	980321.85	0.38	-15.20
8700.0155	389545.0	5395492.0	676.11	980173.38	980321.87	0.37	-15.12
8700.0156	389591.0	5395473.0	674.55	980173.76	980321.88	0.37	-15.07

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NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8700.0157	389637.0	5395454.0	672.19	980174.23	980321.90	0.38	-15.07
8700.0158	389953.0	5396407.0	610.28	980185.35	980321.13	0.44	-15.30
8700.0159	389906.0	5396424.0	609.97	980185.36	980321.12	0.47	-15.31
8700.0160	389859.0	5396441.0	608.43	980185.60	980321.11	0.48	-15.34
8700.0161	389765.0	5396051.0	636.81	980180.53	980321.42	0.42	-15.21
8700.0162	389811.0	5396033.0	629.68	980181.93	980321.43	0.43	-15.21
8700.0163	389789.0	5396255.0	622.91	980183.05	980321.25	0.46	-15.22
8700.0164	389857.0	5396016.0	620.80	980183.71	980321.45	0.43	-15.20
8700.0165	389835.0	5396237.0	620.32	980183.67	980321.27	0.45	-15.14
8700.0166	389882.0	5396220.0	619.12	980183.95	980321.28	0.43	-15.12
8700.0167	389928.0	5396202.0	622.17	980183.59	980321.30	0.44	-14.89
8700.0168	388132.0	5395436.0	639.14	980176.77	980321.89	0.49	-18.91
8700.0169	389042.0	5394785.0	656.99	980178.05	980322.43	0.45	-14.71
8700.0170	389023.0	5394738.0	654.52	980178.45	980322.47	0.49	-14.79
8700.0171	389003.0	5394692.0	655.24	980178.33	980322.51	0.55	-14.74
8700.0172	388984.0	5394648.0	659.91	980177.16	980322.54	0.56	-15.02
8700.0173	388965.0	5394603.0	667.28	980175.92	980322.58	0.57	-14.84
8700.0174	388947.0	5394556.0	668.42	980175.31	980322.61	0.59	-15.24
8700.0175	388927.0	5394510.0	667.24	980175.65	980322.65	0.61	-15.14
8700.0176	388908.0	5394464.0	671.23	980174.73	980322.69	0.60	-15.32
8700.0177	388889.0	5394415.0	671.53	980174.54	980322.73	0.66	-15.43
8700.0178	388871.0	5394368.0	667.04	980175.46	980322.77	0.74	-15.36
8700.0179	388852.0	5394321.0	661.55	980176.63	980322.80	0.79	-15.25
8700.0180	388834.0	5394272.0	653.06	980178.36	980322.84	0.81	-15.22
8700.0181	388878.0	5394254.0	640.88	980181.03	980322.86	0.73	-15.05
8700.0182	388926.0	5394235.0	626.48	980184.26	980322.87	0.70	-14.68
8700.0183	388972.0	5394217.0	619.65	980185.74	980322.89	0.64	-14.63
8700.0184	389018.0	5394198.0	625.78	980184.68	980322.90	0.60	-14.54
8700.0185	389064.0	5394180.0	631.28	980183.62	980322.92	0.54	-14.59
8700.0186	389111.0	5394163.0	634.67	980183.02	980322.93	0.50	-14.57
8700.0187	389158.0	5394144.0	635.81	980182.90	980322.95	0.49	-14.50
8700.0188	389203.0	5394126.0	639.82	980182.12	980322.96	0.46	-14.53
8700.0189	389250.0	5394108.0	644.87	980181.19	980322.98	0.47	-14.47
8700.0190	388953.0	5394444.0	672.34	980174.52	980322.70	0.62	-15.31
8700.0191	388999.0	5394426.0	668.80	980175.18	980322.72	0.64	-15.35
8700.0192	389045.0	5394407.0	660.77	980176.99	980322.74	0.64	-15.14
8700.0193	389091.0	5394388.0	650.86	980179.00	980322.75	0.62	-15.10
8700.0194	389137.0	5394369.0	637.21	980181.90	980322.77	0.59	-14.94
8700.0195	389183.0	5394351.0	629.99	980183.54	980322.78	0.58	-14.75
8700.0196	388529.0	5394850.0	653.96	980177.26	980322.37	0.64	-15.84
8700.0197	388574.0	5394830.0	648.01	980179.00	980322.39	0.61	-15.31
8700.0198	388619.0	5394810.0	643.46	980180.18	980322.41	0.60	-15.05
8700.0199	388664.0	5394790.0	642.78	980180.46	980322.42	0.58	-14.95
8700.0200	388710.0	5394770.0	643.53	980180.50	980322.44	0.57	-14.79
8700.0201	388755.0	5394750.0	646.59	980179.93	980322.46	0.55	-14.79
8700.0202	388802.0	5394729.0	649.31	980179.44	980322.47	0.47	-14.85
8700.0203	388848.0	5394708.0	651.50	980179.14	980322.49	0.54	-14.67
8700.0204	388893.0	5394688.0	655.35	980178.28	980322.51	0.53	-14.79
8700.0205	388940.0	5394668.0	659.58	980177.26	980322.52	0.56	-14.97
8700.0206	388876.0	5394905.0	663.25	980176.53	980322.33	0.43	-14.91
8700.0207	388831.0	5394924.0	660.89	980176.98	980322.32	0.42	-14.92
8700.0208	388784.0	5394945.0	659.84	980177.21	980322.30	0.43	-14.87
8700.0209	388740.0	5394964.0	657.56	980177.56	980322.28	0.45	-14.93
8700.0210	388692.0	5394984.0	653.08	980178.42	980322.27	0.49	-14.90

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8700.0211	388646.0	5395003.0	645.70	980179.79	980322.25	0.49	-14.97
8700.0212	388600.0	5395023.0	635.42	980182.02	980322.23	0.51	-14.71
8700.0213	388555.0	5395043.0	631.29	980182.80	980322.22	0.50	-14.74
8700.0214	388508.0	5395063.0	630.51	980182.84	980322.20	0.49	-14.85
8700.0215	388463.0	5395083.0	628.02	980183.27	980322.18	0.54	-14.84
8700.0216	388409.0	5395103.0	624.67	980183.75	980322.17	0.58	-14.97
8700.0217	388363.0	5395123.0	617.57	980185.07	980322.15	0.61	-14.99
8700.0218	388318.0	5395143.0	606.10	980187.30	980322.13	0.61	-15.00
8700.0219	388267.0	5395163.0	585.57	980191.01	980322.12	0.68	-15.24
8700.0220	388222.0	5395183.0	584.04	980191.17	980322.10	0.70	-15.35
8700.0221	388177.0	5395203.0	597.67	980188.22	980322.08	0.67	-15.63
8700.0222	388132.0	5395223.0	608.80	980185.74	980322.07	0.68	-15.90
8700.0223	388087.0	5395243.0	621.11	980183.07	980322.05	0.73	-16.08
8700.0224	388042.0	5395263.0	629.18	980181.22	980322.03	0.72	-16.33
8700.0225	387997.0	5395283.0	630.23	980181.06	980322.02	0.61	-16.38
8700.0226	387952.0	5395303.0	628.60	980181.27	980322.00	0.67	-16.41
8700.0227	388862.0	5395123.0	653.86	980178.25	980322.16	0.40	-14.89
8700.0228	388815.0	5395142.0	643.81	980180.24	980322.14	0.43	-14.84
8700.0229	388768.0	5395162.0	637.00	980181.63	980322.12	0.44	-14.76
8700.0230	388722.0	5395181.0	640.84	980180.76	980322.11	0.46	-14.83
8700.0231	388676.0	5395199.0	639.69	980180.95	980322.09	0.47	-14.84
8700.0232	388630.0	5395208.0	633.85	980182.08	980322.08	0.47	-14.85
8700.0233	388584.0	5395239.0	622.86	980184.25	980322.06	0.48	-14.81
8700.0234	388537.0	5395258.0	618.72	980185.14	980322.04	0.57	-14.63
8700.0235	388492.0	5395276.0	617.79	980185.21	980322.03	0.57	-14.73
8700.0236	388447.0	5395296.0	609.81	980186.60	980322.01	0.58	-14.88
8700.0237	388402.0	5395316.0	611.17	980186.08	980322.00	0.59	-15.11
8700.0238	388357.0	5395336.0	622.28	980183.46	980321.98	0.60	-15.51
8700.0239	388312.0	5395356.0	634.39	980180.80	980321.96	0.59	-15.79
8700.0240	388267.0	5395376.0	649.84	980176.94	980321.94	0.61	-16.57
8700.0241	389272.0	5394955.0	674.72	980174.22	980322.30	0.38	-14.98
8700.0242	389319.0	5394936.0	673.87	980174.30	980322.31	0.42	-15.04
8700.0243	389366.0	5394917.0	665.12	980176.31	980322.33	0.39	-14.80
8700.0244	389412.0	5394898.0	663.62	980176.64	980322.34	0.38	-14.79
8700.0245	389259.0	5395178.0	667.34	980175.39	980322.12	0.36	-15.10
8700.0246	389304.0	5395161.0	671.38	980174.51	980322.13	0.37	-15.19
8700.0247	389350.0	5395142.0	674.64	980173.72	980322.15	0.37	-15.36
8700.0248	389396.0	5395123.0	677.62	980173.11	980322.16	0.36	-15.41
8700.0249	389442.0	5395104.0	678.90	980172.91	980322.18	0.37	-15.36
8700.0250	389489.0	5395086.0	679.45	980172.89	980322.19	0.36	-15.30
8700.0251	389535.0	5395066.0	680.09	980172.74	980322.21	0.37	-15.33
8700.0252	389426.0	5395324.0	675.66	980173.58	980322.00	0.38	-15.13
8700.0253	389518.0	5395287.0	682.26	980172.13	980322.03	0.37	-15.33
8700.0254	389564.0	5395267.0	683.89	980171.68	980322.05	0.39	-15.46
8700.0255	389610.0	5395248.0	685.56	980171.56	980322.06	0.38	-15.28
8700.0256	389656.0	5395229.0	680.81	980172.63	980322.08	0.37	-15.17
8700.0257	389672.0	5396086.0	649.94	980177.77	980321.39	0.46	-15.31
8700.0258	389719.0	5396068.0	640.84	980179.65	980321.40	0.48	-15.22
8700.0259	389530.0	5396558.0	637.62	980178.62	980321.01	0.61	-16.36
8700.0260	389576.0	5396543.0	634.57	980179.34	980321.02	0.65	-16.21
8700.0261	389623.0	5396525.0	630.60	980180.28	980321.03	0.64	-16.08
8700.0262	389670.0	5396508.0	624.89	980181.74	980321.05	0.62	-15.77
8700.0263	389718.0	5396492.0	614.52	980184.01	980321.06	0.62	-15.56
8700.0264	389765.0	5396475.0	606.85	980185.69	980321.08	0.58	-15.44
8700.0265	389813.0	5396458.0	606.80	980185.74	980321.09	0.53	-15.47

LEAMAN GEOPHYSICS   GRAVITY REDUCTION

CSR QUE ROAD GRAVITY SURVEY FEB 1987 ADDENDUM

BASE VALUE	BASE NUMBER	METER	CAL DATE	SCALE	DENSITY	ELEV DATUM
980177.50	8551.9976	561	10187	1.0093	2.67	0.00

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8700.0266	389031.0	5394625.0	656.81	980177.92	980322.56	0.55	-14.89
8700.0267	389076.0	5394607.0	658.16	980177.71	980322.57	0.52	-14.88
8700.0268	389121.0	5394586.0	657.41	980177.84	980322.59	0.50	-14.94
8700.0269	389167.0	5394565.0	654.64	980178.50	980322.61	0.51	-14.83
8700.0270	389212.0	5394546.0	648.83	980179.83	980322.63	0.51	-14.66
8700.0271	389259.0	5394527.0	645.02	980180.75	980322.64	0.48	-14.54
8700.0272	389305.0	5394506.0	640.99	980181.59	980322.66	0.49	-14.50
8700.0273	388484.0	5394870.0	656.93	980176.29	980322.36	0.82	-16.03
8700.0274	388439.0	5394890.0	652.03	980177.15	980322.34	0.70	-16.24
8700.0275	388394.0	5394910.0	644.49	980178.74	980322.32	0.79	-16.02
8700.0276	388349.0	5394930.0	636.08	980180.31	980322.31	0.83	-16.05
8700.0277	388304.0	5394950.0	630.39	980181.54	980322.29	0.82	-15.93
8700.0278	388259.0	5394970.0	618.46	980184.14	980322.27	0.76	-15.72
8700.0279	388214.0	5394990.0	604.12	980187.27	980322.26	0.67	-15.48
8700.0280	388169.0	5395010.0	587.95	980190.22	980322.24	0.67	-15.70
8700.0281	388124.0	5395030.0	580.23	980191.93	980322.22	0.72	-15.44
8700.0282	388079.0	5395050.0	571.14	980193.71	980322.21	0.77	-15.38
8700.0283	388034.0	5395070.0	575.00	980192.44	980322.19	0.66	-15.99
8700.0284	387989.0	5395090.0	588.51	980189.75	980322.17	0.62	-16.04
8700.0285	387944.0	5395110.0	597.21	980187.46	980322.16	0.61	-16.61
8700.0286	387899.0	5395130.0	591.87	980188.47	980322.14	0.59	-16.66
8700.0287	389[illegible]34.0	5394716.0	654.40	980178.87	980322.50	0.41	-14.49
8700.0288	389456.0	5394880.0	664.79	980176.40	980322.36	0.39	-14.81
8700.0289	389504.0	5394862.0	666.60	980176.04	980322.37	0.41	-14.81
8700.0290	388941.0	5395308.0	661.54	980176.35	980322.01	0.42	-15.11
8700.0291	388896.0	5395327.0	660.82	980176.47	980321.99	0.43	-15.11
8700.0292	388851.0	5395347.0	655.57	980177.50	980321.97	0.42	-15.10
8700.0293	388962.0	5395513.0	655.66	980177.35	980321.84	0.37	-15.15
8700.0294	388914.0	5395533.0	652.09	980178.14	980321.83	0.38	-15.04
8700.0295	388868.0	5395552.0	647.97	980179.00	980321.81	0.37	-14.98
8700.0296	388823.0	5395572.0	644.93	980179.58	980321.79	0.34	-15.02
8700.0297	388777.0	5395591.0	645.42	980180.14	980321.78	0.33	-14.35
8700.0298	388732.0	5395610.0	643.63	980179.68	980321.76	0.34	-15.14
8700.0299	389472.0	5395306.0	678.69	980172.93	980322.02	0.37	-15.22
8700.0300	389038.0	5395699.0	655.70	980177.09	980321.69	0.39	-15.24
8700.0301	388992.0	5395718.0	658.93	980176.33	980321.68	0.40	-15.34
8700.0302	389080.0	5395895.0	643.57	980179.20	980321.54	0.41	-15.34
8700.0303	389398.0	5396191.0	640.77	980179.42	980321.30	0.43	-15.41
8700.0304	389744.0	5396275.0	625.48	980182.48	980321.24	0.48	-15.25
8700.0305	389698.0	5396295.0	628.34	980181.77	980321.22	0.51	-15.35
8700.0306	389653.0	5396314.0	626.51	980182.08	980321.20	0.49	-15.40
8700.0307	389608.0	5396334.0	630.29	980181.15	980321.19	0.49	-15.57
8700.0308	389563.0	5396353.0	627.45	980181.86	980321.17	0.48	-15.41
8700.0309	389517.0	5396372.0	621.45	980183.19	980321.16	0.49	-15.23
8700.0310	389472.0	5396391.0	617.37	980183.94	980321.14	0.49	-15.27
8700.0311	389303.0	5395428.0	669.97	980174.61	980321.92	0.36	-15.16
8700.0312	389322.0	5395474.0	671.95	980174.38	980321.88	0.28	-15.04
8700.0313	389618.0	5396215.0	650.27	980177.62	980321.28	0.48	-15.28
8700.0314	389636.0	5396261.0	638.35	980179.76	980321.25	0.49	-15.43
8700.0315	389671.0	5396360.0	617.47	980183.95	980321.17	0.52	-15.24
8700.0316	389689.0	5396404.0	605.27	980186.33	980321.13	0.54	-15.20
8700.0317	389707.0	5396450.0	607.89	980185.73	980321.10	0.56	-15.24

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LEAMAN GEOPHYSICS GRAVITY REDUCTION

CSR QUE ROAD GRAVITY SURVEY JAN 1988

BASE VALUE	BASE NUMBER	METER	CAL DATE	SCALE	DENSITY	ELEV DATUM
980177.50	8551.9976	556	10188	1.0139	2.67	0.00

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0400	389323.0	5395474.0	671.89	980174.84	980321.88	0.28	-14.59
8800.0401	389120.0	5395584.0	665.78	980175.43	980321.79	0.29	-15.11
8800.0402	389028.0	5395626.0	657.82	980176.94	980321.75	0.28	-15.14
8800.0403	388949.0	5395671.0	657.29	980176.89	980321.72	0.28	-15.25
8800.0404	388854.0	5395721.0	653.45	980177.65	980321.67	0.28	-15.21
8800.0405	388765.0	5395768.0	649.57	980178.19	980321.63	0.29	-15.38
8800.0406	388741.0	5395865.0	652.96	980177.36	980321.56	0.31	-15.45
8800.0407	388674.0	5395925.0	654.96	980176.21	980321.51	0.33	-16.13
8800.0408	388581.0	5395932.0	660.96	980174.34	980321.50	0.36	-16.79
8800.0409	388480.0	5395932.0	660.41	980174.32	980321.50	0.40	-16.88
8800.0410	388369.0	5395938.0	655.27	980175.35	980321.49	0.45	-16.80
8800.0411	388280.0	5395911.0	650.65	980176.36	980321.51	0.38	-16.79
8800.0412	388192.0	5395854.0	645.09	980177.49	980321.56	0.35	-16.83
8800.0413	388118.0	5395796.0	641.13	980178.05	980321.60	0.36	-17.09
8800.0414	388024.0	5395749.0	640.17	980178.16	980321.64	0.37	-17.19
8800.0415	387942.0	5395699.0	642.03	980177.59	980321.68	0.39	-17.41
8800.0416	387846.0	5395671.0	647.95	980176.09	980321.70	0.40	-17.76
8800.0417	387764.0	5395715.0	654.90	980174.31	980321.66	0.46	-18.08
8800.0418	387667.0	5395731.0	653.14	980174.48	980321.65	0.45	-18.25
8800.0419	387571.0	5395724.0	650.51	980174.81	980321.66	0.44	-18.45
8800.0420	387460.0	5395704.0	650.23	980174.96	980321.67	0.38	-18.43
8800.0421	387357.0	5395709.0	650.28	980174.81	980321.66	0.35	-18.59
8800.0422	387265.0	5395744.0	647.21	980175.44	980321.63	0.36	-18.53
8800.0423	387190.0	5395798.0	645.14	980176.08	980321.59	0.37	-18.24
8800.0424	387102.0	5395854.0	643.84	980176.54	980321.54	0.36	-18.00
8800.0425	387003.0	5395882.0	643.01	980176.25	980321.52	0.36	-18.43
8800.0426	386907.0	5395889.0	643.11	980176.06	980321.51	0.38	-18.57
8800.0427	386813.0	5395893.0	645.05	980175.61	980321.51	0.39	-18.62
8800.0428	386710.0	5395893.0	642.91	980175.93	980321.51	0.41	-18.71
8800.0429	386607.0	5395912.0	643.00	980175.80	980321.49	0.41	-18.81
8800.0430	386535.0	5395935.0	643.86	980175.58	980321.47	0.42	-18.82
8800.0431	386526.0	5396064.0	636.59	980177.01	980321.37	0.43	-18.71
8800.0432	386525.0	5396165.0	634.27	980177.64	980321.29	0.44	-18.44
8800.0433	386533.0	5396263.0	635.98	980177.43	980321.21	0.44	-18.24
8800.0434	386542.0	5396355.0	640.25	980176.86	980321.13	0.45	-17.88
8800.0435	386542.0	5396468.0	644.70	980176.28	980321.04	0.46	-17.49
8800.0436	386536.0	5396563.0	645.57	980175.99	980320.96	0.48	-17.51
8800.0437	386532.0	5396668.0	640.55	980176.99	980320.88	0.50	-17.39
8800.0438	386527.0	5396765.0	638.35	980177.43	980320.80	0.52	-17.29
8800.0439	386895.0	5393821.0	527.24	980203.12	980323.18	0.87	-15.49
8800.0440	386873.0	5393774.0	539.63	980200.84	980323.22	0.69	-15.54
8800.0441	386865.0	5393727.0	549.04	980199.05	980323.26	0.69	-15.52
8800.0442	386881.0	5393678.0	559.39	980197.04	980323.30	0.65	-15.58
8800.0443	386899.0	5393614.0	561.57	980196.71	980323.35	0.71	-15.46
8800.0444	386930.0	5393592.0	566.60	980195.57	980323.37	0.68	-15.67
8800.0445	386968.0	5393558.0	576.94	980193.41	980323.40	0.67	-15.83
8800.0446	386993.0	5393513.0	588.37	980191.21	980323.43	0.63	-15.86
8800.0447	387025.0	5393471.0	593.87	980190.26	980323.47	0.62	-15.77

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QUERED1

LEAMAN GEOPHYSICS GRAVITY REDUCTION

CSR QUE ROAD GRAVITY SURVEY JAN 1988

BASE VALUE	BASE NUMBER	METER	CAL DATE	SCALE	DENSITY	ELEV DATUM
980177.50	8551.9976	556	10188	1.0139	2.67	0.00

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0400	389323.0	5395474.0	671.89	980174.84	980321.88	0.28	-14.59
8800.0401	389120.0	5395584.0	665.78	980175.43	980321.79	0.29	-15.11
8800.0402	389028.0	5395626.0	657.82	980176.94	980321.75	0.28	-15.14
8800.0403	388949.0	5395671.0	657.29	980176.89	980321.72	0.28	-15.25
8800.0404	388854.0	5395721.0	653.45	980177.65	980321.67	0.28	-15.21
8800.0405	388765.0	5395768.0	649.57	980178.19	980321.63	0.29	-15.38
8800.0406	388741.0	5395865.0	652.96	980177.36	980321.56	0.31	-15.45
8800.0407	388674.0	5395925.0	654.96	980176.21	980321.51	0.33	-16.13
8800.0408	388581.0	5395932.0	660.96	980174.34	980321.50	0.36	-16.79
8800.0409	388480.0	5395932.0	660.41	980174.32	980321.50	0.40	-16.88
8800.0410	388369.0	5395938.0	655.27	980175.35	980321.49	0.45	-16.80
8800.0411	388280.0	5395911.0	650.65	980176.36	980321.51	0.38	-16.79
8800.0412	388192.0	5395854.0	645.09	980177.49	980321.56	0.35	-16.83
8800.0413	388118.0	5395796.0	641.13	980178.05	980321.60	0.36	-17.09
8800.0414	388024.0	5395749.0	640.17	980178.16	980321.64	0.37	-17.19
8800.0415	387942.0	5395699.0	642.03	980177.59	980321.68	0.39	-17.41
8800.0416	387846.0	5395671.0	647.95	980176.09	980321.70	0.40	-17.76
8800.0417	387764.0	5395715.0	654.90	980174.31	980321.66	0.46	-18.08
8800.0418	387667.0	5395731.0	653.14	980174.48	980321.65	0.45	-18.25
8800.0419	387571.0	5395724.0	650.51	980174.81	980321.66	0.44	-18.45
8800.0420	387460.0	5395704.0	650.23	980174.96	980321.67	0.38	-18.43
8800.0421	387357.0	5395709.0	650.28	980174.81	980321.66	0.35	-18.59
8800.0422	387265.0	5395744.0	647.21	980175.44	980321.63	0.36	-18.53
8800.0423	387190.0	5395798.0	645.14	980176.08	980321.59	0.37	-18.24
8800.0424	387102.0	5395854.0	643.84	980176.54	980321.54	0.36	-18.00
8800.0425	387003.0	5395882.0	643.01	980176.25	980321.52	0.36	-18.43
8800.0426	386907.0	5395889.0	643.11	980176.06	980321.51	0.38	-18.57
8800.0427	386813.0	5395893.0	645.05	980175.61	980321.51	0.39	-18.62
8800.0428	386710.0	5395893.0	642.91	980175.93	980321.51	0.41	-18.71
8800.0429	386607.0	5395912.0	643.00	980175.80	980321.49	0.41	-18.81
8800.0430	386535.0	5395935.0	643.86	980175.58	980321.47	0.42	-18.82
8800.0431	386526.0	5396064.0	636.59	980177.01	980321.37	0.43	-18.71
8800.0432	386525.0	5396165.0	634.27	980177.64	980321.29	0.44	-18.44
8800.0433	386533.0	5396263.0	635.98	980177.43	980321.21	0.44	-18.24
8800.0434	386542.0	5396355.0	640.25	980176.86	980321.13	0.45	-17.88
8800.0435	386542.0	5396468.0	644.70	980176.28	980321.04	0.46	-17.49
8800.0436	386536.0	5396563.0	645.57	980175.99	980320.96	0.48	-17.51
8800.0437	386532.0	5396668.0	640.55	980176.99	980320.88	0.50	-17.39
8800.0438	386527.0	5396765.0	638.35	980177.43	980320.80	0.52	-17.29
8800.0439	389575.0	5394003.0	659.16	980177.84	980323.07	0.30	-15.27
8800.0440	388801.0	5392931.0	660.22	980178.73	980323.92	0.44	-14.89
8800.0441	386895.0	5393821.0	527.24	980203.12	980323.18	0.87	-15.48
8800.0442	386873.0	5393774.0	539.63	980200.84	980323.22	0.69	-15.54
8800.0443	386865.0	5393727.0	549.04	980199.05	980323.26	0.69	-15.52
8800.0444	386881.0	5393678.0	559.39	980197.04	980323.30	0.65	-15.58
8800.0445	386899.0	5393614.0	561.57	980196.71	980323.35	0.71	-15.46
8800.0446	386930.0	5393592.0	566.60	980195.57	980323.37	0.68	-15.67
8800.0447	386968.0	5393558.0	576.94	980193.41	980323.40	0.67	-15.83

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0448	386993.0	5393513.0	588.37	980191.21	980323.43	0.63	-15.86
8800.0450	387025.0	5393471.0	593.87	980190.26	980323.47	0.62	-15.77
8800.0451	387063.0	5393445.0	596.39	980190.00	980323.49	0.59	-15.59
8800.0452	387096.0	5393405.0	596.68	980189.93	980323.52	0.57	-15.65
8800.0453	387129.0	5393367.0	599.87	980189.35	980323.55	0.55	-15.65
8800.0454	387149.0	5393320.0	602.52	980188.82	980323.59	0.53	-15.72
8800.0455	387149.0	5393274.0	604.11	980188.47	980323.63	0.50	-15.83
8800.0456	387142.0	5393225.0	607.68	980187.56	980323.67	0.48	-16.10
8800.0457	387124.0	5393176.0	613.55	980186.38	980323.70	0.52	-16.12
8800.0458	387106.0	5393131.0	618.02	980185.42	980323.74	0.50	-16.26
8800.0459	387086.0	5393087.0	623.16	980184.50	980323.78	0.48	-16.22
8800.0460	387099.0	5393033.0	631.49	980182.91	980323.82	0.46	-16.23
8800.0461	387132.0	5392993.0	639.59	980181.34	980323.85	0.48	-16.22
8800.0462	387156.0	5392957.0	645.59	980180.16	980323.88	0.50	-16.24
8800.0463	387148.0	5392905.0	651.25	980179.15	980323.92	0.56	-16.11
8800.0464	387150.0	5392857.0	652.96	980178.97	980323.96	0.44	-16.11
8800.0465	387172.0	5392809.0	652.05	980179.14	980324.00	0.39	-16.21
8800.0466	387182.0	5392758.0	651.11	980179.57	980324.04	0.39	-16.01
8800.0467	387208.0	5392723.0	649.79	980179.76	980324.07	0.38	-16.12
8800.0468	387247.0	5392689.0	644.80	980181.12	980324.10	0.36	-15.79
8800.0469	387285.0	5392661.0	642.74	980181.58	980324.12	0.35	-15.77
8800.0470	386893.0	5393885.0	542.85	980200.00	980323.13	0.87	-15.48
8800.0471	386911.0	5393931.0	560.05	980196.60	980323.09	0.85	-15.48
8800.0472	386931.0	5393977.0	560.24	980196.37	980323.06	0.83	-15.66
8800.0473	386950.0	5394022.0	552.24	980198.01	980323.02	0.82	-15.56
8800.0474	386966.0	5394069.0	558.59	980196.73	980322.98	0.85	-15.52
8800.0475	386984.0	5394114.0	543.93	980199.55	980322.95	0.71	-15.69
8800.0476	387001.0	5394160.0	564.84	980195.33	980322.91	0.63	-15.84
8800.0477	387019.0	5394206.0	580.35	980192.30	980322.87	0.63	-15.78
8800.0478	387038.0	5394253.0	587.64	980190.80	980322.84	0.68	-15.76
8800.0479	387055.0	5394299.0	587.42	980191.11	980322.80	0.67	-15.48
8800.0480	387073.0	5394346.0	585.19	980191.39	980322.76	0.66	-15.60
8800.0481	387000.0	5394434.0	587.19	980190.94	980322.69	0.61	-15.63
8800.0482	386954.0	5394455.0	592.97	980189.83	980322.67	0.63	-15.57
8800.0483	386908.0	5394476.0	596.19	980189.18	980322.65	0.68	-15.52
8800.0484	386864.0	5394497.0	596.87	980189.08	980322.64	0.69	-15.46
8800.0485	386818.0	5394518.0	596.51	980189.13	980322.62	0.66	-15.50
8800.0486	386772.0	5394539.0	594.33	980189.61	980322.60	0.62	-15.47
8800.0487	386726.0	5394560.0	606.48	980186.99	980322.58	0.60	-15.70
8800.0488	386680.0	5394581.0	617.54	980184.67	980322.57	0.59	-15.84
8800.0489	386634.0	5394602.0	627.41	980182.70	980322.55	0.53	-15.91
8800.0491	386588.0	5394623.0	629.42	980182.48	980322.53	0.51	-15.74
8800.0492	386542.0	5394644.0	630.59	980182.21	980322.51	0.48	-15.78
8800.0493	386496.0	5394665.0	635.85	980180.91	980322.50	0.51	-16.01
8800.0495	386450.0	5394686.0	641.22	980179.55	980322.48	0.54	-16.26
8800.0496	386404.0	5394707.0	646.68	980178.14	980322.46	0.62	-16.62
8800.0497	386358.0	5394728.0	642.45	980178.97	980322.44	0.65	-16.45
8800.0498	386318.0	5394520.0	610.99	980185.82	980322.61	0.86	-15.74
8800.0499	386374.0	5394500.0	614.53	980185.09	980322.63	0.83	-15.83
8800.0500	386420.0	5394479.0	616.77	980184.65	980322.64	0.79	-15.89
8800.0501	386466.0	5394458.0	615.84	980184.92	980322.66	0.81	-15.80
8800.0502	386510.0	5394437.0	617.31	980184.74	980322.68	0.82	-15.70
8800.0503	386556.0	5394416.0	619.38	980184.32	980322.70	0.83	-15.71
8800.0504	386602.0	5394395.0	621.24	980183.95	980322.71	0.84	-15.73

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0505	386694.0	5394353.0	596.93	980189.13	980322.75	0.83	-15.37
8800.0506	386742.0	5394332.0	582.57	980192.01	980322.77	0.91	-15.26
8800.0507	386788.0	5394311.0	576.30	980193.35	980322.78	0.96	-15.12
8800.0508	386834.0	5394290.0	561.91	980196.12	980322.80	1.02	-15.13
8800.0509	386880.0	5394269.0	568.27	980194.98	980322.82	1.10	-14.96
8800.0510	386926.0	5394248.0	570.25	980194.44	980322.84	1.00	-15.23
8800.0511	386972.0	5394227.0	554.71	980197.29	980322.86	0.96	-15.49
8800.0512	387090.0	5394390.0	576.68	980192.80	980322.72	0.61	-15.88
8800.0513	387136.0	5394369.0	571.85	980193.85	980322.74	0.57	-15.84
8800.0514	387181.0	5394348.0	568.65	980194.55	980322.76	0.63	-15.72
8800.0515	387227.0	5394327.0	562.83	980195.69	980322.78	0.68	-15.70
8800.0516	387262.0	5394306.0	552.73	980197.82	980322.79	0.68	-15.57
8800.0517	387307.0	5394285.0	550.36	980198.14	980322.81	0.69	-15.72
8800.0518	387353.0	5394264.0	554.54	980197.14	980322.83	0.63	-15.98
8800.0519	387398.0	5394243.0	556.15	980197.01	980322.85	0.58	-15.87
8800.0520	387444.0	5394222.0	543.34	980199.58	980322.87	0.56	-15.85
8800.0521	387489.0	5394201.0	544.16	980199.42	980322.88	0.52	-15.91
8800.0522	387534.0	5394180.0	554.65	980197.32	980322.90	0.54	-15.94
8800.0523	387579.0	5394159.0	565.71	980195.28	980322.92	0.55	-15.81
8800.0524	387624.0	5394138.0	563.84	980195.87	980322.94	0.58	-15.58
8800.0525	387669.0	5394117.0	568.45	980194.86	980322.95	0.59	-15.69
8800.0526	387711.0	5394096.0	575.47	980193.48	980322.97	0.60	-15.70
8800.0527	387757.0	5394075.0	585.38	980191.74	980322.99	0.63	-15.47
8800.0529	387802.0	5394054.0	596.94	980189.50	980323.01	0.64	-15.44
8800.0530	387848.0	5394033.0	609.37	980187.12	980323.02	0.68	-15.36
8800.0531	387894.0	5394012.0	621.87	980184.56	980323.04	0.67	-15.49
8800.0532	387940.0	5393991.0	627.72	980183.37	980323.06	0.63	-15.58
8800.0533	387990.0	5393970.0	634.72	980181.98	980323.07	0.60	-15.64
8800.0534	388037.0	5393949.0	645.00	980179.88	980323.09	0.58	-15.76
8800.0535	388083.0	5393928.0	648.16	980179.17	980323.11	0.57	-15.87
8800.0536	388130.0	5393907.0	647.69	980179.64	980323.13	0.56	-15.53
8800.0537	387940.0	5393991.0	630.89	980182.79	980323.06	0.63	-15.54
8800.0538	387930.0	5393950.0	639.64	980180.88	980323.09	0.78	-15.62
8800.0539	387913.0	5393903.0	643.34	980180.20	980323.13	0.86	-15.53
8800.0540	387896.0	5393855.0	641.45	980180.82	980323.17	0.80	-15.38
8800.0541	387879.0	5393807.0	633.10	980182.59	980323.21	0.75	-15.33
8800.0542	387933.0	5393786.0	639.16	980181.44	980323.22	0.74	-15.32
8800.0543	387978.0	5393765.0	645.83	980180.11	980323.24	0.73	-15.37
8800.0544	387090.0	5393714.0	649.86	980178.73	980323.27	0.70	-16.02
8800.0545	388069.0	5393723.0	659.39	980177.55	980323.28	0.71	-15.31
8800.0546	387834.0	5393828.0	627.09	980183.68	980323.19	0.74	-15.41
8800.0547	387789.0	5393849.0	617.32	980185.56	980323.17	0.76	-15.42
8800.0548	387743.0	5393870.0	611.97	980186.55	980323.15	0.77	-15.45
8800.0549	387698.0	5393891.0	597.17	980189.50	980323.14	0.79	-15.38
8800.0550	387653.0	5393912.0	588.93	980191.16	980323.12	0.78	-15.34
8800.0551	387607.0	5393933.0	581.09	980192.47	980323.10	0.79	-15.54
8800.0552	387562.0	5393954.0	595.49	980189.39	980323.08	0.80	-15.76
8800.0553	387527.0	5393975.0	602.88	980187.90	980323.06	0.79	-15.79
8800.0554	387471.0	5393996.0	599.60	980188.53	980323.05	0.78	-15.80
8800.0555	387426.0	5394017.0	601.75	980187.97	980323.03	0.79	-15.90
8800.0556	387381.0	5394038.0	590.17	980190.21	980323.01	0.81	-15.90
8800.0557	387336.0	5394059.0	576.44	980192.41	980322.99	0.87	-15.93
8800.0558	387290.0	5394080.0	562.68	980195.40	980322.98	0.88	-16.01
8800.0559	387245.0	5394101.0	540.53	980199.66	980322.96	0.90	-16.07

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NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0560	387200.0	5394122.0	529.41	980201.73	980322.94	0.95	-16.13
8800.0561	387155.0	5394143.0	529.97	980201.81	980322.93	0.96	-15.91
8800.0562	387109.0	5394164.0	536.98	980200.49	980322.91	0.96	-15.83
8800.0563	387064.0	5394185.0	543.85	980199.31	980322.89	0.98	-15.63
8800.0564	387091.0	5394392.0	575.90	980193.44	980322.72	0.65	-15.36
8800.0565	387109.0	5394438.0	580.78	980192.30	980322.69	0.67	-15.47
8800.0566	387127.0	5394485.0	579.00	980192.35	980322.65	0.69	-15.72
8800.0567	387144.0	5394531.0	583.26	980190.93	980322.61	0.73	-16.22
8800.0568	387098.0	5394548.0	597.97	980187.80	980322.60	0.65	-16.53
8800.0569	387050.0	5394565.0	611.47	980184.82	980322.58	0.62	-16.87
8800.0570	387003.0	5394582.0	621.70	980182.65	980322.57	0.60	-17.03
8800.0571	386956.0	5394599.0	625.17	980182.20	980322.55	0.59	-16.79
8800.0572	386910.0	5394616.0	626.95	980182.02	980322.54	0.56	-16.64
8800.0573	386864.0	5394632.0	626.38	980182.46	980322.53	0.55	-16.31
8800.0574	386818.0	5394649.0	622.04	980183.64	980322.51	0.54	-15.97
8800.0575	386772.0	5394666.0	618.18	980184.68	980322.50	0.51	-15.71
8800.0576	386726.0	5394683.0	632.07	980181.62	980322.48	0.51	-16.03
8800.0577	386680.0	5394700.0	638.55	980180.20	980322.47	0.49	-16.18
8800.0578	386634.0	5394717.0	643.56	980178.85	980322.46	0.50	-16.52
8800.0579	386586.0	5394735.0	646.07	980178.17	980322.44	0.52	-16.67
8800.0580	389668.0	5398101.0	698.69	980164.68	980319.76	0.25	-17.40
8800.0581	389694.0	5398061.0	697.72	980165.10	980319.80	0.25	-17.20
8800.0582	389726.0	5398011.0	692.37	980165.83	980319.84	0.26	-17.56
8800.0583	389756.0	5397959.0	686.89	980167.07	980319.88	0.28	-17.42
8800.0584	389784.0	5397915.0	684.76	980167.52	980319.91	0.29	-17.41
8800.0585	389816.0	5397868.0	683.27	980167.88	980319.95	0.28	-17.40
8800.0586	389843.0	5397825.0	681.07	980168.30	980319.99	0.27	-17.45
8800.0587	389873.0	5397776.0	677.56	980168.90	980320.03	0.27	-17.58
8800.0588	389902.0	5397731.0	673.92	980169.53	980320.07	0.26	-17.71
8800.0589	389935.0	5397680.0	672.19	980169.79	980320.11	0.27	-17.82
8800.0590	389963.0	5397635.0	673.41	980169.62	980320.14	0.27	-17.79
8800.0591	389993.0	5397586.0	676.26	980169.21	980320.18	0.28	-17.69
8800.0592	390007.0	5397549.0	676.28	980168.90	980320.21	0.28	-18.01
8800.0593	390034.0	5397508.0	678.74	980169.05	980320.25	0.27	-17.41
8800.0594	390061.0	5397444.0	679.63	980169.12	980320.30	0.29	-17.21
8800.0595	390079.0	5397396.0	680.02	980169.10	980320.34	0.30	-17.18
8800.0596	390103.0	5397339.0	680.76	980169.34	980320.38	0.29	-16.85
8800.0597	390122.0	5397284.0	680.91	980169.34	980320.43	0.29	-16.86
8800.0598	390150.0	5397221.0	681.26	980169.34	980320.48	0.27	-16.87
8800.0599	390179.0	5397145.0	678.70	980169.97	980320.54	0.27	-16.80
8800.0600	390191.0	5397100.0	676.62	980170.39	980320.58	0.28	-16.81
8800.0601	390216.0	5397051.0	674.13	980170.86	980320.62	0.29	-16.87
8800.0602	390237.0	5396997.0	669.62	980171.71	980320.65	0.31	-16.93
8800.0604	390251.0	5396957.0	665.90	980172.45	980320.69	0.32	-16.94
8800.0605	390270.0	5396904.0	660.86	980173.46	980320.74	0.35	-16.93
8800.0606	390284.0	5396842.0	655.14	980174.68	980320.79	0.38	-16.86
8800.0607	390292.0	5396770.0	651.92	980175.39	980320.84	0.40	-16.82
8800.0608	390289.0	5396723.0	649.33	980176.00	980320.88	0.40	-16.76
8800.0609	390282.0	5396671.0	646.11	980176.81	980320.93	0.40	-16.62
8800.0610	390257.0	5396592.0	640.58	980178.04	980320.99	0.36	-16.59
8800.0611	390229.0	5396540.0	634.99	980179.24	980321.03	0.37	-16.51
8800.0612	390204.0	5396484.0	628.72	980180.84	980321.07	0.36	-16.21
8800.0613	390178.0	5396432.0	622.81	980182.40	980321.12	0.35	-15.86
8800.0614	390158.0	5396385.0	618.68	980183.61	980321.15	0.35	-15.50

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NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0615	387331.0	5395760.0	647.91	980175.32	980321.62	0.36	-18.50
8800.0616	387302.0	5395809.0	646.42	980175.74	980321.58	0.27	-18.43
8800.0617	387294.0	5395854.0	644.99	980176.21	980321.55	0.39	-18.08
8800.0618	387272.0	5395903.0	644.53	980176.50	980321.51	0.40	-17.83
8800.0619	387248.0	5395955.0	645.69	980176.43	980321.46	0.42	-17.61
8800.0620	387229.0	5396017.0	648.12	980175.95	980321.41	0.43	-17.55
8800.0621	387228.0	5396061.0	651.19	980175.17	980321.38	0.44	-17.68
8800.0622	387703.0	5395736.0	655.24	980174.03	980321.65	0.42	-18.31
8800.0623	387681.0	5395694.0	663.95	980171.95	980321.68	0.58	-18.55
8800.0624	387660.0	5395650.0	671.03	980170.37	980321.72	0.62	-18.73
8800.0625	387639.0	5395605.0	677.06	980168.93	980321.75	0.66	-18.98
8800.0626	387617.0	5395560.0	679.18	980168.54	980321.79	0.63	-19.03
8800.0627	387595.0	5395516.0	681.82	980168.04	980321.82	0.62	-19.05
8800.0628	387574.0	5395472.0	683.30	980167.72	980321.86	0.63	-19.11
8800.0629	387552.0	5395427.0	680.97	980168.25	980321.89	0.63	-19.06
8800.0630	387532.0	5395382.0	674.70	980169.59	980321.93	0.60	-19.02
8800.0631	387512.0	5395338.0	669.15	980170.80	980321.97	0.60	-18.95
8800.0632	387489.0	5395293.0	662.93	980172.03	980322.00	0.57	-19.01
8800.0633	387444.0	5395312.0	659.31	980172.93	980321.99	0.56	-18.81
8800.0634	387489.0	5395293.0	650.47	980175.17	980322.00	0.57	-18.32
8800.0635	387579.0	5395245.0	642.46	980177.26	980322.04	0.58	-17.83
8800.0636	387629.0	5395226.0	635.80	980178.86	980322.06	0.59	-17.55
8800.0637	387679.0	5395207.0	628.04	980180.64	980322.07	0.62	-17.27
8800.0638	387729.0	5395188.0	620.08	980182.42	980322.09	0.61	-17.09
8800.0639	387779.0	5395169.0	614.88	980183.63	980322.11	0.61	-16.91
8800.0640	387829.0	5395150.0	598.83	980187.15	980322.12	0.60	-16.58
8800.0641	387899.0	5395130.0	591.87	980188.64	980322.14	0.59	-16.49
8800.0642	387944.0	5395306.0	628.60	980181.37	980322.00	0.57	-16.41
8800.0643	387899.0	5395326.0	628.05	980181.36	980321.98	0.60	-16.48
8800.0644	387854.0	5395347.0	630.76	980180.63	980321.96	0.66	-16.60
8800.0645	387809.0	5395368.0	639.26	980178.50	980321.94	0.70	-17.00
8800.0646	387754.0	5395389.0	645.48	980176.73	980321.93	0.70	-17.53
8800.0647	387709.0	5395410.0	654.10	980174.48	980321.91	0.68	-18.09
8800.0648	387664.0	5395430.0	670.33	980170.73	980321.89	0.65	-18.66
8800.0649	387619.0	5395451.0	682.03	980168.00	980321.88	0.60	-19.12
8800.0650	387574.0	5395472.0	684.14	980167.66	980321.86	0.58	-19.05
8800.0651	387240.0	5396115.0	647.89	980175.99	980321.33	0.46	-17.45
8800.0652	387271.0	5396156.0	645.83	980176.33	980321.30	0.47	-17.46
8800.0653	387275.0	5396218.0	646.26	980176.13	980321.25	0.48	-17.52
8800.0654	387266.0	5396288.0	644.33	980176.46	980321.20	0.48	-17.52
8800.0655	387263.0	5396343.0	643.57	980176.50	980321.15	0.49	-17.58
8800.0656	387240.0	5396391.0	638.78	980177.58	980321.11	0.50	-17.38
8800.0657	387192.0	5396429.0	635.58	980178.19	980321.08	0.50	-17.37
8800.0658	387148.0	5396462.0	630.94	980179.10	980321.05	0.51	-17.34
8800.0659	386780.0	5395804.0	649.19	980175.01	980321.58	0.39	-18.49
8800.0660	386790.0	5395722.0	645.66	980175.77	980321.65	0.39	-18.49
8800.0661	386776.0	5395662.0	643.57	980176.25	980321.69	0.38	-18.47
8800.0662	386765.0	5395593.0	643.20	980176.31	980321.75	0.38	-18.54
8800.0663	386750.0	5395531.0	643.10	980176.47	980321.80	0.37	-18.47
8800.0664	386716.0	5395507.0	643.30	980176.47	980321.82	0.37	-18.45
8800.0665	387171.0	5394592.0	570.03	980193.57	980322.56	0.68	-16.19
8800.0666	387221.0	5394569.0	565.15	980194.65	980322.58	0.72	-16.04
8800.0667	387267.0	5394546.0	559.13	980195.98	980322.60	0.70	-15.94
8800.0668	387313.0	5394523.0	553.10	980197.32	980322.62	0.68	-15.82

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0669	387358.0	5394500.0	551.04	980197.90	980322.64	0.63	-15.72
8800.0670	387403.0	5394477.0	548.11	980198.47	980322.66	0.61	-15.77
8800.0671	387450.0	5394453.0	546.79	980198.85	980322.68	0.65	-15.62
8800.0672	387495.0	5394430.0	545.47	980199.26	980322.70	0.62	-15.53
8800.0673	387542.0	5394407.0	543.61	980199.63	980322.72	0.68	-15.48
8800.0674	387589.0	5394384.0	544.94	980199.46	980322.74	0.71	-15.38
8800.0675	387634.0	5394361.0	546.95	980198.90	980322.76	0.73	-15.54
8800.0676	387678.0	5394338.0	551.82	980197.91	980322.77	0.75	-15.57
8800.0677	387723.0	5394315.0	557.44	980196.80	980322.79	0.76	-15.58
8800.0678	387767.0	5394292.0	563.85	980195.73	980322.81	0.78	-15.39
8800.0679	387812.0	5394269.0	571.13	980194.43	980322.83	0.74	-15.32
8800.0680	387857.0	5394246.0	582.20	980192.32	980322.85	0.70	-15.31
8800.0681	387900.0	5394223.0	594.44	980189.85	980322.87	0.64	-15.45
8800.0682	387940.0	5394200.0	602.54	980188.35	980322.89	0.60	-15.42
8800.0683	387942.0	5394195.0	599.59	980189.09	980322.89	0.43	-15.44
8800.0684	387961.0	5394241.0	593.19	980190.50	980322.86	0.44	-15.24
8800.0685	387980.0	5394287.0	589.79	980191.53	980322.82	0.46	-14.82
8800.0686	387999.0	5394333.0	587.84	980191.73	980322.78	0.47	-14.95
8800.0687	388107.0	5394349.0	582.23	980192.59	980322.77	0.49	-15.17
8800.0688	388061.0	5394368.0	584.74	980192.04	980322.76	0.48	-15.22
8800.0689	387978.0	5394406.0	571.43	980194.81	980322.72	0.50	-15.02
8800.0690	387932.0	5394425.0	568.99	980195.11	980322.71	0.50	-15.18
8800.0691	387885.0	5394444.0	560.01	980196.73	980322.69	0.49	-15.31
8800.0692	387838.0	5394463.0	552.03	980198.32	980322.68	0.48	-15.29
8800.0693	387792.0	5394482.0	550.12	980198.45	980322.66	0.52	-15.48
8800.0694	387745.0	5394501.0	548.74	980198.65	980322.64	0.55	-15.51
8800.0695	387699.0	5394520.0	548.23	980198.62	980322.63	0.57	-15.60
8800.0696	387652.0	5394539.0	547.41	980198.67	980322.61	0.59	-15.68
8800.0697	387606.0	5394558.0	550.13	980197.91	980322.60	0.60	-15.88
8800.0698	387559.0	5394577.0	550.47	980197.86	980322.58	0.63	-15.81
8800.0699	387493.0	5394596.0	552.00	980197.66	980322.56	0.65	-15.68

QUERED2

LEAMAN GEOPHYSICS GRAVITY REDUCTION

CSR QUE ROAD GRAVITY SURVEY JAN 1988 (2)

BASE VALUE	BASE NUMBER	METER	CAL DATE	SCALE	DENSITY	ELEV DATUM
980177.50	8551.9976	556	10188	1.0139	2.67	0.00

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0700	387447.0	5394615.0	555.47	980197.04	980322.55	0.64	-15.61
8800.0701	387401.0	5394634.0	557.72	980196.17	980322.53	0.62	-16.04
8800.0702	387354.0	5394653.0	570.53	980193.13	980322.52	0.61	-16.55
8800.0703	387308.0	5394672.0	570.11	980193.07	980322.50	0.60	-16.69
8800.0704	387261.0	5394691.0	577.32	980191.35	980322.48	0.58	-17.00
8800.0705	387215.0	5394710.0	593.62	980187.90	980322.47	0.57	-17.23
8800.0706	387216.0	5394715.0	597.18	980187.14	980322.46	0.60	-17.26
8800.0707	387660.0	5395650.0	677.22	980168.84	980321.72	0.51	-19.15
8800.0708	387705.0	5395628.0	683.69	980167.32	980321.73	0.51	-19.42
8800.0709	387795.0	5395584.0	658.83	980173.21	980321.77	0.50	-18.47
8800.0710	387840.0	5395562.0	648.72	980175.77	980321.79	0.49	-17.93
8800.0711	387885.0	5395540.0	642.99	980177.22	980321.81	0.48	-17.63
8800.0712	387930.0	5395518.0	641.43	980177.80	980321.83	0.49	-17.36
8800.0713	387975.0	5395496.0	640.56	980178.17	980321.84	0.50	-17.18
8800.0714	388020.0	5395474.0	641.65	980178.23	980321.86	0.50	-16.92
8800.0715	388065.0	5395452.0	645.96	980177.52	980321.88	0.53	-16.77
8800.0716	388110.0	5395430.0	650.25	980176.83	980321.90	0.56	-16.60
8800.0717	388155.0	5395408.0	655.89	980175.69	980321.92	0.58	-16.64
8800.0718	388200.0	5395386.0	657.94	980175.33	980321.94	0.60	-16.59
8800.0719	388245.0	5395364.0	649.84	980177.03	980321.95	0.61	-16.49
8800.0720	387390.0	5395076.0	634.87	980178.28	980322.18	0.62	-18.40
8800.0721	387394.0	5395073.0	633.34	980178.70	980322.18	0.62	-18.28
8800.0722	387440.0	5395055.0	630.23	980179.54	980322.19	0.66	-18.03
8800.0723	387486.0	5395037.0	625.98	980180.61	980322.21	0.70	-17.77
8800.0724	387532.0	5395019.0	618.01	980182.54	980322.22	0.73	-17.39
8800.0727	387578.0	5395001.0	612.49	980183.89	980322.24	0.76	-17.11
8800.0728	387670.0	5394965.0	597.15	980186.83	980322.27	0.85	-17.13
8800.0729	387716.0	5394946.0	590.86	980188.44	980322.28	0.88	-16.74
8800.0730	387762.0	5394927.0	581.94	980190.40	980322.30	0.91	-16.53
8800.0731	387908.0	5395692.0	642.85	980177.52	980321.69	0.47	-17.25
8800.0732	387861.0	5395709.0	643.70	980177.12	980321.67	0.44	-17.49
8800.0733	387814.0	5395726.0	644.43	980176.84	980321.66	0.45	-17.61
8800.0734	387767.0	5395743.0	645.66	980176.38	980321.64	0.45	-17.81
8800.0735	387720.0	5395760.0	645.20	980176.47	980321.63	0.46	-17.79
8800.0736	387731.0	5395799.0	645.35	980176.33	980321.60	0.54	-17.78
8800.0737	387744.0	5395877.0	635.11	980178.99	980321.53	0.59	-17.03
8800.0738	387758.0	5395877.0	635.11	980178.84	980321.53	0.62	-17.15
8800.0739	387769.0	5395920.0	631.40	980179.63	980321.50	0.63	-17.04
8800.0740	387780.0	5395930.0	631.33	980179.64	980321.49	0.56	-17.11
8800.0741	387827.0	5395914.0	629.44	980180.18	980321.50	0.56	-16.96
8800.0742	387874.0	5395898.0	633.88	980179.32	980321.52	0.58	-16.93
8800.0743	387920.0	5395882.0	634.06	980179.38	980321.53	0.57	-16.87
8800.0744	387967.0	5395866.0	635.18	980179.14	980321.55	0.54	-16.92
8800.0745	388014.0	5395850.0	637.98	980178.62	980321.56	0.53	-16.92
8800.0746	388061.0	5395834.0	639.61	980178.27	980321.57	0.50	-16.99
8800.0747	388107.0	5395818.0	642.33	980177.80	980321.59	0.48	-16.95
8800.0748	388154.0	5395802.0	645.63	980177.36	980321.60	0.46	-16.79
8800.0749	388200.0	5395786.0	648.32	980176.89	980321.61	0.45	-16.75

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0750	388247.0	5395770.0	649.73	980176.71	980321.63	0.44	-16.68
8800.0751	388294.0	5395754.0	651.69	980176.49	980321.64	0.44	-16.53
8800.0752	388341.0	5395738.0	655.15	980175.85	980321.65	0.45	-16.49
8800.0753	388387.0	5395722.0	651.36	980176.74	980321.67	0.44	-16.36
8800.0754	388434.0	5395706.0	645.62	980178.36	980321.68	0.45	-15.87
8800.0755	388481.0	5395690.0	641.38	980179.55	980321.69	0.45	-15.54
8800.0756	388528.0	5395674.0	637.69	980180.28	980321.71	0.44	-15.56
8800.0758	388472.0	5395488.0	631.73	980182.14	980321.86	0.48	-14.97
8800.0759	388425.0	5395505.0	637.54	980180.80	980321.84	0.48	-15.16
8800.0760	388378.0	5395572.0	646.15	980178.62	980321.79	0.48	-15.59
8800.0761	388331.0	5395539.0	657.33	980175.62	980321.81	0.45	-16.44
8800.0762	388284.0	5395556.0	661.96	980174.68	980321.80	0.46	-16.45
8800.0763	388237.0	5395573.0	660.81	980174.86	980321.78	0.47	-16.47
8800.0764	388190.0	5395590.0	654.83	980176.02	980321.77	0.45	-16.50
8800.0765	388143.0	5395607.0	648.12	980177.17	980321.76	0.46	-16.65
8800.0766	388096.0	5395624.0	644.17	980177.72	980321.74	0.46	-16.85
8800.0767	388049.0	5395641.0	642.11	980178.00	980321.73	0.43	-17.00
8800.0768	388002.0	5395658.0	641.86	980177.83	980321.71	0.47	-17.15
8800.0769	387955.0	5395675.0	642.41	980177.54	980321.70	0.46	-17.34
8800.0770	388485.0	5395914.0	660.08	980174.14	980321.51	0.51	-17.02
8800.0771	387804.0	5394908.0	569.92	980193.13	980322.32	0.89	-16.19
8800.0772	387846.0	5394890.0	559.50	980195.71	980322.33	0.93	-15.64
8800.0773	387890.0	5394872.0	562.04	980195.48	980322.35	0.91	-15.41
8800.0774	387932.0	5394853.0	571.24	980193.79	980322.36	0.90	-15.31
8800.0775	387974.0	5394834.0	576.72	980192.79	980322.38	0.91	-15.24
8800.0776	388135.0	5394805.0	602.93	980187.20	980322.40	0.89	-15.71
8800.0777	388177.0	5394770.0	635.03	980180.08	980322.43	0.92	-16.53
8800.0779	388220.0	5394787.0	623.04	980182.99	980322.42	0.91	-15.97
8800.0780	388100.0	5394567.0	561.78	980196.01	980322.60	0.65	-15.43
8800.0781	388054.0	5394583.0	554.78	980197.41	980322.58	0.63	-15.41
8800.0782	388008.0	5394600.0	553.65	980197.61	980322.57	0.62	-15.44
8800.0783	387960.0	5394619.0	552.67	980197.64	980322.55	0.61	-15.60
8800.0784	387908.0	5394637.0	551.62	980197.71	980322.54	0.60	-15.73
8800.0785	387866.0	5394654.0	550.65	980197.77	980322.52	0.58	-15.86
8800.0786	387818.0	5394673.0	550.26	980197.67	980322.51	0.55	-16.05
8800.0787	387770.0	5394692.0	551.19	980197.48	980322.49	0.53	-16.06
8800.0788	387722.0	5394711.0	551.97	980197.14	980322.47	0.51	-16.25
8800.0789	387674.0	5394730.0	554.84	980196.28	980322.46	0.52	-16.52
8800.0790	387626.0	5394749.0	563.83	980194.31	980322.44	0.54	-16.69
8800.0791	387580.0	5394767.0	570.68	980192.84	980322.43	0.55	-16.78
8800.0792	387533.0	5394785.0	581.22	980190.49	980322.41	0.55	-17.05
8800.0793	387487.0	5394803.0	591.61	980188.06	980322.40	0.52	-17.44
8800.0794	387440.0	5394822.0	604.30	980185.25	980322.38	0.51	-17.76
8800.0795	387393.0	5394841.0	610.70	980184.08	980322.36	0.50	-17.66
8800.0797	387346.0	5394860.0	612.15	980183.67	980322.35	0.49	-17.77
8800.0798	387297.0	5394878.0	610.43	980184.05	980322.33	0.46	-17.75
8800.0799	387280.0	5394840.0	608.50	980184.24	980322.36	0.50	-17.93
8800.0800	388527.0	5395897.0	659.42	980174.36	980321.53	0.50	-16.96
8800.0801	388574.0	5395879.0	656.53	980175.29	980321.54	0.47	-16.64
8800.0802	388620.0	5395861.0	651.19	980176.82	980321.56	0.46	-16.19
8800.0803	388665.0	5395843.0	649.35	980177.50	980321.57	0.43	-15.92
8800.0804	388710.0	5395824.0	650.71	980177.53	980321.59	0.43	-15.63
8800.0805	388755.0	5395806.0	652.84	980177.09	980321.60	0.41	-15.69
8800.0806	388802.0	5395797.0	647.10	980178.47	980321.61	0.39	-15.46

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0807	388847.0	5395778.0	650.09	980177.93	980321.63	0.39	-15.44
8800.0808	388892.0	5395760.0	652.12	980177.61	980321.64	0.38	-15.38
8800.0809	388937.0	5395740.0	654.89	980177.07	980321.66	0.39	-15.38
8800.0810	388985.0	5395718.0	655.06	980177.12	980321.68	0.39	-15.31
8800.0811	389123.0	5395882.0	643.57	980179.21	980321.55	0.42	-15.32
8800.0812	389077.0	5395900.0	636.28	980180.65	980321.53	0.45	-15.27
8800.0813	389031.0	5395918.0	633.19	980181.17	980321.52	0.44	-15.36
8800.0814	388985.0	5395936.0	642.76	980179.27	980321.50	0.43	-15.37
8800.0815	388938.0	5395954.0	643.29	980179.24	980321.49	0.43	-15.28
8800.0816	388892.0	5395972.0	642.68	980179.29	980321.47	0.48	-15.28
8800.0817	388845.0	5395990.0	651.14	980179.45	980321.46	0.46	-15.47
8800.0818	388799.0	5396006.0	645.26	980178.73	980321.44	0.46	-15.33
8800.0819	388752.0	5396024.0	648.79	980177.61	980321.43	0.48	-15.72
8800.0820	388760.0	5396076.0	650.52	980177.23	980321.39	0.48	-15.72
8800.0821	388769.0	5396220.0	632.50	980180.88	980321.27	0.55	-15.43
8800.0822	388816.0	5396203.0	624.30	980182.71	980321.28	0.54	-15.23
8800.0823	388863.0	5396186.0	631.07	980181.27	980321.30	0.52	-15.38
8800.0824	388910.0	5396169.0	633.00	980180.91	980321.31	0.48	-15.41
8800.0825	388957.0	5396152.0	624.37	980182.94	980321.33	0.44	-15.13
8800.0829	389004.0	5396135.0	629.88	980181.83	980321.34	0.45	-15.17
8800.0830	389051.0	5396118.0	634.17	980181.06	980321.36	0.44	-15.12
8800.0831	389098.0	5396101.0	634.66	980181.04	980321.37	0.40	-15.09
8800.0832	389145.0	5396084.0	635.21	980181.11	980321.38	0.39	-14.94
8800.0833	389192.0	5396067.0	639.03	980180.27	980321.40	0.39	-15.04
8800.0834	389239.0	5396050.0	645.17	980178.92	980321.41	0.37	-15.22
8800.0835	389286.0	5396033.0	649.74	980177.98	980321.43	0.36	-15.29
8800.0836	389333.0	5396016.0	652.06	980177.48	980321.44	0.38	-15.32
8800.0837	388706.0	5396042.0	663.25	980173.68	980321.41	0.49	-16.78
8800.0838	388659.0	5396060.0	665.74	980172.94	980321.40	0.51	-17.00
8800.0839	388613.0	5396078.0	662.37	980173.39	980321.38	0.55	-17.15
8800.0840	388520.0	5396114.0	645.81	980176.64	980321.35	0.61	-17.07
8800.0841	388473.0	5396132.0	640.68	980177.48	980321.34	0.68	-17.16
8800.0842	388426.0	5396150.0	625.54	980181.93	980321.32	0.72	-16.63
8800.0843	388380.0	5396168.0	616.31	980183.03	980321.31	0.73	-16.32
8800.0844	388333.0	5396186.0	611.11	980184.25	980321.29	0.75	-16.08
8800.0845	388287.0	5396204.0	609.88	980184.24	980321.28	0.77	-16.30
8800.0846	388194.0	5396240.0	591.77	980187.68	980321.25	0.78	-16.39
8800.0847	388150.0	5394556.0	567.27	980195.12	980322.60	0.60	-15.30
8800.0848	388102.0	5396276.0	590.18	980187.89	980321.22	0.81	-16.43
8800.0849	388055.0	5396294.0	588.94	980188.17	980321.20	0.82	-16.37
8800.0852	388009.0	5396312.0	576.00	980190.67	980321.19	0.90	-16.32
8800.0853	387962.0	5396328.0	567.75	980192.31	980321.17	0.94	-16.24
8800.0854	387916.0	5396346.0	568.89	980192.03	980321.16	0.66	-16.57
8800.0855	387890.0	5396163.0	611.45	980183.77	980321.31	0.69	-16.58
8800.0856	387935.0	5396144.0	612.03	980184.03	980321.32	0.62	-16.28
8800.0857	387981.0	5396125.0	614.46	980183.67	980321.34	0.54	-16.26
8800.0858	388026.0	5396106.0	613.98	980183.82	980321.35	0.51	-16.26
8800.0859	388072.0	5396087.0	618.41	980182.92	980321.37	0.50	-16.30
8800.0860	388117.0	5396068.0	626.20	980181.14	980321.38	0.50	-16.57
8800.0861	388162.0	5396049.0	631.56	980179.92	980321.40	0.51	-16.74
8800.0862	388908.0	5394464.0	671.23	980174.73	980322.69	0.70	-15.23
8800.0863	388252.0	5396011.0	642.79	980177.61	980321.43	0.49	-16.89
8800.0864	388297.0	5395992.0	649.37	980176.23	980321.45	0.48	-17.00
8800.0865	388345.0	5395976.0	654.30	980175.14	980321.46	0.48	-17.14

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0866	388391.0	5395957.0	658.86	980174.26	980321.48	0.49	-17.13
8800.0867	388427.0	5395938.0	660.16	980174.09	980321.49	0.48	-17.07
8800.0868	389298.0	5394521.0	642.40	980181.35	980322.65	0.45	-14.48
8800.0869	389313.0	5394570.0	651.61	980179.56	980322.61	0.43	-14.45
8800.0870	389296.0	5394629.0	651.02	980179.61	980322.56	0.43	-14.47
8800.0871	389229.0	5394682.0	654.24	980178.92	980322.52	0.41	-14.50
8800.0872	389171.0	5394729.0	655.58	980178.65	980322.48	0.39	-14.49
8800.0873	389089.0	5394767.0	656.77	980178.30	980322.45	0.40	-14.56
8800.0874	389015.0	5394846.0	662.22	980177.08	980322.38	0.39	-14.65
8800.0875	388943.0	5394853.0	667.00	980175.99	980322.37	0.40	-14.79
8800.0876	389092.0	5394567.0	662.82	980176.76	980322.61	0.58	-14.89
8800.0877	389037.0	5394575.0	661.62	980177.06	980322.60	0.55	-14.85
8800.0878	388985.0	5394630.0	662.15	980176.82	980322.55	0.55	-14.94
8800.0879	388963.0	5394698.0	657.62	980178.03	980322.50	0.42	-14.70
8800.0880	388949.0	5394777.0	662.21	980177.14	980322.44	0.47	-14.57
8800.0881	388888.0	5394925.0	662.53	980176.83	980322.32	0.32	-14.85
8800.0882	388810.0	5394967.0	660.02	980177.24	980322.28	0.42	-14.80
8800.0883	388752.0	5395015.0	658.61	980177.44	980322.24	0.42	-14.83
8800.0884	388676.0	5395089.0	647.52	980179.43	980322.18	0.48	-14.91
8800.0885	388629.0	5395169.0	638.85	980181.14	980322.12	0.48	-14.83
8800.0886	388574.0	5395232.0	622.49	980184.52	980322.06	0.47	-14.63
8800.0887	388499.0	5395284.0	615.88	980185.72	980322.02	0.54	-14.61
8800.0888	388729.0	5395648.0	647.65	980178.83	980321.73	0.42	-15.09
8800.0889	388650.0	5395545.0	637.10	980181.07	980321.81	0.45	-14.98
8800.0890	388521.0	5395471.0	626.13	980183.45	980321.87	0.46	-14.80
8800.0891	388568.0	5395454.0	630.15	980182.72	980321.88	0.45	-14.76
8800.0894	388615.0	5395437.0	636.99	980181.17	980321.90	0.47	-14.96
8800.0895	388662.0	5395420.0	642.27	980180.20	980321.91	0.45	-14.93
8800.0896	388709.0	5395403.0	647.09	980179.25	980321.93	0.44	-14.95
8800.0897	388756.0	5395386.0	649.78	980178.78	980321.94	0.43	-14.92
8800.0898	388803.0	5395368.0	652.80	980178.01	980321.96	0.43	-15.11
8800.0899	388851.0	5395347.0	655.57	980177.62	980321.97	0.42	-14.98
8800.0900	388579.0	5395360.0	628.68	980183.15	980321.96	0.48	-14.67
8800.0901	388620.0	5395642.0	646.25	980178.90	980321.73	0.42	-15.30
8800.0902	388689.0	5395623.0	644.85	980179.30	980321.75	0.45	-15.15
8800.0903	388735.0	5395604.0	643.59	980179.76	980321.77	0.36	-15.05
8800.0904	388848.0	5394487.0	666.38	980175.66	980322.67	0.58	-15.35
8800.0905	388803.0	5394505.0	657.65	980177.55	980322.65	0.59	-15.15
8800.0906	388756.0	5394525.0	650.27	980179.67	980322.64	0.61	-14.45
8800.0907	388709.0	5394545.0	639.15	980182.06	980322.62	0.65	-14.19
8800.0908	388672.0	5394565.0	630.54	980183.74	980322.60	0.67	-14.17
8800.0909	388627.0	5394582.0	625.40	980184.71	980322.59	0.69	-14.17
8800.0911	388582.0	5394600.0	620.97	980185.45	980322.57	0.73	-14.25
8800.0912	388537.0	5394617.0	638.45	980181.14	980322.56	0.77	-15.07
8800.0913	388492.0	5394639.0	652.74	980177.42	980322.54	0.77	-15.96
8800.0914	388446.0	5394661.0	660.42	980175.19	980322.52	0.79	-16.64
8800.0915	388302.0	5394683.0	658.98	980175.69	980322.50	0.78	-16.42
8800.0916	388356.0	5394705.0	652.04	980177.17	980322.49	0.76	-16.30
8800.0918	388311.0	5394727.0	646.74	980178.26	980322.47	0.84	-16.15
8800.0919	388266.0	5394750.0	642.83	980178.73	980322.45	0.84	-16.44
8800.0920	388196.0	5394537.0	575.32	980193.53	980322.62	0.57	-15.36
8800.0921	388243.0	5394518.0	580.57	980192.51	980322.64	0.53	-15.40
8800.0922	388290.0	5394499.0	579.06	980192.88	980322.65	0.48	-15.39
8800.0923	388373.0	5394461.0	568.67	980195.33	980322.68	0.50	-14.99

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NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0924	388419.0	5394442.0	574.44	980194.25	980322.70	0.53	-14.93
8800.0925	388466.0	5394423.0	575.87	980194.13	980322.72	0.55	-14.76
8800.0926	388508.0	5394404.0	585.05	980192.28	980322.73	0.59	-14.78
8800.0927	388555.0	5394385.0	595.74	980190.13	980322.75	0.63	-14.80
8800.0928	388602.0	5394367.0	610.18	980187.17	980322.76	0.72	-14.85
8800.0929	388696.0	5394329.0	644.91	980179.99	980322.79	0.63	-15.32
8800.0930	388742.0	5394310.0	652.11	980178.54	980322.81	0.72	-15.28
8800.0931	388788.0	5394291.0	654.48	980178.09	980322.83	0.77	-15.23
8800.0932	388834.0	5394272.0	653.06	980178.42	980322.84	0.81	-15.15
8800.0933	389097.0	5394919.0	664.49	980176.56	980322.32	0.38	-14.68
8800.0934	389052.0	5394938.0	662.81	980176.88	980322.31	0.38	-14.67
8800.0935	389009.0	5394960.0	660.48	980177.32	980322.29	0.39	-14.67
8800.0936	388966.0	5394979.0	657.97	980177.82	980322.27	0.40	-14.63
8800.0937	388922.0	5394998.0	657.29	980178.00	980322.26	0.40	-14.57
8800.0938	388876.0	5395017.0	656.64	980177.85	980322.24	0.41	-14.82
8800.0939	388831.0	5395036.0	658.96	980177.44	980322.23	0.43	-14.74
8800.0940	388787.0	5395055.0	658.60	980177.37	980322.21	0.45	-14.85
8800.0941	388771.0	5394125.0	600.79	980189.29	980322.96	0.72	-14.77
8800.0942	388792.0	5394175.0	621.92	980185.23	980322.92	0.66	-14.70
8800.0943	388752.0	5394080.0	610.00	980187.61	980323.00	0.60	-14.80
8800.0944	388730.0	5394100.0	588.34	980191.56	980322.98	0.63	-15.06
8800.0945	388637.0	5394140.0	592.14	980191.05	980322.95	0.61	-14.82
8800.0946	388591.0	5394159.0	580.10	980193.38	980322.93	0.63	-14.82
8800.0947	388545.0	5394178.0	581.50	980192.80	980322.91	0.61	-15.12
8800.0948	388478.0	5394197.0	588.75	980191.36	980322.90	0.57	-15.16
8800.0949	388432.0	5394216.0	577.54	980193.56	980322.88	0.54	-15.18
8800.0950	388386.0	5394235.0	577.25	980193.56	980322.87	0.54	-15.22
8800.0951	388339.0	5394254.0	578.25	980193.35	980322.85	0.50	-15.26
8800.0952	388293.0	5394273.0	579.32	980193.05	980322.83	0.47	-15.36
8800.0953	388238.0	5397057.0	636.90	980178.68	980320.59	0.90	-15.73
8800.0954	388200.0	5394311.0	577.45	980193.44	980322.80	0.44	-15.34
8800.0955	388153.0	5394330.0	574.89	980194.00	980322.79	0.45	-15.26
8800.0956	388023.0	5394349.0	568.67	980194.98	980322.77	0.49	-15.44
8800.0957	388038.0	5394157.0	602.25	980188.92	980322.93	0.50	-15.05
8800.0958	388085.0	5394136.0	602.50	980188.99	980322.94	0.48	-14.96
8800.0959	388131.0	5394119.0	606.96	980188.25	980322.96	0.49	-14.83
8800.0960	388177.0	5394100.0	616.17	980186.34	980322.97	0.49	-14.94
8800.0961	388223.0	5394082.0	626.41	980184.10	980322.99	0.48	-15.19
8800.0962	388270.0	5394064.0	627.09	980184.14	980323.00	0.47	-15.04
8800.0963	388316.0	5394046.0	629.88	980183.57	980323.02	0.47	-15.08
8800.0964	388363.0	5394027.0	622.37	980185.20	980323.03	0.46	-14.96
8800.0965	388409.0	5394008.0	610.51	980187.58	980323.05	0.44	-14.94
8800.0966	389755.0	5397101.0	667.26	980171.52	980320.57	0.45	-17.35
8800.0967	388502.0	5393971.0	614.31	980186.76	980323.08	0.42	-15.07
8800.0968	388549.0	5393953.0	626.71	980184.02	980323.10	0.43	-15.37
8800.0969	388595.0	5393934.0	633.89	980182.54	980323.11	0.41	-15.48
8800.0970	388640.0	5393916.0	638.23	980181.64	980323.13	0.41	-15.54
8800.0971	388685.0	5393898.0	636.72	980182.17	980323.14	0.42	-15.31
8800.0972	388704.0	5394944.0	585.44	980191.97	980322.30	0.45	-14.72
8800.0973	388798.0	5394061.0	623.93	980185.07	980323.01	0.63	-14.58
8800.0974	388844.0	5394042.0	628.38	980184.39	980323.03	0.53	-14.50
8800.0975	388890.0	5394023.0	630.96	980183.89	980323.04	0.47	-14.58
8800.0976	388936.0	5394004.0	636.49	980182.67	980323.06	0.41	-14.78
8800.0977	388982.0	5393985.0	643.83	980181.39	980323.08	0.43	-14.61

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.0978	389028.0	5393966.0	650.40	980180.09	980323.09	0.41	-14.66
8800.0979	389074.0	5393947.0	655.22	980179.04	980323.11	0.40	-14.78
8800.0980	389120.0	5393928.0	654.72	980179.03	980323.12	0.43	-14.88
8800.0981	390004.0	5397237.0	679.23	980169.38	980320.46	0.37	-17.11
8800.0982	389959.0	5397256.0	678.82	980169.26	980320.45	0.38	-17.29
8800.0983	389914.0	5397275.0	677.23	980169.35	980320.43	0.40	-17.47
8800.0984	389869.0	5397294.0	673.91	980169.93	980320.42	0.40	-17.53
8800.0985	389823.0	5397314.0	670.56	980170.68	980320.40	0.42	-17.40
8800.0986	389778.0	5397333.0	665.11	980171.49	980320.38	0.43	-17.64
8800.0987	389733.0	5397352.0	657.62	980172.82	980320.37	0.40	-17.80
8800.0988	389688.0	5397371.0	657.58	980172.76	980320.35	0.40	-17.85
8800.0990	389643.0	5397390.0	661.59	980171.96	980320.34	0.42	-17.82
8800.0991	389598.0	5397409.0	668.82	980170.43	980320.32	0.40	-17.93
8800.0992	389552.0	5397429.0	675.81	980168.93	980320.30	0.39	-18.05
8800.0993	389507.0	5397448.0	678.71	980168.29	980320.29	0.37	-18.12
8800.0994	389462.0	5397467.0	680.07	980168.05	980320.27	0.38	-18.07
8800.0995	389417.0	5397486.0	682.27	980167.34	980320.26	0.35	-18.36
8800.0997	389372.0	5397505.0	686.98	980166.24	980320.24	0.36	-18.52
8800.0998	389327.0	5397525.0	691.78	980165.87	980320.22	0.35	-17.93
8800.0999	389280.0	5397545.0	693.17	980166.48	980320.21	0.34	-17.04

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687191

LEAMAN GEOPHYSICS   GRAVITY REDUCTION

CSR QUE ROAD GRAVITY SURVEY JAN 1988 (3)   QUERED3

BASE VALUE	BASE NUMBER	METER	CAL DATE	SCALE	DENSITY	ELEV DATUM
980177.50	8551.9976	556	10188	1.0139	2.67	0.00

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.1000	389229.0	5397384.0	680.88	980168.31	980320.34	0.41	-17.68
8800.1001	389204.0	5397334.0	679.46	980168.63	980320.38	0.42	-17.68
8800.1002	389158.0	5397353.0	677.78	980169.12	980320.36	0.42	-17.51
8800.1003	389112.0	5397372.0	677.65	980168.99	980320.34	0.42	-17.64
8800.1004	389066.0	5397391.0	678.29	980168.72	980320.33	0.41	-17.78
8800.1005	389020.0	5397410.0	680.23	980168.46	980320.31	0.42	-17.64
8800.1006	388975.0	5397430.0	683.64	980167.68	980320.30	0.43	-17.72
8800.1007	388929.0	5397449.0	684.06	980167.50	980320.28	0.45	-17.77
8800.1008	388883.0	5397468.0	682.86	980167.73	980320.27	0.46	-17.76
8800.1009	388837.0	5397487.0	679.48	980168.32	980320.25	0.47	-17.80
8800.1010	388792.0	5397506.0	677.77	980168.86	980320.23	0.50	-17.55
8800.1011	388746.0	5397526.0	674.71	980169.28	980320.22	0.53	-17.69
8800.1012	389220.0	5397327.0	680.13	980168.52	980320.38	0.42	-17.66
8800.1014	389250.0	5397315.0	679.91	980168.53	980320.39	0.40	-17.73
8800.1015	389296.0	5397295.0	679.82	980168.74	980320.41	0.42	-17.53
8800.1016	389342.0	5397276.0	678.88	980168.97	980320.43	0.45	-17.47
8800.1017	389388.0	5397257.0	672.97	980170.17	980320.44	0.45	-17.45
8800.1018	389434.0	5397238.0	665.21	980171.80	980320.46	0.46	-17.35
8800.1019	389480.0	5397219.0	659.14	980172.99	980320.47	0.48	-17.35
8800.1020	389526.0	5397200.0	656.99	980173.47	980320.49	0.49	-17.29
8800.1021	389572.0	5397180.0	654.04	980174.06	980320.51	0.51	-17.28
8800.1022	389617.0	5397161.0	652.61	980174.22	980320.52	0.50	-17.44
8800.1023	389663.0	5397142.0	655.79	980173.59	980320.54	0.49	-17.47
8800.1024	389709.0	5397123.0	660.39	980172.78	980320.55	0.47	-17.41
8800.1025	389801.0	5397083.0	672.43	980170.54	980320.59	0.45	-17.32
8800.1026	389847.0	5397064.0	676.47	980169.61	980320.60	0.45	-17.48
8800.1027	389893.0	5397045.0	678.43	980169.41	980320.62	0.44	-17.32
8800.1028	389939.0	5397026.0	679.23	980169.41	980320.63	0.43	-17.19
8800.1029	389985.0	5397007.0	679.93	980169.34	980320.65	0.43	-17.14
8800.1030	390031.0	5397988.0	680.64	980168.27	980319.86	0.42	-17.28
8800.1031	390077.0	5396970.0	680.19	980169.30	980320.68	0.42	-17.17
8800.1032	389865.0	5396880.0	677.73	980169.66	980320.75	0.43	-17.35
8800.1033	389911.0	5396861.0	676.86	980169.70	980320.77	0.47	-17.46
8800.1034	389947.0	5396842.0	671.18	980170.79	980320.78	0.47	-17.50
8800.1035	389993.0	5396823.0	665.65	980172.10	980320.80	0.47	-17.30
8800.1036	390039.0	5396804.0	663.33	980172.68	980320.81	0.46	-17.19
8800.1037	390085.0	5396785.0	664.78	980172.40	980320.83	0.48	-17.19
8800.1038	390131.0	5396766.0	664.82	980172.42	980320.85	0.49	-17.17
8800.1039	389814.0	5396895.0	677.62	980169.56	980320.74	0.48	-17.41
8800.1040	389767.0	5396914.0	677.55	980169.44	980320.72	0.49	-17.52
8800.1041	389722.0	5396933.0	678.37	980169.20	980320.71	0.52	-17.55
8800.1042	389673.0	5396950.0	678.24	980169.27	980320.69	0.53	-17.49
8800.1043	389626.0	5396971.0	672.41	980170.32	980320.67	0.50	-17.59
8800.1044	389579.0	5396990.0	663.84	980171.97	980320.66	0.49	-17.62
8800.1045	389534.0	5397007.0	655.96	980173.68	980320.64	0.48	-17.46
8800.1046	389485.0	5397028.0	650.58	980174.72	980320.63	0.46	-17.48
8800.1047	389433.0	5397049.0	648.66	980175.37	980320.61	0.47	-17.18
8800.1048	389390.0	5397066.0	651.14	980174.95	980320.60	0.47	-17.10

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.1049	389343.0	5397088.0	656.54	980173.70	980320.58	0.45	-17.29
8800.1050	389296.0	5397107.0	663.37	980172.25	980320.56	0.46	-17.37
8800.1051	389252.0	5397128.0	666.88	980171.63	980320.54	0.45	-17.29
8800.1052	389204.0	5397145.0	665.69	980172.03	980320.53	0.43	-17.13
8800.1053	389157.0	5397164.0	663.05	980172.57	980320.51	0.42	-17.10
8800.1054	389116.0	5397181.0	659.61	980173.43	980320.50	0.44	-16.88
8800.1055	389073.0	5397197.0	657.15	980173.99	980320.49	0.43	-16.80
8800.1056	389027.0	5397216.0	660.38	980173.13	980320.47	0.44	-17.00
8800.1057	388981.0	5397234.0	668.59	980171.41	980320.45	0.42	-17.12
8800.1058	388935.0	5397254.0	673.91	980170.27	980320.44	0.42	-17.19
8800.1059	388889.0	5397275.0	676.27	980169.69	980320.42	0.40	-17.30
8800.1060	388843.0	5397293.0	676.44	980169.46	980320.41	0.42	-17.47
8800.1061	388797.0	5397311.0	673.91	980169.89	980320.39	0.43	-17.52
8800.1062	388752.0	5397329.0	671.44	980170.15	980320.37	0.44	-17.71
8800.1063	388704.0	5397348.0	668.73	980170.59	980320.36	0.45	-17.78
8800.1064	388658.0	5397366.0	666.39	980171.28	980320.34	0.47	-17.51
8800.1065	388612.0	5397385.0	664.43	980171.64	980320.33	0.49	-17.51
8800.1066	388563.0	5397404.0	661.28	980172.47	980320.31	0.51	-17.26
8800.1067	388519.0	5397423.0	659.10	980173.01	980320.30	0.48	-17.16
8800.1068	388472.0	5397441.0	658.64	980173.03	980320.28	0.48	-17.22
8800.1069	388426.0	5397460.0	658.54	980173.05	980320.27	0.46	-17.22
8800.1070	388379.0	5397479.0	657.49	980173.21	980320.25	0.48	-17.23
8800.1071	388366.0	5397399.0	663.77	980172.12	980320.31	0.49	-17.14
8800.1072	388327.0	5397306.0	656.91	980173.64	980320.39	0.50	-17.04
8800.1073	388325.0	5397300.0	656.17	980173.81	980320.39	0.51	-17.00
8800.1074	389009.0	5396988.0	645.65	980176.58	980320.65	0.42	-16.66
8800.1075	389055.0	5396970.0	643.36	980177.49	980320.67	0.44	-16.19
8800.1076	389101.0	5396952.0	644.36	980177.20	980320.68	0.44	-16.30
8800.1077	389148.0	5396934.0	645.31	980176.87	980320.70	0.45	-16.44
8800.1078	389194.0	5396916.0	646.00	980176.70	980320.71	0.46	-16.49
8800.1079	389240.0	5396898.0	647.23	980176.37	980320.73	0.48	-16.56
8800.1080	389286.0	5396880.0	648.63	980176.31	980320.74	0.48	-16.36
8800.1081	389332.0	5396862.0	645.49	980176.67	980320.76	0.49	-16.63
8800.1082	389378.0	5396844.0	646.45	980176.41	980320.77	0.44	-16.77
8800.1083	389424.0	5396826.0	649.89	980175.82	980320.79	0.44	-16.70
8800.1084	389470.0	5396808.0	655.41	980174.53	980320.80	0.48	-16.88
8800.1085	389517.0	5396790.0	661.93	980173.03	980320.82	0.53	-17.06
8800.1086	389564.0	5396772.0	669.11	980171.41	980320.83	0.55	-17.26
8800.1087	389610.0	5396754.0	670.78	980171.21	980320.85	0.60	-17.09
8800.1088	389656.0	5396736.0	666.32	980172.12	980320.86	0.58	-17.10
8800.1089	389702.0	5396718.0	666.87	980172.34	980320.88	0.56	-16.96
8800.1090	389748.0	5396700.0	666.57	980172.00	980320.90	0.53	-17.25
8800.1091	389795.0	5396682.0	657.35	980173.78	980320.91	0.50	-17.33
8800.1092	389530.0	5396558.0	637.42	980178.67	980321.01	0.61	-16.35
8800.1093	389484.0	5396576.0	639.78	980178.08	980320.99	0.60	-16.47
8800.1094	389438.0	5396594.0	638.23	980178.32	980320.98	0.57	-16.55
8800.1095	389392.0	5396612.0	634.82	980179.07	980320.96	0.56	-16.46
8800.1096	389346.0	5396631.0	629.77	980180.19	980320.95	0.54	-16.34
8800.1097	389300.0	5396649.0	620.50	980182.23	980320.93	0.55	-16.09
8800.1100	389253.0	5396667.0	611.68	980184.20	980320.92	0.52	-15.88
8800.1101	389207.0	5396685.0	610.22	980184.68	980320.90	0.48	-15.71
8800.1102	389161.0	5396703.0	621.35	980182.60	980320.88	0.48	-15.59
8800.1103	389115.0	5396721.0	630.25	980180.76	980320.87	0.47	-15.66
8800.1104	389069.0	5396739.0	633.48	980180.11	980320.86	0.50	-15.64

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.1105	389023.0	5396758.0	638.62	980179.04	980320.84	0.51	-15.67
8800.1106	388977.0	5396776.0	640.70	980178.62	980320.82	0.49	-15.69
8800.1107	388931.0	5396794.0	639.87	980178.73	980320.81	0.51	-15.71
8800.1108	388885.0	5396803.0	642.16	980178.19	980320.80	0.52	-15.78
8800.1109	388838.0	5396822.0	647.87	980176.74	980320.79	0.54	-16.07
8800.1110	388746.0	5396858.0	653.31	980175.65	980320.76	0.57	-16.02
8800.1111	388700.0	5396876.0	652.47	980175.91	980320.74	0.59	-15.90
8800.1112	388654.0	5396894.0	653.69	980175.64	980320.72	0.63	-15.87
8800.1113	388608.0	5396913.0	656.68	980174.64	980320.71	0.64	-16.26
8800.1114	388561.0	5396931.0	659.36	980173.88	980320.69	0.73	-16.39
8800.1115	388515.0	5396949.0	661.65	980173.27	980320.68	0.79	-16.47
8800.1116	388469.0	5396967.0	658.07	980174.29	980320.66	0.87	-16.06
8800.1117	388422.0	5396985.0	651.16	980175.82	980320.65	0.88	-15.87
8800.1118	388376.0	5397003.0	645.19	980177.03	980320.63	0.87	-15.82
8800.1119	388330.0	5397021.0	640.93	980177.92	980320.62	0.87	-15.76
8800.1120	388284.0	5397039.0	634.20	980179.08	980320.60	0.85	-15.92
8800.1121	388192.0	5397077.0	636.46	980178.55	980320.57	0.92	-15.91
8800.1122	388146.0	5397095.0	634.47	980178.70	980320.56	0.95	-16.11
8800.1123	388100.0	5397114.0	629.48	980179.22	980320.54	0.99	-16.51
8800.1124	388052.0	5397133.0	622.82	980180.83	980320.52	1.05	-16.14
8800.1125	389475.0	5396389.0	617.37	980184.07	980321.14	0.49	-15.15
8800.1126	389428.0	5396406.0	617.01	980183.97	980321.13	0.50	-15.29
8800.1127	389380.0	5396424.0	612.68	980184.85	980321.11	0.48	-15.27
8800.1128	389333.0	5396442.0	612.55	980184.77	980321.10	0.49	-15.35
8800.1129	389239.0	5396478.0	610.25	980185.24	980321.07	0.48	-15.31
8800.1130	389192.0	5396496.0	613.21	980184.60	980321.05	0.50	-15.34
8800.1131	389145.0	5396514.0	607.30	980185.74	980321.04	0.52	-15.32
8800.1132	389098.0	5396532.0	602.47	980186.60	980321.02	0.51	-15.40
8800.1133	389051.0	5396550.0	607.66	980185.55	980321.01	0.48	-15.45
8800.1134	389004.0	5396568.0	625.29	980182.05	980320.99	0.50	-15.45
8800.1135	388910.0	5396604.0	631.36	980180.90	980320.96	0.53	-15.35
8800.1136	388863.0	5396622.0	627.54	980181.77	980320.95	0.52	-15.22
8800.1137	388816.0	5396640.0	634.03	980180.02	980320.93	0.54	-15.65
8800.1138	388769.0	5396658.0	633.59	980180.11	980320.92	0.53	-15.65
8800.1139	388722.0	5396676.0	630.43	980180.74	980320.90	0.55	-15.60
8800.1140	388675.0	5396694.0	630.20	980180.64	980320.89	0.53	-15.75
8800.1141	388628.0	5396712.0	630.09	980180.60	980320.87	0.58	-15.75
8800.1142	388581.0	5396730.0	623.17	980182.21	980320.86	0.60	-15.46
8800.1143	388534.0	5396748.0	617.65	980183.22	980320.84	0.65	-15.48
8800.1144	388487.0	5396766.0	618.51	980182.91	980320.83	0.67	-15.58
8800.1145	388440.0	5396784.0	616.25	980183.27	980320.81	0.68	-15.65
8800.1146	388393.0	5396802.0	621.76	980182.11	980320.80	0.69	-15.69
8800.1147	388346.0	5396820.0	633.19	980179.68	980320.78	0.69	-15.86
8800.1148	388299.0	5396838.0	641.44	980177.79	980320.77	0.72	-16.08
8800.1149	388252.0	5396856.0	638.50	980178.61	980320.75	0.73	-15.82
8800.1150	388205.0	5396874.0	631.93	980179.96	980320.73	0.75	-15.72
8800.1151	388158.0	5396892.0	624.62	980181.30	980320.72	0.80	-15.76
8800.1152	389398.0	5396191.0	640.77	980179.56	980321.30	0.44	-15.26
8800.1153	389351.0	5396209.0	639.52	980178.87	980321.29	0.43	-16.19
8800.1154	389304.0	5396227.0	635.61	980180.63	980321.27	0.44	-15.17
8800.1155	389257.0	5396245.0	636.39	980180.32	980321.26	0.42	-15.34
8800.1156	389210.0	5396263.0	640.15	980179.45	980321.24	0.44	-15.44
8800.1157	389163.0	5396281.0	637.64	980179.78	980321.23	0.42	-15.60
8800.1158	389116.0	5396299.0	634.58	980180.59	980321.21	0.44	-15.36

NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.1159	389069.0	5396317.0	626.39	980182.18	980321.20	0.42	-15.38
8800.1160	389022.0	5396335.0	623.62	980182.62	980321.18	0.41	-15.48
8800.1161	388975.0	5396353.0	623.69	980182.51	980321.17	0.43	-15.55
8800.1162	388928.0	5396371.0	620.97	980182.94	980321.15	0.42	-15.64
8800.1163	388881.0	5396389.0	611.03	980185.01	980321.13	0.46	-15.47
8800.1164	388834.0	5396407.0	596.70	980187.78	980321.12	0.48	-15.49
8800.1165	388787.0	5396425.0	596.20	980187.98	980321.11	0.51	-15.34
8800.1166	388740.0	5396443.0	594.76	980188.11	980321.09	0.55	-15.44
8800.1167	388693.0	5396461.0	605.91	980185.90	980321.07	0.60	-15.39
8800.1168	388646.0	5396479.0	612.99	980184.42	980321.06	0.75	-15.31
8800.1169	388600.0	5396497.0	612.74	980184.38	980321.04	0.72	-15.41
8800.1170	388553.0	5396515.0	600.57	980186.72	980321.03	0.68	-15.50
8800.1171	388506.0	5396533.0	583.93	980189.77	980321.01	0.66	-15.73
8800.1172	388459.0	5396551.0	562.73	980193.42	980321.00	0.62	-16.27
8800.1173	388412.0	5396569.0	547.86	980196.09	980320.98	0.67	-16.46
8800.1174	388365.0	5396587.0	546.62	980196.38	980320.97	0.73	-16.34
8800.1175	388318.0	5396605.0	546.13	980196.36	980320.95	0.76	-16.41
8800.1177	388271.0	5396623.0	565.50	980192.78	980320.94	0.75	-16.18
8800.1178	388224.0	5396641.0	593.90	980187.43	980320.92	0.83	-15.85
8800.1179	388177.0	5396659.0	609.69	980184.19	980320.91	1.02	-15.77
8800.1180	388130.0	5396677.0	605.93	980184.87	980320.89	1.10	-15.74
8800.1181	388083.0	5396696.0	594.80	980187.10	980320.88	1.13	-15.65
8800.1182	388002.0	5396394.0	582.49	980189.53	980321.12	0.92	-16.09
8800.1183	387970.0	5396499.0	539.15	980197.55	980321.03	0.90	-16.53
8800.1184	388017.0	5396482.0	554.40	980194.86	980321.05	0.88	-16.26
8800.1185	387064.0	5396465.0	557.12	980194.28	980321.05	0.83	-16.36
8800.1186	388158.0	5396431.0	555.66	980194.72	980321.09	0.71	-16.37
8800.1187	388205.0	5396414.0	559.30	980194.18	980321.11	0.80	-16.11
8800.1188	388252.0	5396397.0	555.61	980194.82	980321.12	0.73	-16.29
8800.1189	388299.0	5396380.0	549.86	980195.70	980321.13	0.72	-16.56
8800.1190	388346.0	5396363.0	549.04	980195.73	980321.15	0.80	-16.62
8800.1191	388393.0	5396356.0	539.24	980197.13	980321.16	0.83	-17.13
8800.1192	388487.0	5396322.0	533.01	980197.20	980321.18	0.73	-18.41
8800.1193	388534.0	5396305.0	569.33	980191.40	980321.20	0.76	-17.05
8800.1194	388581.0	5396288.0	602.50	980185.96	980321.21	0.73	-16.01
8800.1195	388628.0	5396271.0	620.95	980182.88	980321.23	0.71	-15.49
8800.1196	388675.0	5396254.0	633.15	980180.54	980321.24	0.65	-15.51
8800.1197	388722.0	5396237.0	638.60	980179.58	980321.26	0.62	-15.44
8800.1198	389140.0	5394900.0	665.40	980176.39	980322.34	0.37	-14.69
8800.1199	389186.0	5394891.0	665.31	980176.39	980322.35	0.38	-14.71
8800.1200	389230.0	5394872.0	664.28	980176.61	980322.36	0.39	-14.70
8800.1201	389277.0	5394853.0	662.51	980176.89	980322.38	0.39	-14.78
8800.1202	389320.0	5394834.0	660.49	980177.42	980322.40	0.39	-14.67
8800.1203	389366.0	5394815.0	660.13	980177.51	980322.41	0.39	-14.66
8800.1204	389314.0	5394796.0	659.97	980177.54	980322.43	0.40	-14.67
8800.1205	389461.0	5394777.0	662.90	980176.97	980322.44	0.39	-14.69
8800.1206	389508.0	5394758.0	665.75	980176.32	980322.46	0.40	-14.78
8800.1207	389554.0	5394739.0	667.98	980175.85	980322.47	0.40	-14.84
8800.1208	389600.0	5394720.0	672.11	980174.91	980322.49	0.41	-14.96
8800.1209	389647.0	5394700.0	676.13	980173.90	980322.51	0.42	-15.19
8800.1210	389361.0	5394752.0	657.88	980178.12	980322.46	0.40	-14.54
8800.1211	389340.0	5394716.0	654.23	980178.95	980322.49	0.41	-14.44
8800.1212	389572.0	5394495.0	663.37	980176.98	980322.67	0.40	-14.80
8800.1213	389525.0	5394514.0	662.52	980177.08	980322.66	0.41	-14.84

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NUMBER	EASTING	NORTHING	HEIGHT	OBS GRAV	THEO GRAV	CORR	BOUG ANOM
8800.1214	389480.0	5394533.0	661.25	980177.42	980322.64	0.40	-14.75
8800.1215	389435.0	5394552.0	659.88	980177.74	980322.62	0.40	-14.68
8800.1216	389392.0	5394571.0	656.99	980178.38	980322.61	0.41	-14.59
8800.1217	389347.0	5394590.0	655.43	980178.76	980322.59	0.41	-14.50
8800.1218	389302.0	5394609.0	650.04	980179.76	980322.58	0.42	-14.53
8800.1220	389282.0	5394566.0	644.31	980180.93	980322.61	0.46	-14.49
8800.1221	389259.0	5394527.0	645.07	980180.75	980322.64	0.49	-14.51
8800.1222	389245.0	5394480.0	643.39	980180.94	980322.68	0.49	-14.70
8800.1223	389226.0	5394432.0	644.94	980180.49	980322.72	0.51	-14.86
8800.1224	389207.0	5394390.0	638.21	980181.85	980322.75	0.54	-14.83
8800.1225	389023.0	5394738.0	654.52	980178.53	980322.47	0.49	-14.70
8800.1226	388978.0	5394757.0	658.82	980177.48	980322.44	0.47	-14.90
8800.1227	388933.0	5394776.0	661.30	980177.18	980322.44	0.46	-14.72
8800.1228	388888.0	5394795.0	662.42	980176.89	980322.42	0.46	-14.77
8800.1229	388843.0	5394814.0	662.03	980176.90	980322.40	0.44	-14.84
8800.1230	388798.0	5394833.0	656.30	980177.97	980322.39	0.50	-14.83
8800.1231	388754.0	5394852.0	650.59	980178.94	980322.37	0.53	-14.93
8800.1232	388709.0	5394871.0	643.95	980180.28	980322.36	0.57	-14.84
8800.1233	388273.0	5397721.0	653.11	980174.29	980320.05	0.64	-16.66
8800.1234	388181.0	5397759.0	643.63	980176.11	980320.02	0.66	-16.65
8800.1235	388135.0	5397777.0	639.48	980176.97	980320.01	0.71	-16.54
8800.1236	388090.0	5397795.0	636.96	980177.33	980319.99	0.76	-16.61
8800.1237	388045.0	5397813.0	631.65	980178.04	980319.98	0.83	-16.86
8800.1238	387998.0	5397831.0	621.79	980179.99	980319.96	0.87	-16.79
8800.1239	387952.0	5397849.0	613.01	980181.91	980319.95	0.90	-16.56
8800.1240	387906.0	5397867.0	602.68	980183.97	980319.93	0.98	-16.43
8800.1241	388365.0	5397240.0	656.43	980173.79	980320.44	0.60	-16.93
8800.1242	388411.0	5397222.0	654.52	980174.25	980320.46	0.57	-16.90
8800.1243	388458.0	5397204.0	653.63	980174.62	980320.47	0.55	-16.73
8800.1244	388504.0	5397186.0	653.98	980174.46	980320.49	0.52	-16.87
8800.1245	388550.0	5397168.0	656.01	980174.07	980320.50	0.50	-16.89
8800.1246	388596.0	5397150.0	660.74	980173.07	980320.52	0.47	-17.01
8800.1247	388643.0	5397132.0	666.54	980171.91	980320.53	0.44	-17.07
8800.1248	388689.0	5397114.0	671.46	980170.93	980320.55	0.43	-17.11
8800.1249	388735.0	5397096.0	673.28	980170.57	980320.56	0.42	-17.14
8800.1251	388781.0	5397078.0	672.69	980170.81	980320.58	0.40	-17.05
8800.1252	388827.0	5397060.0	672.56	980170.88	980320.59	0.38	-17.04
8800.1253	388873.0	5397042.0	669.53	980171.37	980320.61	0.39	-17.16
8800.1255	388919.0	5397024.0	659.01	980173.75	980320.62	0.41	-16.84
8800.1256	388966.0	5397006.0	652.03	980175.65	980320.64	0.41	-16.32

196

687196

Report submitted on behalf of
Leaman Geophysics
by

D. Leaman

Dr. D.E. Leaman, B.Sc., Ph.D
M.Aus.I.M.M., M.M.I.C.A

Apr 16, 1988

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Wide Experience Most Methods
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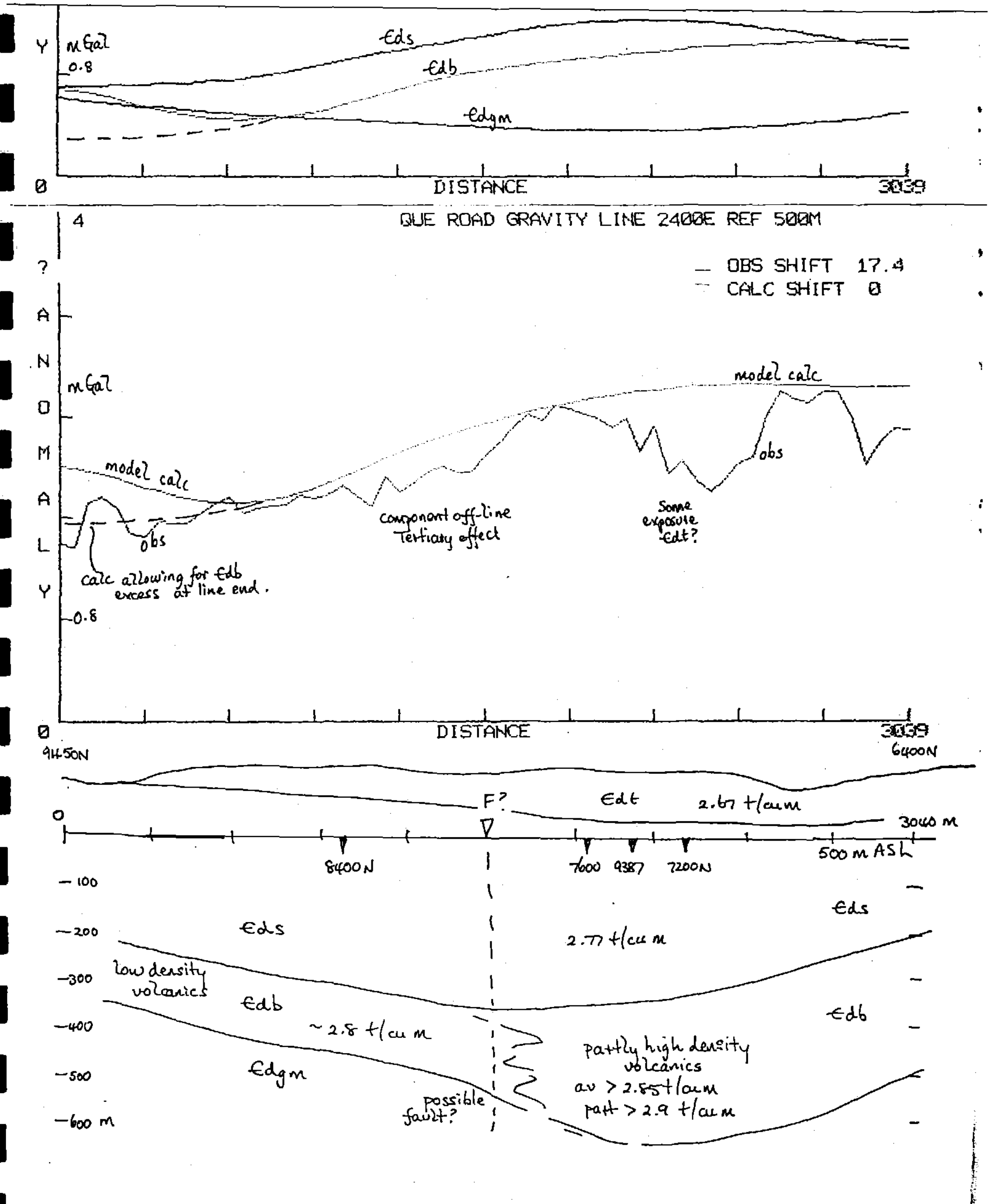
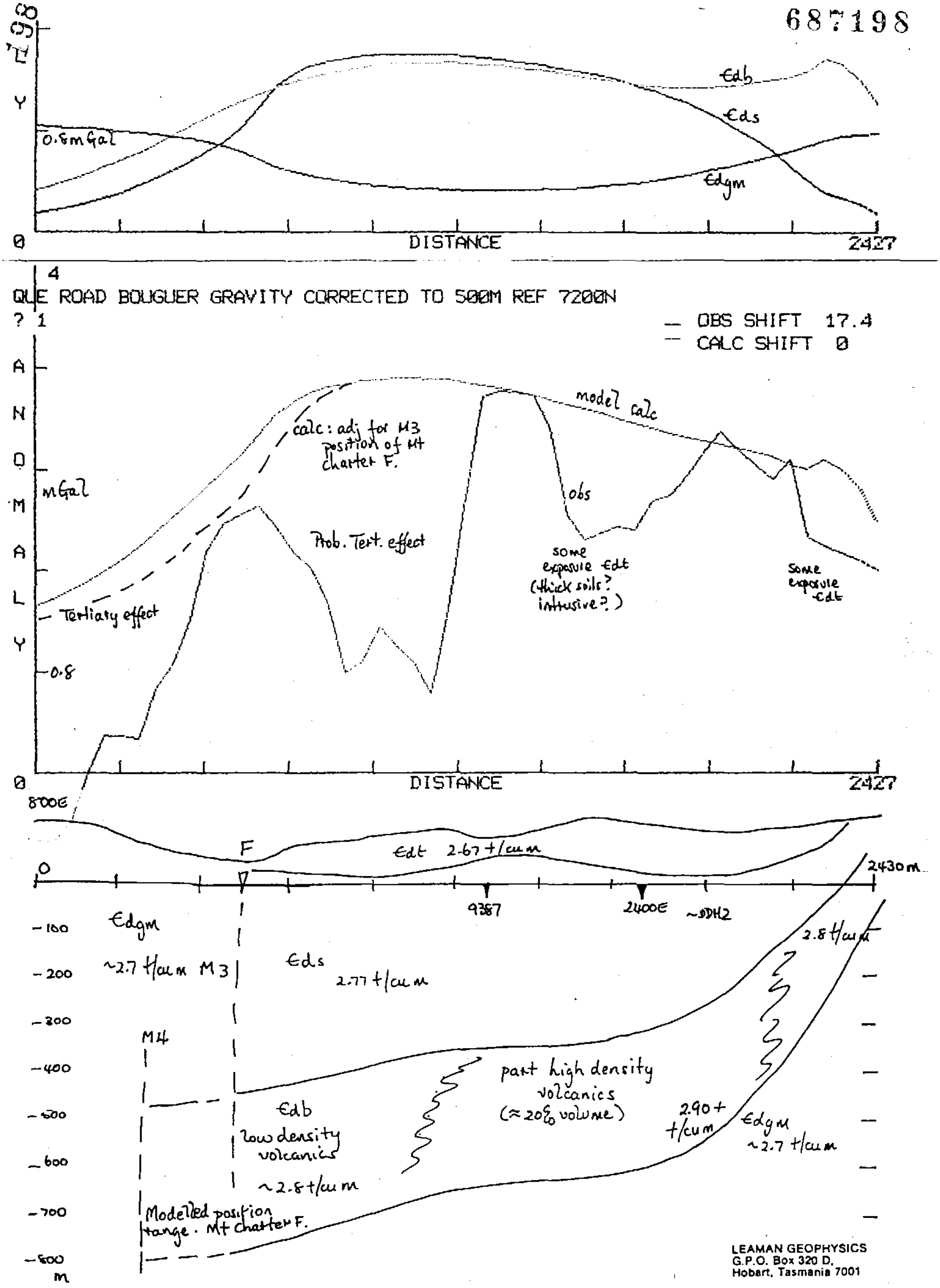
687197



3D SOLUTION LINE 2400E FIGURE 1
Showing anomaly components, profile match and model section

687198



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3D SOLUTION LINE 7200N FIGURE 2
Showing anomaly components, profile match and model section

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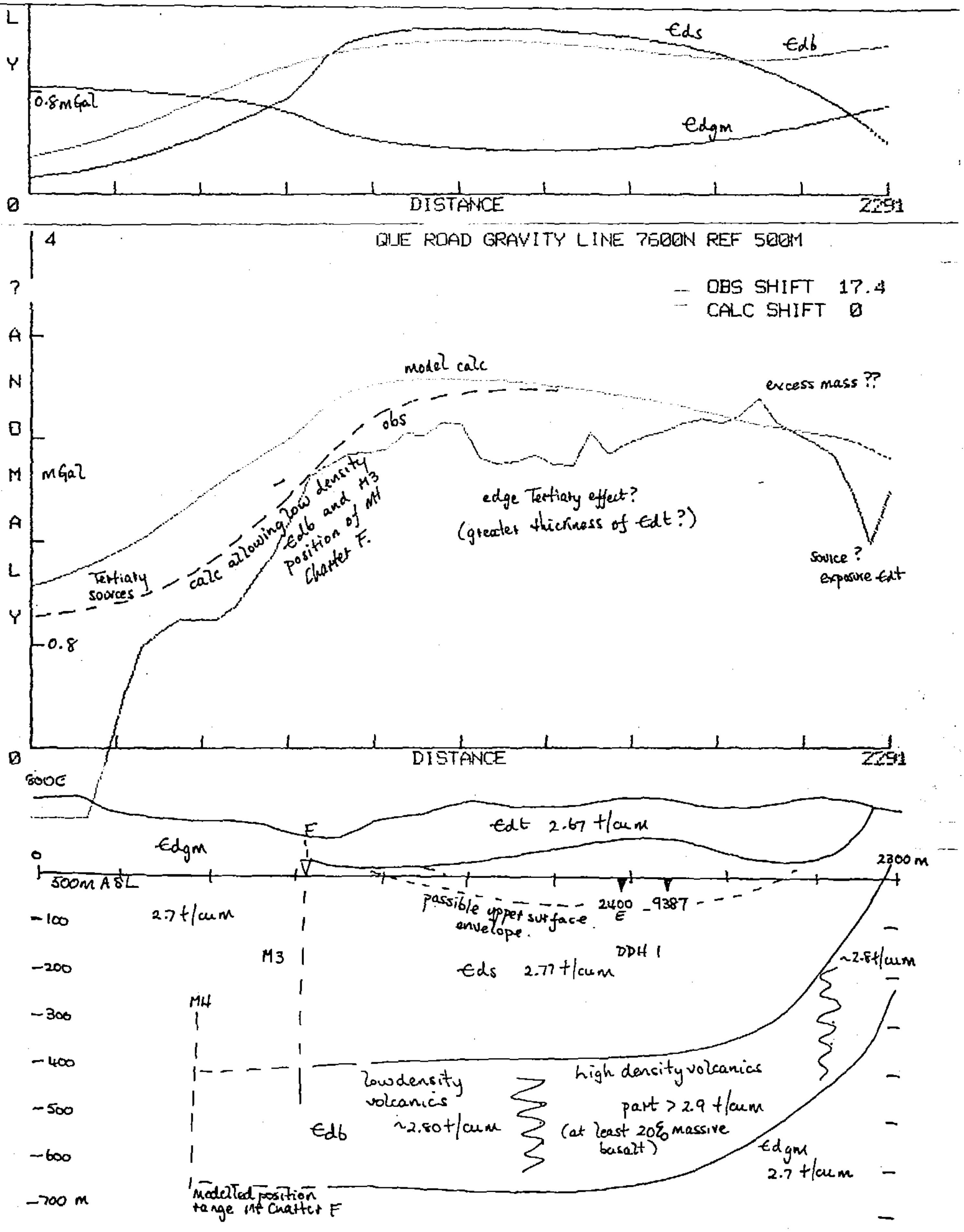

3D SOLUTION LINE 7600N FIGURE 3
Showing anomaly components, profile match and model section

200

687200

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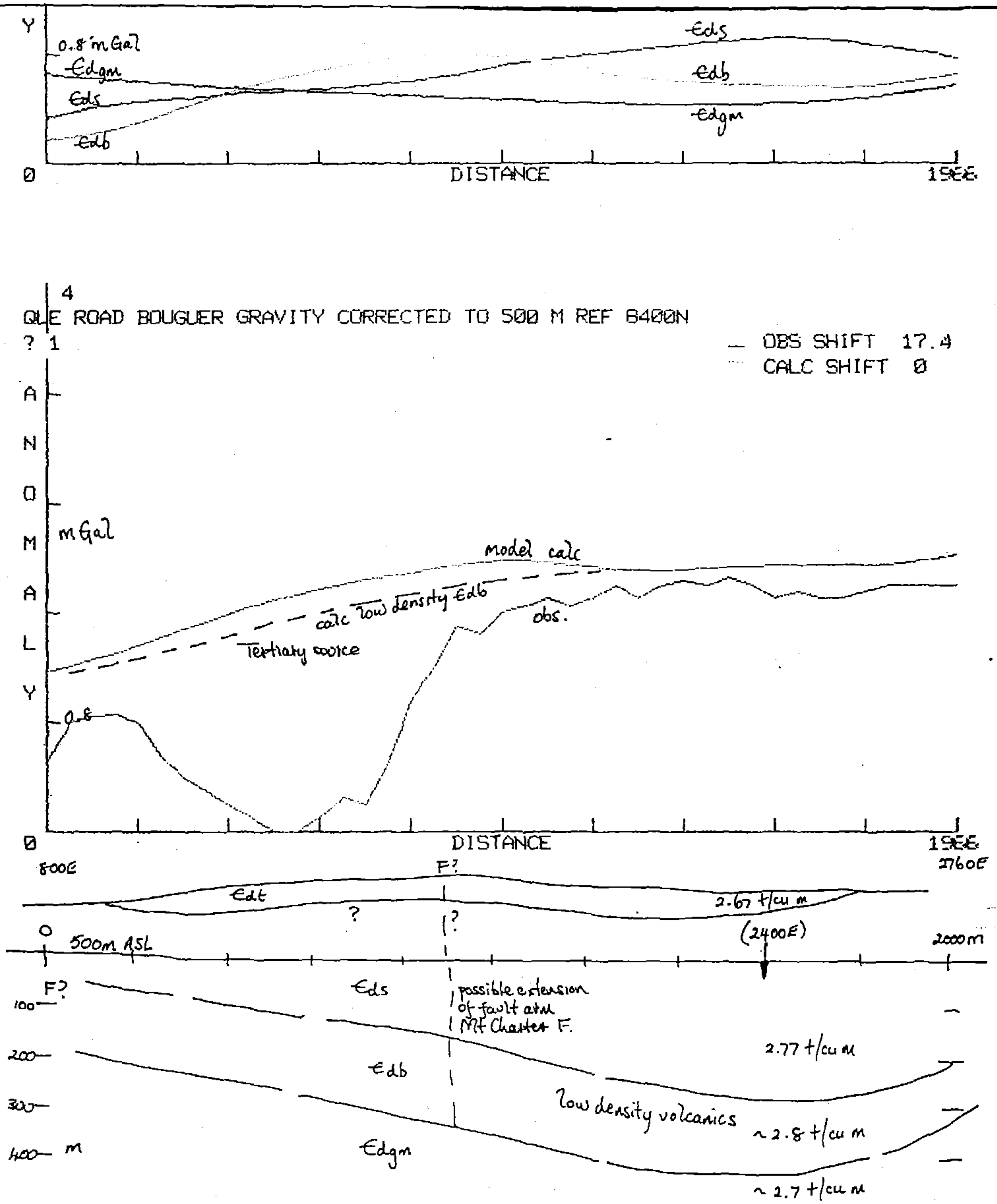

3D SOLUTION LINE 8400N

FIGURE 4

Showing anomaly components, profile match and model section

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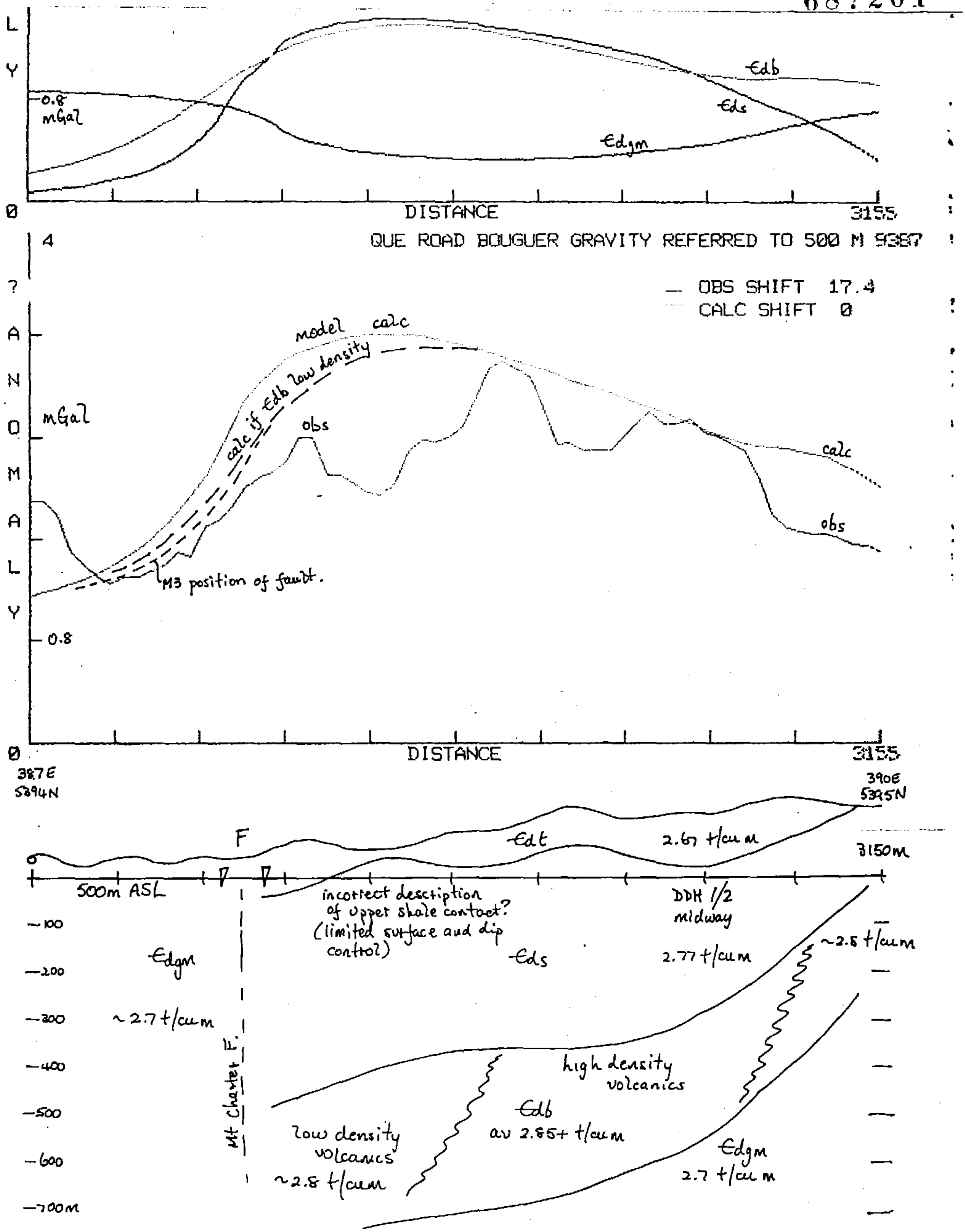
687201



3D SOLUTION LINE 9387 FIGURE 5
Showing anomaly components, profile match and model section

202

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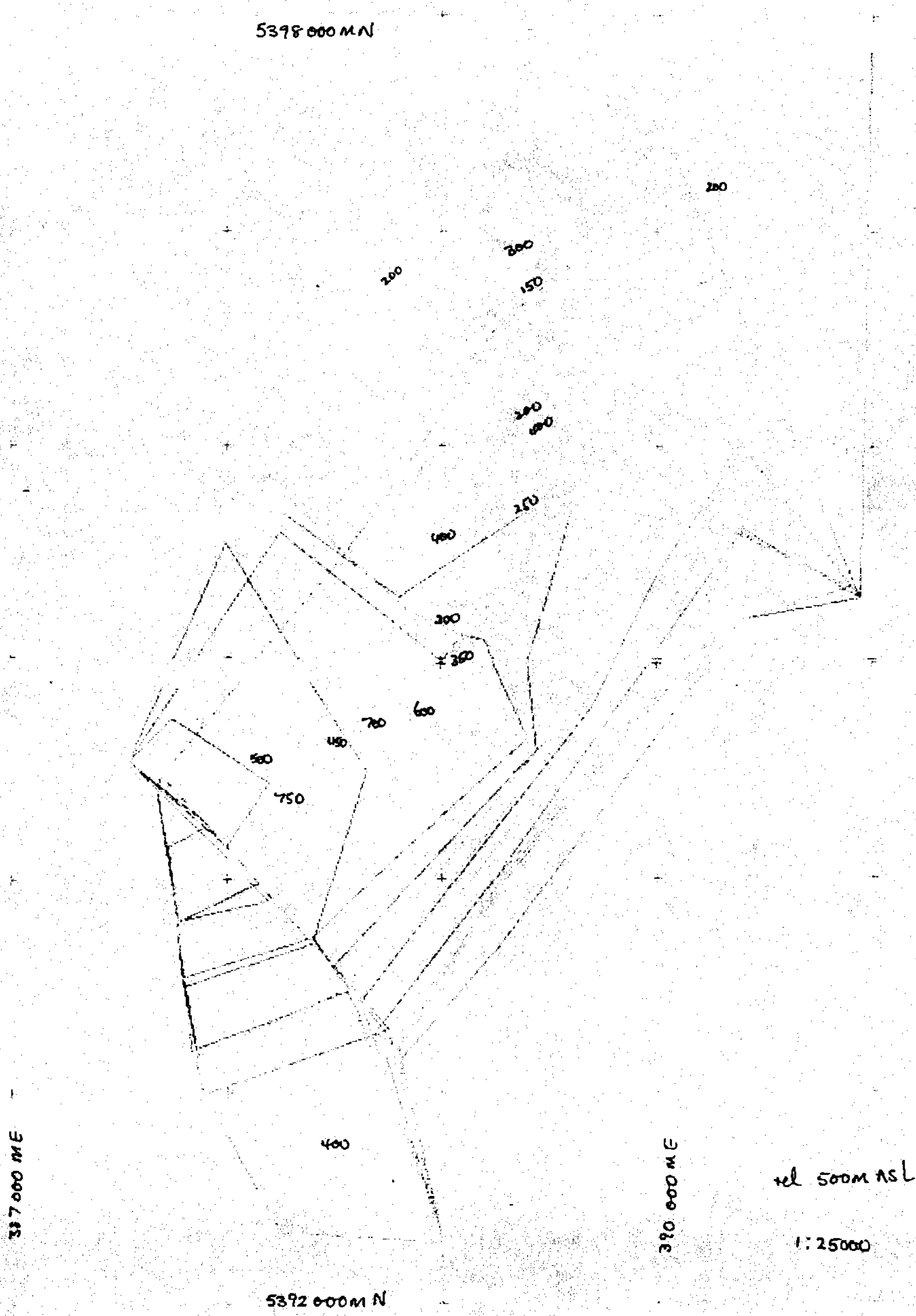
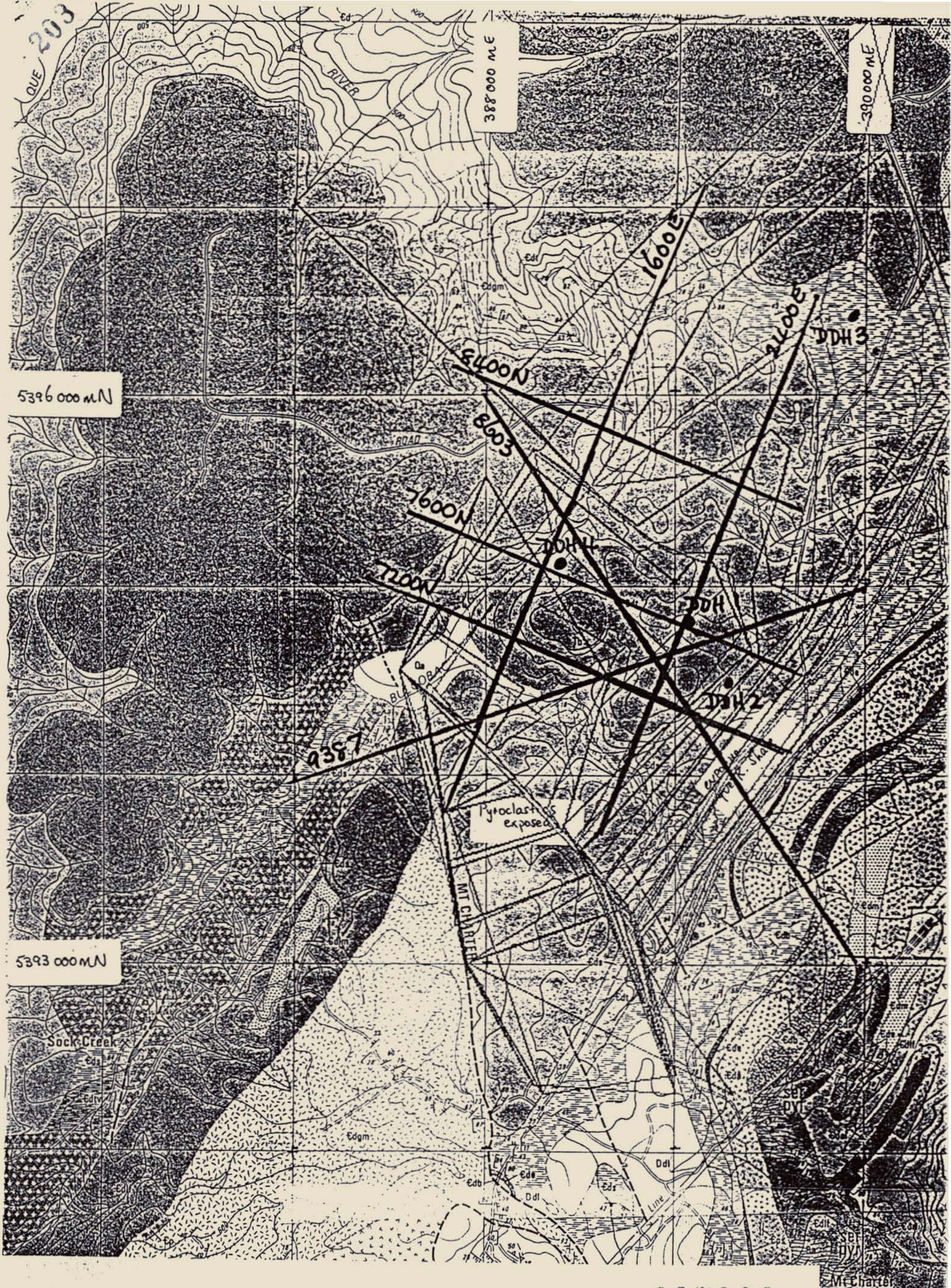


STRUCTURE CONTOURS FOR 3D MODEL ITERATION 4 - ALL SURFACES
Shale dark blue, basalt light blue, mixed seq red QRS4 QRB4 QRG1
FIGURE 6A



687203

GEOLOGICAL BASEMAP (after Komyshan, 1986) AND 3D MODEL
Profile positions and drillholes also shown

FIGURE 6B

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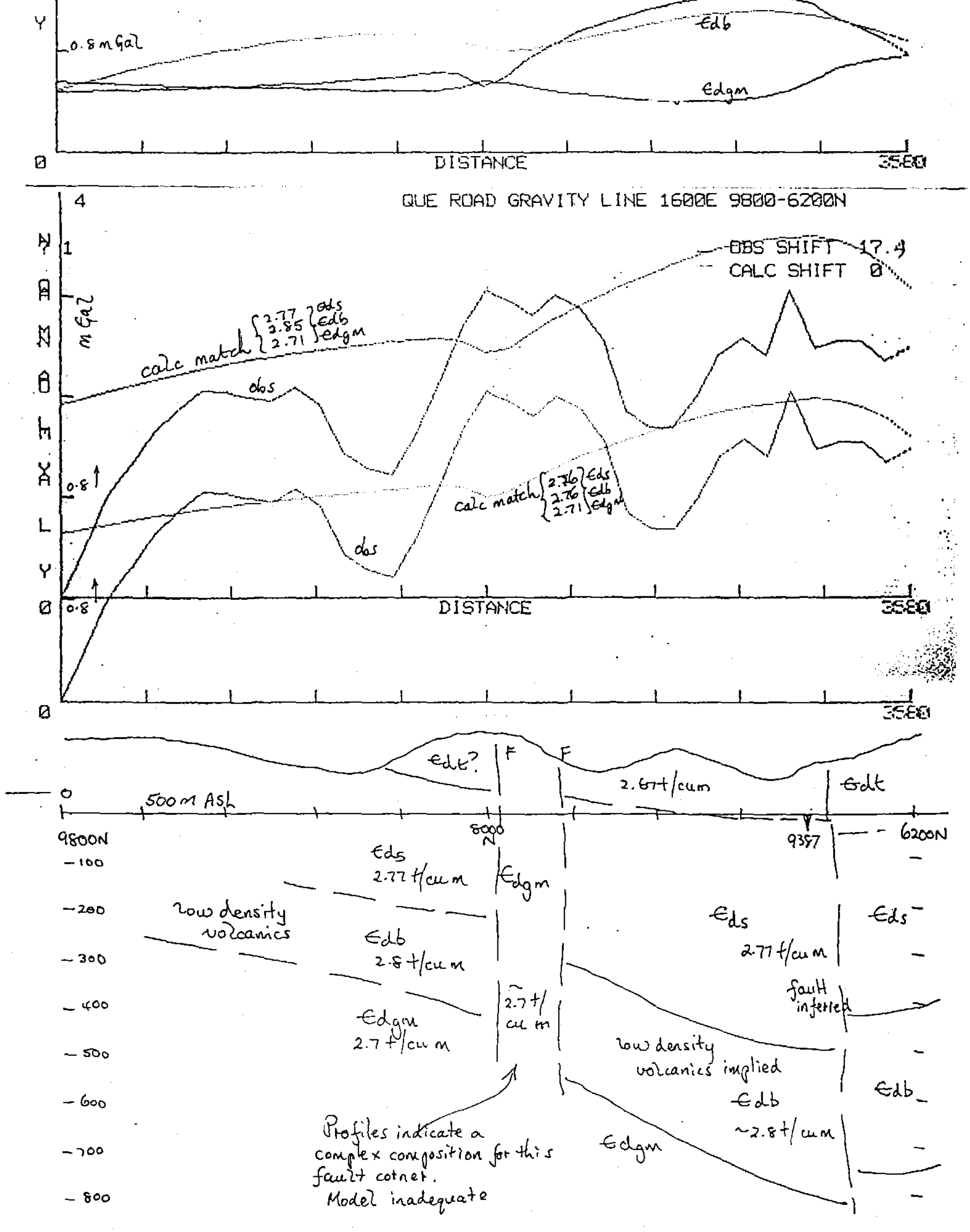
204

687204



3D SOLUTION LINE 1600E FIGURE 7
Showing anomaly components, profile match and model section

205

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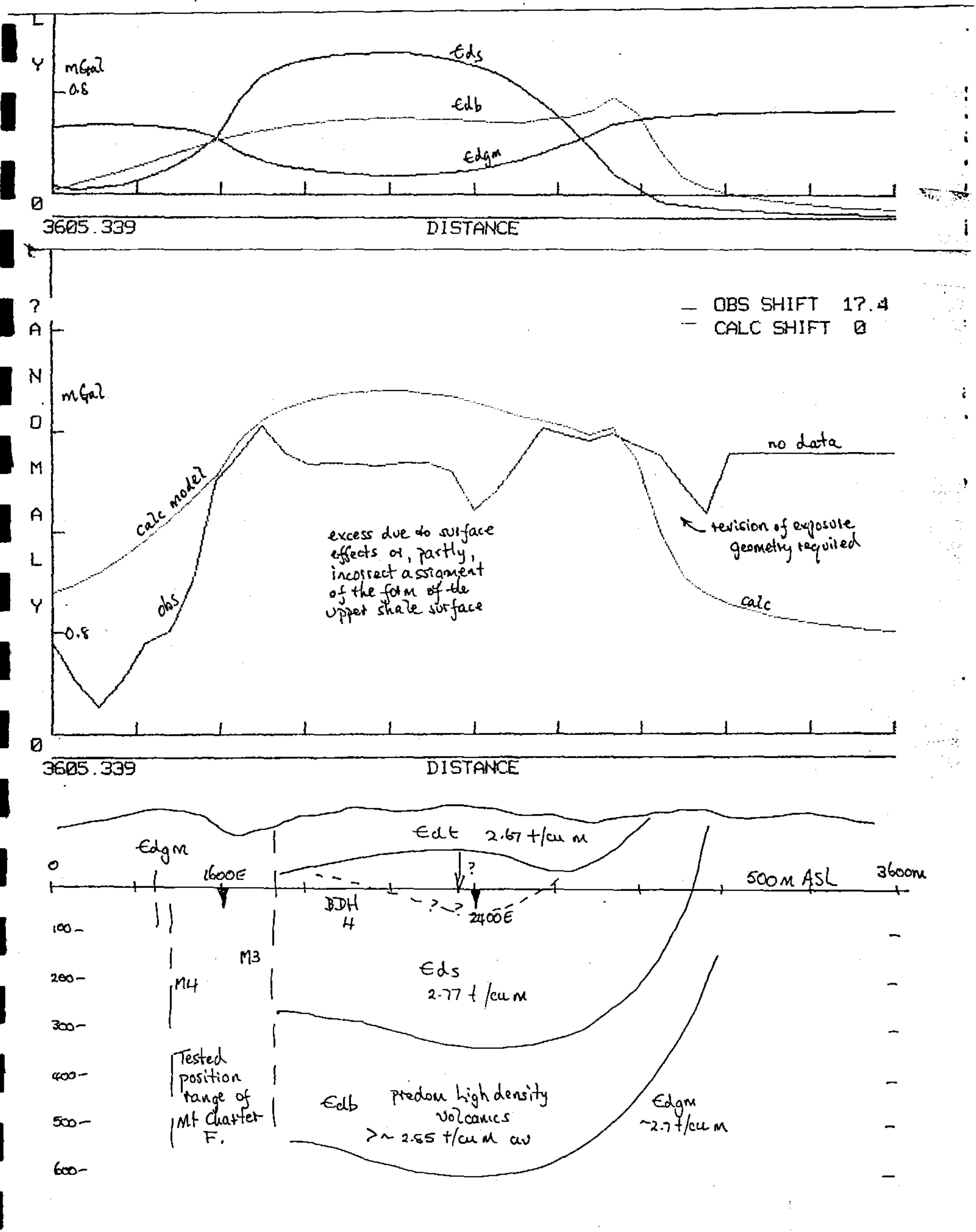
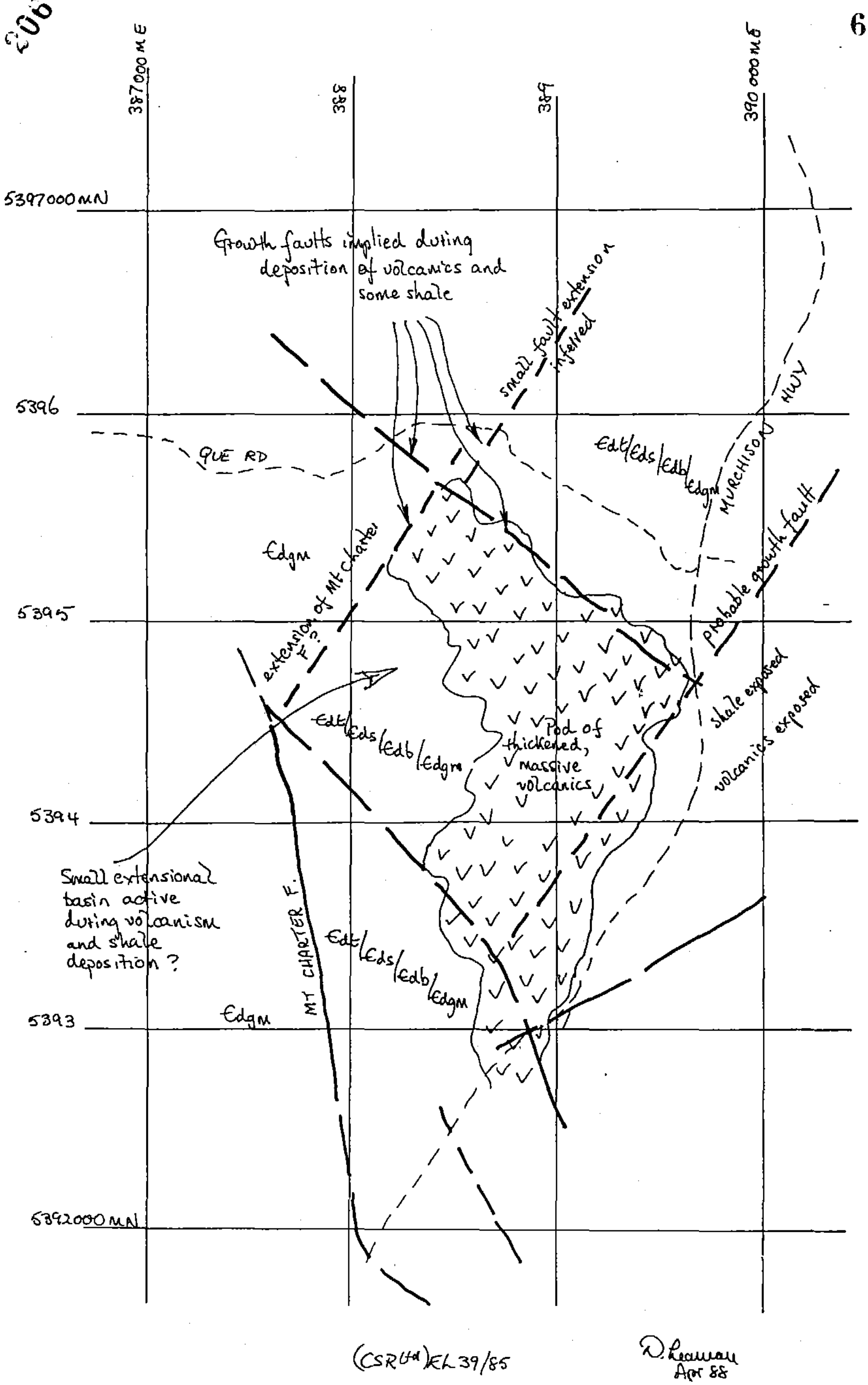


3D SOLUTION LINE 8306 FIGURE 8
Showing anomaly components, profile match and model section



SUMMARY OF INTERPRETATION

FIGURE 9

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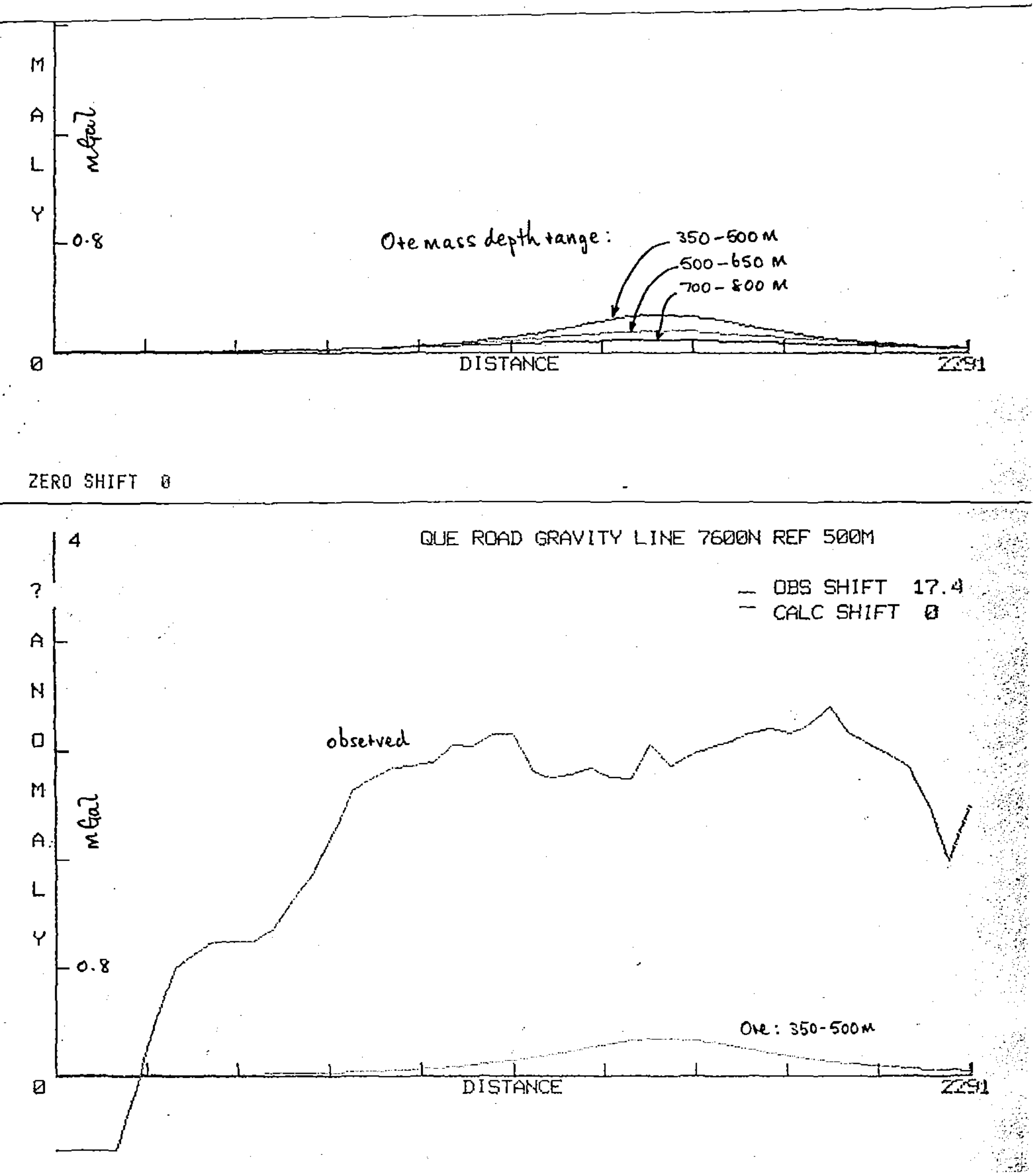
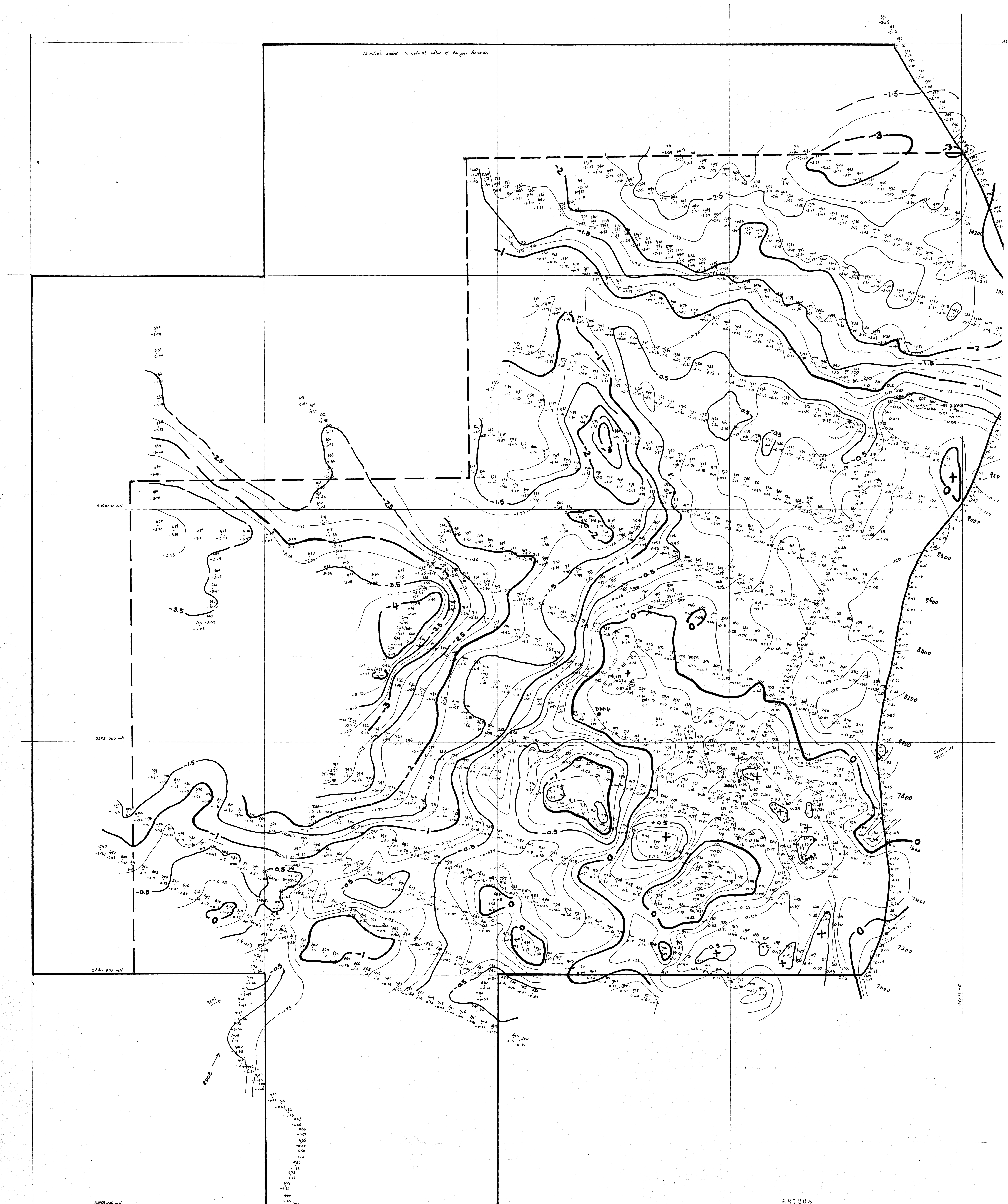


COMPARATIVE EVALUATION OF LIMITED ORE SCALE SOURCES

Diagram indicates that, in an environment where substantial surface sources are present, and targets are deep there is little likelihood of direct resolution of an ore mass. There is also no clear evidence in the existing data for a mass and alteration couplet.

FIGURE 10



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QUE ROAD GRAVITY SURVEYS

1987 - 88

BOUGUER ANOMALY

2.67 t/cu m

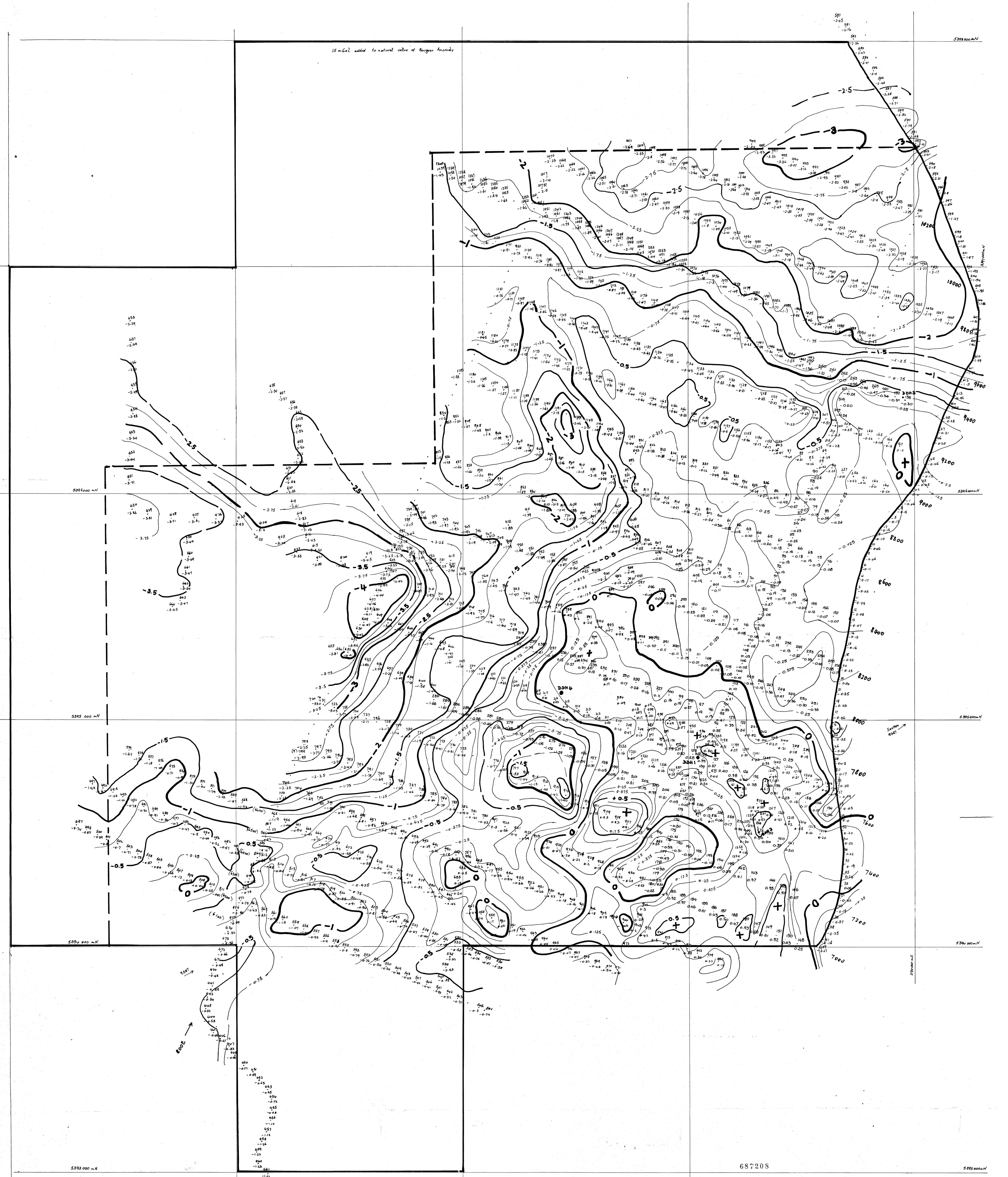
CORRECTION, COMPILATION and REDUCTION by LEAMAN GEOPHYSICS, HOBART (April, 1988)

OBSERVATION SOLO GEOPHYSICS, ADELAIDE

89-29

FIG 1

7967



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2.67 t/cu m

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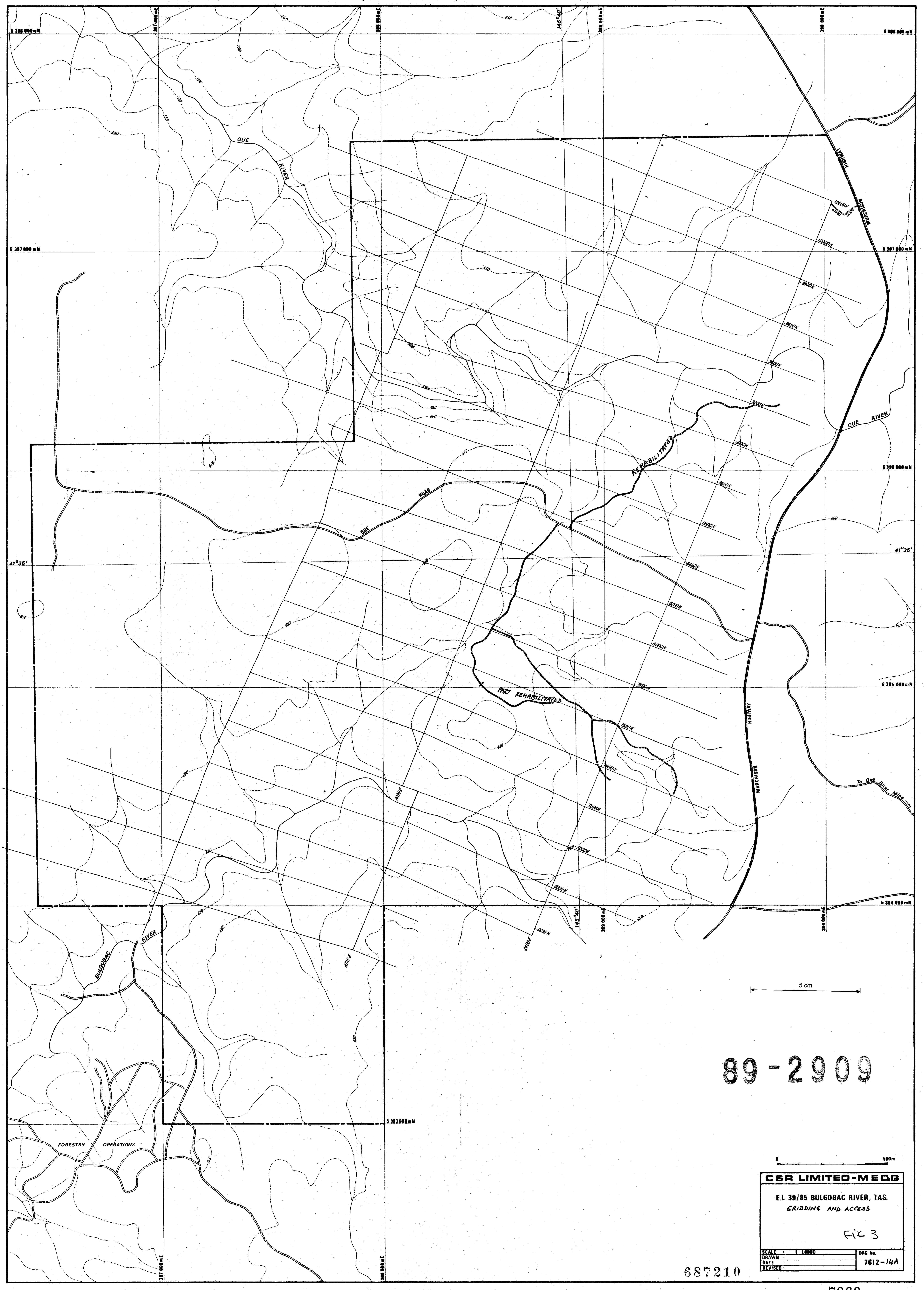
OBSERVATION SOLO GEOPHYSICS, ADELAIDE

89-2909

FIG 1

7967


7968
QUE RIVER
MURCHISON HIGHWAY
TERTIARY BASALT
TERTIARY FLUVIOGLACIALS
QUE ROAD
Debussey Creek
Shot Creek
Omitted Creek
Mutter Creek
Distant Creek
Joint Ck
Pam Creek
Hash Ck
BULGOBAC RIVER
FORESTRY OPERATIONS
MT. CHARTER FAULT
BRD01
BRD02
BRD03
BRD 04
"To Que River Mine"
5 398 000 mN
5 397 000 mN
5 396 000 mN
5 395 000 mN
5 394 000 mN
5 393 000 mN
387 000 mE
388 000 mE
389 000 mE
390 000 mE
41°35'
145°40'
89-2909
REFERENCE
TERTIARY 1 BASALT
DEVONIAN 2 DOLERITE
CAMBRIAN DUNDAS GROUP
WEST OF MT. CHARTER FAULT
3 Dominantly qtz felspar porphyritic intrusives, some possibly extrusive.
pyroclastics
and siltstone
lava, felspar phyric, massive to vesicular with zone breccia and epiclastic rocks
lithicwacke and silstone
EAST OF MT. CHARTER FAULT
intrusive or extrusive, qtz-felspar phyric
tuff, ranges from volcanic congl at base to vitric tuff. thin shale - siltstone bands
siltstone, massive, generally carbaceous, pyritic in
lavas and pyroclastics (Mutter Creek)
Strike & dip of bedding
Strike & dip of cleavage
A162224 Rock sample location & sample No.
Outcrop boundary
Rubble boundary
Float boundary
Fault
Interpreted geol. contact
SOURCE OF MAPPING
Majority within EL 39/85 - R.E. Williams
Sock Creek Area - P Komyshan
Murchison Highway - E.Z.
0 500m
CSR LIMITED-MEDG
E.L. 39/85 BULGOBAC RIVER, TAS.
GEOLOGICAL MAPPING TO DEC. 1987
687209
FIG 2
SCALE : 1 : 5000
DRAWN : R.E.W.
DATE : April '87
REVISED : Dec. '87
DRG. No. 7612-13
7968


QUE RIVER
QUE ROAD
REHABILITATED
PART REHABILITATED
MURCHISON HIGHWAY
QUE RIVER
To Que River Mine
BULGOBAC RIVER
FORESTRY OPERATIONS
41°35'
145°40'
5 cm
89-2909
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E.L. 39/85 BULGOBAC RIVER, TAS.
GRIDDING AND ACCESS
FIG 3
SCALE 1:10000
DRG. No. 7612-14A
687210

7969