C.R.A. EXPLORATION PTY. LIMITED

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EXPLORATION AT EAST CETHANA E.L. 10/76

NORTHERN TASMANIA

SEPTEMBER 1977 - SEPTEMBER 1979

MICROFILMED

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1 SUMMARY

Three further diamond drill holes have been drilled at the East Cethana lead-zinc prospect without locating economic mineralisation. The drilling has delineated a zone of highly altered cherty carbonaceous tuffs containing disseminated galena and sphalerite.

On the margin of this zone of "dirty" tuffs, a weak I.P. anomaly has been discovered. The anomaly is deep and between 100 - 350m long. Rock chip sampling over the anomaly has returned values up to 1.2% Pb over a 7m true width in the tuffs.

From its geological setting and geochemical expression, it is concluded that the anomaly could be due to a concentration of base metal sulphides.

One precollared diamond drill hole is recommended to test the anomaly.

No other significant targets are apparent on the prospect.

2 CONCLUSIONS

1 The results of drill holes CC6, 7 and 8 and the subsequent dipole-dipole I.P. survey, indicate that most of the previously known I.P. / geochemical anomalies are due to insignificant weakly disseminated basemetal mineralisation.

2 Geochemical indications suggest that the new I.P. anomaly located on the northern end of lines 21750E and 21800E, could be due to a concentration of basemetal sulphides. The anomaly is on the upper margin of the zone of altered "dirty" cherty tuffs - a geological environment in which a massive sulphide body could have formed.

3 RECOMMENDATIONS

It is recommended that one diamond drill hole be drilled to test the I.P. anomaly located at 3420-40S on line 21800E.

The hole should be designed to intersect the target at a depth of 100m. It should be precollared to 50m to reduce unnecessary cost.

4 INTRODUCTION

This report covers exploration carried out on the East Cethana prospect, E.L. 10/76 northern Tasmania, during the period September 1977 to September 1979.

The prospect comprises a suite of Cambrian acid volcanics with minor showings of lead-zinc mineralisation. The best results from work during 1976-77 was one metre of 4% Zn, 1% Pb, 1% Cu and 185 ppm Ag within a chloritic tuff-shale in drill hole 77CC5. (refer C.R.A.E. Report No. 9044).

Work completed during the September 1977-79 period included three further diamond drillholes, a dipole-dipole I.P. survey, and a small amount of additional gridding, geochemical sampling and mapping. Drill holes 77CC6 and 7 were sited to test gradient array I.P. anomalies, while 78CC8 tested 60m below the intersecton in 77CC5.

Results of the work undertaken are shown in the plans and appendices at the back of this report. The present state of knowledge of the prospect is summarised in the Interpreted Geology plan.

5 DISCUSSION OF RESULTS

Results were poor. The best values were encountered in 77CC6 within partly carbonaceous altered cherty tuffs containing finely disseminated galena and sphalerite. Two separate 12m intervals in the hole averaged 1% Pb and Zn, with the best intersections being 4.5m of 0.4% Pb, 1.2% Zn and 2.4m of 1% Pb, 0.65% Zn. Values for copper and silver were negligible. (Plan Tc123)

Hole 78CC8 did not intersect the down dip extension of the mineralisation in 77CC5, apparently because the mineralisation was faulted off. (See plan Tc52).

Subsequent to the drilling, the dipole-dipole I.P. survey showed that most of the gradient array I.P. "anomalies" in the central part of the prospect were spurious. It confirmed the presence of the anomalies already drilled, but downgraded them.

The dipole-dipole survey detected one new anomaly centred at 120N / 21750E and 3430S / 21800E - a strike length of 100m. Measurements further east were not possible due to a high tension powerline, but the anomaly could extend as far as the fault beyond 22000E - a total strike length of 350m. The anomaly was not detected on 21700E, 80m west of 21750E. Depth to the anomaly is estimated at 60m on 21750E, the only line on which such measurements could be made.

A 30m (7m true width) chip sample of tuff directly over the anomaly on 21800E, assayed 1.2% Pb and 0.15% Zn. The I.P. anomaly has a coincident soil anomaly with maximum values of 1275 ppm Pb and 520 ppm Zn. (See plan Tc94-97).

The I.P. anomaly is in a geologically favourable situation on the upper margin of the zone of altered "dirty" cherty tuffs, which contain disseminated basemetal sulphides and minor pyrite. (Plan Tc147

The geochemical indications suggest that the I.P. anomaly could be due to a concentration of base metal sulphides, and the immediate geological environment is one in which a massive ore grade sulphide body could have formed.

Several gradient array I.P. anomalies and geochemical anomalies remain untested at East Cethana. The work over the last two years has clarified the geological setting and resolved the difficulties with geophysics to the extent that these anomalies no longer appear to warrant testing.

Many of the I.P. anomalies are clearly part of the "pyritic zone" in which two unsuccessful holes have already been drilled. Others are apparently spurious, some reflecting minor sulphides at surface or unmineralised rocks with unexplained higher chargeabilities.

Numerous geochemical anomalies are "spot highs" within the coarser tuffs or ignimbritic volcanics, and are proobably derived from fracture-filling mineralisaiton. These anomalies have no geophysical expression.

J.G. Purvis FOR R.R.

6 BIBLIOGRAPHY

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C.R.A.E. Report No. 9044

7 KEYWORDS

Lead, zinc, acid volcanics, alteration, geophys. - I.P., drill - diamond.

8 LOCATION

Burnie SK 55-3 1:250,000 map sheet

APPENDIX I

Diamond Drill Logs - 77 CC6, 77 CC7 and 77 CC8

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DIAMOND DRILL CORE LOG

PROJECT EAST CETHANA

CO-ORDINATES 21600E 35055 AZIMUTH 180° DRILLERS ASSOCIATED COMMENCED 6-12-77 DEPTH 200.50 m HOLE No. 77CC6

RL COLLAR INCLINATION 55° DRILL TYPE Nimbrill F 30 COMPLETED 16-12-77 CASING LEFT Nil DPD No(s)

DEPTH FROM (m)	DEPTH TO (m)	CORE REC. (m)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (m)	TO (m)	REC (m)	ASSAY VALUES Pb	Zn	Cu	Ag	Mn
							618800	2·50	7·00	C	310	105	15	<1	30
0·00	2·50	-			Tricored - no core		297305	7·00	10·00		1000	65	45	1	48
							297306	10·00	13·00		1450	75	40	1	25
2·50	19·50	8·10	NQ3		Dividsed crystal tuff (?)		297307	13·00	16·00		1100	80	80	2	22
					Highly altered and schistose siliceous acid volcanic with	Limonite (many boxworks) on	297308	16·00	19·50		740	220	85	2	19
					porphyritic quartz set in creamy sericitic matrix. Minor	schistosity planes.	297309	19·50	22·90		690	140	90	2	40
					glass shards (?). Badly broken. Schistosity 30°/axis		297310	22·90	25·00		1600	680	210	4	55
							297311	25·00	27·00		1100	485	50	2	85
19·50	35·00	5·50	"		Crystal Tuff (quartz-eye Tuff)	1-2% py > gn > sp.	297312	27·00	31·00		940	470	70	2	80
					Very highly altered and schistose siliceous acid volcanic	Below 31m 4% gn > py > sp in	618801	31·00	33·00	C	3300	2500	55	3	60
					with porphyritic quartz 2-3mm decreasing lower and	very fine grained threads of	618802	33·00	35·00	C	2000	4400	80	3	125
					smaller at base. Colour: pale silvery grey. Highly	schistosity.	618803	35·00	36·50	C	1500	3600	140	3	50
					sericitic with minor chlorite and graphite towards base.		618804	36·50	38·00	C	4500	>1%	160	3	1600
					Very broken. Schistosity 35°/axis		618805	38·00	39·50	C	5000	1·1%	270	4	3100
							618806	39·50	41·00	C	1700	7500	250	3	5300
35·00	38·30	2·40	"		Graphitic vitric tuff	5-7% py : gn : sp > cp	618807	41·00	42·00	C	5600	1400	180	3	5300
					Very fine grained. Black and cream in colour. Highly	disperised throughout. Very	297313	43·00	45·00		820	1250	55	1	4100
					altered / sericitic, with minor chlorite and carbonate.	fine grained.	297314	45·00	46·80		450	290	40	<1	3400
					Badly broken		618808	46·80	48·50	C	1900	900	60	2	3600
							618809	48·50	50·20	C	1800	980	25	1	3300
38·30	64·80	25·70	NQ3		Vitric gently graphitic tuff	Strongly mineralised in places	618810	50·20	52·20	C	3500	1200	60	2	4600
					Very fine grained highly altered (sericite-chlorite-carbonate)	- predominantly v. fine grained	618811	52·20	54·20	C	9200	2800	110	5	3500
					and highly schistose siliceous (cherty ?) in places below	sp > gn with local associated	618812	54·20	56·20	C	6200	1300	190	6	3700
					41·5m. Graphitic material in bands and patches // to	with the graphitic material.	618813	56·20	57·20	C	5300	150	260	14	3500
					schistosity (also bedding?) - average 1cm thick.	Best mineralised zones:	297315	57·20	60·00		2050	1100	45	2	3500
					Schistosity at 45m · 46°/axis ; at 55m 40°/axis	38·3 - 41m 7% py > sp : gn > cp.	618814	60·00	62·40	C	9300	6500	310	5	3500
					Possible bedding at 63m 45°/axis. Few broken zones	41 - 43m 5% sp 3% py	297316	62·40	65·00		890	1250	75	<1	2500
					below 41·5m	47 - 50m 4% sp > gn > py > cp.	297317	65·00	68·00		540	560	48	<1	2350
						50 - 57·2m 7% sp > gn. 3% py. > cp	297318	68·00	71·00		330	190	35	<1	2400
						60 - 62·4m 7% sp > gn > cp. 3% py	297319	71·00	74·00		160	270	38	<1	3240
						Locally sp gn. inclusions	297320	74·00	77·00		330	210	22	<1	3450
						often associated with patches	297321	77·00	79·00		70	180	55	<1	9200
						of carbonate material	618815	79·00	80·00	C	3300	240	115	3	4250
							297322	80·00	83·00		1400	190	48	<1	6300
64·80	87·80	22·40	BQ		Variable quartz-eye Tuffs and Tuff-breccia.	Overall minor sulphides (<1%)	297323	83·00	86·00		640	310	70	1	2450
					Predominantly sandy grey-green Tuff & porphyritic quartz	mainly py with lesser sp. gn. sp	297324	86·00	89·00		95	640	22	<1	1350
					2-3mm in matrix containing small fragments of glass	Best Zones:	297325	89·00	92·00		65	280	35	<1	7700
					and / or feldspar. Tuff-breccia - fine grained cherty	73·5 - 75·5m 2-3% sp : gn : py	297326	92·00	95·00		90	220	42	<1	2150
					vitric tuff fragments up to 3cm in similar or sandy	associated with intense	297327	95·00	98·00		220	260	22	<1	1950
					matrix.	carbonate and bleaching.	297328	98·00	101·00		130	230	22	<1	2450
					All rocks strongly altered to sericite - chlorite - carbonate	79 - 80m 5% sp > gn > py > cp	297329	101·00	104·00		65	110	20	<1	1700
					schists. Chaotic irregular carbonate - quartz - chlorite vein	associated with carbonate veining	297330	104·00	107·00		120	240	20	<1	1500
					veining especially 76·5 - 79·5m and 85 - 89·5m. Core	86 - 92·5 2% sp : gn > py > cp.	297331	107·00	110·00		160	840	55	<1	1600
					badly broken in places from 76·5 - 89·5m. Fault at 83·5m		297332	110·00	113·00		110	230	42	<1	1300
					Schistosity 70m 40°/axis ; 86m 45°/axis. Possible bedding		297333	113·00	116·00		250	220	28	1	2450
					(orientation of breccia fragments) at 72·5m 45°/axis.		297334	116·00	119·00		15	700	48	<1	2500
							297335	119·00	122·00		20	320	42	<1	4500
87·80	103·20	15·20	NQ3	BQ	Altered variable porphyritic acid volcanic (tuff?)	Minor pyrite and sp. gn.	297336	122·00	125·00		28	560	25	<1	3400
					Hard, siliceous, multicoloured - varies from cream to grey-	<1% overall. Many zones	297337	125·00	128·00		30	940	25	<1	3500
					green but generally characterised by small blotchy apricot	completely devoid of sulphides.	297338	128·00	131·00		250	820	40	1	2800

SUMMARY AND SPECIAL COMMENTS: Sequence of Tuffs with persistent interpreted sulphides, some significant mineralisation in graphitic zones

Hand hole surveys: 30m 53·5°/60m 50·5°/90m 45°/120m 37°/150m 32·5°/180m 27·5° (EASTMAN READING 210° at 120m = 39°)

LOGGED BY G. PURVIS DATE 13-12-77

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CRAE 117 PLAN No M 046

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PROJECT

DRILL CORE LOG

CO-ORDINATES | AZIMUTH | DRILLERS | COMMENCED | DEPTH | HOLE No. 77cc6

RL COLLAR | INCLINATION | DRILL TYPE | COMPLETED | CASING LEFT | DPO No(s)

DEPTH FROM(M)	DEPTH TO(M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALISATION	SAMPLE No.	FROM (M)	TO (M)	REC (M)	ASSAY VALUES Pb	Zn	Cu	Ag	Mn
					Coloration (iron oxide?) Abundant porphyritic quartz up to 6mm - average 3mm. Small fragments (?) of glass and/or feldspar in matrix. Rare grains chlorite up to 1cm.		297339	131·00	134·00		190	240	22	<1	2200
					Vague clast outlines up to 4cm x 3cm suggest intensely silicified		297340	134·00	137·00		95	200	25	1	1600
					brecciation. Alteration - sericite with carbonate and chlorite.		297341	137·00	140·00		110	170	25	1	2050
					Rock is schistose - schistosity at 100m 55°/axis (varies)		297342	140·00	143·00		250	500	20	1	2500
					Numerous fine qtz-carbonate veins.		297343	143·00	146·00		170	240	20	1	1550
							297344	146·00	149·00		110	560	18	<1	1500
							297345	149·00	152·00		160	450	25	1	1500
							297346	152·00	155·00		150	350	32	2	1600
103·40	131·50	27·90	BQ		Altered variable porphyritic acid volcanic (Tquimbrite?).	Very minor sulphides - py, sp, gn	297347	155·00	158·00		240	600	25	1	2000
					Very similar to above - essentially tuffaceous in character.	<<1%	297348	158·00	161·00		32	300	38	1	2500
					Hard, siliceous grey-green av. bleached in places to	Trace haematite.	297349	161·00	164·00		65	340	22	1	3250
					pale fawn. Porphyritic quartz - small at top becoming larger		297350	164·00	167·00		20	180	18	<1	2950
					and (up to 6mm) and more abundant towards base.		297351	167·00	170·00		430	1200	70	2	1800
					Matrix contains feldspar laths and glass fragments, generally		297352	170·00	173·00		740	1350	220	3	1900
					lineated.		297353	173·00	176·00		60	700	110	1	2400
					Vague outlines of breccia clasts in more tuffaceous upper part		297354	176·00	179·00		540	960	140	1	1950
					of interval.		297355	179·00	182·00		110	620	180	2	1940
					Altered to sericite - chlorite - carbonate schist. Alteration uneven		297356	182·00	185·00		200	1100	75	2	2500
					- some weak patchy silicification (?) thin irregular veins		297357	185·00	187·20		430	1100	50	1	3100
					of carbonate, rarely quartz. Badly broken 111·3 - 113·7m.		618819	187·20	189·00	C	440	660	120	4	2300
					Schistosity: 110m 45°/axis 120m 45°/axis (varies).		618820	189·00	191·00	C	550	1800	165	4	2000
					130m 55°/axis.		618821	191·00	193·00	C	1100	3500	90	2	3300
					Gradual change around 131·5m.		618822	193·00	195·00	C	1200	3300	105	3	1100
							618823	195·00	197·00	C	740	2000	90	3	1800
131·50	167·50	36·00	BQ		Altered variable porphyritic acid volcanic - fine lapilli tuff(?)	Traces of py, sf, gn - mainly	297440	197·00	200·50		200	2050	640	7	2600
					Similar to above.	associated with qtz-carbonate									
					Grey-green or fawn tone apricot coloration (iron oxide?)	veining.	Whole hole average:				962	1098	76	1	2550
					Abundant porphyritic quartz average 3-4 mm, in matrix										
					containing glass shards, feldspars and other fragments		Petrological samples:								
					averaging 1-2 mm, rarely up to 5mm. Alteration variable		618816	103·70							
					and patchy - rock is a sericite-chlorite-carbonate schist.		618817	115·20							
					Thin irregular qtz-carbonate veins particularly 159-166m -		618818	151·50							
					some fracturing in this zone including fault @ 30°/axis 161-161·1										
					Much internal brecciation of rock in places.										
					Schistosity: 135m 55°/axis, 145m 48°/axis, 151·5m 63°/axis, 162·5°/axis.			Best Intervals:							
					Faulted contact at base 30°/axis?			131·00	143·00	12	3442	6308	142	3	
							including:								
167·50	187·20	19·70	BQ		Altered tuffaceous grit/breccia - reworked acid volcanic	169-177m 2% pyrite with		136·50	141·00	4·5	3333	11·9%	227	3	
					fragmental debris.	minor gn, sp, cp. Some									
					Dark banded grey-green pink creamy bleached zones.	very fine grained black pyrite in		150·2	162·4	12·2	5933	2412	137	5	
					Fine gritty tuff, sandy tuff and fine grained vitric tuff	graphitic bands	including								
					with clastics and fragments (often well-rounded) of	Estimate < 1% pyrite, trace		151·2	154·2	3	9200	2800	110	5	
					qtz, cherty tuff, vitric tuff, glass and feldspar; up to 3cm	gn, cp, sp.		160·0	162·4	2·4	9800	6500	310	5	
					average < 5mm. Minor traces of graphite.										
					Bedding indistinct, badly disrupted and brecciated.										
					Pervasive alteration - sericite - chlorite with minor carbonate.			183·0	200·5	11·5	743	3467	273	4	
					Rock is schistose. Qtz-carbonate veining very minor.										
					Bedding: 173m 65°/axis, 180·5m 73°/axis. Bedding										
					contact at base 70°/axis.										

SUMMARY AND SPECIAL COMMENTS: Largely banded porphyritic acid volcanic passing to coarse tuff with minor pyrite

LOGGED BY G. Purvis DATE 16·12·77

SHEET 2 OF 3

CRAE WT PLAN No. M 446

C.R.A. EXPLORATION PTY. LIMITED

PROJECT

DRILL CORE LOG

CO-ORDINATES | AZIMUTH | DRILLERS | COMMENCED | DEPTH | HOLE No. 77CC6

RL COLLAR | INCLINATION | DRILL TYPE | COMPLETED | CASING LEFT | DPO No(s)

012

DEPTH FROM (M)	DEPTH TO (M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	REC (M)	ASSAY VALUES
187.20	194.20	7.00	BQ		Graphitic vitric tuff. Grey, fine grained, almost a tuff-shale in places. Bedding badly disrupted. Local brecciation and net-vein fracturing with carbonate and pyrite infilling. Weakly-moderately altered and schistose (a sericite-chlorite-carbonate schist). Bedding 190.5m 53°/axis, 191m 72°/axis 191.5m 35°/axis. At 191.9m - three probable graded beds with facing downhole.	3% pyrite - patchy. Minor Trace qn, cp. Some pyrite is syngenetic in massive beds to 3mm. Other remobilised into spidery hairline stringers.					
194.20	200.50	6.30	BQ		Altered tuff. Coarsely sandy massive tuff at base, fine grained irregularly bedded tuff > tuff shale at top. Traces of graphite. Small qtz fragments 2-3mm at base, with clasts of tuff, feldspar and/or glass. Bedding irregular and disrupted - probably stiff-sed deformation. Altered - Sericite, chlorite, minor carbonate. Schistose. Bedding: 196.2m 37°/axis 198m 70°/axis Fault at base - rock is bleached. END OF HOLE. Results of Petrological samples. GIPP16 - 103.70m - Strained, sericitised porphyritic rhyolite. An extrusive (or shallow intrusive) lava showing flow banding. GIPP17 - 115.20m - Mildly sheared, altered porphyritic rhyolite. Flow banding present, bt is indiscernible. GIPP18 - 151.50m - Mildly sheared, altered porphyritic rhyolite. Similar to above.	3% pyrite at top in fine tuffs decreasing to 1-2% in sandy tuffs. Trace <<1% at base. Minor qn cp. Pyrite as in remobilised veins and stringers.					

SUMMARY AND SPECIAL COMMENTS: Graphitic tuff with 3% pyrite, passing downwards into coarser bedded tuffs.

LOGGED BY G. Purvis DATE 19-12-77

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APPENDIX 1 PAGE 3

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C.R.A. EXPLORATION PTY. LIMITED

DIAMOND DRILL CORE LOG

PROJECT EAST CETHANA – TASMANIA

CO-ORDINATES 21600 E 3718.5 S AZIMUTH 190° DRILLERS ADD COMMENCED 19.12.77 DEPTH 137.40m HOLE No. 77CC7

RL COLLAR INCLINATION 50° DRILL TYPE MINDRILL F30 COMPLETED 11.1.78 CASING LEFT 6m HQ DPO Hotel

DEPTH FROM (m)	DEPTH TO (m)	CORE REC. (m)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	REC (M)	ASSAY VALUES Pb	Zn	Cu	Ag	Mn
0.00	3.90	2.70	HQ		Chloritic tuff and tuff-breccia (altered). Green with brown limonite on joints. Fine grained chloritic and sericitic acid volcanic tuff-schistose. Tuff internally bedded in places. Bedding 20° and 35°/axis. Core badly broken.	3-5% dispersed pyrite, limonite after sulphides on joints. Minor haematite.	618835	1.10	3.00	c	350	660	25	2	200
							618836	3.00	4.50	c	270	820	20	3	300
							618837	4.50	6.00	c	200	900	20	3	1100
							618838	6.00	7.50	c	90	860	10	2	1100
							618839	7.50	9.00	c	105	820	20	2	1400
							618840	9.00	10.50	c	130	1200	15	3	1100
3.90	14.60	10.30	NQ	1m 5.7m	Chloritic gritty tuff. Dark green tuff containing sub-rounded fragments of quartz up to 5mm in matrix of small fragments of feldspar, glass and tuff (tuff clasts rarely to 1.5cm). Zones of net vein stockwork. Several qtz veins 1-2 cms wide. 30°/axis. At 5.5m bedding 38°/axis (high angle to qtz veining).	3-5% pyrite. Minor haematite. Trace cpy in qtz veins.	618841	10.50	12.00	c	320	1300	20	4	720
							618842	12.00	13.50	c	200	1100	25	4	1200
							618843	13.50	14.50	c	50	690	15	2	2200
							618851	14.50	19.00		60	860	290	5	1600
							618852	18.00	21.00		75	500	130	3	2600
							618853	21.00	24.00		120	580	130	3	2600
							618854	24.00	27.00		300	360	65	2	2400
14.60	29.00	12.60	NQ		Variable crystal tuff - altered. Pale grey-green. Siliceous acid volcanic with abundant porphyritic quartz up to 7mm; smaller green feldspar and/or glass fragments generally 2mm. Rock has been altered to a sericite-carbonate schist. Several propy shear zones:- 14.6-16.1m 65°/axis - with qtz veins up to 15cm wide; and others down to 26m. At 20.5m fine grained tuff interbeds 40°/axis. [redacted] sheared basal contact 55°/axis.	2-3% py. Trace cpy + haematite. Locally +5% py lens in bands to 6cm thick 35°/axis.	618855	27.00	30.00		90	450	40	1	2200
							618856	30.00	32.50		150	620	25	2	2100
							618857	32.50	35.00		95	560	30	2	3400
							618858	35.00	37.50		55	440	25	1	2200
							618859	37.50	40.00		[redacted]			2	3000
							618860	40.00	42.50		40	520	25	1	2400
							618861	42.50	45.50		135	640	45	2	3700
							618844	45.50	46.50	c	270	1300	15	3	3500
							618845	46.50	48.00	c	330	1200	40	2	720
							618846	48.00	49.00	c	340	1200	40	5	2200
29.00	123.40	93.80	BQ	1m 5m	Altered tuff. Grey, fine grained pyroclastic tuff with coarsely sandy texture. Recrystallised small porphyritic qtz (1mm maximum/3mm) and fragments (<1mm) of glass and/or feldspar in vitric matrix. Strongly sericitic and schistose, lesser carbonate (strong in places), very minor chlorite. Cemented fines grained with possible bedding evident, below 108m. Quartz-carbonate veining in places. Numerous small shears - especially 42.4-42.7m, 46.4-47.2m, 94.4-95.4m, 110.3-112.5m. Schistosity: 30.5m 42°/axis, 40m 55°/axis, 43m 48°/axis, 62m 60°/axis, 78m 43°/axis, 91m 55°/axis, 114.5 60°/axis. Bedding: 81m 50°/axis, 96m 52°/axis, 108.5m 65°/axis, 121.5m 60°/axis. Basal contact 68°/axis.	28-45.5m: Overall 1-2% py (3-5% py 38-40m). Minor haematite. Trace cpy.	618847	49.00	50.00	c	250	2200	30	3	4800
							618848	50.00	51.00	c	165	960	20	2	6600
							618849	51.00	52.00	c	280	1800	30	3	5300
							618862	52.00	53.00	c	120	540	35	<1	4800
						45.5-62.2m: 2-7% py, overall 4% mainly in stringers and massive bands // schistosity, upto 3cm average 2-5mm. Abv v fine dissemination. Minor gn sp. cp assoc c py. Locally 1%	618850	53.00	54.00	c	490	2300	30	2	3300
							618863	54.00	55.50	c	420	2000	28	1	2650
							618864	55.50	56.50	c	320	1000	60	1	1500
							618865	56.50	58.00	c	650	2150	38	1	550
							618866	58.00	59.00	c	550	1200	60	1	1250
							618869	59.00	60.50		140	760	50	1	4400
						62.2-62.8m: SEMI-MASSIVE BANDED PYRITE (70%). Sharp contact upper 55°/axis, lower 45°/axis. Minor gn, sp.	618870	60.50	62.20		3550	1000	42	2	5600
							618867	62.20	62.80	c	1400	4550	90	<1	2450
							618871	62.80	65.00		110	760	45	<1	5200
							618872	65.00	67.00		140	500	45	1	5600
						62.8-123.4m: Overall 2% py minor sp, gn and haematite. Best zones 68.5-70.5m 4% py, 74.5-83.2m 4% py, 107.3-108.3 5% py, 1% sp, gn 108.3-112.5m	618873	67.00	68.50		580	580	80	2	5200
							618869	61.50	70.50	c	1000	3750	40	2	4900
							618877	70.50	73.00		470	960	35	1	5200
							618879	73.00	75.50		650	2250	65	2	3300
							618880	75.50	78.00		530	2700	160	3	2100
							618883	78.00	80.50		1100	2150	95	5	350
						123.40-132.8m: Minor sp, gn, py + haematite	618884	80.50	83.00		1050	3650	70	2	3700
							618885	83.00	86.00		170	2050	40	1	5400
132.80	137.40	4.60	BQ		Altered lapilli tuff. Variation of above rock type. Pale grey-green, more siliceous with less porphyritic qtz and strongly lineated veined with flattened fragments of glass. Fines grained at base. Sericite, carbonated, [illegible] schistose. (70°/axis) - probably after primary mineral lineation. END OF HOLE.	132.8-137.4m: 3% dispersed haematite. Minor gn, sp, py, cp.	618886	86.00	89.00		440	640	50	2	3800
							618887	89.00	92.00		480	720	55	2	4200
							618888	92.00	95.00		410	1200	50	2	2300
							618889	95.00	98.00		760	720	60	2	7500
							618890	98.00	101.80		240	420	40	2	3000

SUMMARY AND SPECIAL COMMENTS: Altered tuffs, highly pyritic in places, with very minor fracture fill. Hole Surveys: (azimuth/dip) 30m 47.5°/60m 42.5°/90m 38°/120m 32°.

LOGGED BY G. PURVIS DATE 12.1.78

SHEET 1 OF 2

CRA 117 PLAN No 19-946

013

APPENDIX 1 PAGE 4 of 8

132014

C.R.A. EXPLORATION PTY. LIMITED

PROJECT

DRILL CORE LOG

CO-ORDINATES | AZIMUTH | DRILLERS | COMMENCED | DEPTH | HOLE No. 77CC7

RL COLLAR | INCLINATION | DRILL TYPE | COMPLETED | CASING LEFT | DPO No(s)

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	REC (M)	ASSAY VALUES Pb	Zn	Cu	Ag	Mn
					Petrological Samples:		618991	101·00	104·00		250	1180	50	2	2400
					618878: 89·8m - Sheared, altered lithic vitric tuff.		618992	104·00	107·00		650	1100	55	2	1·05%
					618891: 126·4m - Sheared, altered vitric-crystal tuff (ignimbrite?).		618993	107·00	109·30		600	640	40	2	9200
					618892: 131·6m.		618994	109·30	110·50	C	2100	1500	49	3	1%
							618875	110·50	111·50	C	1300	2930	186	3	1·2%
							618876	111·50	112·50	C	1600	1900	248	3	1·12%
							618994	112·50	115·50		360	820	30	1	1·1%
							618895	115·50	118·50		960	2000	68	3	1·05%
							618896	118·50	121·50		1200	620	50	2	1%
							618897	121·50	124·50		1300	1500	50	2	1·25%
							618898	124·50	127·50		360	540	48	1	9200
							618899	127·50	130·50		350	780	65	2	1·3%
							618900	130·50	133·50		600	1040	145	2	1·5%
							618901	133·50	136·00		440	1160	80	2	1·3%
							618902	136·00	137·40		660	1180	50	1	1·3%
							Whole hole average:				482	1237	61	2	5180
							Best Intervals:								
								62·2	62·8	0·6	1400	4550	90	<1	
								68·5	86·00	17·5	693	2453	72	2	
								109·3	112·5	3·2	1634	2009	149	3	

014

CRAE H7

SUMMARY AND SPECIAL COMMENTS

LOGGED BY G. PURVIS DATE 12·1·78

SHEET 2 OF 2

APPENDIX 1 PAGE 5

132015

C.R.A. EXPLORATION PTY.[T] LIMITED

DIAMOND DRILL CORE LOG

PROJECT EAST CETHANA – TASMANIA

CO-ORDINATES 21750E 42·5N AZIMUTH 180° DRILLERS A.D.D. COMMENCED 16·1·78 DEPTH 157·60m HOLE No. 78CC8

RL COLLAR INCLINATION 55° DRILL TYPE Mini Drill E 30 COMPLETED 29·1·78 CASING LEFT 3m HQ DPO No(s)

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	REC (M)	ASSAY VALUES Pb	Zn	Cu	Ag	Mn
0·00	8·40		HQ to 2·95m Then NQ		Highly altered siliceous kff. Creamy-white very fine grained, highly sericitic & locally silicified, highly broken and sheared with clayey zones. Highly schistose / schistosity at 0·5m 37°/axis.	Minor limonite stained	618994	0·00	2·00		200	340	55	<1	1350
							618995	2·00	4·00		240	140	55	3	190
							618996	4·00	6·00		420	150	90	17	190
							618997	6·00	8·00		2550	85	80	10	160
							618998	8·00	10·00		1550	1650	110	5	70
8·40	14·50		NQ		Highly altered crystal kff. Creamy-grey, very sericitic and schistose. Numerous porphyritic quartz generally < 2mm. Irregularly silicified with 'knots' of quartz up to 2cm and some barren quartz veins. Very clayey and broken. Schistosity at 12·5m 35°/axis.	Minor limonite down to 11·8m 8·3-14·5m: 1% py. Minor sp.	618999	10·00	12·00		850	1100	120	3	120
							619000	12·00	14·00		2150	1050	780	2	75
							297287	14·00	16·00		400	560	28	<1	75
							297288	16·00	18·00		230	2700	120	<1	120
							297289	18·00	20·00		100	1350	32	<1	[illegible]
							297290	20·00	22·00		210	330	75	1	9600
							297291	22·00	24·00		140	2150	60	<1	7500
14·50	25·50		NQ		Highly altered cherty kff. Very sericitic and siliceous it/very-grey kff. Very fine grained with minor bands of crystal kff. Core very badly sheared, brecciated, clayey and broken. Schistosity at 21·5m 40°/axis.	Minor py. Some qn associated with carbonate veins below 19m.	297292	24·00	26·00		170	520	30	<1	1650
							297293	26·00	28·00		140	1450	45	<1	2900
							297294	28·00	30·00		100	860	110	2	2500
							297295	30·00	32·00		160	1650	120	1	5800
							297296	32·00	32·75	C	1500	5000	130	3	1·34%
							297297	32·75	33·50	C	460	1700	12	1	6800
25·50	29·60		NQ		Highly altered gritty crystal kff. Creamy-green, sericitic and highly schistose, clayey-broken. Schistosity at 27·5m 30°/axis. Banding (bedding?) 26·5m 20°/axis. Porphyritic quartz < 2mm and abundant bleached glass fragments 2mm.	Trace py-sp.	297298	33·50	35·50		140	960	35	<1	4550
							297299	35·50	37·50		270	1050	95	1	6400
							297300	37·50	40·00		150	700	120	2	6100
							297301	40·00	42·00		180	580	85	2	7200
							297302	42·00	44·00		45	540	45	<1	4700
							297303	44·00	46·00		560	740	110	2	3600
29·60	40·25		NQ		Highly altered, often cherty kff. Pale creamy-grey very fine grained, highly sericitic and schistose, very intensely in places - especially near top of interval. Banded, possibly after bedding. Core very badly broken and sheared. Minor porphyritic quartz up to 2mm, below 34m. Qz veins 38·5-38·86; 39·05-39·[illegible]m. Bedding? 32m 15°/axis. Schistosity 36·5m 40°/axis. Basal contact 25°/axis.	32·10-32·50 2% py, 1-2% sp, qn up. Fine dark minor py, sl, qn.	297304	46·00	48·00		40	490	42	<1	6200
							297393	48·00	51·00		580	230	35	<1	5840
							297394	51·00	54·00		240	540	48	<1	4350
							297395	54·00	57·00		1150	3150	140	2	1·12%
							297396	57·00	60·00		340	900	38	<1	9700
							297397	60·00	63·00		240	950	18	<1	9800
							297398	63·00	66·00		430	470	30	<1	2650
							297399	66·00	69·00		330	540	35	<1	2600
							297400	69·00	72·00		1150	490	50	2	1950
40·25	55·50		NQ		Altered crystal kff and kff breccia. Greenish-cream, cherty kff with porphyritic quartz and glass shards 2-3mm, shards up to 7mm towards base. Characteristic thin ret. vein fractures with filling of chl/ct or carbonate - rock generally fairly brecciated internally. Schistosity very strong, but rock is not broken than before. Shearing and clayey zones largely confined to adjacent to the numerous qz-chl/ct veins 5-40 cms wide. Schistosity 45m 35°/axis, 55·5m 37°/axis.	1% py. Minor sp, qn.	297401	72·00	75·00		45	330	22	<1	5600
							297402	75·00	78·00		200	550	28	<1	3500
							297403	78·00	81·00		800	3150	55	<1	2700
							297404	81·00	84·00		400	1550	60	<1	3400
							297405	84·00	87·00		460	1250	200	<1	3500
							297406	87·00	90·00		660	1300	110	<1	4600
							297407	90·00	92·50		850	2400	70	1	3950
							297408	92·50	95·00		340	800	30	<1	4200
							297461	95·00	97·00	C	1150	4600	240	2	2900
							297410	97·00	99·00		1050	3250	110	1	2200
55·50	62·30		NQ		Altered, silicified crystal-lapilli kff. Green and brecc. very siliceous at top of interval. Increase in chl/ct with depth. Prominent porphyritic quartz up to 5mm, feldspar/glass 2-3mm. Clasts of lapilli kff, kff and quartz below 60·8m. Sericitic, much carbonate in veinlets and patches. Schistose, broken, some qz veins. Basal bedding contact 37°/axis.	Minor py, haematite, sp+qn.	297411	99·00	101·00		650	2900	140	1	1900
							297412	101·00	103·00		1450	3450	200	2	4800
							297413	103·00	105·00		1800	4600	210	2	5600
							297414	105·00	107·00		320	1200	70	<1	6200
							297415	107·00	109·00		540	1200	130	<1	1·05%
							297416	109·00	111·00		1500	1950	120	1	7000
							297417	111·00	113·00		2000	4450	120	3	9900

SUMMARY AND SPECIAL COMMENTS: Highly altered siliceous kff with very minor sulphides.
Acid tube surveys: 30m 52·5° / 60m 45° / 84m 40° / 120m 32·5° / 157m 25°.

LOGGED BY G. PURVIS DATE 27·1·78

SHEET 1 OF 3

CRAE MT PLAN No 8444

015

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132016

C.R.A. EXPLORATION PTY. LIMITED

DRILL CORE LOG

PROJECT

CO-ORDINATES | AZIMUTH | DRILLERS | COMMENCED | DEPTH | HOLE No. 71cc8

RL COLLAR | INCLINATION | DRILL TYPE | COMPLETED | CASING LEFT | DPD No(s)

DEPTH FROM (m)	DEPTH TO (m)	CORE REC (%)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	REC (M)	ASSAY VALUES Pb	Zn	Cu	Ag	Mn
62.30	71.90		NQ		Altered crystal lapilli tuff. Variable, multicoloured, silicified porphyritic quartz 2-4 mm glass 2-4 mm, in gritty matrix sericitic, chloritic - schistose. Mod. irregular carbonate veining. Numerous sheared and broken zones, some fine axis // Rare // schistosity. Most siliceous zones are badly fractured. Shear 65.85 - 66.70 20°/axis. Basal shear 45°/axis.	63 - 63.8m 1% sp, gn, cp. Minor Ebenhure minor sp, gn, py	297418	83.00	115.00		300	580	85	2	5500
							297419	115.00	117.00		340	1900	110	2	4950
							297420	117.00	119.00		780	2050	230	1	4000
							297421	119.00	121.00		760	2290	220	1	2800
							297422	121.00	123.00		1050	640	42	1	5200
							297423	123.00	125.00		190	420	48	<1	4000
							297424	125.00	127.00		370	960	30	<1	2200
							297425	127.00	129.00		960	1200	42	1	3000
71.00	73.85		NQ		Fault zone. Badly broken schistose tuff to 72.2m ; below this siliceous tuff fragments in a blond carbonate matrix with sericitic rock flour. Basal contact 35°/axis.	Trace sp, gn, py.	297426	129.00	131.00		340	560	35	<1	2600
							297427	131.00	133.00		110	300	38	<1	8400
							297428	133.00	135.00		29	250	55	1	3500
							297429	135.00	137.00		180	350	60	<1	4400
							297430	137.00	139.00		48	240	65	<1	2300
73.85	76.85		NQ		Altered siliceous crystal lapilli tuff. Abundant porphyritic qtz 3-4mm, small glass 1-2mm. Thin carbonate veinlets, some qtz veins. Chloritic in places.	Trace py, sp, gn	297431	139.00	141.00		15	310	90	<1	2900
							297432	141.00	143.00		330	900	60	1	2600
							297433	143.00	145.00		230	500	109	1	2900
							297434	145.00	147.00		740	1400	140	2	2300
76.85	84.50		NQ		Chloritic gritty tuff and tuffaceous breccia. Green, sericitic and chloritic. Fragments of tuff crystal, tuff glass and qtz generally 2-5mm in sandy matrix. Siliceous. Occasional larger clasts up to 4cm. Numerous green cherty layers. Moderate carbonate. Several qtz-chlorite veins. Bedding: 78.5m 15°/axis; 81m 47°/axis. Irregular bedding contact at base 45°/axis.	Very minor py, gn, sp, cp.	297435	147.00	149.00		300	460	30	1	1400
							297436	149.00	151.00		110	440	45	<1	1200
							297437	151.00	153.00		230	400	29	<1	1400
							297438	153.00	155.00		240	640	30	<1	1550
							297439	155.00	157.60		140	370	30	<1	1600
							Whole Hole average:				540	1260	88	1	4200
							Best 9 intersections:								
84.50	95.00		BQ		Altered gritty tuff and breccia. Similar to above except more strongly schistose and bleached. Grey-grey with minor chloritic zones characteristically with abundant qtz fragments 2-3mm. Fragments of tuff, chert, glass angular to sub-rounded (especially larger clasts). Numerous disrupted beds of grey tuffaceous chert. Locally much dispersed carbonate especially chloritic zones. Bedding: 86.5m 57°/axis, 91.5m 47°/axis. Basal contact 60°/axis.	Minor py, sp, gn.		92.00	92.75	0.75	1500	5000	130	3	
								94.00	97.00	3.0	1150	3150	140	2	
								95.00	105.00	10.0	1220	4120	180	2	
95.00	115.40		BQ		Chloritic tuff and tuff-shale. Cherty fragments many. Dark greenish-grey, fine grained vitric and siliceous tuff. Chloritic, sericitic, carbonated and schistose. Below 100m, tuff is very cherty and hard - very fractured and brecciated with carbonate infilling. Tectonic fault breccia 106.1 - 107.1 + 107.5 - 108.5 (15°/axis). Bedding: 97m 52°/axis; 109.5m 57°/axis.	Locally 1% sp, gn with trace py and cp. Overall: minor sp, gn, py, cp.									
115.40	116.00		BQ		Fault Zone. Quartz vein and 20cm cavity. Producing water.										
116.00	125.10		BQ		Chloritic tuffaceous grit / breccia. Dark grey-green, chloritic, sericitic and schistose. Fragments generally 1-4mm of glass, qtz, chert, and tuff	Minor py, sp, gn, cp										

SUMMARY AND SPECIAL COMMENTS: Sedimentary tuffs, cherts, grits and breccias, with minor tuffaceous

LOGGED BY G. PURVIS DATE 23.1.78

SHEET 2 OF 3

CRAE HT PLAN No 81-0-004

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APPENDIX 1 PAGE 87 of 88

132017

C.R.A. EXPLORATION PTY. LIMITED

DRILL CORE LOG

PROJECT

CO-ORDINATES | AZIMUTH | DRILLERS | COMMENCED | DEPTH | HOLE No. 78CC8

RL COLLAR | INCLINATION | DRILL TYPE | COMPLETED | CASING LEFT | DPO No(s)

DEPTH FROM (M)	DEPTH TO (M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALISATION	SAMPLE No.	FROM (M)	TO (M)	REC (M)	ASSAY VALUES
					Numerous larger sub-rounded clasts, generally 4-8mm but up to 5cm. Matrix often very dark chloritic tuff. Rock is very fibrous in parts - especially at base. Moderate carbonate. Several large qtz veins almost // core axis. 122.5 - 123.5m. Shear at base 62°/axis. Bedding? ~~80~~ 111m 57°/axis.						
125.10	131.50		BQ		Chloritic sandy tuff. Evenly textured, well bedded, dark green tuff Sericitic and schistose. Abundant fragments of qtz. glass and tuff <2mm most <1mm Rare larger clasts, flattened, up to 1.5cm. Bedding: 130.5m 58°/axis Fold hinge 129.15m Bedding contact at base.	Trace py, qtz, sp.					
131.50	157.60		BQ		Altered gritty crystal tuffs and tuffaceous breccia. Mt Cap fine banded siliceous at base dark green and chloritic. Porphyritic quartz 2-5mm, also glass and tuff fragments generally <3mm, Occasional clasts of chloritic tuff, qtz and siliceous gritty tuff up to 6cm. Sericitic chloritic schistose. Much dispersed carbonate especially in chloritic rocks towards base. Rare pebble bands of black chert. Bedding: 141.5m 73°/axis, 146m 58°/axis.	Increasing pyrite towards base but small. 146-149 2% py. 149.3-150.8 5% py. 155.9-157.6 3% py.					
					END OF HOLE						

SUMMARY AND SPECIAL COMMENTS: Altered gritty tuffs with 2-5% py below 145m.

LOGGED BY G. PURVIS DATE 30-1-78

SHEET 3 OF 3

APPENDIX 1 PAGE 8 of 8

1320118

CRAE HT PLAN No 9446

APPENDIX II

Petrological Descriptions of Drill Core Samples

132020

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 11.1.78

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
618816
STRESSED, SERICITISED PORPHYRITIC RHYOLITE

Job No. CMS 78/1/4 Date Received: 5.1.78

Reference DPO 00158

Sample No. 618816 103-70m 77CC6

Nature of Sample: D.D. Core

DESCRIPTION **SECTION No.** 23177

a. Hand Specimen:

Pale grey fine-grained porphyritic rock. K-feldspar stain test negative.

b. Microscopic:

This is a sheared, sericitised porphyritic rhyolite; the term rhyolite is used in a broad sense, since the feldspars are completely altered and therefore indeterminate; however, the abundance of quartz phenocrysts is in keeping with a rhyolitic composition, and the fabric is that of a lava rather than a pyroclastic rock.

Quartz phenocrysts are common, and show strong strain-extinction, with some microfracturing and disruption, due to dynamic metamorphism after consolidation. Feldspar phenocrysts are sericitised and there is no indication (e.g. relict lamellar twinning) as to their former composition.

The groundmass is flow banded and now consists of fine quartz and sericite; relict textures indicate that the groundmass was at least partly glassy and was devitrified.

Poorly-defined streaks and patches of leucoxene occur throughout; veinlets and individual small crystals of secondary carbonate have formed, with occasional coarser aggregates.

This rock may have been a shallow/minor intrusive, or extrusive, depending on its relationship to surrounding rocks; it appears similar to some of the Mt. Read volcanics.

H.W. Fander, M.Sc.

HBJ 65652

132021

Date 11.1.78

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
618817
ALTERED PORPHYRITIC RHYOLITE

Job No. CMS 78/1/4 Date Received: 5.1.78

Reference DPO 00158

Sample No. 618817 115.20m 77CC6

Nature of Sample: D.D. Core

DESCRIPTION **SECTION No.** 231178

a. Hand Specimen:

Pale, porphyritic, fine-grained rock; K-stain test negative.

b. Microscopic:

The same problem of classification arises with this rock as with 618816, in that feldspars are sericitised; in a broad sense this is a porphyritic rhyolite, altered and mildly sheared. It differs in some textural details and in style of alteration from 618816 but is otherwise broadly similar.

The quartz phenocrysts are stressed, sometimes fragmented, and generally small; feldspar phenocrysts were sericitised and subsequently drawn out through mild shearing. The groundmass now consists predominantly of small interlocking quartz patches, typical of devitrified, silicified glass; there are vague indications of perlitic structures, in keeping with a glassy groundmass. Flow-banding is present but inconspicuous, and is overprinted and obscured by later shearing.

Apart from general effects of mild shearing throughout, there are zones of more massive sericitie with schistose orientation. Carbonate is fairly abundant, as small single crystals, aggregates and veins. Accessory cloudy leucoxene, and occasional zircon crystals occur.

H.W. Fander, M.Sc.

HBJ 65652

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 11.1.78

021

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
618818
ALTERED PORPHYRITIC RHYOLITE

Job No. CMS 78/1/4 Date Received: 8.1.78

Reference DPO 00158

Sample No. 618818 151.50m 77CC6

Nature of Sample: D.D. Core

DESCRIPTION **SECTION No.** 23179

a. Hand Specimen:

Pale grey fine-grained rock with few phenocrysts; K-stain test negative.

b. Microscopic:

A mildly sheared, altered porphyritic rhyolite, very similar to 618816/7 and differing only in minor details of little significance.

Irregular quartz phenocrysts are scattered fairly sparingly through the rock and are stressed, disrupted and fragmented. Feldspar phenocrysts are recognisable only as elongate streaks of sericite. The groundmass has relict devitrification textures and now consists of fine quartz and wisps of sericite, with some flow-banding and relict perlitic cracking.

Large and small masses of fibrous carbonate have developed, and also occur as veinlets cutting quartz phenocrysts; massive lenses and veinlets of cryptocrystalline illite are also present.

As with the other rocks, it is now not possible to determine whether this rock was intrusive or extrusive; however, acid extrusives are often partly fragmental or pyriclastic, or incorporate solidified lava and show flow-brecciation. Such features were not observed and the original rock must have been fairly homogeneous, favouring (but not proving) an intrusive origin.

H.W. Fander, M.Sc.

H&J 65652

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 27.1.78

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
618878
ALTERED, SHEARED RHYOLITIC TUFF (?IGNIMBRITE)

Job No. CMS 78/1/14 Date Received: 23.1.78

Reference DPO No. 00168

Sample No. 618878 88.8m 77CC7

Nature of Sample: D.D. Core

DESCRIPTION **SECTION No.** 23269

a. Hand Specimen:

Grey siliceous altered fragmental ?rhyolite, K stain negative.

b. Microscopic:

This is a strongly altered and mildly sheared fragmental rhyolite, considered as primarily a lithic vitric tuff although much of the finer textural detail has been obliterated.

Mineralogically the rock consists of quartz and slightly subordinate semi-orientated sericite with accessory traces of very fine grained ankeritic carbonate and leucoxenised primary opaques. Texturally it comprises mainly poorly sorted porphyritic "rhyolitic" lava clasts (< 500μ - 5 mm +) now somewhat flattened in response to shearing. Interclast areas are relatively sericitic and on close inspection show microtextures reminiscent of semi-lineated sericitised shards. There are a few discrete quartz crystal fragments but insufficient to warrant the term lithic-vitric-crystal tuff.

The altered lava clasts show frequent relict phenocrystal quartz grains and occasional completely sericitised feldspar phenocrysts. These are typically enclosed in microcrystalline quartz with subordinate but variable proportions of sericite. A few clasts show faint relict flow banding and the majority appear to have been glassy at least in part. There are no recognisable pumiceous or distinctly pyroclastic fabrics within the clasts. However, the rock, overall, has a certain ignimbritic character and an extrusive origin is inferred.

As with previous specimens (CMS 78/1/4) rhyolitic primary composition is inferred from the abundant primary quartz. In this sense the rock can be contrasted with the bulk of the Mount Read volcanics.

D. Cowan, B.Sc.

HBJ 65652

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 27.1.78

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
618881
ALTERED, SHEARED RHYOLITIC VITRIC-CRYSTAL TUFF (?IGNIMBRITE)

Job No. CMS 78/1/14 Date Received: 23.1.78

Reference DPO No. 00168

Sample No. 618881 126-4-M 77CC7

Nature of Sample: D.D. Core

DESCRIPTION **SECTION No.** 23270

a. Hand Specimen:

Grey altered rhyolitic ?crystal tuff, K stain negative.

b. Microscopic:

A pervasively altered and mildly sheared rhyolitic fragmental recognisable as a vitric-crystal tuff and of probable ignimbritic origin.

Abundant weakly to moderately stressed and partly recrystallised quartz grains are present and whilst these features are relatively coarse (to 2 mm) for a rock of this type many show characteristic cracking patterns and/or marginal embayments typical of (fragmented) phenocrysts. There are thinly dispersed completely sericitised feldspar grains and fairly frequent aggregates of ankeritic carbonate which may also represent altered feldspar although the shapes are irregular and non-diagnostic. In contrast to 618878 there are no recognisable lava clasts.

The matrix consists of random to weakly orientated sericite with a little closely intergrown microcrystalline quartz and accessory carbonate, leucoxenic TiO_2 and thinly dispersed zircons. Much of this material is texturally featureless but locally relict lineated microshard textures are seen and these are reasonably inferred elsewhere. Some areas show a weakly cortorted microscale relict flow banding and this tends to confirm an ignimbritic origin although, as previously, the critical fine textural details have been obliterated by alteration and shearing.

D. Cowan, B.Sc.

HBJ 65652

APPENDIX III

Report on Dipole-Dipole I.P. Survey

025

C.R.A. EXPLORATION PTY. LIMITED

132026

CETHANA EAST, DIPOLE-DIPOLE I.P. SURVEY

1 PURPOSE

A brief dipole-dipole survey was conducted at East Cethana. The object was to explain the somewhat puzzling results of the previous gradient array survey and provide some depth control on the gradient array anomalies. It was also hoped that further targets might come to light.

2 METHOD

A Huntec battery powered transmitter was used with the Huntec MK IV I.P. receiver. A number of full spectral readings were taken for later analysis since the gology and mineralisation of the prospect are reasonably well known. In all cases, 20m dipoles were used.

3 RESULTS

Pseudosections are enclosed. Since the resistivities are quite high the pseudosections may be taken as approximately true scale vertically. The resistivity variations correlated very well with the mapped geology and helped to delineate boundaries in areas of cover.

There are three chargeability anomalies worth noting on the pseudosections :

"A" dominates the south end of all the lines except 21,500E which failed to reach it. This very large anomaly has been drilled and found to be pyrite, in places massive. Nothing in the I.P. results suggests a change of character along strike, and it can be written off as tested.

"B" has the appearance of a lobe projecting from the north end of the main "A" anomaly. As the dips are known to be subvertical, it is interpreted as a (number of?) very thin stringers of mineralisation. Then at greater "n" spacings the dilution of the response by a greater volume of unmineralized rock caused the anomaly to drop out.

02E

It is extremely unlikely that this anomaly could represent a viable drilling target; and, in fact, there is no reason to expect any improvement on the narrow intersections encountered in 77CC5.

"C" is found at depth on the north ends of lines 21,700E to 21,800E. Noise created by a power line prevented its delineation beyond this point. This is not a particularly strong anomaly, but it does seem to be associated with a resistivity low. Considering the importance of the property, it probably merits further study with a large dipole seperation to achieve greater depth penetration.

T. Kerr

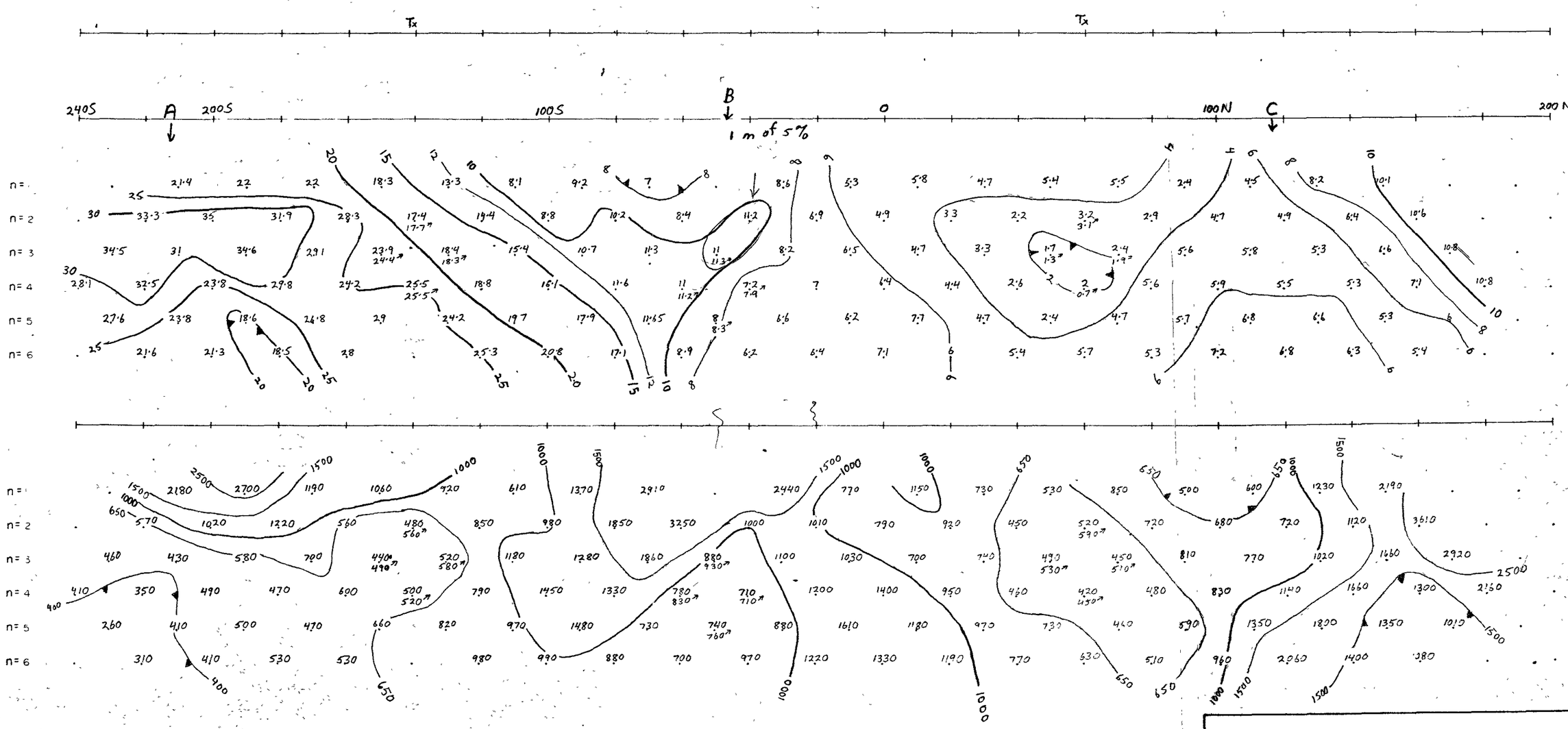
cc R.B. Smith
R.J. Rebek

tk/cs
enc.

Culture Plan

Apparent Chargeability (msecs)

Apparent Resistivity (ohm m)



Transmitter type	Lopo
Timing sequence	2 sec on / 2 sec off
Receiver type	Huntec Mk4
Integration time	40 to 100 msecs after cut off
ρa measured over one current pulse	

5 cm

SURVEYED COMPILED & INTERPRETED BY
geoterrex limited
SYDNEY

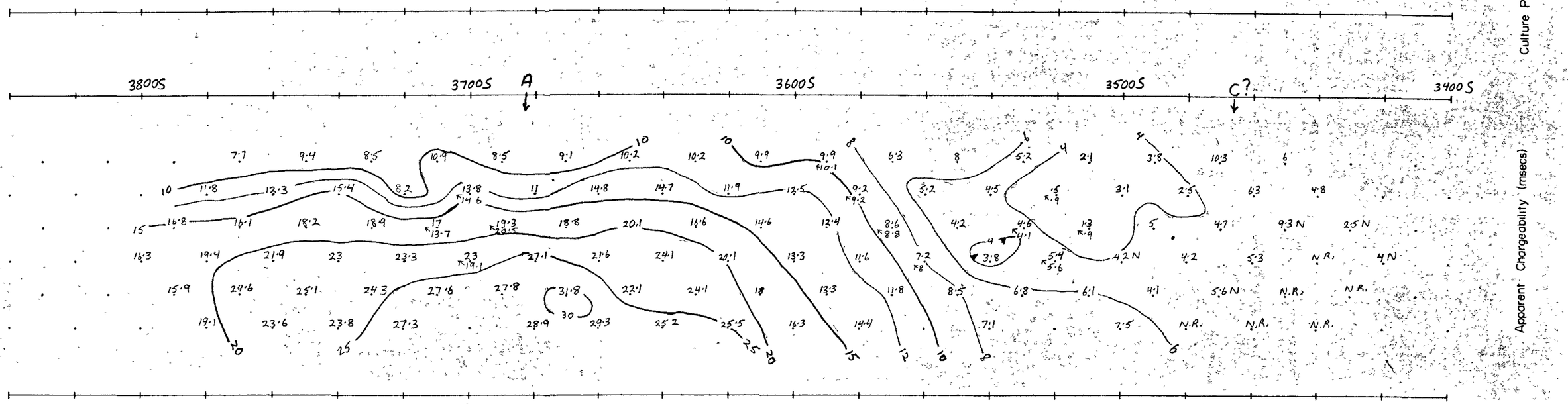
INDUCED POLARIZATION and RESISTIVITY SURVEY

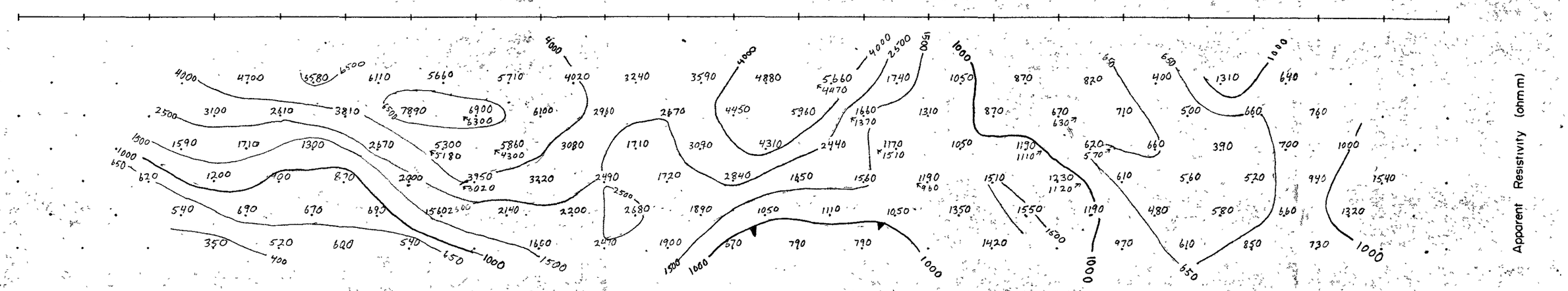
CETHANA EAST
LINE : 21750E

4083

Array	Dipole - Dipole	Dipole length	20 metres
Date	3.79	Job No 85	Scale 1:1000

132029





Transmitter type	Lopo ~~S.I.P.A.~~
Timing sequence	2 sec on / 2 sec off
Receiver type	~~Scintrex IRIS~~ Huntec Mk4
Integration time	450 to 1100 msecs after cut off
IP measured over one current pulse	

5 cm

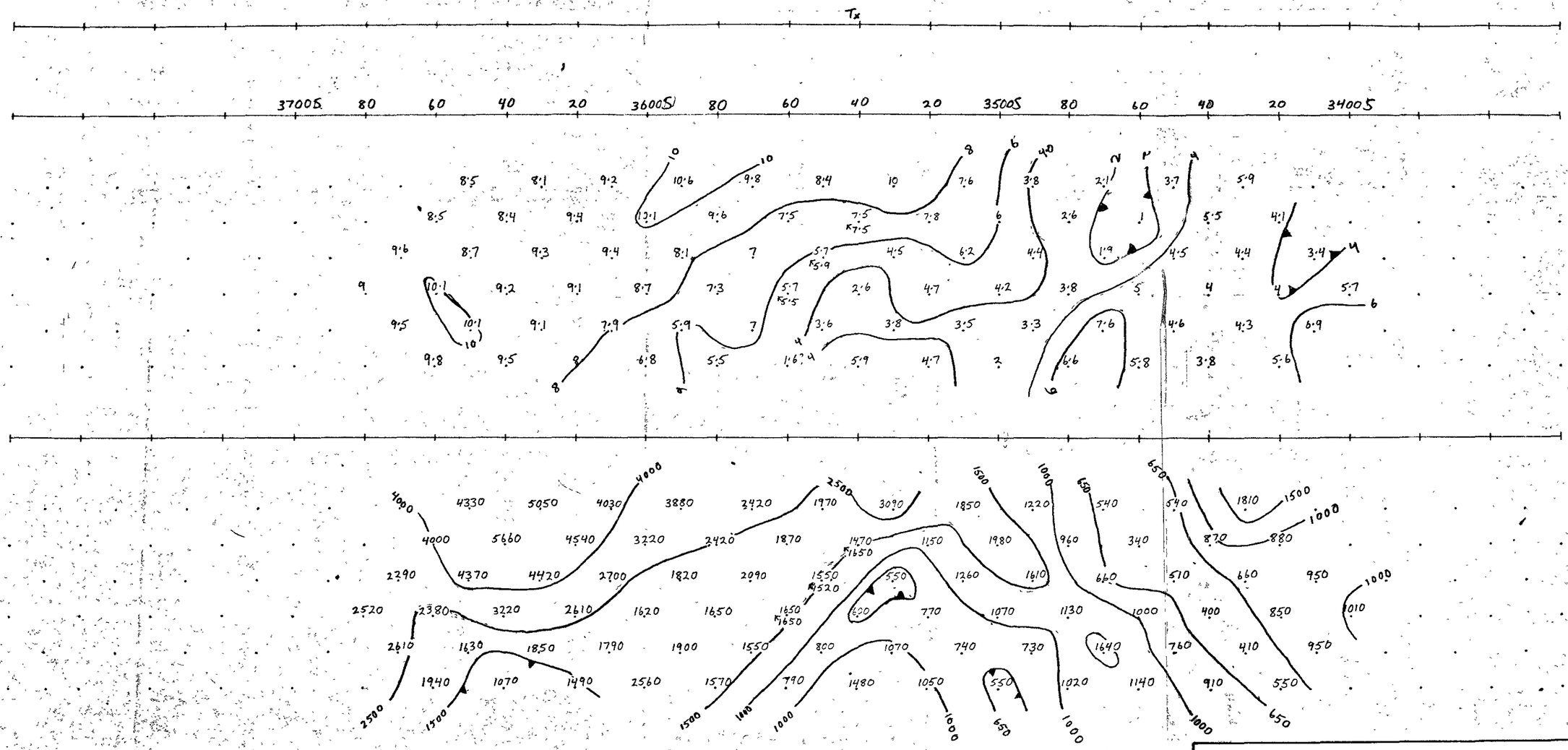
SURVEYED COMPILED & INTERPRETED BY
geoterrex limited
SYDNEY

INDUCED POLARIZATION and RESISTIVITY SURVEY

CETHANA EAST
LINE: 21800E

4084

Array Dipole - Dipole		Dipole length 20 metres
Date 3.79	Job No 85-	Scale 1:1000



Transmitter type	HUNTEC 5 KVA PO
Timing sequence	2 sec on / 2 sec off
Receiver type	Scintrex HUNTEC Mk IV
Integration time	450 to 1100 msecs after cut off
IP measured over one current pulse	

5 cm

SURVEYED COMPILED & INTERPRETED BY
geoterrex limited
SYDNEY

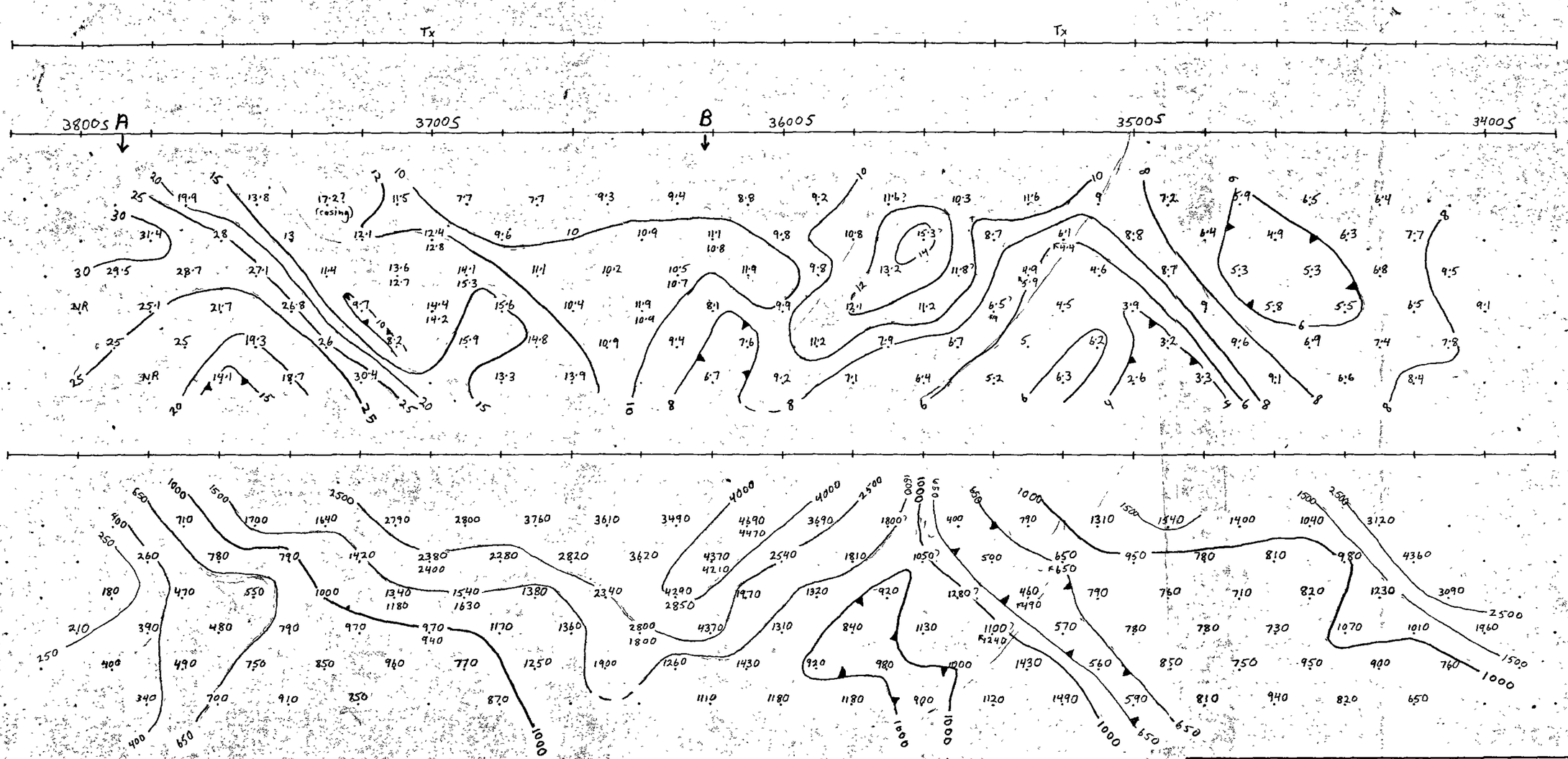
INDUCED POLARIZATION and RESISTIVITY SURVEY

EAST CETHANA

LINE: 21500E

4085

Array Dipole - Dipole		Dipole length 20 metres
Date 18-3-79	Job No 85-	Scale 1:1000



Transmitter type	Lapo ~~5 KVA~~
Timing sequence	2 sec on / 2 sec off
Receiver type	~~Scintrex IRIS-7~~ Huntec Mk4
Integration time	450 to 1100 msecs after cut off
I.P.	measured over one current pulse

5 cm

SURVEYED COMPILED & INTERPRETED BY
geoterrex limited
SYDNEY

INDUCED POLARIZATION and RESISTIVITY SURVEY

CETHANA EAST
LINE: 21600E

4086

Array	Dipole - Dipole	Dipole length	20 metres
Date	3.79	Job No 85-	Scale 1:1000

3800S A 3700S 3600S B 3500S C 3400S

n=1
n=2
n=3
n=4
n=5
n=6

Apparent Chargeability (msecs)

Culture Plan

Apparent Resistivity (ohm.m)

Transmitter type	Lo Po ~~5KVA~~
Timing sequence	2 sec on / 2 sec off
Receiver type	~~Scintrex IPR-7~~ HUNTEC Mk II
Integration time	450 to 1100msecs after cut off
IP measured over one current pulse	

5 cm

SURVEYED, COMPILED & INTERPRETED BY
geoterrex limited
SYDNEY

INDUCED POLARIZATION and RESISTIVITY SURVEY

CETHANA EAST
LINE: 21700E

4087

Array Dipole - Dipole	Dipole length 20 metres
Date 22·3·79	Job No 85
	Scale 1:1000

APPENDIX IV

Rock Sample Results

028

GEOCHEMICAL ROCK SAMPLING LEDGER

Page No. .....

TENEMENT EL 10/76 D.P.O. No. .....

AREA/PROSPECT EAST CETHANA SAMPLE No's. ..... GEOLOGIST GP DATE .....

PLAN REFERENCE ..... ANALYSED BY .....

Sample No.		Metal Content in ppm.							Geological observations
		Pb	Zn	Cu	Ag	Mn			
618215	20800E/3200S	1300	2100	270	65	1850			o/c: Highly pyritic fracture filling in av.
618216	21600E/3750S	230	200	38	1	190			o/c: Qtz-ser schist ē pits after py.
618217	21600E/3790S	9500	430	460	<1	7·6%			o/c: Mn pan and Mn-schist.
618218	22100E/3640S	150	100	12	<1	250			o/c: Qtz-ser schist ē minor py.
618219	22100E-new	100	30	65	<1	580			Sub o/c: Qtz-ser schist ē pits after py.
618220	Near 22100E	60	45	80	1	110			o/c: Bleached schist ē limonite after py.
618240	21600E/3720S	420	270	45	<1	190			Chloritic tuff ē 5% limonite after py.
618264	22400E/3480S	90	10	8	<1	70			Scree: alt. av grit ē 5% lim after py.
618148	LOOKOUT	60	30	15	2	40			o/c: Fe/Mn lens in Roland Conglomerate
618579	21800E/3720S	340	20	60	3	15			o/c: Schist ē pits and limonite after sulphide.
618580	21800E/3695S	12	5	50	<1	32			Scree: Schist ē limonite a/t 5-10% py.

APPENDIX V

Soil Sample Results

030

132036

APPENDIX V PAGE 94

TENEMENT EL 10/76 — GEOCHEMICAL SOIL SAMPLING LEDGER — Page No. 1

AREA/PROSPECT EAST CETHANA — SAMPLE Nos. — D.P.O. No.

PLAN REFERENCE ADDITIONAL SOIL SAMPLING — GEOLOGIST P.B. — DATE 27·10·77

A 9005 — ANALYSED BY AMDEL

Grid Co-ordinate	Sample No.	Soil Composition: Rock %	Organic %	Sand %	Silt %	Clay %	Soil Horizon	Sample: Depth cm.	Colour	Bedrock: Outcrop	Concealed	Est. Depth to	Metal Content in ppm: Pb	Zn	Cu	Ag	Mn		Geological observations
Line 21600E																			
3480S	618223	40	5	30	15	10	C	90	GREY				25	15	2	<1	15		20% RC SAND; O/C - QTZ-SER. SCHIST AFTER XTL TUFF,
3500S	618224	40	5	20	15	20	B	50	YELLOW				100	5	2	<1	10		20% RC SAND; SCREE - QTZ-SER. SCHIST.
3520S	618225	30	5	15	10	40	C	70	BROWN				1950	100	50	1	28		SCREE - QTZ-SERICITE SCHIST.
3540S	618226	30	5	15	10	40	B	60	"				540	120	65	1	50		SCREE - QTZ-SER. SCHIST & LIM. GOXWORKS.
3660S	618227	50	15	15	10	10	B	40	"				300	22	18	<1	48		O/C - QTZ-SER. SCHIST AFTER LAPILLI TUFF.
3580S	618228	30	15	15	10	30	B	30	YELLOW				380	25	18	<1	10		HOLE FRAGS - ALTERED SANDY TUFF.
3600S	618229	30	15	15	10	30	B	30	BROWN				180	32	15	1	30		HOLE FRAGS & SCREE - SANDY TUFF.
3620S	618230	20	15	20	15	30	B	30	"				440	32	25	2	90		HOLE FRAGMENTS - SANDY TUFF.
3640S	618231	30	20	25	15	10	B	60	"				180	12	10	1	80		HOLE FRAGS - ALT. SANDY TUFF & FERRUG. STAINING.
3660S	618232	30	20	20	10	20	B	40	"				600	50	38	2	240		SCREE - ALTERED VITRIC TUFF.
3680S	618233	40	20	20	15	5	B	30	"				1050	200	110	2	4850		HOLE FRAGS - AV SOIL & RC PEBBLES
3700S	618234	30	15	15	20	20	B	40	"				960	240	140	2	2900		HOLE FRAGS - QTZ-SER. SCHIST AFTER TUFF, & LIM.
3720S	618235	20	20	25	15	20	B	60	"				310	95	45	2	140		HOLE FRAGS - AV SOIL & RC PEBBLES; SCREE - COLOM. AV, LIM. OPAL PY.
3740S	618236	20	25	15	15	25	B	30	"				310	130	60	1	1200		AV SOIL & ROLAND CONGL. PEBBLES
3760S	618237	20	20	25	20	15	B	40	"				170	40	18	1	1400		AV SOIL & FRAGS & RC PEBBLES.
3780S	618238	30	20	10	10	30	B	40	"				460	80	42	<1	2600		HOLE FRAGS - QTZ-SER SCHIST + AV SOIL + RC PEBBS.
3800S	618239	30	15	20	15	20	B	40	"				1050	40	25	2	3150		70% AV, 30% RC; SCREE & HOLE FRAGS - ALL RC.
3820S	NO SAMPLE																		pE DEBRIS.

* Check assay value.

031

132037

APPENDIX V PAGE 2 of 4

TENEMENT EL 10/76 — GEOCHEMICAL SOIL SAMPLING LEDGER — Page No. 2

AREA/PROSPECT EAST GETHANA — SAMPLE Nos. — D.P.O. No.

PLAN REFERENCE ADDITIONAL SOIL SAMPLING — GEOLOGIST PB — DATE 27·10·77

ANALYSED BY AMDEL

A 9005

Grid Co-ordinate	Sample No.	Soil Composition					Soil Horizon	Sample		Bedrock			Metal Content in ppm.					Geological observations
		Rock %	Organic %	Sand %	Silt %	Clay %		Depth cm.	Colour	Outcrop	Concealed	Est. Depth to	Pb	Zn	Cu	Ag	Mn	
Line.																		
2230 0 E																		
3320 S	618241	30	15	10	15	30	C	30	BROWN				70	20	120	<1	30	HOLE FRAGS: QTZ-SER SCHIST AFTER LAPILLI TUFF.
3340 S	618242	40	10	10	10	30	C	10	YELLOW				42	140	35	<1	75	o/c: CHLOR. SCHIST & NUMEROUS PITS AFTER PY
3360 S	NO SAMPLE																	SOIL HIGHLY LEACHED; FRAGS. PALE QTZ-SER SCHIST.
3380 S	618243	40	20	20	10	10	B	30	GREY				10	10	5	<1	15	HOLE FRAGS: PALE QTZ-SERICITE SCHIST.
3400 S	618244	40	20	20	10	10	C	10	YELLOW				20	15	18	<1	25	o/c: PALE ALT. & LEACHED IGNIMBRITE?
3420 S	618245	30	25	15	10	20	C	20	"				22	15	8	<1	25	o/c: PALE ALT. AV & LIM. PITS AFTER PYRITE
3440 S	618246	Sample lost.					C	30	"									o/c: ALT PALE AV, WELDED(?), LIM. PITS AFTER PY.
3460 S	618247	30	20	15	15	20	B	30	GREY				10	8	2	<1	5	HOLE FRAGS: PALE ALT. LEACHED LAPILLI TUFF.
3480 S	618248	50	5	30	10	5	B	60	BROWN				12	8	2	<1	10	HOLE FRAGS: ALT. PALE LAPILLI TUFF.
3500 S	618249	60	10	15	10	5	B	20	GREY				18	15	5	<1	48	o/c: ALT. SILIC. LAPILLI TUFF & MUCH LIMONITE.
3520 S	618250	60	5	15	10	10	C	60	"				20	10	5	<1	15	HOLE FRAGS & SCREE & o/c: PALE ALT. AV, GROUD FERRUG. GOETHITIC.
3540 S	618251	50	5	20	20	5	B	60	"				48	20	10	<1	20	HOLE FRAGS: QTZ-SER SCHIST & LIMONITE AFTER PY
3560 S	618252	40	15	20	20	5	C	40	"				50	15	8	<1	30	o/c: PALE " " " " " " "
3580 S	618253	30	20	20	25	5	B/A	20	"				38	20	8	<1	50	o/c: ALT SILIC. PALE GRITTY TUFF.
3600 S	618254	30	10	20	30	10	B	40	BROWN				45	15	5	<1	35	HOLE FRAGS: QTZ-SER SCHIST AFTER LAPILLI TUFF.
3620 S	618255	40	20	15	20	5	B	40	"				100	20	8	<1	70	HOLE FRAGS: QTZ-SERICITE SCHIST.
3640 S	NO SAMPLE																	ROAD FILL MATERIAL.
3660 S	" "																	" " " .
3680 S	" "																	" " " .
Line 2210 0 E																		
3640 S	618581						B	40	Brown				960	440	65	1	8500	Brown av soil in gully on roadside.

* Check assay value.

032

132038

APPENDIX V PAGE 3
of 4

TENEMENT EL 10/76 — GEOCHEMICAL SOIL SAMPLING LEDGER — Page No. 3

AREA/PROSPECT EAST CETHANA — SAMPLE Nos. — D.P.O. No.

PLAN REFERENCE ADDITIONAL SOIL SAMPLING — GEOLOGIST PR — DATE OCT, 1977

ANALYSED BY AMDEL

Grid Co-ordinate	Sample No.	Soil Composition					Soil Horizon	Sample		Bedrock			Metal Content in ppm.					Geological observations
		Rock %	Organic %	Sand %	Silt %	Clay %		Depth cm.	Colour	Outcrop	Concealed	Est. Depth to	Pb	Zn	Cu	Ag	Mn	
LINE	22400 E																	
33205	618256	30	10	15	30	15	B	40	BROWN				400	480	70	[illegible]	1.0%	HOLE FRAGS: LIMONITE + Mn (PAN?).
33405	618257	10	10	20	30	30	B	50	"				110	90	32	1	140	AV SOIL ∓ ALT. AV FRAGS & RC PEBBLES
33605	618258	10	5	20	35	30	B	50	"				95	80	32	1	80	AV SOIL ∓ 20-30% ROLAND CONGL.
33805	618259	10	5	10	25	50	B	50	"				120	75	60	5	55	VERY CLAYEY AV SOIL.
34005	618260	10	5	10	15	60	B	40	"				90	42	18	1	50	60% AV SOIL & FRAGS; 40% RC.
34205	NO SAMPLE																	ROLAND CONGLOMERATE.
34405	618261	30	15	15	20	20	B	30	BROWN				30	18	5	<1	32	50% AV & 50% RC — POOR SAMPLE.
34605	618262	10	5	10	15	60	B	40	"				95	42	15	<1	40	CLAYEY AV SOIL.
34805	618263	60	5	10	30	5	B	40	GREY				15	10	2	<1	10	SCREE: FINE ALT. AV GRIT ∓ 5% LM FRAGS AFTER PY.
35005	618265	10	5	-	5	80	C	40	YELLOW				390	35	8	<1	28	O/C: ALT. LAPILLI TUFF ∓ 25% LM. AFTER PY.
35205	618266	50	5	5	10	30	B	50	"				140	45	8	<1	30	HOLE FRAGS: ALTERED AV.
35405	618267	50	10	-	10	30	B	40	"				45	22	2	<1	15	SCREE: ALTERED LAPILLI TUFF.
35605	618268	40	10	10	10	30	B	50	"				110	25	5	<1	25	SCREE: ALTERED AV
35805	618269	30	5	30	25	10	B	60	BROWN				240	130	8	<1	70	HOLE FRAGS: ALTERED AV.

* Check assay value.

033

132039

APPENDIX V PAGE 4 of 4

TENEMENT EL 10/76 — GEOCHEMICAL SOIL SAMPLING LEDGER — Page No.

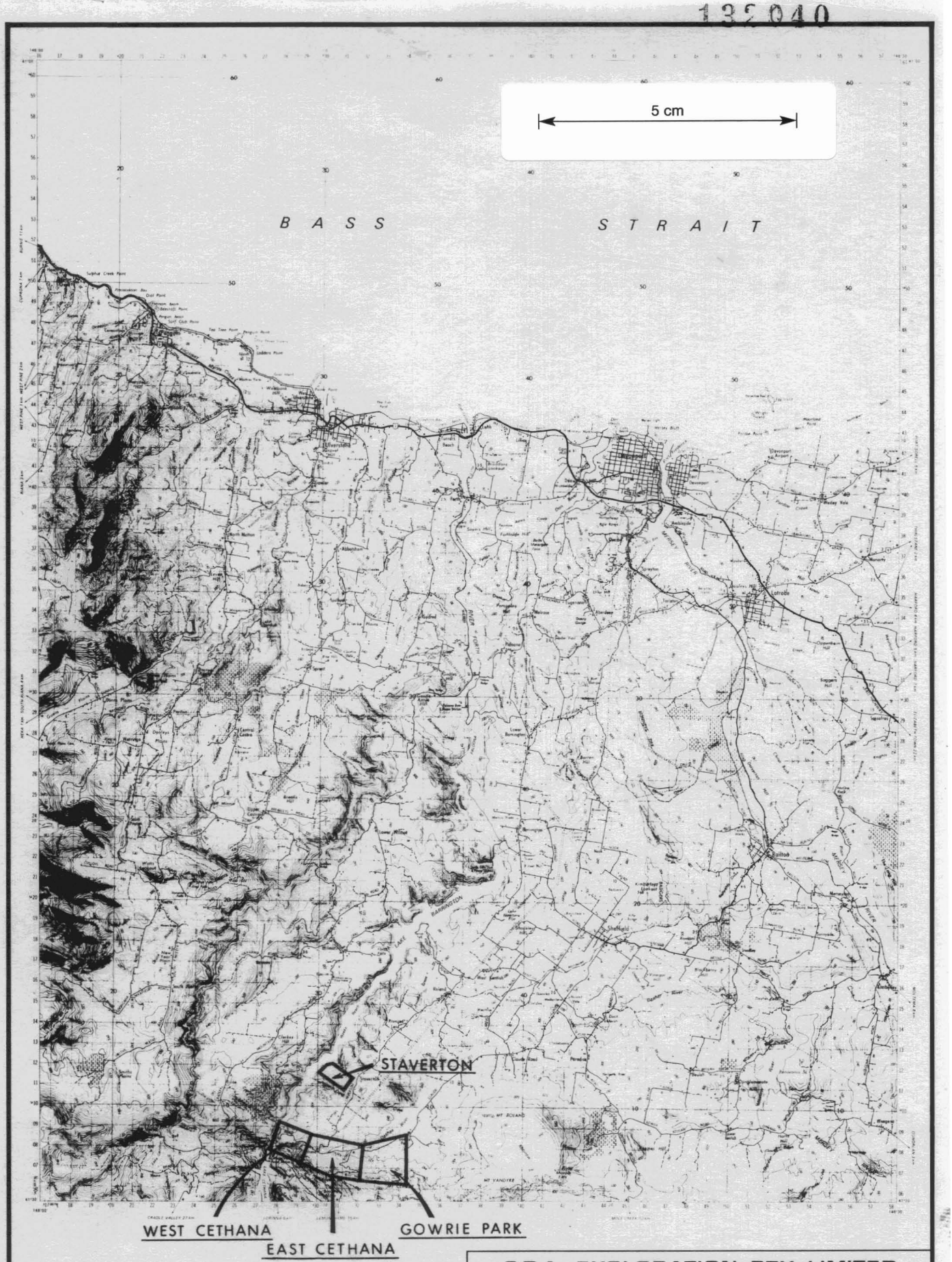
AREA/PROSPECT EAST GETHANA — SAMPLE Nos. — D.P.O. No.

PLAN REFERENCE ADDITIONAL SOIL SAMPLING — GEOLOGIST PB — DATE 14-11-77

A 9006 — ANALYSED BY AMDEL

Grid Co-ordinate	Sample No.	Soil Composition: Rock %	Organic %	Sand %	Silt %	Clay %	Soil Horizon	Sample: Depth cm.	Colour	Bedrock: Outcrop	Concealed	Est. Depth to	Metal Content in ppm: Pb	Zn	Cu	Ag	Mn		Geological observations
LINE	21775 E																		
0 S	618559	30	10	20	20	20	B	30	BROWN				380	120	85	<1	120		V. CLAYEY AV SOIL; AV ELLUVIUM.
20 S	618560	40	20	20	15	5	B	50	PINK				130	20	12	<1	75		WHOLE FRAGS: QTZ-SER SCHIST; SCREE: QTZ-SER SCHIST ≥1% LIM. BOXWORKS.
40 S	618561	30	15	20	15	20	B	40	YELLOW				95	12	8	<1	45		WHOLE FRAGS: " " " ; SCREE: " " " " " " " .
60 S	618562	40	10	15	15	20	B	60	BROWN				480	140	80	2	70		WHOLE FRAGS: " " " ; SCREE: SILK. ALT. AV ≥1% LIM. BOXWORKS.
80 S	618563	40	15	15	10	20	B	40	"				660	50	63	1	170		WHOLE FRAGS & SCREE: CHLORITIC QTZ-SERICITE SCHIST.
100 S	618564	50	15	15	10	10	B	20	"				840	25	25	1	140		WHOLE FRAGS & SCREE: QTZ-SER SCHIST AFTER CRYSTAL TUFF ≥1% LIM.
120 S	618565	40	10	15	15	20	B	70	"				440	45	35	2	48		WHOLE FRAGS & SCREE: QTZ-SER SCHIST AFTER CRYSTAL TUFF.
140 S	618567	50	15	15	15	5	B	30	YELLOW				8	10	2	<1	15		WHOLE FRAGS & SCREE: QTZ-SERICITE SCHIST.
160 S	618568	40	10	20	15	15	B	90	BROWN				480	90	48	3	95		WHOLE FRAG: SILK. QTZ-SER SCHIST ≥1% LIM. BOXWORKS; MINOR QTZ.
180 S	618569	40	15	15	10	20	B	60	"				660	220	35	3	760		WHOLE FRAGS: ALT. AV; SCREE: MAINLY RC.
200 S	618570	40	10	20	15	15	B	80	"				1050	800	85	2	4000		RICH AV SOIL; WHOLE FRAGS & SCREE: MAINLY RC.
220 S	618571	30	20	25	20	5	B	30	"				2150	1000	80	1	1.55%		WHOLE FRAGS: 10% QTZ-SER. SCHIST, 90% RC; RICH AV SOIL.
240 S	618572	40	20	20	15	5	B	40	"				880	580	45	1	1.30%		WHOLE FRAGS: ROLAND CONGLOMERATE; AV SOIL.
260 S	618573	SAMPLE REJECTED					B	50	GREY										WHOLE FRAGS & SCREE: ROLAND CONGLOMERATE; RC SOIL.
280 S	618574	40	15	20	20	5	B	40	BLACK				1750	1200	70	2	5.0%		WHOLE FRAGS & SCREE: ROLAND CONGLOMERATE.
300 S	618575	40	20	20	15	5	B	30	GREY				25	8	5	<1	120		WHOLE FRAGS & SCREE: 70% QTZ-SER SCHIST, 30% RC.
320 S	618576	40	15	20	15	10	B	40	"				32	8	5	<1	45		WHOLE FRAGS & SCREE: 90% QTZ-SER SCHIST, 10% RC.
340 S	618577	50	15	20	15	—	B	30	PINK				90	22	8	<1	210		WHOLE FRAG: SILK. ALT. AV; SCREE: QTZ-SER SCHIST ≥1% LIM.
[redacted]																			[redacted]
360 S	618578	50	10	20	15	5	B	30	GREY				18	5	5	<1	48		WHOLE FRAG: 80% QTZ-SER SCHIST, 20% RC; SCREE: MAINLY RC.

* Check assay value.



INDEX TO 1:250 000 SHEETS

C.R.A. EXPLORATION PTY. LIMITED

LOCATION MAP

BURNIE SK 55-3

geologist: J.G.P.	scale: 1:250 000	report no: 9041, 44 9159, 60, 9717
drawn: N.A.P.	date: Nov. '77	plan no: Tc 89

132041

LEGEND

younger ↑ facing? older

- 65° Dip and strike of bedding
- Inferred geological boundary
- Fault
- Zone of faulting and shearing
- //// Zone of pyrite mineralisation
- ⊗ Peak of chargeability anomaly over pyrite zone
- Trend of pyrite zone
- (H) Dipole - dipole I.P anomaly within fine tuffs
- (L) Dipole - dipole I.P chargeability low within fine tuffs
- 1070 Pb / 1085 Zn Soil sample value in p.p.m. Only values over 1000 p.p.m. shown
- 0·2% Pb / 0·3% Zn Rock sample value in p.p.m. Only values > 0·5% combined Pb + Zn shown

5 cm

RECENT SCREE COVER

ALTERED LAPILLI TUFF

ALTERED COARSER TUFFS

ALTERED FINE TUFFS

ALTERED LAPILLI TUFF AND IGNIMBRITE

LAPILLI TUFF

ALTERED FINE TUFFS

Deep (+60m) Weak I.P. Anomaly

1275 Pb

1163 Pb

30m rock chip 1·2% Pb 0·15% Zn

ALTERED FINE TUFFS

CHERTY 'DIRTY' ? HIGHLY ALTERED SILICEOUS TUFF HORIZON

2900 Pb 780 Zn

False 0·56% Pb Jasper 0·40% Zn

1040 Pb

1078 Pb 1062 Zn

78CC8 -55°

3m of 0·12% Pb 0·32% Zn

77CC6 -55° 86° 1850 Pb

12m of 0·34% Pb 0·63% Zn

12m of 0·59% Pb 0·24% Zn

77CC5 -55°

10m of 0·12% Pb 0·41% Zn

1m of 0·8% Pb 3·9% Zn 1·2% Cu 185 p.p.m. Ag

2m of 0·95% Pb 0·15% Zn

1750 Pb

1200 Pb 1720 Zn

5m of 0·11% Pb 0·15% Zn

2160 Pb

77CC4 -58° 88°

1400 Pb 2640 Pb 1160 Pb

2150 Pb 1000 Zn

1750 Pb 1200 Zn

11·5 m of 0·07% Pb 0·25% Zn

1050 Pb

77CC2 -50° 70°

17·5 m of 0·07% Pb 0·25% Zn

0·04% Zn 0·95% Pb

3m of 0·17% Pb 0·20% Zn

1050 Pb

ALTERED COARSER TUFFS

PYRITIC ZONE

ALTERED COARSER TUFFS

ALTERED LAPILLI TUFF

PRECAMBRIAN - QUARTZITE BASEMENT

UNALTERED RHYOLITE LAVA

RECENT SCREE COVER

Zone of limonitic rocks

0·20% Pb 0·30% Zn

0·35% Pb 0·20% Zn

0·08% Pb 0·55% Zn

NOTE:

Interpretation based on mapped outcrop geology, diamond drilling, 1977 gradient array I.P. and magnetic surveys, 1979 dipole-dipole I.P. survey.

Drawn from uncorrected aerial photograph

M.N. approx.

Scale 1:2500 (Approx)

0 100 m

C.R.A. EXPLORATION PTY. LIMITED

CETHANA EAST - E.L. 10/76
NORTH - WEST TASMANIA
INTERPRETED GEOLOGY

geologist: J.G.P.	scale: 1:2500 (Approx)	report no: 9717
drawn: T.G.D.S.	date: August 1979	plan no: Tc 147

4088

LEGEND

QUATERNARY

- Qrc — *Scree, alluvium and undivided debris commonly predominantly of Pre-Cambrian Conglomerate detritus*
- Qas — *Scree and alluvium composed predominantly of acid volcanic detritus*

TERTIARY

- Tb — *Basalt*

ORDOVICIAN

ROLAND CONGLOMERATE

- Orc — *Coarse, poorly sorted conglomerate composed largely of Precambrian quartzite pebbles and cobbles*

ACID VOLCANIC AND ASSOCIATED SEDIMENTARY UNITS (Not listed in stratigraphic order)
Important Note: Most of these rocks have been hydrothermally altered to quartz sericite ± chlorite schists. The level of alteration is indicated on the map by the following suffixes

- a — moderately or highly altered
- w — weakly altered
- u — essentially unaltered

RHYOLITE LAVA?

- Cr — *Hard, dense igneous rock with small ± hazy quartz crystals. Generally weakly altered or unaltered and non schistose*

IGNIMBRITE?

- Ci — *Semi-massive, welded? ± acid volcanic. Lensoidal pumice fragments and glass shards. Porphyritic quartz crystals 1-3 mm. Generally moderately altered and slightly schistose*

LAPILLI TUFF

- Cl / Cls — *Fine porphyritic composed of acid clasts/debris 2-25 mm in diameter. Flattened pumice fragments, glass shards, fragments and crystals of quartz in a fine grained ashy matrix. Usually highly altered*
  Cls — *Fine grained, highly ashy tuff with prominent porphyritic quartz*

CAMBRIAN

GREYWACKE

- Cg — *Variable rock type composed of acid volcanic debris showing some evidence of deposition on transport by water. Most commonly a re-worked lapilli tuff containing angular or sub-rounded fragments of quartz and pumice from 2-25 mm in a sandy matrix. Often contains lithic clasts, including pebbles of Pre-Cambrian quartzite, generally ≥ 10 mm (rarely up to 150 mm). Bedding rarely distinguishable. Usually moderately or highly altered*

CRYSTAL TUFF

- Cs — *Fine grained ashy tuff with porphyritic quartz crystals from 1-3 mm. Numerous glass shards. Generally highly altered and schistose*

TUFF

- Ct — *Very fine grained ashy tuffs. Less commonly lapilli tuffs. Usually well bedded, sometimes thin cross bedding rarely seen due to alteration. Variably schistose, but often highly siliceous rocks. Rare pyrite cubes or casts. Rare black shale interbeds. Tuff Shale Bedded Tuff is minus siltstones and shales with rare sandstone and quartz pebble conglomerate interbeds. Generally weakly to moderately altered and schistose. Largely unaltered where exposed on drill Lucinda Road south of Cethana. Tb - Monotonous sequence of coarsely sandy tuffs north of Cethana - massive bedding. Moderately to weakly altered*

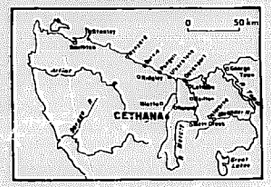
PRECAMBRIAN (BASEMENT)

- pCg — *Green, white metasediment*

GEOLOGICAL SYMBOLS

- Dip and strike of bedding
- Vertical dip and strike of bedding
- Dip and strike of schistosity
- Vertical dip and strike of schistosity
- Contact
- 77-C.C 5 → -80/155°/164 Zm — Diamond drill hole showing azimuth, dip and depth in metres
- Geological boundary
- Inferred geological boundary
- Fault
- Grid line
- Inferred fault
- Dyke

LOCALITY MAP



C.R.A. EXPLORATION PTY. LTD.

GEOLOGICAL MAP

CETHANA EAST – E.L. 10/76

NORTH - WEST TASMANIA

BURNIE SK 55 - 3

SCALE 1:5000 (approx.)

0 100 200 300 400 500m

Geologist: J.G.P.
Drawn: Cangraphics Pty Ltd

Date: Sept 77

Report No.: 9044, 9717
Plan No.: Tc 84

132044

SOUTH

NORTH

77-C.C 4 Azimuth 180° dip 58°

77-C.C 5 Azimuth 180° dip 55°

78-C.C 8 Azimuth 180° dip 55°

Soil sample site with values in ppm Pb, Zn, Cu
sample Nos prefixed by sn

Bedding dip

Schistosity dip

Shearing dip

N.B. Drillhole survey for CC 4,5&8 by acid tube method

5 cm

C.R.A. EXPLORATION PTY. LIMITED

DIAMOND DRILL SECTION C.C 4,5 & 8

ALONG LINE 21 750 E LOOKING W.

CETHANA EAST - E.L. 10/76

NORTH - WEST TASMANIA

BURNIE SK 55-3

SCALE 1:1000

Geologist : J.G.P.

Drawn : N.A.P.

Date : May 1977
April 1978

Report No. 9044, 9717

Plan No : Tc 52

4091

E.L. 7/73 ASARCO - CRAE J.V.
E.L. 10/76 CRAE
(approximate boundary)

Cethana

Sealed road
Unsealed road
Grid line with soil sample sites at 20m int.

LEGEND

- 297247(C) Drainage sample (A) Asarco (C) CRAE
- 401050 Soil sample
- 403203 Grab rock sample (float or outcrop see ledger for details)
- 403404(R) Rock chip sample over interval shown - outcrop

5 cm

C.R.A. EXPLORATION PTY. LIMITED

SAMPLE LOCATION MAP

CETHANA EAST - E.L. 10/76

NORTH - WEST TASMANIA

BURNIE SK 55-3

SCALE 1:5000 (approx.)

100m 0 100 200m

Geologist: J.G.P.
Drawn: N.A.P.

Report No. 9044, 8717
Plan No. Tc 93

4092

132046

E.L. 7/73 ASARCO - CRAE J.V.
E.L. 10/76 CRAE
(approximate boundary)

N
approx.

Cethana

Sealed road
Unsealed road
Grid line with soil sample sites at 20m int.

5 cm

LEGEND

2100(A) Drainage sample (A) = Asarco (C) = CRAE
330 Soil sample
330(R) Grab rock sample – float or outcrop
330(R) Rock chip sample over interval shown – outcrop
Contouring based on soil samples
Only reliable soil samples shown

C.R.A. EXPLORATION PTY. LIMITED

GEOCHEMICAL MAP – ppm LEAD

CETHANA EAST – E.L. 10/76

NORTH – WEST TASMANIA

BURNIE SK 55-3

SCALE 1:5 00 (approx.)

100 m 0 100 200m

Geologist: J.G.P.
Drawn: N.A.P.

Report No. 9044, 8717
Plan No. Tc 94

4093

132047

(approximate boundary)

E.L. 7173 ASARCO - CRAE J.V.

E.L. 10/76 CRAE

M N approx.

Cethana

Sealed road

Unsealed road

Grid line with soil sample sites at 20m int.

5 cm

LEGEND

- 300(C) Drainage Sample (A)= Asarco (C)= CRAE
- 110 Soil sample
- 110(R) Grab rock sample - float or outcrop
- 100(R) Rock chip sample over interval shown - outcrop

Contouring based on soil samples
Only reliable soil samples shown

C.R.A. EXPLORATION PTY. LIMITED

GEOCHEMICAL MAP - ppm ZINC

CETHANA EAST - E.L. 10/76

NORTH - WEST TASMANIA

BURNIE SK 55-3

SCALE 1:5000 (approx.)

100m 0 100 200m

Geologist: J.G.P.

Drawn: N.A.P.

Report No: 9044, 9717

Plan No: Tc 95

4094

132048

(approximate boundary)

E.L. 7/73 ASARCO - CRAE J.V.

E.L. 10/76 CRAE

Cethana

Sealed road

Unsealed road

Grid line with soil sample sites at 20m int.

5 cm

LEGEND

- 30(A) Drainage sample (A)= Asarco (C)= CRAE
- 30 Soil sample
- 30(R) Grab rock sample – float or outcrop
- 30(R) Rock chip sample – outcrop over interval shown

Only reliable soil samples shown

C.R.A. EXPLORATION PTY. LIMITED

GEOCHEMICAL MAP - ppm COPPER

CETHANA EAST - E.L. 10/76

NORTH - WEST TASMANIA

BURNIE SK 55-3

SCALE 1:5000 (approx.)

Geologist: J.G.P.

Drawn: N.A.P.

Report No: 9044, 8717

Plan No: Tc 96

4095

(approximate boundary)

ASARCO - CRAE J.V.
E.L. 7/73
CRAE
E.L. 10/76

N
approx.

Cethana

Sealed road

Unsealed road

Grid line with soil sample sites at 20m int.

LEGEND

- 40 Soil sample
- 40(R) Grab rock sample - float or outcrop
- 40(R) Rock chip sample over interval shown - outcrop
- ND None detected

Only reliable soil samples shown

5 cm

C.R.A. EXPLORATION PTY LIMITED

GEOCHEMICAL MAP - ppm MANGANESE

CETHANA EAST - E.L. 10/76

NORTH - WEST TASMANIA

BURNIE SK 55-3

SCALE 1:5000 (approx.)

100m 0 100 200m

Geologist: J.G.P.
Drawn: N.A.P.

Report No. 9044, 9717
Plan No. Tc 97