

189002

Figure 1

Locality Map

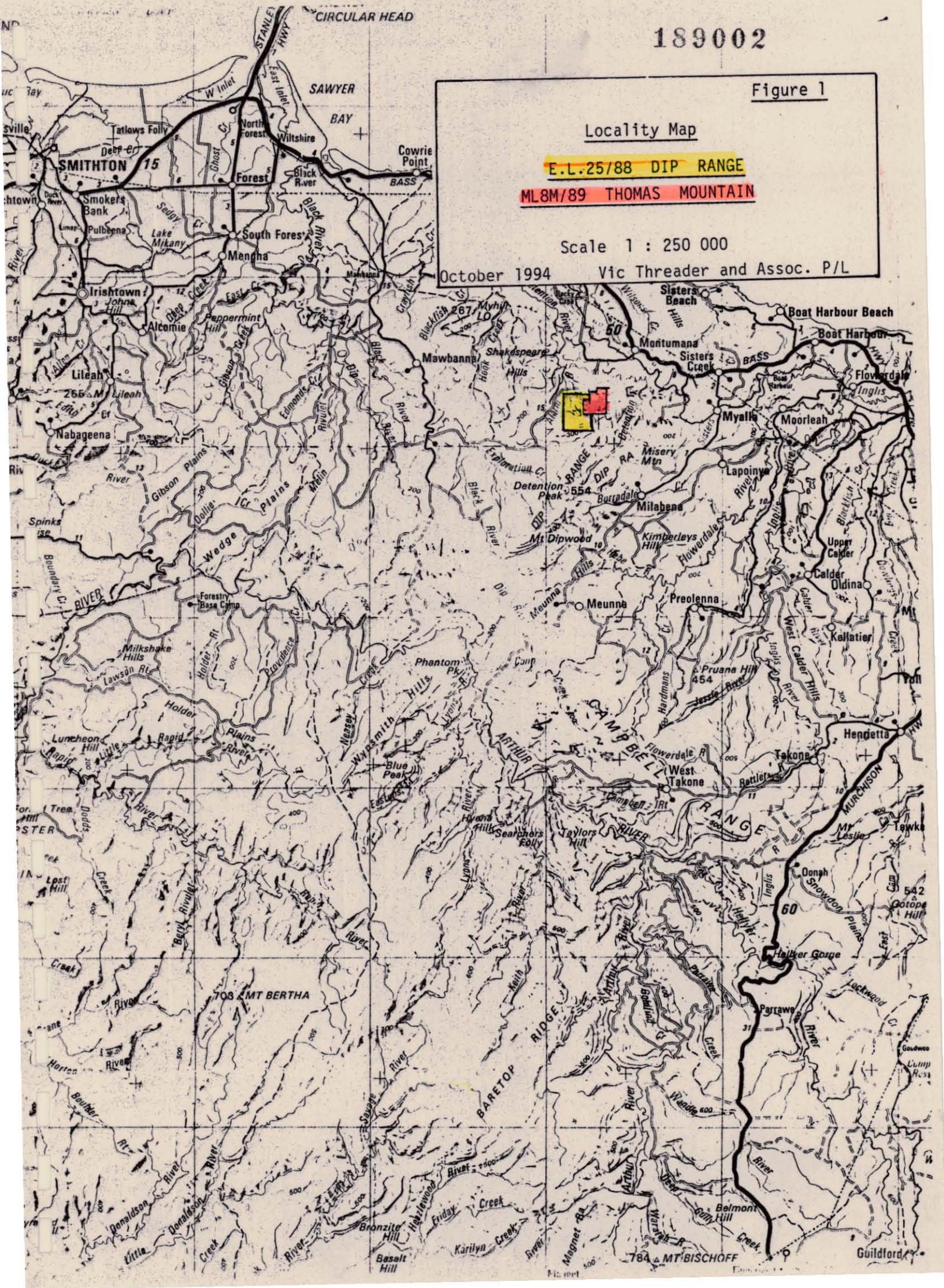
E.L.25/88 DIP RANGE

ML8M/89 THOMAS MOUNTAIN

Scale 1 : 250 000

October 1994

Vic Threader and Assoc. P/L



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Introduction

The licence is for the exploration of high grade silica and was issued on 28th October 1988 for 7 km² surrounding the company's mineral lease(s). It was reduced to 2+ km, on the S.W. corner of the consolidated lease, at the last renewal.

There is no silica production from the lease at present and this report details exploration on the lease (as well as on the licence) in support of an application for an Exemption from the Labour Covenant.

Previous Exploration

Prior to the current year exploration in EL.25/88 has been confined to surface sampling and excavator pit sampling along existing tracks.

Exploration 1993-4

General Statement

1. A surface sampling and percussion drilling programme was conducted in the combined tenements of EL.25/88 Dip Range and ML8M/89 Thomas Mountain.
2. A 5 kg sample of sand from the production sand pit was beneficiation tested to determine whether the level of contaminants could be reduced.
3. A prepared 20/40 sand was tested for permeability and conductivity in connection with its use as fracturing sand in oil well drilling.

Item 1 above was conducted as one exploration programme and consisted of 22 surface samples, 14 in the lease and 8 in the E.L., and 42 Hammer drill holes, 304m in the lease and 362m in the E.L.

Items 2 and 3 were testings of material from the production sand pit in ML8M/89.

4. Track cutting for sampling and mapping purposes. This was mainly in the area of the lease and it is proposed to extend this in the 1994-5 year for these purposes and also for drill access.

Structural Interpretation

A section through BH.1 drawn by D. Hassell of Temco (figure 6 AR 1992) presupposes that dips are continuous for more than 100m but the poor correlation between BH.1 and HHs 18-22 suggest that this may not be so.

It is not possible to interpret the data so far obtained until a better understanding of the geological structure has been achieved.

During the current year a sampling grid was undertaken over portion of the drilled area. This should be extended to cover the potential resource (figure 3) and utilised for structural mapping. This may help to determine whether the beds of sand etc are integral units in the sedimentary sequence or repeated occurrences of the same unit due to folding and/or faulting.

Resource Estimate

The hammer drill samples were described by colour and hardness in the field. Estimates of hardness were based on penetration rate and categorised as Very Hard, Hard, Soft and Very Soft. On this basis the material has been divided into:

0.35Mt of Silicified Sandstone (V.H.)

1.55 Mt of Sandstone (H)

0.65 Mt of poorly consolidated sandstone (S)

2.45 Mt of sand (VS)

Sixteen of the 42 holes in this programme have been excluded from the estimate due to poor colour or high alumina content (>1%) (see Table 2).

Some infill drilling is required to raise the status of this estimate to Indicated Level (AIMM Code of Reporting of Ore Reserves).

More structural data is required before the reserve to deeper level can be reliably estimated but indications are that the sand units have a stratigraphic thickness of 60m and could extend to a vertical depth of 50m or more. If this were so then a significant increase in reserves is likely, see figure 2 sections 5 and 8.

Discussion of Additional Testing

Some screen tests were carried out to determine the distribution of contaminants in different size fractions:

1) 4AD0200

hand

Crushing to -30mm and screening at 25mm of quartzite from the quartzite quarry (TM 105) indicates an increase in Fe₂O₃ and TiO₂ in the -25mm (finer) fraction, 1% and 11% respectively and a decrease of sericite of 4%.

2) 4AD0127

hand

Chemical analyses of BHs 27-39 and surface samples were screened at 0.5mm and the oversize compared with Head assay. No consistent pattern in distribution of contaminants was apparent.

3) 4AD1466

Selected borehole samples of sand were screened to determine the proportion of -850µm+425µm (-20+40 ASTM) which is the favoured size fraction for use as fracturing sand in oil well drilling:

<u>B.H.No</u>	<u>Depth (m)</u>	<u>Proportion of -850+425µm (%)</u>	<u>Proportion of -425µm</u>	<u>Al₂O₃ (%)</u>
DR 30	2 - 11	16.71	82.32	0.13
30	11 - 22	12.67	85.4	0.09
34	2 - 6	29.95	69.33	0.06
34	9 - 17	16.70	82.55	0.07
36	5 - 17	29.25	68.5	0.06
4	5 - 14	20.21	78.46	0.28
24	2 - 17	31.43	67.7	0.05

hand

EL

Screen analysis of drilled sandstone sequences are difficult to interpret as the results depend on the degree of disaggregation caused by drilling as much as on the natural particle size distribution of the material. The wide range of 20/40 content in this table illustrates this point.

4) AD0361

Surface sample No.105 was screened into two fractions, -75mm+25mm and -25mm. The finer fraction was 11% of total mass and contained higher levels of contaminants, principally CaO, Fe₂O₃ and TiO₂.

5) AD0903

Chemical analyses of Boreholes 2²⁶ - 26. ML

6) Stimlab

i) June 1994 Screen analysis and conductivity/permeability tests of a prepared 20/40 (-850µm+425µm) sand from ML8M/89.

ii) July 1950 Comparison of sand from ML8M/89 with U.S.A. fracturing sands in current use.

7) Ammtec Ltd

Sand from the production sand pit was beneficiation tested to lower Fe₂O₃, Al₂O₃ and TiO₂. Slimes were 2.1% of head sample. Flotation of deslimed sand resulted in negligible separation: 99.97% float/0.03% sink.

There was a marked decrease in contaminants by flotation but this was offset by the extremely low proportion of sinks. The only contaminant which showed an improvement over the Head assay was TiO₂, which was lowered from 570 to 210 ppm, which is significant.

Proposed Exploration 1994-5

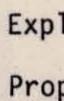
Remaining prospective ground in the licence is deeply dissected by the east branch of Alarm River which greatly reduces the accessible area. Two areas are hatched on figure 2 for prospecting in 1994-5. This will be done initially by hand held Stihl auger.

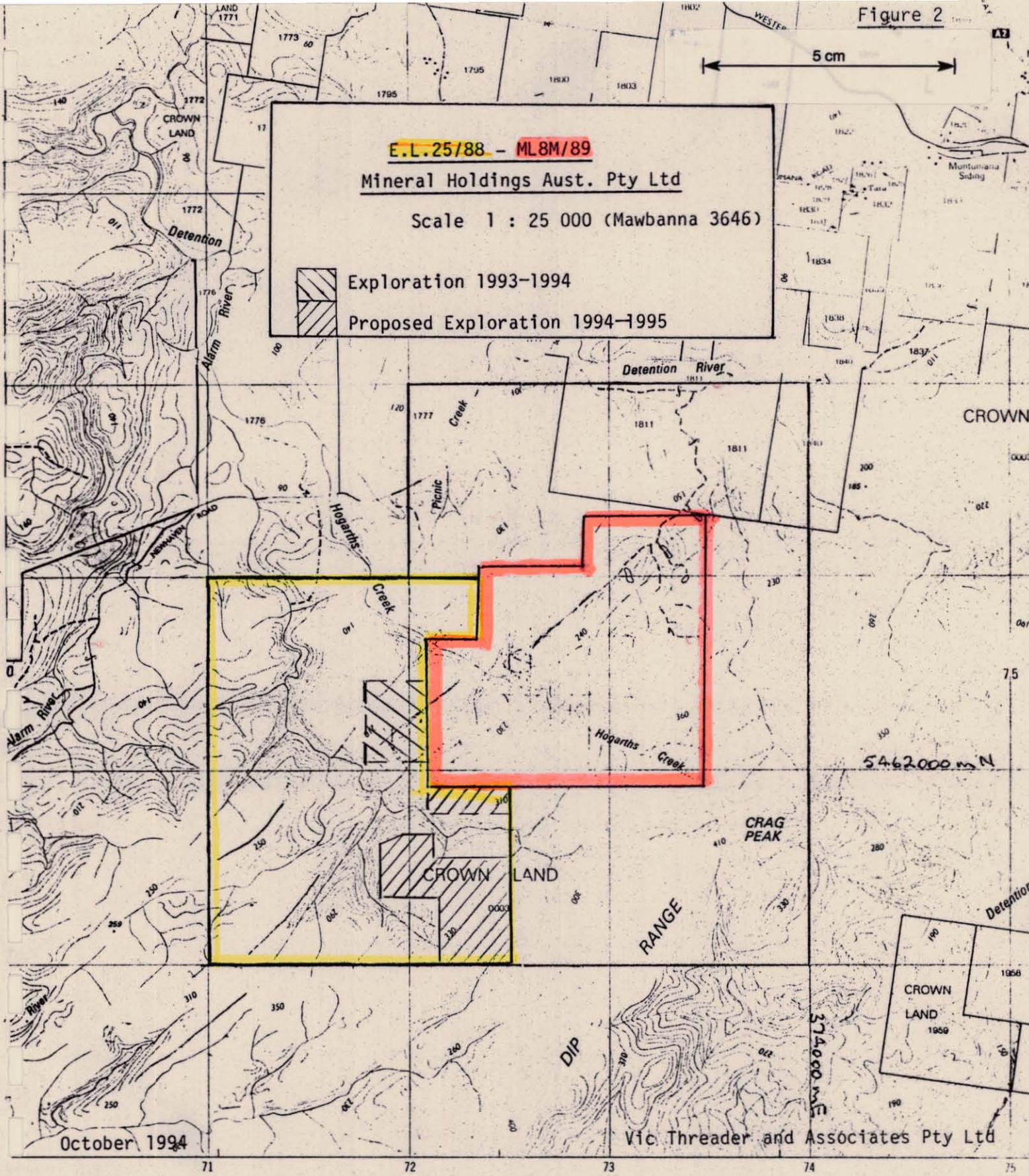
There will be infill drilling along the sand deposit defined on figure 3 extending into the lease which holds the greater part of this resource.

Additional track cutting is proposed to improve access and allow surface sampling and mapping so that the resource can be better defined.

5 cm

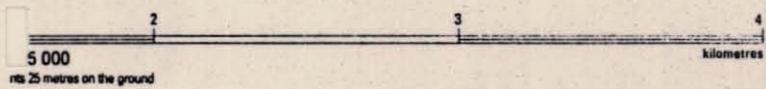
E.L.25/88 - ML8M/89
Mineral Holdings Aust. Pty Ltd
 Scale 1 : 25 000 (Mawbanna 3646)

 Exploration 1993-1994
 Proposed Exploration 1994-1995



October 1994

Vic Threader and Associates Pty Ltd



- Swamp
- Windbreak
- Wet area; Subject to flooding
- Waterfall; Rapids
- Indefinite shoreline or floodbank; Levee
- Tidal rocks or ledge; Offshore rock
- Navigation light or lighthouse; Exposed wreck
- Sand; Tidal reef
- Saline coastal flat; Tidal flats
- Jetty; Launching ramp

BOUNDARIES shown on this map are NOT authoritative. For full particulars please consult the Registrar General's Division, Law Department; or the Survey Division, Lands Department. Areas within proclaimed towns or less than two hectares may not be depicted. Boundaries of Crown Land (including Reserves) extend to low water mark. To give a land parcel reference, prefix parcel number with municipal number. To use this number to gain title or survey information please consult the Mapping Division. Property and parcel boundaries are shown as at July 1984.

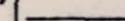
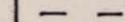
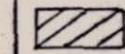
- Municipality name and number **189009**
- Municipality boundary
- Ward name
- Ward boundary
- Town boundary; Other administrative boundaries
- Reserve boundary; Vinculum or joining symbol
- Property boundary; Land parcel boundary and number
- Boundary location uncertain or indefinite

Figure 3

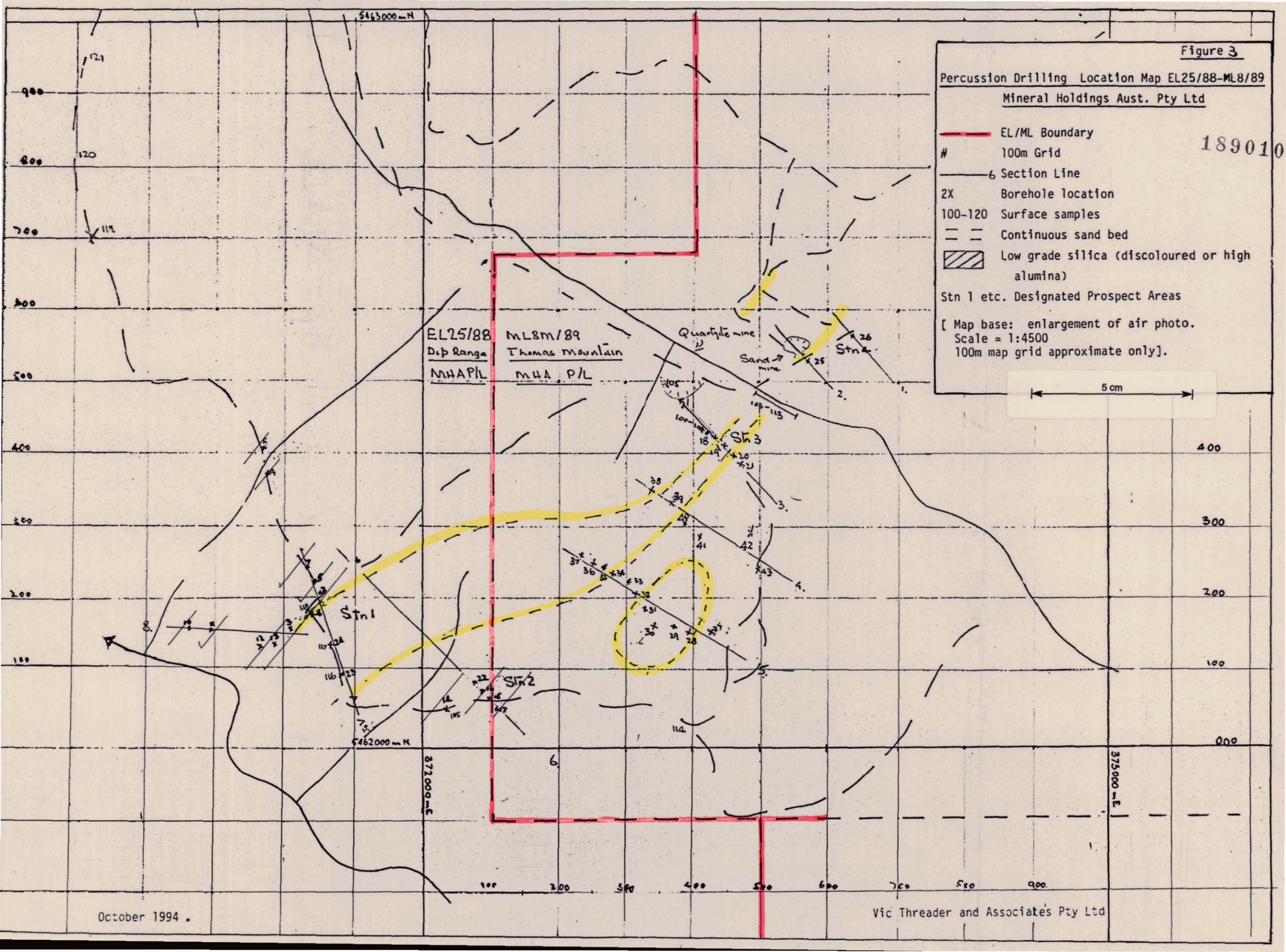
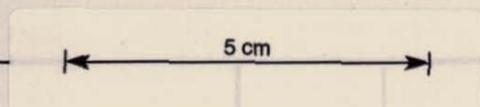
Percussion Drilling Location Map EL25/88-ML8/89

Mineral Holdings Aust. Pty Ltd

189010

-  EL/ML Boundary
- # 100m Grid
-  Section Line
- 2X Borehole location
- 100-120 Surface samples
-  Continuous sand bed
-  Low grade silica (discoloured or high alumina)
- Stn 1 etc. Designated Prospect Areas

[Map base: enlargement of air photo.
 Scale = 1:4500
 100m map grid approximate only].



Analyses Hammer Drill Samples

EL 25/88 Dip Range - ML8M/89 Thomas Mtn

189012

<u>BH No</u>	<u>Sample No</u>	<u>Al2O3</u>	<u>Fe2O3</u>	<u>TiO2</u>	<u>CaO</u>	<u>P2O5</u>	<u>V2O5</u>	<u>LOI</u>	<u>SiO2</u>	<u>Colour</u>	<u>Hardness</u>
DR2	1									Yellow	V.Soft
	2-10									L Brown	Hard
	11-13									Brown	Soft
	14-20									D Brown	Hard
DR3	1										Soil
	+5.66mm 2,3	0.53	0.034	1550	110	75	8	0.63	98.4	OW	Hard
	-5.66mm	0.81	0.058	1100	150	90	8	0.63	98.1	OW	Hard
	4,5	0.39	0.04	1700	100	80	7	0.33	98.9	L Brown	Hard & Soft
	6,7	0.57	0.054	1800	100	90	8	0.31	98.7	W	Hard
	8-10	0.27	0.044	2500	110	90	5	0.25	99.1	OW	V.Soft
	11,12	0.34	0.048	2850	120	110	8	0.2	99	OW	Hard
	13,14	1.18	0.078	2000	60	120	17	0.34	97.7	W	V.Hard
	15,16	1.58	0.115	2200	<10	95	19	0.43	97.1	W	V.Hard
	17,18	1.68	0.15	1700	50	100	22	0.44	96.9	W	V.Hard
	19,20	1.36	0.125	2500	80	160	17	0.39	97.4	W	V.Hard
DR4	1,2	0.63	0.062	5100	120	110	16	0.91	97.6	OW	Hard
	3,4	0.69	0.052	3550	100	95	13	0.4	98.3	OW	Hard
	5-14	0.28	0.041	2050	120	45	6	0.25	99.1	OW	V.Soft (sand)
DR5	1										Soil
	2,3	5.25	0.305	3250	30	70	48	1.1	91.1	OW	Hard
	4,5	6.8	0.8	2850	20	130	60	2.34	87.8	L Brown	Hard
	6,7	9.75	0.38	4150	35	150	75	1.89	84.5	OW	Hard
	8,9	5.1	0.19	2200	70	120	40	1.25	91.5	OW	Hard & Soft
	10,11	6.85	0.295	3150	<10	120	60	1.42	88.9	OW	Hard
	12,13	4.32	0.17	1400	<10	100	24	0.98	93	OW	Hard
	14,15	9.80	0.22	4150	90	150	70	1.85	84.7	OW	Hard
	16,17	1.4	0.275	6000	100	180	95	2.78	78.2	L Brown	Hard
	18									D Grey	Hard
	19,20	7.4	0.175	4000	100	160	60	1.44	88.1	D Grey	Hard
DR6	1,2	5.25	0.175	2700	80	95	42	1.08	91.4	W	Hard
	3,4	10.00	0.39	4850	200	110	85	1.69	84	OW	Hard
	5,6	9.55	0.33	5300	90	100	75	1.7	84.7	OW	Hard
DR7	1-14									L Brown	Hard
DR8	1,2									OW	Hard
	3,4	10.8	2.46	5600	140	170	80	2.3	79	OW	Hard
	5,6	12.8	2.3	4900	95	220	75	2.58	76	OW	Hard
	7,8	9.3	1.4	3950	190	330	70	1.91	82.7	OW	Hard

BH No	Sample No	Al2O3	Fe2O3	TiO2	CaO	P2O5	V2O5	LOI	SiO2	Colour	Hardness
DR8	9,10	4.16	0.57	1750	90	220	32	0.95	92.2	OW	Hard
	11,12	10.4	1.6	4200	340	580	65	2.08	80.7	OW	Hard
	13,14	9.4	2.02	4300	210	450	75	2.06	81.8	OW	Hard
	15-17	12.1	2.24	5400	240	600	95	2.36	77.5	OW	Hard
	18-20	11.4	2.3	5100	150	410	90	2.24	78.3	OW	Hard
DR9	1-4									D Brown	Hard
	5,6									D Brown Clay	blocked bit
DR10	1									L Brown	Hard
	2,3									W	Hard
	4-6									Grey	Hard
DR11	1-6									OW	Soft
DR12	1,2	1.06	0.115	2100	580	95	15	0.51	97.6	W	Hard
	3-5	1.88	0.11	2400	130	100	22	0.42	96.6	Cream	Hard
	6-9	1.14	0.08	2000	100	95	15	0.29	97.8	Cream	Hard
	10	0.4	0.045	1800	110	70	8	0.21	99	Cream	V.Soft
	11-15	0.9	0.056	2900	80	65	9	0.39	98.1	W	V.Hard
	16-20	1.64	0.11	1250	75	85	14	0.36	97.1	W	V.Hard
DR13	1,2	0.75	0.06	1600	20	50	8	0.44	98.3	OW	Hard & Soft
	3-6	0.83	0.066	1500	60	60	9	0.4	98.3	L Brown	Soft
	7-10	2.74	0.215	3000	65	100	36	0.62	95.1	L Brown	Soft
DR14	1-3									L Brown	Soft
	4									L Brown	Hard
	5									D Brown	Hard
	6									Red Brown	Hard
DR15	1										
	2,3	1.44	0.054	1250	10	60	16	0.53	97.3	OW	Hard
	4,5	1.58	0.068	1250	130	65	18	0.45	97.2	W	Hard
	6,7	1.82	0.072	1250	<10	55	19	0.52	96.8	W	Hard
	8,9	1.38	0.066	1100	25	55	14	0.51	97.5	W	Hard
	10,11	1.24	0.076	900	40	55	15	0.61	97.5	W	Hard
	12,13	1.42	0.115	1050	15	45	16	0.5	97.3	W	Hard
	14,15	1.7	0.098	1200	35	50	19	0.54	96.9	W	Hard
	16,17	1.84	0.125	1300	20	50	19	0.57	96.7	W	V.Hard
	18-20	1.24	0.115	1100	<10	45	14	0.56	97.5	W	V.Hard
DR16	1-3	1.4	0.115	1100	560	85	17	0.77	97	OW	Hard
	4-10	1.84	0.076	1250	100	70	20	0.66	96.6	Brown	Hard

BH No	Sample No	Al2O3	Fe2O3	TiO2	CaO	P2O5	V2O5	LOI	SiO2	Colour	Hardness
DR17	1-5	1.5	0.084	800	<10	50	15	1.7	96.1	W	Hard
	6-8	1.72	0.11	1350	<10	75	15	0.42	97	W	Hard
	9-11	1.44	0.074	1050	<10	35	14	0.56	97.3	OW	Hard
	12-14	1.74	0.16	1050	<10	55	18	0.66	96.7	OW	Hard
	15-17	3.24	0.325	2050	<10	100	32	1.65	93.6	L Brown	Hard
DR18	1,2	0.09	0.027	920	45	20	2	0.45	99.3	W	V.Hard
	+5.66mm3,4	0.054	0.017	700	40	15	<2	0.25	99.6	W	V Hard
	-5.66mm3,4	0.1	0.03	900	50	20	2	0.49	99.3	W	V Hard
	5,6	0.1064	0.028	920	45	20	<2	0.17	99.6	W	V Hard
	7,8	0.058	0.032	880	45	20	<2	0.15	99.6	W	V Hard
	9-11	0.056	0.031	800	65	25	<2	0.25	99.5	W	V Hard
	12,13	0.074	0.039	900	70	20	<2	0.25	99.5	W	V Soft, soft
	14,15	0.072	0.06	800	90	30	3	0.39	99.4	W	Hard
	16	0.072	0.043	840	55	35	4	0.28	99.5	W	Hard
DR19	1-3	0.05	0.02	860	40	20	3	0.28	99.5	OW	V Soft
	4-6	0.66	0.049	1100	55	50	9	0.4	98.5	OW	V Soft
	7-9	0.058	0.03	880	55	30	3	0.31	99.5	W	Hard
	10,11	0.07	0.033	580	50	20	3	0.28	99.5	W	V Hard
	12-14	0.084	0.044	680	45	25	3	0.17	99.6	W	V Hard
	15-17	0.395	0.054	660	55	45	3	0.22	99.1	W	V Hard
DR20	1									L Brown	Hard
	2,3	0.076	0.031	1050	40	20	3	0.62	99.1	OW	Hard
	4,5	0.08	0.027	1200	<10	20	4	0.26	99.5	OW	Hard
	6,7	0.074	0.03	960	<10	15	3	0.2	99.6	W	Hard
	8,9	0.185	0.039	780	60	45	4	0.23	99.4	W	Hard
	10,11	0.395	0.045	980	50	45	7	0.16	99.2	OW	Hard
	12,13	0.88	0.07	1050	75	55	13	0.28	98.3	OW	V Hard
	14,15	0.84	0.07	1050	55	50	12	0.28	98.4	OW	V Hard
	16,17	0.88	0.084	880	20	55	13	0.4	98.2	OW	V Hard
DR21	1										Contaminated
	2,3	0.125	0.03	920	15	35	4	0.41	99.3	OW	Hard
	4,5	0.26	0.032	880	55	45	5	0.19	99.3	W	Hard
	6,7	0.25	0.035	1300	80	45	6	0.17	99.3	W	Hard
	8	0.245	0.031	960	65	55	5	0.28	99.2	OW	V Soft
	9,10	0.78	0.064	880	50	55	10	0.6	98.2	OW	Hard
DR22	1										Contaminated
	+5.66mm2,3	0.195	0.019	470	70	45	3	0.12	99.5	W	Hard
	-5.66mm2,3	0.56	0.049	880	85	40	7	0.43	98.7	OW	Hard

<u>BH No</u>	<u>Sample</u>	<u>Al2O3</u>	<u>Fe2O3</u>	<u>TiO2</u>	<u>CaO</u>	<u>P2O5</u>	<u>V2O5</u>	<u>LOI</u>	<u>SiO2</u>	<u>Colour</u>	<u>Hardness</u>
	<u>No</u>										
	4,5	1.26	0.068	1050	40	45	16	0.32	97.8	OW	Hard
	6,7	1.66	0.07	1100	<10	40	20	1.24	96.4	Brown	Hard
	8-10									Brown	Hard
DR23	3	0.11	0.027	1000	15	15	3	0.39	99.3	LB-OW	V Soft
	4-7	0.1	0.025	1000	<10	20	<2	0.25	99.5	W	V Soft
	8,9	0.086	0.023	820	55	35	<2	0.14	99.6	W	V Soft
	10-12	0.09	0.024	920	25	25	<2	0.07	99.7	W	V Soft
	13,14	0.165	0.029	880	60	40	5	0.12	99.5	W	V Soft
	15-17	0.16	0.03	800	50	35	4	0.12	99.5	W	V Soft
DR24	1,2	0.078	0.029	1100	90	30	4	0.6	99.1	OW	V Soft
	3-5	0.056	0.023	940	15	15	3	0.13	99.7	W	V Soft
	6-8	0.043	0.022	880	15	15	3	0.07	99.7	W	V Soft
	9-11	0.04	0.021	720	40	20	3	0.07	99.8	W	V Soft
	12-14	0.062	0.027	860	45	20	4	0.04	99.7	W	V Soft
	15-17	0.052	0.027	740	50	20	4	0.28	99.5	W	V Soft
DR25	1,2	0.06	0.025	1250	25	15	4	0.38	99.4	OW	Soft
	3-5	0.05	0.019	1100	15	20	3	0.26	99.5	W	Soft
	6-8	0.052	0.019	1050	40	25	3	0.33	99.5	W	Soft
	9-11	0.068	0.023	900	50	25	3	0.15	99.6	W	Soft
	12-14	0.052	0.024	720	50	15	2	0.06	99.8	W	Soft
	15-17	0.16	0.036	1350	<10	65	5	0.25	99.3	W	Soft
DR26	1,2	0.062	0.023	900	<10	20	2	0.14	99.6	W	Soft
	3,4	0.047	0.016	1050	<10	15	<2	0.26	99.5	W	Soft
	5,6	0.054	0.022	1150	50	25	3	0.28	99.5	W	Hard
	7,8	0.056	0.022	1000	40	30	2	0.19	99.6	W	Soft/Hard
	9,10	0.072	0.024	1000	40	15	3	0.26	99.5	W	Soft
	11,12	0.105	0.029	1400	60	30	4	0.36	99.3	W	Soft
	13,14	0.05	0.024	680	55	20	<2	0.15	99.7	W	Hard
	15-17	0.049	0.028	840	50	30	2	0.22	99.6	W	Hard

EL 25/88 Dip Range - ML8M/89 Thomas Mountain

Analyses, Hammer drill samples.

BH No.	Sample No.	Al2O3 %	Fe2O3 %	TiO2 ppm	CaO ppm	P2O5 ppm	V2O5 ppm	SiO2 %	LOI %	Colour	Hardness	Remarks
DR 27	1,2											1m soil and 1m contam. sample
	3,4	0.1	0.07	880	420	30	30	99.3	0.35	W	Hard	
	5 - 9	0.35	0.07	1550	360	45	8	98.8	0.38	O.W.	Med, Soft	
	5 - 9/-22#	0.285	0.06	1600	320	60	8	99.1	0.24			
	5 - 9/+22#	0.78	0.155	1050	1150	110	13	97.9	0.57			
	10 - 21	1.46	0.15	1150	270	70	18	97.2	0.48	W	V. Hard	
	10-21/-22#	1.4	0.155	1150	400	170	19	97.4	0.37			
	10-21/+22#	1.22	0.062	1100	270	160	19	97.6	0.48			
DR 28	1											Soil
	2,3									W	Sand	
	4 - 12									O.W.	Sand	
	13 - 19									L. Brown	Hard	
	19 - 22									"	V. Hard	
DR 29	1											Soil
	2,3									W	Sand	
	4									O.W.	"	Hole aborted - caving
DR 30	1											Soil
	2 - 11	0.13	0.032	1100	130	25	4	99.4	0.29	W	Sand	
	12 - 22	0.094	0.034	1450	95	35	6	99.4	0.27	W	Sand	
DR 31	1											Soil
	2 - 13									W	Sand	
	14 - 18									W	Hard	
	19, 20									W	Hard with soft seams	
	21, 22									W	Hard	

189016

<u>BH No.</u>	<u>Sample No.</u>	<u>Al2O3</u> %	<u>Fe2O3</u> %	<u>TiO2</u> ppm	<u>CaO</u> ppm	<u>P2O5</u> ppm	<u>V2O5</u> ppm	<u>SiO2</u> %	<u>LOI</u> %	<u>Colour</u>	<u>Hardness</u>	<u>Remarks</u>
DR 32	1											Soil
	2 - 4									Cream	Soft	
	5 - 13	0.55	0.045	1200	95	55	12	98.7	0.31	W	Hard	
	14 - 22	0.456	0.12	1000	85	55	11	98.9	0.27	W	Hard	Soft band at 15m
DR 33	1											Soil
	2,3									Cream	Sand	
	4 - 6									W	Hard	
	7,8									W	Soft	
	9									W	Hard	
	10 - 16									W	Soft	
	17 - 21									W	Hard	
DR 34	1											Soil
	2 - 6	0.058	0.022	660	85	30	5	99.4	0.36	W	Sand	
	7,8	0.052	0.022	600	75	35	5	99.6	0.25	W	Hard	
	9 - 17	0.074	0.03	780	70	40	5	99.5	0.27	W	Sand	
	18 - 22	0.415	0.052	760	85	45	9	99	0.3	W	Hard	
	18-22/-22#	0.395	0.054	860	60	50	8	99.1	0.21			
	18-22/+22#	0.62	0.044	820	140	90	12	98.7	0.32			
DR 35	1											Soil
	2 - 14									W	Sand	
	15 - 17									W	Hard	
	18 - 22									W	Soft	
DR 36	1											Soil
	2 - 4									Cream	Sand	
	5 - 17									W	Sand	Too soft to continue

189017

<u>BH No.</u>	<u>Sample No.</u>	<u>Al2O3</u> %	<u>Fe2O3</u> %	<u>TiO2</u> ppm	<u>CaO</u> ppm	<u>P2O5</u> ppm	<u>V2O5</u> ppm	<u>SiO2</u> %	<u>LOI</u> %	<u>Colour</u>	<u>Hardness</u>	<u>Remarks</u>
DR 37	1											Soil
	2 - 6									Cream	Sand	
	7 - 12									L.Cream	Sand	
	13 - 18									W	Sand	Too soft to continue
DR 38	1											Soil
	2,3									W	Sand	
	4 - 6									W	Hard	
	7 - 9									W	Soft	
	10									L.Brown	Soft	
	11									"	V.Hard	
	12									Cream	V.Hard	
	13									W	V.Hard	
	14									Brown	Soft	
	15,16									Brown	M.Hard	
DR 39	17 - 19									Brown	Soft	
	1											Soil
	2 - 4									W	Sand	
	5 - 7									Cream	Sand	
	8									Brown	Sand	
	9									Brown	Hard	
	10									L.Brown	Hard	
	11 - 22	1.1	0.105	860	75	55	15	97.9	0.39	Cream	Hard	
	11-22/-22#	0.99	0.092	760	90	70	16	98	0.42			
	11-22/+22#	1.02	0.06	780	130	90	16	97.9	0.48			
DR 40	1 - 6									W	Hard	
	7									Brown	Hard	
	8									L.Brown	Hard	
	9 - 14									Cream	Hard	
	15									L.Brown	Hard	Water in hole

189018

<u>BH No.</u>	<u>Sample No.</u>	<u>Colour</u>	<u>Hardness</u>	<u>Remarks</u>
DR 41	1			Soil
	2 - 8	Cream	Hard	
	9,10	W	Hard	
	11 - 14	Cream	Hard	
	15	Brown	Soft	
	16 - 19	L. Brown	Hard	
	20	Cream	Hard	
	21	L. Brown	Hard	
	22	Brown	Hard	
DR 42	1			Soil
	2	Cream	Hard	
	3	L. Brown	Hard	
	4 - 6	L. Brown	Soft	
	7 - 12	L. Brown	Med Hard	Hole abandoned
DR 43	1 - 5	Cream	Hard	
	6,7	L. Brown	Soft	
	8	Brown	Soft	Hole abandoned

RESERVE ESTIMATE

189020

Distribution of Percussion Drilling Samples according to Hardness

B.H.No.	Very Hard		Hard		Soft		Very Soft		Total Depth
	m	%	m	%	m	%	m	%	
1	19	19	48	47	15	15	20	20	102
2	-	0	14	82	2	12	1	6	17 x
3	8	42	7	37	1	5	3	16	19 x
4	-	0	4	29	-	0	10+	71	14
5	19	95	1	5	-	0	-	0	20 x
6	-	0	6	100	-	0	-	0	6 x
7	-	0	14	100	-	0	-	0	14 x
8	-	0	20	100	-	0	-	0	20 x
9	-	0	5	100	-	0	-	0	6 x
10	-	0	6	100	-	0	-	0	6 x
11	-	0	-	0	-	0	6+	100	6 x
12	10	50	9	45	-	0	1	5	20 x
13	-	0	1	10	9	90	-	0	10 x
14	-	0	3	50	3	50	-	0	6 x
15	5	25	15	75	-	0	-	0	20 x
16	-	0	10	100	-	0	-	0	10 x
17	-	0	17	100	-	0	-	0	17 x
18	11	64	4	24	-	0	2	12	17
19	8	47	3	18	-	0	6	35	17
20	6	35	11	65	-	0	-	0	17
21	-	0	9	90	-	0	1	10	10
22	-	0	10	100	-	0	-	0	10 x
23	-	0	-	0	-	0	17+	100	17
24	-	0	-	0	-	0	17+	100	17
25	-	0	-	0	17	100	-	0	17
26	-	0	8	47	9	53	-	0	17
27	12	63	2	11	5	26	-	0	17
28	3	14	6	29	-	0	12	57	21
29	-	0	-	0	-	0	4+	100	4
30	-	0	-	0	-	0	22+	100	22
31	-	0	7	33	1	5	13	62	21
32	-	0	17	81	4	19	-	0	21
33	-	0	11	53	7	33	3	14	21
34	-	0	7	32	-	0	15	68	22

<u>B.H.No.</u>	<u>Very Hard</u>		<u>Hard</u>		<u>Soft</u>		<u>Very Soft</u>		<u>Total Depth</u>
	%	%	m	%	m	%	m	%	
35	-	0	3	14	5	23	14	63	22
36	-	0	-	0	-	0	17+	100	17
37	-	0	-	0	-	0	18+	100	18
38	3	16	5	26	8	42	3	16	19
39	-	0	15	68	-	0	7	32	22
40	-	0	15	100	-	0	-	0	15
41	-	0	17	81	4	19	-	0	21
42	-	0	9	75	3	25	-	0	12
43	-	0	5	63	3	37	-	0	8

Mean % BHs2-43
(excluding BHs
marked x)

7 31 13 49

cf BH No.1

19 47 15 20

In Situ resource (t x 10⁶)

0.35 1.55 0.65 2.45

Area Drilled 25 hectares

Mean Vertical Depth drilled 10m

Density Factor 2

Tonnage 5 x 10⁶

189022

AMG BH LOCATIONS - DIP RANGE - THOMAS MTN

<u>BH No.</u>	<u>mE</u>	<u>mN</u>	<u>BH No.</u>	<u>mE</u>	<u>mN</u>
DR 1	372 390	5 462 470	DR 24	371 870	5 462 130
2	371 850	210	25	372 570	530
3	810	160	26	640	560
4	840	170	27	440	150
5	840	220	28	420	160
6	910	240	29	400	170
7	830	240	30	380	180
8	760	410	31	360	190
9	770	370	32	340	200
10	660	160	33	320	210
11	690	160	34	300	220
12	760	130	35	290	230
13	780	130	36	270	240
14	372 040	060	37	250	250
15	100	070	38	370	350
16	090	080	39	400	330
17	110	050	40	430	320
18	410	440	41	460	300
19	430	420	42	490	290
20	440	400	43	500	240
21	460	380			
22	080	090			
23	371 880	090			

A P P E N D I XLABORATORY REPORTS

<u>Report</u>	<u>Date</u>	<u>Content</u>
Analabs	2.11.93	Chemical analyses of surface samples 100 to 121
Amde1 4 AD0200	8.2.94) Chemical analyses of screened surface sample no.105
Amde1 4 AD0361	15.2.94	
Amde1 4AD0127	28.2.94	Chemical analyses of screened samples from B.H.1
Amde1 4 AD0903	22.4.94	Chemical analyses of boreholes 1 to 26
Amde1 4AD1466	9.5.94	Chemical analyses of boreholes 27 - 39 Screen analysis of borehole sand samples for 20/40 content.
Stimlab	30.6.94 5.7.94	Permeability and conductivity tests on sand from ML8M/89
Ammtek A4281	August 1994	Beneficiation Testing of sand from ML8M/89



Analabs
Inchcape Testing Services

2 November 1993

Mr Vic Threader
Vic Threader & Associates
15 Kingston Heights
KINGSTON BEACH TAS 7150

Inchcape Testing Services
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ACN 004 591 664
14 Thirkell St., Burnie
Tasmania 7320.
P.O. Box 929, Burnie,
Tasmania 7320
Telephone: (61 04) 31 6837
Facsimile: (61 04) 31 8890

189024

Dear Sir,

On 11 October 1993, Mr Kevin Pinner delivered 30 samples to us for analysis. The results are as follows.

	SiO2	Fe2O3	Al2O3	CaO	TiO2	P2O5	V2O5	Na2O	K2O	MgO	MnO	LOI	Ni	Pb	Colour	Hardness
Calder O/S	99.70	0.0126	0.090	0.0037	0.042	0.003	0.0004	0.005	0.016	0.0029	0.00015	0.12	1	1	W	H
HR 1	99.79	0.0073	0.020	0.0040	0.016	0.001	0.0003	0.004	0.005	0.0033	0.00013	0.15	2	2	W	H
HR 2	99.72	0.0079	0.029	0.0032	0.012	0.004	0.0001	0.003	0.006	0.0023	0.00009	0.21	1	1	W	H
BR 1	94.52	0.1148	3.300	0.0054	0.052	0.001	0.0022	0.011	1.070	0.3537	0.00037	0.57	1	2	O/W	H
BR 2	99.87	0.0030	0.025	0.0041	<0.005	0.002	<0.0001	0.004	0.006	0.0030	0.00002	0.08	1	1	W	H
BR 3	99.71	0.0143	0.041	0.0035	0.050	0.001	0.0001	0.007	0.009	0.0047	0.00016	0.16	2	4	W	H
BR 4	97.28	0.0629	1.891	0.0052	0.021	0.003	0.0009	0.013	0.346	0.0803	0.00033	0.30	1	0	W	H
BR 5	99.65	0.0106	0.074	0.0029	0.041	0.015	0.0003	0.007	0.018	0.0060	0.00011	0.17	1	1	W	H
TM 100	99.66	0.0183	0.131	0.0035	0.019	0.003	0.0003	0.003	0.029	0.0048	0.00012	0.13	1	0	W	H
TM 101	99.38	0.0265	0.336	0.0029	0.039	0.002	0.0006	0.003	0.080	0.0082	0.00014	0.12	1	0	W	H
TM 102	99.60	0.0181	0.170	0.0027	0.023	0.002	0.0002	0.003	0.042	0.0055	0.00016	0.13	1	0	W	H
TM 103	99.57	0.0283	0.150	0.0032	0.060	<0.001	0.0003	0.003	0.033	0.0052	0.00151	0.14	1	1	W	H
TM 104	99.56	0.0172	0.183	0.0029	0.036	<0.001	0.0003	0.004	0.045	0.0065	0.00011	0.14	1	0	W	H
TM 105	99.76	0.0107	0.038	0.0049	0.030	0.001	0.0001	0.002	0.007	0.0026	0.00013	0.14	0	0	W	H
TM 106	99.63	0.0178	0.179	0.0034	0.018	0.002	0.0003	0.002	0.042	0.0067	0.00016	0.10	1	<1	W	H
TM 107	99.36	0.0236	0.378	0.0029	0.012	0.001	0.0007	0.003	0.090	0.0103	0.00014	0.12	0	0	W	H
TM 108	99.15	0.0303	0.518	0.0029	0.010	<0.001	0.0008	0.004	0.116	0.0139	0.00013	0.15	0	0	W	H
TM 109	99.64	0.0217	0.124	0.0032	0.014	0.005	0.0004	0.003	0.060	0.0075	0.00016	0.12	<1	1	W	H
TM 110	99.69	0.0094	0.063	0.0030	0.051	0.001	0.0002	0.002	0.012	0.0036	0.00012	0.16	<1	0	O/W	H
TM 111	99.32	0.0208	0.348	0.0033	0.030	<0.001	0.0006	0.004	0.081	0.0106	0.00013	0.18	<1	1	O/W	H
TM 112	99.54	0.0178	0.234	0.0031	0.023	0.004	0.0001	0.003	0.049	0.0067	0.00031	0.12	1	0	W	H
TM 113	98.87	0.0333	0.737	0.0047	0.022	0.003	0.0007	0.005	0.142	0.0217	0.00016	0.16	1	1	O/W	H
TM 114	99.37	0.0094	0.345	0.0031	0.012	0.003	0.0003	0.005	0.077	0.0121	0.00012	0.16	<1	<1	W	H
TM 115	99.70	0.0076	0.056	0.0032	0.033	0.002	<0.0001	0.003	0.012	0.0031	0.00022	0.18	1	0	W	H
TM 116	99.68	0.0061	0.068	0.0022	0.021	0.002	<0.0001	0.002	0.014	0.0034	0.00007	0.20	0	0	W	H
TM 117	99.48	0.0100	0.228	0.0024	0.024	0.004	<0.0001	0.003	0.049	0.0069	0.00008	0.19	1	0	W	H
TM 118	99.33	0.0194	0.368	0.0030	0.014	0.004	0.0004	0.004	0.080	0.0105	0.00007	0.17	1	0	W	H
TM 119	98.35	0.0317	1.046	0.0024	0.034	0.002	0.0005	0.010	0.181	0.0463	0.00008	0.30	1	<1	B/W	H
TM 120	98.52	0.0323	0.860	0.0032	0.061	0.003	0.0005	0.007	0.153	0.0364	0.00012	0.32	1	<1	B/W	H
TM 121	99.39	0.0140	0.155	0.0023	0.073	0.003	0.0003	0.004	0.030	0.0081	0.00011	0.32	1	1	B/W	H
TM 107R	99.35	0.0285	0.373	0.0032	0.015	0.005	0.0007	0.004	0.088	0.0105	0.00016	0.12	0	0	W	H
TM 121R	99.38	0.0155	0.166	0.0023	0.066	0.002	0.0002	0.005	0.031	0.0086	0.00010	0.32	<1	1	B/W	H

UNITS

Yours faithfully
ANALABS - A division of
Inchcape Testing Services Pty Ltd

COLOUR:- W = WHITE, O/W = OFF WHITE, B/W = BROWN-WHITE
HARDNESS:- ALL SAMPLES WERE DETERMINED TO BE HARD
NO DISCRIMINATION COULD BE MADE DURING CRUSHING



ANALYTICAL SERVICES

8m/89
189025

Amdel Laboratories Limited
Brown Street, Thebarton, 5031
Telephone: (08) 416 5300 Facsimile: (08) 234 0321

Mr Neil Thomas
Mineral Holdings Australia P/L
2nd Floor, 135 Collins Street
MELBOURNE
VIC 3000

F I N A L A N A L Y S I S R E P O R T

Your Order No:

Our Job Number : 4AD0200

Samples received : 27-JAN-1994

Results reported : 08-FEB-1994

No. of samples : 2

Report comprises a cover sheet and pages 1 to 1

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source.

Note:

If you have any enquiries please contact Mr Alan Ciplys quoting the above job number.

Approved Signatory:

Chris Altman

for Trevor Francis
Marketing Manager

CC Mr Vic Threader TAS

Report Codes:

N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficient Sample.

Distribution Codes:

CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media



Job: 4AD0200
O/N:

ANALYTICAL REPORT

		Sample	Sample	
		TM 105B -25 WET SCREEN	TM 105B -30+25 WET SCREEN	
CaO	ppm	40	70	IC4E
Fe2O3	ppm	200	180	IC4E
Na2O	ppm	40	40	IC4E
Al2O3	ppm	500	520	IC4E
TiO2	ppm	700	620	IC4E
K2O	ppm	70	95	IC4E
MnO	ppm	<5	5	IC4E
P2O5	ppm	25	35	IC4E
MgO	ppm	110	100	IC4E
V2O5	ppm	3	3	IC4E
SiO2	%	99.1	99.1	IC4E
LOI	%	0.12	0.18	IC4E
Colour		White	White	

Sample TM105B, re-submitted 27 January 1994, comprised 2 rocks of approximately 75 to 100mm. The rocks were crushed by hammer to minus 30mm, wet screened at 25mm and each size fraction assayed.

Fraction	Weight (%)
-30 + 25mm	43.7
-25mm	56.3

ANALYTICAL REPORT

		Sample	Sample		
		-3"+1"	-1"		
		WET	WET		
		SCREENED	SCREENED		
	CaO	ppm	65	90	IC4E
Total Fe as	Fe2O3	ppm	325	550	IC4E
	Na2O	ppm	65	65	IC4E
	Al2O3	ppm	2555	2665	IC4E
	TiO2	ppm	335	440	IC4E
	K2O	ppm	715	710	IC4E
	MnO	ppm	<5	<5	IC4E
	P2O5	ppm	25	35	IC4E
	MgO	ppm	160	180	IC4E
	V2O5	ppm	4	5	IC4E
	SiO2	%	99.2	99.1	IC4E
	LOI	%	0.07	0.06	IC4E
SiO2 (by difference)	%		99.5	99.5	
	TiO2	%	0.035	0.045	IND6
	Colour		Off White	Off White	

WET SCREENING PROCEDURE

The sample TM105 consisted of a single lump of quartzite rock weighing ≈ 10 kg. This was broken up using a sledge hammer into pieces smaller than 75mm.

All -75mm material was screened on 25mm. The +25mm fraction was soaked in water and after hand agitation thoroughly wet screened using a mains pressure hand sprayer.

After drying, the products were prepared for assay by crushing in a non-metallic bowl followed by pulverising in a zirconia mill.

Product weights were:-

-75mm + 25 (wet screened)	9447.3g
-25mm	1176.7g

METHODS (IC4E)

The methods used are a combination of acid leach and fusion techniques.

The majority of the silica is volatilised and the loss measured gravimetrically. The residue, (including residual silica) is taken into solution by means of an alkaline fusion and its composition determined by ICP-AES

This methodology gives total element values for all the elements sought, unlike most acid dissolutions, which will generally not quantitatively attack minerals such as chromite, rutile, ilmenite etc.

Job: 4AD0127
 O/N:

ANALYTICAL REPORT

	Sample	Sample	Sample	Sample	Sample	
	DRP1B(81-82) HEAD	DRP1B(81-82) +0.5MM	DRP1(11-12) HEAD	DRP1(11-12) +0.5MM	DRP1B(64-65) HEAD	
----- WET SCREENED -----						
SiO2	%	98.7	96.8	98.2	98.2	98.7 IC4E
TiO2	%	0.06	0.12	0.09	0.04	0.05 IC4E
Al2O3	%	0.57	1.14	0.22	0.14	0.47 IC4E
Fe2O3	%	0.06	0.08	0.10	0.03	0.11 IC4E
MnO	%	<0.01	<0.01	<0.01	<0.01	<0.01 IC4E
MgO	%	0.02	0.06	0.02	0.01	0.01 IC4E
CaO	%	<0.01	<0.01	<0.01	<0.01	<0.01 IC4E
Na2O	%	<0.01	0.02	<0.01	<0.01	<0.01 IC4E
K2O	%	0.02	0.37	0.07	0.06	0.12 IC4E
P2O5	%	<0.01	<0.01	<0.01	<0.01	<0.01 IC4E
LOI	%	0.34	0.36	0.36	0.28	0.40 IC4E
V2O5	ppm	<20	50	<20	<20	<20 IC4E
Colour		Off White	Off White	Off White	Off White	Off White

ANALYTICAL REPORT

	Sample	Sample	Sample		
	DRP1B(64-65)	TM105	TM105		
	+0.5MM	-25MM	-30+25MM		
	<----- WET SCREENED ----->				
SiO2	%	98.6	99.3	99.0	IC4E
TiO2	%	0.07	0.07	0.07	IC4E
Al2O3	%	0.78	0.04	0.03	IC4E
Fe2O3	%	0.12	0.05	0.04	IC4E
MnO	%	<0.01	<0.01	<0.01	IC4E
MgO	%	0.02	<0.01	<0.01	IC4E
CaO	%	<0.01	<0.01	<0.01	IC4E
Na2O	%	<0.01	<0.01	<0.01	IC4E
K2O	%	0.21	0.02	0.01	IC4E
P2O5	%	<0.01	<0.01	<0.01	IC4E
LOI	%	0.50	0.24	0.25	IC4E
V2O5	ppm	<20	<20	<20	IC4E
Colour		Off White	White	White	

SIZE DISTRIBUTIONS OF SAMPLES: JOB 4AD0127

Sample	Weight %	
	+0.5mm	-0.5mm
DRP1, 11-12m	32.2	66.8
DRP1, 64-65m	25.0	75.0
DRP1, 81-82m	31.1	68.9

Sample	Weight %	
	-30+25mm	-25mm
TM 105	52.7	47.3



189035

ANALYTICAL SERVICES

Amdel Laboratories Limited ACN 009 076 555;
Brown Street, Thebarton, South Australia 5031
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Head Office: Adelaide Branches in: Perth, Darwin, Kalgoorlie,
Meekatharra, Townsville, Melbourne, Sydney, Mt Isa, Alice Springs

FACSIMILE TRANSMISSION SHEET

TO: MINERAL HOLDINGS
FROM: D. CAPUTO ATT: MICHAEL THOMAS
DATE: 22/4/94 CC:
REF: 4AD0903 PAGES: 6

MESSAGE:

FINAL REPORTS FOLLOWING -
FOR RESULTS PREVIOUSLY FAX'D
By CHRIS ALTMAN

REGARDS
DINO

189036



Analysis code 104E

Report 4AD0005

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Station Designation	Sample	Al2O3	Total Fe as Fe2O3	TiO2	CaO	P2O5	V2O5	LOI	SiO2	Colour	Hardness
	DR 3/2,3 +5.00mm	0.63	0.034	1550	110	75	8	0.63	98.4	Off White	Hard
	DR 3/2,3 -5.00mm	0.81	0.058	1100	150	90	8	0.63	98.1	Off White	Hard
	DR 3/4,5	0.39	0.04	1700	100	80	7	0.33	98.0	Off White	Hard with soft bands
	DR 3/6,7	0.67	0.054	1800	100	90	8	0.31	98.7	Off White	Hard
	DR 3/8,9,10	0.27	0.044	2500	110	90	8	0.25	98.1	Off White	V. Soft
	DR 3/11,12	0.34	0.048	2850	120	110	8	0.2	98	Off White	Hard
	DR 3/13,14	1.10	0.078	2000	80	120	17	0.34	97.7	Off White	V. Hard
	DR 3/15,16	1.60	0.118	2200	<10	98	19	0.43	97.1	Off White	V. Hard
	DR 3/17,18	1.88	0.15	1700	50	100	22	0.44	98.9	Off White	V. Hard
	DR 3/19,20	1.38	0.125	2800	60	180	17	0.39	97.4	Off White	V. Hard
	DR 4/1,2	0.83	0.082	5100	120	110	18	0.91	97.0	Off White	Hard
	DR 4/3,4	0.69	0.082	3550	100	95	13	0.4	98.5	Off White	Hard
	DR 5/2,3	5.25	0.305	3250	80	70	48	1.1	91.1	Off White	Hard
	DR 5/4,5	6.8	0.8	2850	20	130	00	2.34	87.8	Off White	Hard
	DR 5/6,7	9.75	0.38	4150	35	150	75	1.89	84.5	Off White	Hard
	DR 5/8,9	5.1	0.19	2200	70	120	40	1.25	91.5	Off White	0.5m V. Soft, 0.5m
	DR 5/10,11	6.85	0.295	3150	<10	120	60	1.42	88.9	Off White	Hard
	DR 5/12,13	4.32	0.17	1400	<10	100	24	0.90	93	Off White	Hard
	DR 5/14,15	0.8	0.22	4150	90	150	70	1.85	84.7	Off White	Hard
	DR 5/16,17	14	0.278	8000	100	180	95	2.78	78.2	Off White	Hard
	DR 5/19,20	7.4	0.175	4000	100	180	60	1.44	88.1	Off White	Hard
	DR 6/1,2	5.25	0.175	2700	80	95	42	1.08	91.4	Off White	Hard
	DR 6/3,4	10	0.39	4950	200	110	85	1.09	84	Off White	Hard
	DR 6/5,6	9.55	0.33	5300	90	100	78	1.7	84.7	Off White	Hard
	DR 6/3,4	10.8	2.48	5800	140	170	80	2.3	78	Off White	Hard
	DR 6/5,6	12.8	2.9	4900	95	220	75	2.68	78	Off White	Hard
	DR 6/7,8	9.3	1.4	3950	100	890	70	1.91	82.7	Off White	Hard
	DR 6/9,10	4.18	0.57	1750	90	220	82	0.66	92.2	Off White	Hard
	DR 8/11,12	10.4	1.0	4200	340	500	65	2.68	80.7	Off White	Hard
	DR 8/13,14	9.4	2.02	4300	210	450	75	2.00	81.0	Off White	Hard
	DR 8/15,16,17	12.1	2.24	6400	240	600	95	2.56	77.5	Off White	Hard
	DR 8/18,19,20	11.4	2.3	5100	150	410	90	2.24	78.8	Off White	Hard
	DR 12/1,2	1.08	0.115	2100	580	95	18	0.61	97.0	Off White	Hard
	DR 12/3,4,5	1.88	0.11	2400	130	100	22	0.42	98.6	Off White	Hard
	DR 12/6,7,8,9	1.14	0.08	2000	100	95	15	0.29	97.8	Off White	Hard
	DR 12/10	0.4	0.045	1800	110	70	0	0.21	99	White	V. Soft
	DR 12/11,12,13,14,15	0.9	0.058	2900	80	65	9	0.39	98.1	Off White	V. Hard/Hard
	DR 12/16,17,18,19,20	1.64	0.11	1250	75	85	14	0.30	97.1	White	V. Hard
	DR 13/1,2	0.75	0.08	1800	20	50	8	0.44	98.3	Off White	Hard/Soft
	DR 13/3,4,5,6	0.83	0.080	1500	80	80	9	0.4	98.3	Off White	Soft
	DR 13/8,9,10	2.74	0.215	3000	85	100	55	0.82	95.1	Off White	Soft
	DR 23/3	0.11	0.027	1000	15	15	3	0.39	99.3	Off White	V. Soft
	DR 23/4,5,6,7	0.1	0.025	1000	<10	20	3	0.25	99.5	Off White	V. Soft
	DR 23/8,9	0.088	0.023	820	55	55	4	0.14	99.8	White	Hard
	DR 23/10,11,12	0.89	0.024	920	25	25	4	0.07	99.7	White	Soft
	DR 23/13,14	0.185	0.020	880	60	40	5	0.12	99.5	White	Hard
	DR 23/15,16,17	0.18	0.03	800	50	35	4	0.12	99.5	White	Hard
	DR 24/1,2	0.078	0.020	1100	90	30	4	0.61	99.1	Off White	V. Soft
	DR 24/3,4,5	0.050	0.023	940	15	15	8	0.13	99.7	White	V. Soft
	DR 24/6,7,8	0.043	0.022	880	15	15	3	0.07	99.7	White	V. Soft
	DR 24/9,10,11	0.04	0.021	720	40	20	3	0.07	99.8	White	V. Soft
	DR 24/12,13,14	0.062	0.027	800	45	20	4	0.04	99.7	White	V. Soft
	DR 24/16,18,17	0.052	0.027	740	50	20	4	0.20	99.5	White	V. Soft

Detect limit Units: 0.001 %, 0.001 %, 10 ppm, 10 ppm, 10 ppm, 2 ppm, 0.01 %, 0.01 %

Au

DR 3/2,3 -5.00mm <0.02

Detect limit Units: 0.02 ppm



189037

Analysis code 104E

Report 4AD0003

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Stallon Designation 2		Total Fe as Fe2O3								
Sample	Al2O3	Fe as Fe2O3	TiO2	CaO	P2O5	V2O5	LOI	SiO2	Colour	Hardness
DR 15/2,3	1.44	0.064	1250	10	60	18	0.63	97.3	Off White	Hard
DR 15/4,5	1.68	0.068	1250	130	65	18	0.46	97.2	White	Hard
DR 15/0,7	1.82	0.072	1250	<10	65	19	0.62	98.8	Off White	Hard
DR 15/8,9	1.36	0.060	1100	25	65	14	0.61	97.6	Off White	Hard
DR 15/10,11	1.24	0.078	900	40	65	15	0.61	97.6	Off White	Hard
DR 15/12,13	1.42	0.116	1050	15	48	10	0.5	97.3	Off White	Hard
DR 15/14,16	1.7	0.098	1200	35	60	19	0.54	98.9	Off White	Hard
DR 15/16,17	1.81	0.125	1300	20	60	19	0.57	98.7	Off White	V. Hard
DR 15/18,19,20	1.24	0.115	1100	<10	45	14	0.50	97.6	Off White	V. Hard
DR 16/1,2,3	1.4	0.118	1100	680	65	17	0.77	97	Off White	Hard
DR 16/4,5,9,7,8,9,10	1.84	0.070	1250	100	70	20	0.60	98.6	Off White	Hard
DR 17/1,2,3,4,5	1.5	0.084	800	<10	60	15	1.7	98.1	Off White	Hard
DR 17/0,7,8	1.72	0.11	1350	<10	76	15	0.42	97	White	Hard
DR 17/9,10,11	1.44	0.074	1050	<10	36	14	0.50	97.3	Off White	Hard
DR 17/12,13,14	1.74	0.10	1050	<10	65	18	0.60	98.7	Off White	Hard
DR 17/15,16,17	3.24	0.326	2050	<10	100	32	1.65	93.6	Off White	Hard
DR 22/2,3 - 5.68mm	0.195	0.019	470	70	45	3	0.12	99.5	White	Hard
DR 22/2,3 - 6.68mm	0.58	0.040	680	65	40	7	0.43	98.7	Off White	Hard
DR 22/4,5	1.28	0.068	1050	40	45	10	0.32	97.0	Off White	Hard
DR 22/0,7	1.68	0.07	1100	<10	40	20	1.24	98.4	Off White	Hard
Detn limit	0.001	0.001	10	10	10	2	0.01	0.01		
Units	%	%	ppm	ppm	ppm	ppm	%	%		

189038



Analysis code IC4E

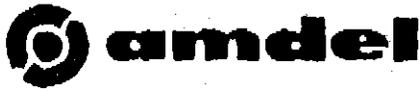
Report 4AD0003

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Station Designation 3

Sample	Al2O3	Total Fe as Fe2O3	TiO2	CaO	P2O5	V2O5	LOI	SiO2	Colour	Hardness
DR 18/1,2	0.09	0.027	920	45	20	2	0.45	99.9	Off White	V. Hard
DR 18/3,4 - 5.00mm	0.054	0.017	700	40	15	<2	0.25	99.8	White	V. Hard
DR 18/3,4 - 5.00mm	0.1	0.03	900	50	20	2	0.49	99.9	White	V. Hard
DR 18/5,6	0.064	0.028	920	45	20	<2	0.17	99.0	White	V. Hard
DR 18/7,8	0.068	0.032	880	45	20	<2	0.15	99.0	White	V. Hard
DR 18/9,10,11	0.050	0.031	800	55	25	<2	0.25	99.5	White	V. Hard
DR 18/12,13	0.074	0.039	900	70	20	<2	0.25	99.5	White	V. Soft/Soft
DR 18/14,15	0.072	0.08	800	90	80	9	0.39	99.4	Off White	Hard
DR 18/16	0.072	0.043	840	55	35	4	0.28	99.5	White	Hard
DR 19/1,2,3	0.05	0.02	860	40	20	9	0.28	99.5	Off White	V. Soft
DR 19/4,5,6	0.88	0.049	1100	55	50	0	0.4	98.6	Off White	V. Soft
DR 19/7,8,9	0.058	0.03	880	55	30	9	0.31	99.5	White	Hard
DR 19/9,10,11	0.07	0.039	580	50	20	9	0.28	99.5	White	V. Hard
DR 19/12,13,14	0.084	0.044	880	45	25	3	0.17	99.8	White	V. Hard
DR 19/15,16,17	0.395	0.054	880	55	45	0	0.22	99.1	White	V. Hard
DR 20/2,3	0.078	0.031	1050	40	20	3	0.62	99.1	Off White	Hard
DR 20/4,5	0.09	0.027	1200	<10	20	4	0.28	99.5	Off White	Hard
DR 20/6,7	0.074	0.03	900	<10	15	9	0.2	99.8	Off White	Hard
DR 20/8,9	0.185	0.039	780	60	45	4	0.23	99.4	White	Hard
DR 20/10,11	0.395	0.045	980	50	45	7	0.18	99.2	White	Hard
DR 20/12,13	0.05	0.07	1050	75	55	19	0.28	99.3	Off White	V. Hard/Hard
DR 20/14,15	0.84	0.07	1050	55	50	12	0.28	98.4	Off White	Hard/V. Hard
DR 20/16,17	0.89	0.084	800	20	55	19	0.4	98.2	Off White	V. Hard
DR 21/2,3	0.126	0.03	920	15	30	4	0.41	99.3	Off White	Hard
DR 21/4,5	0.28	0.032	880	55	45	5	0.19	99.9	White	Hard
DR 21/6,7	0.25	0.036	1300	60	48	0	0.17	99.3	White	Hard
DR 21/8	0.245	0.031	800	55	55	5	0.28	98.2	Off White	V. Soft
DR 21/9,10	0.78	0.064	880	50	55	10	0.0	98.2	Off White	Hard
Defn limit	0.001	0.001	10	10	10	2	0.01	0.01		
Units	%	%	ppm	ppm	ppm	ppm	%	%		



189039

Analysis code IC4E

Report 4AD0903

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Station Designation 4

Sample	Al2O3	Total Fe as Fe2O3	TiO2	CaO	P2O5	V2O5	LOI	SiO2	Colour	Hardness
DR 26/1,2	0.00	0.025	1250	25	15	4	0.38	99.4	Off White	Soft
DR 26/3,4,5	0.05	0.019	1100	15	20	3	0.28	99.6	White	Soft
DR 26/6,7,8	0.052	0.019	1050	40	25	3	0.33	99.5	White	Soft
DR 26/9,10,11	0.088	0.023	900	60	25	3	0.15	99.8	White	Soft
DR 26/12,13,14	0.062	0.024	720	80	16	2	0.00	99.8	White	Soft
DR 26/15,16,17	0.18	0.030	1350	<10	00	5	0.25	99.3	White	Soft
DR 26/1,2	0.002	0.023	960	<10	20	2	0.14	99.6	White	Soft
DR 26/3,4	0.047	0.010	1050	<10	15	<2	0.20	99.5	White	Soft
DR 20/5,0	0.054	0.022	1150	50	25	3	0.28	99.5	White	Hard
DR 20/7,8	0.058	0.022	1000	40	30	2	0.19	99.6	White	Soft/Hard
DR 20/9,10	0.072	0.024	1000	40	15	3	0.28	99.5	White	Soft
DR 26/11,12	0.105	0.029	1400	00	30	4	0.30	99.3	White	Soft
DR 26/13,14	0.05	0.024	880	55	20	<2	0.15	99.7	White	Hard
DR 26/15,16,17	0.049	0.028	840	50	30	2	0.22	99.6	White	Hard
Detn limit	0.001	0.001	10	10	10	2	0.01	0.01		
Units	%	%	ppm	ppm	ppm	ppm	%	%		



189040

Analysis code IC4E

Report 4AD0903

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Standards		Total Fe as Fe2O3		TiO2	CaO	P2O5	V2O5	LOI	SiO2
Sample	Al2O3								
STD 2492	0.15	0.020	210	190	40	<2	0.08	99.0	
STD 2492	0.155	0.020	200	120	20	3	0.08	99.6	
STD 2492	0.155	0.020	210	190	20	<2	0.08	99.0	
STD 2492	0.10	0.025	210	100	15	<2	0.08	99.6	
STD 2492	0.175	0.020	230	110	20	<2	0.08	99.0	
STD 2492	0.175	0.020	220	120	20	3	0.08	99.6	
STD 2492	0.14	0.022	210	00	15	<2	0.08	99.7	
Defn limit	0.001	0.001	10	10	10	2	0.01	0.01	
Units	%	%	ppm	ppm	ppm	ppm	%	%	

Analysis Code IC4E

Report 4AD1466

Sample	Al2O3	Total Fe as Fe2O3	TiO2	CaO	P2O5	V2O5	SiO2	LOI
STD 2490	0.86	0.77	1600	1.70%	220	16	96.1	<0.010
STD 2492	0.145	0.025	200	130	20	<2	99.7	<0.010
DR 27 3-4	0.1	0.07	880	420	30	3	99.3	0.35
DR 27 5-9	0.35	0.066	1550	360	45	8	98.8	0.38
DR 27 10-21	1.46	0.15	1150	270	70	18	97.2	0.48
DR 30 2-11	0.13	0.032	1100	130	25	4	99.4	0.28
DR 30 12-22	0.094	0.034	1450	95	35	6	99.4	0.27
DR 32 5-13	0.55	0.046	1200	95	55	12	98.7	0.31
DR 32 14-22	0.455	0.12	1000	85	55	11	98.9	0.27
DR 34 2-6	0.058	0.022	660	85	30	5	99.4	0.36
DR 34 7-8	0.052	0.022	600	75	35	5	99.6	0.25
DR 34 9-17	0.074	0.03	780	70	40	5	99.5	0.27
DR 34 18-22	0.415	0.052	760	85	45	9	99	0.3
DR 36 5-17	0.064	0.032	680	110	25	4	99.4	0.32
DR 39 11-22	1.1	0.105	860	75	55	15	97.9	0.39
DR 4 5-14	0.28	0.041	2050	120	45	6	99.1	0.25
DR 24 2-17	0.054	0.027	860	55	20	3	99.6	0.13
DR 27 5-9 -22#	0.285	0.06	1600	320	60	8	99.1	0.24
DR 27 5-9 +22#	0.78	0.155	1050	1150	110	13	97.9	0.57
DR 27 10-21 -22#	1.4	0.155	1150	400	170	19	97.4	0.37
DR 27 10-21 +22#	1.22	0.062	1100	270	160	19	97.6	0.48
DR 34 18-22 -22#	0.395	0.054	860	60	50	8	99.1	0.21
DR 34 18-22 +22#	0.62	0.044	820	140	90	12	98.7	0.32
DR 39 11-22 -22#	0.99	0.092	760	90	70	16	98	0.42
DR 39 11-22 +22#	1.02	0.06	780	130	90	16	97.9	0.48
Detn limit	0.001	0.001	10	10	10	2	0.01	0.01
Units	%	%	ppm	ppm	ppm	ppm	%	%

Gannett

189042

Analysis Code IC4E

Report 4AD1466

Sample	Al2O3	Total Fe as Fe2O3	TiO2	CaO	P2O5	V2O5	SiO2	LOI
STD 2490	0.86	0.77	1600	1.70%	220	18	96.1	<0.010
STD 2492	0.145	0.025	200	130	20	<2	99.7	<0.010
DR 27 3-4	0.1	0.07	880	420	30	3	99.3	0.35
DR 27 5-9	0.35	0.066	1550	360	45	8	98.8	0.38
DR 27 10-21	1.46	0.15	1150	270	70	18	97.2	0.48
DR 30 2-11	0.13	0.032	1100	130	25	4	99.4	0.28
DR 30 12-22	0.094	0.034	1450	95	35	6	99.4	0.27
DR 32 5-13	0.55	0.046	1200	95	55	12	98.7	0.31
DR 32 14-22	0.455	0.12	1000	85	55	11	98.9	0.27
DR 34 2-6	0.058	0.022	660	85	30	5	99.4	0.36
DR 34 7-8	0.052	0.022	600	75	35	5	99.6	0.25
DR 34 9-17	0.074	0.03	780	70	40	5	99.5	0.27
DR 34 18-22	0.415	0.052	760	85	45	9	99	0.3
DR 36 5-17	0.064	0.032	680	110	25	4	99.4	0.32
DR 39 11-22	1.1	0.105	860	75	55	15	97.9	0.39
DR 4 5-14	0.28	0.041	2050	120	45	6	99.1	0.25
DR 24 2-17	0.054	0.027	860	55	20	3	99.6	0.13
DR 27 5-9 -22#	0.285	0.06	1600	320	60	8	99.1	0.24
DR 27 5-9 +22#	0.78	0.155	1050	1150	110	13	97.9	0.57
DR 27 10-21 -22#	1.4	0.155	1150	400	170	19	97.4	0.37
DR 27 10-21 +22#	1.22	0.062	1100	270	160	19	97.6	0.48
DR 34 18-22 -22#	0.395	0.054	860	60	50	8	99.1	0.21
DR 34 18-22 +22#	0.62	0.044	820	140	90	12	98.7	0.32
DR 39 11-22 -22#	0.99	0.092	760	90	70	16	98	0.42
DR 39 11-22 +22#	1.02	0.06	780	130	90	16	97.9	0.48
Detn limit	0.001	0.001	10	10	10	2	0.01	0.01
Units	%	%	ppm	ppm	ppm	ppm	%	%



 SPECTRO-TECH

189043

SIZING ANALYSIS

Sample DR4 5-14

Screen Aperture mm	Weight g	Weight %	Cumul Weight %	
	Retained	Retained	Retained	Passing
1.700	0.49	0.49	0.49	99.51
1.180	0.15	0.15	0.64	99.36
0.850	0.70	0.70	1.34	98.66
0.600	5.89	5.89	7.23	92.77
0.425	14.32	14.32	21.54	78.46
-0.425	78.46	78.46	100.00	
Orig Sample Wt, g		100.00		
U/Size Wt by Diff, g		78.46		
U/Size Wt Recovered, g		78.46		
Wt Loss %		-0.00		

File Ref: MH6

20-May-94

SIZING ANALYSIS

Sample DR24 2-17

Screen Aperture mm	Weight g Retained	Weight % Retained	Cumul Weight %	
			Retained	Passing
1.700	0.02	0.02	0.02	99.98
1.180	0.07	0.07	0.09	99.91
0.850	0.78	0.78	0.87	99.13
0.600	6.26	6.26	7.13	92.87
0.425	25.17	25.17	32.30	67.70
-0.425	67.70	67.70	100.00	
Orig Sample Wt, g		100.00		
U/Size Wt by Diff, g		67.70		
U/Size Wt Recovered, g		67.70		
Wt Loss %		-0.00		

File Ref :

MH7

20-May-94

SIZING ANALYSIS

Sample DR30 2-11

Screen Aperture mm	Weight g Retained	Weight % Retained	Cumul Weight %	
			Retained	Passing
1.700	0.37	0.37	0.37	99.63
1.180	0.50	0.50	0.87	99.13
0.850	0.10	0.10	0.97	99.03
0.600	1.36	1.36	2.33	97.67
0.425	15.35	15.35	17.68	82.32
-0.425	82.32	82.32	100.00	
Orig Sample Wt, g		100.00		
U/Size Wt by Diff, g		82.32		
U/Size Wt Recovered, g		82.32		
Wt Loss %		-0.00		

File Ref : MH1 20-May-94

SIZING ANALYSIS

Sample DR30 12-22

Screen Aperture mm	Weight g Retained	Weight % Retained	Cumul Weight %	
			Retained	Passing
1.700	1.13	1.13	1.13	98.87
1.180	0.43	0.43	1.56	98.44
0.850	0.38	0.38	1.94	98.06
0.600	1.35	1.35	3.28	96.72
0.425	11.32	11.32	14.60	85.40
-0.425	85.40	85.40	100.00	
Orig Sample Wt, g		100.00		
U/Size Wt by Diff, g		85.40		
U/Size Wt Recovered, g		85.40		
Wt Loss %		-0.00		

File Ref :

MH2

20-May-94

SIZING ANALYSIS

Sample DR34 2-6

Screen Aperture mm	Weight g Retained	Weight % Retained	Cumul Weight %	
			Retained	Passing
1.700	0.00	0.00	0.00	100.00
1.180	0.03	0.03	0.03	99.97
0.850	0.69	0.69	0.72	99.28
0.600	6.84	6.84	7.56	92.44
0.425	23.11	23.11	30.67	69.33
-0.425	69.33	69.33	100.00	
Orig Sample Wt, g		100.00		
U/Size Wt by Diff, g		69.33		
U/Size Wt Recovered, g		69.33		
Wt Loss %		-0.00		

File Ref : MH3

20-May-94

SIZING ANALYSIS

Sample DR34 9-17

Screen Aperture mm	Weight g Retained	Weight % Retained	Cumul Weight %	
			Retained	Passing
1.700	0.30	0.30	0.30	99.70
1.180	0.20	0.20	0.50	99.50
0.850	0.25	0.25	0.75	99.25
0.600	1.78	1.78	2.53	97.47
0.425	14.92	14.92	17.45	82.55
-0.425	82.55	82.55	100.00	
Orig Sample Wt, g		100.00		
U/Size Wt by Diff, g		82.55		
U/Size Wt Recovered, g		82.55		
Wt Loss %		0.00		

File Ref : MH4 20-May-94

189050

SIZING ANALYSIS

Sample DR36 5-17

Screen Aperture mm	Weight g Retained	Weight % Retained	Cumul Weight %	
			Retained	Passing
1.700	0.00	0.00	0.00	100.00
1.180	0.25	0.25	0.25	99.75
0.850	1.99	1.99	2.25	97.75
0.600	11.10	11.10	13.34	86.66
0.425	18.15	18.15	31.50	68.50
-0.425	68.50	68.50	100.00	
Orig Sample Wt, g		100.00		
U/Size Wt by Diff, g		68.50		
U/Size Wt Recovered, g		68.50		
Wt Loss %		0.00		

File Ref : MH5 20-May-94

AMMTEC LTD

189051

**TREATMENT
OF
A HIGH GRADE SILICA SAND
FOR
GWALIA CONSOLIDATED LTD**

REPORT NO. A4281

AUGUST 1994

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SUMMARY

1. A single ^{*} sample of high grade silica sand was supplied to AMMTEC for upgrading and analysis.

Head Fe ₂ O ₃	:	113 ppm
Head Al ₂ O ₃	:	287 ppm
Head TiO ₂	:	570 ppm

2. The sample was attritioned and deslimed.

Deslimed sand	:	97.9% by weight
Slime sand	:	2.1% by weight

3. The deslimed sand was TBE separated to remove any heavy mineral particles.

TBE Float	:	99.97% by weight
TBE Sink	:	0.03% by weight

4. Full details of the test results are found in the report.

* THE SILEX SAND SAMPLE WAS TAKEN BY T. ROWS IN AUGUST 1994 FROM THE FACE OF THE TYPICAL MOUNTAIN SAND PIT ABOUT 10 METRES BELOW THE SURFACE

1. INTRODUCTION

Mr David Bale, of Gwalia Consolidated Ltd, requested AMMTEC to carry out a treatment program on a sample of high grade silica.

The test program included the following :

1. Dry and weigh the received sand.
2. Assay a split of the sand.
3. Attrition and deslime the sand, deslime the product at 53 μ m and assay the products.
4. TBE separate a split of the deslimed sand.
5. Size and assay (in detail) the screen fractions.

Full details of the test program are found in the flowsheet of Figure 1.

2. SAMPLE

A single sample of damp, high grade silica was supplied to AMMTEC in a plastic bag.

MHA 1 : 8307 grams (damp)

3. ANALYTICAL

Most of the test products were sent to Analabs, Welshpool, for detailed analysis. Analabs used specific preparation methods, i.e. Zirconia bowls.

The following elements (oxides) were assayed :

Fe ₂ O ₃	Al ₂ O ₃	TiO ₂	CaO	MgO
Na ₂ O	K ₂ O	WO ₃	ZrO ₂	Cr ₂ O ₃
NiO	CoO	Cl	V ₂ O ₅	

Gwalia specified the analytical detection limit for each analyte. In some cases (e.g. Cr₂O₃) the analysis was at a higher detection limit (i.e. 10 vs 1).

A single sample was sent to SGS, Queens Park, to assay for Fe_2O_3 , Al_2O_3 , TiO_2 and Cr_2O_3 as a check and to determine if Cr_2O_3 in the product (float tail) was within specification. The method D3-AAS was used.

4. SAMPLE PREPARATION

The received sample was oven dried at 105°C overnight. The oven and all sample trays were washed and scrubbed clean to remove any source of cross contamination.

The sample (and intermediate products) were mixed and split using a clean stainless steel riffle.

Damp Head Weight	=	8307.5 grams
Dry Head Weight	=	7906.9 grams
Sample Moisture	=	4.82 %

A split of the head was taken for detailed assay with the results presented in Table 1.

5. ATTRITIONING

The sample was lightly attritioned to remove any residual or surface contaminants. Following attritioning the sand was deslimed by screening at $53\mu\text{m}$.

5.1 Test Procedure

The test procedure was as follows :

- (1) Split out 2 x 1100 grams of dry head sample.
- (2) Transfer 1100 grams of sample to a 1 litre *WEMCO* attritioning cell and add water to achieve 76% solids.
- (3) Attrition for 5.0 minutes.
- (4) Recover the attritioned sand and wet screen at $53\mu\text{m}$ using 10 litres of wash water.
- (5) Repeat for the second charge.
- (6) Recover, dry and weigh the $+53\mu\text{m}$ and $-53\mu\text{m}$ fractions.
- (7) Assay splits of the $+53\mu\text{m}$ and $-53\mu\text{m}$ fractions in detail.

5.2 Test Results

The $-53\mu\text{m}$ fraction after attritioning was only a small fraction (2.1%). The deslime fraction was high in contaminate grades.

The attrition weight results are shown below :

Attrition Test Results	
Feed Weight	2 x 1100 grams
Solids Density	76%
Attrition Time	5 minutes
+53 μm Weight	2150.2 grams
-53 μm Weight	47.0 grams
Total Weight	2197.2 grams

Details of the product assays are presented in Table 2.

6. TBE SEPARATION

A split of the deslimed (attritioned) sands was treated by TBE in an attempt to remove any heavy mineral particles, i.e. high in Fe and Ti.

6.1 Test Procedure

The test procedure was as follows :

- (1) Split out 500 grams of $+53\mu\text{m}$ attritioned sand.
- (2) Transfer to a 2000 ml beaker and fill with new, clean TBE.
- (3) Mix the sample and allow to separate.
- (4) Recover the floats and sinks and wash thoroughly with acetone. Oven dry overnight.

- (5) Weigh the sinks and floats. Send the sinks for detailed assay at Analabs and send a split of the TBE float (50 grams) to SGS for Fe_2O_3 , Al_2O_3 , TiO_2 , and Cr_2O_3 analysis.

6.2 Test Results

The results showed that only 0.03% of the sample sank in the TBE. The sinks assay indicated high assays of all elements, particularly Fe_2O_3 , Al_2O_3 , MgO , TiO_2 , ZrO_2 and Cr_2O_3 .

TBE Separation		
Product	Weight (g)	Weight (%)
TBE Float	499.80	99.97
TBE Sink	0.17	0.03
Total	499.97	100.00

Details of the assay results for the sinks and floats are found in Tables 3 and 4.

7. SIZE ANALYSIS - TBE FLOATS

A split of the TBE floats was screen sized and the screen products assayed in detail.

7.1 Test Procedure

- (1) Split out about 450 grams of TBE floats.
- (2) Wet screen at $53\mu\text{m}$ and dry the oversize and undersize.
- (3) Dry screen the dry oversize at 1180, 850, 600, 425, 300, 212, 150, 106, 75 and $53\mu\text{m}$.
- (4) Recover and weigh each screen fraction. Send each fraction to Analabs for detailed analysis.
- (5) Calculate the distribution (by size) of each analyte.

U.S. Dept. of the Interior
Bureau of Mines

7.2 Test Results

The sizing results indicated that most of the weight of material fell in the size range 150 to 600 μ m (i.e. 81.8% of the weight). There was a small quantity of -53 μ m material (0.7%) remaining in the sample even after desliming.

The results indicate a bias in most elements towards the fine and coarse fractions. Details of the results are found in Table 4. Note the head assay results for Fe₂O₃, Al₂O₃, TiO₂, and Cr₂O₃.

The Fe₂O₃, Al₂O₃, and TiO₂ grades and distribution over the size fractions were plotted and the results are presented in Figures 2 and 3.

FIGURES

FIGURE 1

189060

FLWSHEET - HIGH GRADE SILICA SANDS

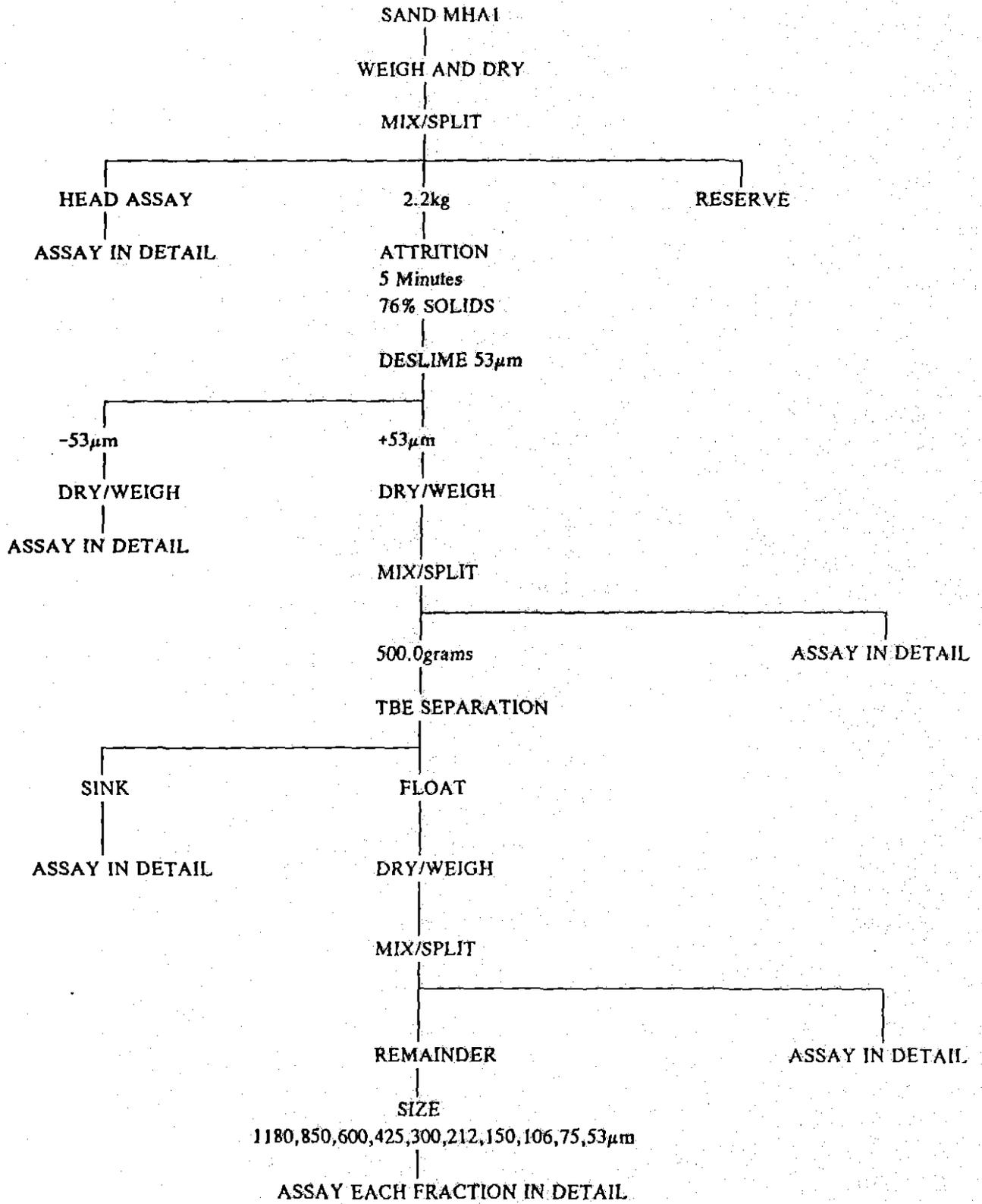


FIGURE 2
GRADE OF Fe₂O₃, Al₂O₃, TiO₂

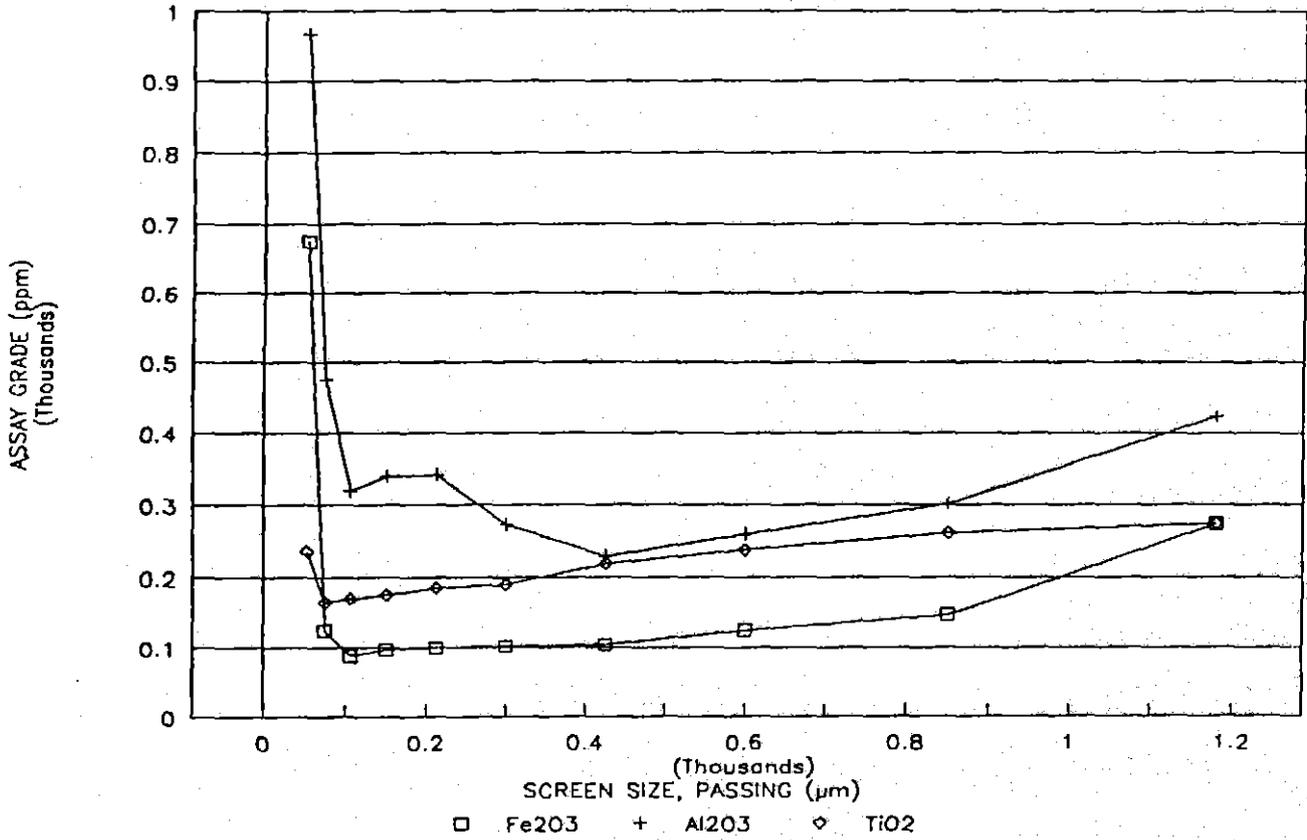
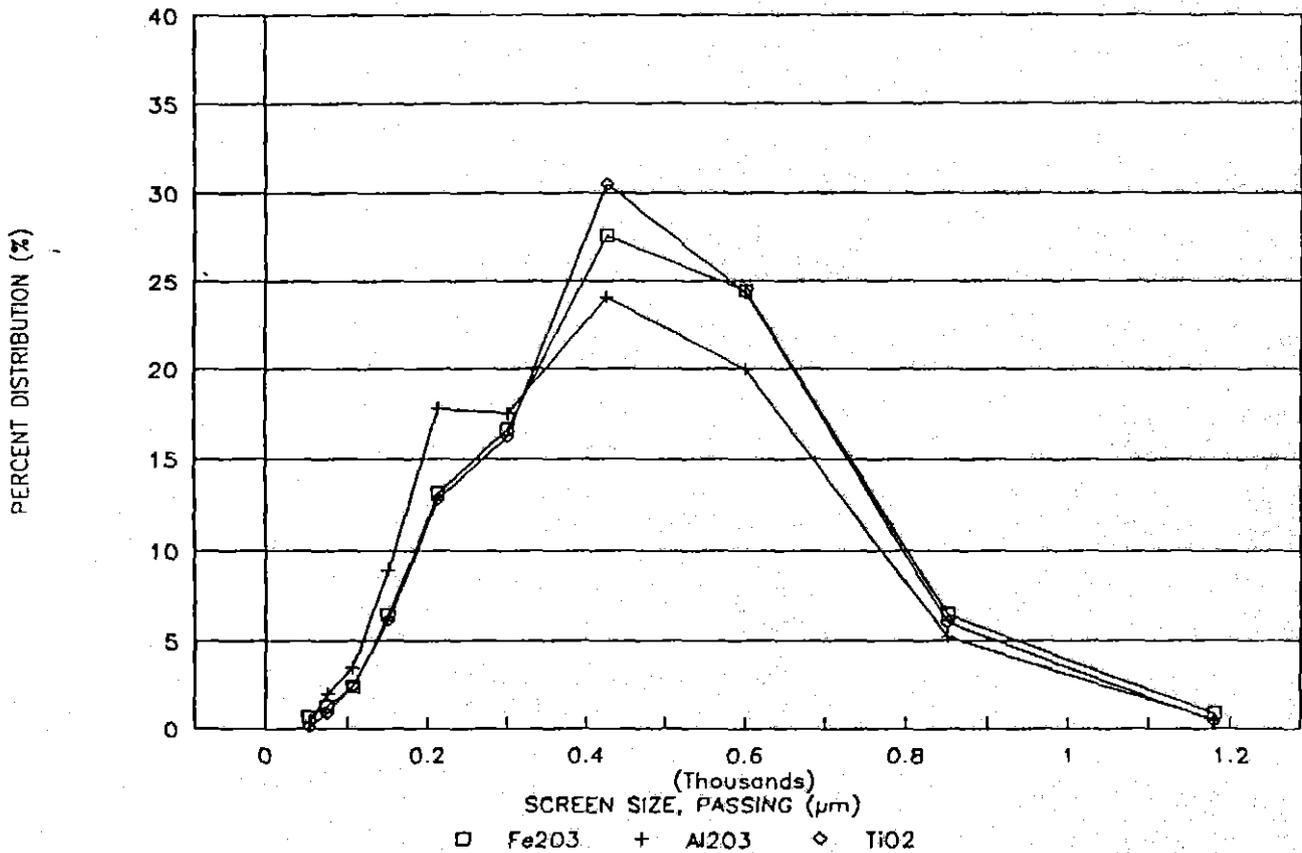


FIGURE 3

DISTRIBUTION OF Fe₂O₃, Al₂O₃, TiO₂



TABLES

TABLE 1

HEAD ASSAY														
SAMPLE	Fe2O3 (ppm)	Al2O3 (ppm)	Na2O (ppm)	MgO (ppm)	Cl (ppm)	K2O (ppm)	CaO (ppm)	TiO2 (ppm)	V2O5 (ppm)	Cr2O3 (ppm)	CoO (ppm)	NiO (ppm)	ZnO (ppm)	WG3 (ppm)
MHA1	113	287	19	23	120	59	31	570	<2	<10	<0.2	<2	52	0.1

TABLE 2

ATTRITIONED TEST RESULTS

SAMPLE	Product Weight (g)	Weight Percent (%)	Fe2O3		Al2O3		Na2O		MgO		Cl		K2O		CaO		TiO2		V2O5		Cr2O3		CoO		NiO		ZrO2		WO3	
			(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)
ATTRITED +53 μ m	2150.20	97.86	114	59.1	264	86.0	39	49.0	38	85.9	75		38	91.7	52	55.5	237	46.3	<2		<10		<0.2		<2		23	47.9	0.1	59.6
ATTRITED -53 μ m	47.00	2.14	3625	40.9	1965	14.0	1859	51.0	287	14.1			240	8.3	1896	44.5	12460	53.5	20		335		11		414		1128	52.1	3.9	40.4
TOTAL	2197.20	100.00	189	100.0	301	100.0	78	100.0	43	100.0			62	100.0	91	100.0	498	100.0			10		0		0		46	100.0	0.2	100.0
ASSAY HEAD			113		287		19		23		120		39		31		570		<2		<10		<0.2		<2		52		0.1	

TABLE 3

SINK ASSAY RESULTS

SAMPLE	Fe2O3 (ppm)	Al2O3 (ppm)	Na2O (ppm)	MgO (ppm)	Cl (ppm)	K2O (ppm)	CaO (ppm)	TiO2 (ppm)	V2O5 (ppm)	Cr2O3 (ppm)	CoO (ppm)	NiO (ppm)	ZrO2 (ppm)	WO3 (ppm)
SINKS	14443	38913	2130	6367		<600	651	48038	184	167	7	188	35531	6.1

TABLE 4

FLOAT SIZING RESULTS

Screen Fraction (μ m)	Screen Weight (g)	Weight Percent (%)	Fe2O3		Al2O3		Na2O		MgO		Cl		K2O		CaO		TiO2		V2O5		Cr2O3		CoO		NiO		ZrO2		WO3	
			(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)
+1180	0.12	0.03	(Combined with +850 μ m fraction for analysis)																											
-1180+850	1.58	0.35	273	0.9	423	0.6	65	0.6	36	0.3			96	0.6	52	0.4	274	0.5	<2		<10		0		4		23	0.6	0.3	
-850+600	21.95	4.85	147	6.4	300	5.2	50	5.9	81	7.3	50		65	5.6	60	5.3	260	6.0	<2		<10		<0.2		4		12	4.1	<0.1	
-600+425	97.26	21.48	126	24.4	259	20.0	46	24.2	55	21.7	50		57	21.6	63	24.8	237	24.3	<2		<10		<0.2		<2		14	21.1	<0.1	
-425+300	132.41	29.25	104	27.6	229	24.0	39	28.1	51	27.7	50		48	25.0	56	30.0	219	30.5	<2		<10		<0.2		4		16	34.7	<0.1	
-300+212	81.1	17.91	103	16.7	272	17.5	36	16.0	55	18.1	50		54	17.2	57	18.8	190	16.3	<2		<10		<0.2		<2		12	15.3	<0.1	
-212+150	65.61	14.49	100	13.1	342	17.8	32	11.5	55	14.6	50		59	15.2	45	11.9	185	12.8	<2		<10		<0.2		<2		12	12.5	<0.1	
-150+106	33.08	7.31	97	6.4	340	8.9	28	5.1	61	8.3	50		66	8.6	42	5.6	175	6.1	<2		<10		<0.2		<2		9	5.0	<0.1	
-106+75	13.78	3.04	89	2.4	319	3.5	28	2.1	17	0.9			71	3.8	36	2.0	170	2.5	<2		<10		<0.2		<2		22	4.9	0.1	
-75+53	5.33	1.18	126	1.3	476	2.0	40	1.2	25	0.5			96	2.0	43	0.9	165	0.9	<2		<10		<0.2		4		16	1.4	0.3	
-53	0.53	0.12	675	0.7	967	0.4	1859	5.3	287	0.6			200	0.4	90	0.2	235	0.1	<2		<10		<0.2		4		50	0.4	0.3	
TOTAL	452.75	100.00	111	100.0	278	100.0	41	100.0	54	100.0			56	100.0	55	100.00	210	100.0									14	100.0		
ASSAY			110		310													190				1								

12

100% = 100%
 100% = 100%
 100% = 100%
 TOTAL
 100% = 100%

159065

APPENDIX I

ANALABS RESULTS

189067


Analabs Pty. Ltd.
 A.C.N. 004 591 664

Phone (09) 4587999

52 Murray Road, Welshpool, W.A. 6106

Fax (09) 4587922

ANALYTICAL REPORT No. 101160.10.13262

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO:

 I Smith
 Ammtec Pty Ltd
 6 MacAdam Place

Balcatta WA 6021

ORDER No.

PROJECT

DATE RECEIVED

RESULTS REQUIRED

04/08/94

ASAP

No. OF PAGES
OF RESULTSDATE
REPORTEDNo.
OF COPIES

4

16/08/94

1

TOTAL No.
OF SAMPLES

22

SAMPLE NUMBERS	SAMPLE DESCRIPTION	ELEMENT/METHOD
A 44281 & others	Prep : GP013GP016 ZIRCONIA BOWL	Fe, Al, Ca, Mg, Na, X/OA144 Scan/GA201
A 44281 & others	Prep :	W, Ni, Co/GS201
A 44281 & others	Prep :	V, Ti, Cr/G1201
B 44281 & others	Prep : GP013, GP016	Zr/GS201
B 44281 & others	Prep :	Cl/CA25

RESULTS
TO
 I Smith
 Ammtec Pty Ltd
 6 MacAdam Place
 Balcatta WA 6021
RESULTS
TORESULTS
TO

REMARKS

 Note: Zr, Ti data may bias low due to
 solubility problems.

 AUTHORIZED OFFICER



ANALYTICAL DATA

SAMPLE PREFIX			REPORT No.	REPORT DATE	CLIENT ORDER No.			PAGE		
			101160.10.13262	16/08/94				1 OF 4		
METHOD	SAMPLE No.		Na	Na	Na	Mg	Mg	Mg	Al	
			0A144	GI201	GA201	0A144	GI201	GA201	0A144	
1	A A4281	Head Assay	14	-	-	21	-	-	152	
2	A A4281	Deslim +53um	29	-	-	23	-	-	140	
3	A A4281	Float +600um	37	-	-	49	-	-	159	
4	A A4281	Float +425um	34	-	-	33	-	-	137	
5	A A4281	Float +300um	29	-	-	31	-	-	121	
6	A A4281	Float +212um	27	-	-	33	-	-	144	
7	A A4281	Float +150um	24	-	-	33	-	-	181	
8	A A4281	Float +106um	21	-	-	37	-	-	180	
9	A4281	TRE Sinks	-	1580	-	-	3840	-	-	
10	A4281	Float -53um	-	-	68	-	-	55	-	
11	A4281	Float +850um	-	-	48	-	-	22	-	
12	A4281	Slime -53um	1379	-	-	173	-	-	1040	
13	A4281	Float +75um	21	-	-	10	-	-	169	
14	A4281	Float +53um	30	-	-	15	-	-	252	
15										
16										
17										
18										
19										
20										
21										
22										
23										
24	DETECTION		2	50	5	2	20	5	10	
25	UNITS		ppm	ppm	ppm	ppm	ppm	ppm	ppm	

Results in ppm unless otherwise specified
- element not determined

IS = Insufficient sample
SNR = sample not received

ANALYTICAL DATA

SAMPLE PREFIX			REPORT No.	REPORT DATE	CLIENT ORDER No.			PAGE	
			101160.10.13262	16/08/94				2	OF 4
	SAMPLE No.		A1	A1	CI	K	K	K	Ca
METHOD			GI201	GA201	CA25	QA144	GI201	GA201	QA144
1	A A4281	Head Assay	-	-	-	49	-	-	22
2	A A4281	Deslim +53um	-	-	-	48	-	-	37
3	A A4281	Float +600um	-	-	-	54	-	-	43
4	A A4281	Float +425um	-	-	-	47	-	-	45
5	A A4281	Float +300um	-	-	-	40	-	-	40
6	A A4281	Float +212um	-	-	-	45	-	-	41
7	A A4281	Float +150um	-	-	-	49	-	-	32
8	A A4281	Float +106um	-	-	-	55	-	-	30
9	B A4281	Head Assay	-	-	120	-	-	-	-
10	B A4281	Deslim +53um	-	-	75	-	-	-	-
11	B A4281	Float +600um	-	-	50	-	-	-	-
12	B A4281	Float +425um	-	-	50	-	-	-	-
13	B A4281	Float +300um	-	-	50	-	-	-	-
14	B A4281	Float +212um	-	-	50	-	-	-	-
15	B A4281	Float +150um	-	-	50	-	-	-	-
16	B A4281	Float +106um	-	-	50	-	-	-	-
17	A4281	TBE Sinks	2.06	-	-	-	500	-	-
18	A4281	Float -53um	-	512	-	-	-	166	-
19	A4281	Float +850um	-	224	-	-	-	80	-
20	A4281	Slime -53um	-	-	-	199	-	-	1355
21	A4281	Float +75um	-	-	-	59	-	-	26
22	A4281	Float +53um	-	-	-	80	-	-	31
23									
24	DETECTION		0.01	50	50	0	500	5	2
25	UNITS		%	ppm	ppm	ppm	ppm	ppm	ppm

Units in ppm unless otherwise specified
element not determined

IS = Insufficient sample
SNR = sample not received

AUTHORISED
OFFICER

ANALYTICAL DATA

SAMPLE PREFIX			REPORT No.		REPORT DATE		CLIENT ORDER No.		PAGE	
			101160.10.13262		16/08/94				3 OF 4	
METHOD	SAMPLE No.		Ca	Ca	Ti	V	Cr	Fe	Fe	
			GI201	GA201	GI201	GI201	GI201	GA144	GI201	
1	A A4281	Head Assay	-	-	342	<2	<10	79	-	
2	A A4281	Deslim +53um	-	-	142	<2	<10	80	-	
3	A A4281	Float +600um	-	-	156	<2	<10	103	-	
4	A A4281	Float +425um	-	-	142	<2	<10	98	-	
5	A A4281	Float +300um	-	-	131	<2	<10	73	-	
6	A A4281	Float +212um	-	-	114	<2	<10	72	-	
7	A A4281	Float +150um	-	-	111	<2	<10	70	-	
8	A A4281	Float +106um	-	-	105	<2	<10	68	-	
9	A4281	TBE Sinks	465	-	28900	103	114	-	1.01	
10	A4281	Float -53um	-	64	141	<2	<10	-	-	
11	A4281	Float +650um	-	37	164	<2	<10	-	-	
12	A4281	Sline -53um	-	-	7470	11	243	2535	-	
13	A4281	Float +75um	-	-	102	<2	<10	62	-	
14	A4281	Float +53um	-	-	99	<2	<10	89	-	
15										
16										
17										
18										
19										
20										
21										
22										
23										
24	DETECTION		50	5	10	2	10	0	0.01	
25	UNITS		ppm	ppm	ppm	ppm	ppm	ppm	%	

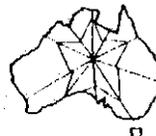
Results in ppm unless otherwise specified

IS = insufficient sample
SNR = sample not receivedAUTHORISED
OFFICER

ANALYTICAL DATA

SAMPLE PREFIX			REPORT No.	REPORT DATE	CLIENT ORDER No.			PAGE	
			101160.10.13262	16/08/94				4	OF 4
MOD	SAMPLE No.		Fe	Co	Ni	Zr	Zr	W	
			GA201	GS201	GS201	GS201	GI201	GS201	
1	A A4281	Head Assay	-	<0.2	<2	-	-	0.1	
2	A A4281	Deslim +53um	-	<0.2	<2	-	-	0.1	
3	A A4281	Float +600um	-	<0.2	3	-	-	<0.1	
4	A A4281	Float +425um	-	<0.2	<2	-	-	<0.1	
5	A A4281	Float +300um	-	<0.2	3	-	-	<0.1	
6	A A4281	Float +212um	-	<0.2	<2	-	-	<0.1	
7	A A4281	Float +150um	-	<0.2	<2	-	-	<0.1	
8	A A4281	Float +106um	-	<0.2	<2	-	-	<0.1	
9	B A4281	Head Assay	-	-	-	38.4	-	-	
10	B A4281	Deslim +53um	-	-	-	16.8	-	-	
11	B A4281	Float +600um	-	-	-	8.7	-	-	
12	B A4281	Float +425um	-	-	-	10.1	-	-	
13	B A4281	Float +300um	-	-	-	12.2	-	-	
14	B A4281	Float +212um	-	-	-	8.8	-	-	
15	B A4281	Float +150um	-	-	-	8.9	-	-	
16	B A4281	Float +106um	-	-	-	7.0	-	-	
17	A4281	TBE Sinks	-	5.2	148	1000.0	26300	4.8	
18	A4281	Float -53um	472	<0.2	3	36.8	-	0.2	
19	A4281	Float +850um	191	0.2	3	16.7	-	0.2	
20	A4281	Slime -53um	-	8.4	325	835.0	-	3.1	
21	A4281	Float +75um	-	<0.2	<2	16.5	-	0.1	
22	A4281	Float +53um	-	<0.2	3	12.2	-	0.2	
23									
24		DETECTION	10	0.2	2	0.5	5	0.1	
25		UNITS	ppm	ppm	ppm	ppm	ppm	ppm	

189072



ANMTEC

AMMTEC LIMITED

A.C.N. 063 332 516

6 MacAdam Place, Balcatta,
Western Australia 6021
Telephone: (09) 344 2416, (09) 344 2418
Telex: AA96177 Fax: (09) 345 4688

A handwritten signature in black ink, appearing to read 'Ian G Smith', written over a horizontal line.

**IAN G SMITH
SENIOR METALLURGIST**

A handwritten signature in black ink, appearing to read 'Graham W Lloyd', written over a horizontal line.

**GRAHAM W LLOYD
MANAGING DIRECTOR**

189073



7406 N. 81 HIGHWAY • P. O. BOX 1644 • DUNCAN, OKLAHOMA 73534
TELEPHONE 405/252-4309 • FAX NUMBER 405/252-6979

GLENN PENNY
President

Mr. Neil Thomas

Mineral Holdings Australia
Fax: 011 61 3 650 3855

Typically there is not a pass/fail conductivity measurement, rather there is a target conductivity. Sieve distribution, grain strength, and angularity dictates conductivity. Enclosed are some typical sieve distributions of the sands listed on the graph. As you notice, the shape of the Mineral Holdings Sand decline curve resembles that of the Arizona sand. The main difference between the two sands in conductivity is the sieve distribution. A larger average size sand distribution should yield more conductivity.

If increased conductivity is needed, sieve the sand more to the 25-35 distribution and get rid of all the small end. The angularity of the Mineral Holdings Sand may have caused the initial sharp stress decline between 500 and 1000 psi closure as is also exhibited by the Arizona sand. (The angles were broken off the sand with increased closure and the pore spaces get smaller) However, based on this limited testing the Mineral Holdings Sand looks like it will hold up vs stress. However, longterm conductivity will be more representative of the product.

If your deposit will yield a larger distribution at a profitable price then offer a 16/30 distribution to the coal fields as well as a higher cut 20/40 sand. At the cost of the imported US sand vs that of an Australian deposit there is no question in choice of which sand will be more attractive to the producer if the conductivity is similar.

Sieve	20/40 Northern White % Retained	20/40 Hickory % Retained	20/40 Arizona % Retained	16/30 % Retained
16	0.0	0.0	0.0	0.0
20	2.8	1.8	6.0	2.2
25	17.4	16.2	41.4	13.5
30	28.2	32.4	36.4	28.9
35	28.6	33.4	12.8	22.5
40	19.6	14.6	3.0	23.1
50	3.2	1.8	0.4	9.8
pan	0.2	0.0	0.0	0.0

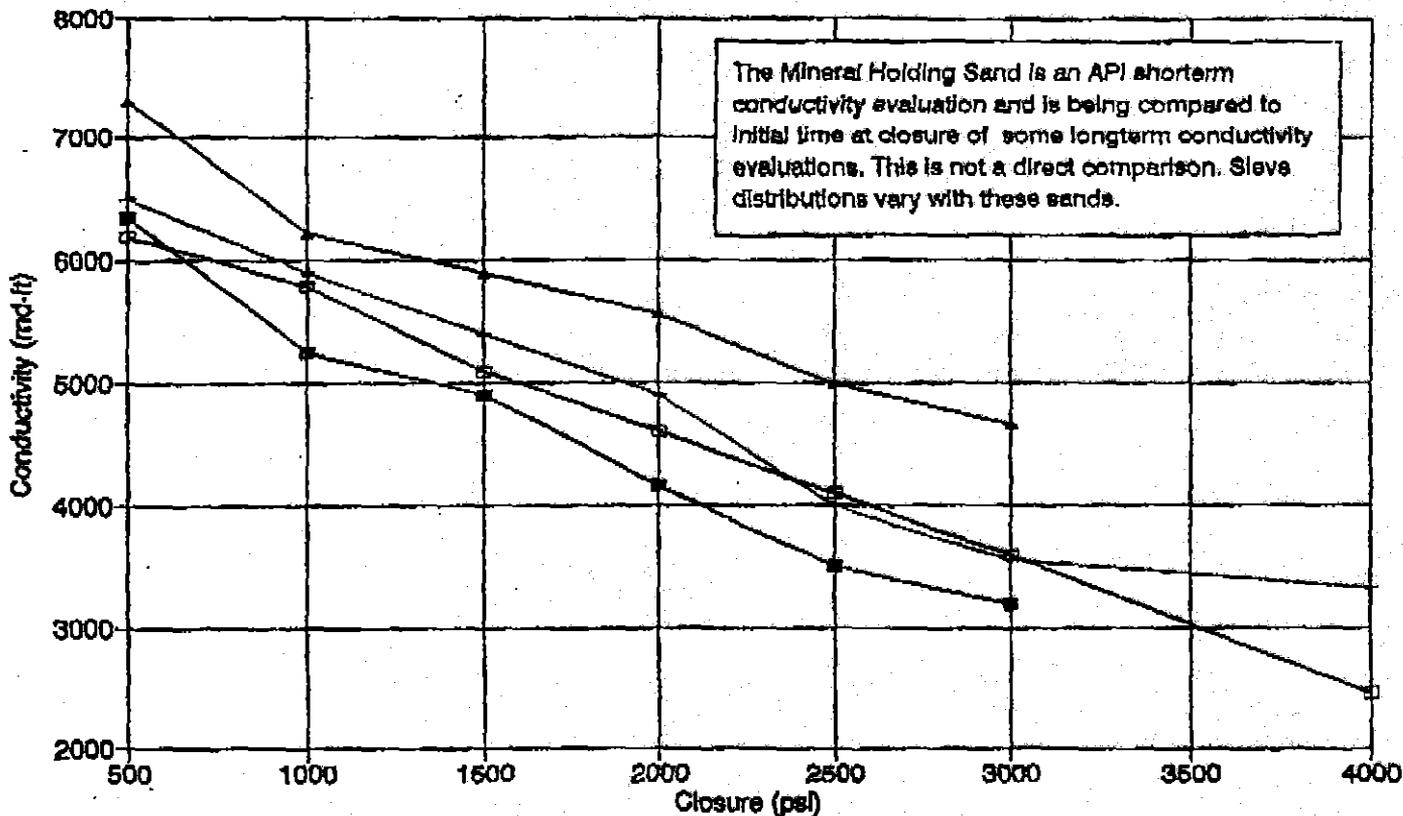
Refer to report for your distribution. Clusters also may be present in your sand and if so, will disaggregate with closure resulting in a lower conductivity. Mechanical processing should help this problem.

Kathy Abney, Conductivity Supervisor

$20/40 = -850 + 425 \approx 2.25\% \text{ at Dipka}$
 STIMULATION FLUID TESTING SERVICE:
 $16/30 = -148 + 600 \approx 7.5\% \text{ at Dipka}$

189074

Comparisons-Initial Time @ Closure Data of Longterm Tests @150F vs API Shorterm



20/40 Min. Hold. Sand
 20/40 North. White
 20/40 Hickory
 20/40 Arizona

189075

**THE SHORT TERM API TYPE CONDUCTIVITY
AND PERMEABILITY OF A SUBMITTED SAMPLE
OF SAND FROM MINERAL HOLDINGS OF AUSTRALIA
2.0 LB/SQ FT 20/40 SAND AT 500, 1,000, 1500,
2000, 2,500 AND 3,000 PSI 75°F**

Tested June, 1994

FOR
Mineral Holdings of Australia P/L
2nd Floor, 135 Collins Street
Melbourne, Victoria 3000
Australia

BY
STIM-LAB
P.O. Box 1644
Duncan OK 73534

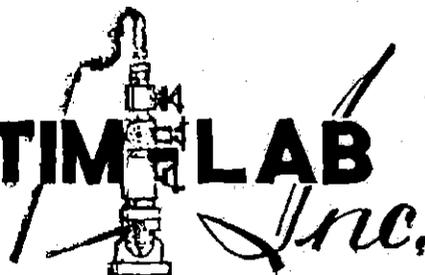
P. O. Number: Fax of 27th May, 1994
per Mr. Neil M. Thomas

File Number: SL 3643
June 1994

STIM-LAB
Inc.

189076

STIM-LAB



7406 N. 81 HIGHWAY • P. O. BOX 1644 • DUNCAN, OKLAHOMA, 73534
TELEPHONE 405/252-4309 • FAX NUMBER 405/252-6979

GLENN PENNY
President

June 30, 1994

Mr. Neil M. Thomas
Mineral Holdings Australia PTY. Limited
135 Collins Street
Melbourne, Victoria
Australia, 3000

Dear Mr. Thomas,

STIM-LAB has completed the requested Short Term API conductivity and permeability type evaluation with closures targeting the near surface coal deposit closure pressures. (5 closures = normal API test - 1 extra free of charge) The sample was sieved to the enclosed sieve distribution to remove the above and below 20/40 cut of sand. The sample was then washed by hand and dried prior to testing the sieve and conductivity at 2.0 lb/sq ft @ 500, 1000, 1500, 2000, 2500, and 3000 psi.

The procedures are outlined in the following section of this report. The data is presented in Tables 1. The sieve analysis of the sample is provided in Table 2.

Thank you for having STIM-LAB perform this test. If you should have any questions, please do not hesitate to call.

Sincerely,

Kathy Abney,
Conductivity Supervisor

KA/cdb
Enclosures

PROCEDURE FOR CONDUCTIVITY AND LIQUID PERMEABILITY MEASUREMENTS

1. The equipment used for the measurement of conductivity and liquid permeability included:

75 ton Dake Press with air oil intensifier. API Monel K-500 flow cells with 10 sq in flow paths.

Rosemont (smart family) 30:1 pressure transducers for measuring pressure drop and rate, plumbed with 1/4 in. lines and calibrated with the smart system computer and checked to 1 in. of water.

One gallon nitrogen driven fluid reservoirs filled with 2% KCl and deoxygenated with nitrogen.

Internal gauges and calipers for measuring widths.

IBM PC to process data and calculate conductivity and permeability.

Two 10 sq in. Ohio Sandstone.

2. An API cell was loaded with proppant sample to be tested. The proppant was leveled with a blade device.
3. The proppant sample was placed between the core slabs and were made a part of a one cell stack.
4. The cell was stacked to within 0.002 in. from top to bottom and positioned between the platens of the Dake Press. Pressure was increased to 500 psi and the system was evacuated and saturated with water at 75°F.
5. The proppant was allowed to equilibrate as outlined in the data tables.
6. The flow rate, pressure differential, and average width were measured at each pressure in order to calculate conductivity and permeability. Five measurements were taken and averaged to arrive at each conductivity. Flow rate was measured with a Mettler balance to 0.01 ml/mn. Darcy's Law was used for the calculations to determine the conductivity and permeability.
8. The pressure was increased at 100 psi per minute, at 500 or 10000 psi increments and the above measuring technique repeated.
9. The conductivity and permeability of the proppant were collected at 500, 1,000, 1,500, 2,000, 2,500 and 3,000 psi at room temperature.

SL-3643

Table 1

Conductivity and Permeability of
2 lb/sq ft of 20/40 (Sieved and Washed) Mineral Holdings of Aust.
Between Ohio Sandstone with 2% KCl
Temperature as indicated

Closure (psi)	Temp. Deg F	Conductivity (md-ft)	Width (in)	Permeability (Darcies)
500	75	6361	0.248	308
1000	75	5252	0.242	260
1500	75	4905	0.237	248
2000	75	4159	0.232	215
2500	75	3502	0.227	185
3000	75	3197	0.222	173

June 1994

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SL 3643

Table 2

Sieve Analysis of Submitted Sample
From Mineral Holdings of Australia P/L

Sample I.D.

Sand
20/40

	Percent Retained	Percent Cumulative
Sieve		
16	0.0	0.0
18	0.0	0.0
20	2.2	2.2
25	13.5	15.7
30	28.9	44.6
35	22.5	67.1
40	23.1	90.2
45	9.8	100.0
50	0.0	100.0
pan	0.0	100.0

June 1994