MINERAL HOLDINGS AUSTRALIA PTY LTD

RETENTION LICENCE RL1/2005
HOGARTH CREEK, NW TASMANIA

ANNUAL REPORT ON EXPLORATION
TO JUNE 2016

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ABSTRACT

This report gives a review of the marketing and exploration work carried out by Mineral Holdings Australia Pty Ltd (MHA) over the past 12 months on RL1/2005.
The licence covers 3 square kilometres in the Dip Ranges and encloses the Thomas Mountain silica mine and the Thomas Mountain frac sand deposits within 23M/2009.

The licence covers the Detention Quartzite of the Rocky Cape Group and the target of exploration is silica, silica sand and quartzite for the chemical, metallurgical glass and coal seam methane industries.

Previous exploration by MHA and its joint venture partners has outlined a substantial inventory of potential silica products in the retention licence consisting of silicified quartzite, sandstone and soft unconsolidated sand. Three separate resource areas of frac sand have now been outlined and background environmental data has been collected in preparation for a full environmental effects statement. Discussions are underway with potential contract miners and treatment companies to process and market the frac sand to the Queensland coal seam gas industry.

Resource Area 1 lies immediately north of Hogarths Creek. It contains an estimated 830,000 tonnes of frac sand based on 14 drill holes and 25 shallow auger holes. Resource Area 2 lies immediately to the north of Area 1. It contains an estimated 550,000 tonnes of frac sand based on 6 drill holes and 8 shallow auger holes, however it may never be mined due to a thick cover of *Banksia serrata* trees. Resource Area 3 lies south of Hogarths Creek and contains an estimated 1,350,000 tonnes of frac sand based on 43 shallow drill holes.

Size fraction and crush resistance testing has been carried out on eight sand samples from Resource Area 1 – the best researched resource area and the area most likely to be mined first. A further sample that was a composite of three auger holes drilled previously in Resource Area 3 south of Hogarths Creek (holes 35, 36, and 37) was taken as an initial evaluation of the sand in that area.

A program of water sampling has been initiated from Hogarths Creek, downstream from the potential work site, to provide background water quality data.

Simcoa, the Western Australian silicon metal producer has investigated the Thomas Mountain quartzite as a possible source of silica feed to blend with their chert deposit in WA. The Thomas Mountain quartzite would appear to match specifications and evaluation work is continuing.

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1.0 INTRODUCTION

RL1/2005 was applied for by Mineral Holdings Australia Pty Ltd (MHA) on 21 February 2005 and was granted on 15 June 2005. RL1/2005 covers the site of the Thomas Mountain silica resource which was originally covered by CML 8M/1989 and 1W/1088. Under its policy of revoking non-performing mining leases, Mineral Resources Tasmania (MRT) suggested that a retention licence would be a more appropriate title for the marketing and industrial testing activities currently being pursued by MHA. Consequently, RL1/2005 was granted and the mineral leases cancelled.

The Thomas Mountain mine and prospect occurs in the northern Dip Range, about 25 kilometres south-west of Wynyard and 20 kilometres south-east of a deep water harbour at Port Latta. Access is via the township of Montumana on the Bass Highway, 25 kilometres west of Wynyard, thence 6km south along Montumana and Newhaven Roads to a turn-off just east of Hogarths Creek. The mine site is held within 23M/2009, a 2 square kilometre area inside RL1/2005.

Over the past several years, MHA has had discussions with a number of industrial companies, within Australia and overseas, as potential customers or developers of the deposit. There has been considerable interest in the potential for producing 'frac' sands from the site and renewed interest in the area as a source of fine silica sand for the glass and specialised silica products.

Three separate resource areas of frac sand have now been outlined and background environmental data has been collected in preparation for a full environmental effects statement. Discussions are underway with potential contract miners and treatment companies to process and market the frac sand to the Queensland coal seam gas industry.

Resource Area 1 lies immediately north of Hogarths Creek. It contains an estimated 830,000 tonnes of frac sand based on 14 drill holes and 25 shallow auger holes. Resource Area 2 lies immediately to the north of Area1. It contains an estimated 550,000 tonnes of frac sand based on 6 drill holes and 8 shallow auger holes, however it may never be mined due to a thick cover of *Banksia serrata* trees. Resource Area 3 lies south of Hogarths Creek and contains an estimated 1,350,000 tonnes of frac sand based on 43 shallow drill holes.

Size fraction and crush resistance testing has been carried out on 8 sand samples from Resource Area 1 - the best researched resource area and the area most likely to be mined first. A further sample which was a composite of three auger holes drilled previously in Resource Area 3 south of Hogarths Creek (holes 35, 36, and 37) was taken as an initial evaluation of the sand in that area.

A program of water sampling has been initiated from Hogarths Creek, downstream from the potential work site, to provide background water quality data.

Simcoa, the Western Australian silicon metal producer has investigated the Thomas Mountain quartzite as a possible source of silica feed to blend with their chert deposit in WA. The Thomas Mountain quartzite would appear to match specifications and evaluation work is continuing.

2.0 GEOLOGY

Resources of high-grade quartzite have been reported in various government publications as occurring within the Proterozoic rocks of north-west Tasmania. The better quartzite occurred within the Detention Quartzite sub-group and rocks of this sub-group underlie most of the licence area.

Gee (1971) described the Proterozoic sequence within the Rocky Cape Group, from youngest to oldest, as the Jacob Quartzite (1,130m in thickness), the Irby Siltstone (760m) and the Detention Sub-group (1,400m). Gee suggested The Detention Sub-group contained about 10% siltstone, in beds from a few metres to more than 80 metres in thickness. The Rocky Cape Group, in turn, overlies the Cowrie Siltstone which was at least 2,400m in thickness.

Structurally, the Detention Quartzite is folded into a tight series of anticlines and synclines with north-east trending and dipping axes with folds becoming overturned in the east resulting in north-west dipping beds at 45 degrees or above.

Gee (1971) described the quartzites as uniformly fine-grained orthoquartzites with 99% quartz grains and a granular to glassy texture, depending on the degree of cementation by silica. Turner (1989), on the other hand, preferred to call the mature, quartzose, sandy sediments quartz arenites and attributes their variable physical character as mostly due to variable silicification and occasionally to metamorphism.

The silica resources currently outlined in the licence are 0.35Mt of very hard, silicified sandstone or quartzite, 1.55Mt of hard sandstone, 0.65Mt of poorly consolidated or soft weathered sandstone and 2.45Mt of unconsolidated sand. The potential uses of the resources include silicon metal, silica sand and quartzite for the chemical, metallurgical, glass, petroleum and coal seam gas industries.

3.0 PREVIOUS EXPLORATION AND EVALUATION

There has been a long history of exploration by MHA and a series of joint venture partners, for a wide range of silica products at Thomas Mountain. Details of that work were provided in the 2007 report.

In 1993/94, MHA developed 42 hammer drill holes along 8 sections for 666m in the area south-west of Hogarths Creek. This has allowed a resource estimate to be made for an area of about 25ha extent, to a depth of 10 metres, extending south- west of the Quarry site.

Duncan (2005) estimated an inferred resource of 5 million tonnes (Mt) of siliceous material in the area just south of Hogarths Creek, which breaks down to:

0.35Mt of very hard, silicified sandstone,
1.55Mt of hard sandstone,
0.65Mt of poorly consolidated, soft sandstone and
2.45Mt of very soft sand

Duncan suggested some infill drilling would be necessary to lift the resource to the Indicated level of the JORC Code. He also suggested a significant increase in resource was likely at depth and along strike to the NE and SW, with an inferred 20Mt of high-grade sand and sandstone available (as a conservative figure) in the area of the Retention Licence.

In 2010, MHA was asked by BHP Billiton to supply a bulk sample of quartzite from Hogarth Creek to determine its suitability in the manufacture of ferrosilicon at the TEMCO plant in Bell Bay. About 8,000 tonnes of quartzite was mined and crushed on site to +25 -60mm size and 5,000 tonnes of sized material was shipped to Bell Bay. A full report has not yet been supplied but verbal information suggests the Hogarth Creek material provided superior furnace returns but the cost of transport to Bell Bay more than offset the cost of inferior local quartzite. (Great material but cost of transport is too high). TEMCO has subsequently ceased production of ferrosilicon and the Bell Bay plant is for sale.

In recent times considerable effort was put into testing the unconsolidated sand from Thomas Mountain as a proppant agent in oil drilling. Dip Range sand was tested by Stim-Lab, Halliburton and Schlumberger of the USA and Santos and Amdel in Australia. Tests were carried out on the 20/40 size range (US mesh screen) which is the -850 to +420µm fraction. Dip range sand is a fine to medium-grained sand with a median value of about 250µm, with about 25% in the 20/40 size fraction

As summarized by Stim-Lab (SL9176 – February 2011), the Dip Range sample passed all the API RP56 tests for size, shape (sphericity and roundness), grain clusters, acid solubility, turbidity and crush resistance. The crush resistance tests indicate that the sand is most suitable for shallow wells, such as coal seam gas recovery operations, where lower pressure is required.

4.0 CURRENT EXPLORATION AND MARKETING

4.1 Frac Sand

Three separate resource areas of frac sand have now been outlined and background environmental data has been collected in preparation for a full environmental effects statement. Discussions are underway with potential contract miners and treatment companies to process and market the frac sand to the Queensland coal seam gas industry.

Resource Area 1

Resource Area 1 lies immediately north of Hogarth's Creek. The resource is based on 14 drill holes and 25 shallow auger holes. The indicated resource to a depth of 10 metres is approximately 830,000 tonnes after allowing for a 15% loss during mining and would be very close to indicated resource status under the JORC code. (See Appendix 1)

The sand resource exists as a thick 'layer' draped over the south-east slope of a prominent NE-SW trending ridge. A thin veneer of A-horizon soil covers the resource. The soil horizon, which supports heathland and button grass regrowth, is typically less than 0.5 metres in thickness. *Banksia serrata* trees are the only threatened faunal species but only one tree occurs within the resource area.

The grain size of the raw sand typically ranges from 1.0 mm (medium silt) down to less than 53 microns. The pay fractions, -20 to +40 mesh (-850 microns to +425 microns) and -40 to +70 mesh (-425 to +212 microns), make up 26.2% and 47.3 % respectively of the sand. The oversize fraction (+20 or +850 microns) makes up only 0.4% of the sand, while the fines (less than or minus 70 mesh or 212 microns down to -53 microns) make up an additional 25.1% of the sand. Once markets are established even the 21.8% of the sand sitting below 70 mesh to 140 mesh may be saleable to some frac sand users. Only 1.3% of the sand is fine enough to be sold as silica flour but such small quantities would hardly be economic.

Figure 4.1.1: Resource Area 1 Scale I------------I 100 metres

Resource Area 1 Calculations

Area: 6.153 ha = 61,530 m²

Volume: 615,300 m³ (to 10 m)

Mass: 984,480 tonnes (x1.6 SG of dry sand in situ)
836,808 tonnes (allowing 15% loss during mining)

830,000 tonnes after rounding

Eight samples were submitted to Stim-Lab for testing from Resource Area 1. Stim-Lab's testing indicates passes for roundness, sphericity and bulk density. Stress tests are in the range of 3,000 to 5,000 psi which is sufficient for the Queensland coal gas industry.

Figure 4.1.2: Resource Area 1 showing Stim-Lab Sample Sites

Sample site	Coordinates		Notes
	Easting	Northing	
MHA A&D	372 647E	5 462 701N	Bottom of pit face
MHA E	372 711E	5 462 744N	2m from top of face
MHA F	372 800E	5 462 816N	1.5m depth
MHA G	372 907E	5 462 904N	1m depth
MHA H	372 934E	5 462 872N	1m depth
MHA I	373 095E	5 463 078N	1.5m depth
MHA C	373 126E	5 463 048N	1m depth

Note: Sample MHA B is in Resource Area 3

Table 4.1.1: GDA94 Coordinates for Stim-Lab Sample Sites

SAMPLE	% YIELD	SPH.	RND.	BULK DENSITY	% FINES GENERATED UNDER PRESSURE (PSI)				K-VALUE
					3,000	**4,000**	**5,000**	**6,000**	
MHA D									
20/40	21.1	0.7	0.7	1.42	6.10	11.30			3K
40/70	50.7	0.7	0.6	1.33		8.00	12.00		4K
70/140	24.3	0.6	0.5	1.29		7.00	11.10		4K
MHA E									
20/40	22.3	0.7	0.6	1.4		8.50	14.70		4K
40/70	46.4	0.7	0.5	1.29		8.80	12.90		4K
70/140	27.3	0.6	0.4	1.27		6.80	11.40		4K
MHA F									
20/40	18.3	0.7	0.7	1.43		8.00	14.80		4K
40/70	44.2	0.7	0.6	1.33			7.50	11.80	5K
70/140	31.1	0.6	0.5	1.31			9.50	13.10	5K
MHA G									
20/40	24.6	0.7	0.6	1.37	8.10	16.70			3K
40/70	41.3	0.7	0.5	1.29		7.20	12.20		4K
70/140	23.8	0.7	0.5	1.29			9.60	13.00	5K
MHA H									
20/40	25.2	0.7	0.6	1.42	7.30	14.20			3K
40/70	45.7	0.7	0.6	1.39		8.20	14.00		4K
70/140	25.4	0.6	0.6	1.31			9.80	14.30	5K
MHA I									
20/40	16	0.7	0.6	1.42	5.50	11.70			3K
40/70	39.7	0.7	0.6	1.33	7.70	19.40			3K
70/140	37.1	0.6	0.5	1.32		6.70	10.50		4K
SAMPLE	**% YIELD**	**SPH.**	**RND.**	**BULK DENSITY**	**% FINES GENERATED UNDER PRESSURE (PSI)**				**K-VALUE**
					2,000	**3,000**	**4,000**	**5,000**	
MHA A	On track in Resource Area 2								
20/40	14.2	0.7	0.6	1.38	7.50	16.40	25.80		2K
40/70	49.3	0.6	0.5	1.33		6.10	10.50	15.30	3K
MHA B	Same as MHA D								
20/40	35.3	0.7	0.6	1.45	3.20	7.50	14.00		3K
40/70	43.5	0.6	0.6	1.37		5.50	9.00	13.90	4K
MHA C	Resource Area 3 Holes 35-37								
20/40	29.7	0.7	0.6	1.43	5.80	8.50	11.20		3K
40/70	34.7	0.7	0.6	1.36		4.30	7.70	11.20	4K

Table 4.1.2: Stim-Lab Analysis Results

Resource Area 2

Resource Area 2 lies immediately to the north of Resource Area1. It contains an estimated 550,000 tonnes of frac sand based on 6 drill holes and 8 shallow auger holes, however it may never be mined due to a thick cover of *Banksia serrata* trees.

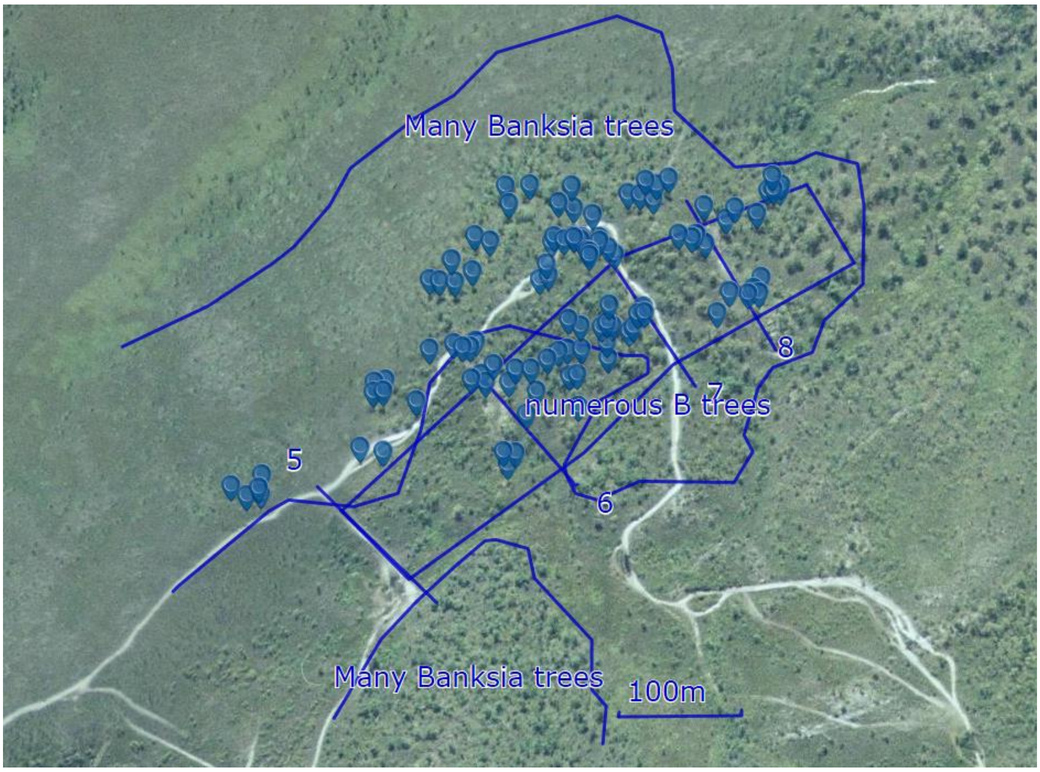

Figure 4.1.3: Resource Area 2 with Location of *Banksia serrata* Trees Indicated

Resource Area 2 Calculations

Area: 4.053 ha = 40,530 m²

Volume: 405,300 m³ (to 10 m)

Mass: 648,480 tonnes (x1.6 SG of dry sand in situ)
551,208 (allowing 15% loss during mining)

550,000 Tonnes after rounding

Based on six drill holes to 10m+ and eight shallow auger holes.

Information on Resource Area 2 and the coordinates for the *Banksia serrata* trees can be found in Appendices D & E.

Resource Area 3

Resource Area 3 lies south of Hogarths Creek and contains an estimated 1,350,000 tonnes of frac sand based on forty-three shallow drill holes. Data is shown in Appendix 6.

Resource Area 3 Calculations

Area: 9.97 ha = 99,700 m²

Volume: 997,000 m³ (to 10 m)

Mass: 1,595,200 tonnes (x1.6 SG of dry sand in situ)
1,355,920 tonnes (allowing 15% loss during mining)

1,350,000 tonnes after rounding

Based on 43 drill holes to 10 metres.

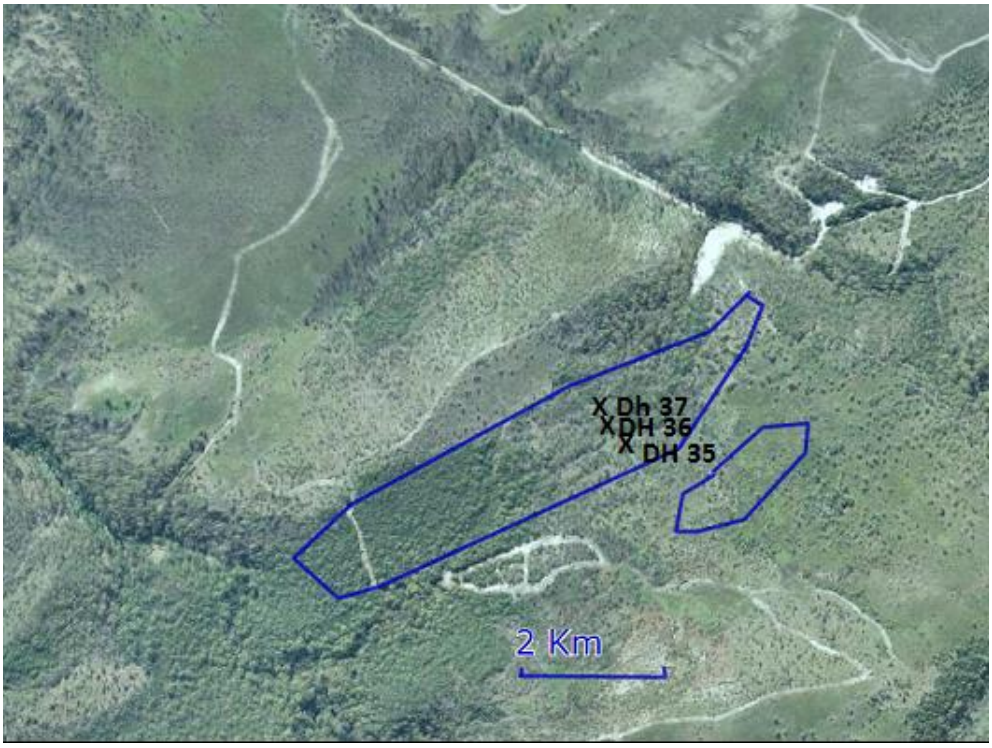

Figure 4.1.4: Resource Area 3
Showing Location of Sample Holes 35, 36 & 37
(Stim-Lab Composite Sample - MHA C)

*Note the scale bar is actually 200 metres not 2km

4.2 Hogarths Creek Water Sampling

A program of water sampling has been initiated from Hogarths Creek, downstream from the potential work site, to provide background water quality data. The sample site is located where Hogarths Creek crosses Newhaven Road and is shown in Figure 4.2.1.

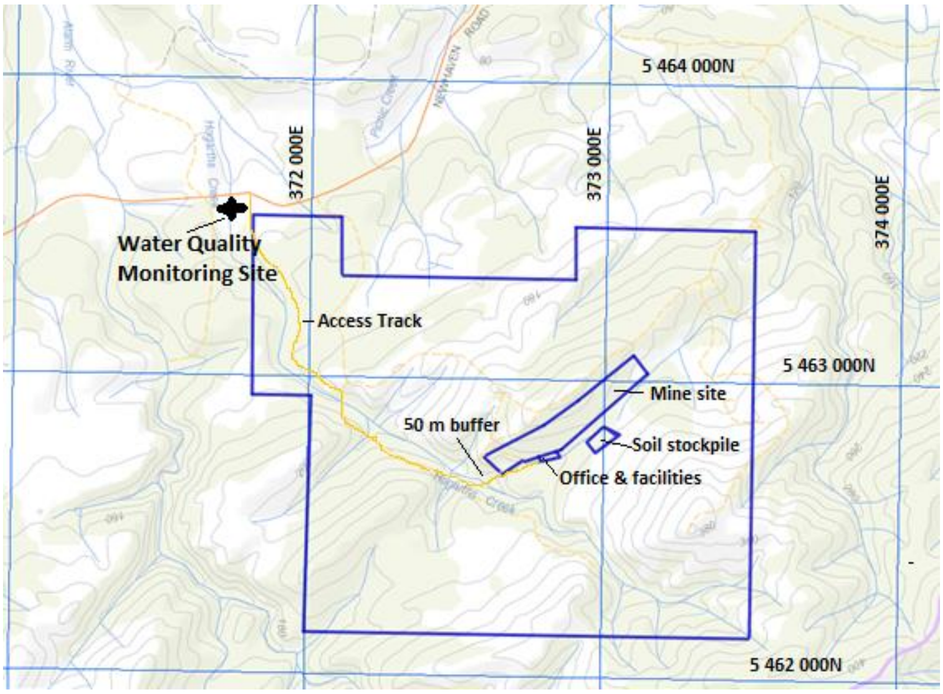

Figure 4.2.1: Location of Water Monitoring Site on Hogarths Creek

The samples were collected on a monthly basis between April and September 2015 by pitt&sherry and analysed by Analabs Melbourne. The data is summarised in the tables provided in Appendix 6 and compared to ANZECC guidelines for 95% for the protection of aquatic ecosystems and lowland rivers.

In general, the water in Hogarths Creek is of high quality and well below the ANZECC guidelines, especially with regard to the more nasty items like sulphate as SO_4 (a measure of pyrite in the environment) and the elements arsenic, cadmium, lead, selenium and mercury. There are however two very surprising results.

Aluminium is at levels three times the "safe" level of 0.055 mg/L. The two highest levels, in May and June 2015, occurred during a period of rain and slightly increased turbidity in the stream. The last 800 metres of Hogarths Creek above the sample point is in the alumina rich shales and siltstones of the Irby Siltstone Formation.

Zinc levels for May and June 2015 (high rainfall months) are at three times the required levels and copper is also doubled in May.

These are very surprising results as there is no sign of mineralisation and the sulphate levels are low indicating no pyrite a common associate with base metal mineralisation. However the results are well within ANZECC guidelines for 90% protection of the aquatic environment.

4.3 Evaluation of Quartzite by Simcoa

Simcoa is the major producer of silicon metal in Australia. They currently produce the metal from a chert deposit in Western Australia but are having problems with high levels of alumina, iron, titanium and phosphorous and are currently looking for sources of lump silica materials to blend with their material in order to reduce the level of impurities. They visited the Thomas Mountain site on 10 December 2015 and collected a number of representative samples of the high-grade quartzite.

Two samples were collected from dump material from the old crusher site. An additional four samples (Nos. 1 to 4 - as shown in Figure 4.3.1) were taken from the quartzite outcrop and a sixth sample was collected from the frac sand pit.

Figure 4.3.1: Location of Simcoa's Quartzite Sample Sites

GDA94 coordinates for the samples are:

Sample 1:	372 490E	5 462 654N
Sample 2:	372 500E	5 462 654N
Sample 3:	372 508E	5 462 658N
Sample 4:	372 545E	5 462 655N

Simcoa were especially interested in the iron, aluminium, titanium and phosphorus content of the samples. Other elements are monitored but not often included in customer specifications. For the Thomas Mountain quartzite samples they suggested:

Fe_2O_3 – acceptable result, but not outstanding

Simcoa work on 0.07% as the cut off for most of their own grades and typically have stockpiles ranging from 0.03 to 0.07%. The high result on the large lump sample is a concern, but could be sampling error (small volume taken) or contamination (old stockpile present in exposed environment).

Al_2O_3 – sample results high

They work on an Al_2O_3 cut off of 0.20%, having found that high alumina increases the power requirement in the furnace. Again the large crushed lump result is very high.

TiO_2 – sample results tending high

Their internal cut off is approximately 0.015% with some grades tolerating 0.030% TiO_2.

P_2O_5 – sample results very good

Working solely with these few samples a possible grade specification for the deposit could be:

Fe_2O_3	0.07% max	Acceptable
Al_2O_3	0.40% max	Needs to be diluted with Simcoa quartz
TiO_2	0.050% max	Needs to be diluted with Simcoa quartz
P_2O_5	0.002% max	Good result

It is believed MHA has about 360,000 tonnes of high grade quartzite available south of the existing quarry site and negotiations with Simcoa are continuing.

Sample ID	Analysis by ICP-OES (% Concentration)							
	Fe_2O_3	Al_2O_3	TiO_2	CaO	MgO	P_2O_5	Na_2O	K_2O
Crushed Lump - Stockpile Large	0.121	0.532	0.034	0.010	0.019	0.001	0.009	0.169
Crushed Lump - Stockpile Small	0.055	0.122	0.036	0.007	0.007	>0.001	0.004	0.033
Sample 1	0.046	0.446	0.025	0.007	0.014	>0.001	0.007	0.138
Sample 2	0.044	0.320	0.054	0.006	0.013	0.001	0.006	0.100
Sample 3	0.053	0.253	0.024	0.005	0.010	>0.001	0.005	0.079
Sample 4	0.035	0.101	0.029	0.005	0.005	0.001	0.004	0.028
Silica Sand	0.011	0.039	0.049	0.004	0.003	>0.001	0.004	0.008

Sample ID	Analysis by ICP-OES (% Concentration)								
	Cd	Cu	Pb	Mg	Mn	K	Na	Zn	As
Crushed Lump – Stockpile Large	BDL	0.0012	BDL	0.1130	0.0650	1.4200	0.0650	0.0400	BDL
Crushed Lump – Stockpile Small	BDL	0.0021	BDL	0.0435	0.0280	0.2950	0.0320	0.0390	BDL
Sample 1	BDL	0.0010	BDL	0.0950	0.0150	1.2000	0.0500	0.0230	BDL
Sample 2	BDL	0.0040	BDL	0.0800	0.0162	0.8520	0.0410	0.0439	BDL
Sample 3	BDL	BDL	BDL	0.0620	0.0260	0.6940	0.0390	0.0140	BDL
Sample 4	BDL	0.0016	BDL	0.0390	0.0190	0.2410	0.0330	0.0031	BDL
Silica Sand	BDL	0.0009	BDL	0.0180	0.0011	0.0820	0.0340	0.0680	BDL

Table 4.3.1: Simcoa Quartzite & Silica Sand Assay Results

Sample ID	Analysis by ICP-OES (% Concentration)								
	Sb	Be	Se	Ag	Sn	V	Ni	Cr	Co
Crushed Lump - Stockpile Large	BDL	BDL	0.0058	BDL	BDL	0.0029	0.0129	0.0097	0.1090
Crushed Lump - Stockpile Small	BDL	BDL	0.0009	BDL	BDL	0.0005	0.0105	0.0021	0.1100
Sample 1	BDL	BDL	0.0059	BDL	BDL	0.0023	0.0083	0.0012	0.1290
Sample 2	BDL	BDL	0.0030	BDL	BDL	0.0016	0.0126	0.0017	0.1010
Sample 3	BDL	BDL	BDL	BDL	BDL	0.0011	0.0090	0.0011	0.0150
Sample 4	BDL	BDL	BDL	BDL	BDL	0.0002	0.0082	0.0008	0.0620
Silica Sand	BDL	BDL	0.0015	BDL	BDL	BDL	0.0168	BDL	0.1090

Table 4.3.1 (cont.): Simcoa Quartzite & Silica Sand Assay Results

5.0 CONCLUSION

MHA is currently working to produce a fully-fledged DPEMP report for submission to Environment Tasmania. All basic data has been collected and MHA is currently seeking submissions from potential mine and treatment operators to work the frac sand deposit.

Negotiations with Simcoa are continuing.

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7.0 KEYWORDS

Dip Range, Thomas Mountain, Detention Subgroup, Rocky Cape Group, Sand, Quartzite, Silica Resources.

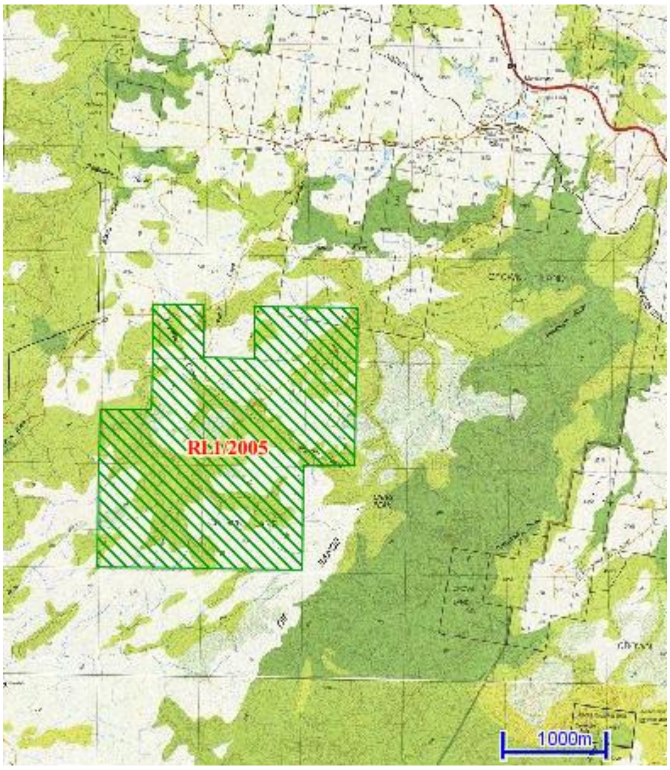


Figure A: Location Diagram - RL1/2005

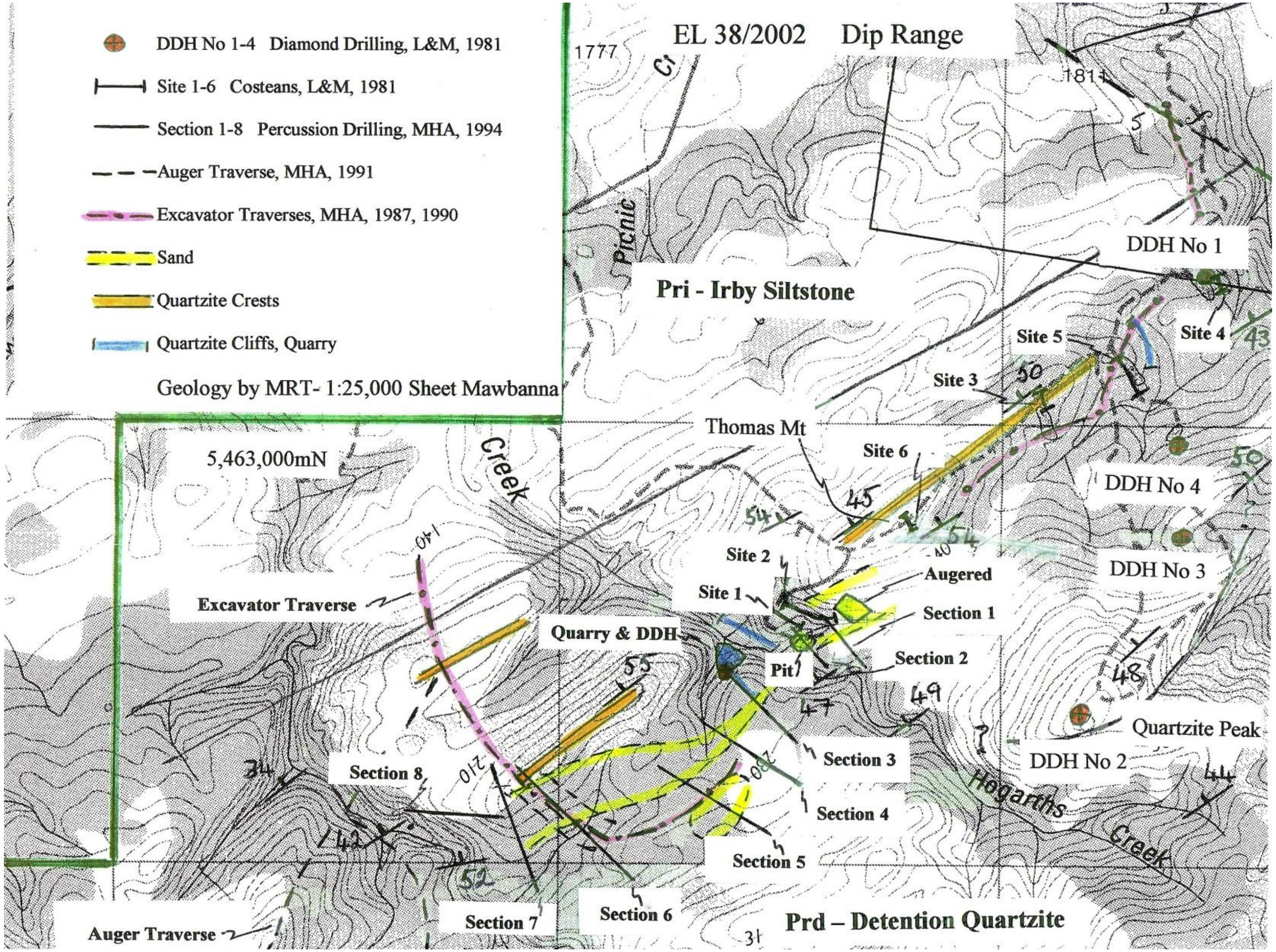


Figure B: Geology & Exploration – RL1/2005

APPENDIX A

RESOURCE AREA 1
DRILL DATA

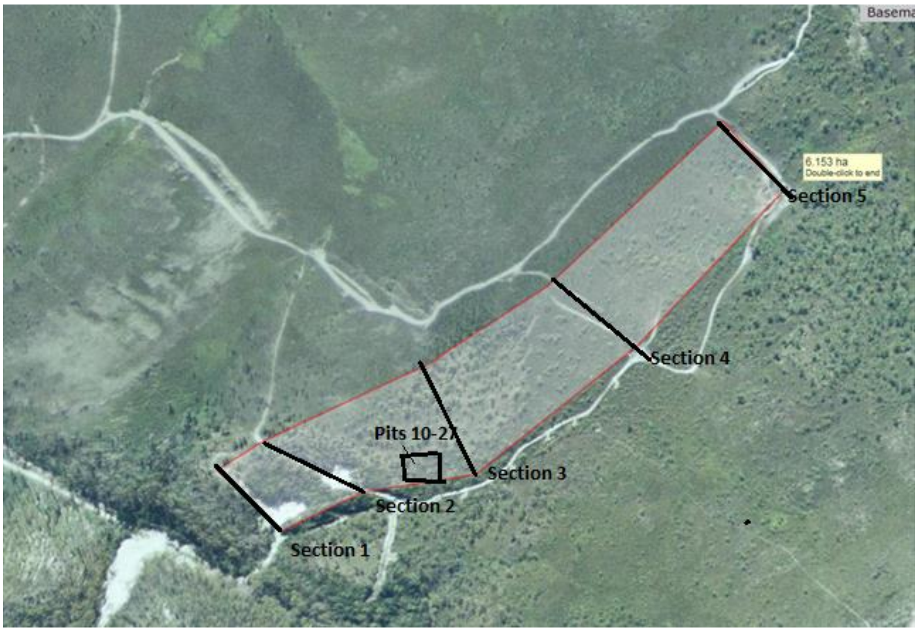
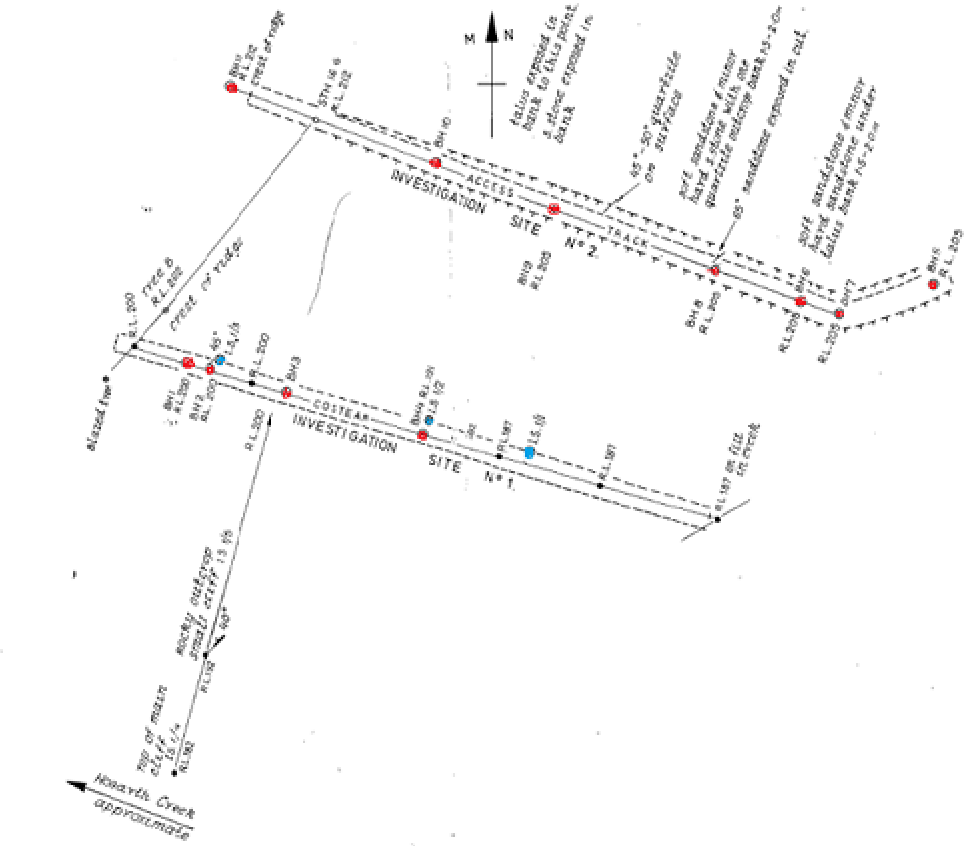


Figure A.1: Drill Sections in Resource Area 1



Costean wall IS1/1
0-0.9 Soil
0.9-1.7 Sand
1.7-2.4 Talus

Costean IS1/2
0-0.6 Soil
0.6-2.3 Sand

Costean IS1/3
0-0.5 Soil
0.5-1.5 Sandstone Weak

Figure A.2: Plan View of Sections 1 & 2

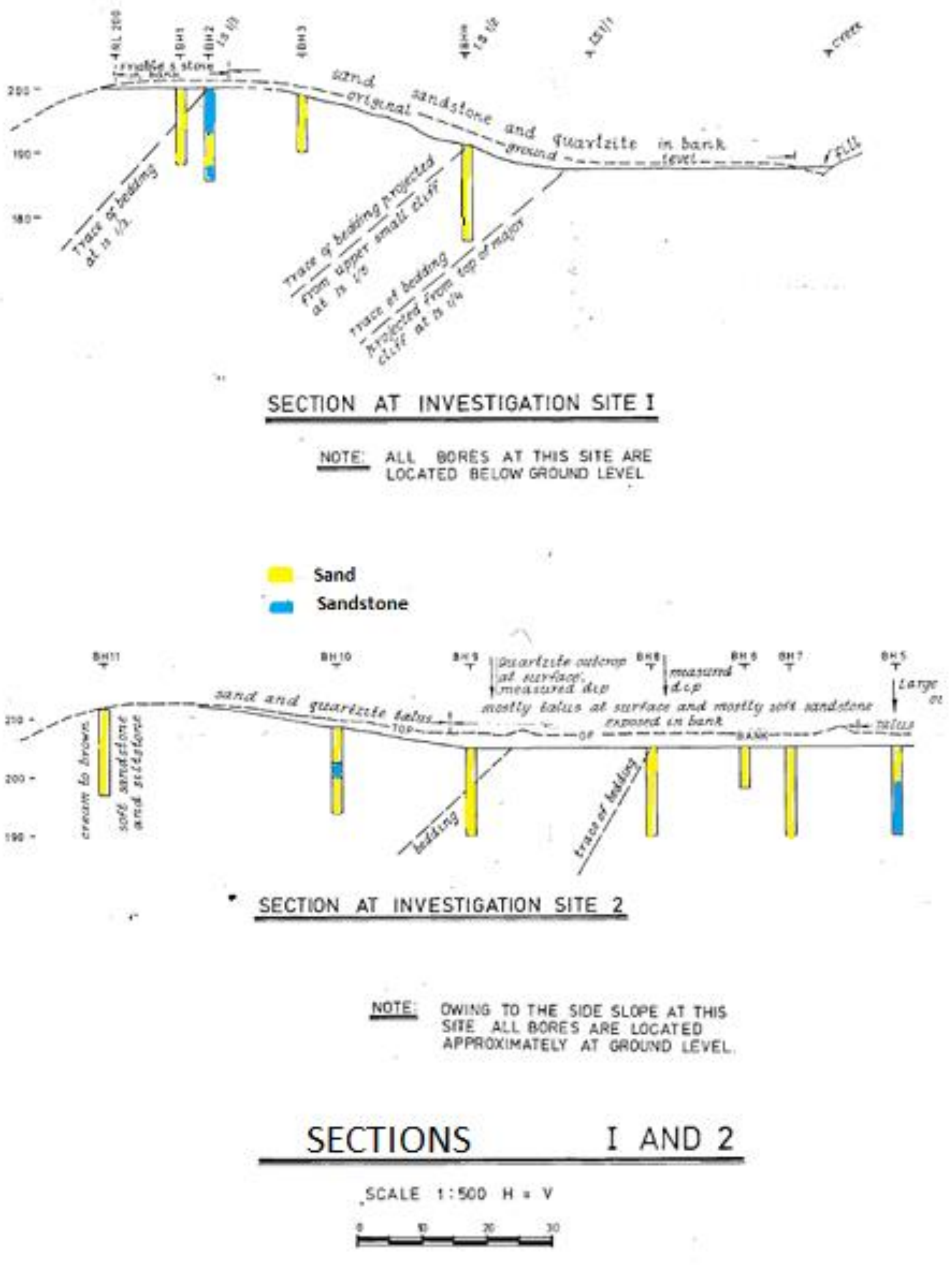


Figure A.3: Sections 1 & 2

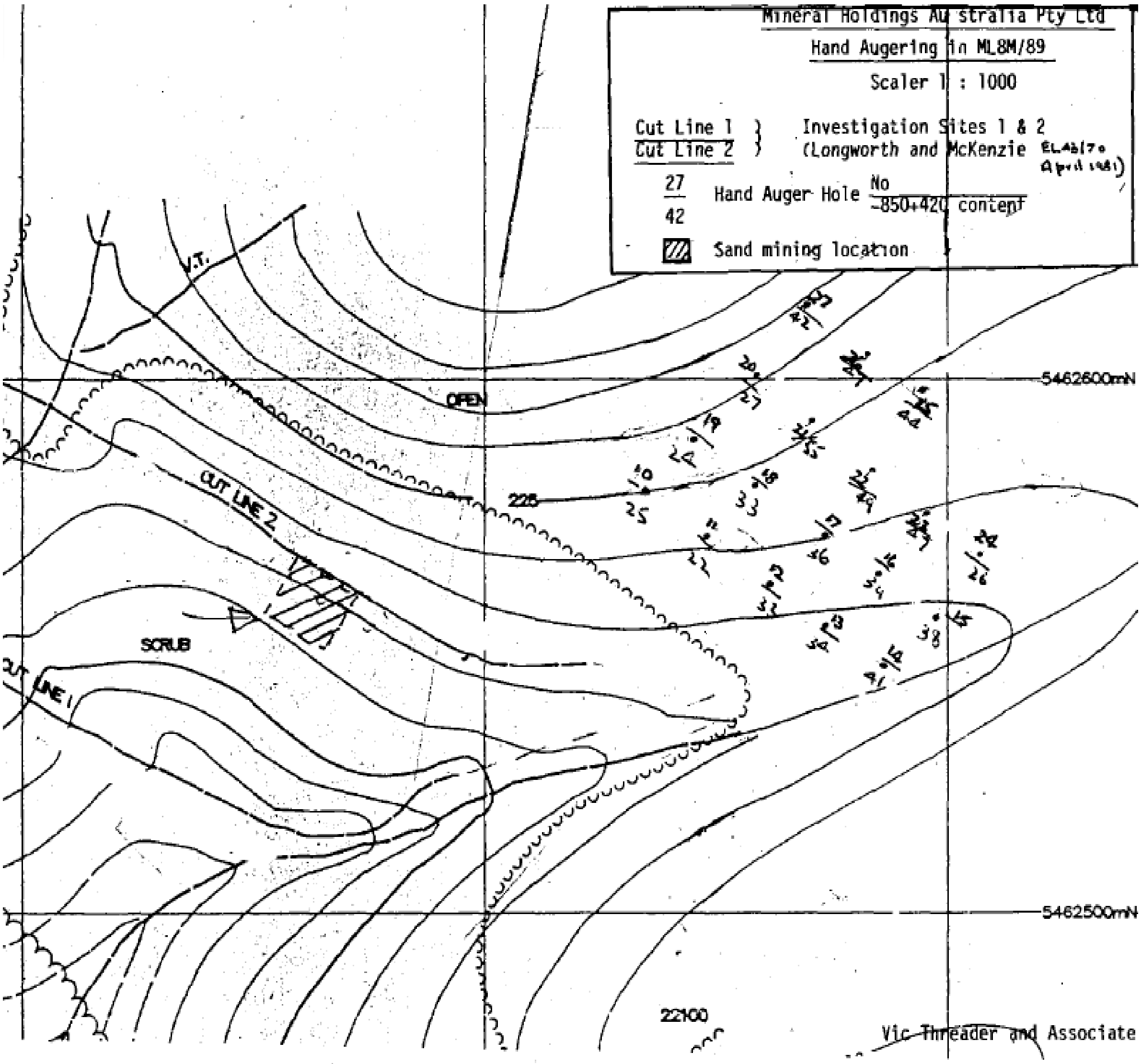


Figure A.4: Location of Hand Auger Holes 10 to 27

FIELD SCREEN ANALYSES K.PINNER ML8M/89

Pit Nos 10 - 27

Particle Diam μm	Mass % Retained	Cumulative Mass % Retained	Mass % Retained	Cumulative Mass % Retained	Mass % Retained	Cumulative Mass % Retained
	No.10		No.11		No.12	
+2000	13	13	11	11	2	2
-2000+850	6	19	6	17	4	6
-850+420	25	44	22	39	33	39
-420	56	100	61	100	61	100
	No.13		No.14		No.15	
+2000	0	0	2	2	2	2
-2000+850	2	2	4	6	5	7
-850+420	34	36	41	47	38	45
-420	64	100	53	100	55	100
	No.16		No.17		No.18	
+2000	1	1	2	2	4	4
-2000+850	4	5	5	7	4	8
-850+420	39	44	36	43	33	41
-420	56	100	57	100	59	100
	No.19		No.20		No.21	
+2000	19	19	4	4	3	3
-2000+850	5	24	4	8	2	5
-850+420	24	48	27	35	55	60
-420	52	100	65	100	40	100
	No.22		No.23		No.24	
+2000	3	3	4	4	20	20
-2000+850	2	5	4	8	7	27
-850+420	49	54	47	55	26	53
-420	46	100	45	100	47	100
	No.25		No.26		No.27	
+2000	4	4	3	3	11	11
-2000+850	11	15	3	6	5	16
-850+420	44	59	47	53	42	58
-420	41	100	47	100	42	100

Figure A.5: Screen Analyses of Holes 10 to 27

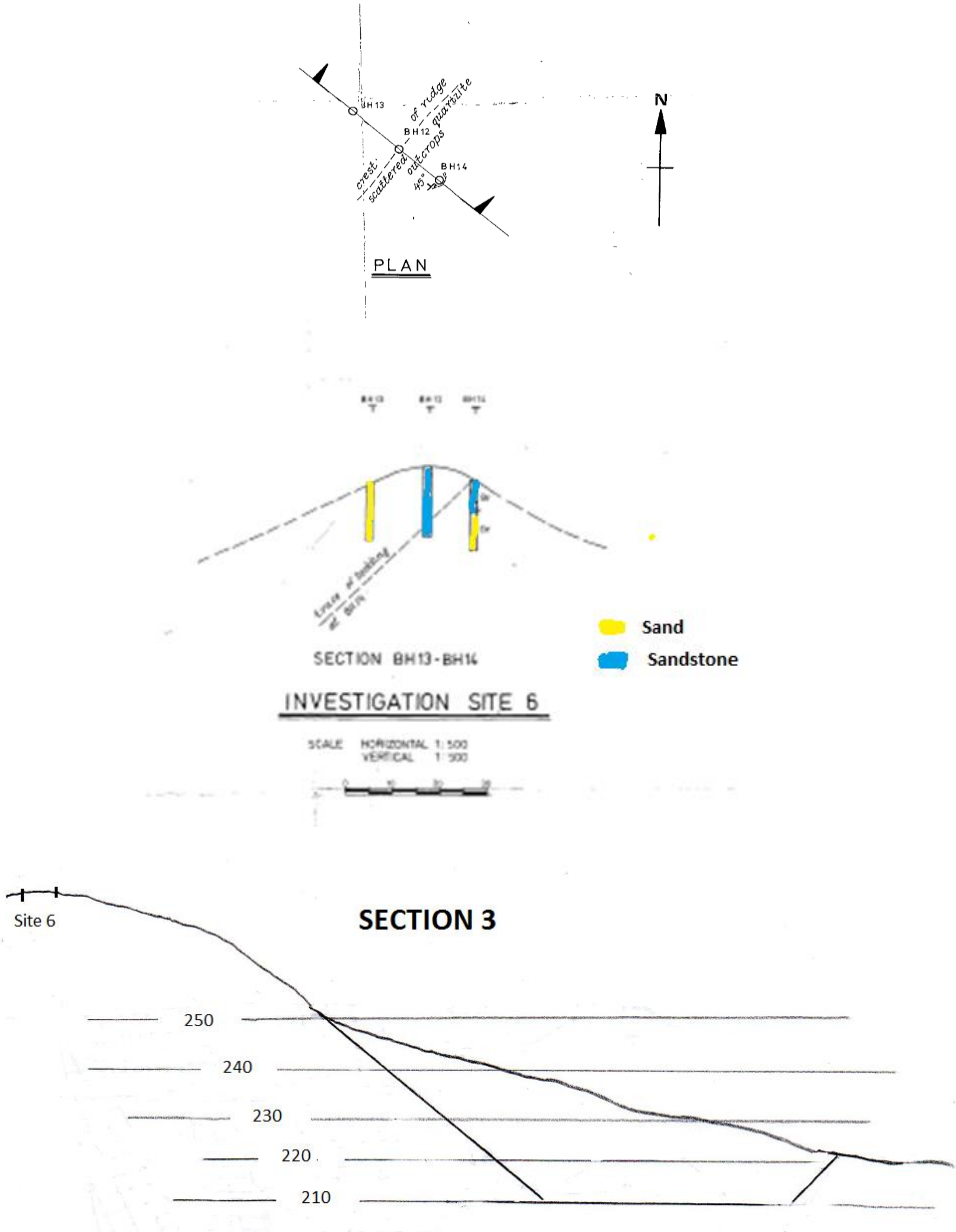


Figure: A.6: Section 3

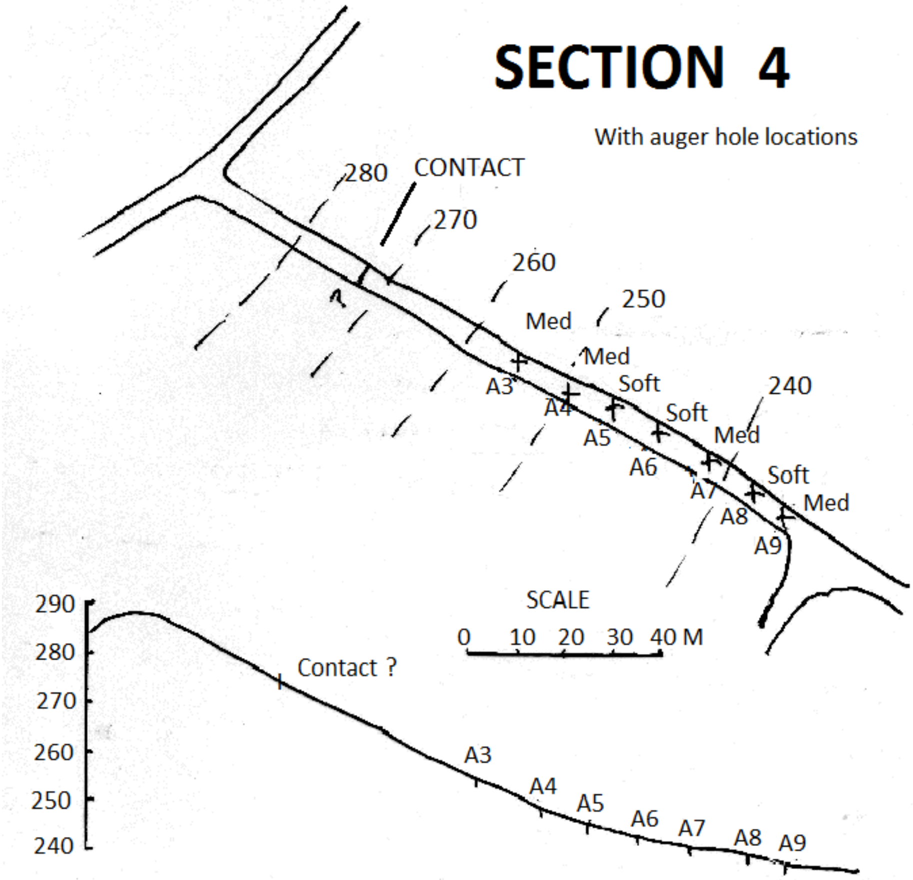


Figure A.7: Section 4 (with location of auger holes A3 to A9)

Figure A.8: Recreational 4WD track along Section 4 (showing low scrub over the sand)

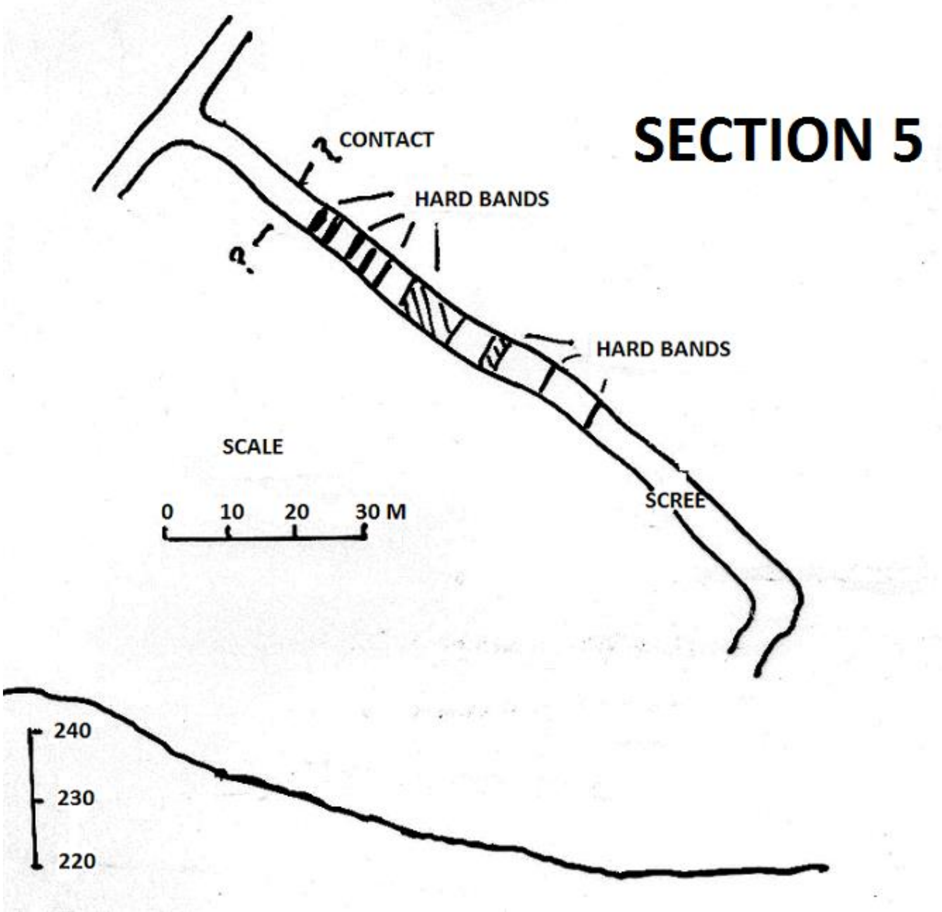


Figure A.9: Section 5

Figure A.10: Recreational 4WD track along Section 5 (showing possible contact at change of slope)

APPENDIX B

EVALUATION OF SAMPLES MHA A to C

STIM-LAB REPORT
SL 11741 – JULY 2015

"Measurement of Properties for Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations" Evaluations on Three Composite Sand Samples For Mineral Holdings Australia PTY LTD Submitted May 28, 2015

Prepared For:
Neil Thomas
Mineral Holdings Australia PTY LTD
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Prepared By:
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Lisa O'Connell
____
Lisa O'Connell, Laboratory Supervisor

P.O. Number: API2015-0529-087

File Number: SL 11741

July 2015

Stim-Lab
A CORE LABORATORIES COMPANY

A CORE LABORATORIES COMPANY

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July 9, 2015

Neil Thomas
Mineral Holdings Australia PTY LTD
11 Kent Court
Toorak, Victoria, Australia 3142

Dear Mr. Thomas:

Stim-Lab, Inc. has completed the ISO 13503-2:2006/API RP19C:2008 evaluations requested on the submitted sand samples labeled MHA 1, MHA 2, and MHA 3. The samples were received at Stim-Lab, Inc. on May 28, 2015.

Upon arrival the samples were dried, weighed, and washed through a 200 mesh sieve. The sample retained on the sieve was then dried and reweighed. The percent loss was calculated from the material that washed through the sieve. The "Pre" and "Post" wash weights as well as the calculated loss for each sample are provided in Table 1. The composite sieve analysis results for the samples are provided in Table 2.

As instructed, the 20/40 and 40/70 size ranges of each sample were isolated for further analysis. The sphericity and roundness (Krumbein Shape Factor), acid solubility, turbidity, bulk density, apparent density, and crush with K-Value results for the samples are provided in Tables 3 through 8. As instructed, the 20/40 samples were crushed at 2,000psi, 3,000psi, and 4,000psi. The 40/70 samples were crushed at 3,000psi, 4,000psi, and 5,000psi. Pictures of the samples are provided directly following each Table for you to review. The procedures followed are as stated in ISO 13503-2:2006/API RP19C:2008.

Thank you for choosing Stim-Lab, Inc. to perform these analyses. We hope you will consider us for your future testing needs. If you have any questions regarding the testing or results, please do not hesitate to give me a call.

Sincerely,

Lisa O'Connell

Lisa O'Connell
Laboratory Supervisor
Conductivity Laboratory

SL 11741

Table 1				
Mineral Holdings Australia PTY LTD May 28, 2015				
Loss From Washing				
Sample ID	Dry Prewash Wt (g)	Dry Postwash Wt(g)	Grams Lost	% Loss
MHA 1 Composite	4351.63	4045.22	306.41	7.04
MHA 2 Composite	4573.57	4495.93	77.64	1.70
MHA 3 Composite	4185.65	3714.11	471.54	11.27

July 2015

SL 11741

Table 2

Sieve Analysis of Submitted Proppant Samples
Mineral Holdings Australia PTY LTD

ISO 13503-2:2006/API RP19C:2008, Section 6, "Sieve Analysis"

Sample I.D.	MHA 1 Composite		MHA 2 Composite		MHA 3 Composite	
US Standard	Weight %		Weight %		Weight %	
Sieve No.	Retained	Cumulative	Retained	Cumulative	Retained	Cumulative
6	-	0.0	-	0.0	-	0.0
8	-	0.0	-	0.0	-	0.0
10	0.0	0.0	0.0	0.0	0.1	0.1
12	0.0	0.0	0.0	0.0	0.1	0.2
14	0.0	0.0	0.0	0.0	0.1	0.3
16	0.0	0.0	0.0	0.0	0.3	0.7
18	0.1	0.1	0.2	0.3	0.8	1.5
20	0.2	0.3	0.9	1.2	1.9	3.4
25	0.5	0.8	2.5	3.6	4.5	7.8
30	1.7	2.5	7.1	10.7	8.6	16.4
35	4.1	6.5	11.2	21.9	8.0	24.4
40	7.9	14.5	15.1	37.0	8.7	33.1
45	10.9	25.4	15.0	52.0	9.1	42.2
50	12.9	38.3	12.0	64.0	8.6	50.9
60	13.9	52.1	9.6	73.6	8.6	59.5
70	11.6	63.8	7.0	80.5	7.7	67.2
80	11.0	74.8	6.6	87.1	8.2	75.4
100	8.0	82.8	4.7	91.8	6.9	82.3
120	6.5	89.3	4.2	96.1	6.6	88.9
140	3.6	92.9	1.8	97.9	3.9	92.8
170	2.6	95.5	1.0	98.9	2.8	95.6
200	1.7	97.2	0.5	99.4	1.9	97.6
230	1.7	99.0	0.4	99.8	1.8	99.4
pan	1.0	100.0	0.2	100.0	0.7	100.0
total	100.0		100.0		100.0	
in-size	0.0	= as 6/12	0.0	= as 6/12	0.2	= as 6/12
in-size	0.0	= as 8/16	0.0	= as 8/16	0.7	= as 8/16
in-size	0.3	= as 12/20	1.2	= as 12/20	3.2	= as 12/20
in-size	2.4	= as 16/30	10.6	= as 16/30	15.8	= as 16/30
in-size	14.2	= as 20/40	35.8	= as 20/40	29.7	= as 20/40
in-size	35.8	= as 30/50	53.3	= as 30/50	34.4	= as 30/50
in-size	49.3	= as 40/70	43.5	= as 40/70	34.1	= as 40/70
in-size	29.1	= as 70/140	17.4	= as 70/140	25.7	= as 70/140
ISO Mean Dia. (mm)	0.280		0.379		0.364	
Median Dia. (mm)	0.244		0.335		0.292	

July 2015

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Table 3

Sample ID: MHA 1 20/40
Mineral Holdings Australia PTY LTD
May 28, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 22 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**Approx. 1 of Every 150 Grains Contained Clusters**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.38**	**g/cm^3**
Bulk Density =	**86.1**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
2000	**7.5%**
3000	**16.4%**
4000	**25.8%**
K-Value =	**2K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 4

Sample ID: MHA 1 40/70
Mineral Holdings Australia PTY LTD
May 28, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 21 count

Sphericity =	**0.6**
Roundness =	**0.5**
Clusters =	**Approx. 1 of Every 150 Grains Contained Clusters**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.33**	**g/cm^3**
Bulk Density =	**83.0**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
3000	**6.1%**
4000	**10.5%**
5000	**15.3%**
K-Value =	**3K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 5

Sample ID: MHA 2 20/40
Mineral Holdings Australia PTY LTD
May 28, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**Approx. 1 of Every 200 Grains Contained Clusters**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.45**	**g/cm^3**
Bulk Density =	**90.5**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
2000	**3.2%**
3000	**7.5%**
4000	**14.0%**
K-Value =	**3K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 6

Sample ID: MHA 2 40/70
Mineral Holdings Australia PTY LTD
May 28, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.6**
Roundness =	**0.6**
Clusters =	**Approx. 1 of Every 200 Grains Contained Clusters**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.37**	**g/cm^3**
Bulk Density =	**85.5**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
3000	**5.5%**
4000	**9.0%**
5000	**13.9%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 7

Sample ID: MHA 3 20/40
Mineral Holdings Australia PTY LTD
May 28, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**Approx. 1 of Every 200 Grains Contained Clusters**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.43**	**g/cm^3**
Bulk Density =	**89.2**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
2000	**5.8%**
3000	**8.5%**
4000	**11.2%**
K-Value =	**3K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 8

Sample ID: MHA 3 40/70
Mineral Holdings Australia PTY LTD
May 28, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**Approx. 1 of Every 200 Grains Contained Clusters**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.36**	**g/cm^3**
Bulk Density =	**84.9**	**lb/ft^3**

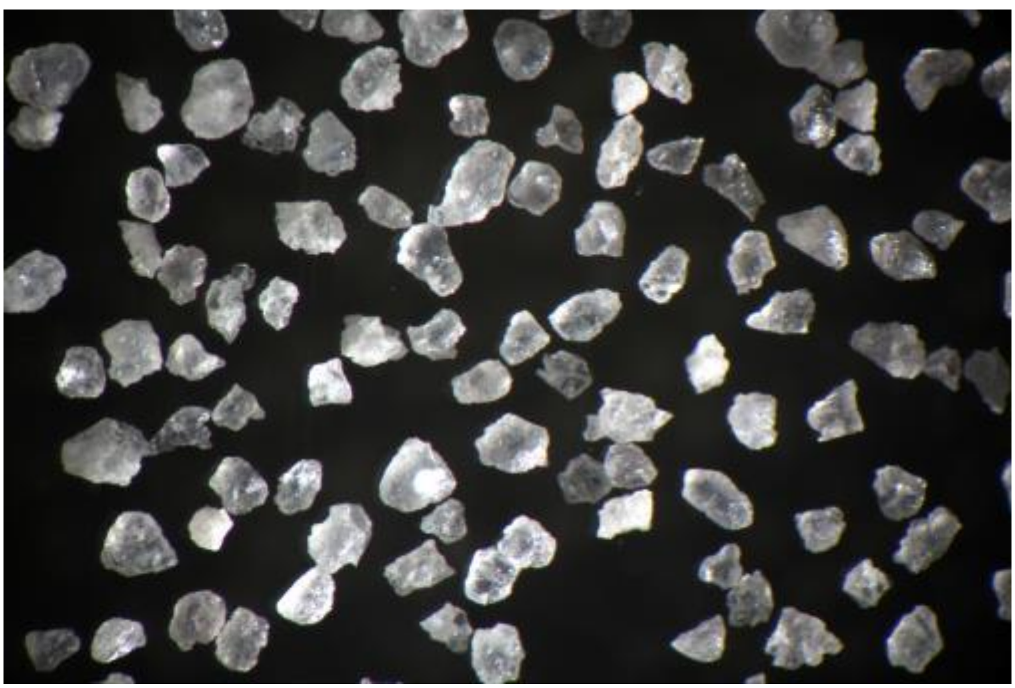
ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
3000	**4.3%**
4000	**7.7%**
5000	**11.2%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

MHA 1 20/40

MHA 1 40/70



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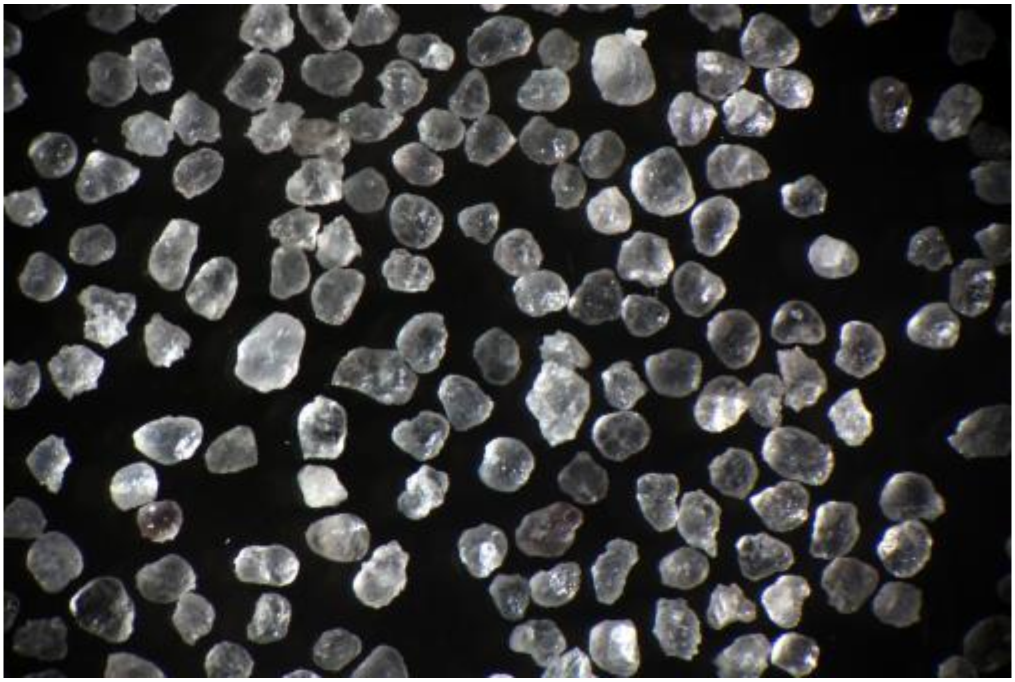
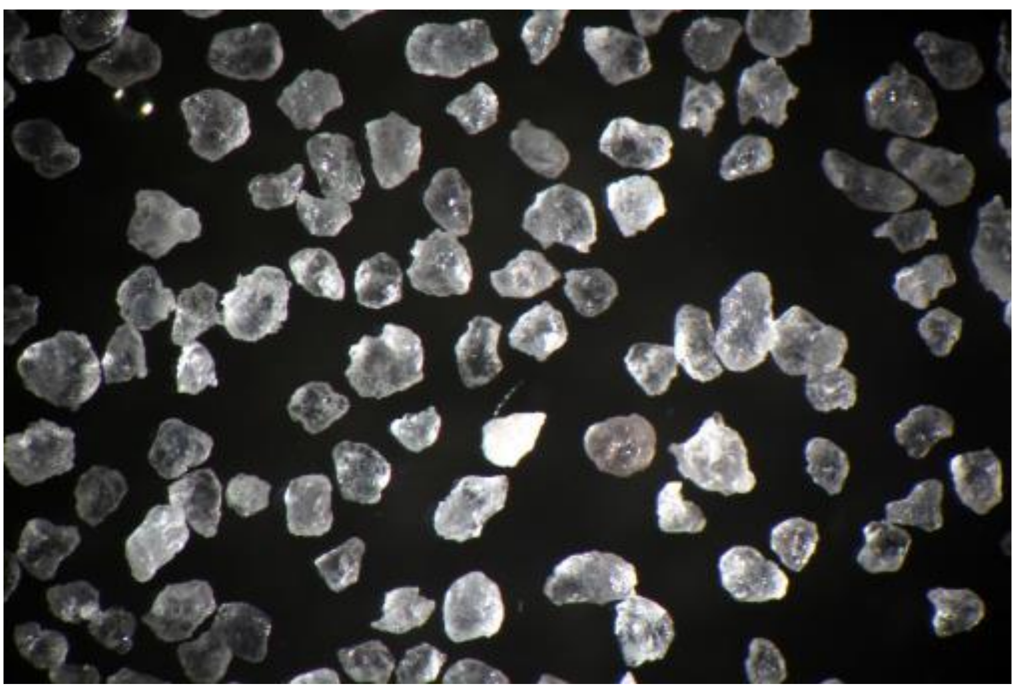
MHA 2 20/40

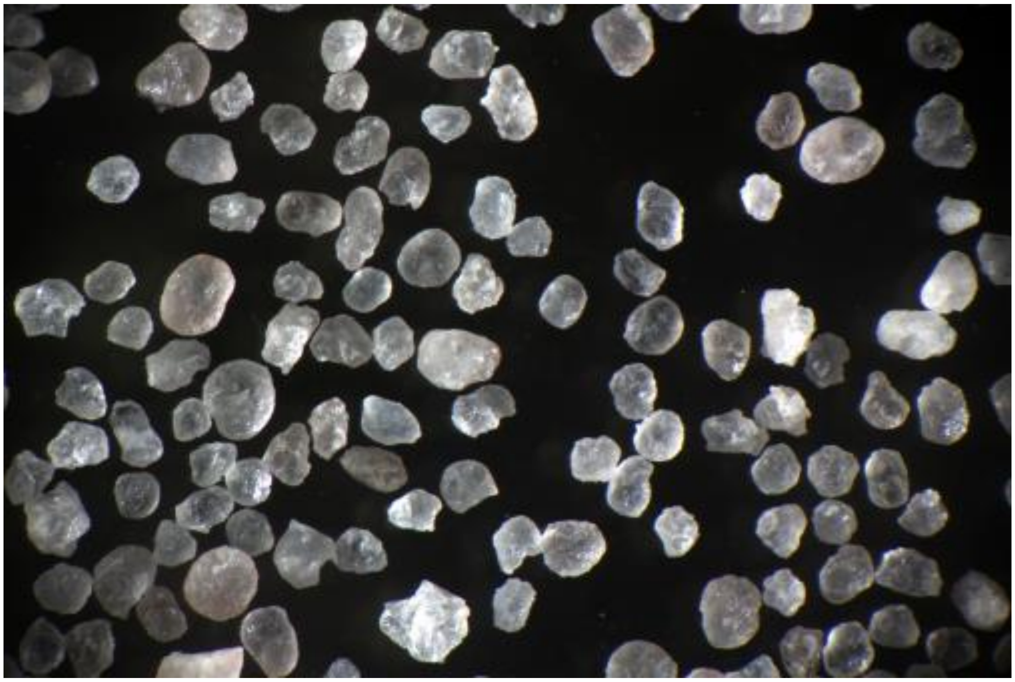


MHA 2 40/70

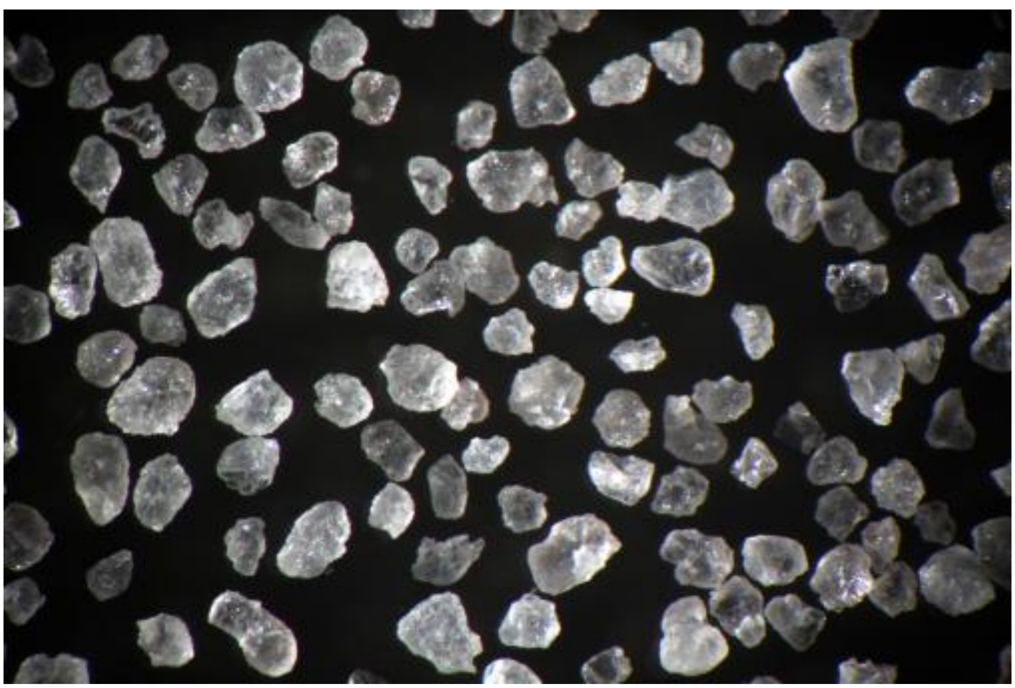


Stim-Lab
A CORE LABORATORIES COMPANY

MHA 3 20/40



MHA 3 40/70



Stim-Lab
A CORE LABORATORIES COMPANY

APPENDIX C

EVALUATION OF SAMPLES MHA D to I

STIM-LAB REPORT
SL 11887 – NOVEMBER 2015

"Measurement of Properties for Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations" Evaluations on Six Sand Samples For Mineral Holdings Australia PTY LTD, Submitted November 2, 2015

Prepared For:
Neil Thomas
Mineral Holdings Australia PTY LTD
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Toorak, Victoria, Australia 3142
+61 3 9822 0077
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Prepared By:
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Lisa O'Connell, Laboratory Supervisor

P.O. Number: API2015-1102-153

File Number: SL 11887

November 2015

Stim-Lab
A CORE LABORATORIES COMPANY

STIM-LAB, Inc.
7118 North Highway 81
Duncan, Ok. 73533-8719
Phone: 580-252-4309
Fax: 580-252-6979
www.stimlab.com

November 30, 2015

Neil Thomas
Mineral Holdings Australia PTY LTD
11 Kent Court
Toorak, Victoria, Australia 3142

Dear Mr. Thomas:

Stim-Lab, Inc. has completed the ISO 13503-2:2006/API RP19C:2008 evaluations requested on the submitted sand samples labeled MHA D Composite, MHA E Composite, MHA F Composite, MHA G Composite, MHA H Composite, and MHA I Composite. The samples were received at Stim-Lab, Inc. on November 2, 2015.

Upon arrival, the samples were inventoried and dried. The samples were then weighed and washed through a 200 mesh sieve. The sample retained on the sieve was then dried and reweighed. The percent loss was calculated from the material that washed through the sieve. The "Pre" and "Post" wash weights as well as the calculated loss for each sample are provided in Table 1.

The composite sieve analysis results for the samples are provided in Tables 2 and 3. As instructed, the 20/40, 40/70, and 70/140 size fractions of each composite sample were isolated for further testing. The sphericity and roundness (Krumbein Shape Factor), bulk density, and crush with K-Value results for the samples are provided in Tables 4 through 21. Pictures of the samples are provided following Table 21, for you to review. The procedures followed are as stated in ISO 13503-2:2006/API RP19C:2008.

Thank you for choosing Stim-Lab, Inc. to perform these analyses. We hope you will consider us for your future testing needs. If you have any questions regarding the testing or results, please do not hesitate to give me a call.

Sincerely,

Lisa O'Connell

Lisa O'Connell
Laboratory Supervisor
Conductivity Laboratory

Table 1				
Mineral Holdings Australia PTY LTD November 2, 2015				
Loss From Washing				
Sample ID	Dry Prewash Wt (g)	Dry Postwash Wt(g)	Grams Lost	% Loss
MHA D Composite	3899.19	3773.27	125.92	3.23
MHA E Composite	3962.10	3857.96	104.14	2.63
MHA F Composite	3853.64	3702.25	151.39	3.93
MHA G Composite	3878.79	3664.57	214.22	5.52
MHA H Composite	3876.22	3700.29	175.93	4.54
MHA I Composite	3797.08	3349.29	447.79	11.79

SL 11887

Table 2

Sieve Analysis of Submitted Proppant Samples
Mineral Holdings Australia PTY LTD

ISO 13503-2:2006/API RP19C:2008, Section 6, "Sieve Analysis"

Sample I.D.	**MHA D Composite**		**MHA E Composite**		**MHA F Composite**		**MHA G Composite**	
US Standard	Weight %		Weight %		Weight %		Weight %	
Sieve No.	Retained	Cumulative	Retained	Cumulative	Retained	Cumulative	Retained	Cumulative
6	-	0.0	-	0.0	-	0.0	-	0.0
8	-	0.0	-	0.0	-	0.0	-	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
25	0.5	0.8	0.4	0.4	0.3	0.4	0.9	0.9
30	2.7	3.5	3.2	3.6	2.7	3.1	5.0	5.9
35	5.7	9.1	7.4	11.0	5.6	8.7	7.5	13.4
40	12.2	21.3	11.3	22.3	9.6	18.3	11.2	24.6
45	14.2	35.5	11.6	33.9	10.4	28.7	12.4	37.1
50	13.6	49.2	11.6	45.4	10.6	39.3	11.8	48.9
60	13.6	62.7	13.3	58.8	12.8	52.1	12.9	61.8
70	9.3	72.0	9.9	68.7	10.4	62.5	9.3	71.1
80	9.6	81.7	10.2	78.9	11.4	73.9	9.3	80.4
100	7.4	89.0	8.6	87.5	9.6	83.4	7.2	87.6
120	4.2	93.2	5.3	92.8	5.6	89.1	4.3	92.0
140	3.1	96.3	3.5	96.4	4.5	93.6	3.5	95.5
170	1.8	98.1	1.8	98.2	3.0	96.6	2.1	97.7
200	1.1	99.2	1.1	99.3	2.0	98.6	1.5	99.2
230	0.5	99.6	0.5	99.8	1.1	99.8	0.7	99.9
pan	0.3	100.0	0.1	100.0	0.2	100.0	0.1	100.0
total	100.0		100.0		100.0		100.0	
in-size	0.0	= as 6/12	0.0	= as 6/12	0.0	= as 6/12	0.0	= as 6/12
in-size	0.0	= as 8/16	0.0	= as 8/16	0.0	= as 8/16	0.0	= as 8/16
in-size	0.2	= as 12/20	0.0	= as 12/20	0.0	= as 12/20	0.0	= as 12/20
in-size	3.5	= as 16/30	3.6	= as 16/30	3.1	= as 16/30	5.9	= as 16/30
in-size	21.1	= as 20/40	22.2	= as 20/40	18.2	= as 20/40	24.6	= as 20/40
in-size	45.7	= as 30/50	41.9	= as 30/50	36.2	= as 30/50	43.0	= as 30/50
in-size	50.7	= as 40/70	46.4	= as 40/70	44.2	= as 40/70	46.5	= as 40/70
in-size	24.2	= as 70/140	27.7	= as 70/140	31.1	= as 70/140	24.4	= as 70/140
ISO Mean Dia. (mm)	0.314		0.308		0.287		0.321	
Median Dia. (mm)	0.279		0.273		0.251		0.282	

November 2015

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Table 3

Sieve Analysis of Submitted Proppant Samples
Mineral Holdings Australia PTY LTD

ISO 13503-2:2006/API RP19C:2008, Section 6, "Sieve Analysis"

Sample I.D.	MHA H Composite		MHA I Composite	
US Standard	Weight %		Weight %	
Sieve No.	Retained	Cumulative	Retained	Cumulative
6	-	0.0	-	0.0
8	-	0.0	-	0.0
10	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0
20	0.0	0.1	0.1	0.1
25	0.3	0.4	1.0	1.1
30	4.5	4.9	3.5	4.6
35	7.6	12.4	4.0	8.6
40	12.9	25.3	7.5	16.1
45	12.2	37.5	8.6	24.7
50	11.3	48.9	9.1	33.8
60	13.0	61.8	11.7	45.5
70	9.2	71.0	10.3	55.8
80	9.5	80.5	12.5	68.3
100	8.1	88.6	11.4	79.7
120	4.6	93.2	7.6	87.3
140	3.2	96.4	5.6	92.9
170	1.8	98.2	3.2	96.1
200	1.1	99.2	1.9	98.0
230	0.6	99.8	1.3	99.3
pan	0.2	100.0	0.7	100.0
total	100.0		100.0	
in-size	0.0	= as 6/12	0.0	= as 6/12
in-size	0.0	= as 8/16	0.0	= as 8/16
in-size	0.0	= as 12/20	0.1	= as 12/20
in-size	4.8	= as 16/30	4.6	= as 16/30
in-size	25.2	= as 20/40	15.9	= as 20/40
in-size	44.0	= as 30/50	29.2	= as 30/50
in-size	45.7	= as 40/70	39.7	= as 40/70
in-size	25.4	= as 70/140	37.1	= as 70/140
ISO Mean Dia. (mm)	0.320		0.274	
Median Dia. (mm)	0.283		0.235	

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Table 4

Sample ID: MHA D 20/40
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.7**
Clusters =	**Approx. 1 of Every 200 Grains Contained Clusters**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.42**	**g/cm^3**
Bulk Density =	**88.6**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
3000	**6.1%**
4000	**11.3%**
K-Value =	**3K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 5

Sample ID: MHA D 40/70
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 21 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.33**	**g/cm^3**
Bulk Density =	**83.0**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
4000	**8.0%**
5000	**12.0%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 6

Sample ID: MHA D 70/140
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.6**
Roundness =	**0.5**
Clusters =	**None Observed in Field of Count**

*This sample does not meet the minimum recommended roundness per API RP19C:2008

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.29**	**g/cm^3**
Bulk Density =	**80.5**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -70+140 crush prep***
4000	**7.0%**
5000	**11.1%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 7

Sample ID: MHA E 20/40
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.40**	**g/cm^3**
Bulk Density =	**87.4**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
4000	8.5%
5000	14.7%
K-Value =	4K

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 8

Sample ID: MHA E 40/70
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.5**
Clusters =	**None Observed in Field of Count**

*This sample does not meet the minimum recommended roundness per API RP19C:2008

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.29**	**g/cm^3**
Bulk Density =	**80.5**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
4000	**8.8%**
5000	**12.9%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 9

Sample ID: MHA E 70/140
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 21 count

Sphericity =	**0.6**
Roundness =	**0.4**
Clusters =	**None Observed in Field of Count**

*This sample does not meet the minimum recommended roundness per API RP19C:2008

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.27**	**g/cm^3**
Bulk Density =	**79.2**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -70+140 crush prep***
4000	**6.8%**
5000	**11.4%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 10

Sample ID: MHA F 20/40
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.7**
Clusters =	**Approx. 1 of Every 200 Grains Contained Clusters**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.43**	**g/cm^3**
Bulk Density =	**89.2**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
4000	**8.0%**
5000	**14.8%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table11

Sample ID: MHA F 40/70
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.33**	**g/cm^3**
Bulk Density =	**83.0**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
5000	**7.5%**
6000	**11.8%**
K-Value =	**5K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 12

Sample ID: MHA F 70/140
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.6**
Roundness =	**0.5**
Clusters =	**None Observed in Field of Count**

*This sample does not meet the minimum recommended roundness per API RP19C:2008

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.31**	**g/cm^3**
Bulk Density =	**81.7**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -70+140 crush prep***
5000	**9.5%**
6000	**13.1%**
K-Value =	**5K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 13

Sample ID: MHA G 20/40
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 21 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.37**	**g/cm^3**
Bulk Density =	**85.5**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
3000	**8.1%**
4000	**16.7%**
K-Value =	**3K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 14

Sample ID: MHA G 40/70
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 21 count

Sphericity =	**0.7**
Roundness =	**0.5**
Clusters =	**None Observed in Field of Count**

*This sample does not meet the minimum recommended roundness per API RP19C:2008

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.29**	**g/cm^3**
Bulk Density =	**80.5**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
4000	**7.2%**
5000	**12.2%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 15

Sample ID: MHA G 70/140
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.5**
Clusters =	**None Observed in Field of Count**

*This sample does not meet the minimum recommended roundness per API RP19C:2008

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.29**	**g/cm^3**
Bulk Density =	**80.5**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -70+140 crush prep***
5000	**9.6%**
6000	**13.0%**
K-Value =	**5K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 16

Sample ID: MHA H 20/40
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 21 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.42**	**g/cm^3**
Bulk Density =	**88.6**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
3000	**7.3%**
4000	**14.2%**
K-Value =	**3K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

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Table 17

Sample ID: MHA H 40/70
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 23 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.39**	**g/cm^3**
Bulk Density =	**86.7**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
4000	**8.2%**
5000	**14.0%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 18

Sample ID: MHA H 70/140
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 25 count

Sphericity =	**0.6**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.31**	**g/cm^3**
Bulk Density =	**81.7**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -70+140 crush prep***
5000	**9.8%**
6000	**14.3%**
K-Value =	**5K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 19

Sample ID: MHA I 20/40
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.42**	**g/cm^3**
Bulk Density =	**88.6**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -20+40 crush prep***
3000	**5.5%**
4000	**11.7%**
K-Value =	**3K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 20

Sample ID: MHA I 40/70
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.7**
Roundness =	**0.6**
Clusters =	**None Observed in Field of Count**

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.33**	**g/cm^3**
Bulk Density =	**83.0**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -40+70 crush prep***
3000	**7.7%**
5000	**19.4%**
K-Value =	**3K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Table 21

Sample ID: MHA I 70/140
Mineral Holdings Australia PTY LTD
November 2, 2015

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

Sphericity =	**0.6**
Roundness =	**0.5**
Clusters =	**None Observed in Field of Count**

*This sample does not meet the minimum recommended roundness per API RP19C:2008

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 10, "Procedures for Determining Proppant Bulk Density"

Bulk Density =	**1.32**	**g/cm^3**
Bulk Density =	**82.4**	**lb/ft^3**

ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

Stresses Tested (psi)	***% Fines -70+140 crush prep***
4000	**6.7%**
5000	**10.5%**
K-Value =	**4K**

The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

Stim-Lab
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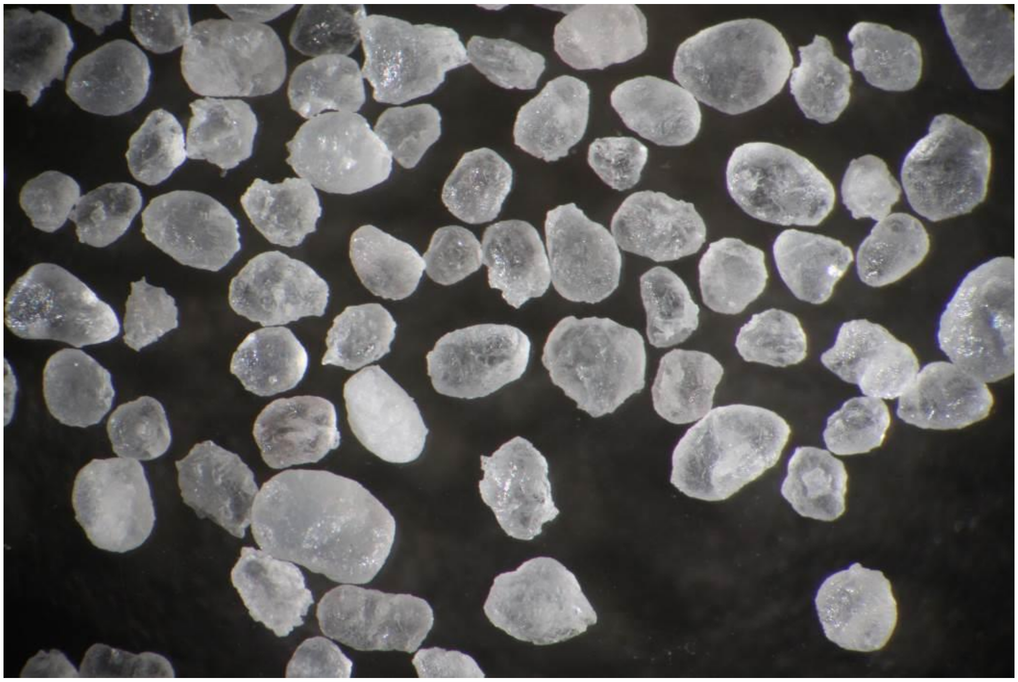
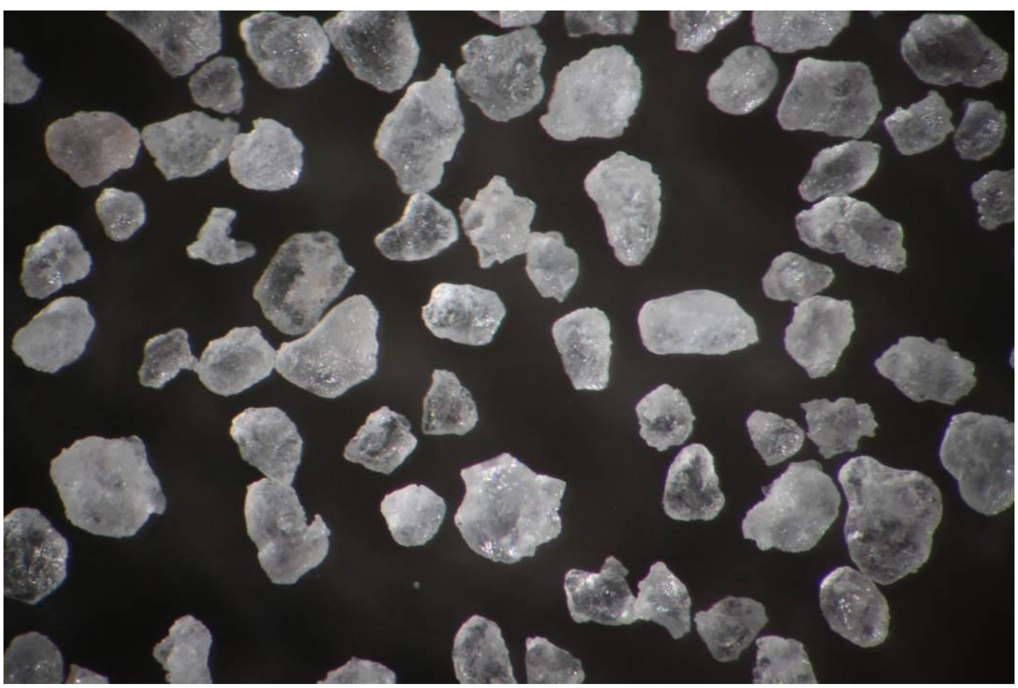
MHA D 20/40



MHA D 40/70



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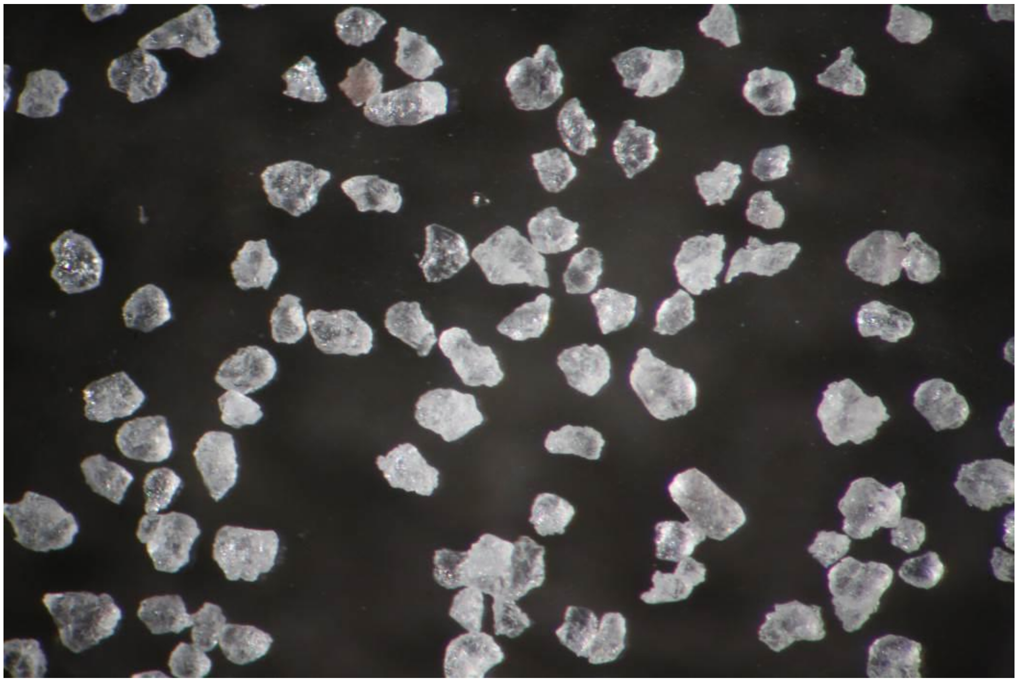

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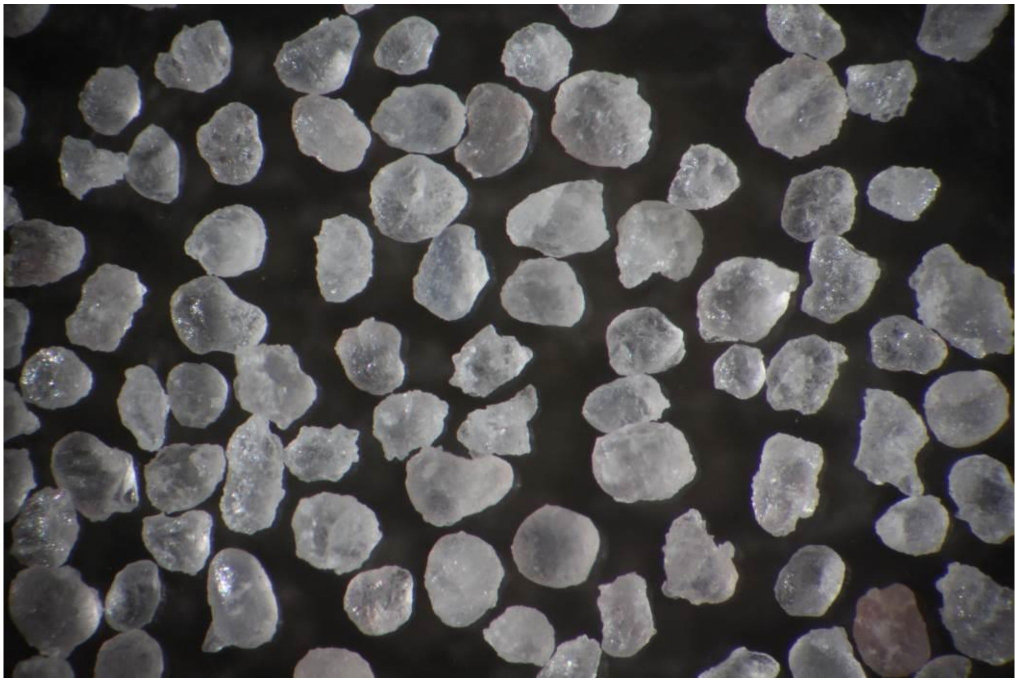

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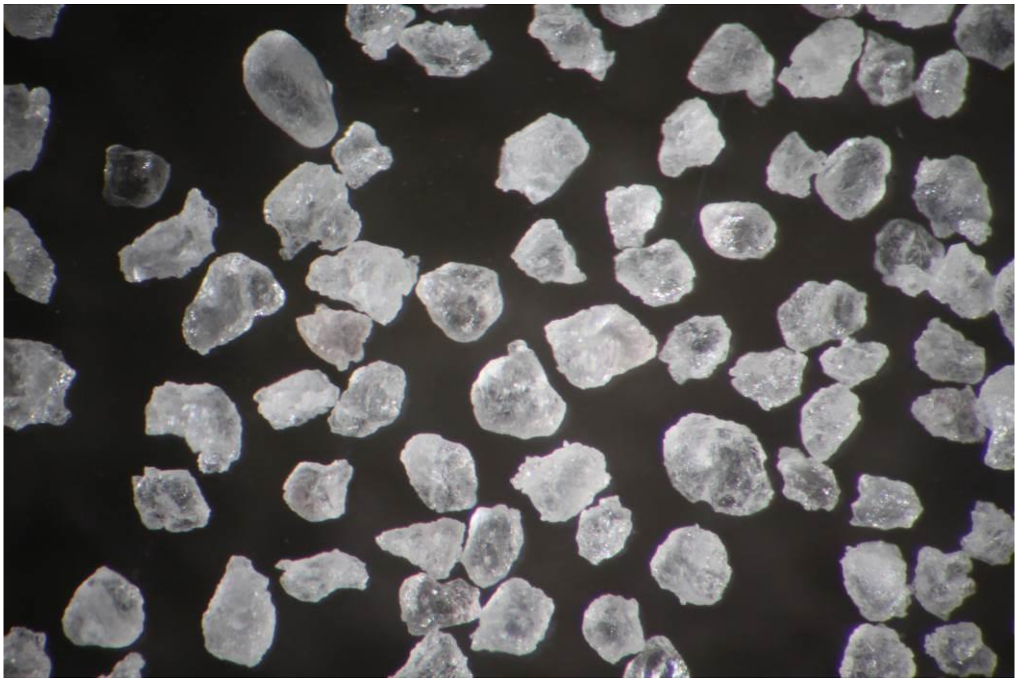
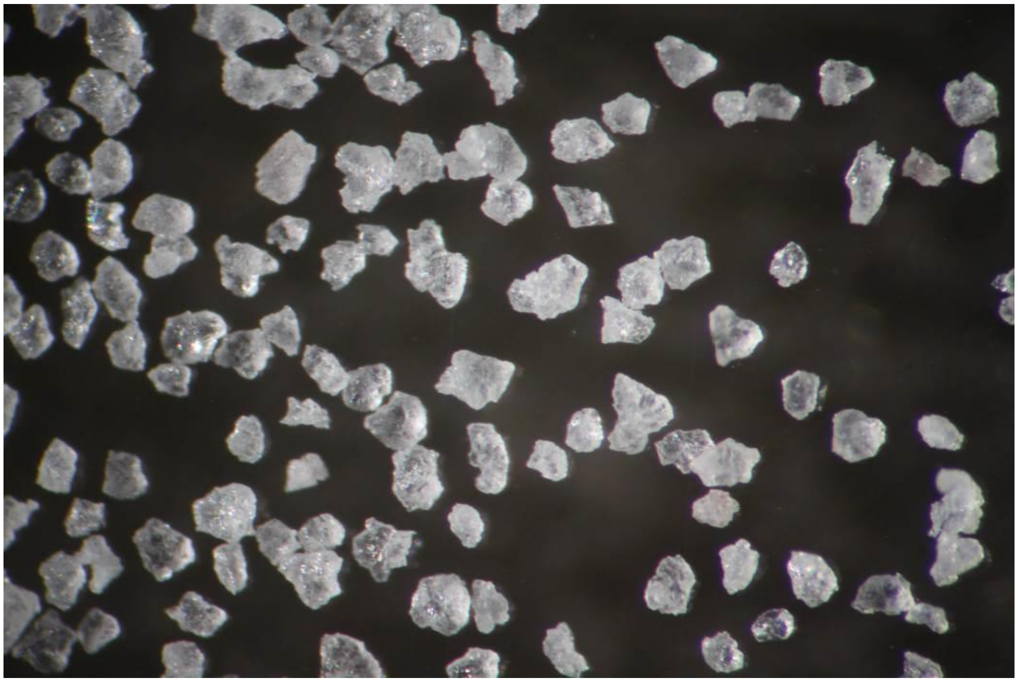


MHA E 70/140



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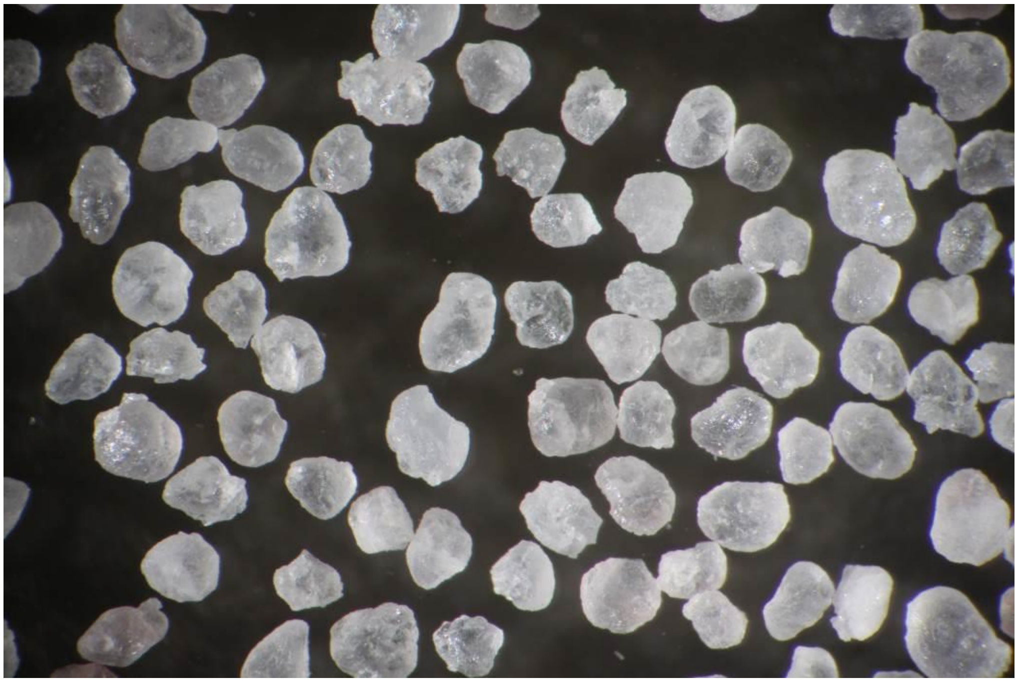

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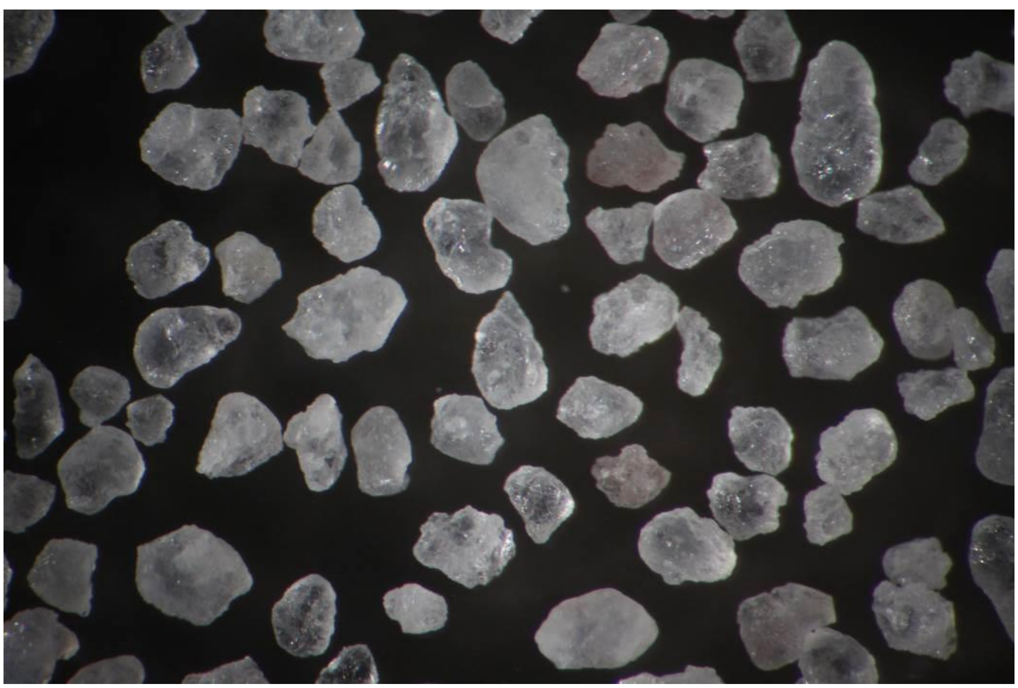

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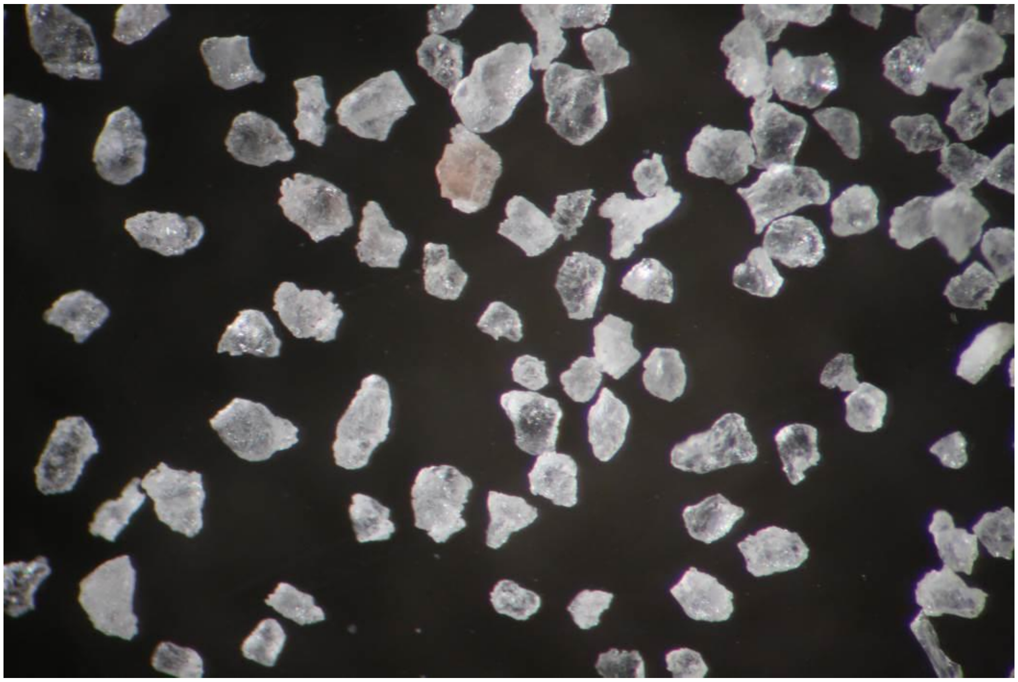
MHA F 70/140



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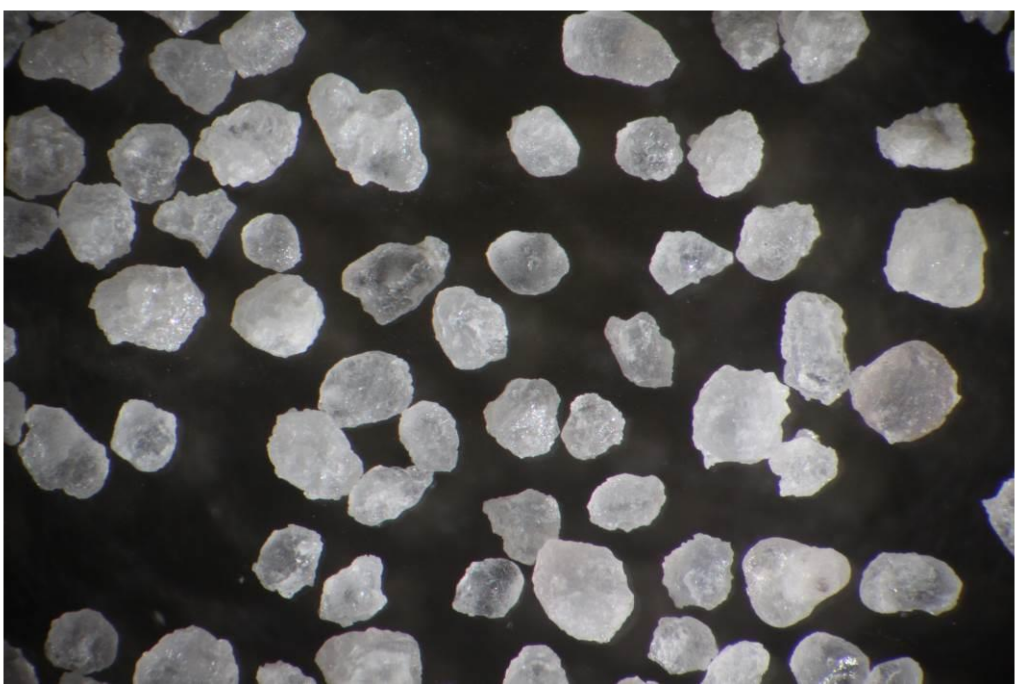

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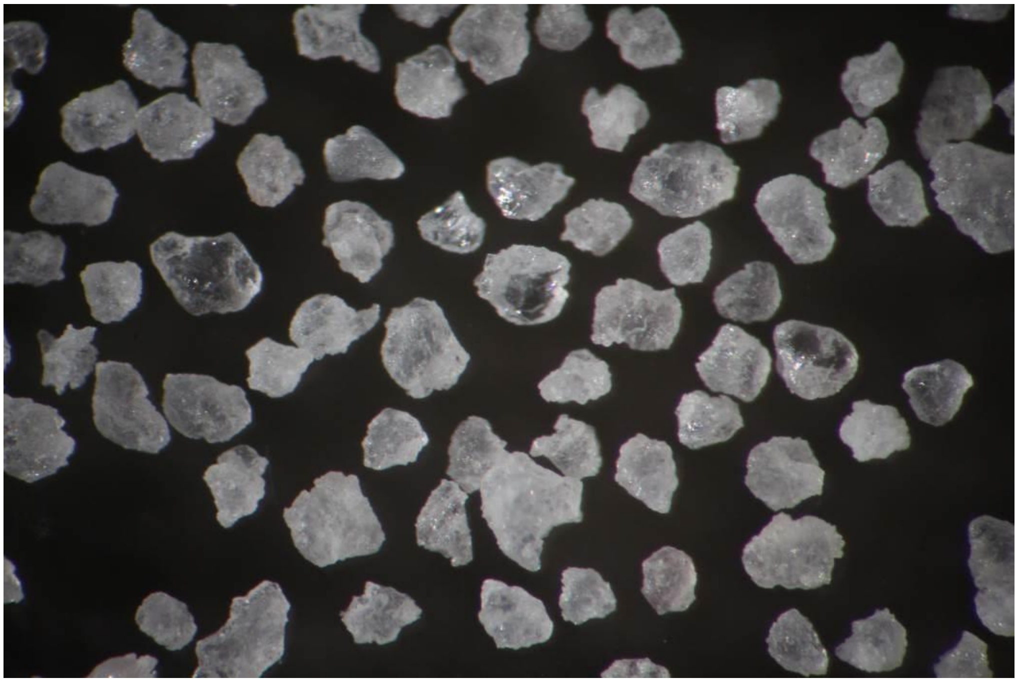

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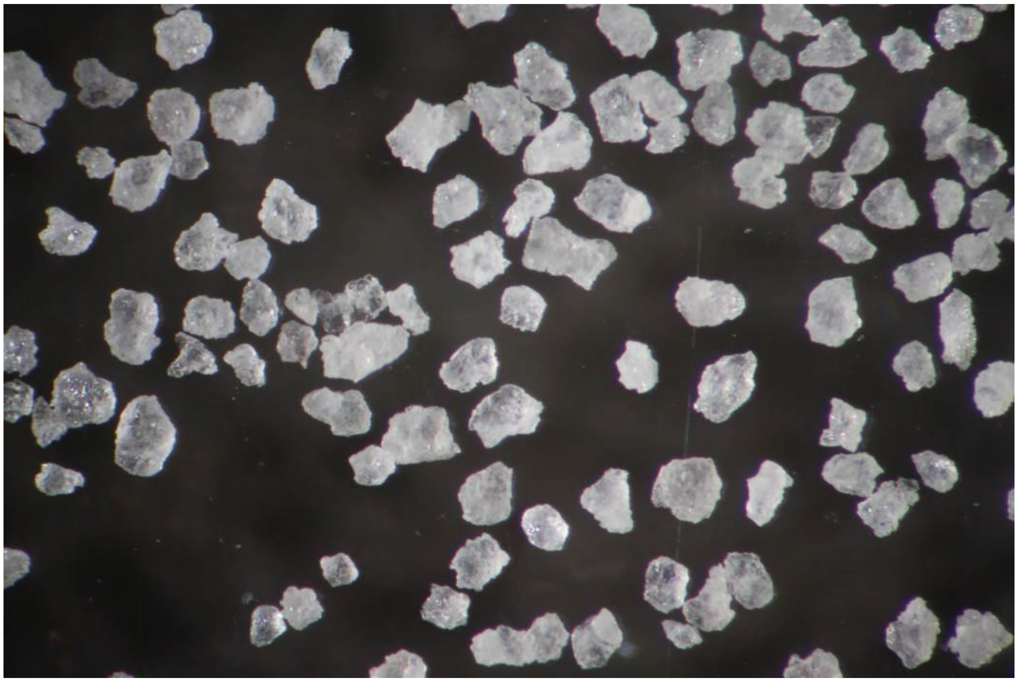

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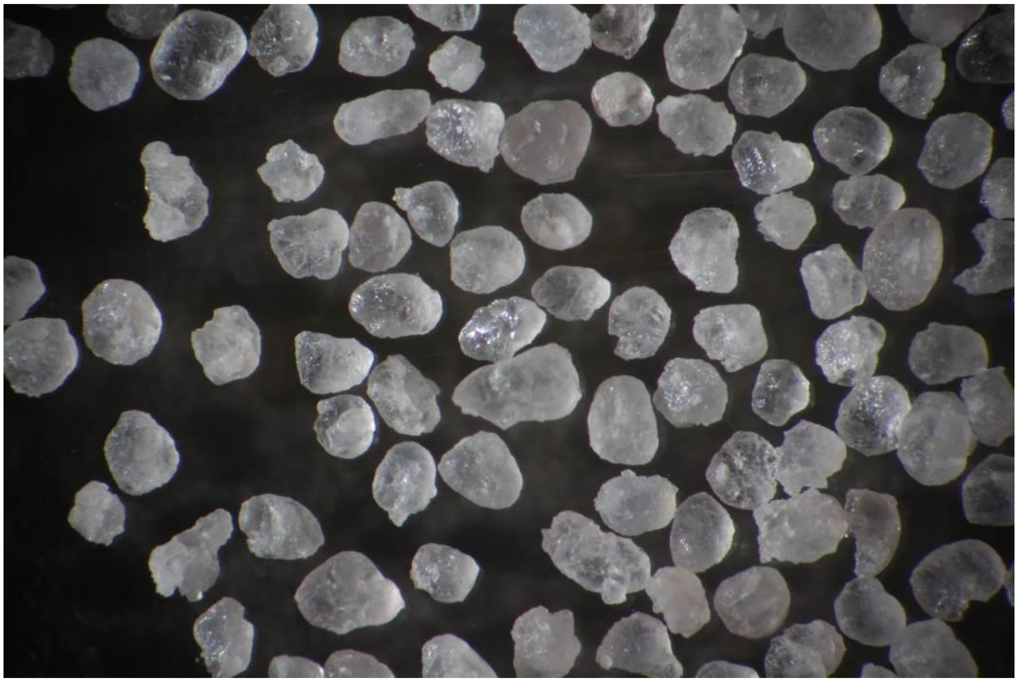

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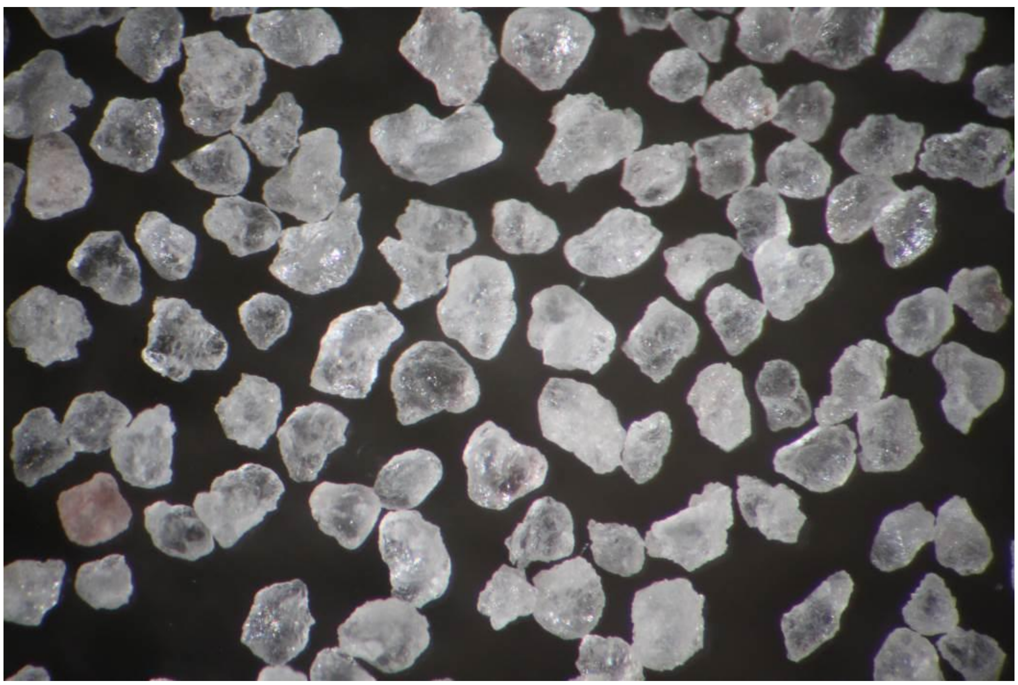

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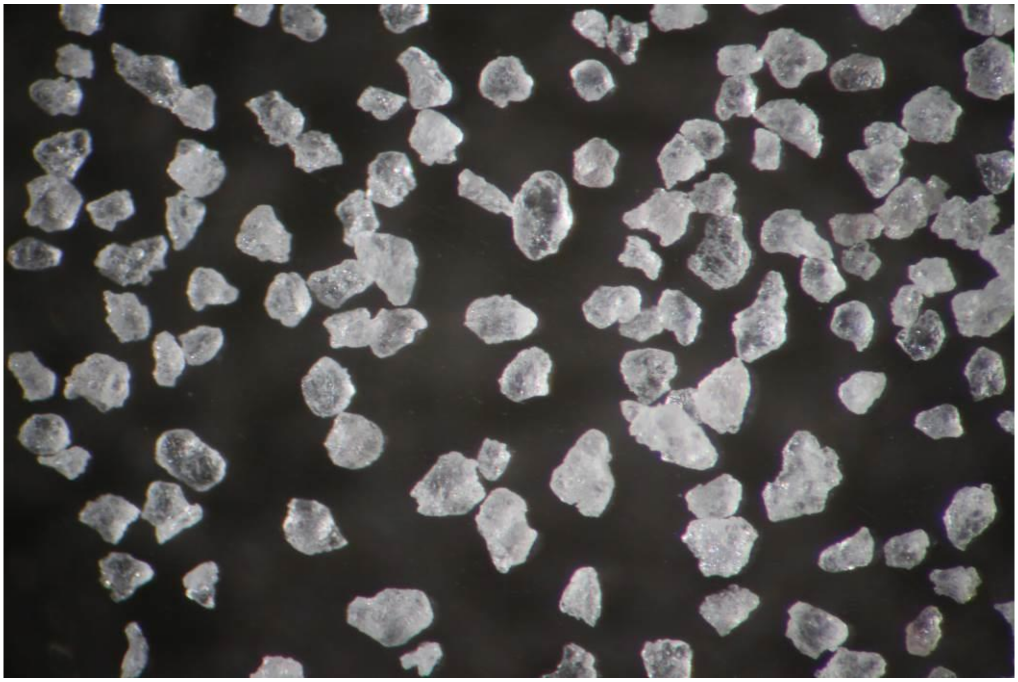

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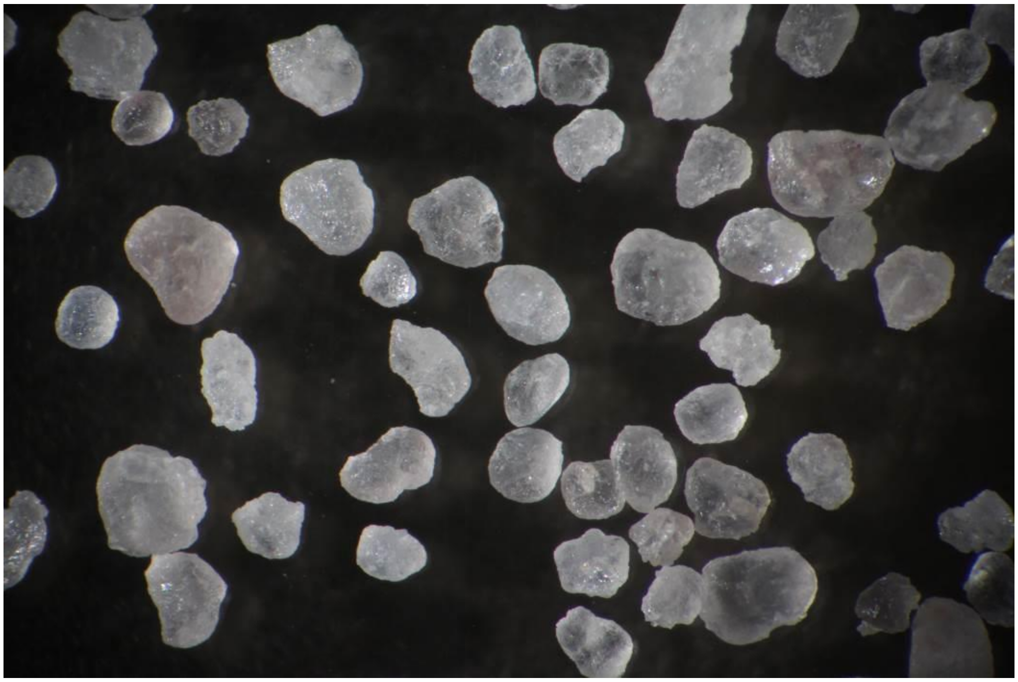

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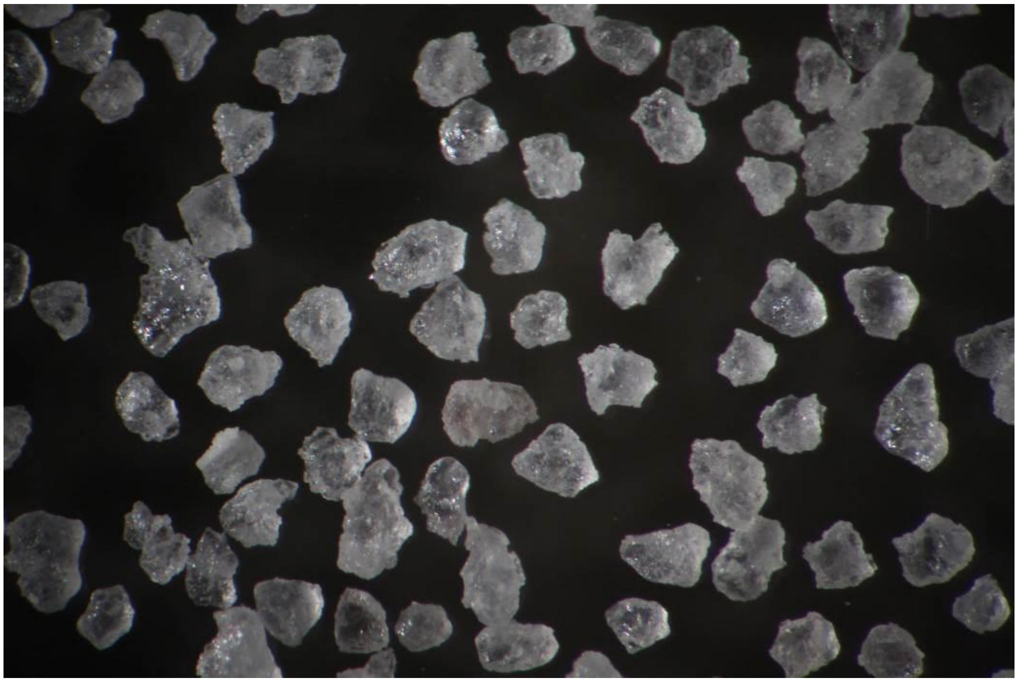
MHA I 40/70



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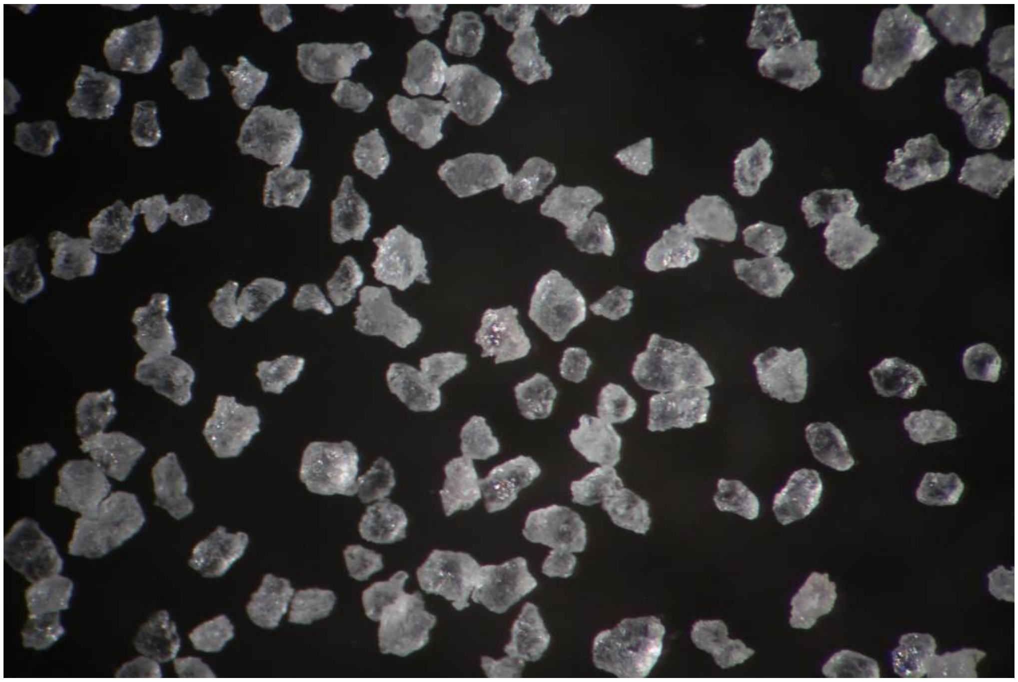

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APPENDIX D

RESOURCE AREA 2
DRILL DATA

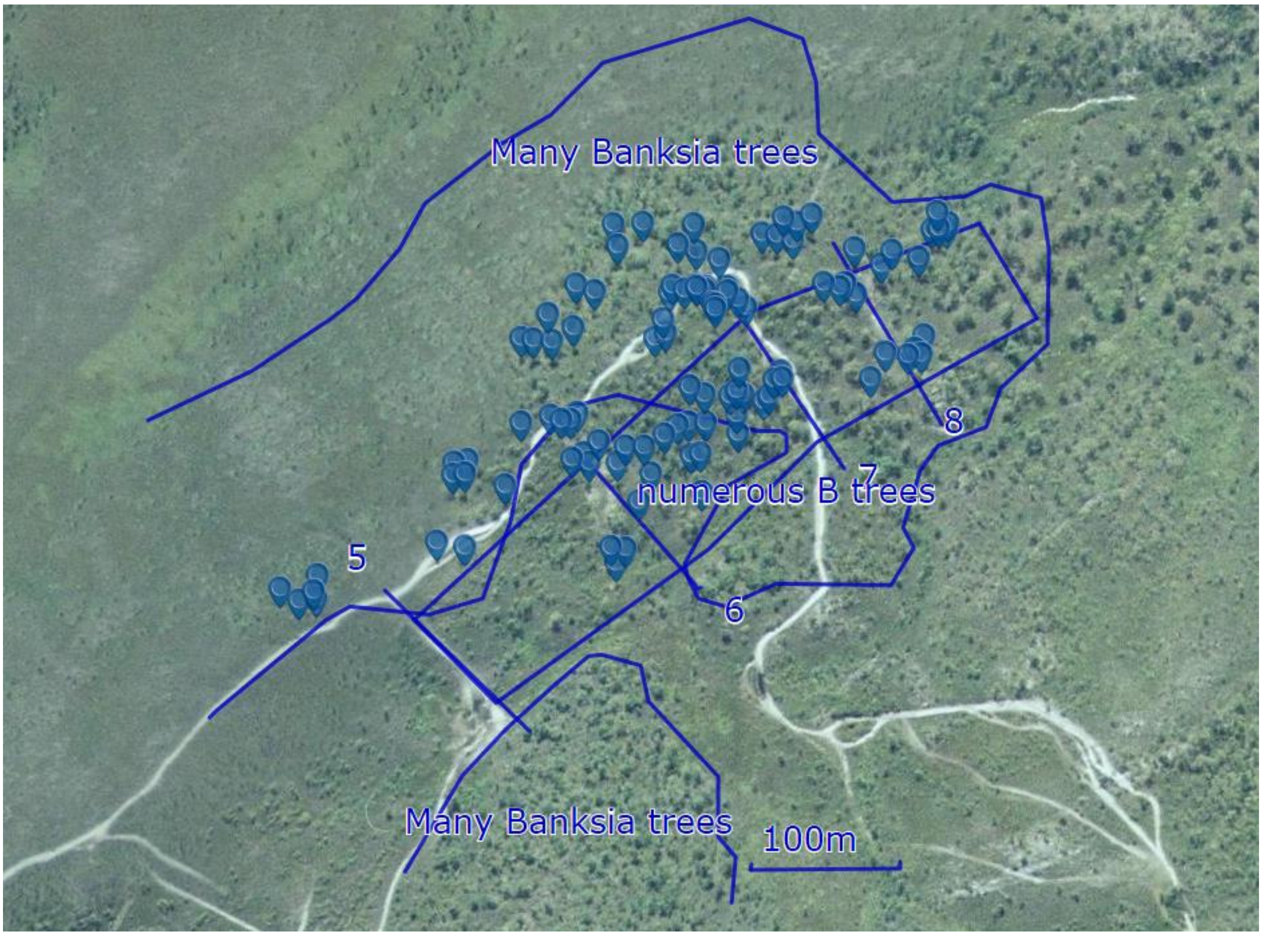


Figure D.1: Resource Area 2
(showing drill sections and location of *Banksia serrata* trees)

The frac sand horizon does extend further to the north east. The resource zone is outlined and the location of sections 5 to 8 are indicated.

The area of *Banksia serrata* woodland shown on *LISTmap* surrounds the horizon on three sides and overlaps the north-eastern half of the zone. The location of individual Banksia trees close to or within the zone is tagged.

An estimated 559,000 tonnes of frac sand (to 10 m depth) occurs in the northern extension but the coincidence of the extension with numerous rare and threatened *Banksia serrata* trees would effectively sterilise the extension and this area is therefore excluded from the EER.

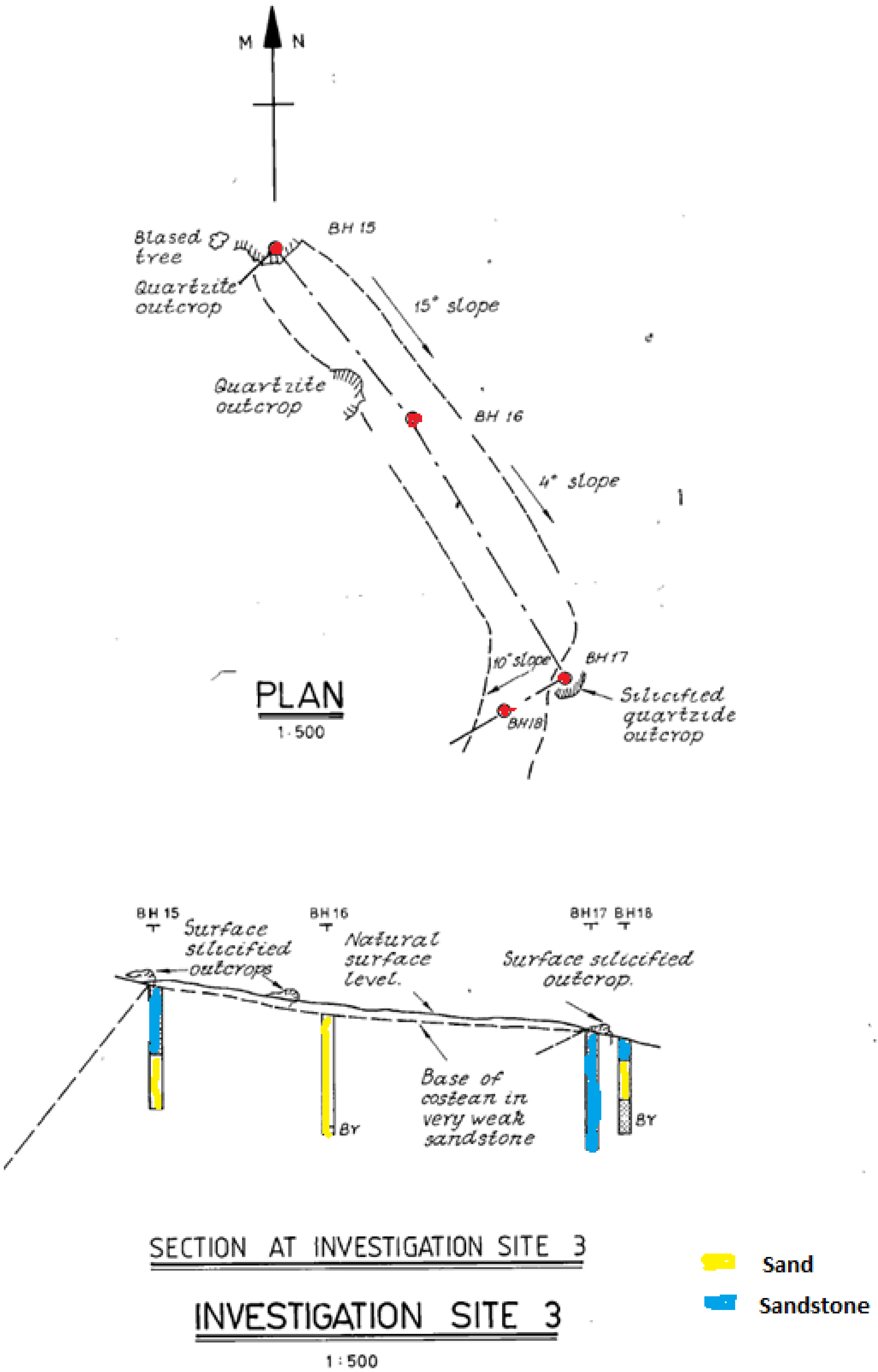


Figure D.2: Section 6

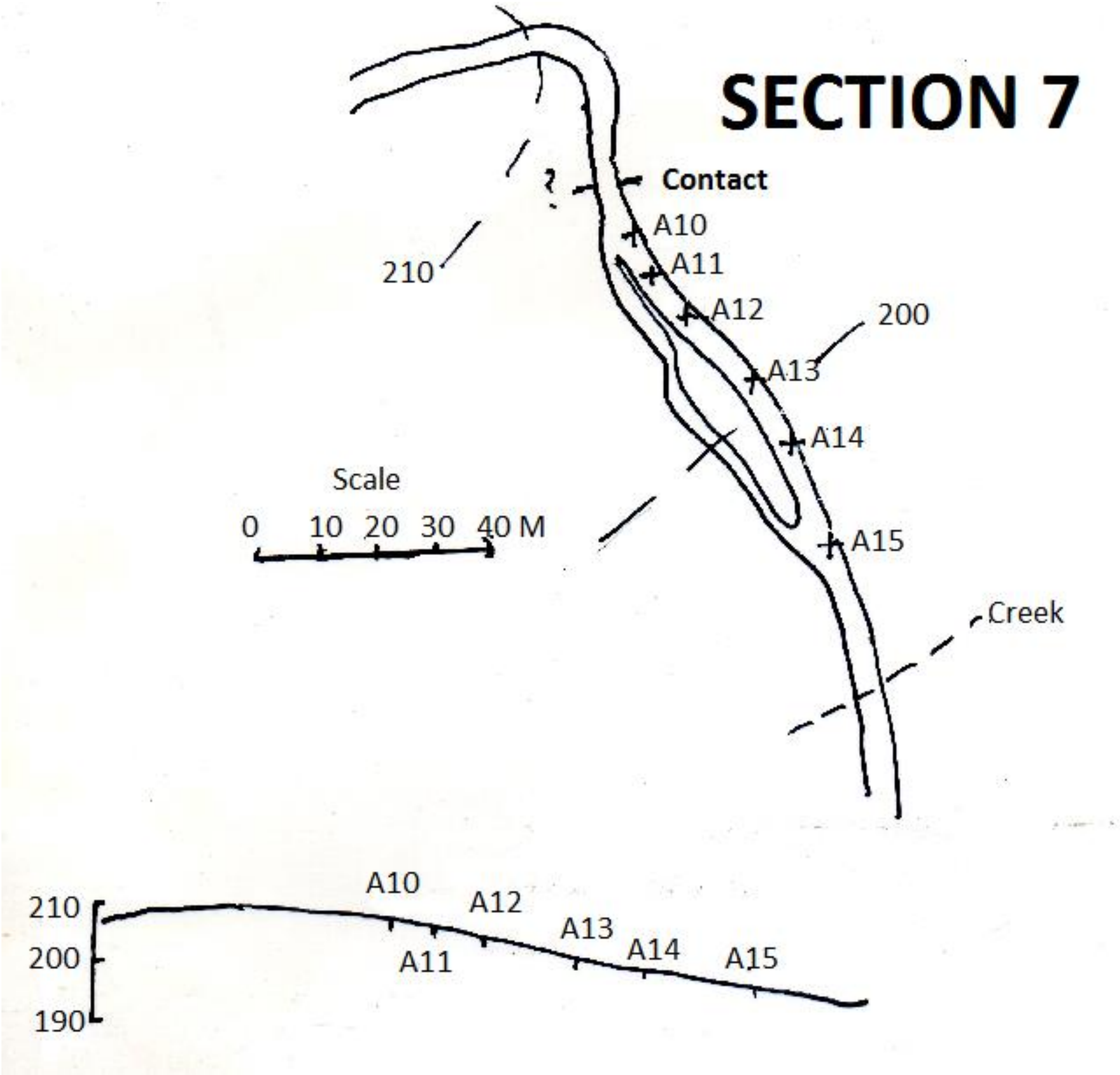


Figure D.3: Section 7

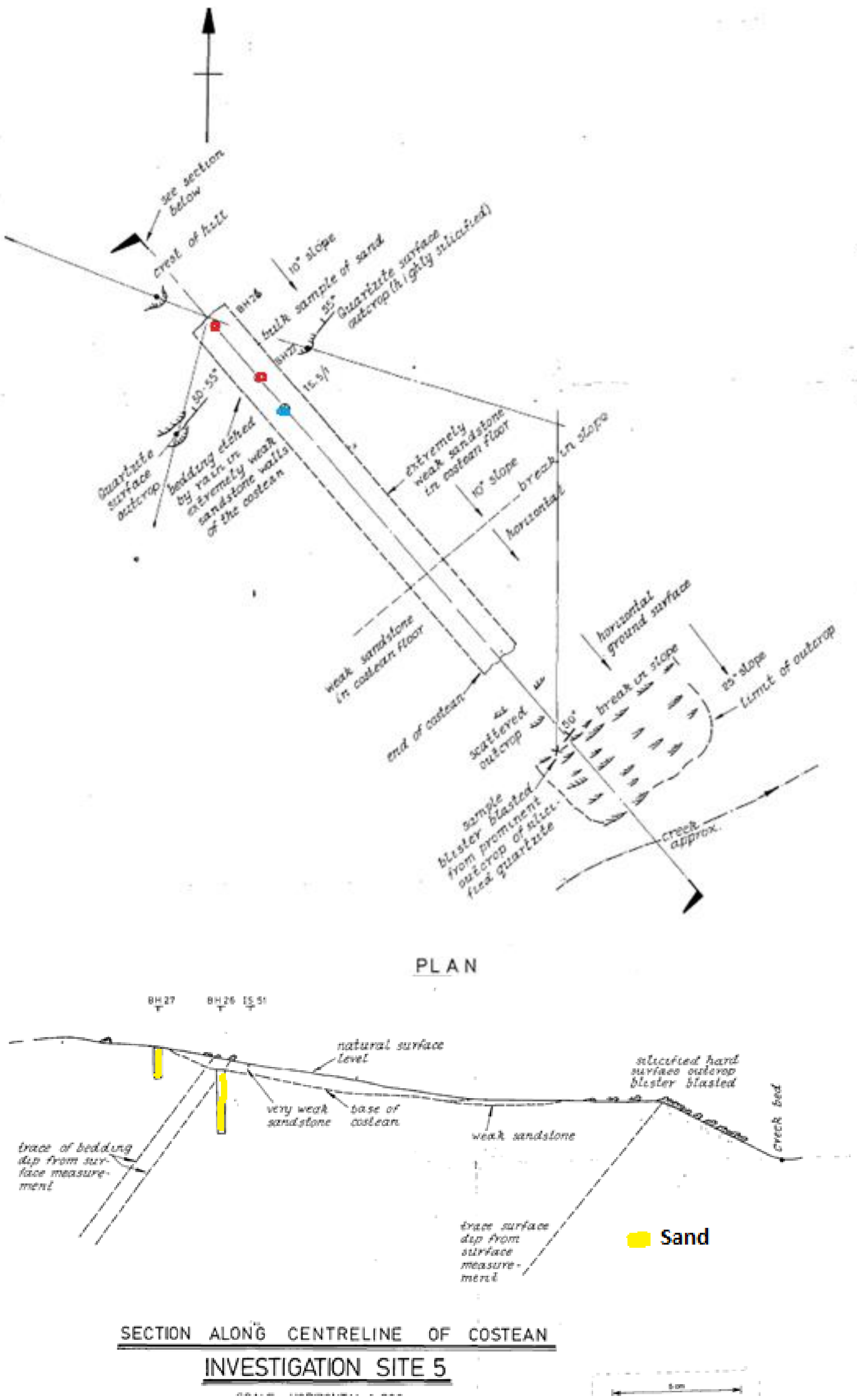


Figure D.4: Section 8

Summary Logs of Percussion Holes on Investigation Sites

ite No.	B.H. No.	Depth (m)	Description	Reasons for Termination
1	1	12	White sand	Rods jamming
	2	15	White sand	Target depth
	3	9	White sand with some chips at surface	Rods jamming
	4	15	White sand	Target depth
2	5	15	White sand, mixed with sandstone chips below 12	Target depth
	6	7	White sand (very rapid drilling)	Too soft
	7	15	″ ″ ″ ″ ″	Target depth
	8	15	″ ″ ″ ″ ″	″ ″
	9	15	″ ″ ″ ″ ″	″ ″
	10	15	″ ″ ″ ″ ″	″ ″
	11	15	Cream to brown sand and some siltstone	″ ″
3	15	15	0–5 white quartzite, remainder white and yellow sand	″ ″
	16	15	White sand	″ ″
	17	15	White sandstone/quartzite	″ ″
	18	12	0–2.5 White sandstone 2.5–7.5 White sand 7.5–12 Brown quartzite	Too hard
4	19	15	0–2.5 White sand 2.5–15 White and brown sandstone/quartzite	Target depth
	20	15	0–1.5 White sand 1.5–15 White and brown sandstone/quartzite	″ ″
	21	14.25	0–1 White and brown sandstone and quartzite	Bit collapsed
	22	15	0–1 White sand 1.5–15 Brown and white sandstone	Target depth
	23	12	White and brown sandstone	Too hard
	24	15	0–2.7 White sand 2.7–15 White and brown sandstone	Target depth
	25	9	Light brown sand	Rods jammed
5	26	12	White sand	
	27	6	″ ″	Bit braking
6	12	15	White and brown sand and sandstone/siltstone	Target depth
	13	12	White sand, light brown sand from 3–6m.	Too wet
	14	15	White and brown quartzite	Target depth

APPENDIX E

LOCATION OF BANKSIA SERRATA TREES

It is very obvious in the Dip Range area that the *Banksia serrata* trees and woodland areas occur on the north-western slopes of the ridge lines whereas the sand horizon occurs on the south-east-facing ridge slope. In fact only one solitary banksia tree occurs within the proposed pit outline.

To the north-east, the ridge line becomes lower in elevation and the Banksia trees cover the northern extension of the sand horizon in that area. There are numerous banksia trees in the northern extension of the sand zone and any mining in that northern area has been ruled out.

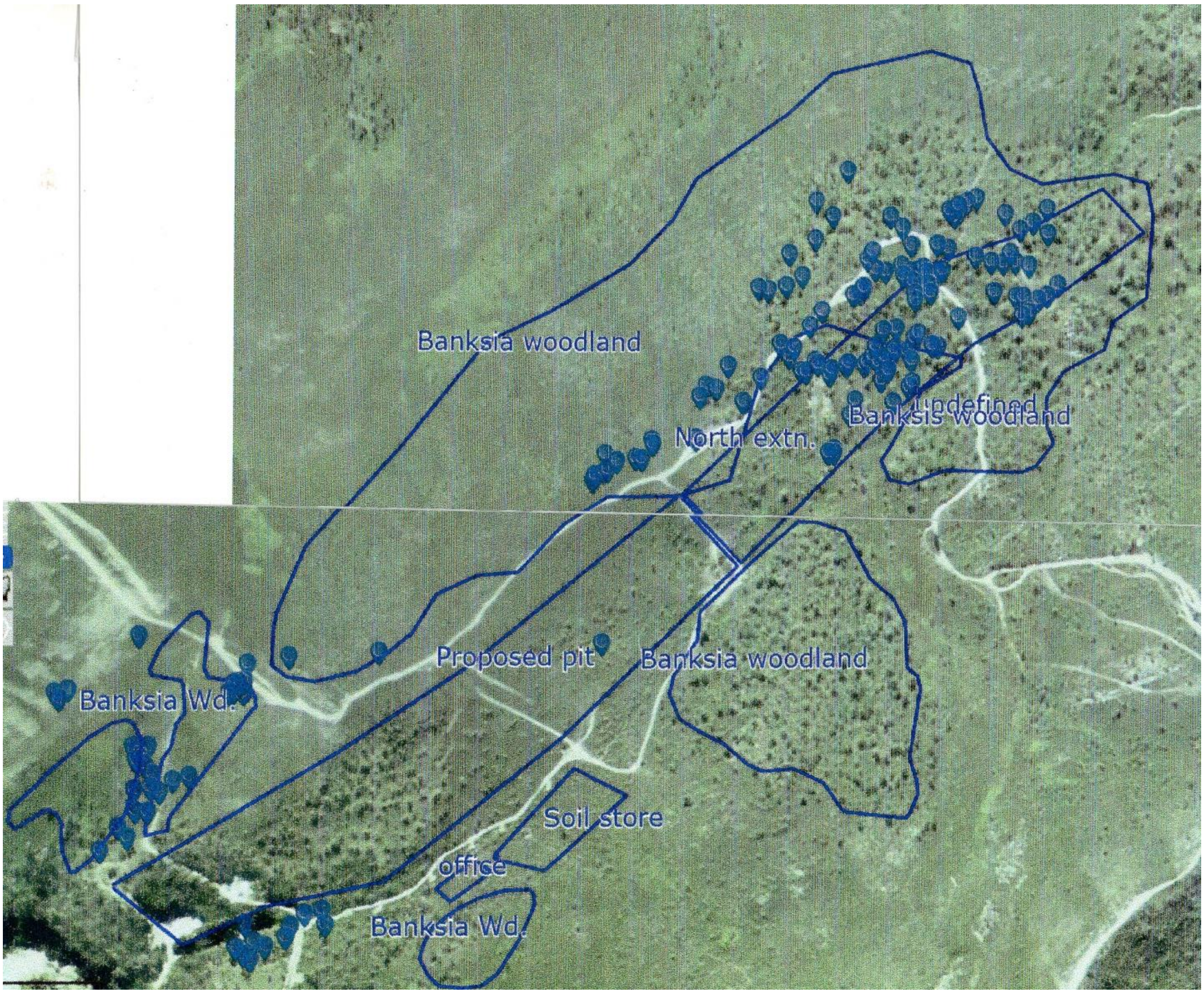


Figure E.1: Relationship of *Banksia serrata* Trees & Woodland to Proposed Pit

Figure E.1 shows location of the proposed pit and the excluded northern extension of the sand horizon along with the position of soil storage and site of office buildings. Also shown are the areas of *Banksia serrata* woodland taken from LISTmap and the surveyed position of individual *Banksia serrata* trees that are close to the proposed pit and the excluded north extension.

One hundred and sixty-three (163) *Banksia serrata* trees have been mapped close to the sand horizon. One hundred and twenty-three (123) of those overlay and surround the excluded northern extension and forty (40) trees surround the southern proposed pit.

Near the south-western corner of the proposed pit, a small patch of about twenty-five (25) trees approach within 25 to 60 metres from the pit outline. Another patch of seven (7) trees come within 40 to 50 metres from the north-eastern corner. A patch of ten (10) trees approach within 28 to 50 metres of the south-western corner and a large patch of banksia woodland comes close to the road near the south-east corner of the proposed pit but the closest individual tree is about 30 metres away. One solitary banksia tree occurs within the proposed pit.

Apart from the one and only *Banksia serrata* tree that occurs within the proposed pit area, no tree is closer than 25 metres from the pit boundary. Only nine (9) banksia trees come within 25 to 30 metre of the Resource Area 1 pit boundary.

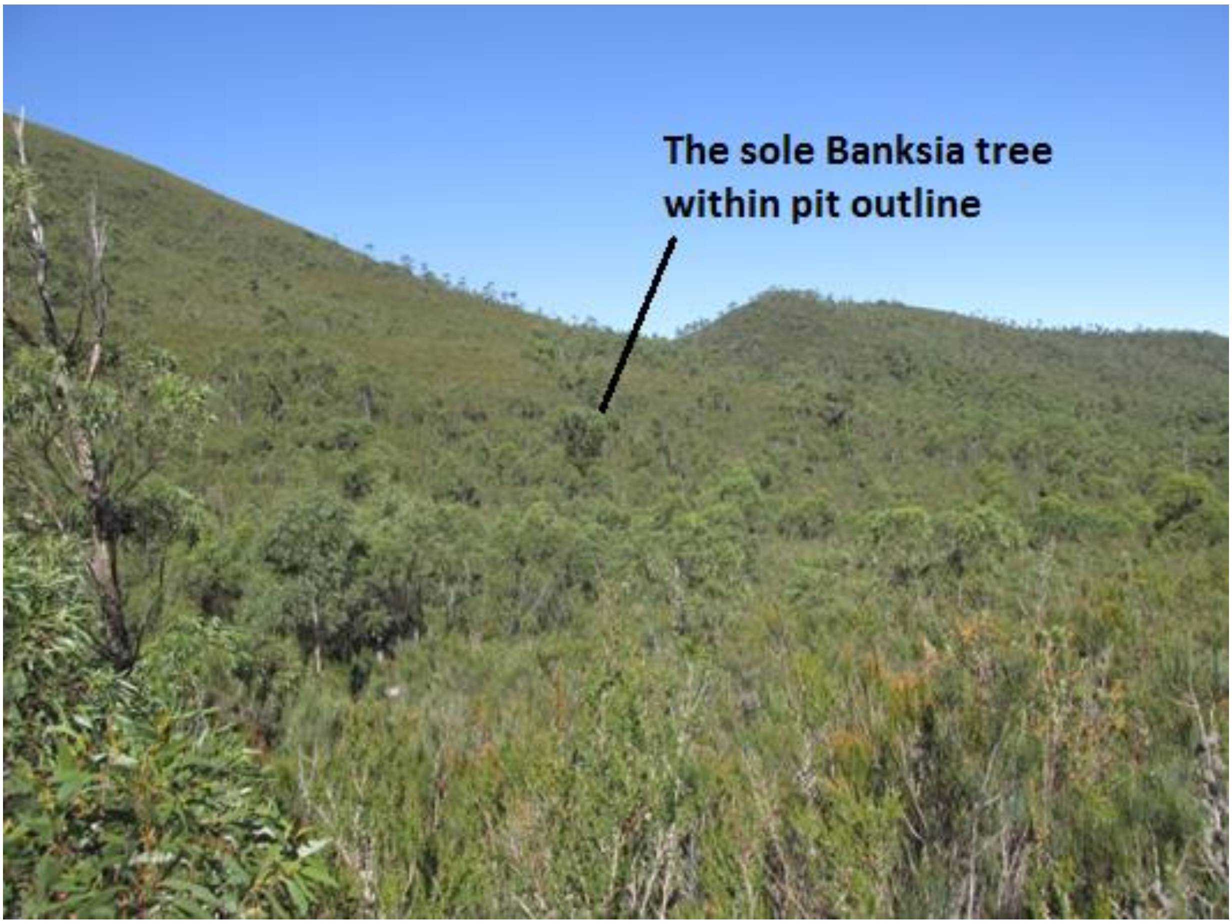


Figure E.2: Looking North-east between Sections 3 & 4

The one lone banksia tree in the centre of Figure E.2 is the one and only banksia within the pit area. The rest of the vegetation is button grass moorland and *Leptospermum* scrub.

Figure E.3: Large Area of *Banksia serrata* Woodland South of Section 5

Figure E.3 shows the banksia trees south-east of Section 5, outside the boundary of the proposed pit. Almost half the trees in this area are banksia with button grass moorland on the highest peaks.

Only one tree occurs proposed within the pit outline and only nine (9) other trees occur within 25 to 30 metres of the pit outline so there should be little or no ill effect from the mining operation.

One hundred and sixty-three (163) individual banksia trees were mapped in and around the proposed pit and the excluded northern extension of the sand horizon. There would be at least another two hundred (200) banksia trees in the area of the *Banksia serrata* woodland outlined further removed from the pit area.

Table E.1: Location of *Banksia serrata* Trees near Proposed Pit

Survey by P. Milner (GPS)			
Ref.	**East**	**North**	**Notes**
A	372576	5462761	South tree in patch
B	372619	5462857	North tree in patch
C	372743	5462935	Old tree
D	372823	5462941	In decline
E	372690	5462904	Patch of 9 (3 sick)
F	372694	5462912	
G	372698	5462911	
H	372699	5462914	
I	372701	5462912	
J	372703	5462913	
K	372706	5462929	
L	372705	5462905	
M	372701	5462904	
N	372694	5462904	
O	372313	5462966	Patch nearest road
P	372399	5463056	North tree in patch
Q	372373	5463032	South tree in patch
R	372538	6462896	Patch of 3
S	372609	5462953	

Survey by LJM (GPS)			
Ref.	**East**	**North**	**Notes**
1	373005	5463093	
2	373005	5463095	
3	373007	5463098	
4	373013	5463101	
5	373019	5463104	
6	373016	5463118	Group of 25 trees
7	373026	5463114	
8	373004	5463115	
9	373048	5463114	
10	373058	5463129	
11	373060	5463127	
12	373099	5463135	
13	373117	5463121	
14	373140	5463168	
15	373144	5463212	
16	373172	5463220	
17	373175	5463207	
18	373181	5463209	
19	373185	5463218	
20	373190	5463196	
21	373196	5463195	
22	373204	5463203	

Survey by LJM (GPS) (cont.)			
Ref.	**East**	**North**	**Notes**
23	373208	5463203	
24	373217	5463197	
25	373220	5463198	
26	373233	5463201	
27	373234	5463204	
28	373249	5463203	
29	373252	5463205	
30	373255	5463211	
31	373262	5463205	
32	373271	5463202	
33	373265	5463189	
34	373268	5463210	
35	373275	5463213	
36	373259	5463221	
37	373275	5463219	
38	373287	5463216	
39	373288	5463222	
40	373295	5463227	
41	373297	5463231	
42	373277	5463234	
43	373265	5463235	
44	373238	5463266	
45	373245	5463368	
46	373248	5463272	
47	373266	5463288	
48	373258	5463290	
49	373251	5463300	
50	373255	5463307	
51	373281	5463293	
52	373290	5463311	
53	373291	5463289	
54	373299	5463289	
55	373300	5463291	
56	373305	5463287	
57	373315	5463285	
58	373317	5463290	
59	373314	5463313	
60	373322	5463309	
61	373325	5463343	
62	373332	5463339	
63	373332	5463342	
64	373332	5463348	
65	373339	5463352	
66	373348	5463354	

Table E.1 (cont.): Location of *Banksia serrata* Trees near Proposed Pit

Survey by LJM (GPS) (cont.)			
Ref.	**East**	**North**	**Notes**
67	373374	5463342	
68	373389	5463327	
69	373399	5463333	
70	373413	5463324	
71	373411	5463347	
72	373390	5463307	
73	373384	5463298	
74	373373	5463297	
75	373362	5463299	
76	373380	5463306	
77	373424	5463377	
78	373414	5463268	
79	373406	5463264	
80	373389	5463267	
81	373390	5463250	
82	373325	5463247	
83	373319	5463237	
84	373315	5463226	
85	373314	5463222	
86	373310	5463222	
87	373292	5463208	
88	373271	5463199	
89	373291	5463183	
90	373295	5463189	
91	373278	5463170	
92	373242	5463172	
93	373237	5463158	
94	373224	5463127	
95	373223	5463124	
96	373218	5463124	
97	372601	5462774	
98	372594	5462782	
99	372607	5462798	
100	372608	5462816	
101	372622	5462819	
102	372630	5462817	
103	372622	5462831	
104	372620	5462843	
105	372615	5462840	
106	372611	5462847	
107	372606	5462851	
108	372603	5462855	
109	372620	5462855	
110	373655	5462829	

Survey by LJM (GPS) (cont.)			
Ref.	**East**	**North**	**Notes**
111	372640	5462826	
112	372760	5462708	
113	373021	5462952	

Plotted by TWD (Aerial Photo)			
Ref.	**East**	**North**	**Notes**
AP1	373092	5463172	
AP2	373105	5463182	
AP3	373114	5463181	
AP4	373115	5463192	
AP5	373159	5463190	
AP6	373193	5463235	
AP7	373205	5463345	
AP8	373162	5463269	
AP9	373150	5463273	
AP10	373175	5463271	
AP11	373168	5463290	
AP12	373189	5463279	
AP13	373185	5463298	
AP14	373201	5463305	
AP15	373191	5463312	
AP16	373216	5463339	
AP17	373230	5463353	
AP18	373266	5463345	
AP19	373256	5463334	
AP20	373269	5463331	
AP21	373294	5463328	
AP22	372707	5462698	
AP23	372698	5462678	
AP24	372706	5462671	
AP25	372711	5462667	
AP26	372725	5462679	
AP27	372718	5462684	
AP28	372746	5462687	
AP29	372748	5462698	
AP30	372778	5462699	
AP31	372776	5462712	

All the trees we saw were fit and healthy; however, Philip Milner's survey recorded four (4) trees which he thought were in decline or sick. The first was at 372823E 5462941N (37 metres from the northern boundary of the pit) and the other three were in a group of nine trees located around 372690E 5462904N (some 96 metres north of the pit boundary). Both locations are close to a track used by recreational 4WD vehicles and trail bikes and both were burnt in the 2009 bushfire.

Banksia serrata is very common on the mainland extending from southern Queensland to Wilsons Promontory in Victoria. However it is considered as a threatened species in Tasmania. A note paper on *Banksia serrata* by DPIPWE Tasmania states there are about 3,000 to 10,000 individual plants in three to five populations at Sisters Beach and at Wingaroo on Flinders Island. The note goes on to state the species is well reserved in the Rocky Cape National Park and in the Wingaroo Nature reserve on Flinders Island and there is no immediate need for reassessment of *Banksia serrata*.

Banksia serrata woodland is considered to be a rare and endangered forest community under the RFA. Again the areas listed were three to five areas at Sisters Beach and Wingaroo on Flinders Island.

Additional areas of *Banksia serrata* trees and woodlands are listed by DPIPWE on the Tasmanian LISTmap service along the Bass Highway and at Dip Range and the Shakespeare Hills as shown in Figure E.4 below.

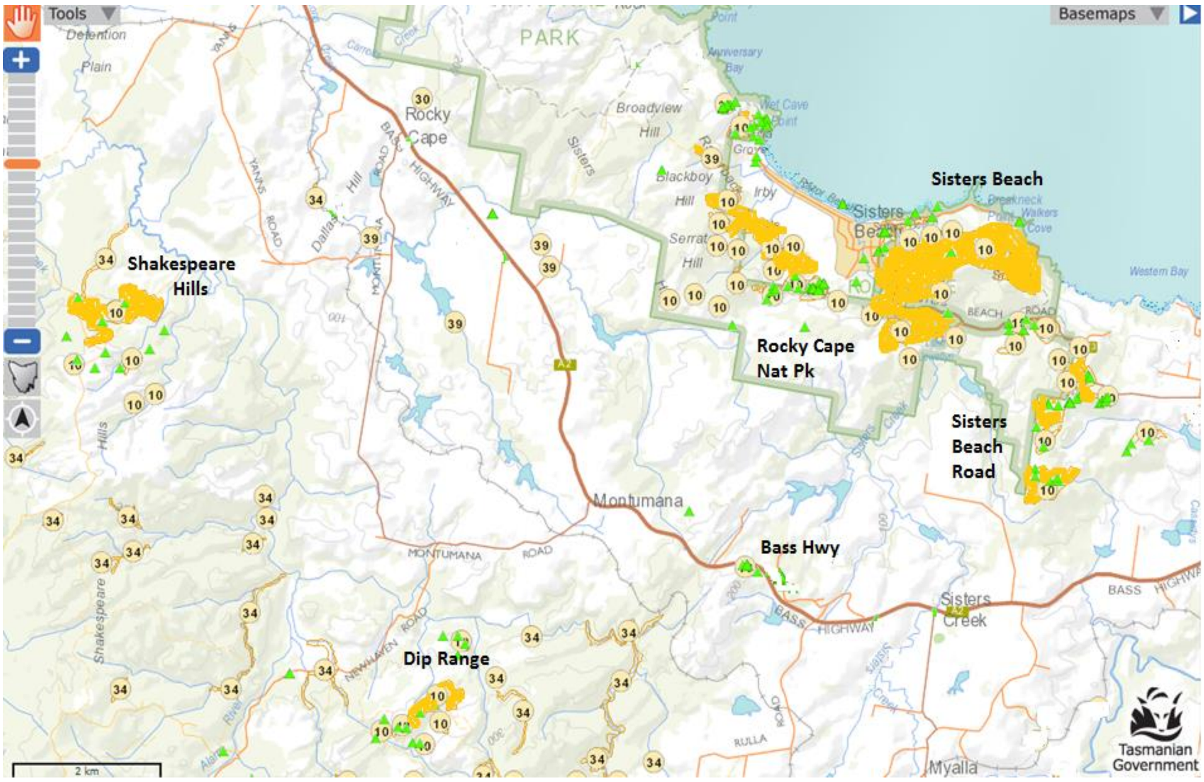


Figure E.4: Location of *Banksia serrata* Woodlands in North-west Tasmania (marked by orange areas, green triangles and areas with No 10)

Map also includes other threatened flora such as No 34 Riparian scrub and No 39 Wetlands. From LISTmap after DPIPWE

The *Banksia serrata* trees and *Banksia serrata* woodland are clearly well represented in the Rocky Cape National Park and the Wingaroo Nature Reserve on Flinders Island and the Shakespeare Hills area is also untouched.

Mining of the frac sand at Dip Range will have very little effect on the trees and woodland in that area. One tree will have to be removed but many more could be planted in its place. The majority of the trees are well removed from the proposed pit. The northern extension of the sand area will not be mined because of the extensive tree cover in that area and the closest tree to the pit outline is 25 metres away. Only nine trees occur within 25 to 30 metres from the proposed pit margin.

Trees along the Bass Highway and along the road to Sisters Beach are much closer to the road and to considerably more passing traffic than the few trees near the pit margins. There are many *Banksia serrata* trees alongside the roads and even within gardens at Sisters Beach and adjacent to the car park to the Rocky Cape National Park. None of these trees seem effected by suburbia, people, cars or disease.

On 21 April 2015, areas within Sisters Beach and near the National Park car park were being burnt off to reduce undergrowth. Fire was extending right up into the crown of the banksia trees, obviously without any ill effects to the trees.

APPENDIX F

RESOURCE AREA 3
DRILL DATA

Resource Area 3 lies south of Hogarth's Creek and contains an estimated 1,350,000 tonnes of frac sand based on 43 shallow drill holes.

Resource Area 3 Calculations

Area: 9.97 ha = 99,700 m²

Volume: 997,000 m³ (to 10 m)

Mass: 1,595,200 tonnes (x1.6 SG of dry sand in situ)
1,355,920 tonnes (allowing 15% loss during mining)

1,350,000 tonnes after rounding

Based on 43 drill holes to 10 metres.

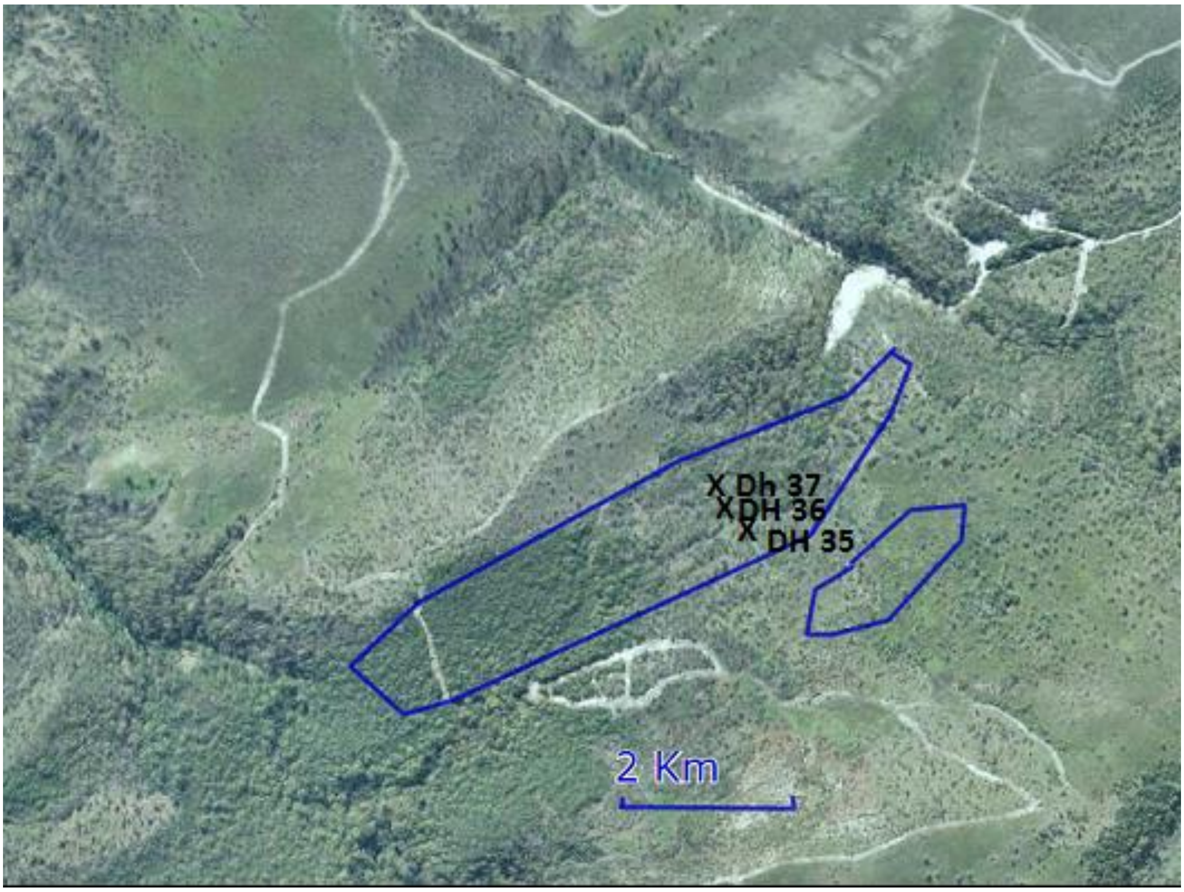


Figure F.1: Resource Area 3
Showing Location of Sample Holes 35, 36 & 37
(Stim-Lab Composite Sample - MHA C)

*Note the scale bar is actually 200 metres not 2km

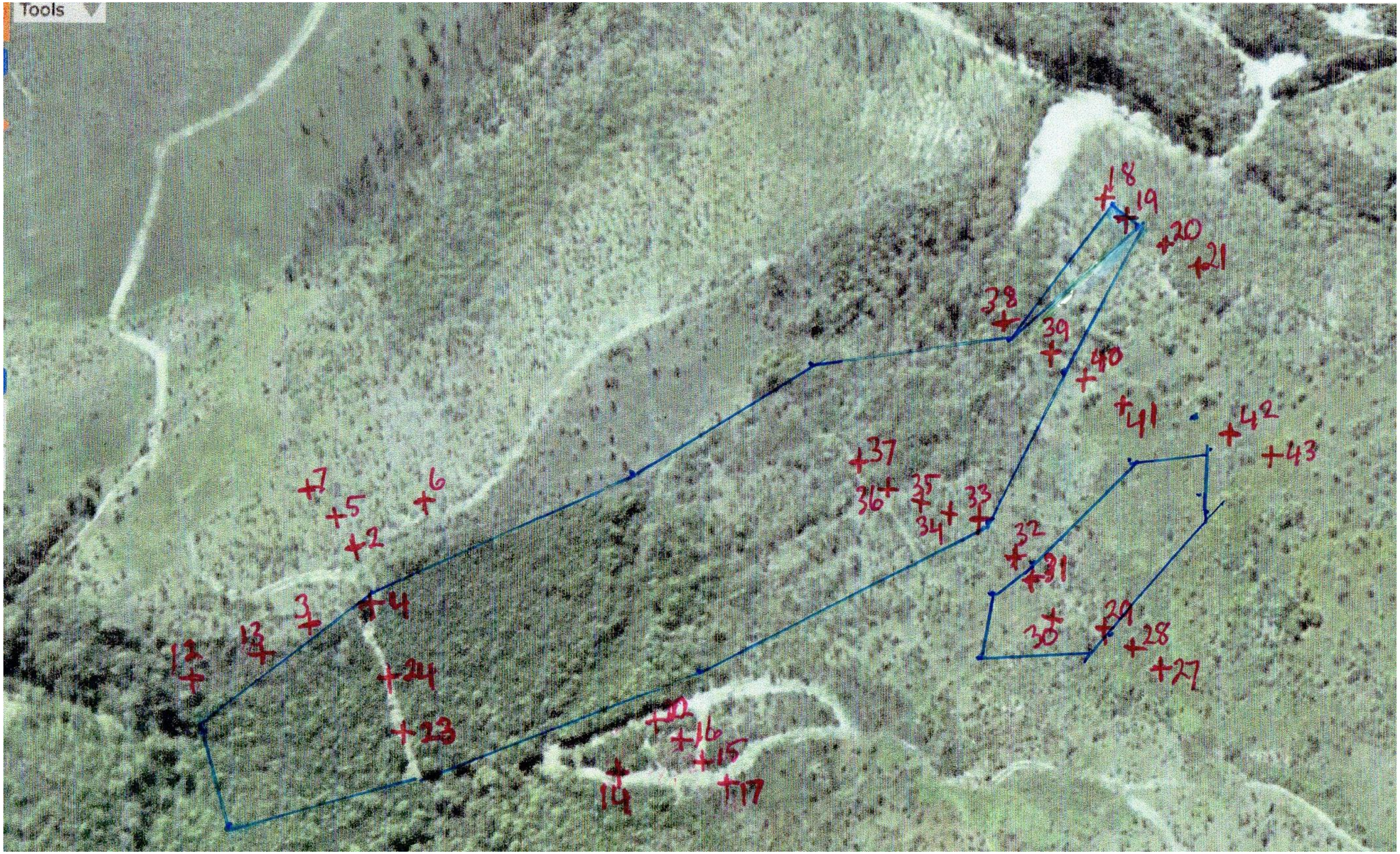


Figure F.2: Location of Drill Holes in Resource Area 3

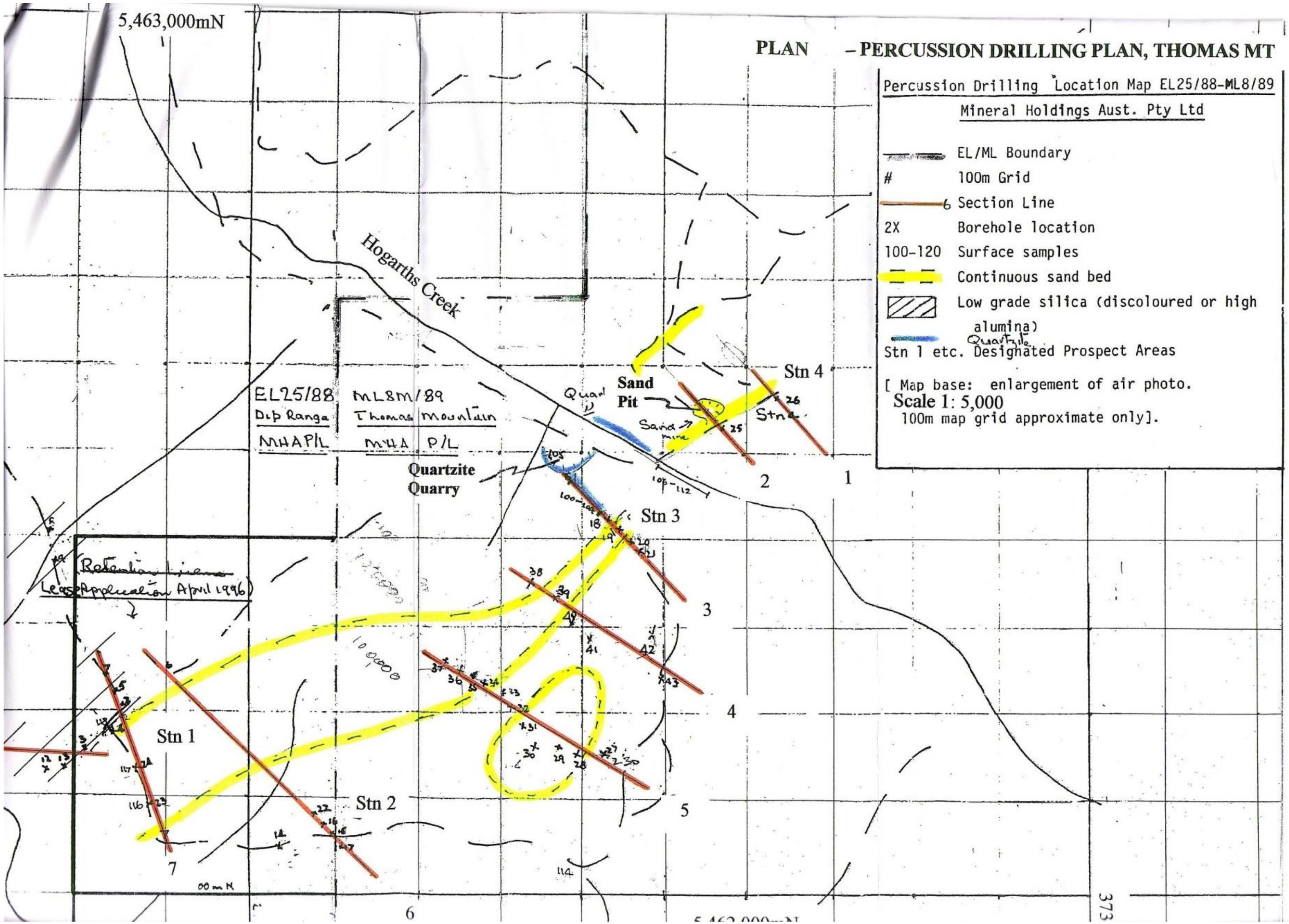


Figure F.3: Resource Area 3 Drilling by V M Threader (1996)

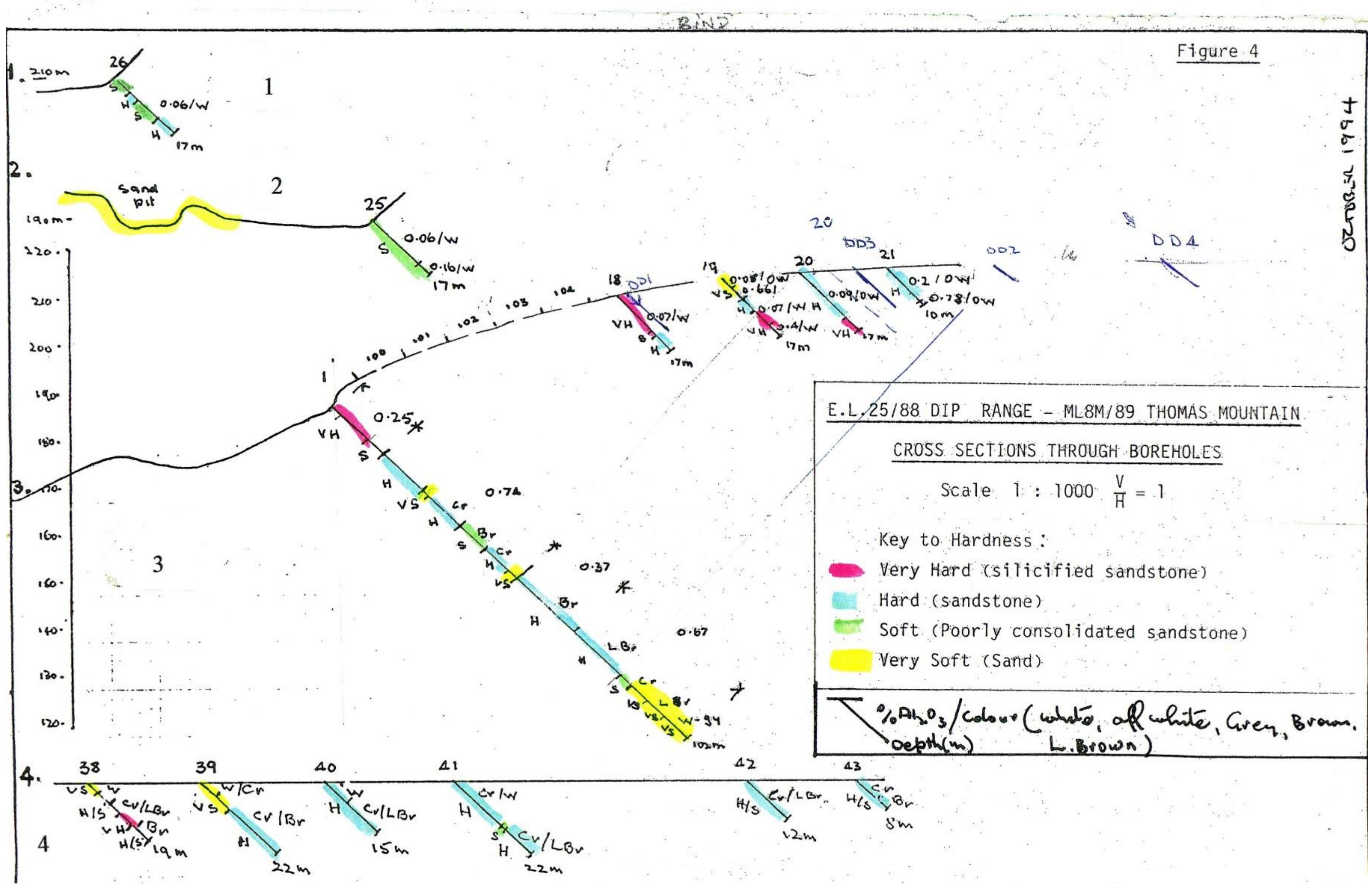
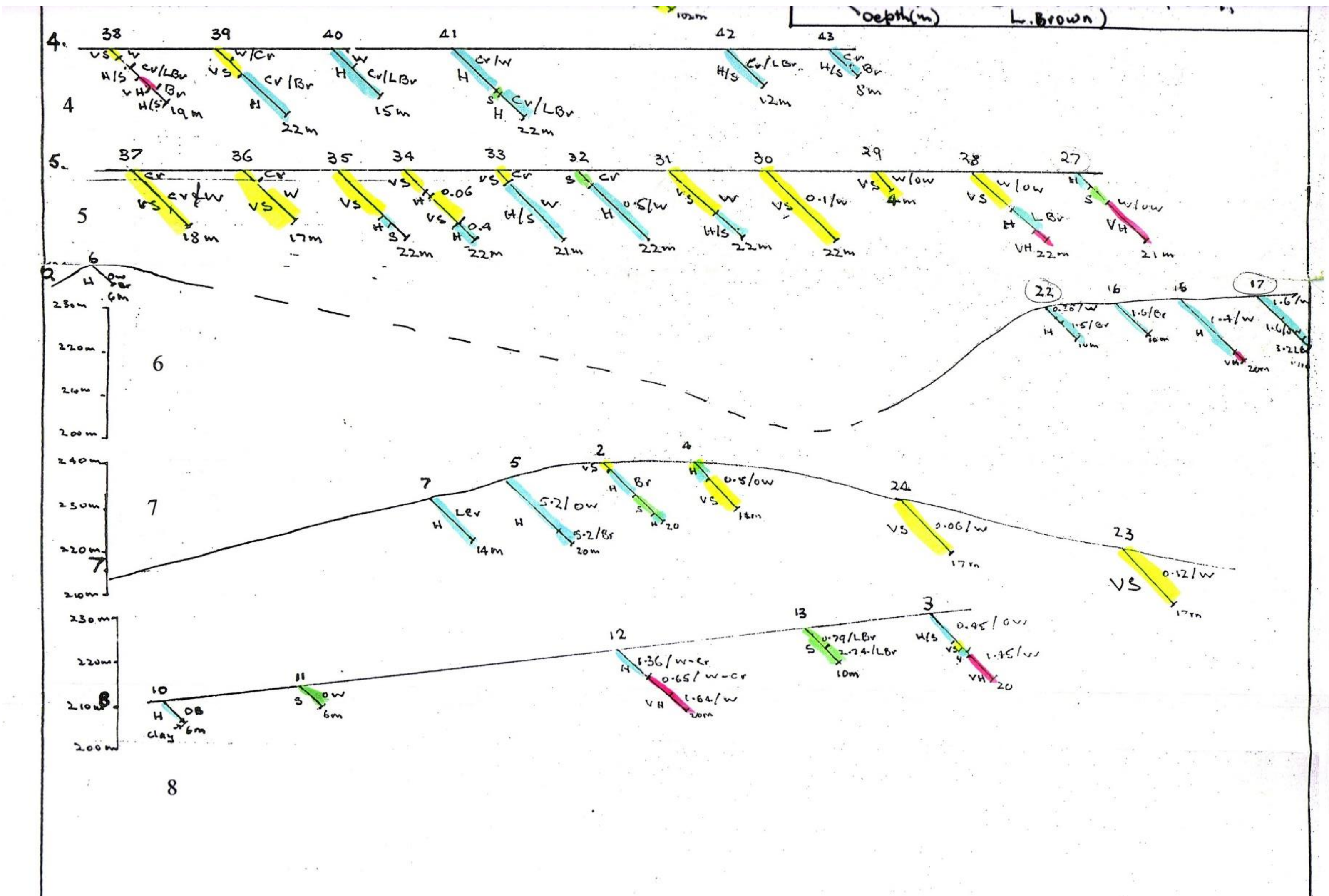


Figure F.4: **Resource Area 3 Drill Sections by V M Threader (1996)**



PLAN 3C – PERCUSSION DRILLING SECTIONS, THOMAS MT

Figure F.5: Resource Area 3 Drill Sections by V M Threader (1996)

APPENDIX G

HOGARTHS CREEK
WATER SAMPLING DATA

Stream chemistry has been monitored by pitt&sherry since April 2015 in order to gain an idea of background environmental values. Samples were taken and in situ measurements were made by R. Saltmarsh of pitt&sherry and chemical assays were carried out by ALS Environmental Division Melbourne. The data is summarised in the attached tables and compared to ANZECC guidelines for 95% for the protection of aquatic ecosystems and lowland rivers.

In general the water in Hogarths Creek is of high quality and well below the ANZECC guidelines and especially in the more nasty items like sulphate as SO_4 (a measure of pyrite in the environment) and the elements arsenic, cadmium, lead, selenium and mercury. There are however two very surprising results.

Aluminium is at levels three times the "safe" level of 0.055mg/L. The two highest levels, in May and June 2015, occurred during a period of rain and slightly increased turbidity in the stream. The last 800 metres of Hogarths Creek above the sample point is in the alumina rich shales and siltstones of the Irby Siltstone Formation.

Zinc levels for May and June 2015 (high rainfall months) are at three times the required levels and copper is also doubled in May. These are very surprising results as there is no sign of mineralisation and the sulphate levels are low indicating no pyrite a common associate with base metal mineralisation.

The higher than normal results may be related to the 2009 bushfires that occurred in the lease area. Charcoal from a recent fire can absorb metals and slowly release them in later periods of rain and this could explain the anomalous results.

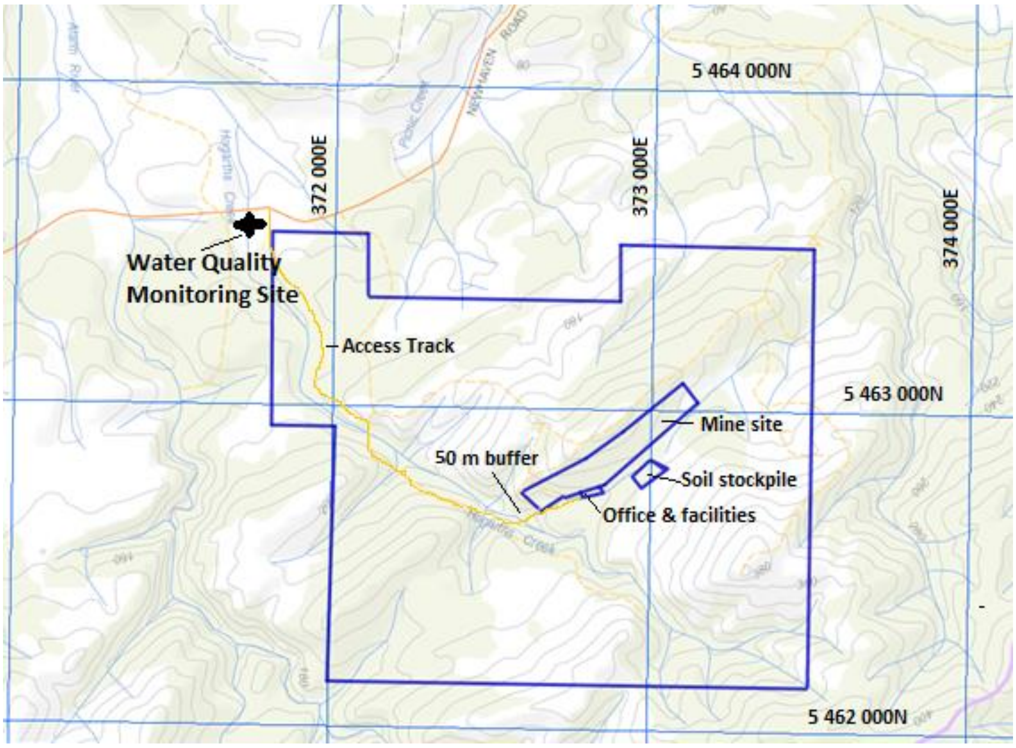


Figure G.1: Location of Water Quality Monitoring Site

Compound/Property	Limit of report	Unit	Sampling date			ANZECC**
			8/04/2015	20/05/2015	10/06/2015	
Dissolved oxygen		%s	13.7	11.9	17.6	85-110
Electrical Conductivity		us/cm	50.7	95.1	110.3	125-2000
pH units			5.6	5.65	5.05	6.5-8.0
Temperature		° C	16.4	11.5	10.6	
Turbidity		ntu	1.1	2.6	2.7	6.0-50
Suspended Solids	5	mg/L	6	<5	<5	
Turbidity	0.1	ntu	1.1	2.6	2.7	6.0-50
Total Hardness as $CaCO_3$	1	mg/L	8	8	15	
Hydroxide Alkalinity as $CaCO_3$	1	mg/L	<1	<1	<1	
Carbonite Alkalinity as $CaCO_3$	1	mg/L	<1	<1	<1	
Bicarbonate Alkalinity as $CaCO_3$	1	mg/L	<1	<1	<1	
Total Alkalinity as $CaCO_3$	1	mg/L	<1	<1	<1	
Acidity as $CaCO_3$	1	mg/L	24	20	29	
Sulphate as SO_4 Turbidimetric	1	mg/L	<1	<1	<1	
Chloride	1	mg/L	20	22	23	
Calcium total	1	mg/L	<1	<1	1	
Magnesium total	1	mg/L	2	2	3	
Sodium total	1	mg/L	9	12	15	
Potassium total	1	mg/L	<1	<1	<1	
Aluminium	0.01	mg/L	0.32	0.57	0.69	0.055
Arsenic	0.001	mg/L	<0.001	<0.001	<0.001	0.024
Boron	0.05	mg/L	<0.05	0.07	<0.05	0.37
Barium	0.001	mg/L	0.001	0.003	0.003	
Beryllium	0.001	mg/L	<0.001	<0.001	<0.001	
Cadmium	0.0001	mg/L	<0.0001	0.001	<0.0001	0.0002
Cobalt	0.001	mg/L	<0.001	0.002	<0.001	
Chromium	0.001	mg/L	<0.001	<0.001	<0.001	0.001
Copper	0.001	mg/L	<0.001	0.002	<0.001	0.0014
Manganese	0.001	mg/L	0.009	0.041	0.01	1.9
Nickel	0.001	mg/L	<0.001	0.001	<0.001	0.011
Lead	0.001	mg/L	<0.001	<0.001	<0.001	0.0034
Selenium	0.01	mg/L	<0.01	<0.01	<0.01	0.011
Vanadium	0.01	mg/L	<0.01	<0.01	<0.01	
Zinc	0.005	mg/L	0.006	0.021	0.027	0.008
Molybdenum	0.001	mg/L	<0.001	<0.001	<0.001	
Iron	0.05	mg/L	0.62	0.81	0.59	
Mercury	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0006
Fluoride	0.1	mg/L	<0.1	0.2	<0.1	
Total Anions	0.01	mg/L	0.56	0.62	0.65	
Total Cations	0.01	mg/L	0.56	0.69	0.95	

**ANZECC is guideline for 95% protection of aquatic ecosystems lowland rivers

Table G.1: Hogarths Creek Below Mine Surface Water Monitoring

Compound/Property	Limit of report	Unit	Sampling date			ANZECC**
			29/07/2015	26/08/2015	16/09/2015	
Dissolved oxygen		%s	6.26	8.68	7.76	85-110
Electrical Conductivity		us/cm	82.9	46.8	68	125-2000
pH			3.69	3.77	4.1	6.5-8.0
Temperature		° C	9.2	8.3	9.5	
Turbidity		ntu	3.8	1.2	25.6	6.0-50
Suspended Solids	5	mg/L	<5	<5	<5	
Turbidity	0.1	ntu	3.8	1.2	2.6	6.0-50
Total Hardness as $CaCO_3$	1	mg/L	8	8	8	
Hydroxide Alkalinity as $CaCO_3$	1	mg/L	<1	<1	<1	
Carbonite Alkalinity as $CaCO_3$	1	mg/L	<1	<1	<1	
Bicarbonate Alkalinity as $CaCO_3$	1	mg/L	<1	<1	<1	
Total Alkalinity as $CaCO_3$	1	mg/L	<1	<1	<1	
Acidity as $CaCO_3$	1	mg/L	32	30	18	
Sulphate as SO_4 Turbidimetric	1	mg/L	<1	<1	<1	
Chloride	1	mg/L	24	23	18	
Calcium total	1	mg/L	<1	<1	<1	
Magnesium total	1	mg/L	2	2	2	
Sodium total	1	mg/L	12	12	12	
Potassium total	1	mg/L	1	<1	<1	
Aluminium	0.01	mg/L	0.71	0.52	0.48	0.055
Arsenic	0.001	mg/L	<0.001	<0.001	<0.001	0.024
Boron	0.05	mg/L	<0.05	<0.05	<0.5	0.37
Barium	0.001	mg/L	0.002	0.002	0.002	
Beryllium	0.001	mg/L	<0.001	<0.001	<0.001	
Cadmium	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0002
Cobalt	0.001	mg/L	<0.001	<0.001	<0.001	
Chromium	0.001	mg/L	<0.001	<0.001	<0.001	0.001
Copper	0.001	mg/L	<0.001	<0.001	<0.001	0.0014
Manganese	0.001	mg/L	0.006	0.005	0.007	1.9
Nickel	0.001	mg/L	<0.001	<0.001	<0.001	0.011
Lead	0.001	mg/L	0.001	<0.001	<0.001	0.0034
Selenium	0.01	mg/L	<0.01	<0.001	<0.01	0.011
Vanadium	0.01	mg/L	<0.01	<0.001	<0.01	
Zinc	0.005	mg/L	0.008	<0.005	0.011	0.008
Molybdenum	0.001	mg/L	<0.001	<0.001	<0.001	
Iron	0.05	mg/L	0.45	0.40	0.45	
Mercury	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0006
Fluoride	0.1	mg/L	0.6	<0.1	<0.011	
Total Anions	0.01	mg/L	0.68	0.65	0.51	
Total Cations	0.01	mg/L	0.71	0.69	0.69	
**ANZECC is guideline for 95% protection of aquatic ecosystems lowland rivers						

Table G.1 (cont.): Hogarths Creek Below Mine Surface Water Monitoring