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Annual report on Exploration April 1999 to March  
2000 - EL 38/97 - Aberfoyle Hill  
Mineral Holdings Australia Proprietary Limited\*  
Duncan, D.McP. EL38/97



**EXPLORATION LICENCE 38/97  
ABERFOYLE HILL**

**MICROFILMED**  
FICHE No.015262-

MINERAL RESOURCES		
EL38/97 Pt 1		
31 MAR 2000		
SEARCHED	INDEXED	FOR INFO
See folio 45		

**ANNUAL REPORT ON EXPLORATION  
APRIL 1999 TO MARCH 2000**

for  
**Mineral Holdings Australia Pty Ltd**  
2nd Floor; 135, Collins St  
Melbourne Vic 3000

00\_4428

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2000 - EL 38/97 - Aberfoyle Hill  
Mineral Holdings Australia Proprietary Limited\*  
Duncan, D.McP. EL38/97

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**30th March 2000**

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**Table 2- Summary of Test Results for Clay**

**Appendix**

## EL 38/97- Aberfoyle Hill- Annual Report

### 1.0 Introduction

EL 38/97 was granted to Mineral Holdings Australia Pty Ltd on 6th March 1998 for a maximum of 5 years to 6th March 2003 over an area of 4 sq km at Aberfoyle Hill to search for bentonitic clay. The EL is adjacent to RLs 8715 and 8723 held by the same company covering Fosters Marches for alluvial tin (Plan 1). The minimum expenditure commitment is \$10,000 over the first two years and the licence is subject to satisfactory annual reporting.

The target is bentonitic or smectite type clay suitable primarily as a pelletising agent for the Savage River iron ore mine but a wide range of other industrial uses would be considered such as in moulding agents, sealants, drilling muds, ceramics, paper, rubber, paints, water purification and chemical catalysts.

### 2.0 Previous Exploration

An account of exploration in the area before the granting of the present licence has been given in last year's annual report and will not be repeated here.

Exploration carried out in Year 1 of the present licence and reported in last year's annual report consisted of an auger drill program of 10 holes with a combined depth of 76m (Plan 3).

The results from the drilling are summarised in Table 1 and the logs of the holes and the sampling scheme are contained in the Appendix.

The clays have a range of colours - brown, grey, yellow, blue, green, white, black and red (in order of incidence)- and textures - waxy, plastic and sticky (Table 1).

**Table 1**

Hole No	Clay (m)	Overburden (m)	Description
1	3	1	brown grey clays
2	4.2	2	yellow, grey and brown clays
3	2.75	1.5	brown plastic and grey sticky clays
4	0.75	1	yellow and brown clays
5	10.5	2	grey and yellow (blue) clays
6	10.1	2	brown, grey and white clays



wet/areas

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PLAN 3<sup>6</sup>

0117

CROWN LAND

1:10,000

Current Drilling

level

5 cm

RINGAROOMA

RAVER

579,000 m E

Dry Gut Creek

5,470,000 m N

0117

0022

HOLES 1-10 Mineral wet area Holdings 1999



fume

CROWN

WATERHOUSE

gravel pit

Crack

gravel pit

HINBAIRU

39

59

27

7	5.7	2	green, brown and blue clays
8	9.9	0.3	grey, brown and blue clays
9	6	1	brown clays
10	7	1	yellow, brown and red clays

The scout drilling program has confirmed a clay deposit over an area of 0.25sq km based on 10 drill holes ranging from 100 to 250m apart.

The clay is from 0.75 to +10.5m thick, averaging 6m and occurs under a sandy overburden from 1 to 2m thick. This gives an inferred geological in situ resource of 1.5 million cu m or 2.8 million tonnes (assuming an SG factor of 1.86 and rounding) of mixed clays.

The thickest section of clay is on a 20m high ridge covered by the two northern most holes 5 and 6 which show a 10m thickness of grey, yellow and brown, plastic to sticky clay over an area of about 200m by 100m inferring approximately 200,000 cu m or 372,000 tonnes. At an annual production of say 15,000 tonnes per annum, this would give about 25 years supply.

This ridge runs off the licence and if the clay proves to be worthwhile pursuing then the next square kilometre to the west should be added to the licence.

The overburden is commonly 1-2m thick of fine grained, grey sand passing into brown, sandy clay locally called "coffee rock". Occasional small patches of coarse, siliceous (silcrete?) gravels and cobbles, possibly of Tertiary age, exposed on small knolls on the flat plain towards the old tin workings, did not prove to be widespread and were not encountered in the drilling. Some of these coarse gravels may be the oversize dispersed from and adjacent to the former alluvial tin workings.

The clays commonly overlie and are derived from a Jurassic doleritic bedrock or more rarely a possible granitic or metasedimentary (Mathinna ?) bedrock for four of the southern holes (1,2, 9 and 10).

### 3.0 Current Exploration

Ten composite samples of clays (each sample + 3kg) were sent for industrial testing to Sud-Chemie A G, Munich, Germany and Australian Bulk Minerals, Burnie (Appendix).

Fourteen specific clay samples (each less than 0.5kg) were sent for clay identification to Amdel Ltd, Adelaide (Appendix) comprising thirteen from the drilling and one from surface sampling of clay derived from dolerite exposed in the old Dry Gut workings (913).

Logs of the drilling and the clay sampling scheme for the testing are given in the Appendix.

Composite samples were prepared for the industrial testing grouping together up to six drill intervals of, wherever possible, the same clay lithologies and representing up to 6m thickness of clay as mapped in the holes. The aim was to identify reasonable thicknesses of clay with appropriate physical properties capable of extraction and processing in an open cut situation.

Detailed samples over much more restricted intervals (up to 1m generally) were sent to Amdel for clay identification particularly of the smectite or montmorillonite content.

#### 4.0 Results

The Sud-Chemie tests are the more comprehensive giving information on a wide variety of physical properties and mineralogy of the clays (Table 2 & Appendix).

The clays fall naturally into two types on properties and a geographic basis.

The northern group represented in the drill holes 3- 8 have a relatively rich montmorillonite content (from 44- 61%), a higher adsorption factor ( from 192- 268 mg/g by the methylene blue test) and a higher specific surface area (from 55- 80 m sq./g). The percentage water adsorption (PWA) determined by Australian Bulk Minerals is in the range 100- 300 and is consistent in trend with the Sud-Chemie data.

smectite?  
zeolite?

The southern group found in the drill holes 1,2, 9 and 10 have 8% or less montmorillonite, adsorption factors 37 mg/g or less, and specific surface areas 20m sq/g or less. PWAs are in the range 100 or less.

The northern clays have no kaolinite (although Amdel has detected some in some samples perhaps due to a lower detection limit by the method employed) but some quartz (up to 12%) and feldspar (up to 11%), the former perhaps being due to contamination. Relict dolerite fragments found in the clay suggest its derivation by alteration and /or weathering from a Jurassic dolerite bedrock found altered in old tin workings to the east (Dry Gut) and fresh in the Ringarooma River.

The southern clays have characteristically no montmorillonite but up to 8.5% kaolinite, quartz in the range 45-65%, no feldspar and both Sud-Chemie and Amdel have recorded mica (muscovite) as a component. Quartz and ?granite and other fine grained fragments in the clay infer derivation from a granitic and possibly a metasedimentary substrate.

#### 5.0 Conclusions

The recent (1999) drilling program has confirmed the presence of a clay deposit averaging 6m thick under a sandy overburden 1-2m thick stretching from the old tin workings of the Dry Gut area, adjacent to the Ringarooma River, under the flat plain to the west.

Hole Id	Thick m	Colour Clay	Sample No	MBA	PWA	Mont %	Kaol %	Quartz %	Felds %	Musc %	Smect %	Others
1	3	brown, grey	908	0	60	0	8.5	65	0	yes	no	mica, kaolinite
2	4.2	yellow, grey brown	80	37	100	8	7.5	45	0	no	no	mica, kaolinite
3	2.75	brown plastic grey sticky	86	255	200	58	0	12	3.5	no	yes	no
5	3	grey, yellow white	88	243	170	55	0	7.5	3.5	no	yes	kaolinite
5	6	grey yellow sticky	94	268	140	61	0	3.5	2.5	no	yes	kaolinite
6	10.1	brown, grey white	96	192	110	44	0	3.5	6.5	no	yes	kaolinite
7	5.7	green, brown blue	100	243	300	55	0	3.5	11	no	yes	no
8	2	sticky blue grey	902	268	220	61	0	5.5	11	no	yes	? pyrophyllite
8	3	sticky coffee brown	906	216	210	49	0	5.5	11	no	yes	? pyrophyllite
9	6	brown	912	0	70	0	7.5	55	0	yes	no	mica, kaolinite

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Table 2- Summary of Test Results for Clay

This gives an inferred, in situ resource of approximately 2.8 million tonnes of clay. The variety of colours and textures seen in the samples suggests that the deposit contains a range of clay types.

Concentrating on the smectite rich clays, it is clear that the thickest (10m) and most accessible sections are on the 20m high ridge intersected by holes 5 and 6 and inferring a resource of 200,000 cu m. Including holes 7 and 8 to the east, the resource figure of this clay type would almost double.

The present testing done by Australian Bulk Minerals suggests that the clay would not be suitable as a pelletising agent in the iron ore industry. PWA's were in the range 100-300 whereas those required to rival Wyoming bentonite would be 600-800.

Tests by Sud-Chemie confirm the low adsorption and swelling volume characteristics of the clay and infer that the clay is a low swelling smectite such as a beidellite and/or a nontronite rather than a montmorillonite as was suggested by the previous CSIRO test which gave Fe, Mg and Ca rather than Na in the chemistry.

Beidellite and nontronite are widely found in soils derived from the weathering of basic rocks and this is consistent with the Jurassic dolerite as in the case here. Much of the Fuller's earth in Europe comes from this source and this may provide encouragement that higher adsorptive clays may still be found at Aberfoyle Hill.

The kaolinitic clays are too impure to be considered as an exploration target.

## **6.0 Further Program**

Previous industrial and scientific testing of clay from the area of the licence indicates that swelling smectite types may be present, some comparable to Wyoming bentonite, others with inferior properties. Other clay types suggested by testing were kaolinite, halloysite and illite.

Other prospective areas for clays will be examined in the licence particularly east of the Ringarooma River where previous work indicated the possibility of swelling clays close to Wyoming bentonite in properties.

If the results of these investigations are positive, consideration will be given to further drilling to measure a resource and possible bulk sampling to prove up an industrial use for the clay.

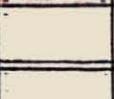
The potential for substantial amounts of tin gravels will also be evaluated.

**APPENDIX**

- : Logs of auger drill holes DGH 1-10**
- : Sample information**
- : Description and location of composite samples for Sud-Chemie A G,  
Australian Bulk Minerals and Amdel**
- : Industrial and scientific evaluation tests for clay**

Core lift	Core loss (%)	Depth (m)	Graphic Log	Sample No Depth (m) Prep'n	DESCRIPTION
		0			APPERFAYNE HILL - DRY GUT PROSPECT
		1m		001	SAMPLE PREFIX No P141 - 0-1m; brown <sup>sandy</sup> soil, occ frags qtz to 1cm.
A	X	2.5m		002	1-2.5m; brownish grey clay with some qtz vesicular (50% core loss) [A907]
	X	4m		003	2.5-4m; brownish grey clay - as above (60% core loss)
	X	4.5m		004	4-4.5m; brown clay with oxidized bedrock fragments (meta-sediment?)
		4.5m		ECH	ECH - hard bedrock; broke cutters.
					<u>Summary</u> : brown grey clay 3m (1-4m)
					X Composite samples SR 909, SC 908
					A clay identification (Andr) A907 mica, kaolinite

Core lift	Core loss (%)	Depth (m)	Graphic Log	Sample No. Depth (m) Prepin	DESCRIPTION
		0		005	0-1m; dark grey sandy soil becoming coffee rock (hard pan)
		1m		006	1-2m; dark to light brown sandy clay (50% core loss)
		2m		007	2-2.75m; Waxy yellow grey clay (quartz, kalsbein frags) [A082]
A	X	2.75m		008	2.75-3.5m; grey brown clay
	X	3.5m		009	3.5-4.25m; as above (dolerite frags) (15% core loss)
		4.25m		010	4.25-5m; as above (dolerite and meta-sediment frags) (15% core loss)
	X	5.0m		011	5-5.75m; Waxy chocolate brown clay (dolerite frags) [A083]
A	X	5.75m		012	5.75-6.2m; brown clay (oxidised dolerite frags) (45% core loss)
		6.20m			6.2-7m; oxidised, altered dolerite (50% core loss)
		7m		EOH	EOH - unable to proceed due to hard bedrock.
					<u>Summary:</u> yellow, grey and brown clays 4.2m (2-6.2m)
					X Composite samples: SR 081, SC 080
					A Clay identification (ANDEC): A082 mica, kaolinite A083 mica, kaolinite

Core lift	Core loss (%)	Depth (m)	Graphic Log	Sample No Depth (m) Prep'n	DESCRIPTION
		0			
		1.5m		013	0-1.5m; sand (top 0.2m black soil)
A	X	2.75m		014	1.5-2.75m; dark brown plastic clay
A	X	3.5m		015	2.75-3.5m; waxy greenish brown clay (40% core loss) [A084]
A	X	4.25m		016, 017	3.5-4.25m; greenish grey sticky clay (from outside in 5 levels) [A087]
		5m		018	017, light green gritty clay in end of auger tube.
				EOH	4.25-5m; altered dolomite (rock fragments with gravel)
					EOH - unable to proceed, heavy bedrock.
<p><u>Summary:</u> brown plastic clays and grey sticky clays 2.75m (1.5-4.25m)</p>					
<p>X Composite samples SR085, SC086</p>					
<p>A clay identification (from) A084 smectite A087 smectite</p>					

Core lift	Depth (m)	Graphic Log	Sample No. Depth (m) Prep'n	DESCRIPTION
	0		019	0-1m; Fg grey sand
	1m		020	1-1.75m; yellow brown clay
	1.75m		021	1.75-2m; brown oxidised dolomite with some light clayey zones
	2m		EOH	EOH - unable to proceed, level ground
				<u>Summary:</u> yellow and brown clays 0.75m (1-1.75m)

Core lift	Core loss (%)	Depth (m)	Graphic Log	Sample No Depth (m) Prep'n	Hollow Auger Core Drilling DESCRIPTION 0-5m	SOLID AUGER DRILLING SAMPLES FROM SPICES 5-12.5m
		0				
		1m		022	0-1m; fg grey sand	
		2m		023	1-2m; sand (1-1.20 brown coffee wk, tertiary level pau?)	
A	X	2.75m		024	2-2.75m; brownish grey, plastic clay [A090]	
089	X	3.5m		025	2.75-3.5m; yellow clay (plastic)	
088	X	4.25m		026	3.5-4.25m; yellow white clay (plastic)	
A	X	5m		027	4.25-5m; grey yellow plastic clay [A091] END CORE SAMPLES	↑
	X	6m		028	5-6m; grey yellow sticky clay	AUGER SAMPLES
	X	7m		029	6-7m; as above	↓
093	X	8m		030	7-8m; as above	
094	X	9m		031	8-9m; as above	
A	X	10m		032	9-10m; as above [A092]	
	X	11m		033	10-11m; as above	
		12.5m		034	11-12.5m; blue clay	
				ECH	END OF DRILL STRING	
<p>Summary: grey and yellow (blue) clays 10.5m (2-12.5m)  X Composite samples, SR089, SC088; SR093, SC094  A clay identification (MIOC) A090, 091, 092 smectite, kaolinite</p>						

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Core lift	Core less (%)	Depth (m)	Graphic Log	Sample No. Depth (m) Purp'n	DESCRIPTION
		0			SOLID AUGER DRILLING
		1m		035	0-1m; fg grey sand
		2m		036	1-2m; brown sandy clay (coffee rock = hard pan)
		3m		037	2-3m; light brown clay
A	X	4m		038	3-4m; grey white plastic clay [A095]
		5m		039	4-5m; yellow grey plastic clay
	X	6m		040	5-6m; as above
		7m		041	6-7m; light yellow brown clay
		8m		042	7-8m; yellow brown clay
	X	9m		043	8-9m; light brown plastic clay
		10m		044	9-10m; light grey gritty clay
	X	11.5m		045	10-11.5m; light brown clay
		12.1m		046	11.5-12.1m; light grey brown clay
		12.1m		EOH	EOH unable to proceed with drill - too hard
Summary: brown, grey and white clays 10.1m (2-12.1m)					
X Composite samples SR 087, SR 096					
A clay identification A095 smectite, kaolinite					

Core lift	Core loss (%)	Depth (m)	Graphic Log	Sample No. Depth (m) Prepin	DESCRIPTION
		0			SOLID AUGER DRILLING
		1m		047	0-1m; Fg grey sand
		2m		048	1-2m; dark grey sandy clay
		3m		049	2-3m; olive green plastic clay
A	X	4m		050	3-4m; tan brown plastic clay [A 098]
		5m		051	4-5m; as above (gritty?)
	X	6m		052	5-6m; brown plastic clay
	X	7m		053	6-7m; dry blue clay
				054	7-7.7m; brown blue clay with dolerite logs
		7.7m		EOH	EOH unable to proceed with drill - too hard
<p><u>Summary:</u> green, brown and blue clays 5.7m (2-7.7m)</p> <p>X Composite samples SR 099, SC 100</p> <p>A clay identification (Andra) A 098 smectite</p>					

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MINERAL HOLDINGS PTY LTD

DRILL GEOLOGICAL RECORD

HOLE No. DGH 8 11 / MARCH / 99  
REF. No. E 38/97 SHEET No. 1 of 1

Core lift	Core ID	Depth (m)	Graphic Log	Sample No Depth (m) Prep'n	DESCRIPTION
		0			SOLID AUGER DRILLING
		1m		055	0-1m; grey clay <sup>with</sup> 0.30m fg grey sand
		2m		056	1-2m; sticky chocolate brown clay
903	X	3m		057	2-3m; sticky grey blue clay
902	X	4m		058	3-4m; sticky brown grey clay [A901]
A	X	5m		059	4-5m; sticky coffee brown clay (dolomite frags) [A904]
A	X	6m		060	5-6m; as above
905	X	7m		061	6-7m; as above
906	X	8m		062	7-8m; as above with numerous dolomite frags.
		9.5m		063	8-9.5m; grey clay with dolomite grit
		10.2m		064	9.5-10.2m; yellow brown gritty clay.
		10.2m		EOH	EOH unable to proceed with drill - too hard
					Summary: grey, brown and blue clays to 9.9m (0.3-10.2m)
					X Composite samples SR 903, SC 902; SR 905, SC 906
					A clay identifier (more) A 901, 904 smectite, ? pyrophyllite.

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Core lift	Core SS (-)	Depth (m)	Graphic Log	Sample No Depth (m) Prep'n	DESCRIPTION
		0		065	SOLID ANGLE DRILLING 0-1m; Fg, grey sand
		1m			
	X	2m		066	1-2m; yellow brown plastic clay (occ. grit)
	X	3m		067	2-3m; coffee brown clay
A	X	4m		068	3-4m; orange brown clay (occ. grit - dolomite) [A 910]
	X	5m		069	4-5m; crumbly brown ochreous clay (occ. fags mixed, dolomite)
	X	6m		070	5-6m; as above (occ dolomite, other fags)
				071	6-7m; as above (occ silicate?, granite?, other fags)
		7m		EDH	EDH - very slow drilling; no incentive to proceed.
					<u>Summary:</u> brown clays 6m (1-7m)
					X Composite samples SR 911, SC 912
					A clay identification (under) A 910 mica, kaolinite.

Core lift	Core loss (%)	Depth (m)	Graphic Log	Sample No. Depth (m) Prep'n	DESCRIPTION
		0			SOLID MUD DRILLING
		1m		072	0-1m; fgy sand getting into clay
		2m		073	1-2m; yellow grey clay (qtz frags to 10mm)
		3m		074	2-3m; dry tan yellow clay (qtz frags to 20mm, also silicates, grit?)
		4m		075	3-4m; chocolate brown to red clay (qtz & dolomite frags)
		5m		076	4-5m; rust red plastic clay (2mm bedded rock frags)
		6m		077	5-6m; dry brown clay with frags (meta sediment?)
		7m		078	6-7m; as above
		8m		079	7-8m; as above
				EDH	EDH - very slow drilling; no incentive to proceed.
					<u>Summary:</u> yellow, brown and red clays 7m (1-8m)

## MINERAL HOLDINGS — SAMPLE INFORMATION

PROJECT NAME	PROSPECT NAME	SAMPLE TYPE	SAMPLED BY	SAMPLE DATE		
ABERFOYLE Hill	DRY Gut	Core	Angus D.H.P.D	9-12-03-99		
SAMPLE NO	SOLE ID	FROM	TO	NORTHING	EASTING	COMMENTS
141001	DGH1	0	1m	Composites		Core
002	"	1	2.50 x	SC	SR	A907
003	"	2.50	4.00 x	908	909	"
004	"	4.00	4.50 x			"
005	DGH2	0	1m			Core
006	"	1	2			"
007	"	2	2.75 x			A082
008	"	2.75	3.50 x			"
009	"	3.50	4.25	080	081	"
010	"	4.25	5.00 x			"
011	"	5.00	5.75 x			A083
012	"	5.75	6.20			"
013	DGH3	0	1.5m			Core
014	"	1.50	2.75 x			"
015	"	2.75	3.50 x	086	085	A084
016	"	3.50	4.25 x			A087
017	"	"	"			"
018	"	4.25	5.00			"
019	DGH4	0	1m			Core
020	"	1	1.75			Core
021	"	1.75	2.00			Core
022	DGH5	0	1.2m			Core
023	"	1.20	2.00			"
024	"	2.00	2.75 x			A090
025	"	2.75	3.50 x	088	089	"
026	"	3.50	4.25 x			"
027	"	4.25	5.00 x			A091
028	"	5.00	6.00 x			Aug 02
029	"	6.00	7.50 x			"
030	"	7.50	8.50 x	094	093	"
031	"	8.50	9.50 x			"
032	"	9.50	10.00 x			A092
033	"	10.00	11.50 x			"
034	"	11.50	12.50			"

## MINERAL HOLDINGS — SAMPLE INFORMATION

PROJECT NAME	PROSPECT NAME	SAMPLE TYPE	SAMPLED BY	SAMPLE DATE		
HERBERT W. HILL	DRY CREEK	ANGLER	DRY CREEK	9-12-03-99		
SAMPLE NO.	HOLE ID.	FROM	TO	NORTHING	EASTING	COMMENTS
035	DGH6	0	1m			ANGLER
036	"	1	2m			"
037	"	2	3			"
038	"	3	4	x		A 095
039	"	4	5			"
040	"	5	6	x		"
041	"	6	7			"
042	"	7	8		096 097	"
043	"	8	9	x		"
044	"	9	10			"
045	"	10	11.5	x		"
046	"	11.5	12.1			"
047	DGH7	0	1m			ANGLER
048	"	1	2			"
049	"	2	3			"
050	"	3	4	x		A 098
051	"	4	5			"
052	"	5	6	x	100 099	"
053	"	6	7	x		"
054	"	7	7.7m			"
055	DGH8	0	1m			ANGLER
056	"	1	2			"
057	"	2	3	x	902 903	"
058	"	3	4	x		A 901
059	"	4	5	x		A 904
060	"	5	6	x	906 905	"
061	"	6	7	x		"
062	"	7	8			"
063	"	8	9.5			"
064	"	9.5	10.20			"
065	DGH9	0	1m			ANGLER
066	"	1	2	x		"
067	"	2	3	x		"
068	"	3	4	x	912 911	A 910
069	"	4	5	x		"
070	"	5	6	x		"
071	"	6	7			"



COMPOSITE CLAY SAMPLES FROM ABERFOYLE HILL  
FOR TESTING BY SUD CHEMIE

SAMPLE NO	HOLE ID	FROM (m)	TO (m)	STATUS	COMMENTS
SC 080 4kg	DGH 2	2	2.75	CORE	waxy yellow grey clay
		2.75	3.5		grey brown clay
		4.25	5		as above
		5	5.75		waxy chocolate brown clay
SC 086 3.25kg	DGH 3	1.5	2.75	CORE	dark brown plastic clay
		2.75	3.5		waxy greeny brown clay
		3.5	4.25		greeny grey sticky clay
SC 088 4.75kg	DGH 5	2	2.75	CORE	brownly grey plastic clay
		2.75	3.5		yellow clay
		3.5	4.25		yellow white clay
		4.25	5		grey yellow plastic clay
SC 094 4kg	DGH 5	5	6	AUGER	grey yellow sticky clay
		6	7		as above
		7	8		as above
		8	9		as above
		9	10		as above
		10	11		as above
SC 096 5kg	DGH 6	3	4	AUGER	tan grey to white plastic clay
		5	6		yellow grey plastic clay
		8	9		light brown plastic clay
		10	11.5		light brown clay
SC 100 4kg	DGH 7	3	4	AUGER	tan brown plastic clay
		5	6		brown plastic clay
		6	7		blue clay
SC 902 3.5kg	DGH 8	2	3	AUGER	sticky grey blue clay
		3	4		sticky brown grey clay
SC 906 5.25kg	DGH 8	4	5	AUGER	sticky coffee brown clay
		5	6		as above
		6	7		as above
SC 908 4.75kg	DGH 1	1	2.5	CORE	brownly grey clay
		2.5	4		as above
		4	4.5		brown clay
SC 912 4.75kg	DGH 9	1	2	AUGER	yellow brown plastic clay
		2	3		coffee brown clay
		3	4		orange brown clay
		4	5		crumbly brown clay
		5	6		as above

COMPOSITE CLAY SAMPLES FROM ABERFOYLE HILL  
FOR TESTING BY AUSTRALIAN BULK MINERALS

SAMPLE NO	HOLE ID	FROM (m)	TO (m)	STATUS	COMMENTS
SR 081 4kg	DGH 2	2	2.75	CORE	waxy yellow grey clay
		2.75	3.5		grey brown clay
		4.25	5		as above
		5	5.75		waxy chocolate brown clay
SR 085 3.5kg	DGH 3	1.5	2.75	CORE	dark brown plastic clay
		2.75	3.5		waxy greeny brown clay
		3.5	4.25		greeny grey sticky clay
SR 089 5.25kg	DGH 5	2	2.75	CORE	browny grey plastic clay
		2.75	3.5		yellow clay
		3.5	4.25		yellow white clay
		4.25	5		grey yellow plastic clay
SR 093 4kg	DGH 5	5	6	AUGER	grey yellow sticky clay
		6	7		as above
		7	8		as above
		8	9		as above
		9	10		as above
		10	11		as above
SR 097 5kg	DGH 6	3	4	AUGER	tan grey to white plastic clay
		5	6		yellow grey plastic clay
		8	9		light brown plastic clay
		10	11.5		light brown clay
SR 099 4kg	DGH 7	3	4	AUGER	tan brown plastic clay
		5	6		brown plastic clay
		6	7		blue clay
SR 903 3.5kg	DGH 8	2	3	AUGER	sticky grey blue clay
		3	4		sticky brown grey clay
SR 905 4.75kg	DGH 8	4	5	AUGER	sticky coffee brown clay
		5	6		as above
		6	7		as above
SR 909 4.75kg	DGH 1	1	2.5	CORE	browny grey clay
		2.5	4		as above
		4	4.5		brown clay
SR 911 4kg	DGH 9	1	2	AUGER	yellow brown plastic clay
		2	3		coffee brown clay
		3	4		orange brown clay
		4	5		crumbly brown clay
		4	5		crumbly brown clay
		5	6		as above

CLAY SAMPLES FROM ABERFOYLE HILL  
TO BE TESTED BY AMDEL

SAMPLE NO	HOLE ID	FROM (m)	TO (m)	STATUS	COMMENTS
A 082	DGH 2	2	2.75	CORE	waxy yellow grey clay
A 083	DGH 2	5	5.75	CORE	waxy chocolate brown clay
A 084	DGH 3	2.75	3.5	CORE	waxy greeny brown clay
A 087	DGH 3	3.5	4.25	CORE	greeny grey sticky clay
A 090	DGH 5	2	2.75	CORE	brownly grey clay
A 091	DGH 5	4.25	5	AUGER	grey yellow plastic clay
A 092	DGH 5	9	10	AUGER	grey yellow sticky clay
A 095	DGH 6	3	4	AUGER	grey white clay
A 098	DGH 7	3	4	AUGER	tan brown plastic clay
A 901	DGH 8	3	4	AUGER	brown grey clay
A 904	DGH 8	4	5	AUGER	coffee brown clay
A 907	DGH 1	1	2.5	CORE	brownly grey clay
A 910	DGH 9	3	4	AUGER	orange brown clay
A913	Dry Gut workings			GRAB	light grey clay after dolerite



TELEFAX

SÜD-CHEMIE AG  
Ostenrieder Straße 15  
85368 Moosburg

3-pages

an: Mineral Holdings Australia  
Mr. Neil Thomas

Hr. Dörschug  
Tel: 08761/82-522  
Fax: 08761/82-519  
e-mail:  
m.doerschug@sued-chemie.de

Telefax-Nummer +61-3-9650 3855

Date: 20.5.99

Dear Mr. Thomas,

meanwhile we have made basical tests with your clay samples sent in March/ April this year.

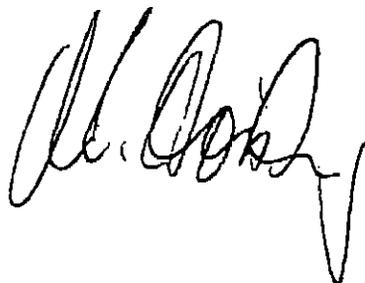
We have attached these data to this telefax.

As you can see the Methylen Blue adsorption is rather low ( $< 300$  mg/g) and as well the swelling volumes. Also the the samples SC 100 and SC 902 , which you mentioned in your fax dated 30.4.99 are not that promising. As well the contaminations with quartz etc. are rather high.

So far I do not see a chance to perform further application tests, but I will let you know if further tests will be made.

I am sorry about these news , but if you find other deposits we are always interested to check these qualities.

Regards





# Basic Data

Database C

NR. 124 S.2/3

NR. 124

SUEID CHEMIE D.A.R.T

9:59

20. MAI. 1999

		99075	99076	99077	99078	99079	99080	99081
sample 1		SC 080	SC 086	SC 088	SC 094	SC 094	SC 100	SC 902
sample 2		Hole ID: DGH 2	Hole ID: DGH 3	Hole ID: DGH 5	Hole ID: DGH 5	Hole ID: DGH 6	Hole ID: DGH 7	Hole ID: DGH 8
sample 3								
origin		McPherson Duncan & Associates						
condition		raw clay (core)	raw clay (core)	raw clay (core)	raw clay (auger)	raw clay (auger)	raw clay (auger)	raw clay (auger)
amount		4	3.25	4.75	4	5	4	3.5
colour of raw clay		copper brown	ocher brown	green beige	ochre yellow	brown beige	crumy	crumy
RAL raw clay		804	801	100	124	111	127	127
colour of powder		floral orange	beige	pastel yellow	sandy yellow	beige	sand yellow	ivory
RAL powder		210	101	134	102	101	102	114
others		99075	99076	99077	99078	99079	99080	99081
water content	%	15.4	36.6	29.6	35.4	34.7	38.7	38.4
MB-adsorption	mg/g	37	255	243	268	192	243	268
montmorillonite	%	8	58	55	61	44	55	61
carbonate (CO2)	%	.05	.05	.3	.3	.05	.1	.1
pH-value (100:8)		5.95	6.35	5.5	5.65	5.4	8.55	8.45
specific surface	m <sup>2</sup> /g	20	65	61	80	69	76	60
swelling volume		99075	99076	99077	99078	99079	99080	99081
water 0 h	ml/2g	4	8	6	8	4	6	8
water 24 h	ml/2g	4	9	6	9	5	6	9
saline solution 0 h	ml/2g	2	14	11	13	9	10	12
saline solution 24 h	ml/2g	4	15	11	13	9	11	13
x-ray		99075	99076	99077	99078	99079	99080	99081
quartz	%	45	12	7.5	3.5	3.5	3.5	5.5
mica	%	0	0	0	0	0	0	0
kaolinite	%	7.5	0	0	0	0	0	0
feldspar	%	0	3.5	3.5	2.5	3.5	11	11
enstatite	%	0	0	0	0	1.5	1	2
calcite	%	0	0	0	0	0	0	.5
actonite	%	0	0	0	0	0	0	0
magnesite	%	0	0	0	0	0	0	0
others	%	0	0	0	0	0	0	0
mineralogy		99075	99076	99077	99078	99079	99080	99081
montmorillonite			X	X	X	X	X	X
kaolinite		X						
quartzine					X			
omite			X	X		X	X	X
murcavite								

636098



# Basic Data

Database Cla

		99082	99083	99084
sample 1		SC 908	SC 908	SC 912
sample 2		Hole ID: DGH 8	Hole ID: DGH 1	Hole ID: DGH 9
sample 3				
origin		McPherson Duncan & Associates	McPherson Duncan & Associates	McPherson Duncan & Associates
condition		raw clay (auger)	raw clay (core)	raw clay (auger)
amount		5.25	4.75	4.75
colour of raw clay		brown beige	partiel yellow	orange brown
RAL raw clay		111	134	823
colour of powder		brown beige	saltron yellow	partiel yellow
RAL powder		111	117	134
others		99082	99083	99084
water content	%	34.3	13.3	15.3
MB adsorption	mg/g	216	0	0
montmorillonite	%	49	0	0
carbonate (CO <sub>2</sub> )	%	.05	.05	.05
pH-value (100+8)		7.95	5.65	5.65
specific surface	m <sup>2</sup> /g	55	12	17
swelling volume		99082	99083	99084
water 0 h	ml/2g	7	3	2
water 24 h	ml/2g	8	3	3
saline solution 0 h	ml/2g	9	3	2
saline solution 24 h	ml/2g	10	3	3
x-ray		99082	99083	99084
quartz	%	5.5	6.5	5.5
mica	%	0	1	1
kaolinite	%	0	8.5	7.5
feldspar	%	11	0	0
crystalite	%	1	0	0
calcite	%	.5	0	0
dolomite	%	.5	0	0
magnesite	%	0	0	0
others		0	0	0
mineralogy		99082	99083	99084
montmorillonite		X		
kaolinite			X	X
serpentine				
albite		X		
muscovite			X	X

To: Neil Thomas  
Fax No.: 03 9650 3855  
Company: Mineral Holdings Australia  
Pty Ltd  
From: John Galbraith  
Ref: JG:SN:F1868  
CC:  
Pages:  
Date: 27 April 1999  
Subject: Clay Samples - Aberfoyle  
Hill



**AUSTRALIAN  
BULK  
MINERALS**

60 Willmot Street  
PO Box 659  
Burnie Tasmania 7320 Australia  
ph: 03 64 323 377  
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E:mail [abmtas@tassie.net.au](mailto:abmtas@tassie.net.au)  
A Division of Goldamere Pty Ltd  
ACN 073 634 581

**FACSIMILE**

Dear Neil,

Please find attached our analysis of your samples. The results remain poor and would not be improved significantly by sodium addition. We do not believe the material is suitable for pelletisation and will not carry out any additional tests. The material may be suitable for other uses and we wish you success with the project.

Kind regards,

A handwritten signature in cursive script that reads "John Galbraith".

**John Galbraith  
Process Manager**

Attachment

COMPOSITE CLAY SAMPLES FROM ABERFOYLE HILL  
FOR TESTING BY AUSTRALIAN BULK MINERALS

PWA

SAMPLE NO.	HOLE ID	FROM (m)	TO (m)	STATUS	COMMENTS	
SR 081 4kg	DGH 2	2	2.75	CORE	waxy yellow (grey) clay	100
		2.75	3.5		grey brown clay	
		4.25	5		as above	
		5	5.75		waxy chocolate brown clay	
SR 085 3.5kg	DGH 3	1.5	2.75	CORE	dark brown plastic clay	200
		2.75	3.5		waxy greeny brown clay	
		3.5	4.25		greeny grey sticky clay	
SR 089 5.25kg	DGH 5	2	2.75	CORE	brownish grey plastic clay	170
		2.75	3.5		yellow clay	
		3.5	4.25		yellow white clay	
		4.25	5		grey yellow plastic clay	
SR 093 4kg	DGH 5	5	6	AUGER	grey yellow sticky clay	140
		6	7		as above	
		7	8		as above	
		8	9		as above	
		9	10		as above	
		10	11		as above	
SR 087 5kg	DGH 6	3	4	AUGER	tan grey to white plastic clay	110
		5	6		yellow grey plastic clay	
		8	9		light brown plastic clay	
		10	11.5		light brown clay	
SR 089 4kg	DGH 7	3	4	AUGER	tan brown plastic clay	300
		5	6		brown plastic clay	
		6	7		blue clay	
SR 903 3.5kg	DGH 8	2	3	AUGER	sticky grey blue clay	220
		3	4		sticky brown grey clay	
SR 905 4.75kg	DGH 8	4	5	AUGER	sticky coffee brown clay	210
		5	6		as above	
		6	7		as above	
SR 909 4.75kg	DGH 7	1	2.5	CORE	brownish grey clay	60
		2.5	4		as above	
		4	4.5		brown clay	
SR 911 4kg	DGH 9	1	2	AUGER	yellow brown plastic clay	70
		2	3		coffee brown clay	
		3	4		orange brown clay	
		4	5		crumbly brown clay	
		5	6		as above	

Amdel Laboratories Ltd  
PO Box 338  
Torrensville Plaza SA 5031  
ACN 009 076 555

Telephone (08) 8416 5300  
Facsimile (08) 8234 0321

Mr D McP Duncan  
McPherson Duncan & Associates  
18 Old Summerleas Road  
KINGSTON TAS 7050

**FINAL ANALYSIS REPORT**

Your Order No:

Our Job Number : 9AD0652

Sample rec'd : 22/03/99

Results reported : 30/03/99

No. of samples : 14

Report comprises a cover sheet and pages 1 to 1

Approved Signature:



for  
Alan Ciplys  
Manager - Mineral Chemistry

**Report Codes:**

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

**Distribution Codes:**

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

## DETERMINATION OF BENTONITE IN 14 CLAY SAMPLES

### 1. INTRODUCTION

Clay samples were received from Mr David Duncan of McPherson Duncan & Associates with a request for XRD identification of the clay and non-clay minerals, major element analysis and checking for diatoms. This request was changed on 30/3/99 to identification of bentonite by XRD.

### 2. PROCEDURE

The samples were oven-dried. A representative portion was pulverise and then analysed by X-ray diffraction. Samples with suspected smectite were re-analysed after the addition of glycerol, which characteristically causes swelling of the clay layers.

### 3. RESULTS

The presence of smectite in the samples is given below. Smectite is the name given to a family of clay minerals, of which montmorillonite is the most common. Smectite is an essential component of bentonite. Note that the smectite detection limit in loose packed powder samples is at least 10%. Although the XRD scans did not include information on the non-clay minerals, it is possible that smectite is the dominant mineral in the samples in which it is detected.

Sample No.	Smectite Detected	Other Clay Minerals Detected
A082	No	Mica, kaolinite
A083	No	Mica, kaolinite
A084	Yes	-
A087	Yes	-
A090	Yes	Kaolinite
A091	Yes	Kaolinite
A092	Yes	Kaolinite
A095	Yes	Kaolinite
A098	Yes	-
A901	Yes	?Pyrophyllite
A904	Yes	?Pyrophyllite
A907	No	Mica, kaolinite
A910	No	Mica, kaolinite
A913	No	Serpentine