DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept.Bk.No. 72/80
G.S. No. 4849
D.M. No. 146/72

INVESTIGATION OF CLAY (WEATHERED SHALE) OCCURRENCES IN THE BIRDWOOD AREA

by

S. BARNETT
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NON-METALLICS SECTION

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ABSTRACT

White weathered shale in the Birdwood area appears to be associated with north-south trending quartzite ridges. Scout drilling is recommended between quartzite ridges south of the pit in Section 6397, Hundred of Talunga.

INTRODUCTION

A geological investigation of clay (weathered shale) deposits has been carried out in the Birdwood area. Road, rail and pipeline cuttings, existing pits and gold diggings have been investigated. P.G.H. Industries and Clay & Mineral Sales Pty. Ltd. have provided valuable information.

Several investigations and reports have been made on the deposit in Section 6397, Hd. Talunga by Ridgway (1951, 53), Wade (1954) & Whitton (1962). A report by Tarvydas (1969) is the most recent report on this deposit and contains a topographical and geological plan, cross sections and borehole logs.

GEOLOGICAL SETTING

The bedrock in the area of this survey is from two groups: The Burra Group of late Proterozoic age, and the Kanmantoo Group of Lower to Middle Cambrian age which overlies the Burra

Group unconformably. Both groups are geosynclinal sediments which are regionally metamorphosed in this area. In the Birdwood area, they are strongly folded and dip to the east. The Burra Group lithology consists of a thick quartzite horizon (locally known as the "Birdwood" quartzite of 500 ft. maximum width) and several minor quartzites and minor bands of calcsilicate rock interbedded with mica schists and some garnetiferous quartz mica schist. The prominant hills to the north of Birdwood are all composed of "Birdwood" quartzite, which further to the north becomes distinctly feldspathic and kaolinized with interbedded shales which are also kaolinized. Mecaceous pegamtite dykes are strongly developed near Birdwood.

The lithology of the Kanmantoo Group consists of a considerable thickness of mica and quartz-mica schists exhibiting a much more advanced stage of metamorphism than the Burra Group. The schists are coarser in texture with abundant flaky biotite. Except for the quartzites, the bedrock outcrops poorly.

CLAY DEPOSITS

White and pale coloured clays are worked from several pits for refractory and building bricks. All of the producing pits lie in the area underlain by Burra Group rocks. Relict bedding in the clay is evident from changes in texture and composition and the deposits are clearly altered sediments. The presence of white veins of kaolin suggests some hydrothermal activity.

The proximity of the pits to the Burra-Kanmantoo Group unconformity suggests that Kaolinisation may be related to this feature (M.H. Hiern personal communication). Brown and red staining of various intensities is common in some of the pits. Bricks manufactured from many of the clays in the area show green staining due to abnormally high vanadium content.

Upon investigations of road, railway and pipeline cuttings and gold diggings, white weathered shale was found at those locations shown on the accompanying geological plan (72-161). The occurrence of weathered shale appears to be associated with the north-south ridges of "Birdwood" quartzite. In the pit operated by Newbold General Refractories in Section 6397, Hd. Talunga (Pit A - see Plate 1) and the small pit directly to the south, the quartzite beds overly the clay horizons. To the south along the quartzite ridges, a lens of weathered shale (Plate 3) is exposed on the western face of the quartzite quarry ¼ mile northeast of Birdwood (Plate 2) in Section 6641, Hd. Talunga. Further evidence to suggest this association can be seen in the pipeline cutting west of Birdwood (Plate 4), and the road cutting one mile west of Pit A (Plate 5). Weathered shale also occurs to the east of the unconformity between the Burra and Kanmantoo Groups as seen in the disused pit one mile east of Birdwood (Plate 6) and the old gold mining shaft 1¼ miles northeast of Pit A (Plate 7). Pit B in Section 4, Hd. Talunga is operated by Clay, Mineral Sales Pty. Ltd. (Plate 8).

P.G.H. Industries have also drilled further north in Sections 4 & 9 and found areas of useable clay (see appended bore logs and plans.) Bulldozer scrapings in the area (Plate 9) show the shallow depth at which white weathered shale can be found. Clay and Mineral Sales Pty. Ltd. has drilled Section 3, Hd. Talunga to the west of Pit B and has found weathered shale in the area shown on the plan. However, drilling in Section 2 (1½ mile directly to the south) revealed no suitable material.

A search of the bore records in the Records Section of the Department of Mines revealed few bores in the area with logs. Of the 8 available, only 3 are located in Burra Group rocks (see plan 72-161, Appendix 1).

SUMMARY AND CONCLUSIONS

Useful deposits of white clay occur in Burra Group rocks in the area.

Several pits are located north of Birdwood close to the Burra-Kanmantoo Group unconformity. Further exploration in this zone is warranted.

Reconnaissance showed which clay associated with quartztites in a zone 2 miles to the west of the producing pits. Further investigation of this area is recommended.

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APPENDIX I

HUNDRED OF TALUNGA

DEPTH (FT.) From	To	DESCRIPTION
	BH 1	Sec. 6621
0	10	Clay
10	35	Soft brown schist
35	208	Hard black schist with bands of quartz schist
208	210	Broken schist
	BH 2	Sec. 6613
0'	1'	Black soil
1	10	Sandstone
10	31	Soft sandy clay (white 7 yellow)
31	34	Hard sandstone
34	44	Softer sandstone (layers of clay)
44	64	Decomposed sandstone (harder patches)
64	77	Greyish decomposed sandstone
77	83	Greenish grey sticky clay
83	84	Yellow sticky clay
84	90	Sticky clay
90	91	Yellow sandy clay
91	92	Broken Yellow sandstone (water bearing)
92	103	Decomposed sandstone and clay
103	104	Firm sandstone (water bearing)
104	107	Soft sandy clay
107	113	Firm sandstone
113	118	Soft sandstone
118	158	White iron stained clay
158	175	Red clay

DEPTH(FT.) From	To	DESCRIPTION
BH 3		Sec. 6588
0'	3½'	Brown soil and sand
3½'	11'	Dark brown sand (fine)
11	36	Grey quartzite - considerable quartz
36	43	Grey quartzite - also white quartzite and considerable spidote
		Some quartz and mica schist rock generally more broken.
BH 4		Sec. 6572
0	2	Very fine grained sand and clay
2	4	Very fine-grained felspathic sandstone
4	7	Yellowish very fine-grained micaceous felspathic sandstone
7	34	White fine-grained felspathic and micaceous (muscovite) sandstone
34	37	White felspathic micaceous (muscovite) sandstone with quartz veins
37	55	White coarse-grained felspathic and micaceous (muscovite) sandstone with quartz veins
55	85	White felspathic and micaceous (muscovite) sandstone
85	100	White felspathic and micaceous (muscovite) sandstone
100	128	White felspathic and micaceous (muscovite) sandstone with quartz veins

DEPTH(FT.) From	To	DESCRIPTION
BH 4		Seq. 6572
128	132	Fine-grained quartz-mica-schist
132	145	Fine-grained felspathic and micaceous (large plates of muscovite) sandstone
145	160	Felspathic and micaceous sandstone with bands of quartz-mica-schist
160	165	Quartz-mica-schist with thin bands of felspathic sandstone
BH 5		Seq. 19
0'	2'2'	Topsoil and sandstone rubble
2	5	Brown sandy clay
5	15	Micaceous sandstone
15	18	Soft mica sandstone
18	23	Grey mica sandy clay
23	37	Grey mica sandy clay
37	65	Soft mica schist
65	80	Hard mica schist
80	92'6"	Mica schist
92'6"	118	Crevieed mica schist
118	127	Softer schist

DEPTH(FT.) From	To	DESCRIPTION
BH 6		Sec. 23
0'	1'6"	Black topsoil
1'6"	4'6"	Yellow brown clay
4'6"	7'9"	Brown sandy clay
7'9"	10	Sandstone and water
10	15	Broken mica schist
15	21	Hard and soft layers mica schist
21	27'6"	Hard mica schist
27'6"	28'6"	Hard sandstone
28'6"	46	Hard and soft layers mica schist
46	50	Soft mica schist
BH 7		Sec. 6343
0'	1'6"	Topsoil and sandstone rubble
1'6"	4	Brown clay and rubble
4	5	Brown clay
5	10	Yellowish limestone
10	12	Soft white clayey limestone
12	14	Grey limestone
14	24	White limestone
24	32	Sandstone and grey clay
32	40	Grey sandy clay
40	45	Soft sandstone
45	46	Hard micaceous sandstone
46	66	Hard and soft schist
66	77	Micaceous clay
77	80	Hard and soft mica schist

DEPTH(FT.) From	To	DESCRIPTION
BH 7		Sec. 6343
80	98	Hard and soft mica schists
98	100'6"	Hard mica rock
100'6"	103	Hard mica rock
103	105'6"	Hard grey sandstone
105'6"	109	Hard grey rock (Dolomite)
109	113	Hard greenish grey close grained rocks
113	119'6"	Hard greenish grey rock. (close grained)
119'6"	122	Softer grey sandstone
122	123	Grey sandy clay
123	127	Grey sandstone (traces schist and quartz)
BH 8		Sec. 6335
0'	6"	Grey topsoil
6"	1'	Quartzite rubble and gravel
1'	2'6"	Yellow clay
2'6"	7'6"	Soft sandstone and clay
7'6"	13	Soft mica schist/sandstone
13	20	Yellow sandstone/schist
20	23	White sandstone
23	29	Hard sandstone
29	38	Soft mica schist
38	42'6"	Brownish sandstone/schist
42'6"	50'6"	Soft mica schist
50'6"	61'6"	Hard grey schist
61'6"	64'6"	Hard whitish grey quartzite

DEPTH(FT.) From	To	DESCRIPTION
BH 8		Sec. 6335
64'6"	66	Hard schist with quartzite veins
66	79'6"	Dark grey mica schist
79'6"	91	Very hard schist
91	113	Dark grey sandstone/schist
113	118	Lighter sandstone
118	133	Alternate layers sandstone and sandstone schist

APPENDIX II

LOGS OF RECONNAISSANCE BORES DRILLED BY P.G.H. INDUSTRIES IN SEC. 4, HUNDRED OF TALUNGA

NO LOCATIONS AVAILABLE

From	To	Description
		BH 4
0"	6"	Topsoil
6"	3'	Red-orange sandstone
3'	21'	Grey sandstone (soft)
		BH 5
0"	1'	Topsoil
1'	3'	Red-orange sandstone
3'	5'	White sandstone
5'	21'	Yellow sandstone
		BH 6
0"	6"	Topsoil
6"	5'	Red-orange sandstone
5'	6'	Yellow sandstone
6'	20'	Salmon pink sandstone
20'	21'	Mauve sandstone

From	To	Description
		BH 7
0"	6"	Topsoil
6"	5'	Red-orange sandstone
5'	6'	White shale with yellow sandstone
6'	9'	White shale with yellow sandstone
9'	21'	White sandstone with little shale
		BH 8
0"	6"	Topsoil
6"	3'	Red-orange sandstone
3'	6'	White, hard shale-sandstone
6'	36'	White shale
		BH 9
0"	1'	Topsoil with quartz floaters
1'	5'	Red-yellow sandy clay
5'	12'	Good quality white shale
12'	20'	Fair quality white shale Silica sand (fine)
20'	30'	Good quality white shale with traces of pink (very light)
30'	35'	Good white shale
35'	36'	White shale with pink traces (good quality again)

Hole 9 is 50 ft from Hole 8 on boundary of adjoining claim.

From	To	Description
	BH 10	
0"	1'	Topsoil
1'	3'	Red sandstone
3'	14'	Yellow sand
		Unable to drill further due to hard rock

Hole 10 is 65 ft from Hole 9 along boundary

	BH 11	
0"	1'	Topsoil
1'	3'	Red sandstone
3'	6'	Yellow sandstone dark
6'	21'	Sandstone light yellow

Hole 11 is 50 ft from Hole 10

	BH 12	
0"	1'	Topsoil
1'	3'	Sandy clay-red
3'	8'	Sandstone light
		Could not drill further

Hole 12 is 65 ft from Hole 11 and 50 ft from Hole 9

From	To	Description
	BH 13	
0"	1'	Topsoil
1'	4'	Sandy clay-red
4'	9'	Shale white but sandy
9'	21'	Shale discoloured
21'	24'	Shale pinkish
24'	40'	Shale light colour - bit off white

Hole 13 is 25 ft from Hole 12 and 25 ft from Hole 9

	BH 14	
0"	1'	Topsoil
1'	3'	Sandy clay red
3'	6'	Sandstone light
6'	40'	Shale off white

Hole 14 is 50 ft from Hole 8

	BH 15	
0"	1'	Topsoil
1'	6'	Sandstone yellow
6'	18'	Shale cream sandy
18'	24'	Shale yellow very sandy

Hole 15 is 50 ft from Hole 13

	BH 16	
0"	3'	Topsoil
3'	21'	Sandstone various colours

APPENDIX III

LOGS OF BORES DRILLED BY P.G.H. INDUSTRIES IN SECTIONS 4 & 9 HUNDRED OF TALUNGA

M.C. 5292

SEE PLAN S9803

APPENDIX III

LOGS OF BORES DRILLED BY

P.G.H. INDUSTRIES IN SECTIONS 4 & 9

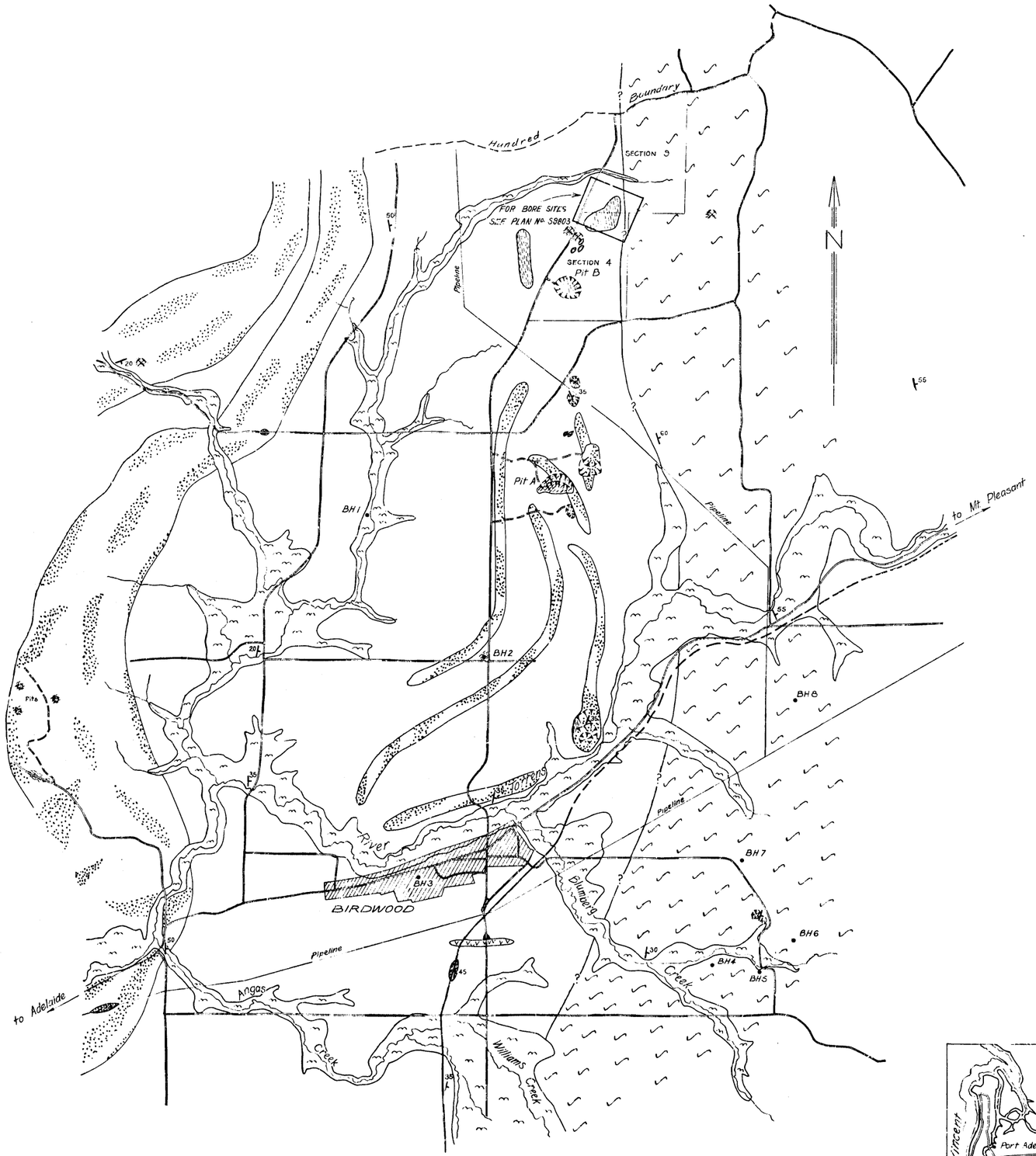
HUNDRED OF TALUNGA

From	To	Description
	HOLE 1	
0"	1'	Topsoil
1'	6'	Sandy clay
6'	9'	Grey-white rock (very hard)
	HOLE 2	
0"	1'	Topsoil
1'	2'	Silica sand
2'	5'	Orange-red sand
5'	8'	White sandstone
8'	11'	Brown-grey sandstone
11'	13'	Grey sandstone
13'	14'	Red sandstone
	HOLE 4	
0"	3'	Topsoil
3'	4'	Red sandy clay
4'	6'	Yellow sandstone
6'	9'	Grey-white sandstone
9'	11'	Brown-grey sandstone

From	To	Description
	HOLE 6	
0"	4'	Red Silica sand
4'	9'	White sand stone
9'	15'	Red sand
15'	40'	Mauve sandstone (soft)
	HOLE 7	
0"	1'	Topsoil
1'	3'	Sandy red clay
3'	6'	Yellow sand
6'	11'	White sandy shale
11'	33'	Yellow sandstone
	HOLE 8	
0"	1'	Topsoil
1'	3'	Sandy red clay
3'	8'	Yellow sand
8'	30'	Yellow-grey sand

From	To	Description
		HOLE 9
0"	1'	Topsoil
1'	3'	Sandy red clay
3'	9'	Yellow sand
9'	27'	Grey sand
		HOLE 10
0"	2'	Topsoil
2'	4'	Sandy red clay
4'	7'	Yellow sand
7'	11'	White sandy shale
11'	15'	Yellow-white sand
15'	21'	Yellow sand
		HOLE 11
0"	2'	Topsoil
2'	4'	Sandy red clay
4'	8'	White shale with a little sandstone
8'	10'	Red sand

From	To	Description
		HOLE 12
0"	2'	Topsoil
2'	4'	Brown clay with white traces
4'	6'	Mauve sandstone
6'	7'	Pink sandstone
7'	9'	Cream sandstone
9'	11'	White - cream sandstone
11'	12'	Mauve sandstone
		HOLE 13
0"	2'	Topsoil
2'	4'	Red-white clay
4'	7'	Red-yellow sand
7'	9'	White sandstone
9'	11'	Yellow white sandstone



GEOLOGICAL PLAN

Scale in Kilometres

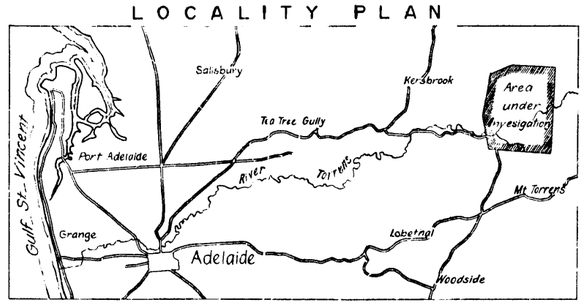
0 ¼ 0 ¼ ½ ¾ 1 1¼ 2

Scale in Miles

LEGEND

- Quaternary alluvium
- Burra Group:- Quartzites, calc-silicates, mica schists
- Kanmantoo Group:- Quartz-mica schists
- Quartzite with interbedded shales
- Mica pegmatite
- Weathered shale (white)
- BH4 Bore hole (S.A. Dept. of Mines)
- Pit or quarry
- Railway
- Disused railway
- Bulldozer scraping
- Gold digging
- 45 Dip and strike of bedding

LOCALITY PLAN



Scale in Kilometres

5 0 5 10 15 20

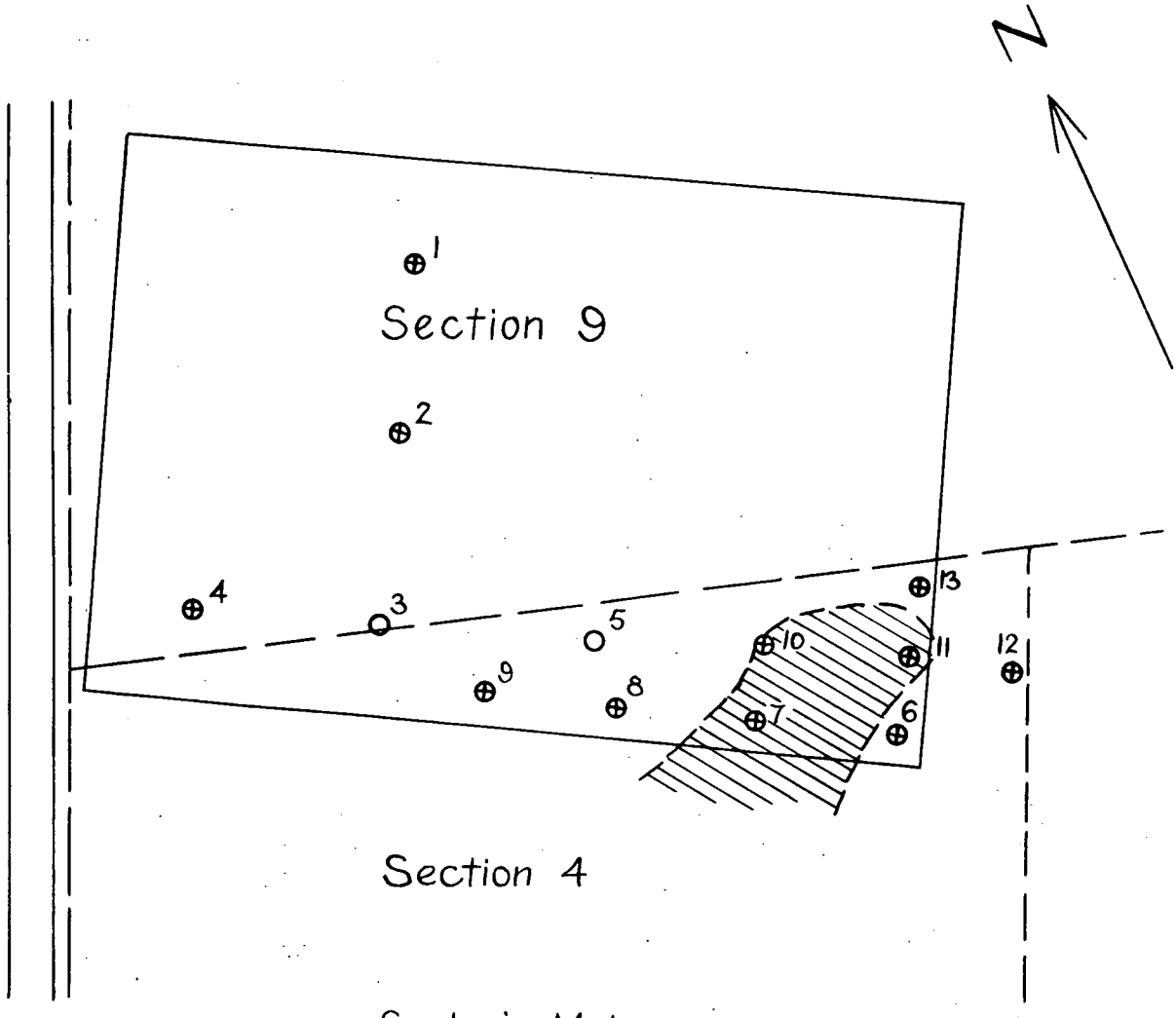
5 0 5 10

Scale in Miles

DEPARTMENT OF MINES — SOUTH AUSTRALIA

BIRDWOOD AREA
WEATHERED SHALE DEPOSITS
GEOLOGICAL AND LOCALITY PLANS

NON-METALLIC MINERALS SECTION	GEOLOGIST	Drn. S.B.	SCALE: 4 ins = 1 mile (orig.)
		Tcd. D.J.M.	72-161 Ha8
Director of Mines	SUP. GEOLOGIST	Chd. R.K.	
		Fcd.	DATE: 28 March 1972



Scale in Metres

500 0 500

1000 0 1000 2000

Scale in Feet

⊕ Existing drill holes

o Proposed drill holes

White sandy shale

This plan is drawn from a plan prepared by P.G.H. Industries

MINERAL RESOURCES SECTION	**DEPARTMENT OF MINES – SOUTH AUSTRALIA**	Scale: 1 IN. = 880 ft (app.)
Compiled: S. B.	WEATHERED SHALE DEPOSITS – BIRDWOOD AREA	Date: 1 MAY 1972
Drn. D.J.M. | Ckd. R.H.	P.G.H. BORES ON M.C. 5292	Drg. No. S 9803
	LOCALITY PLAN	Ha 3
	SECTIONS 4 & 9 HD. TALUNGA	

1M–2.70 A1810

PLATES

Fig. 1
9638

Pit A, Section 6397, Hd. Talunga - owned by Newbold Refractories. View looking north.

Fig. 2

Lens of weathered shale in western face of quartzite quarry. View looking north.

Fig. 3
9640

Quartzite quarry 1/4 mile northeast of Birdwood
View looking north.

Fig. 4

Weathered shale in pipeline cutting west of Birdwood.
View looking west.

Fig.5 Weathered shale in roadcutting one mile west of
9642 pit A. View looking west.

Fig.6 Disused pit, one mile east of Birdwood.
9643 View looking north-east.

Fig.7 Old gold mining shaft, 1¼ miles north-east of pit A.

9644

Fig.8 Pit B, Section 4, Hd. Talunga - owned by

9645 P.G.H. Industries.

View looking east.

Fig.9 Bulldozer scrapings, Section 4, Hd. Talunga.

~~9647~~
9646

View looking south.