DEPARTMENT OF MINES
SOUTH AUSTRALIA

DRILLING-COMPLETION REPORT

WHITE-CLAY DEPOSIT, BIRDWOOD

Section 6397, Hd. Talunga, Co. Adelaide

- Newbold General Refractories Ltd., -

by

R. TARVYDAS
GEOLOGIST
NON-METALLIC MINERALS SECTION

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Rept.Bk.No. 68/50
G.S. No. 4201
D.M. No. 1621/66

16th April, 1969

Figure 1. Drilling diamond-core hole DH 3. October - November, 1966, Birdwood White-Clay Deposit, Section 6397, Hd.Talunga.

Figure 2. Face of Birdwood White-Clay Quarry, November 1966. Note contact between white-clay horizon (light grey) and overlying quartzite (dark grey.)

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ABSTRACT

Burra Group argillaceous and arenaceous slates have been converted into white clay, and sandstone partly into quartzite. Seven diamond-drill holes were put down through the clay and sandstone for a total of 540ft., the core recovery being 83 percent. In two holes, white clay extends to 30.5ft. and 109 ft. below the clay-quarry floor, a maximum thickness of 68ft. of sandstone was intersected.

INTRODUCTION

Section 6397, Hd. Talunga extends over part of a gently rounded hill located two miles north of Birdwood. It carries moderately heavy timber and is gazetted as a Temporary Timber Reserve with mineral rights reserved to the Crown. From before 1870 the area was worked for gold as evidenced by the many shafts and underground workings. Clay mining began before 1938 by the S.A. Portland Cement Co., and the operations were later taken over by Jarvis Industries Ltd. In 1966 the clay was being worked from an open-cut in the south-western portion of Mining Lease 2951. More recently another open-cut has been established in the sandstone on the adjoining Mining Lease 2917 (see accompanying plan 69-116 for locations).

In 1966, Newbold General Refractories Ltd. the present owners of the quarry, retained the Department of Mines to carry out a programme of diamond-drilling. This work was supervised by Mr. K. Steggles, Raw Materials Manager of the Company. Departmental geological assistance was confined to a stadia survey (carried out by J. Erkelens, Assistant Surveyor and the author) of the two quarries, the drill sites and some shafts (see plan 69-116) Survey data on plan 69-116 are not all claimed to be precisely accurate, being a compilation of

the work of several previous surveys, but are regarded as the best possible fit.

The drilling programme consisted of seven holes drilled with a diamond-core drill between 26th October and 15th November, 1966, at sites selected by the Company. Total footage drilled was 540ft. of which 444ft. 10in. (83%) was recovered as core. The core was logged by Mr. Steggles, and sent to the Company's Beverly plant for laboratory testing. Borelogs and Laboratory data, obtained from the Company, and compiled in its present form by the author, are attached as appendices.

In addition, four channel samples were cut from the clay quarry face by the Company.

This report, incorporating the latest results of drilling, is based on an unpublished compilation of data by G.F. Whitten, of the Dept. of Mines, in 1962.

PREVIOUS INVESTIGATIONS

The first geological mapping of the deposit was carried out by Ridgway who inspected several underground openings recorded the results of five drill holes and defined the geological setting. (Ridway, 1951). A further inspection and calculation of reserves based on a stadia survey is given in Ridgway (1953).

Reserves were reassessed by Wade who mapped all existing workings and prepared a surface-contour plan. A programme of auger-boring was commenced but could not be completed because of the hard 'porcellaneous' nature of the clay in some areas. (Wade, 1954)

Four cable tool holes were drilled by the Department of Mines in November, 1953 for the then leaseholder, D.H. Jarvis of Jarvis Industries Ltd., (Dept. Mines docket D.M. 140/49; no report issued). The holes were drilled in the "New Open-Cut" which has since been enlarged, but their exact locations are not known (see attached plan, and plan S 7184). Borelogs compiled by A.A. Gibson, Senior Geologist are attached in Appendix 1.

In 1962 G.F. Whitten of the Department of Mines appaised the deposit to locate new reserves for open-cut mining and prepared a surface plan and a set of geological cross sections (docket no. 1223/60.) The work, which has not

been formally assembled, provides the basis for the plan accompanying this report. Whitten's plans have been sealed down and incorporate new data.

GEOLOGY

Except for some dip-and-strike measurements in the vicinity of the two operating open-cuts, no new geological data are presented. What follows is mainly a summary of Ridgway (1951, 1953) and Wade (1954).

Slates, mica schists, quartzite and sandstones belonging to the Burra Group have been folded into a structural terrace which contains a saucer-shaped depression. The regional structural trend is northerly, and a minor fold plunging at least 19° towards the north has been mapped by the author near drill-hole DH3.

The upper part of the structural depression is occupied by sandstone which has been silicified to quartzite in places. At least 68ft. thick in the centre, the sandstone thins towards the east, south and west. It is mostly friable and is stained brown in places, especially near the surface. Clay lenses up to 10ft. thick are present within the sandstone in places.

The sandstone rests on a horizon of clays which appear to be weathered argillaceous and arenaceous slates; relict bedding in the chy is evident from observable changes in compositional and texture. Some of the clay has been hardened by secondary kaolinization. Brown and red staining of various intensities is common, so that the white clay has to be worked selectively.

Towards the edges of the basin relatively unaltered rocks crop out. In the east, slates with interbedded sandstones dip at moderate angles in an easterly direction. On the western and southern edges mica-schists are exposed.

RESULTS OF DRILLING

The main lithologies intersected in the latest drilling are generalised below. More detailed logs are contained in Appendix 1.

DH1

0 - 2ft.	WHITE CLAY, sericitic.
2 - 10ft.	OFF-WHITE to WHITE CLAY with fawn staining and banding.
10 - 11ft.	WHITE CLAY similar 0-2ft.
11 - 30.5ft.	OFF-WHITE to WHITE CLAY with pink, purple and brown laminations; some sections stained brown.
30.5 - 45ft.	BROWN CLAY, plastic with zones of white clay;
45 - 51ft.	OFF-WHITE CLAY with mauve-fawn tinting.

DH2

0 - 8ft.	OVERBURDEN, partly silty.
8 - 79ft.	WHITE CLAY, stained in parts.

DH3

0 - 56ft.	SANDSTONE, quartzose in parts; brown 0-43ft., elsewhere white; kaolin vein 48-48.5ft.
56 - 58ft.	FAULT BRECCIA of sericitic schist and crystalline quartz in white, kaolinitic matrix.
58 - 75ft.	KAOLIN, off-white with some interbands of fawn clay; plastic in some parts.
75 - 84ft.	KAOLINISED CLAY tinted to heavily stained brown.
84 - 90.5ft.	OFF-WHITE to WHITE CLAY, in parts tinted fawn.
90.5 - 95.5ft.	†SILICEOUS HORIZON (no[illegible] core)
95.5 - 109ft.	OFF-WHITE to WHITE CLAY, some fawn-brown staining.

DH4

0 - 15ft.	WHITE CLAYSTONE
15 - 59.5ft.	WHITE CLAY, similar DH2, 8-79ft.

DH5

0 - 5ft.	RUBBLE
5 - 15ft.	WHITE CLAYSTONE.
15 - 80ft.	WHITE CLAY, similar DH2, 8-79ft.

DH6

0 - 35ft.	SANDSTONE
35 - 50ft.	WHITE CLAY, stained

DH6 (continued)

50 - 86.5ft. WHITE CLAY with section of sulphide mineralization.

86.5 - 101.5ft. GREY CLAY.

DH7

0 - 30ft. SANDSTONE, with band of white clay 23-24ft. interval.

30 - 40ft. RED-BROWN CLAY with quartzite inclusions.

40 - 68ft. SANDSTONE.

SUMMARY AND CONCLUSIONS

The following features emerge from the drilling:

(1) White clay extends to a possible 109ft. below the floor of the clay quarry.

(2) White clay occurs as pockets in coloured clay, and vice versa, as observed in Ridgway, 1953.

(3) Little of the white clay is without slight staining or light discolouration.

(4) Some of the clay has been kaolinized by processes secondary to the formation of the clay.

(5) In places the contact between the overlying sandstone and the clay is brecciated.

(6) The maximum thickness of the sandstone is at least 68ft.

(7) The sandstone has interbands of white clay (DH7, 23-24ft.), brown clay, (DH7, 30-40ft.) and kaolin, (DH3, 48-48.5ft.)

(8) The sandstone is stained over some sections, e.g. DH3, 0-43ft.

(9) Sulphide mineralization has been detected in DH6, 50-86.5ft.

(10) Judging from the minor fold near DH3, and the variation in dips recorded in several holes, the structure may be more complicated than that of a simple basin.

REFERENCES

RIDGWAY, J.E. 1951. Birdwood Clay Deposit. Min. Rev. (Adelaide) 91: 130-133.

RIDGWAY, J.E. 1953. Birdwood Clay Deposit. Min. Rev. (Adelaide) 95: 72-74.

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RT:CC:JKD
15.4.1969

APPENDIX 1

Logs of 1. Diamond-drill Holes Nos. 1-7

2. Channels Nos. 1-4

3. Drive in old open-cut, east of Main Quarry

4. Cable-tool Holes Nos. 6-9, drilled December, 1953.

by

K.R. STEGGLES

rearranged by

R.K. TARVYDAS

Courtesy: Newbold General Refractories Limited.

For locations of drill-holes and sample-channels see plan 69-116

LOG OF DIAMOND-DRILL HOLE NO.1 (DH1)

BORE SERIAL NO. 650/67

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: 995.7ft. DEPTH: 51ft. ATTITUDE: Vertical

LOGGED BY: K.R. STEGGLES DRILLER: JENSEN DATE DRILLED: 26th & 27th October, 1966.

DEPTH (FEET) From	To	DESCRIPTION
0	2	WHITE CLAY light, powdery; contains very fine, silvery, sericitic material; no bedding structures visible; core mainly broken.
2	4.5	OFF-WHITE CLAY with fawn stainings, coarser than above; staining along bedding in some sections, but across bedding over interval 2.5-3ft.; red-brown and black kernel of limonite at 3.75ft; bedding planes at 45° to core-axis; some well cored pieces, but loose lumps prevalent.
4.5	7	OFF-WHITE CLAY similar above but less discoloured; some thin bands of very white clay with a very fine silvery, sericitic appearance when rubbed; core broken to 6ft. thence well cored.
7	10	WHITE CLAY similar above; but with subhorizontal bands of fawn-cream plastic clay 1/16 to 1/4 inch thick; superimposed in some sections a darker fawn-brown discolouration but less severe than in above sections; mainly well cored but some sections broken.
10	11	WHITE CLAY similar 0-2ft; soft, powdery, medium-grained; much very fine sericite; bedding not distinctive; mainly well cored.
11	12.5	OFF-WHITE CLAY medium-grained; distinct light pink-brown speckled discolouration along bedding planes which dip at 30°; very well cored.
12.5	15.5	OFF-WHITE to WHITE CLAY medium-grained, soft, friable; very fine sericite present; slight fawn and light pink-brown discolourations present; core mainly broken; beddi.. dip at 15.5ft., 40°.
15.5	18	OFF-WHITE CLAY medium-grained to fine-grained; slightly harder then above; very well cored.
18	22.5	OFF-WHITE CLAY with sections coloured light brown-pink and fawn-brown; more friable, more plastic and coarser -grained than above; brown limonite kernel at 20.5ft. bedding dips 20° at 18ft., 25° at 22ft.; very well cored to 22ft., thence broken.
22.5	25.5	WHITE CLAY similar above, but less discoloured and softer; higher content of plastic white-clay fragments. Core broken to 23.5ft., thence entire.

DH 1 (continued)

DEPTH (FEET) From	To	DESCRIPTION
25.5	30.5	WHITE TO OFF-WHITE CLAY similar 15.5-22.5ft., but brown and purple-brown banding more distinct, 1/16 to 1/8 inch thick; at 26ft. and 29ft. iron kernels with associated fawn staining; bedding dips 10° at 25.5.ft., 15° at 28.5ft.; mainly very well cored.
30.5	45	BROWN, PLASTIC CLAY with zones of white clay, some of which similar 25.5-30.5ft; brown zones vary in colour from light brown to deep brown and have fine needles of white clay roughly oriented along bedding planes; the white zones have rounded pieces of white clay giving sections a speckled appearance; contact between brown and white zones irregular, with bulbous interpenetrations; the only staining 30.5-32ft., fawn-brown and red-brown on original brown and white; latter section also has small bands of very white, soft, powdery clay; bedding dips 25° at 31ft., 30° at 33.5ft., 30° at 36ft., 10° at 40ft. 0° at 41ft., 30° at 45ft., core: 30.5-33.5ft. well cored; 33.5-36ft. large broken lumps, reasonably well cored; 36-45ft., very well cored; many varieties of material present 30.5 - 45ft., e.g. 36-37.5ft. very coarse grain. 40-41.5ft. faulted; material platy, ashen in colour; lower 1ft. light, porous, medium-grained material.
45	51	OFF-WHITE CLAY with very light mauve-fawn tint; some sections with light brown striated clay mottled white similar 30.5-45ft; core broken to 46ft., thence mainly well cored.

END OF HOLE 51 FEET. CORE RECOVERY 100% (DRILLER)

LOG OF DIAMOND-DRILL HOLE NO.2 (DH2)

BORE SERIAL NO. 658/67

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD.

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: 1050.2ft. DEPTH: 79ft. ATTITUDE: vertical

LOGGED BY: K.R. STEGGLES DRILLER: JENSEN DATE DRILLED: 3-7th November, 1966

DEPTH (FEET) From	To	DESCRIPTION
0	8	OVERBURDEN; about 2ft. of silt recovered.
8	79	WHITE CLAY stained in some parts; becoming harder and siltier towards base.
		END OF HOLE 79ft.

CORE RECOVERY (FEET)

FROM	TO	DISTANCE	CORE RECOVERED
0.0	2.7	2.7	-
2.7	5.0	2.3	0.7'
5.0	6.7	1.7	?1.5
6.7	10.7	4.0	4.0
10. 7	15.7	5.0	5.0
15.7	16.7	1.0	1.0
16.7	18.0	1.3	1.3
18.0	23.0	5.0	5.0
23.0	32.2	9.2	?9.2
32.2	36.5	4.2	?4.2
36.5	40.0	3.5	?3.5
40.0	45.0	5.0	5.0
45.0	49.0	4.0	4.0
49.0	53.8	4.8	4.8
53.8	56.8	3.0	?
56.8	58.8	2.0	2.0
58.8	62.0	3.2	3.2
62.0	66.0	4.0	4.0
66.0	70.0	4.0	4.0
70.0	72.0	2.0	2.0
72.0	75.0	3.0	3.0
75.0	79.0	4.0	4.0

LOG OF DIAMOND-DRILL HOLE NO.3 (DH3)

BORE SERIAL NO. 651/67

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.:1033.3ft. DEPTH: 109ft. ATTITUDE: Vertical

LOGGED BY: K.R. STEGGLES DRILLER: JENSEN DATE DRILLED: 28th Oct. - 2 November,1966.

DEPTH (FEET) From	To	DESCRIPTION
0.0	43.0	SANDSTONE fawn-brown to red-brown; friable, porous; bedding difficult to distinguish from joints; assumed bedding dips: 40° at 2ft., 30° at 8ft., 40° at 15ft., 20° at 18ft., 15° at 23ft., 35° at 33ft., 30° at 38ft., 25° at 43ft.,
43.0	48.0	SANDSTONE whiter than above; in parts cemented to glassy quartzite; some joints clay-filled; bedding dip 15° at 46ft., 10° at 48ft.
48.0	48.5	KAOLIN off-white, pure.
48.5	56.0	SANDSTONE similar 43.0 - 48.0ft., assumed-bedding dips; 60° at 50ft., 40° at 53ft., 40° at 55ft.,
56.0	58.0	?FAULT BRECCIA; two inches of core consisting of fragments of sericite schist and pink crystal-quartz set in off-white, kaolinitic matrix;
58.0	60.0	KAOLIN white; some bands of discontinuous, green sericitic crystal-quartz; ?bedding-dip 45° at 60ft.
60.0	63.0	KAOLIN off-white, with very light fawn-tinted, wish-like striations giving effect of mottling; some green sericitic matter and odd lumps of crystal quartz; reasonably well cored; bedding dip 35° at 62ft.
63	67	KAOLIN off-white, with bands of silt-sized kaolinised material; odd lumps of crystal quartz; core of small fragments with some larger fragments; bedding dip of the order of 10°; 65-90ft. core mainly small fragments with some larger pieces.
67	70	KAOLIN, plastic; off-white and light fawn interbands; pink and fawn-brown staining between 69 and 70ft., mainly well cored with some broken sections.
70	73	KAOLIN off-white brittle and slightly powdery; with some interlaminations of light fawn clay; odd lumps of crystalline quartz; mainly well cored with some broken sections.
73	75	PLASTIC KAOLINITIC CLAY similar 67-70ft; contains high proportion deep red-brown and fawn-stained clay; some bands of drier, friable, off-white kaolin; mainly well cored with some broken sections.
75	82	KAOLINISED CLAY, medium-grained, arenaceous; mainly off-white, tinted fawn; sections heavily stained with ferric

DEPTH (FEET) From	To	DESCRIPTION
75	82	oxide to fawn-brown colour with development of concretionary limonite kernels; some sections whiter, fissile,friable,very well cored.
82	84	KAOLINISED CLAY coarse-grained, slightly gritty; heavily stained a light fawn colour; very well cored.
84	85	OFF-WHITE CLAY with parts tinted fawn; medium-grained, $0ft. friable; very well cored.
85	87	WHITE CLAY pure, even-textured; core very broken.
87	90	OFF-WHITE CLAY, similar 84-85ft., core broken; bedding dip of the order of 10° over interval 65-90ft.
90	90.5	WHITE CLAY similar 85-87ft.
90.5	95.5	No core; return water indicates a friable siliceous horizon.
95.5	109	OFF-WHITE to WHITE CLAY with some fawn-brown staining and limonite kernels to 105ft., heavier staining 105-109ft., hard, medium-grained to coarse-grained; silty bands throughout. Section 95.5-97ft., a softer whiter variety with some crystalline quartz fragments.
		END OF HOLE 109ft.

CORE RECOVERY (FEET)

From	To	Distance	Core Recovered	From	To	Distance	Core Recovered
0	2.7	2.7	0.7	56.0	61.0	5.0	2.0
2.7	5.0	2.3	0.3	61.0	64.5	3.5	3.5
5.0	10.0	5.0	3.2	64.5	67.0	2.5	?0.5
10.0	13.0	3.0	3.0	67.0	70.0	3.0	3.0
13.0	18.0	5.0	1.0	70.0	75.0	5.0	5.0
18.0	23.0	5.0	2.0	75.0	80.0	5.0	5.0
23.0	28.0	5.0	?nil	80.0	85.0	5.0	4.0
28.0	33.0	5.0	0.5	85.0	90.0	5.0	5.0
33.0	38.0	5.0	1.0	90.0	94.0	4.0	?nil
38.0	43.0	5.0	3.0	94.0	99.0	5. 0	4.0
43.0	47.0	4.0	3.0	99.0	104.0	5.0	4.0
47.0	49.2	2.2	2.2	104.0	109.0	5.0	4.0
49.2	51.0	1.8	1.8				
51.0	53.0	2.0	2.0				
53.0	56.0	3.0	3.0				

LOG OF DIAMOND-DRILL BORE HOLE NO.4 (DH4)

BORE SERIAL NO. 659/67

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: 1000.2ft. DEPTH: 59.5ft. ATTITUDE: Vertical

LOGGED BY: K.R. STEGGLES DRILLER: KRUZE DATE DRILLED: 4-7 Nov.1966

DEPTH (FEET) From	To	DESCRIPTION
0	15	WHITE CLAYSTONE hard, flint-like.
15	59.5	WHITE CLAY, stained in parts, similar hole No.2, 8-79ft.
		END OF HOLE 59.5ft.

CORE RECOVERY (FEET)

From	To	Distance	Core Recovered
0.0	2.5	2.5	2.0
2.5	5.0	2.5	2.2
5.0	26.5	21.5	18.2
26.5	59.5	33.0	32.5

LOG OF DIAMOND-DRILL HOLE NO. 5 (DH5)

BORE SERIAL NO. 667/67

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: 1009.4ft. DEPTH: 80.5ft. ATTITUDE: Vertical

LOGGED BY: K.R. STEGGLES DRILLER: JENSEN DATE DRILLED: 8-10 Nov. 1966

DEPTH (FEET) From	To	DESCRIPTION
0	5	RUBBLE, including sandstone.
5	15	WHITE CLAYSTONE, hardened.
15	80·5	WHITE CLAY, similar hole No. 2, 8-79ft.
		END OF HOLE 80ft.

CORE RECOVERY (FEET)

From	To	Distance	Core Recovered
0	2.7	2.7	Nil
2.7	5.0	2.3	1.3
5.0	10.0	5.0	5.0
10.0	15.0	5.0	5.0
15.0	20.0	5.0	5.0
20.0	25.0	5.0	5.0
25.0	30.0	5.0	5.0
30.0	34.3	4.3	4.3
34.3	38.3	4.0	4.0
38.3	43.3	5.0	5.0
43.3	46.7	3.4	3.4
46.7	50.0	3.3	3.3
50.0	52.0	2.0	2.0
52.0	56.7	4.7	4.7
56.7	61.7	5.0	5.0
61.7	62.5	0.8	0.8
62.5	65.0	2.5	2.5
65.0	70.0	5.0	2.5
70.0	74.5	4.5	2.5
74.5	80.5	5.0	5.5

LOG OF DIAMOND-DRILL HOLE NO.6 (DH6)

BORE SERIAL NO. 668/67

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L: 1009.6ft. DEPTH: 101.5ft. ATTITUDE: Vertical

LOGGED BY: K R. STEGGLES DRILLER: KRUZE DATE DRILLED: 8-11 Nov.1966

DEPTH (FEET) From	To	DESCRIPTION
0	35	SANDSTONE
35	50	WHITE CLAY with staining.
50	86.5	CLAY, harder towards base; sections with sulphides marcasite or pyrrhotite with arsenopyrite.
86.5	101.5	GREY CLAY (driller's notes)
		END OF HOLE 101.5ft.

CORE RECOVERY (FEET)

From	To	Distance	Core Recovered
0	5.0	5.0	0.7
5.0	10.0	5.0	5.0
10.0	15.0	5.0	5.0
15.0	16.5	1.5	1.5
16.5	21.5	5.0	2.8
21.5	26.5	5.0	4.4
26.5	30.2	3.7	3.5
30.2	34.2	4.0	3.5
34.2	38.2	4.0	3.6
38.2	43.2	5.0	5.0
43.2	48.2	5.0	5.0
48.2	53.3	5.0	5.0
53.2	58.2	5.0	5.0
58.2	61.5	3.3	3.3
61.5	66.5	5.0	5.0
66.5	71.5	5.0	5.0
71.5	76.5	5.0	5.0
76.5	81.5	5.0	5.0
81.5	86.5	5.0	5.0
86.5	91.5	5.0	5.0
91.5	96.5	5.0	5.0
96.5	101.5	5.0	5.0

LOG OF DIAMOND-DRILL HOLE NO.7 (DH7)

BORE SERIAL NO. 674/67

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: Approx.985ft. DEPTH: 68ft. ATTITUDE: Vertical

LOGGED BY: K.R. STEGGLES DRILLER: KRUZE DATE DRILLED: 14-15 Nov. 1966.

DEPTH (FEET) From	To	DESCRIPTION
0	23	QUARTZITIC SANDSTONE.
23	24.5	WHITE CLAY, micaceous, stained in parts; with quartzite inclusions.
24.5	30	QUARTZITIC SANDSTONE.
30	40	RED-BROWN CLAY, micaceous, with high quartzite contamination.
40	68	QUARTZITIC SANDSTONE.
		END OF HOLE 68ft.

CORE RECOVERY (FEET)

From	To	Distance	Core Recovered
0	5.0	5.0	0.5
5.0	9.0	4.0	1.5
9.0	11.0	2.0	1.7
11.0	14.0	3.0	2.6
14.0	19.0	5.0	3.4
19.0	24.0	5.0	2.5
24.0	27.8	3.8	2.5
27.8	31.8	4.0	2.3
31.8	36.8	5.0	3.5
36.8	40.0	3.3	1.7
40.0	42.0	2.0	0.4
42.0	45.0	3.0	0.7
45.0	47.0	2.0	2.0
47.0	50.0	3.0	nil?
50.0	52.5	2.5	2.5
52.5	55.0	2.5	2.5
55.0	57.5	2.5	2.2
57.5	60.0	2.5	2.5

LOG OF CHANNEL NO. 1

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

LOGGED BY: K.R.STEGGLES DATE SAMPLED: Nov. 1966.

SAMPLE NO.	THICKNESS (FEET)	DESCRIPTION
	?10	SANDSTONE, quartzose, stained brown.
B1/66 (underlying above)	3.75	WHITE CLAY, moderately hard, passing to very hard CLAYSTONE at bottom; faintly banded; minor quartz grains scattered over basal section; quartz veinlets upper 1ft., whirls and striations of recrystallised kaolin in basal section.
B2/66 (underlying above)	3.75	WHITE to LIGHT FAWN CLAY with white interbands; hard upper section, elsewhere soft; laminations throughout, tending finer (1/16 inch) in lower section; recrystallised white, concretionary-type striations within white, interbands of the upper section.
B3/66 (underlying above)	6	LIGHT FAWN CLAY with some white bands; 1/8 in. - 1/16 in. laminae of varying shades of fawn; softer than above, fissile.
B4/66 (Underlying; above)	4	CLAY, coloured RED, BROWN and YELLOW throughout, at times preferentially along bedding planes; laminated from 1/16 - 1inch; in places irregular veinlets of recrystallised white clay and quartz intersecting bedding. Scree to quarry floor.
		LOG OF CHANNEL NO. 2
	5	SANDSTONE, quartzitic, (nearly removed by stripping)
B5/66 (Underlying' above)	3.5	WHITE CLAY, wet, plastic, brittle on drying; tending to semi-claystone with quartz veinlets at base; indistinct laminations apparently recrystallised kaolin.
B6/66 (Underlying above and 8' to SW.	3	FAWN CLAYSTONE with fine WHITE and FAWN laminations; fine grey-green micaceous and finely siliceous material along bedding plane near base.
B7/66 (Underlying above)	6	CLAY-SHALE soft, layered, FAWN, WHITE, BROWN and PINK, finely laminated towards base; greenish micaceous material on some bedding planes;
B8/66 (Underlying above)	10.5	Light FAWN CLAY with white interbands; fine dark yellow-brown banding in middle of section; fine to coarse quartz grains in lower section.
	4	Scree to quarry floor.

LOG OF CHANNEL NO.3

SAMPLE NO.	THICKNESS (FEET)	DESCRIPTION
B9/66 same sequence as B8 but 25ft. W.	10.5	WHITE CLAY, hard, brittle; in composition similar to B8/66; when wet, very plastic and soft.

LOG OF CHANNEL NO.4

B11/66	0.3	CLAY-SHALE, stained fawn-brown; soft, friable, fissile.
	3.1	WHITE CLAYSTONE with faint banding; a few patches softer clay-shale tinted fawn in some places; some quartz veinlets and grains.
B12/66 (underlying above)	3.4	OFF-WHITE CLAY, banded, very slightly stained; hard, brittle at top, tending softer with depth.
B13/66 (underlying above)	9.5	OFF-WHITE CLAY, with slight pink staining along some bedding planes and some joint planes; soft, powdery; laminated, with bedding-plan fissility.
B14/66 (underlying above)	4.8	FAWN CLAY-SHALE, severely stained; laminated; becoming coarser.
B15/66 (underlying above, and 30ft. away)	4	WHITE CLAY-SHALE laminated, soft, powdery.

LOG OF DRIVE IN CORNER OF OLD PIT EAST OF QUARRY

30ft. inside drive; channel sample over 6 feet thickness.

B10/66	6	KAOLIN CLAYSTONE, hard, off-white, with patches of red, pink and purplish-pink hue.

LOG OF CABLE-TOOL HOLE NO.6 (CH.6)

BORE SERIAL NO.593/53

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD (DM.140/49)

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: approx.1020 DEPTH: 30ft. DRILLER: WILSON (D.M.)

LOGGED BY: A.A. GIBSON ATTITUDE: Vertical DATE DRILLED: 7-12 November, 1953

DEPTH (FEET) From	To	DESCRIPTION
0	5	White kaolinitic clay with much irregular pale greenish-grey mottling, patches and streaks.
5	7	Ditto but with patchy ironstaining also.
7	11	Off white kaolinitic clay with irregular iron staining throughout, waxy lustre in places.
11	11'2"	White to pale greenish-grey kaolinitic clay with irregular large fragments of clear quartz.
11'2"	17'5"	Pale greenish-grey to off-white kaolinitic clay with patchy ironstaining throughout.
17'5"	18'10"	White to off-white kaolinitic clay, slight ironstaining in places.
18'10"	19'6"	Pale greenish-grey to off-white kaolinitic clay with moderate iron staining.
19'6"	19'9"	Off-white kaolinitic clay, moderately iron stained, numerous fragments of clear quartz.
19'9"	23'0"	Off-white to pale grey kaolinitic clay with a few pockets of limonite and some iron-stained patches, waxy lustre.
23'0"	25'	Off-white and pale grey kaolinitic clay mixture slight ironstaining in places.
25'	28'6"	Pale grey and off-white kaolinitic clay with some pockets of limonite and a few ironstained patches.
28'6"	30'	Pale grey and off-white kaolinitic clay with feeble iron staining in places.

END OF HOLE 30ft.

LOG OF CABLE-TOOL HOLE NO.7 (CH.7)

BORE SERIAL NO.594/53

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD (DM.140/49)

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: approx. 1020 DEPTH: 30ft. DRILLER: WILSON (D.M.)

LOGGED BY: A.A. GIBSON ATTITUDE: vertical DATE DRILLED: 9-10 Dec., 1953

DEPTH (FEET) From	To	DESCRIPTION
0	2	Off-white to very pale grey kaolinitic clay, faint iron-staining.
2	4	Weakly ironstained off-white kaolinitic clay.
4	7	Off-white to very pale grey kaolinitic clay with 2 very feeble lengthwise streaks of dark brown limonite.
7	10'6"	Off-white to pale buff kaolinitic clay with weak iron-staining in patches.
10'6"	11'	Heavily ironstained kaolinitic clay with some very dark red ferruginous material.
11'	15'6"	Pale greenish grey and off-white kaolinitic clay with moderate ironstaining in patches.
15'6"	21'8"	Pale greenish-grey to off-white kaolinitic clay with weak patchy ironstaining throughout.
21'8"	27'4"	Pale greenish-grey and off-white kaolinitic clay with moderate to strong patchy ironstaining.
27'4"	30'	Pale greenish grey kaolinitic clay with feeble ironstaining.

END OF HOLE 30ft.

LOG OF CABLE - TOOL HOLE NO.8 (CH.8)

BORE SERIAL NO. 595/53

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD (DM.140/49)

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: approx. 1020 DEPTH: 20ft. DRILLER: WILSON (D.M.)

LOGGED BY: A.A. GIBSON ATTITUDE: vertical DATE DRILLED: 10-11 Nov., 1953

DEPTH (FEET) From	To	DESCRIPTION
0	20	Mixture of pale greenish-grey, off-white and white kaolinitic clay with a little feeble patchy ironstaining.

END OF BORE 20ft.

LOG OF CABLE-TOOL HOLE NO. 9 (CH.9)

BORE SERIAL NO.600/53

PROJECT: WHITE-CLAY DEPOSIT, BIRDWOOD (DM.140/49)

SECTION: 6397 HUNDRED: TALUNGA COUNTY: ADELAIDE

R.L.: approx. 1045 DEPTH: 83.5ft. DRILLER: WILSON (D.M.)

LOGGED BY: A.A. GIBSON ATTITUDE: vertical DATE DRILLED: 14-23 Nov., 1953

DEPTH (FEET) From	To	DESCRIPTION
0	19'10"	Friable salmon-pink sandstone, little clay.
19'10"	28'6"	White clay with very coarse quartz grit.
28'6"	34'6"	Off-white kaolinitic clay, weakly iron-stained, some rutile, a little fine black mineral
34'6"	38'	Gritty and heavily ironstained patches in white clay.
38'	38'6"	Gritty ironstained clay with glassy quartz vein.
38'6"	40'	Heavily ironstained coarsely gritty clay.
40	46'6"	Lightly to moderately ironstained kaolinitic clay, a little grit in places.
46'6"	50'	White, off-white and pale grey kaolinitic clay.
50'	51'3"	Lightly ironstained kaolinitic clay, a little fine grit in places. Quartz vein at 50'8".
51'3"	51'9"	Pale grey, white and off-white kaolinitic clay.
51'9"	53'6"	Kaolinitic clay with light purple ironstaining and a small pocket of dark purplish ironstone.
53'6"	57'	Feebly ironstained white, off-white and pale grey kaolinitic clay, quartz vein at 56'9".
57	60	Moderately ironstained kaolinitic clay with some coarse quartz grit.
60	66'6"	Pale greenish-grey mottled white and off-white kaolinitic clay with a few narrow ironstained bands containing a little quartz grit.
66'6"	70'6"	White kaolinitic clay with some pale greenish-grey patches. A little ironstaining at 68'6".
70'6"	80	Kaolinitic clay with numerous grey and lightly ironstained patches and a little quartz grit in places.
80	83'6"	White to off-white kaolinitic clay.

END OF HOLE 83ft. 6 in.

APPENDIX 2

Chemical Analyses and Firing Tests of Clay Samples from Diamond-drill Holes, Sampling Channels; etc. with comments by analyst.

Courtesy: Newbold General Refractories Limited.

COMMENTS:

Diamond Drill Core Samples:

"These samples show a range of alumina from 41% down to 27.7% in the clay type samples and a range of 3.3% down to 1.5% in apparently quartzitic samples. There appears to be some evidence of higher than normal soda content, which may indicate the presence of soluble salts in some cases.

In general it could be said that the material represented by DH1 and DH3 would be suitable chemically for general application as Birdwood clay, notwithstanding a lower alumina content level than the better quality available. Material of quality equivalent to DH2, DH4 and DH5 would potentially contain variable and unsuitable material and could not be considered for high alumina fireclay work. However, if separation is possible and if total consumption of the products of the quarry is essential, the material may be useable in more siliceous mixtures."

Samples B1/66 to B5/66:

"Of these samples B1/66, B2/66, B3/66 and B5/66 are chemically satisfactory and have adequate fusion point. Their plasticity is possibly considered normal compared with that currently being used at Beverley Works. The shrinkages and bik densities are somewhat variable but an examination of the brickettes indicates that the reason for this may be in the preparation of material for moulding and moulding itself. Fundamental particle size may also be involved.

In summary these four are considered a satisfactory highalumina material for use in Beverley mixes as currently used and for the manufacture of a high alumina grog of medium density.

Sample B4/66 contains series iron spotting which would effect the appearance of brick produced and should be avoided for high quality production. However, a minor percentage would not effect the general quality as represented by B1/66, B2/66, B3/66 and B5/66."

Samples B6/66, B7/77, B9/66 and B10/66:

"Each of these are significantly lower in alumina content than the above and should preferably be segregated in use. Differences in shrinkage are apparent, but again some influence of material preparation and method of manufacture is evident. Sample B6/66 appeared to have only a coarse quartz contamination and otherwise was satisfactory. Sample B7/66 was iron spotted in similar fashion to Sample B4/66. Samples B9/66 and 10/66 showed the presence of soluble salts and this has been estimated as water soluble soda. Sample B8/66 has been discarded as top quality material because of the presence of a small amount of water soluble soda which was relected in contamination of the surface."

Description of burnt briquettes: (hand-moulded)

"B1/66 White - hard with extensive surface crazing emenating from coarse quartzy grains which are evident on the brick surface.

B2/66 Cream White - hard - appears to be closer to vitrification than (1) and surface cracking is not as severe.

B3/66 White - hard and quite tight. Less evidence of quartz grains.

B4/66 Cream - with black iron spotting and severe cracking. Quite hard but has poor sound and appearance of lower grade fireclay material.

B5/66 Intermediate between 1 and 2 in external appearance but appears to be tighter than 2 and has a better ring.

B6/66 Cream and fairly hard but edges are crumbly and extensive crazy cracking. Quartz grains evident on surface, and interior of briquettes is very crumbly and deficient in fines and/or clay.

B7/66 White - Cream with small amount of iron spotting (less than 4) and only minor surface cracking. Somewhat similar to 4 but better in appearance and sound.

B8/66 Buff - very hard and severe surface cracking, although no coarse quartz grains are evident. Appears to be approaching vitrification, presence of small amount of soluble salts evidenced by slight scumming on corners.

B9/66 Almost identical with (8) but may be a little lighter.

B10/66 Buff - very hard and little to no surface crazing. Hard white coarse grains common and break has gritty structure. Evidence of soluble salts greater than in previous two."

APPENDIX 3

Analytical Reports on quartzite from Sandstone Quarry, Mining Lease No. 2917, Section 6397, Hundred of Talunga.

by

NEWBOLD GENERAL REFRACTORIES LIMITED

and

AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

REPORT BY NEWBOLD, 1966

Nature of Samples weathered, shattered quartzite with overall light brown tint.

Location of Samples - 1/66: top 10ft. of quarry face, eastern side of quarry entrance track.
2/66: lower 6ft. of quarry-face underlying 1/66.
3/66: material in stockpile obtained from the above quarry region; contains a high percentage of fine material created during quarrying.

Particle-size analysis

Retained by mesh.	1/66	2/66	3/66
6#	28	29	11
10#	13	16	8
20#	14	15	12
28#	7	7	9
48#	16	14	28
65#	9	7	15
100#	3	2	5
200#	6	5	8
-200#	4	5	4

All the samples were crushed to - 1/8# inch.

Chemical analysis

	1/66	2/66	3/66
Fe_2O_3	0.22	0.23	0.29
Al_2O_3	0.40	0.43	0.44
TiO_2	0.13	0.12	0.10
CaO	0.05	0.15	0.05
MgO	0.20	0.05	0.10
Na_2O	0.04	0.02	0.03
K_2O	0.24	0.16	0.34

Firing

Material was crushed and briquettes were pressed from a mix graded according to the theoretically correct coke-oven silica-sizing. The briquettes were burnt in a plant kiln in a normal silica burn.

	1/66	2/66	3/66
% linear change 105-1400°C	+7. 81	not supplied	+4.11

Sample 1/66 was consistent in appearance with regular silica bricks.

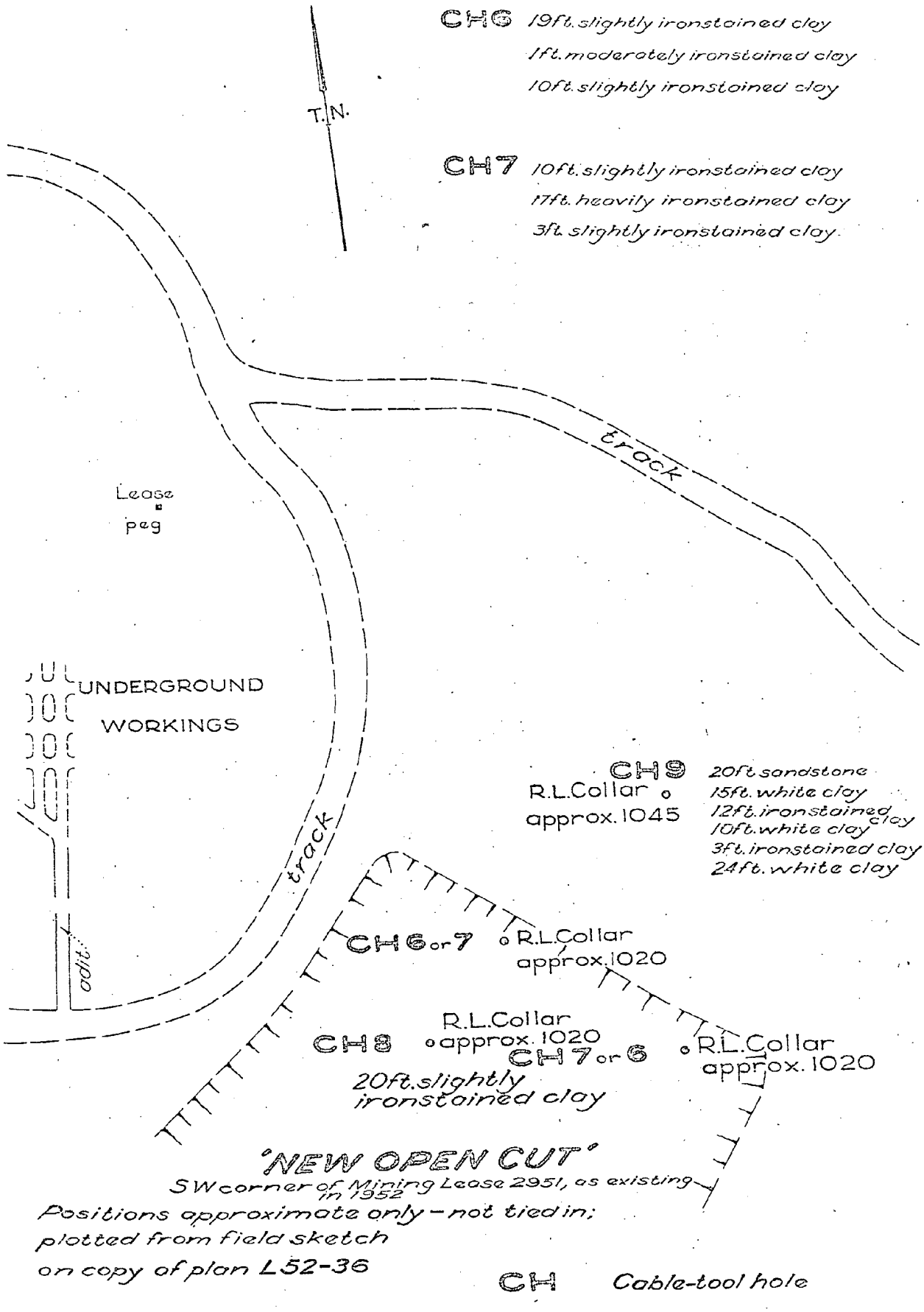
AMDEL REPORT CE 186/68

Sample of quartzose sandstone from quarry on M.L. 2917, Section 6397, Hd. Talunga; submitted by Department of Mines, Sample No. A 2021/67.

"The sample was crushed to minus 18 mesh (BSS), slurried with water and screened on 300 mesh (BSS). The undersize amounted to 7% of the weight of the original sample. It was quite white, and might have consisted largely of fine silica, rather than clay.

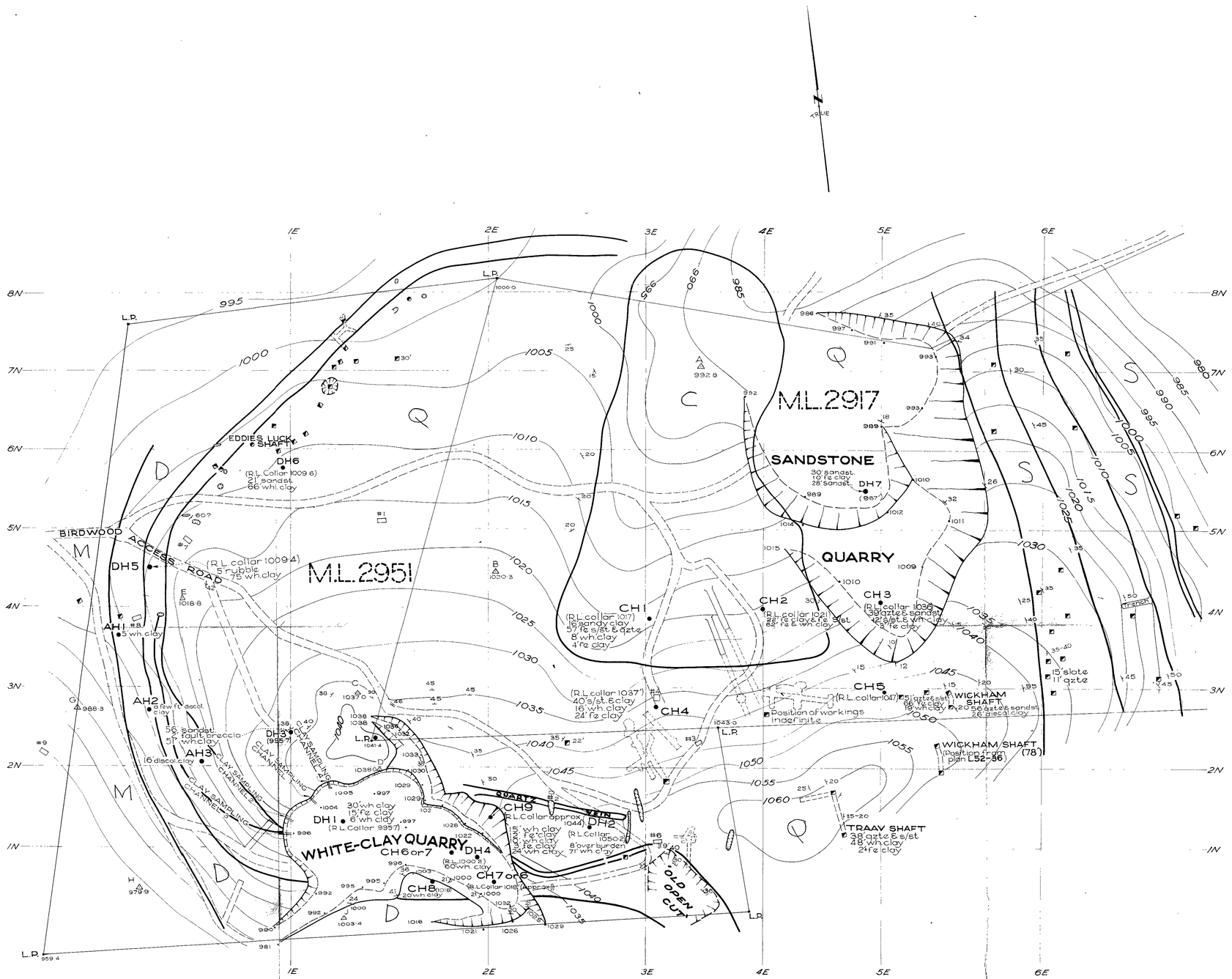
The washed silica was heated to 1650°C. After heating it was white and slightly sintered, and particles at the edges had fused to clear globules.

This material, either washed or in its original form would be suitable for use in ceramic whiteware. It should also be suitable for glass manufacture, and may be of interest to refractory manufacturers".



DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn. R.T.	BIRDWOOD WHITE-CLAY DEPOSIT	SCALE: 50ft to 1inch
	Tr. J.G.M.	SEC. 6397 HP TALUNGA	S7184
	Chd. R.T.	LOCATION OF CABLE-TOOL HOLES	H08
	Exd.	DRILLED DEC. 1953	DATE: 21·3·69
		D.M. 140/49	



LEGEND

RECENT / ADELAIDEAN

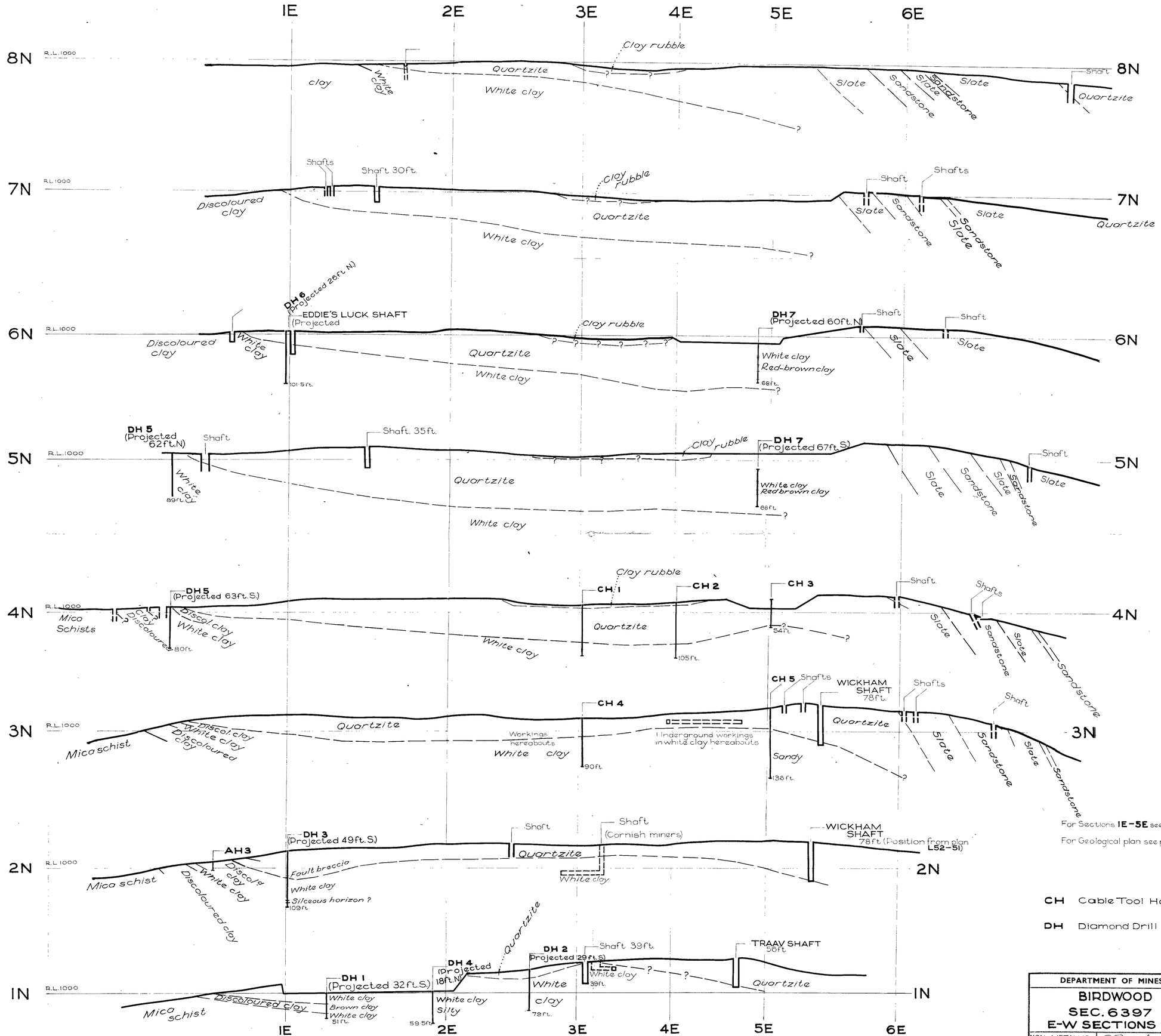
- C — Pebbly clay
- Q — Sandstone and quartzite
- (blank) — White clay
- D — Discoloured clay
- M — Mica-schist
- S — Slate

- Geological boundary
- 1E, 1N — Lines of geological section
- 40 — Strike and dip of bedding
- Qzte — Quartzite or quartzitic sandstone
- S/st — Sandstone
- Wh. — White
- fe — Ironstained
- Discol. — Discoloured
- • AH — Auger hole
- • CH — Cable-tool hole (NOTE: locations of CH6-9 approximate only)
- • DH — Diamond-drill hole (NOTE: location of DH 7 approximate only)
- Shaft (position from earlier plans)
- #9 — Shaft (position from present survey S.F.B. 398)
- Excavation
- Mound
- Underground workings (abandoned)
- Clay-sampling channel
- Survey station (S.F.B. 398, J. Erkelens)
- 995 — Surface contour (5 ft interval)
- 1009 — Spot height (feet)
- L.P. — Lease peg
- M.L.2917 — Mining Lease

DEPARTMENT OF MINES — SOUTH AUSTRALIA

BIRDWOOD WHITE CLAY
SEC. 6397 Hd TALUNGA
TOPOGRAPHICAL & GEOLOGICAL PLAN

NON-METALLIC MINERALS SECTION	GEOLOGIST	Drn. R.K.T.	SCALE: 80 feet to inch
		Tcd. G.F.J.M.	69-116
		Ckd. E.B.T.	HoB
Director of Mines	SEN. GEOLOGIST	Exd.	DATE: 4.3.69



For Sections **1E–5E** see plan

For Geological plan see plan **69–116**

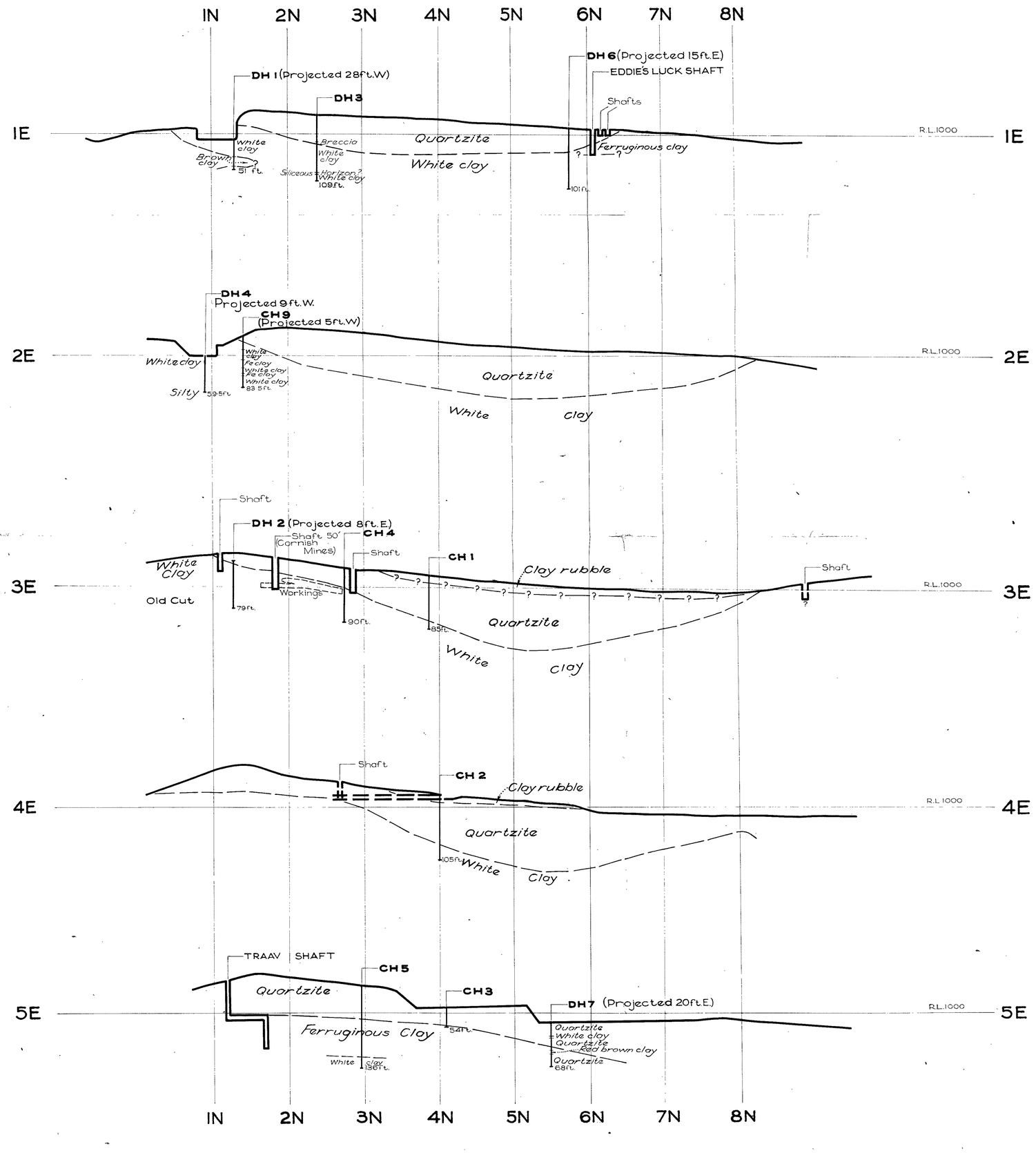
CH Cable Tool Hole

DH Diamond Drill Hole

DEPARTMENT OF MINES — SOUTH AUSTRALIA

BIRDWOOD WHITE CLAY
SEC. 6397 Hd. TALUNGA
E-W SECTIONS LOOKING NORTH

NON-METALLIC MINERALS SECTION	R. Parry-Okeden GEOLOGIST	Drn. R.K.T.	SCALE: 80 feet to 1 inch
		Tcd. G.M.	69-147
		Ckd. E.B.T.	Hd 8
Director of Mines	SEN. GEOLOGIST	Exd.	DATE: 20·3·69



For Sections **1N–8N** see plan

For Geological plan see plan **69–116**

CH Cable Tool Hole

DH Diamond Drill Hole

DEPARTMENT OF MINES — SOUTH AUSTRALIA

BIRDWOOD WHITE CLAY
SEC. 6397 Hd TALUNGA
N-S SECTIONS LOOKING WEST

NON-METALLIC MINERALS SECTION	R. Tarr GEOLOGIST	Lin. R.K.T.	SCALE: 80 feet to 1 inch
		Tcd. G.M.	69-148 Ha8
Director of Mines	SEN. GEOLOGIST	Ckd. E.B.T.	
		Exd.	DATE: 20.3.69