DEPARTMENT OF MINES
SOUTH AUSTRALIA

PRELIMINARY REPORT ON
WHITE CLAY AND TALC DEPOSIT
Section 489, Hd. Hallett, Co. Burra

- J.S. Bowden -

by

M.N. HIERN
SENIOR GEOLOGIST
NON METALLIC MINERALS SECTION

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PLAN ACCOMPANYING THE REPORT

No.	Title	Scale
S 6207	Clay and talc deposit, Section 489, Hd. Hallett.	1" = 80 chains

Rept. Bk. No. 66/20
G.S. 3882
D.M. 37/65

17th January, 1968

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SOUTH AUSTRALIA

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ABSTRACT

Firing tests have shown the presence of high quality white clay and talcose clay. The deposit is not well exposed and exploratory work is necessary before the full economic potential can be assessed.

INTRODUCTION

White clay, exposed in a railway cutting in Section 489, Hd. Hallett, was sampled by Mr. Bowden in August 1965, and submitted to the Department for identification. X-ray examination by the Australian Mineral Development Laboratories showed the sample to consist of approximately 60% illite and 40% kaolin (See Appendix 1).

The site was inspected by the author in company with Mr. Bowden on 3rd August, 1967, when representative samples were taken for ceramic investigation. Preliminary firing tests showed the clay to be of high quality and further exploration of the deposit is recommended in this report.

Mineral rights on Section 489 and the adjoining land are privately owned and mining titles must be negotiated with the owners. The land on both sides of the cutting has been cultivated for cereals and lucerne.

LOCATION AND GEOLOGICAL SETTING

The township of Hallett lies near the eastern margin of a northerly trending valley which is flanked to the east and

west by rounded hills of moderate relief. The valley floor is flat and drainage is northerly into Ulooloo Creek.

Precambrian rocks of the Adelaide System underlie the hills and the adjacent valley slopes. These have been equated with the Umberatana Group by Mirams (1964). Younger alluvial sediments fill the valley proper; a bore in the railway yard at Hallett intersected 66ft. of brown and red-brown sandy clay and interbedded gravel (Chugg, R. - unpublished report RB.57/7).

Near the western margin of the valley, approximately ¾ mile northwest of Hallett, a local creek has cut a steep bank into a low rise. A railway cutting through the rise exposes deeply weathered and contorted Umberatana Group sediments striking northeasterly and dipping to the northwest at a high angle. Approximately 5ft. of siliceous duricrust and younger transported soils overlie this formation. Restricted exposures of kaolinitic sandstone occur in the creek bank to the southwest but elsewhere bedrock is covered by soil.

Hallett is 120 miles north of Adelaide on the Terowie broad gauge railway and 70 miles by road east of Pt. Pirie.

THE CLAY DEPOSIT

The railway cutting runs obliquely across the strike of the beds and the section exposed represents only a narrow stratigraphic thickness. In addition the cutting shallows to the north and in this part only the superficial rocks are exposed.

In the western wall of the cutting, white clay (Sample A 2026/67) and talcose clay (A 2027/67) occupy the southern 100ft. A narrow band of grey claystone containing ¼ inch porphyroblasts of cream talc (Sample A 2028/67)overlies these while beyond this to the north claystone is partially exposed. Traces of clay and talcose clay occur along the creek bank to the east, but for the most part bedrock is covered by

soil. Preliminary firing tests showed the white clay and talcose clay in the southern end of the cutting to be of high quality (See Appendix 2). The samples submitted contained excess salt and washing will be necessary for industrial use. The grey talcose clay fired a dark colour which possibly could not be improved by washing.

Yellow-brown impure talc (Sample A 2029/67) was found near the top of the bank a few hundred yards southwest of the railway cutting. Although this fired a dark colour, representative samples of the same material at depth should be tested before the suitability of this material can be fairly assessed.

The deposit now requires opening up with a bulldozer or trench digging machine to fully expose the sequence underlying the bank and provide more representative samples for full scale ceramic testing.

If this work returns satisfactory results, the deposit should be auger drilled to prove reserves.

SUMMARY AND CONCLUSIONS

The presence of high quality clay has been indicated by laboratory testing but the deposit is not sufficiently well exposed to fully evaluate its potential.

Exploratory trenching is recommended on both sides of the railway line, particularly on the eastern side, to fully expose the rock sequence present and to provide samples for full scale laboratory testing.

Talc occurs in the railway cutting and also in a small surface outcrop to the southwest. The material exposed is not satisfactory for ceramic use, but more representative samples should be obtained from depth for testing.

The exploratory work should be supervised by a geologist.

Mineral rights are privately owned and agreement must be reached with the owners before access for exploration and mining can be obtained.

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NON METALLIC MINERALS SECTION

MNH:CC:SMA
17.1.1968

REFERENCES

MIRAMS, R.C. 1964. Geological Atlas of S.A. 1:250,000 Series. Sheet Burra.

APPENDIX 1

AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

REPORT MP 564-66

YOUR REFERENCE:	Application dated 30/8/65
MATERIAL:	Clay specimen
LOCALITY:	16 miles south of Terowie
IDENTIFICATION:	P433/65
DATE RECEIVED:	2/9/65
WORK REQUIRED:	Identification

This sample consists entirely of clay, with only very minor impurities. X-ray diffraction showed that approximately 60% of the sample consists of illite, and approximately 40% of kaolin.

Investigation and Report by: D. Smale and E.C. Stock

Officer in Charge, Mineralogy Section: H.W. Fander

P. DIXON
ACTING DIRECTOR

APPENDIX 2

AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

EXTRACTS FROM REPORT CE 448/68

IDENTIFICATION

Lab. No.	Dept. No.	Section	Hundred
3117A	A2026/67 clay 1	489	Hallett railway cutting - west wall
3117	A2026/67 clay 2	489	" " "
3118	A2027/67	489	" " " talcose clay
3119	A2028/67	489	Hallett railway cutting - grey talcose clay
3120	A2029/67	489	Hallett creek bank - west of railway cutting

DESCRIPTION OF SAMPLES

2026 (1)	1	White, small quantity of grit
2026 (2)		White, small quantity of grit
2027		Off-white, very small quantity of grit
2028		Grey, very small quantity of grit
2029		Yellow, small amount of grit

EXTRUSION

The samples were ground to -18 mesh (BSS), mixed with water to a suitable consistency and extruded non de-aired to form cylindrical specimens of 1inch diameter. Characteristics of the extruded column were:

2026 (1)	Weak, short, low plasticity
2026 (2)	Weak, short, low plasticity
2027	Weak, short, low plasticity
2028	Very weak and short, low plasticity
2029	Weak, very short, low plasticity

The extruded specimens were dried at room temperature, then at 40°C andfinally at 105°C. No drying cracks were observed in any of the samples. The extrusion moisture content and the drying shrinkage are shown on Table 1.

TABLE 1: Wet-to-dry Contraction

Sample No.	Moisture as Extruded %	Linear Wet-to-dry Contraction %
2026 (1)	28.0	4.0
2026 (2)	29.2	3.0
2027	28.7	4.0
2028	26.2	4.0
2029	24.6	3.0

TABLE 2:; Firing Shrinkage, %

Sample No.	Temperature °C								
	800	850	900	950	1000	1050	1100	1150	1200
2026 (1)	0	0	2.0	2.0	2.5	2.5	4.5	9.0	12.5
2026 (2)	0	0	0	1.0	1.0	1.5	2.5	9.6	16.7
2027	0	0	1.5	1.5	1.5	1.5	3.5	9.6	17.2
2028	0	0	0	0	2.0	3.5	8.0	10	10
2029	0	0	0	0	0	0	0	1.0	4.5

TABLE 3: Cold Water Absorption %

Sample No.	Temperature °C								
	800	850	900	950	1000	1050	1100	1150	1200
2026 (1)	33.2	32.6	32.3	32.3	32.3	30.8	28.4	17.2	7.7
2026 (2)	37.9	37.3	36.6	36.6	36.4	36.0	31.3	17.2	4.7
2027	33.0	33.0	33.0	32.9	32.5	32.3	28.4	14.6	2.3
2028	34.0	33.0	32.1	30.6	28.3	24.6	16.5	6.7	2.3
2029	24.8	24.8	24.9	25.6	25.7	26.0	26.4	25.6	23.1

FIRING

The dry specimens were fired in 50° steps over the range 800-1200°C. The linear firing shrinkage is shown in Table 2 and the 24 hour cold-water absorption in Table 3. Sets of fired specimens of each sample are submitted to show the fired colour.

2026 (1) Off-white to white. Texture rather coarse. Soft to 1000°C, then becoming hard. Salt glazing appeared at 1150°C. This is the best of all the samples in colour, and washing to remove coarse material andsalt should produce a clay of very high quality.

2026(2) This is not quite so good as 2026(1). There is a slight pinkish tint at the lower temperatures, the texture is coarser and salt glazing more marked. Soft to 1100°C, but more highly vitrified at 1200°C than 2026(1). Washing however would probably produce a high quality clay from this material.

2027 Off-white to cream. Texture rather coarse. Soft to 1100°C. Short firing range and marked shrinkage at 1200°C. Salt glazing marked at 1150°C and above. Washing should produce a high-grade product from this clay.

2028 Pink to grey. Texture coarse. Soft to 1000°C. Salt glazed at 1100°C, glazed and bloated above 1150°C. This sample evidently contains a very high salt content and could not be used without beneficiation. The fired colour is poor. Washing is necessary to remove the salt, and this could improve the fired colour, although this is less likely in view of the fact that the characteristic surface iron-staining caused by salt is not present.

2029 Light red fading at 1150°C and burning yellow at 1200°C. The iron discolouration renders this talc unsuitable for use in earthenware.

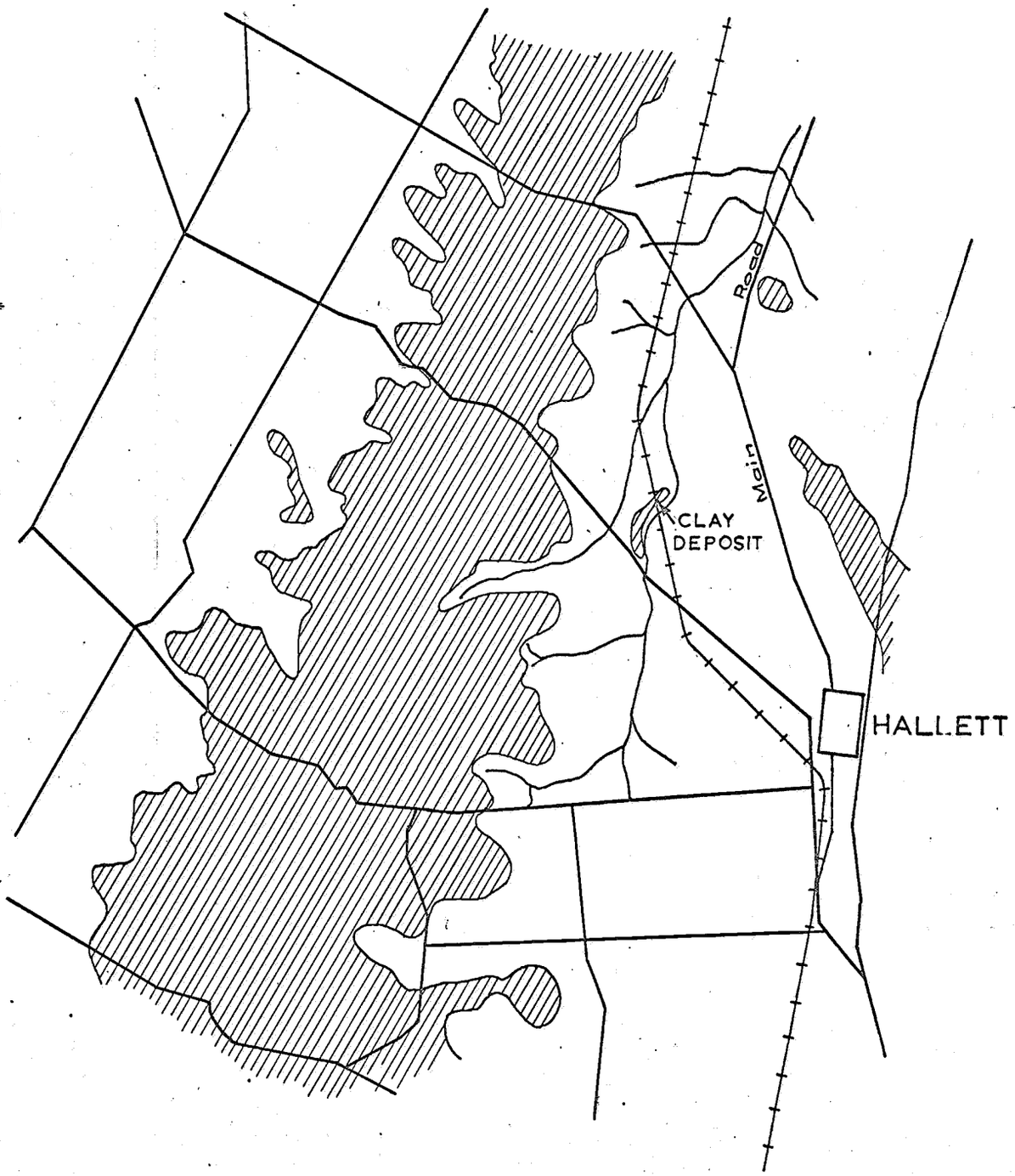
CONCLUSIONS AND RECOMMENDATIONS

1. 2026 (1) and(2), 2027. These are already a good colour, but contain excessive soluble salt.

2. 2028. Poor colour and very high salt content. Unlikely to be sufficiently improved by washing to be acceptable in whiteware.

It is recommended that all these clay samples, with the exception of 2028, should be further investigated, and in particular, that they should be washed and screened on 200 mesh, and the undersize submitted to a firing test.

No further work on 2029 is recommended.



LEGEND

Precambrian bedrock ....

Alluvial plains .....

Road .....

Railway .....

Creek .....

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	Drn. MNH Tcd. N.E. Ckd. L.V.W Exd.	CLAY & TALC DEPOSIT SECTION 489 HD. HALLETT LOCALITY PLAN	SCALE: 1 inch = 80 chains S 6207 G.e.l. DATE: 7 November 67.