DEPARTMENT OF MINES
SOUTH AUSTRALIA

TUMBY BAY TALC DEPOSIT

Sects. A^{s}. 46, 33 & 413, Hd. Yarenyacka, Co. Flinders

- Jarvis Industries Pty. Ltd. -

by

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PLANS

Plan No.	Title	Scale
3344	Tumby Bay Talc, Hd. Yarenyacka, Surface geological plan.	1" to 100'

Rept. Bk. No. 65/14
G.S. No. 3732
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DEPARTMENT OF MINES
SOUTH AUSTRALIA

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Sects. A°. 46, 33 & 413, Hd. Yaranyacka, Co. Flinders

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ABSTRACT

Increasing demand for ceramic grade talc may justify reopening of the deposit by open cut mining. Published reports and plans have been used to study production potential. Recent regional mapping has shown an alternative structural setting and detailed mapping is warranted. A moderate budget will be required to establish reserves and develop an orebody.

INTRODUCTION

Demand for both cosmetic and ceramic grade talc is increasing and Jarvis Industries, who hold ML3152 over the Tumby Bay deposit have requested an assessment of reserves and production potential.

This report has been prepared following a brief surface inspection and an office study of published reports and plans.

High quality cosmetic grade talc was mined by underground methods almost continuously from 1910 to 1956. Since then the deposit has been abandoned except for a small tonnage won from an open cut in 1962.

The accompanying plan prepared in 1946 by E. Broadhurst (1951) shows section numbers and mining titles as they existed in 1946. Since that date the following changes have been made.

Sections 60W, 60E and the western portion of Block AN have been combined to form section 412.

Sections 30, 28 and the remainder of Block AN have been combined to form section 413.

Mineral Lease 2676 has been transferred to M.L. 3152 and the various claims have been cancelled.

The mineral tenure of the various sections on which the deposit lies is as follows:-

Sections 412, 413, are leasehold land with minerals reserved to the Crown.

Section 46 and Block A* are freehold land with minerals reserved to the Crown.

Sections 24, 33 and 42 are freehold land with minerals alienated from the Crown.

Special Mining Lease 43 and several Authorities to Enter were granted over an area including the talc deposit in 1962 but the lease expired in 1963.

PREVIOUS REPORTS

Broadhurst (1951) mapped the field in 1946 when many of the workings were accessible and his report provides the main basis for the present study. Accompanying that report are the results of a detailed petrological study by Stillwell (1951).

Brief reports on the progress of mining operations were published in the Mining Review between 1911 and 1948, the most detailed being that by Dickinson (1943) in Mining Review 78.

Results of an unsuccessful attempt to diamond drill the

deposit are given in Mining Review 83.

The following Mining Reviews contain references to the Tumby Bay deposit: Numbers 14 (1911), 20 (1914), 24 (1916), 45 (1926), 78 (1943), 83 (1945) and 89 (1948).

LOCATION, HISTORY & PRODUCTION

The workings are located two miles northwest of Lipson and 7 miles due north of Tumby Bay. A secondary graded road from the deposit joins the Lincoln Highway 37 miles north of Pt. Lincoln.

Total recorded production amounts to 12,000 tons, raised between the years 1910 and 1962.

The first claim was pegged in April 1909, in Section 46 and with a later adjacent claim was converted into M.L. 2078 in March 1910. In 1923, this and other holdings in Section 46 were incorporated into M.L. 2448 by the Tumby Bay Talc Company and this lease was held until 1936.

In June 1917, the first claim was pegged in the adjacent Section A^9 and in June 1918, this was converted to M.L. 2327. It was transferred to the Snowflake Talc Company in October 1918. This area was acquired by the Tumby Bay Talc Company in April 1923, as M.L. 2449 and was held until 1936.

Minerals Pty. Ltd. acquired the main talc bodies in the former leases 2448 and 2449 in January 1937 and their holding was registered as M.L. 2676. Mineral claim 3152, taken out by Jarvis Industries Pty. Ltd. in July 1961, covers the same area as M.L. 2676.

The first claim pegged on the western line of talc bodies

was registered in August 1940, and between 1943 and 1945 five adjoining claims, extending over almost 1½ miles, were held. From 1945 onwards only one claim was held and this lapsed in 1960.

Details of claims and leases held on the field are shown in Appendix 1.

Production figures listed below are of significance in the absence of mine plans.

Production

1910	40 tons	1930	155 tons
1911	100	1931	143
1912	110	1932	173
1913	80	1933	159
1914	-	1934	198
1915	-	1935	139
1916	103	1936	145
1917	-	1937	188
1918	235	1938	175
1919	224	1939	179
1920	98	1940	197
1921	108	1941	470
1922	118	1942	479
1923	118	1943	682
1924	125	1944	495
1925	152	1945	414
1926	251	1946	608
1927	319	1947	618
1928	131	1948	520
1929	229	1949	682

Production (contd.)

1950	495 tons	1957	-
1951	489	1958	-
1952	331	1959	-
1953	383	1960	-
1954	358	1961	-
1955	283	1962	27
1956	193	1963	-

Total 11,999 tons

GEOLOGICAL SETTING

Muscovite and biotite schists strike northeasterly and dip at generally steep angles to the southeast. Enclosed in these is an elongated lens of dolomite approximately 3 miles long.

High quality talc occurs in discrete bodies which lie adjacent to and along both flanks of the dolomite lens.

On a regional scale the dolomite occupies the axis of a synclinal fold (Johns 1958) although Broadhurst (op. cit.), unable to find any evidence locally of a synclinal habit, concluded that the dolomite represented a lens in an east dipping sequence of metasediments. The structural setting of the dolomite is significant when considering extensions to the known talc bearing zone.

Between the dolomite and the surrounding schists is a zone of poor outcrop underlain by intensely sheared and altered rocks. Within this zone are the talc bodies, masses of jasper and residual bands of altered quartz schist, quartz-talc schist and talc schist showing gradations between talc and jasper, (Stillwell 1951). Pegmatites have been observed in the schists adjacent to the talc bodies and the silica necessary for both talc and jasper formation is thought to have been introduced with the pegmatites.

Both talc and jasper bodies are spatially related, although reference to the accompanying plan shows that the jasper masses are approximately conformable with the dolomite boundaries but the talc lodes strike in a slightly transverse direction. Little is known of the relative dips of talc and jasper bodies. The close relationship of jasper and talc bodies is a consequence of their common origin from introduced silica. This association may be significant in prospecting for talc bodies.

The altered zone varies in width from 150-300 feet and according to Broadhurst (op. cit.) contains much impure talc as well as the distinct talc bodies which have been mapped; the latter are lenticular in plan and probably also in section.

Although the talc bodies represent the maximum development of talc, the lodes still contain a proportion of impurities. These consist of

1. earth staining - prevalent in the upper 20 feet of the bodies; probably organic in origin and thus not deleterious to ceramic grade talc.
2. jasper bars - occur as thin bars and pockets throughout the talc, up to 3 feet in thickness.
3. rubble - finer grained jasper impregnating talc; gradational from almost pure talc to the jasper bars and massive bodies.
4. discolouration consisting of staining in various forms. The most common type is layered, often seeming to lie parallel to the walls of the talc body and consisting of chlorite or stained clay bands.

Talc is sometimes stained red and associated with red jasper. This, unlike the earth staining, is not a

surface effect. Broadhurst (op. cit. p. 112) recorded that "many of the talc bodies are reported to have passe into red stained material in winzes below the main workings."

The dip of the orebodies is not established. Broadhurst (op. cit. p. 112) recorded that "orebody A appears to dip to the east at 45° and the others seem to have an easterly dip" while Mansfield (1950) recorded a dip of 45°N.W. in workings in M.C. 923, (M.C. 552 on the accompanying plan).

TALC BODIES AND WORKINGS

Past mining has with one exception been by underground methods but no maps of the workings are available. Within the talc bodies, minable lenses of relatively pure talc were narrow, ranging up to 10 feet in width, and apparently irregularly arranged. This, combined with unfavourable physical properties of the talc, which prevented the development of large stopes, resulted in twisting openings with little semblance of order.

Talc has been worked discontinuously along almost the entire length of the dolomite and on both flanks of it. However the principal workings are in the present lease and appear to have been concentrated on orebodies A and B (see accompanying plan). The reports in the Mining Reviews record shafts to 40ft. in the vicinity of orebody B. Broadhurst (op. cit. p. 115) stated the main shaft (at 6.22 N., 0.90 E.) in orebody A to be at 40ft. In Mining Review 45 (1926) the workings were reported to go to 60ft. while in Mining Review 78 (1943) the deepest workings were

reported to go to 70 feet.

In 1962 Jarvis Industries cut an opening approximately 150ft. long and 60ft. wide in the northwestern flank of orebody A and recovered a small quantity of high grade talc. The orebody exposed in this cut shows all the features described from the underground workings. Of significance is the widespread distribution of jasper ranging in size from 1" upwards.

The outlines of the talc bodies on the accompanying plan are based on underground mapping which was made difficult because of the undulating and winding nature of the openings. Some of the shafts were inaccessible and in others the limits of the orebody were not exposed but the map is regarded as "the best interpretation of the data available" (Broadhurst, op. cit. p. 112).

The accompanying plan does not show the full extent of either the dolomite bed or the workings.

From study of the air photo it is apparent that the principal workings are located in M.C. 3152 in Section 46 and the southern part of Section A^S, and to the west on the western line of lode in Section AN (now 413) or M.C. 726 on the accompanying plan. Other groups occur to the north, adjacent to the boundary of Section AN (now 413) and A^S and to the south on the southern boundary of Section 33. The eastern and western lines of lode clearly converge towards the north, the point of intersection lying adjacent to orebody A and the workings in M.C. 726. The workings to the north in Section AN appear to be separate.

Recorded depths of workings are such as to place them as extending to at least RL. 270 whereas the lowest surface

elevation in the vicinity of the orebodies is at EL. 310.

FUTURE DEVELOPMENT

As demand exists for both cosmetic and ceramic grade talc, future mining operations could be conducted on one of the following schemes.

1. production of cosmetic grade talc . As in the past, mining would be by underground methods and the operation would be essentially on a small scale.
2. production of a single grade of ceramic talc by open cut mining operations. Would be on a relatively large scale and would take all talc exposed.
3. production of both cosmetic and ceramic grade talc by open cutting and selective mining of high grade zones. Such an operation would be on a smaller scale than 2) and would require considerably more skill and supervision.

Any plan involving open cut mining and production of ceramic grade talc must include the ability to successfully and economically treat run of mine ore to separate jasper and talc.

Plans to open cut the existing orebodies must take into account the presence of the abandoned underground workings and their effect on safety, ore reserves, and in the case of 3 above, depletion of the highest grade of talc.

In addition to, or alternatively, instead of attempting to reopen the old workings, exploration effort could be directed towards finding new orebodies for development. Operations could

be aimed at

1. the low grade zones described by Broadhurst (op. cit, p. 111) for a source of ceramic grade talc by open cut mining.
2. locating concealed high grade bodies.

Considering firstly further development of the known orebodies. From past production and the size of the orebodies, the only worthwhile sites for further development by open cut methods are orebodies A and B. The same conclusion was reached by Broadhurst.

The aerial dimensions of orebody A can be regarded as well established while the outlines for orebody B are open to the north. On orebody A, exploration should be directed towards proving the subsurface shape, dip and grade but on orebody B surface dimensions have to be proved as well.

For both safety and reserve calculations it is necessary to have the old workings located. This can be achieved either by mapping of the workings, or if they cannot be reopened, by close pattern surface drilling.

Establishing the dip of the orebodies is essential for calculating reserves available for open cutting, because of the effect of dip on the depth to which the cut can be taken. Cross sections were drawn during the office study and calculations showed approximately 14,000 tons in situ available for open cutting assuming a 45° dip to the orebody and 23,000 tons available assuming a dip of 70°. These figures should not be taken as an indication of actual reserves as they take no account of jasper bodies and the old workings.

Open cut operations will be limited to the 65ft. allowed by State Mining regulations and this is the zone from which all of the past production has come.

Re-opening to produce high grade talc from underground mining operations must be preceded by exploration to prove the continuity of the talc bodies with depth and to investigate the red staining described in the previous report.

Reports mention high quality talc left in the workings as pillars and this, if selectively mined, offers a chance of a higher return for open cut operations. However, selective mining will require special practices and supervision.

Considering all aspects, the following points are significant when considering re-opening of the old workings.

1. the old workings are a considerable handicap in their effect on working methods, safety and available reserves and a large proportion of exploration expenditure will have to be used to define them.
2. if open cut mining is envisaged, establishing the dip of the orebodies is a pre-requisite to determining available reserves.
3. if underground methods are planned, the continuity of the orebodies at depth must be proved. As the bodies are lenticular in plan, they are likely to be also in section. Also the reports of red staining at depth should be investigated, before any large capital expenditure is planned.
4. the present cut in orebody A exposes a typical cross section of the type of material likely to be encountere

in open cut operations. This includes jasper and stained patches and an acceptable grade of talc would have to be produced from material of this type. Trial separation of impurities should be carried out on a bulk sample of this material before any exploration and capital expenditure is incurred.

5. considering the dimensions of the orebodies and past production figures, orebodies A and B on the accompanying plan offer the only potential for open cut mining.

As an alternative to reopening the old workings, entirely new talc bodies could be found and developed. The following points are relevant.

1. the high grade talc bodies are lenticular in plan and probably also in section. Therefore other high grade bodies are likely to occur at depth.
2. a close relation between major jasper bodies and high grade talc bodies is apparent. The deposits have been known and worked continuously for cosmetic grade talc for nearly 30 years and it is reasonable to assume that favourable surface areas have already been explored and all high grade talc bodies occurring near to the surface have been found.
3. early reports record impure talc bodies which were not developed and these may contain ceramic grade talc.
4. recognition or a synclinal habit to the dolomite and the occurrence of talc bodies in areas of intense shearing suggests that the ends of the dolomite outcrops might be particularly favourable for development of talc bodies. Detailed mapping of the entire field is

warranted.

5. if the high grade talc bodies occur in areas of intense shearing, geophysical methods might aid in locating non outcropping zones.

6. potential talc bodies should be explored by surface trenching followed by drilling.

CONCLUSIONS AND RECOMMENDATIONS

From study of the deposit and discussions with Jarvis Industries it is apparent that a thorough feasibility study is required before any decision on reopening the deposit can be made. Knowledge of available results are fundamental data for a study of this type.

However, it can be said at this stage that a moderate budget will be needed for proving and preparation of the orebody and for development of a beneficiation process.

It is recommended that the Company make a preliminary economic study to determine the scale and type of operation necessary to meet current market demands.

If this study is favourable then detailed geological mapping should be carried out along the entire length of the dolomite to provide a basis for an exploration and development programme. This will prove reserves and provide data for a more detailed economic study of the deposit.

MNH:CAE
24.7.67

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APPENDIX 1

SUMMARY OF MINERAL TITLES ON TUMBY BAY TALC DEPOSIT

EASTERN LINE OF LODE

TITLE	NUMBER	LOCATION	HOLDER	DATES	SUCCEEDED BY
M.C.	8715	Section 46.	T.H. Smeaton	7.4.09 - ? 1909	
M.C.	8755	Section 46	N. Malcolm	26.5.09 - ?	M.C. 8949
M.C.	8802	Section A	J.H. Cooke	12.8.09 - ? 1911	M.C. 10603
M.C.	8949	Section 46	T.M. Berry	2.2.10 - 31.12.10	Part into M.L. 2078
M.C.	8956	" "	R.H. Fenwick	23.3.10 - 31.12.10	Part into M.L. 2078
M.L.	2078	" "	R.H. Fenwick	31.12.10 - 9.1.20	With other claims to
"	"	" "	Aust. Talc Co.	9.1.20 - 29.3.23	M.L. 2448 in 1923.
M.C.	10603	Section A north of M.C.10888	Dr. W. Cormack	27.6.17 - 30.6.18	M.L. 2327
M.C.	10888	" " " " " 2078	T. Partington	16.7.18 - 30.6.19	M.L. 2407
M.L.	2327	" "	Dr. W. Cormack	30.6.18 - 14.10.18	M.L. 2427
"	"	" "	Snowflake Talc Syn.	14.10.18 - 1.9.21	
M.C.	10975	Section A north of M.L. 2427	A. Elliot	24.9.18 - ? 1920	M.C.11488
M.C.	11003	Section 46 south of M.L. 2078	F. James	23.10.18 - ? 1919	M.C. 11158
M.L.	11158	" "	J. Ryan	23.9.19 - 8.3.20	
			M. Sheehan	8.3.20 - 20.7.20	M.L. 2426
			Aust. Talc Co.	20.7.20 - 30.6.21	
M.L.	2407	Section A between M.L. 2327 and M.L. 2078	T. Partington	30.6.19 - 10.2.20	
			Aust. Talc Co.	10.2.20 - 26.3.23	M.L. 2448
M.C.	11488	Section A north of M.L.2427	J. Ryan	26.10.20 - ? 1922	M.C. 552 and 1572
M.L.	2426	Section 46 South of M.L. 2078	Aust. Talc Co.	30.6.21 - 26.3.23	M.L. 2448
M.L.	2427	Section A	N.D. Harder	31.12.21 - ? 1922	M.L. 2449
			Aust. Talc Co.	1922 - 26.3.23	
M.L.	2448	Section 46 M.S. 866	Tumby Bay Talc Co.	1.4.23 - 22.10.36	Portion to M.L. 2676
M.L.	2449	Section A M.S. 865	" " " "	1.4.23 - 22.10.36	" " M.L. 2676

EASTERN LINE OF LODE

TITLE	NUMBER	LOCATION	HOLDER	DATES	SUCCEEDED BY
M.C.	12586	Section 46 south of M.L.2448	M. De Lurant	25.5.28 - 1.1.29	M.L. 2571
M.L.	2571	" " " " "	" "	1.1.29 - 18.7.34	Portion to M.L. 2676
M.L.	2676	Section 46 M.S. 865, 866	Minerals Pty. Ltd.	1.1.37 - 31.12.57	M.C. 2541
M.C.	552	Section A^s north of M.L. 2676	C. Partington	13.10.43 - 15.5.46	M.C. 923
M.C.	923	Section A^s	" "	1.10.46 - 17.5.50	M.C. 1657
M.C.	1657	" "	D.H. Jarvis	19.6.51 - 25.5.55	
M.C.	1439	Section A^n	C. Carr	2.8.49 - 28.3.55	
M.C.	1572	Section A^s north of M.C. 1657	C. Carr	25.9.50 - 14.7.52	M.C. 1783
M.C.	1783	" "	C. Carr	22.9.52 - 5.7.54	
M.C.	2541	Section 46 M.S. 865, 866	H.M. Johnson	25.2.59 - 26.10.59	M.C. 2784 on plaint
M.C.	2784	" " " " "	K. Seeman	12.11.59 - 21.7.61	M.C. 3467 on plaint
M.C.	3467	" " " " "	J.H. Jarvis	26.7.61 - 31.8.61	M.L. 3152
M.L.	3152	" " " " "	J.H. Jarvis	1.7.61 - current until 1982	

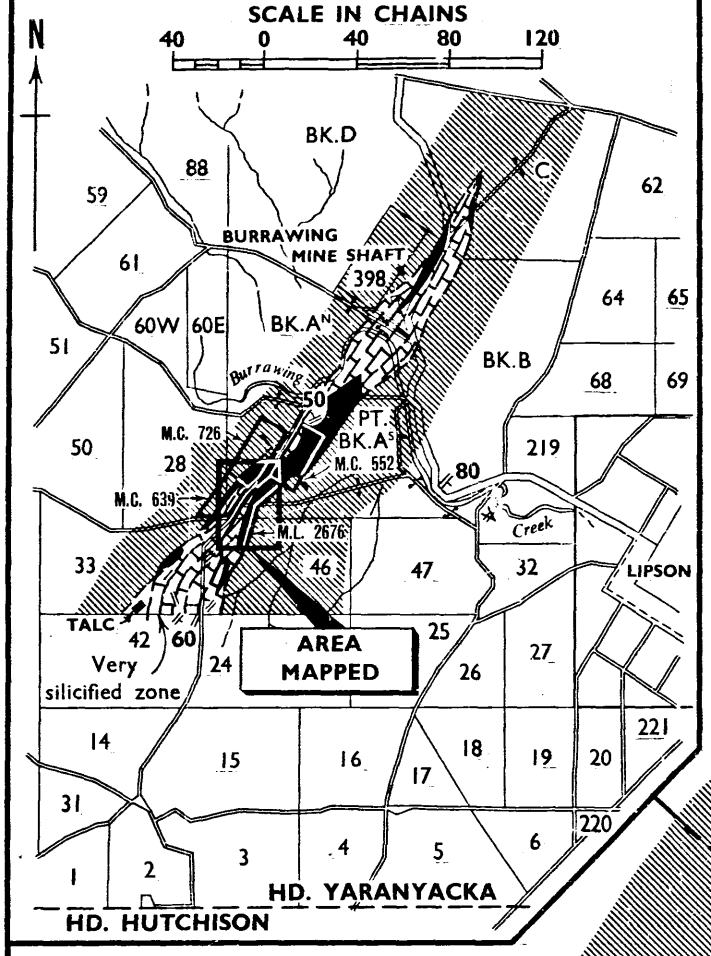
WESTERN LINE OF LODE

TITLE	NUMBER	LOCATION	HOLDER	DATES	SUCCEEDED BY
M.C.	70	A^{n} (Section)	E. Hambour	12.8.40 - 15.1.42	M.C. 498 and 499
M.C.	366	33 "	H.C. Beaty	13.12.41 - 2.9.42	M.C. 444
M.C.	444	33 "	" "	26.9.42 - 26.9.46	
M.C.	498	Section A^{n}	S.A. Mines Co.	19.4.43 - 21.6.43	(Central part is M.C. 70
M.C.	499	" " and 28	F. Drummond	" "	(to M.C. 515 and 516
M.L.	515	" "	"	(21.6.43 - 2.4.44	M.C. 609 and 610
M.L.	516	" " " "	"	" "	
M.C.	517	" 33 between M.C.516 & 444	H.C. Beaty	26.6.43 - 23.4.45	
M.C.	518	" " " " " "	"	" "	
M.C.	519	" 42	"	" "	
M.C.	609	" A^{n}	S.A. Mines Co.	2.4.44 - 6.10.44	M.C. 638, 639
M.C.	610	" " and 28	F. Drummond		
M.C.	638	" "	F. Chambers	6.10.44 - 19.5.45	M.C. 726
M.C.	639	" " " "	"	" "	
M.C.	726	" "	Tumby Bay Talc Co.	28.5.45 - 3.4.52	M.C. 1762
M.C.	1762	" "	France, Orr and Brougham	30.4.52 - 31.3.54	M.C. 1880
M.C.	1880	" "	" " "	9.4.54 - 7.3.56	2677
M.C.	2677	" "	M.A. Johnson	10.9.59 - 26.8.60	

REGIONAL GEOLOGICAL PLAN

SCALE IN CHAINS

40 0 40 80 120



LOCALITY MAP

LEGEND

Talc lodes

Schist

Dolomite

Jasper — Inset

Jasper — Enlargement

Strike and dip of bedding — Inclined 60

Strike and dip of bedding — Vertical

Strike (dip unknown)

Contours at 10 ft. intervals (arbitrary datum) 300 / 310

Mineral claim or lease boundary

Shaft

SCALE

FEET 100 0 100 200 300 400 500 600 700 FEET

3344 M.N. Hiern Senior Geologist S.A. Department of Mines

Reduce to 5 inches

16,940/1054.

SURFACE GEOLOGICAL PLAN OF
TUMBY BAY TALC HD. YARANYACKA R127

C.R.S. 3344/4
Dn 4
23-8-68