DEPARTMENT OF MINES
SOUTH AUSTRALIA

TALC
SOUTH AUSTRALIA

by

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ENVIRONMENT AND RESOURCES

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TALC

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GEOLOGICAL SETTING

Talc deposits occur in several stratigraphic units of the Cambrian and Pre-cambrian sequence in the Adelaide Geosyncline and on Eyre Peninsula. Usually the host rocks are dolomites and magnesian limestones but several talc bodies also occur in a zone of metamorphosed Adelaidean arenaceous and argillaceous rocks extending northwards for 35 kilometres from the vicinity of Gumeracha in the Mt. Lofty Ranges. In these the magnesium is considered to have been derived from biotite in the schistose host rock. This type of origin is believed to be unique.

Talc is a common associated of corcidolite and tremolite asbestos and the two minerals share a common metasomatic origin. Pegmatite and granite intrusions are present in the vicinity of most of the principal talc deposits and there is evidence that the igneous rocks are all of lower Palaeozoic age.

No talc is recorded from the ultrabasic rocks of the Musgrave Block in northwestern South Australia.

PRODUCTION AND GRADES

Recorded production of talc and soapstone from 1900 to 1971 amounts to 250 000 tonnes valued at $3.1 million. South Australian deposits have for many years supplied Australia's requirements except for small quantities of imported high grade block steatite.

Analyses of local talcs and from Three Springs in Western Australia are shown in Table 1 overleaf. The appearance and physical properties of the various South Australian talcs vary considerably as discussed by Spry et.al. (1972) following detailed laboratory testing. The Gumeracha type is characterised by over 1% ferrous iron which imparts a brown colour to fired ware.

The principal talc deposits are described in detail by Dickinson et. al. (1951). Hiern (1969 a) summarises the geological setting of the deposits and presents a comprehensive bibliography.

SOUTH AUSTRALIAN DEPOSITS

Flinders Range

Discovered in 1944, the Mt. Fitton deposits are located 130 kilometres east of Lyndhurst, a siding on the standard gauge railway, 275 kilometres north of Port Augusta. The talc bodies, which are the largest and highest grade in the State, occur in fault zones in a large lenticular body of massive dolomitic marble equated with the Balcanoona Formation of the Umberatana Group of Adelaidean age. Although several hundred separate talc veins are known within the dolomite bed, the largest and all potentially productive bodies are located around the margins on faults and minor fold structures. Sprigg (1951) considered that structural deformation would be at a maximum near the boundaries of the bed. Total pro-

duction to 1971 amounts to approximately 110 000 tonnes of which about half was first grade material used mainly for cosmetics and the remainder second and third grade. The remote location and consequent high transport costs influences the amount of lower grade talc which can be marketed.

Blissett in Coats and Blissett (1971) describes the workings. The deposits lie in the metamorphic aureole of the lower Palaeozoic granites of the Mt. Painter Block (Coats in Coats and Blissett, 1971) and the formation of talc and associated tremolite is related to metasomatic alteration of dolomite.

Further developments of Balcanoona Formation occur 60-70 kilometres to the south in the Arkaroola Syncline and also northwards from the Munyallinna Valley to just east of Arkaroola. Coats (op. cit. p.119) includes the former but not the latter in the aureole of the Mt. Painter granite. No detailed mapping has been carried out to determine whether structurally favourable zones exist in these beds. Low grade steatite associated with dolomite and magnesite near Illawartina Well (probably Illinawortina Well - Hiern 1969 a) is the only recorded occurrence in this area.

Altered dolomite with talc occurs in the Wywyana Formation at Yudnamutana and Humanity Seat Trig on the western and southern margins of the Mt. Painter Block (Coats and Blissett op. cit.) but the talc is low grade containing actinolite and iron oxide impurities.

Eyre Peninsula

At Tumby Bay, 13 kilometres north of Port Lincoln on lower Eyre Peninsula, lenticular bodies of high grade talc occur in a poorly exposed zone of quartz-talc schist and other metasediments around the margins of a narrow elongate body of dolomite. The sequence is equated with the Cleve Metamorphics. Almost continuous production was maintained between 1910 and 1956 when approximately 1200 tonnes were raised from narrow irregular underground workings. A small parcel of talc was produced from an open cut in 1962.

The dolomite is approximately 5 kilometres long and occupies the axis of a closed synclinal fold. Broadhurst (1951) examined the deposits in detail, noting that the main producing bodies were located along the eastern flank of the fold but recording talc and talcose schist in numerous shallow pits and trenches around the dolomite. The high grade talc bodies are lenticular in plan and thus probably also in section. The talc contains jasper fragments ranging from 25mm upwards and earlier mining was by hand selection of jasper free talc. An economic method of separating jasper would permit further production from known and any newly located talc bodies (Hiern 1969b).

Pale green fine grained talc is associated with serpentinous dolomitic marble, chrysotile asbestos and nephritic jade in the Cleve Metamorphics at two localities north of Cowell on northern Eyre Peninsula. In Section 110, Hundred Minbrie, Miles (1952) described small talc workings from which an earlier analyses showed 3% iron and Mason (1970) records the presence of talc bodies in Section 116, Hundred Minbrie 16 kilometres to the northeast.

Mt. Lofty Range

Bodies of coarse grained green foliaceous talc containing fine and coarse grained albite and occasional quartz veins with minor amounts of sulphide minerals occur within the Undalya Quartzite in a zone extending from Gumeracha, 40 kilometres east of Adelaide to the vicinity of Lyndoch, 35 kilometres to the north. The Undalya Quartzite, as a stratigraphic unit, here contains thick schist members. Pegmatite bodies, equated with a lower Palaeozoic intrusive granite phase, are common in the district. The deposits are described by Dickinson (1951). Their genesis is discussed by Stillwell and Edwards (1951) who relate talc and albite formation to metasomatic processes associated with igneous activity of which the pegmatites are an expression. Magnesium was provided either wholly or in part from biotite in the schistose country rock.

The deposits are attractive because of their proximity to rail and sea transport, and to Adelaide, but Spry et al (1972) have shown the talc to be generally of low to medium grade with consequent lower value. Apart from an appreciable amount of iron in the crystal lattice which effects the physical properties, the near surface portion of the talc bodies contains superficial iron staining on frequent joints. Present production is mainly from underground workings at Gumeracha below the zone of iron staining. The largest body in this area inferred by Dickinson (1951 Plate 111) in Sections 6200, 6261 and 6323, Hundred Talunga, is still largely unexploited and, if the material in the iron stained cap could be disposed of, offers a potential large tonnage of talc available for open cut mining close to markets. Deposits have been worked in the Lyndoch area and more recently a kaolin-talc body within which malachite and

azurite occur has been opened up to the north at Gomersal (Nicol 1973).

A talc-vermiculite body over 30 metres wide is being worked for 'asbestine' in Section 1800 Hundred Nuriootpa, 3 kilometres north of Lyndoch. Since 1955 over 2500 tonnes valued at $28 000 gave been produced for use in paint manufacture. (Note this production appears in published records as asbestos). The material has had no detailed laboratory examination but differs from the Gumeracha type in appearance. Host rocks lie in a diopside-actinolite metamorphic zone in the Woolshed Flat shale stratigraphically below the Undalya Quartzite.

Minor production of third grade talc has previously been recorded from narrow veins in an altered saccharoidal marble equated with the Cambrian Hawker Group from Section 228 Hundred Hellicoe, 5 kilometres northwest of Truro. (Johns 1962). More recently investigations have revealed argillaceous talc bodies of apparent considerable size in the same rocks several kilometres to the north. Tremolite, often in fibrous asbestos form, is also present. The deposits are almost totally concealed by soil and few details of exploration results are available, except for an initial drilling programme by Olliver (1967).

Examination of off-white foliaceous talc from a small high purity pocket showed the talc to be difficult to grind by normal milling methods but attrition grinding could produce a talc of high quality. A product containing 50% talc could be won by open cut mining. This area has good exploration potential.

MID NORTH

Impure gritty talc is imposed in a cutting for the standard gauge railway near Yongala, 70 kilometres east of Port Pirie. Preliminary laboratory testing of drill samples showed the talc, after separation from free quartz and feldspar grit impurity, to be of good white colour and low in iron. The talc is associated with a large mass of altered and deformed dolomitic limestone in an area of mature topography and poor outcrop. Thus concealed bodies could exist.

Numerous other small deposits are known which are summarised by Hiern (1969a).

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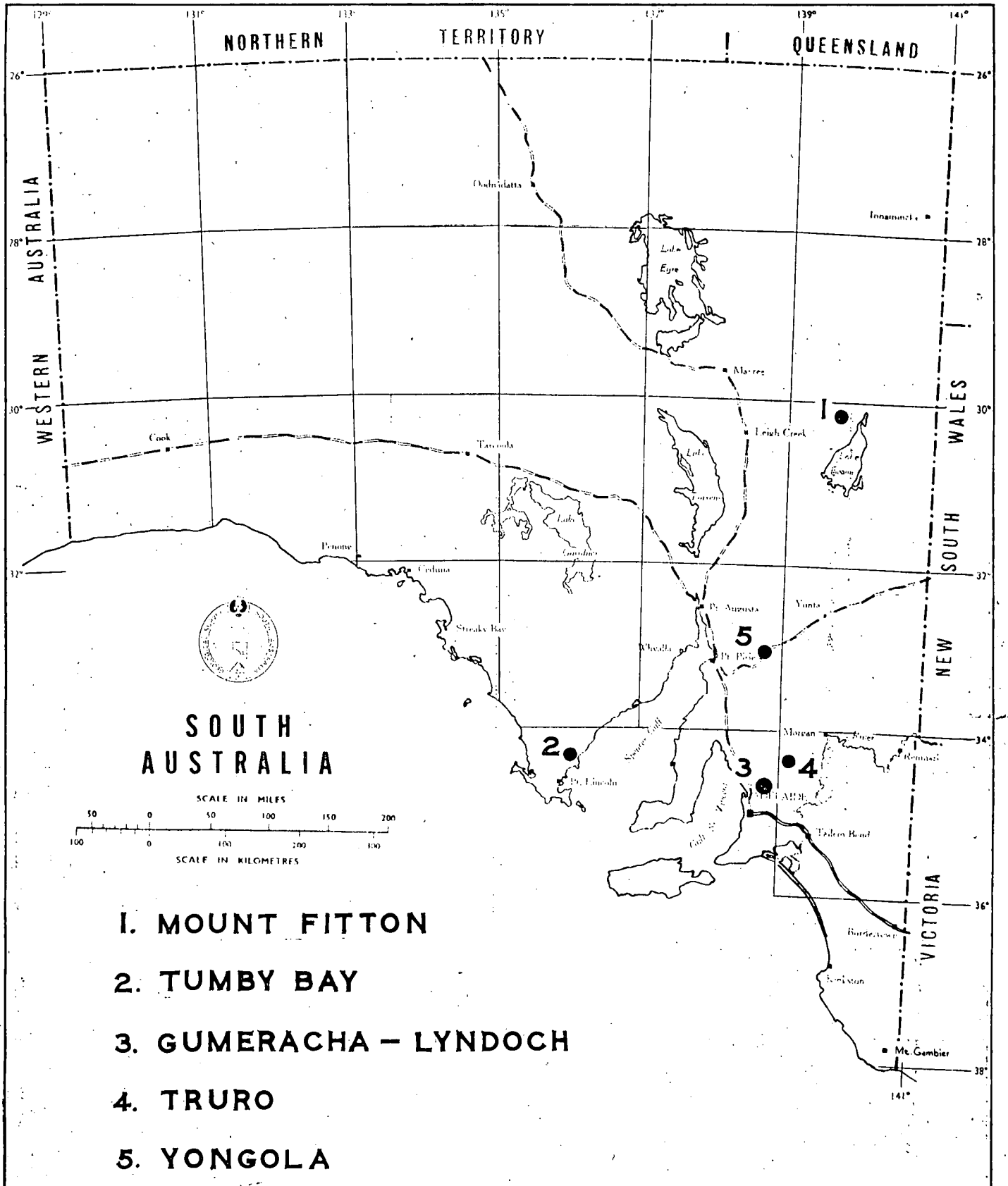
TABLE 1

ANALYSES OF TALC

Theoretical composition SiO_2 63.5; MgO 31.7; H_2O 4.8

SiO_2	60.3	63.1	64.2	61.0	52.92	62.2	70.3	62.08
Al_2O_3	1.50	3.8	0.87	0.43	5.79	0.7	10.8	0.46
Fe_2O_3	0.01	0.22	0.12	0.43	0.58	0.07	0.2	0.08
FeO	0.47	1.84	0.22	1.78	3.14	0.05	0.57	0.77
MgO	30.9	23.8	29.5	29.4	28.94	31.7	9.95	31.33
CaO	0.14	0.14	0.20	0.21	0.08	0.1	0.25	0.04
Na_2O	0.03	2.25	0.26	0.05	0.92	0.03	0.1	0.31
K_2O	0.01	0.03	0.01	0.21	0.10	0.25	2.4	0.01
TiO_2	0.12	0.32	0.07	0.39	0.14	0.02	0.58	0.01
MnO	0.01	0.01	0.04	0.02	-	0.02	-	0.01
CO_2	0.50	0.25	0.04	0.10	-	-	0.15	0.06
SO_3	0.03	0.03	0.04	-	0.02	-	-	-
Cl	0.01	0.01	0.34	-	-	-	0.04	-
H_2O+	5.60	3.90	4.77	5.10	6.93	4.95	6.1	4.68
H_2O-	0.15	0.19	0.61	0.66	0.14	-	-	0.33

1. Mt. Fitton. First Grade. Stockpile Rosewater plant. AMDEL analysis.
2. Gumeracha. First grade - underground workings - hand picked. AMDEL analysis.
3. Tumby Bay. First grade - open pit, hand picked. AMDEL analysis.
4. Lyndoch - best green - hand picked. AMDEL analysis.
5. Cowell. Section 110 Hd. Minbrie. Min. Rev. 92:18.
6. Truro - High grade pocket. Section 325, Hd. Belvidere. AMDEL analysis.
7. Yongala - impure gritty talc. AMDEL analysis.
8. Three Springs W.A.



SOUTH AUSTRALIA

1. MOUNT FITTON
2. TUMBY BAY
3. GUMERACHA – LYNDOCH
4. TRURO
5. YONGOLA

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