DEPARTMENT OF MINES

SOUTH AUSTRALIA

B A R I T E

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Rept.Bk.No. 74/33
G.S. No. 5349
D.M. No. 715/72

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DEPARTMENT OF MINES

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BARITE

REGIONAL SETTING

Reid (1969) in a systematic study of Barite deposits recognised eight Australian provinces, "defined geographically and by age of host rocks", of which the Olary Archaean Province, The Flinders Range Proterozoic Province and the Adelaide - Truro Proterozoic Province lie in South Australia. The two former provinces were considered as genetic types.

Production has been recorded from deposits in Precambrian and Cambrian rocks in seven districts in the State, four of these being extensions of Reid's provinces. Barite has also been reported from the younger cover rocks; as barite cemented "biscuits" and "buns" in the upper portion of Permian glacial beds underlying Tertiary rocks at Hallett Cove, 20 km south of Adelaide (Mawson, 1907), in similar form from Jurassic sand on the southern margin of the Great Artesian Basin (Hiern pers. observation); in veins associated with the Coorikiana Sandstone (Cretaceous) on OODNADATTA and as nodules and fragments on BILLAKALINA (Williams, 1972).

Regional studies have shown relatively high values of barium at particular stratigraphic horizons within the Adelaide Geosyncline. Thomson (1965) describes a marked association of Ba and Mn base metal elements in calcareous sediments near the base of the Cambrian sequence and Nixon (1967) records barite and barito-calcite in the lead-ore zones in basal Cambrian limestones at Ediacara.

Purple shales of the Wilpena Group (Marinoan), particularly the Brachina Formation, are the most common host rocks for barite lodes in the Flinders Range and also at the old Noarlunga mines south of Adelaide. Barite veins also occur in purple shales at some other stratigraphic horizons in the geosyncline.

The association of barite with purple shales of Marinoan age in the Flinders Range, particularly where the sequence is thin, was recognised by Horwitz (1962) who considered the source of these sediments to be the Gawler Block to the west. Reid (op. cit) records the presence of barite veins in Gawler Range Volcanics on the eastern end of the Gawler Block and proposes these rocks as the source of barite veins in overlying Pandurra Formation sediments.

In the Flinders Range, several deposits lie adjacent to diapiric piercement structures. The veins contain quartz, iron oxides and small amounts of pyrite and chalcopyrite making the barite usually only suitable for drilling muds. These contaminants generally decrease with increasing distance from the diapir. Blissett (1970) proposed a lower Palaeozoic age for the Moralana deposit near Hawker, noting that the barite veins cut across folded upper Adelaidean sediments.

At Mt. Serle, (Ridgway, 1953) and Corunna (Reid op. cit.) barite veins become increasingly contaminated with quartz in both directions along strike, eventually grading into quartz veins.

Further detailed study is necessary to clarify the genesis of barite veins. It is suggested that in the Flinders Range, barite was deposited from low temperature solutions passing along channel ways opened during diapiric emplacement or other tectonic events, with barium possibly derived from adjacent favourable country rocks. Some zoning of contaminant minerals around the diapirs is evident.

In the Adelaide area some small deposits are associated with meridional faults which were active in the Tertiary. The presence of

barite cemented sands at Hallett Cove immediately below Pliocene sediments indicates that barium rich solutions were active in the Tertiary and Tertiary age of these deposits is not precluded.

In the Olary district, barite occurs in large masses, contaminated by iron oxides, silica and sulphide minerals, in Lower Proterozoic metasediments. These deposits are pre-Adelaidean in age and represent a distinct genetic type.

PRODUCTION AND GRADES

Total recorded production amounts to 383 000 tonnes valued at $4.04 million. From an average of 4500 tonnes per year prior to 1959, production increased to a mean 13 000 tonnes per year in the period 1960-1967 with a further major increase to an average of 31 000 tonnes per year from 1968-1972. Annual fluctuations in production are related to drilling activity, particularly in southern Australia.

Table 1 below shows total recorded production from the various districts, illustrating the importance of the Flinders Range area where barite mining commenced in 1940. The Noarlunga mines near Adelaide produced a significant amount of industrial grade barite in the period 1920-1952.

Flinders Range	295 000 tonnes	
Mt. Lofty Range	66 000 "	(Noarlunga 58 000 tonnes)
Julia Creek	11 000 "	
Olary area	6 000 "	
Corunna district	2 000 "	
Pernatty Lagoon	1 600 "	
Oladdie	1 400 "	
TOTAL	383 000 tonnes	

TABLE 1. TOTAL PRODUCTION OF BARITE.

Most published analyses of industrial grade barite show $BaSO_4$ in excess of 92% with the balance being chiefly SiO_2. More recently,

following Reid (op. cit), analyses have revealed 2-5% $SrSO_4$ which was previously included as $BaSO_4$.

Iron oxides are the principal contaminant affecting colour, which reduces barite to oil drilling grade.

FLINDERS RANGE

Approximately 40 occurrences of barite have been recorded in the Flinders Range between Hawker and Blinman. They are all lode type deposits filling fractures in Adelaidean and in a few cases Cambrian rocks. Many are located in close proximity to diapiric structures, particularly the Oraparinna diapir on PARACHILNA, and in these the barite contains iron oxides and some sulphides making the ore suitable only for drilling muds.

The largest deposit is the Oraparinna or Bunkers Mine located in a faulted wedge of unaltered sediments 3 km northeast of the margin of the Oraparinna diapir. Host rocks are thinly bedded siltstones and shales of the Brachina Formation which in the mine area strike northwesterly with low to moderate dips to the northeast. Six sub parallel lodes or groups of lodes strike northeasterly and dip generally steeply to the south east. The largest group is the No. 1 or Mine Lode system, comprising two major lodes diverging southwards and connected by several link veins (Gibson, 1957). Although the lode shears originate from structural movements, stratigraphic control is evident from the abrupt termination of lodes when they pass from siltstone into a quartzite which occupies the crest of the Bunkers Range. The lodes have been worked from open cuts and from 4 levels which reach to 140 m below the surface outcrop. Ore shoots are up to 180 m long, ranging up to 5 m in width and averaging 1.6 m. Total ore reserves amount to 122 500 tonnes of industrial grade barite with 175 500 tonnes of inferred ore. Additional reserves exist in the adjacent Robert Lode

(Hiern and Olliver, 1973).

Several deposits occur on the margin of the Oraparinna diapir, the largest being Linke's, which strikes in an easterly direction at the contact between diapiric breccia and slates of the Tapley Hill Formation. It has a length of 1.2 km and has been worked by open cut over a length of approximately 200 m (Reid, 1970). The northern wall dips steeply and is well defined, with barite containing siderite and quartz extending for an average of 3.5 m to the south and passing into slates cut by barite veins. The ore is mainly of oil drilling grade.

Other deposits of similar character to those referred to above are described by Mansfield (1947), Reid (1970) and Gerdes (1973).

ADELAIDE DISTRICT

A series of parallel lodes extend for approximately 2.75 km in Marinoan purple slates near Noarlunga, 30 km south of Adelaide. Barite was won from underground workings to a maximum depth of 80 m vertically below the surface. The lode channels dip steeply east, parallel with country rock bedding and comprise a series of irregular lenticular ore shoots up to 3 m wide connected by thin veins. Iron staining was common below 7 m from the surface but production of 58 000 tonnes of first and second grade industrial barite is recorded up to 1952 when working ceased. Diamond drilling (Government Drilling Operations 1942) below the deepest workings to the north showed only narrow lodes. Inefficient mining methods in the central portion of the field resulted in some ore becoming inaccessible to mining.

Elsewhere in the ranges, small lodes were worked at many localities recorded by Jack (1928) and described by Kingsbury (In Gerdes 1973).

JULIA CREEK DISTRICT

Narrow veins have been owrked in purple slates of Marinoan and Sturtian age at several localities over a distance of 16 km between Eudunda and Truro, 80 km northeast of Adelaide. (Jack, 1928, Gerdes,

1973). Maximum recorded vein width was 3 m. A particularly high grade barite (98.98% $BaSO_4$ and 0.38% SiO_2) was reported from near Dutton and also from the Newlands Deposit (Fleming 1967).

CORUNNA DISTRICT

Reid (1969) records three deposits in the Iron Knob - Whyalla area and also refers to barite veins within the Gawler Range Volcanics. A deposit near Mt. Whyalla, from which 2200 tonnes of barite were produced between 1938 and 1967, is described by Cornelius (1941). The Gawler Ranges offer a potential exploration target in view of the large area of outcropping Gawler Range Volcanics which are possible source rocks for barium. Prospecting on the margins of the ranges will be restricted by younger cover sediments.

PERNATTY LAGOON

Patches of high quality barite were described by Ward and Jack (1917) from the floor of Pernatty Lagoon, 110 km northwest of Pt. Augusta. The form of occurrence was indistinct but appeared "to be that of a long lode, relatively narrow with bulges at intervals". An analysis (Nichol 1973) showed 95.9%, $BaSO_4$ 2.61% $SrSO_4$, 0.06% SiO_2 and 0.05% Fe_2O_3. The deposit is considered to be a normal vein type fracture filling in Adelaidean sediments, similar to other deposits in the area, which coincides with the lake floor. Reserves are estimated at 16 000 tonnes per vertical metre.

OLADDIE DISTRICT

Several barite lodes up to 4 m wide occur in a Burra Group dolomitic sequence near a diapiric crush zone 30 km north of Orroroo. (Winton 1925). The deposit was recently worked for oil drilling mud but excess quartz reduced the specific gravity.

Other veins are reported in the area.

OLARY DISTRICT

Masses of barite, up to 30 m wide and contaminated by quartz, iron oxides, pyrite and chalcopyrite, occur at 5 localities in an arenaceous calc-silicate unit referred to as the Ethiudna Group, in Lower Proterozoic metasediments of the Olary Province (Campana & King, 1958).

The Mt. Mulga Deposit, located 20 km north of Olary, is currently being worked. Mansfield (1949) calculated reserves of 1900 tons per vertical foot (5 400 tonnes/vertical metre) in the largest No.1 lens, with a similar amount in the four subsidiary masses.

Earlier workers considered the deposits to be of the bedded replacement type, barium being introduced in association with pegmatites post dating the main phase of metamorphism, but Reid (1969) favoured a pre-metamorphic sedimentary origin with some reconstitution during metamorphism.

Barite is a constituent of quartz - fluorite veins cutting Adelaidean meta-sediments, 8 km south of Mutooroo (Olliver 1973).

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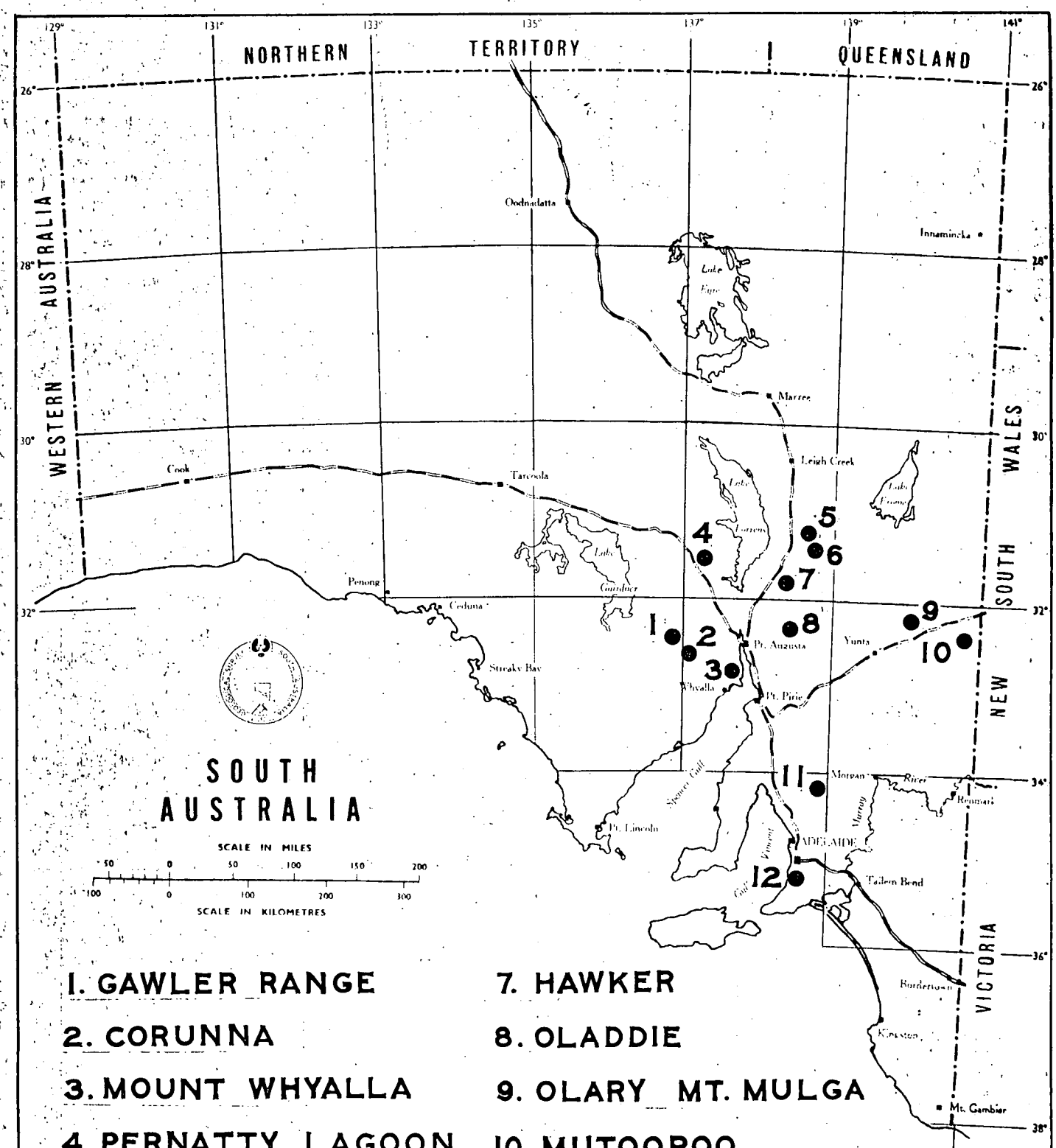

1. GAWLER RANGE
2. CORUNNA
3. MOUNT WHYALLA
4. PERNATTY LAGOON
5. BLINMAN
6. ORAPARINNA
7. HAWKER
8. OLADDIE
9. OLARY MT. MULGA
10. MUTOOROO
11. JULIA CREEK
12. NOARLUNGA

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Scale:

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BARITE

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