

DEPARTMENT OF MINES  
SOUTH AUSTRALIA

PERNATTY LAGOON BARITE DEPOSIT

by

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ABSTRACT

A deposit of barite, up to 20m wide and 350m long occurs in the Woocalla Dolomite Member at Pernatty Lagoon. The barite as indicated by grab samples, is associated with up to about 2.6 per cent strontium sulphate, 0.12 per cent iron oxide and 0.8 per cent silica. The barite was probably formed by low temperature hydrothermal fluids.

It is estimated that there are about 16,000 tonnes per vertical metre of barite available.

The prospect of finding more barite in the area, is considered favourable.

INTRODUCTION

This report describes a barite deposit which crops out in the lake bed on the west side of Pernatty Lagoon, 127 km\* north-west of Port Augusta.

The barite deposit was briefly inspected by the writer on 10th March, 1971.

Production of barite from the deposit for the years 1917-1924 and 1938-1939 are officially recorded and total 1524 tonnes.

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\*Conversion factors are available in Appendix B.

Petrographic and mineralogical description and chemical analysis was carried out by the Australian Mineral Development Laboratories. The results are referred to briefly in the report, and the full AMDEL reports Nos. MP4901/71, MP4900/71 and AN4899/71 are included in the Appendix A.

The deposit has previously been described by Ward (1917) and has been mentioned by others (Winton, 1920; Jack, 1928; Johns, 1968).

#### TITLE

The barite deposit is on Pernatty Station and is leasehold land with minerals reserved to the Crown. It also lies within Special Mining Lease No. 527 which is held jointly by Pacminex Pty. Ltd. and United Uranium N.L. and is current until 2nd December, 1971. Close to the deposit are two claims over a manganese deposit. These are M.L.3508 and M.L.3509 which are held jointly by Mining Industries Pty. Ltd. and Carl Heinrich Kuchel and which are current until 31st March, 1973.

#### GEOLOGY

Three "barite provinces" defined geographically and by age of host rocks can be recognised in South Australia (Reid, 1969).

These are:-

1. Olary Archaean Province
2. Flinders Ranges Proterozoic Province
3. Adelaide - Truro Proterozoic Province

The barite deposit at Pernatty Lagoon is not included in the above 'provinces' and must be considered to be geologically quite separate.

The barite deposit appears as a north-west to south-east trending series of patches. Outcrop is all but absent. The host rock of the barite is the Woocalla Dolomite Member of Upper Proterozoic age. The regional and local geology of the area is described by Johns (1968).

The material consists of clear transparent to light grey-white translucent, coarsely crystalline barite. Dark brown limonite and yellow goethite of supergene origin coat crystal faces and fracture surfaces in the barite. However the occurrence of these impurities is probably limited to the surface zone of the deposit.

In proximity to the barite deposit are deposits of manganese and natural red ochre. Winton (1920) reported the occurrence of fluorite in the area, but no in situ deposit has been located.

The origin of the barite occurrence is probably as a vein or cavity filling deposit, the barium being derived from local sediments by circulating connate water. A precise genesis is impossible based on the present limited exposure.

#### Quality

Two analyses of the Pernatty Lagoon barite are available. The first one has previously been presented (Johns, 1968).

			<u>Per Cent</u>
I	Barium Sulphate	BaSO <sub>4</sub>	98.25
	Silica	SiO <sub>2</sub>	0.80
	Alumina	Al <sub>2</sub> O <sub>3</sub>	0.24
	Total Iron as	Fe <sub>2</sub> O <sub>3</sub>	0.12
	Calcium Oxide	CaO	0.44

		<u>Per Cent</u>	
	Magnesium Oxide	MgO	0.10
	Loss on ignition		0.05
II	Barium Sulphate	BaSO <sub>4</sub>	95.9
	Strontium Sulphate	SrSO <sub>4</sub>	2.61
	Silica	SiO <sub>2</sub>	0.06
	Total Iron as	Fe <sub>2</sub> O <sub>3</sub>	0.05

The barite is very pure. The amount of strontium sulphate present is low and silica and iron, impurities which commonly occur in barite is very low.

#### Reserves

Due to lack of outcrop, dimensions from which reserves may be calculated can only be estimated.

The writer agrees with the approximate dimensions given by Ward (1917). These are a variable width of between 1 and 20 metres and a traceable length of 350 metres. Calculation of reserves based on these estimates yields 16,000 tonnes per vertical metre. If there is no diminution with depth, then there is 160,000 tonnes of barite to a depth of 10 metres. There may be considerable quantity below this depth, but drilling would be required to prove continuity.

Further deposits may occur away from the present occurrence. This is supported by the presence of a small outcrop of very similar barite, about 6 km to the south, in a small roadside cutting on a pipeline road between Pernatty Lagoon and Lake Dutton (M.N. Hiern, personal communication, 1971).

## CONCLUSIONS

It is estimated that the Pernatty Lagoon barite deposit has almost 160,000 tonnes of barite available to a depth of 10 metres, and it is expected that exploration below this depth and laterally would add a substantial increase in quantity.

Because of the high grade and possible large reserves of this barite deposit, further testing is recommended.

The content of iron oxides in the analyses made to date ranges from 0.05 to 0.12 per cent. A high content of iron oxides may be present in near-surface material due to the presence of supergene limonite and goethite.

The prospect of finding further barite deposits in the surrounding area is considered favourable.

DN:CMH  
4.10.1971

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APPENDIX A

AMDEL REPORT AN4899/71

by R.L. Bruce

Identification: A700/71

ANALYSIS

% <hr/>		
Silica	SiO <sub>2</sub>	0.06
Total Iron as	Fe <sub>2</sub> O <sub>3</sub>	0.05
Barium Sulphate	BaSO <sub>4</sub>	95.9
Strontium Sulphate	SrSO <sub>4</sub>	2.61

AMDEL REPORT MP4901

by Dr. J. Gordon-Smith

Sample: DN102/71, P833/71: TS 27025:

Location:

Pernatty Lagoon, Torrens.

Rock Name:

Barite veinstuff.

Hand Specimen:

This comprises grey-white to colourless crystalline barite in large, irregular crystals and crystal intergrowths, together with portions of brecciated country rock. The whole is irregularly iron-stained.

Thin Section:

The following minerals are present:

Barite

Chalcedony/quartz

Limonite

Goethite



The coarse nature of the components would make any estimate of prevalence on a thin section irrelevant to the grade of material in bulk.

Barite forms coarse fracture fillings, crystal aggregates and intergrowths, and also occurs to a slight extent, as euhedral crystals replacing adjacent country rock. Cleavage, in three directions nearly at right angles, is conspicuous in the barite crystals. Country rock is represented by pale cream chalcedony with quartz. The chalcedony is seen under the microscope to consist of a fine mosaic of interlocking angular shards. This may replace some earlier component, but it was brecciated prior to the introduction of barite. Subhedral and irregular quartz grains of irregular orientation are scattered through the chalcedony. Dark brown limonite and yellow goethite stain and coat some of the fracture surfaces; they are of late, supergene origin.

Sample: DN105/71, P834/71: TS 27026:

Location:

Pernatty Lagoon, Torrens.

Rock Name:

Gossanized barite veinstuff.

Hand Specimen:

This consists of white-grey to colourless barite crystals, embedded in earthy yellow goethite and brown limonite.

Thin Section:

The following minerals are present:

Barite

Goethite

Limonite

As in the previous example, the coarse nature of the components preclude any useful estimate of their prevalence. Barite occurs as coarse crystal intergrowths with well-defined cleavage. No remnants of country rock are to be seen, but the barite crystals are embedded in an earthy yellow mass of very fine-grained goethite. On the weathered surfaces, this is coated with brown limonite. Due to its fine grain and relative opacity, the goethite lacks distinctive character in section. Its identity has been confirmed by X-ray diffraction measurements.

Sample: DN106/71, P835/71: TS 27027:

Location:

Pernatty Lagoon, Torrens.

Hand Specimen:

This consists of grey-white or yellowish-white barite crystals and crusts embedded in earthy yellow and red-brown goethite, limonite and hematite.

Thin Section:

The following minerals are present:

Barite

Goethite

Limonite

Hematite

Quartz

Carbonate

As in the previous examples, the coarse nature of the components precludes estimates of their prevalence.

Barite forms coarse comb-like aggregates with prominent cleavage. Drusy goethite covers many of the crystal faces, and

what appears to have been an open vugh is finely colloform banded iron oxides.

A number of ? detrital, rounded, quartz grains are embedded in 'goethite.'

Traces of carbonate occur.

AMDEL REPORT MP 4900/71

by Dr. J. Gordon Smith

Sample: DN103/71, A701/71:

Location:

Barite working on west coast of Pernatty Lagoon, Torrens.

Rock Name:

Barite

The material comprised two distinct specimens plus a number of smaller fragments apparently derived from the larger ones by casual abrasion in transit.

Both specimens are substantially pure barite, but they differ in crystal size and slightly in crystal habit, and in the amount and colour of associated brownish earthy material with which they are partly coated. There are traces of green material, seen under the microscope to be dried algae, on both specimens.

The larger and more coarsely crystalline specimen consists of clear transparent to light grey-white translucent barite, with a very slight pink cast towards one side of the specimen. It carried a dusting of yellow-brown to medium brown pulvurent ochre. Crystal faces show fine pitting which, together with the irregular development of cleavage, accounts for the variations in translucency. The largest crystal faces which can be seen measure nearly 6 cm across, the average is about one third of this.

The crystals are typically tabular in habit, they are intergrown, apparently at random, enclosing a multitude of plane-sided vughs, most of which show thin ochreous linings. There is a suggestion that crystals fall into three preferred size ranges, indicating three main periods of nucleation. Individual crystals do not show zoning.

Barite is orthorhombic in crystal form, being the type member of one of the principal subdivisions of this class of symmetry. Crystal faces shown in the specimen include the prism (210), the basal pinacoid (001), the orthodome (101) and a somewhat unusual brachydome (?035), together with several high order orthodomal faces. The perfect basal and prismatic cleavages are well shown. The small specimen is composed of light grey-white to white material, thickly dusted with yellow-brown ochre and fine barite. A few minute needles of quartz project from some vugh-enclosed crystal faces. Individual crystals are again of tabular habit, but average 1 cm or less in length. Only one main period of nucleation is apparent, but the crystal intergrowths are more clearly grouped giving a suggestion of incipient rosette arrangement. The green algal staining is rather more prominent than in the other specimen.

The crystals exhibit the basal pinacoid (001), the prism (210), which is commonly dull and rough, the orthodome (101) and several high order orthodomal faces. Cleavage is not so obvious as in the other specimen, due no doubt, to the lower transparency, but the prismatic cleavage shows on several edges.

APPENDIX B

CONVERSION FACTORS

Length

1 cm	=	0.394 inches
1 metre	=	3.281 feet
	=	1.094 yards
1 km	=	0.621 miles

Weight

1 tonne	=	0.984 tons
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