Rept. Bk. No. 28-57

D.M. 494/50

DEPARTMENT OF MINES

SOUTH AUSTRALIA

LAKE BUMBUNGA GYPSUM DEPOSITS

Location - Sections 106, 539, 538, 79, 80, 87, 548 and 88, hundred of Cameron, County of Daly. Gypsum occurs as a dune formation near the eastern margin of Lake Bumbunga, at a distance of 2-4 miles north east of the railway siding at Lochiel, on a branch line of the Main Adelaide-Port Pirie railway.

Portion of the deposit in section 538 (School Reserve) has been pegged as gypsum leases by the South Australian Housing Trust.

PREVIOUS REFERENCE

Geological Survey of S. Aust. Bull. 8p. 102, 1921 (Jack)

HISTORY OF GYPSUM PRODUCTION

Small quantities of gypsum have been removed in the past from sections 539 (previously held as Miscellaneous Gypsum Leases 153, 211 and 174 respectively) and 79 (private property) Surface material only was worked. Most of the gypsum produced (1,307 tons in all) was purchased by an Adelaide chemical company and smaller quantities were sold to market gardeners for agricultural use.

There has been no activity at the deposit since 1941, and there are no existing leases. Details of past production are tabulated hereunder

PAST PRODUCTION

LAKE BUMBUNGA GYPSUM DEPOSIT

Year	Tons	Year	Tons	Year	Tons
1921	75	1928	261	1935	-
1922	40	1929	-	1936	0
1923	120	1930	32	1937	-
1924	100	1931	-	1938	-
1925	70	1932	-	1939	-
1926	20	1933	-	1940	-
1927	579	1934	-	1941	10
					1307 tons

MICROFILMED

GENERAL GEOLOGY AND PHYSIOGRAPHY

Lake Bumbunga is situated in the lowest part of an extensive valley underlain by Recent and Tertiary sediments, and enclosed by prominent hills of Upper pre-Cambrian rocks. Surface drainage and ground water seepages from a large catchment area feed into the lake during the wet winter months, where they are held at the surface by an impervious layer. Evaporation during the summer months results in the deposition of salt and gypsum.

A section of the Recent saline sediments in the lake bed was recorded by Jack (1921) and is as follows:-

feet	
0 - 1	...salt layers
1 - 2	... black mud with gypsum crystals
2 - 6	... grey fine-grained gypseous mud
6 plus	... hard layer, probably crystalline gypsum.

The gypsum deposit accumulated on the eastern bank of the lake from small crystals blown off the lake by westerly winds. The upper portion of the dune is now very weathered and its formation appears to have ceased.

NATURE AND EXTENT OF THE GYPSUM DEPOSIT

The gypsum occurs as a dune of finely divided flour and seed gypsum 2½ miles long, ¼ mile wide, and about 35-40 feet high (see accompanying plan) trending parallel to the eastern margin of Lake Bumbunga, at a distance of approximately half a mile from the present lake edge. At the northern end, the deposit is covered by a thickness of between 1-3 feet of soil.

Between the gypsum dune and the lake edge is a low lying flat comprising partly samphire swamp and partly arable ground underlain by a gypseous soil. Low cliffs (4-7 feet) on the eastern shore of the lake consist of impure clayey flour gypsum discoloured with iron stains.

The only locality where the gypsum of the dune has been exposed to any depth is in a railway cutting at the southern

extremity of the deposit. The section at this place (Locality S3 on plan) is as follows)

feet	
0- 2½	white flour gypsum
2½- 6½	pale yellow-brown seed gypsum, some clay.
6½- 8½"	pale grey flour gypsum and some clay

The deposit was tested to a depth of 12 feet with a hand auger and was found to comprise flour gypsum with some interbedded seed gypsum in the lower horizons. The shallow holes were not sufficient to test the deposit adequately and it was recommended that test bores be sunk with a percussion plant to full depth of the gypsum dune.

RESULT OF BORING OPERATIONS.

Three bores were sunk at intervals along the crest of the dune in sections 539 and 79. They revealed the presence of a bed of impure seed gypsum below th superficial flour gypsum. The base of the deposit is defined approximately by the present lake level and the underlying strata comprises interbedded brown clay and gypsum which apparently represent sediments deposits in the bed of a former extension of Lake Bumbunga.

A summary of the strata penetrated in the bores is shown hereunder:

Bore No. 1	<u>On the road between sections 539 and 79</u>
0 - 2	Brown clayey soil and flour gypsum.
2 - 11	Off-white flour gypsum with clayey patches and secondary limestone.
11 - 27	Fine pale grey seed gypsum with disseminated clay
27 - 68	Brown clay interbedded with seed and flour gypsum.
Bore No. 2 - Section 79(private property)	
0 - 5	Gypseous soil and impure flour gypsum.
5 - 10	Brown gypseous clay.

10	-	18	Off white flour gypsum
18	-	28	White and pale brown fine seed gypsum-some interbedded and disseminated brown clay.
28	-	52	Brown clay with interbedded seed and flour gypsum.

Bore No.3 Section 539 (School Reserve)

0	-	9	Gypseous surface soil and discoloured flour gypsum
9	-	26	White and pale brown fine seed gypsum with disseminated clay particles.
26	-	40	Brown gypseous clay with interbedded seed gypsum.

QUALITY

Samples were taken continuously from the boreholes and, after geological examination, representative samples were chemically analysed by the Departmental Analyst. Results of analyses are shown in Table L

The flour gypsum ranges in composition from 46-81% $CaSO_4.2H_2O$ This finely divided variety is unfit for plaster manufacture in its natural state, nor is it amenable to simple beneficiation, and must therefore be regarded as overburden.

The seed gypsum is of a very low grade - 40-67% $CaSO_4 2H_2O$ - but could probably be upgraded to a reasonably pure product by washing treatment. The chief impurity is a brown clay which is present as both disseminated particles and interbedded thin layers. The colour is off-white to pale brown deepening on the relative abundance of this impurity. Beneficiation tests on a bulk sample of this material are at present being carried out by by the Departmental Metallurgist but his report will not be available for several weeks.

A sample of the typical impure seed gypsum (Sample No 1479) 50 was examined by the Departmental Petrologist and his observation were as follows:

"The grains are irregular, angular or angular sub rounded in shape and range in size from 0.15 to 0.46 mm Pure colourless grains are rare, most being dark grey or brown due to calcareo-argillaceous impurities. Calcite and clay in fine admixture are the chief impurities, together forming 20-25% of the whole.

There are minute iron-ore and carbonaceous inclusions. Garnet and ilmenite grains are present as rare accessories".

RESERVES

The most promising portion of the deposit is in section 539, where Bores Nos 1 and 3 showed the presence of 16-17 feet of seed gypsum below 10-11 feet of flour gypsum overburden. On the assumption that the strata penetrated in these two bores are representative of the deposit in this area, the reserves in section 539 have been estimated roughly to be of an order of 400,000 tons of impure seed gypsum. The flour gypsum overburden which would have to be removed is approximately 600,000 tons.

Bore No 3 situated near the centre of Section 79, revealed 10 feet of similar seed gypsum underlying 18 feet of over burden. In view of this result, the area is not included within the reserves.

CONCLUSIONS.

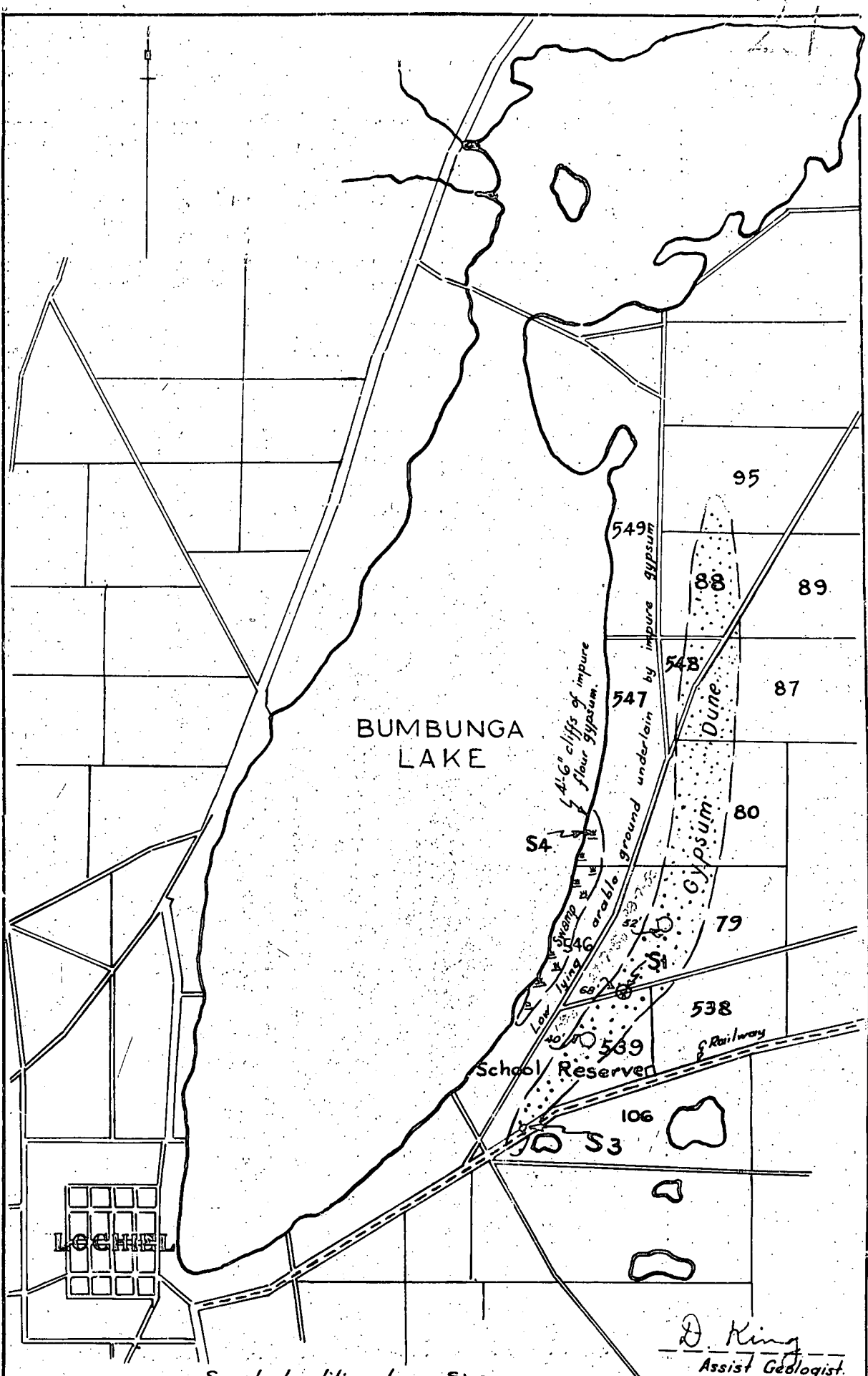
Considerable reserves of low grade seed gypsum averaging 50% $CaSO_4$ $2H_2O$ are available which probably could be improved in quality to a product suitable for plaster manufacture by washing treatment. The cost of upgrading would be considerable and, in view of the additional expense involved in removing overburden and cartage, it is considered unlikely that the deposit could be worked on an economic basis at the present time.

DK:AR
14-8-1950

D. KING
ASSISTANT GEOLOGIST

TABLE 1
PARTIAL ANALYSES OF GYPSUM SAMPLES.

Location	Footage Depth from Ft.	Ins	Depth to Ft.	Ins	Thickness Ft.	Ins	Description	Sample No.	Moisture %	Insolubles %	Ferric Oxide %	Sodium Chloride %	Calcium Carbonate %	Gypsum %
	5	0	11	0	6	0	Impure flour gypsum	1477/50	2.30	13.10	0.68	0.26	5.15	75.23
Borehole No.1	11	0	15	0	4	0		1478/50	3.10	22.00	1.22	0.21	3.18	64.41
	15	0	21	0	6	0	Clayey seed gypsum	1479/50	3.86	27.40	1.34	0.23	3.48	55.78
	21	0	27	0	6	0		1480/50	4.85	38.67	1.51	0.24	4.03	42.99
Borehole No.2	18	0	24	0	6	0	Clayey seed gypsum	1541/50	10.35	25.25	1.26	0.64	3.05	60.39
	24	0	28	0	4	0		1542/50	12.30	36.03	1.51	0.64	3.64	46.58
Borehole No.3	9	0	15	0	6	0	Clayey seed	1543/50	10.00	23.70	1.27	0.54	2.93	61.68
	15	0	21	0	6	0		1544/50	12.08	30.50	1.47	0.48	3.64	51.81
	21	0	23	0	2	0	gypsum	1545/50	14.75	37.88	1.78	0.54	4.75	40.09
	23	0	26	0	3	0		1546/50	9.95	29.76	1.38	0.35	2.91	54.72
Railway Cutting	0	0	2	6	2	6	Flour gypsum	1226/50	-	13.73	0.25	0.01	3.30	80.99
(Pos S3 on Plan)	2	6	6	6	4	0	Clayey seed gypsum	1227/50	-	29.30	0.37	0.04	1.75	66.54
	6	6	8	6	2	0		1228/50	-	33.38	0.65	0.03	2.40	59.82
Auger Hole (Pos.S1 on plan)	1	6	2	3	0	9	Impure flour gypsum	1222/50	-	28.88	0.98	0.02	12.30	46.54
	2	3	5	3	2	0		1223/50	-	40.83	1.62	nil	6.30	39.94
	4	3	7	3	3	0	Flour gypsum	1224/50	-	5.50	0.21	0.02	3.10	89.41
	7 1	3	8	0	0	0	Flour gypsum	1225/50	-	3.43	0.41	0.03	2.40	92.81



Sample localities shown. S1-7

To accompany report by D. King

D. King
Assist Geologist.

S. A. G. DEPT. OF MINES

Approved-	Passed	Drn.	GYPSUM DEPOSIT LAKE BUMBUNGA PRELIMINARY REPORT	D.M. 422/50	Scale 1 mile to 2 ins.
		Tcd. L.B.H.		Reg.	S 311
		Ckd.			Gc 9
Director	C.D.	Exd. DLT.	Portion Hd Cameron showing extent of the Gypsum Dunes.		Date 30-6-50