DEPARTMENT OF MINES

SOUTH AUSTRALIA

AB 69

"SALT LAKE" GYPSUM DEPOSIT - KANGAROO ISLAND

ESTIMATED MINING COSTS

By

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Introduction

Contained in a report No. 42/117 July 3rd 1956 DM1139/54 relating to the drilling and testing of this deposit the writer submitted tentative proposals and estimated costs for the mining of gypsum, subject to certain physical characteristics of the gypsum, and volume of water to be handled being known, in the mining of the gypsum.

Subsequent test work, carried out during July 1956, for the extraction of a ten ton sample of gypsum, when the lake was inundated with 2'6" depth of water, indicated that the water problem could be successfully handled by paddocking the area to be mined and pumping out the water overlying the gypsum. No serious seepage is anticipated either through the mud and stone banks which will be built to paddock the mining area, or from the soft underlying clay, once the gypsum has been mined.

It was found however that the gypsum was too hard and consolidated to consider the mining proposal by dredging. Light blasting was necessary to extract the ten ton sample.

It is prudent to record however, that this test work was of necessity, due to the depth of water on the lake, confined to the very edge of the gypsum deposit, which was only 15 inches thick in the area excavated, instead of as planned in the centre of Paddock No. 1B, where a thickness of gypsum 3 ft. to 3 ft. 6 ins. existed.

Proposed Mining Method

Requirements are for an initial output commencing as early as possible of not less than 12,000 tons per annum, increasing to 50,000 tons per annum, as local demand and market is established.

Mining of the gypsum involves three stages.

1. Paddock preparation and pumping.
2. Overburden removal.
3. Mining of gypsum

Paddock preparation and pumping

Surface water on the lake is permanent and varies in depth from 2'6" in midwinter (September) to dryness in places in midsummer (March). The South Eastern quarter of the lake however is always covered to a depth of 18" to 24", as water makes from springs along the southern shore.

The proposal is to paddock off several acres at a time to be mined. Paddocking material for dam walls will be limestone boulders existing as walls on the lake, bags filled with overburden as required, and boarding from existing salt paddocks on the lake. No difficulty should be experienced in maintaining these banks. No capital expenditure, except possibly for several hundred bags will be necessary; labour cost only for bank building.

Area 1B of approximately 8 acres and containing approximately 75,000 tons of gypsum to a mean depth of 3'6" is recommended as a starting point. This area is already walled in and has a shore approach for vehicles already built. Volume of water to be pumped to a depth of 2'6" is 5.5 million gallons.

Two 3" diesel driven centrifugal pumps (one as a standby in normal times) each with a capacity of 10-12 thousand gallons per hour will dewater this area in approximately ten days. Thereafter pumping will be confined to seepage and rain.

Overburden removal

Overburden, principally gypseous and calcareous mud, covers the lake area to a depth of from 6" to 18" and is readily removable exposing a solid even gypsum floor beneath.

In paddock 1B the overburden is 6" deep and totals approximately 6000 cubic yards.

Initially once the area is pumped dry, overburden can be removed by overloader and truck dumping at a shore based waste dump.

Once mining has commenced overburdenncan be dumped in mined out areas, saving vehicle travel to a shore dump.

Mining

The test excavation indicated a soft clay bottom beneath the gypsum not capable of supporting vehicle traffic. All mining operations and transport of gypsum to a shore based stockpile or washing plant must be carried out on a floor of solid gypsum.

Indications to date are that it will be necessary to lightly blast the gypsum for excavation by diesel shovel. The mining operation will in fact be similar at this stage to that carried out at Stenhouse Bay and described by Armstrong in Mining Review No. 93 pp.145-150.

Blast holes will be drilled by compressed air driven rotary auger type drill.

Compressed air will be supplied from a diesel engine driven portable compressor either 110 c.ft. or 160 c.ft., capital cost £1700 and £2200 respectively.

The smaller unit will in all probability be of ample capacity to operate two air augers and be quite satisfactory for the purpose. Diesel power is recommended in preference to petrol power to obviate electrical breakdown in the salt atmosphere of the lake.

Blasting pattern and explosive consumption must be determined by trial and error. An estimate at this stage would be 2-2½ tons broken per pound of explosive. Present cost of explosives are:

Ligdyn	- 133/-	)
Monobel	- 135/-	) per 50 lb. case
60% Gelignite	- 150/-	)

No. 6 Detonators £6.17.6 per 1000

Hence explosive cost per ton would be in the region of 1/3 - 1/6 per ton.

Blasted material would be loaded by a ⅜ yard diesel shovel of the drag or back hoe type working from the solid gypsum floor and loading into 5-7 ton motor tip trucks for delivery to a shore based stockpile or washing plant. It is estimated that a ⅜ yard shovel fitted with drag shovel (capital cost including spares and landed on the site £7500) will have ample capacity to handle 200 tons per day of this material. Two 5 c.yd. steel body motor tip trucks will have more than ample capacity to transport material from the shovel to the dump site. In fact in the initial stages one truck will probably be sufficient for this duty. Capital cost of truck landed on the site £2500 each.

These trucks may also on occasion be used to augment transport of gypsum from Salt Lake to American River. It is assumed this transport will normally be done on private contract.

It is not proposed at this stage to advance any set plan of mining the deposit, beyond recommending commencement in paddock 1B.

It is suggested that overburden be initially cleared round the walls of the paddock to form a road for access to build and maintain banks and attend pumps. The actual opening cut can be commenced anywhere branching off from this road, but so designed to allow a complete circuit for trucks handling gypsum to the shore base.

Once operations have commenced it may be possible to utilize the shovel also for dumping overburden into mined out areas, i.e. should the overloader be engaged elsewhere on either the shore or the American River stockpile.

Costs

An estimate of mining costs based on 200 tons per day is as follows:

	£
1 - $\frac{3}{8}$ yard diesel shovel	7,500
2 - 5 c.yd. tip truck	5,000
1 - Overloader (already owned)	3,000
Maintenance Shop and equipment	1,500
Two diesel driven 5" certrifugal pumps for dewatering the paddock	1,000
Compressor diesel driven 110 c.ft. portable	1,700
Two air augers, hoses and drills	200
Belt loading plant at American River	-
	£19,900

Say £20,000 capital expenditure.

Over a 12 years period capital and interest charges will be approximately 1/- per ton.

Loading plant American River

Towards this installation three portable belts totalling 150 feet span have already been purchased and should represent the bulk of the capital outlay necessary. No attempt has been made to form an estimate of cost to adapt this equipment to run on the jetty, which is a matter for S.A. Harbors Board to assess.

Washing Plant

No account has been taken of any crushing or washing that may be necessary on the site. This is the subject of a separate estimate in the hands of the Research and Development Branch.

An estimate of water available on the lake during March the dryest period is that the South East quarter of the area of approximately one hundred acres is covered to a depth of one foot, equivalent to 37,000,000 gallons.

Another area contained in Old Miscellaneous Lease No. 466 of approximately 100 acres is usually covered to a depth of 6" giving another 18 million gallons of wash water.

Salinity of either source has not been measured. See Plan No. 55-41-L9.

Housing and Domestic Water Supply

The only domestic supply of water available is from roof catchment. It will be necessary to erect housing and storage tanks at the earliest opportunity to obtain a water supply if operations are to commence this summer.

No allowance has been made in estimate for housing expenditure.

Mining costs are expected to be within the following order;

	Shills	
Paddock preparation (initial)	0 - 6	)
Drilling and blasting	1 - 6	) 4/6
Shovel operation	2 - 0	)
Trucking to shore stockpile	0 - 6	)
Transport to American River 10 miles	10 - 0	
Loading from stockpile to vessel	0 - 8	
Freight American River to Port Adelaide	40 - 0	
Capital and interest charges	1 - 0	
In vessel hold at Port Adelaide	56 - 2	

No allowance has been made for unloading at Port Adelaide and cartage to the plant at Wingfield. This could be in the region of 4/- to 7/- per ton, but outside the province of this report.

CMW:EAK
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