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Proposed production of Salt
By Solar Salt Ltd
At Port Augusta

DM. 1521/52.

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PROPOSED PRODUCTION OF SALT BY SOLAR SALT LTD. AT PORT AUGUSTA.

by

F.N. Betheras, Assistant State Mining Engineer.

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PROPOSED PRODUCTION OF SALT

by

SOLAR SALT LTD. AT PORT AUGUSTA..

Messrs. Mainguard (Australia) Limited have made a submission to the South Australian Government on behalf of Solar Salt Ltd. who are developing the Salt leases near Port Augusta held by Mr. J. Saeck.

This report comments on the statements made in the submission.

Tenure of leases.

In the hundreds of Davenport and Winninowie Mr. J. Saeck holds ten miscellaneous salt leases having a total area of 5,826 acres, and special mining lease No. 19 of 11,200 acres. The miscellaneous salt leases have a tenure of 21 years with right of renewal. The special mining lease has a tenure of one year from the 22nd May, 1954; the Mining Act makes no provision for the renewal of special mining leases.

The statement in the submission that J. Saeck holds leases for a period of 21 years with rights of renewal over an area of 17,000 acres, is, therefore, incorrect.

Testing of the Area.

The statement that tests have proved conclusively that the land has perfect water retaining properties is not supported by the evidence available to the Department.

In a report ¥ dated 24th. May, 1954, it is pointed out that, although the test work already done is encouraging, further testing is necessary to prove conclusively that the ground is sufficiently water-tight for the leases to be economically utilized.

The holding quality of the ground is of prime importance. Until this is known it is not possible to decide what portions of the leases can be utilized, nor is it possible to make satisfactory estimates of the annual production of salt and the capital expenditure that will be required. Definite information regarding the holding properties of the land should be obtained before the project is committed to any large capital expenditure.

In the above-mentioned report it was recommended -

(a) that standard rain gauges and evaporimeters be installed in order that valuable weather data can be recorded.

(b) that a contour survey be made of Special Mining Lease No. 18.

(c) that testing of the ground in Special Mining Lease No. 18 and in the southern portion of Miscellaneous Salt Leases be deferred until after that in the northern portion has been proved satisfactory.

(d) that the holding quality of the ground in the crystallizing area snd in a strip across No. 2 concentrating area be tested.

A suitable method of testing is to flood the areas with a known volume of sea-water and to determine periodically the total salt content of the brine remaining on the area.

¥ Production of Solar Salt near Port Augusta by F.N. Betheras Report Book No. 37/118

Annual Production of Salt

Solar Salt Limited consider that, of the 5,826 acres covered by the salt leases, 3,200 acres can be used for the production of salt, and that from this area the production will eventually exceed 800,000 tons per annum. No information is given as to how much of the special mining lease can be utilized, but the company considers that when this land is used the annual production will be 2,000,000 tons.

The figures quoted for the salt leases are equivalent to a yield of 250 tons of salt per annum per acre of land utilized. It appears that the expected production was determined in the following manner:

Net annual evaporation at Port Augusta 60 inches = 5 feet.

Sodium chloride content of sea-water at Port Augusta 6.66 ozs. per gallon.

One acre-foot of water equals 272,250 gallons.

Quantity of salt per acre per annum.

$$\frac{272{,}250 \times 5 \times 6.66}{16 \times 2240}$$

$$= 253 \text{ tons (approximately)}$$

This method of calculation gives the total amount of sodium chloride that would be obtained in the salts deposited per acre per annum if a depth of 60 inches of sea-water was evaporated to dryness per annum.

This method does not allow for the following factors:

1. Dr. R. Lockhart Jack [¥] has shown that sea-water and brine evaporate at a slower rate than distilled water. According to his experiment the net evaporation figure

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¥ G.S.B. No. 8 pp 37-39.

must be reduced in the ratio of 100 to 69.05 to show the depth of sea-water that can be evaporated to dryness.

2. If reasonably pure salt is to be deposited a considerable portion of the salt content of sea-water must be discarded in the bitterns. Theoretically 75 per cent of the salt content can be deposited but in practice 66 per cent is considered to be very good.

There will be some loss by seepage in the concentrating and brine storage areas and possibly in the crystallizers.

After harvesting the losses due to windage, weathering, and in washing are considerable and may average 15 per cent or more.

None of these factors can be determined with any exactitude and in estimating the annual production it would be safer to be guided by results obtained in other places where conditions are similar. In California, in 1950, the annual production of salt by solar evaporation was 40 tons per acre of concentrating area. In South Australia in 1953 the annual production, with the use of a special green dye to increase evaporation, was 50 tons per acre of total area at Dry Creek and 55 tons per acre at Whyalla. The higher salinity of sea-water at Port Augusta as compared with that at Whyalla may increase the production per acre at Port Augusta, but it is difficult to see how it could exceed 60 tons per acre per annum.

On this basis and provided that the holding quality of the ground is suitable, the production that could be expected from 3,200 acres of the salt leases would be 192,000 tons per annum. If half of the area covered by the special mining lease can be utilized the production might be increased to 528,000 tons per annu. Both of these estimates assume that the ground is reasonably water-

tight. This most important factor has not yet been proved.

Capital Requirements.

The company estimates that the total capital required will be £356,182.

Road Making.

The roads already constructed on the leases are suitable for dry weather only. It will be necessary to make all-weather roads suitable for the movement of heavy vehicles and equipment, not only on the present salt leases, but on the special mining lease, if this latter land is utilized. The provision of £1,000 for road construction is not considered to be adequate.

Crystallizers.

There is a difference in level of about seven feet between the highest and lowest portionf of the crystallizing area. For satisfactory deposition and harvesting of the salt, it is considered that the ground should be levelled. As harvesting is to be done by a dragline scraper, the company does not intend to compact the bottom of the crystallizers in any way. Without compaction of the ground it will not be possible to operate heavy equipment or vehicles on the salt crust. It is considered that it will be nessessary sometimes to use such equipment. No provision has been made in the estimates for any work on the crystallizing area other than the construction of the banks surrounding and dividing it.

At other centres producing salt from sea-water the cost of crystallizers has been between £500 and £1,000 per acre. The crystallizers at Port Augusta will have an area of 400 acres and the capital expenditure required for them alone could be as high as £400,000.

Total Capital Expenditure.

In order to estimate the total capital requirements for such a project, certain basic factors must be known. Two of these factors are the area of ground that will be utilized and the nature of the ground. As these factors are not definitely known it is not possible to prepare a satisfactory estimate for the project.

In other areas similar to Port Augusta a figure of £10 per ton of annual production is a rough estimate of the capital required. At Port Augusta, since it is proposed to harvest and handle the salt on somewhat different lines than is customary, the use of the figure £10 per ton might be misleading.

It is considered, however, that the capital expenditure as estimated by the company is low and that this estimate should be revised after additional investigational and testing work has been done.

Production Cost Estimates.

Direct Costs.

The cost of labour, power, fuel, etc., per ton of salt, will depend to some extent on the quantity of salt produced. It would be expected that the greater the output the lower would be the direct working cost per ton. The company estimates the same direct cost for outputs ranging from 100,000 tons to 800,000 tons per annum.

Further, it is reasonable to think that in preparing the cost estimate the company has made the same assumption as in preparing production estimates, that is, that all the salt content in the sea-water will be recovered. If this is so, the cost of sea-water supply, movement and control would have to be increased. Provision should also be made for the cost of disposal of the bitterns.

Indirect Costs.

Interest and amortisation of capital is a major problem in the cost of producing salt from sea-water. As the capital expenditure cannot yet be definitely determined, no estimate can be made for this item.

Total.

It is considered that it will not be possible to prepare a satisfactory estimate of the cost of production until definite information is available as to how much of the land can be utilized, that is, until after further test work has been doen.

As different methods of harvesting and handling the salt are proposed for Port Augusta, the costs at existing installations cannot be used as a basis for estimating. It is pointed out, however, that for one large South Australian producer, salt in stacks costs about 15/- per ton without any allowance for interest on or amortization of capital.

Markets.

Australian.

1. The statement that the selling price for salt is the same in the capital city of each State is not correct.

Prices obtained from the South Australian Prices Commissioner are:

Coarse bagged salt:

	1948 per ton	1953 per ton
Adelaide	104/9	243/7
Sydney	145/4	278/7
Brisbane	166/5	N.A.

2. No evidence was obtained that there is a preferential water freight rate of 60/- to 70/- per ton for salt.

Freight rates during 1953 were:

Port Adelaide to Fremantle	140/6 per ton.
Port Adelaide to Sydney	143/- per ton.
Port Adelaide to Brisbane	150/- per ton.

3. Comsumption of salt in Australia is expected to increase, but the increase is not likely to be large enough to absorb more than a small percentage of the salt that Solar Salt expect to produce.

Overseas.

During 1952, New Zealand imported 72,250 tons of salt, of which 52,160 tons were obtained from the United Kingdom.

Malaya imported 67,830 tons of coarse salt during 1953, Thailand supplying 58,417 tons. The value of the salt was approximately £A6 per ton.

Although it may be possible to increase the exports of salt from Australia to New Zealand and the Pacific Islands, and perhaps develop a market in Malaya, the most promising market for large quantities is in Japan.

Japan.

Japan imports between one million and two million tons of salt per annum. Salt is obtained from the cheapest available sources on short term contracts.

The following information was obtained by the Trade Promotion section of the Department of Commerce and Agriculture in an advice dated 2nd. June, 1954, from the Australian Commercial Counsellor in Tokyo:

"Under the present budget allocations, a little over two million tons of salt will be imported during the 1954/55 fiscal year, at an expected cost

of $11,631,000. The salt purchase programme calls for 750,000 tons from the sterling area, 575,000 tons from the dollar area, and 625,000 tons from the open account area."

(Sterling areas include Aden, India, Ehypt, Spain, Turkey, and Australia.

Dollar areas include United States of America, Mexico, and Italy.

Open account areas are Taiwan, Thailand, Indonesia, and French Indo-China.)

"Japan is endeavouring to purchase salt from all sources other than the sterling area, due to her dwindling sterling exchange funds.

Every method is being explored by the Government to obtain salt from all sources in return for goods from Japan, even on a barter or link system."

A notification dated 17th. May, 1954, by the Japan Monopoly Corporation states inter alia:

"With a view to maintaining and improving the balance of our international payments, imports of salt shall be carried out by barter or link systems."

"The ratio of the value of exports (on the basis of F.O.B. prices) to that of imports shall be equal to or greater than the value of the imports multiplied by the following factors:

Communist China	100 per cent
Spain	50 per cent.

For other areas rates of ten per cent or twenty per cent will be applied according to the degrees of necessity for exporting to those areas."

"An import offer (to the Monopoly Corporation) of salt shall be accompanied by a statement describing the conditions pertaining to the transaction within the terms of barter or link trade as mentioned above."

The Commercial Counsellor considers that in view of the most recent prices it will be necessary to quote Australian Salt in the neighbourhood of 17/- sterling F.O.B. per metric ton in order to compete with supplies from other sources. If loaded on vessels other than Japanese, the freight must be such that the C.I.F. price will be competitive with that from other sources.

The figure of 17/- sterling per metric ton is equivalent to £A1-17-6 per long ton as their average selling price.

The above information shows that, in order to trade with Japan under existing overseas conditions, salt must be produced at an F.O.B. price not higher than £1-3-10 per long ton at Port Augusta. In addition, any trade will be dependent of Japan's trade balance with British Commonwealth countries. It cannot be assumed that Japan is an assured market for any surplus salt produced in Australia.

Summary.

1. Messrs. Mainguard (Australia) Limited have made a submission to the South Australian Government for financial support in the developing of salt leases near Port Augusta held by Mr. J. Saeck.

2. Land held consists of ten miscellaneous salt leases totalling 5,826 acres, and one special mining lease of 11,200 acres.

3. Test work done to date has not proved conclusively what portions of the land can be economically utilized for salt production.

4. The company's estimates of an annual production of 800,000 tons of salt from the salt leases and of 2,000,000 tons when the special mining lease is utilized, and considered to be too high.

5. Provided that the holding quality of the ground is suitable, it is considered that the annual production from the salt leases may be 192,000 tons, and from the salt leases and special mining lease 528,000 tons.

6. The capital requirements of the project cannot be satisfactorily estimated until it is known what portions of the ground can be utilized. The company's estimate of £356,182 is, however, thought to be low.

7. One of the main items in the cost of production will be the interest on and amortization of the capital. This is not yet known. Working costs per ton will depend on the unknown factors of what portions of the land can be used and the annual production.

The company's estimate of production costs is considered to be too low.

8. If large quantities of salt are harvested, Japan appears to be the most likely market for the bulk of the production.

9. Subject to her trade balances with salt producing countries, Japan purchases her salt on short term contracts from the cheapest sources.

10. Under present overseas conditions, in order to compete with other suppliers, salt from Port Augusta must be sold at a price not higher than £A1-3-10 per long ton F.O.B., Port Augusta.

11. Owing to her dwindling sterling exchange funds, Japan at present is endeavouring to purchase salt from all sources other than those in the sterling area.

12. Japan cannot be considered to be an assured market for salt produced at Port Augusta.

13. The economics of the project depend on further test work being done to prove conclusively what portions of the land can be utilized for salt production.

(Sgd) F.N. Betheras.

ASSISTANT STATE MINING ENGINEER.

13.7.1954