

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

329 SW. Oak Street
Portland, Oregon

G M I SHORT PAPER

No. 1

PRELIMINARY REPORT UPON OREGON SALINE LAKES

by

O. F. Stafford
Department of Chemistry
University of Oregon



STATE GOVERNING BOARD

W. H. STRAYER, CHAIRMAN	SALEM
ALBERT BURCH	MEADFORD
E. B. MACNAUGHTON	PORTLAND

EARL K. NIXON
DIRECTOR

PRICE 10 CENTS

PRELIMINARY REPORT UPON OREGON SALINE LAKES

by

O. F. Stafford
Department of Chemistry
University of Oregon.

The commercially useful substances to be obtained from the saline lakes of southeastern Oregon are essentially common salt; soda in the form of soda ash, sal soda, or sodium bicarbonate; and possibly smaller yields of potash salts and borax.

All of these substances are being produced elsewhere upon the Pacific Coast either from ocean water or from the waters of such saline lakes as Searles Lake and Owens Lake in California.

It is technically possible to separate the substances in question from the waters of Abert Lake or Summer Lake, say, although the costs of such separations are not known and probably cannot be accurately known short of actual plant operations. The successful operations now supplying the Western markets from the California sources mentioned above are the results of experience obtained after many costly failures and much expensive research. A new operation in Oregon would not only be obliged to find its own particular procedure, but would then have to sell its products in a market already in the possession of the California producers, who, incidentally, are reported even now to have manufacturing capacities in excess of present demand.

For simplicity of discussion it is here assumed that the important products coming from the Oregon lakes would be common salt and soda ash. To find even local markets these commodities would have to be available at prices not greater than those at which they could be delivered from California.

THE SALT SITUATION:

Almost all of the common salt marketed upon the Pacific Coast is produced from ocean water by solar evaporation. Conditions for the production of salt by this method are so favorable in places like the southern end of San Francisco Bay that most competitive sources are barred. It is said that salt which can be had for practically nothing at the Searles Lake and Owens Lake operations is discarded since it costs more to haul it to San Pedro for ocean shipment than it is worth at that point. The distance to be covered by the haulage in question is of the order of 200 miles.

The above situation is understandable in the light of the fact that the price of salt on San Francisco Bay is reported to be not more than three dollars per ton. As a matter of fact, private information places the price at from \$2.60 to \$2.80 per ton.

Taking the above figure as the starting point there remains to be determined the transportation costs from San Francisco to a point of large industrial consumption in Oregon such as Bonneville.

A communication from Mr. Ralph L. Shepherd, secretary-manager of the Portland Traffic Association indicates that there is now in effect over the Consolidated Olympic Line a rate of \$3.30 per ton on salt in sacks in 250-ton lots. The rate on bulk salt in 300-ton lots is \$2.50 per ton; on 500-ton lots it is \$2.25 per ton, these rates carrying restrictions with reference to loading and unloading. There is in effect from Oakland to Tacoma a rate of \$1.38 per ton on bulk salt in 1000-ton lots, this rate carrying an exceedingly large number of restrictions all of which, however, could be met by a concern using salt in quantity.

The above figures show that from California sources salt can be delivered in all probability at Bonneville at figures ranging from \$6.50 down to \$4.40 per ton. One informant is of the opinion that the electrochemical industries at Tacoma are securing their salt at around \$5.00 per ton. C. E. Senseman, acting chief industrial chairman, Products Research Division, Bureau of Chemistry and Soils, U.S. Department of Agriculture, Washington, D.C., says that the reported cost to the electrochemical industries at Tacoma is \$6.50 per ton. The above figures all point to the conclusion that an Oregon operation would have to expect to sell its product delivered to Bonneville at a round figure of say \$5.00 per ton.

No bona fide transportation rates on salt from the Abert Lake region to Bonneville are securable for the reason that many factors are hypothetical. It is the opinion of A. F. Harvey, superintendent of transportation in the office of the Public Utilities Commissioner of Oregon, that the commodity rates on loads of 16 tons would be somewhat in excess of \$8.00 per ton. This figure apparently is reached by considering that the railroad rate from Lapine to The Dalles (80,000 pounds) is \$5.00 per ton while the trucking rate from Abert Lake to Lapine (136 miles) probably would be \$3.60 per ton. This assumes a rate of about 2.5 cents per ton mile for trucking. Since the distance from Abert Lake to Bonneville is about 340 miles the trucking cost according to this authority would be of the order of \$8.50 per ton.

It is conceivable that a concern operating its own trucks could reduce the transportation cost somewhat below the figures indicated above but it is doubtful if the figure could be as low as \$5.00 per ton.

It follows, therefore, that even if salt of the right quality could be had for no cost at Abert Lake or even at Summer Lake it could not be delivered at Bonneville in competition with present sources.

THE SODA ASH SITUATION:

Soda ash, anhydrous sodium carbonate, is used to the extent of about 90,000 tons per year upon the Coast for making glass, soap, lye, paper, and in petroleum refining. The principal usage in the Northwest would be in the making of pulp.

The reported cost of the substance at points of production is \$15.00 per ton in round figures. It is said that the current cost to users in the Northwest is \$24.80 per ton, this price being maintained by all manufacturers. It is reported that by far the largest part of the soda ash consumed on the Coast is from the Owens Lake and Searles Lake operations, only a small proportion being imported from Eastern factories. There is, however, a small plant in operation at an alkali lake in Washington. As was mentioned above the present producers are in possession of the market and are in position to expand to meet all needs.

Assuming that the transportation cost of soda ash from Abert Lake to Bonneville (or Portland) is \$8.00 per ton as estimated for common salt, it would be necessary to produce and sell the substance at Abert Lake for not more than \$17.00 per ton to meet present competition.

Whether or not this could be done is a question that at this time has no answer. All that can be said is that if the California producers can make money at this figure there is the possibility that the Oregon producers also could do so, other things being equal.

The inequalities which might appear would be represented by (a) possible greater difficulties in the treatment of Abert Lake or Summer Lake saline waters although there is no present evidence that such difficulties would be encountered; (b) greater costs of the fuel needed for the processing whether this processing were to be completed at the lakes or at a Columbia River point; (c) the uncertainties regarding the costs of recovering potash, borax, and sodium sulphate as products in addition to sodium carbonate as compared with these costs in California. The California plants, or some of them, depend upon the sales of these substances for a considerable portion of their revenues.

It should be explained that there is no good reason for believing that a recovery of valuable products from the lakes can be made by solar evaporation alone. If the writer is correctly informed all attempts to work California saline lakes by this method have been disastrous failures. This situation is due to the fact that recoveries involving separations of constituents from each other are not made by mere removal of water, but by evaporations at carefully controlled temperatures. Such temperature control is very obviously not possible in pools exposed to weather. The daily temperature variations in Eastern Oregon are extreme, and the seasonal variations even more so. Any recovery operation would therefore require a significant amount of fuel. The locality is not blessed with an abundant fuel supply and in this respect would be at a disadvantage compared with California localities.

At one time there was a promotion scheme which contemplated the construction of a pipe line from the lakes to a point on the Columbia River, the proposal being to carry on the recoveries at the line terminus. The fuel situation may have been one of the factors which suggested such a fantasy.

RESEARCH:

If operations ever are attempted at either Abert Lake or Summer Lake an extensive research program will have to be followed through before production plans can be formulated. It took five years of intensive and expensive laboratory work to devise the procedure which took the principal Searles Lake operation out of the red and into the black. With what is now known generally about the procedures which must be used it is probable that a workable process for the Oregon lakes could be set up in a much shorter time. In any event it would be a mistake to undertake production without a thorough investigation in the laboratory followed by the actual operation of pilot plants.

THE ALKALI LAKE SITUATION:

Not far north of Abert Lake is a playa known as Alkali Lake. The earthy material in the playa contains sodium carbonate which is carried to the surface in spots by upward local seepages. At these points very pure sodium carbonate can be secured. At various times in the past attempts have been made to carry on commercial production. None of these efforts, judging by the scattered remains of equipment used, could have been very well planned. Furthermore, at the time that operations were attempted the transportation situation was very bad although a good highway now skirts the lake. It is reported that the lake area is owned by a California concern.

At a very similar spot in Washington (Wilson Creek, about 100 miles west of Spokane) a plant is said to be operating successfully. There is the possibility that a parallel operation could be carried on at Alkali Lake were it not for the transportation handicap and the fact of powerful competition in the markets by California producers.

SUMMARY:

There is the possibility of securing salt, sodium carbonate, borax, potassium chloride, and sodium sulphate from the waters of Abert Lake, Summer Lake, Alkali Lake, etc.

Recoveries of these substances (excepting sodium carbonate from Alkali Lake) would require equipment which would permit precise temperature controlled evaporation in accordance with a procedure which would have to be worked out carefully in the laboratory and in pilot plants.

It does not seem possible to transport the salt to points of consumption or shipment on the Columbia River in competition with salt from other sources. All salt produced accordingly would have to be discarded or at most consumed as might be locally for salting stock, etc.

The sodium carbonate would have a value of about \$17.00 per ton at the plant; or about \$25.00 per ton at Portland. These figures are based upon current market price at Portland and the probable cost of moving the commodity to Portland.

Whether or not there can be profitable recoveries of potash, sodium sulphate and borax depends upon the outcome of research as yet to be made.

There is no apparent margin of advantage in operations at the Oregon lakes over those at the California lakes. There is a decided disadvantage in the comparative fuel situations.
