Romance of Potash

Made by Nebraska Prairie Fire

New Assets of This State Developing Into Wonderful Resources in Alkali Basins of Western Nebraska.

The potash industry of western Nebraska is receiving much publicity these days. The daily papers and the Sunday editions in particular seem to be giving considerable space to the telling of the romance of this young industry. The Sunday World-Herald, in an article written by Ned Aitchison, tells the story in the following language:

Presto.

The prairie fires which swept the arid plains and left a heritage of alkali lakes and basins in portions of western Nebraska, made vast stretches of fields of potash.

Prof. E. H. Barbour is authority for this explanation of the deposit which is now being shipped to an eager market in this and other countries. Where once the red man carelessly left his camp fire to sweep the dry stubble of the plain, potash was born. Useless the attempt to raise corn, wheat and potatoes there for the Indian and pioneer set the elements right for potash.

Now a ne windustry is created and resources of big import are being uncovered in the much-despised alkali beds.

It is difficult to couple romance with the barren, sparsely-vegetated regions in the sandhills of Sheridan and Cherry county, yet the inspired dreams of the fictionist hardly rival the story of the meteoric development of that industry in so short a time.

Prior to 1910, at the close of the long, dry summers, ranchmen used to make a practice of scraping up, bagging and shipping the dry salts so abundant around Jesse and Richardso niakes in northwestern Nebraska, forwarding them to Omaha to be refined into sal soda. That is the beginning of the recorded history of the industry in this state.

Two college youths, skilled in geology and advanced chemistry—John Show, University of Nebraska, class of '06, and Carl Modisett, class of '09—were the first to recognize the commercial possibilities of these salt lakes. Investigations conducted during a two-year period starting in 1910, resulted in their filing mineral claims on Jess lake and environing government lands in 1912.

Thus occurred the real birth of the industry—one that seems destined to be of utmost importance in enabling America to realize the ambition of national commercial independence from foreign lands. It will help to solve the problems faced by glass and soap manufacturers, farmers and artisans who found their supplies of essential chemical—previously imported from Germany — cut off at the beginning of the European war.

A Big Commercial Factor

In 1859, the nited States produced $1,500,000 worth of potash, but the production has steadily diminished since that time until practically the entire supply was being secured from the great Stassfurt "mines" in Germany. During 1905, American soap manufacturers used 4,235,000 pounds of potash, and glass workers 4,000,000. This shows the importance of the chemical to industrial interests of the nation.

Alkali lakes of Nebraska are found chiefly in Brown, Cherry, Sheridan, Dawes, Box Butte and Garden counties. The largest and most numerous are in Cherry county, and the richest and most promising, to date, in Sheridan, according to the report of an exhaustive survey conducted under the direction of Erwin inckley Barbour, state geologist.

Credit is here given to Mr. Barbour and his assistants for the information, including statistical tables, etc., which is used in this article.

There are many alkali lakes and lakelets in the northwest quarter of Nebraska, most of them being soda lakes, and a few carrying important deposits of potash, also. These lakes differ widely in their degree of alkalinity, some being almost fresh, others feebly alkaline and still others alkaline to the point of saturation. Many are important breeding ground for wild fowl, and others are well stocked with game fish.

They are regular in outline, mostly circular, and vary from a few square yards to several hundred square acres. At the ordinary stage of water, most of them have no outlet, being merely shallow evaporating basins in which the alkaline waters of the respective drainage areas are caught and concentrated by solar exaporation. During spring and summer, they are usually full. Later, many dry up. Some are perennial. When dry the beds and shores are white with alkali and the winds carry away clouds of alkali dust. This is not necessarily lost, for it settles nearby and is washed back by rains.

How Product Is Shipped

To recover from the waters of these lakes the potash and other chemicals involves a somewhat complicated and tedious process to reduce the alkaline content of the lakes to a heavy liquid, largely through the medium of solar and forced evaporation, and then to crystal salts by a further drying process.

Product of the several large plants that have sprung up in Nebraska is shipped either in the form of the the heavy liquid, which is about 45 per cent solids, in tank cars, or in "crystals," bagged and shipped in box cars.

Every alkali lake cannot be korked profitably, nor is everyone equipped, however well disposed he may be, to engage successfully in the undertaking. Few men have the requisite knowledge or the necessary capital. Long and exact technical training, good business sense and ample funds are necessary prequisites.

Condition on Exploitation

"Indiscriminate exploitation of our alkali resources is to be deprecated," declares Prof. Barbour. "Everyone should consider the inexpediency of precipitate haste in investing. Zeal in these matters should be taken after due deliberation and careful computation, or not at all."

"In all mining operations, it is possible to count gains and losses well in advance. Accordingly, judgment and accuracy supplant chance even though the fascination of the lottery is forfeited. Those owning alkali properties of promise should have them investigated, especially if potash is present. Prior to the capilization of a company, a number of exact chemical analysis should be made and the advice of engineers and commercial chemists obtained. This will prove to be the least costly and indeed, the only rational mode of procedure."

Four of Nebraska's largest potash companies have an authorized capital of $675,000. Two of these concerns—the Potash Products Co., located at Hoffland, with main offices in Omaha, and the Nebraska Potash Works Co., at Antioch, a Denver enterprise—both have all of their capital stock paid up.

A New Town on Potash

A little city of some seventy buildings has sprung up at Hoffland in the wake of the Potash Products Co. The plant is located on the Burlington railroad, about twelve miles east of Alliance, at the edge of Sheridan county. Suitable switches and tracks have been laid to deliver supplies and to ship the products. The company, itself, has built some twenty bunk houses, together with a hotel and commissary for the seventy employes. There is a well-equipped office, drafting room and laboratory adjoining the plant. The Burlington has built a small station and local trains stop there.

The Potash Products Co., as now constituted, was organized in 1915, with home offices in Omaha, the capital stock of $150,000 being fully paid up. Officers of the company include:

President, T. E. Stevens; vice president, Dr. Herman Reinbolt; secretary, W. A. Redick, all of Omaha. With W. H. Austinberg and John W. Show, these three constitute the directorate. Show and Carl Modisett, who "discovered" the potash industry, are managers of the plant.

Seven boilers of 150 horsepower each have been installed in the power house. About 100 tons of coal, purchased from Wyoming mines, is used daily. "Brine"—the alkaline lake water—is pumped from Lake Jess, three miles south, through a 2½ inch and 4-inch pipe by electrically-operated suction pumps, into the great solar evaporating tower where one-seventh of the work of evaporation is effected.

This tower, a frame structure 32 feet long, 24 feet broad and 40 feet high, was erected by Show and Modisett in 1912. The upper half consists of a series of lattices and about twenty floors over which the water, in early experiments, was pumped at a rate of 300 gallons a minute. By solar evaporations, a noticeable concentration of the brine was effected, the evaporation amounting to 1,200 pounds an hour for a ten-hour day.

Divide the Basin

Advantage is taken of the high evaporation at Jess Lake. Dikes have been constructed to cut off the eastern end of the lake, subdividing it into evaporating basins, each having a capacity of several acres. When the lake water is concentrated by solar evaporation to the desired degree, the brine is pumped to the plant at Hoffland.

Adjoining the tower on the south is the distilling building equipped with four great vacuum pans, centrifugal drier and other machinery. After passing through the evaporating tower, the brine is conveyed to the vacuum pans at the rate of 4,000 gallons an hour, or 75,000 to 100,000 gallons a day, according to conditions. The combined capacity of these four vacuum pans is twenty-five to thirty tons a day.

In the first pan, the liquor is boiled under pressure; in the second the pressure is reduced, while in the third is it boiled under a vacuum. The fourth is used as a finishing pan, the brine being converted into a heavy liquid carrying 45 per cent solids.

Part of this is delivered into the great storage tanks and part into fifteen steel crystalizing vats. As "salts in solution," the liqu'd is shipped in tank cars, while the salt crystals from the vats are bagged and shipped in ordinary freight cars.

Output $2,000 a Day

The present output of alkali is reported to be thirty to forty tons a day, worth $75 a ton, or a total daily value exceeding $2,000. Daily expense runs about $600—$200 or more for coal, a similar amount for labor and the balance for sundry expenses. When two additional driers are installed, the output will equal or pass 100 tons a day, representing a total value of $7,000 or more, according to prevailing prices.

The final plan is to separate the salts at the plant and thus get the benefits of the high prices some of them command. Although war prices prevail and a changeable market makes quotations unreliable, prices of some potash products have increased many fold, even several hundred per cent.

By way of comparison, Mr. Barbour in his report points out that in certain regions men are glad to mine gold running $2.50 a ton. A barrel of brine from the eastern end of Jess Lake is nearly equal in value to a barrel of crude oil at the market price in 1914. Computation gives 100,000 tons of alkali in Jess Lake, worth $2,000,000 or $3,000,000.

Numerous Concerns

Detailed description has been given of this plant at Hoffland because it is the oldest and most representative of any of the companies thus far organized. Other potash concerns in the field, together with the personnel of their officers, include:

American Potash Co., Antioch, Neb., capitalized at $150,000. President, Arthur English; vice president, Wilson Lowe; secretary, Geo. McIntyre, and treasurer, A. Hall, all of Omaha. A. J. Dunbar is manager and general superintendent.

Nebraska Potash Works Co., Antioch, Neb., capital $100,000 fully paid-up. L. F. Hulen of Denver, president; D. B. Snyder, Denver, vice president; B. I. Kibble, Alliance, secretary-treasurer; A. H. Lowe, manager and chief chemist. Alkaline water for this plant is obtained from a series of lakes, of which Wilson lake is the most prominent. The water is pumped through a 4-inch pipe for a distance of one and a half miles.

Hord Alkali Products Co., Lakeside. Capital stock reported to be $275,000. The plant utilizes alkaline waters of Cook lake, two and a half miles northeast, in Sheridan county. Officers include Heber Hord, Central City, president; W. F. Richardson, vice president; George E. Locke, treasurer; George P. Bissell, secretary, and J. W. Hutchison, assistant secretary.

Palmer Alkali Co., near Lakeside, is owned and operated by J. H. Palmer, president of the concern.

Prairie Fires and Decay

How came this great quantity of alkali to northwestern Nebraska?

Prof. Barbour answers: "The close identity of old-fashioned lye to the brine in Jess lake suggests an origin from the ash of prairie fires and decay. The drainage area around this lake is extensive. The prairies are covered throughout with grasses, woods and shrubs, varying from one-fourth to one ton an acre, and when swept by prairie fires large amounts of ash are produced. These fires may have been of natural origin or set by Indians to start game, or by warriors to worst enemies. It is not necessary to assume actual combustion. Rotting or decomposing is oxidation or slow burning. In either process, ash results."

"Organic matter dropped in the open suffers complete combustion, in that a portion passes into the air as gas and a part is left as ash. However produced, the ash would be leached by rains and snows, and washed as lye into the pools and lakes. Since these lakes are practically without outlet, there is no waste and the alkali has been concentrated through the centuries.

"Hoffland is in the sandhill country, where grasses have a drought resisting or dune adaption. This is the short grass region where the vegetation covering, though sufficient to stabilize the sandhills, and to repress wind erosion, so excessive in pioneer days, is sparse and the average yield an acre is light, perhaps a fourth to a third of a ton.

"Jess lake seems to have a drainage area of 10,000 or more square acres. Accordingly, if the ash ran as low as ten or fifteen pounds to the acre the total amount at the end of a few hundred years would be large. Six or eight centuries seems ample for the saline enrichment of Jess lake.

Industrial Value

Alkalis are essential to chemical processes, fundamental to the arts and therefore of utmost consequence. Shortage of chemicals resulting from the European war is viewed by Prof. Barbour as a warning that American commercial chemistry has been neglected too long. In the matter of potash, alone, manufacturers of glass, soap, dye and the like, were unexpectedly left with an inadequate supply. Even the farmer, who needs it as a fertilizer for his fields, discovered the European supply suddenly rendered unavailable.

Plants, like animals, need properly balanced rations. Sometimes one element of soil fertility is lacking, sometimes another. Successful agriculturists find what is lacking and supply it. Among the elements constituting plant food, the chief are nitrogen, phosphoric acid, lime, magnesia, iron, silica and potash. All of these except nitrogen, phosphoric acid and potash occur abundantly in nearly all soils. Nitrogen, nearly always deficient in soils, is the most effective and expensive element of plant food. Cheapest sources of potash are muriate of potash and wood ash. Most important is carnallite, found at Stassfurt, Germahy.

Potash beds of great promise have been reported in Galatia and recently in Spain. Of all known sources, the great beds of Germany are preeminently the most important, especially those around Stassfurt. Here the potash is mined like rock. These enormous salt beds are several hundred miles in extent and attain a maximum thickness of about 5,000 feet.

Surveys of geologists under Prof. Barbour indicate that there are several million dollars' worth of alkali in Nebraska lakes, and that a considerable portion of this is recoverable.

TIN CAN SHORTAGE REPORTED

Washington, D. C.—Representatives of the National Canners' association told Secretary Redfield that a serious shortage of tin cans threatened to reduce production of canned food this year.