THE FUTURE OF AMERICAN POTASH

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taine 28 to 30 per cent K20. It is ground, sacked and sold as a fertilizer. The manufacture of refined potash salts running abou t 50 per cent K20 is more complicated. The materials are leached out, settled, filtered, evaporated and crystallize.

The problem of extracting potash from kelp commercially has not been completely solved. Too little attention has been given to the recovery of by-products. The U. S. Department of Agriculture has established an experimental plant at Sutherland, California, mainly for the purpose of investigating the best methods of extracting potash and other materials from sea weeds.

Potash from Wool Washings.

Some of the large wool washings plants are in the New England states. The wool received at these centers carries a considerable amount of dirt, oil and mineral salts. The salts run high in potash. The oils are removed by solution in naphtha; then the potash is dissolved in water.

The complete recovery of potash at the wool washing and other industrial plants would be a considerable item. In 1917 the production of three companies amounted to 365 tons of potash material, or 305 tons of K20. The potash, a high-grade muriate and ash, was made by the Diamond Match Company and the Arlington Mills, Lawrence, Massachusetts, and the East Saint Louis Cotton Mill Company, East Saint Louis, Illinois.

Potash from Blast Furnaces.

Much was said during the war in regard to the future of potash from blast furnaces. The talk related more to the amount of potash entering the furnaces than to investigations and practical results. It is said that the iron ores, of the different districts vary much in potash content and that those of Alabama are quite rich. According to Catlett, 380,000 tons of potash was charged into blast furnaces in the United States in 1917, and a 50 per cent recovery of this would be 190,000 tons of potash, or nearly 80 per cent of the normal needs of the country.

"Three companies—The Bethlehem Steel, South Bethlehem, Pennsylvania; The Thomas Iron Company, Hokendauqua, Pennsylvania; and the Tennessee Coal, Iron and Railroad Company, Birmingham, Alabama—marketed blast furnace dust in 1917." The low grade product from these furnaces contains 6 to 9 per cent water soluble K20. It is dust which settled in the stoves, flues, etc. By the use of the Cottrell process, it would be possible to recover a larger amount of potash and to turn out a high grade product. Though a vast amount of potash passes through the blast furnaces, and much of it is recoverable, as shown by experimentation, no well-organized movement has been perfected whereby the blast furnace is to become a factor of importance in the manufacture of potash in America. Here is a possibility which may become of economic importance if furthered by capital and the government.

Potash from Cement Mills.

Cement materials contain potash. There are about 100 cement plants in the United States, widely distributed; some of them occur in or near the potash consuming centers. Much of the potash of the cement mills is volatilized in the kilns. Researches have been made to recover this. The method coming into general use is known as the Cottrell electrical dust precipitation process. This process has been installed in plants at points in California, New York, Maryland, Indiana and other states. It was first used to eliminate the dust nuisance of blast furnaces and cement mills.

The recovery of potash from cement plants began in 1917. According to Gale and Hicks, 13,500 tons of crude potash, containing 1,620 tons of pure K20 was recovered from the cement mills in 1917. Additional installations were made in 1918 and the production was increased, but practically no progress has been made since the signing of the armistice. The cement companies are holding off until a market for their production is assurred.

It has been estimated that 75,000 tons of by-product potash might be reduced annually from the cement mills of the United States at comparatively low cost. Engineers claim that the per ton cost of K20 would start at about $160 after the installation of a by-product plant and gradually decrease to less than $20 per ton.

It is generally conceded that the cement mills should become one of the main factors in solving the problem of national independence in potash.

Potash from Natural Brines.

The largest source of American potash has been alkali lakes and lake beds, notably those of Nebraska and southern California. The brines run from 2 to about 20 of mixed salts and as high as 30 per cent K20. The lakes of Nebraska occur in the western part of what is known as the Sandhill Region. They vary in size from mere ponds to those of 600 acres or more. They are located in basins and on valleys where they receive a small amount of surface drainage and some underflow. The best of these potash lakes lose their waters principally by evaporation. There are all stages of development between nearly fresh water lakes and the strong alkali lakes. Much of the brine occurs in sub-surface sands 10 to 40 feet thick. All of the Nebraska lakes have been carefully surveyed, studied and mapped by the State Conservation and Soil Survey. They occur in one large area extending 40 miles north and south and 35 miles east and west and in three smaller outlying areas. Most of the lakes are along or near the C. B. & Q. Railroad east of Alliance, but some of them are along the Northwestern Railroad in the vicinity of Merriman, Cherry county.

Many potash lakes have been discvoered in Arizona, Colorado, Wyoming, Utah, Nevada and California. Most of these contain much more soda than potash and are therefore not workable under present conditions. The two leading districts or places in which potash is produced from brines, outside of Nebraska, are at Salt Lake, Utah, and Searless Lake of Southern California. There are extensive deposits at these places, containing many thousands of tons of potash. Common salt is the principal ingredient in the Salt Lake district and salt and borax are among the ingredients at Searluess Lake.

The amount of brine in the Nebraska districts has been determined by the state surveys. It is much larger than was first supposed and is sufficient to support extensive operation for a number of years. The quantity of brine at Salt Lake has not been determined. The workable part of Searless Lake has an area of about 20 square miles, and an average thickness of 70 to 80 feet. According to Hicks of the U. S. Geological Survey, the lake contains about 20,000,000 tons of K20.

Production in Nebraska.

This started in a small way before the war. It was rapidly expanded during the war until 18 small plants were operating or building and 9 large plants were in operation. The total investment in plants and pipe lines is about $12,000,000. Brines are pumped from lakes and lake beds. At small plants located off the railroads and having capacities of three to ten tons each, the brines are reduced to solids and hauled to shipping centers. The big plants, all on railroads, operate on brines transported through pipe lines. There are about 285 miles of pipe line. There plants are located as follows: The Potash Reduction Company, at Hoffland, Nebraska; the Western, National, Nebraska, American, and Alliance at Antioch, Nebraska; the Hood and the Standard at Lakeside, Nebraska; and the William Berg Company at Merriman, Nebraska. Brine, arriving at the plants, is stored in large reservoirs, passed through spray ponds, solar towers, evaporators in multiple effects, and dried in rotary kilns. The capacities of the large plants range between 30 and 200 tons per day. The product runs from 20 to 30 per cent K20 and is free from borax and other deleterious materials. The total capacity of the Nebraska plants, when operating night and day, would be about 900 tons or about 200,000 tons a year. This would be equal to about 65,000 tons of K20. Nebraska was producing about 60 per cent of the potash of the United tSates at the time the armistice was signed. Soon thereafter 70,000 tons were in storage at the plants and in warehouses in the Central, Eastern and Southern states. The market price declined from about $5.00 per unit to something like $2.50 per unit and all the plants closed the first months of 1919.

The per ton cost of Nebraska grude ranged between $20.00 and $70,00, depending upon the richness of brines, overhead, and efficiency of management.

The cost has been due to the high cost of machinery, fuel, labor and transportation. The purpose of nearly all of the plants was to rush production, which meant a higher per-ton cost than there would be under normal conditions. If the plants are again operated, they will be managed very differently. There will be more evaporation of brines by solar heat and more pumping when ice is on the lakes. There are a number of places wherein the operating costs can be reduced. Labor will be cheaper and it is thought that there should be reductions in fuel and transportaton.

Production in Great Salt Lake Basin.

Much of Great Salt Lake Basin is floored with sedimentary materials carrying salts of sodium, potassium and magnesium, which also occur in the open water on the lake. Soundings have shown that salts are found as deep as 400 feet in the salt flats.

Three large companies have operated on the brines of the lake and flats, and many filings have been made which may be developed by additional companies. The first operation in the basin was for the manufacture of salt. The production of potash began in 1916. Through the nearly saturated brines containing principally sodium salts ti is possible to seperat ethe potash. The processes include pumping from the lake, well or sump, as the case may be; and the separation of compounds at different densities and temperatures.

The Utah Chemical Company, on a branch of the Salt Lake Route running to Saltair, produces by-product potash in the manufacture of salt. Lake City, on the Western Pacific

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